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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	EL01.0088US
	Application Number	
Title of Invention	Carrier, Carrier Leadframe, And Light Emitting Device	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
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☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

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All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

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IKEA Supply AG
Exhibit 1002 Page 1 of 519

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Customer Number	13859		
Email Address	pto@haniplaw.com	Add Email	Remove Email

Application Information:

Title of the Invention	Carrier, Carrier Leadframe, And Light Emitting Device		
Attorney Docket Number	EL01.0088US	**Small Entity Status Claimed**	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	28	**Suggested Figure for Publication (if any)**	4

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)
☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

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This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.

Prior Application Status			Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)

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Application Number	Country [i]	Filing Date (YYYY-MM-DD)	Access Code [i] (if applicable)
103118060	TW	2014-05-23	

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Application Number	Country [i]	Filing Date (YYYY-MM-DD)	Access Code [i] (if applicable)
104103527	TW	2015-02-03	

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Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

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If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the instant patent application is filed access to the instant patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the instant patent application is filed to have access to the instant patent application.

In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the instant patent application with respect to: 1) the instant patent application-as-filed; 2) any foreign application to which the instant patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the instant patent application; and 3) any U.S. application-as-filed from which benefit is sought in the instant patent application.

In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date of filing this Authorization.

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Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1 Remove

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

◉ Assignee	○ Legal Representative under 35 U.S.C. 117	○ Joint Inventor
○ Person to whom the inventor is obligated to assign.	○ Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor :

If the Applicant is an Organization check here. ☒

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Phone Number		Fax Number	

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	Application Number	
Title of Invention	Carrier, Carrier Leadframe, And Light Emitting Device	

Email Address	

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Signature	/Andy M. Han, Reg. No. 60,266/			Date (YYYY-MM-DD)	2015-05-22
First Name	Andy M.	Last Name	Han	Registration Number	60266

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3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

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7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

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CARRIER, CARRIER LEADFRAME, AND LIGHT EMITTING DEVICE

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the priority benefit of Taiwan Patent Application No. 103118060, filed on May 23, 2014, and Taiwan Patent Application No. 104103527, filed on February 03, 2015, both of which are incorporated herein by reference in their entirety.

TECHNICAL FIELD

[0002] The present disclosure relates to a carrier leadframe and a light emitting device made from the carrier leadframe. More particularly, the present disclosure relates to a carrier leadframe for receiving a light emitting diode (LED) chip and a light emitting device made from the leadframe.

BACKGROUND

[0003] Unless otherwise indicated herein, approaches described in this section are not prior art to the claims listed below and are not admitted to be prior art by inclusion in this section.

[0004] Light emitting diodes (LEDs) have such advantages as a long service life, a small volume, high resistance to shock, low heat generation and low power consumption, so they have been widely used as indicators or light sources in household appliances and various other appliances. In recent years, LEDs have developed towards multicolor and high brightness, so applications thereof have been extended to large-sized outdoor signboards, traffic signal lamps and related fields. In the future, it is even possible that the LEDs become mainstream illumination light sources having both power-saving

and environmental protection functions. To impart the LEDs with good reliability, most of the LEDs are subjected to a packaging process to form durable light emitting devices.

[0005] In recent years, a dicing-type carrier leadframe has been developed by manufacturers in the art to which the present disclosure belongs. Specifically, a plastic body is molded on a metal sheet material, then a die bonding process, a wire bonding process and an encapsulation process are performed, and then the metal sheet material and the plastic body are diced away simultaneously to form individual light emitting devices that are separate from each other. However, a large amount of plastic and metal dusts tend to be produced during the dicing process, which seriously pollute the surfaces of the final products and thus degrade the reliability of the products. Additionally, this process does not allow for a light-on test prior to the encapsulation process, and measurements can only be made after the products are singulated. However, the final products that have been singulated are piled randomly, and machine measurements on them can only be made after surface orientation and direction adjustment. This requires use of additional instruments and is time consuming.

SUMMARY

[0006] The following summary is for illustrative purpose only and is not intended to be limiting in any way. That is, the following summary is provided to introduce concepts, highlights, benefits and advantages of the novel and non-obvious techniques described herein. Select implementations are further described below in the detailed description. Thus, the following summary is

not intended to identify essential features of the claimed subject matter, nor is it intended for use in determining the scope of the claimed subject matter.

[0007] In view of the aforesaid problems, the present invention provides a carrier and a carrier leadframe, which has at least one carrier that is separated in advance and mechanically engaged with the leadframe, thereby facilitating quick release of material after die bonding, wire bonding and encapsulation. Besides, in the carrier leadframe of the present invention, each carrier is electrically isolated from other carriers, so after LEDs are die bonded and wire bonded to the carriers, the electric measurement can be performed before the release of material. Furthermore, a light emitting device made from the carrier leadframe is also provided in the present invention, and with the advantages of the aforesaid carrier leadframe, the production speed and yield of the light emitting device can be greatly improved.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] The accompanying drawings are included to provide a further understanding of the disclosure, and are incorporated in and constitute a part of the present disclosure. The drawings illustrate implementations of the disclosure and, together with the description, serve to explain the principles of the disclosure. It is appreciable that the drawings are not necessarily in scale as some components may be shown to be out of proportion than the size in actual implementation in order to clearly illustrate the concept of the present disclosure.

[0009] FIG. 1 is a partial schematic view of an embodiment of a carrier leadframe according to the present disclosure.

[0010] FIG. 2 is a partial schematic view of a conductive sheet used in the carrier leadframe of FIG. 1.

[0011] FIG. 3 is a partial schematic view of the carrier leadframe of FIG. 1 after a plastic body is formed.

[0012] FIG. 4 and FIG. 4A are partial schematic views of the carrier leadframe of FIG. 1 after the residual material is removed.

[0013] FIG. 5 is a partial schematic view of another embodiment of the carrier leadframe according to the present disclosure.

[0014] FIG. 6 is a top view of a light emitting device according to an embodiment of the present disclosure.

[0015] FIG. 7 is a top view of a light emitting device according to another embodiment of the present disclosure.

[0016] FIG. 8 is a top view of a light emitting device according to a further embodiment of the present disclosure.

[0017] FIG. 9 is a top view of a light emitting device according to yet another embodiment of the present disclosure.

[0018] FIG. 10 is a top view of a light emitting device according to yet a further embodiment of the present disclosure.

[0019] FIG. 11 is a top view of a light emitting device according to still another embodiment of the present disclosure.

[0020] FIG. 12A to FIG. 12D are respectively a top view, a cross-sectional view taken along the front-to-back direction, a cross-sectional view taken along the left-to-right direction, and a partially enlarged view of a carrier leadframe according to an embodiment of the present disclosure.

[0021] FIG. 13A to FIG. 16 are schematic views illustrating steps of a method for manufacturing a carrier leadframe according to an embodiment of the present disclosure.

[0022] FIG. 17A to FIG. 17D are respectively a top view, a cross-sectional view taken along the front-to-back direction, a cross-sectional view taken along the left-to-right direction, and a partially enlarged view of a carrier leadframe according to an embodiment of the present disclosure.

[0023] FIG. 18A to FIG. 22 are schematic views illustrating steps of a method for manufacturing a carrier leadframe according to an embodiment of the present disclosure.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0024] A carrier leadframe of the present invention comprises a frame body and a carrier, and the carrier includes a housing and at least one electrode portion. In the present invention, the frame body includes at least one supporting portion and is mechanically engaged with the carrier so that the carrier is supported on the frame body. In a specific embodiment of the present invention, the housing may have a concave portion mating with the supporting portion, and the carrier is supported on the frame body through the engagement between the supporting portion and the concave portion. The position of the concave portion is not particularly limited in the present invention, and the concave portion may be located at a side surface or at the border between a bottom surface and the side surface of the carrier. The supporting portion goes deep into the carrier or is only positioned on the bottom surface of the carrier with a half thereof being exposed outside.

[0025] FIG. 1 is a partial schematic view of an embodiment of a carrier leadframe according to the present disclosure. As shown in FIG. 1, a carrier leadframe 100 comprises a carrier 110 and a frame body 120, and the carrier 110 comprises a housing 111 and two electrode portions 112. The frame body 120 comprises a plurality of supporting portions 121. As shown in FIG. 1, the frame body 120 beneath the carrier leadframe 100 comprises four supporting portions 121, and four concave portions are formed at the border between the side surfaces and the bottom surface of the housing 111 (corresponding to positions of the supporting portions 121) so that each of the four supporting portions 121 is positioned on the bottom surface of the carrier 110 with a half thereof being exposed outside. In an embodiment, the carrier 110 further comprises a reflection concave cup to expose a part of each of the electrode portions 112. The electrode portion 112 extends outwardly from the reflection concave cup through the housing 111 to the outside.

[0026] The frame body 120 may also have a runner area 122 and a side portion 123, and the runner area 122 is disposed on the side portion 123. The runner area 122 is a through area that allows a plastic body 150 (as shown in FIG. 3) to be described later to flow therethrough, and the supporting portion 121 is disposed also on the side portion 123.

[0027] Additionally, each of the electrode portions 112 may also be formed with pinholes, grooves (linear slits on the surface of the electrode portion) and steps in the present disclosure. The mechanical binding force between the housing and the electrode portion of the carrier can be increased due to the pinholes, the grooves and the steps. As shown in FIG. 1, each of the two electrode portions 112 in the carrier 110 comprises two pinholes 141 and three grooves

143, and steps 142 are provided on edges of the two electrode portions 112 that are surrounded by the housing 111, thereby increasing the binding strength between the housing 111 and the electrode portions 112.

[0028] Each carrier in the carrier leadframe of the present disclosure is supported on the frame body via the mechanical engagement between the concave portion and the supporting portion, and the electrode portions of different carriers are electrically isolated from each other. Thus, after the die bonding process, the wire bonding process and the encapsulation process subsequently performed on the light emitting devices, the electric measurement can be made on the light emitting devices that have not been singulated (i.e., the light emitting devices that are still supported on the frame body in a regular way). Since the light emitting devices are arranged regularly, equipment and time required for surface orientation and direction adjustment are eliminated and the production speed of the light emitting devices can be greatly improved.

[0029] The carrier leadframe of the present disclosure may be manufactured in the following way. First, a conductive sheet is provided. The conductive sheet comprises a frame body, at least one void area and at least one extending portion, and the frame body comprises at least one supporting portion. Then, a plastic body is formed on the conductive sheet to cover at least a part of the extending portion and at least a part of the supporting portion and to fill at least a part of the void area. Subsequently, the part of the extending portion exposed outside the housing and a part of the plastic body filled within the void area are respectively removed so as to form the carrier. In particular, after the two removing steps, the housing of the carrier is formed by the remaining plastic

body, and the electrode portion of the carrier is formed by the extending portion remaining on the plastic body.

[0030] Hereinafter, the manufacturing process of the carrier leadframe 100 of FIG. 1 will be detailed with reference to FIG. 2 to FIG. 4. First, a conductive sheet 160 as shown in FIG. 2 is provided. The conductive sheet 160 comprises a frame body 120, a plurality of void areas 130 and a plurality of extending portions 140. The frame body 120 also comprises a plurality of supporting portions 121, and each of the extending portions 140 comprises a plurality of pinholes 141, grooves 143 and steps 142. Finally, the part of each of the extending portions 140 exposed outside the housing is removed to form the carrier leadframe 100 of FIG. 1.

[0031] In the present disclosure, the conductive sheet may be made of a metal sheet, including a pure metal sheet, an alloy sheet, and a metal composite sheet, and the composite sheet is preferably a metal sheet cladded with a conductive layer having a relatively high resistance to oxidation or a relatively high solder binding force (e.g., a silver-plated copper sheet, or the like). The frame body, the extending portion and the void portion are formed in an appropriate way. When the conductive sheet is made of a metal sheet, the frame body, the extending portion and the void portion may be preferably formed through a stamping process; however, they may also be formed through a dicing process or a mold casting process. Moreover, if the conductive sheet has insufficient conductivity, a conductive layer (not shown) may be formed on the conductive sheet after the conductive sheet is provided (the conductivity of the conductive layer is higher than that of the conductive sheet) so as to

increase the reliability of the subsequent test. The material of the conductive layer may include materials having high conductivity (e.g., silver, or the like).

[0032] After the conductive sheet is provided, a plastic body is then formed on the conductive sheet. The way in which the plastic body is formed is not limited. For Example, the plastic body may be formed through transfer molding, injection molding, etc. The material of the plastic body is not limited. For example, it may be selected from plastic materials commonly used in this industry, e.g., epoxy compositions, silicon compositions, polyphthalamide compositions, or polyethylene terephthalate compositions. In a specific embodiment of the present disclosure, the plastic body is made of an epoxy composition through transfer molding. In another embodiment, the plastic body may be a thermosetting material and may further comprise a reflective material, e.g., titanium dioxide (TiO2), zinc oxide (ZnO) or boron nitride (BN).

[0033] Next, a plastic body 150 is formed on the conductive sheet 160 as shown in FIG. 3. The plastic body 150 covers a part of each of the extending portions 140 and completely covers all of the pinholes 141 and grooves 143. The plastic body 150 also fills a part of the void area 130 (the part of the void area 130 above and below the extending portion 140 is not filled) and completely covers all of the supporting portions 121. The plastic body 150 also fills the runner area 122 and is formed integrally with another adjacent plastic body 150.

[0034] Further speaking, during the formation of the plastic body 150 in the present disclosure, the material of the plastic body 150 will fill the mold cavity of the mold and the void area. In this step, the housing 111 and the residual material 151 are still held together. The scope of the residual material 151 is defined depending on the subsequent application of the product. As shown in

FIG. 3, what denoted by dotted lines is the residual material 151 defined in this embodiment. Thereafter, the defined residual material 151 is removed as shown in FIG. 4, thereby forming the housing 111 of the carrier 110.

[0035] If the runner area 122 is filled with the plastic body 150, the residual material 151 may be removed in at least two steps, e.g., by firstly removing the residual material 151 filled in the runner area 122 and then removing the residual material 151 filled in the void area 130 or vice versa. This can simplify the arrangement of knives for removing the residual material 151 in each step so that the knives have sufficient distances therebetween and desirable strength.

[0036] Finally, the part of each of the extending portions 140 exposed outside the housing 111 is removed to form the carrier leadframe 100 as shown in FIG. 1. Before the part of each of the extending portions 140 is removed, the part of the frame body 120 at two sides of the runner area 122 may be removed optionally with a knife of a length larger than that of the runner area 122 so as to thoroughly remove the residual material 151 possibly left in the runner area 122; thus, the damage to the electrode portions 112 or the light emitting diode (LED) chips can be avoided by preventing the residual material 151 from falling off onto the electrode portions 112 or the LED chips. After the part of the frame body 120 at the two sides of the runner area 122 is removed, the length of the runner area 122 is increased as shown in FIG. 4B.

[0037] Therefore, the manufacturing method of this embodiment may optionally perform two or more removing steps on the conductive sheet 160 and may also perform two or more removing steps on the plastic body 150 (the residual material 151).

[0038] In the present disclosure, the residual material 151 and parts of the extending portions 140 are removed separately. In particular, the order in which the residual material 151 and the parts of the extending portions 140 are removed is not particularly limited as long as they are separately removed. For example, it may be that all the parts of the extending portions 140 are simultaneously removed after all the residual material 151 is simultaneously removed, or all the residual material 151 is removed after all the parts of the extending portions 140 are simultaneously removed, or part of the residual material 151 and parts of the extending portions 140 are removed alternately in different stages. The way in which the removing steps are performed is not limited, and the removing steps may be accomplished for example through a dicing process or a stamping process but preferably be accomplished through the stamping process. The stamping process is taken as an example in the embodiments of the present disclosure.

[0039] The tools and the working strength can be adjusted depending on the mechanical properties of the parts to be removed in the present disclosure. In particular, the respective removing steps can avoid drawbacks resulting from removing different materials simultaneously, e.g., plane defects or damage to the removing tools (knives) due to non-uniform stresses. Additionally, dusts of the plastic body tend to be produced during the removal of the plastic body as compared to the removal of the extending portion. The dusts can only be removed by a strong external force, e.g., through strong air blowing, shaking, or ultrasonic waves. If the cleaning step is to be performed after the residual material and the extending portion are simultaneously removed, it is possible that the bonding force between the carrier and the frame body is insufficient to

avoid falling off of the material. Thus, in the present disclosure, the cleaning step (i.e., the cleaning of the plastic body) is preferably performed after the residual material is removed and before the extending portion is removed. This can enhance the connection strength between the carrier and the leadframe by means of the extending portion so as to avoid falling off of the material during the cleaning step, and finally the extending portion is removed.

[0040] After the removing steps, at least one electrode portion cross section will be formed on the electrode portion of the carrier, and a housing cross section will be formed by the residual material on the housing of the carrier. In the present disclosure, the electrode portion cross section and the housing cross section may be located on a same surface or different surfaces of the carrier depending on the safety specification of the final product or depending on the customer requirements. Further speaking, when the electrode portion cross section and the housing cross section are located on the same surface of the carrier, the electrode portion cross section and the housing cross section may be level with each other (i.e., form a flat surface) or may not be level with each other (i.e., do not form a flat surface).

[0041] As shown in FIG. 1, the electrode portion 112 has a wing portion 112A exposed outside the housing, and the wing portion 112A comprises a central protruding area (or called central area) 112A1 and two outer edge areas (or called edge areas) 112A2. In the embodiment of FIG. 1, each of the edge areas 112A2 comprises an electrode portion cross section, and the electrode portion cross sections are level with a part of the housing cross section 111A of the housing 111; and in this case, the carrier has a relatively flat appearance. However, as shown in FIG. 5, the wing portion 112A of the electrode portion

112 comprises a central protruding area 112A1 and two outer edge areas 112A2, and the electrode portion cross section of the electrode portion 112 is not level with the housing cross section 111A of the housing 111; and in this case, the electrode portion 112 has an additional lateral area that can increase the binding force with the solder so as to increase the component bonding strength of the light emitting devices after the subsequent component bonding process.

[0042] Moreover, in case where the conductive sheet is a metal composite sheet with an antioxidant layer, a cross section uncovered with the antioxidant layer will be formed on the electrode portion cross section. In the present disclosure, the cross section uncovered with the antioxidant layer is preferably formed integrally with the central area of the electrode portion. During the subsequent component bonding process, the solder may climb along the side surface of the wing portion and cover the side surface, and in this case, at least a part of the cross section uncovered with the antioxidant layer can be covered by the solder to reduce the probability that the cross section portion is oxidized. Additionally, the cross section uncovered with the antioxidant layer and the surface of the adjacent central area are at the same side, and preferably form a continuous surface so as to reduce sharp points or rough edges of the electrode portion. Otherwise, the sharp points or rough edges would cause wear of the subsequent processing machine, and what is worse, a charge accumulation effect might occur at the sharp points or the rough edges to influence the reliability of the finally product.

[0043] The present disclosure also provides a light emitting device made from the carrier leadframe of the present disclosure, and the light emitting device

comprises a carrier, an LED chip and an encapsulant. The LED chip is carried within the carrier and covered by the encapsulant. The material of the encapsulant in the present disclosure may be a plastic composite of epoxy resins or silicone. Moreover, the light emitting device of the present disclosure may optionally have fluorescent materials added into the encapsulant, and examples of the fluorescent materials include: aluminate fluorescent materials (e.g., doped yttrium aluminum oxide compounds, doped lutetium aluminum oxide compounds, doped terbium aluminum oxide compounds, or combinations thereof), silicate fluorescent materials, sulfide fluorescent materials, oxynitride fluorescent materials, nitride fluorescent materials, fluoride fluorescent materials, or combinations thereof.

[0044] The light emitting device of the present disclosure may be manufactured in the following way. First, a carrier leadframe as described above is provided. Then, an LED chip is provided and die bonded and wire bonded into the reflection concave cup of the carrier. Thereafter, the reflection concave cup is filled with an encapsulant so as to encapsulate the LED chip to form a light emitting device on the frame body. Finally, the light emitting device is separated from the frame body (i.e., the carrier is separated from the frame body for example through extrusion) to form a separate light emitting device.

[0045] A plurality of LED chips may also be provided within the carrier in the present disclosure, and these LED chips can emit lights of the same or different spectrums. After the LED chips are fixed, the wire bonding process may be performed to electrically connect the LED chips with the electrode portion. Other electronic elements, e.g., a Zener diode or a thermistor, may also be provided depending on requirements of the final product.

[0046] Referring to FIG. 6, a top view of a light emitting device according to an embodiment of the present disclosure is shown therein. The wing portion 112A of the electrode portion 112 has a central area 112A1 and two edge areas 112A2, and the central area 112A1 protrudes from the two edge areas 112A2. The wing portion 112A protrudes out of the housing cross section 111A of the housing 111 so that the central area 1112A1 of the wing portion 112A of the electrode portion 112 is not coplanar with the housing cross section 111A of the housing 111. An interval D1 is the distance between the central area of the wing portion 112A of the electrode portion 112 and the inner side of the housing cross section 111A of the housing 111, and the interval D1 is about 0.1 mm. An interval D2 is the distance between the central area 112A1 of the wing portion 112A of the electrode portion 112 and the outer side of the wing portion 112A of the housing 111 (i.e., the central area 112A1 of the wing portion 112A of the electrode portion 112 and the wing portion 112A of the housing 111), and the interval D2 is about 0.05 mm.

[0047] Referring to FIG. 7, a top view of a light emitting device according to another embodiment of the present disclosure is shown therein. The wing portion 112A of the electrode portion 112 has a central area 112A1 and two edge areas 112A2, and the wing portion 112A protrudes out of the housing cross section 111A of the housing 111 so that the wing portion 112A of the electrode portion 112 is not coplanar with the housing cross section 111A of the housing 111. The interval D1 is the distance between the central area of the wing portion 112A of the electrode portion 112 and the inner side of the housing cross section 111A of the housing 111, and the interval D1 is about 0.1 mm. An interval D3 is the distance between the central area 112A1 of the wing

portion 112A of the electrode portion 112 and the outer side of the cross section 111A of the housing 111, and the interval D3 is about 0.075 mm.

[0048] Referring to FIG. 8, a top view of a light emitting device according to a further embodiment of the present disclosure is shown therein. The wing portion 112A of the electrode portion 112 has a central area 112A1 and two edge areas 112A2, the central area 112A1 is recessed from the two edge areas 112A2, and the electrode portion cross sections of the two edge areas 112A2 are sloping surfaces. The wing portion 112A is recessed into the cross section 111A of the housing 111 so that the wing portion 112A of the electrode portion 112 is not coplanar with the cross section 111A of the housing 111. An interval D4 is the distance between the outer side and the inner side of the cross section 111A of the housing 111, and the interval D4 is about 0.05 mm. An interval D5 is the distance between the central area of the wing portion 112A of the electrode portion 112 and the outer side of the cross section 111A of the housing 111, and the interval D5 is about 0.025 mm.

[0049] Referring to FIG. 9, a top view of a light emitting device according to yet another embodiment of the present disclosure is shown therein. The wing portion 112A of the electrode portion 112 has a central area 112A1 and two edge areas 112A2, the central area 112A1 protrudes out of the two edge areas 112A2, and the electrode portion cross sections of the two edge areas 112A2 are sloping surfaces. The wing portion 112A protrudes out of the cross section 111A of the housing 111 so that the wing portion 112A of the electrode portion 112 is not coplanar with the cross section 111A of the housing 111.

[0050] Referring to FIG. 10, a top view of a light emitting device according to yet a further embodiment of the present disclosure is shown therein. The wing

portion 112A of the electrode portion 112 is a convex curved surface, i.e., the external surface of the central area and the outline (the electrode portion cross sections) of the edge areas together form a continuous convex curved surface. The wing portion 112A protrudes out of the cross section 111A of the housing 111 so that the wing portion 112A of the electrode portion 112 is not coplanar with the cross section 111A of the housing 111.

[0051] Referring to FIG. 11, a top view of a light emitting device according to still another embodiment of the present disclosure is shown therein. The wing portion 112A of the electrode portion 112 is a concave curved surface, i.e., the external surface of the central area and the outline (the electrode portion cross sections) of the edge areas together form a continuous concave curved surface. The wing portion 112A is recessed into the cross section 111A of the housing 111 so that the wing portion 112A of the electrode portion 112 is not coplanar with the cross section 111A of the housing 111.

[0052] Referring to FIG. 12A to FIG. 12D, schematic views (i.e., a top view, a cross-sectional view taken along the front-to-back direction, a cross-sectional view taken along the left-to-right direction, and a partially enlarged view) of a carrier leadframe 100' according to an embodiment of the present disclosure are shown therein. The carrier leadframe 100' is similar to the aforesaid carrier leadframe 100. That is, the carrier leadframe 100' also comprises a frame body 120 and a carrier 110, the frame body 120 comprises at least one supporting portion 121, the carrier 110 comprises a housing 111 and at least one electrode portion 112, and the housing 111 is mechanically engaged with the frame body 120 via the supporting portion 121. Thus, for the technical

contents of the aforesaid elements, reference may be made to the counterparts of the carrier leadframe 100.

[0053] Preferably, the at least one electrode 112 may be two electrode portions 112 spaced apart from each other to respectively serve as an anode terminal and a cathode terminal of the carrier 110. The two electrode portions 112 are surrounded by the frame body 120, i.e., the two electrode portions 112 are located within a space surrounded by the frame body 120 itself. The two electrode portions 112 may be separated from the frame body 120 by at least one void area 130 so that the two electrode portions 112 will not make contact with the frame body 120 and thus be electrically isolated from the frame body 120.

[0054] The supporting portion 121 of the frame body 120 extends towards one of the two electrode portions 112, but will not make contact with the electrode portion 112. In this embodiment, there are four supporting portions 121 that are distributed at two sides of the electrode portions 112. The housing 111 may at least cover the supporting portions 121 and at least a part of the two electrode portions 112, and is at least disposed within a part of the void area 130. Thereby, the housing 111 is mechanically engaged with the frame body 120 via the supporting portions 121, and the housing 111 is also mechanically engaged with the two electrode portions 112 so that the housing 111 and the two electrode portions 112 can be held within the frame body 120 without falling off from the frame body 120.

[0055] The shape features of the electrode portions 112 will be further described. Referring to FIG. 13A, each of the two electrode portions 112 has a wing portion 112A and an inner side surface 112B that are disposed opposite

to each other (i.e., disposed oppositely), the wing portion 112A may be exposed outside the housing cross section 111A of the housing 111 (reference may be made to the aforesaid relevant descriptions of FIG. 6 to FIG. 11) and does not face the wing portion 112A of another electrode portion 112. The inner side surfaces 112B of the two electrode portions 112 may face each other, and at least a part of the two electrode portions 112 may be covered by the housing 111.

[0056] Each of the two electrode portions 112 further comprises two connecting surfaces 112C disposed opposite to each other, and each of the connecting surfaces 112C connects the wing portion 112A with the inner side surface 112B. That is, an edge (e.g., a front edge) of the connecting surface 112C connects with an edge (i.e., a left edge) of the wing portion 112A, while another edge (e.g., a back edge) of the connecting surface 112C connects with an edge (i.e., a left edge) of the inner side surface 112B. The wing portion 112A, the inner side surface 112B and the two connecting surfaces 112C may not be flat surfaces. That is, the wing portion 112A, the inner side surface 112B and the two connecting surfaces 112C may be uneven or stepped surfaces.

[0057] Each of the two electrode portions 112 may further comprise at least one recess 1121, and the recess 1121 may be disposed on the connecting surface 112C so that the connecting surface 112C becomes an uneven surface. The recess 1121 can increase the contact area between the electrode portion 112 and the housing 111 (the plastic body 150) and strengthen the fastening effect between the electrode portion 112 and the housing 111 by virtue of the corresponding geometric relationships so that the binding force between the electrode portion 112 and the housing 111 is relatively strong. If there are a

plurality of recesses 1121, the recesses 1121 may be sized differently according to different binding forces required at different positions between the electrode portion 112 and the housing 111.

[0058] The wing portion 112A, the inner side surface 112B and the two connecting surfaces 112C of the two electrode portions 112 may have the at least one void area 130 divided into a plurality of void areas 130, namely a gap 131, two first through grooves 132 and two second through grooves 133 in communication with each other. The gap 131 is disposed between the inner side surfaces 112B of the two electrode portions 112, and the two first through grooves 132 are disposed along the two connecting surfaces 112C of the two electrode portions 112. That is, one of the first through grooves 132 extends from an edge of one connecting surface 112C of one electrode portion 112 to an edge of one connecting surface 112C, which faces the same direction, of the other electrode portion 112. The two first through grooves 132 are spaced apart from each other.

[0059] The two second through grooves 133 are disposed along the wing portions 112A of the two electrode portions 112. That is, each of the second through grooves 133 extends only along the wing portion 112A of one of the electrode portions 112. The two second through grooves 133 are also spaced apart from each other.

[0060] The supporting portion 121 of the frame body 120 may extend towards one of the two connecting surfaces 112C of the two electrode portions 112 into one of the two first through grooves 132. The housing 111 may be optionally disposed within the two first through grooves 132 and/or the gap 131. Additionally, the housing cross section 111A of the housing 111 may at least

comprise a curved surface, e.g., may have a rounded corner 111R as shown in FIG. 12D. The housing cross section of the housing 111 has the rounded corner that is connected to the electrode portion cross section 112A2 of the electrode portion 112. The rounded corner 111R can disperse the impact force so that the rounded corner 111R is unlikely to be broken or cracked by the impact force during a vibration test of the singulated carrier 110. Moreover, in the embodiment as shown in FIG. 12D, the housing cross section and the electrode portion cross section do not form a flat surface, i.e., the housing cross section is not level with the electrode portion cross section.

[0061] According to the above descriptions, the carrier leadframe 100' can also allow the electrode portions 112 of the carriers 110 to be electrically isolated from each other. Thus, after the die bonding process, the wire bonding process and the encapsulation process are subsequently performed on the light emitting devices, the electric measurement can be directly performed on the light emitting devices that are not singulated, and this greatly improves the production speed of the light emitting devices. It shall be further appreciated that, the technical contents of the carrier leadframe 100' may also be used as a reference for the carrier leadframe 100.

[0062] An embodiment of the present disclosure further provides a method for manufacturing a carrier leadframe, which can at least manufacture the aforesaid carrier leadframe 100'. The method for manufacturing the carrier leadframe 100' is similar to the method for manufacturing the aforesaid carrier leadframe 100 and comprises the following steps.

[0063] Referring to FIG. 13A to FIG. 13C, first a conductive sheet 160 is provided. The conductive sheet 160 comprises a frame body 120, and the

frame body 120 comprises at least one supporting portion 121, at least one void area 130 and at least one extending portion 140. The at least one void area 130 may correspond to a gap 131, two first through grooves 132 and two second through grooves 133 of the carrier leadframe 100', but at this point, the two first through grooves 132 are not in communication with the two second through grooves 133 yet. The at least one extending portion 140 may correspond to the two electrode portions 112 of the carrier leadframe 100', but at this point, the two electrode portions 112 have not been separated from the frame body 120 yet.

[0064] Referring to FIG. 14, then a plastic body 150 is formed in a second step. The plastic body 150 covers at least a part of the extending portion 140 and at least a part of the supporting portion 121, and the plastic body 150 fills at least a part of the void area 130. For example, the plastic body 150 covers a part of the two electrode portions 112 of the extending portion 140 and completely covers the supporting portion 121, and the plastic body 150 fills the gap 131 and the two first through grooves 132 of the void area 130 but does not fill the second through grooves 133 of the void area 130. Furthermore, the plastic body 150 may make contact with the recess 1121 (as shown in FIG. 13A) of the extending portion 140 so as to increase the contact area between the plastic body 150 and the extending portion 140.

[0065] Referring to FIG. 15, part of the plastic body 150 filled in the void area 130 is removed in a third step. That is, part of the plastic body 150 filled in the two first through grooves 132 is removed. The plastic body 150 to be removed is called the residual material 151 (as shown in FIG. 14), and the scope of the residual material 151 is defined depending on the specific shape of the product.

In this embodiment, the plastic body 150 filled in two end areas of the two first through grooves 132 is removed so that convex corners at four corners of the plastic body 150 are removed. The remaining plastic body 150 forms the housing 111 of the carrier leadframe 100'.

[0066] Referring to FIG. 16, the part of the extending portion 140 exposed outside the plastic body 150 is removed in a fourth step so that the remaining extending portion 140 is separated from the frame body 120. In other words, the part of the extending portion 140 at two sides of the second through groove 133 (as shown in FIG. 15) will be removed in this step so that the second through groove 133 is in communication with the first through groove 132. The remaining extending portion 140 forms the electrode portions 112 of the carrier leadframe 100'.

[0067] After the aforesaid steps, the carrier leadframe 100' is formed. For detailed technical contents of the aforesaid steps, reference may be made to the method for manufacturing the carrier leadframe 100. For example, a conductive layer may be firstly formed on the conductive sheet 160, the third step and the fourth step may be swapped with each other, and the plastic body 150 may be cleaned before the fourth step.

[0068] Referring to FIG. 17A to FIG. 17D, schematic views (i.e., a top view, a cross-sectional view taken along the front-to-back direction, a cross-sectional view taken along the left-to-right direction, and a partially enlarged view) of a carrier leadframe 100'' according to an embodiment of the present disclosure are shown therein, where more than one carrier leadframe 100'' are shown.

[0069] The carrier leadframe 100'' is similar to the aforesaid carrier leadframes 100 and 100', so reference may be made to each other for the technical

contents of the carrier leadframes 100'', 100, and 100'. However, it shall be appreciated that, the frame body 120 of the carrier leadframe 100'' has a side portion 123 and a runner area 122, and the side portion 123 may be commonly owned by the leadframes 120 of two carrier leadframes 100''. In other words, the frame body 120 of the two carrier leadframes 100'' may be formed integrally via the commonly owned side portion 123. Moreover, the carriers 110 of the two carrier leadframes 100'' are separated from each other by the side portion 123. The runner area 122 is disposed in the side portion 123 and is in communication with one of the two first through grooves 132 of each carrier leadframe 100''. It shall be further appreciated that, the housing cross section 111A of the housing 111 may at least comprise a curved surface, e.g., may have a rounded corner 111R, and the rounded corner 111R is connected to the side portion 123 of the frame body 120. Additionally, the electrode portion cross section of the electrode portion 112 may also at least comprise a curved surface, and the aforesaid curved surfaces are not limited to a single curvature. That is, the outline of the edge areas of the electrode portion 112 is a curved line. The electrode portion cross section is not adjacent to the rounded corner 111R. The impact force can be dispersed due to the curved cross section. Meanwhile, in the embodiment as shown in FIG. 17D, the housing cross section and the electrode portion cross section do not form a flat surface, i.e., the housing cross section is not level with the electrode portion cross section.

[0070] In terms of the effect, the carrier leadframe 100'' can also allow the electrode portions 112 of the carriers 110 to be electrically isolated from each other. Thus, after the die bonding process, the wire bonding process and the encapsulation process are subsequently performed on the light emitting

devices, the electric measurement can be directly performed on the light emitting devices that are not singulated, and this greatly improves the production speed of the light emitting devices.

[0071] An embodiment of the present disclosure further provides a method for manufacturing a carrier leadframe, which can at least manufacture the aforesaid carrier leadframe 100''. The method for manufacturing the carrier leadframe 100'' is similar to the method for manufacturing the carrier leadframe 100', so identical descriptions will be omitted or simplified. The method for manufacturing the carrier leadframe 100'' may comprise the following steps.

[0072] Referring to FIG. 18A to FIG. 18C, first a conductive sheet 160 is provided. Two conductive sheets 160 are provided in this embodiment as an example. Each of the conductive sheets 160 comprises at least one frame body 120, and the frame body 120 comprises at least one supporting portion 121, at least one side portion 123, at least one runner area 122, at least one void area 130 and at least one extending portion 140. The runner area 122 is disposed on the side portion 123 and is in communication with the void area 130.

[0073] Referring to FIG. 19, then a plastic body 150 is formed in a second step. The plastic body 150 covers at least a part of the extending portion 140 and at least a part of the supporting portion 121 of each conductive sheet 160, and the plastic body 150 fills at least a part of the void area 130. The plastic body 150 also fills the runner area 122; that is, the plastic body 150 passes through the runner area 122 to cover another conductive sheet 160. Moreover, the plastic body 150 makes contact with the recess 1121 (as shown in FIG. 18A) of the

extending portion 140 to increase the contact area between the plastic body 150 and the extending portion 140.

[0074] Referring to FIG. 20, the plastic body 150 within the runner area 122 is removed in a third step. The plastic body 150 can be removed in one step or in several steps. Specifically, if the plastic body 150 is to be removed in one step, then a knife of a length larger than that of the runner area 122 will be used to remove the part of the frame body 120 at the two sides of the runner area 122 as well as the plastic body 150 within the runner area 122 together. Thus, after the plastic body 150 within the runner area 122 is removed, the runner area 122 will be slightly elongated.

[0075] If the plastic body 150 is to be removed in several steps, then first a knife of a length slightly smaller than that of the runner area 122 will be used to remove part of the plastic body 150 within the runner area 122, and then another knife is used to scrape off the remaining plastic body 150 within the runner area 122.

[0076] Referring to FIG. 21, part of the plastic body 150 filled within the void area 130 is removed in a fourth step. That is, part of the plastic body 150 filled within the two first through grooves 132 (e.g., the residual material 151 at the four corners as shown in FIG. 20) is removed. After the third and the fourth steps, the remaining plastic body 150 that is not removed forms the housing 111 of the carrier leadframe 100''.

[0077] Referring to FIG. 22, the part of the extending portion 140 exposed outside the plastic body 150 (as shown in FIG. 21) is removed in a fifth step so that the remaining extending portion 140 is separated from the frame body 120. In other words, the part of the extending portion 140 at the two sides of the

second through groove 133 will be removed in this step so that the second through groove 133 is in communication with the first through groove 132. The remaining extending portion 140 forms the electrode portions 112 of the carrier leadframe 100''.

[0078] After the aforesaid steps, the carrier leadframe 100'' is formed. It shall be noted that, the order in which the third step to the fifth step are executed is not limited, but can be swapped with each other.

[0079] The above description is related to the detailed technical contents and inventive features thereof. People skilled in this field may proceed with a variety of modifications and replacements based on the description and suggestions of the present disclosure as described without departing from the characteristics thereof. Nevertheless, although such modifications and replacements are not fully disclosed in the above descriptions, they have substantially been covered in the following claims as appended.

CLAIMS

What is claimed is:

1. A carrier, comprising:

one or more electrode portions, each of the one or more electrode portions comprising an electrode portion cross section; and

a housing comprising a housing cross section and at least partially covering the one or more electrode portions,

wherein the housing cross section or the electrode portion cross section of at least one electrode portion of the one or more electrode portions comprises at least one curved surface.

2. The carrier of Claim 1, wherein the at least one electrode portion has a central area and two edge areas, and wherein the electrode portion cross section of the at least one electrode portion is located on at least one of the edge areas.

3. The carrier of Claim 1, wherein the housing cross section has a rounded corner.

4. The carrier of Claim 3, wherein the rounded corner is connected to the housing cross section.

5. The carrier of Claim 2, wherein the housing cross section is not coplanar with the central area.

6. A carrier, comprising:

one or more electrode portions, each of the one or more electrode portions comprising an electrode portion cross section; and

a housing comprising a housing cross section and at least partially covering the at least one electrode portion,

wherein the housing cross section is not level with the electrode portion cross section of at least one electrode portion of the one or more electrode portions.

7. The carrier of Claim 6, wherein the at least one electrode portion has a central area and two edge areas on two opposing sides of the central area, and wherein the electrode portion cross section of the at least one electrode portion is located on at least one of the edge areas.

8. The carrier of Claim 7, wherein the central area protrudes from the edge areas.

9. The carrier of Claim 7, wherein the electrode portion cross section of the at least one electrode portion comprises a sloping surface.

10. The carrier of Claim 7, wherein the housing cross section is not coplanar with the central area.

ABSTRACT

A carrier leadframe, including a frame body and a carrier, is provided. The frame body includes at least one supporting portion, and the carrier includes a shell and at least one electrode portion and is mechanically engaged with the frame body via the supporting portion. A method for manufacturing the carrier leadframe as described above, as well as a light emitting device made from the carrier leadframe and a method for manufacturing the device, are also provided. The carrier leadframe has carriers that are separate in advance and mechanically engaged with the frame body, thereby facilitating the quick release of material after encapsulation. Besides, in the carrier leadframe as provided, each carrier is electrically isolated from another carrier, so the electric measurement can be performed before the release of material. Therefore, the speed and yield of production of the light emitting device made from the carrier leadframe is improved.

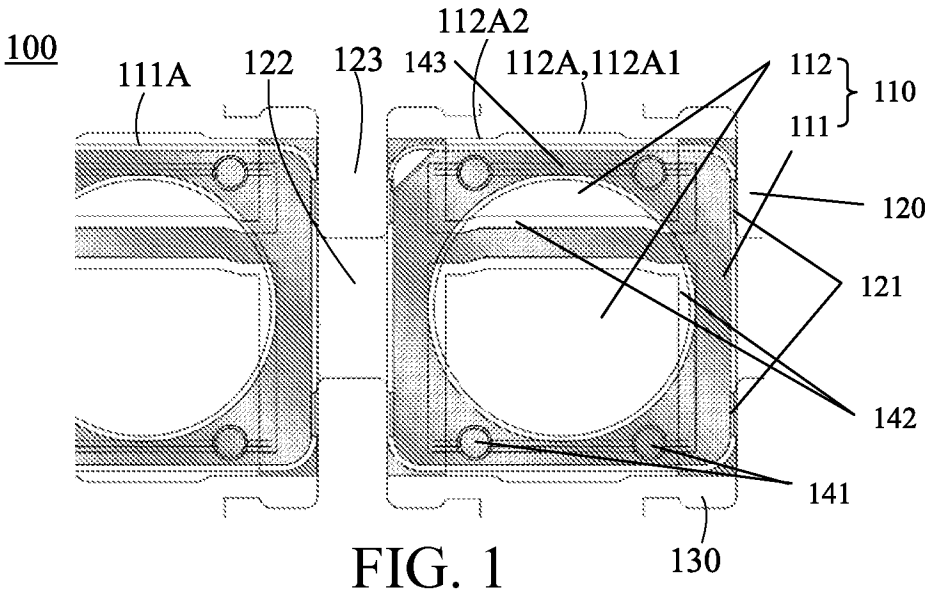

100
111A
122
123
143
112A2
112A,112A1
112
110
111
120
121
142
141
130

FIG. 1

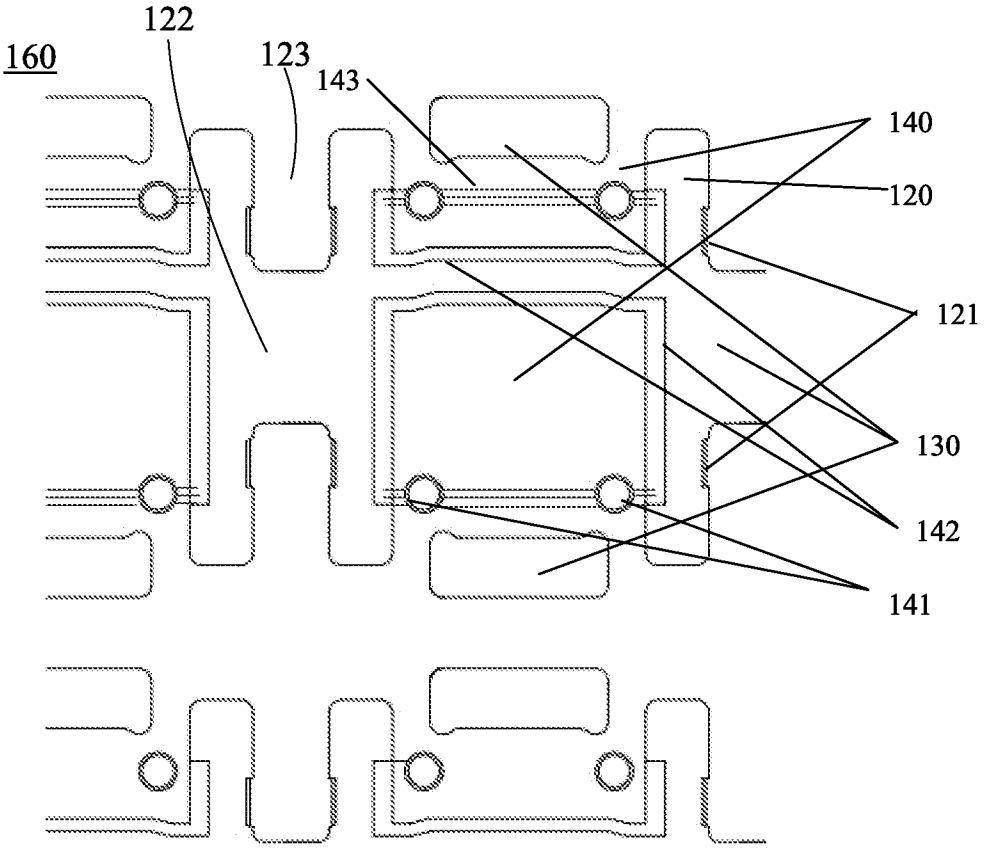

160
122
123
143
140
120
121
130
142
141

FIG. 2

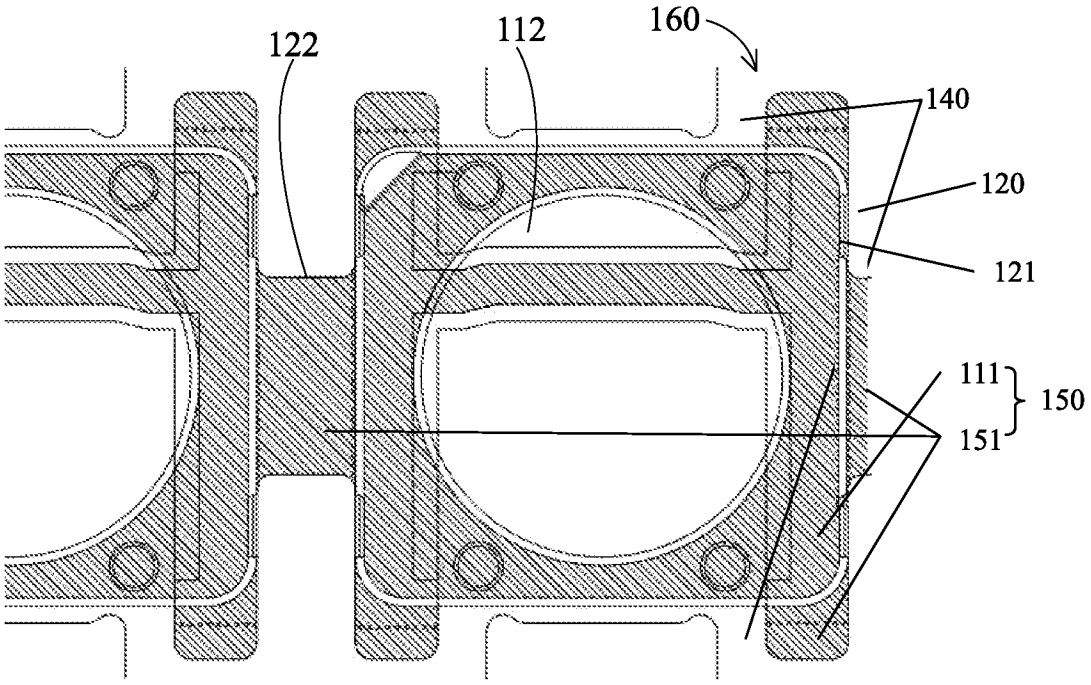


FIG. 3

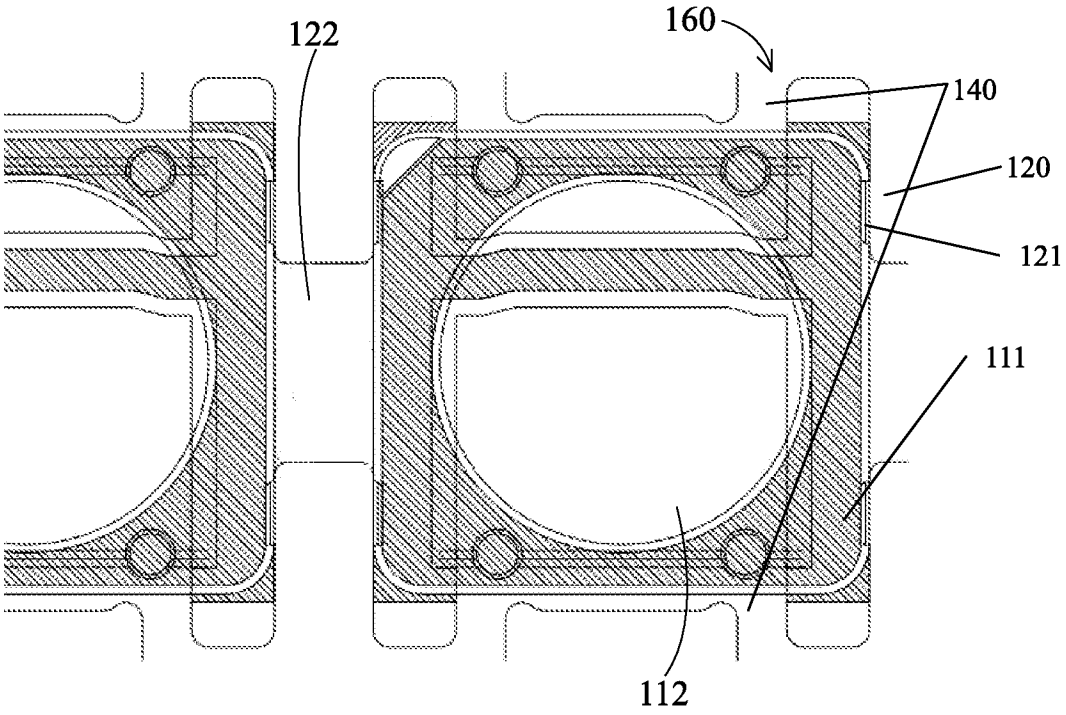


FIG. 4

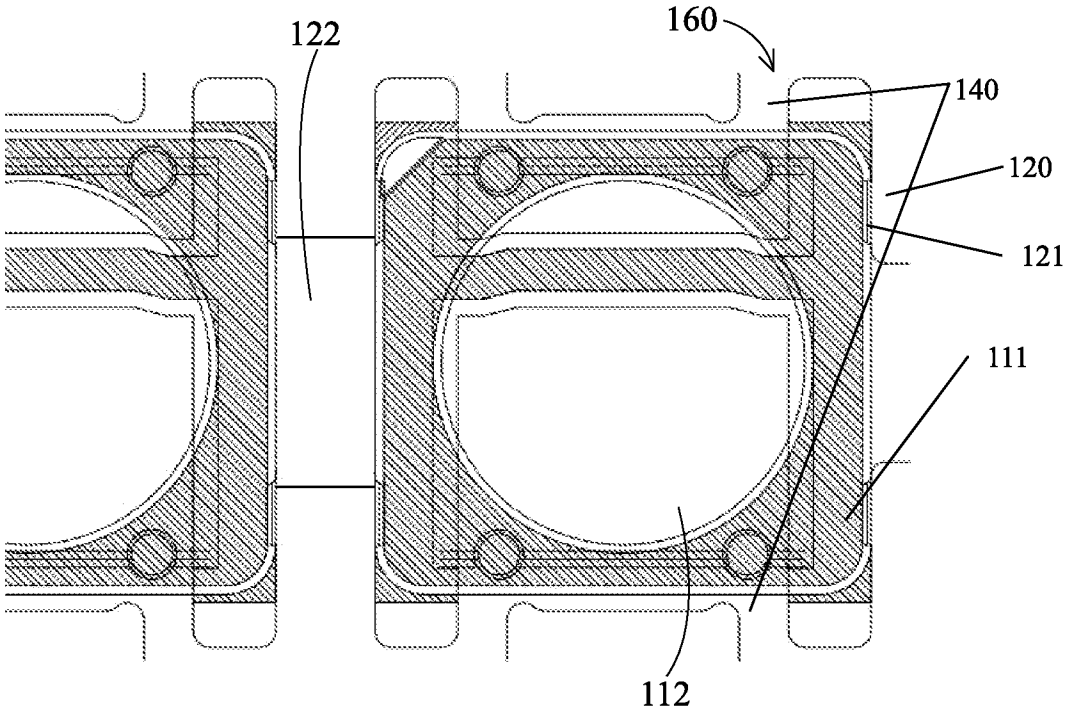


FIG. 4A

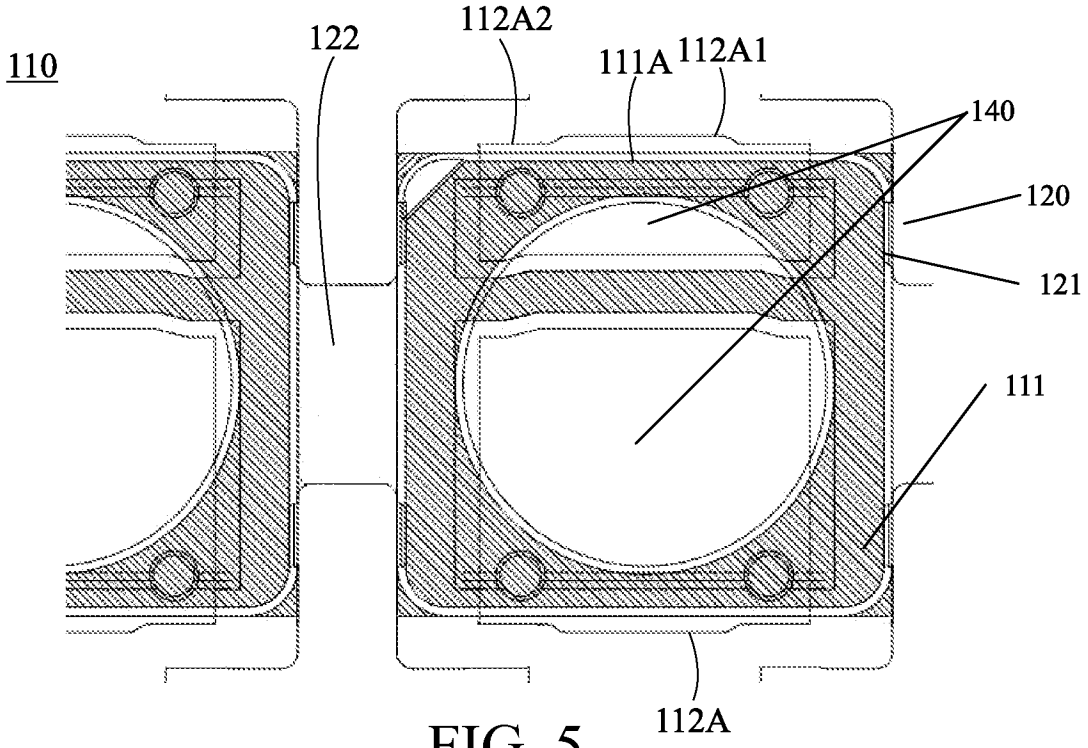

110
122
112A2
111A
112A1
140
120
121
111
112A

FIG. 5

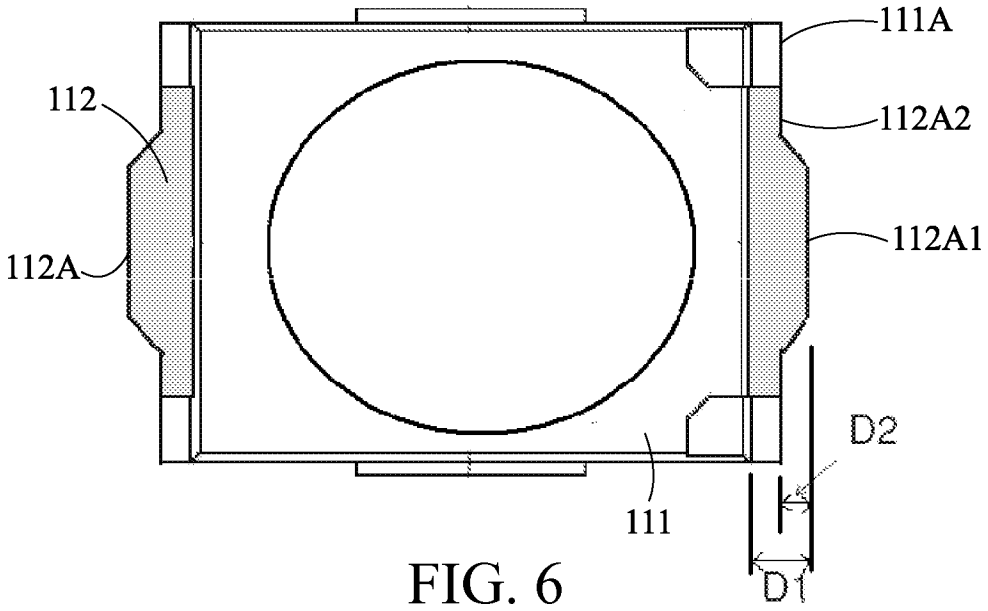

111A
112
112A2
112A1
112A
D2
111
D1

FIG. 6

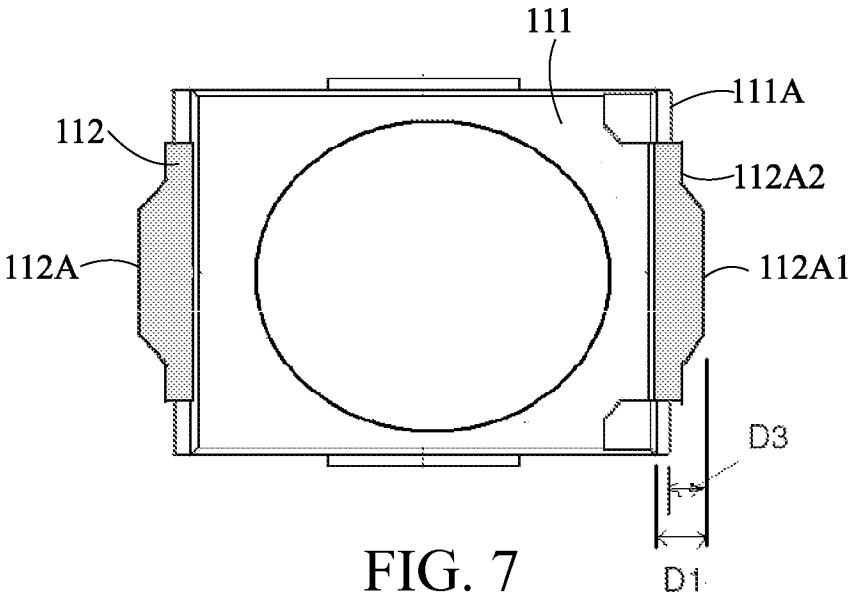

111
111A
112
112A2
112A
112A1
D3
D1

FIG. 7

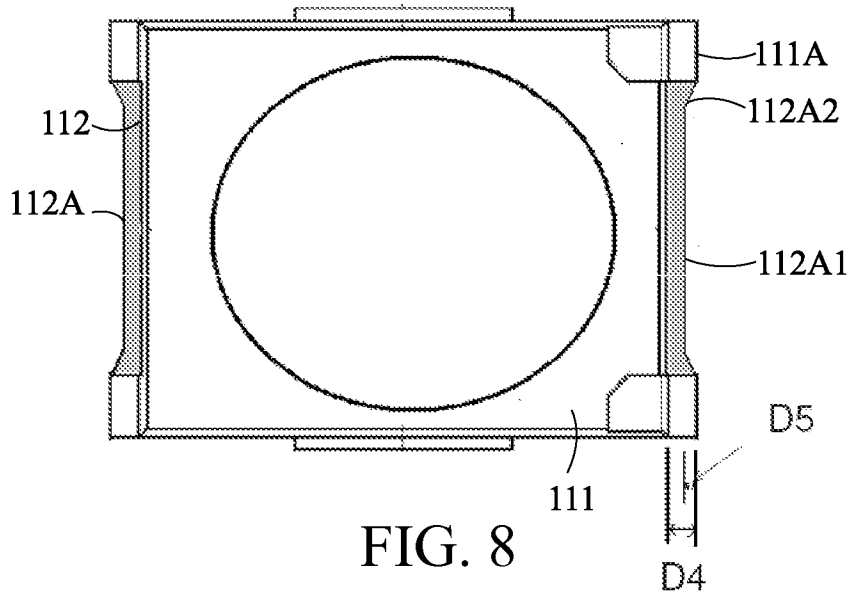

111A
112
112A2
112A
112A1
D5
111
D4

FIG. 8

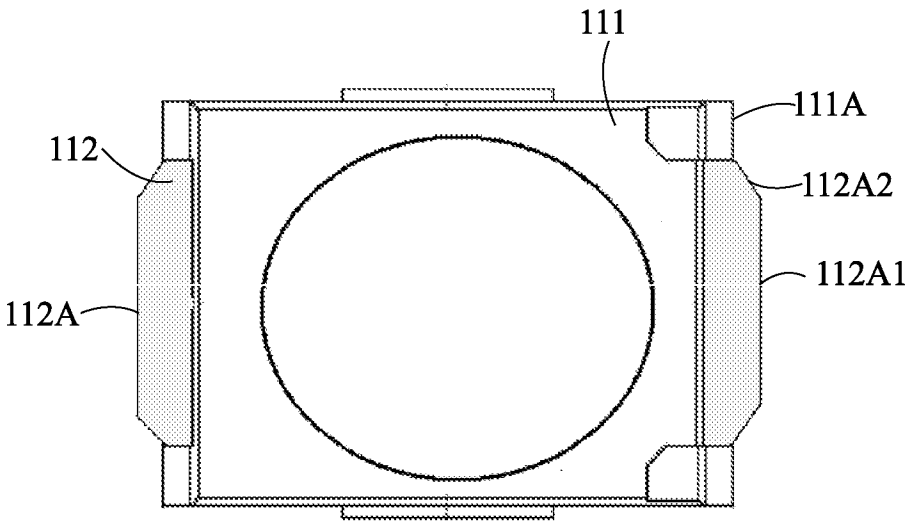


FIG. 9

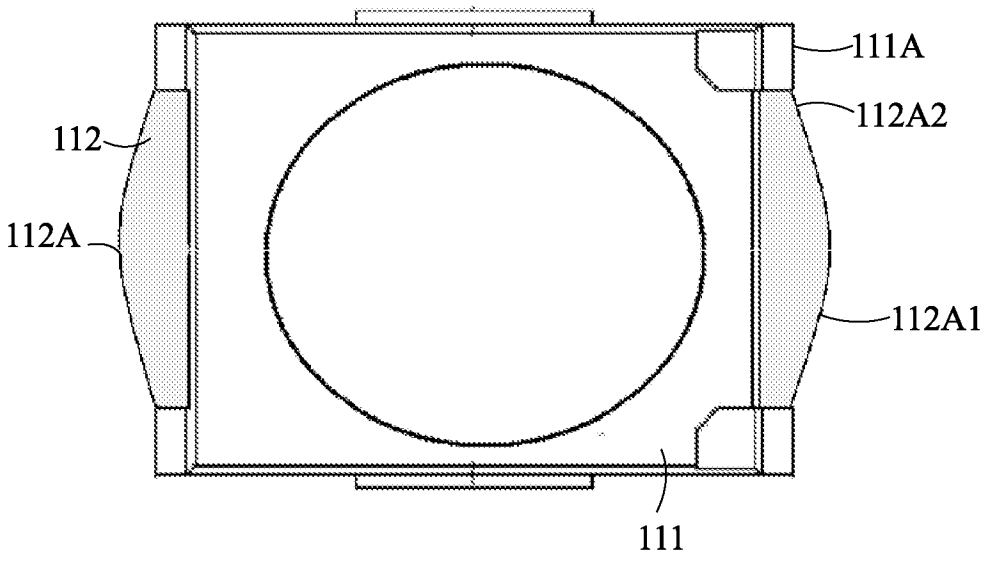


FIG. 10

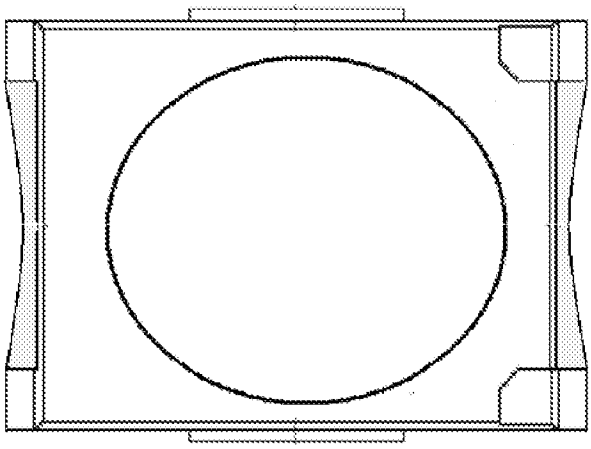


FIG. 11

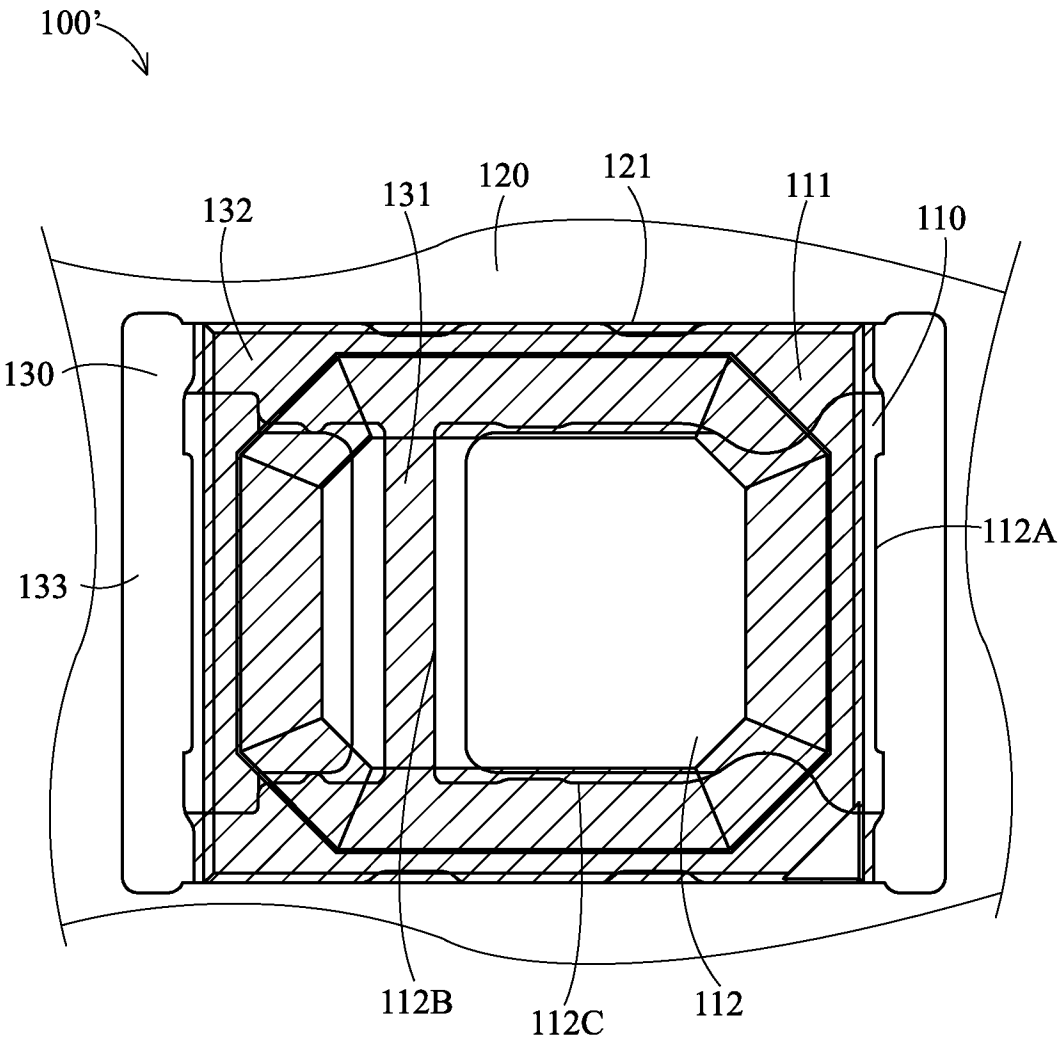


FIG. 12A

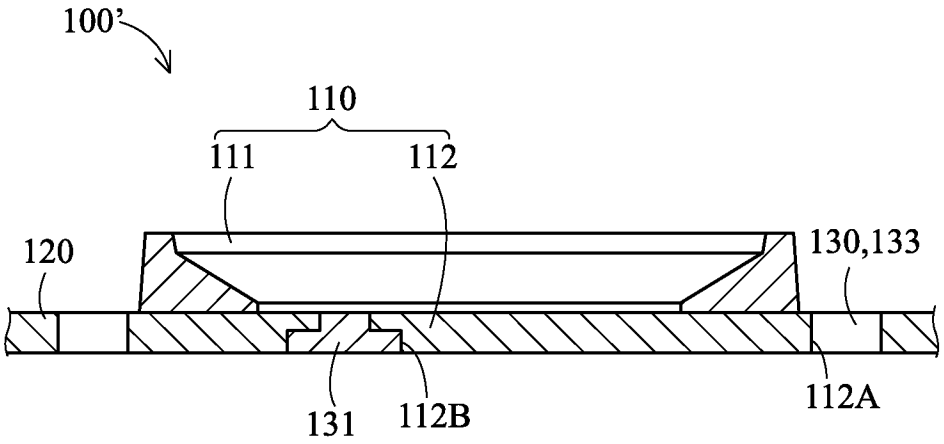


FIG. 12B

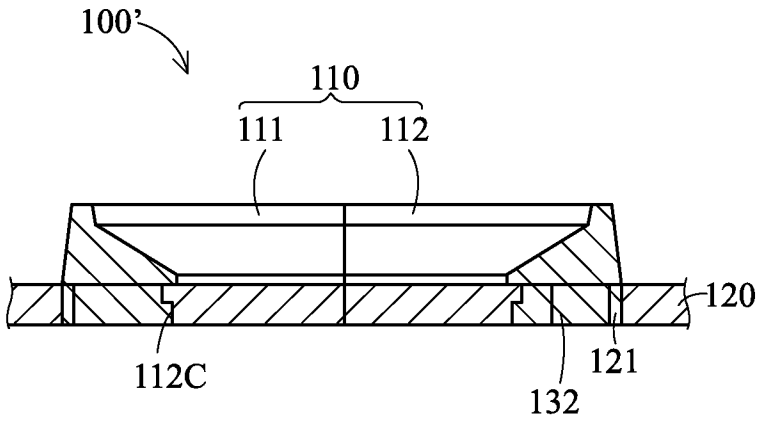


FIG. 12C

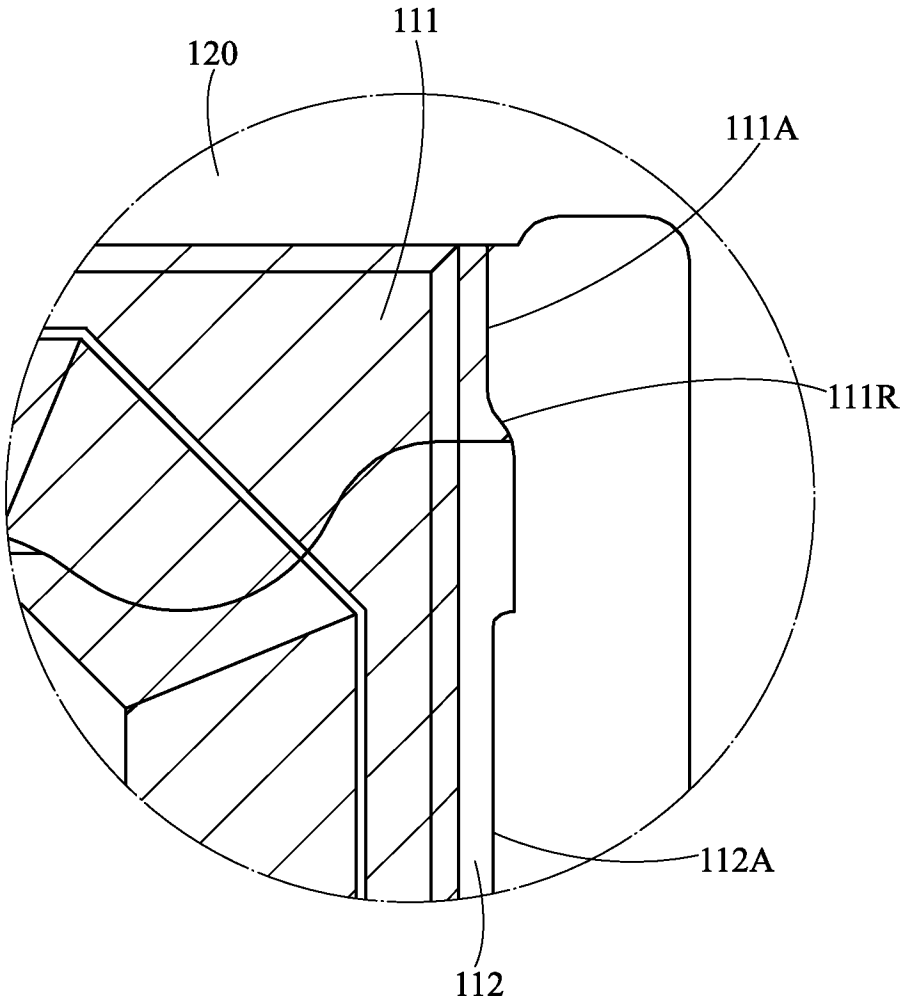


FIG. 12D

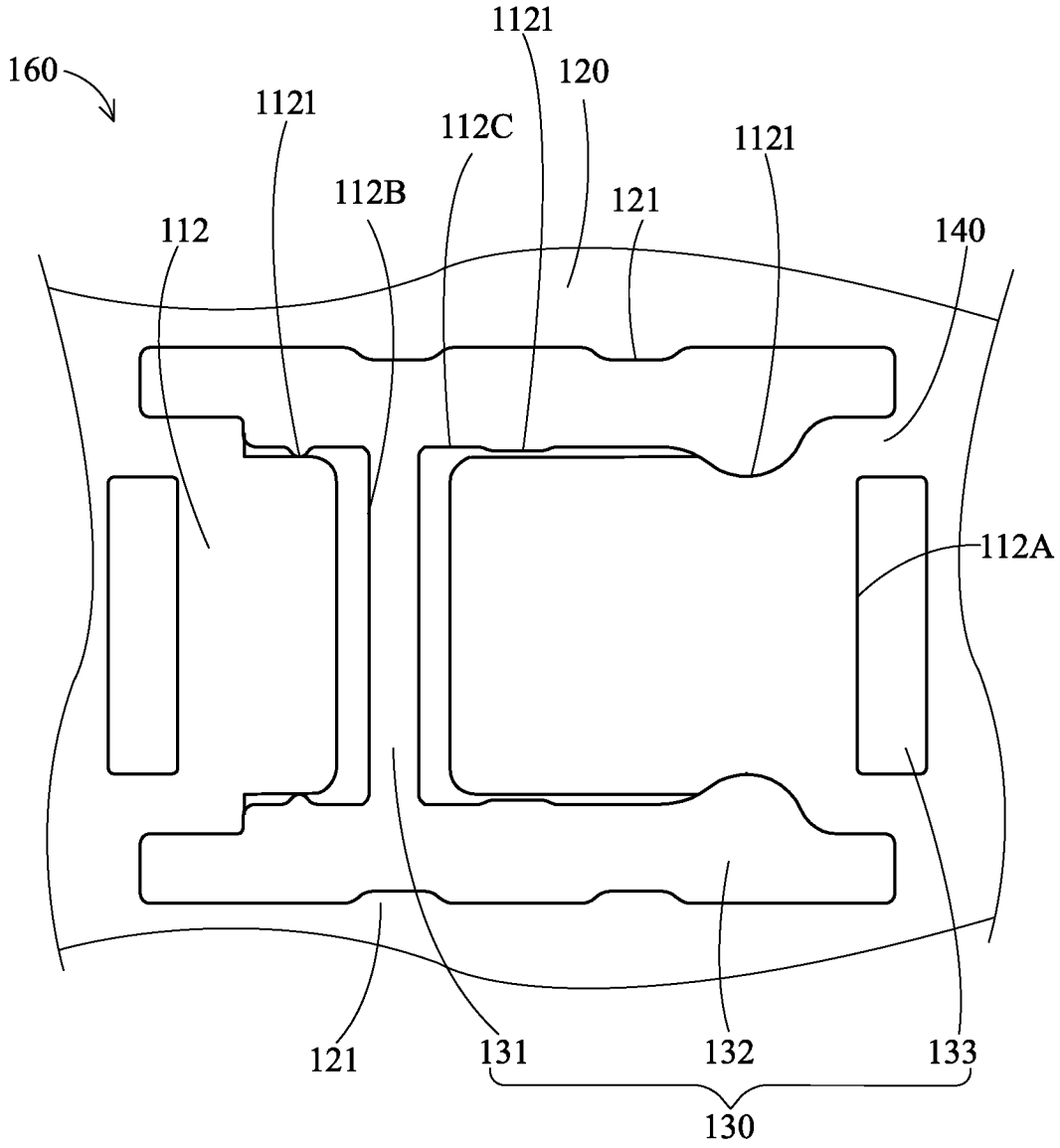

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FIG. 13A

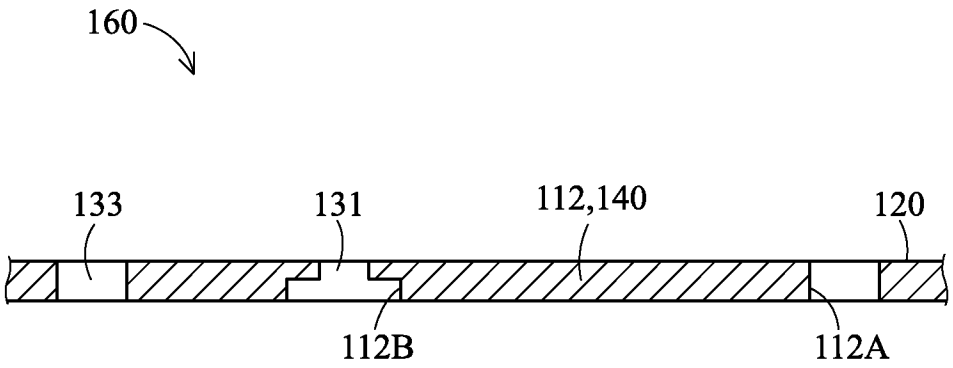


FIG. 13B

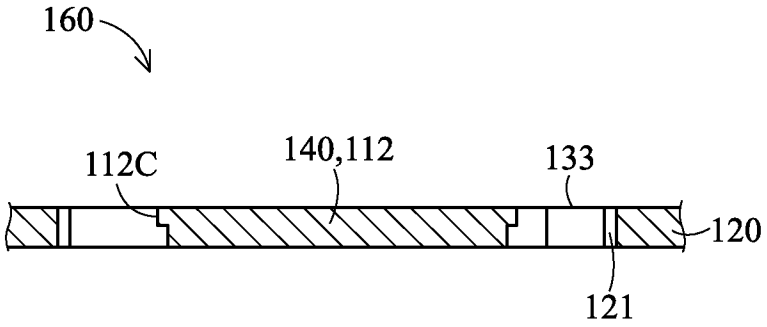


FIG. 13C

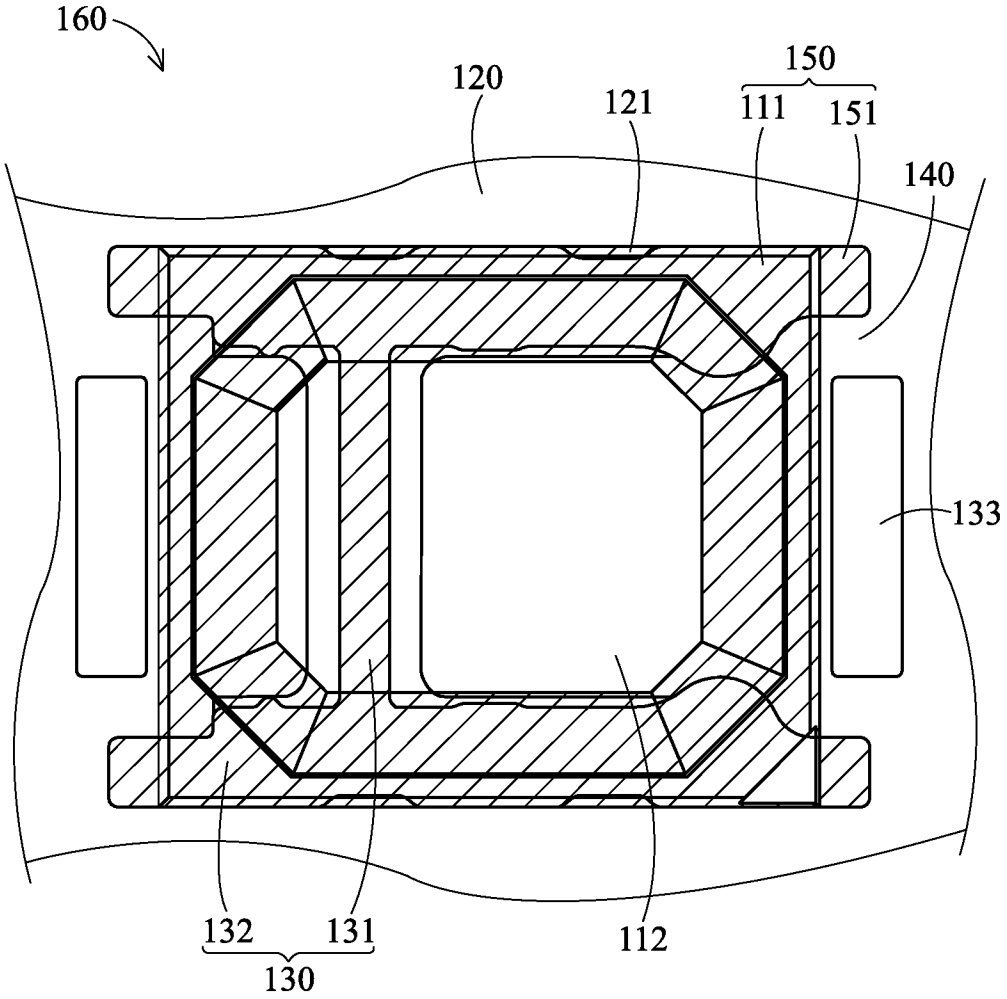


FIG. 14

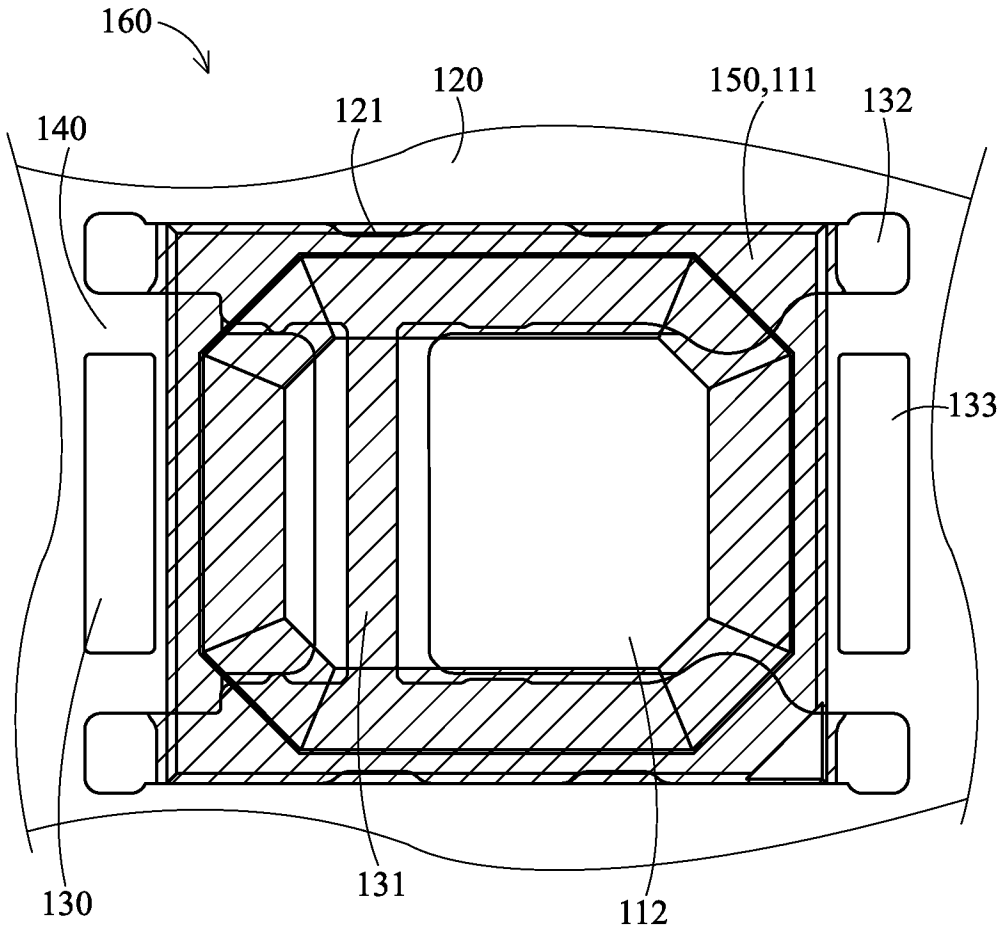


FIG. 15

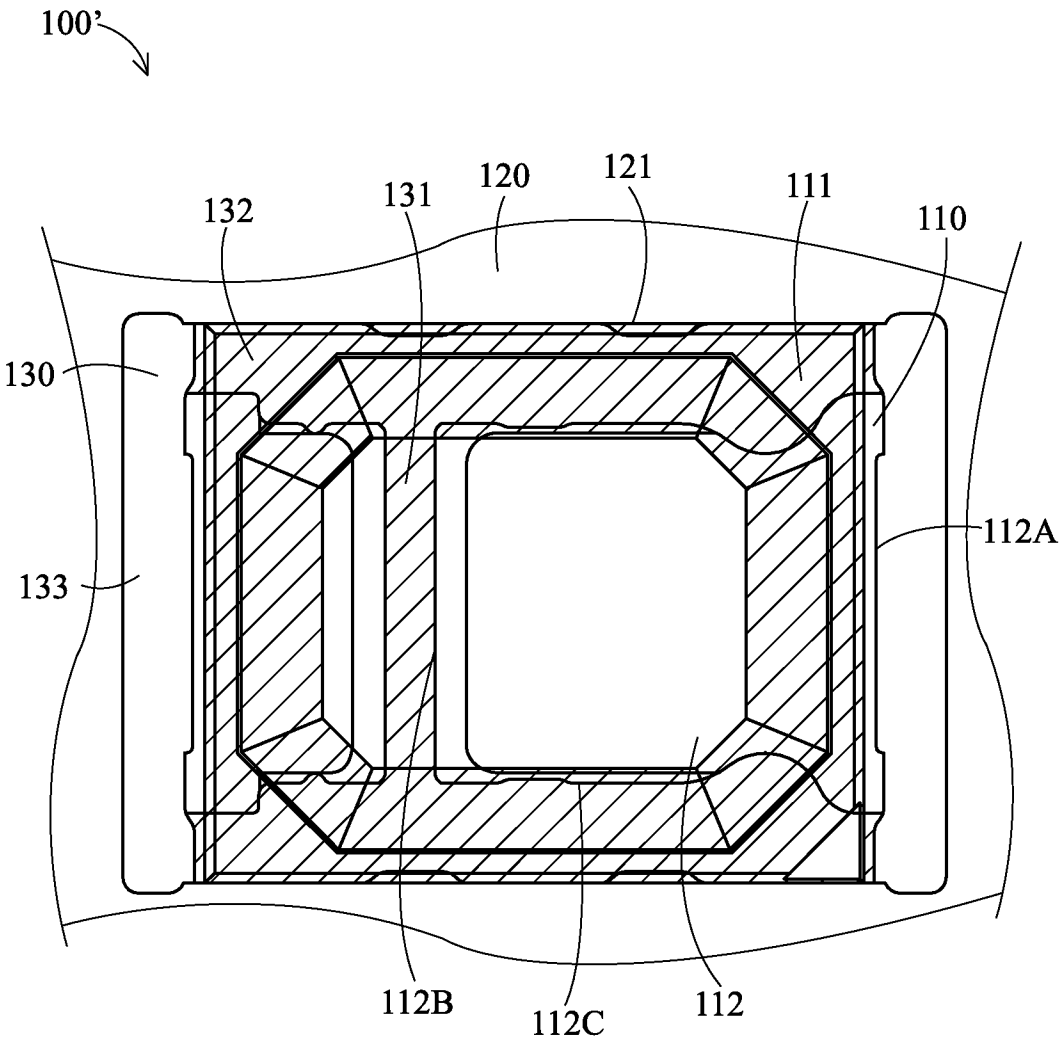


FIG. 16

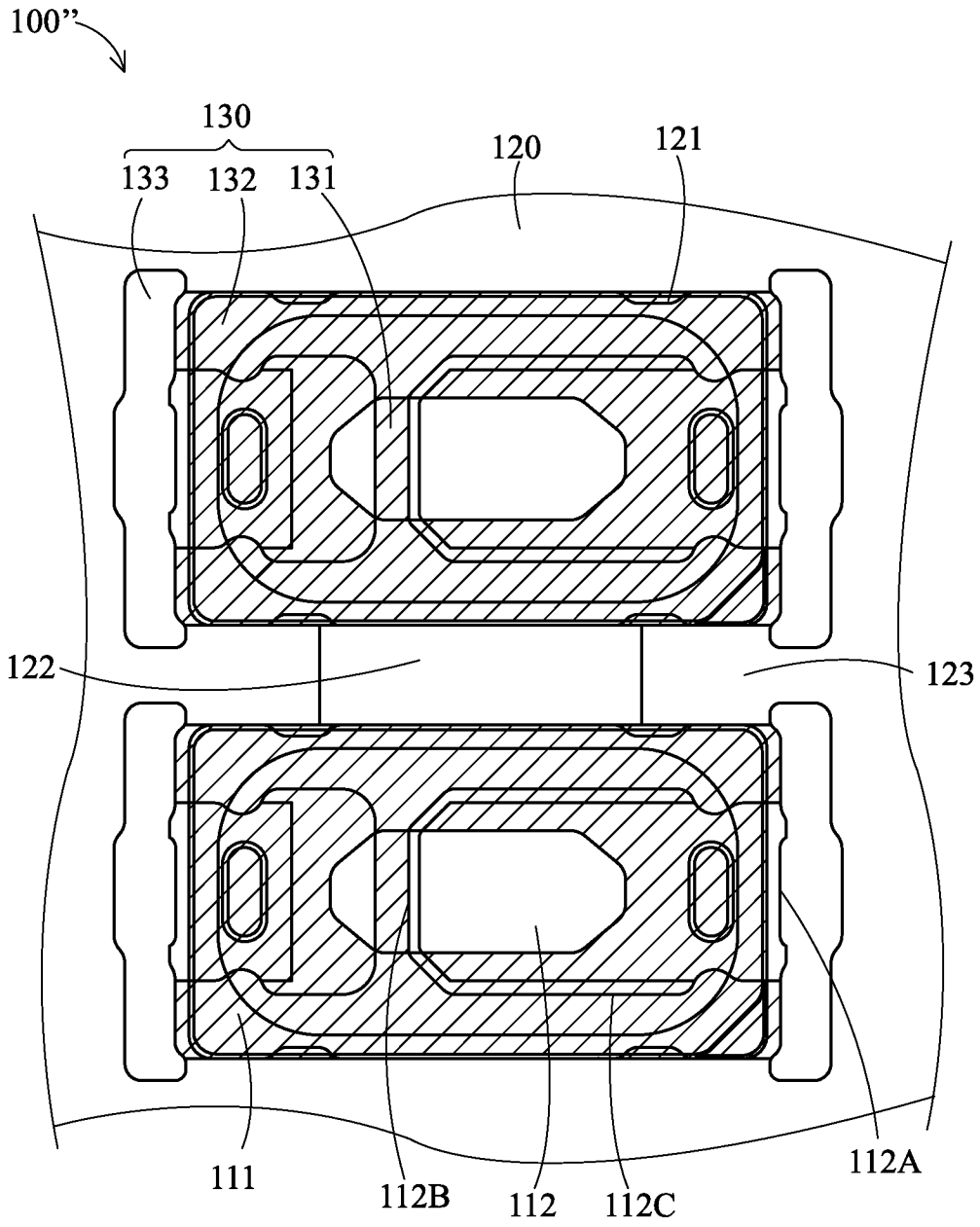


FIG. 17A

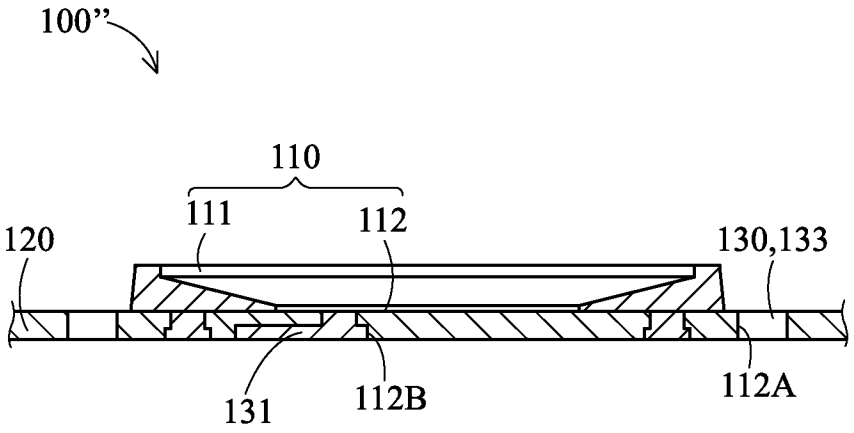


FIG. 17B

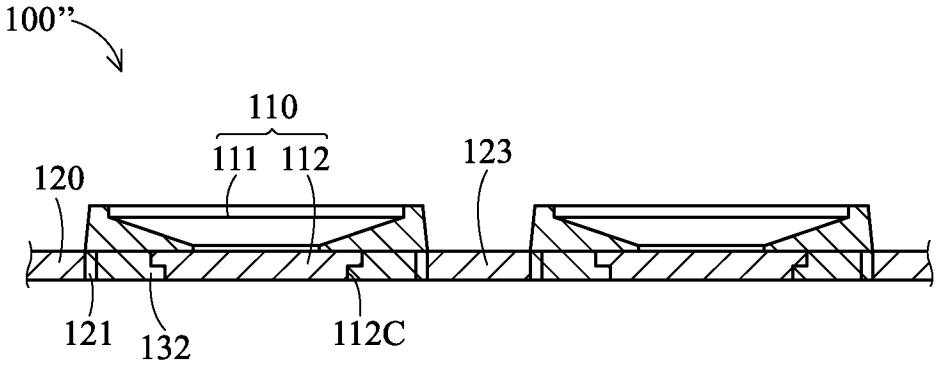


FIG. 17C

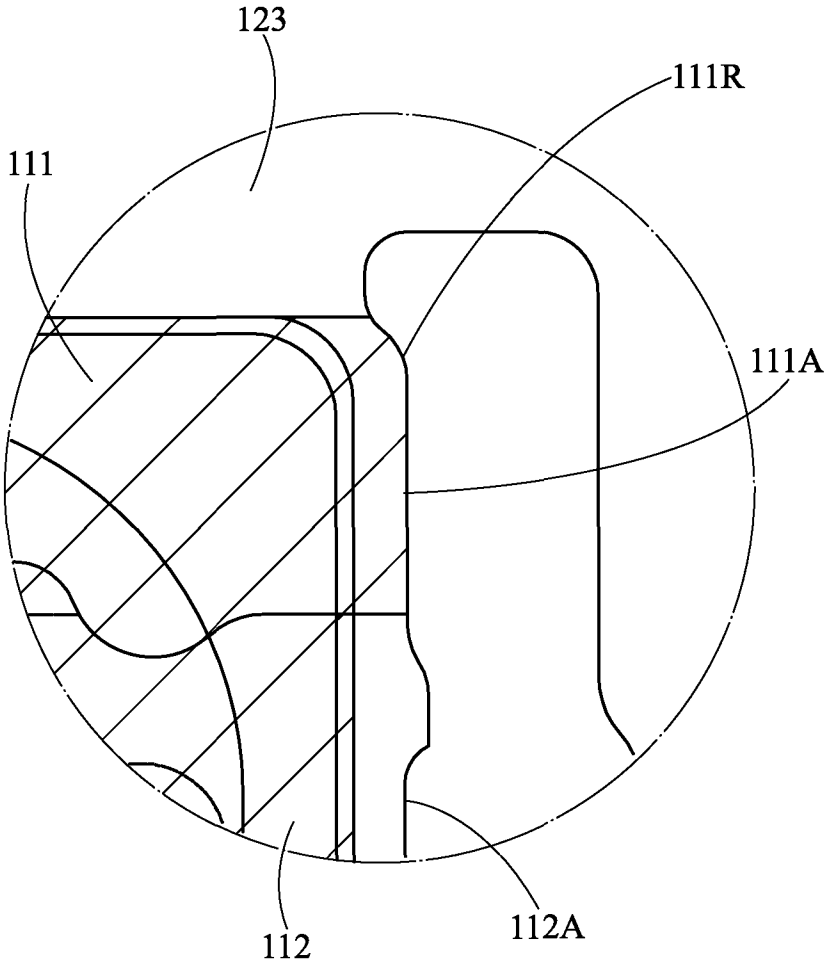


FIG. 17D

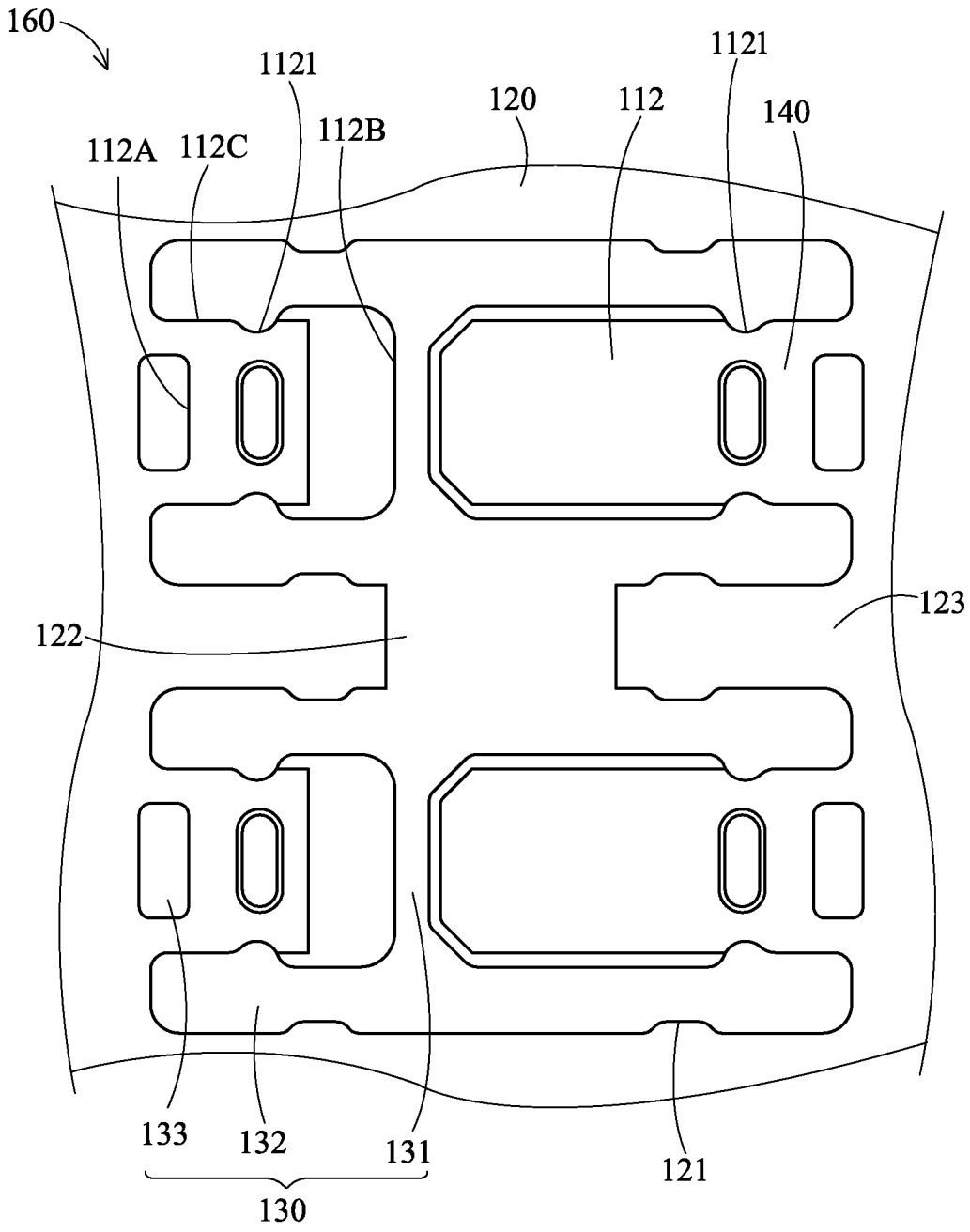

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FIG. 18A

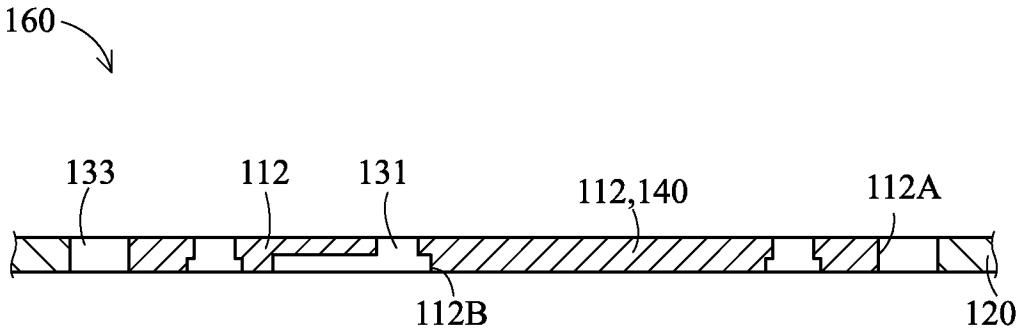


FIG. 18B

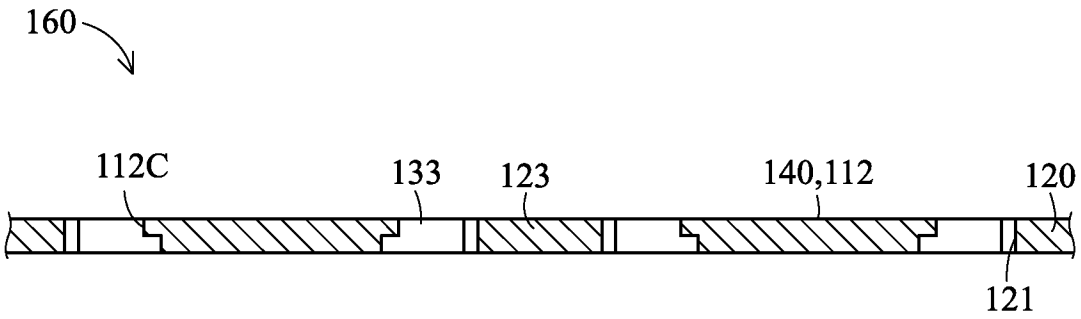


FIG. 18C

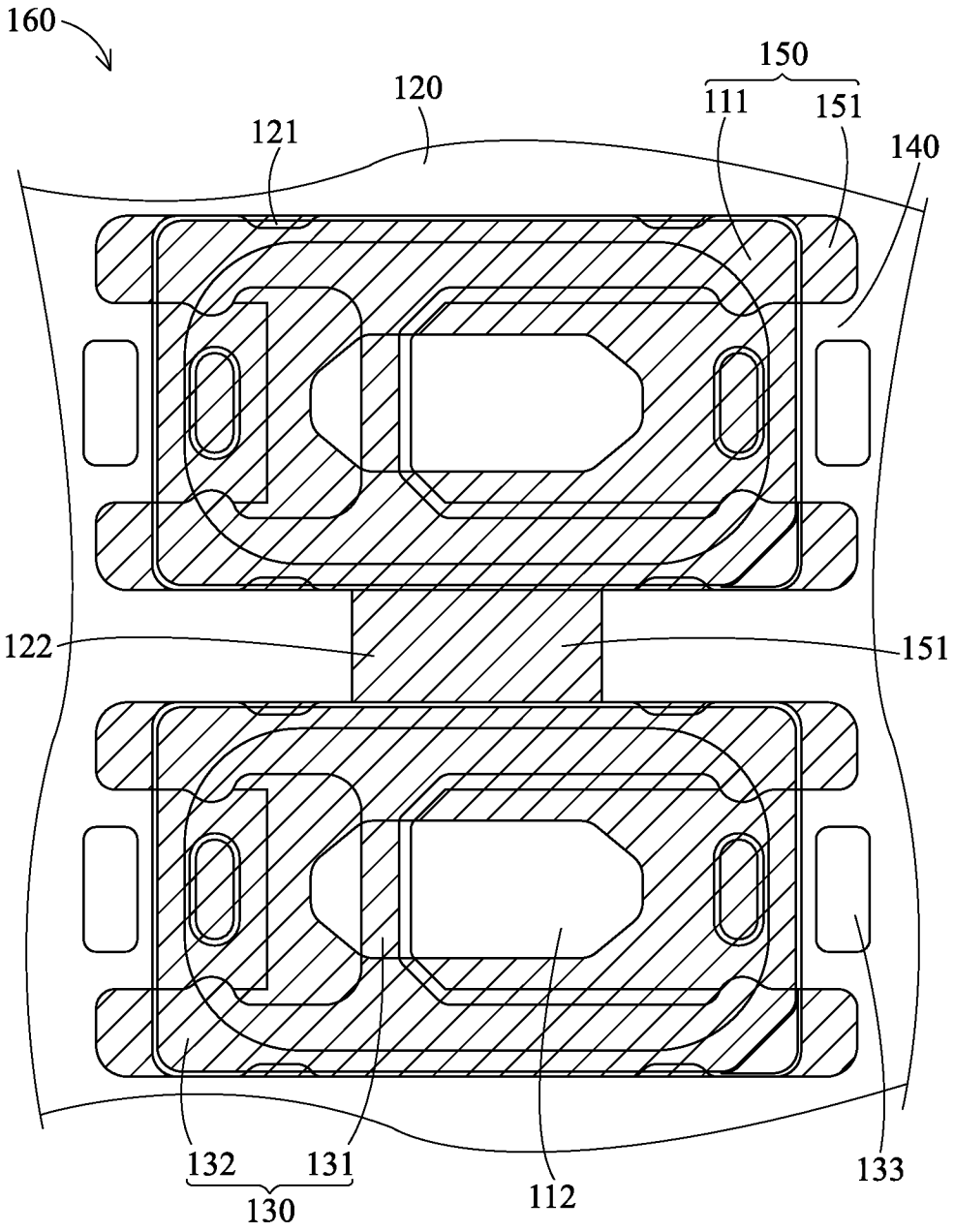


FIG. 19

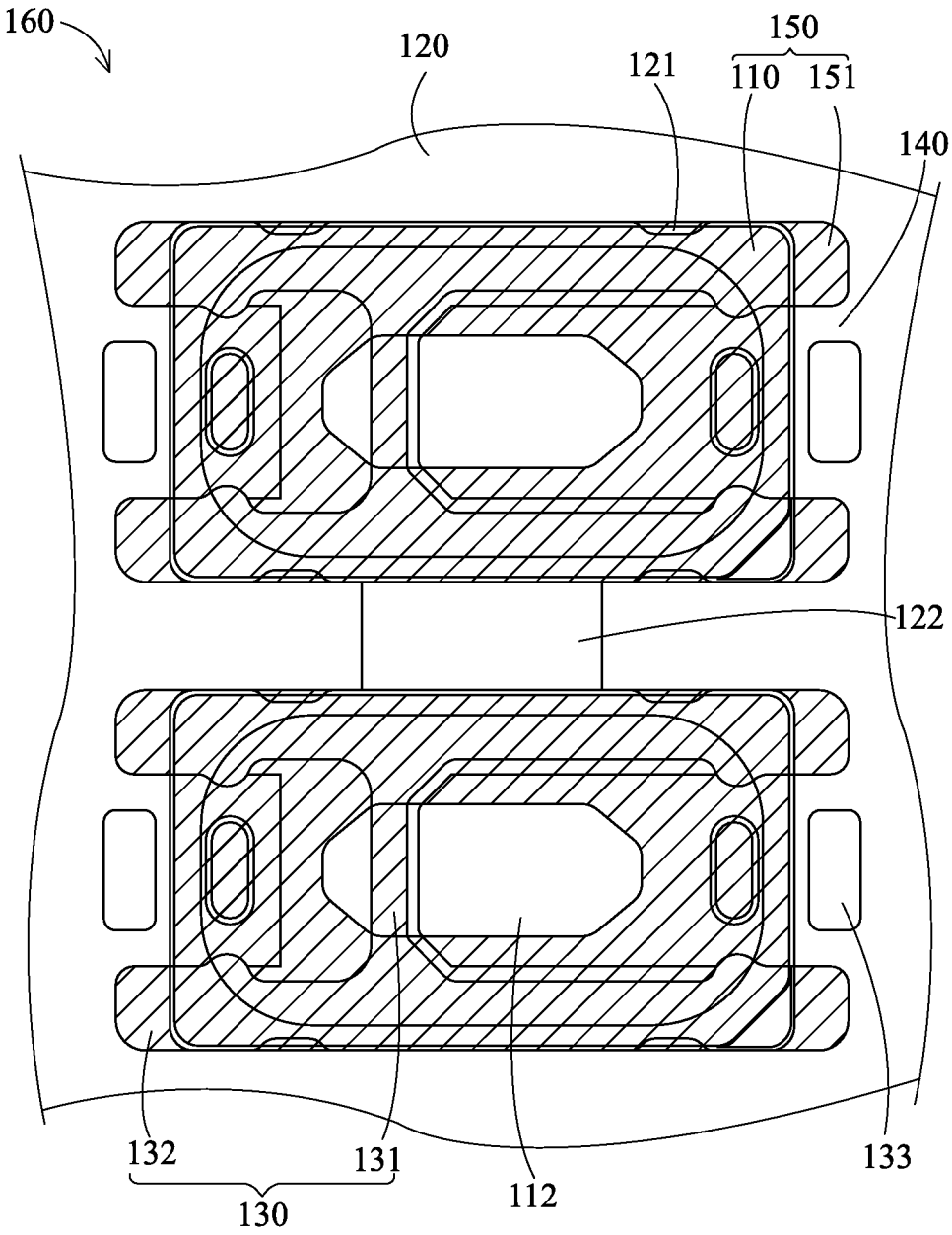


FIG. 20

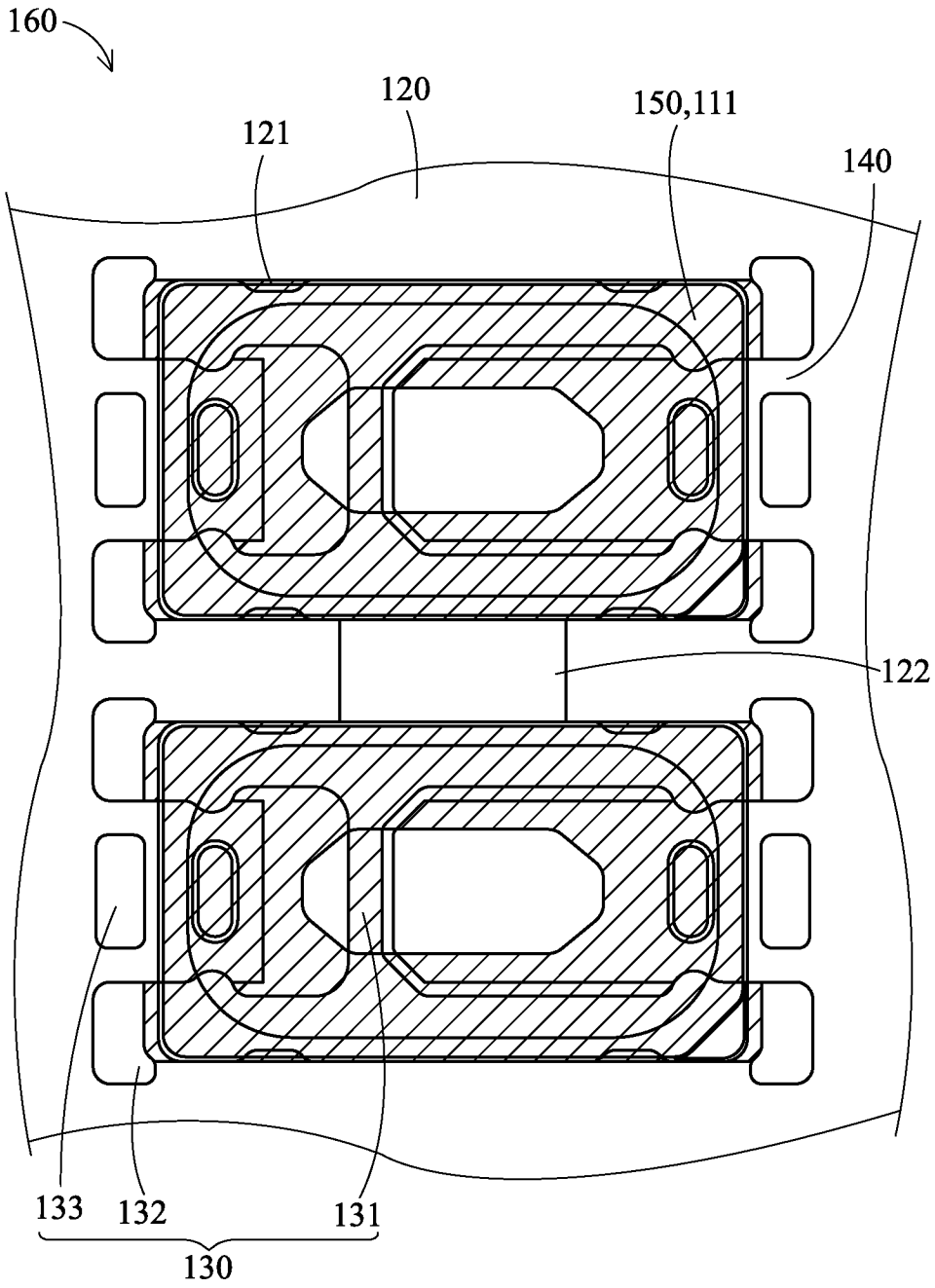


FIG. 21

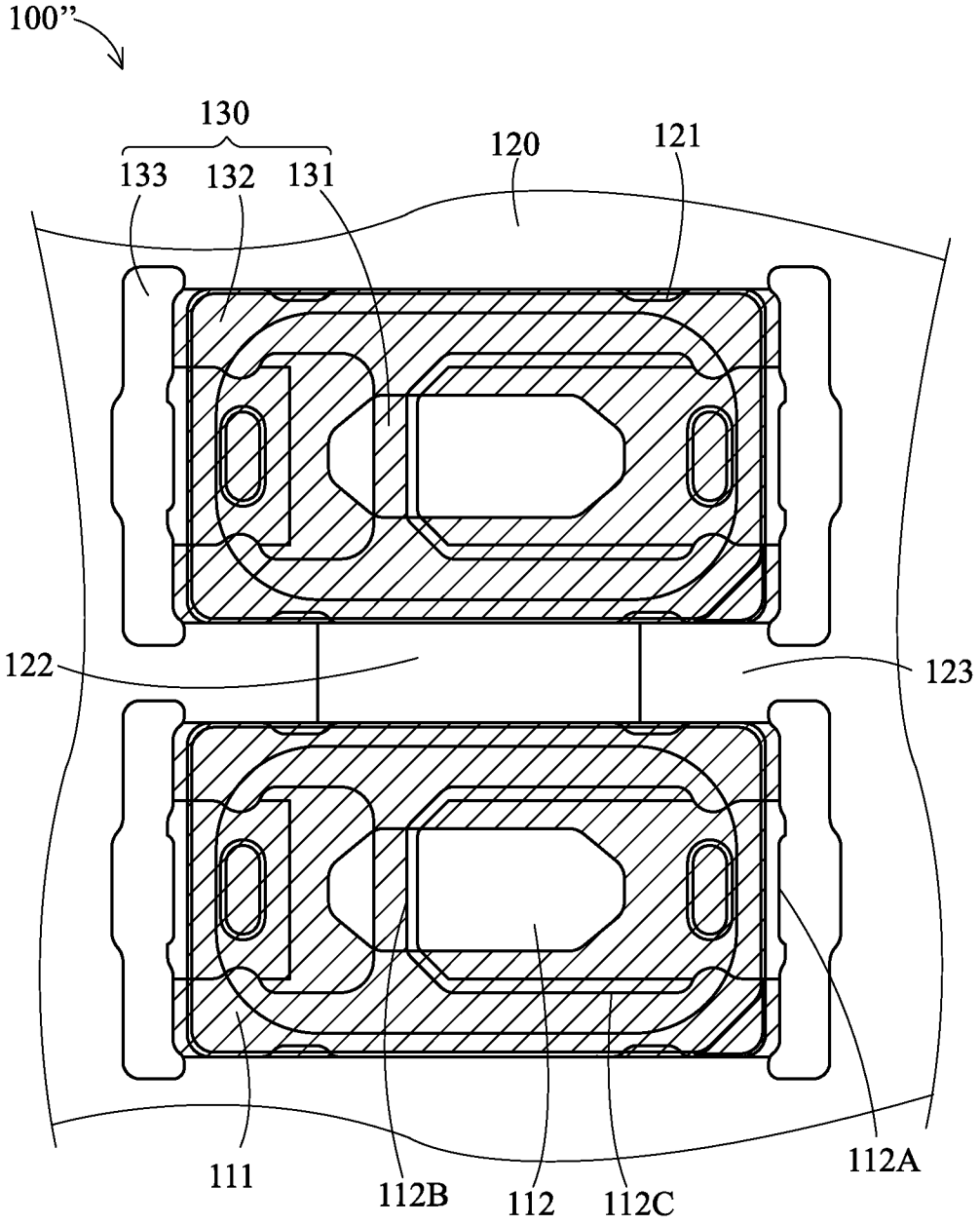


FIG. 22

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	Carrier, Carrier Leadframe, And Light Emitting Device
First Named Inventor/Applicant Name:	Chung-Chuan Hsieh
Filer:	Andy M. Han
Attorney Docket Number:	EL01.0088US

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Utility application filing	1011	1	280	280
Utility Search Fee	1111	1	600	600
Utility Examination Fee	1311	1	720	720
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**1600**

Electronic Acknowledgement Receipt

EFS ID:	22430293
Application Number:	14720230
International Application Number:	
Confirmation Number:	4909
Title of Invention:	Carrier, Carrier Leadframe, And Light Emitting Device
First Named Inventor/Applicant Name:	Chung-Chuan Hsieh
Customer Number:	13859
Filer:	Andy M. Han
Filer Authorized By:	
Attorney Docket Number:	EL01.0088US
Receipt Date:	22-MAY-2015
Filing Date:	
Time Stamp:	16:30:34
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$1600
RAM confirmation Number	4140
Deposit Account	
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	EL01_0088US_ADS.pdf	1255417 7c9458fb0b2d1fca35650347575af68c2017192b	no	7
Warnings:					
Information:					
2		EL01_0088US_Specification.pdf	156005 f3d099f2fb10372f8e922268ac60e15647733a50	yes	30

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Specification	1	27
	Claims	28	29
	Abstract	30	30

Warnings:					
Information:					
3	Drawings-only black and white line drawings	EL01_0088US_Drawings.pdf	1172341 57b57ff6ef2acdf508cc73d308fb671706213436	no	28
Warnings:					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	34423 ebfb031f65beefdb32a17406ca574a589db88bed	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	2618186	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

SCORE Placeholder Sheet for IFW Content

Application Number: 14720230 Document Date: 05/22/2015

The presence of this form in the IFW record indicates that the following document type was received in electronic format on the date identified above. This content is stored in the SCORE database.

- Drawings – Other than Black and White Line Drawings

Since this was an electronic submission, there is no physical artifact folder, no artifact folder is recorded in PALM, and no paper documents or physical media exist. The TIFF images in the IFW record were created from the original documents that are stored in SCORE.

To access the documents in the SCORE database, refer to instructions below.

At the time of document entry (noted above):

- Examiners may access SCORE content via the eDAN interface.
- Other USPTO employees can bookmark the current SCORE URL (http://Score.uspto.gov/ScoreAccessWeb/).
- External customers may access SCORE content via the Public and Private PAIR interfaces.

Form Revision Date: September 30, 2013

COMBINED DECLARATION AND ASSIGNMENT FOR APPLICATION FOR UNITED STATES LETTERS PATENT

DECLARATION

Title of Invention: **CARRIER, CARRIER LEADFRAME, AND LIGHT EMITTING DEVICE**

As the below named inventor, I hereby declare that:

This declaration is directed to: (X) The attached application, or

( ) U.S. Application No. _____ filed on _____.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

I have reviewed and understand the contents of the present application, including the claims, as amended by any amendment specifically referred to herein.

I acknowledge the duty to disclose to the Patent Office all information known to me to be material to patentability as defined in 37 C.F.R. § 1.56.

CLAIM OF PRIORITY

I hereby claim foreign priority benefits under Title 35, United States Code Section 119 of any foreign application(s) for patent or inventor(s) certificate listed below and have also identified below any foreign application for patent or inventor(s) certificate having a filing date before that of the application on which priority is claimed:

COUNTRY	APPLICATION NUMBER	DATE FILED	PRIORITY CLAIMED UNDER 35 U.S.C. 119
Taiwan, R.O.C.	**103118060**	**May 23, 2014**	YES: **X** NO:
Taiwan, R.O.C.	**104103527**	**February 3, 2015**	YES: **X** NO:

POWER OF ATTORNEY

As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) associated with Customer No.

13859

to prosecute this application and transact all business in the Patent and Trademark Office connected therewith.

Send Correspondence to:

Han IP Corporation
4790 Irvine Boulevard Suite 105-347
Irvine, CA 92620
Direct Telephone Calls To: (949) 383-5385
Email: pto@haniplaw.com

ASSIGNMENT

PARTIES TO THE ASSIGNMENT

Assignor(s):

1. Chung-Chuan Hsieh
2. Yung Chieh Chen

Assignee:
Everlight Electronics Co., Ltd.
No. 6-8, Zhonghua Road, Shulin District
New Taipei City 23860, Taiwan, R.O.C.

WHEREAS, ASSIGNOR(S) (listed above) are inventor(s) of the above-identified invention for which:

☐ a provisional application for United States Letters Patent was filed on

_____ and was given U.S. Serial No. _____ and/or

☒ a non-provisional application for United States Letters Patent was:

☐ filed on _____and was given U.S. Serial No. _____; or filed concurrently herewith.

Assignors hereby authorize and request ASSIGNEE's legal representatives, of **Han IP Corporation, 4790 Irvine Boulevard Suite 105-347, Irvine, CA 92620**, who are associated with customer number **13859**, to handle all matters related to the above-identified application.

WHEREAS, Everlight Electronics Co., Ltd. (hereinafter referred to as ASSIGNEE), a corporation of Taiwan, R.O.C. having a place of business at No. 6-8, Zhonghua Road, Shulin District, New Taipei City 23860, Taiwan, R.O.C., is desirous of acquiring the entire right, title and interest in and to the invention and in and to any letters patent that may be granted therefore in the United States and in any and all foreign countries;

NOW, THEREFORE, in exchange for good and valuable consideration, the receipt of which is hereby acknowledged, ASSIGNORS hereby sell, assign and transfer unto ASSIGNEE, the entire right, title and interest in and to said invention, said application and any and all letters patent which may be granted for said invention in the United States of America and its territorial possessions and in any and all foreign countries, and in any and all divisions, reissues and continuations thereof, including the right to file foreign applications directly in the name of ASSIGNEE and to claim priority rights deriving from said United States application to which said foreign applications are entitled by virtue of international convention, treaty or otherwise, said invention, application and all letters patent on said invention to be held and enjoyed by ASSIGNEE and its successors and assigns for their use and benefit and of their successors and assigns as fully and entirely as the same would have been held and enjoyed by ASSIGNORS had this assignment, transfer and sale not been made. ASSIGNORS hereby authorize and request the Commissioner of Patents and Trademarks to issue all letters patent on said invention to ASSIGNEE. ASSIGNORS agree to execute all instruments and documents required for the making and prosecution of applications for United States and foreign letters patent on said invention, for litigation regarding said letters patent, or for the purpose of protecting title to said invention or letters patent therefore.

Legal Name of First-Named Inventor: **Chung-Chuan Hsieh**	
Inventor's Signature: Hsieh Chung Chuan	Date: May 22, 2015
Residence: Taipei, Taiwan, R.O.C.	
Citizenship: Taiwan, R.O.C.	
Mailing Address: No. 6-8, Zhonghua Road, Shulin District, New Taipei City 23860, Taiwan, R.O.C.	

Legal Name of Co-Inventor: **Yung Chieh Chen**	
Inventor's Signature: CHEN YUNG CHIEH	Date: May 22, 2015
Residence: Taipei, Taiwan, R.O.C.	
Citizenship: Taiwan, R.O.C.	
Mailing Address: No. 6-8, Zhonghua Road, Shulin District, New Taipei City 23860, Taiwan, R.O.C.	

Electronic Patent Application Fee Transmittal

Application Number:	14720230
Filing Date:	
Title of Invention:	Carrier, Carrier Leadframe, And Light Emitting Device
First Named Inventor/Applicant Name:	Chung-Chuan Hsieh
Filer:	Andy M. Han
Attorney Docket Number:	EL01.0088US

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Late Filing Fee for Oath or Declaration	1051	1	140	140
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**140**

Electronic Acknowledgement Receipt

EFS ID:	22587847
Application Number:	14720230
International Application Number:	
Confirmation Number:	4909
Title of Invention:	Carrier, Carrier Leadframe, And Light Emitting Device
First Named Inventor/Applicant Name:	Chung-Chuan Hsieh
Customer Number:	13859
Filer:	Andy M. Han
Filer Authorized By:	
Attorney Docket Number:	EL01.0088US
Receipt Date:	10-JUN-2015
Filing Date:	
Time Stamp:	13:15:42
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$140
RAM confirmation Number	10120
Deposit Account	
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Oath or Declaration filed	EL01_0088US_Combined_Declaration_Assignment.pdf	163537 9c55f7c26054cc50f87b2e4ed198de5a65c24e72	no	3
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	29667 41bc4c4259e2d5c58158e9c07e6f79a017b64750	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	193204		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
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National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 14/720,230

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	280
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	600
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	720
TOTAL CLAIMS (37 CFR 1.16(i))	10 minus 20 =	*			OR	x 80 =	0.00
INDEPENDENT CLAIMS (37 CFR 1.16(h))	2 minus 3 =	*				x 420 =	0.00
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						0.00
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							0.00
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	1600

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE($)	ADDITIONAL FEE($)		RATE($)	ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

UNITED STATES PATENT AND TRADEMARK OFFICE

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www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
14/720,230	05/22/2015	2811	1740	EL01.0088US	10	2

CONFIRMATION NO. 4909

13859
Han IP Corporation
4790 Irvine Boulevard Suite 105-347
Irvine, CA 92620

FILING RECEIPT

OC000000075853035

Date Mailed: 06/23/2015

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Chung-Chuan Hsieh, New Taipei City, TAIWAN;
Yung Chieh Chen, New Taipei City, TAIWAN;

Applicant(s)

Everlight Electronics Co., Ltd., New Taipei City, TAIWAN;

Power of Attorney: None

Domestic Applications for which benefit is claimed - None.
A proper domestic benefit claim must be provided in an Application Data Sheet in order to constitute a claim for domestic benefit. See 37 CFR 1.76 and 1.78.

Foreign Applications (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.)
TAIWAN 103118060 05/23/2014
TAIWAN 104103527 02/03/2015

Permission to Access - A proper **Authorization to Permit Access to Application by Participating Offices** (PTO/SB/39 or its equivalent) has been received by the USPTO.

If Required, Foreign Filing License Granted: 06/19/2015
The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 14/720,230**
Projected Publication Date: 11/26/2015
Non-Publication Request: No
Early Publication Request: No

Title

Carrier, Carrier Leadframe, And Light Emitting Device

Preliminary Class

257

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

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This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

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NOT GRANTED

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PTO/AIA/80 (07-12)
Approved for use through 11/30/2014. OMB 0651-0035
U.S. Patent and Trademark Office; U.S DEPARTMENT OF COMMERCE
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POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(c).

I hereby appoint:

■ Practitioners associated with Customer Number: 13859

OR

☐ Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number	Name	Registration Number

As attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignments documents attached to this form in accordance with 37 CFR 3.73(c).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(c) to:

■ The address associated with Customer Number: 13859

OR

☐	Firm or Individual Name		
	Address		
	City	State	Zip
	Country		
	Telephone	Email	

Assignee Name and Address:
EVERLIGHT ELECTRONICS CO., LTD
NO. 6-8, Zhonghua Rd., Shulin Dist., New Taipei City 23860, Taiwan

A copy of this form, together with a statement under 37 CFR 3.73(c) (Form PTO/AIA/96 or equivalent) is required to be Filed in each application in which this form is used. The statement under 37 CFR 3.73(c) may be completed by one of The practitioners appointed in this form, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record
The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

Signature	Robert Yeh	Date	December 3, 2012
Name	Robert Yeh	Telephone	
Title	President		

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Electronic Acknowledgement Receipt

EFS ID:	22748202
Application Number:	14720230
International Application Number:	
Confirmation Number:	4909
Title of Invention:	Carrier, Carrier Leadframe, And Light Emitting Device
First Named Inventor/Applicant Name:	Chung-Chuan Hsieh
Customer Number:	13859
Filer:	Andy M. Han
Filer Authorized By:	
Attorney Docket Number:	EL01.0088US
Receipt Date:	25-JUN-2015
Filing Date:	22-MAY-2015
Time Stamp:	22:35:49
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	EL01_0088US_POA.pdf	41049 2fa1ef12749b94b54a2e27e4cc55f5cba8cb2651	no	1

Warnings:	
Information:	

Total Files Size (in bytes):	41049

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/720,230	05/22/2015	Chung-Chuan Hsieh	EL01.0088US

CONFIRMATION NO. 4909

13859
Han IP Corporation
4790 Irvine Boulevard Suite 105-347
Irvine, CA 92620

POA ACCEPTANCE LETTER

OC000000076061260

Date Mailed: 07/06/2015

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 06/25/2015.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/tlulu/

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UNITED STATES DEPARTMENT OF COMMERCE
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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/720,230	05/22/2015	Chung-Chuan Hsieh	EL01.0088US

CONFIRMATION NO. 4909

13859
Han IP Corporation
4790 Irvine Boulevard Suite 105-347
Irvine, CA 92620

PUBLICATION NOTICE

OC000000078924796

Title: Carrier, Carrier Leadframe, And Light Emitting Device

Publication No.US-2015-0340568-A1
Publication Date:11/26/2015

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently http://www.uspto.gov/patft/.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Office of Public Records. The Office of Public Records can be reached by telephone at (703) 308-9726 or (800) 972-6382, by facsimile at (703) 305-8759, by mail addressed to the United States Patent and Trademark Office, Office of Public Records, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently http://pair.uspto.gov/. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Office of Data Managment, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

2014006-US
EL01.00885US

中華民國經濟部智慧財產局

INTELLECTUAL PROPERTY OFFICE
MINISTRY OF ECONOMIC AFFAIRS
REPUBLIC OF CHINA

茲證明所附文件，係本局存檔中原申請案的副本，正確無訛，
其申請資料如下 ：

This is to certify that annexed is a true copy from the records of this office of the application as originally filed which is identified hereunder：

申　　請　　日 ： 西元 2015 年 02 月 03 日
Application Date　　Feb. 3, 2015

申　請　案　號 ： 104103527
Application No.

申　　請　　人 ： 億光電子工業股份有限公司
Applicant(s)

發　　明　　人 ： 謝忠全、陳詠傑
Inventor(s)

局　　長
Director General

王美花

西元 2015 年 05 月 13 日
May. 13, 2015

IKEA Supply AG
Exhibit 1002 Page 88 of 519

專利案號：104103527

申請日：
IPC分類：

【發明摘要】

【中文發明名稱】 承載支架及其製造方法以及從該承載支架所製得之發光裝置及其製造方法

【英文發明名稱】 CARRIER LEADFRAME AND MANUFACTURUNG METHOD THEREOF AND LIGHT EMITTING DEVICE AND MANUFACTURUNG METHOD FROM SAID CARRIER LEADFRAME

【中文】

本發明係提供一種承載支架，其中包含一框架，該框架包含至少一支撐部；以及一承載體，該承載體係包含一外殼及至少一電極部；其中該承載體係藉由該支撐部機械偶合於該框架之上。此外，本發明亦提供前述承載支架之製造方法；以及從其所製得之發光裝置及其製造方法。特定言之，本發明之承載支架係具有預先彼此分離之承載體機械偶合於框架上，可便於封膠後迅速下料。同時本發明之承載支架中各承載體係彼此電性分離，可於下料前進行電性量測。藉此，可提高從其所製得之發光裝置的生產速度及良率。

【英文】

A carrier leadframe, including a leadframe and a carrier, is provided.The leadframe includes at least one supporting portion, and the carrier includes a shell and at least one electrode portion and is mechanically engaged with the leadframe by the supporting portion.A method for manufacturing a carrier leadframe as described above, as well as a light emitting device made from the carrier leadframe and a method for manufacturing the device, is also provide.The carrier leadframe as provided has carriers that are separate in advance and mechanically engaged with the leadframe, thereby facilitating the quick release of material after encapsulation.Besides, in the carrier leadframe as provided, each carrier is electrically isolated from another carrier, so the electric measurement can

IKEA Supply AG
Exhibit 1002 Page 89 of 519

be performed before the release of material.Therefore, the speed and yield of production of the light emitting device made from the carrier leadframe is improved.

【指定代表圖】 第（1）圖。

【代表圖之符號簡單說明】

100：承載支架

110：承載體

111：殼體

111A：殼體截面

112：翼部

112A：外側面

112A1：中央外突出區、中央區域

112A2：外側邊緣區域、邊緣區域、電極部截面

120：框架

121：支撐部

122：通道區

123：側部

130：空乏區

141：鎖孔

142：階部

143：凹槽

【特徵化學式】

【發明說明書】

【中文發明名稱】 承載支架及其製造方法以及從該承載支架所製得之發光裝置及其製造方法

【英文發明名稱】 CARRIER LEADFRAME AND MANUFACTURUNG METHOD THEREOF AND LIGHT EMITTING DEVICE AND MANUFACTURUNG METHOD FROM SAID CARRIER LEADFRAME

【技術領域】

【0001】 本發明係關於承載支架及從其所製得之發光裝置。特別關於一種用於容置發光二極體晶片的支架及從其所製得之發光裝置。

【先前技術】

【0002】 發光二極體具有諸如壽命長、體積小、高抗震性、低熱產生及低功率消耗等優點，因此已被廣泛應用於家用及各種設備中的指示器或光源。近年來，發光二極體已朝多色彩及高亮度發展，因此其應用領域已擴展至大型戶外看板、交通號誌燈及相關領域。在未來，發光二極體甚至可能成爲兼具省電及環保功能的照明光源主流。爲使發光二極體信賴性佳，發光二極體多會經過一封裝製程而形成耐用的發光裝置。

【0003】 近來本發明相關領域之業者係研發一種切割式的承載支架。其中係於一金屬料片上模塑一塑料體，隨後在進行固晶、銲線及封膠後嗣以切割的方式同時切除金屬料片及塑料及塑料體，藉此形成單獨分離之發光裝置。然而該切割時容易產生大量的塑料及金屬粉塵，嚴重汙染最終產品之表面並因此影響產品之信賴性。另外

IKEA Supply AG
Exhibit 1002 Page 92 of 519

申請案號：104103527

1042005866-0

該製程無法在封膠前進行前點亮測試，需先將最終產品單粒化後才能逐一量測。然而單粒化後之最終產品係散亂堆疊，需先進行面向及方向調整後才能利於機台量測。此需額外裝設儀器且費時不貲。

【發明內容】

【0004】 鑑於上述問題，本發明係提供一種承載支架，該承載支架係具有預先分離之承載體機械偶合於框架上，可便於可在固晶、銲線及封膠後迅速下料。同時本發明之承載支架中各承載體係彼此電性分離，可使發光二極體固晶銲線於承載體後，於下料前進行電性量測。另外，本發明亦提供由該承載支架所製成之發光裝置，藉由前述承載支架所具有之優點，可使發光裝置之生產速度及良率大幅提升。

【圖式簡單說明】

【0005】 第1圖爲本發明之承載支架之一實施態樣之局部示意圖。

第2圖爲第1圖之承載支架所用導電支架之局部示意圖。

第3圖爲第1圖之承載支架於形成塑料體後之局部示意圖。

第4圖及第4A圖爲第1圖之承載支架於移除殘餘料後之局部示意圖。

第5圖爲本發明之承載支架之一另實施態樣之局部示意。

第6圖爲本發明之一實施例的發光裝置的俯視圖。

第7圖爲本發明之另一實施例的發光裝置的俯視圖。

第8圖爲本發明之又一實施例的發光裝置的俯視圖。

第9圖爲本發明之再一實施例的發光裝置的俯視圖。

第10圖爲本發明之更一實施例的發光裝置的俯視圖。

第11圖爲本發明之其一實施例的發光裝置的俯視圖。

第12A圖至第12D圖爲本發明之其一實施例所提出的承載支架的俯視圖、沿前後方向之全剖面圖、沿左右方向之全剖面圖、及局部放大詳圖。

第13A圖至第16圖爲本發明之其一實施例所提出的承載支架之製造方法之各步驟之示意圖。

第17A圖至第17D圖爲本發明之其一實施例所提出的承載支架的俯視圖、沿前後方向之全剖面圖、沿左右方向之全剖面圖、及局部放大詳圖。

第18A圖至第22圖爲本發明之其一實施例所提出的承載支架之製造方法之各步驟之示意圖。

【實施方式】

【0006】 本發明之承載支架包含一框架以及一承載體，該承載體係包含一殼體及至少一電極部。在本發明中框架包含至少一支撐部，並與承載體機械偶合之方式結合，以使承載體支撐於框架之上。在本發明一具體實施態樣中，殼體可具有一與支撐部形狀契合之凹陷部，藉由支撐部與凹陷部間之結合以將承載體支撐於框架之上。在本發明中，凹陷部之位置並無特定限制，可在承載體之側面或底面與側面之交界。使對應之支撐部深入深入承載體之內部或僅位於承載體之底面而半露出。

【0007】 爲本發明之承載支架之一實施態樣之局部示意圖。如第1圖所示，承載支架100係包含承載體110及框架120，其中承載體110又包含殼體111及二個電極部112。框架120則包含數個支撐部121。如第1圖所示，承載支架100下方框架120係包含四個支撐部121，而

殼體111之側面與底面之交界則包含4個凹陷部（對應至支撐部121之位置），藉此使四個支撐部121位於承載體110之底面而半露出。在一實施例中，承載體110更包括一反射凹杯，用以暴露部份之電極部112。其中，電極部112由反射凹杯經由殼體111往外延伸到外部。

【0008】 框架120亦可具有一通道區122及一側部123，而通道區122設置於側部123上。通道區122爲一個貫空區域，其用以讓後述的塑料體150（如第3圖所示）流過；支撐部121亦設置於該側部123上。

【0009】 另外，在本發明中，亦可在電極部112中增加鎖孔、凹槽（電極部表面上之線狀狹縫）及階部設計。藉由鎖孔、凹槽及階部可增加承載體中殼體與電極部間的機械結合力。如第1圖所示，承載體110中之二電極部112各包含兩個鎖孔141及三條凹槽143，並且於二電極部112的被殼體111圍繞之邊緣設置有階部142，藉此增加殼體111與電極部112之結合強度。

【0010】 在本發明承載支架中，各個承載體係藉由凹陷部與支撐部之間的機械偶合而撐持於框架上，各個承載體間之電極部係彼此電性獨立。因此可在後續發光裝置固晶、銲線及封裝後進對未單粒化（即各發光裝置仍有序地撐持於框架上）之發光裝置進行電性量測。其中因各發光裝置排列整齊，可免除面向及方向調整之設備及工時，可大大提升發光裝置之生產速度。

【0011】 本發明承載支架可藉由如下方法製得。首先提供一導電支架，該導電支架包含一框架、至少一空乏區及至少一延伸部，其中框架又包含至少一支撐部。隨後於導電支架上形成一塑料體，該塑料

體係覆蓋至少部分之延伸部及至少部分之支撐部，並且填充至少部分之空乏區。嗣後分別移除部分露出殼體之延伸部及部分填充於空乏區中之塑料體，藉此形成承載體。特定言之，經此二移除步驟後，存留之塑料體即形成承載體中之殼體，而存留於塑料體上之延伸部即形成承載體中之電極部。

【0012】 以下配合第2圖至第4圖詳述第1圖中承載支架100之製作過程。首先如提供第2圖所示導電支架160，其中包含框架120、複數個空乏區130及複數個延伸部140。其中框架120亦包含複數個支撐部121，延伸部140則包含多個鎖孔141、凹槽143及階部142。最後，移除部分露出殼體之延伸部140，即形成如第1圖所示之承載支架100。

【0013】 本發明中，導電支架可由金屬片材，包含純金屬、合金及金屬複合層之片材所形成，其中複合板材較佳爲覆有較高抗氧化能力或較高焊料結合力之導電層之金屬板材，例如鍍銀銅片等。並且透過適當的方式來形成框架、延伸部及空乏區。以金屬片材爲例，較佳可以衝壓的方式形成；然而亦可以切割或者模鑄的方式形成。另外，若導電支架的導電性係不足時，亦可在提供導電支架後，先形成一導電層（圖未示）於該導電支架上（導電層的導電性高於導電支架的導電性），以增加後續的測試結果的可靠度；導電層的材料可包含銀等導電性高的材料。

【0014】 在提供導電支架後，隨後於導電支架上形成塑料體。形成塑料體的方式係無所限制，可以傳遞模塑（Transfer Moulding）、射出成型等方式形成。塑料體之原料亦無所限制，可選用目前業界常用之塑膠複合物，例如環氧樹脂（Epoxy）組成物、矽膠（

Silicon）組成物、聚鄰苯二甲醯胺（Polyphthalamide）組成物或聚苯二甲酸乙二酯(Polyethylene terephthalate) 組成物。本發明之一具體實施態樣中係使用環氧樹脂組成物，並以傳遞模塑之方式形成塑料體。在一實施例中，塑料體可以是熱固型材料，且更可包含反光材料，如二氧化鈦（TiO_2）、氧化鋅（ZnO）或氮化硼（BN）等。

【0015】 隨後如第3圖所示，於導電支架160上形成一塑料體150。塑料體150係覆蓋部分之延伸部140並完整包覆所有的鎖孔141及凹槽143。塑料體150亦填充部分之空乏區130（延伸部140上下之空乏區130並未被填中）並完整覆蓋所有的支撐部121；塑料體150亦會填充於通道區122中，並與相鄰的另一塑料體150爲一體。

【0016】 申言之，在本發明中，塑料體150之原料會在形成過程中會填充於模具的模穴及空乏區間。在此步驟中殼體111與殘餘料151仍爲一體。殘餘料151之界定範圍係視後續產品之應用範圍而定。如第3圖所示，虛線所爲之部分即爲本實施例中所定義之殘餘料151。隨後如第4圖所示，移除被定義之殘餘料151，藉此形成承載體110中之殼體111。

【0017】 若通道區122有填充塑料體150時，可分成至少二道步驟來移除殘餘料151，例如先移除填充於通道區122的殘餘料151後、再移除填充於空乏區130的殘餘料151，反之亦可。此舉可簡化每一步驟中用以移除殘餘料151的刀具的配置，使得刀具之間的距離足夠，亦可使刀具有較佳的強度。

【0018】 最後，移除部分露出於殼體111外的延伸部140，以形成如第1圖

所示之的承載支架100。在移除延伸部140之前，可選擇地以一長度大於通道區122的刀具來移除通道區122兩旁的部分框架120，以將通道區122內可能尚存的殘餘料151移除乾淨，從而避免殘餘料151脫落至電極部112或發光二極體晶片而產生損害上。通當道區122兩旁的部分框架120被移除後，通道區122的長度會增加，如第4A圖所示。

【0019】 因此，本實施例的製造方法可選擇地對導電支架160進行兩道或以上的移除步驟，亦可對塑料體150（殘餘料151）進行兩道或以上的移除步驟。

【0020】 在本發明中，殘餘料151及延伸部140係分別移除。特定言之，移除殘餘料151及延伸部140之順序並無特殊限制，惟其分別移除即可。舉例言之，可同時移除全部的殘餘料151後再同時移除全部的延伸部140、亦可同時移除全部的延伸部140後再移除全部的殘餘料151，或者亦可分階段地除部分的殘餘料151及延伸部140，兩者可交互進行。移除方法係無所限制，舉例言之，可以切割、衝壓等方式進行，較佳係以衝壓方式進行。在本發明之實施例中係以衝壓爲例。

【0021】 本發明可針對移除部分的機械特性加以調整器具及工作強度。特定言之，分別移除步驟可避免同時移除不同材料時所造成之缺點，例如應力不均所造成之缺面缺陷、移除工具（刀具）損壞等。另外，較於移除延伸部，移除塑料體時通常會產生塑料體的粉塵。該等粉塵需以強大外力作用才可去除乾淨，例如強風吹拂、抖動或超音波。倘若同時移除殘餘料及延伸部後進行清潔，此時承載體與框架間的作用力恐難撐持而有落料之虞。因此，本發明較

佳係先移除殘餘料後進行清潔工作（即清潔塑料體），隨後再移除延伸部。藉此，可利用延伸部強化承載體與框架間之連結強度，避免清潔時落料的情況產生，最後再移除延伸部。

【0022】 移除後延伸部會於承載體之電極部上產生至少一電極部截面，而移除後殘餘料會於承載體之殼體上產生一殼體截面。在本發明中，視最終產品之安全規範或客戶需求等條件，電極部截面與殼體截面可於承載體之同一面或不同面。又在電極部截面與殼體截面爲承載體同一面之情況下，電極部截面與殼體截面可齊平（構成一平直之面）或者不齊平（非構成一平直之面）。

【0023】 如第1圖所示，電極部112具有一外露於殼體之翼部112A，翼部112A係具有一中央外突出區（或稱中央區域）112A1及二外側邊緣區域（或稱邊緣區域）112A2。在第1圖所示之實施例中，每一邊緣區域112A2包含一個電極部截面，該等電極部截面與殼體111之殼體截面111A的部份區域爲齊平者，此時承載體具有較平整的外觀。然而，亦可如第5圖所示，電極部112之翼部112A具有一中央外突出區112A1及二外側邊緣區域112A2，電極部112之電極部截面與殼體111之殼體截面111A非齊平者，此時電極部112具有額外的側面積，可增加與銲料間的結合力，進而增強發光裝置於後續打件後之打件強度。

【0024】 另外，在導電支架爲抗氧化層之金屬複合片材之情況下，於電極部截面會產生未覆有抗氧化層之截面。在本發明中，未覆有抗氧化層之截面較佳係與電極部之中央區域一體。蓋於後續之打件過程中銲料可沿著翼部之側面爬升並覆蓋側面，此時至少部分之未覆有抗氧化層的截面可被銲料覆蓋，可減少截面部位發生氧化之

機率。另外未覆有抗氧化層之截面與相鄰接的中央區域之表面同側，較佳係形成連續的面，以減少電極部產生尖端或毛邊，進而造成後續加工機台的損耗，更甚者會於尖端或毛邊處產生電荷累積之效應，影響末端產品之信賴性。

【0025】 本發明亦提供一種由本發明承載支架所製得之發光裝置，該發光裝置係包含一承載體、一發光二極體晶片及一封裝體。該發光二極體晶片係承載於承載體之中被封裝體所覆蓋。在本發明中封裝體之材料可爲環氧樹脂或矽膠等塑膠材料之複合物。另外，本發明之發光裝置可視需要添加螢光材料於封裝體之中，舉例之螢光材料有：鋁酸鹽螢光物質（諸如，經摻雜的釔鋁氧化物化合物、經摻雜的鐿鋁氧化物化合物、經摻雜的鋱鋁氧化物化合物或其組合）、矽酸鹽螢光物質、硫化物螢光物質、氧氮化物螢光物質、氮化物螢光物質、氟化物螢光物質或其組合。

【0026】 本發明之發光裝置可以藉由以下方法所製得。首先提供前述之承載支架。隨後提供一發光二極體晶片並將其固晶、銲線於承載體之反射凹杯之中。嗣後以封裝膠體填充反射凹杯以封裝密封發光二極體晶片，即形成位於框架上之發光裝置。最後分離發光裝置及框架（即分離框架承載體與框架，例如以擠壓方式進行分離），以形成單獨的發光裝置。

【0027】 本發明中亦可提供多個發光二極體晶片於承載體中，該等發光二極體晶片可發射出相同或不同屏譜之光。在固定發光二極體晶片後可進行銲線工作以將發光二極體晶片與電極部電性連接。其中可視最終產品需要於亦可提供其他電子元件，例如齊納二極體或熱敏電阻等。

【0028】 請參考第6圖，其爲本發明之一實施例之發光裝置的俯視圖。電極部112之翼部112A具有一中央區域112A1及兩邊緣區域112A2，且中央區域112A1係突出於兩邊緣區域112A2。翼部112A係突出於殼體111之殼體截面111A之外，使得電極部112之翼部112A的中央區域1112A1與殼體111之殼體截面111A爲非共平面。其中間隔D1爲電極部112之翼部112A的中央區域及殼體111之殼體截面111A的內側區域之間的距離，約爲0.1mm。間隔D2爲電極部112之翼部112A的中央區域112A1及殼體111之翼部112A的外側區域之間的距離，即電極部112之翼部112A的中央區域112A1及殼體111之翼部112A，約爲0.05mm。

【0029】 請參考第7圖，其爲本發明之另一實施例之發光裝置的俯視圖。電極部112之翼部112A具有一中央區域112A1及兩邊緣區域112A2，且突出於殼體111之殼體截面111A之外，使得電極部112之翼部112A與殼體111之殼體截面111A爲非共平面。其中間隔D1爲電極部112之翼部112A的中央及殼體111之殼體截面111A的內側區域之間的距離，約爲0.1mm。間隔D3爲電極部112之翼部112A的中央區域112A1及殼體111之截面111A的外側區域之間的距離，約爲0.075mm。

【0030】 請參考第8圖，其爲本發明之再一實施例之發光裝置的俯視圖。電極部112之翼部112A具有一中央區域112A1及兩邊緣區域112A2，且該中央區域112A1係凹陷於兩邊緣區域112A2，又該兩邊緣區域112A2之電極部截面爲斜面。翼部112A係凹陷於殼體111之截面111A之內，使得電極部112之翼部112A與殼體111之截面111A爲非共平面。其中間隔D4爲殼體111之截面111A的外側區域及內側區

域之間的距離，約爲0.05mm。間隔D5爲電極部112之翼部112A的中央及殼體111之截面111A的外側區域之間的距離，約爲0.025mm。

【0031】 請參考第9圖，其爲本發明之又一實施例之發光裝置的俯視圖。電極部112之翼部112A具有一中央區域112A1及兩邊緣區域112A2，且該中央區域112A1係突出於兩邊緣區域112A2，又該兩邊緣區域112A2之電極部截面爲斜面。該翼部112A係突出於殼體111之截面111A之外，使得電極部112之翼部112A與殼體111之截面111A爲非共平面。

【0032】 請參考第10圖，其爲本發明之更一實施例之發光裝置的俯視圖。電極部112之翼部112A爲一外凸曲面，即中央區域之外表面與邊緣區域之外輪廓（電極部截面）係形成一連續的外凸曲面。翼部112A係突出於殼體111之截面111A之外，使得電極部112之翼部112A與殼體111之截面111A爲非共平面。

【0033】 請參考第11圖，其爲本發明之其一實施例的發光裝置的俯視圖。電極部112之翼部112A爲一內凹曲面，即中央區域之外表面與邊緣區域之外輪廓（電極部截面）係形成一連續的內凹曲面。翼部112A凹陷於殼體111之截面111A之內，使得電極部112之翼部112A與殼體111之截面111A爲非共平面。

【0034】 請參考第12A圖至第12D圖，其爲本發明之其一實施例所提出的承載支架100’的各示意圖（即俯視圖、沿前後方向之全剖面圖、沿左右方向之全剖面圖、及局部放大詳圖）。該承載支架100’與前述的承載支架100相似，也就是，該承載支架100’同樣包含

一框架120及一承載體110，該框架120包含至少一支撐部121，而該承載體110具有一殼體111及至少一電極部112，該殼體111藉由該支撐部121而機械偶合於該框架120；因此，上述各元件的技術內容可參考承載支架100的對應者。

【0035】 較佳地，該至少一電極部112可爲相分隔的二電極部112，以作爲承載體110的陽極端及陰極端。該二電極部112被該框架120環繞，即二電極部112位於框架120本身所圍繞而成的空間之中。該二電極部112與該框架120可藉由至少一空乏區130來分隔，使得兩者不會相接觸，進而使得該二電極部112與該框架120相電性隔離。

【0036】 該框架120之支撐部121朝著該二電極部112的其中之一延伸，但不會接觸到電極部112。本實施例中支撐部121爲四個，分布於電極部112的兩側。殼體111可至少包覆該支撐部121及至少部份的二電極部112，且至少設置於部分的空乏區130中；藉此，殼體111藉由支撐部121與框架120相機械地耦合，而殼體111與二電極部112亦相機械相耦合，使得殼體111及二電極部112保持在框架120之中而不脫落。

【0037】 進一步說明電極部112的形狀特徵。請配合參閱第13A圖，該二電極部112之每一個具有相對設置（即相反設置）的一翼部112A及內側面112B，該翼部112A可暴露出殼體111之殼體截面111A外（可參考前述第6圖至第11圖的相關說明），且與另一電極部112之翼部112A不相面對；該二電極部112之內側面112B可爲相面對，且至少部分的該二電極部112可被殼體111包覆住。

【0038】 該二電極部112之每一個更具有相對設置的二連接面112C，其連接該翼部112A及內側面112B，即連接面112C的一邊緣（如前邊）連接翼部112A的一邊緣（如左邊），而連接面112C的另一邊緣（如後邊）連接內側面112B的一邊緣（如左邊）。該翼部112A、內側面112B及二連接面112C可爲非平面，也就是，該翼部112A、內側面112B及二連接面112C可爲凹凸起伏或階梯狀的表面。

【0039】 該二電極部112之每一個更可具有至少一個凹部1121，該凹部1121可設置於該連接面112C上，以使得連接面112C成爲凹凸起伏的表面。該凹部1121可增加電極部112與殼體111(塑料體150)之間的接觸面積並且藉由幾何對應關係增加電極部112與殼體111間之卡固作用，以使得電極部112與殼體111之間的結合力較強。若凹部1121爲多個時，各凹部1121的尺寸可設計成不一致，以因應電極部112與殼體111之間不同處的所需結合力。

【0040】 該二電極部112的翼部112A、內側面112B及二連接面112C可將該至少一空乏區130區分爲複數個空乏區130，即該些空乏區130可分別爲一間隙131、二第一貫穿槽132及二第二貫穿槽133，彼此相連通。間隙131設置於該二電極部112的內側面112B之間，而該二第一貫穿槽132沿著該二電極部112的二連接面112C而設置，也就是，一個第一貫穿槽132會由其中一個電極部112的一個連接面112C的一邊緣延伸至另一個電極部112的同面向的一個連接面112C的一邊緣；該二第一貫穿槽132位置上爲相分隔。

【0041】 該二第二貫穿槽133則沿著該二電極部112的翼部112A而設置，也就是，一個第二貫穿槽133僅在其中一個電極部112的翼部112A延伸；該二第二貫穿槽133位置上亦爲相分隔。

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【0042】 框架120之支撐部121可朝著該二電極部112的二連接面112C的其中之一，延伸至該二第一貫穿槽132之其中之一中。該殼體111可選擇地設置於該二第一貫穿槽132及/或該間隙131中。此外，該殼體111之殼體截面111A可以至少包含一彎曲面，例如可具有一圓角111R，如第12D圖所示，其殼體截面爲圓角，其連接至該電極部112之電極部截面112A2。該圓角111R可分散撞擊力量，使得單粒化的承載體110在做震動測試時，圓角111R不易被撞斷或撞裂。此外，在如第12D圖所示之實施態樣中，該殼體截面與該電極部截面係非構成一平直之面，即殼體截面與該電極部截面係非齊平者。

【0043】 綜上，承載支架100’亦可使得各個承載體110的電極部112彼此電性獨立，因此在後續的發光裝置固晶、銲線及封裝完成後，可直接對未單粒化之發光裝置進行電性量測，大幅提升發光裝置之生產速度。另說明的是，承載支架100’的技術內容亦可供承載支架100參照。

【0044】 本發明之其中一實施例又提出一種承載支架之製造方法，其可至少製造出上述承載支架100’。該承載支架100’的製造方法與前述承載支架100的製造方法相似，該承載支架100’的製造方法包含以下步驟。

【0045】 請參閱第13A圖至第13C圖，首先提供一導電支架160，該導電支架160包含一框架120，而該框架120包含至少一支撐部121、至少一空乏區130及至少一延伸部140。該至少一空乏區130可對應承載支架100’的一間隙131、二第一貫穿槽132及二第二貫穿槽133，但此時該二第一貫穿槽132及該二第二貫穿槽133尚未相連通。

該至少一延伸部140可對應承載支架100’的二電極部112，但此時該二電極部112尚未與框架120相分離。

【0046】 請參閱第14圖，接著於第二步驟中，形成一塑料體150。該塑料體150覆蓋至少部分之該延伸部140及至少部分之該支撐部121，且該塑料體150填充至少部分之該空乏區130。舉例而言，塑料體150部分地覆蓋延伸部140之二電極部112，完整地覆蓋代支撐部121，且塑料體150填充於空乏區130的間隙131及二第一貫穿槽132中，但沒有填充於第二貫穿槽133中。此外，塑料體150可與延伸部140的凹部1121（如第13A圖所示）相接觸，以增加塑料體150與延伸部140之間的接觸面積。

【0047】 請參閱第15圖，於第三步驟中，移除部分填充於空乏區130的塑料體150，也就是，將填充於該二第一貫穿槽132中的部分塑料體150移除。欲移除的塑料體150稱爲殘餘料151(如第14圖所示)，該殘餘料151的範圍將依據產品的具體形狀而定。於本實施例中，填充於該二第一貫穿槽132的兩末端區域中的塑料體150將被移除，以使塑料體150的四個角落的凸角被移除。剩餘的塑料體150即形成承載支架100’的殼體111。

【0048】 請參閱第16圖，於第四步驟中，移除部分露出塑料體150之延伸部140，以使得延伸部140的剩餘部分與框架120相分隔。換言之，於此步驟中，該第二貫穿槽133兩旁的延伸部140（如第15圖所示）會被移除，以使得該第二貫穿槽133連通至第一貫穿槽132。剩餘的延伸部140即形成承載支架100’的電極部112。

【0049】 當上述步驟完成後，承載支架100’即可被製造出。上述步驟的

若干細部技術內容可參照承載支架100的製造方法，例如導電支架160上可先形成一導電層、第三步驟及第四步驟的實施順序可互換、第四步驟實施前可先清潔塑料體150等。

【0050】 請參考第17A圖至第17D圖，其爲第本發明之其一實施例所提出的承載支架100”的各示意圖（即俯視圖、沿前後方向之全剖面圖、沿左右方向之全剖面圖、及局部放大詳圖），其顯示出一個以上的承載支架100”。

【0051】 該承載支架100”與前述的承載支架100及100’相似，故彼此的技術內容應可相互參照。而欲說明的是，承載支架100”之框架120具有一側部123及一通道區122，該側部123可由兩個承載支架100”的框架120所共有，換言之，兩個承載支架100”的框架120可藉由共有的側部123而爲一體；此外，兩個承載支架100”的承載體110被該側部123相分隔。該通道區122設置於該側部123中，並連通於每個承載支架100”的該二第一貫穿槽132之其中之一。另說明的是，該殼體111之殼體截面111A可以至少包含一彎曲面，例如可具有一圓角111R，而該圓角111R連接至框架120的側部123。此外，該電極部112之電極部截面同樣可至少包含一彎曲面，而上述所述之彎曲面皆不限於單一曲率。即其邊緣區域之外輪廓呈現一彎曲線。該電極部截面與該圓角111R係不相鄰。藉由彎曲的擊部截面，可分散撞擊力量。同時，在如第17D圖所示之實施例中，該殼體截面與該電極部截面係非構成一平直之面，即殼體截面與該電極部截面係非齊平者。

【0052】 在功效上，承載支架100”亦可使得各個承載體110的電極部112彼此電性獨立，因此在後續的發光裝置固晶、銲線及封裝完成後

，可直接對未單粒化之發光裝置進行電性量測，大幅提升發光裝置之生產速度。

【0053】 本發明之其中一實施例又提出一種承載支架之製造方法，其可至少製造出上述承載支架100”。該承載支架100”的製造方法與承載支架100’的製造方法相似，故兩製造方法的相同技術內容將省略或簡化描述。該承載支架100”可包含以下步驟。

【0054】 請參閱第18A圖至第18C圖，首先提供一導電支架160，本實施例以二導電支架160爲例。每一個導電支架160包含至少一框架120，而該框架120包含至少一支撐部121、至少一側部123、至少一通道區122、至少一空乏區130及至少一延伸部140。該通道區122設置於該側部123上，並與空乏區130相連通。

【0055】 請參閱第19圖，接著於第二步驟中，形成一塑料體150。該塑料體150覆蓋每一個導電支架160的至少部分之該延伸部140及至少部分之該支撐部121，且該塑料體150填充至少部分之該空乏區130。該塑料體150還填充於通道區122中，也就是，塑料體150會經過通道區122，以覆蓋另一導電支架160。此外，塑料體150還會與延伸部140的凹部1121（如第18A圖所示）相接觸，以增加塑料體150與延伸部140之間的接觸面積。

【0056】 請參閱第20圖，於第三步驟中，移除填充於該通道區122中之該塑料體150。塑料體150的移除可藉由一步驟來完成或由多道步驟來完成。具體而言，採取一道步驟時，一長度大於通道區122的刀具會被使用，以將通道區122兩旁的部分框架120、連同通道區122內的塑料體150一併移除。因此，通道區122內的塑料體150移

除後，通道區122將略微變長。

【0057】 採取多道步驟時，首先使用一長度略小於通道區122的刀具，將通道區122內的部分塑料體150移除，接著再使用另一刀具將通道區122內的剩餘塑料體150透過刮除等動作來移除。

【0058】 請參閱第21圖，於第四步驟中，移除部分填充於空乏區130的塑料體150，也就是，將填充於該二第一貫穿槽132中的部分塑料體150（例如四個角落的殘餘料151，如第20圖所示）移除。當第三及第四步驟完成後，未被移除的剩餘塑料體150即形成承載支架100”的殼體111。

【0059】 請參閱第22圖，於第五步驟中，移除部分露出塑料體150之延伸部140（如第21圖所示），以使得延伸部140的剩餘部分與框架120相分隔。換言之，於此步驟中，該第二貫穿槽133兩旁的延伸部140會被移除，以使得該第二貫穿槽133連通至第一貫穿槽132。剩餘的延伸部140即形成承載支架100”的電極部112。

【0060】 當上述步驟完成後，承載支架100”即可被製造出。值得一提的是，上述第三至第五步驟的實施順序可互換，並不限定。

【0061】 雖然上文描述了本揭露的數個實施例，但本揭露的範疇不限於所揭露的實施例，且無法限於所揭露的實施例。更具體言之，一般熟習此項技術者可基於所揭露的實施例而進行各種偏差及改良，且此等偏差及改良仍處於本揭露的範疇內。因此，根據本揭露而頒佈的專利的保護範疇由下文提供的申請專利範圍來確定。

【符號說明】

【0062】 100、100’、100”：承載支架

110：承載體

111：殼體

111A：殼體截面

111R：圓角

112：電極部

112A：翼部

112A1：中央外突出區、中央區域

112A2：外側邊緣區域、邊緣區域、電極部截面

112B：內側面

112C：連接面

1121：凹部

120：框架

121：支撐部

122：通道區

123：側部

130：空乏區

131：間隙

132：第一貫穿槽

133：第二貫穿槽

140：延伸部

141：鎖孔

142：階部

143：凹槽

150：塑料體

151：殘餘料

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1042005866-C

【發明申請專利範圍】

【第1項】 一種承載體，包含：

至少一電極部，各個電極部係具有一電極部截面；以及

一殼體，具有一殼體截面，該殼體係包覆至少部分的該至少一電極部；

其中該殼體截面或該電極部截面可至少包含一彎曲面。

【第2項】 如請求項1所述的承載體，其中該電極部具有一中央區域及二邊緣區域，該電極部截面係位於該邊緣區域上。

【第3項】 如請求項1所述的承載體，其中該殼體截面具有一圓角。

【第4項】 如請求項3所述的承載體，其中該圓角連接該殼體截面。

【第5項】 如請求項2所述的承載體，其中該電極部截面與該中央區域係非共平面。

【第6項】 一種承載體，包含：

至少一電極部，各個電極部係具有一電極部截面；以及

一殼體，具有一殼體截面，該殼體係包覆至少部分的該至少一電極部；

其中該殼體截面與該電極部截面係非齊平。

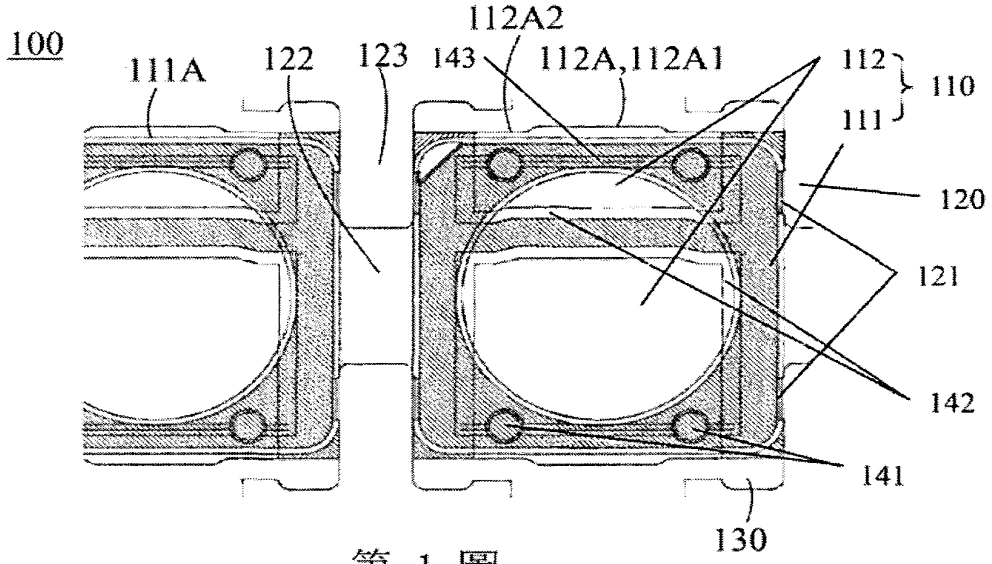
【第7項】 如請求項6所述的承載體，其中該電極部具有一中央區域及二邊緣區域，該電極部截面係位於該邊緣區域上。

【第8項】 如請求項7所述的承載體，其中該中央區域係突出於該等邊緣區域。

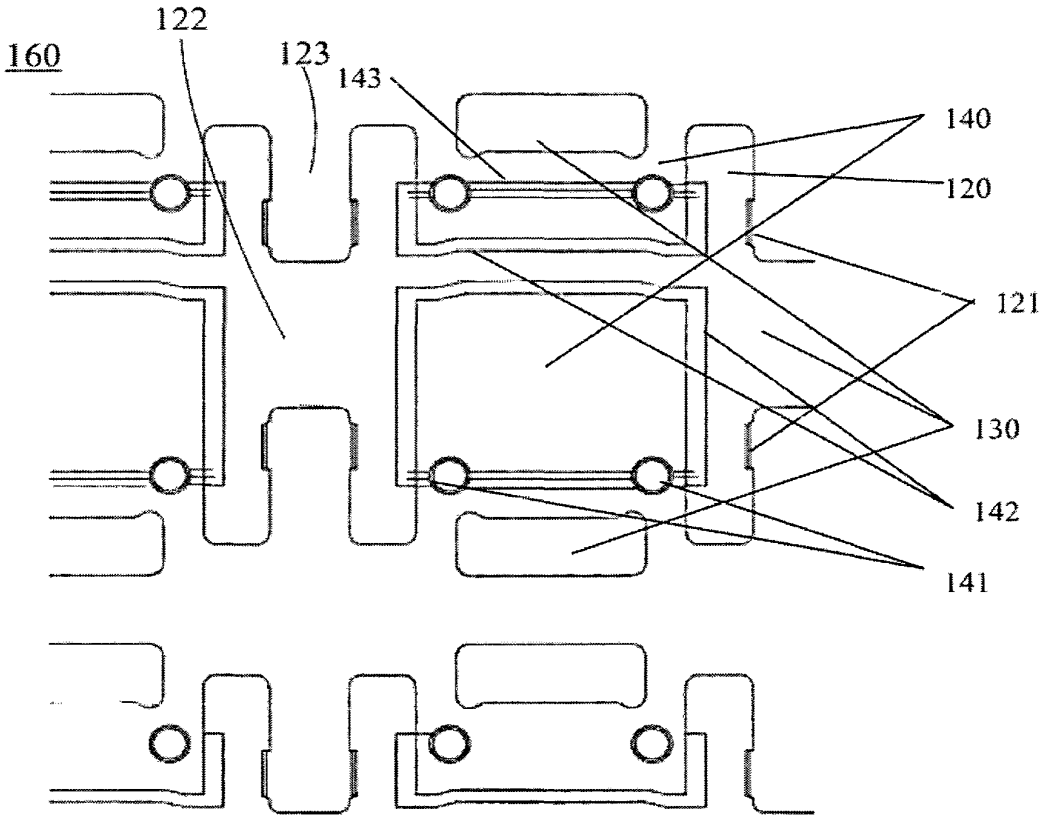
【第9項】 如請求項7所述的承載體，其中該電極部截面爲一斜面。

【第10項】 如請求項7所述的承載體，其中該電極部截面與該中央區域係非共平面。

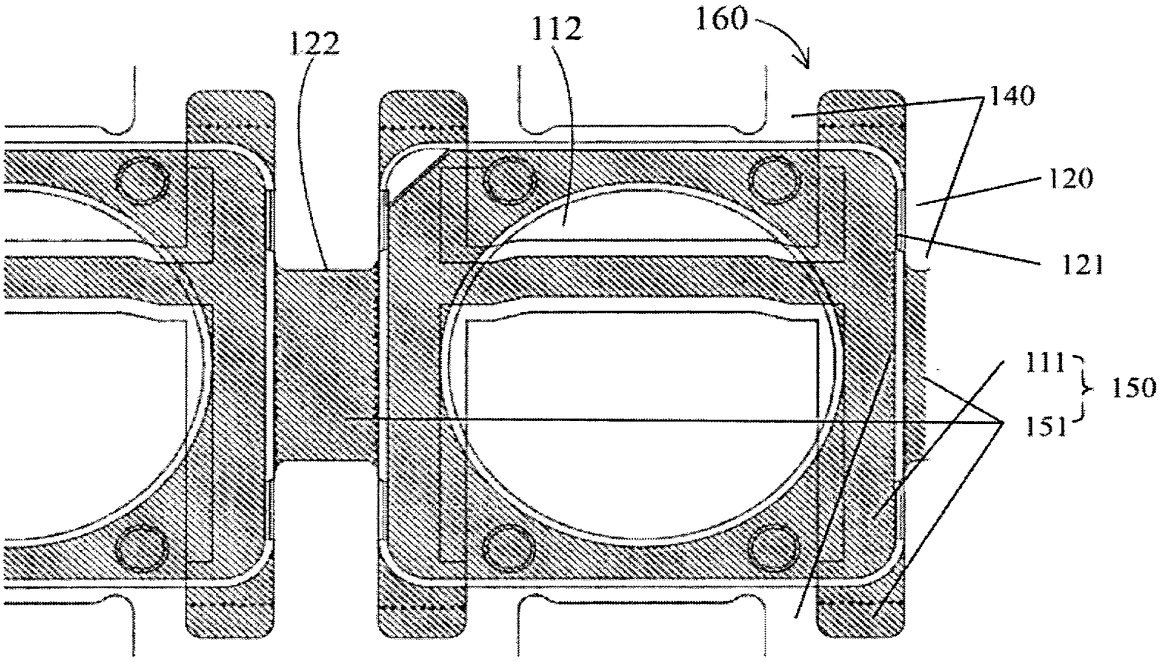
【發明圖式】


100
111A
122
123
143
112A2
112A,112A1
112
110
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142
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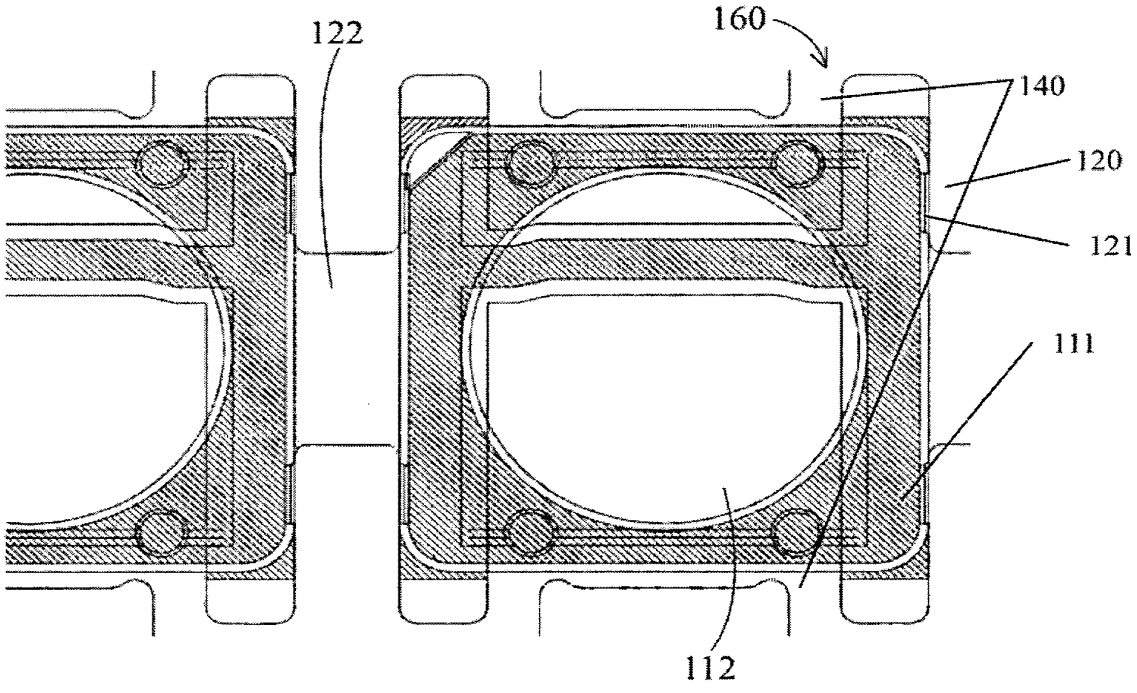
第 1 圖


160
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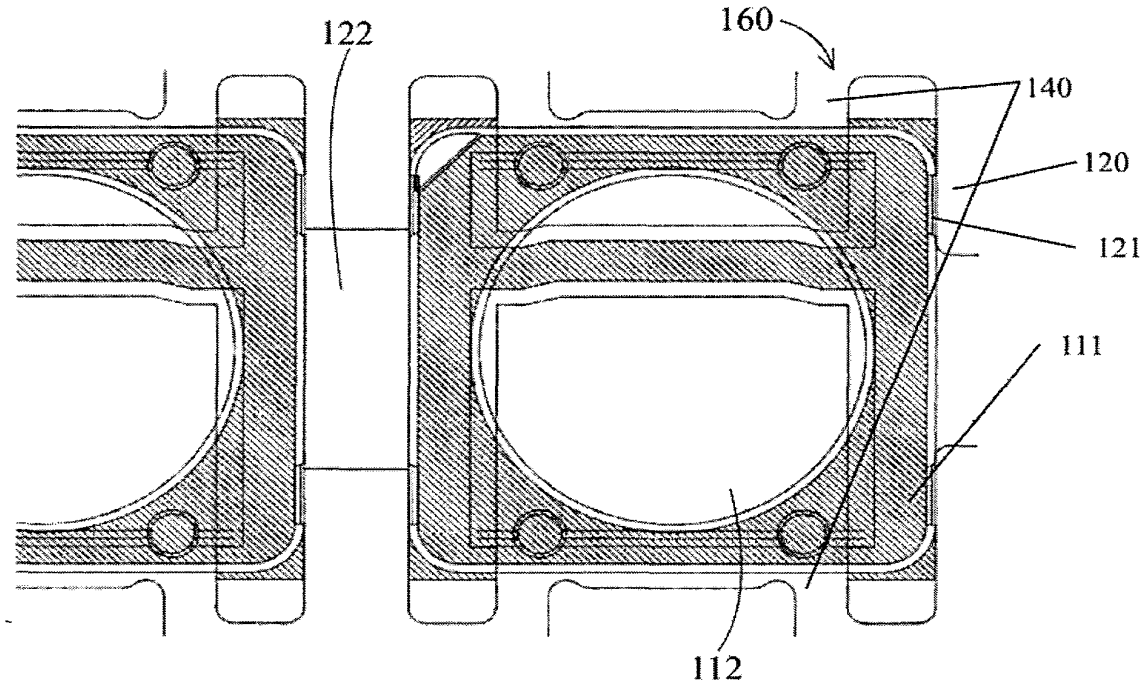
第 2 圖



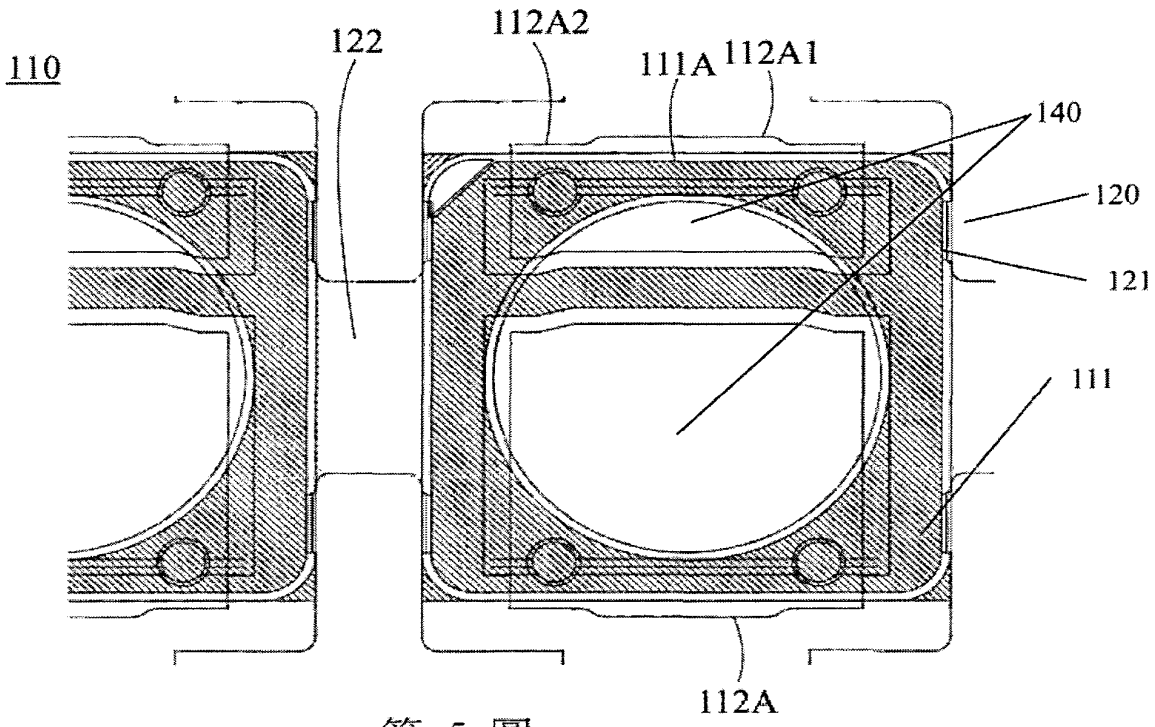
第 3 圖



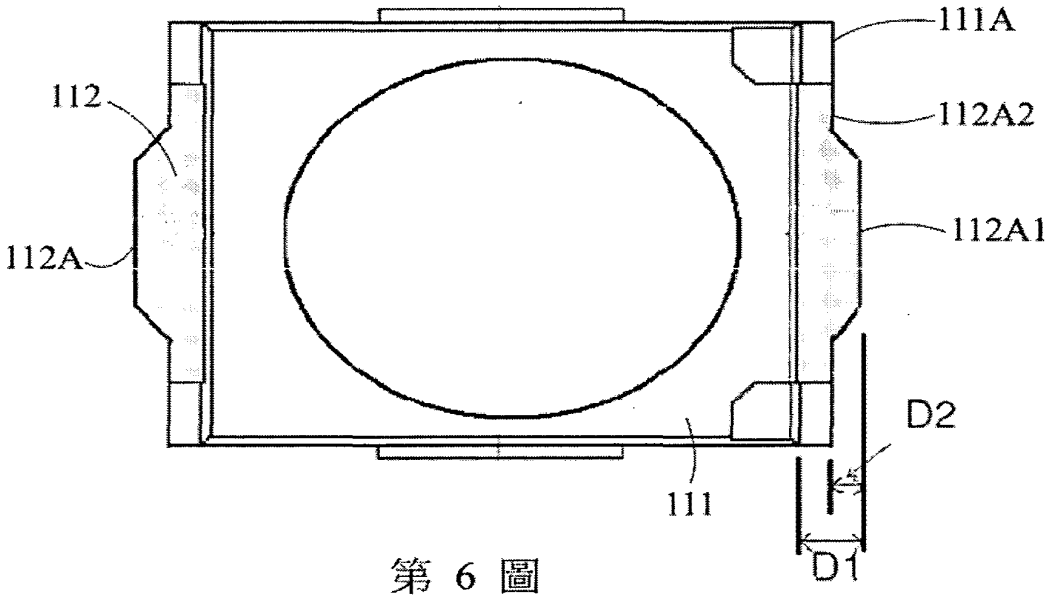
第 4 圖



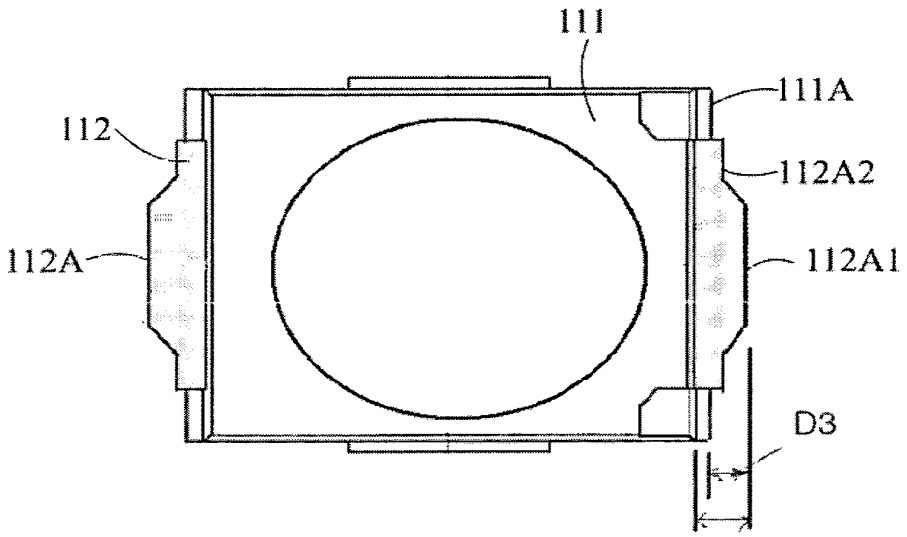
第 4A 圖


110
122
112A2
111A
112A1
140
120
121
111
112A

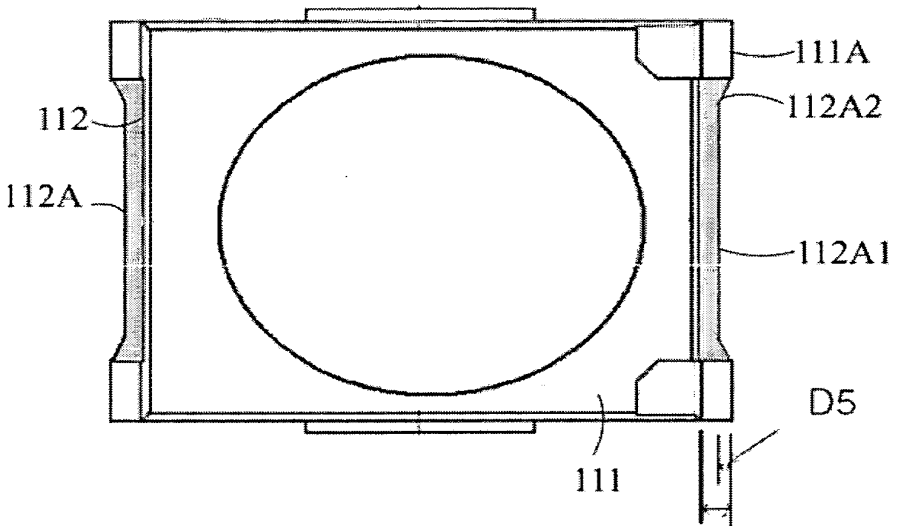
第 5 圖


111A
112
112A2
112A
112A1
D2
111
D1

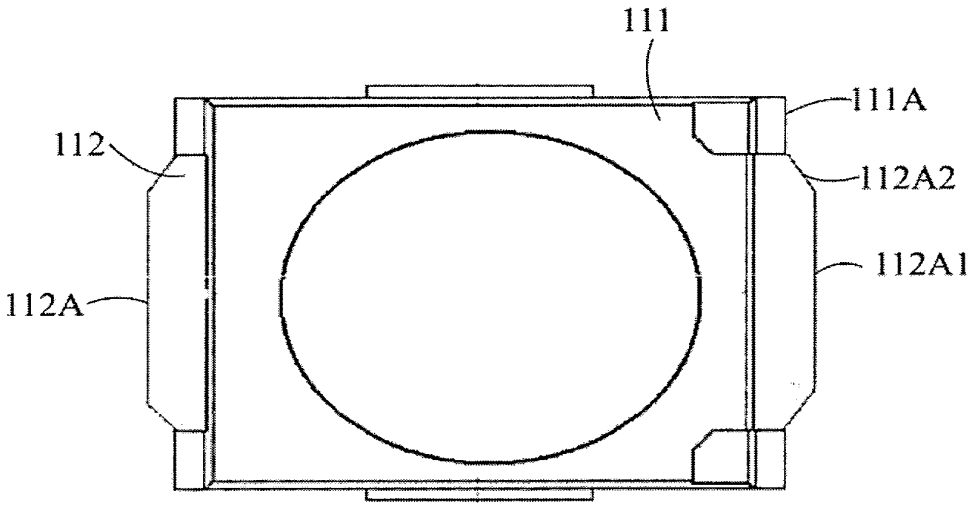
第 6 圖


111
111A
112
112A2
112A
112A1
D3
D1

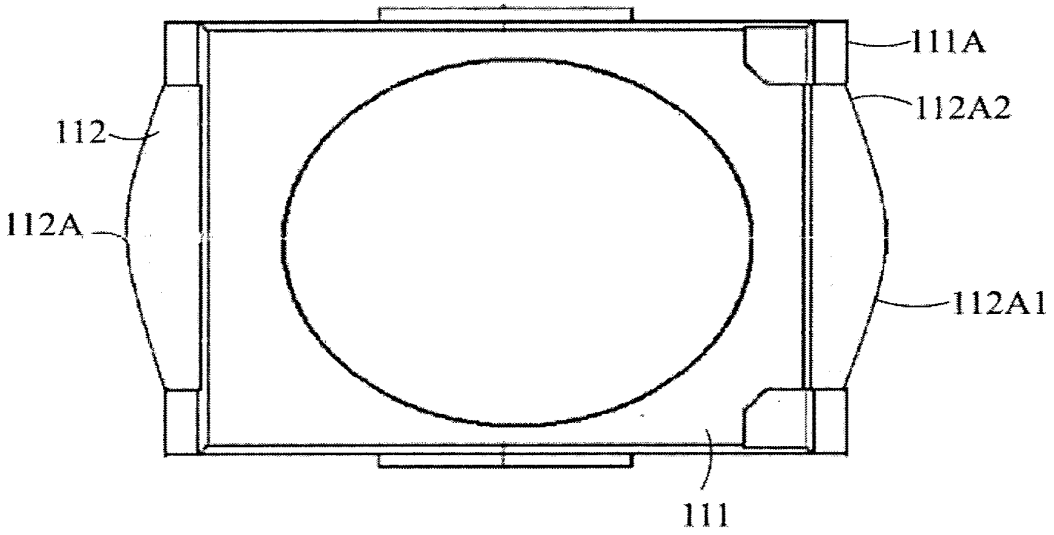
第 7 圖


111A
112
112A2
112A
112A1
D5
111
D4

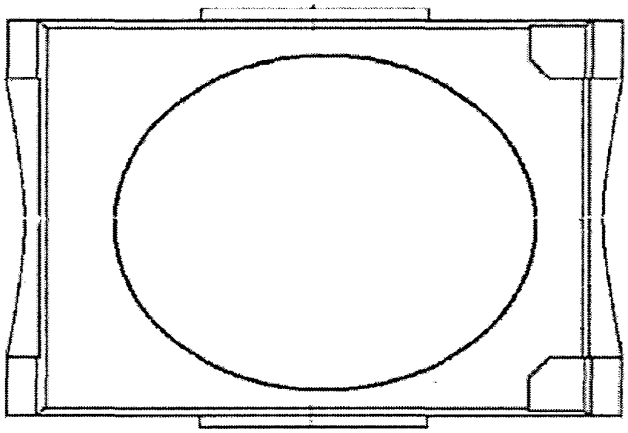
第 8 圖



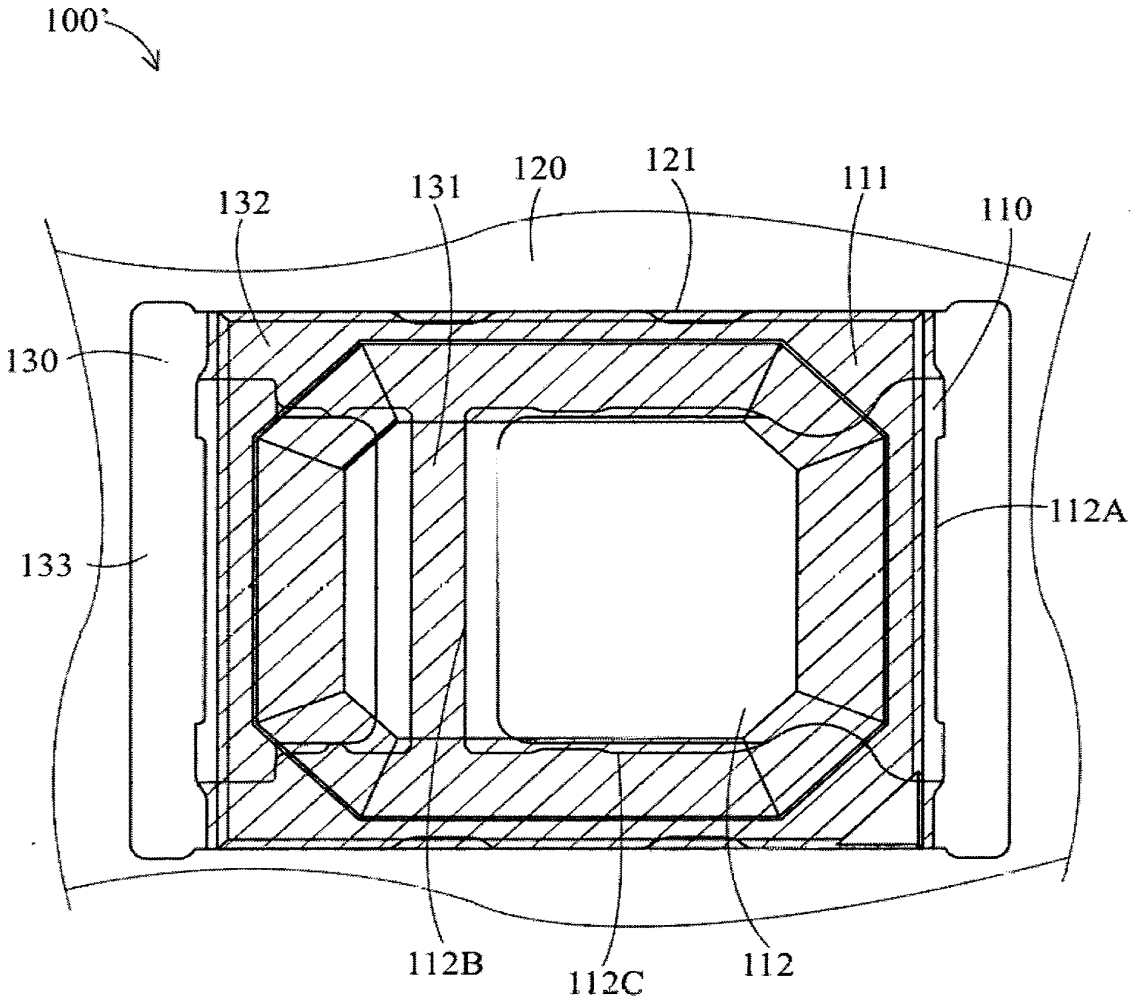
第 9 圖



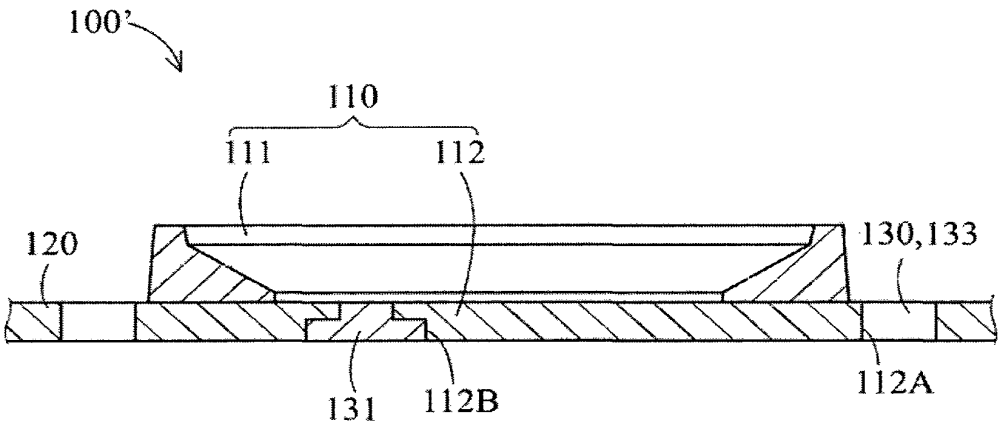
第 10 圖



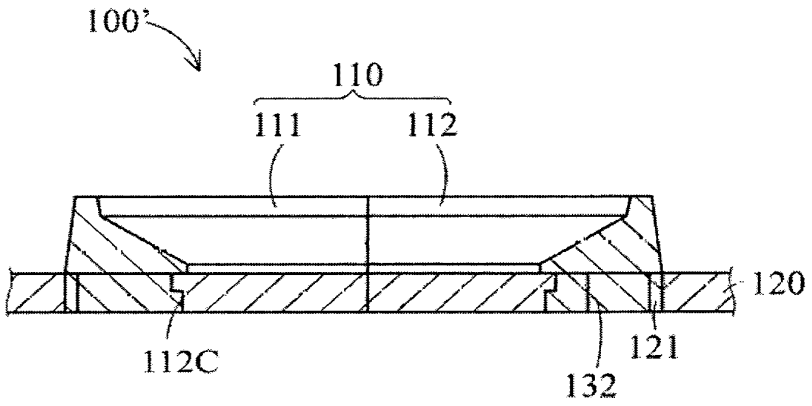
第 11 圖



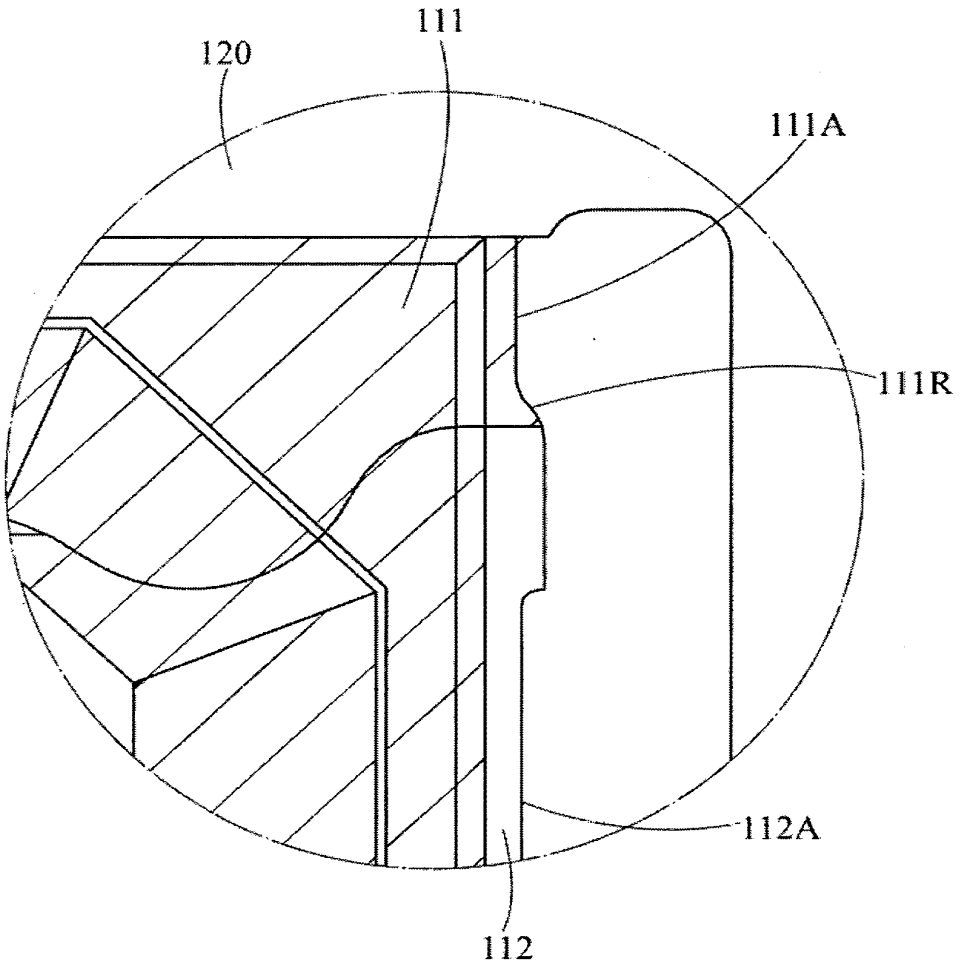
第 12A 圖



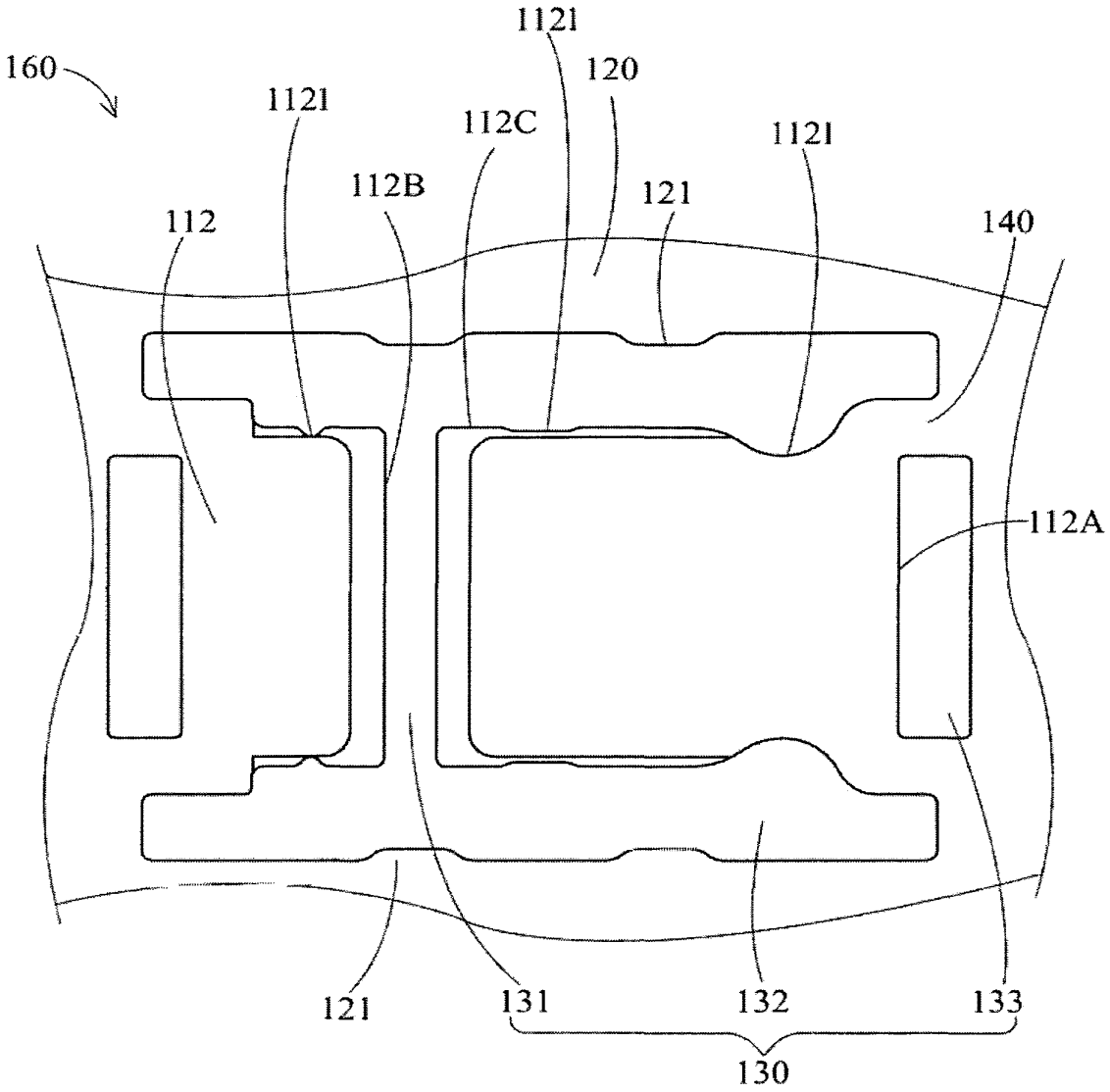
第 12B 圖



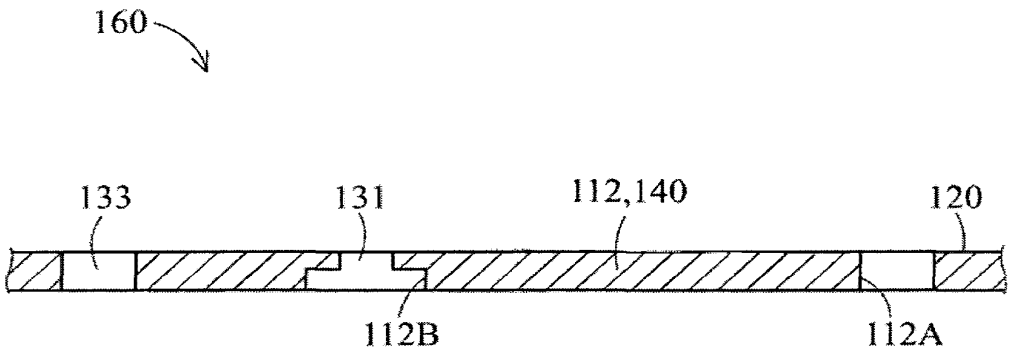
第 12C 圖



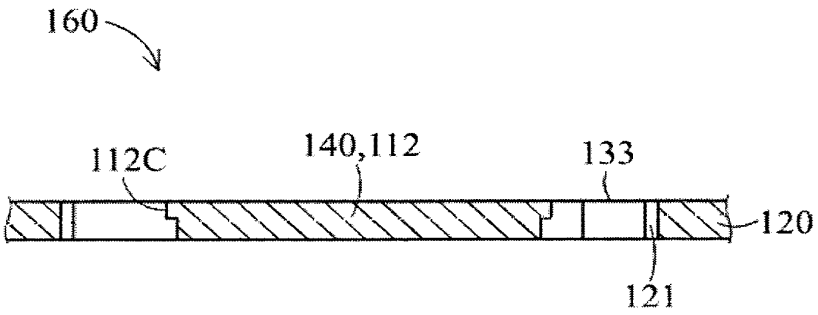
第 12D 圖


160
1121
1121
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112C
1121
112B
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112A
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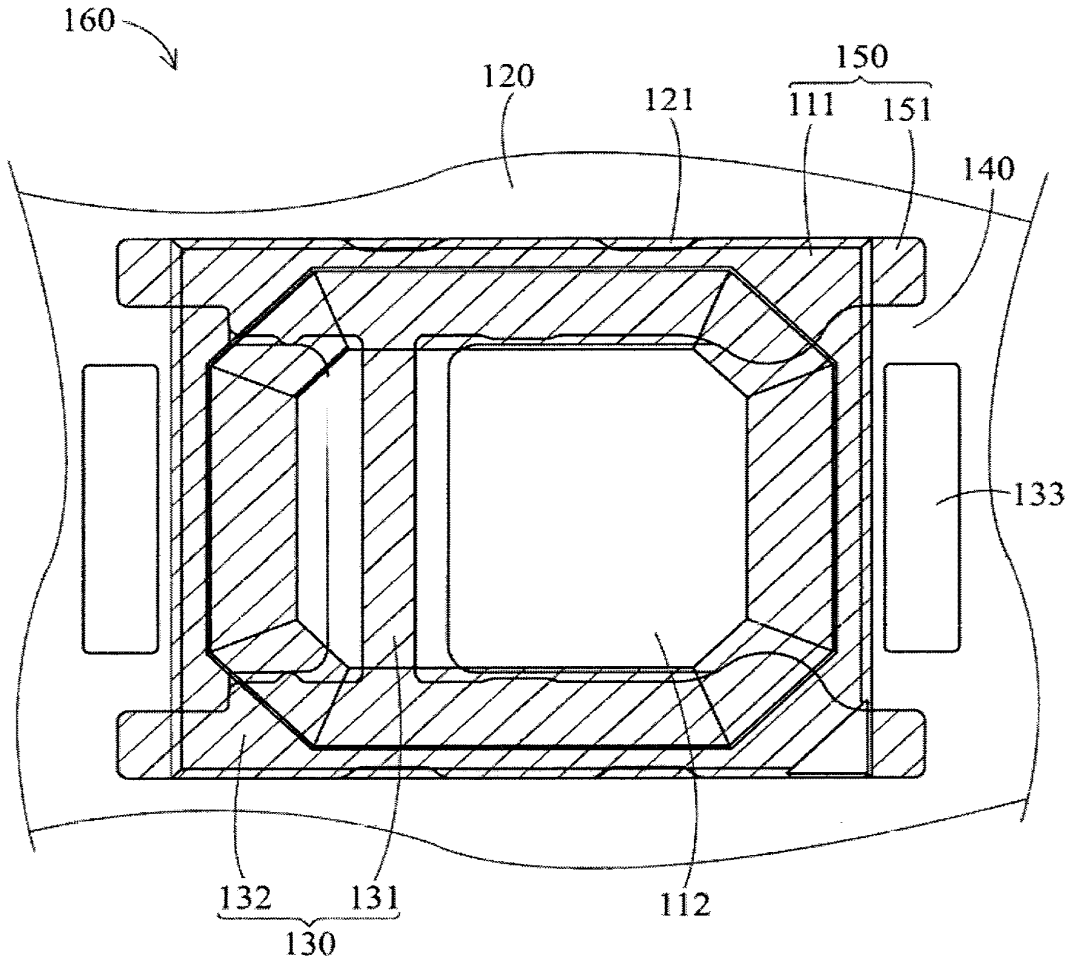
第 13A 圖



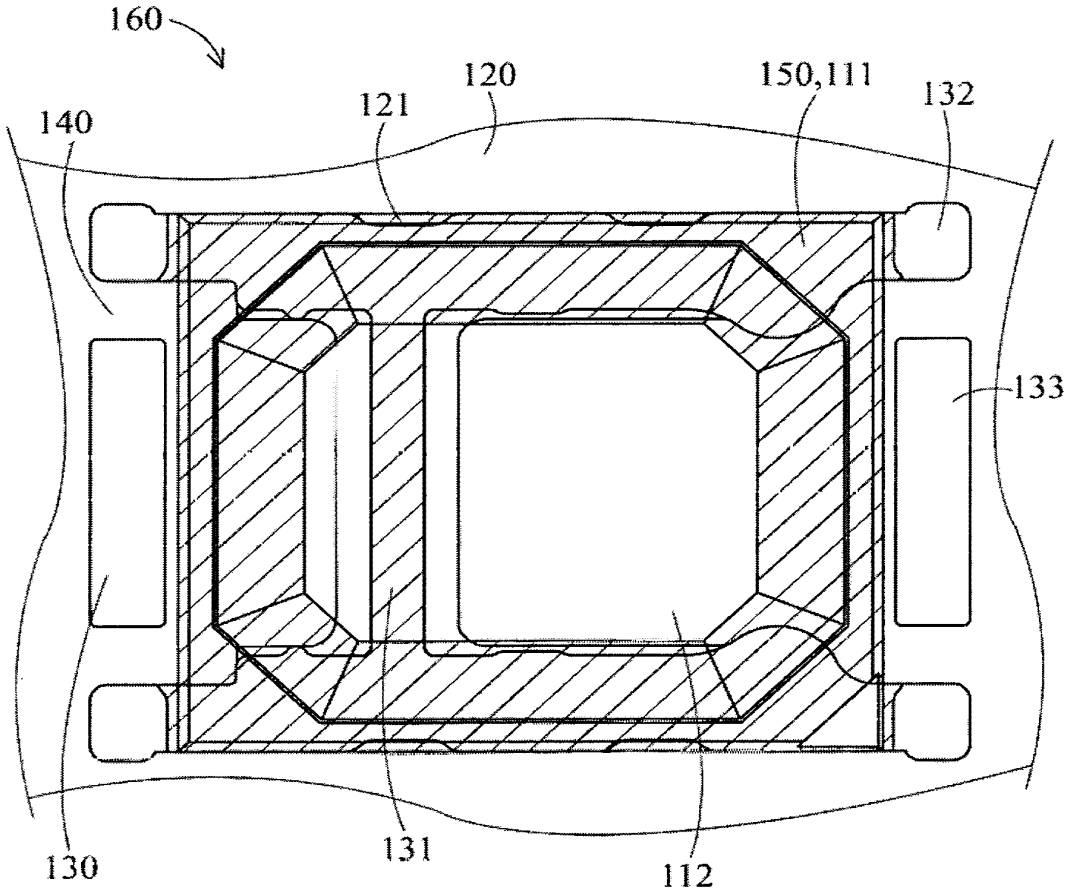
第 13B 圖



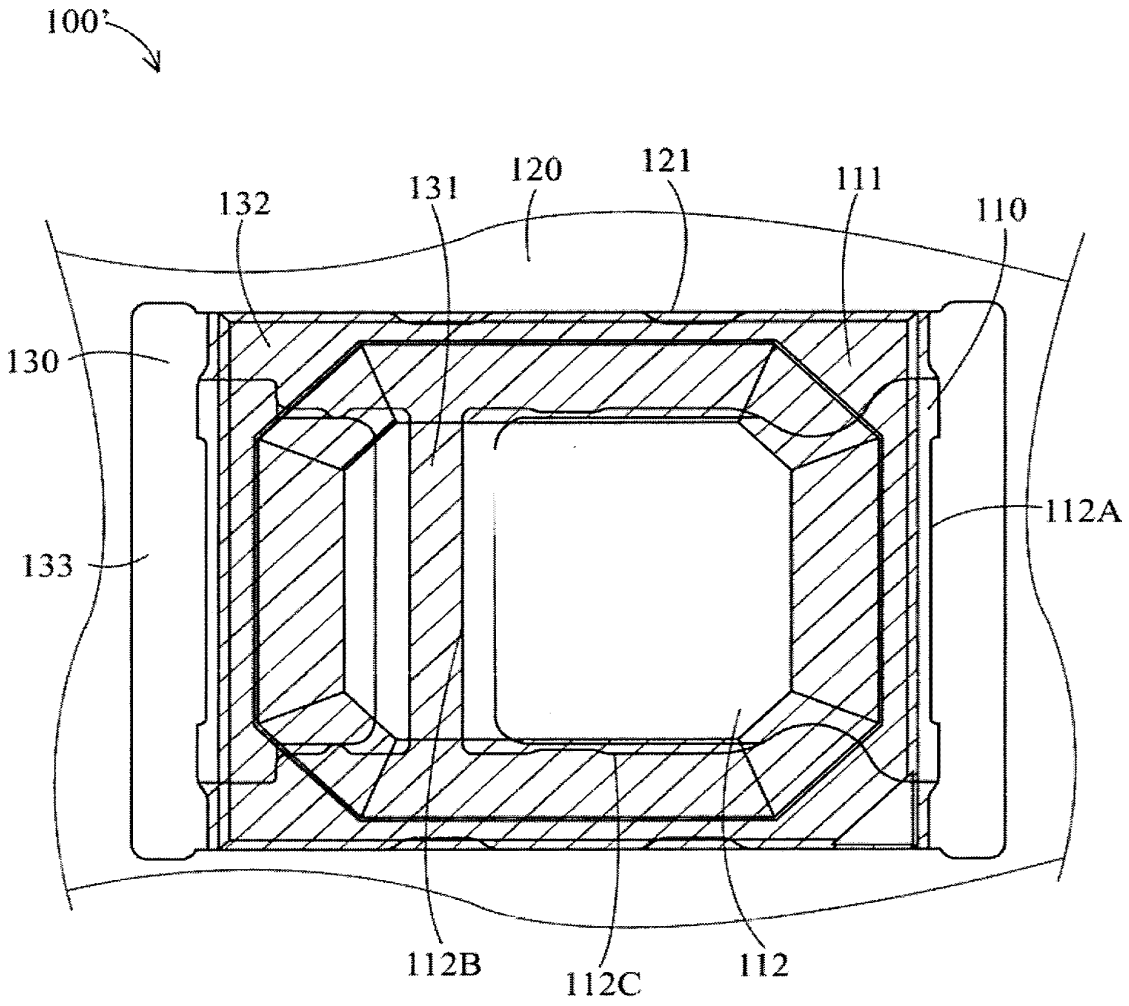
第 13C 圖



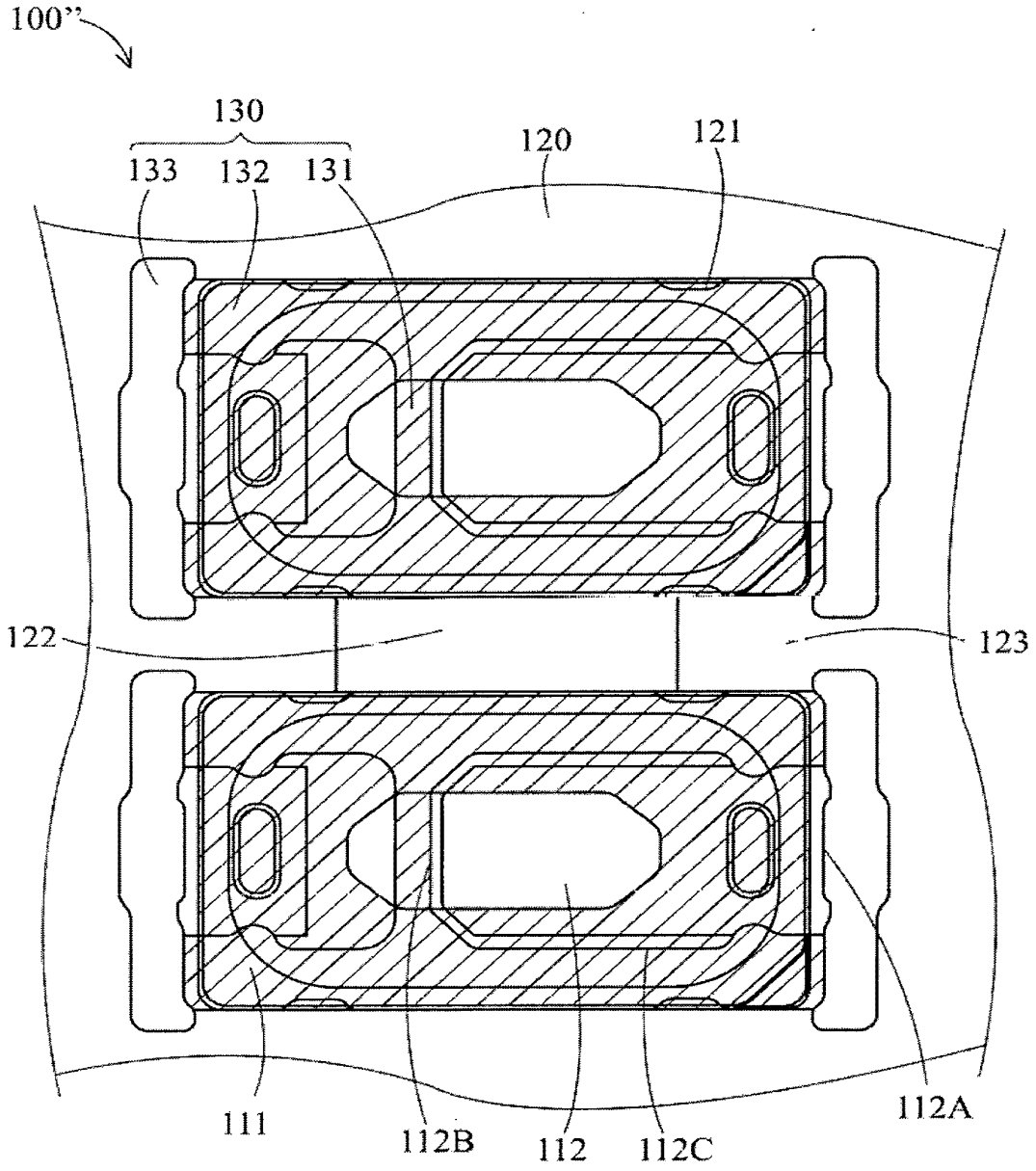
第 14 圖



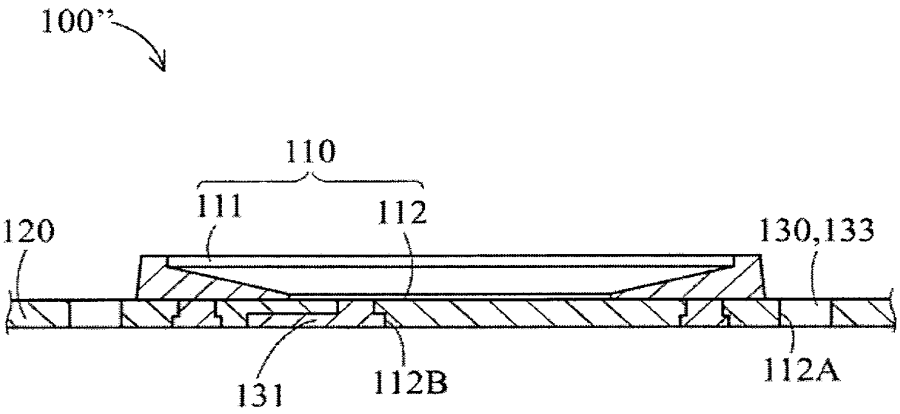
第 15 圖



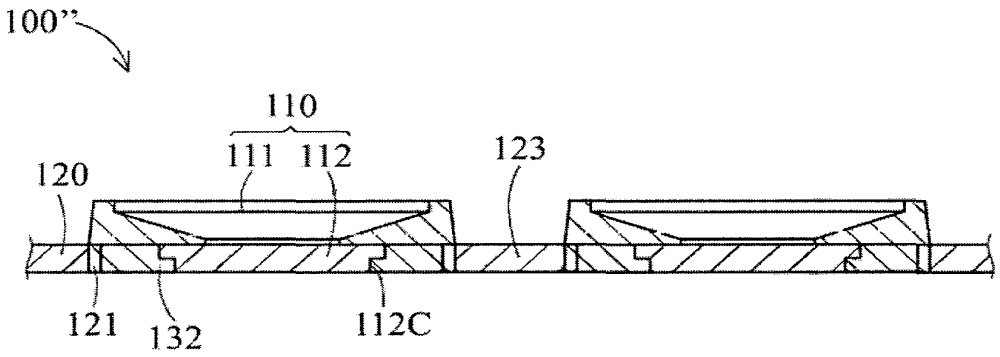
第 16 圖



第 17A 圖



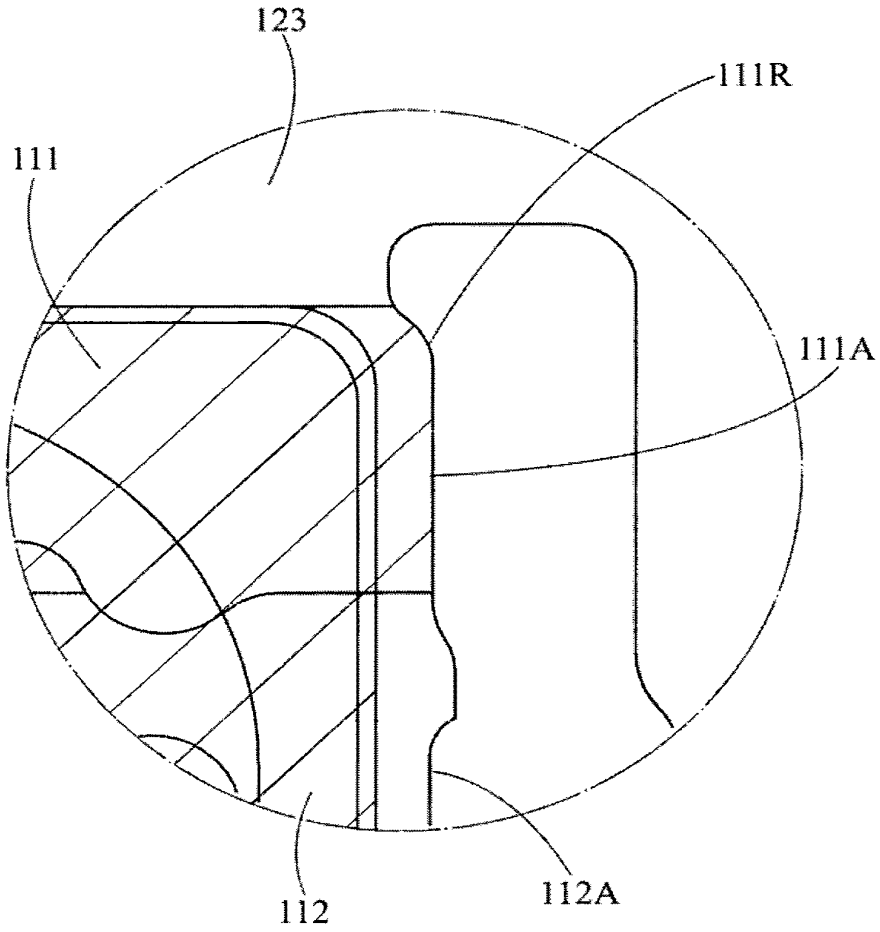
第 17B 圖



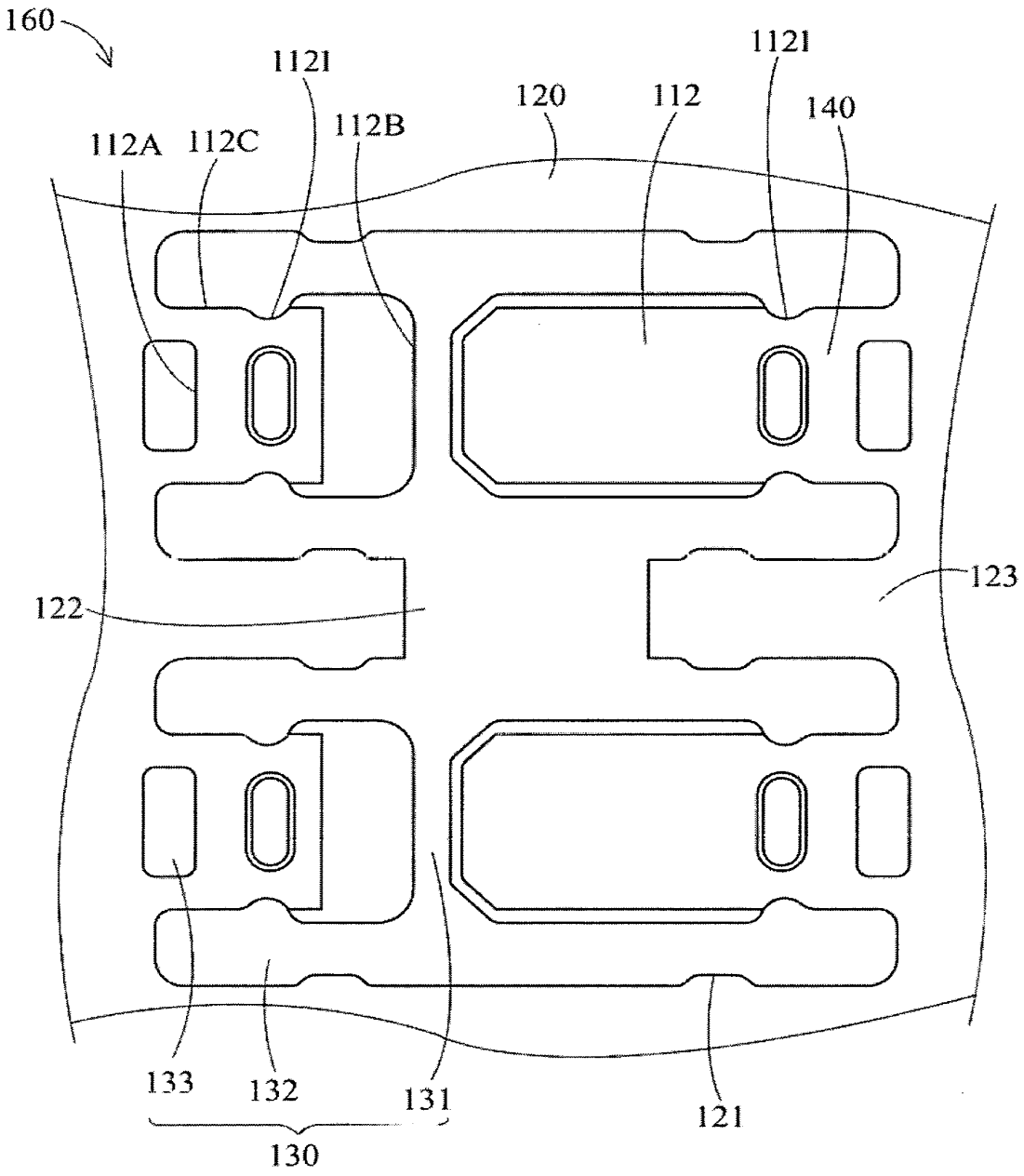
第 17C 圖

申請案號：104103527
FH-000133

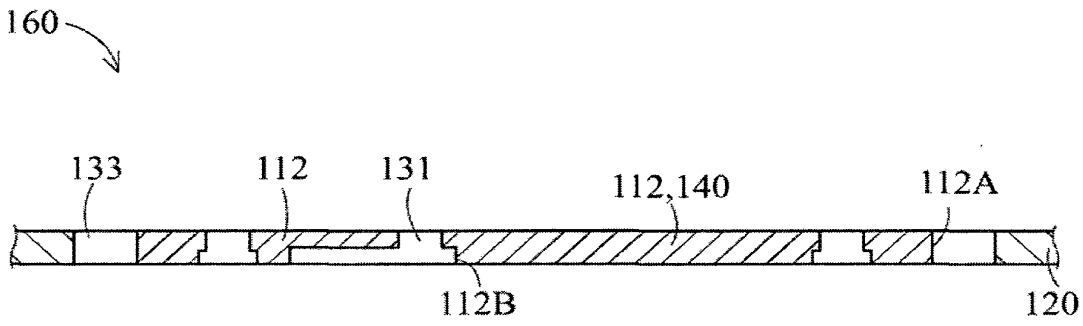
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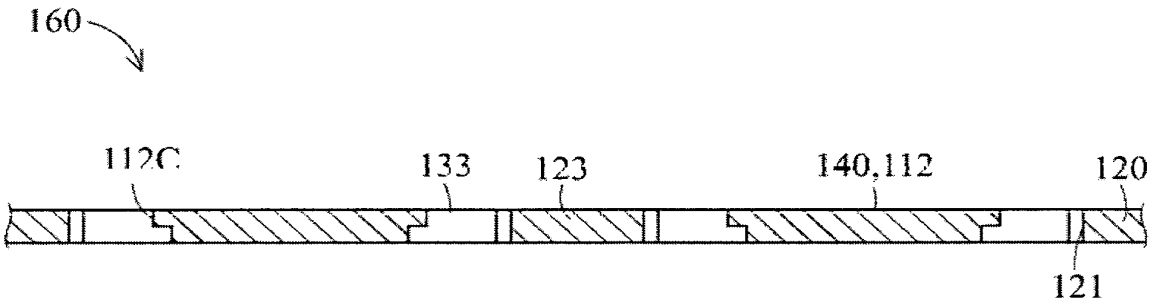
第 17D 圖


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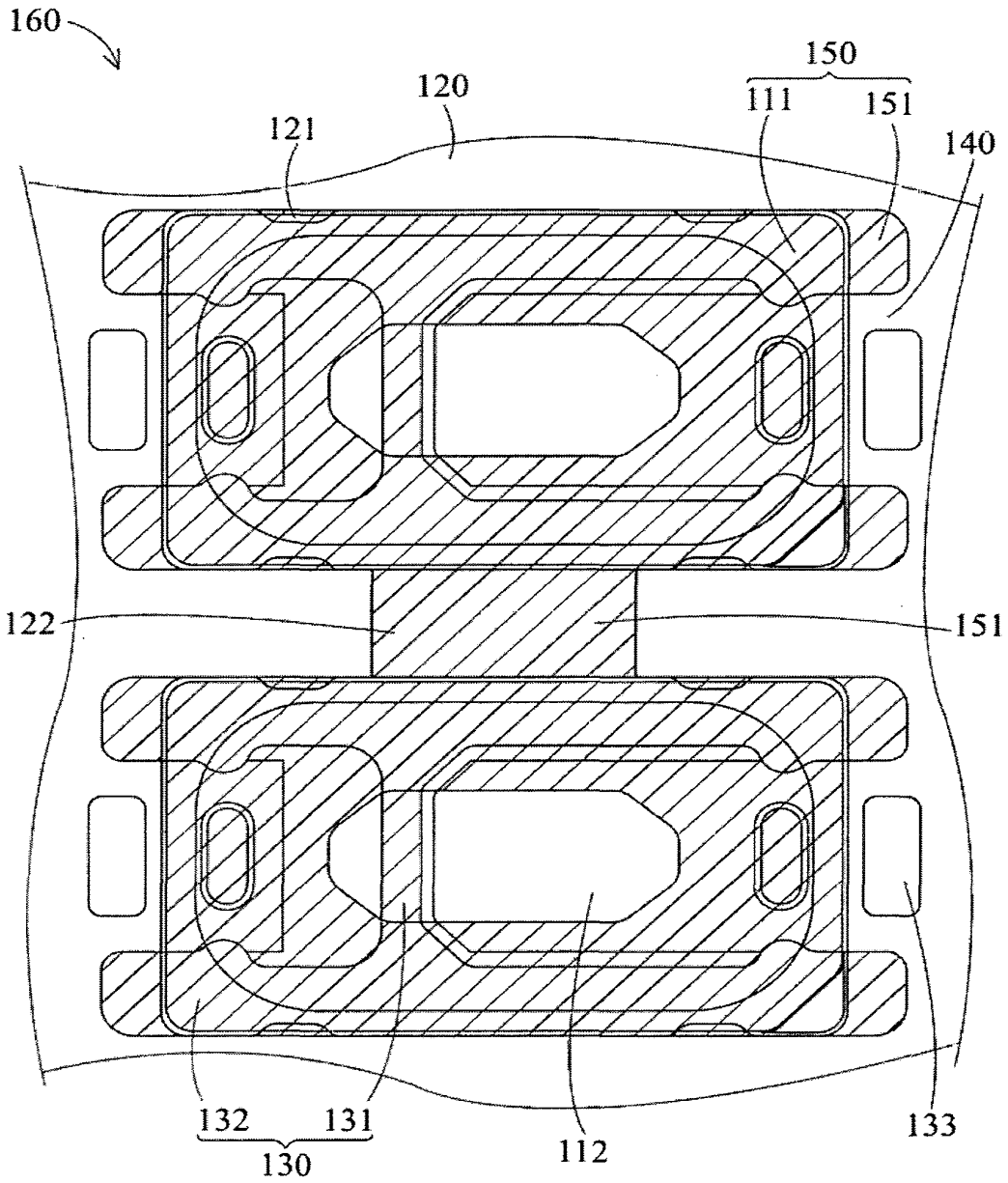
第 18A 圖



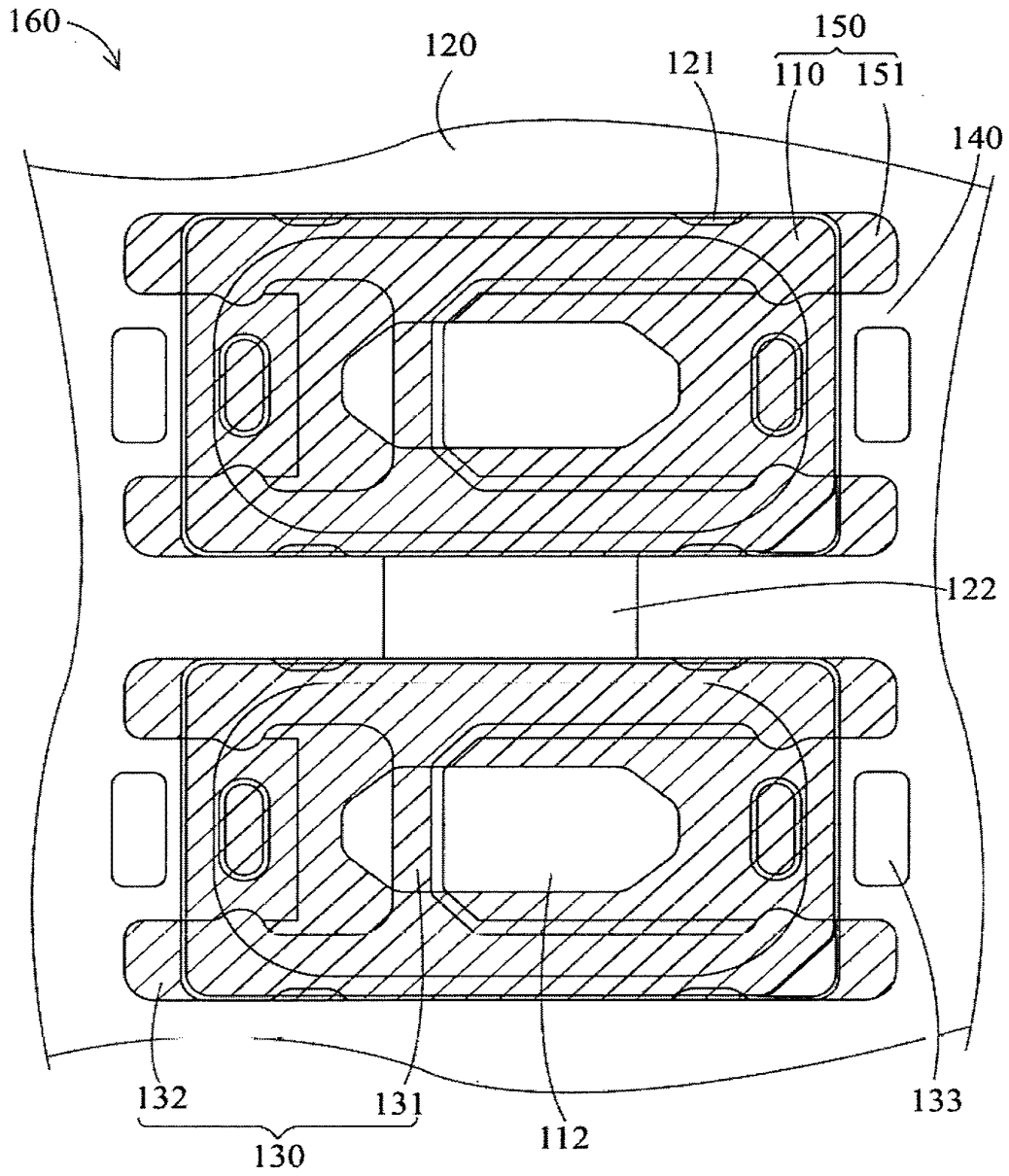
第 18B 圖



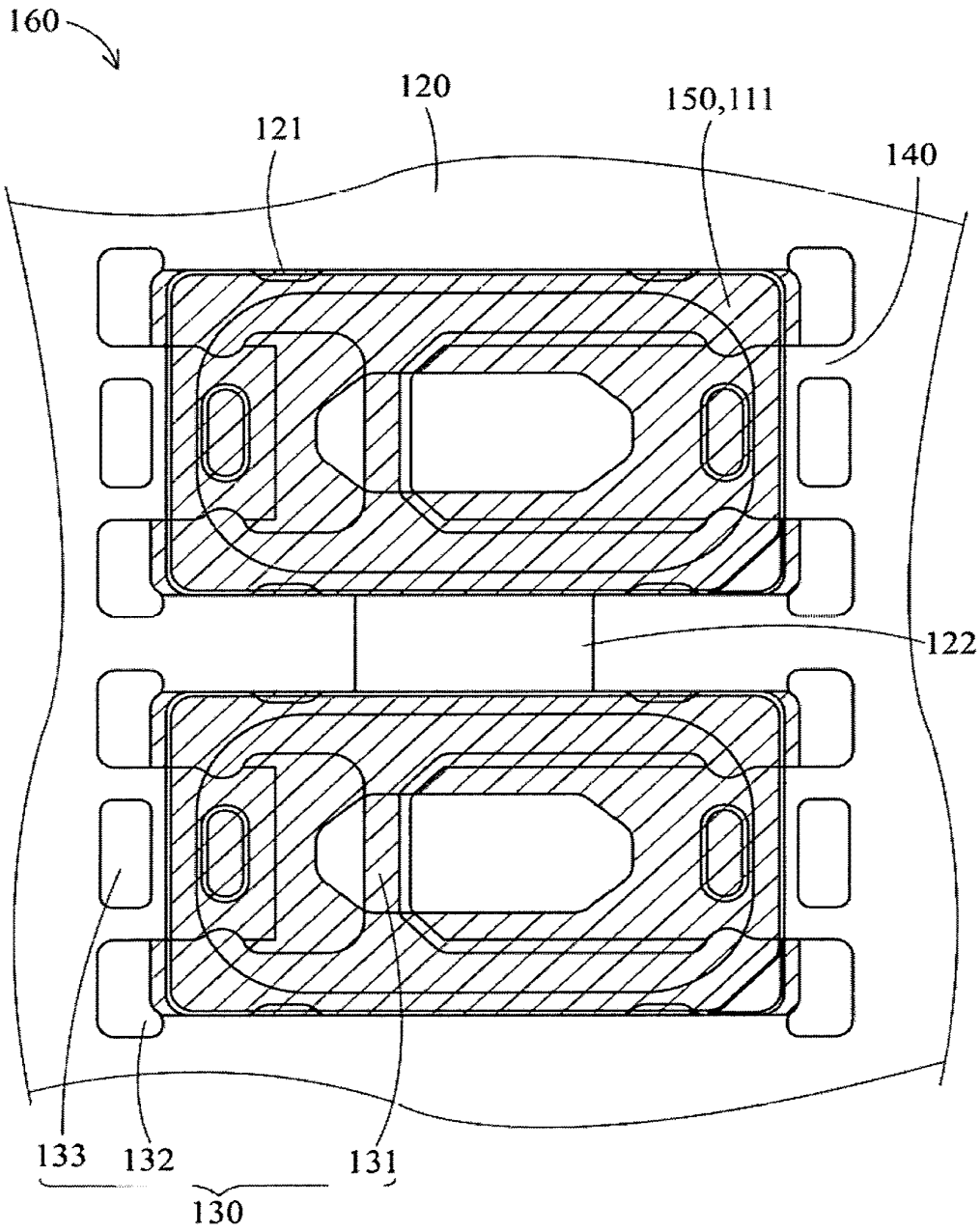
第 18C 圖



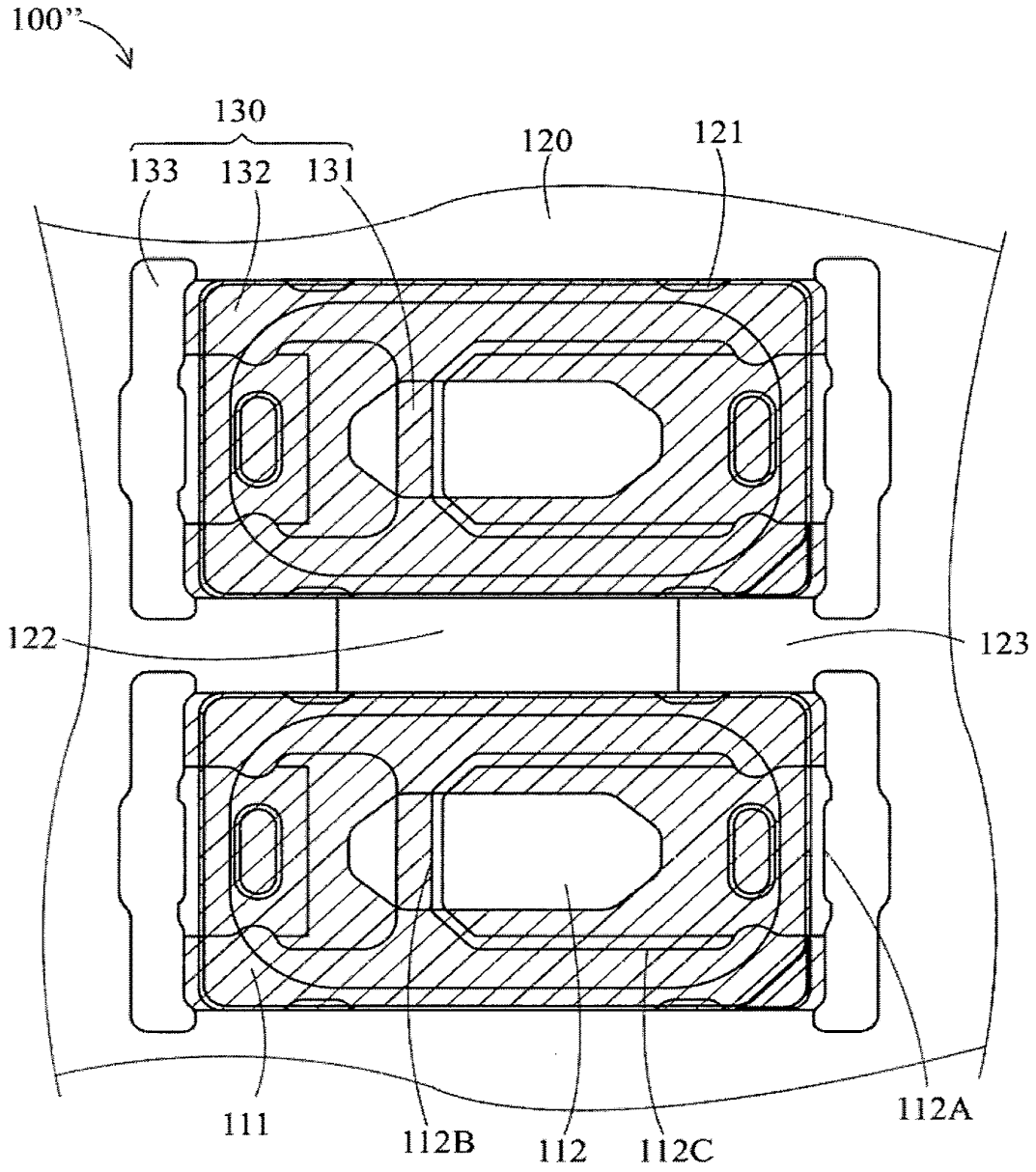
第 19 圖



第 20 圖



第 21 圖



第 22 圖

中華民國經濟部智慧財產局

INTELLECTUAL PROPERTY OFFICE
MINISTRY OF ECONOMIC AFFAIRS
REPUBLIC OF CHINA

茲證明所附文件，係本局存檔中原申請案的副本，正確無訛，
其申請資料如下 ：

This is to certify that annexed is a true copy from the records of this office of the application as originally filed which is identified hereunder：

申　　請　　日 ： 西元 2014 年 05 月 23 日
Application Date　　May 23, 2014

申　請　案　號 ： 103118060
Application No.

申　　請　　人 ： 億光電子工業股份有限公司
Applicant(s)

發　　明　　人 ： 謝忠全、陳詠傑
Inventor(s)

局　　長
Director General

王美花

西元 2015 年 05 月 13 日
May. 13, 2015

專利案號：103118060

申請日：
IPC分類：

【發明摘要】

【中文發明名稱】 承載支架及其製造方法以及從該承載支架所製得之發光裝置及其製造方法

【英文發明名稱】 CARRIER LEADFRAME AND MANUFACTURUNG METHOD THEREOF AND LIGHT EMITTING DEVICE AND MANUFACTURUNG METHOD FROM SAID CARRIER LEADFRAME

【中文】

本發明係提一種承載支架，其中包含一框架，該框架包含至少一支撐部；以及一承載體，該承載體係包含一外殼及至少一電極部；其中該承載體係藉由該支撐部機械偶合於該框架之上。此外，本發明亦前述承載支架之製造方法；以及從其所製得之發光裝置及其製造方法。特定言之，本發明之承載支架係具有預先彼此分離之承載體機械偶合於框架上，可便於封膠後迅速下料。同時本發明之承載支架中各承載體係彼此電性分離，可於下料前進行電性量測。藉此，可提高從其所製得之發光裝置的生產速度及良率。

【指定代表圖】 第（1）圖。

【代表圖之符號簡單說明】

100：承載支架

110：承載體

111：殼體

112：電極部

120：框架

121：支撐部

141：鎖孔

142：階部

143：凹槽

【發明說明書】

【中文發明名稱】 承載支架及其製造方法以及從該承載支架所製得之發光裝置及其製造方法

【英文發明名稱】 CARRIER LEADFRAME AND MANUFACTURUNG METHOD THEREOF AND LIGHT EMITTING DEVICE AND MANUFACTURUNG METHOD FROM SAID CARRIER LEADFRAME

【技術領域】

【0001】 本發明係關於承載支架及從其所製得之發光裝置。特別關於一種用於容置發光二極體晶片的支架及從其所製得之發光裝置。

【先前技術】

【0002】 發光二極體具有諸如壽命長、體積小、高抗震性、低熱產生及低功率消耗等優點，因此已被廣泛應用於家用及各種設備中的指示器或光源。近年來，發光二極體已朝多色彩及高亮度發展，因此其應用領域已擴展至大型戶外看板、交通號誌燈及相關領域。在未來，發光二極體甚至可能成爲兼具省電及環保功能的照明光源主流。爲使發光二極體信賴性佳，發光二極體多會經過一封裝製程而形成耐用的發光裝置。

【0003】 近來本發明相關領域之業者係研發一種切割式的承載支架。其中係於一金屬料片上模塑一塑料體，隨後在進行固晶、銲線及封膠後藉以切割的方式同時切除金屬料片及塑料及塑料體，藉此形成單獨分離之發光裝置。然而該切割時容易產生大量的塑料及金屬粉塵，嚴重汙染最終產品之表面並因此影響產品之信賴性。另外

該製程無法在封膠前進行前點亮測試，需先將最終產品單粒化後，才能逐一量測。然而單粒化後之最終產品係散亂堆疊，需先進行面向及方向調整後才能利於機台量測。此需額外裝設儀器且費時不貲。

【發明內容】

【0004】 鑑於上述問題，本發明係提供一種承載支架，該承載支架係具有預先分離之承載體機械偶合於框架上，可便於可在固晶、銲線及封膠後迅速下料。同時本發明之承載支架中各承載體係彼此電性分離，可使發光二極體固晶銲線於承載體後，於下料前進行電性量測。另外，本發明亦提供由該承載支架所製成之發光裝置，藉由前述承載支架所具有之優點，可使發光裝置之生產速度及良率大幅提升。

【圖式簡單說明】

【0005】 圖1爲本發明之承載支架之一實施態樣之局部示意圖。

圖2爲圖1之承載支架所用導電支架之局部示意圖。

圖3爲圖1之承載支架於形成塑料體後之局部示意圖。

圖4爲圖1之承載支架於移除殘餘料後之局部示意圖。

圖5爲本發明之承載支架之一另實施態樣之局部示意。

圖6爲本發明之一實施例的發光裝置的俯視圖。

圖7爲本發明之另一實施例的發光裝置的俯視圖。

圖8爲本發明之又一實施例的發光裝置的俯視圖。

圖9爲本發明之再一實施例的發光裝置的俯視圖。

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圖10爲本發明之更一實施例的發光裝置的俯視圖。

圖11爲本發明之其一實施例的發光裝置的俯視圖。

【實施方式】

【0006】 本發明之承載支架包含一框架以及一承載體，該承載體係包含一殼體及至少一電極部。在本發明中框架包含至少一支撐部，並與承載體機械偶合之方式結合，以使承載體支撐於框架之上。在本發明一具體實施態樣中，殼體可具有一與支撐部形狀契合之凹陷部，藉由支撐部與凹陷部間之結合以將承載體支撐於框架之上。在本發明中，凹陷部之位置並無特定限制，可在承載體之側面或底面與側面之交界。使對應之支撐部深入深入承載體之內部或僅位於承載體之底面而半露出。

【0007】 爲本發明之承載支架之一實施態樣之局部示意圖。如圖1所示，承載支架100係包含承載體110及框架120，其中承載體110又包含殼體111及二個電極部112。框架120則包含數個支撐部121，該等支撐部121係深入。如圖1所示，承載支架100下方框架120係包含四個支撐部121，而殼體111之側面與底面之交界則包含4個凹陷部（對應至支撐部121之位置），藉此使四個支撐部121位於承載體之底面而半露出。在一實施例中，承載體110更包括一反射凹杯，用以暴露部份之電極部112。其中，電極部112由反射凹杯經由殼體111往外延伸到外部。

【0008】 另外，在本發明中，亦可在導電支架中增加鎖孔、凹槽及階部設計。藉由鎖孔、凹槽及階部可增加承載體中殼體與電極部間的機械結合力。如圖1所示，承載體110中之二電極部112各包含兩個

鎖孔141及三條凹槽143，並且於二電極部112的被殼體111圍繞之邊緣設置有階部142，藉此增加殼體111與電極部112之結合強度。

【0009】 在本發明承載支架中，各個承載體係藉由凹陷部與支撐部之間的機械偶合而撐持於框架上，各個承載體間之電極部係彼此電性獨立。因此可在後續發光裝置固晶、銲線及封裝後進對未單粒化（即各發光裝置仍有序地撐持於框架上）之發光裝置進行電性量測。其中因各發光裝置排列整齊，可免除面向及方向調整之設備及工時，可大大提升發光裝置之生產速度。

【0010】 本發明承載支架可藉由如下方法製得。首先提供一導電支架，該導電支架包含一框架、至少一空乏區及至少一延伸部，其中框架又包含至少一支撐部。隨後於導電支架上形成一塑料體，該塑料體係覆蓋至少部分之延伸部及至少部分之支撐部，並且填充至少部分之空乏區。嗣後，分別移除部分露出殼體之延伸部及部分填充於空乏區中之塑料體，藉此形成承載體。特定言之，經此二移除步驟後，存留之塑料體即形成承載體中之殼體，而存留於塑料體上之延伸部即形成承載體中之電極部。

【0011】 以下配合圖2至圖4詳述圖1中承載支架100之製作過程。首先如提供圖2所示導電支架160，其中包含框架120、複數個空乏區130及複數個延伸部140。其中框架120亦包含複數個支撐部121，延伸部140則包含多個鎖孔141、凹槽143及階部142。最後，移除部分露出殼體之延伸部140，即形成如圖1所示之承載支架100。

【0012】 本發明中，導電支架可由金屬片材，包含純金屬、合金及金屬複

合層之片材，或者具有導電層之複合板材所形成，較佳係覆有抗氧化層之金屬複合片材，例如鍍銀銅片等。並且透過適當的方式來形成框架、延伸部及空乏區。以金屬片材爲例，較佳可以沖壓的方式形成；然而亦可以切割或者模鑄的方式形成。

【0013】 在提供導電支架後，隨後於導電支架上形成塑料體。形成塑料體的方式係無所限制，可以傳遞模塑（Transfer Moulding）、射出成型等方式形成。塑料體之原料亦無所限制，可選用目前業界常用之塑膠複合物，例如環氧樹脂（Epoxy）複合物、矽膠（Silicon）之複合物、聚鄰苯二甲醯胺（Polyphthalamide）複合物或聚苯二甲酸乙二酯(Polyethylene terephthalate) 複合物。本發明之一具體實施態樣中係使用環氧樹脂複合物，並以傳遞模塑之方式形成塑料體。在一實施例中，塑料體可以是熱固型材料，且更可包含反光材料，如二氧化鈦（TiO 2）、氧化鋅（ZnO）或氮化硼（BN）等。

【0014】 隨後如圖3所示，於導電支架上形成一塑料體150。塑料體150係覆蓋部分之延伸部140並完整包覆所有的鎖孔141及凹槽143。塑料體150亦填充部分之空乏區130（延伸部140上下之空乏區130並未被填中）並完整覆蓋所有的支撐部121。

【0015】 申言之，在本發明中，塑料體150之原料會在形成過程中會填充於模具的模穴及空乏區間。在此步驟中殼體111與殘餘料151仍爲一體。殘餘料151之界定範圍係視後續產品之應用範圍而定。如圖3所示，虛線所爲之部分即爲本實施例中所定義之殘餘料151。隨後如圖4所示，移除被定義之殘餘料151，藉此形成承載體中之殼體111。

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【0016】 最後，移除部分露出於殼體111外的延伸部，以形成如圖1所示之的承載支架100。在本發明中，殘餘料151及延伸部140係分別移除。特定言之，移除殘餘料151及延伸部140之順序並無特殊限制，惟其分別移除即可。舉例言之，可同時移除全部的殘餘料151後再同時移除全部的延伸部140、亦可同時移除全部的延伸部140後再移除全部的殘餘料151，或者亦可分階段地除部分的殘餘料151及延伸部141，兩者可交互進行。移除方法係無所限制，舉例言之，可以切割、沖壓等方式進行，較佳係以沖壓方式進行。在本發明之實施例中係以沖壓爲例。

【0017】 本發明可針對移除部分的機械特性加以調整器具及工作強度。特定言之，分別移除步驟可避免同時移除不同材料時所造成之缺點，例如應力不均所造成之缺面缺陷、移除工具損壞等。另外，較於移除延伸部，移除塑料體時通常會產生塑料體的粉塵。該等粉塵需以強大外力作用才可去除乾淨，例如強風吹拂、抖動或超音波。倘若同時移除殘餘料及延伸部後進行清潔，此時程載體與框架間的作用力恐難撐持而有落料之虞。因此，本發明較佳係先移除殘餘料後進行清潔工作，隨後再移除延伸部。藉此，可利用延伸部強化承載體與框架間之連結強度，避免清潔時落料的情況產生，最後在移除延伸部。

【0018】 移除後延伸部會於承載體之電極部上產生一電極部截面，而移除後殘餘料會於承載體之殼體上產生一殼體截面。在本發明中，視最終產品之安全規範或客戶需求等條件，電極部截面與殼體截面可於承載體之同一面或不同面。又在電極部截面與殼體截面爲承載體同一面之情況下，電極部截面與殼體截面可齊平或者不齊平

。如圖1所示，電極部112之截面具有一中央外突出區及二外側邊緣區域，而電極部112之截面的二側邊緣區域與殼體111之截面的部份區域爲齊平者，此時承載體具有較平整的外觀。然而，亦可如圖5所示，電極部112之截面具有一中央外突出區及二外側邊緣區域，電極部112之截面與殼體111之截面非齊平者，此時電極部112具有額外的側面積，可增加與銲料間的結合力，進而增強發光裝置於後續打件後之打件強度。另外，在導電支架爲抗氧化層之金屬複合片材之情況下，於電極部截面會產生未覆有抗氧化層之截面。在本發明中，未覆有抗氧化層之截面較佳係與電極部之翼部（電極部凸出殼體之部分）一體。蓋於後續之打件過程中銲料可沿著翼部之側面爬升並覆蓋側面，此時之少部分之未覆有抗氧化層的截面可被銲料覆蓋，可減少截面部位發生氧化之機率。另外未覆有抗氧化層之截面與相鄰接的電極部表面同側，較佳係形成連續的面，以減少電極部產生尖端或毛邊，進而造成後續加工機台的損耗，更甚者會於尖端或毛邊處產生電荷累積之效應，影響末端產品之信賴性。

【0019】 本發明亦提供一種由本發明承載支架所製得之發光裝置，該發光裝置係包含一承載體、一發光二極體晶片及一封裝體。該發光二極體晶片係承載於承載體之中被封裝體所覆蓋。在本發明中封裝體之材料可爲環氧樹脂或矽膠等塑膠材料之複合物。另外，本發明之發光裝置可視需要添加螢光材料於封裝體之中，舉例之螢光材料有：鋁酸鹽螢光物質（諸如，經摻雜的鈰鋁氧化物化合物、經摻雜的鐠鋁氧化物化合物、經摻雜的鈰鋁氧化物化合物或其組合）、矽酸鹽螢光物質、硫化物螢光物質、氧氮化物螢光物質、

氮化物螢光物質、氟化物螢光物質或其組合。

【0020】 本發明之發光裝置可以藉由以下方法所製得。首先提供前述之承載支架。隨後提供一發光二極體晶片並將其固晶、銲線於承載體之反射凹杯之中。嗣後以封裝膠體填充反射凹杯以封裝密封發光二極體晶片，即形成位於框架上之發光裝置。最後分離發光裝置及框架（即分離框架承載體與框架，例如以沖壓方式進行分離），以形成單獨的發光裝置。

【0021】 本發明中亦可提供多個發光二極體晶片於承載體中，該等發光二極體晶片可發射出相同或不同屏譜之光。在固定發光二極體晶片後可進行銲線工作以將發光二極體晶片與電極部電性連接。其中可視最終產品需要於亦可提供其他電子元件，例如齊納二極體或熱敏電阻等。

【0022】 請參考圖6，其爲本發明之一實施例之發光裝置的俯視圖。電極部之截面具有一中央區域及兩邊緣區域，且突出於殼體之截面之外，使得電極部之截面的中央區域與殼體之截面爲非共平面。其中間隔D1爲電極部之截面的中央及殼體之截面的內側區域之間的距離，約爲0.1mm。間隔D2爲電極部之截面的中央區域及殼體之截面的外側區域之間的距離，即電極部之截面的中央區域及邊緣區域之間的距離，約爲0.5mm。

【0023】 請參考圖7，其爲本發明之另一實施例之發光裝置的俯視圖。電極部之截面具有一中央區域及兩邊緣區域，且突出於殼體之截面之外，使得電極部之截面與殼體之截面爲非共平面。其中間隔D1爲電極部之截面的中央及殼體之截面的內側區域之間的距離，約

爲0.1mm。間隔D3電極部之截面的中央區域域及殼體之截面的外側區域之間的距離，約爲0.075mm。

【0024】 請參考圖8，其爲本發明之再一實施例之發光裝置的俯視圖。電極部之截面具有一中央區域及兩邊緣區域，且凹陷於殼體之截面之內，使得電極部之截面與殼體之截面爲非共平面。其中間隔D4爲殼體之截面的外側區域及內側區域之間的距離，約爲0.05mm。間隔D5爲電極部之截面的中央及殼體之截面的外側區域之間的距離，約爲0.025mm。

【0025】 請參考圖9，其爲本發明之又一實施例之發光裝置的俯視圖。電極部之截面具有一中央區域及兩邊緣區域，且突出於殼體之截面之外，使得電極部之截面與殼體之截面爲非共平面。

【0026】 請參考圖10，其爲本發明之更一實施例之發光裝置的俯視圖。電極部之截面爲曲面，且突出於殼體之截面之外，使得電極部之截面與殼體之截面爲非共平面。

【0027】 請參考圖11，其爲本發明之其一實施例的發光裝置的俯視圖。電極部之截面爲曲面，且凹陷於殼體之截面之內，使得電極部之截面與殼體之截面爲非共平面。

【0028】 雖然上文描述了本揭露的數個實施例，但本揭露的範疇不限於所揭露的實施例，且無法限於所揭露的實施例。更具體言之，一般熟習此項技術者可基於所揭露的實施例而進行各種偏差及改良，且此等偏差及改良仍處於本揭露的範疇內。因此，根據本揭露而頒佈的專利的保護範疇由下文提供的申請專利範圍來確定。

【符號說明】

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【0029】　100：承載支架

110：承載體

111：殼體

112：電極部

120：框架

121：支撐部

130：空乏區

141：鎖孔

142：階部

143：凹槽

150：塑料體

151：殘餘料

160：導電支架

【發明申請專利範圍】

【第1項】　一種承載支架，包含：

一框架，該框架包含至少一支撐部；以及

一承載體，該承載體係包含一外殼及至少一電極部；

其中該承載體係藉由該支撐部機械偶合於該框架之上。

【第2項】　一種製造一承載支架之方法，包含：

提供一導電支架，該導電支架包含一框架，該框架包含至少一支撐部、至少一空乏區及至少一延伸部；

形成一塑料體，該塑料體係覆蓋至少部分之該延伸部及至少部分之該支撐部，並且填充至少部分之該空乏區；以及

分別移除部分露出該塑料體之該延伸部及部分填充於該空乏區中之塑料體。

【第3項】　一種發光裝置，包含：

一承載體，該承載體係包含一外殼及至少一電極部；

一發光二極體晶片，承載於該承載體之中；以及

一封裝膠體，覆蓋該發光二極體晶片及該電極部。

【第4項】　一種製造一發光裝置之方法，包含：

提供一如請求項1所述之承載支架；

提供一發光二極體晶片以及

固定該發光二極體晶片於該承載體中；

以一封裝膠體封裝密封該發光二極體晶片；

分離該承載體與該框架。

【發明圖式】

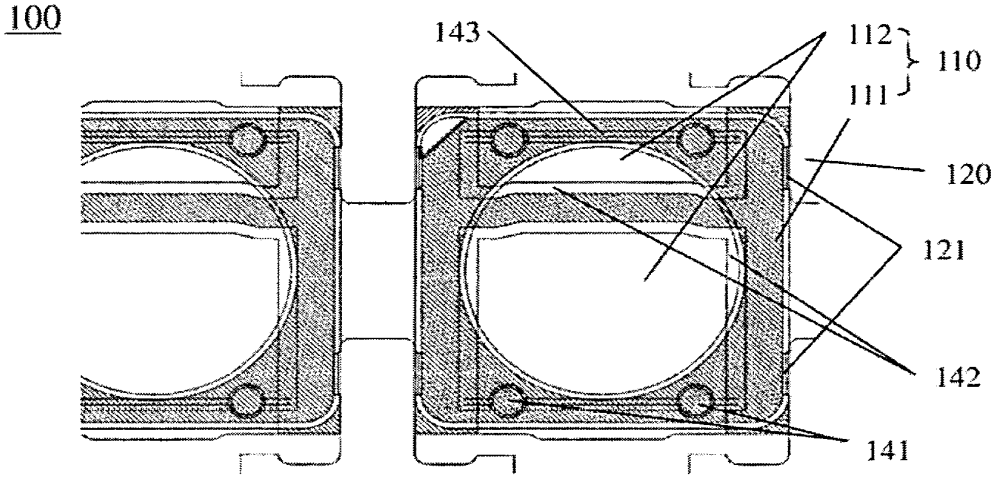

100
143
112
110
111
120
121
142
141

圖 1

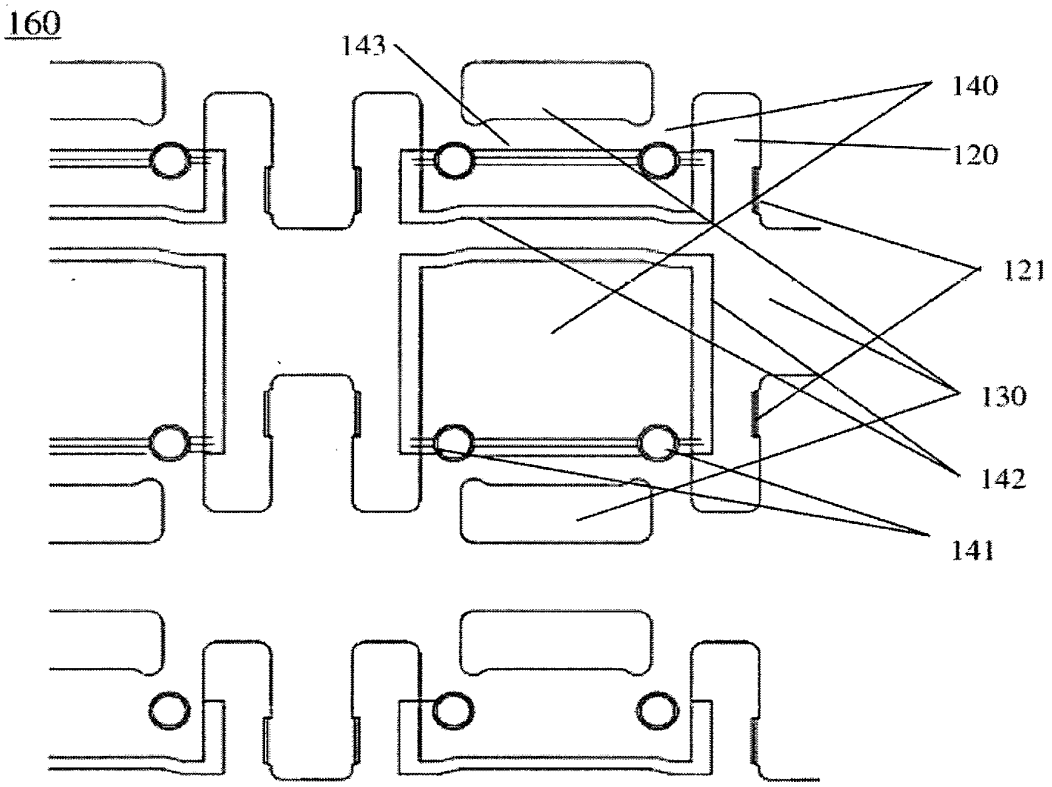

160
143
140
120
121
130
142
141

圖 2

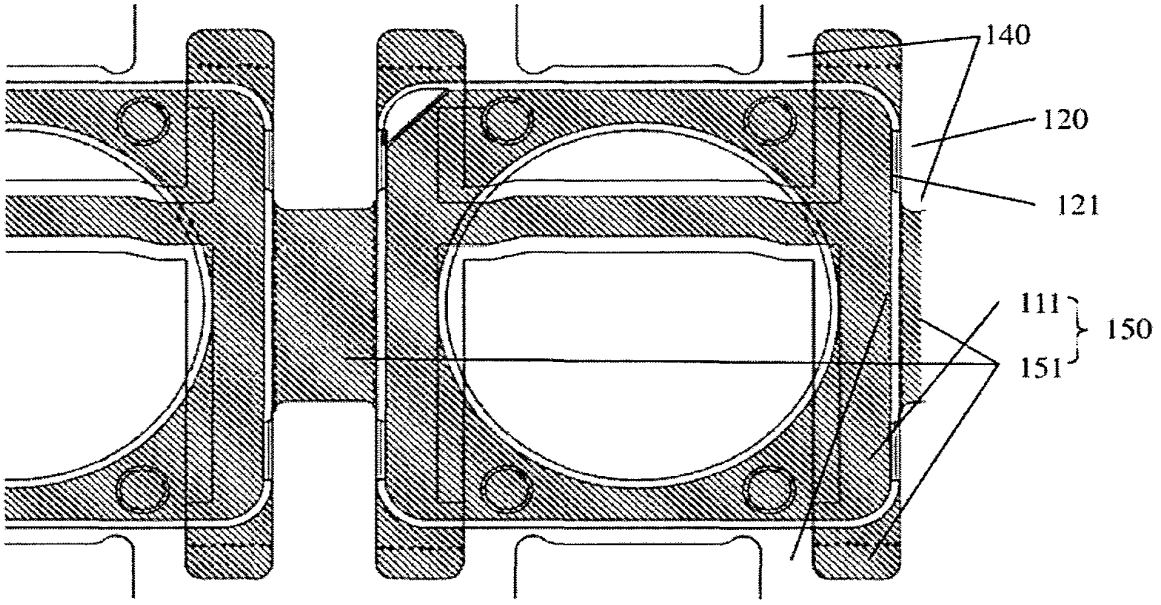


圖 3

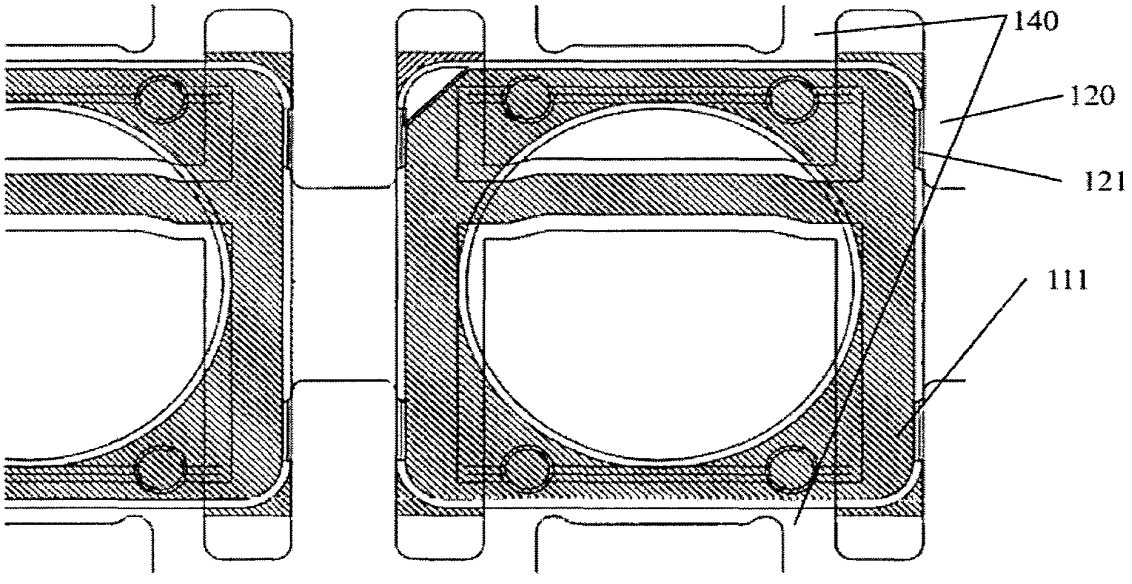


圖 4

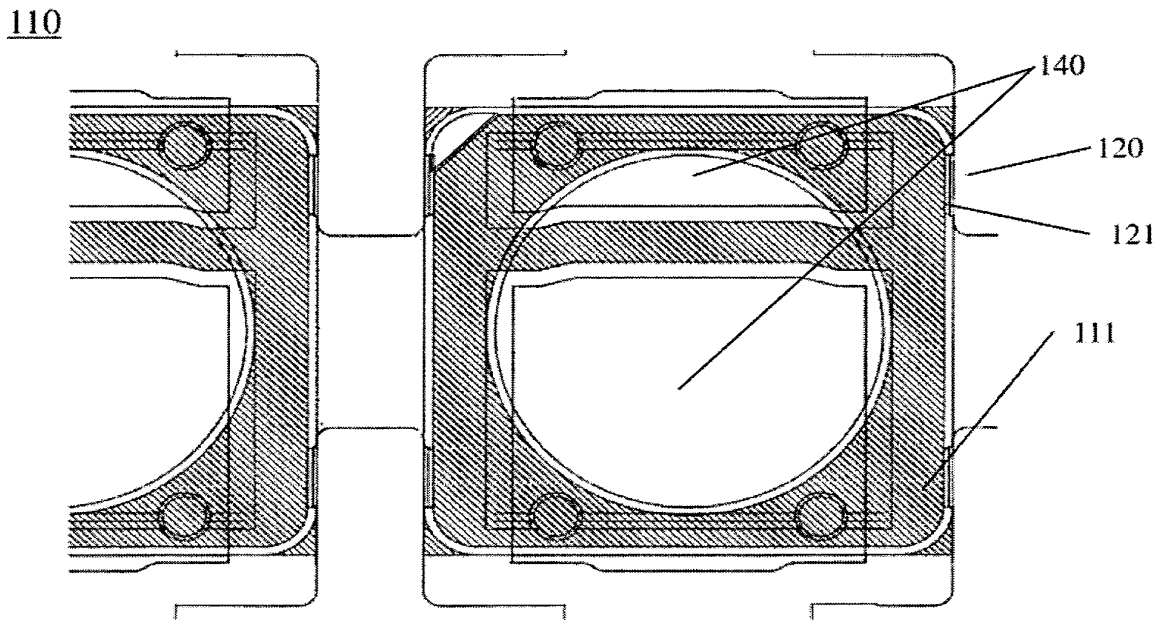


圖 5

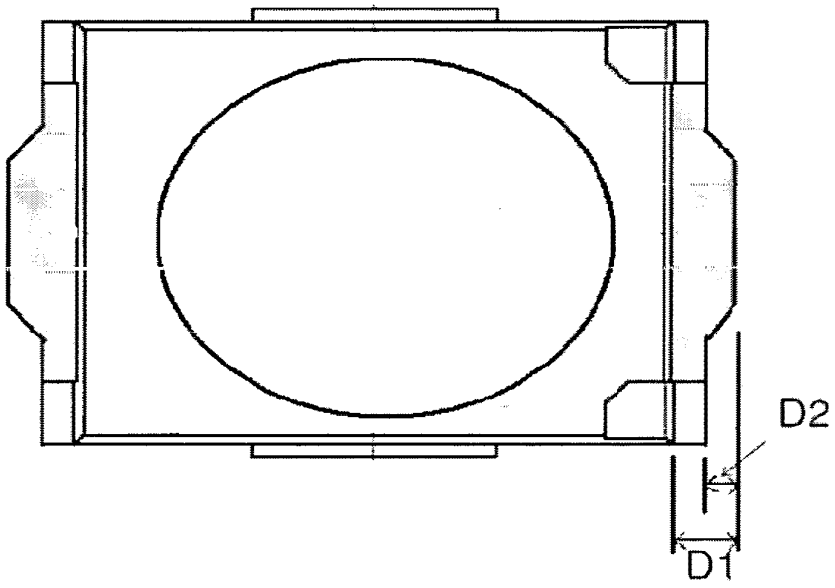


圖 6

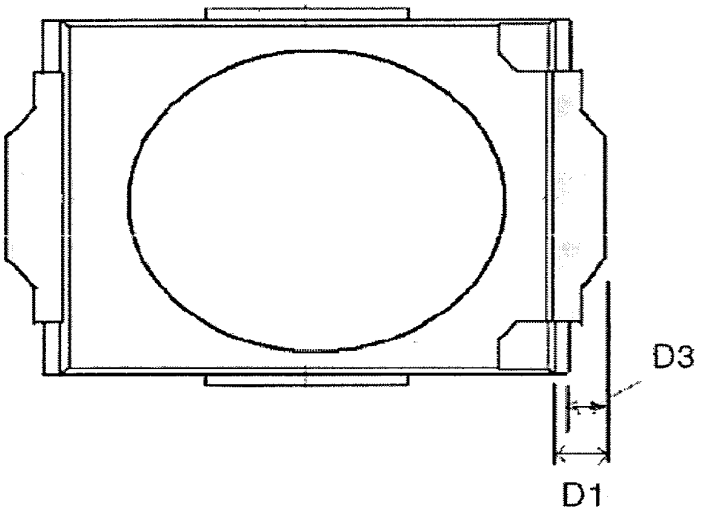


圖 7

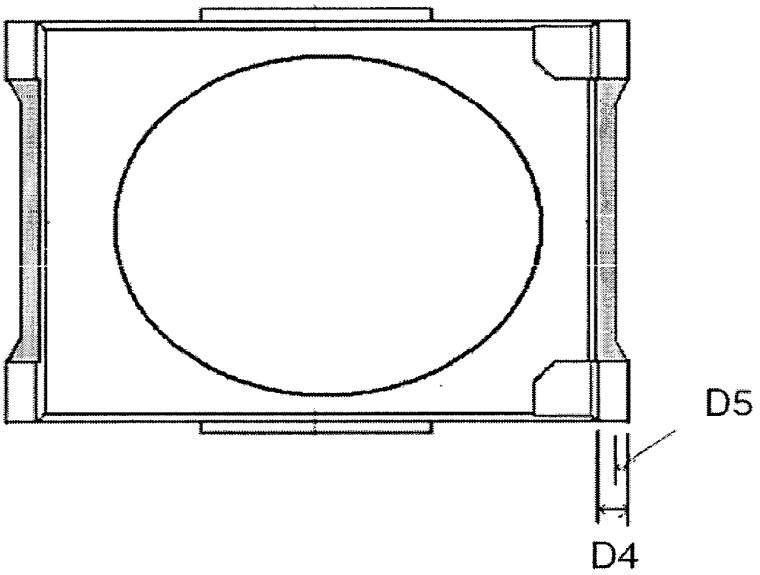


圖 8

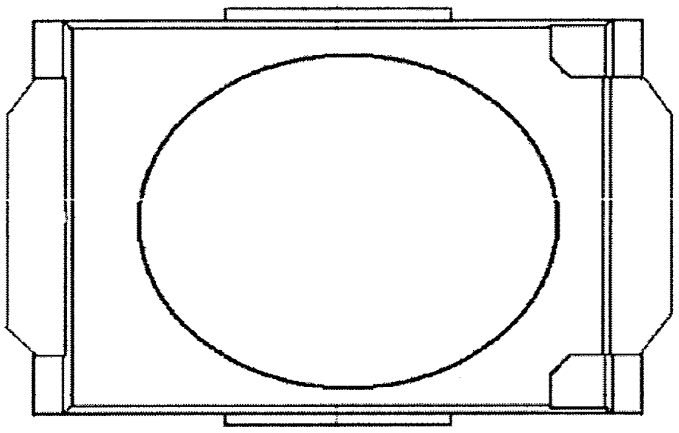


圖 9

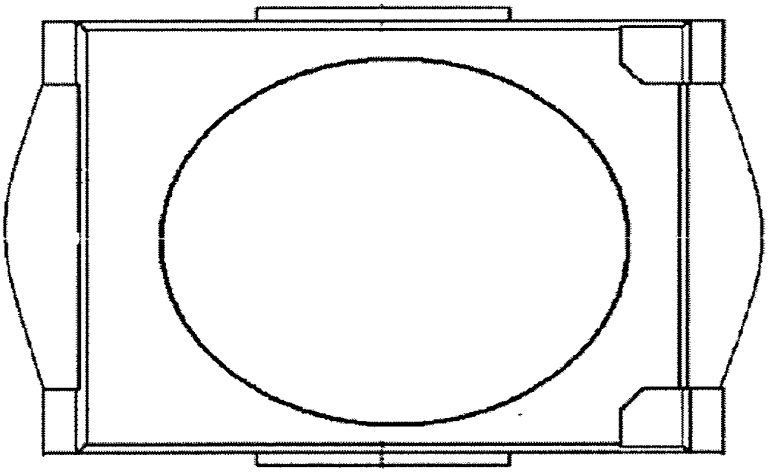


圖 10

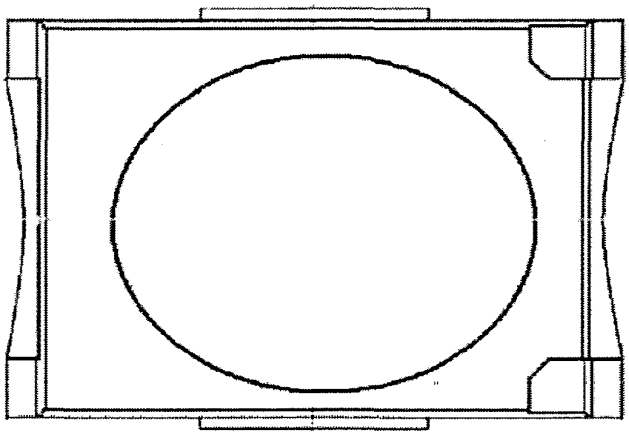


圖 11

OPAP AKIMA-16
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Total Number of Pages in This Submission

Application Number	14/720,230
Filing Date	05-22-2015
First Named Inventor	Chung-Chuan Hsieh
Art Unit	2847
Examiner Name	MCALLISTER, MICHAEL F
Attorney Docket Number	EL01.0088US

ENCLOSURES *(Check all that apply)*

- ☐ Fee Transmittal Form
  - ☐ Fee Attached
- ☐ Amendment/Reply
  - ☐ After Final
  - ☐ Affidavits/declaration(s)
- ☐ Extension of Time Request
- ☐ Express Abandonment Request
- ☐ Information Disclosure Statement
- ☑ Certified Copy of Priority Document(s)
- ☐ Reply to Missing Parts/ Incomplete Application
  - ☐ Reply to Missing Parts under 37 CFR 1.52 or 1.53
- ☐ Drawing(s)
- ☐ Licensing-related Papers
- ☐ Petition
- ☐ Petition to Convert to a Provisional Application
- ☐ Power of Attorney, Revocation Change of Correspondence Address
- ☐ Terminal Disclaimer
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- ☐ CD, Number of CD(s) _____
  - ☐ Landscape Table on CD
- ☐ After Allowance Communication to TC
- ☐ Appeal Communication to Board of Appeals and Interferences
- ☐ Appeal Communication to TC **(Appeal Notice, Brief, Reply Brief)**
- ☐ Proprietary Information
- ☐ Status Letter
- ☐ Other Enclosure(s) (please Identify below):

Remarks

Submitted herewith is a certified copy of the priority document, Taiwan Patent Application No. 104103527, for the above-identified patent application.

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm Name	Han IP Corporation		
Signature	/Andy M. Han, Reg. No. 60,266/		
Printed name	Andy M. Han		
Date	December 24, 2015	Reg. No.	60266

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(Not for submission under 37 CFR 1.99)

Application Number	14720230
Filing Date	2015-05-22
First Named Inventor	Chung-Chuan Hsieh
Art Unit	2847
Examiner Name	MCALLISTER, MICHAEL F
Attorney Docket Number	EL01.0088US

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	1	20130270588		2013-10-17	Wang Chiou-Yueh	
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	1	KR20100083907A	KR		2010-07-23	SUL MYUNG SOON		
	2	JP2014017460A	JP		2014-01-30	FUSHENG IND CO LTD		

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14720230
	Filing Date	2015-05-22
	First Named Inventor	Chung-Chuan Hsieh
	Art Unit	2847
	Examiner Name	MCALLISTER, MICHAEL F
	Attorney Docket Number	EL01.0088US

	3	JP2014060343A	JP		2014-04-03	SANKEN ELECTRIC CO LTD		

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[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14720230
	Filing Date	2015-05-22
	First Named Inventor	Chung-Chuan Hsieh
	Art Unit	2847
	Examiner Name	MCALLISTER, MICHAEL F
	Attorney Docket Number	EL01.0088US

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Andy M. Han, Reg. No. 60266/	Date (YYYY-MM-DD)	2016-01-13
Name/Print	Andy M. Han	Registration Number	60266

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5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

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7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

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9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Espacenet

Bibliographic data: KR20100083907 (A) — 2010-07-23

LED PACKAGE AND METHOD FOR MANUFACTURING THE SAME

Inventor(s): SUL MYUNG SOON [KR]; SUNG KI JOO [KR] ± (SUL, MYUNG SOON, ; SUNG, KI JOO)

Applicant(s): SUL MYUNG SOON [KR] ± (SUL, MYUNG SOON)

Classification: - international:***H01L33/62; H01L33/64***
- cooperative: **H01L24/97**; H01L2224/48091; H01L2224/48247 more

Application number: KR20090003237 20090115

Priority number (s): KR20090003237 20090115

Abstract of KR20100083907 (A)

PURPOSE: A light emitting diode(LED) package and a method for manufacturing the same are provided to improve thermal conductivity and thermal radiation capacity by forming asymmetrically two metals which forms the LED package. CONSTITUTION: A reflective surface(130) and a lead frame(110) are respectively integrated into a cathode (111) and an anode(112). One end of the cathode and one end of the anode are expanded from the lead frame. The other ends of the cathode and the anode are opposite to each other. A reflective surface is formed by deforming at least part of the cathode and the anode. The reflective surface has an angle more than 90 degrees with respect to the cathode or the anode.

(19) 대한민국특허청(KR)
(12) 공개특허공보(A)

(11) 공개번호 10-2010-0083907
(43) 공개일자 2010년07월23일

(51) Int. Cl.
H01L 33/62 (2010.01) *H01L 33/64* (2010.01)
(21) 출원번호 10-2009-0003237
(22) 출원일자 2009년01월15일
심사청구일자 2009년01월15일

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경기도 용인시 수지구 성복동 LG빌리지 605동 503호
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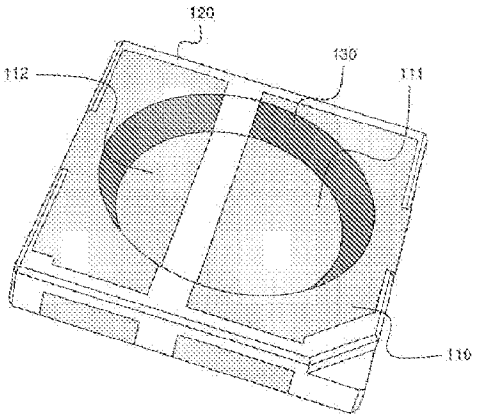
전체 청구항 수 : 총 15 항

(54) LED 패키지 및 이의 제조 방법

(57) 요 약

LED 패키지 및 이의 제조 방법이 개시된다. 본 발명에 의하면, 리드 프레임(110), 각각의 일단은 리드 프레임(110)으로부터 연장되며 타단은 소정 거리 이격된 상태로 서로 대향하는 캐소드(111)와 애노드(112), 및 캐소드(111)와 애노드(112)의 적어도 일부가 변형되어 형성된 반사면(130)을 포함하는 LED 패키지가 제공된다. 본 발명에 의하면, LED 패키지가 간단한 구조로 구성됨과 동시에 높은 열전도율과 열방사율을 가지며, 완성품의 신뢰성과 내구성 또한 향상될 수 있게 된다.

대 표 도 - 도2



특허청구의 범위

청구항 1

캐소드, 애노드, 상기 캐소드 및 상기 애노드와 각각 일체를 이루면서 연속적으로 형성되는 반사면 및 리드 프레임을 포함하는 것을 특징으로 하는 LED 패키지.

청구항 2

리드 프레임;

각각의 일단은 상기 리드 프레임으로부터 연장되며 타단은 소정 거리 이격된 상태로 서로 대향하는 캐소드(cathode)와 애노드(anode); 및

상기 캐소드와 상기 애노드의 적어도 일부가 변형되어 형성된 반사면

을 포함하는 것을 특징으로 하는 LED 패키지.

청구항 3

제2항에 있어서,

상기 캐소드와 상기 애노드는 비대칭적으로 형성되어 상기 캐소드와 상기 애노드 중 어느 하나가 더 넓게 형성되는 것을 특징으로 하는 LED 패키지.

청구항 4

제2항에 있어서,

상기 반사면은 상기 캐소드 또는 상기 애노드를 기준으로 90도 이상의 경사도를 갖는 것을 특징으로 하는 LED 패키지.

청구항 5

제2항에 있어서,

상기 캐소드 및 상기 애노드와 상기 반사면이 서로 접하는 부분은 에칭된 상태인 것을 특징으로 하는 LED 패키지.

청구항 6

제2항에 있어서,

상기 캐소드와 상기 애노드의 LED 칩이 안착되는 부분은 에칭된 상태인 것을 특징으로 하는 LED 패키지.

청구항 7

제2항에 있어서,

상기 캐소드와 상기 애노드 사이에 절연체를 더 포함하는 것을 특징으로 하는 LED 패키지.

청구항 8

제2항에 있어서,

상기 리드 프레임, 상기 캐소드와 상기 애노드 및 상기 반사면의 재질은 금속 또는 금속 합금을 포함하는 것을 특징으로 하는 LED 패키지.

청구항 9

(a) 리드 프레임을 가공하되, 각각의 일단은 상기 리드 프레임으로부터 연장되며 타단은 소정 거리 이격된 상태로 서로 대향하는 캐소드(cathode)와 애노드(anode)가 함께 형성되도록 가공하는 단계; 및

(b) 상기 캐소드와 애노드의 전면 중 적어도 일부에 프레싱(pressing)을 가하여 반사면을 형성하는 단계

를 포함하는 것을 특징으로 하는 LED 패키지의 제조방법.

청구항 10

제9항에 있어서,

상기 (a) 단계에서 상기 캐소드와 애노드를 비대칭적으로 형성하여 상기 캐소드와 애노드 중 어느 하나가 더 넓게 형성되도록 하는 것을 특징으로 하는 LED 패키지의 제조방법.

청구항 11

제9항에 있어서,

상기 (b) 단계에서 상기 반사면은 상기 캐소드 또는 상기 애노드를 기준으로 90도 이상의 경사도를 갖는 것을 특징으로 하는 LED 패키지의 제조방법.

청구항 12

제9항에 있어서,

상기 (a) 단계 이후에 상기 캐소드 및 상기 애노드와 상기 반사면이 서로 접하는 부분을 에칭하는 단계를 더 포함하는 것을 특징으로 하는 LED 패키지의 제조방법.

청구항 13

제9항에 있어서,

상기 (a) 단계 이후에 상기 캐소드와 상기 애노드의 LED 칩이 안착되는 부분을 에칭하는 단계를 더 포함하는 것을 특징으로 하는 LED 패키지의 제조방법.

청구항 14

제9항에 있어서,

상기 (b) 단계 이후에 상기 캐소드와 상기 애노드 사이에 절연체를 형성하는 단계를 더 포함하는 것을 특징으로 하는 LED 패키지의 제조방법.

청구항 15

제14항에 있어서,

상기 절연체는 사출물 주입 방식을 이용하여 형성하는 것을 특징으로 하는 LED 패키지의 제조방법.

명 세 서

발명의 상세한 설명

기 술 분 야

[0001] 본 발명은 LED 패키지 및 이의 제조 방법에 관한 것이다. 보다 상세하게는, LED 칩이 반사면과 직접적으로 연결되어 높은 열전도율을 보이고, LED 칩과의 높은 부착력을 보이며, 캐소드와 애노드의 일부를 반사면으로 이용함에 따라 높은 반사율을 보임과 동시에 반사면을 위한 별도의 구성요소의 필요가 없게 되는 LED 패키지 및 이의 제조 방법에 관한 것이다.

배 경 기 술

[0002] LED(light-emitting diode)는 반도체의 p-n접합 다이오드의 일종으로서 화합물인 반도체 단자에 전기 신호를 보내면 이를 빛으로 변환하여 발광하는 발광 다이오드를 일컫는다.

[0003] 이러한 LED에 있어서는 모듈화를 위한 패키지가 중요한 요소인데, 이렇게 패키지된 LED는 가전기기, 자동차, 건축, 의료 기기, 디스플레이, 환경 등 거의 모든 산업에 적용되고 있으며, 최근에는 일반 조명 시장에서도 기존

조명을 대체하고 있는 추세이다.

[0004] 특히, LED를 이용한 조명이 부각되고 있는 이유는 고휘도 백색 LED의 성능지수가 100l m/W로 이미 백열전구 및 할로겐 램프의 수준을 완전히 넘었고, 일반 형광등 수준에 비해 높은 성능을 보이고 있기 때문이다. 또한, 전력소비, 수명, 내구성, 견고성, 집적화 등의 측면에서도 여러가지 형태로 장점을 보이고 있기 때문이다.

[0005] 이러한 우수한 특성의 LED를 얻기 위해서는 그 패키지 과정이 매우 중요하다.

[0006] 도 1은 통상적인 고전력용 LED 모듈의 기본 구조를 나타내는 도면이다. LED 모듈에는 LED 패키지가 포함되어 있다.

[0007] 도 1에 도시되는 바와 같이, 통상적인 LED 모듈은 LED 칩(10), 리드 프레임(20), 열 싱크(heat sink; 30), 형광체(40) 및 렌즈(50) 등을 포함하여 구성될 수 있다.

[0008] LED 칩(10)은 LED 소자를 포함하여 전기적 신호를 광 신호로 변환하는 구성요소이고, 리드 프레임(20)은 LED 칩(10)에 전기적 신호를 전달하는 기능을 수행한다. 이러한 프레임(20)의 재질로서는 가격이 저렴한 고분자 재료가 널리 이용되고 있다.

[0009] 한편, 열 싱크(30)는 LED 모듈이 동작할 시에 방출되는 열을 흡수하는 기능을 수행하며, 형광체(40)는 LED 칩(10)으로부터 방출되는 빛을 원하는 색과 온도를 갖는 빛으로 변환하는 기능을 수행한다. 또한, 렌즈(50)는 반사 특성을 원하는 형태로 제어하기 위한 구성요소이다.

[0010] 이러한 통상적인 LED 모듈에 있어서는 LED 칩(10)으로부터 방출되는 광이 반사되는 반사면(A)이 플라스틱 등으로 이루어지는 것이 일반적이었다. 이 경우 반사율이 떨어지는 플라스틱 부위에서 반사가 이루어지므로 반사율의 저하를 감수하였어야 했다.

[0011] 또한, 캐소드와 애노드를 분리하여 형성하는 2단 구조의 리드 프레임에 있어서는 절연체로서 기능하는 몰딩 재료가 중앙에 존재하게 되어서 LED 칩이 상기 몰딩 재료 상에 실장될 수 밖에 없었다. 이에 따라 열방산 능력이 떨어지는 문제가 있었다.

[0012] 한편, 열 싱크(30)와 같은 재료를 이용하는 구조이 있어서는 열 싱크(30)와 다른 구성요소 또는 LED 칩(10)과 다른 구성요소 간의 접착면에서 계면 잔류응력 등에 의하여 신뢰성이 저하되는 문제가 있었다.

[0013] 따라서, 계면이 최소화되는 간단한 구조로 구성할 수 있으면서도 높은 열방산 능력과 신뢰성을 갖는 LED 모듈을 위한 패키지 방법에 대한 개발이 시급한 실정이다.

발명의 내용

해결 하고자하는 과제

[0014] 본 발명은 상술한 종래 기술의 문제점을 해결하기 위하여 안출된 것이다.

[0015] 본 발명의 다른 목적은 LED 패키지를 간단한 2개의 금속물로 구성하되, 상기 2개의 금속물을 비대칭적으로 형성하여 LED 칩이 금속물 상에 실장되게 함으로써 높은 열방산 능력과 열전도율을 갖는 LED 모듈을 얻을 수 있도록 하는 것이다.

[0016] 본 발명의 또 다른 목적은 LED 패키지를 구성하는 금속물 자체를 반사면으로 이용함으로써 높은 반사 효율을 보이고 반사면을 위한 별도의 구성요소를 필요로 하지 않아 제조 원가를 절감하고, 완성품의 무게를 경감시킬 수 있도록 하는 것이다.

[0017] 본 발명의 또 다른 목적은 LED 패키지에 있어서 절연을 위한 플라스틱 몰딩부가 차지하는 공간을 최소화함으로써 LED 칩이 금속물 위의 넓은 부분에 실장될 수 있도록 하고 이에 따라 우수한 열방산 능력을 가질 수 있도록 하는 것이다.

[0018] 본 발명의 또 다른 목적은 LED 패키지에 있어서 캐소드 및 애노드와 반사면이 접하는 부분을 하프 에칭하여 반사면의 형성을 용이하게 하고 LED 칩과 캐소드 및 애노드의 접촉 면적을 극대화시킴으로써 완성품의 열방산 능력이 향상될 수 있도록 하는 것이다.

[0019] 본 발명의 또 다른 목적은 LED 패키지에 있어서 LED 칩이 실장되는 부분을 하프 에칭하여 LED 칩과 다른 구성요소간의 접촉력을 극대화시킴으로써 완성품의 내구성 및 신뢰성이 향상될 수 있도록 하는 것이다.

과제 해결수단

[0020] 상술한 목적을 달성하기 위하여, 본 발명의 일 실시예에 따르면, 캐소드, 애노드, 상기 캐소드 및 상기 애노드와 각각 일체를 이루면서 연속적으로 형성되는 반사면 및 리드 프레임을 포함하는 LED 패키지가 제공된다.

[0021] 그리고, 상술한 목적을 달성하기 위하여, 본 발명의 다른 실시예에 따르면, 리드 프레임; 각각의 일단은 상기 리드 프레임으로부터 연장되며 타단은 소정 거리 이격된 상태로 서로 대향하는 캐소드(cathode)와 애노드(anode); 및 상기 캐소드와 상기 애노드의 적어도 일부가 변형되어 형성된 반사면을 포함하는 LED 패키지가 제공된다.

[0022] 상기 캐소드와 상기 애노드는 비대칭적으로 형성되어 상기 캐소드와 상기 애노드 중 어느 하나가 더 넓게 형성될 수 있다.

[0023] 상기 반사면은 상기 캐소드 또는 상기 애노드를 기준으로 90도 이상의 경사도를 가질 수 있다.

[0024] 상기 캐소드 및 상기 애노드와 상기 반사면이 서로 접하는 부분은 에칭된 상태일 수 있다.

[0025] 상기 캐소드와 상기 애노드의 LED 칩이 안착되는 부분은 에칭된 상태일 수 있다.

[0026] 상기 캐소드와 상기 애노드 사이에 절연체를 더 포함할 수 있다.

[0027] 상기 리드 프레임, 상기 캐소드와 상기 애노드 및 상기 반사면의 재질은 금속 또는 금속 합금을 포함할 수 있다.

[0028] 그리고, 상술한 목적을 달성하기 위하여, 본 발명의 또 다른 실시예에 따르면, (a) 리드 프레임을 가공하되, 각각의 일단은 상기 리드 프레임으로부터 연장되며 타단은 소정 거리 이격된 상태로 서로 대향하는 캐소드(cathode)와 애노드(anode)가 함께 형성되도록 가공하는 단계; 및 (b) 상기 캐소드와 애노드의 전면 중 적어도 일부에 프레싱(pressing)을 가하여 반사면을 형성하는 단계를 포함하는 LED 패키지의 제조방법이 제공된다.

[0029] 상기 (a) 단계에서 상기 캐소드와 애노드를 비대칭적으로 형성하여 상기 캐소드와 애노드 중 어느 하나가 더 넓게 형성될 수 있다.

[0030] 상기 (b) 단계에서 상기 반사면은 상기 캐소드 또는 상기 애노드를 기준으로 90도 이상의 경사도를 가질 수 있다.

[0031] 상기 (a) 단계 이후에 상기 캐소드 및 상기 애노드와 상기 반사면이 서로 접하는 부분을 에칭하는 단계를 더 포함할 수 있다.

[0032] 상기 (a) 단계 이후에 상기 캐소드와 상기 애노드의 LED 칩이 안착되는 부분을 에칭하는 단계를 더 포함할 수 있다.

[0033] 상기 (b) 단계 이후에 상기 캐소드와 상기 애노드 사이에 절연체를 형성하는 단계를 더 포함할 수 있다.

[0034] 상기 절연체는 사출물 주입 방식을 이용하여 형성할 수 있다.

효 과

[0035] 본 발명에 의하면, LED 패키지를 간단한 2개의 금속물로 구성할 수 있으며, 이렇게 하더라도 상기 2개의 금속물을 비대칭적으로 형성함으로써, LED 칩이 금속물(반사면) 상에 직접적으로 실장될 수 있어 높은 열방산 능력과 열전도율을 갖는 LED 모듈이 얻어질 수 있게 된다.

[0036] 또한, 본 발명에 의하면, LED 패키지를 구성하는 금속물이 반사면으로서의 기능도 수행하기 때문에, 높은 반사효율이 얻어질 수 있고, 반사면을 위한 별도의 구성요소가 필요 없게 되어 제조 원가 절감과 완성품의 부피 경감을 꾀할 수 있게 된다.

[0037] 또한, 본 발명에 의하면, LED 패키지에 있어서 절연을 위한 플라스틱 몰딩부가 차지하는 공간이 최소화되어, LED 칩이 금속물 위의 넓은 부분에 실장될 수 있으며, 이에 따라 우수한 열방산 능력이 달성될 수 있게 된다.

[0038] 또한, 본 발명에 의하면, LED 패키지에 있어서 캐소드 및 애노드와 반사면이 접하는 부분의 두께를 하프 에칭에 의하여 감소시킬 수 있으며, 이에 따라 반사면 형성을 위한 캐소드 및 애노드의 변형을 용이하게 하고 반사면 형성 후에 캐소드 및 애노드의 휨 현상 등이 나타나지 않아서 LED 칩과 캐소드 및 애노드의 접촉 면적을 극대화

시킴으로써 완성품의 열방산 능력이 향상되게 된다.

[0039] 또한, 본 발명에 의하면, LED 패키지에 있어서 LED 칩이 실장되는 부분이 하프 에칭에 의해 적절한 거칠기를 가질 수 있으며, 이에 따라 LED 칩과 다른 구성요소간의 접촉력이 극대화될 수 있게 된다.

발명의 실시를 위한 구체적인 내용

[0040] 후술하는 본 발명에 대한 상세한 설명은, 본 발명이 실시될 수 있는 특정 실시예를 예시로서 도시하는 첨부 도면을 참조한다. 이들 실시예는 당업자가 본 발명을 실시할 수 있기에 충분하도록 상세히 설명된다. 본 발명의 다양한 실시예는 서로 다르지만 상호 배타적일 필요는 없음이 이해되어야 한다. 예를 들어, 여기에 기재되어 있는 특정 형상, 구조 및 특성은 일 실시예에 관련하여 본 발명의 정신 및 범위를 벗어나지 않으면서 다른 실시예로 구현될 수 있다. 또한, 각각의 개시된 실시예 내의 개별 구성요소의 위치 또는 배치는 본 발명의 정신 및 범위를 벗어나지 않으면서 변경될 수 있음이 이해되어야 한다. 따라서, 후술하는 상세한 설명은 한정적인 의미로서 취하려는 것이 아니며, 본 발명의 범위는, 적절하게 설명된다면, 그 청구항들이 주장하는 것과 균등한 모든 범위와 더불어 첨부된 청구항에 의해서만 한정된다. 도면에서 유사한 참조부호는 여러 측면에 걸쳐서 동일하거나 유사한 기능을 지칭한다.

[0041] 이하에서는, 본 발명이 속하는 기술분야에서 통상의 지식을 가진 자가 본 발명을 용이하게 실시할 수 있도록 하기 위하여, 본 발명의 바람직한 실시예들에 관하여 첨부된 도면을 참조하여 상세히 설명하기로 한다.

[0042] [본 발명의 바람직한 실시예]

[0043] LED 패키지의 전체 구성

[0044] 도 2는 본 발명의 일 실시예에 따른 LED 패키지의 전체적인 구성을 나타내는 사시도이다.

[0045] 도 3은 도 2에 도시되는 LED 패키지의 분해 사시도이다.

[0046] 도 4는 본 발명의 일 실시예에 따른 LED 패키지를 일 이상 포함하는 구조의 전면 사시도이다.

[0047] 도 5 및 도 6은 도 4의 후면 사시도를 나타낸다.

[0048] 도 2 내지 도 6에 도시되는 바와 같이, 본 발명의 일 실시예에 따른 LED 패키지는 캐소드(cathode: 111) 및 애노드(anode: 112)를 포함하는 리드 프레임(lead frame: 110), 캐소드(111)와 애노드(112) 사이의 절연체로서 기능하는 플라스틱 사출물(120), LED 칩으로부터 방사되는 광을 반사시키는 반사면(130)을 포함하여 구성될 수 있다.

[0049] 리드 프레임(110)은 LED 패키지에 실장되는 LED 칩에 전기를 공급하고 이를 지지해주는 기능을 수행한다. 리드 프레임(110)은 캐소드(111)와 애노드(112)를 포함하는 형태로 가공되며, 이에 따라 캐소드(111)와 애노드(112)의 형태는 리드 프레임(110)의 형태에 의존적이게 된다.

[0050] 캐소드(111)와 애노드(112)는 모두 리드 프레임(110)으로부터 연장된다. 즉, 캐소드(111)와 애노드(112)의 일단은 리드 프레임(110)에 연결되어 있으며, 캐소드(111)와 애노드(112)의 타단은 서로 이격되어 있게 된다.

[0051] 캐소드(111)와 애노드(112)는 서로 대향하는 형태일 수 있으나, 대칭적이지는 않도록 형성되는 것이 바람직하다. 즉, 캐소드(111)와 애노드(112) 중 어느 하나의 면적이 더 넓도록 형성되는 것이 바람직하다. 도면에는 더 넓은 면적을 차지하고 있는 것이 캐소드(111), 그렇지 않은 것이 애노드(112)인 것으로 도시되었으나, 그 반대일 수도 있다.

[0052] 한편, 캐소드(111)와 애노드(112)에 있어서, 추후 반사면(130)을 형성하기 위하여 캐소드(111)와 애노드(112)가 변형되는 부분, 즉 캐소드(111) 및 애노드(112)와 반사면(130)이 접하는 부분은 하프 에칭(half etching)이 수행된 상태일 수 있다. 여기서 하프 에칭이라는 것은 에칭 대상물에 대하여 그 두께의 반 정도를 부식시켜 제거하는 것을 의미한다. 즉, 하프 에칭을 통해 캐소드(111) 및 애노드(112)와 반사면(130)이 접하는 부분의 두께가 리드 프레임(110)의 두께보다 얇도록 한다.

[0053] 이러한 하프 에칭은 캐소드(111) 및 애노드(112)와 반사면(130)이 접하는 부분의 두께를 감소시킬 수 있으며, 이에 따라 반사면(130) 형성을 위한 캐소드(111) 및 애노드(112)의 변형을 용이하게 하고 반사면(130) 형성 후에 캐소드(111) 및 애노드(112)의 휨 현상 등이 나타나지 않아서 LED 칩과 캐소드 및 애노드의 접촉 면적을 극대화시킴으로써 완성품의 열방산 능력이 향상되게 된다.

[0054] 또한, 캐소드(111)와 애노드(112)에 있어서, 추후 LED 칩이 실장되는 면, 즉 리드 프레임(110)의 전면은 하프 에칭(half etching)이 수행된 상태일 수 있다. 즉, 리드 프레임(110) 두께의 반만큼을 부식시키는 하프 에칭을 통해 LED 칩이 실장되는 공간을 캐소드(111)와 애노드(112) 상에 형성시킨다. 이때, 하프 에칭에 의해 부식되는 면적이 실장될 LED 칩의 크기보다 약간 크게 하는 것이 바람직하다.

[0055] 이러한 하프 에칭은 LED 칩이 캐소드(111)와 애노드(112) 상에 안착되게 하며, 동시에 LED 칩이 실장되는 부분에 적당한 거칠기(roughness)를 가져다 주므로 LED 칩 실장시 접착력을 강화시켜 주고 그 결과 LED 패키지의 내구성 및 신뢰성을 향상시켜 준다.

[0056] 그리고, 본 발명의 일 실시예에 따른 LED 패키지의 반사면(130)은 캐소드(111)와 애노드(112)의 일부가 변형된 형태로 형성된다. 추후 설명되는 바와 같이, 캐소드(111)와 애노드(112)가 프레싱(pressing) 됨에 따라, 외곽부가 소정 각도의 경사면으로 이루어지는 오목부가 형성되게 되고, 상기 오목부의 외곽부, 즉 경사면이 반사면(130)으로서 기능하게 된다. 이러한 오목부는 도면에 도시되는 바와 같이 LED 패키지의 정 중앙을 중심으로 하는 원형일 수 있으나 이에 제한되는 것은 아니다. 또한, 반사면(130)의 경사도는 LED 패키지에서 요구되는 반사 효율에 따라 다양하게 변경될 수 있다. 일례로서 반사면(130)은 캐소드(111) 또는 애노드(112)를 기준으로 90도 이상의 경사도를 가질 수 있다.

[0057] 이와 같이 캐소드(111)와 애노드(112)의 일부가 반사면(130)으로서의 기능을 수행함에 따라 반사면(130)을 위한 별도의 구성요소가 필요 없게 되고, 반사면(130)의 재질이 금속 물질로 이루어짐에 따라 LED 패키지의 반사 효율이 향상되게 되고, 캐소드(111)와 애노드(112) 상에 실장되는 LED 칩이 반사면과 직접적으로 연결됨에 따라 LED 패키지의 방열(열전달) 효율이 향상되게 된다.

[0058] LED 패키지의 제조 방법

[0059] 이하에서는, 도 2 내지 도 6을 참조하여 본 발명의 일 실시예에 따른 LED 패키지의 제조 과정에 대해 상세히 설명하기로 한다.

[0060] 먼저, 리드 프레임(110)의 형태를 소정의 원하는 형태로 가공한다. 리드 프레임(110)은 임의의 도전체, 즉 금속 또는 금속 합금을 포함하여 형성할 수 있으나 리드 프레임(110)의 재질은 구리인 것이 바람직하다.

[0061] 상기 가공 과정에서 캐소드(111) 및 애노드(112)도 함께 형성시킨다. 전술한 바와 같이, 캐소드(111)와 애노드(112)는 리드 프레임(110)에서 각각 연장되어 서로 대향하되 일단이 서로 이격되는 형태로 형성될 수 있다.

[0062] 이 때 캐소드(111)와 애노드(112)는 비대칭적인 형태로 가공하여, 즉 캐소드(111)와 애노드(112) 중 어느 하나의 면적이 더 크도록 가공하는 것이 바람직하다. 이로써 캐소드(111)와 애노드(112)가 비대칭적인 형태로 형성됨에 따라 캐소드(111)와 애노드(112) 사이에 노출되는 플라스틱 사출물(120)의 면적이 줄어들어, 즉 LED 칩과 접촉되는 캐소드(111)와 애노드(112)의 면적이 커져서 LED 패키지의 방열 효과가 향상될 수 있다.

[0063] 다음으로 리드 프레임(110)의 두께의 반 정도를 부식시키는 하프 에칭을 수행한다. 하프 에칭은 캐소드(111) 및 애노드(112)와 반사면(130)이 접하는 부분 및/또는 캐소드(111)와 애노드(112) 상에LED 칩이 실장될 부분에 대해 행해진다. 이러한 하프 에칭을 통해 추후 반사면(130) 형성 후에 캐소드(111) 및 애노드(112)의 휨 현상 등이 나타나지 않게 된다. 또한 추후 완성될 LED 패키지에 LED 칩이 안착될 공간이 확보될 수 있음과 동시에 LED 칩이 안착되는 리드 프레임(110), 더 정확하게는 캐소드(111)와 애노드(112)의 거칠기(roughness)가 증가하게 된다. 하프 에칭은 마스크를 이용하는 통상의 포토 리소그래피 및 습식 에칭 방식을 이용하여 수행될 수 있으나, 반드시 이에 한정되는 것은 아니다.

[0064] 이러한 캐소드(111) 및 애노드(112)의 휨 현상의 방지, 즉 캐소드(111) 및 애노드(112)의 평탄도의 향상에 따라 LED 칩과 캐소드(111) 및 애노드(112)의 접촉 면적이 커져서 LED 패키지의 열방산 능력이 더욱 향상될 수 있다. 구체적으로 설명하면, 하프 에칭에 의해 캐소드(111) 및 애노드(112)와 반사면(130)이 접하는 부분의 두께가 얇아지면[즉, 리드 프레임(110)의 두께보다 얇아지면] 향후 반사면(130) 형성을 위한 프레싱 작업시 발생할 수 있는 캐소드(111)와 애노드(112) 상의 원하지 않는 변형(예를 들면, 휨 또는 국부적인 굴곡 등)을 줄일 수 있어서 캐소드(111)와 애노드(112)가 보다 편평한 상태로 형성되고 그 결과 LED 칩과 캐소드(111) 및 애노드(112)간의 접촉 면적이 커져서 LED 패키지의 열방산 능력이 향상된다.

[0065] 또한, 이러한 거칠기의 증가에 따라 캐소드(111)와 애노드(112) 상의 LED 칩의 접착력은 더욱 향상될 수 있다.

구체적으로 설명하면, 하프 에칭에 의해 LED 칩이 실장될 부분에 일정 깊이(300 ㎛ 내외)의 공동(cavity)이 형성되고, 이 부분이 에칭에 따라 거칠기가 증가하여 LED 칩의 안정적인 실장이 가능하고 안착된 LED 칩의 접착

력이 향상되어 LED 패키지의 내구성 및 신뢰성이 더욱 향상될 수 있다.

[0066] 다음으로 프레싱을 통해 반사면(130)을 형성한다. 도 2 내지 도 4에 도시되는 바와 같이, 일단이 리드 프레임(110)에 연결되어 있고 타단은 서로 이격되어 있는 캐소드(111)와 애노드(112)의 전면, 즉 추후 LED 칩이 실장되는 부분의 주변에 프레싱을 수행하여 오목부가 형성될 수 있도록 한다. 다시 말하여, LED 칩이 실장될 지점 주위에 소정의 경사각을 갖는 반사면(130)을 형성한다.

[0067] 본 발명의 LED 패키지에 있어서 반사면(130)의 특징은 캐소드(111)와 애노드(112)의 적어도 일부가 반사면(130)으로서의 기능을 수행한다는 것이다. 구체적으로 설명하면, 본 발명에서는 반사면(130)이 캐소드(111)와 애노드(112)와는 별개의 구성요소로 형성되는 것이 아니라, 프레싱 과정을 통해 캐소드(111)와 애노드(112)의 적어도 일부가 변형되어 반사면(130)이 형성된다는 것이다. 즉, 본 발명의 LED 패키지는 반사면(130)이 캐소드(111)와 애노드(112)와 각각 일체를 이루면서 연속적으로 형성되는 것을 특징적 구성으로 한다.

[0068] 본 발명에서는 캐소드(111)와 애노드(112)가 금속 재질이므로 종래의 LED 패키지에서 채용하는 플라스틱 재질의 반사면에 비하여 표면 상태가 우수하여 상대적으로 LED패키지의 반사율이 향상될 수 있다. 특히, 종래의 플라스틱 재질의 반사면은 광원 중에 포함되는 자외선 등에 의하여 그 성질이 서서히 변질되어 LED 패키지의 신뢰성이 저하될 수 있으나, 본 발명의 금속 재질의 반사면(130)은 이러한 현상을 방지할 수 있다.

[0069] 한편, 캐소드(111)와 애노드(112)에 대한 프레싱 작업만으로 반사면(130)이 형성되게 됨에 따라, 반사면(130) 설치를 위하여 금속 부재 등과 같은 별도의 구성요소를 사용할 필요가 없어서 LED 패키지의 무게가 경감되고 LED 패키지의 제조 비용이 절감될 수 있게 된다.

[0070] 끝으로 반사면(130)을 형성시킨 후에는 몰딩 작업을 통해 절연체 기능을 하는 플라스틱 사출물(120)을 주입함으로써 LED 패키지의 제조를 완료한다. 이때 절연체의 재질은 플라스틱에 한정되지는 않으며, 플라스틱 사출물의 주입 과정은 공지의 기술이므로 본 명세서에서는 상세한 설명은 생략한다.

[0071] LED 모듈 제조

[0072] 이하에서는 본 발명의 일 실시예에 따른 LED 패키지를 이용하여 LED 모듈을 제조하는 과정에 대해 간단히 설명하기로 한다.

[0073] 먼저, 상술한 과정으로 제조된 LED 패키지의 중앙 부분에 LED 칩을 실장시킨다. 전술한 바와 같이, 캐소드(111)와 애노드(112)가 서로 대향하되 비대칭적인 형태를 띄기 때문에, LED 패키지의 중심에 LED 칩이 실장된다면, 이러한 LED 칩은 캐소드(111) 및 애노드(112) 상에 실장될 수 있게 된다. LED 칩의 실장 방법은 솔더링(soldering) 방식 또는 Ag 에폭시(epoxy) 수지 등의 물질을 이용하여 접합하는 방식 등이 이용될 수 있으나, 이에 한정되지 않음은 물론이다

[0074] LED 칩 실장 후에는 와이어 본딩(wire bonding)을 수행한다. 와이어 본딩이란 LED 패키지에서 리드 프레임(또는 캐소드와 애노드)과 LED 칩의 두 전극을 와이어로 연결하는 과정이다. 이러한 와이어 본딩은 캐소드(111)와 애노드(112)에 대해 각각 수행하게 되는데, 본 발명에 따른 LED 패키지에 포함되는 캐소드(111)와 애노드(112)는 서로 비대칭적인 형태를 띠고 있으므로, 캐소드(111)와 애노드(112)의 구분을 위한 별도의 표시가 필요 없게 된다. 즉, 와이어 본딩시 캐소드(111)와 애노드(112)가 대칭적인 형태가 아니므로 양자간의 구별이 용이하여 캐소드(111)와 애노드(112)의 구별을 위한 특별한 방향 표시 등이 필요 없게 된다.

[0075] 와이어 본딩 작업이 완료된 후에는 LED 칩의 응용 분야에 따라 형광체 도포, 렌즈 부착 과정 등을 추가로 수행하여 최종적인 LED 모듈을 완성시킬 수 있다.

[0076] 한편, LED 모듈의 생산성 제고 측면에서 도 4 내지 도 6에 도시한 바와 같이 본 발명에서는 복수개의 LED 패키지를 일괄 공정으로 제조할 수 있음은 물론이다.

[0077] 이상에서 본 발명이 구체적인 구성요소 등과 같은 특정 사항들과 한정된 실시예 및 도면에 의해 설명되었으나, 이는 본 발명의 보다 전반적인 이해를 돕기 위해서 제공된 것일 뿐, 본 발명이 상기 실시예들에 한정되는 것은 아니며, 본 발명이 속하는 기술분야에서 통상적인 지식을 가진 자라면 이러한 기재로부터 다양한 수정 및 변형을 꾀할 수 있다.

[0078] 따라서, 본 발명의 사상은 상기 설명된 실시예에 국한되어 정해져서는 아니되며, 후술하는 특허청구범위뿐만 아니라 이 특허청구범위와 균등하게 또는 등가적으로 변형된 모든 것들은 본 발명의 사상의 범주에 속한다고 할 것이다.

도면의 간단한 설명

[0079] 도 1은 종래 LED 모듈의 구성을 나타내는 도면이다.

[0080] 도 2는 본 발명의 일 실시예에 따른 LED 패키지의 전체적인 구성을 나타내는 사시도이다.

[0081] 도 3은 도 2에 도시되는 LED 패키지의 분해 사시도이다.

[0082] 도 4는 본 발명의 일 실시예에 따른 LED 패키지를 일 이상 포함하는 구조의 전면 사시도이다.

[0083] 도 5 및 도 6은 도 4의 후면 사시도이다.

[0084] <주요 도면부호에 관한 간단한 설명>

[0085] 110: 리드 프레임

[0086] 111: 캐소드

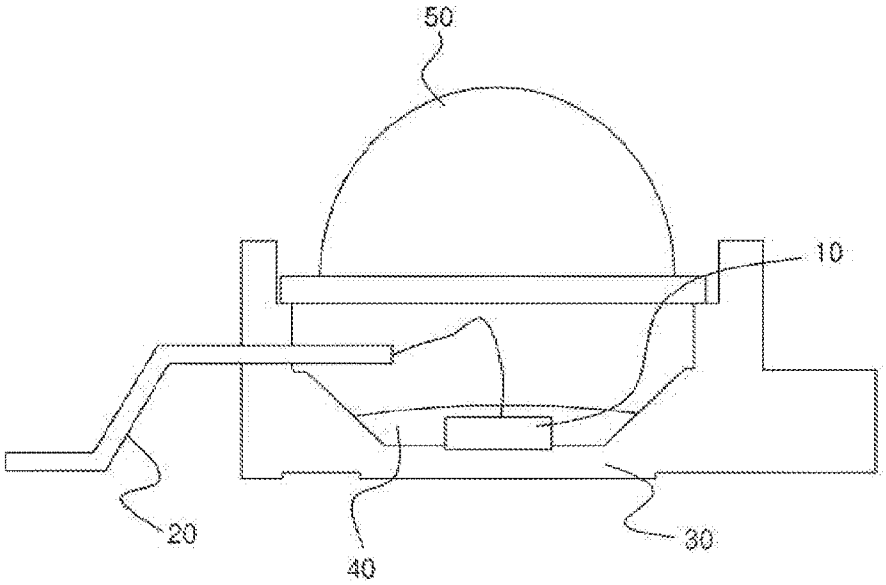
[0087] 112: 애노드

[0088] 120: 플라스틱 사출물

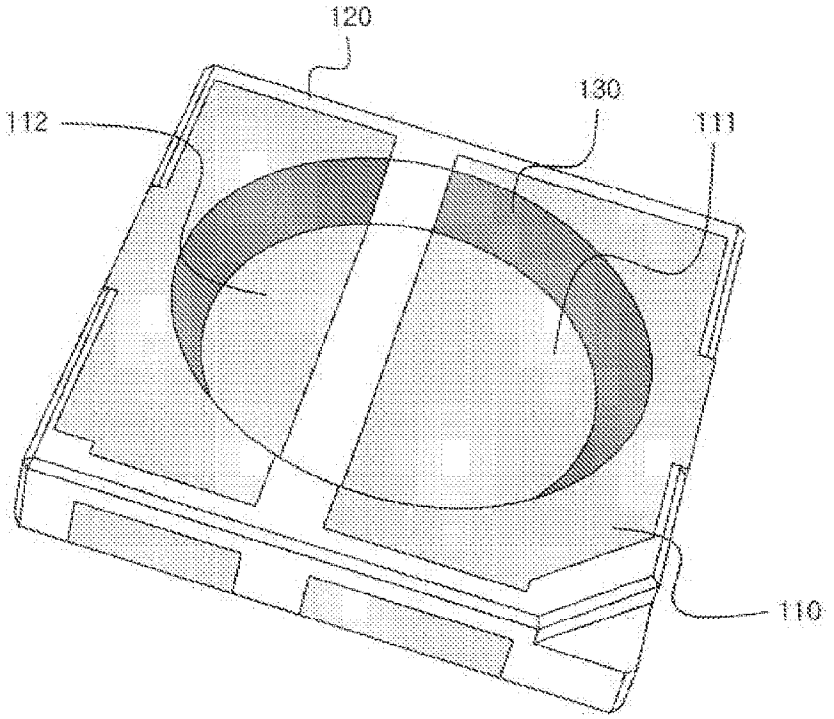
[0089] 130: 반사면

도면

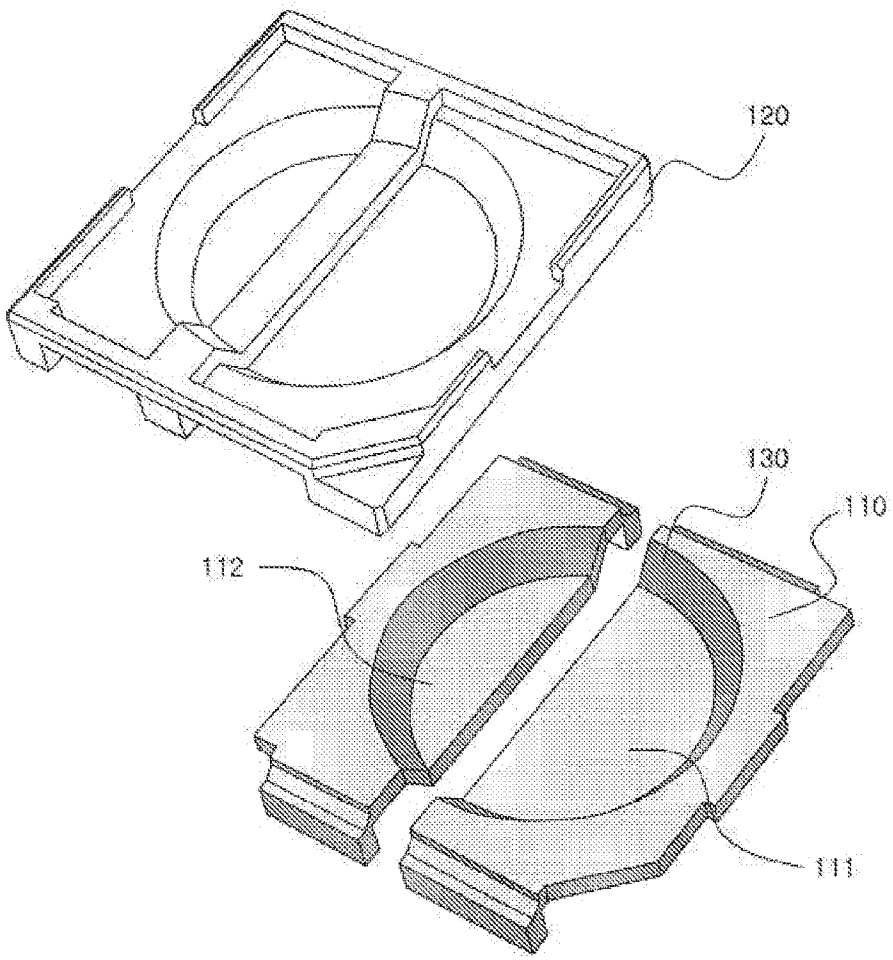
도면1



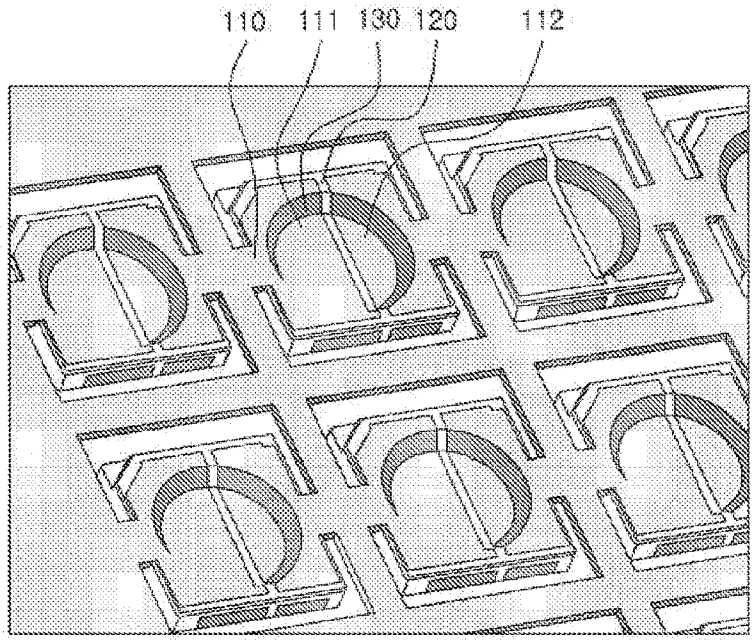
도면2



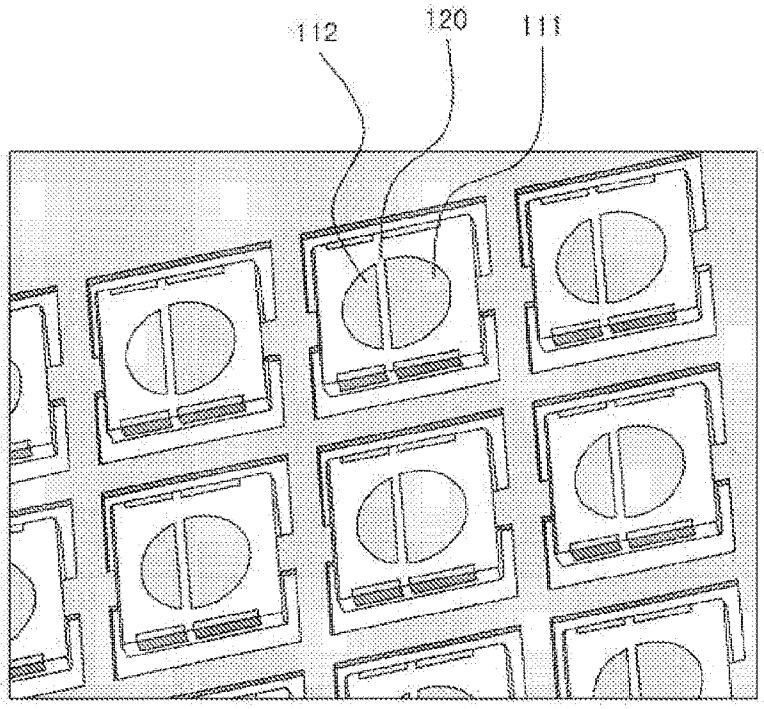
도면3



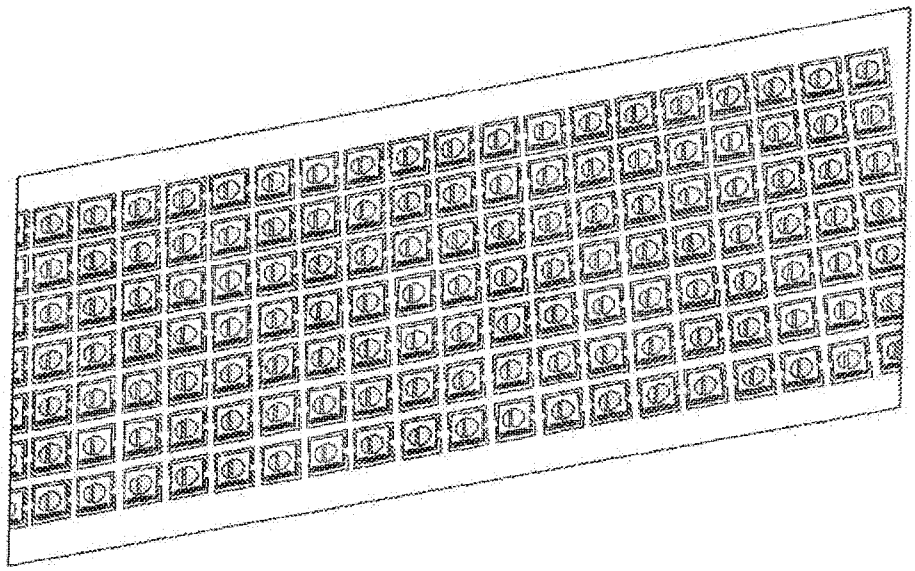
도면4



도면5



도면6



Espacenet

Bibliographic data: JP2014060343 (A) — 2014-04-03

METHOD OF MANUFACTURING LIGHT-EMITTING DIODE, LIGHT-EMITTING DIODE

Inventor(s):

Applicant(s): SANKEN ELECTRIC CO LTD ± (SANKEN ELECTRIC CO LTD)

Classification:
- **international:** ***H01L23/29; H01L23/31; H01L33/60; H01L33/62***
- **cooperative:** **H01L24/97**; H01L2224/48091; H01L2224/48247; H01L2224/48464; H01L2924/12041; H01L2924/181 more

Application number: JP20120205789 20120919

Priority number (s): JP20120205789 20120919

Abstract not available for JP2014060343 (A)

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CLAIMS DETAILED DESCRIPTION
TECHNICAL FIELD PRIOR ART TECHNICAL PROBLEM MEANS DESCRIPTION OF DRAWINGS DRAWINGS

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CLAIMS

[Claim(s)]
[Claim 1]
A textile preparation step for which a textile which contains the 1st fiber in which leaching is possible, and the 2nd fiber that does not carry out leaching by the aforementioned etching agent by an etching agent is prepared,
Opal down stream processing which makes ink-jet pearl ink which contains the aforementioned etching agent adhere to the 1st region that is some regions of the aforementioned textile, and carries out leaching of said 1st fiber,
The 1st dyeing process that makes the 1st ink jet color ink which contains the 1st color adhere to the 3rd region that is at least some regions among the 2nd region in which said 1st region is a different region, and dyes said 1st fiber,
The 2nd dyeing process that makes the 2nd ink jet color ink which contains the 2nd color adhere to said 3rd region, and dyes said 2nd fiber,
It ****,
A manufacturing method of an opal-finishing textile which dyes said 3rd region with similar colors and an affiliated design in said 1st dyeing process and said 2nd dyeing process.
[Claim 2]
In Claim 1,
It has the moist-heat-treatment process of performing moist heat treatment of the aforementioned textile,
When the aforementioned moist-heat-treatment process is performed between said 1st dyeing process and said 2nd dyeing process,

A manufacturing method of an opal-finishing textile to which ink jet color ink is made to adhere to said 3rd region based on contraction of the aforementioned textile by the aforementioned moist-heat-treatment process in a dyeing process behind performed among said 1st dyeing process and said 2nd dyeing process.
[Claim 3]
In Claim 1 or Claim 2,
A manufacturing method of a dyeing process to which the aforementioned opal down stream processing is previously performed among said 1st dyeing process and said 2nd dyeing process, and an opal-finishing textile performed continuously.
[Claim 4]
In Claim 1 or Claim 2,
It has the moist-heat-treatment process of performing moist heat treatment of the aforementioned textile,
When the aforementioned moist-heat-treatment process is performed before the aforementioned opal down stream processing,
A manufacturing method of an opal-finishing textile to which the aforementioned opal down stream processing makes the aforementioned ink-jet pearl ink adhere to said 1st region based on contraction of the aforementioned textile by the moist-heat-treatment process.
[Claim 5]
In any 1 item of Claim 1 thru/or Claim 4,
A manufacturing method of an opal-finishing textile using a textile which has a ratio of mass of said 1st fiber to mass of said 2nd fiber within the limits of 3:7-7:3.
[Claim 6]
It is an opal-finishing textile obtained using a textile containing the 1st fiber in which leaching is possible, and the 2nd fiber that does not carry out leaching by the opal processing by opal processing,
The 1st region that is some regions of the aforementioned textile where the aforementioned opal processing was performed,
The 3rd region which said 1st region is at least some regions of the 2nd different region, and it comes to dye,
It ****,
An opal-finishing textile which said 1st fiber and said 2nd fiber were dyed with similar colors and an affiliated design in said 3rd region.
[Claim 7]
In Claim 6,
An opal-finishing textile obtained using a textile which has a ratio of mass of said 1st fiber to mass of said 2nd fiber within the limits of 3:7-7:3.

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CLAIMS DETAILED DESCRIPTION
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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[Field of the Invention]
[0001]
The present invention relates to an opal-finishing textile and the manufacturing method of this.
[Background of the Invention]
[0002]
from the former, as technology of processing a fiber, leaching destruction of a part of fiber which constitutes cloth (textile) is carried out, and opal finishing which forms a watermark partially is known.
[0003]
For example, dmy [****** / Patent document 1 / ********** / thing / of a fiber / form a handle for a thing in the part etching / a full etching part / of denaturation polyester fiber /, and partial etching part, and / by the thing of a sizing agent / containing an embrittlement agent / form a print / that coating weight differs / portion for a thing] the opal-finishing textile which came out with the etching part which consists of a nylon fiber, the colored polyester fiber layer, and the non-etching part which consists of the nylon fiber layer which is not colored, and was constituted is disclosed in the Patent document 2. A Patent document 3 has disclosed the processing method of cloth including the print using the opal paste containing acid for decomposing a cellulosic fiber, and printing using the ripple paste containing the alkali for shrinking cloth. In the textile constituted by polyester system elastic yarn and inelastic thread, carrying out etching processing of the inelastic thread, and

forming a watermark is disclosed in the Patent document 4. A Patent document 5 has disclosed the opal-finishing pile textile whose height of the pile of at least one copy with which the textile-printing pattern is given is lower than the height of the pile of other portions.
[0004]
If the technology of dyeing is combined with such opal finishing, it will be thought that a textile with a high design can be manufactured. Since the productivity of a textile will improve if these processings can be continuously performed using an inkjet system, it excels in convenience. For example, dmy [****** / Patent document 6 / ********** / dye / a portion / etching using the ink set for opal finishing / having ink for dyeing, and at least two ink of ** / of the ink of a cellulosic fiber / including ammonium sulfate / for opal finishing, and an acid-proof fiber]
[Citation list]
[Patent literature]
[0005]
[Patent document 1] JP,H06-136674,A
[Patent document 2] The patent No. 5006792 gazette
[Patent document 3] JP,2010-126843,A
[Patent document 4] JP,2007-039854,A
[Patent document 5] JP,2002-061070,A
[Patent document 6] The patent No. 5060235 gazette
[Summary of Invention]
[Problem to be solved by the invention]
[0006]
However, a Patent document 1 - opal finishing of the description to six are performed, a leaching part is formed, and when the non-leaching part which is not performing opal finishing is dyed, partially or on the whole, the color of the dyed non-leaching part may fade, or may become muddy, and may become indistinct.
[0007]
The present invention solves at least a part of problems in next. That is, it is in making the color of the dyed non-leaching part clear, and improving color enhancement in opal finishing. It is in obtaining a design and the high opal-finishing textile of quality, or obtaining an opal-finishing textile with high contrast of a handle. It is in providing technology suitable for opal finishing using an inkjet system.
[Means for solving problem]
[0008]
The present invention is made in order to solve at least one copy of above-mentioned problem, and it can be realized as the following modeses or examples of application.
[0009]
[The example 1 of application]
One modes of the manufacturing method of the opal-finishing textile concerning the present invention,
The textile preparation step for which the textile which contains the 1st fiber in which leaching is possible, and the 2nd fiber that does not carry out leaching by the aforementioned etching agent by an etching agent is prepared,
Opal down stream processing which makes the ink-jet pearl ink which contains the aforementioned etching agent adhere to the 1st region that is some regions of the aforementioned textile, and carries out leaching of the 1st above-mentioned fiber,
The 1st dyeing process that makes the 1st ink jet color ink which contains the 1st color adhere to the 3rd region that is at least some regions among the 2nd region whose 1st above-mentioned region is a different region, and dyes the 1st above-mentioned fiber,
The 2nd dyeing process that makes the 2nd ink jet color ink which contains the 2nd color adhere to the 3rd above-mentioned region, and dyes the 2nd above-mentioned fiber,
It ****,
In the 1st above-mentioned dyeing process and the 2nd above-mentioned dyeing process, the 3rd above-mentioned region is dyed with similar colors and an affiliated design.
[0010]

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According to the manufacturing method of the opal-finishing textile of the example 1 of application, the color enhancement of the color of the dyed non-leaching part can be improved. An opal-finishing textile with a design and high quality, and high contrast of a handle is obtained.
[0011]
In the present invention, when "opal processing" carries out leaching destruction only of the fiber of some kinds selected using the etching agent to the textile which consists of the fiber of a plurality of kinds by which union was carried out, the thing of processing which attaches a watermark to cloth is said. A "leaching part" means the region where opal processing was performed, and a "non-leaching part" means the region where opal processing is not performed.
[0012]
[The example 2 of application]
In the example 1 of application,
It has the moist-heat-treatment process of performing moist heat treatment of the aforementioned textile,
When the aforementioned moist-heat-treatment process is performed between the 1st above-mentioned dyeing process and the 2nd above-mentioned dyeing process,
Ink jet color ink can be made to adhere to the 3rd above-mentioned region based on contraction of the aforementioned textile by the aforementioned moist-heat-treatment process in the dyeing process behind performed among the 1st above-mentioned dyeing process and the 2nd above-mentioned dyeing process.
[0013]
According to the example 2 of application, it can inhibit that a gap of a dyeing position occurs in a next dyeing process.
[0014]
[The example 3 of application]
In the example 1 of application, or the example 2 of application,
The aforementioned opal down stream processing may be continuously performed with the dyeing process previously performed among the 1st above-mentioned dyeing process and the 2nd above-mentioned dyeing process.
[0015]
According to the example 3 of application, it can inhibit the position where opal processing was performed, the position where dyeing by the dyeing process performed previously was performed, and that ****** occurs.
[0016]
[The example 4 of application]
In the example 1 of application, or the example 2 of application,
It has the moist-heat-treatment process of performing moist heat treatment of the aforementioned textile,
When the aforementioned moist-heat-treatment process is performed before the aforementioned opal down stream processing,
The aforementioned opal down stream processing can make the aforementioned ink-jet pearl ink adhere to the 1st above-mentioned region based on contraction of the aforementioned textile by the moist-heat-treatment process.
[0017]
According to the example 4 of application, it can inhibit that a gap of the position where opal processing was performed occurs.
[0018]
[The example 5 of application]
In any one example of the example 1 of application thru/or the example 4 of application,
The textile which has a ratio of the mass of the 1st above-mentioned fiber to the mass of the 2nd above-mentioned fiber within the limits of 3:7-7:3 can be used.
[0019]
[The example 6 of application]
One modes of the opal-finishing textile concerning the present invention,
It is an opal-finishing textile obtained using the textile containing the 1st fiber in which

leaching is possible, and the 2nd fiber that does not carry out leaching by the opal processing by opal processing,
The 1st region that is some regions of the aforementioned textile where the aforementioned opal processing was performed,
The 3rd region which the 1st above-mentioned region is at least some regions of the 2nd different region, and it comes to dye,
It ****,
In the 3rd above-mentioned region, the 1st above-mentioned fiber and the 2nd above-mentioned fiber are dyed with similar colors and an affiliated design.
[0020]
It is excellent in the color enhancement of a non-leaching part, the opal-finishing textile of the example 6 of application has a design and high quality, and its contrast of a handle is high.
[0021]
[The example 7 of application]
In the example 6 of application,
The ratio of the mass of the 1st above-mentioned fiber to the mass of the 2nd above-mentioned fiber is obtained using the textile which is within the limits of 3:7-7:3.
[Brief Description of the Drawings]
[0022]
[Drawing 1]The plan view which expresses typically the textile used for the manufacturing method of an opal-finishing textile.
[Drawing 2]The plan view which expresses the textile after opal down stream processing typically.
[Drawing 3]The plan view showing typically the textile after the 1st dyeing process and opal down stream processing.
[Drawing 4]The first plan view showing typically the textile after the 1st dyeing process, opal down stream processing, and the 2nd dyeing process.
[Drawing 5]The second plan view showing typically the textile after the 1st dyeing process, opal down stream processing, and the 2nd dyeing process.
[Drawing 6]The figure showing typically the opal-finishing textile A concerning an working example.
[Drawing 7]The figure showing typically the opal-finishing textile B concerning an working example.
[Drawing 8]The figure showing typically the opal-finishing textile C concerning a comparative example.
[Drawing 9]The figure showing typically the opal-finishing textile D concerning a comparative example.
[Description of Embodiments]
[0023]
It describes about the suitable embodiment of the present invention below. The embodiment described below describes an example of the present invention. The present invention is not limited to following embodiments and also includes various kinds of modifications carried out in the range which does not change the summary of the present invention.
[0024]
1. Opal-finishing textile and manufacturing method for the same
An opal-finishing textile concerning one embodiment of the present invention and a manufacturing method for the same are applied to the textile containing the 1st fiber that carries out leaching by an etching agent, and the 2nd fiber that does not carry out leaching by an etching agent.
[0025]
The manufacturing method of the opal-finishing textile concerning one embodiment of the present invention makes the ink-jet pearl ink (only henceforth "opal ink") which contains an etching agent adhere to the 1st region that is some regions of the aforementioned textile, and has opal down stream processing which carries out leaching of the 1st above-mentioned fiber. This manufacturing method is the 1st ink jet color ink which contains the 1st color. (hereinafter, it is also only called "the 1st color ink".) -- it is made to adhere to the 3rd

region that is at least some regions among the 2nd region whose 1st above-mentioned region is a different region, and has the 1st dyeing process that dyes the 1st above-mentioned fiber. This manufacturing method makes the 2nd ink jet color ink (only henceforth "the 2nd color ink") which contains the 2nd color adhere to the 3rd above-mentioned region, and has the 2nd dyeing process that dyes the 2nd above-mentioned fiber. In the 1st above-mentioned dyeing process and the 2nd above-mentioned dyeing process, the 3rd above-mentioned region is dyed with similar colors and an affiliated design.
[0026]
The opal-finishing textile concerning one embodiment of the present invention has the 1st region formed in a part of aforementioned textile by performing opal processing. This opal-finishing textile has the 3rd region dyed at least a part of 2nd different region from the 1st above-mentioned region. In the 3rd above-mentioned region, the 1st above-mentioned fiber and the 2nd above-mentioned fiber are dyed with similar colors and an affiliated design.
[0027]
Hereinafter, it describes in order of a manufacturing process and the ink used for this about an opal-finishing textile concerning this embodiment, and a manufacturing method for the same. It describes about a textile in the place of the textile preparation step of a manufacturing process.
[0028]
1.1. Manufacturing process
The manufacturing method of the opal-finishing textile concerning this embodiment has a textile preparation step, opal down stream processing, the 1st dyeing process, and the 2nd dyeing process. Hereinafter, it describes for every process about the process included in the manufacturing method of the opal-finishing textile concerning this embodiment, and the process which may be included.
[0029]
The manufacturing method of the opal-finishing textile concerning this embodiment can be conventionally performed using publicly known ink jet textile-printing equipment (or ink-jet recording device), and the equipment in particular used is not limited.
[0030]
1.1.1. Textile and its preparation step
The manufacturing method of the opal-finishing textile concerning this embodiment has a textile preparation step. A textile preparation step is a process for which the textile by which opal down stream processing, the 1st dyeing process, and the 2nd dyeing process which are mentioned below are not carried out is prepared.
[0031]
A textile contains the 1st fiber and the 2nd fiber. The 1st fiber is a fiber in which leaching is possible at the etching agent contained in Opal, Inc. which uses it by opal down stream processing mentioned below. The 2nd fiber is a fiber (or fiber which cannot carry out leaching as easily as the 1st fiber) which does not carry out leaching by the etching agent contained in Opal, Inc. which uses it by opal down stream processing mentioned below.
[0032]
Fig.1 is a plan view which expresses typically the textile 1 which neither dyeing nor opal processing is made. The 1st region 10 of a schedule where opal down stream processing is given, the 2nd region 20 that is regions which are different in the 1st region 10, and the 3rd region 30 where it is some regions of the 2nd region 20, and the 1st dyeing process and the 2nd dyeing process are given exist in the textile 1. Although the example of Fig.2 - Fig.9 described to Fig.1 and the following showed the case where all the regions outside the 2nd region 20 (20a, 20b, 20c) were made into the 1st region 10 (10a, 10b), it is good also as the 1st region (10a, 10b) in a part of region outside the 2nd region 20 (20a, 20b, 20c). Namely, the 2nd region 20 (20a, 20)
Opal processing only of the part instead of all regions besides b and 20c may be carried out. Although the example of Fig.2 - Fig.9 described to Fig.1 and the following showed the case where the 3rd region 30 (30a, 30b, 30c) was provided by the whole region in the 2nd region 20 (20a, 20b, 20c), The 3rd region 30 (30a, 30b, 30c) may be provided by some regions in the 2nd region 20 (20a, 20b, 20c). That is, it is not all the regions in the 2nd region 20 (20a, 20b, 20c), and may dye only a part.

[0033]
It is preferable that the ratio of the mass of the 1st fiber and the mass of the 2nd fiber to ** uses what is within the limits of 3:7-7:3 as such a textile. The textile in which each fiber is contained by the above-mentioned ratio is in the tendency for the effect by opal processing to be unable to be easily conspicuous. However, since the contrast of a leaching part and a non-leaching part will become high if the manufacturing method of the opal-finishing textile concerning this embodiment is used, the visibility by opal processing improves. Therefore, the ratio of the 1st fiber to the 2nd fiber can use suitably the manufacturing method of the opal-finishing textile concerning this embodiment also to the textile in a mentioned range.

[Translation done.]

[0034]
When Opal, Inc. which uses it by opal down stream processing contains an acid etching agent (after-mentioned), cellulose fibers (for example, cotton, hemp, rayon, etc.) etc. are mentioned as an example of the fiber which is easy to carry out leaching to this. On the other hand, as an example of the fiber which cannot carry out leaching easily due to an acid etching agent, polyester fiber, polyamide fibers (wool yarn, silk, etc.), etc. are mentioned, for example.
[0035]
When Opal, Inc. which uses it by opal down stream processing contains a basic etching agent (after-mentioned), as an example of the fiber which is easy to carry out leaching to this, Polyester fiber (for example, polyethylene terephthalate etc.), polyamide fibers (an epsilon caprolactam polymer, the condensation product of hexamethylenediamine and adipic acid, silk, wool yarn, nylon, etc.), etc. are mentioned. On the other hand, a cellulose fiber etc. are mentioned as an example of the fiber which cannot carry out leaching to a basic etching agent easily.
[0036]
It is preferable to use the textile which is used widely and containing a cellulose fiber and polyester fiber as a textile for opal finishing also in such a textile.
[0037]
Fibers, such as wool yarn, silk, polyolefin, acetate, triacetate, polyurethane, and polylactic acid, may be contained in the textile concerning this embodiment.
[0038]
although the textile concerning this embodiment is a thing containing 2 or more type of fibers -- these fibers -- **** -- it may be mixed. As a textile, what made the above-mentioned fiber which forms, such as textiles, knitting, and a nonwoven fabric, may be used. In particular thickness, fiber density, etc. of a textile are not limited.
[0039]
1.1.2. Opal down stream processing
The manufacturing method of the opal-finishing textile concerning this embodiment has opal down stream processing. Opal down stream processing is a process of making Opal, Inc. adhering to the 1st region that is some regions of the aforementioned textile, and carrying out leaching of the 1st fiber. Opal, Inc. is made to discharge from the nozzle of a recording head, and it is made to adhere to the 1st region in opal down stream processing specifically. The 2nd fiber will exist in the 1st region of the opal-finishing textile obtained eventually by this.
[0040]
Although opal down stream processing may be performed to which timing, it is preferable to be continuously carried out with the dyeing process previously performed among the 1st dyeing process and the 2nd dyeing process which are mentioned below. In this case, there is an advantage that it can inhibit the position (leaching part) where opal processing was performed, the position (non-leaching part) where dyeing by the dyeing process performed previously was performed, and that ****** occurs.
[0041]
It is a blot of a color when opal down stream processing is continuously performed with the dyeing process performed previously.
It is preferable to inhibit and to perform the dyeing process previously performed after opal down stream processing from a viewpoint of improving the color enhancement by dyeing. When opal down stream processing is continuously performed with the dyeing process

performed behind from same viewpoint, it is preferable to perform the dyeing process behind performed after opal down stream processing.
[0042]
Fig.2 is a plan view which expresses typically the textile 1 after performing opal down stream processing. The 2nd fiber exists in the 1st region 10a after opal down stream processing.
[0043]
Since opal down stream processing is performed using an inkjet system, it can reduce the gap of a position which performs opal finishing. As an inkjet system at the time of discharging ink, which system may be used and an electrification deviation system, a continuous method, an ONDEN mand system (a piezo type, a bubble jet (registered trademark) type), etc. are held. Also in these ink jet recording methods, it is preferable to use a piezo type.
[0044]
1.1.3. The 1st dyeing process
The manufacturing method of the opal-finishing textile concerning this embodiment has the 1st dyeing process. It is the process of dyeing the 1st fiber that the 1st dyeing process makes the 1st color ink adhering to the 3rd region that is at least some regions among the 2nd region whose 1st region is a different region, and exists in the 3rd region. The 1st color ink is made to discharge from the nozzle of a recording head, and it is made to adhere to the 3rd region in the 1st dyeing process specifically. The 1st fiber dyed with the 1st color will exist in the 3rd region of the opal-finishing textile obtained eventually by this.
[0045]
Fig.3 is a plan view showing typically the textile 1 after the 1st dyeing process concerning this embodiment and opal down stream processing were carried out. The 2nd fiber of the schedule which the 1st fiber dyed with the 1st color ink exists, and is dyed by the 2nd dyeing process mentioned below exists in the 3rd region 30a (20a) of Fig.3. The 2nd fiber exists in the 1st region 10a of Fig.3 (namely, it is in the state after carrying out leaching of the 1st fiber). In Fig.3, although the case where the whole region of the 2nd region was the 3rd region was shown, it may not be limited to this, but a part of 2nd region may be dyed.
[0046]
Since the 1st dyeing process is performed using an inkjet system, it can inhibit that the position which dyes deviates. Since the example of an inkjet system is the same as that of opal down stream processing, the description is omitted.
[0047]
1.1.4. The 2nd dyeing process
The manufacturing method of the opal-finishing textile concerning this embodiment has the 2nd dyeing process. It is the process of dyeing the 2nd fiber that the 2nd dyeing process makes the 2nd color ink adhering to the 3rd region that is at least some regions among the 2nd region whose 1st region is a different region, and exists in the 3rd region. The 2nd color ink is made to discharge from the nozzle of a recording head, and it is made to adhere to the 3rd region in the 2nd dyeing process specifically. The 2nd fiber dyed with the 2nd color will exist in the 3rd region of the opal-finishing textile obtained eventually by this. The 2nd dyeing process may be performed after the 1st dyeing process, and may be performed before the 1st dyeing process.
[0048]
The manufacturing method of the opal-finishing textile concerning this embodiment dyes the 3rd region with similar colors and an affiliated design by the 1st dyeing process and the 2nd dyeing process. Thereby, since the 1st fiber and the 2nd fiber in the 3rd region are dyed with similar colors and an affiliated design, the color becomes clear and, as for the 3rd region after dyeing, color enhancement increases. A design and the high opal-finishing textile of quality are obtained by this, and an opal-finishing textile with high contrast (contrast which arises by the 3rd region after dyeing and the 1st region after opal finishing) of a handle is obtained.
[0049]
In the present invention, "similar colors" means the thing of the range accepted to be the same color by viewing, and it is an ingredient.

What has each difference of L* value in a CIELAB color space, a* value, and b* value to less than 10% is said in body. Preferably, each of these differences says what is less than 5%. An "affiliated design" means the thing in the range accepted to be the same handle (pattern) by viewing.

[0050]

Fig.4 is a plan view showing typically the textile 1 after the 1st dyeing process concerning this embodiment, the 2nd dyeing process, and opal down stream processing were carried out. The 1st fiber dyed with the 1st color ink and the 2nd fiber dyed with the 2nd color ink exist in the 3rd region 30b (20b) of Fig.4, and these show the state where it was dyed by an affiliated design and similar colors. The 2nd fiber exists in the 1st region 10a of Fig.4 (namely, it is in the state after carrying out leaching of the 1st fiber). In Fig.4, although the case where the whole region of the 2nd region was the 3rd region was shown, it may not be limited to this, but a part of 2nd region may be dyed.

[0051]

In the 2nd dyeing process, in addition to the 3rd region, the 2nd color ink is made to adhere to the 1st region, and the 2nd fiber that exists in the 1st region may be dyed. Fig.5 is a plan view showing typically the textile 1 after the 1st dyeing process concerning this embodiment, the 2nd dyeing process, and opal processing were carried out. The 2nd fiber dyed by the 2nd dyeing process exists in the 1st region 10b of Fig.5 (that is, the state after giving opal down stream processing and the 2nd dyeing process to the 1st region is shown). The 1st fiber dyed with the 1st color ink and the 2nd fiber dyed with the 2nd color ink exist in the 3rd region 30b (20b) of Fig.5, and these show the state where it was dyed by an affiliated design and similar colors. Various designs can be expressed by dyeing the 1st region.

[0052]

Since the 2nd dyeing process is performed using an inkjet system, it can inhibit the gap of a position which dyes. Since the example of an inkjet system is the same as that of opal down stream processing, the description is omitted.

[0053]

1.1.5. Moist-heat-treatment process

The manufacturing process of the opal-finishing textile concerning this embodiment may have the moist-heat-treatment process of performing moist heat treatment of a textile. Thereby, dyeing of a color promotes or leaching of the fiber by an etching agent promotes. As for a moist-heat-treatment process, it is preferable to be carried out after each dyeing process, respectively.

[0054]

Here, when a moist-heat-treatment process is performed between the 1st dyeing process and the 2nd dyeing process, the textile may have contracted by the moist-heat-treatment process. In this case, when a next dyeing process is carried out, the dyeing position by a next dyeing process deviates, and dyeing may be performed to regions other than the 3rd region. In this case, in the dyeing process performed behind, it is preferable to make color ink adhere to the 3rd region based on contraction of the textile by a moist-heat-treatment process. Thereby, it is because generating of a gap of the dyeing position in a next dyeing process can be inhibited.

[0055]

When opal down stream processing is performed after a moist-heat-treatment process from same viewpoint, in opal down stream processing, it is preferable to make Opal, Inc. adhere to the 1st region based on contraction of the textile by moist heat treatment. Thereby, generating of the positional displacement of opal finishing can be inhibited.

[0056]

Contraction of a textile may be the data preliminarily computed based on a kind, weight, etc. of a textile. In this case, the control means (it has CPU and a memory) of ink jet textile-printing equipment may be made to memorize the data concerned, the data concerned may be read before the dyeing process performed behind, and the position which dyes may be adjusted.

[0057]

Or contraction of the textile may give the mark before the moist-heat-treatment process at

the textile, and may be the data obtained because a control means calculates contraction based on the information which scanned the position change of the mark before and behind a moist-heat-treatment process. In this case, the data concerned may be read before the process performed behind, and the position which dyes may be adjusted based on the data concerned.
[0058]
When a drying stage (after-mentioned) is performed after a moist-heat-treatment process, contraction of the above-mentioned textile is based on contraction of the textile after the drying stage concerned.
[0059]
A publicly known method can be conventionally used for a moist-heat-treatment process, for example, the HT method (the elevated-temperature steaming method), the HP method (the high voltage steaming method), etc. are mentioned.
[0060]
The temperature and time of a moist-heat-treatment process are set as the range compatible [dyeing, or advance of leaching and reduction of the damage of a textile]. The temperature and time of a moist-heat-treatment process are changed with the kind of fiber, the kind of etching agent, the addition amount of an etching agent, etc.
[0061]
1.1.6. Cleaning process
The manufacturing method of the opal-finishing textile concerning this embodiment may have a cleaning process which washes a textile after the moist-heat-treatment process mentioned above. Thereby, removal of an undyed color, improvement in the dyeing affinity of a color and the removal of a fiber which carried out leaching, etc. can be performed.
[0062]
May perform a cleaning process using water and (henceforth "rinsing treatment"), It may carry out using the aqueous solution which contains water and surfactants (heat soap etc.), may carry out using the aqueous solution (henceforth "reduction cleaning processing") which contains water and a reducing agent (henceforth "soaping processing"), and may carry out combining these processings. Especially when reduction cleaning processing dyes using a disperse dye, it is useful.
[0063]
The cleaning process may be provided with water jet processing for the purpose of removing the fiber which carried out leaching much more effectively. Water jet processing removes the fiber which carried out leaching forcibly with water pressure, and it can carry it out by a publicly known method.
[0064]
1.1.7. Drying stage
The manufacturing method of the opal-finishing textile concerning this embodiment may have a drying stage which dries a textile after the cleaning process. A textile drying stage can be performed to a textile using a means to apply heat, a means to spray a wind, the means that combines them further, etc., for example. Specifically, forced air heating, radiation heating, electrical conduction heating, high-frequency heat drying, microwave drying, etc. are used preferably.
[0065]
As drying temperature at the time of a drying stage, since the improvement in drying efficiency and reduction of the damage of a textile are made compatible, it is preferable that it is above 40 degrees C and below 80 degrees C, and it is more preferable that it is above 60 degrees C and below 80 degrees C. As drying time in a drying stage, they are 10 minutes or more and 30 minutes or less, for example.
[0066]
1.1.8. Other processes
The manufacturing method of the opal-finishing textile concerning this embodiment may have a head end process which gives a pretreating agent to a textile in advance of the 1st dyeing process, the 2nd dyeing process, and opal down stream processing. In a head end process, the pretreating agent which contains a publicly known water soluble polymer (sizing agent) for the purpose of reduction of a blot or the promotion of osmosis of the ink to a

textile can be given.
[0067]
1.2. Ink
Next, it describes about each ink used for the manufacturing method of the opal-finishing textile concerning this embodiment.
[0068]
1.2.1. Opal ink
Yne KUJIE used for opal down stream processing which Opal, Inc. concerning this embodiment mentioned above
It is ink for TTO textile printing.
[0069]
<Etching agent>
Opal, Inc. concerning this embodiment contains an etching agent. An etching agent is provided with the function to carry out destructive leaching (etching) of the fiber which constitutes a textile. According to the kind of fiber to carry out leaching, what shows the property of acid or a base underwater can be suitably chosen as an etching agent, and can be used for it.
[0070]
As an etching agent (into this Description, it is also only called "an acid etching agent".) which shows acidity underwater, For example, from the point of chloride, sulfuric acid, nitric acid, and these salts being mentioned, and excelling in etching of a cellulosic fiber, sulfuric acid and sulfate (for example, sodium hydrogensulfate and aluminum sulfate -- 14 to 18 hydrate) It is preferable to use ammonium sulfate, ferrous sulfate, copper sulfate, sulfate of zinc, sulfuric acid tin, etc., and it is more preferable to use sulfuric acid, sodium hydrogensulfate, 14 to aluminum sulfate 18 hydrate, and ammonium sulfate. These acid etching agents may be used solely and may use 2 or more type together.
[0071]
As an etching agent (into this Description, it is also only called "a basic etching agent".) which shows basicity underwater, guanidine, the salt of this, and an alkaline metal (lithium and sodium --) Hydroxide, such as potassium, hydroxide of alkaline-earth metals (calcium, barium, etc.), etc. are mentioned, It is preferable to use hydroxide (for example, sodium hydroxide, a potassium hydrate, lithium hydroxide, etc.) of an alkaline metal and guanidine weak acid salts (for example, guanidine carbonate, a guanidine-acetic acid salt, etc.) from the point of excelling in etching of a polyamide fiber or polyester fiber. These basic etching agents may be used solely and may use 2 or more type together.
[0072]
As for the content of an etching agent, it is preferable that it is more than the 10 mass % and below the 40 mass % to the whole mass (100 mass %) of Opal, Inc., and it is more preferable that it is more than the 20 mass % and below the 30 mass %. The capability to carry out leaching of the fiber improves further because the content of an etching agent is more than the 10 mass %. It becomes easy to make viscosity of Opal, Inc. into the range suitable for an inkjet system, and it can make the jetting stability of a recording head good because the content of an etching agent is below the 40 mass %.
[0073]
<Water>
Opal, Inc. concerning this embodiment contains water. Water is a liquid medium which becomes main [Opal, Inc.]. As for water, it is preferable to remove an ionic impurity like pure water, such as ion exchange water, ultrafiltration water, Milli Q water, and distilled water, or ultrapure water as much as possible. Content of water can be made more than the 40 mass % as opposed to the whole mass of Opal, Inc.
[0074]
<Organic solvent>
Opal, Inc. concerning this embodiment may contain an organic solvent from a viewpoint that moisture retention can be improved or the permeability to a textile can be improved. As an organic solvent, 1,2-alkanediol, a polyhydric alcohol class, glycol ether, a pyrrolidone derivative, etc. are mentioned, for example.
[0075]

As 1,2-alkanediol, 1,2-propanediol, 1,2-butanediol, 1, 2-pentanediol, 1, 2-hexandiol, 1, and 2-octanediol etc. are mentioned, for example. 1,2-alkanediol is excellent in the operation which improves the wettability of the ink to a textile and it wets uniformly. As for more than the 1 mass % and below the 10 mass %, content in the case of containing 1,2-alkanediol can be carried out to the whole mass of Opal, Inc.
[0076]
As a polyhydric alcohol class (except for the above-mentioned 1,2-alkanediol), For example, ethylene glycol, a diethylene glycol, propylene glycol, dipropylene glycol, 1,3-propanediol, 1,4-butanediol, 1,6-hexanediol, trimethylolpropane, triethylene glycol, glycerin, etc. are mentioned. A polyhydric alcohol class is provided with the function of improving the wettability over the textile of ink or improving moisture retention of a nozzle. As for more than the 1 mass % and below the 20 mass %, content in the case of containing a polyhydric alcohol class can be carried out to the whole mass of Opal, Inc.
[0077]
As glycol ether, it is ethylene glycol monoisobutyl ether, for example. Ethylene glycol monohexyl ether, ethylene glycol MONOISO hexyl ether, Diethylene-glycol monobutyl ether, diethylene glycol monomethyl ether, Diethylene-glycol monohexyl ether, triethylene glycol monobutyl ether, Triethylene glycol monomethyl ether, triethylene glycol monoethyl ether, Triethylene glycol monohexyl ether, diethylene-glycol MONOISO hexyl ether, Triethylene glycol MONOISO hexyl ether, ethylene glycol MONOISO heptyl ether, Diethylene-glycol MONOISO heptyl ether, triethylene glycol MONOISO heptyl ether, Ethylene glycol monooctyl ether, ethylene glycol MONOISO octyl ether, Diethylene-glycol MONOISO octyl ether, triethylene glycol MONOISO octyl ether, ethylene glycol mono-2-ethylhexyl ether, diethylene -glycol mono-2-ethylhexyl ether, Triethylene glycol mono-2-ethylhexyl ether, diethylene-glycol mono-2-ethyl pentyl ether, Ethylene glycol mono-2-ethyl pentyl ether, ethylene glycol mono-2-ethylhexyl ether, Diethylene-glycol mono-2-ethylhexyl ether, ethylene glycol mono-2-methyl pentyl ether, Diethylene-glycol mono-2-methyl pentyl ether, propylene glycol monobutyl ether, Dipropyleneglycol monobutyl ether, tripropylene glycol monobutyl ether, propylene glycol monopropyl ether, dipropyleneglycol monopropyl ether, tripropyllene glycol monomethyl ether, etc. are mentioned. These are independent 1 type, or can mix and use 2 or more type. glycol ether controls the wettability over the textile of ink, etc. -- things can be carried out. As for more than the 1 mass % and below the 10 mass %, content in the case of containing glycol ether can be carried out to the whole mass of 1st Etching, Inc.
[0078]
As a pyrrolidone derivative, N-methyl-2-pyrrolidone, an N-ethyl-2-pyrrolidone, an N-vinyl-2-pyrrolidone, 2-pyrrolidone, an N-butyl-2-pyrrolidone, a 5-methyl-2-pyrrolidone, etc. are mentioned, for example. A pyrrolidone derivative is provided with the function to improve the solubility of other solvents, and the moisture retention of ink. As for more than the 1 mass % and below the 20 mass %, content in the case of containing a pyrrolidone derivative can be carried out to the whole mass of Opal, Inc.
[0079]
<Surfactant>
Opal, Inc. concerning this embodiment may contain a surfactant. A surfactant is provided with the function to make the surface tension of ink be deteriorated and to adjust a wettability with a textile. Also in a surfactant, an acetylene glycol system surfactant, an anionic surfactant, a silicone series surfactant, and a fluorochemical surfactant can be used preferably.
[0080]
As an acetylene glycol system surfactant, Although not limited in particular, for example SAFI Norians 104, 104E, and 104H, 104A, 104BC, 104DPM, 104PA, 104PG-50, 104S, 420, 440, 465 and 485, SE, SE-F, 504 and 61, DF37, CT111, CT121, CT131, CT136, TG, GA DF110D (above wholly a trade name, Air Products and Chemicals. Inc. company make), ORUFINB, Y, and P, A, STG, SPC, E1004 and E1010, PD-001, PD-002W, PD-003, PD-004, PD -005, EXP.4001, EXP.4036, EXP.4051, and AF-103, AF-104, AK-02, SK-14, and AE-3 (the above -- all -- a trade name --) The Nissin Chemical Industry Co., Ltd. make, ASECHIRE Norian E00, E00P, E40, and E100 (above wholly a trade name, the Kawaken Fine Chemicals Co., Ltd. make) are mentioned.

[0081]
Especially as an anionic surfactant, although not limited, Pelex SS-H, SS-L, RATEMURU WX, E-150, neo Pelex GS, G-15, G-25, G-35 (above wholly a trade name, the KAO CORPORATION make), etc. are mentioned, for example.
[0082]
Especially as a silicone series surfactant, although not limited, a polysiloxane system compound is mentioned preferably. Especially as the polysiloxane system compound concerned, although not limited, polyether denaturation organosiloxane is mentioned, for example. As a commercial item of the polyether denaturation organosiloxane concerned, for example, BYK-306, BYK-307, and BYK-333, BYK-341, BYK-345, BYK-346, and BYK-348 (the above -- a trade name --) The product made by BYK, KF-351A, KF-352A, KF-353, KF-354L, KF-355A, KF-615A, KF-945, KF-640, KF-642, KF-643, KF-6020, X-22-4515, KF-6011, KF-6012, KF-6015, and KF-6017 (above a trade name, the Shin-Etsu Chemical Co., Ltd. make) are mentioned.
[0083]
As a fluorochemical surfactant, it is preferable to use fluoride denaturation polymer, and BYK -340 (made in big KEMI Japan) is mentioned as an example.
[0084]
As for more than the 0.05 mass % and below the 1.5 mass %, content in the case of containing a surfactant can be carried out to the whole mass of Opal, Inc.
[0085]
<Other components>
Opal, Inc. concerning this embodiment may contain various kinds of additive agents, such as urea, sugars, a pH adjuster, a chelating agent, an antiseptic, an antifungal agent, and rust preventives, if needed.
[0086]
1.2.2. The 1st color ink
The 1st color ink concerning this embodiment is ink for ink jet textile printing used for the 1st dyeing process mentioned above.
[0087]
The 1st color ink can contain the same component as Opal, Inc. which mentioned above except containing the 1st color and not containing an etching agent. About the example of these components, the range of content, a function, and an effect, since it is as the description in Opal, Inc. which mentioned above having described, the description is omitted.
[0088]
As the 1st color, as long as it is a color which can dye the 1st fiber, the color of which kind may be used. Various colors used for the usual ink jet textile printing, such as a direct color, acid dye, the food color, a basic stain, reactive dye, a disperse dye, vat dye, solubilized vat dye, and a reaction disperse dye, can be used for the 1st color, for example.
[0089]
Here, as a textile for opal finishing, the textile containing a cellulosic fiber (for example, cotton) and polyester fiber is used widely. In this case, when carrying out leaching of the cellulosic fiber, a disperse dye is used as the 2nd color (after-mentioned) using an acid etching agent as an etching agent, using reactive dye as the 1st color. On the other hand, in carrying out leaching of the polyester fiber, it uses a disperse dye as the 1st color using a basic etching agent as an etching agent, and it is as the 2nd color.
Reactive dye is used.
[0090]
Although the content of the 1st color can especially be suitably set up according to a request and is not limited, as for more than the 0.5 mass % and below the 20 mass %, it can be carried out, for example to the whole mass of the 1st color ink.
[0091]
1.2.3. The 2nd color ink
The 2nd color ink concerning this embodiment is ink for ink jet textile printing used for the 2nd dyeing process mentioned above.
[0092]

The 2nd color ink can contain the same component as Opal, Inc. which mentioned above except containing the 2nd color and not containing an etching agent. About the example of these components, the range of content, a function, and an effect, since it is as the description in Opal, Inc. which mentioned above having described, the description is omitted.

[0093]

As the 2nd color, as long as the 1st color is a color from which a kind differs and it is a color which can dye the 2nd fiber, the color of which kind may be used. Various colors used for the usual ink jet textile printing, such as a direct color, acid dye, the food color, a basic stain, reactive dye, a disperse dye, vat dye, solubilized vat dye, and a reaction disperse dye, can be used for the 2nd color, for example.

[0094]

Although the content of the 2nd color can especially be suitably set up according to a request and is not limited, as for more than the 0.5 mass % and below the 20 mass %, it can be carried out, for example to the whole mass of the 2nd color ink.

[0095]

1.2.4. Preparing method of ink

Each ink (the opal ink, the 1st color ink, and the 2nd color ink which were mentioned above) concerning this embodiment mixes the component mentioned above in arbitrary order, and is obtained by carrying out filtration etc. if needed and removing an impurity. The method of adding and stirring and mixing material sequentially in the container provided with agitating devices, such as a mechanical stirrer and a magnetic stirrer, as a mixing method of each component is used suitably. As a filtering method, centrifugal filtration, filtering, etc. can be performed if needed.

[0096]

1.2.5. Physical properties of ink

As for each ink concerning this embodiment, it is preferable that surface tension [in / in view of the reliability as ink for ink jets / 20 degrees C] is 20 or more mN/m40 mN/m, and it is more preferable that they are 23 or more mN/m and 38 mN/m or less. Measurement of surface tension can be measured, for example using automatic surface-tension-balance CBVP-Z (a trade name, harmony interface science incorporated company make) by checking surface tension when a platinum plate is soaked in ink under the environment of 20 degrees C.

[0097]

As for the viscosity at 20 degrees C of the same viewpoint to each ink, it is preferable that they are 1.5 or more mPa-s and 10 mPa-s or less, and it is more preferable that they are 2 or more mPa-s and 8 mPa-s or less. The measurement of viscosity can measure the viscosity under the environment of 20 degrees C, for example using viscoelasticity testing machine MCR-300 (a trade name, the product made by Pysica).

[0098]

3. EXAMPLE

Hereinafter, although the present invention is specifically described based on an working example, the present invention is not limited to these working examples.

[0099]

3.1. Preparation of ink

After having put each component into the container so that it might become composition of Table 1, and mixing and stirring with a magnetic stirrer for 2 hours, opal ink, the 1st color ink, the 2nd color ink, and the 3rd color ink were obtained by filtering with a membrane filter with the pore diameter of 5 micrometers. The numerical value in Table 1 showed the mass %, and ion exchange water was added so that the mass of each ink might turn into the 100 mass %, respectively.

[0100]

The component described among the components shown in Table 1 except the compound name is as follows.

[0101]

- Disperse dye X:C.I.Disperse Blue 60 (the 2nd color)
- Disperse dye Y:C.I.Disperse Red 92 (the 3rd color)

- Reactive dye : C.I.Reactive Blue 15 (the 1st color)
- ORUFIN E1010 : a trade name, the Nissin Chemical Industry Co., Ltd. make, an acetylene glycol system surfactant
- Pro cheating-on-the-fare XL2 : a trade name, the product made by ABISHIA, an antiseptic
- Pelex SS-H : a trade name, the KAO CORPORATION make, an anionic surfactant

[0102]

[Table 1]

材料		オパールインク	第1カラーインク	第2カラーインク	第3カラーインク
染料	分散染料X	—	—	6	—
	分散染料Y	—	—	—	6
	反応性染料	—	12	—	—
抜蝕剤	硫酸アルミニウム14-18水和物	20	—	—	—
保湿剤	2-ピロリドン	10	10	10	10
浸透剤	トリエチレングリコールモノブチルエーテル（ブチルトリグリコール）	-	3	3	3
	トリエチレングリコールモノメチルエーテル（メチルトリグリコール）	3	-	-	-
界面活性剤	オルフィンE1010	-	0.3	0.3	0.3
	ペレックスSS-H	0.3	-	-	-
防腐剤	プロキセルXL2	0.3	0.3	0.3	0.3
水	イオン交換水	残量	残量	残量	残量
合計（質量%）		100	100	100	100

[0103]

3.2. Evaluation test

It carried out to the following evaluation tests using the ink jet printer adjusted as follows. First, the ink chamber of the exclusive cartridge of ink jet printer PM-G800 (a trade name, the SEIKO EPSON CORPORATION make) was filled up with each ink shown in Table 1, respectively. And the above-mentioned printer was equipped with the cartridge and each ink was supplied to the nozzle.

[0104]

"The E/C ** opal III" (a trade name, made in a Tadashi Tanaka color store, thin cloth, a material: 50% of cotton and polyester 50%) was used for the textile. Cotton is the 1st fiber in which leaching is possible among two kinds of fibers which constitute the E/C ** opal III by the etching agent (14 to aluminum sulfate 18 hydrate) shown in Table 1. To the reactive dye (the 1st color) which showed cotton in Table 1

It ******. Polyester is the 2nd fiber that does not carry out leaching by the etching agent (14 to aluminum sulfate 18 hydrate) shown in Table 1. Polyester is dyed by the disperse dye X (the 2nd color) and the disperse dye Y (the 3rd color) which were shown in Table 1.

[0105]

Opal-finishing textile A-D shown in Fig.6 - Fig.9 was created in the evaluation test using the above-mentioned printer. When creating the opal-finishing textile A, B, and D described below, the 2nd dyeing process was performed before the 1st dyeing process.

[0106]

3.2.1. Working example 1

Fig.6 is the figure showing the opal-finishing textile A concerning the 1st working example.

The opal-finishing textile A of Fig.6 was produced as follows. First, Opal, Inc. which made it discharge from the nozzle of the above-mentioned printer was made to adhere to the 1st region 10 (opal down stream processing). Next, the 2nd color ink made to discharge from the nozzle of the above-mentioned printer was made to adhere to the 3rd region 30b (the 2nd dyeing process). Then, after performing steaming for 10 minutes at 170 degrees C (moist-heat-treatment process), It washed for 10 minutes at 85 degrees C using the aqueous solution which contains a reducing agent (hydrosulfite sodium), alkali chemicals (sodium hydroxide), and a surfactant (RAKKORU STA) (cleaning process), and made it dry for 30 minutes at 60 degrees C (drying stage). Then, the 1st color ink was made to discharge from the nozzle of the above-mentioned printer, and was made to adhere to the 3rd region based on contraction of the textile preliminarily input into the control part of the above-mentioned printer (the 1st dyeing process). Then, after performing steaming for 10 minutes at 102 degrees C (moist-heat-treatment process), it washed for 10 minutes at 90 degrees C using the aqueous solution 0.2 mass % Containing RAKKORU STA (a trade name, the Akinari chemistry incorporated company make, surfactant) (cleaning process), and made it dry for 30 minutes at 60 degrees C (drying stage).

[0107]

Thus, when opal processing was performed by Opal, Inc. which contains an etching agent, the 2nd undyed fiber (polyester) remained in the 1st region 10a of the created opal-finishing textile A. The 1st fiber (cotton) and the 2nd fiber (polyester) remained in the 2nd region 20b (the 3rd region 30b). The 3rd region 30b was dyed by reactive dye (the 1st color) and the disperse dye X (the 2nd color). That is, the cotton (the 1st fiber) of the 3rd region 30b was dyed in the 1st dyeing process by the 1st color ink that contains reactive dye (the 1st color). Polyester (the 2nd fiber) of the 3rd region 30b was dyed in the 2nd dyeing process by the 2nd color ink that contains the disperse dye X (the 2nd color). In the 1st dyeing process and the 2nd dyeing process, the cotton and polyester of the 3rd region 30b were dyed with similar colors and an affiliated design.

[0108]

Thus, the opal-finishing textile A (working example 1) which has the 1st region 10a where undyed polyester fiber exists, and the 3rd region 30b where the cotton dyed by the polyester fiber dyed by the disperse dye X and reactive dye exists was obtained.

[0109]

3.2.2. Working example 2

Fig.7 is the figure showing the opal-finishing textile B concerning the 2nd working example. The opal-finishing textile B shown in Fig.7 is the 2nd dyeing process, and it manufactured it like the manufacturing process of the opal-finishing textile A shown in Fig.6 except having made the 2nd color ink adhere to the 3rd region 30b, and having made the 3rd color ink adhere to the 1st region 10b. That is, the color ink which is not similar colors dyed polyester (polyester which remained without carrying out leaching by opal processing) of the 1st region 10b, and the polyester which exists in the 3rd region 30b.

[0110]

Thus, the created opal-finishing textile B changed into the same state as the opal-finishing textile A of the working example 1, except that the 2nd fiber (polyester) that remained in the 1st region 10b was dyed by the disperse dye Y (the 3rd color). The cotton and polyester of the 3rd region 30b were dyed with similar colors and an affiliated design like the opal-finishing textile A of the working example 1.

[0111]

Thus, the opal-finishing textile B (working example 2) which has the 1st region 10b where the polyester fiber dyed by the disperse dye Y exists, and the 3rd region 30b where the cotton dyed by the polyester fiber dyed by the disperse dye X and reactive dye exists was obtained.

[0112]

3.2.3. Comparative example 1

Fig.8 is the figure showing the opal-finishing textile C concerning the 1st comparative example. The opal-finishing textile C shown in Fig.8 was manufactured like the manufacturing process of the opal-finishing textile A of the working example 1 shown in Fig.6 except not having performed the 2nd dyeing process. That is, each of polyester

(polyester which remained without carrying out leaching by opal processing) of the 1st region 10a, and polyester which exists in the 3rd region 30a (the 2nd region 20a) was left un-dyeing.
[0113]
Thus, the created opal-finishing textile C changed into the same state as the opal-finishing textile A of the working example 1, except that the 2nd fiber (polyester) of the 3rd region 30a was not dyed by the disperse dye X (the 2nd color). That is, unlike the opal-finishing textile A of the working example 1, by the opal-finishing textile C of the comparative example 1, the 1st fiber (cotton) and the 2nd fiber (polyester) were not dyed by similar colors and the affiliated design in the 3rd region 30c.
[0114]
Thus, the opal-finishing textile C (comparative example 1) which has the 1st region 10a where undyed polyester fiber exists, and the 3rd region 30a where the cotton dyed by undyed polyester fiber and reactive dye exists was obtained.
[0115]
3.2.4. Comparative example 2
Fig.9 is the figure showing the opal-finishing textile D concerning the 2nd comparative example. The opal-finishing textile D shown in Fig.9 was manufactured as ink made to adhere to the 3rd region in the 2nd dyeing process like the manufacturing process of the opal-finishing textile B of the working example 2 shown in Fig.7 except having used the 3rd color ink instead of the 2nd color ink. That is, in the opal-finishing textile D, the 3rd color ink dyed each of polyester (polyester which remained without carrying out leaching by opal processing) of the 1st region 10b, and polyester which exists in the 3rd region 30c (the 2nd region 20c).
[0116]
Thus, the created opal-finishing textile D changed into the same state as the opal-finishing textile B of the working example 2, except that the 2nd fiber (polyester) of the 3rd region 30c was dyed by not the disperse dye X (the 2nd color) but the disperse dye Y. namely, -- setting to the 3rd region 30c by the opal-finishing textile D of the comparative example 2 unlike the opal-finishing textile B of the working example 2 -- the 1st fiber (cotton) and the 2nd fiber (polyester) -- a different system -- it was dyed by the color.
[0117]
Thus, the opal-finishing textile D (comparative example 2) which has the 1st region 10b where the polyester fiber dyed by the disperse dye Y exists, and the 3rd region 30c (the 2nd region 20c) where the cotton dyed by the polyester fiber dyed by the disperse dye Y and reactive dye exists was obtained.
[0118]
Thus, the 3rd region 30a, 30b, and 30c after dyeing of obtained opal-finishing textile A-D was observed visually, and the color-enhancing quality was judged.
[0119]
3.3. Evaluation result
In the 3rd region 30, the opal-finishing textiles A and B (Fig.6 and Fig.7) which cotton and polyester were dyed with similar colors and an affiliated design were excellent in the color enhancement of the 3rd region 30b after dyeing. on the other hand, the opal-finishing textile C (Fig.8) and polyester which polyester was not dyed in the 3rd region 30 -- cotton and a different system -- the opal-finishing textile D (figure) dyed with the color of the color In 9), the color enhancement of the 3rd region 30a after dyeing and the 3rd region 30c was not excellent.
[0120]
The present invention is not limited to the embodiment mentioned above, and various deformation is possible for it. For example, the present invention includes the substantially same composition (and EFFECT OF THE INVENTION the same composition) as the composition described by the embodiment. [For example, a function, a method and composition with same result, or the object] The present invention includes the composition which replaced the portion which is not essential as for composition of having described by the embodiment. The present invention includes the composition described by the embodiment, the composition which produces the same operation effect, or the composition

which can achieve the same object. The present invention includes the composition which added known art to the composition described by the embodiment.
[Explanations of letters or numerals]
[0121]
1 -- textile, 10 -- the 1st region, 10 a -- the 1st region after opal processing, 10 b -- the 1st region after opal processing and dyeing, 20 -- The 2nd region, 20a -- They are the 2nd region after dyeing, and 20b at the 1st color. -- With the 1st color and the 2nd color, the 2nd region after dyeing, 20c [-- It is the 3rd region after dyeing at the 1st color and the 3rd color.] -- They are the 2nd region after dyeing, and 30a at the 1st color and the 3rd color. -- They are the 3rd region after dyeing, and 30b at the 1st color. -- They are the 3rd region after dyeing, and 30c at the 1st color and the 2nd color.
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TECHNICAL FIELD

[Field of the Invention]
[0001]
The present invention relates to an opal-finishing textile and the manufacturing method of this.

Representative drawing | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9

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PRIOR ART

[Background of the Invention]
[0002]
from the former, as technology of processing a fiber, leaching destruction of a part of fiber which constitutes cloth (textile) is carried out, and opal finishing which forms a watermark partially is known.
[0003]
For example, dmy [****** / Patent document 1 / ********** / thing / of a fiber / form a handle for a thing in the part etching / a full etching part / of denaturation polyester fiber /, and partial etching part, and / by the thing of a sizing agent / containing an embrittlement agent / form a print / that coating weight differs / portion for a thing] the opal-finishing textile which came out with the etching part which consists of a nylon fiber, the colored polyester fiber layer, and the non-etching part which consists of the nylon fiber layer which is not colored, and was constituted is disclosed in the Patent document 2. A Patent document 3 has disclosed the processing method of cloth including the print using the opal paste containing acid for decomposing a cellulosic fiber, and printing using the ripple paste containing the alkali for shrinking cloth. In the textile constituted by polyester system elastic yarn and inelastic thread, carrying out etching processing of the inelastic thread, and forming a watermark is disclosed in the Patent document 4. A Patent document 5 has disclosed the opal-finishing pile textile whose height of the pile of at least one copy with which the textile-printing pattern is given is lower than the height of the pile of other portions.
[0004]

If the technology of dyeing is combined with such opal finishing, it will be thought that a textile with a high design can be manufactured. Since the productivity of a textile will improve if these processings can be continuously performed using an inkjet system, it excels in convenience. For example, dmy [****** / Patent document 6 / ********** / dye / a portion / etching using the ink set for opal finishing / having ink for dyeing, and at least two ink of ** / of the ink of a cellulosic fiber / including ammonium sulfate / for opal finishing, and an acid-proof fiber]

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TECHNICAL PROBLEM

[Problem to be solved by the invention]
[0006]
However, a Patent document 1 - opal finishing of the description to six are performed, a leaching part is formed, and when the non-leaching part which is not performing opal finishing is dyed, partially or on the whole, the color of the dyed non-leaching part may fade, or may become muddy, and may become indistinct.
[0007]
The present invention solves at least a part of problems in next. That is, it is in making the color of the dyed non-leaching part clear, and improving color enhancement in opal finishing. It is in obtaining a design and the high opal-finishing textile of quality, or obtaining an opal-finishing textile with high contrast of a handle. It is in providing technology suitable for opal finishing using an inkjet system.

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MEANS OPERATION

[Means for solving problem]
[0008]
The present invention is made in order to solve at least one copy of above-mentioned problem, and it can be realized as the following modeses or examples of application.
[0009]
[The example 1 of application]
One modes of the manufacturing method of the opal-finishing textile concerning the present invention,
The textile preparation step for which the textile which contains the 1st fiber in which leaching is possible, and the 2nd fiber that does not carry out leaching by the aforementioned etching agent by an etching agent is prepared,
Opal down stream processing which makes the ink-jet pearl ink which contains the aforementioned etching agent adhere to the 1st region that is some regions of the aforementioned textile, and carries out leaching of the 1st above-mentioned fiber,
The 1st dyeing process that makes the 1st ink jet color ink which contains the 1st color adhere to the 3rd region that is at least some regions among the 2nd region whose 1st above-mentioned region is a different region, and dyes the 1st above-mentioned fiber,
The 2nd dyeing process that makes the 2nd ink jet color ink which contains the 2nd color adhere to the 3rd above-mentioned region, and dyes the 2nd above-mentioned fiber,
It ****,
In the 1st above-mentioned dyeing process and the 2nd above-mentioned dyeing process, the 3rd above-mentioned region is dyed with similar colors and an affiliated design.

[0010]
According to the manufacturing method of the opal-finishing textile of the example 1 of application, the color enhancement of the color of the dyed non-leaching part can be improved. An opal-finishing textile with a design and high quality, and high contrast of a handle is obtained.
[0011]
In the present invention, when "opal processing" carries out leaching destruction only of the fiber of some kinds selected using the etching agent to the textile which consists of the fiber of a plurality of kinds by which union was carried out, the thing of processing which attaches a watermark to cloth is said. A "leaching part" means the region where opal processing was performed, and a "non-leaching part" means the region where opal processing is not performed.
[0012]
[The example 2 of application]
In the example 1 of application,
It has the moist-heat-treatment process of performing moist heat treatment of the aforementioned textile,
When the aforementioned moist-heat-treatment process is performed between the 1st above-mentioned dyeing process and the 2nd above-mentioned dyeing process,
Ink jet color ink can be made to adhere to the 3rd above-mentioned region based on contraction of the aforementioned textile by the aforementioned moist-heat-treatment process in the dyeing process behind performed among the 1st above-mentioned dyeing process and the 2nd above-mentioned dyeing process.
[0013]
According to the example 2 of application, it can inhibit that a gap of a dyeing position occurs in a next dyeing process.
[0014]
[The example 3 of application]
In the example 1 of application, or the example 2 of application,
The aforementioned opal down stream processing may be continuously performed with the dyeing process previously performed among the 1st above-mentioned dyeing process and the 2nd above-mentioned dyeing process.
[0015]
According to the example 3 of application, it can inhibit the position where opal processing was performed, the position where dyeing by the dyeing process performed previously was performed, and that ****** occurs.
[0016]
[The example 4 of application]
In the example 1 of application, or the example 2 of application,
It has the moist-heat-treatment process of performing moist heat treatment of the aforementioned textile,
When the aforementioned moist-heat-treatment process is performed before the aforementioned opal down stream processing,
The aforementioned opal down stream processing can make the aforementioned ink-jet pearl ink adhere to the 1st above-mentioned region based on contraction of the aforementioned textile by the moist-heat-treatment process.
[0017]
According to the example 4 of application, it can inhibit that a gap of the position where opal processing was performed occurs.
[0018]
[The example 5 of application]
In any one example of the example 1 of application thru/or the example 4 of application,
The textile which has a ratio of the mass of the 1st above-mentioned fiber to the mass of the 2nd above-mentioned fiber within the limits of 3:7-7:3 can be used.
[0019]
[The example 6 of application]
One modes of the opal-finishing textile concerning the present invention,

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It is an opal-finishing textile obtained using the textile containing the 1st fiber in which leaching is possible, and the 2nd fiber that does not carry out leaching by the opal processing by opal processing,
The 1st region that is some regions of the aforementioned textile where the aforementioned opal processing was performed,
The 3rd region which the 1st above-mentioned region is at least some regions of the 2nd different region, and it comes to dye,
It ****,
In the 3rd above-mentioned region, the 1st above-mentioned fiber and the 2nd above-mentioned fiber are dyed with similar colors and an affiliated design.
[0020]
It is excellent in the color enhancement of a non-leaching part, the opal-finishing textile of the example 6 of application has a design and high quality, and its contrast of a handle is high.
[0021]
[The example 7 of application]
In the example 6 of application,
The ratio of the mass of the 1st above-mentioned fiber to the mass of the 2nd above-mentioned fiber is obtained using the textile which is within the limits of 3:7-7:3.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[0022]
[Drawing 1]The plan view which expresses typically the textile used for the manufacturing method of an opal-finishing textile.
[Drawing 2]The plan view which expresses the textile after opal down stream processing typically.
[Drawing 3]The plan view showing typically the textile after the 1st dyeing process and opal down stream processing.
[Drawing 4]The first plan view showing typically the textile after the 1st dyeing process, opal down stream processing, and the 2nd dyeing process.
[Drawing 5]The second plan view showing typically the textile after the 1st dyeing process, opal down stream processing, and the 2nd dyeing process.
[Drawing 6]The figure showing typically the opal-finishing textile A concerning an working example.
[Drawing 7]The figure showing typically the opal-finishing textile B concerning an working example.
[Drawing 8]The figure showing typically the opal-finishing textile C concerning a comparative example.
[Drawing 9]The figure showing typically the opal-finishing textile D concerning a comparative example.

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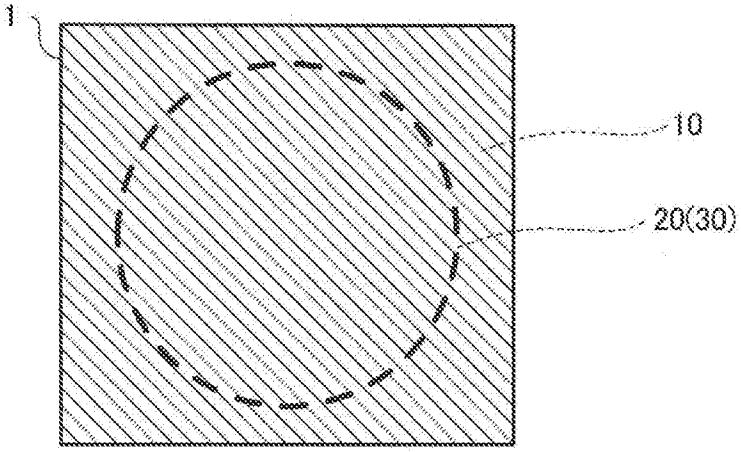
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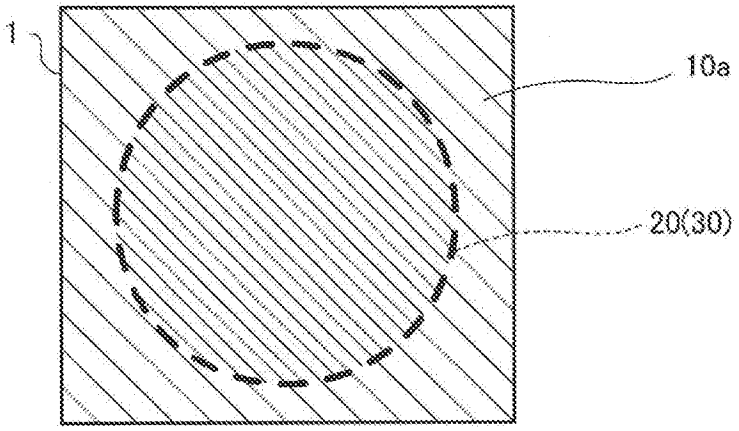
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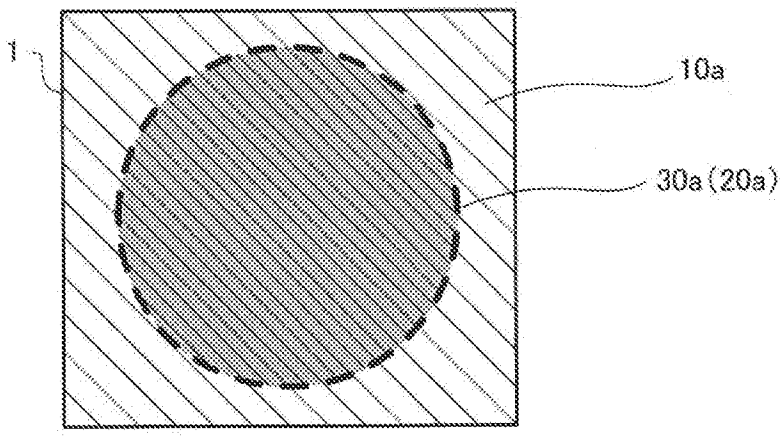
[Drawing 1]



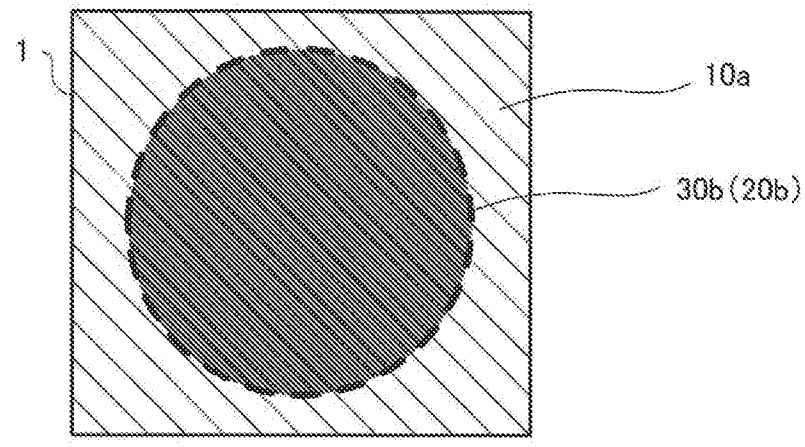
[Drawing 2]



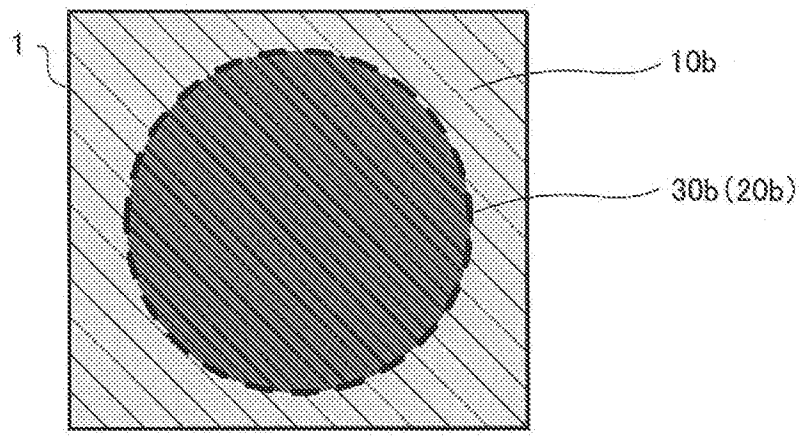
[Drawing 3]



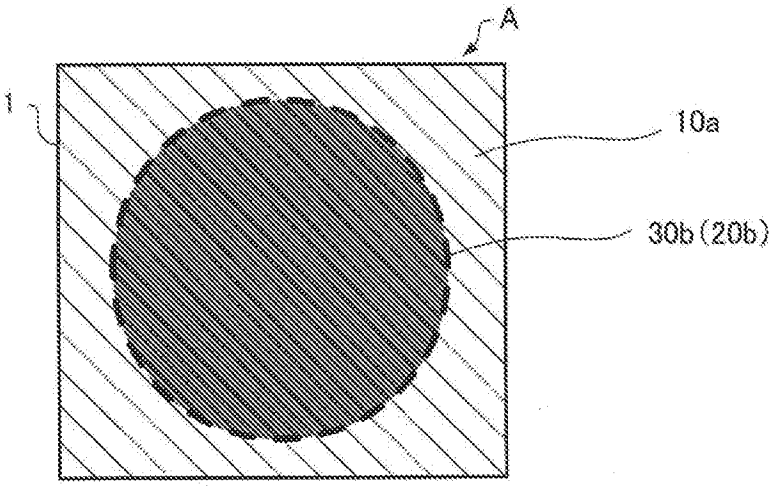
[Drawing 4]



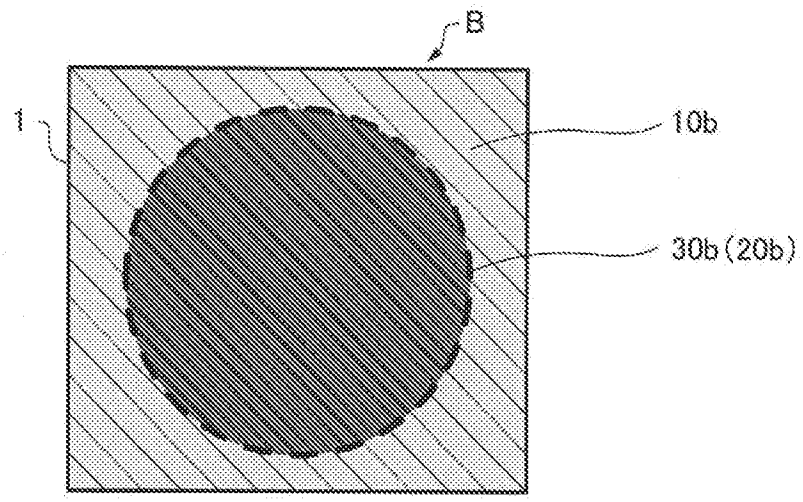
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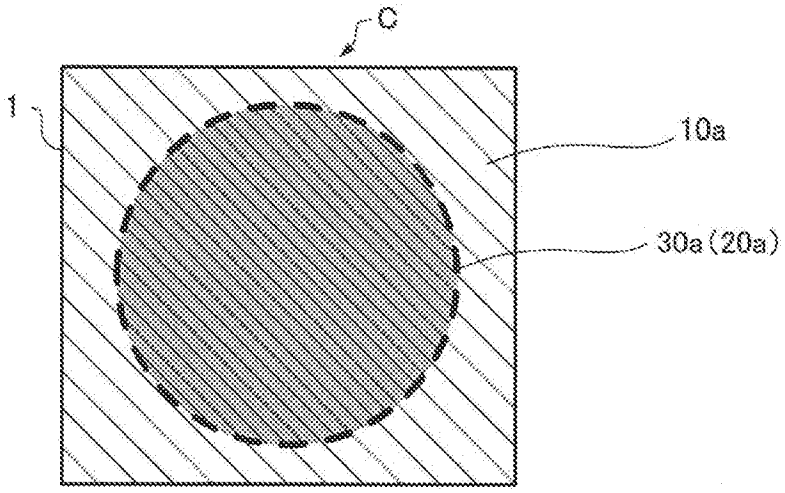
[Drawing 6]



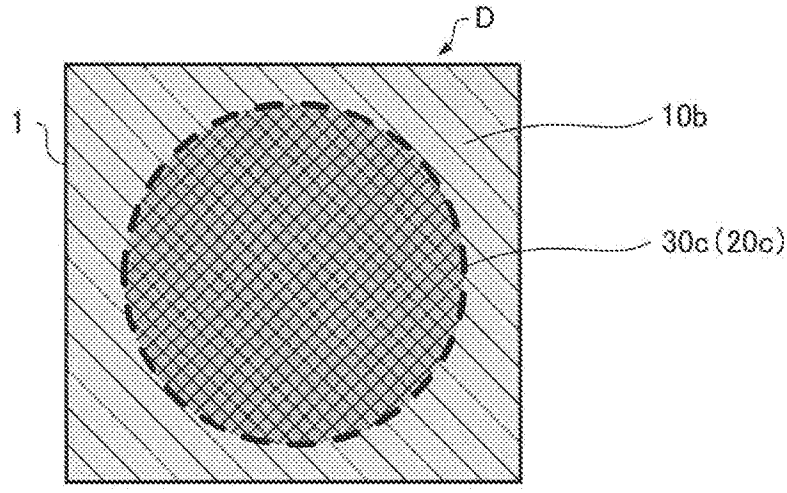
[Drawing 7]



[Drawing 8]



[Drawing 9]



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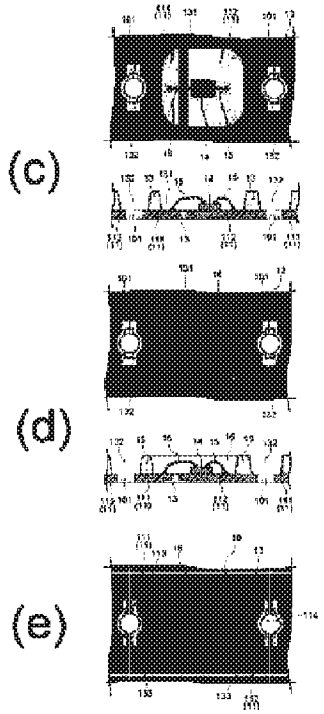
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(57)【要約】
【課題】反射層からリード端子が突出した構成の発光ダイオードを容易に製造する。
【解決手段】反射層１３を全体リードフレーム上に形成する。反射層１３は、全体リードフレーム上の広い範囲にわたり一様に形成されるが、窓部１３１とリード開口部１３２では開口した形態とされる。図４（ｃ）に示されるように、窓部１３１内部で露出した第２リードフレーム１１２上に発光ダイオードチップ１４を搭載する。図４（ｄ）に示されるように、窓部１３１内部に蛍光材料を充填し、蛍光層１６を形成する。隣接する発光ダイオードに対応した領域間をダイシングソーを用いて切断することによって、複数の発光ダイオード１０を分断して得る。リードフレーム開口部１０１が２つに分断され、その両側において形成される発光ダイオードのリードフレーム切り欠き部１１４、１１３となる。また、リード開口部１３２も同様に２つに分断されて２つの反射層切り欠き部１３３となる。
【選択図】図４



【特許請求の範囲】
【請求項１】
リードフレーム上に発光ダイオードチップを搭載し、当該発光ダイオードチップの周囲に蛍光層を介して反射層が形成された構成を具備する発光ダイオードを２次元配列させた状態で製造する、発光ダイオードの製造方法であって、
一つの発光ダイオードに対応する領域において、前記リードフレームは空隙を介して配置された第１リードフレームと第２リードフレームとを具備し、一方向で隣接する２つの発光ダイオードに対応した領域間においては、一方の発光ダイオードに対応した領域における前記第１リードフレームと他方の発光ダイオードに対応した領域における前記第２リードフレームとが連結して構成されるように、前記リードフレームが多数配列された構成を具備する全体リードフレームが用いられ、
前記全体リードフレーム上において、一つの発光ダイオードに対応する領域において前記第１リードフレームの一部と前記第２リードフレームの一部とを露出させる窓部と、前記一方向で隣接する２つの発光ダイオードに対応する領域の境界部分において前記全体リードフレームを露出させるリード開口部と、を具備した形態で前記全体リードフレームを覆う前記反射層を、トランスファーモールドによって形成する反射層形成工程と、
前記窓部の中における前記第１リードフレーム又は前記第２リードフレーム上に前記発光ダイオードチップを搭載し、前記発光ダイオードチップ中の両極をそれぞれ前記第１リードフレーム、前記第２リードフレームに接続するチップ搭載工程と、
前記窓部内に前記蛍光層を形成する蛍光層形成工程と、
前記一方向で隣接する２つの発光ダイオードに対応した領域の境界部分を前記一方向と垂直な他方向に沿って前記反射層及び前記全体リードフレームを切断し、かつ前記他方向において隣接する発光ダイオードに対応する領域間を前記一方向に沿って切断する切断工程と、
を具備することを特徴とする発光ダイオードの製造方法。
【請求項２】
前記全体リードフレームにおいて、前記リード開口部に対応した箇所に、前記リード開口部よりも小さなリードフレーム開口部が形成されたことを特徴とする請求項１に記載の発光ダイオードの製造方法。
【請求項３】
前記リードフレーム開口部は円形状とされたことを特徴とする請求項２に記載の発光ダイオードの製造方法。
【請求項４】
下面において前記リードフレーム開口部に隣接した箇所が局所的に薄肉加工された前記全体リードフレームが用いられ、
前記反射層形成工程において、
前記全体リードフレームの下面側において、前記リードフレーム開口部に隣接し局所的に薄肉加工された箇所に前記反射層を形成しないことを特徴とする請求項２又は３に記載の発光ダイオードの製造方法。
【請求項５】
下面において前記第１リードフレーム又は前記第２リードフレームの外周が局所的に薄肉加工された前記全体リードフレームが用いられ、
前記反射層形成工程において、
前記全体リードフレームの下面側において、前記外周が局所的に薄肉加工された箇所に前記反射層を形成することを特徴とする請求項１から請求項４までのいずれか１項に記載の発光ダイオードの製造方法。
【請求項６】
請求項１から請求項５までのいずれか１項に記載の発光ダイオードの製造方法によって製造されたことを特徴とする発光ダイオード。
【発明の詳細な説明】

【技術分野】
【０００１】
本発明は、ＬＥＤ（発光ダイオード）チップをリードフレーム上に搭載した構成を具備する発光ダイオード、その製造方法に関する。
【背景技術】
【０００２】
ＬＥＤ（発光ダイオード）が使用される際には、リードフレーム上に発光ダイオードチップが搭載され、この発光ダイオードに通電がされ、その発光が外部に取り出される形態とされる。高い発光効率を得るために、発光ダイオードチップの周囲には、その内面で光を反射させる反射層が形成される。また、白色発光ダイオードの場合には、白色を発光させるために必要となる蛍光層が反射層で囲まれた内部において発光ダイオードチップの周辺に形成される。反射層は樹脂材料で構成することができ、発光ダイオードチップの電極となるリード端子はこの反射層の両側から突出した形態とされる。
【０００３】
こうした構成の発光ダイオードの構造、製造方法は、例えば特許文献１に記載されている。ここでは、単一の全体リードフレームを用いて、多数の発光ダイオードが多数配列して同時に製造される。最後に全体リードフレーム等が縦横の２方向で切断されて、個々の発光ダイオードが分離されて得られる。
【０００４】
図８（ａ）～（ｆ）は、特許文献１の製造方法における各工程を全体リードフレーム９００に対応して上面から見た図である。
【０００５】
図８（ａ）は、この場合に用いられる全体リードフレーム９００の平面図である。図８（ａ）において破線で囲まれた領域が単一の発光ダイオードに対応したリードフレーム９１となる。リードフレーム９１は、発光ダイオードにおける両極に対応して左右２つの領域（第１リードフレーム９１１、第２リードフレーム９１２）に分割されている。図示されるように、この全体リードフレーム９００においては、リードフレーム９１が２次元配列して一体化した構成とされる。このため、全体リードフレーム９００においては、外枠部９０１が設けられており、外枠部９０１によって各リードフレーム９１（第１リードフレーム９１１、第２リードフレーム９１２）が一体化されている。また、この２次元配列における縦方向においては、隣接するリードフレーム９１間あるいはリードフレーム９１と外枠部９０１とは連結部９０２によって接続される。これによって、複数のリードフレーム９１が全体リードフレーム９００として一体化される。
【０００６】
この全体リードフレーム９００に対して、まず、図８（ｂ）に示されるように、反射層９２がトランスファーモールドによって所望の形状で形成される。反射層９２は、各リードフレーム９１上において搭載された発光ダイオードを取り囲むパターンで形成される。このため、反射層９２には窓部９２１が形成され、この窓部９２１中で各第１リードフレーム９１１、第２リードフレーム９１２の表面が露出する形態とされる。
【０００７】
その後、この各窓部９２１中において露出した第２リードフレーム９１２に発光ダイオードを搭載し、第１リードフレーム９１１、第２リードフレーム９１２に対して発光ダイオードにおける両極からそれぞれボンディングワイヤを接続した後に、図８（ｃ）に示されるように、各窓部９２１を埋め込むように蛍光層９３を形成する。窓部９２１の内面は、発光ダイオードが発した光を図８中の紙面上方に反射させるために、全体リードフレーム９００に対して傾斜角をもって形成されている。
【０００８】
その後、図８（ｄ）に示されるように図中上下方向に延伸するブレード（切断刃）２００を用いて上下における外枠部９０１が切断され、図８（ｅ）に示されるように左右方向に延伸するブレード２００を用いて左右における外枠部９０１及び連結部９０２（図示せ

ず）が切断される。これによって、図８（ｆ）に示されるように、個々の発光ダイオード９０が分割されて得られる。

【０００９】

図９は、この製造方法によって製造される発光ダイオード９０の上面図（ａ）、そのＤ－Ｄ方向の断面図（ｂ）、底面図（ｃ）である。この発光ダイオード９０においては、右側の第２リードフレーム９１２上に発光ダイオードチップ９４が搭載され、その両極が、それぞれ左側の第１リードフレーム９１１、右側の第２リードフレーム９１２にボンディングワイヤ９５で接続される。この構成によって、蛍光層９３中（リードフレーム９１上）の発光ダイオードチップ９４が発した光を蛍光層９３が吸収し、異なる波長の光が放出される。発光ダイオードが発した光と蛍光層９３が発した光は混合されて白色となり、共に蛍光層９３を取り囲む反射層９２の内面で反射され、図８（ｃ）における紙面の上方向に発せられる。これによって、この発光ダイオード９０は、高効率で白色の発光をすることができる。

【００１０】

また、第１リードフレーム９１１の左側端部、第２リードフレーム９１２の右側端部は反射層９２からそれぞれ左側、右側に突出している。この発光ダイオード９０を実装して使用する際には、この第１リードフレーム９１１、第２リードフレーム９１２におけるこの突出した部分をリード端子として用いることができ、これに対してはんだ付けを行い、発光ダイオード９０を基板上に固定し、配線を接続することができる。

【００１１】

上記の製造方法を用いて、この構造を具備する発光ダイオード９０を容易に製造することができる。

【先行技術文献】

【特許文献】

【００１２】

【特許文献１】特開２０１２－０６９８８５号公報

【発明の概要】

【発明が解決しようとする課題】

【００１３】

上記の製造方法において、反射層９２は、図８（ｂ）に示されるように、図中上下方向に延びる列では一体化されているが、左右方向に隣接する列の間では分離されて形成される。これは、前記の通り、反射層９２から左右方向に第１リードフレーム９１１、第２リードフレーム９１２が突出した部分をリード端子として用いるためである。このため、少なくとも図８における左右方向に隣接した２つの発光ダイオードに対応する領域の境界付近においては反射層９２は形成されない。

【００１４】

こうした反射層９２のパターンはトランスファーモールドによって形成することができるものの、そのパターンは図８（ｂ）中の上下方向において細長く、左右方向において隣接する発光ダイオードに対応する領域間で分離された形態となる。トランスファーモールドにおいては、反射層９２となる樹脂材料が液状の状態とされて金型中に流し込まれ、その後にこれを硬化させることによって、反射層９２とされる。この際、このパターニングを精密に行うためには、金型中がこの樹脂材料で空隙なく充填されることが必要であるが、このように独立した細長いパターンが多く存在する場合には、このパターンの金型を樹脂材料で空隙無く充填することが困難となる。このため、上記の形状をもつ反射層９２の精密なパターニングを行うことは実際には困難であった。

【００１５】

従って、反射層からリード端子が突出した構成の発光ダイオードを容易に製造することは困難であった。

【００１６】

本発明は、かかる問題点に鑑みてなされたものであり、上記問題点を解決する発明を提

供することを目的とする。

【課題を解決するための手段】

【００１７】

本発明は、上記課題を解決すべく、以下に掲げる構成とした。

本発明の半導体モジュールの製造方法は、リードフレーム上に発光ダイオードチップを搭載し、当該発光ダイオードチップの周囲に蛍光層を介して反射層が形成された構成を具備する発光ダイオードを２次元配列させた状態で製造する、発光ダイオードの製造方法であって、一つの発光ダイオードに対応する領域において、前記リードフレームは空隙を介して配置された第１リードフレームと第２リードフレームとを具備し、一方向で隣接する２つの発光ダイオードに対応した領域間においては、一方の発光ダイオードに対応した領域における前記第１リードフレームと他方の発光ダイオードに対応した領域における前記第２リードフレームとが連結して構成されるように、前記リードフレームが多数配列された構成を具備する全体リードフレームが用いられ、前記全体リードフレーム上において、一つの発光ダイオードに対応する領域において前記第１リードフレームの一部と前記第２リードフレームの一部とを露出させる窓部と、前記一方向で隣接する２つの発光ダイオードに対応する領域の境界部分において前記全体リードフレームを露出させるリード開口部と、を具備した形態で前記全体リードフレームを覆う前記反射層を、トランスファーモールドによって形成する反射層形成工程と、前記窓部の中における前記第１リードフレーム又は前記第２リードフレーム上に前記発光ダイオードチップを搭載し、前記発光ダイオードチップ中の両極をそれぞれ前記第１リードフレーム、前記第２リードフレームに接続するチップ搭載工程と、前記窓部内に前記蛍光層を形成する蛍光層形成工程と、前記一方向で隣接する２つの発光ダイオードに対応した領域の境界部分を前記一方向と垂直な他方向に沿って前記反射層及び前記全体リードフレームを切断し、かつ前記他方向において隣接する発光ダイオードに対応する領域間を前記一方向に沿って切断する切断工程と、を具備することを特徴とする。

本発明の半導体モジュールの製造方法は、前記全体リードフレームにおいて、前記リード開口部に対応した箇所に、前記リード開口部よりも小さなリードフレーム開口部が形成されたことを特徴とする。

本発明の半導体モジュールの製造方法において、前記リードフレーム開口部は円形状とされたことを特徴とする。

本発明の半導体モジュールの製造方法は、下面において前記リードフレーム開口部に隣接した箇所が局所的に薄肉加工された前記全体リードフレームが用いられ、前記反射層形成工程において、前記全体リードフレームの下面側において、前記リードフレーム開口部に隣接し局所的に薄肉加工された箇所に前記反射層を形成しないことを特徴とする。

本発明の半導体モジュールの製造方法は、下面において前記第１リードフレーム又は前記第２リードフレームの外周が局所的に薄肉加工された前記全体リードフレームが用いられ、前記反射層形成工程において、前記全体リードフレームの下面側において、前記外周が局所的に薄肉加工された箇所に前記反射層を形成することを特徴とする。

本発明の半導体モジュールは、前記発光ダイオードの製造方法によって製造されたことを特徴とする。

【発明の効果】

【００１８】

本発明は以上のように構成されているので、反射層からリード端子が突出した構成の発光ダイオードを容易に製造することができる。

【図面の簡単な説明】

【００１９】

【図１】本発明の実施の形態に係る発光ダイオードの製造方法において用いられるリードフレームの形態を示す上面図（ａ）、その断面図（ｂ）である。

【図２】本発明の実施の形態に係る発光ダイオードの製造方法において用いられる全体リードフレームの形態を示す上面図である。

【図３】本発明の実施の形態に係る発光ダイオードの製造方法の各工程における形態を示す図（その１）である。
【図４】本発明の実施の形態に係る発光ダイオードの製造方法の各工程における形態を示す図（その２）である。
【図５】本発明の実施の形態に係る発光ダイオードの製造方法の各工程における全体リードフレーム上における形態を示す図である。
【図６】本発明の実施の形態に係る発光ダイオードの上面図（ａ）、断面図（ｂ）、底面図（ｃ）である。
【図７】本発明の実施の形態に係る発光ダイオードの端面の斜視図である。
【図８】従来の発光ダイオードの製造方法の一例の各工程における形態を示す図である。
【図９】従来の発光ダイオードの一例の上面図（ａ）、断面図（ｂ）、底面図（ｃ）である。
【発明を実施するための形態】
【００２０】
以下、本発明の実施の形態となる発光ダイオードの製造方法、及びこの発光ダイオードについて説明する。この発光ダイオードにおいては、リードフレーム上に発光ダイオードチップが搭載され、その周囲に反射層が形成されている。発光ダイオードチップは、この反射層に設けられた窓部中に設置され、その周囲には蛍光層が設けられている。蛍光層は、発光ダイオードチップが発した単色の光を吸収してこれと異なる波長の光を発する。このため、この発光ダイオードにおいては、発光ダイオードチップが発する光と、蛍光層が発した光の、異なる２種類の波長の光が同時に発せられる。これらの光のうち、窓部の内面に達した光はそこで反射される。これにより、例えば白色光を発することができる。これらの点については特許文献１に記載の発光ダイオードと同様である。ただし、特許文献１に記載の発光ダイオードとは、反射層の両端部におけるリード端子の形態が大きく異なる。これに応じて、リードフレーム、反射層の形態が大きく異なる。
【００２１】
図１は、この製造方法において用いられるリードフレーム１１の上面図（ａ）及びそのＡ－Ａ方向の断面図（ｂ）である。ここで示されたリードフレーム１１は、発光ダイオード１個分に相当する。実際には複数の発光ダイオードを同時に製造するために、図１のパターンのリードフレーム１１が多数配列されて固定された形態の全体リードフレーム１００が用いられる。図２は、この全体リードフレーム１００の形態を示す上面図であり、この破線で囲まれた領域が図１に示されたリードフレーム１１に相当する。
【００２２】
このリードフレーム１１は、図１において図示された範囲（単一の発光ダイオードに対応する領域）内では第１リードフレーム１１１と第２リードフレーム１１２に分離されている。このため、第１リードフレーム１１１と第２リードフレーム１１２とは空隙を介して左右に配されている。第１リードフレーム１１１の左側端部、第２リードフレーム１１２の右側端部、すなわち、これらにおける空隙と反対側の端面側にはそれぞれリードフレーム切り欠き部１１３、１１４が形成されている。リードフレーム切り欠き部１１３、１１４はリード端子とされる部分に対応して形成される。
【００２３】
第１リードフレーム１１１においては、その上下に連結部１１５、１１６がそれぞれ接続され、第２リードフレーム１１２においては、その上側に連結部１１７、１１８が、その下側に連結部１１９、１２０が接続されている。第１リードフレーム１１１、第２リードフレーム１１２共に、図示されるように下面側（発光ダイオードチップが搭載される側と反対側）の外周が局所的に薄肉加工されており、このために段差が形成されている。また、リードフレーム切り欠き部１１３、１１４と隣接した領域においても、第１リードフレーム１１１、第２リードフレーム１１２は局所的に薄肉加工されており、同様に段差が形成されている。図１（ａ）における点線は、これらの段差を示している。また、連結部１１５～１２０も第１リードフレーム１１１、第２リードフレーム１１２の周囲と同様に

薄肉加工されている。

【００２４】

全体リードフレーム１００においては、図２に示されるように、図１の構成が２次元配列されて一体化されている。ここでは、図中左右方向（一方向）で隣接する２つの発光ダイオードに対応した領域間においては、一方の発光ダイオードに対応した領域における第１リードフレーム１１１と他方の発光ダイオードに対応した領域における第２リードフレーム１１２とは連結している。このため、図１における第１リードフレーム１１１はその左側の発光ダイオードに対応した第２リードフレーム１１２と、第２リードフレーム１１２はその右側の発光ダイオードに対応した第１リードフレーム１１１と連結して一体化されている。

【００２５】

また、図１の構成におけるリードフレーム１１は、その上下方向（他方向）において隣接する発光ダイオードに対応したリードフレーム１１と、連結部１１５～１２０によって接続される。なお、実際には図８（ａ）と同様の外枠部も使用されるが、ここではその記載を省略している。以上の構成によって、全体リードフレーム１００は一体化して構成されている。

【００２６】

ここで、左右方向で隣接する発光ダイオードに対応した領域間で一体化された第１リードフレーム１１１と第２リードフレーム１１２の間の境界部分（単一の発光ダイオードに対応する領域の左右両端の部分）において、円形状のリードフレーム開口部１０１が形成されている。後述するように、図１におけるリードフレーム切り欠き部１１３、１１４は、このリードフレーム開口部１０１が左右に分断されることによって形成される。図２で示されるように、リードフレーム開口部１０１は、全体リードフレーム１００中において周期的に２次元配列されて形成される。

【００２７】

この構成の全体リードフレーム１００は、例えば銅板を板金加工することによって製造することができる。この際、第１リードフレーム１１１と第２リードフレーム１１２における前記の薄肉加工も、プレス加工やエッチングによって行うことができる。

【００２８】

図３（ａ）（ｂ）、図４（ｃ）～（ｅ）は、この全体リードフレーム１００を用いた発光ダイオードの製造方法の工程における形態を単一の発光ダイオードに対応した領域において示す図である。ここで、図３（ａ）（ｂ）、図４（ｃ）（ｄ）中の上側は各工程において上面から見た形態を示し、下側はその断面図を示す。ここでは、左右に隣接した発光ダイオードに対応する領域との境界部分も同時に示されている。図４（ｅ）においては、上面から見た形態のみが示され、断面図は省略されている。

【００２９】

また、図５（ａ）～（ｆ）は、複数の発光ダイオードが配列された広い領域において、各工程における上面から見た形態を示している。ここで、図５（ａ）、（ｂ）、（ｃ）、（ｆ）は、それぞれ図３（ａ）、図３（ｂ）、図４（ｄ）、図４（ｅ）に対応した工程における広い領域を示す上面図となっている。

【００３０】

図３（ａ）は、ここで示される箇所における前記の全体リードフレーム１００の形態が示されている。以降で示される断面図は、このＢ－Ｂ方向の断面に対応する。上面図（上側）においては、下面において形成された段差は点線で示されている。図５（ａ）は、これに対応した全体リードフレーム１００の上面図である。

【００３１】

この全体リードフレーム１００に対して、図３（ｂ）、図５（ｂ）に示される形状で、反射層１３を全体リードフレーム１００（リードフレーム１１）上に形成する（反射層形成工程）。反射層１３の材料としては例えばエポキシ樹脂等の熱硬化性樹脂を用い、その成型はトランスファーモールドによる。この形状で反射層１３を形成するためには、例え

ば、下金型に全体リードフレーム１００をセットし、この上に、内部の形状がこの反射層１３の形状とされた空洞部をもつ上金型をセットし、この空洞部に反射層１３となる樹脂材料を液状の状態として加圧供給する。空洞部がこの材料で充填された後で硬化させることによって、反射層１３とされる。図３（ｂ）上、図５（ｂ）に示されるように、反射層１３は、全体リードフレーム１００（リードフレーム１１）上の広い範囲にわたり一様に形成されるが、窓部１３１とリード開口部１３２では開口した形態とされる。

【００３２】

窓部１３１の中には後で発光ダイオードチップが搭載され、これを取り囲む反射層１３の内面は発光ダイオードチップが発する光を上方に向けて反射させる。このため、窓部１３１中における反射層１３の内面は、この中に収容される発光ダイオードチップが発する発光を反射するように、リードフレーム１１の表面に対して傾斜角をもつように設定される。

【００３３】

リード開口部１３２は、前記のリードフレーム開口部１０１に対応して形成される。このため、リード開口部１３２も、左右方向において隣接する２つの発光ダイオードに対応する領域の境界部分に形成される。ただし、リード開口部１３２はリードフレーム開口部１０１よりもその周囲のリードフレーム１１上面が露出するように設定される。また、リード開口部１３２もリードフレーム開口部１０１と同様に、全体リードフレーム１００上で周期的に２次元配列されて形成される。

【００３４】

ここで、トランスファーモールドの際に、下金型に全体リードフレーム１００の下面側の薄肉加工されない部分が当接するようにして全体リードフレーム１００を固定した場合、反射層１３は、全体リードフレーム１００の上面側だけでなく、第１リードフレーム１１１、第２リードフレーム１１２間の空隙や第１リードフレーム１１１、第２リードフレーム１１２の下面側外周の薄肉加工された箇所にも形成される。このため、反射層１３の下面側においては、全体リードフレーム１００（リードフレーム１１）の薄肉加工されなかった領域が露出し、その周囲に反射層１３が形成される。一方、リードフレーム開口部１０１が形成された箇所の上面側においては、リードフレーム開口部１０１よりも広いリード開口部１３２が形成されているため、リードフレーム開口部１０１に樹脂は入り込まず、リードフレーム開口部１０１内には反射層１３は形成されない。このため、全体リードフレーム１００におけるリードフレーム開口部１０１に隣接して薄肉加工された箇所にも反射層１３は形成されない。このため、この箇所は薄肉加工されているものの、反射層１３の下面において露出する。

【００３５】

また、図５（ｂ）に示されるように、反射層１３は、全体リードフレーム１００の上面側において、図中の上下方向、左右方向共に隣接する発光ダイオードに対応する領域間で一体化して形成される。すなわち、左右方向に隣接する発光ダイオードに対応する領域間では反射層９２が分離された図８（ｂ）の場合（特許文献１）と異なり、反射層１３は、全体リードフレーム１００の上の広い範囲で一体化されて形成されている。

【００３６】

次に、図４（ｃ）に示されるように、窓部１３１内部で露出した第２リードフレーム１１２上に発光ダイオードチップ１４を搭載する（チップ搭載工程）。発光ダイオードチップ１４中に形成された発光ダイオードの一方の極、他方の極は、ボンディングワイヤ１５によって第１リードフレーム１１１、第２リードフレーム１１２にそれぞれ接続される。

【００３７】

次に、図４（ｄ）、図５（ｃ）に示されるように、この状態で、窓部１３１内部に蛍光材料を充填し、蛍光層１６を形成する（蛍光層形成工程）。例えば青色発光ダイオードが用いられる場合には、ＹＡＧ（イットリウム・アルミニウム・ガーネット）系の蛍光材料を用いれば、この蛍光材料が発する光と青色とが混合された疑似白色の発光を得ることが可能である。

【００３８】
その後、図４（ｅ）に示されるように、隣接する発光ダイオードに対応した領域間をダイシングソーを用いて切断することによって、複数の発光ダイオード１０を分断して得る（切断工程）。切断工程は、図５における上下方向に沿った切断を行う第１切断工程と、左右方向に沿った切断を行う第２切断工程とからなる。
【００３９】
まず、図５（ｄ）に示されるように、ダイシングソーのブレード２００を用いて、左右方向において隣接する発光ダイオードに対応する領域間を上下方向に沿って切断する（第１切断工程）。図においてはブレード２００を複数同時に記載しているが、実際には切断は各箇所毎に行われる。この切断の際には、ブレード２００は、図中上下方向に並んだリードフレーム開口部１０１の中心を結ぶ線上を切断する。これによって、全体リードフレーム１００において一体化されていた第２リードフレーム１１２（左側）と第１リードフレーム１１１（右側）とが分断される。この際、リードフレーム開口部１０１が２つに分断され、その両側において形成される発光ダイオードのリードフレーム切り欠き部１１４、１１３となる。また、リード開口部１３２も同様に２つに分断されて２つの反射層切り欠き部１３３となる。
【００４０】
次に、図５（ｅ）に示されるように、同様にブレード２００を用いて、図中上下方向において隣接する発光ダイオード１０間を左右方向に沿って切断する（第２切断工程）。この際にブレード２００が切断するのは、肉厚が薄くかつ細い連結部１１５～１２０と、樹脂材料で構成された反射層１３と、図示しない外枠部である。なお、第１切断工程と第２切断工程の順序を逆転させることも可能である。
【００４１】
これにより、図４（ｅ）、図５（ｆ）に示されるように、個々の発光ダイオード１０が分断されて得られる。この製造方法においては、反射層形成工程（図３（ｂ）、図５（ｂ））において、反射層１３が全体リードフレーム１００の上の広い範囲で、特に図４、５における左右方向において一体化されているため、トランスファーモールドを行う際に、金型に樹脂材料を空隙無く充填することが容易である。すなわち、この発光ダイオード１０を高い歩留まりで容易に製造することができる。
【００４２】
また、第１リードフレーム１１１、第２リードフレーム１１２の下面側において、その外周が薄肉加工された部分にも反射層１３が形成されることによって、反射層１３は、第１リードフレーム１１１、第２リードフレーム１１２の端部において上面側から下面側までこれらを取り囲んで形成される。このため、第１リードフレーム１１１、第２リードフレーム１１２の外周端部が反射層１３に対するくさびとなり、反射層１３は全体リードフレーム１００（リードフレーム１１）に強固に固定される。すなわち、この段差を設けることによって、反射層１３のリードフレーム１１に対する固定の機械的強度を高めることができる。一方、リード開口部１３２に隣接して薄肉化された領域には反射層１３は形成されないため、こうした効果はこの箇所では得られないが、これによる他の効果については後述する。
【００４３】
この発光ダイオード１０の上面図、そのＣ－Ｃ方向の断面図、底面図を図６（ａ）、（ｂ）、（ｃ）にそれぞれ示す。また、その端部の斜視図を図７に示す。上面側（図６（ａ））においては、左右両端の反射層切り欠き部１３３から、第１リードフレーム１１１のリードフレーム切り欠き部１１３周囲、第２リードフレーム１１２のリードフレーム切り欠き部１１４周囲の部分がそれぞれ露出する。一方、下面側（図６（ｃ））においては、反射層１３の中で、第１リードフレーム１１１と第２リードフレーム１１２の薄肉加工されなかった領域が露出する。また、リードフレーム開口部１０１（リードフレーム切り欠き部１１３、１１４）に隣接して薄肉加工された領域には反射層１３は形成されていない。

【００４４】
この発光ダイオード１０においては、第１リードフレーム１１１と第２リードフレーム１１２とが発光ダイオードの両極に接続された電極となり、これらに通電することにより、発光させることが可能である。これらの電極に対する電気的接続は、例えばプリント基板上でこの発光ダイオード１０の裏面においてはんだを介した接続を行うことにより得ることができる。この際、図６、７に示されるように、反射層１３端部の反射層切り欠き部１３３から第１リードフレーム１１１と第２リードフレーム１１２の端部が突出しており、この突出した部分がリード端子とされる。このため、反射層切り欠き部１３３から露出した第１リードフレーム１１１と第２リードフレーム１１２の端部にはんだ付けを行うことによって、この発光ダイオード１０を固定あるいはこれに対して電気的接続をとることができる。

【００４５】
この際、特許文献１に記載の技術（図９の構成）においては、反射層９２の端面からリード端子（第１リードフレーム９１１、第２リードフレーム９１２）が突出したのに対し、この発光ダイオード１０においては、反射層１３の端面に形成された反射層切り欠き部１３３から第１リードフレーム１１１と第２リードフレーム１１２の端部が露出している。この構成により、リード端子は反射層１３の端面から突出しない状態で形成され、取り扱い時におけるリード端子の損傷が抑制され、かつ発光ダイオード１０全体を小型化することもできる。あるいは、単一の全体リードフレーム１００を用いてより多くの発光ダイオード１０を製造することができる。

【００４６】
また、リード端子となる第１リードフレーム１１１と第２リードフレーム１１２の端部にはんだ付けを行なう際には、リードフレーム切り欠き部１１３、１１４が形成されているため、図６（ａ）に示される上面側からはんだを目視で確認することが容易となる。また、リードフレーム切り欠き部１１３、１１４の箇所の裏面側で第１リードフレーム１１１、第２リードフレーム１１２の端部は図７に示されたように薄肉加工され、かつこの箇所には反射層１３も形成されないため、溶けたはんだは、この薄肉加工された部分に溜まりやすくなる。その後、この溶けたはんだは、リードフレーム切り欠き部１１３、１１４の端面を上側に向かって濡れ広がるため、はんだの存在を上側から目視で特に容易に確認することができる。すなわち、この構成の発光ダイオード１０においては、はんだ付けを高い信頼性で容易に行うことができる。

【００４７】
なお、上記の構成において、リードフレーム開口部１０１は円形状であるとしたが、２つに分断されて２つのリードフレーム切り欠き部とすることができる限りにおいて、その形状は任意である。また、上下左右対称の形状である必要もない。例えば、三角形、四角形等、金属板に形成することのできる開口形状であれば任意である。

【００４８】
更に、図７の形状より、第１リードフレーム、第２リードフレームにリードフレーム切り欠き部が存在せず、反射層切り欠き部のみが形成された場合においても、反射層切り欠き部で突出した第１リードフレーム、第２リードフレームをリード端子として使用することができることは明らかである。この場合、反射層において反射層切り欠き部（リード開口部）を形成すれば、反射層切り欠き部で露出した第１リードフレーム、第２リードフレームをリード端子とすることができる。

【００４９】
また、第１リードフレーム、第２リードフレームの下面外周における段差あるいは局所的に薄肉加工された部分、リードフレーム開口部（切り欠き部）に隣接した段差あるいは局所的に薄肉加工された部分、をそれぞれ形成しない場合でも、同様に第１リードフレーム、第２リードフレームをリード端子とすることができることも明らかである。

【００５０】
更に、リードフレーム、全体リードフレームの構成も、上記の製造方法が適用できる限

りにおいて、任意である。例えば、連結部の数、太さ等は、リードフレームを全体として一体化できる限りにおいて任意である。連結部を太くして発光ダイオードの下面で露出する金属面積を広くすれば、高い放熱特性が得られる。

【００５１】

また、リードフレームの上面は平坦である必要はない。例えば、発光ダイオードチップを搭載するリードフレーム（第２リードフレーム）における発光ダイオードに対応する領域を掘り下げた形状に加工すれば、発光ダイオードチップの固定がより確実に行われ、かつこの固定に用いられた接着剤やはんだが他の領域、例えばボンディングワイヤが接続される領域にまで広がることが抑制される。こうした加工も、全体リードフレームにおいて前記の下面側の段差と同様に行うことができる。

【００５２】

また、上記の例では同一構成の発光ダイオードが多数同時に配列して形成されるものとしたが、寸法が同一であれば、各発光ダイオードの構成が同一である必要はない。更に、上記の切断工程によって分断できる構成であれば、寸法も全ての発光ダイオードで同一である必要はない。

【００５３】

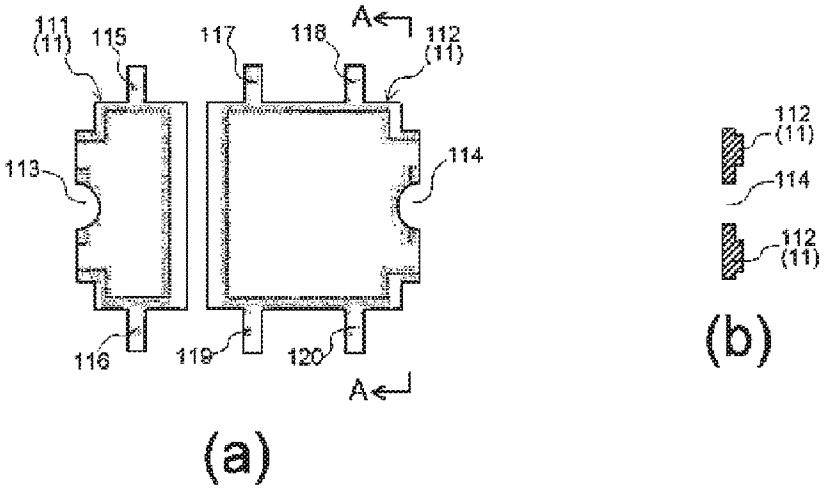
また、リードフレームの形状は、２つの電極として反射層の外部に取り出せ、かつ上記の製造方法が適用できる限りにおいて、任意である。例えば、単一の発光ダイオードに対応する領域内において、第１リードフレーム、第２リードフレーム以外の他の部分を適宜設けることもできる。これらの部分のうちのどれに発光ダイオードチップを搭載するかは適宜設定することができる。反射層やその窓部の形状も、内部に発光ダイオードチップや蛍光層を設けることができる限りにおいて、任意である。また、窓部内における発光ダイオードチップとリードフレームとの電気的接続はボンディングワイヤによって行うものとしたが、２つの電極が上記と同様に外部に取り出せる限りにおいて、任意である。

【符号の説明】

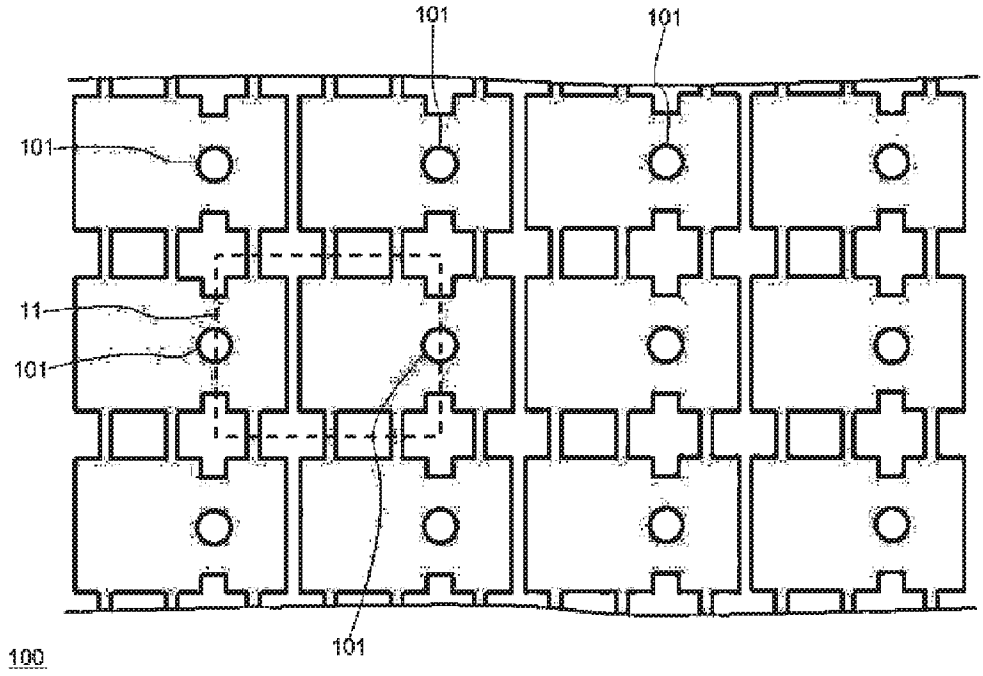
【００５４】

１０、９０　発光ダイオード
１１、９１　リードフレーム
１３、９２　反射層
１４、９４　発光ダイオードチップ
１５、９５　ボンディングワイヤ
１６、９３　蛍光層
１００、９００　全体リードフレーム
１０１　リードフレーム開口部
１１１、９１１　第１リードフレーム
１１２、９１２　第２リードフレーム
１１３、１１４　リードフレーム切り欠き部
１１５～１２０、９０２　連結部
１３１、９２１　窓部
１３２　リード開口部
１３３　反射層切り欠き部
２００　ブレード
９０１　外枠部

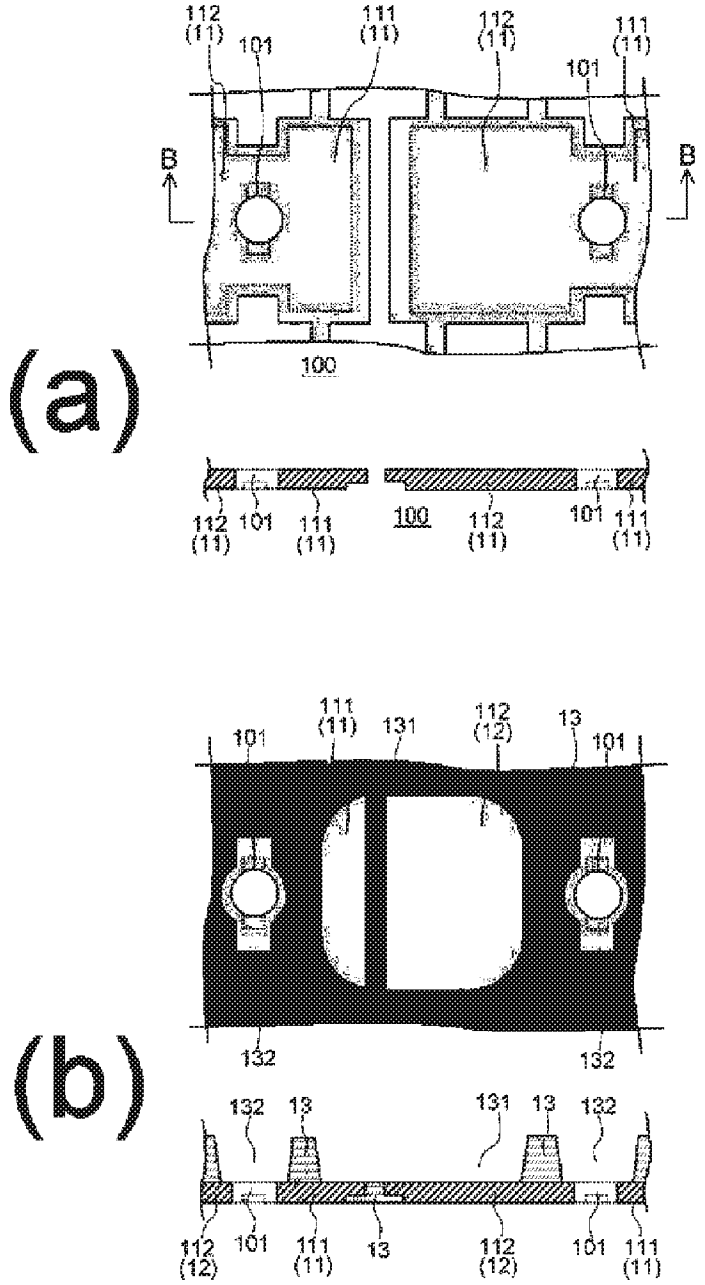
【図１】


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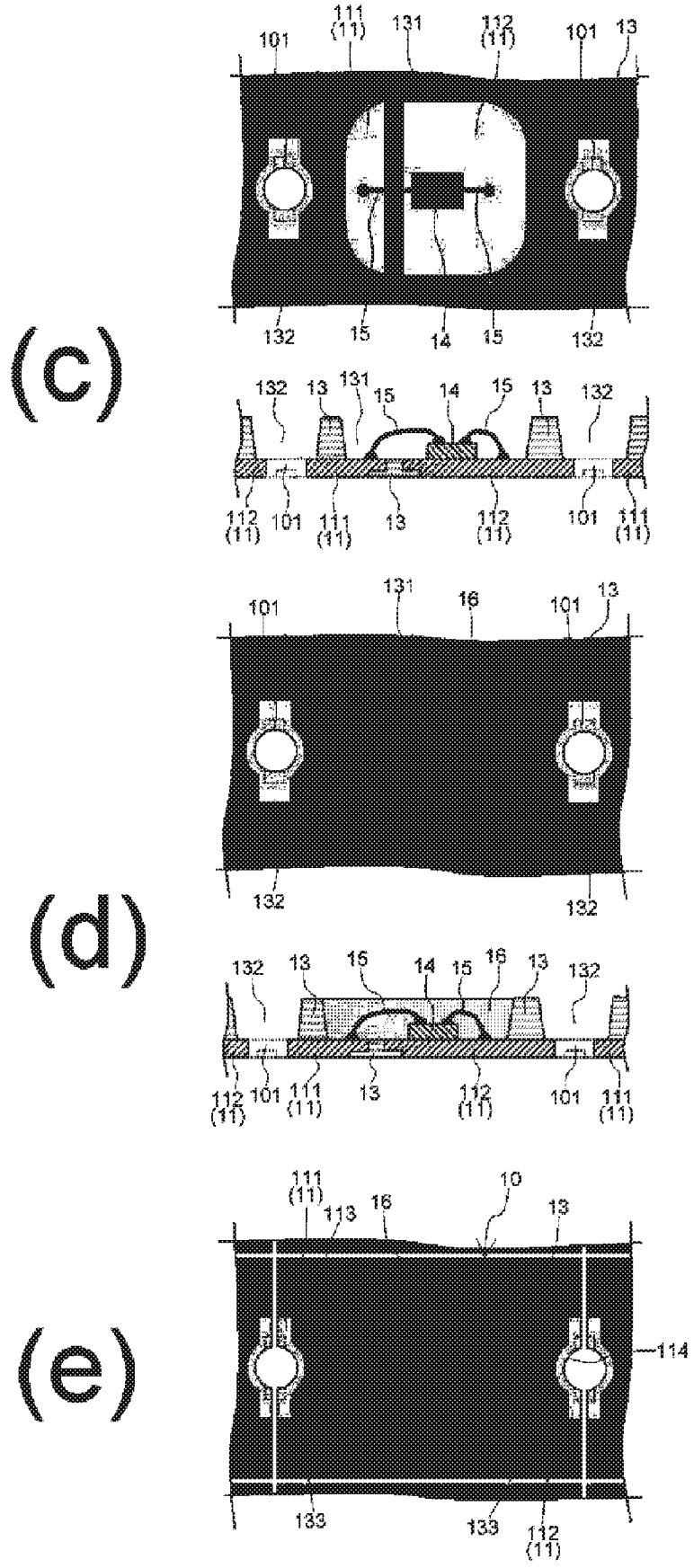
【図２】


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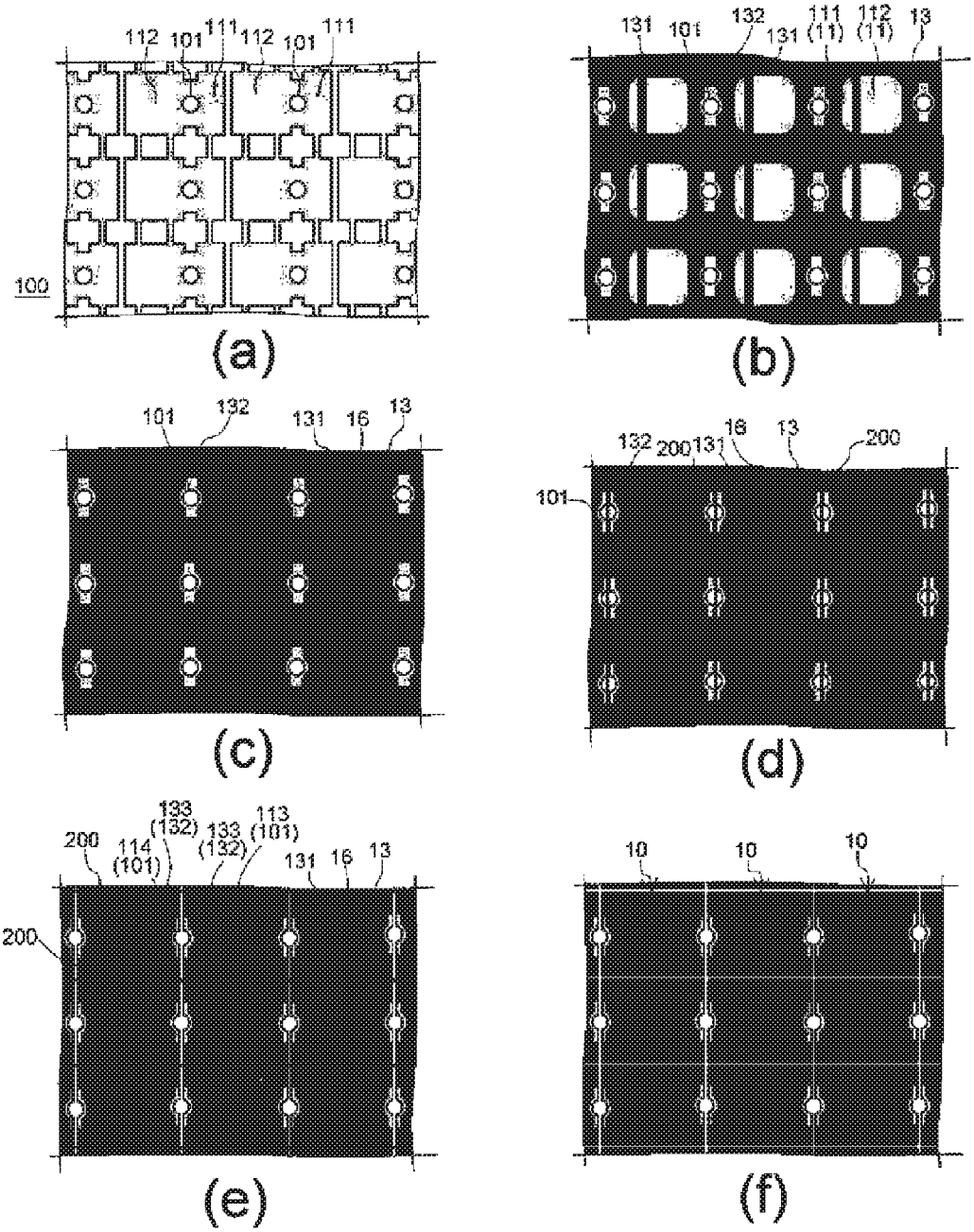
【図３】


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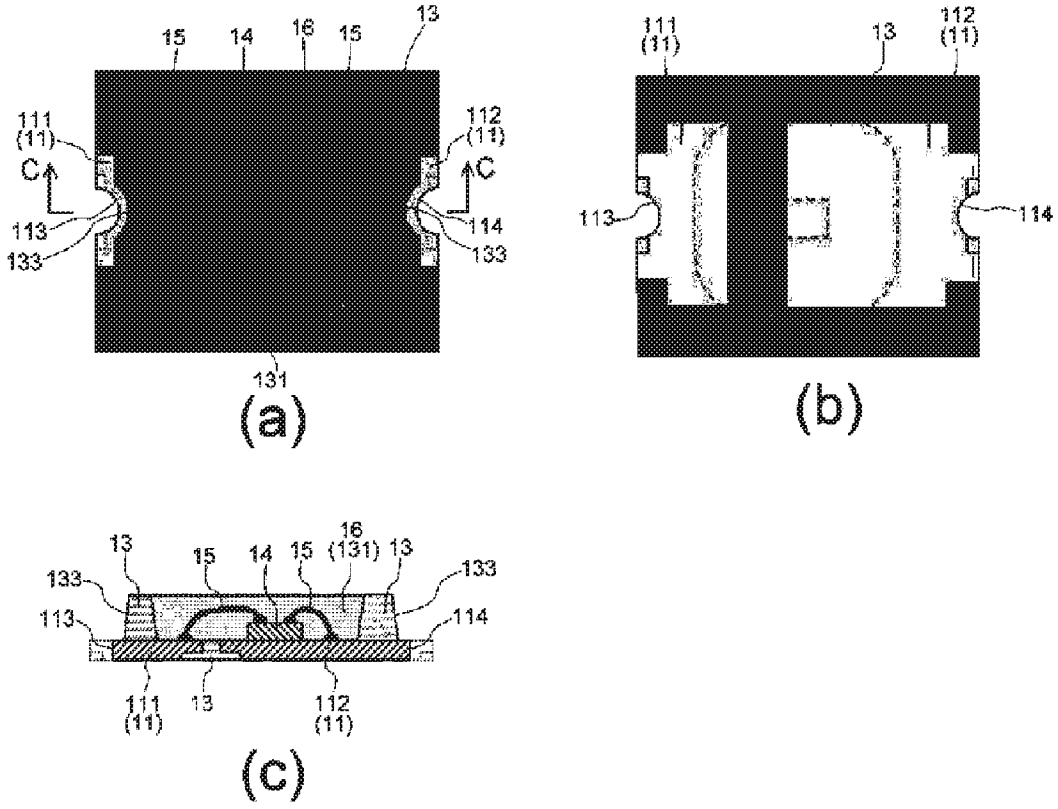
【図４】



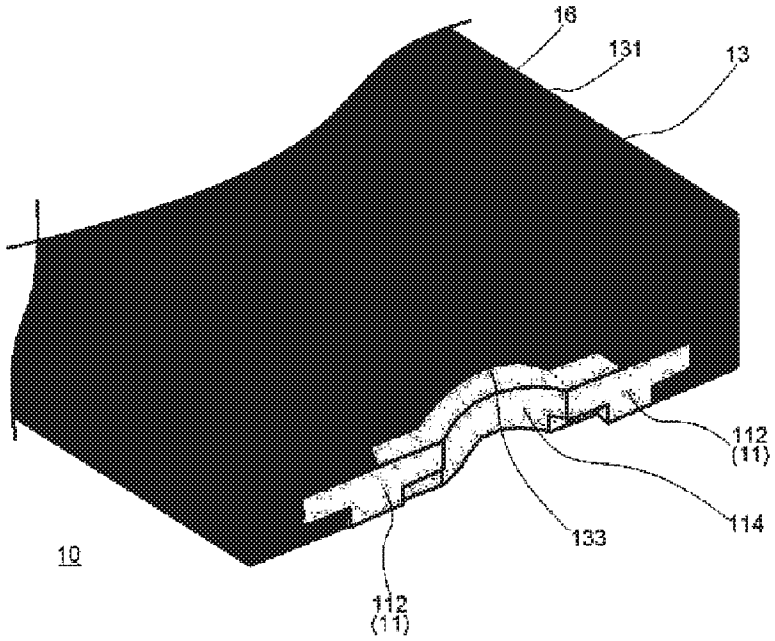
【図５】


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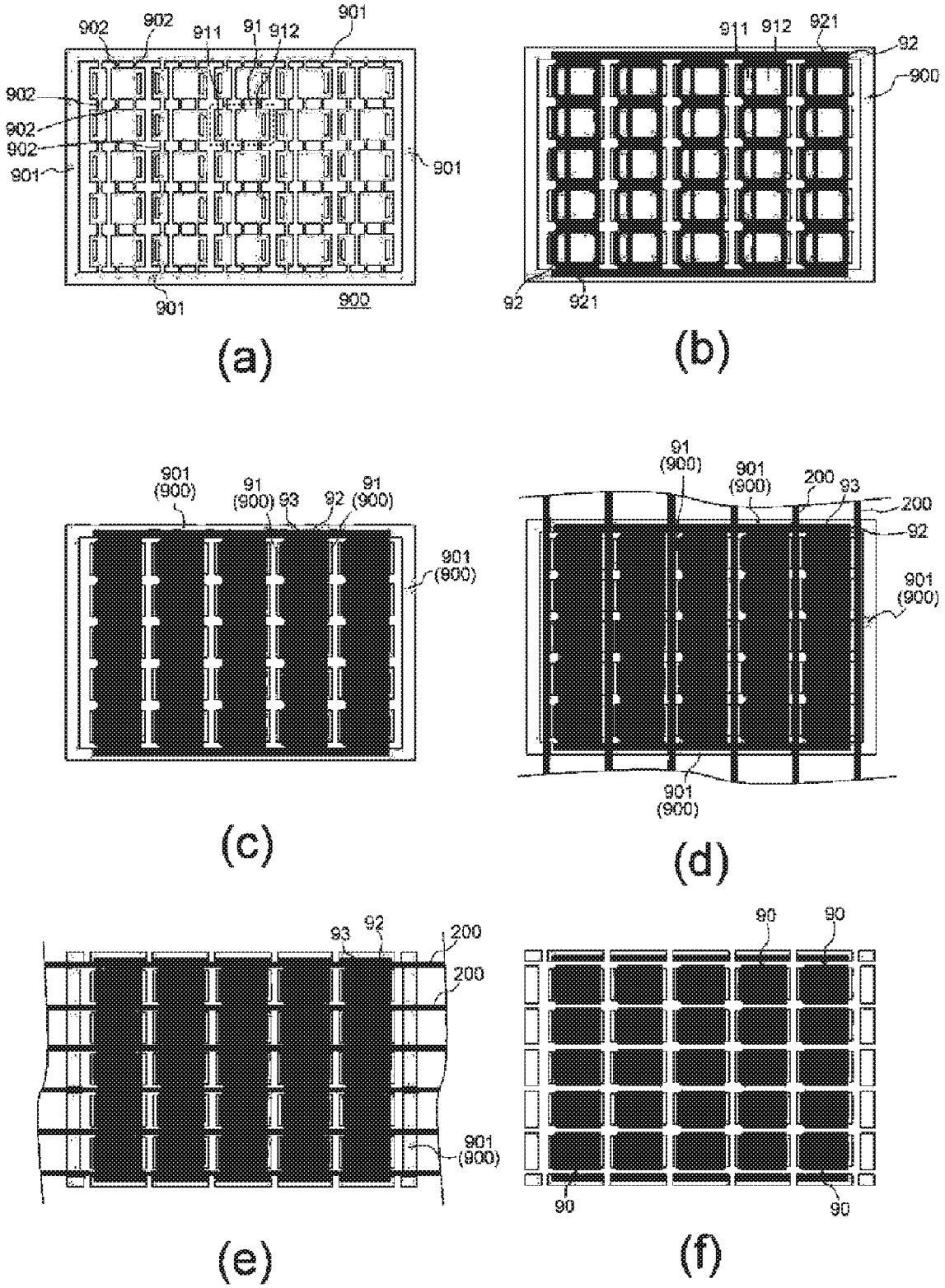
【図６】


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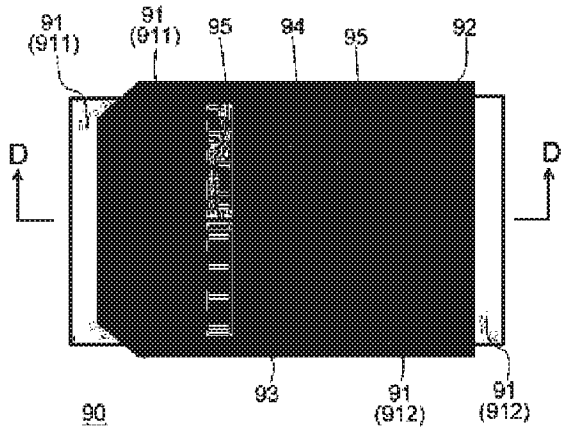
【図７】


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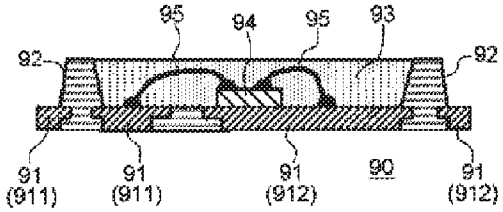
【図８】


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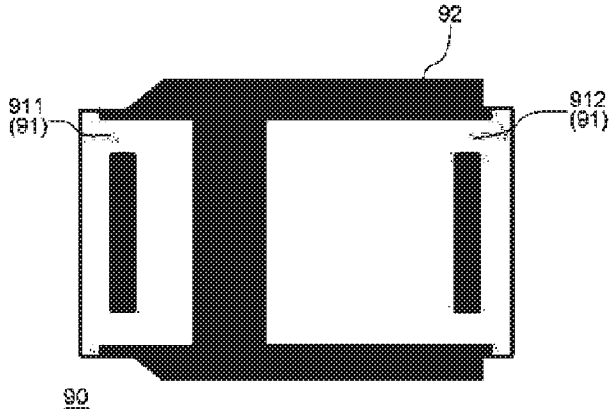
【図９】


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Espacenet

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METHOD FOR MANUFACTURING LEAD FRAME ASSEMBLY OF LIGHT-EMITTING DIODE

Inventor(s):

Applicant(s): FUSHENG IND CO LTD ± (FUSHENG INDUSTRIAL CO LTD)

Classification: **- international:** ***H01L33/62***
- cooperative:

Application number: JP20120183580 20120822

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Abstract not available for JP2014017460 (A)
Abstract of corresponding document: TW201403895 (A)

A method for manufacturing LED leadframe first prepares a metal plate formed with a metal frame and a plurality of metal racks. The metal racks and the metal frame are connected by a plurality of connection parts. After the metal racks are electro-plated, the metal racks are formed with a glue stage and a plurality of yielding spaces adjacent to a hollow functional area of the glue stage, through the yielding spaces the connection part are exposed such that the exposed connection part can be cut. LED die mounting, wire bonding and glue dispensing operations are then performed on the glue stage. The cut connection part is then applied with electric energy to light the LED die for luminance and chromatic test before the glue curing, thus enhancing the yield of LED device.

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H01L 33/62	(2010.01)	H01L 33/00	440	5F142

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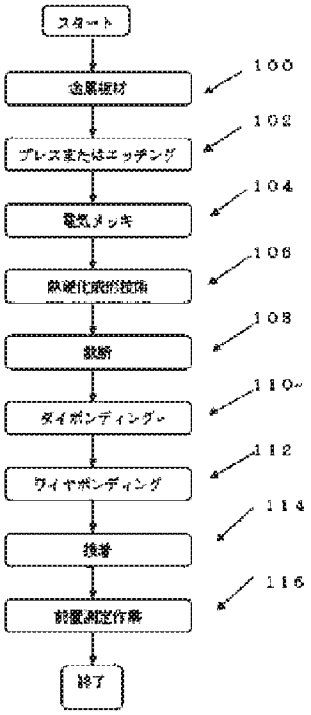
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最終頁に続く

(54)【発明の名称】発光ダイオードのリードフレームアセンブリーの製造方法

(57)【要約】　（修正有）
【課題】発光ダイオードの製造良品率を向上する。
【解決手段】リードフレームアセンブリーの製造方法であって、金属板材を用意するステップを備えており、金属板材には金属外枠および複数の金属リードフレームが形成されており、金属外枠および金属リードフレームは複数の連結部により連結されており、金属リードフレームは電気メッキを施した後に、金属リードフレームにゴム台座が形成されて、およびゴム台座の中空機能エリアと隣り合う位置には連結部を外部に漏出せしめる複数の保留空間が形成されることにより、外部に露出した連結部を裁断する。それからゴムの台座の中にてダイボンディング、ワイヤボンディングおよび接着剤注入工程を行う。最後に、接着剤が硬化する前に、切断された金属リードフレームの連結部に電源を印加して発光チップを点灯せしめて、輝度および色度の配合比が正確か否かをテストする。
【選択図】図１



【特許請求の範囲】
【請求項１】
発光ダイオードのリードフレームアセンブリーの製造方法であって、
ａ）、金属板材を用意するステップと、
ｂ）、該金属板材に金属外枠および複数の金属リードフレームのリードフレームアセンブリーを成形するステップであって、該金属リードフレームには第一電極片および第二電極片を有して、該第一電極片と該第二電極片には連結部を有しており、該連結部は複数の金属リードフレームおよび該金属外枠とを連結するステップと、
ｃ）、該金属リードフレームにゴム台座を成形するステップであって、成形後の該ゴム台座の正面には該第一電極片および該第二電極片を外部に露出せしめるための中空機能エリアを有して、該ゴム台座と隣り合う横方向および縦方向の位置には複数の保留空間が形成されて、該保留空間該は連結部を外部に露出せしめるステップと、
ｄ）、外部に露出した該連結部を裁断するステップと、
ｅ）、該ゴム台座の中空機能エリア中の第二電極片に発光チップを固接するステップと、
ｆ）、金属ワイヤを用いて該発光チップと該第一電極片とを電気的に接続するステップと、
ｇ）、該中空機能エリアに接着剤を注入するステップと、
ｈ）、切断された金属リードフレーム上の連結部に電源を印加し、該第一電極片および該第二電極片を通電して該発光チップを点灯せしめ、輝度および色度の配合比のテストを行なうステップと、
を備える前記方法。
【請求項２】
ステップｂの金属外枠には離隔態様で配列された複数の長孔および短孔を有しており、二つの該短孔のあいだには貫通孔を有する請求項１に記載のリードフレームアセンブリーの製造方法。
【請求項３】
該ステップｂの該第一電極片は、該第二電極片と隣り合わないかまたは対応しない側辺にいずれも該連結部を有する請求項２に記載のリードフレームアセンブリーの製造方法。
【請求項４】
該連結部が、縦方向および横方向にて各々の金属リードフレームを連結している請求項３に記載のリードフレームアセンブリーの製造方法。
【請求項５】
該第一電極片が長方形であり、かつ該第一電極片は、該第二電極片と隣り合うかまたは対応する側辺には、対応する二つの切り欠きを有する請求項４に記載のリードフレームアセンブリーの製造方法。
【請求項６】
該第二電極片の二つの側辺には対応する二つの凹槽を有しており、該第二電極片の他方の側辺には凹口を有する請求項５に記載のリードフレームアセンブリーの製造方法。
【請求項７】
ステップｂとｃとのあいだに電気メッキのステップをさらに備えており、リードフレームアセンブリーをプレスまたはエッチングした後に、該リードフレームアセンブリーの金属リードフレームに電気メッキにより一層の金属膜を施す請求項６に記載のリードフレームアセンブリーの製造方法。
【請求項８】
該ゴム台座の裏面に二つの通孔を有しており、該二つの通孔は該第一電極片および該第二電極片を外部に露出するのに用いられる請求項７に記載のリードフレームアセンブリーの製造方法。
【請求項９】
該ステップｃにおける保留空間は、該連結部にて熱硬化性プラスチックを有しない請求

項８に記載のリードフレームアセンブリーの製造方法。
【請求項１０】
該ステップｅの発光チップが単色または多色のチップである請求項９に記載のリードフレームアセンブリーの製造方法。
【請求項１１】
該ステップｆの金属ワイヤが金ワイヤである請求項１０に記載のリードフレームアセンブリーの製造方法。
【請求項１２】
該ステップｇの接着剤がシリコン接着剤である請求項１１に記載のリードフレームアセンブリーの製造方法。
【請求項１３】
該接着剤に蛍光パウダーが添加されている請求項１２に記載のリードフレームアセンブリーの製造方法。
【請求項１４】
発光ダイオードのリードフレームアセンブリーの製造方法であって、
ａ）、金属板材を用意するステップと、
ｂ）、該金属板材に金属外枠および複数の金属リードフレームのリードフレームアセンブリーを成形するステップであって、該金属リードフレームには第一電極片および第二電極片を有して、該第一電極片と該第二電極片には連結部を有しており、該連結部は複数の金属リードフレームおよび該金属外枠とを連結するステップと、
ｃ）、該金属リードフレームにゴム台座を成形するステップであって、該ゴム台座の正面には該第一電極片および該第二電極片を外部に露出せしめるための中空機能エリアを有するステップと、
ｄ）、ドリルを用いて該中空機能エリアに隣り合う位置を掘って該連結部を破断するステップと、
ｅ）、該ゴム台座の中空機能エリア中の第二電極片に発光チップを固接するステップと、
ｆ）、金属ワイヤを用いて該発光チップと該第一電極片とを電気的に接続するステップと、
ｇ）、該中空機能エリアに接着剤を注入するステップと、
ｈ）、切断された金属リードフレーム上の連結部に電源を印加し、該第一電極片および該第二電極片を通電して該発光チップを点灯せしめ、輝度および色度の配合比のテストを行なうステップと、
を備える前記方法。
【請求項１５】
ステップｂの金属外枠には離隔態様で配列された複数の長孔および短孔を有しており、二つの該短孔のあいだには貫通孔を有する請求項１４に記載のリードフレームアセンブリーの製造方法。
【請求項１６】
該ステップｂの該第一電極片は、該第二電極片と隣り合わないかまたは対応しない側辺にいずれも該連結部を有する請求項１５に記載のリードフレームアセンブリーの製造方法。
【請求項１７】
該連結部が、縦方向または横方向にて各々の金属リードフレームを連結している請求項１６に記載のリードフレームアセンブリーの製造方法。
【請求項１８】
該第一電極片が長方形であり、かつ該第一電極片は、該第二電極片と隣り合うかまたは対応する側辺には、対応する二つの切り欠きを有する請求項１７に記載のリードフレームアセンブリーの製造方法。
【請求項１９】

該第二電極片の二つの側辺には対応する二つの凹槽を有しており、該第二電極片の他方の側辺には凹口を有する請求項１８に記載のリードフレームアセンブリーの製造方法。
【請求項２０】
該ゴム台座の裏面に二つの通孔を有しており、該二つの通孔は該第一電極片および該第二電極片を外部に露出するのに用いられる請求項２１に記載のリードフレームアセンブリーの製造方法。
【請求項２１】
ステップｂとｃとのあいだに電気メッキのステップをさらに備えており、リードフレームアセンブリーをプレスまたはエッチングした後に、該リードフレームアセンブリーの金属リードフレームに電気メッキにより一層の金属膜を施す請求項２０に記載のリードフレームアセンブリーの製造方法。
【請求項２２】
ステップｄにてドリルを用いてゴム台座を掘って、該連結部を破断するがしかし該ゴム台座は穿通しないか、または該ゴム台座をも穿通して該連結部が破断して通孔を形成する請求項２１に記載のリードフレームアセンブリーの製造方法。
【請求項２３】
該ステップｅの発光チップが単色または多色のチップである請求項２２に記載のリードフレームアセンブリーの製造方法。
【請求項２４】
該ステップｆの金属ワイヤが金ワイヤである請求項２３に記載のリードフレームアセンブリーの製造方法。
【請求項２５】
該ステップｇの接着剤がシリコン接着剤である請求項２４に記載のリードフレームアセンブリーの製造方法。
【請求項２６】
該接着剤に蛍光パウダーが添加されている請求項２５に記載のリードフレームアセンブリーの製造方法。
【発明の詳細な説明】
【技術分野】
【０００１】
本発明は発光ダイオードに係わり、特に発光ダイオードのリードフレームアセンブリーの製造方法に係わる。
【背景技術】
【０００２】
昨今において発光ダイオードはさまざまな電子装置、電器製品または照明器具等の製品に広く用いられており、かつ発光ダイオードの製造は高輝度、多色光および優れた放熱効果を有する技術の開発および改善へシフトするため、発光ダイオードの製造原価が高くなりつつある。発光ダイオード製造原価は前記要素により向上されるほか、発光ダイオードの製造良品率の直接影響を受ける。
【０００３】
従来、発光ダイオードを製造の時にまず金属板材を用意し、プレスまたはエッチングにより金属板材をリードフレームアセンブリーに加工すると金属外枠が形成され、該金属外枠は連結部を介して複数の金属リードフレームに連結されており、該金属リードフレームは正極片および負極片を備えており、また複数の該金属リードフレームには熱硬化性プラスチックを用いてゴム台座が成形されており、該ゴム台座が製造完成後に、該ゴム台座の中空機能エリアの中で外部に露出した正、負極片にて発光チップのダイボンディングおよび金ワイヤボンディング工程を行ない、ダイボンディングおよびワイヤボンディング工程後には該中空機能エリアの中に蛍光パウダーが混入されたシリコン接着剤を注入し、接着工程後に金属リードフレームを裁断およびテストする。
【０００４】

従来の発光ダイオードは製造完成後に輝度および色度配合比のテストを行うので、発光ダイオードの輝度および色度の配合比が要求を満たさず、よって発光ダイオードの製造良品率は５０％前後に止まっていた。その主な原因は、該金属リードフレームにゴム台座を成形した後に金属リードフレームの正極片および負極片の連結部を裁断せず、該金属リードフレームの正極片および負極片はいずれも接続された状態にあり、ゴム台座の中空機能エリアに接着剤を注入した後にすぐ発光ダイオードの輝度および色度の配合比が正確か否かをテストできなく、全工程が完成後にはじめて品質確認が可能なため、不良の発光ダイオードを適時に検出できないことにある。

【発明の概要】

【発明が解決しようとする課題】

【０００５】

よって、本発明の主な目的は従来の問題点を解決することにあり、本発明では発光ダイオードのリードフレームアセンブリーの金属リードフレームにてゴム台座を成形した後にまず所定の金属リードフレームの連結部を裁断または切断し、その後のダイボンディング、ワイヤボンディングおよび接着工程においては、接着剤が硬化する前に前置測定作業を行って発光ダイオードの輝度および色度の配合比が正確か否かをテスト可能なため、発光ダイオードの製造良品率が９０％を上回り、さらに製造原価を大幅に下げることも可能になる。

【課題を解決するための手段】

【０００６】

上記目的を実現すべく、本発明は、発光ダイオードのリードフレームアセンブリーの製造方法であって、該製造方法は、

金属板材を用意するステップと、

該金属板材に金属外枠および複数の金属リードフレームのリードフレームアセンブリーを成形するステップであって、該金属リードフレームには第一電極片および第二電極片を有して、該第一電極片と該第二電極片には連結部を有しており、該連結部は複数の金属リードフレームおよび該金属外枠とを連結するステップと、

該金属リードフレームにゴム台座を成形するステップであって、成形後の該ゴム台座の正面には該第一電極片および該第二電極片を外部に露出せしめるための中空機能エリアを有して、該中空機能エリアの隣り合う横方向の位置には複数の保留空間が形成されて、該連結部を外部に露出せしめるステップと、

該外部に露出した該連結部を裁断するステップと、

該ゴム台座の中空機能エリア中の第二電極片に発光チップを固接するステップと、

金属ワイヤを用いて該発光チップと該第一電極片とを電気的に接続するステップと、

該中空機能エリアに接着剤を注入するステップと、

切断された金属リードフレーム上の連結部に電源を印加し、該第一電極片および該第二電極片を通電して該発光チップを点灯せしめ、輝度および色度の配合比のテストを行なうステップとを備える。

【０００７】

該金属外枠には離隔態様で配列された複数の長孔および短孔を有しており、二つの該短孔のあいだには貫通孔を有する。

【０００８】

該第一電極片は、該第二電極片と隣り合わないかまたは対応しない側辺にいずれも該連結部を有する。

【０００９】

該連結部は各々の金属リードフレームを縦方向および横方向に連結する。

【００１０】

該第一電極片が長方形であり、かつ該第一電極片は、該第二電極片と隣り合うかまたは対応する側辺に、対応する二つの切り欠きを有する。

【００１１】

該第二電極片の二つの側辺には対応する二つの凹槽を有しており、該第二電極片の他方の側辺には凹口を有する。

【００１２】

該ゴム台座の裏面に二つの通孔を有しており、該二つの通孔は該第一電極片および該第二電極片を外部に露出するのに用いられる。

【００１３】

リードフレームアセンブリーをプレスまたはエッチングした後に、該リードフレームアセンブリーの金属リードフレームに電気メッキにより一層の金属膜を施す。

【００１４】

該保留空間は該連結部に熱硬化性プラスチックを有しない。

【００１５】

該発光チップが単色または多色のチップである。

【００１６】

該金属ワイヤが金ワイヤである。

【００１７】

該接着剤がシリコン接着剤である。

【００１８】

該接着剤に蛍光パウダーが添加されている。

【００１９】

上記目的を実現すべく、本発明は、別の発光ダイオードのリードフレームアセンブリーの製造方法を提案しており、該製造方法は、

金属板材を用意するステップと、

該金属板材に金属外枠および複数の金属リードフレームのリードフレームアセンブリーを成形するステップであって、該金属リードフレームには第一電極片および第二電極片を有して、該第一電極片と該第二電極片には連結部を有しており、該連結部は複数の金属リードフレームおよび該金属外枠とを連結するステップと、

該金属リードフレームにゴム台座を成形するステップであって、該ゴム台座の正面には該第一電極片および該第二電極片を外部に露出せしめるための中空機能エリアを有するステップと、

ドリルを用いて該中空機能エリアに隣り合う位置の中を掘って該連結部を破断するステップと、

該ゴム台座の中空機能エリア中の第二電極片に発光チップを固接するステップと、

金属ワイヤを用いて該発光チップと該第一電極片とを電気的に接続するステップと、

該中空機能エリアに接着剤を注入するステップと、

切断された金属リードフレーム上の連結部に電源を印加し、該第一電極片および該第二電極片を通電して該発光チップを点灯せしめ、輝度および色度の配合比のテストを行なうステップとを備える。

【００２０】

該金属外枠には離隔態様で配列された複数の長孔および短孔を有しており、二つの該短孔のあいだには貫通孔を有する。

【００２１】

該第一電極片は、該第二電極片と隣り合わないかまたは対応しない側辺にいずれも該連結部を有する。

【００２２】

該連結部は各々の金属リードフレームを縦方向および横方向に連結する。

【００２３】

該第一電極片が長方形であり、かつ該第一電極片は、該第二電極片と隣り合うかまたは対応する側辺に、対応する二つの切り欠きを有する。

【００２４】

該第二電極片の二つの側辺には対応する二つの凹槽を有しており、該第二電極片の他方

の側辺には凹口を有する。
【００２５】
リードフレームアセンブリーをプレスまたはエッチングした後に、該リードフレームアセンブリーの金属リードフレームに電気メッキにより一層の金属膜を施す。
【００２６】
該ゴム台座の裏面に二つの通孔を有しており、該二つの通孔は該第一電極片および該第二電極片を外部に露出するのに用いられる。
【００２７】
該ドリルがゴム台座を掘って該連結部を破断すした後に該ゴム台座は穿通しないか、または該ゴム台座をも穿通して該連結部が破断して通孔を形成する。
【００２８】
該発光チップが単色または多色のチップである。
【００２９】
該金属ワイヤが金ワイヤである。
【００３０】
該接着剤がシリコン接着剤である。
【００３１】
該接着剤に蛍光パウダーが添加されている。
【図面の簡単な説明】
【００３２】
【図１】本発明の製造流れの見取り図である。
【図２】本発明の発光ダイオードのリードフレームアセンブリーの見取り図である。
【図３】図１の局所拡大見取り図である。
【図４】本発明の発光ダイオードのリードフレームアセンブリーにゴム台座が成形された正面図の見取り図である。
【図５】本発明の発光ダイオードのリードフレームアセンブリーにゴム台座が成形された裏面の見取り図である。
【図６】図４の連結部が切断された際の見取り図である。
【図７】本発明の発光ダイオードのリードフレームアセンブリーの上面視見取り図である。
【図８】本発明の発光ダイオードのリードフレームアセンブリーの側面図の見取り図である。
【図９】本発明の別の実施例製造フローチャートの見取り図である。
【図１０】本発明のリードフレームアセンブリー正面図の見取り図である。
【図１１】本発明のゴム台座の中間位置に孔を開けた際の見取り図である。
【発明を実施するための形態】
【００３３】
以下、図面に結合して本発明の技術内容および詳細な説明について説明を行っており、すなわち
図１、図２、および図３に示すは、本発明の製造フローチャートと、発光ダイオードのリードフレームアセンブリーと、および図２の局所拡大見取り図である。図に示すように、本発明の発光ダイオードのリードフレームアセンブリーはまず、ステップ１００において金属板材を用意する。
【００３４】
ステップ１０２において、プレスまたはエッチングにより該金属板材をリードフレームアセンブリー１０に加工しており、該リードフレームアセンブリー１０は金属外枠１および複数の金属リードフレーム２を備える。該金属外枠１には離隔態様で配列された複数の長孔１１および短孔１２を有しており、二つの該短孔１２のあいだには貫通孔１３を有する。該金属リードフレーム２には第一電極片２１および第二電極片２２を有しており、該第一電極片２１は長方形であり、かつ該第一電極片２１は、該第二電極片２２と隣り合う

かまたは対応する側辺には対応する二つの切り欠き２１１を有しており、該第二電極片２２の二つの側辺には対応する二つの凹槽２２１を有して、該第二電極片２２の他方の側辺には凹口２２２を有しており、該側辺の二つの凹槽２２１および該凹口２２２により該第二電極片２２は上着如き形状をなす。該第一電極片２１は、該第二電極片２２と隣り合うかまたは対応する側辺に連結部（ｂａｒ）２３を有せず、それ以外の三つの側辺にはいずれも連結部２３を有しており、該連結部２３は、該縦方向および横方向の複数の金属リードフレーム２および該金属外枠１を連結する。

【００３５】

ステップ１０４において、リードフレームアセンブリー１０をプレスまたはエッチングした後に、該リードフレームアセンブリー１０の金属リードフレーム２に電気メッキを施して、該金属リードフレーム２に一層の金属膜を電気メッキする。

【００３６】

ステップ１０６において、上記発光ダイオードのリードフレームアセンブリー１０を電気メッキを施した後に、熱硬化性プラスチックを用いて、熱硬化成形技術により該金属リードフレーム２にゴム台座３を成形しており、該ゴム台座３は成形後に該第一電極片２１、第二電極片２２および該連結部２３を包覆する。該ゴム台座３は正面に中空機能エリア３１を有しており、該中空機能エリア３１は図４に示すように、該第一電極片２１および該第二電極片２２を外部に露出する。同様に、該ゴム台座３は裏面に二つの通孔３２、３３を有しており、該二つの通孔３２、３３は第一電極片２１および第二電極片２２を外部に露出するのに用いられて、該第一電極片２１および該第二電極片２２が導通して発光チップ（図示せず）を点灯した際に、該二つの通孔３２、３３は図５に示すように、該第一電極片２１および第二電極片２２を放熱させるのに用いられる。ゴム台座３が熱硬化した後に、該ゴム台座３の中空機能エリア３１と隣り合う縦方向および横方向位置に複数の保留空間（熱硬化性プラスチックを有しない）３４が形成されており、図５に示すように、該保留空間３４にて連結部２３は外部に露出している。

【００３７】

ステップ１０８において、該金属リードフレーム２のゴム台座３が熱硬化した後に、図６に示すように、該ゴム台座３の横方向両側の保留空間３４の中にで外部に露出した該連結部２３を裁断し、該連結部２３が切断された後に、該ゴム台座３は他のゴム台座３に連結されている。

【００３８】

ステップ１１０において、該連結部２３を切断した後に、図６、図７に示すように、該ゴム台座３の中空機能エリア３１にて外部に露出した第二電極片２２に発光チップ４を固接する。本図において、該発光チップ４は単色または多色のチップである。

【００３９】

ステップ１１２において、該発光チップ４と該中空機能エリア３１の外部に露出した第一電極片２１とのあいだは金属ワイヤ５により電気的に接続されている。本図面において、該金属ワイヤ５は、図６、図７に示すように金ワイヤである。

【００４０】

ステップ１１４において、ダイボンディングとワイヤボンディング工程が完成後に、図８に示すように、該ゴム台座３の中空機能エリア３１内にて接着工程を行い、該中空機能エリア３１内に接着剤６を注入する。本図面において該接着剤６はシリコン接着剤である。

【００４１】

ステップ１１６において、接着工程後に発光ダイオードに対して前置測定作業を行なうことが可能であるが、いわゆる前置測定作業とは、接着完成後および該接着剤６が硬化する前に、テスト作業者が連結部２３が切断された一つの金属リードフレーム２の該第一電極片２１および該第二電極片２２に電圧を印加して該発光チップ４を点灯せしめ、発生する光は該接着剤６に混入された蛍光パウダーと混色され、形成された色度および輝度が事前に設計された色度および輝度配合比の要求を満たすか否かを確認する作業のことを指す

。

【００４２】

例えば、白色光の一つの発光ダイオードを製造する際に、該発光チップが青色光である場合、中空機能エリア３１に注入された接着剤６には黄色の蛍光パウダーが混入されており、接着剤６を注入後まだ硬化していないうちに、テスト作業者は連結部２３が切断された金属リードフレーム２の該第一電極片２１および該第二電極片２２に電源を印加して、発光チップ４と黄色の蛍光パウダーが混入された接着剤６の輝度および色度の配合比が正確か否かを確認可能である。

【００４３】

上記の金属リードフレーム２が、ゴム台座３の製造完成後、金属リードフレーム２の連結部２３の裁断を行なうことにより、発光ダイオードが接着工程後前置測定作業を行なうことが可能になり、これにより発光ダイオードの製造良品率が９０％を上回ることができる。

【００４４】

図９、図１０、図１１は、本発明の別の実施例の製造フローチャートと、リードフレームアセンブリー正面図と、およびゴム台座の中間位置にて孔を開けた見取り図である。図に示すように、本実施例の製造フローチャートは図１と同様であり、異なるのは連結部２３を切断する方法だけである。ゴム台座３が熱硬化した後に、該ゴム台座３に保留空間が形成されず、ドリルを用いて（図示せず）中空機能エリア３１と隣り合う位置にてかつ該横方向の連結部２３に対応するゴム台座３を掘って該連結部２３を破断する（がしかしゴム台座３は貫通しない）か、またはゴム台座３をも穿通して、該連結部２３が破断して通孔３５を形成せしめて、該連結部２３が破断した後に、該ゴム台座３は依然として他のゴム台座３に連結されている。

【００４５】

該連結部２３が破断した後に、該ゴム台座３の中空機能エリア３１の中にて外部に露出した第二電極片２２に発光チップ４を固接し、該発光チップ４と該中空機能エリア３１の外部に露出した第一電極片２１とのあいだは金属ワイヤ５により電気的に接続されている。ダイボンディングとワイヤボンディング工程が完成後に、該ゴム台座３の中空機能エリア３１内にて接着工程を行い、該中空機能エリア３１内に接着剤６を注入してから、発光ダイオードに対して前置測定作業を行なうことが可能であるが、いわゆる前置測定作業とは、接着完成後および該接着剤６が硬化する前に、テスト作業者が連結部２３が切断された一つの金属リードフレーム２の該第一電極片２１および該第二電極片２２に電圧を印加して該発光チップ４を点灯せしめ、発生する光は該接着剤６に混入された蛍光パウダーと混色され、形成された色度および輝度が事前に設計された色度および輝度配合比の要求を満たすか否かを確認する作業のことを指す。

【００４６】

上記は本発明の好適な実施例であり、本発明の実施範囲を限定するためのものではない。およそ本発明の特許請求の範囲に従って行った均等な変化ならびに修飾は、いずれも本発明の特許範囲に含まれると見なすべきである。

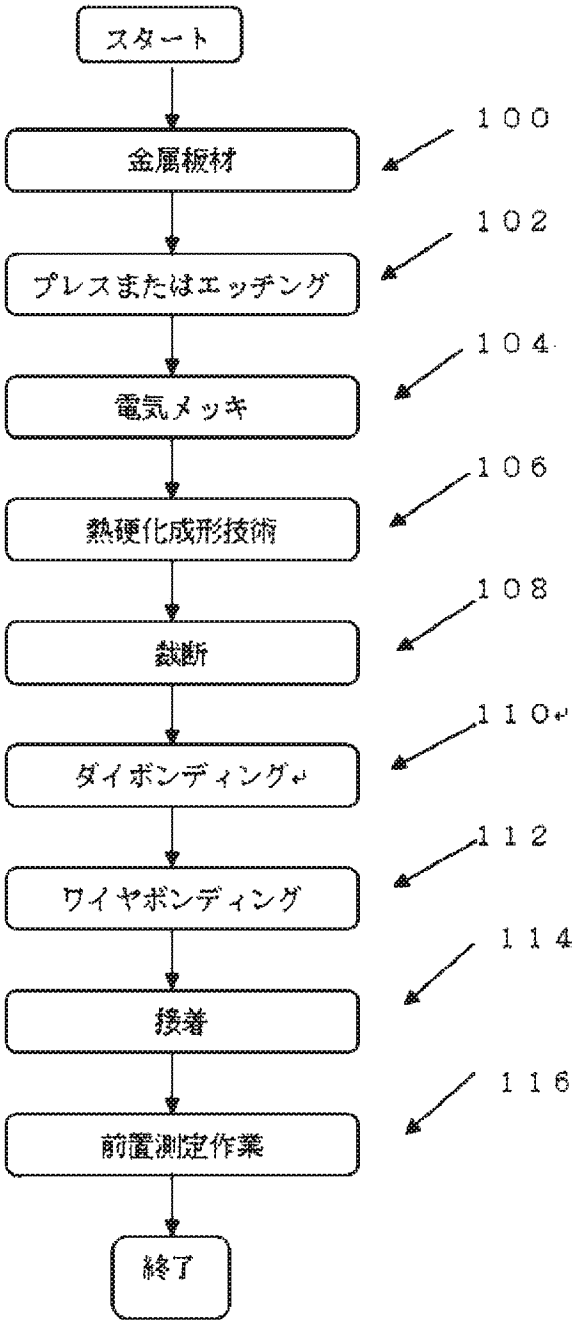
【符号の説明】

【００４７】

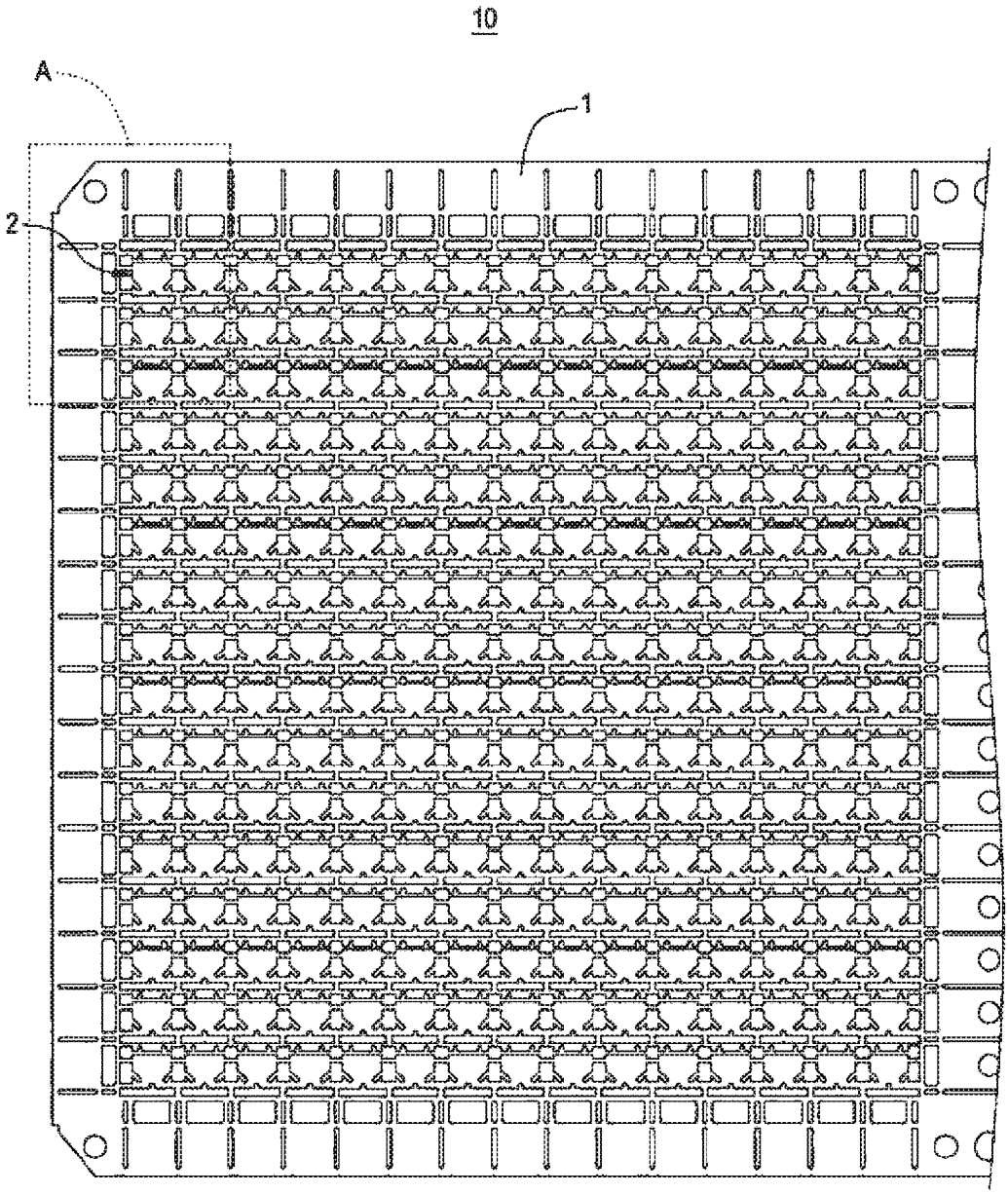
１００～１１６	ステップ
１０	リードフレームアセンブリー
１	金属外枠
１１	長孔
１２	短孔
１３	貫穿孔
２	金属リードフレーム
２１	第一電極片ム
２１１	切り欠き

２２　第二電極片
２２１　凹槽
２２２　凹口
２３　連結部
３　ゴム台座
３１　中空機能エリア
３２、３３　通孔
３４　中間保留空間
３５　通孔
４　発光チップ
５　金ワイヤ
６　接着剤

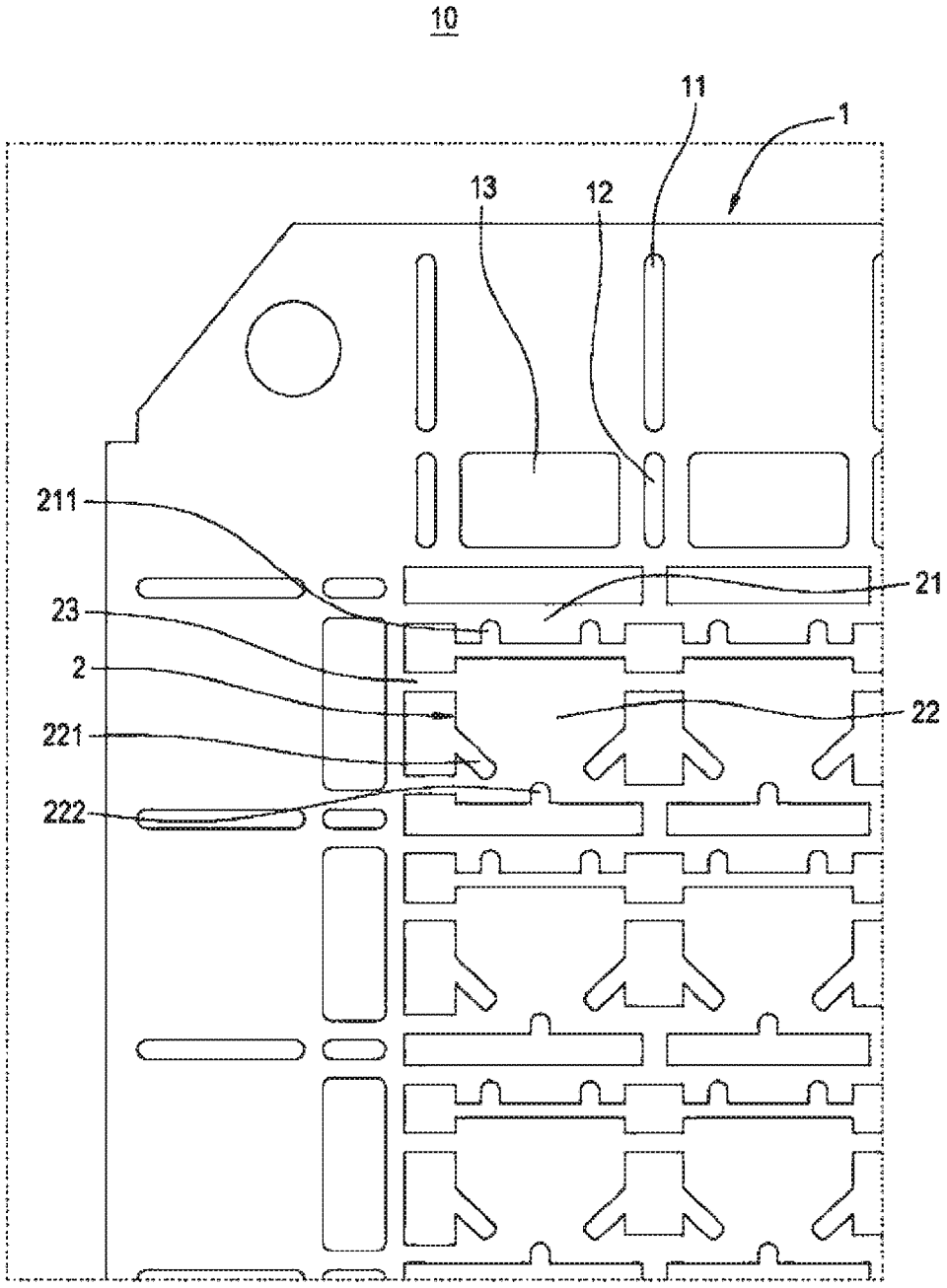
【図１】


スタート
金属板材
１００
プレスまたはエッチング
１０２
電気メッキ
１０４
熱硬化成形技術
１０６
裁断
１０８
ダイボンディング
１１０
ワイヤボンディング
１１２
接着
１１４
前置測定作業
１１６
終了

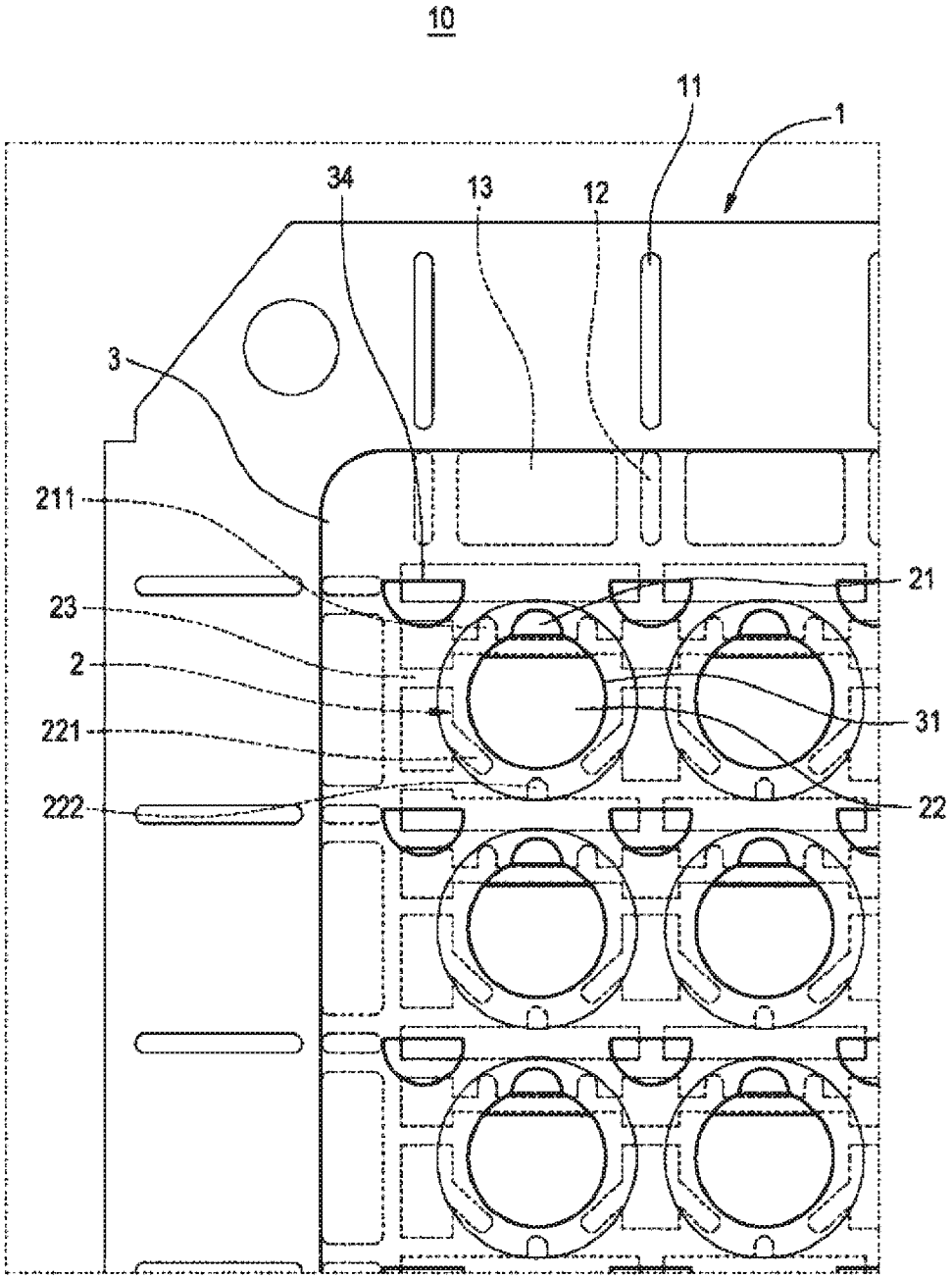
【図２】



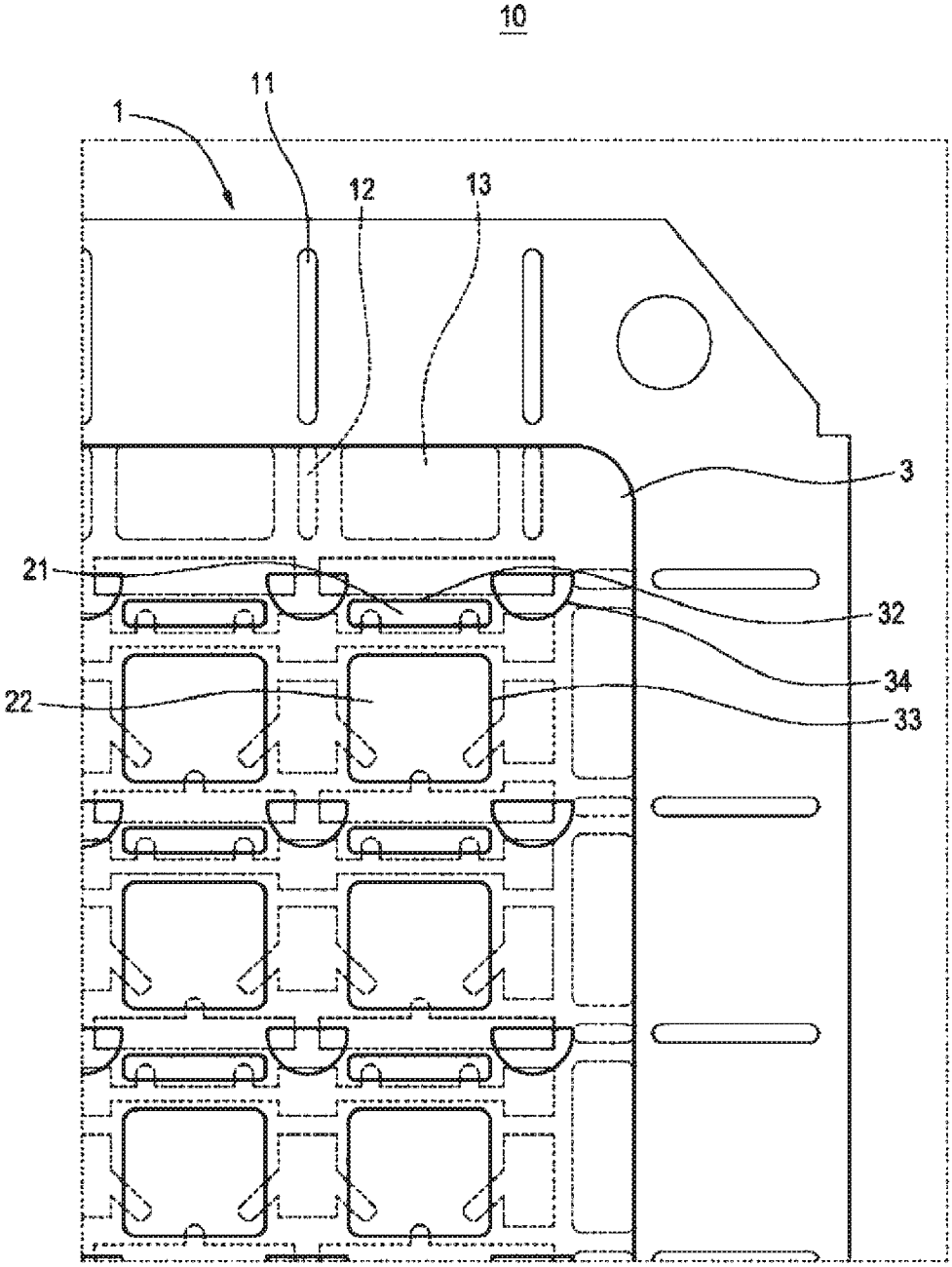
【図３】



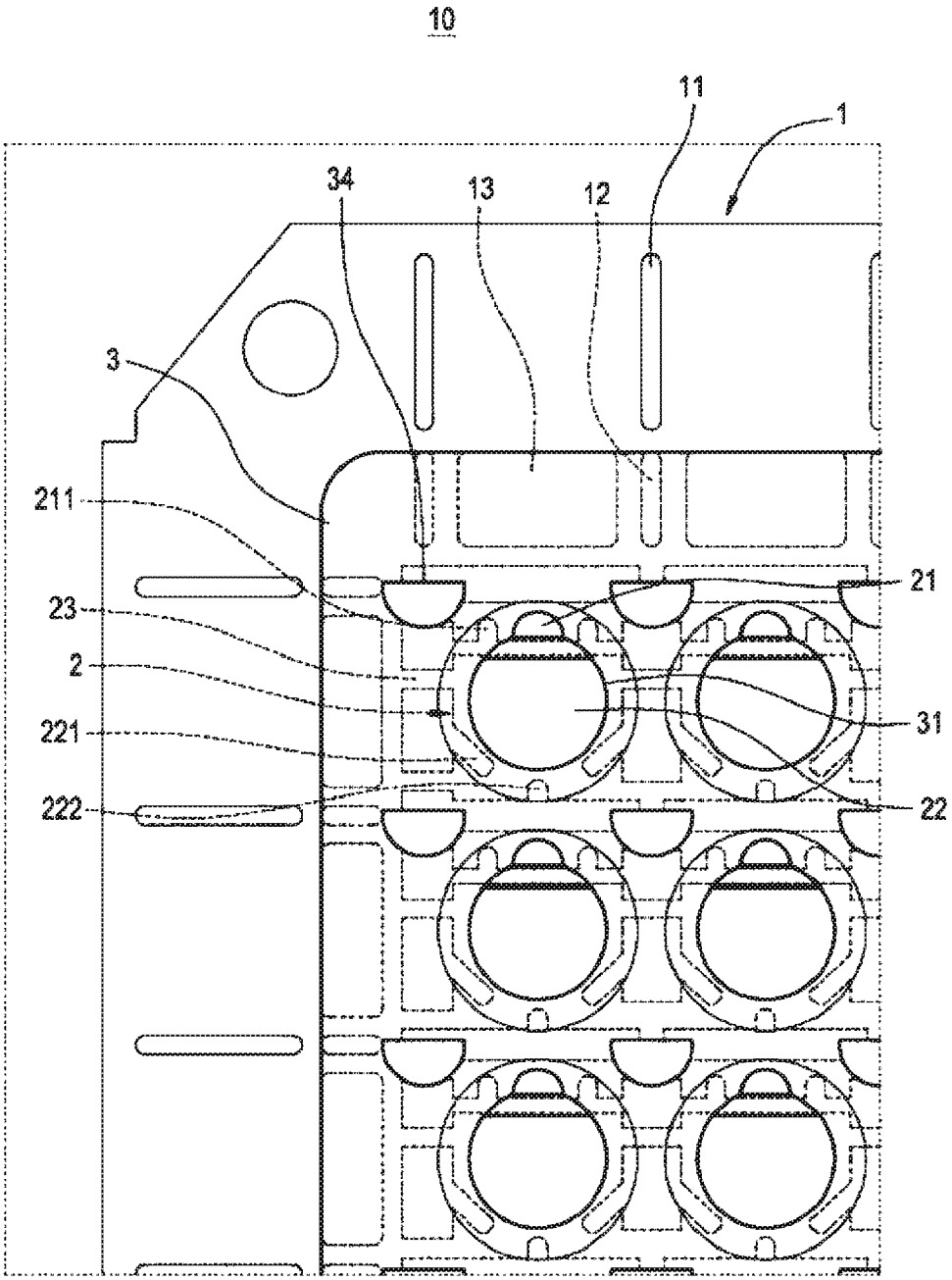
【図４】



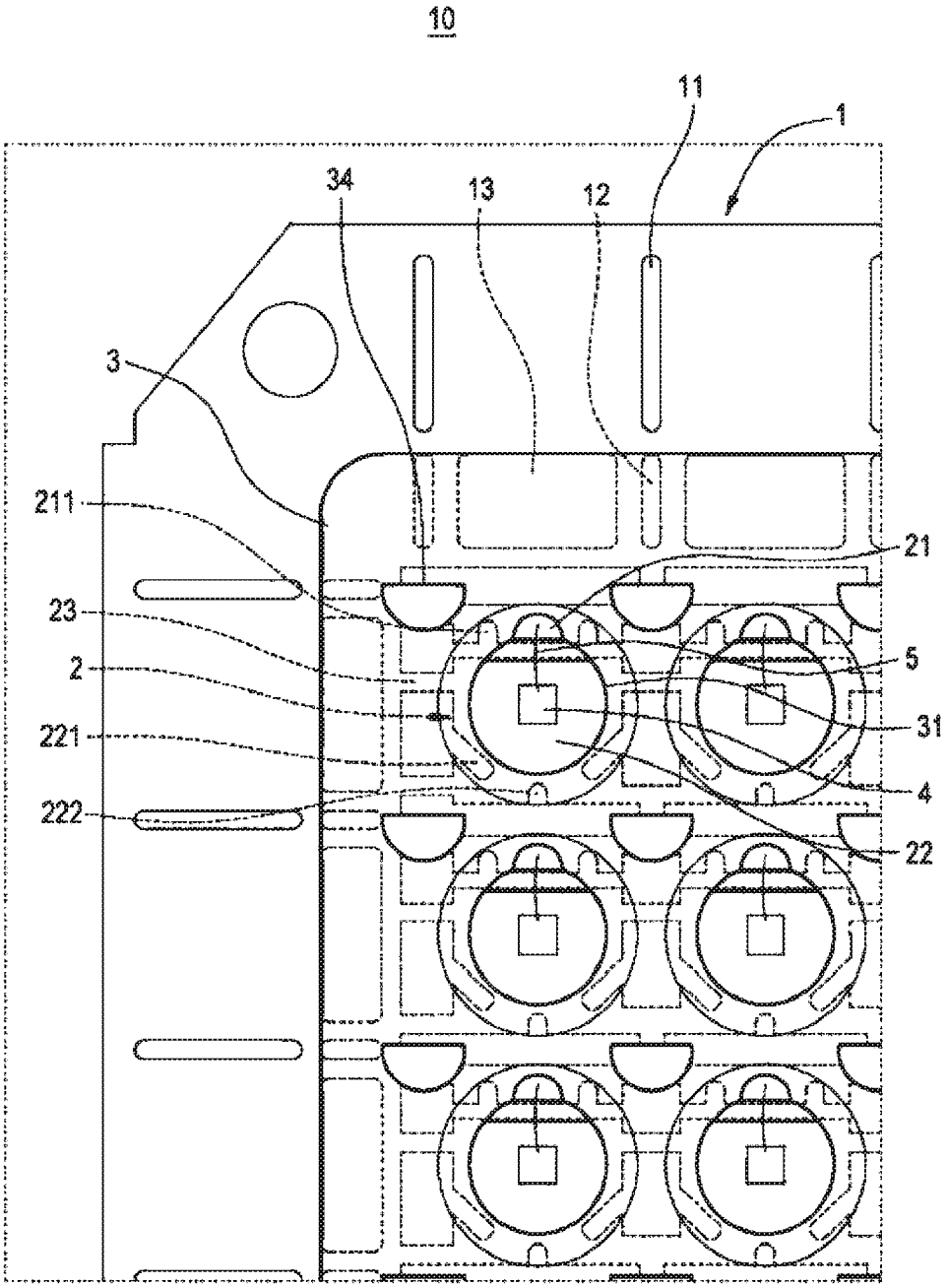
【図５】



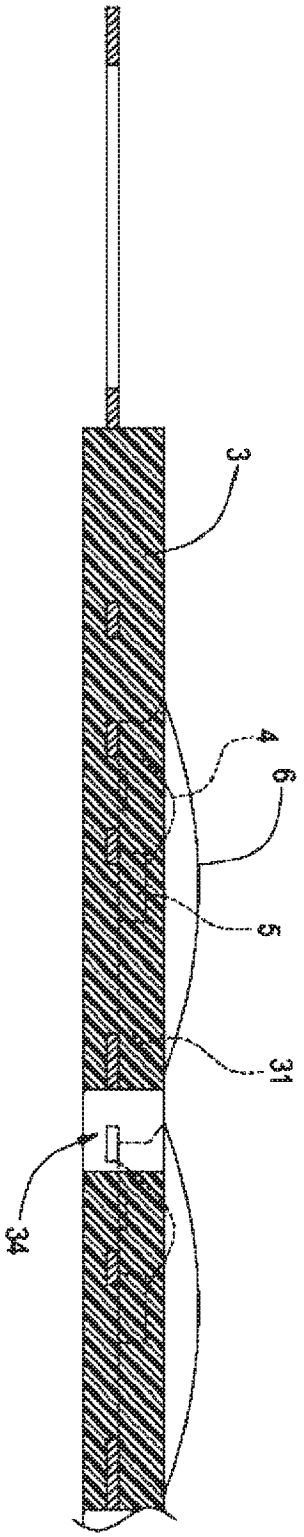
【図６】



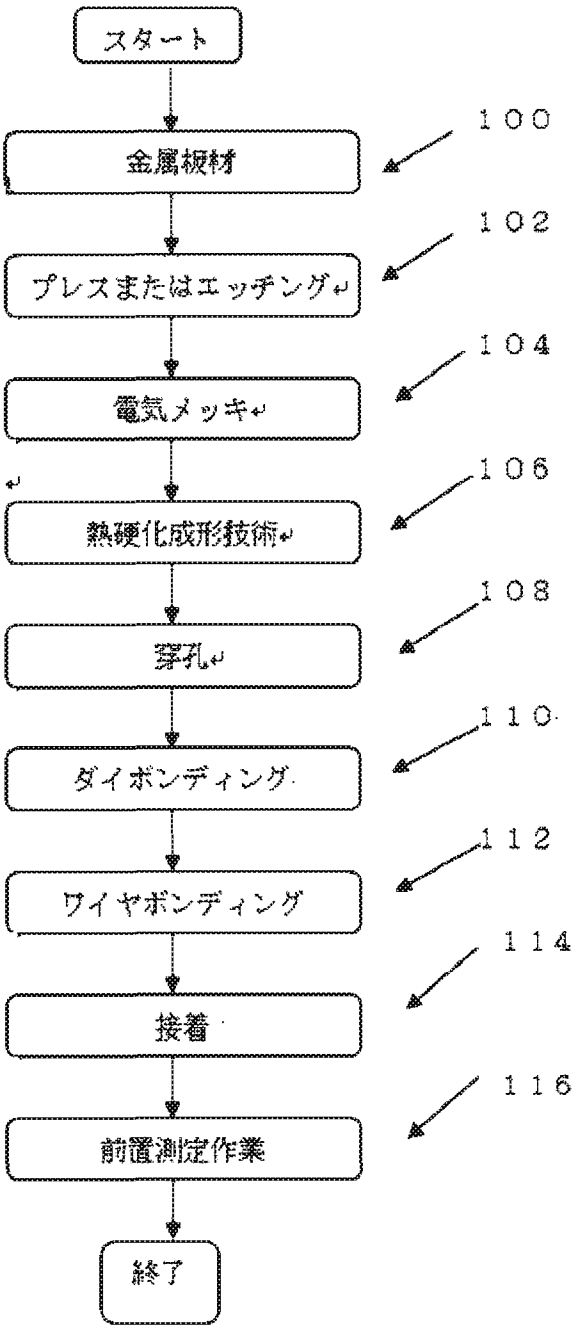
【図７】



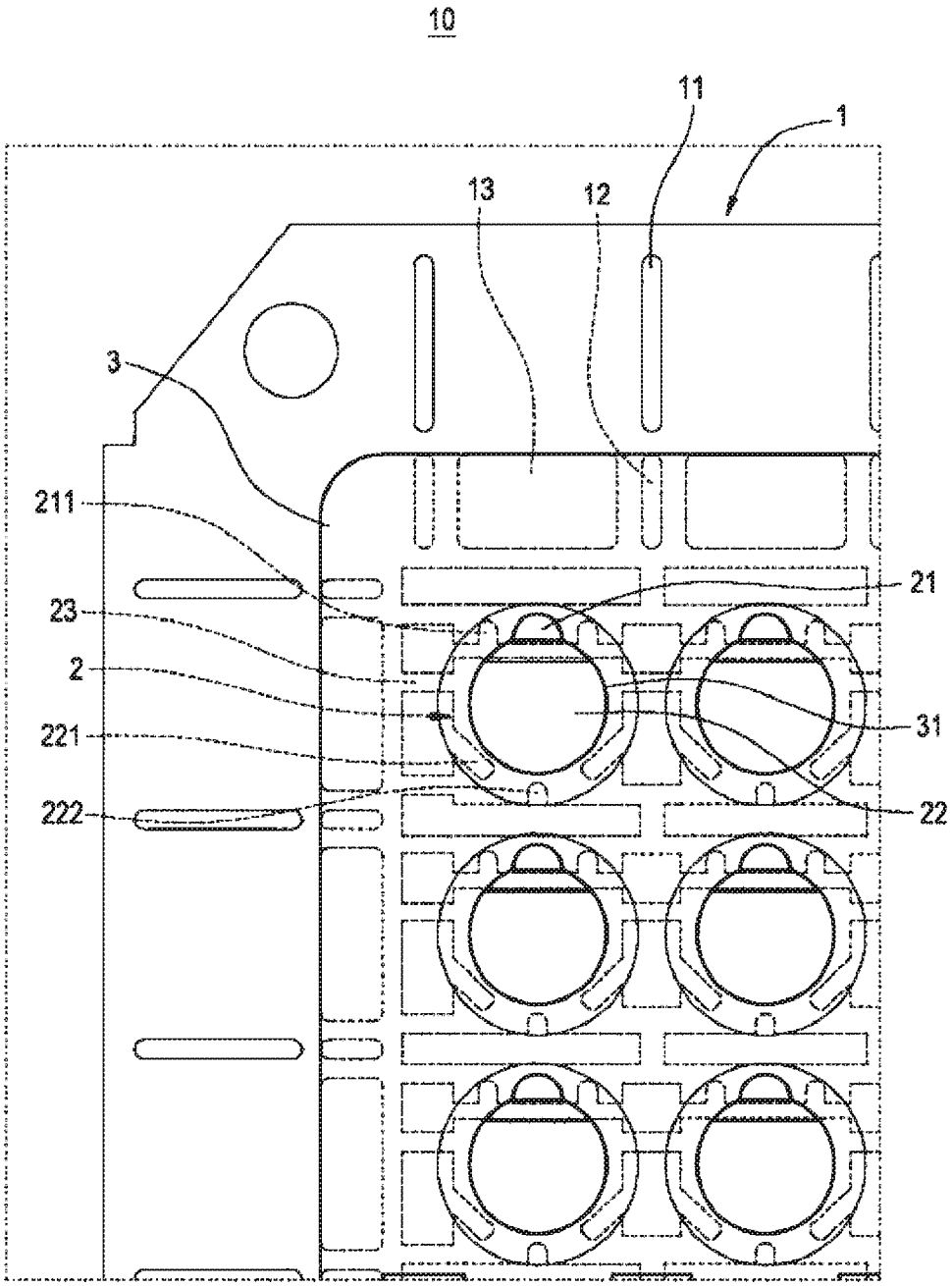
【図８】



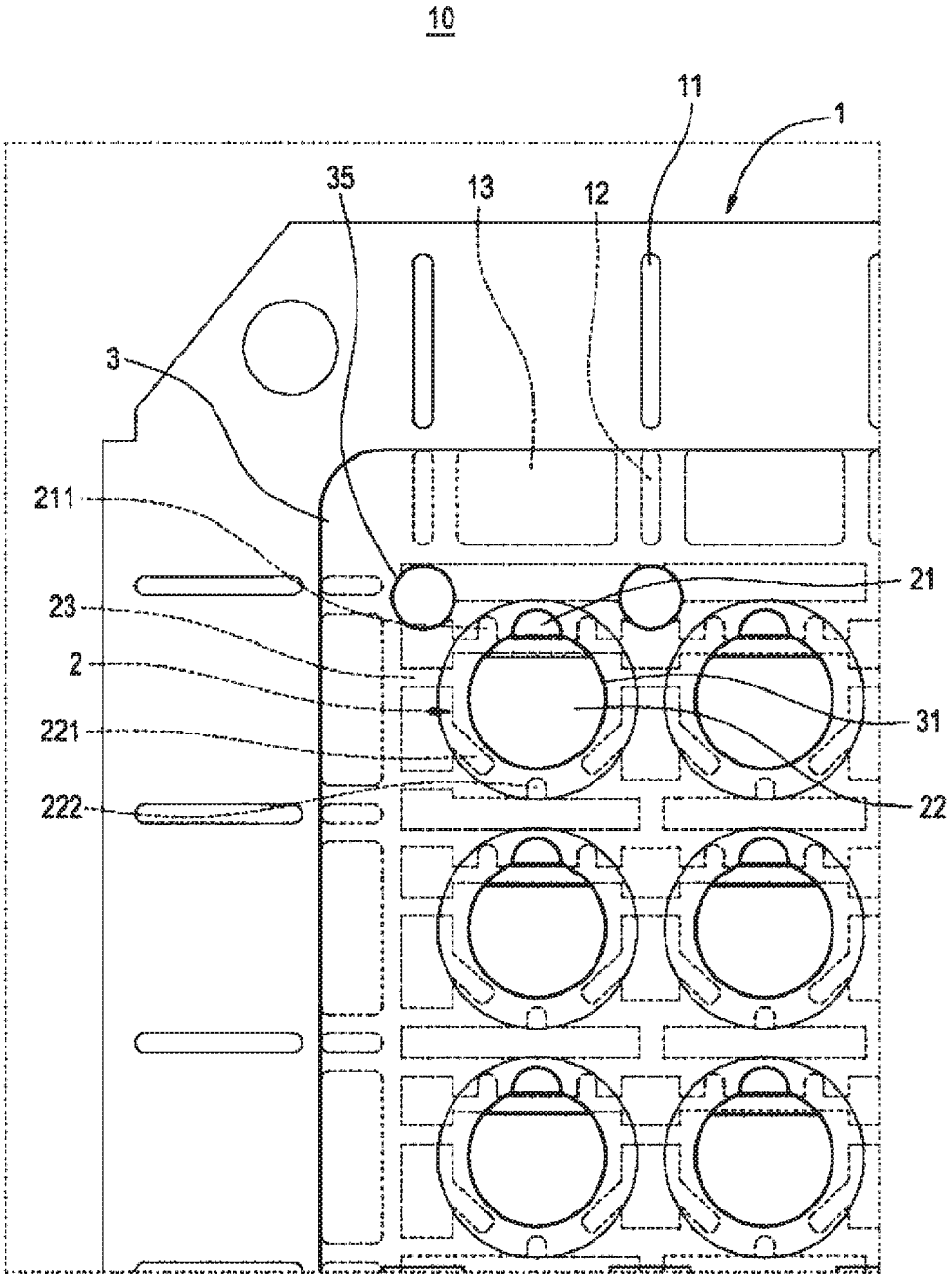
【図９】


スタート
金属板材
100
プレスまたはエッチング
102
電気メッキ
104
熱硬化成形技術
106
穿孔
108
ダイボンディング
110
ワイヤボンディング
112
接着
114
前置測定作業
116
終了

【図１０】



【図１１】



フロントページの続き

Fターム(参考) 5F142 AA84 AA86 BA02 BA24 CA03 CC04 CC25 CD16 CG23 DA02
DA12 FA01

Electronic Acknowledgement Receipt

EFS ID:	24617444
Application Number:	14720230
International Application Number:	
Confirmation Number:	4909
Title of Invention:	Carrier, Carrier Leadframe, And Light Emitting Device
First Named Inventor/Applicant Name:	Chung-Chuan Hsieh
Customer Number:	13859
Filer:	Andy M. Han/Caroline Lu
Filer Authorized By:	Andy M. Han
Attorney Docket Number:	EL01.0088US
Receipt Date:	13-JAN-2016
Filing Date:	22-MAY-2015
Time Stamp:	22:11:27
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	EL01_0088US_IDS.pdf	612244 618195dccb53a370c84e63b9753ca3cbc689dbd6	no	4

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A U.S. Publication Number Citation is required in the Information Disclosure Statement (IDS) form. You may remove the form to add the required data in order to correct the Informational Message or if you chose not to, the image of the form will be processed and be made available within the Image File Wrapper (IFW) system. However, no data will be extracted from this form. Any additional data such as Foreign Patent Documents or Non Patent Literature will be manually reviewed and keyed into USPTO systems.

2	Foreign Reference	KR20100083907.pdf	1737379 5247de32a58c5ce6470e2f5a8956fe07053e3868	no	14
Warnings:					
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3	Foreign Reference	JP2014060343.pdf	3841102 36e27777bd248d93f58e0e0a7bdd0edfab42f1ff	no	53
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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/720,230	05/22/2015	Chung-Chuan Hsieh	EL01.0088US	4909

13859 7590 08/25/2016

Han IP Corporation
4790 Irvine Boulevard Suite 105-347
Irvine, CA 92620

EXAMINER
NARAGHI, ALI

ART UNIT	PAPER NUMBER
2896	

NOTIFICATION DATE	DELIVERY MODE
08/25/2016	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

pto@haniplaw.com

Office Action Summary	Application No. 14/720,230	Applicant(s) HSIEH ET AL.	
	Examiner ALI NARAGHI	Art Unit 2896	AIA (First Inventor to File) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 2 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05/22/2015*.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5)☒ Claim(s) *1-10* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☐ Claim(s) _____ is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☒ Claim(s) *1-10* are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

4) ☐ Other: _____.

The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

DETAILED ACTION

Election/Restrictions

This application contains claims directed to the following patentably distinct species I (Fig.1), and species II (Fig.5), species III (Fig.6), species IV (Fig.7), Species 5 (Fig.8), Species 6 (Fig.9), Species 7 (Figure.10), Species 8 (Fig.11), Species 9 (Fig.12A-D), Species 10 (Figure 13A-16), Species 11 (Fig.17A-D), Species 12 (Fig.18A-22) . The species are independent or distinct according to applicant's specification. In addition, these species are not obvious variants of each other based on the current record.

Applicant is required under 35 U.S.C. 121 to elect a single disclosed species, or a single grouping of patentably indistinct species, for prosecution on the merits to which the claims shall be restricted if no generic claim is finally held to be allowable. Currently, no claims are generic.

There is a search and/or examination burden for the patentably distinct species as set forth above because at least the following reason(s) apply: the species or groupings of patentably indistinct species have acquired a separate status in the art in view of their different classification; the species or groupings of patentably indistinct species have acquired a separate status in the art due to their recognized divergent subject matter the species or groupings of patentably indistinct species require a

different field of search (e.g., searching different classes/subclasses or electronic resources, or employing different search strategies or search queries).

Applicant is advised that the reply to this requirement to be complete must include (i) an election of a species to be examined even though the requirement may be traversed (37 CFR 1.143) **and (ii) identification of the claims encompassing the elected species or grouping of patentably indistinct species**, including any claims subsequently added. An argument that a claim is allowable or that all claims are generic is considered nonresponsive unless accompanied by an election.

The election may be made with or without traverse. To preserve a right to petition, the election must be made with traverse. If the reply does not distinctly and specifically point out supposed errors in the election of species requirement, the election shall be treated as an election without traverse. Traversal must be presented at the time of election in order to be considered timely. Failure to timely traverse the requirement will result in the loss of right to petition under 37 CFR 1.144. If claims are added after the election, applicant must indicate which of these claims are readable on the elected species or grouping of patentably indistinct species.

Should applicant traverse on the ground that the species, or groupings of patentably indistinct species from which election is required, are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing them to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the species unpatentable over the prior art, the

evidence or admission may be used in a rejection under 35 U.S.C. 103 or pre-AIA 35 U.S.C. 103(a) of the other species.

Upon the allowance of a generic claim, applicant will be entitled to consideration of claims to additional species which depend from or otherwise require all the limitations of an allowable generic claim as provided by 37 CFR 1.141.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ALI NARAGHI whose telephone number is (571)270-5720. The examiner can normally be reached on 9AM-6PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Such can be reached on 571-272-8895. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/ALI NARAGHI/

Primary Examiner, Art Unit 2896

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE (USPTO)	
Application Serial Number	14/720,230
Confirmation Number	4909
Filing Date	May 22, 2015
Title of Application	Carrier, Carrier Leadframe, And Light Emitting Diode
First Named Inventor	Chung-Chuan Hsieh
Group Art Unit	2896
Examiner	Naraghi, Ali
Attorney Docket Number	EL01.0088US

To: Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

From: Andy M. Han (Tel: 949-383-5385; Fax: 206-792-5742)
Han IP Corporation
4790 Irvine Boulevard Suite 105-347
Irvine, CA 92620

Customer Number 13859

Response to August 25, 2016 Restriction Requirement

In response to the Restriction Requirement dated August 25, 2016 (hereinafter the "Office Action") regarding the above-identified application, Applicant respectfully submits the following amendments and remarks. Favorable consideration is requested. Any necessary fees will be paid by credit card through the EFS Web.

Amendments to the Claims begin on page 2 of this document.
Remarks begin on page 5 of this document.

AMENDMENTS TO THE CLAIMS

1 – 10. (**Canceled**)

11. (**New**) A light emitting device, comprising:

a carrier;

a light emitting diode (LED) chip carried within the carrier; and

an encapsulant covering the LED chip,

wherein the carrier comprises:

at least one electrode portion, each of the at least one electrode portion comprising at least an electrode portion cross section; and

a housing comprising a housing cross section, the housing at least partially covering the at least one electrode portion,

wherein the housing cross section and the electrode portion cross section are not level with one another.

12. (**New**) The light emitting device of Claim 11, wherein each of the at least one electrode portion further comprises a central area and two edge areas, and wherein the electrode portion cross section is located on at least one of the two edge areas.

13. (**New**) The light emitting device of Claim 12, wherein the central area and the two edge areas protrude from the housing cross section.

14. (**New**) The light emitting device of Claim 12, wherein the central area protrudes from the two edge areas.

15. (**New**) The light emitting device of Claim 11, wherein the electrode portion cross section comprises a sloping surface.

16. (**New**) The light emitting device of Claim 12, wherein the electrode portion cross section and the central area are not coplanar.

17. (**New**) The light emitting device of Claim 11, wherein the housing cross section or the electrode portion cross section comprises a curved surface.

18. (**New**) The light emitting device of Claim 11, wherein the housing cross section comprises a rounded corner.

19. (**New**) The light emitting device of Claim 11, wherein the housing cross section and the electrode portion cross section form a continuous convex curved surface.

20. (**New**) The light emitting device of Claim 11, wherein the at least one electrode portion comprises an antioxidant layer, and wherein the electrode portion cross section comprises a cross section uncovered by the antioxidant layer.

21. (**New**) The light emitting device of Claim 12, wherein the two edge areas protrude from the central area.

22. (**New**) The light emitting device of Claim 21, wherein the at least one electrode portion comprises two electrode portion cross sections respectively located on the two edge areas.

23. (**New**) The light emitting device of Claim 21, wherein the electrode portion cross section comprises a curved surface.

24. (**New**) The light emitting device of Claim 23, wherein the curved surface comprises a concave curved surface.

25. (**New**) The light emitting device of Claim 21, wherein one of the two edge areas and the housing cross section form a continuous surface.

REMARKS

Applicant respectfully requests reconsideration and allowance of all of the claims of the application. The status of the claims is as follows:

- Claims 1 – 10 were pending at the mailing of the instant Office Action.
- Claims 1 – 10 are canceled herein and replaced by newly added Claims 11 – 25.
- Therefore, upon entry of the current amendments, Claims 11 – 25 will be pending.
- Support for the current amendments to the claims can be found in the Specification as originally filed. **No new matter is introduced by the claim amendments**.

Election Restrictions under 35 USC § 121

The Office Action indicates the following (Office Action, page 2):

This application contains claims directed to the following patentably distinct species I (Fig.1), and species II (Fig.5), species III (Fig.6), species IV (Fig.7), Species 5 (Fig.8), Species 6 (Fig.9), Species 7 (Figure.10), Species 8 (Fig.11), Species 9 (Fig.12A-D), Species 10 (Figure 13A-16), Species 11 (Fig.17A-D), Species 12 (Fig.18A-22) . The species are independent or distinct according to applicant's specification. In addition, these species are not obvious variants of each other based on the current record.

Applicant is required under 35 U.S.C. 121 to elect a single disclosed species, or a single grouping of patentably indistinct species, for prosecution on the merits to which the claims shall be restricted if no generic claim is finally held to be allowable. Currently, no claims are generic.

Applicant elects **Species II** (**Fig. 5**) for further examination and prosecution without traverse. In view of current amendments, with new Claim 11 being generic and Claim 11 being the sole independent claim, no claim is withdrawn herein.

Conclusion

For at least the foregoing reasons, all pending claims are in condition for allowance. Applicant respectfully requests reconsideration and prompt issuance of the application.

The Examiner is invited to contact the undersigned representative to expedite the prosecution in pursuance of allowance.

Respectfully Submitted,

Han IP Corporation
Representative for Applicant

/Andy M. Han, Reg. No. 60,266/ Dated: October 25, 2016

Andy M. Han, Esq.
(andyh@haniplaw.com; 949-383-5385)
Registration No. 60266

Electronic Acknowledgement Receipt

EFS ID:	27310372
Application Number:	14720230
International Application Number:	
Confirmation Number:	4909
Title of Invention:	Carrier, Carrier Leadframe, And Light Emitting Device
First Named Inventor/Applicant Name:	Chung-Chuan Hsieh
Customer Number:	13859
Filer:	Andy M. Han
Filer Authorized By:	
Attorney Docket Number:	EL01.0088US
Receipt Date:	25-OCT-2016
Filing Date:	22-MAY-2015
Time Stamp:	11:00:07
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		EL01_0088US_20160825_Restriction_Response.pdf	406659 62f319951e18b81316280c2e4586a47f873a147b	yes	6

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Response to Election / Restriction Filed	1	1
	Claims	2	4
	Applicant Arguments/Remarks Made in an Amendment	5	6
Warnings:			
Information:			
	Total Files Size (in bytes):	406659	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/06 (09-11)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 14/720,230	Filing Date 05/22/2015	☐ To be Mailed

ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	RATE ($)	FEE ($)
☒ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	**280**
☒ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	**600**
☒ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	**720**
TOTAL CLAIMS (37 CFR 1.16(i))	10 minus 20 =	* 0	x $80 =	**0**
INDEPENDENT CLAIMS (37 CFR 1.16(h))	2 minus 3 =	* 0	x $420 =	**0**
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	**1600**

APPLICATION AS AMENDED – PART II

AMENDMENT	10/25/2016	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 15	Minus	** 20	= 0	x $80 =	0
	Independent (37 CFR 1.16(h))	* 1	Minus	***3	= 0	x $420 =	0
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
						TOTAL ADD'L FEE	**0**

AMENDMENT		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=	x $ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x $ =	
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
						TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
AJAY R. DAVID

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**
If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PTO/SB/08a (01-10)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14720230
Filing Date	2015-05-22
First Named Inventor	Chung-Chuan Hsieh
Art Unit	2847
Examiner Name	Ali Naraghi
Attorney Docket Number	EL01.0088US

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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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	1	TW201340410	TW	A	2013-10-01	ADVANCED SEMICONDUCTOR ENG		

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NON-PATENT LITERATURE DOCUMENTS Remove

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14720230
	Filing Date	2015-05-22
	First Named Inventor	Chung-Chuan Hsieh
	Art Unit	2847
	Examiner Name	Ali Naraghi
	Attorney Docket Number	EL01.0088US

	1	

If you wish to add additional non-patent literature document citation information please click the Add button Add

EXAMINER SIGNATURE

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14720230
	Filing Date	2015-05-22
	First Named Inventor	Chung-Chuan Hsieh
	Art Unit	2847
	Examiner Name	Ali Naraghi
	Attorney Docket Number	EL01.0088US

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

☒ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Andy M. Han, Reg. No. 60266/	Date (YYYY-MM-DD)	2016-10-26
Name/Print	Andy M. Han	Registration Number	60266

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these record s.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Espacenet

Bibliographic data: TW201340410 (A) — 2013-10-01

Light emitting diode package and carrier

Inventor(s): CHAN HSUN-WEI [TW] ± (CHAN, HSUN-WEI)

Applicant(s): ADVANCED SEMICONDUCTOR ENG [TW] ± (ADVANCED SEMICONDUCTOR ENGINEERING, INC)

Classification: - international: ***H01L33/48***
- cooperative: **H01L33/486**; H01L2224/48091; H01L2224/48247; H01L2224/49113; H01L33/50; H01L33/62 more

Application number: TW20120124054 20120704

Priority number(s): US201213422213 20120316

Also published as: US2013242524 (A1) CN105514249 (A) CN103311402 (A) CN103311402 (B)

Abstract of TW201340410 (A)

An LED package with trenches traversing a die pad to provide a mechanical interlock mechanism to strengthen bonding between the die pad and an insulator such that de-lamination is less likely to occur between the die pad and the insulator. A chip carrying region is defined by a barrier portion formed by the insulator in the trenches and in gaps between electrodes and the die pad, such that a light converting layer is confined within the barrier portion.

(19)中華民國智慧財產局
(12)發明說明書公開本 (11)公開編號：TW 201340410 A
(43)公開日： 中華民國 102 (2013) 年 10 月 01 日

(21)申請案號：101124054 (22)申請日： 中華民國 101 (2012) 年 07 月 04 日
(51)Int. Cl.： *H01L33/48 (2010.01)*
(30)優先權：2012/03/16 美國 13/422,213
(71)申請人：日月光半導體製造股份有限公司 (中華民國) ADVANCED SEMICONDUCTOR ENGINEERING, INC. (TW)
高雄市楠梓加工區經三路 26 號
(72)發明人：詹勳偉 CHAN, HSUN WEI (TW)
(74)代理人：詹銘文；葉璟宗
申請實體審查：有 申請專利範圍項數：20 項 圖式數：16 共 29 頁

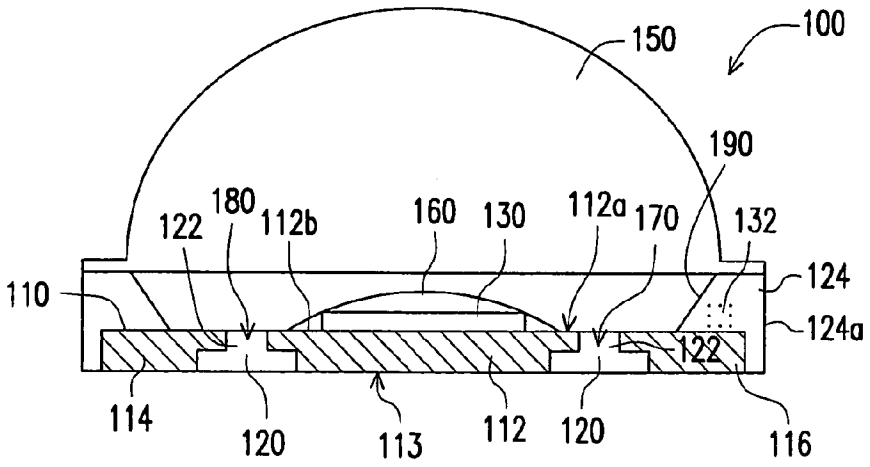
(54)名稱

發光二極體封裝以及承載板

LIGHT EMITTING DIODE PACKAGE AND CARRIER

(57)摘要

一種發光二極體封裝具有橫貫晶片座之多個溝槽，用以提供一機械連結，以強化晶片座與絕緣材間之結合，並降低可能發生於晶片座及絕緣層間之脫層的可能性。位於溝槽內及電極與晶片座間之間隙內的絕緣層共同形成一阻隔部，而阻隔部定義出一晶片承載區，以使光轉變層限位於阻隔部內。



100：發光二極體封裝
110：導線架
112：晶片座
112a：晶片座上表面
112b：晶片承載區
113：晶片座下表面
114：第一電極
116：第二電極
120：第一絕緣材
122：阻隔部
124：周緣部
130：發光二極體晶片
132：保護元件
150：第二絕緣材
160：光轉變層
170：第一間隙
180：第二間隙

190：側壁

IKEA Supply AG
Exhibit 1002 Page 281 of 519

(19)中華民國智慧財產局
(12)發明說明書公開本 (11)公開編號：TW 201340410 A
(43)公開日： 中華民國 102 (2013) 年 10 月 01 日

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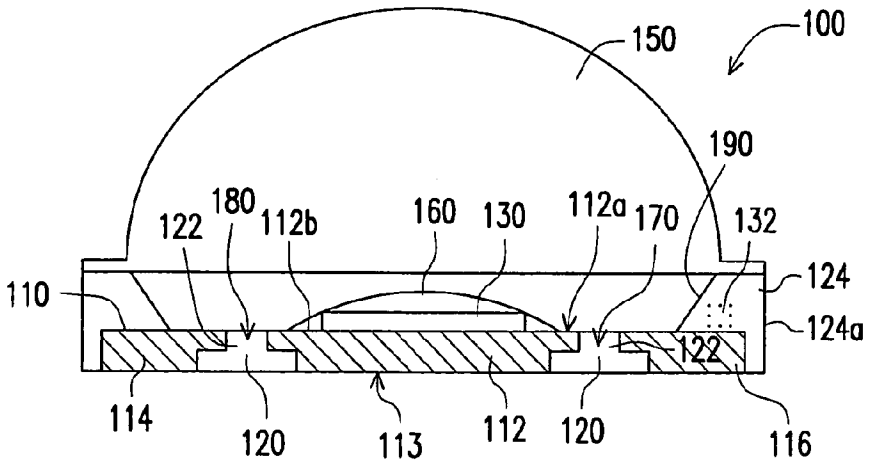
(54)名稱

發光二極體封裝以及承載板

LIGHT EMITTING DIODE PACKAGE AND CARRIER

(57)摘要

一種發光二極體封裝具有橫貫晶片座之多個溝槽，用以提供一機械連結，以強化晶片座與絕緣材間之結合，並降低可能發生於晶片座及絕緣層間之脫層的可能性。位於溝槽內及電極與晶片座間之間隙內的絕緣層共同形成一阻隔部，而阻隔部定義出一晶片承載區，以使光轉變層限位於阻隔部內。



100：發光二極體封裝
110：導線架
112：晶片座
112a：晶片座上表面
112b：晶片承載區
113：晶片座下表面
114：第一電極
116：第二電極
120：第一絕緣材
122：阻隔部
124：周緣部
130：發光二極體晶片
132：保護元件
150：第二絕緣材
160：光轉變層
170：第一間隙
180：第二間隙

六、發明說明：

【發明所屬之技術領域】

本發明是有關於一種封裝結構，且特別是有關於一種發光二極體的封裝結構。

【先前技術】

發光二極體裝置已有許多不同的應用，例如掃描器燈源、投影裝置的燈源、液晶顯示器的背光源或前光源，汽車儀表板上的照明燈源，交通號誌的燈源以及一般照明裝置的燈源等等。相較於傳統燈管，例如白熾燈，發光二極體裝置具有例如體積較小、使用壽命較長、驅動電壓/電流較低、結構強度較高、不含汞（減少廢棄時造成的污染）以及高發光效率以節省能源等顯著優勢。

發光二極體裝置通常包括至少一表面黏著型之發光二極體封裝，其內具有一發光二極體晶片。近年來，具有預封型導線架以承載發光二極體晶片的發光二極體封裝已被提出，取代傳統的陶製基板。預封型導線架包括一絕緣封裝膠材包覆一導線架且封裝膠材暴露出導線架之正電極與負電極。

然而，導線架與封裝膠材間的結合力通常較弱，且導線架與封裝膠材的熱膨脹係數也有極大的差異。由於導線架與封裝膠材的熱膨脹係數不同，當傳統的封裝結構經歷溫度循環時，其導線架與封裝膠材的界面即會誘發應力的產生。例如當發光二極體封裝是以表面黏著方式至一印刷

線路板時，其於回流焊接製程期間應力會造成導線架與封裝膠材之間的脫層現象。更可能使發光二極體封裝經脫層處暴露於空氣或溼氣中，進而造成發光二極體封裝的損壞。

【發明內容】

本發明提供一種發光二極體封裝，其可減少材料上的浪費及簡化發光二極體封裝的製程。

本發明之一實施例提出一種發光二極體封裝，包括一殼體。殼體具有一開口，開口具有一開放式頂部、一封閉式底部及多個側壁，側壁連接封閉式底部及開放式頂部，殼體包括一導線架。導線架具有一晶片座及至少一電極。至少一電極經由至少一間隙而與晶片座隔離。晶片座包括一第一溝槽與一第二溝槽，第一溝槽及第二溝槽位於殼體之開口內，各溝槽之一端連接至少一間隙。殼體更包括一第一絕緣材。第一絕緣材部份地包覆導線架，且暴露一部份晶片座之一上表面及一部份至少一電極，部份第一絕緣材填入至少一間隙及第一及第二溝槽。發光二極體封裝更包括一發光二極體晶片。發光二極體晶片配置於暴露之晶片座之上表面上，且位於第一溝槽及第二溝槽之間。發光二極體封裝更包括一導線，導線連接發光二極體晶片至電極之暴露部分。發光二極體封裝更包括一第二絕緣材。第二絕緣材包覆發光二極體晶片及導線。

本發明之另一實施例提出一種承載板，用於一發光二極體封裝，承載板包括一導線架。導線架包括一晶片座。

晶片座具有一上表面、一下表面、一第一溝槽及一第二溝槽。第一溝槽及第二溝槽完全地橫貫上表面。導線架更包括一第一電極以及一第二電極。第一電極以及第二電極分別位於晶片座的相對兩側，第一電極以及第二電極與晶片座隔離。晶片座與第一電極藉由一第一間隙分離，且第一間隙連通第一溝槽的一第一端以及第二溝槽的一第二端，而晶片座與第二電極藉由一第二間隙分離，且第二間隙連通第一溝槽的一第二端以及第二溝槽的一第二端。晶片座的上表面具有以第一間隙、第二間隙、第一溝槽以及第二溝槽為邊界的一晶片承載區。導線架更包括一絕緣材。絕緣材包覆部分的導線架。絕緣材至少暴露出晶片座的晶片承載區、一部分的第一電極以及一部份的第二電極，且一部分的絕緣材填入第一間隙、第二間隙、第一溝槽以及第二溝槽。

本發明之另一實施例提出一種發光二極體封裝，發光二極體封裝包括一導線架。導線架包括一晶片座。晶片座具有一第一溝槽與一第二溝槽，第一溝槽與第二溝槽橫跨晶片座之一上表面。導線架更包括一第一電極以及一第二電極。第一電極以及第二電極分別位於晶片座的相對兩側，第一電極及第二電極藉由連通第一溝槽及第二溝槽之第一間隙及第二間隙與晶片座間隔。第一間隙、第二間隙、第一溝槽及第二溝槽於晶片座上定義出的一晶片承載區。發光二極體封裝更包括一第一絕緣材。第一絕緣材至少部分地填入第一間隙、第二間隙、第一溝槽以及第二溝槽且

形成圍繞晶片承載區之一阻隔部。發光二極體封裝更包括一發光二極體晶片。發光二極體晶片位於晶片承載區內。發光二極體封裝更包括多條導線。導線連接發光二極體晶片至第一電極與第二電極。發光二極體封裝更包括一第二絕緣材，第二絕緣材包覆發光二極體晶片及導線。

為讓本發明之上述特徵和優點能更明顯易懂，下文特舉實施例，並配合所附圖式作詳細說明如下。

【實施方式】

請參考圖 1，本發明一實施例之發光二極體封裝 100 包括一殼體 102、一發光二極體晶片 130 以及一第二絕緣材或透鏡 150。殼體 102 包括一包覆於第一絕緣材 120 內之導線架 110。發光二極體晶片 130 設置於殼體 102 所定義之一開口內。

圖 2 為圖 1 之發光二極體封裝沿 2-2 線的剖面示意圖。請參考圖 2，導線架 110 包括一晶片座 112、一第一電極 114 及一第二電極 116。導線架 110 的材質通常為金屬，例如：銅、鋁等，亦可在導線架 110 表面鍍上一金屬鍍層（metal coating）例如鍍銀或鍍金，以增加導電性。

第一電極 114 及第二電極 116 分別位於晶片座 112 的相對兩側。晶片座 112、第一電極 114 及第二電極 116 相互分離，其中晶片座 112 與第一電極 114 之間相隔一第一間隙 170，晶片座 112 與第二電極 116 之間相隔一第二間隙 180。圖 3 為導線架 110 之立體示意圖。請參考圖 3，晶

片座 112 包括兩個溝槽 117a、117b，且溝槽 117a、117b 橫貫晶片座 112 之一上表面 112a。在另一實施例中，兩溝槽可如圖 6 中之溝槽 118a、118b 所示，僅部份橫跨上表面 112a，而不橫貫上表面 112a。此部分將於之後做詳述。

請參考圖 2 及圖 3，第一間隙 170 分離晶片座 112 與第二電極 116，而第二間隙 180 分離晶片座 112 與第一電極 114。因此，於晶片座 112 的上表面 112a 上，以第一間隙 170、第二間隙 180、第一溝槽 117a 及第二溝槽 117b 為邊界共同定義出一晶片承載區 112b。部分的第一絕緣材 120 填入溝槽 117a、117b 中。由於溝槽 117a、117b 位於殼體 102 之開口內，第一絕緣材 120 填入溝槽 117a、117b 提供額外的機械互鎖，以加強晶片座 112 與第一絕緣材 120 之間的接合，使晶片座 112 與第一絕緣材 120 之間不容易有脫層的現象發生。圖 4 為導線架 110 的仰視示意圖。請參考圖 4，導線架 110 可具有至少一凹部 115 於第一電極 114 或第二電極 116 上。

請參考圖 2，第一絕緣材 120 包覆部份導線架 110，以將晶片座 112 電性絕緣於第一電極 114 及第二電極 116。第一絕緣材 120 更可形成一周緣部 124，以定義發光二極體封裝 100 之區域，周緣部 124 係由一垂直外壁 124a 所定義。周緣部 124 及導線架 110 共同定義出一殼體，殼體具有一開口，開口具有一開放式頂部、一封閉式底部及多個側壁 190，側壁 190 連接開放式頂部及封閉式底部。該開口環狀設置以容置半球狀之第二絕緣材 150。在另一

實施例中，第一絕緣材 120 為一封裝膠體，其材質可以是透明聚合物或是半透明聚合物，例如軟膠、彈性物質或是樹脂，其中樹脂可為環氧樹脂、矽膠或是環氧-矽膠混合樹脂。

請參考圖 5，第一絕緣材 120 於殼體之封閉式底部暴露出至少一部份之晶片座 112、一部份之第一電極 114 及一部份之第二電極 116（暴露的部份以剖面線繪示）。此外，第一絕緣材 120 填入第一間隙 170 及第二間隙 180，以使晶片座 112 該晶片座 112 電性絕緣於該第一電極 114 及第二電極 116。

請繼續參照圖 5，發光二極體晶片 130 配置於晶片座 112 之上表面 112a 上，以使發光二極體晶片 130 及晶片座 112 之間具有良好之導熱性。舉例而言，發光二極體晶片 130 可經由金屬銲接固定於上表面 112a。導線 140 分別連接第一電極 114 或第二電極 116 之暴露部分至發光二極體晶片 130 之電性接墊上（例如，正極與負極接墊）。在另一實施例中，負極接墊並非如前述實施例所示設置於發光二極體晶片 130 之頂面，而是設置於發光二極體晶片 130 之底面。負極接墊可以一導電材料電性連接至晶片座 112，而可不設置電極 114、116 的其中之一。

承上述，請繼續參照圖 5，周緣部 124 之內側壁上可設有一第一缺口 192 以及一第二缺口 194，分別對應於該第一電極 114 的一第一打線接合區 114a 以及第二電極 116 的一第二打線接合區 116a。在另一實施例中，若打線接合

區 114a、116a 足以提供打線接合空間需求而無需缺口 192、194 提供額外的暴露區域時，則可不設置缺口 192、194。

請回頭參照圖 1 及圖 2，第二絕緣材 150 包覆發光二極體晶片 130 及導線 140。在本實施例中，第二絕緣材 150 可為一封裝膠體，其材質可以是透明聚合物或是半透明聚合物，例如軟膠、彈性物質或是樹脂，其中樹脂可為環氧樹脂、矽膠或是環氧-矽膠混合樹脂。為了增加上述之發光二極體封裝所發射出之光線的均勻度，可散射其光線，使光線猶如從各種發射點射出。例如：添加散射粒子（未繪示）於第二絕緣材 150 中以散射光線。

請參考圖 2，光轉變層 160 設置於第二絕緣材 150 與發光二極體晶片 130 之間，且覆蓋發光二極體晶片 130 及部分導線 140（未繪示於圖 2）。光轉變層 160 包含光轉變物質顆粒，例如為螢光顆粒。發光二極體晶片 130 射出的光線，例如：藍光，可以被光轉變物質顆粒轉換為不同顏色的光線，例如：綠光、黃光或紅光，其不同顏色的光線再混合以產生白光。光轉變層 160 可選擇性設置，例如在只發單色光之發光二極體封裝中則不需設置光轉變層 160。在本發明的其他實施例中，亦可將第二絕緣材 150 摻入光轉變物質顆粒來取代光轉變層 160。

請繼續參照圖 2，發光二極體封裝 100 更包括一保護元件 132，用以保護晶片 130 不承受過量電流。保護元件 132 設置於第二電極 116 上且藉由一導線（未示於圖中）

電性連接至第一電極 114。第一絕緣材 120 覆蓋保護元件 132。保護元件 132。例如為一稽納二極體（Zener Diode）。可調整工作電壓並具有穩定電路之功能。

圖 7 為圖 2 之發光二極體封裝之部分剖面示意圖。請參照圖 7，其中，周緣部 124 及第二絕緣材 150 未繪示於圖中以更清楚呈現內部構造。第一絕緣材 120 位於第一間隙 170、第二間隙 180、第一溝槽 117a 及第二溝槽 117b 的部分形成圍繞晶片承載區 112b 的一阻隔部 122。阻隔部 122 具有一頂部 122a，其實質上與晶片座 112 之上表面 112a 共平面。在一實施例中，光轉變層 160 係由一光轉變合成物形成，此光轉變合成物包括散佈於一透明矽聚合物之磷光粒子及二氧化矽粒子，其中透明矽聚合物可被熱或光硬化。光轉變合成物於液態時，可被塗佈於晶片 130 及緊鄰晶片 130 之晶片座 112 的上表面 112a 上，再將其硬化至固態，而形成光轉變層 160。藉由光轉變合成物之材料性質，使其比黏附於有機的阻隔部 122 更能穩固地黏附於具金屬特性之晶片座。光轉變合成物可被限制在阻隔部 122 之內，且一旦硬化至固態，其形成之光轉變層 160 即會被限制在阻隔部 122 之內。

圖 8A 為圖 8 之發光二極體封裝的立體示意圖。圖 8 及圖 8A 繪示了本發明之另一實施例，其中發光二極體晶片 130 及光轉變層 160 未繪示於圖中以更清楚呈現內部構造。阻隔部 622 具有一上表面 622a，其高於晶片座 112 之上表面 112a。阻隔部 622 將光轉變層 160 局限於阻隔部 122

所圈圍之區域內。在另一實施例中，如圖 9 所示，阻隔部 722 具有一上表面 722a，其高於晶片座 112 之上表面 112a，且阻隔部 722 之上表面 722a 在面向發光二極體晶片 130 的一側具有一斜面 122b。如此配置，阻隔部 722 將光轉變層 160 局限在阻隔部 722 所圈圍之區域內，並增加其出光效率。在另一實施例中，如圖 10 所示，阻隔部 822 具有一上表面 822a，其低於晶片座 112 之上表面 112a 而呈現出一凹陷部。如此配置，利用上表面 822a 之凹陷外型，將光轉變層 160 局限於阻隔部 822 所圈圍之區域內。光轉變層 160 局限於圖 8 至圖 10 之實施例的阻隔部 622、722、822 內，以便於對光轉變層 160 加以硬化以固著於晶片座 112 之上表面 112a 上。

請參照圖 11，導線架 110a 可具有一或多個凹部 113a 於晶片座 112 的上表面 112a，用以供第一絕緣材 120 填入，以增加晶片座 112 與第一絕緣材 120 之間的接合強度，使晶片座 112 與第一絕緣材 120 之間不容易有脫層的現象發生。同理，導線架 110a 具有至少一凹部 115 於第一電極 114 及/或第二電極 116 的表面，用以供第一絕緣材填入，以增加第一電極 114 及/或第二電極 116 與第一絕緣材 120 之間的接合強度，使第一電極 114 或第二電極 116 與第一絕緣材 120 之間不容易有脫層（de-lamination）的現象發生。

請參考圖 12 及 13，在本實施例中，第一絕緣材 120 覆蓋除了第一打線接合區 114a、第二打線接合區 116a 以

及晶片承載區 112b 以外的導線架 110 上表面之所有區域，意即，第一絕緣材 120 只暴露導線架 110 之第一打線接合區 114a、第二打線接合區 116a 以及晶片承載區 112b。

圖 14 至圖 16 為數個發光二極體封裝的側視示意圖，其第二絕緣材 150 有不同的配置。第二絕緣材 150 包覆發光二極體晶片 130 及導線 140，且填充凹杯結構。在本發明之一實施例中，如圖 14 所示，第二絕緣材 150 的一頂面與周緣部 124 的頂面共平面。在本發明之其他實施例中，如圖 15 所示，第二絕緣材 150 更可包括一圓頂形透鏡部，以增強發光二極體封裝結構 100 的光萃取效率，如圖 16 所示，第二絕緣材 150 包括一類橢球狀透鏡部，該透鏡部之頂部被截去而形成一實質平坦表面。

雖然本發明已以實施例揭露如上，然其並非用以限定本發明，任何所屬技術領域中具有通常知識者，在不脫離本發明之精神和範圍內，當可作些許之更動與潤飾，故本發明之保護範圍當視後附之申請專利範圍所界定者為準。

【圖式簡單說明】

圖 1 為根據本發明一實施例之發光二極體封裝的立體示意圖。

圖 2 為圖 1 之發光二極體封裝沿 2-2 線的剖面示意圖。

圖 3 為圖 1 之發光二極體封裝之導線架的立體示意圖。

圖 4 為圖 3 之導線架的仰視示意圖。

圖 5 為圖 1 之發光二極體封裝之俯視示意圖。

圖 6 為本發明另一實施例之發光二極體封裝之俯視示意圖。

圖 7 為圖 2 之發光二極體封裝之部分剖面示意圖。

圖 8 為本發明另一實施例之發光二極體封裝之部分剖面示意圖。

圖 8A 為圖 8 之發光二極體封裝的立體示意圖。

圖 9 為本發明另一實施例之發光二極體封裝之部分剖面示意圖。

圖 10 為本發明另一實施例之發光二極體封裝之部分剖面示意圖。

圖 11 為本發明另一實施例之用於發光二極體封裝之導線架的立體示意圖。

圖 12 為本發明另一實施例之發光二極體封裝之俯視示意圖。

圖 13 為圖 12 之發光二極體封裝之立體示意圖。

圖 14 至圖 16 為本發明之三個不同實施例之發光二極體封裝的側視示意圖。

【主要元件符號說明】

100：發光二極體封裝

102：殼體

110、110a：導線架

112：晶片座

112a：上表面

112b：晶片承載區
113：下表面
113a、115：凹部
114：第一電極
114a：第一打線接合區
116：第二電極
116a：第二打線接合區
117a：第一溝槽
117b：第二溝槽
120：第一絕緣材
122、622、722、822：阻隔部
122a、622a、722a、822a：阻隔部上表面
122b：斜面
124：周緣部
124a：垂直外壁
130：發光二極體晶片
132：保護元件
140：導線
142：第二導線
150：第二絕緣材
160：光轉變層
170：第一間隙
180：第二間隙
190：側壁
192：第一讓位缺口
194：第二讓位缺口

201340410

發明專利說明書

（本說明書格式、順序，請勿任意更動，※記號部分請勿填寫）

※申請案號：101124054

※申請日：101.7.[illegible]　※IPC 分類：H01L 33/48 (2010.01)

一、發明名稱：

發光二極體封裝以及承載板 / LIGHT EMITTING DIODE PACKAGE AND CARRIER

二、中文發明摘要：

一種發光二極體封裝具有橫貫晶片座之多個溝槽，用以提供一機械連結，以強化晶片座與絕緣材間之結合，並降低可能發生於晶片座及絕緣層間之脫層的可能性。位於溝槽內及電極與晶片座間之間隙內的絕緣層共同形成一阻隔部，而阻隔部定義出一晶片承載區，以使光轉變層限位於阻隔部內。

三、英文發明摘要：

An LED package with trenches traversing a die pad to provide a mechanical interlock mechanism to strengthen bonding between the die pad and an insulator such that de-lamination is less likely to occur between the die pad and the insulator. A chip carrying region is defined by a barrier portion formed by the insulator in the trenches and in gaps between electrodes and the die pad, such that a light converting layer is confined within the barrier portion.

七、申請專利範圍：

1. 一種發光二極體封裝，包括：

一殼體，具有一開口，該開口具有一開放式頂部、一封閉式底部及多個側壁，該些側壁連接該封閉式底部及該開放式頂部，該殼體包括：

一導線架，具有一晶片座及至少一電極，該至少一電極經由至少一間隙而與該晶片座隔離，該晶片座包括一第一溝槽與一第二溝槽，該第一溝槽及該第二溝槽位於該殼體之該開口內，各溝槽之一端連接該至少一間隙； 以及

一第一絕緣材，部份地包覆該導線架以暴露一部份該晶片座之一上表面及一部份該至少一電極，且該第一絕緣材部份地填入該至少一間隙及該第一及第二溝槽；

一發光二極體晶片，配置於暴露之該晶片座之該上表面上，且位於該第一溝槽及該第二溝槽之間；

至少一導線，連接該發光二極體晶片至該至少一電極之暴露部分；以及

一第二絕緣材，包覆該發光二極體晶片及該導線。

2. 如申請專利範圍第 1 項所述之發光二極體封裝，其另包含一光轉變層設於該第二絕緣材與該發光二極體晶片之間，該光轉變層覆蓋該發光二極體晶片。

3. 如申請專利範圍第 2 項所述之發光二極體封裝，其中填入該間隙、該第一溝槽及該第二溝槽之部分該第一絕

緣材形成圍繞該光轉變層的一阻隔部。

4. 如申請專利範圍第 3 項所述之發光二極體封裝，其中該阻隔部的一上表面高於該晶片座之該上表面，且該阻隔部的該上表面在面向該發光二極體晶片的一側為一斜面。

5. 如申請專利範圍第 3 項所述之發光二極體封裝，其中該阻隔部的一上表面實質上與該晶片座之該上表面共平面。

6. 如申請專利範圍第 3 項所述之發光二極體封裝，其中該阻隔部的一上表面低於該晶片座之該上表面。

7. 如申請專利範圍第 1 項所述之發光二極體封裝，其中該至少一電極包括至少一凹部，且該第一絕緣材填入至少部份之該凹部。

8. 如申請專利範圍第 1 項所述之發光二極體封裝，其中該晶片座的該上表面包括至少一凹部，且該第一絕緣材填入至少部份之該凹部。

9. 如申請專利範圍第 1 項所述之發光二極體封裝，其中該第一絕緣材包括位於該圍繞該發光二極體晶片的一壁體，該壁體與該導線架共同形成一凹陷杯狀結構，且該暴露部份之該晶片座之該上表面及該暴露部份之該電極位於該凹陷杯狀結構的一底部。

10. 如申請專利範圍第 9 項所述之發光二極體封裝，其中該凹陷杯狀結構的該壁體之一側壁上具有一缺口，以暴露出該電極的一打線接合區。

11. 如申請專利範圍第 10 項所述之發光二極體封裝，其中該第一絕緣材覆蓋與該上表面同側的除了該第一打線接合區、該第二打線接合區及一晶片承載區以外的該導線架的所有區域，該晶片承載區由該至少一間隙、該第一溝槽與該第二溝槽所定義。

12. 一種承載板，用於一發光二極體封裝，該承載板包括：

一導線架，包括：

一晶片座，具有一上表面、一下表面、一第一溝槽及一第二溝槽，該第一溝槽及該第二溝槽完全地橫貫該上表面；以及

一第一電極以及一第二電極，分別位於該晶片座的相對兩側，該第一電極及該第二電極與該晶片座隔離，該晶片座與該第一電極藉由一第一間隙分離，該第一間隙連通該第一溝槽的一第一端以及該第二溝槽的一第一端，該晶片座與該第二電極藉由一第二間隙分離，該第二間隙連通該第一溝槽的一第二端以及該第二溝槽的一第二端，該晶片座的該上表面具有以該第一間隙、該第二間隙、該第一溝槽以及該第二溝槽為邊界的一晶片承載區；以及

一絕緣材，包覆部分的該導線架，其中該絕緣材至少暴露出該晶片座的該晶片承載區、一部分的該第一電極以及一部份的該第二電極，且一部分的該絕緣材填入該第一間隙、該第二間隙、該第一溝槽以及該第二溝槽。

13. 如申請專利範圍第 12 項所述之承載板，其中填入該第一間隙、該第二間隙、該第一溝槽以及該第二溝槽之部分該絕緣材形成圍繞該晶片承載區的一阻隔部，該阻隔部的一上表面高於該晶片座之該上表面。

14. 如申請專利範圍第 13 項所述之承載板，其中該阻隔部的該上表面的一側為一斜面。

15. 如申請專利範圍第 12 項所述之承載板，其中填入該第一間隙、該第二間隙、該第一溝槽以及該第二溝槽之部分該絕緣材形成圍繞該晶片承載區的一阻隔部，該阻隔部的一上表面實質上與該晶片座之該上表面共平面。

16. 如申請專利範圍第 12 項所述之承載板，其中位於該第一間隙、該第二間隙、該第一溝槽以及該第二溝槽之部分該絕緣材形成圍繞該晶片承載區的一阻隔部，該阻隔部的一上表面低於該晶片座之該上表面。

17. 如申請專利範圍第 12 項所述之承載板，其中該絕緣材包括位於該導線架之一周圍且環繞該晶片承載區的一壁體，該壁體與該導線架共同形成一凹陷杯狀結構，且該晶片承載區位於該凹陷杯狀結構的一底部。

18. 如申請專利範圍第 17 項所述之承載板，其中該凹陷杯狀結構的該壁體之一側壁上具有一第一缺口以及一第二缺口，以分別暴露出該第一電極的一第一打線接合區以及該第二電極的一第二打線接合區。

19. 一種發光二極體封裝，包括：

一導線架，包括：

一晶片座，具有一第一溝槽與一第二溝槽，該第一溝槽與該第二溝槽橫跨該晶片座之一上表面；以及

一第一電極以及一第二電極，分別位於該晶片座的相對兩側，該第一電極及該第二電極藉由連通該第一溝槽及該第二溝槽之一第一間隙及一第二間隙與該晶片座間隔，該第一間隙、該第二間隙、該第一溝槽及該第二溝槽於晶片座上定義出一晶片承載區；

一第一絕緣材，該第一絕緣材至少部分地填入該第一間隙、該第二間隙、該第一溝槽以及該第二溝槽且形成圍繞該晶片承載區之一阻隔部；

一發光二極體晶片，位於該晶片承載區內；

多條導線，連接該發光二極體晶片至該第一電極與該第二電極；以及

一第二絕緣材，包覆該發光二極體晶片及該些導線。

20. 如申請專利範圍第 19 項所述之發光二極體封裝，更包括一光轉變層設於該第二絕緣材與該發光二極體晶片之間，該光轉變層覆蓋該發光二極體晶片，其中該阻隔部之一上表面高於、實質上共平面於或低於該晶片座之該上表面，且該阻隔部圍繞該光轉變層。

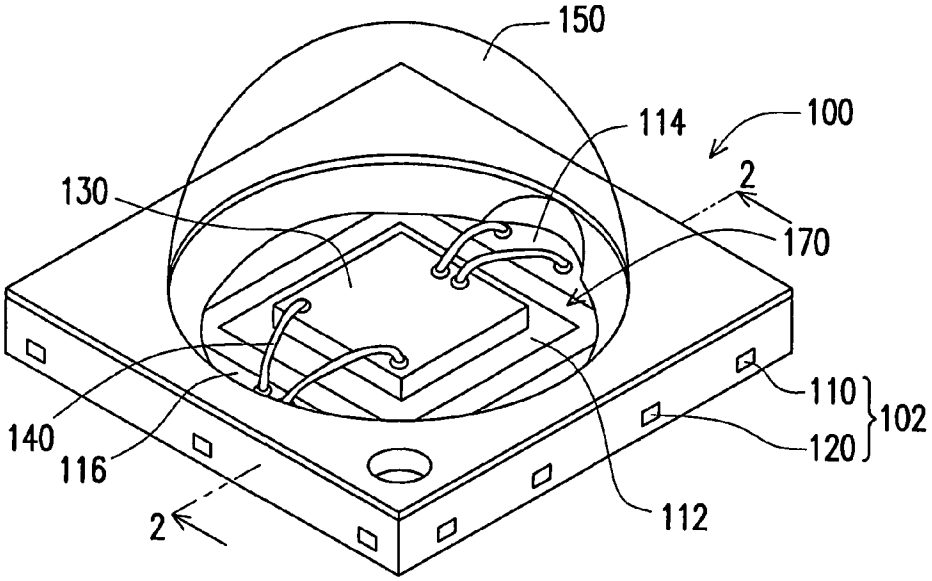

150
114
100
130
2
170
110
102
120
140
116
112
2

圖 1

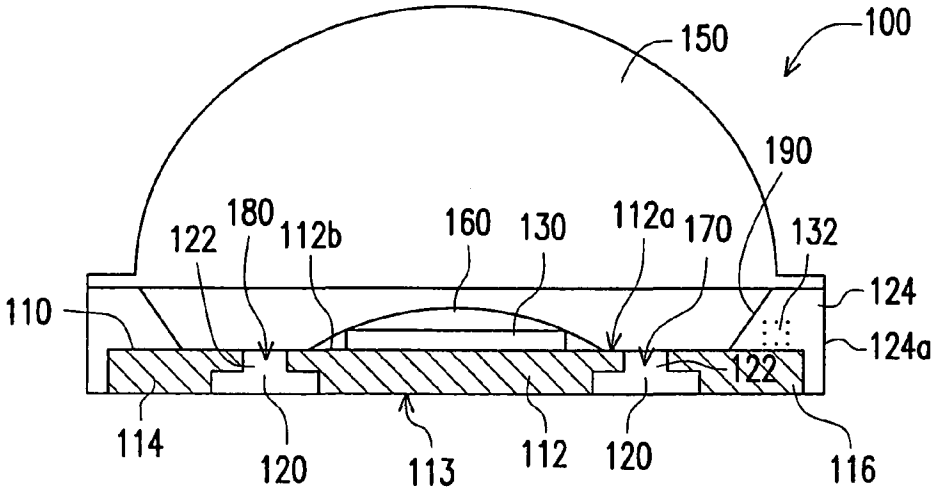

150
100
190
180
122
112b
160
130
112a
170
132
124
110
124a
122
114
120
113
112
120
116

圖 2

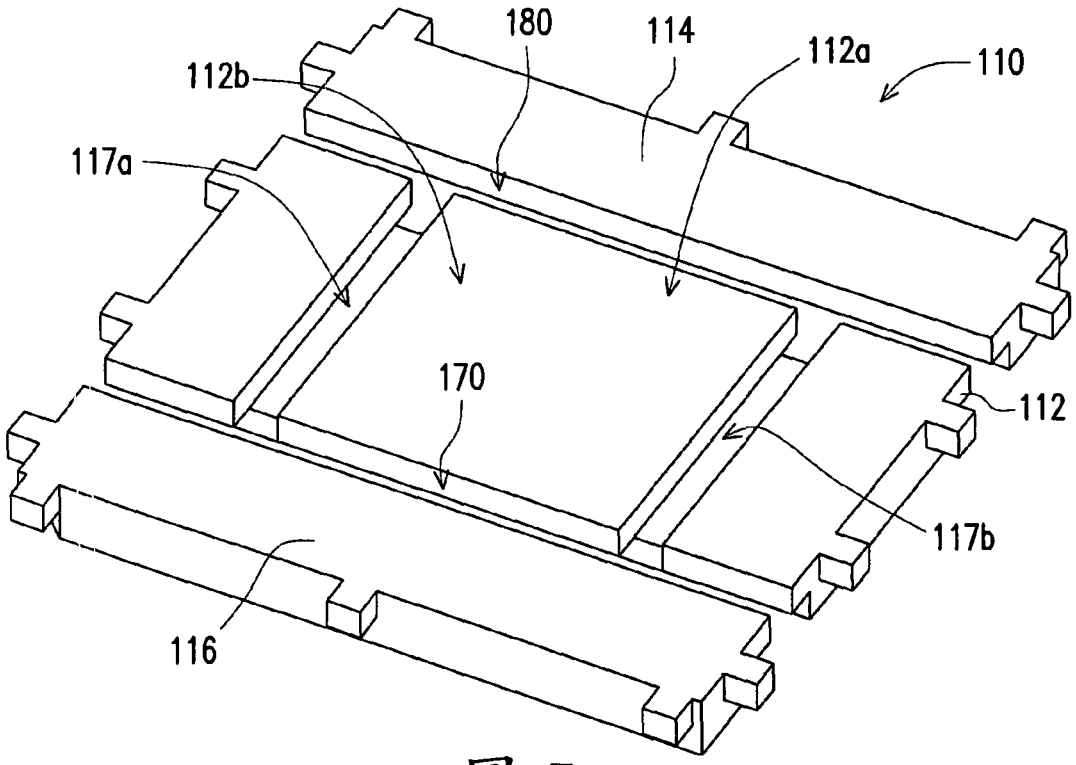

180
114
112a
110
112b
117a
170
112
117b
116

圖 3

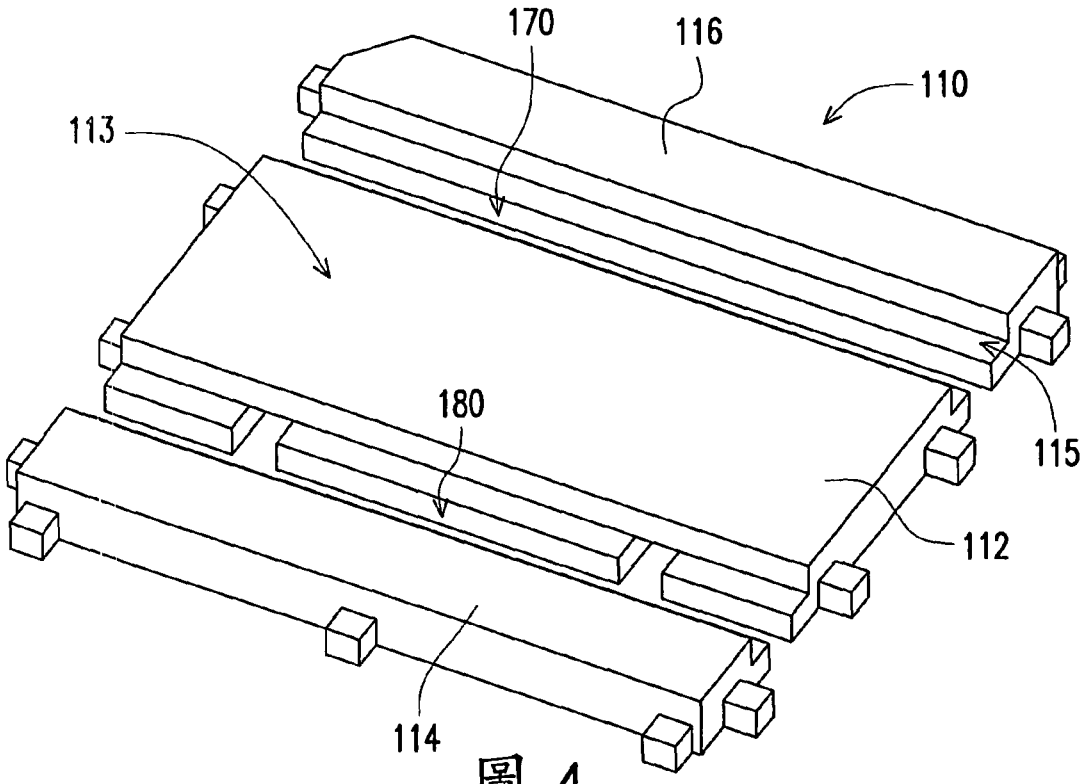

170
116
110
113
180
115
112
114

圖 4

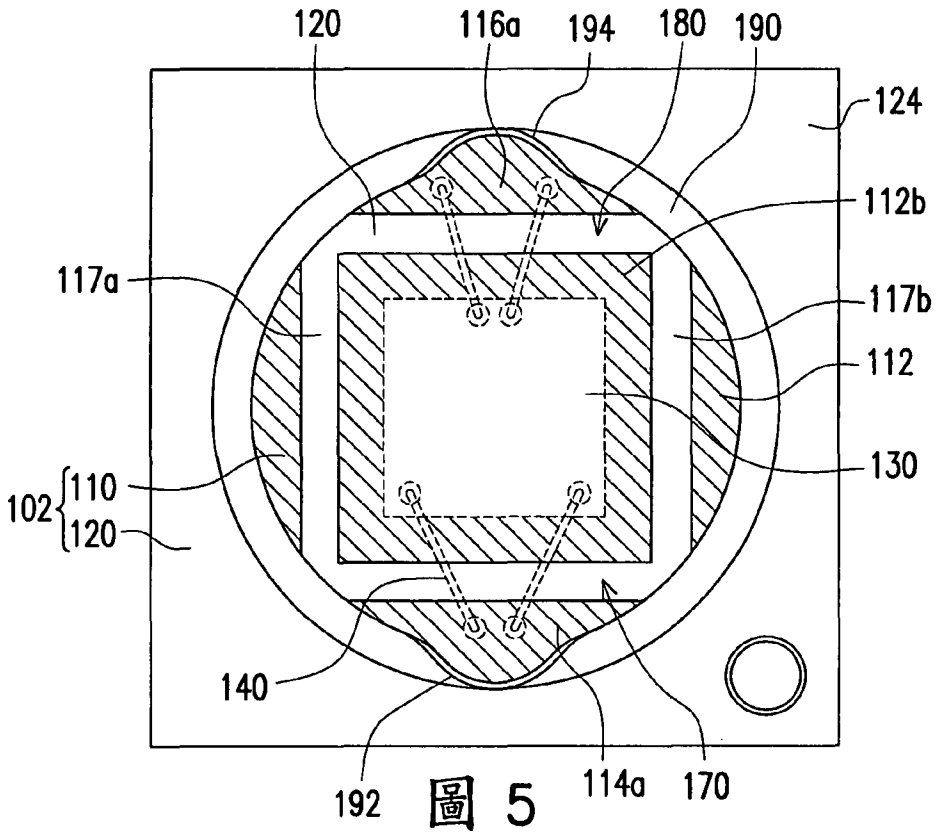

120
116a
194
180
190
124
112b
117a
117b
112
130
102
110
120
140
192
114a
170

圖 5

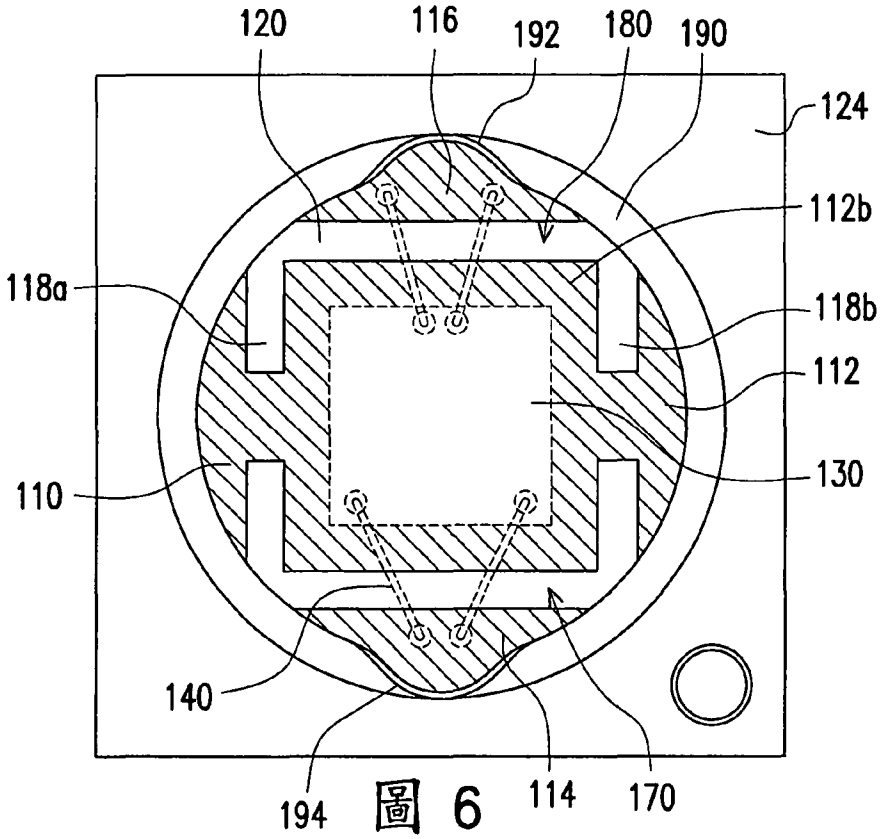

120
116
192
180
190
124
112b
118a
118b
112
130
110
140
194
114
170

圖 6

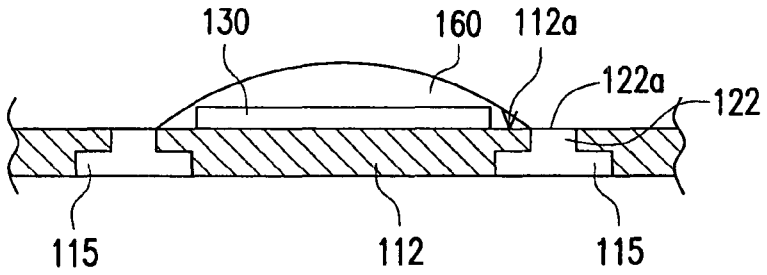

130
160
112a
122a
122
115
112
115

圖 7

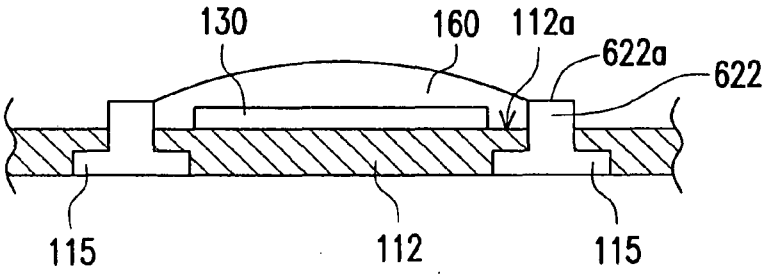

130
160
112a
622a
622
115
112
115

圖 8

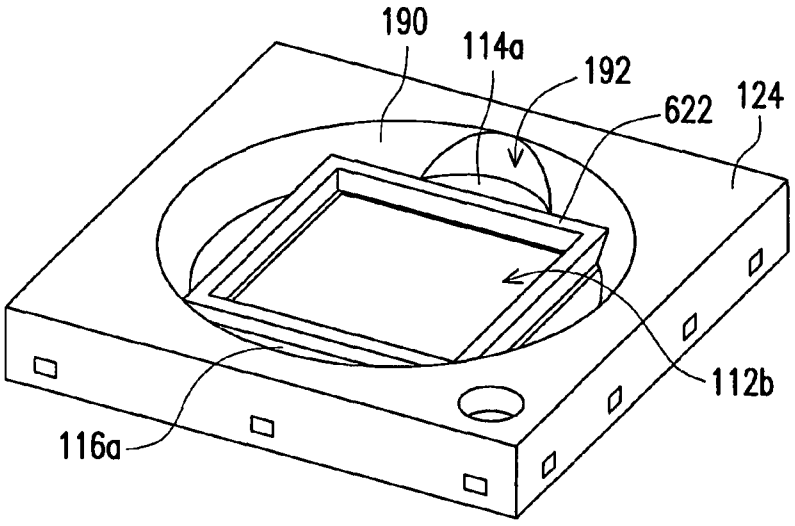

190
114a
192
622
124
112b
116a

圖 8A

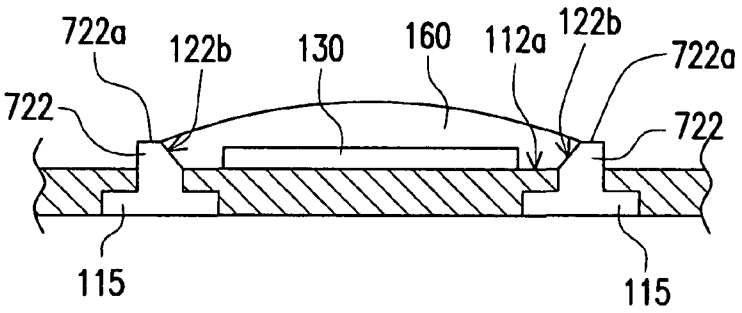

722a
122b
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160
112a
122b
722a
722
722
115
115

圖 9

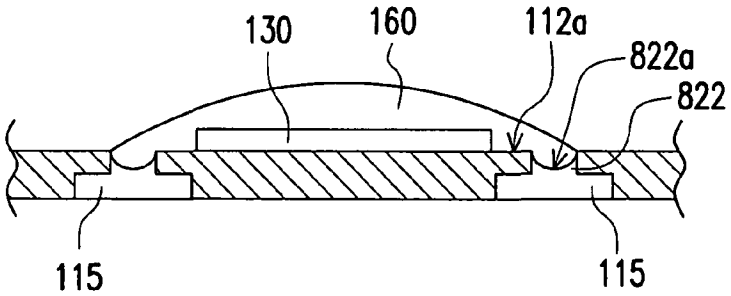

130
160
112a
822a
822
115
115

圖10

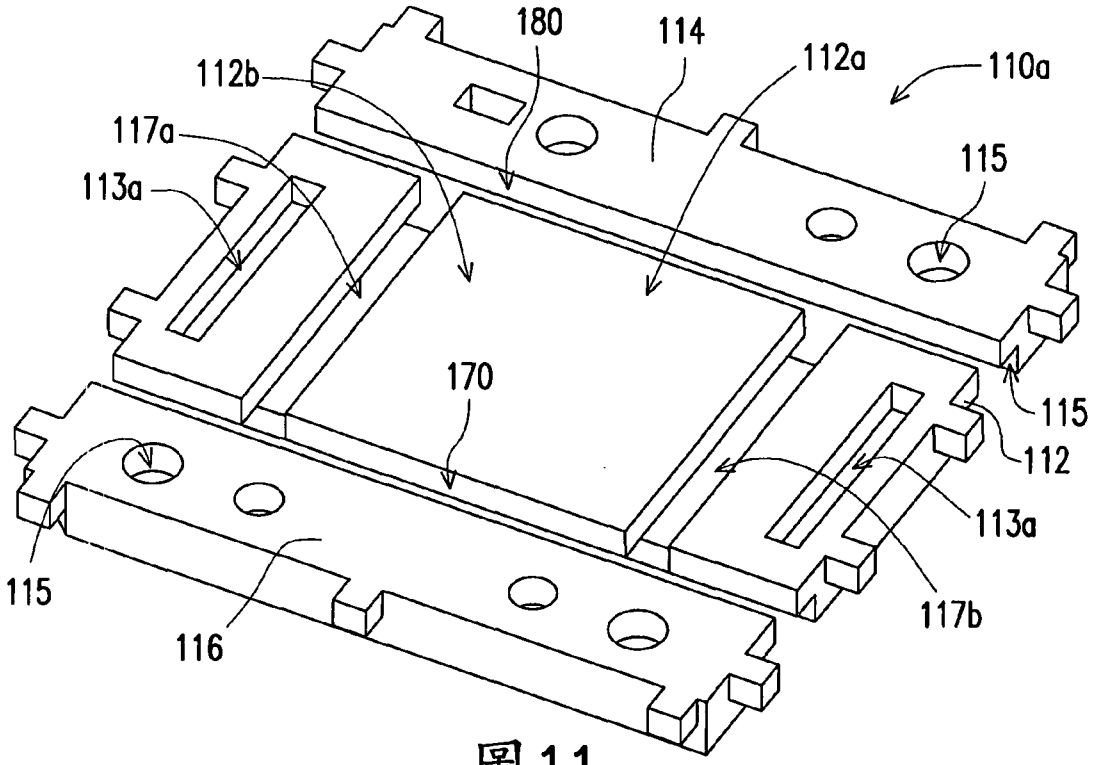

180
114
112a
110a
112b
117a
113a
115
170
115
112
113a
117b
115
116

圖 11

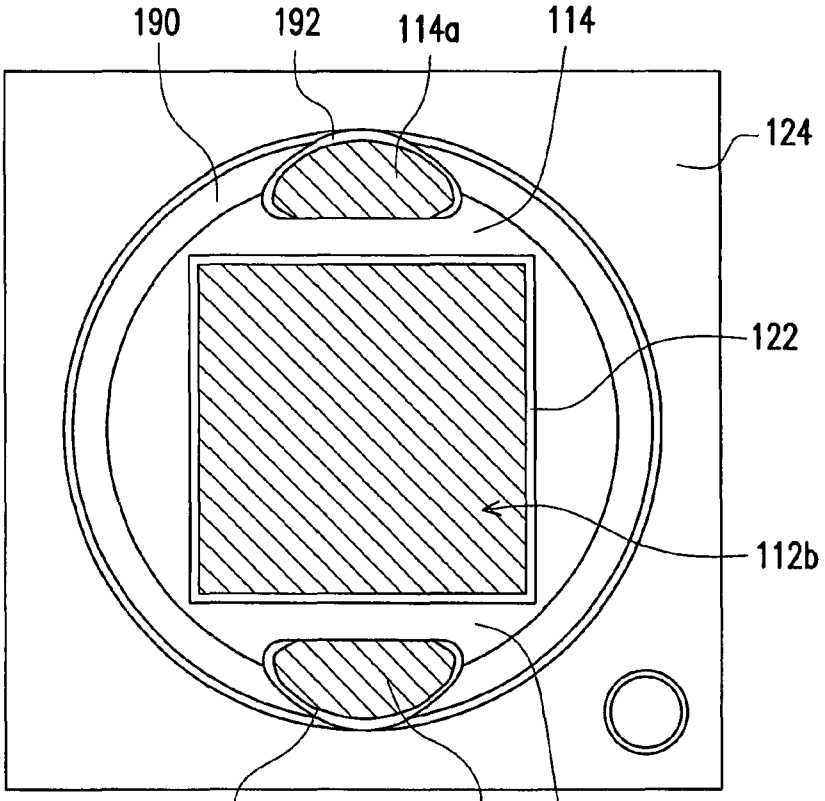

190
192
114a
114
124
122
112b
194
116a
116

圖 12

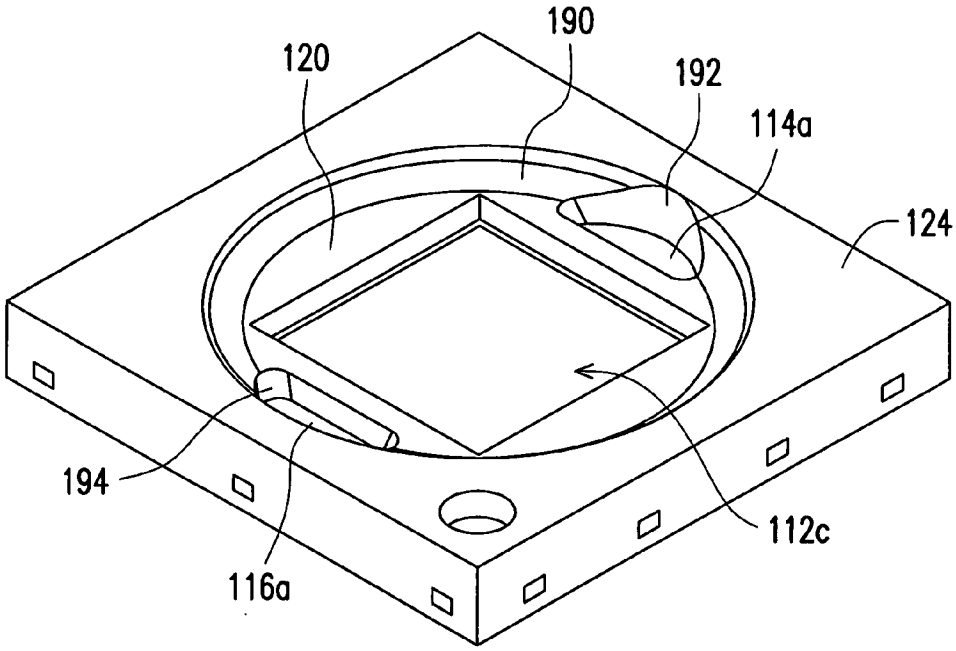


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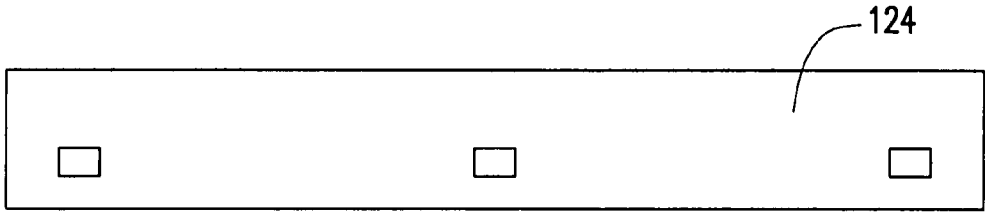


圖14

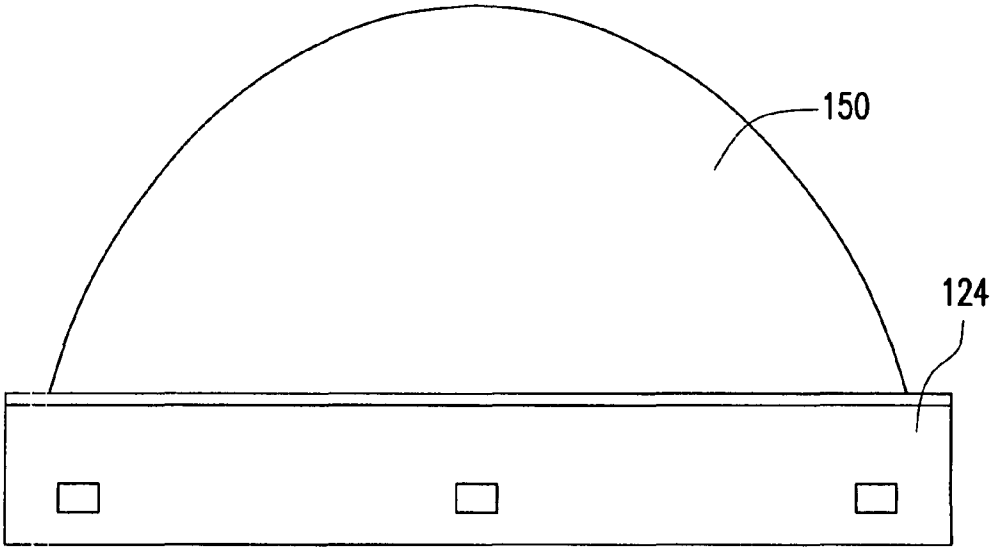


圖15

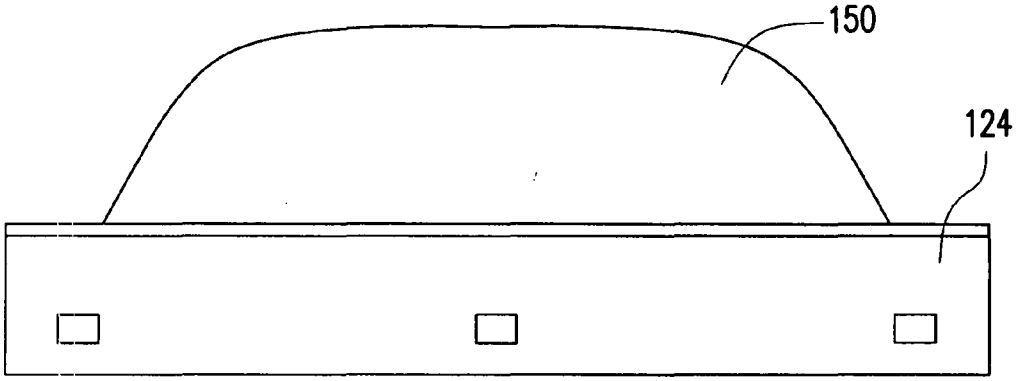


圖16

四、指定代表圖：

（一）本案之指定代表圖：圖 2

（二）本代表圖之元件符號簡單說明：

100：發光二極體封裝

110：導線架

112：晶片座

112a：晶片座上表面

112b：晶片承載區

113：晶片座下表面

114：第一電極

116：第二電極

120：第一絕緣材

122：阻隔部

124：周緣部

130：發光二極體晶片

132：保護元件

150：第二絕緣材

160：光轉變層

170：第一間隙

180：第二間隙

190：側壁

五、本案若有化學式時，請揭示最能顯示發明特徵的化學式：無

Electronic Patent Application Fee Transmittal

Application Number:	14720230
Filing Date:	22-May-2015
Title of Invention:	Carrier, Carrier Leadframe, And Light Emitting Device
First Named Inventor/Applicant Name:	Chung-Chuan Hsieh
Filer:	Andy M. Han
Attorney Docket Number:	EL01.0088US

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
Submission- Information Disclosure Stmt	1806	1	180	180
		Total in USD ($)		**180**

Electronic Acknowledgement Receipt

EFS ID:	27321886
Application Number:	14720230
International Application Number:	
Confirmation Number:	4909
Title of Invention:	Carrier, Carrier Leadframe, And Light Emitting Device
First Named Inventor/Applicant Name:	Chung-Chuan Hsieh
Customer Number:	13859
Filer:	Andy M. Han
Filer Authorized By:	
Attorney Docket Number:	EL01.0088US
Receipt Date:	26-OCT-2016
Filing Date:	22-MAY-2015
Time Stamp:	00:41:07
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$180
RAM confirmation Number	102616INTEFSW00431100
Deposit Account	
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

FH-000312

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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	EL01_0088US_IDS.pdf	612026 a27723cb09f2929939c21d8263aba75fd8afa692	no	4
Warnings:					
Information:					
A U.S. Patent Number Citation or a U.S. Publication Number Citation is required in the Information Disclosure Statement (IDS) form for autoloading of data into USPTO systems. You may remove the form to add the required data in order to correct the Informational Message if you are citing U.S. References. If you chose not to include U.S. References, the image of the form will be processed and be made available within the Image File Wrapper (IFW) system. However, no data will be extracted from this form. Any additional data such as Foreign Patent Documents or Non Patent Literature will be manually reviewed and keyed into USPTO systems.					
2	Foreign Reference	TW_201340410.pdf	3000463 a138873eef7c738bc8c2907ed956da749b222008	no	31
Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	29982 04d8d8ddc92c0cc074982301d1b5826cf7f0c6be	no	2
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National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14720230
Filing Date	2015-05-22
First Named Inventor	Chung-Chuan Hsieh
Art Unit	2847
Examiner Name	Ali Naraghi
Attorney Docket Number	EL01.0088US

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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	CN101346584	CN	A	2009-01-14	MATSUSHITA ELECTRIC WORKS LTD		

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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]

FH-000315

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14720230
	Filing Date	2015-05-22
	First Named Inventor	Chung-Chuan Hsieh
	Art Unit	2847
	Examiner Name	Ali Naraghi
	Attorney Docket Number	EL01.0088US

	1	

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EXAMINER SIGNATURE

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14720230
Filing Date	2015-05-22
First Named Inventor	Chung-Chuan Hsieh
Art Unit	2847
Examiner Name	Ali Naraghi
Attorney Docket Number	EL01.0088US

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☒ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Andy M. Han, Reg. No. 60266/	Date (YYYY-MM-DD)	2016-12-12
Name/Print	Andy M. Han	Registration Number	60266

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

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5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

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9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Espacenet

Bibliographic data: CN101346584 (A) — 2009-01-14

Luminaire using LED

Inventor(s): YOJI URANO [JP]; YOSHIRO GOTO [JP]; YASUHIRO HIDAKA [JP]; TAKUYA NAKATANI [JP] ± (URANO YOJI, ; GOTO YOSHIRO, ; HIDAKA YASUHIRO, ; NAKATANI TAKUYA)

Applicant(s): MATSUSHITA ELECTRIC WORKS LTD [JP] ± (MATSUSHITA ELECTRIC WORKS LTD, ; MATSUSHITA ELECTRIC WORKS, LTD)

Classification: - international: ***F21S8/04; F21V19/00; F21V29/00; F21V5/04;*** *F21Y101/02; H01L33/62; H01L33/64*

- cooperative: **F21K9/00**; **F21S4/20**; **F21V29/20**; **F21V29/70**; F21V23/002; F21Y2101/00; H01L2224/45144; H01L2224/48091; H01L2224/73265; H01L2924/01019; H01L2924/01079; H01L2924/19041; H01L33/62; H01L33/64; H05K1/0203; H05K1/021; H05K1/182; H05K2201/10106 more

Application number: CN2006848537 20061221

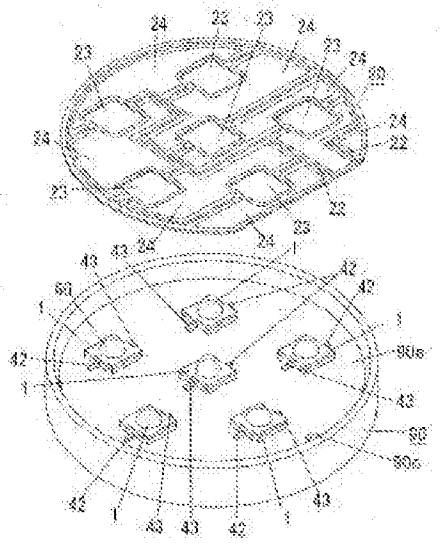
Priority number(s): WO2006JP325527 20061221 ; JP20050371116 20051222

Also published as: CN101346584 (B) EP1965128 (A1) EP1965128 (A4) EP1965128 (B1) US2009046456 (A1) more

Abstract of CN101346584 (A)

An illumination instrument using LED includes: a metal instrument body (90); a plurality of LED chip units (1) having a pair of leads (42, 43) electrically connected to an LED chip and electrodes of the LED chip; and an insulation layer (80) arranged between the instrument body (90) and the LED chip units (1) for electrically insulating them from each other and thermally connecting them. A plurality of window holes (23) are formed on a circuit board (20) for passing the respective LED chip units. Around the window holes, the lead terminals are electrically connected to a circuit pattern on the circuit substrate. The lower surfaces of the respective LED chip units are thermally connected via the insulation layer (80) to the instrument body (90). Thus, the heat generated in the LED chips is transferred to the instrument body via the insulation layer without passing through the circuit substrate.

FIG. 1



[19] 中华人民共和国国家知识产权局

[12] 发明专利申请公布说明书

[21] 申请号 200680048537.9

[51] Int. Cl.
F21V 19/00 (2006.01)
F21S 8/04 (2006.01)
F21V 5/04 (2006.01)
F21V 29/00 (2006.01)
H01L 33/00 (2006.01)
F21Y 101/02 (2006.01)

[43] 公开日 2009 年 1 月 14 日

[11] 公开号 CN 101346584A

[22] 申请日 2006.12.21
[21] 申请号 200680048537.9
[30] 优先权
[32] 2005.12.22 [33] JP [31] 371116/2005
[86] 国际申请 PCT/JP2006/325527 2006.12.21
[87] 国际公布 WO2007/072919 日 2007.6.28
[85] 进入国家阶段日期 2008.6.20
[71] 申请人 松下电工株式会社
地址 日本国大阪府
[72] 发明人 浦野洋二 中谷卓也 日高康博 后藤芳朗

[74] 专利代理机构 隆天国际知识产权代理有限公司
代理人 王玉双 郑小军

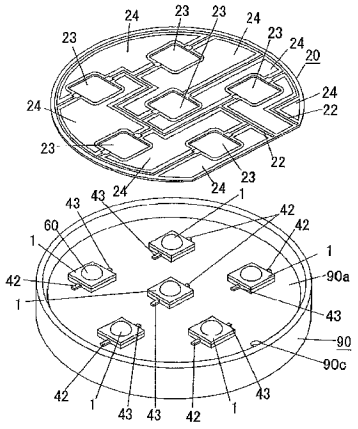
权利要求书 2 页 说明书 22 页 附图 23 页

[54] 发明名称

具有 LED 的照明器具

[57] 摘要

本发明公开了一种使用 LED 的照明器具，其包括：金属器具本体(90)；多个 LED 芯片单元(1)，其具有一对引线(42、43)，所述引线电连接至 LED 芯片和 LED 芯片的电极；以及绝缘层(80)，其设置在器具本体(90)与 LED 芯片单元(1)之间，用以使这两者电绝缘并且热连接。在电路板(20)上形成多个窗孔(23)，用以供相应的 LED 芯片单元穿过。在所述窗孔周围，引线端子电连接至电路基板上的电路图案。相应的 LED 芯片单元的底面经由绝缘层(80)热连接至绝缘体(90)。因此，LED 芯片中产生的热量经由该绝缘层但不经过该电路基板而传递至器具本体。



1．一种具有 LED 的发光装置，包括：

金属制成的主体；

多个 LED 芯片单元，各 LED 芯片单元均包括 LED 芯片和一对引线端子，所述一对引线端子电连接至所述 LED 芯片的电极；

电路板，其形成有电路图案，该电路板构造为向各 LED 芯片单元供电；以及

绝缘层，其设置在所述主体与所述多个 LED 芯片单元之间，用以在所述主体与所述 LED 芯片单元之间形成电绝缘以及热连接，

其中，所述电路板形成有多个窗口，各个 LED 芯片单元分别延伸穿过所述窗口，并且所述引线端子在所述窗口的周边保持与所述电路图案电接触，

各所述 LED 芯片单元均在所述 LED 芯片单元的底面通过所述绝缘层与所述主体热连接。

2．如权利要求 1 所述的具有 LED 的发光装置，其中，

各所述 LED 芯片单元具有由所述引线端子限定的底面，所述引线端子叠置在所述绝缘层上。

3．如权利要求 1 所述的具有 LED 的发光装置，其中，

设置透光构件，以使来自各所述 LED 芯片单元的可见光通过；以及

在所述电路板的与所述透光构件相对的顶面上形成镜，用以反射所述可见光。

4．如权利要求 3 所述的具有 LED 的发光装置，其中，

所述电路图案和所述镜形成在所述电路板的与所述透光构件相对的顶面上。

5．如权利要求 3 所述的具有 LED 的发光装置，其中，

所述电路图案形成在所述电路板的底面。

6．如权利要求 3-5 中任一项所述的具有 LED 的发光装置，其中，

所述镜由铝制成。

7．如权利要求 3-6 中任一项所述的具有 LED 的发光装置，其中，

所述主体形成为盘形，所述主体的一个面上具有凹部，所述凹部用来将所述 LED 芯片单元和所述电路板容置于其中；以及

在所述主体的中心设置电线插孔，该插孔延伸穿过所述凹部的底部，以供电连接至所述电路板的中心处的供电电缆穿过。

8．如权利要求 7 所述的具有 LED 的发光装置，其中，

所述主体在其围绕所述凹部的部分处形成有分别用于多个连接螺钉的连接螺钉孔，所述连接螺钉用于将所述主体固定至支撑材料，

框形的装饰罩，其装配至所述主体，以遮蔽所述主体的一个面上的、所述凹部的周边及所述连接螺钉，所述装饰罩具有窗口，所述透光构件的光输出表面通过所述窗口露出，并且所述装饰罩由金属制成。

9．如权利要求 1-8 中任一项所述的具有 LED 的发光装置，其中，

所述透光构件的与所述多个 LED 芯片单元相对的相应部分处形成有多个透镜，用于确定从所述多个 LED 芯片单元发出的光的取向，所述透光构件的除所述透镜之外的部分由金属制成。

10．如权利要求 1-8 中任一项所述的具有 LED 的发光装置，其中，

各所述 LED 芯片单元均包括：

导热板，其由导热材料制成，并且所述 LED 芯片安装至所述导热板上；

次级安装构件，其夹设在所述 LED 芯片与所述导热板之间，用于减轻因所述 LED 芯片与所述导热板之间的线性热膨胀系数的差异而导致的、作用于所述 LED 芯片上的应力；以及

绝缘板，其形成有一对端子图案，用以分别与所述 LED 芯片的电极电连接，

所述端子图案限定所述引线端子，

所述绝缘板形成有容置所述次级安装构件的孔，所述次级安装构件保持与所述导热板直接接触，

所述 LED 芯片单元具有由所述导热板限定的底面。

11．如权利要求 10 所述的具有 LED 的发光装置，其中，

所述端子图案的一部分在所述绝缘板的表面上露出，以限定外引线，所述外引线在所述窗口的周边上与所述电路板的电路图案电连接。

具有 LED 的照明器具

技术领域。

本发明涉及一种具有 LED（发光二极管）的照明装置。

背景技术

迄今，对通过利用 LED 芯片和作为波长变换材料的荧光粉（荧光颜料、荧光染料等）发光装置的研究已在广泛地进行和发展，所述波长变换材料由来自 LED 芯片的光激发而发出颜色与 LED 芯片的发光颜色不同的光。发光装置能够通过将 LED 芯片与荧光粉结合而发出颜色不同于 LED 芯片的发光颜色的光，从而使白光发射装置（通常称为白光 LED）的商业化。白光发射装置通过将荧光粉与发出诸如蓝色光、紫外光等的 LED 芯片结合而发出白色光（白光的光发射光谱）。

近来，由于 LED 芯片的输出增大，人们已在积极地研究与开发将白光 LED 用作照明装置。日本专利公开第 2003-59332 号提出一种 LED 单元(LED 模块），该 LED 单元包括安装有多个白光 LED 的电路板。

日本专利公开第 2003-168829 号和 2001-203396 号提出了以下结构，这些结构被构造为在伴有高的光输出的同时能够有效地排散热量，所述热量由 LED 芯片的各发光部产生。然而，在传统的 LED 单元中，相应的 LED 芯片直接与电路板上的导电图案电连接，因而从 LED 芯片产生的热量经由电连接部而散布在电路板上。因此，有必要在该电路板的底面连接金属制成的散热板以增强电路板的整个范围上的导热性能，从而增加电路板的成本。此外，当包括这种 LED 单元时，照明装置需要在金属制成的主体与电路板的金属板之间夹设绝缘板（dielectric sheet），以便保护 LED 单元免受避雷涌流（thunder-resistant surge）的影响，以及通过将电路板的金属板热连接至包括该照明装置的一部分的金属制成的主体以增强导热性能。然而，在这种情况下，由于存在夹设在通过电路板从 LED 芯片至金属制成的主体的导热路径上的两个绝缘层，即电路板和绝缘板的绝缘层，因而不能够充分形成的导热

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性能。

发明内容。

考虑到上述问题，本发明旨在提供一种具有发光二极管（LED）的发光装置，该发光装置能够抑制 LED 芯片内的温度上升，以实现高的光输出并降低电路板的成本。根据本发明的发光装置包括：金属制成的主体 90；多个 LED 芯片单元 1，各 LED 芯片单元均包括 LED 芯片和一对引线端子 42、43，这对引线端子电连接至 LED 芯片的电极；以及绝缘层 80，其设置在主体 90 与 LED 芯片单元 1 之间，用以在主体与 LED 芯片单元之间形成电绝缘以及热连接。电路板 20 形成有多个窗口 23，各 LED 芯片单元 1 分别延伸穿过所述窗口，并且所述引线端子保持与电路图案 22 电接触，各 LED 芯片单元均在所述 LED 芯片单元的底面通过绝缘层 80 而与主体 90 热连接。利用这种构造，绝缘层 80 能够不经过电路板而将热量从 LED 芯片传递至主体，从而能够减小 LED 芯片的发光部与主体之间的热阻，用以增强导热性能并抑制 LED 芯片的结区温度（junction temperature）上升。因此，与现有技术相比，能够提高输入电力，从而实现高的光输出。此外，还能够采用较廉价的电路板，诸如玻璃环氧板而不是金属板作为电路板而不必考虑其散热能力，从而降低了电路板的成本。

优选地，各 LED 芯片单元具有由引线端子 42、43 限定的底面，所述引线端子安装在绝缘层 80 上，因而 LED 中产生的热量有效地通过绝缘层从引线端子传导至主体。

优选地，该照明装置形成有：透光构件 91、200，以使来自各 LED 芯片单元的可见光通过；以及镜 24，其形成在电路板 20 的与该透光构件相对的顶面上，用以反射所述可见光。利用这种构造，该镜能够反射从各 LED 芯片单元 1 射出后由透光构件全反射的可见光，从而能够增强光输出。

优选地，在电路板 20 的顶面上形成电路图案 22 和镜 24。

电路图案 22 可形成在电路板 20 的底面。在这种情况下，电路图案和镜可由合适的材料制成并由适当的图案形成，提高图案设计的程度并增大镜的表面积，以进一步增强光输出。

优选地，使用铝制成镜，以增强波长在可见区内的光的反射率。

优选地，主体成形为盘形，该主体的一个面上具有：凹口 192，其用于将各 LED 芯片单元 1 及电路板容置于其中；以及电线插孔 194，其形成在该凹口的底部，延伸穿过该主体的中心，以供连接至电路板的中心处的供电电缆穿过。这种构造不需要用于在该主体的凹口 192 中牵拉电缆的空间，因而可使主体变薄。

在本发明的优选实施例中，主体设置有连接螺钉孔 195，所述连接螺钉孔设置在该主体的凹口 192 的周边，以使多个连接螺钉从该主体表面穿过，从而将该主体 90 固定在支撑材料上。优选地，金属的框形装饰罩 210 上设置窗口 211，以露出透光构件的光输出表面，该装饰罩连接至主体，用以遮蔽主体表面上的凹口 192 的周边以及各连接螺钉。利用这种构造，通过隐藏在装饰罩后的连接螺钉，能够容易地将主体连接至诸如天花板之类的支撑材料。

优选地，透光构件在其与相应的 LED 芯片单元相对的部分处形成有多个透镜，用于控制来自 LED 芯片单元的光的取向（orientation），而该透光构件的其余部分由金属制成。这种构造允许控制来自各 LED 芯片单元的光的取向。由于该透光构件的除透镜之外的部分是由金属制成的，因此与其它完全由合成树脂、玻璃等制成的透光构件相比能够增强导热性能，从而能够进一步抑制 LED 芯片的结区温度的上升。

此外，各 LED 芯片单元优选地包括：导热板 121；其由导热性材料制成，并将 LED 芯片安装至所述导热板上；次级安装构件 30，其夹设在 LED 芯片与导热板之间，用于减轻因 LED 芯片与导热板之间的线性热膨胀系数的差异而导致的、作用于 LED 芯片上的应力；以及绝缘板 122，其安装在导热板上。在这种情况下，在绝缘板 122 的表面上设置一对端子图案，用以与 LED 芯片的相应电极形成电连接，从而形成引线端子。该绝缘板上形成有用于容置次级安装构件的孔，以使该次级安装构件的底面与导热板接触。在这种情况下，该导热板限定了该 LED 芯片单元的底面，因而 LED 芯片中产生的热能够有效地通过次级安装构件 30 和导热板 121 传导到主体，而不经过电路板 20 传导。该次级安装构件能够减轻因 LED 芯片与导热板之间的线性热膨胀系数的差异而导致的、作用于 LED 芯片上的应力。在绝缘板 122 上形成构成 LED 芯片的引线端子的端子图案 123，能够使主体 90 与引线端子 123a、

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123b 之间的绝缘距离加长，并提高其可靠性。

优选地，LED 芯片单元 1 中的端子图案 123 在绝缘板 122 的表面上局部露出，以限定外引线 123b，其中电路板 20 的电路图案 22 在窗口 23 的周边上电连接至外引线 123。

附图说明

图 1 是根据第一实施例的主要部分（essential part）的示意性分解立体图；

图 2 是上述实施例中的主要部分的示意性立体图；

图 3 是上述实施例中的主要部分的示意性剖视图；

图 4 是上述实施例中的局部切开的示意性侧视图；

图 5 是上述实施例中的主要部分的分解立体图；

图 6 是根据第二实施例中的主要部分的示意性分解立体图；

图 7 是上述实施例中的主要部分的示意性剖视图；

图 8 是上述实施例中的主要部分的示意性分解立体图；

图 9 是根据第三实施例中的主要部分的示意性分解立体图；

图 10 是上述实施例中的主要部分的示意性立体图；

图 11 是上述实施例中的主要部分的示意性剖视图；

图 12 包括根据第四实施例的局部切除的示意性主视图（a）和示意性仰视图（b）；

图 13 示出上述实施例中的主体，其中（a）是俯视图，而（b）是沿（a）中的线 A-A′ 剖开的剖视图；

图 14 示出上述实施例中的主体，其中（a）是局部切除的剖视图，而（b）是主要部分的俯视图；

图 15 是上述实施例中的主体的立体图；

图 16 示出上述实施例的透光构件，其中（a）是俯视图，（b）是局部切除的剖视图，而（c）是主要部分的剖视图；

图 17 示出上述实施例中的透光构件的另一种构造实例，其中（a）是俯视图，而（b）是剖视图；

图 18 示出上述实施例中的装饰罩，其中（a）是俯视图，而（b）是沿（a）中的线 A-A′ 剖开的剖视图；

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图 19 是上述实施例中的装饰罩的立体图；

图 20 是安装到上述实施例中的主体的 LED 芯片单元的示意性剖视图；

图 21 是上述实施例中的主要部分的分解立体图；

图 22 是上述实施例中的 LED 芯片单元的主要部分的俯视图；

图 23 是上述实施例中的次级安装构件的立体图；

图 24 示出上述实施例中的装饰板，其中（a）是俯视图，（b）是沿（a）中的线 A-B-C-D 剖开的剖视图，（c）是局部切除的仰视图；

图 25 示出上述实施例中的电路板，其中（a）是俯视图，而（b）是仰视图；

图 26 示出了第五实施例，其中（a）是示意性立体图，而（b）是（a）的主要部分的放大视图；

图 27 是上述实施例的示意性分解立体图；

图 28 是第六实施例的示意性立体图；

图 29 是上述实施例中的主要部分的放大立体图；以及

图 30 是上述实施例的示意性分解立体图。

具体实施方式

（第一实施例）

以下，将参考图 1 至图 5 描述本实施例的发光装置。

本实施例的发光装置用作聚光灯（spot light）或类似用途。主体 90 由金属、诸如 Al 和 Cu 等高导热性金属制成，并通过结合螺钉（bonding screw）113 连接至臂 112。所述臂的一个端部通过杆状螺钉（shaft screw）111 固定至支撑座 100 的可转动的基座 110。

主体 90 成形为有底的筒（本实施例中为有底的柱形筒），并具有开口的表面（前表面）以容纳多个 LED 芯片单元 1（发光器件）。在本主体 90 中，各 LED 芯片单元 1 通过由印刷电路基板（green sheet）制成的绝缘层 80 安装至底部壁 90a，并且开口的表面覆盖有前盖 91。前盖 91 包括：盘形透光板 91a，其由玻璃板制成；以及环形窗框 91b，其用于支撑透光板 91a，该环形窗框 91b 连接至主体 90。绝缘层 80 包含填料，如二氧化硅（silica）、氧化铝等，并且该绝缘层由在加热时具有低粘性的热固性材料如树脂板（例

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如：有机印刷电路基板，如高度填充有包含熔凝石英的填料的环氧树脂板）制成，表现出高的电绝缘性和高的导热性。这种材料在加热时具有高的流动性并粘附至主体90，从而使LED芯片单元1能够牢固地固定至主体90。另外，可利用成形为如印刷电路基板的、非烧结的陶瓷构件作为绝缘层80。透光板91a的材料不限于玻璃板，而是可以为透光的材料，并且透光板91a与多个透镜一体地形成，这些透镜控制从相应的LED芯片单元1发出的光的取向。

相应的LED芯片单元1设置在主体90内部，并通过主体90中的电路板20电连接。电路板20的外周成形为具有直线部分的、局部切除的圆。

电路板20包括形成在其上的玻璃环氧板，该玻璃环氧板具有电路图案22，用以为各LED芯片单元1供电。多个矩形窗口23延伸穿过该电路板的厚度方向，用以分别地将LED芯片容置于其中。在本实施例中，透光板91a形成透光构件，用于使从各LED芯片单元1射出的可见光通过，并远离电路板20的离开主体90的一个表面设置。

电路板20的电路图案22设计为使多个LED芯片单元1彼此并联地连接。包括多条导线的供电电缆（未图示）例如通过焊接等连接至LED芯片单元1构成的并联电路的两端，并延伸穿过在主体90的底部壁90a处形成的电线插孔90c，用以从电源电路（未图示）向LED芯片单元1的并联电路供电。该电源电路包括整流电路（rectifier circuit），该整流电路包括：二极管电桥（diode-bridge），用于对从交流电源如商用电源输出的交流电（AC）进行整流；以及平流电容器（smoothing condenser），用于使整流电路的输出平稳。尽管本实施例示出了在主体90内LED芯片单元1并联连接的情况，但本发明并不限于这种电连接方式，而是可以采用LED芯片单元的串联电连接或串联一并联相结合的方式。

LED芯片单元1包括：矩形的板状LED芯片10；芯片安装构件41，其成形为大于LED芯片10的矩形板，用于支撑LED芯片10；簧片状（reed-shaped）的引线端子42，其一体地形成于芯片安装构件41的一个侧缘上；T形引线端子43，其远离芯片安装构件41的另一个侧缘设置；反射体（reflector）50，其围绕LED芯片10设置，用于反射从LED芯片10的侧面朝向LED芯片10的前侧（图3中的上侧）射出的光；以及保护罩60，其

连接至反射体 50 的前侧，以便覆盖 LED 芯片 10。

芯片安装构件 41 和相应的引线端子 42、43 由包括金属板（例如铜板）的引线框形成。芯片安装构件 41 和相应的引线端子 42、43 与包括合成树脂的、绝缘的矩形框状保持框（holding frame）45 一体地形成，以便分别将芯片安装构件 41 的内引线部 42a、43a 和外引线部 42b、43b 设置在保持框 45 内侧与外侧。上述绝缘层 80 夹设在主体 90 与包括芯片安装构件 41 和相应的引线端子 42、43 的引线框之间，从而在这两者之间形成电绝缘和导热连接。引线端子 42、43 的相应的外引线 42b、43b 通过由焊料形成的结合部 95 而电连接至电路板 20 的电路图案 22。在本实施例中，LED 芯片 10 的封装件（package）包括保持框 45、芯片安装构件 41、各个引线端子 42 和 43、反射体 50、保护罩 60 以及绝缘层 80。此外，在本实施例中，每一个芯片单元 1 均设置绝缘层 80，但也可将多个 LED 芯片单元 1 共同安装至一个略小于主体 90 的底部壁 90a 的印刷电路基板。

引线框的材料并不限于铜，也可以是磷青铜等。尽管在本实施例中，芯片安装构件 41 和相应的引线端子 42、43 与保持框 45 一体地形成，但保持框 45 并不总是必需的，并且芯片安装构件 41 无需与引线端子 42 一体地形成。然而，在将芯片安装构件 41 与引线端子 42 一体形成并设置了保持框 45 的情况下，各 LED 芯片单元 1 在安装至主体 90 之前，可被容易地作为单个部件来操作并单独地检查。

LED 芯片 10 是发蓝光的、氮化镓（GaN）基的蓝色 LED 芯片。LED 芯片 10 包括由导电的 n 型碳化硅（SiC）制成的导电板 11，该 n 型碳化硅的晶格常数（lattice constant）和晶体结构更接近 GaN 而非蓝宝石（sapphire）。在导电板 11 的主表面上形成发光部 12，该发光部由氮化镓基半导体材料制成，并通过外延生长（epitaxial growth）（例如：MOVPE 过程）来获得，以使其具有层状结构，例如双异质结构。在导电板 11 的后侧形成阴极电极（n 型电极）（未图示），作为在阴极侧上的电极。在发光部 12 的表面（导电板 11 的理论表面的最前的表面）形成阳极电极（p 型电极）（未图示），作为在阳极侧上的电极。尽管在本实施例中阴极电极和阳极电极均由镍（Ni）膜和铜（Cu）膜的层压制品组成，但并不特别限定阴极电极和阳极电极的材料，并且可以是一种具有良好的欧姆特性的材料（如 Al 等）。

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在本实施例中，其中一个引线端子 42 形成阴极，而另一个引线端子 43 形成阳极。此外，本实施例示出：LED 芯片 10 安装至芯片安装构件 41，其中 LED 芯片 10 的发光部 12 与芯片安装构件 41 隔开的距离比与导电板 11 隔开的距离更远。考虑到光取出的因素，理想的是将 LED 芯片 10 安装至芯片安装构件 41 并且 LED 芯片 10 的发光部 12 与芯片安装构件 41 隔开的距离比与导电板 11 隔开的距离更远，如本实施例中所示。然而，由于导电板 11 具有与发光部 12 几乎相同的折射率，故光取出损失不会显著增加。因此，可以在使 LED 芯片 10 的发光部 12 与芯片安装构件 41 隔开的距离比与导电板 11 隔开的距离更近的情况下，将 LED 芯片 10 安装至芯片安装构件 41。

反射体 50 成形为框状，以具有开口区域，该开口区域随着反射体 50 沿着 LED 芯片 10 的厚度方向远离 LED 芯片 10 而变大。固定构件 55 由绝缘的片状粘性膜制成，以将反射体 50 固定至相应的引线端子 42、43。应当指出，反射体 50 和固定构件 55 分别形成为具有略小于保持框 45 的内周形状的矩形外周形状。

反射体 50 可由对来自 LED 芯片 10 的光（即：本实施例中的蓝光）具有大的反射率的材料（例如 Al 等）制成。固定构件 55 形成有圆形开口 55a，用以容置反射体 50 的开口部。另外，优选在反射体 50 内部装入（pot）透明的封装树脂如硅树脂等，以形成用于封装 LED 芯片 10 的封装构件。

保护罩 60 具有：圆顶状的罩构件 62，其居中设置在沿着 LED 芯片 10 的厚度方向穿过的中心线上；以及凸缘 61，其设置为从圆顶状的罩构件 62 的开口部的周边横向延伸。凸缘 61 的与反射体 50 相对的表面的周边设有环形肋 61a，用以将保护罩 60 稳固地定位至反射体 50。保护罩 60 必需通过粘合剂如硅树脂、环氧树脂等而连接至反射体 50。

保护罩 60 由透明材料例如硅树脂与粒子状淡黄色荧光材料构成的混合物模制而成，该荧光材料由来自 LED 芯片 10 的蓝色光激发而发出宽频带的淡黄色光。在本实施例的 LED 芯片单元 1 内，保护罩 60 还用作颜色变换构件，其由来自 LED 芯片 10 的光激发而发出颜色与 LED 芯片 10 的发光颜色不同的光，作为整个 LED 芯片单元 1，通过结合来自 LED 芯片 10 的蓝色光与来自淡黄色荧光材料的光而输出白色光。作为构成保护罩 60 的材料，该透明材料并不限于硅树脂，可以是诸如丙烯酸树脂、环氧树脂和玻璃之类的

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一种材料。另外，与构成保护罩 60 的透明材料混合的荧光材料并不限于淡黄色荧光材料。例如，白色光可通过其它荧光材料如淡红色荧光材料和淡绿色荧光材料的混合物来获得。此外，当各 LED 芯片 10 均发出 LED 芯片单元 1 的所需颜色的光时，就不必将荧光材料与透明材料混合。

尽管本发明使用发出蓝色光的蓝光 LED 芯片作为 LED 芯片 10，并使用碳化硅板作为导电板 11，但也可使用氮化镓板来代替碳化硅板。如下文的表 1 中所示与日本特许公开第 2003-168829 号公报中所公开的，与使用绝缘蓝宝石板（dielectric sapphire board）作为晶体成长板相比，使用碳化硅板和氮化镓板作为晶体成长板能够提高导热性并降低其热阻。此外，LED 芯片 10 的发光颜色并不限于蓝色，而是可以为红色、绿色等颜色。即，构成 LED 芯片 10 的发光部 12 的材料并不限于氮化镓基化合物半导体材料，而是根据 LED 芯片 10 的发光颜色，可以为砷化镓基化合物半导体材料、磷化镓基化合物半导体材料等。此外，导电板 11 并不限于碳化硅板，而是可以根据构成发光部 12 的材料而从砷化镓板、磷化镓板等中任选选择。

表 1

晶体成长板	导热率 【W/m・K】	线性热膨胀系数 【$\times 10^{-6}$/K】	热阻 【K/W】
6H-SiC	350	4.2	0.857
GaN	130	5.59	2.308
GaP	110	4.65	2.727
GaAs	54	5.9	5.556
蓝宝石	42	5.3	7.143

表 1 示出了在沿晶体成长板的厚度方向上进行热传导时测量的实验热阻值，该晶体成长板的厚度为 0.3mm、垂直于该厚度的横截面积为 1mm^2。

LED 芯片 10 安装至芯片安装构件 41，其中矩形板状的次级安装构件 30 夹设在 LED 芯片 10 与芯片安装构件 41 之间。次级安装构件 30 的尺寸大于 LED 芯片 10，次级安装构件 30 不仅减轻了由于 LED 芯片 10 与还用作导热板的芯片安装构件 41 之间的线性膨胀系数的差异而施加到 LED 芯片 10 上的应力，而且将 LED 芯片 10 中所产生的热量传导至芯片安装构件 41，以便在比 LED 芯片 10 的区域更宽的区域上传递热量。理想的是，芯片安装构件

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41 的与 LED 芯片 10 相对的表面面积充分地大于 LED 芯片 10 的与芯片安装构件 41 相对的表面面积。优选地，增大接触面积，以便降低芯片安装构件 41 与绝缘层 80 之间的导热率，从而在宽的区域上均匀地传导，能够有效地从 LED 芯片 10 散热。对于 0.3 mm^2-1.0 mm^2 的 LED 芯片 10 而言，优选地，芯片安装构件 41 的与 LED 芯片 10 相对的表面面积比 LED 芯片 10 的与芯片安装构件 41 相对的表面面积大 10 倍以上。在此，需要次级安装构件 30 来减轻应力。当次级安装构件 30 满足这种需要时，次级安装构件 30 必须是薄的，或由较高导热率的材料制成，以便减小热阻。

在本实施例中，钨铜（CuW）用作构成次级安装构件 30 的材料。LED 芯片 10 设有：阴极电极，其通过次级安装构件 30 和芯片安装构件 41 电连接至一个引线端子 42 的内引线部 42a；以及阳极电极，其通过由金属细线（thin wire）（例如，金细线、Al 细线等）制成的结合线（bonding wire）14 电连接至另一个引线端子 43 的内引线部 43a。电路图案 22 通过由焊料形成的结合部 95 电连接至引线端子 42、43 的相应的外引线部 42b、43b。

次级安装构件 30 的材料并不限于钨铜，而是可以为线性热膨胀系数比较接近由 6H-SiC 制成的导电板 11 的线性热膨胀系数、并且导热率较高的材料，诸如 W、AlN、复合碳化硅（complex SiC）、硅等，如下文的表 2 中所列。然而，当将绝缘体如 AlN 或复合碳化硅用于次级安装构件 30 时，导电图案需要设置在次级安装构件 30 的面对 LED 芯片 10 的表面上，用以接合阳极电极，并且需要利用结合线电连接至一个引线端子 42 的内引线部 42a。

表 2

材料		线性热膨胀系数 【$\times 10^{-6}$/K】	导热率 【W/m·K】
晶体成长板	6H-SiC	4.2	350
	GaN	5.59	130
	GaP	4.65	110
	GaAs	5.9	54
	蓝宝石	5.3	42
次级安装构件	Al	23.2	237
	Cu	16.6	398

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	W	4.5	178
	CuW	6.4	160
	Si	2.6	168
	AlN	4.6	165
	Alumina	7.1	29
粘合材料	Au	14.2	315
	63Sn-37Pb	21.0	50
	银膏	70.0	1.1

在此，当使用 Cu 作为芯片安装构件 41 的材料时，采用 CuW 或 W 制造次级安装构件 30，以便将次级安装构件 30 直接结合至芯片安装构件 41，这样与采用在次级安装构件 30 与芯片安装构件 41 之间进行钎焊相比，能够增大次级安装构件 30 与芯片安装构件 41 之间的结合面积并减小两者之间的热阻，如下文的表 3 中所示。应当指出，用于将 LED 芯片 10 结合至次级安装构件 30 的焊料由无铅材料如 AuSn、SnAgCu 等制成。

表 3

	钎焊	直接结合
结合面积	60%-80%	大致为 100%
结合强度	98N/mm^2 或更大	127N/mm^2 或更大
剪切强度	98N/mm^2	127N/mm^2
结合部分	其上可能残留焊剂	

另外，可使用 W 制造次级安装构件 30，以便直接结合至芯片安装构件 41，这样与利用银焊进行结合相比，能够增大导热率并降低热阻，如下文的表 4 中所示。当芯片安装构件 41 的材料为 Cu，并且次级安装构件 30 的材料从 AlN、复合碳化硅等材料中选择时，焊料基本上由无铅材料如 AuSn、SnAgCu 等制成，用以将芯片安装构件 41 结合至次级安装构件 30。

	银焊	直接结合
导热率【W/m·K】	185.4	211.8

在本实施例中，使用 LED 的照明装置在电路板 20 的与透光板 91a 相对

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的表面上设有镜 24，该镜 24 由反射可见光的反射膜（例如：Al 膜之类的金属膜）形成。由于镜 24 使得从各 LED 芯片单元 1 发出后被透光板 91a 全反射的可见光在镜 24 上反射，因此与未设置镜 24 的装置相比，镜 24 能够提高光输出。在此，在电路板 20 的与透光板 91a 相对的表面分别地设置电路图案 22 和镜 24，提高了设计电路图案 22 的自由度。这样能够任选地选择电路图案 22 和镜 24 的材料，从而能够通过选择高反射率的材料用于镜 24 而进一步提高光输出。例如，使用 Al 作为镜 24 的材料就比使用 Ni 作为镜的材料为可见区中光提供了更高的反射率和提供了更高的光输出。尽管在本实施例中采用 Au 作为电路图案 22 的材料，但电路图案 22 的材料不限于 Au，而是可以为 Cu 等。

在上述实施例的具有 LED 的照明装置中，各 LED 芯片单元 1 中产生的热量，能够通过绝缘层 80 如印刷电路基板但不通过电路板，而被传导至金属制成的主体 90。传统的照明装置包括热连接至照明装置底部的电路板，其中在电路板与照明装置底部之间夹设绝缘材料。与传统的照明装置相比，本实施例构造为减小 LED 芯片 10 的发光部 12 与主体 90 之间的距离，并降低两者之间的热阻，以增强导热性能，以便降低发光部 12 的结区温度的上升，从而允许提高输入功率以实现高的光输出。此外，与传统的具有 LED 的照明装置相比，本发明的照明装置能够抑制 LED 芯片 10 的结区温度的上升，在得到同样的光输出功率的条件下延长 LED 芯片 10 的使用寿命。

此外，该照明装置不需要在传统设计中使用的金属板（金属基印刷电路板）作为电路板 20，从而能够采用比金属电路板 20 价格更低廉的电路板如玻璃环氧板，以便降低电路板 20 的成本。

当 LED 芯片 10 与芯片安装构件 41 之间的线性热膨胀系数的差异较小时，无需在 LED 芯片 10 与芯片安装构件 41 之间夹设次级安装构件 30。不具有次级安装构件的照明装置能够缩短 LED 芯片 10 与金属制成的主体 90 的底部壁 90a 之间的距离，降低 LED 芯片 10 的发光部 12 与主体 90 之间的热阻，由此改善其导热性能，以实现更高的光输出。

（第二实施例）

该实施例的具有 LED 的照明装置的构造与第一实施例的构造大致相同。如图 6 至图 8 所示，本实施例中的 LED 芯片单元 1 不同于第一实施例中的

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LED 芯片单元 1。与第一实施例中的组件相同的组件采用相同的附图标记来表示，并且不必进行重复说明。与第一实施例类似，本实施例中设有前盖 91（参见图 4）。

在本实施例中，使用安装板（芯片安装构件）70，来代替第一实施例中的芯片安装构件 41、相应的引线端子 42、43 以及保持框 45，该安装板 70 包括：矩形板状的导电板 71，其表面上承载 LED 芯片 10；以及绝缘膜 72，其叠置在导电板 71 上，并且该绝缘膜 72 的表面上分别形成有图案化的引线端子 73、73，用以与 LED 芯片 10 的阳极电极和阴极电极相连接。导电板 71 设置在承载 LED 芯片 10 的次级安装构件 30 与安装在主体 90 的底部壁 90a 上的绝缘层 80 之间。导电板 71 基本上由具有较高导热率的材料如铜、磷青铜等制成。引线端子 73、73 的材料可以是铜等。导电板 71 的材料的厚度需与安装 LED 芯片 10 的引线框的厚度几乎相同，因而与相关技术中公开的 LED 单元中的电路板的厚度相比，可以使厚度尺寸减小。

在本实施例中，安装单元 51 与反射体 50 一体形成，用以容置环形定位肋 61a，该定位肋 61a 从保护罩 60 的凸缘 61 延伸，以使保护罩能够稳固地相对于反射体 50 定位。

此外，在本实施例中，位于 LED 芯片 10 的一个表面（图 7 中的顶面）上的阳极电极（未图示）通过结合线 14 电连接至一个引线端子 73 的一个端（内引线部），而位于 LED 芯片 10 的另一侧（图 7 中的底面）上的阴极电极（未图示）通过结合线 14 电连接至另一个引线端子 73 的一个端部（内引线部），而各引线端子 73 的其它端部通过由焊料形成的结合部 95 而电连接至电路板 20 的电路图案 22。在本实施例中，LED 芯片 10 的封装件包括芯片安装构件 70、反射体 50 和保护罩 60。

与现有技术相比，本实施例中的具有 LED 的照明装置能够降低 LED 芯片 10 的发光部 12 与主体 90 之间的热阻，增强导热性能，从而抑制 LED 芯片 10 的结区温度的上升，这与第一实施例类似。这种构造允许提高输入电功率以实现高的光输出。通过使用比金属板更廉价的电路板如玻璃环氧板等，能够降低电路板 20 的成本。

当 LED 芯片 10 与导电板 71 之间的线性热膨胀系数的差异较小时，无需在 LED 芯片 10 与芯片安装构件 70 的导电板 71 之间夹设次级安装构件 30。

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不具有次级安装构件 30 的照明装置能够缩短 LED 芯片 10 与金属制成的主体 90 的底部壁 90a 之间的距离，降低 LED 芯片 10 的发光部 12 与主体 90 之间的热阻，从而改善其导热性能以实现更高的光输出。

本实施例还能够使各 LED 芯片单元 1 在安装至主体 90 之前，被容易地作为单个部件来操作并单独地检查。

（第三实施例）

本实施例的具有 LED 的照明装置的构造与第一实施例的构造几乎相同。如图 9 至图 11 所示，本实施例中的电路板 20 的构造与第一实施例不同。与第一实施例中的组件相同的组件采用相同的附图标记来表示，并且不必进行重复的说明。与第一实施例类似，本实施例中设有前盖 91（参见图 4）。

在该实施例中，电路图案 22 从电路板 20 的一个表面经过窗口 23 的周边延伸至该电路板 20 的与透光板 91a（参见图 4）相对的另一个表面，以便在窗口 23 的周边上形成结合区 95，电路图案 22 在该结合区 95 通过结合材料如焊料而电连接至 LED 芯片单元的导电端子 42、43。

与第一实施例相比，该实施例的具有 LED 的发光装置能够形成为使电路板 20 的面对透光板 91a 的表面上的镜 24 的面积增大，从而能够进一步增强高的光输出。第二实施例的电路板 20 可由本实施例的电路板 20 替代。

（第四实施例）

现在，将参考图 12 至图 25 来描述本实施例的具有 LED 的发光装置。与第一实施例中的组件相同的组件采用相同的附图标记来表示，并不必进行重复说明。

本实施例中的具有 LED 的发光装置为顶壁灯（ceiling light），包括由金属（例如，诸如 Al、Cu 之类的高导热性的金属）制成的主体 190，并且该顶壁灯连接至支撑材料 180 如天花板结构。如图 12 至图 15 所示，主体 190 形成为盘形，并在主体 190 的远离支撑材料 180 的表面（图 12 中的（a）的底面）设有圆形的开口的凹部（recess）191。该凹部 191 的内部底面设有凹口 192，用以容置多个（本实施例中为 8 个）LED 芯片单元 1 和圆形板状的电路板 20。在此，电路板 20 形成有多个（本实施例中为 8 个）圆形的窗口 23（参见图 25），用以部分地容置相应的 LED 芯片单元 1。电路板 20 形成有电路图案 22（参见图 25 中的（a）），以便向该电路板 20 的与凹口 192

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的内部底面相对的表面上的 LED 芯片单元 1 供电，并设置在主体 190 的与各 LED 芯片单元 1 相同的一侧。图 25 中的（a）中的电路图案 22 形成为与八个 LED 芯片单元 1 串联连接。

主体 190 在其另一个面（图 12 中的（a）中的顶面）的中心处形成有柱形埋入部 193，该埋入部 193 从主体 190 凸伸，以待插入支撑材料 180 中的圆形连接孔 181 内。主体 190 设有电线插孔 194，该电线插孔 194 从埋入部 193 的前边缘表面和凹口 192 的内部底面的中心延伸。电线插孔 194 能够将用于向电路板 20 供电的供电电缆 96、96 导入凹口 192。换言之，电线插孔 194 形成在主体 190 的凹口 192 的底部。为了接收来自另一个电源单元（未图示）电力，第二连接器 97 在与该第一连接器的与通向电路板 20 的各供电电缆 96、96 相对的一侧的端部可拆卸地与该第一连接器相连接。

在电路板 20 的中心处形成一对供电通孔 26、26（参见图 25），以与供电电缆 96、96 电连接。各供电通孔 26、26 形成为使其内表面及其周边被覆盖，以便利用焊料连接供电电缆 96、96。这种结构不需要在主体 190 的凹口 192 内构造用于牵拉供电电缆 96、96 的空间，从而使主体 190 变薄。每一个供电通孔 26、26 均电连接至电路板 20 的表面上的电路图案 22。

现在，将参考图 20 至图 24 描述 LED 芯片单元 1。

LED 芯片单元 1 包括：LED 芯片 10；安装板 120， LED 芯片 10 安装在该安装板 120 上；框体 140，其设置为在安装板 120 的支撑 LED 芯片 10 的同一侧围绕该 LED 芯片 10；结合线 14、14，其连接至 LED 芯片 10；封装构件 150，其由透光材料（封装树脂）形成，用于将 LED 芯片 10 和结合线 14、14 封装在框体 140 内；透镜 160，其设置为覆盖封装构件 150 和框体 140；以及圆顶状的颜色变换构件 170，其由透明材料和荧光材料模制而成，该荧光材料由来自 LED 芯片 10 的光激发，以发出颜色与 LED 芯片 10 的发光颜色不同的光。该颜色变换构件 170 设置在该透镜上方，以便在透镜 160 的光输出表面 160b 与框体 140 的外表面之间形成空气层 180。

安装板 120 包括金属板 121 和绝缘板 122，该绝缘板 122 由玻璃环氧（FR4）板制成，并叠置在该金属板 121 上。绝缘板 122 设有一对端子图案 123、123，所述一对端子图案 123、123 包括电连接至 LED 芯片 10 的相应电极的导电图案。绝缘板 122 在其对应于 LED 芯片 10 的部分处形成有孔 124。

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尽管在本实施例中采用 Cu 作为金属板 121 的材料，但金属板 121 的材料并不限于铜，而可以是具有较高导热性的金属材料如 Al。在该实施例中的 LED 芯片单元 1 中，金属板 121 形成由导热材料制成的导热板，并支撑 LED 芯片 10。端子图案 123、123 分别形成电连接至 LED 芯片 10 的相应电极的引线端子。

绝缘板 122 被利用结合金属层 125（参见图 20 和图 24）而安装在金属板 121 上，该结合金属层 125 由金属（在本实施例中为 Cu）制成，并形成在绝缘板 122 的与金属板 121 相对的表面。各引线图案 123、123 包括 Cu 膜、Ni 膜和 Ag 膜的层压制品。阻挡层（resist layer）126（参见图 24）由发白的树脂制成，并设置在绝缘板 122 的远离金属板 121 的表面，以便覆盖各引线图案 123、123。阻挡层 126 的中心处设有圆形窗口 126a，用于露出这些引线图案 123、123 的内引线部 123a、123a；阻挡层的周边设有圆形窗口 126b、126b，用于露出这些引线图案 123、123 的相应的外引线部 123b、123b。

LED 芯片 10 安装至上述金属板 121，在 LED 芯片 10 与金属板 121 之间夹设矩形板状的次级安装构件 30。次级安装构件 30 的尺寸大于 LED 芯片 10，次级安装构件 30 不仅减轻了由于 LED 芯片 10 与金属板（导热板）121 之间的线性膨胀系数的差异而施加到 LED 芯片 10 上的应力，而且将 LED 芯片 10 中产生的热量传导至金属板 121，以便在比 LED 芯片 10 的区域更宽的区域上传递热量。在该实施例中，由于 AlN 具有较高的导热率与绝缘性能，所以采用 AlN 作为次级安装构件 30 的材料。次级安装构件 30 的与 LED 芯片 10 相对的表面设有阴极电极，该阴极电极通过导电图案 31（参见图 23）和由金属细线 14（例如，金细线、Al 细线等）构成的结合线 14 电连接至其中一个引线图案 123。阳极电极通过结合线 14 而电连接至另一个引线图案 123。应当指出，在这种连接中，尽管 LED 芯片 10 和次级安装构件 30 可通过焊料如 SnPb、AuSn、SnAgCu 或银膏而连接，但是它们优选使用无铅焊料如 AuSn、SnAgCu 而连接。另外，在次级安装构件 30 的导电图案 31 的周边还设有反射膜 32（如 Ni 膜和 Au 膜的层压制品），以便反射从 LED 芯片 10 发出的光。

次级安装构件 30 的材料并不限于 AlN，而可以是线性热膨胀系数比较接近由 6H-SiC 制成的导电板 11 的线性热膨胀系数、并且导热率较高的材料

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（例如，化合碳化硅、硅等）。由于在本实施例中，LED 芯片 10 安装至金属板 121 并且在 LED 芯片 10 与金属板 121 之间夹设次级安装构件 30，所以 LED 芯片 10 中产生的热量能够通过次级安装构件 30 和金属板 121 而有效地辐射，同时使得因 LED 芯片 10 与金属板 121 之间的线膨胀系数的差异而施加在 LED 芯片 10 上的应力能够被减轻。

在该实施例中，使用硅树脂作为封装构件 150 的透光材料，但此材料并不限于硅树脂，而可以是丙烯酸树脂等。

框体 140 具有筒形形状并包括透明硅树脂的模制品，其中使用硅树脂作为用于该模制品的透明树脂。即，在本实施例中，框体 140 由与封装构件 150 的材料的线性热膨胀系数几乎相同的透光材料形成。在本实施例中，将构成封装构件 150 的透光材料装入框体 140 内，然后热固化，以形成封装构件 150，随后将框体 140 固定至安装板 120。当使用丙烯酸树脂代替硅树脂作为封装构件 150 的透光材料时，框体 140 优选由丙烯酸树脂的模制品形成。框体 140 优选为设置在绝缘板 122 的远离金属板 121 的一个表面，以便围绕 LED 芯片 10 和次级安装构件 30。

透镜 160 成形为两面凸透镜，以便具有凸起形状的光输出表面 160b 和与封装构件 150 相对的光输入表面 160a。尽管在该实施例中，透镜 160 包括硅树脂的模制品，并具有与封装构件 150 相同的折射率，但透镜 160 并不局限于硅树脂的模制品，而可以是丙烯酸树脂的模制品。

透镜 160 的光输出表面 160 b 形成为凸起的表面，以使光输出表面 160b 与空气层 180 之间的界面免于全反射从光输入表面 160a 发出的光。在此，将透镜 160 设置为使其光轴与沿着 LED 芯片 10 的厚度方向经过发光部 12 的中心的线相重合。本构造允许从 LED 芯片 10 发出的光经过该颜色变换构件 170 而不会激发或碰撞颜色变换构件 170 内的荧光材料，随后经过封装构件 150 和空气层 180 传播。

颜色变换构件 170 由透明材料（例如硅树脂）与粒子状淡黄色荧光材料的混合物模制而成。该荧光材料由从 LED 芯片 10 发出、并随后经过封装构件 150 的蓝光激发，能够发出宽频带的淡黄色光。本实施例中的 LED 芯片 1 构造为通过颜色变换构件 170 的外表面 170b，将来自 LED 芯片 10 的蓝光和来自淡黄色荧光材料的光射出，从而能够获得白色光。关于构成颜色变换构

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件 170 的材料，所述透明材料并不限于硅树脂，而可以是诸如丙烯酸树脂、环氧树脂和玻璃之类的一种材料。另外，与颜色变换构件 170 的透明材料混合的荧光材料并不限于淡黄色荧光材料。例如，白色光可通过其它荧光材料如淡红色荧光材料和淡绿色荧光材料的混合物来获得。

颜色变换构件 170 形成为适配于透镜 160 的光输出表面 160b，以使颜色变换构件 170 的内表面 170a 与透镜 160 的光输出表面 160b 隔开几乎一致的距离，并且颜色变换构件 170 构造为在整个表面上具有恒定的壁厚。颜色变换构件 170 可通过粘合剂（例如：硅树脂、环氧树脂）而在其开口侧的周边固定至安装板 122。

该实施例中的 LED 芯片单元 1，次级安装构件 30 成形为平板状（plane-like），其水平尺寸大于 LED 芯片 10 的水平尺寸，在导电图案 31 周边，也就是结合至 LED 芯片 10 的结合部设置反射膜 32。反射膜 32 构造为反射来自 LED 芯片 10 的侧面的光，并且反射膜 32 具有厚度，以使其底面比颜色变换构件 170 的与绝缘板 122 相对的边缘更远离金属板 121，从而防止绝缘板 122 吸收从 LED 芯片 10 的侧面射出的光，进而能够提高器件的光取出效率。此外，反射膜 32 不允许从 LED 芯片 10 的侧面射出的光经过颜色变换构件 170 与绝缘板 122 之间结合部而向外传播，这就抑制 LED 芯片单元的颜色不均匀，从而能够增强用于改善器件的光取出效率的光输出。

在该实施例中，LED 芯片 10 安装在次级安装构件 30 的中央，以使在水平视图中，LED 芯片 10 的每一侧均与次级安装构件 30 的对角线垂直相交，使反射体 32 能够朝向次级安装构件 30 有效地反射从 LED 芯片 10 的侧表面发出的光，从而能够增强用于改善器件的光取出效率的光输出。在本实施例中，将 LED 芯片 10 和次级安装构件 30 设置为沿着厚度方向具有共同的中心轴线，LED 芯片 10 的各个对角线与次级安装构件 30 的对角线以 45 度角相交。在本实施例中，如上所述，由于安装板 120 包括绝缘板 122 叠置于金属板 121 上的层状结构，就使得主体 190 与引线端子 123、123 之间的绝缘距离加长，由此与第一实施例相比，改善了其可靠性。

在本实施例的 LED 芯片单元 1 中，由于设置为在透镜 160 的光输出表面 160b 与框体 140 之间形成空气层 180，同时使框体 140 与透镜 160 脱离密切接触，因而颜色变换构件 170 能确保避免其它因颜色变换构件 170 的尺寸

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不精确或其定位不精确等原因所致的产量降低。此外，在该实施例的 LED 芯片单元 1 中，颜色变换构件 170 能确保避免其它因该颜色变换构件 170 的尺寸不精确或其定位不精确等原因所致的产量降低。在颜色变换构件 170 与透镜 160 之间形成空气层 180，以降低透镜 160 与因其中的外力作用而变形的颜色变换构件 170 之间接触的可能性。该空气层使得 LED 芯片 10 与相应的结合线 14、14 免受应力的作用，从而提高了可靠性，所述应力响应于外力而在颜色变换构件 170 内产生并随后经由透镜 160 和封装构件 150 传递。另外，由于在颜色变换构件 170 与透镜 160 之间设置空气层 180，所以能够抑制外界的湿气传递至 LED 芯片。

由于在颜色变换构件 170 与透镜 160 之间存在空气层 180，所以透镜 160 使得仅有一小部分的光通过透镜 160，所述光在从 LED 芯片 10 发出后经过封装构件 150 和透镜 160 而入射到颜色变换构件 170 上之后，从颜色变换构件 170 内的淡黄色荧光粒子散射，从而整体上改善了 LED 芯片单元 1 的光取出效率。

各 LED 芯片单元 1 均通过由印刷电路基板制成的绝缘层 80 而安装至主体 190 的凹部 192 的内部底面。与其它实施例相似，本实施例中的具有 LED 的发光装置能够抑制 LED 芯片 10 的温度上升，从而可以实现高的光输出以及降低电路板 20 的成本。

图 25 所示的电路板 20 的窗口 23 形成为圆形，用于容置 LED 芯片单元 1 的颜色变换构件 170。电路板 20 设有多个通孔 27，用于在与 LED 芯片单元 1 的相应外引线 123b 重叠的各窗口 23 的周边上通过钎焊材料如焊料而使外部引线 123b 和电路图案 22 电连接。各通孔 27 均形成为：该孔的沿着电路板 20 的厚度方向延伸的内表面及其在电路板 20 的两侧的周边被覆盖，以便连接电路板 20 上的电路图案 22。与第二实施例相似，电路板 20 的与下文所述的透光构件 200 相对的表面上可设有镜 24（参见图 9）以及作为光反射膜的带白色的阻挡层。

上述主体 190 包括多个（本实施例中为两个）连接螺钉孔 195，所述连接螺钉孔 195 从凹部 191 的内部底面延伸至主体 190 的另一表面，以供多个（本实施例中为两个）连接螺钉 198 穿过，从而能够利用连接螺钉 198 将主体 190 连接至支撑材料 180，如天花板结构。

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透光构件 200 设置在电路板 20 的远离主体 190 的凹口 192 的内部底面的表面上方，用于通过来自各 LED 芯片单元 1 的可见光。

透光构件 200 由透光材料（例如：丙烯酸树脂等）的模制品形成。该透光构件 200 包括：前板部 201，其与电路板 20 隔开；以及环形的侧板部 202，其从前板部 201 的周缘朝向主体 190 的凹部 191 的内部底面延伸，如图 12 至图 16 所示。主体 190 形成有两个固定螺钉孔 197，固定螺钉 199 插入固定螺钉孔 197 中，以便将透光构件 200 固定至主体 190。两个凸起部（boss part）203 与透光构件 200 一体形成，并设有固定螺钉孔 204 用以容置从主体 190 的上表面穿过固定螺钉孔 197 插入的固定螺丝 199 的前部边缘。电路板 20 的周边部分形成有与凸起部 203 相对应的切口部 28。

本发明的具有 LED 的发光装置包括装饰罩 210，用以覆盖主体 190 上的凹口 192 的周边及各连接螺钉 198。装饰罩 210 具有圆形开口的窗口 211，用以露出透光构件 200 的光输出表面（图 12 中的（a）中的底面）。主体 190 通过连接螺钉 198 连接至天花板材料 180，随后装饰罩 210 固定至主体 190，从而能够因连接螺钉 198 隐藏在装饰罩 210 后面而改善其美观性。在此，装饰罩 210 由弹性合成树脂（例如：PBT、ABS 等）形成，并设有多个接合凸起 212，所述接合凸起 212 从装饰罩 210 的与主体 190 相对的表面凸出，用以分别接合至主体 190 中形成的多个接合孔 196。换言之，装饰罩 210 能够通过将多个接合凸起 212 分别接合至主体 190 的多个接合孔 196 而连接至主体 190。

尽管装饰罩 210 由合成树脂的模制品形成，但是装饰罩 210 也可由金属制成，以便增强导热性能并抑制 LED 芯片 10 的结区温度的上升（与由合成树脂制成的装饰罩相比）。当装饰罩 210 由金属制成时，其可形成为利用板簧可拆卸地安装在主体 190 上，或利用螺钉固定在该主体上。

在透光构件 200 中，前板部 201 形成为平板，但也可以是具有多个透镜 205 的、由透光材料（例如：丙烯酸树脂、玻璃等）构成的模制品，所述透镜 205 分别设置在该前板部的与 LED 芯片单元 1 相对的部分处，用以控制从 LED 芯片单元 1 发出的光，如图 17 中所示。在此，各透镜 205 均为菲涅耳透镜，并设有用于容置 LED 芯片单元 1 的颜色变换构件 170 的凹部 206。各透镜 205 均设置为使其光轴与 LED 芯片单元 1 的透镜 160 的光轴重合。

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各透镜 205 均能够使从凹部 206 的内表面 206b 发射的光朝向透镜 205 的光输出表面 205a 定向。

当透光构件中除透镜 205 之外的部分由金属制成时，与其完全由合成树脂、玻璃等材料制成相比，图 17 中的这种构造能够增强导热性能、并抑制 LED 芯片 10 的结区温度的上升。

（第五实施例）

如图 26 和图 27 所示，本实施例的具有 LED 的照明装置与第四实施例的不同之处在于金属制成的主体 290 的形状，而本实施例的 LED 芯片单元 1 中的构造与第四实施例相同。与第四实施例中的组件相同的组件采用相同的附图标记来表示，并且不必对其进行重复说明。

该实施例中的主体 290 形成为带板状（伸长的矩形板状），并包括多个（在所示的实例中为八个）LED 芯片单元 1，凹部 290a 用于容置带板状的电路板 20。在此，将多个 LED 芯片单元 1 沿主体 290 的纵向方向隔开预定的间隔。与第四实施例类似，各 LED 芯片单元 1 均通过由印刷电路基板等制成的绝缘层 80（参见图 20）安装至主体 290 的凹部 290a 的内部底面。

在电路板 20 的与凹部 290a 的内部底面相对的表面形成用于串联连接 LED 芯片单元 1 的电路图案（未图示），以便与通过插孔（未图示）延伸至凹部 290a 的电线（未图示）合适地连接。应当指出，与第四实施例类似，电路板 20 在其与各 LED 芯片单元 1 相对应的部分处设有窗口 23 和两个通孔 27。

与第四实施例类似，本实施例的使用 LED 的照明装置还能够抑制 LED 芯片 10 中的温度上升，用以实现高的光输出，并降低电路板 20 的成本。本实施例中的电路板 20 不限于玻璃环氧板，而可以是诸如柔性印制线路板（FPC）之类的板。

（第六实施例）

本实施例的具有 LED 的照明装置的 LED 芯片单元 1 的基本构造与第五实施例几乎相同。在第五实施例中，在主体 290 内利用一个电路板 20 连接所有的 LED 芯片单元，而在本实施例中，通过多个电路板 20 连接所有的 LED 芯片单元，如图 28 至图 30 所示。在该实施例中，应当指出，沿着主体 290 的纵向方向为每一个串联的电路板 20 设置两个 LED 芯片单元，其中相邻的

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LED 芯片单元利用引线（未示出）电连接。本实施例的其它构造与第四实施例相同，并且不必进行重复的说明。

在其它实施例中，可用多个电路板替换一个电路板 20，以便合适地连接这些 LED 芯片单元。

尽管在上述各实施例中，将玻璃环氧板作为电路板 20 予以示例说明，但电路板 20 也可以是诸如陶瓷 MID 板，在其未与 LED 芯片单元重叠的部分形成有多个凸起，所述凸起与主体接触，以便进一步增强导热性能。

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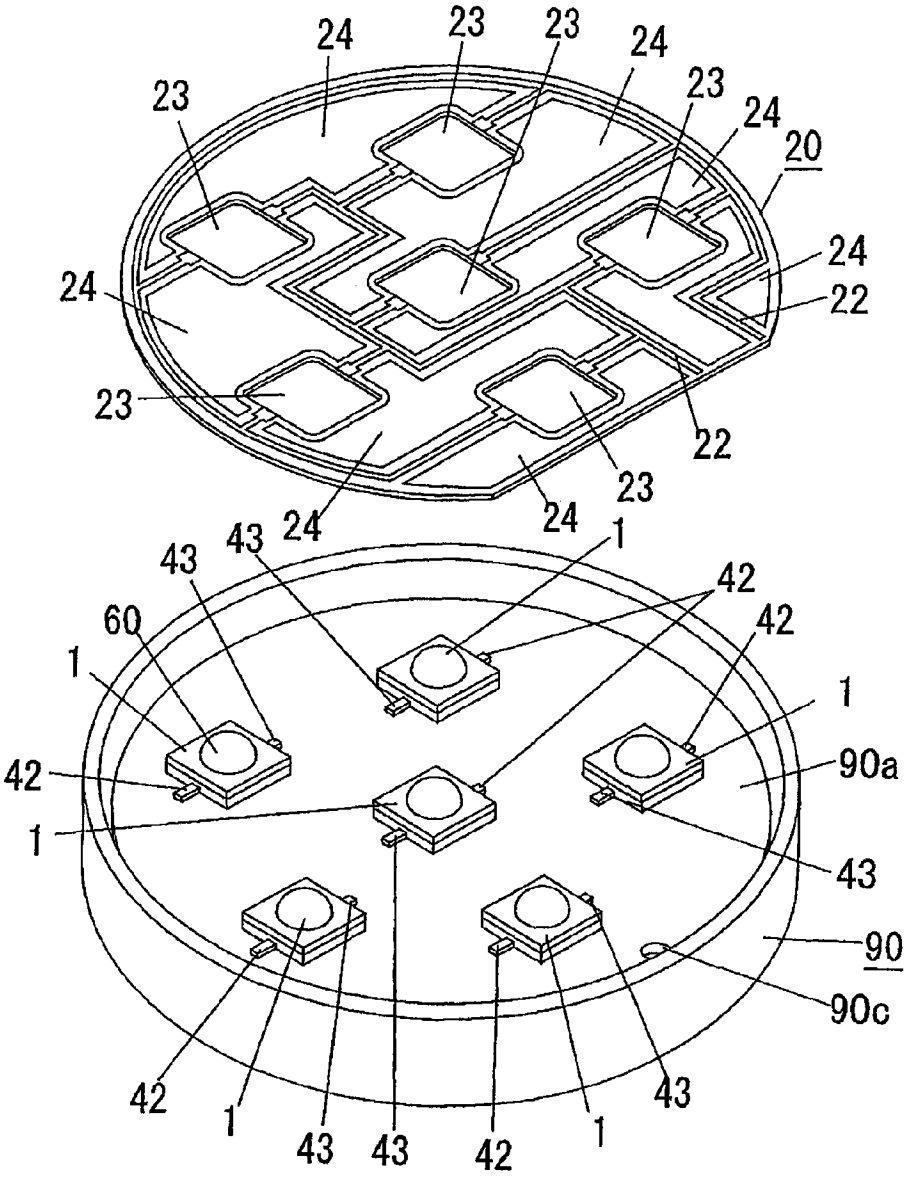

24
23
23
24
23
24
20
23
24
22
24
23
22
23
24
24
43
43
1
42
42
60
1
1
42
90a
1
43
90
90c
42
1
43
43
42
1
43

图1

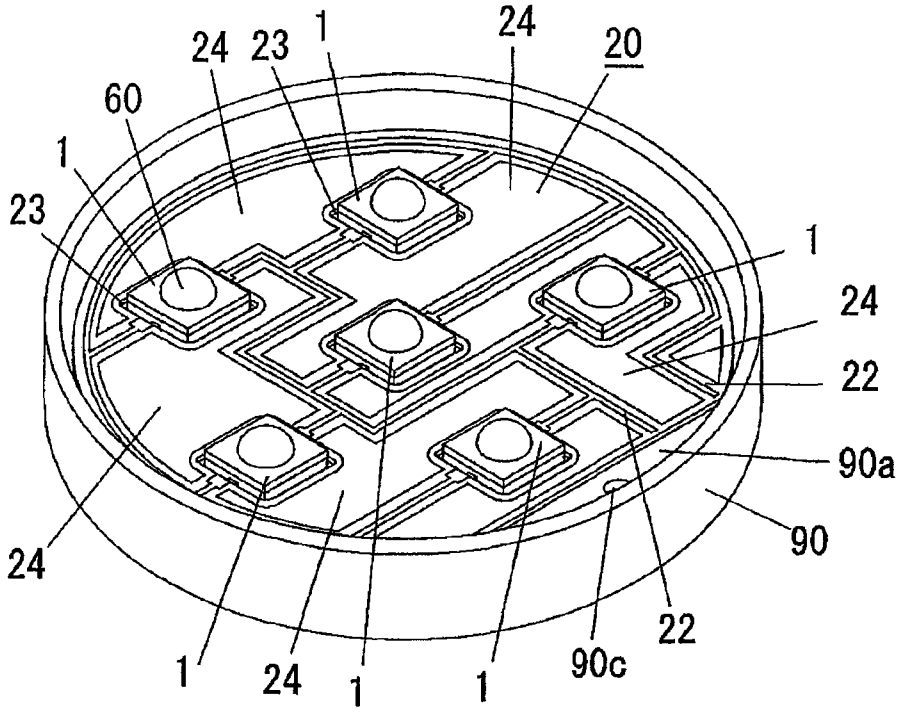

24
23
1
24
20
60
1
23
1
24
22
90a
90
24
1
24
1
1
90c
22

图2

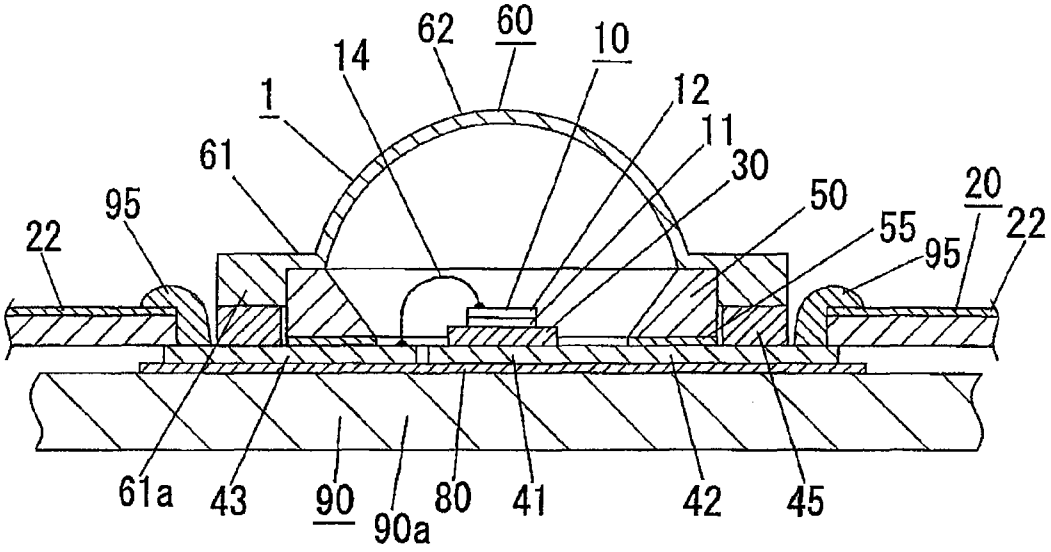

62
60
14
10
1
12
11
61
30
50
20
95
55
95
22
22
61a
43
90
90a
80
41
42
45

图3

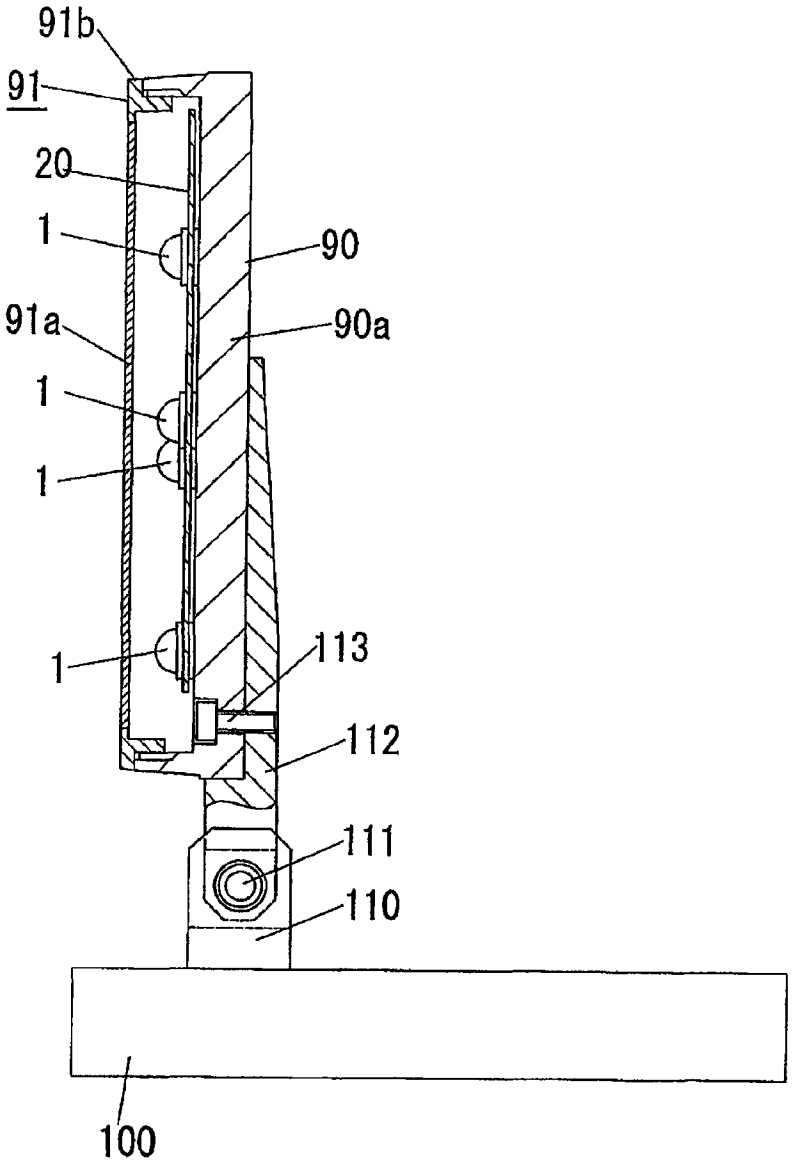


图4

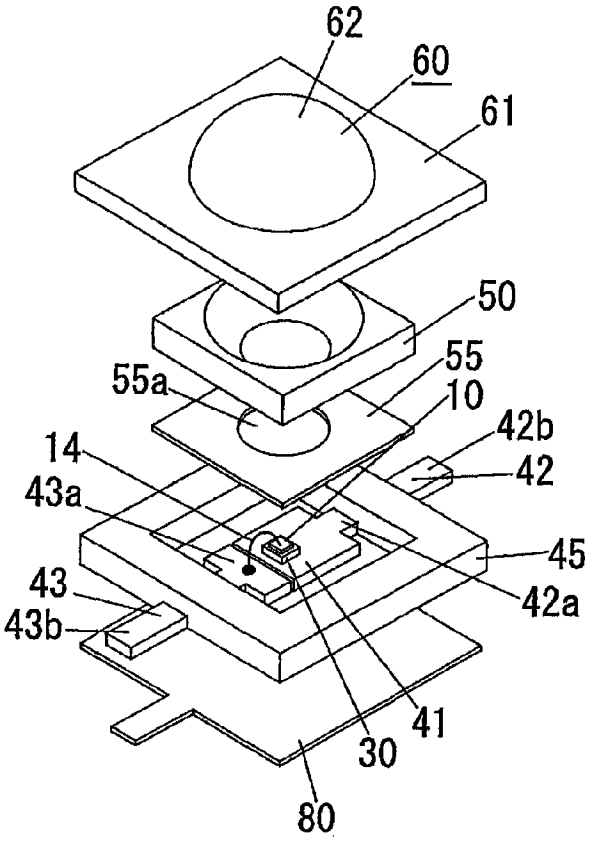


图5

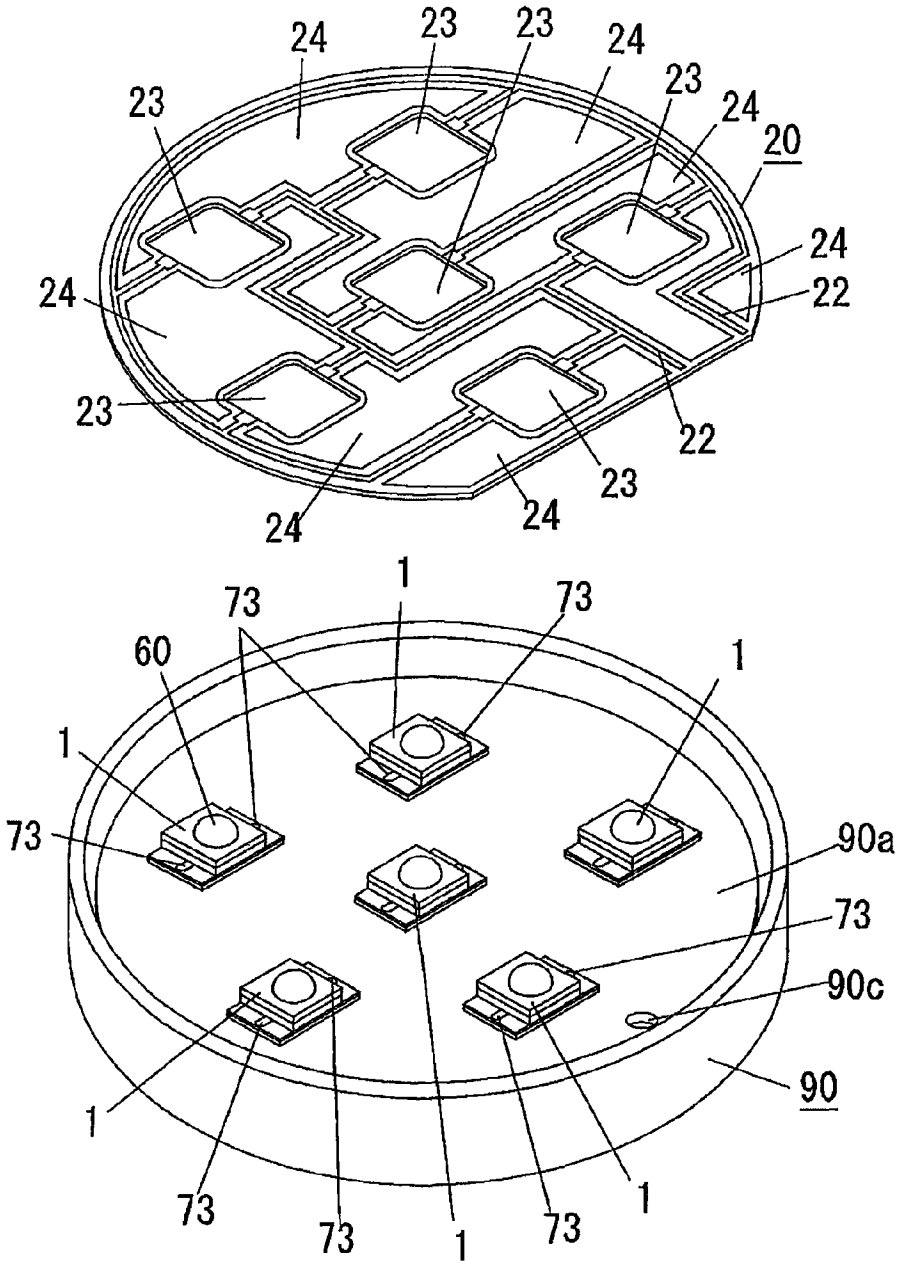

24
23
23
24
23
24
20
23
24
22
24
23
22
23
24
24
1
73
73
60
1
1
73
90a
73
90c
90
1
73
73
1
73
1

图6

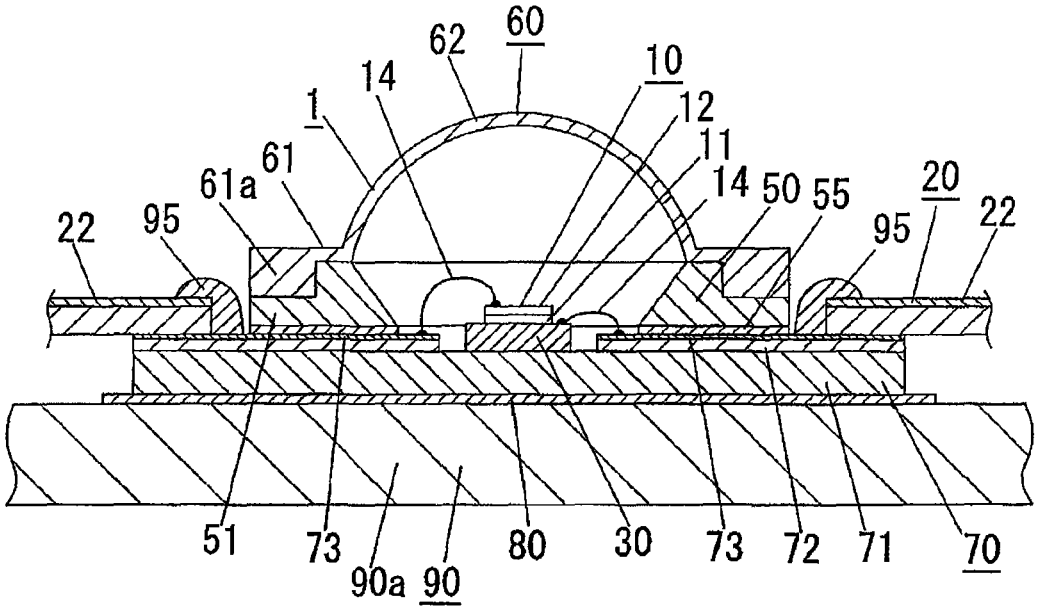

62
60
10
14
1
12
61
11
61a
14
50
55
20
22
95
95
22
51
73
90a
90
80
30
73
72
71
70

图7

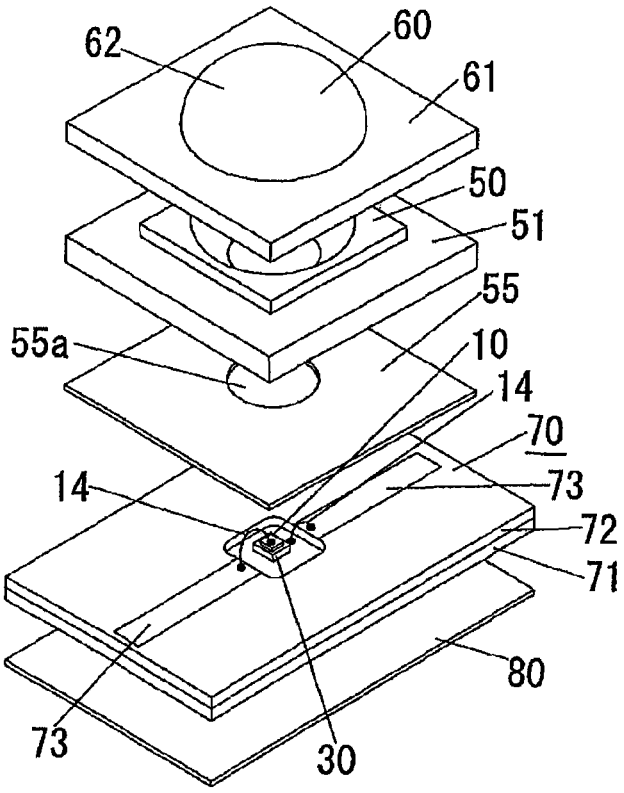

62
60
61
50
51
55
55a
10
14
70
14
73
72
71
80
73
30

图8

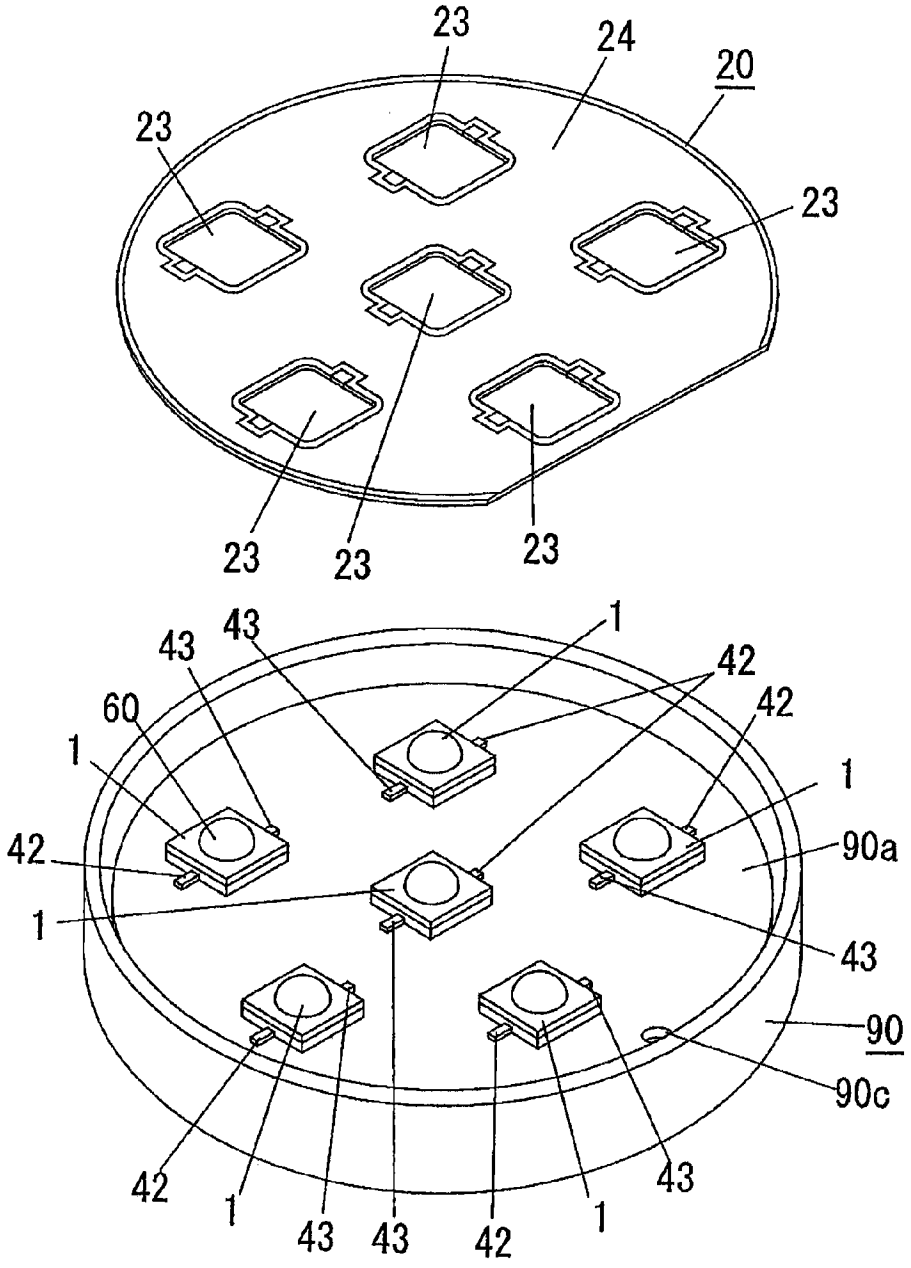

23
24
20
23
23
23
23
23
23
43
43
1
42
42
60
1
1
42
90a
1
43
90
90c
42
1
43
43
42
1
43

图9

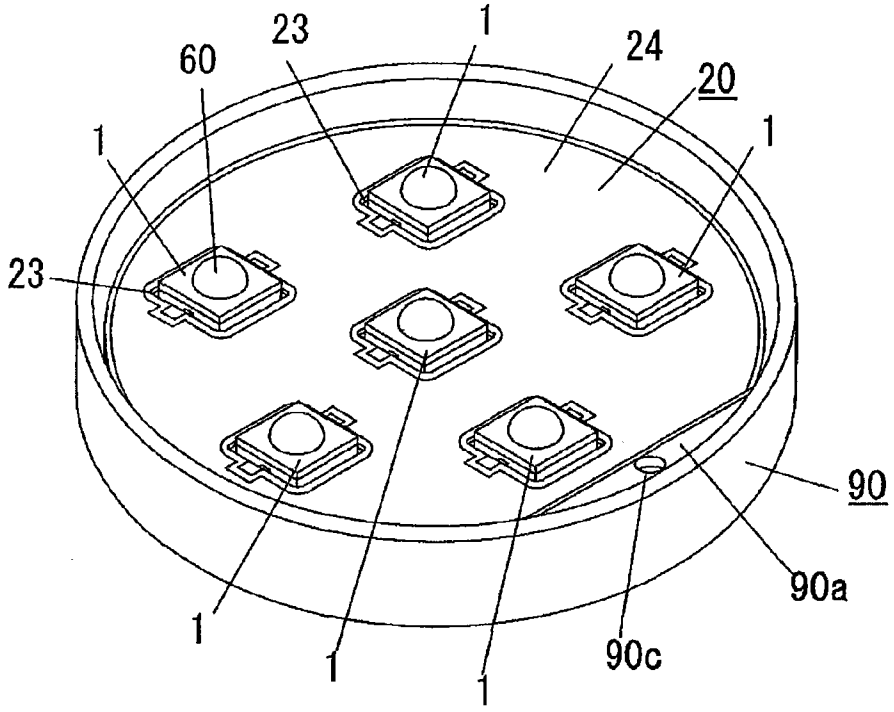

60
23
1
24
20
1
1
23
90
90a
1
1
1
90c

图10

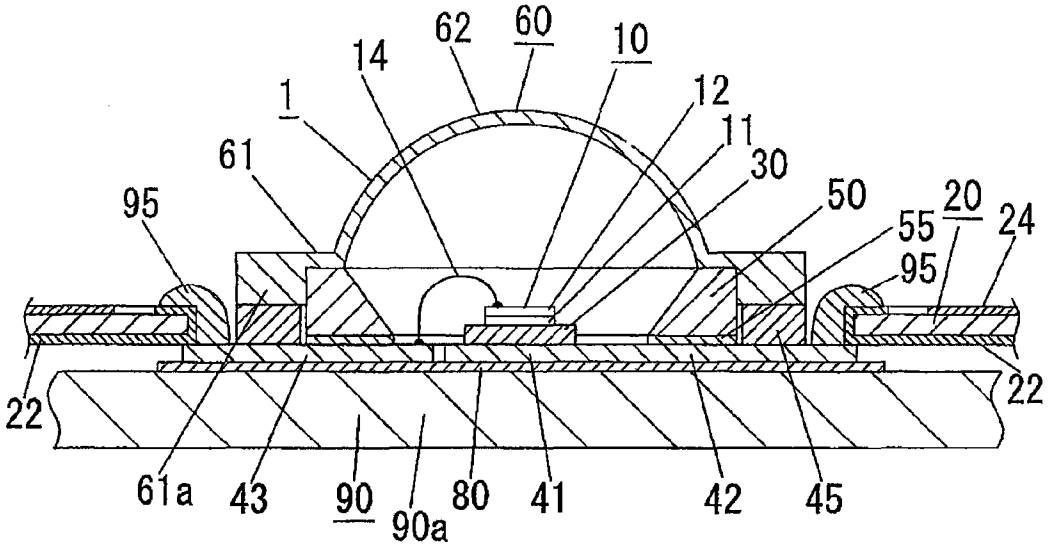

62
60
10
14
1
12
11
61
30
50
95
55
20
24
95
22
22
61a
43
90
90a
80
41
42
45

图11

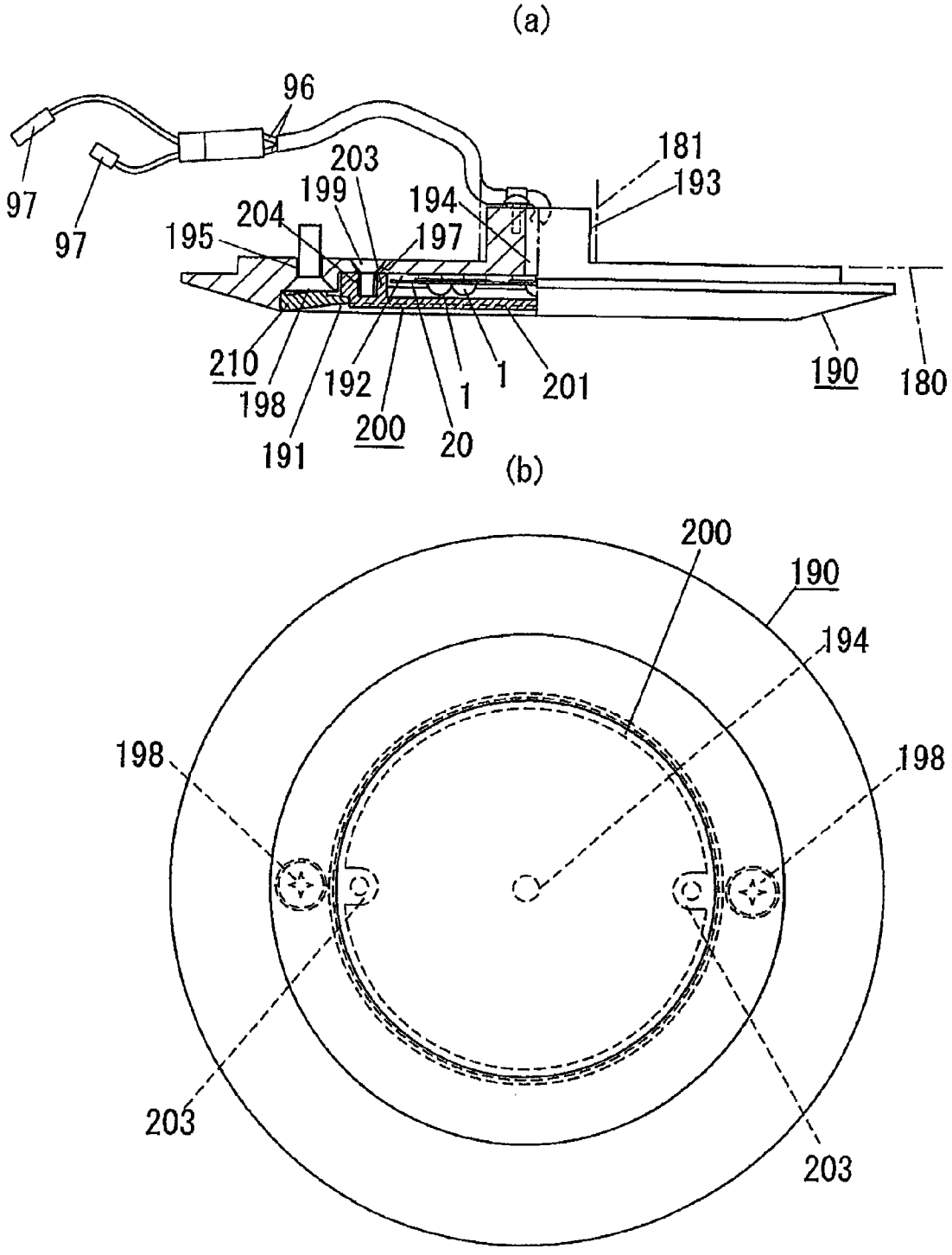

(a)
96
97
97
203
199
204
195
194
197
181
193
210
198
191
192
200
20
1
1
201
190
180
(b)
200
190
194
198
198
203
203

图12

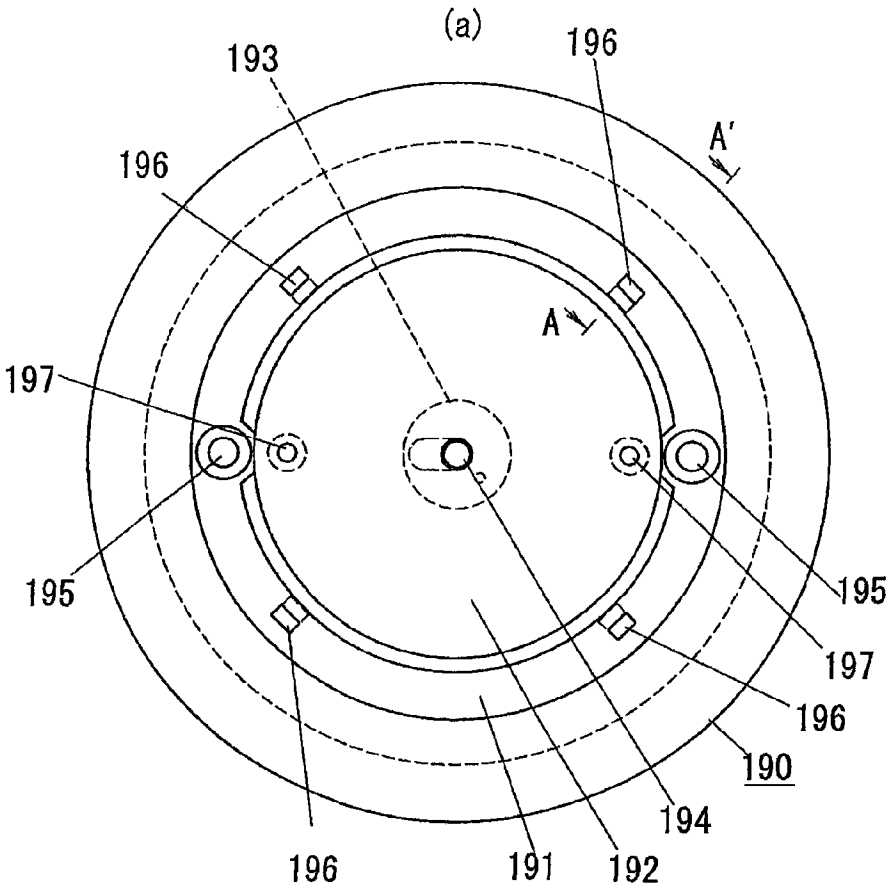

(a)
193
196
A'
196
A
197
195
195
197
196
190
194
196
191
192
(b)
190
196
191
192

图13

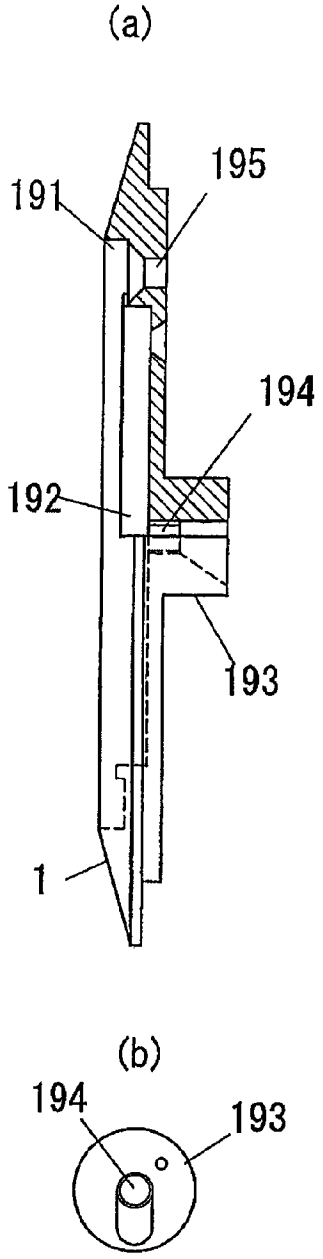


图14

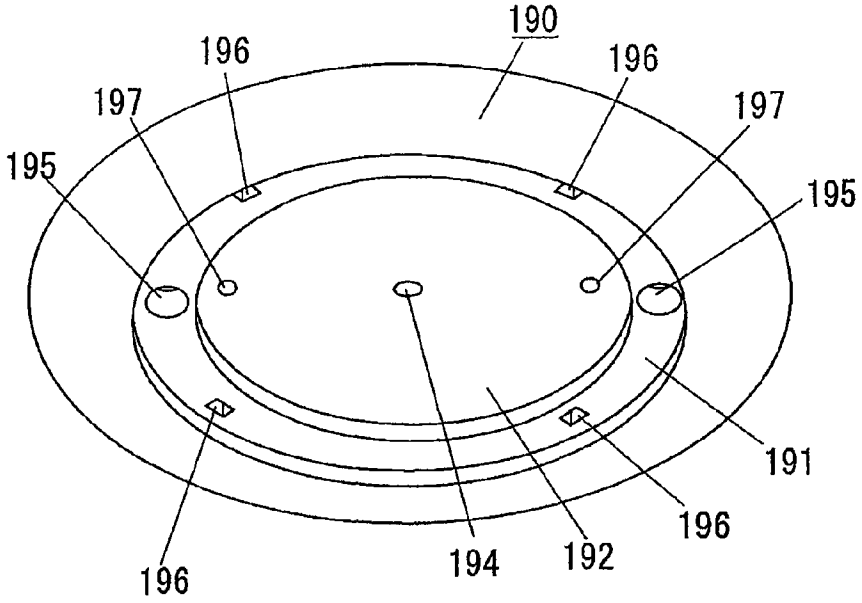

190
196
196
197
197
195
195
191
196
196
194
192

图15

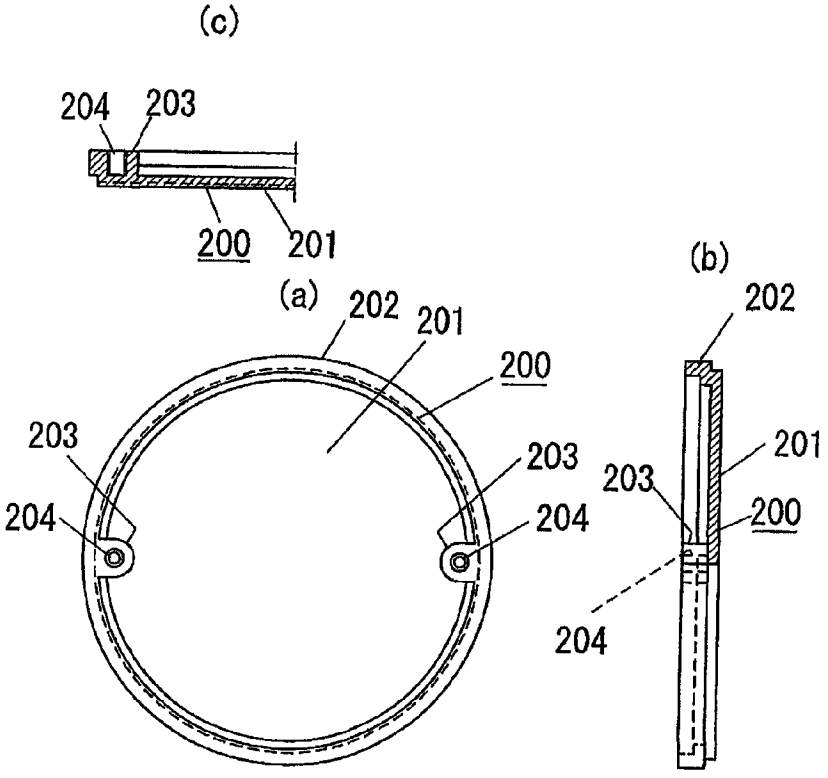

(c)
204
203
200
201
(a)
202
201
200
203
203
204
204
(b)
202
201
203
200
204

图16

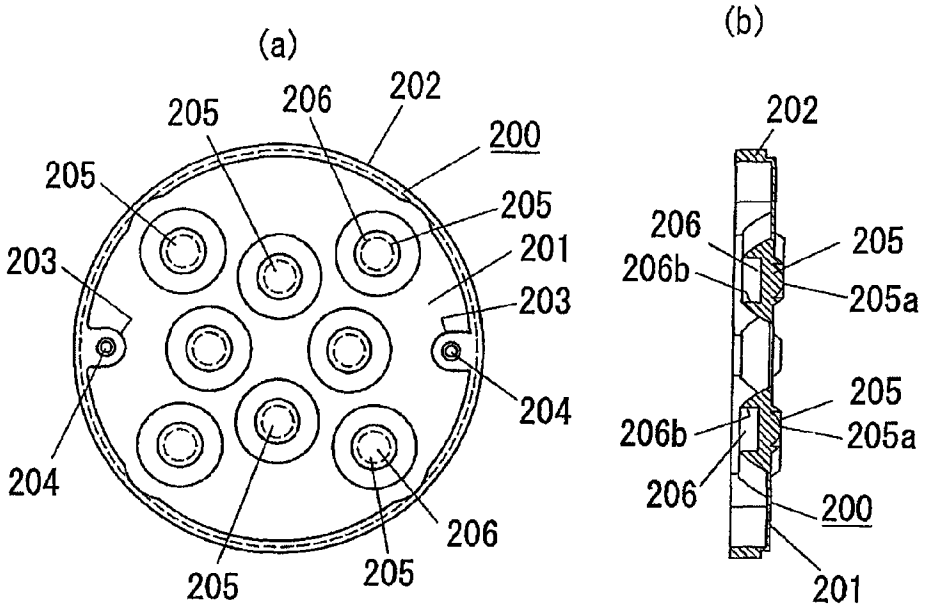

(a)
(b)
205
206
202
200
205
205
201
203
203
204
204
206
205
205
202
206
205
206b
205a
205
206b
205a
206
200
201

图17

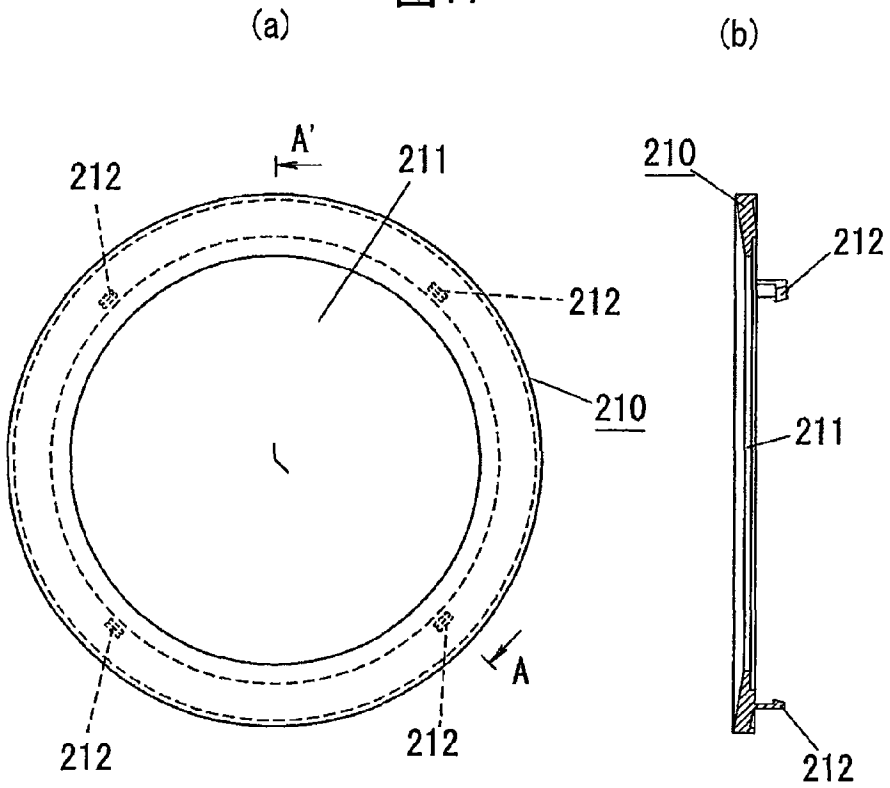

(a)
(b)
A'
211
212
212
210
A
212
212
210
212
211
212

图18

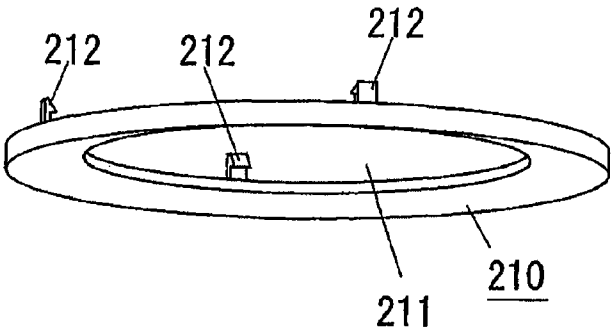


图19

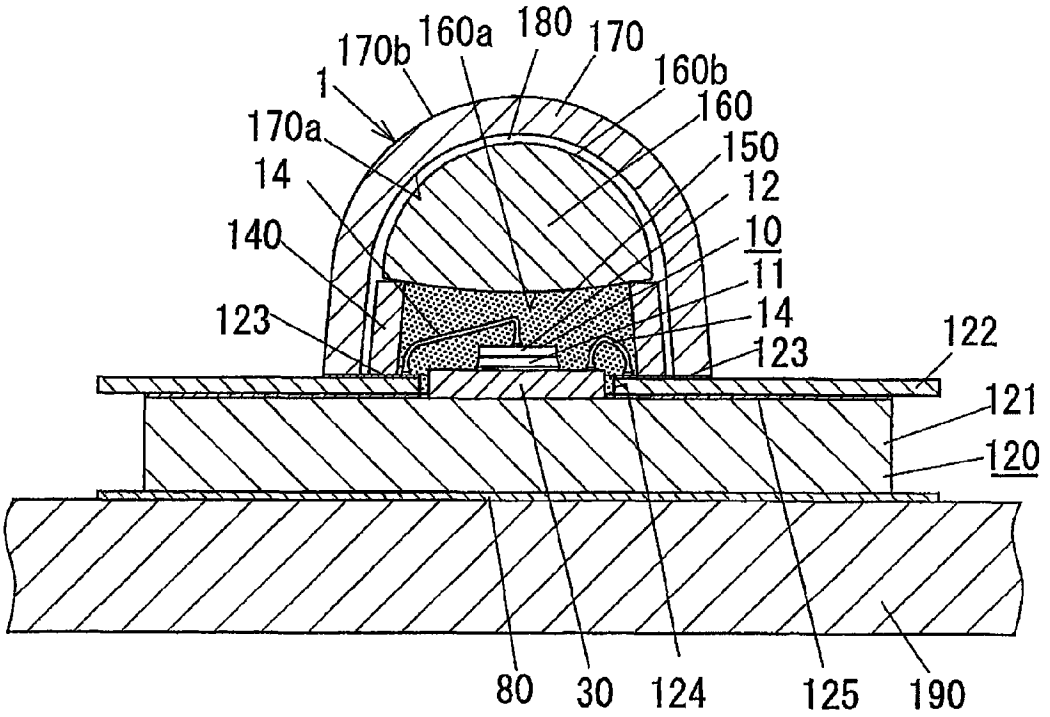


图20

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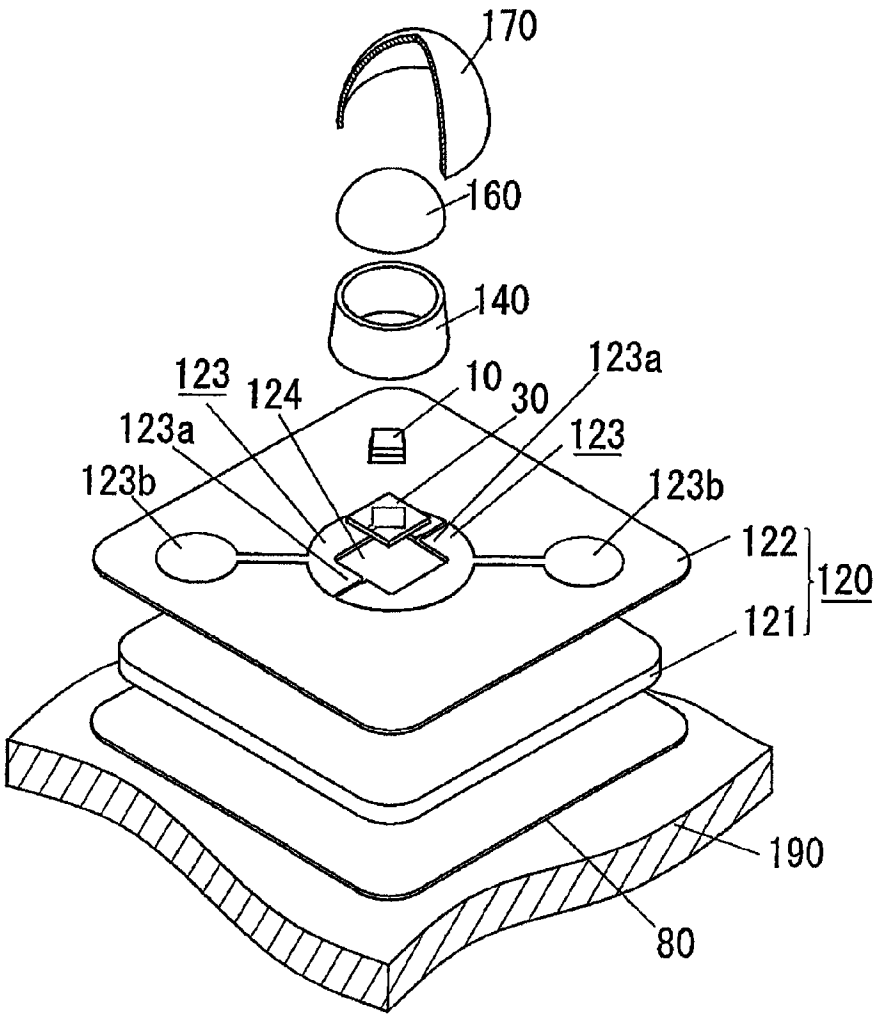

170
160
140
123
124
10
30
123a
123a
123
123b
123b
122
120
121
190
80

图21

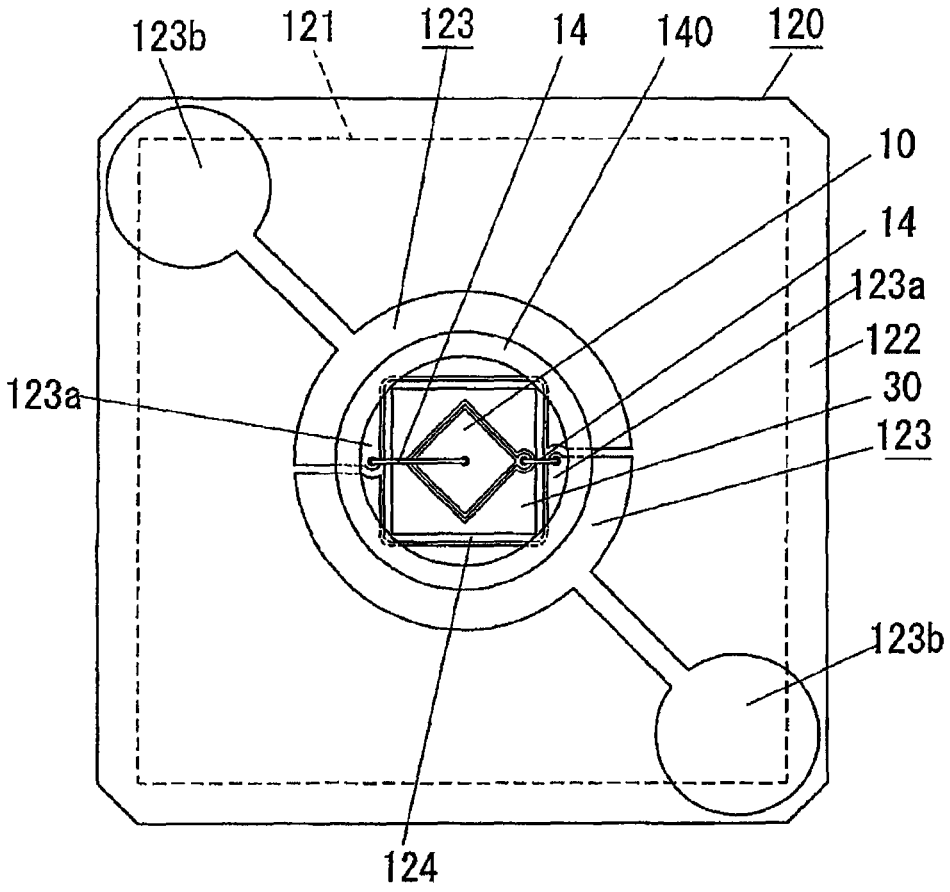

123b
121
123
14
140
120
10
14
123a
122
30
123
123a
123b
124

图22

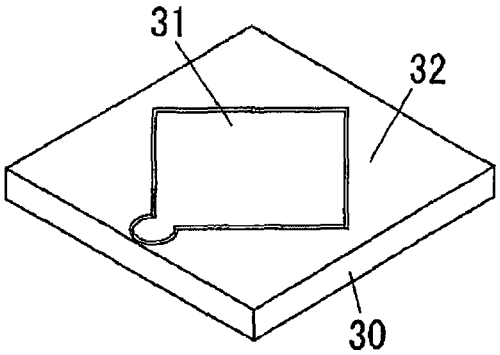

31
32
30

图23

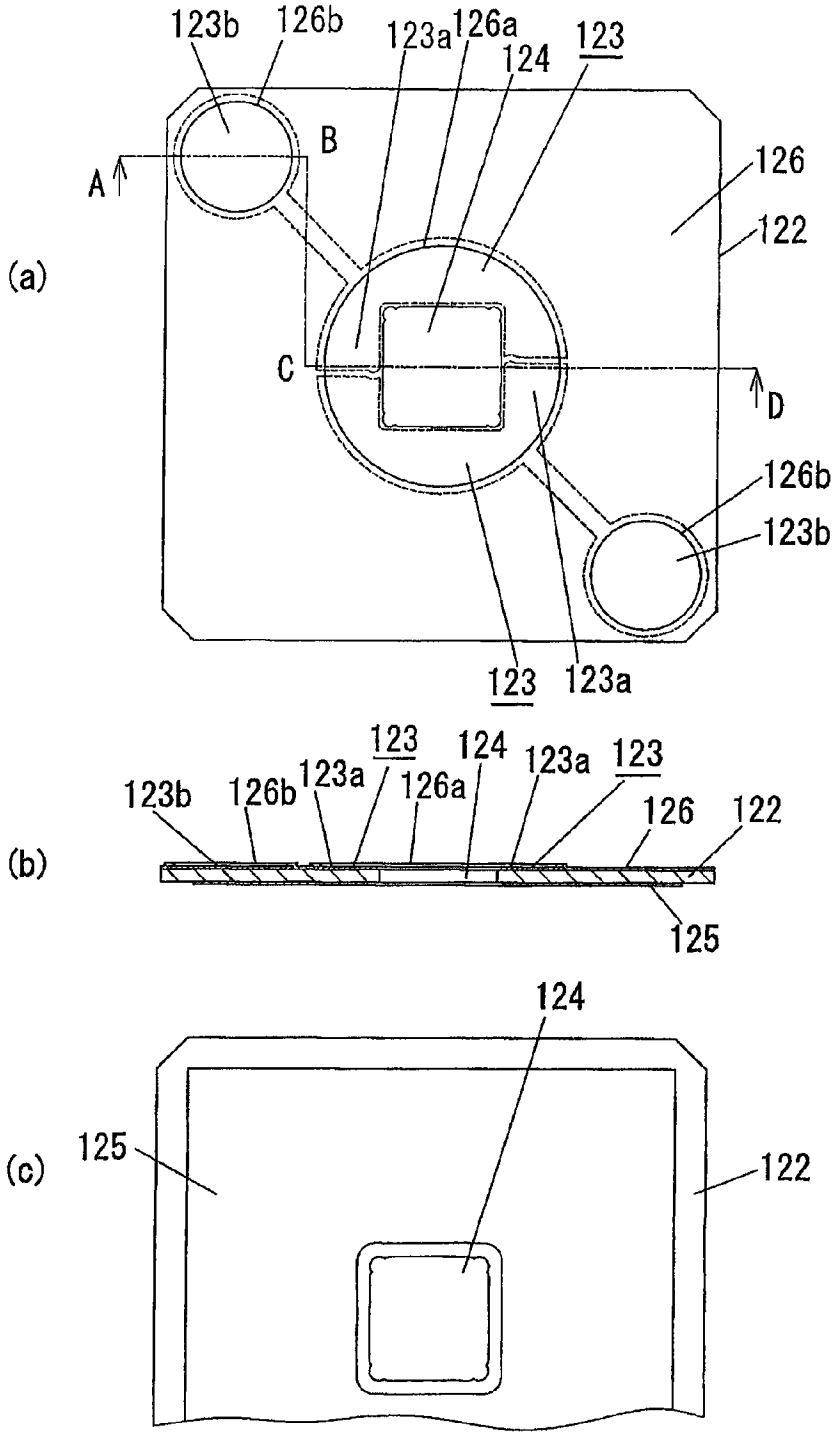

(a)
123b
126b
123a
126a
124
123
A
B
C
D
126
122
126b
123b
123
123a
(b)
123b
126b
123
123a
126a
124
123a
123
126
122
125
(c)
124
125
122

图24

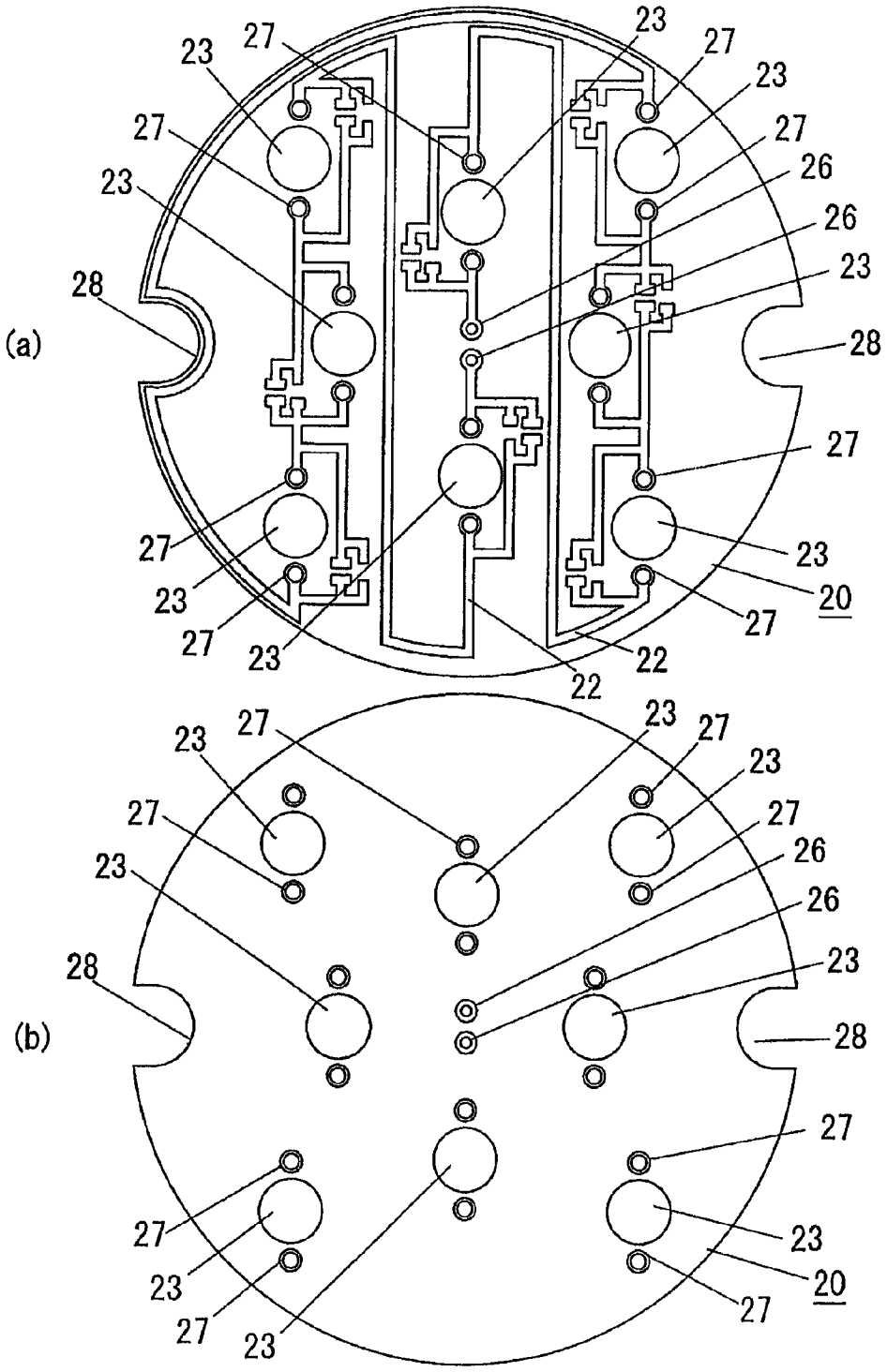


图25

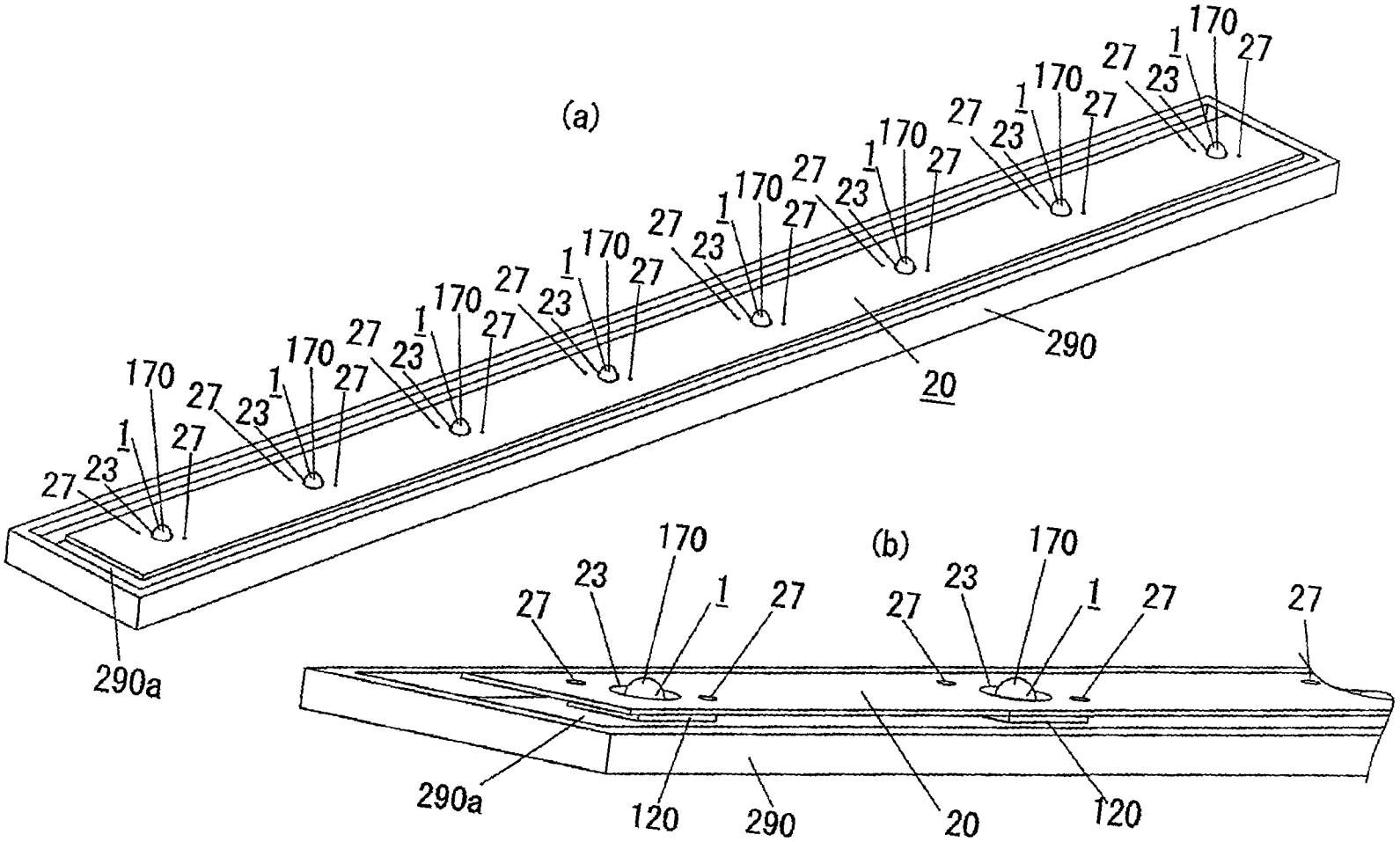


图26

IKEA Supply AG
Exhibit 1002 Page 363 of 519

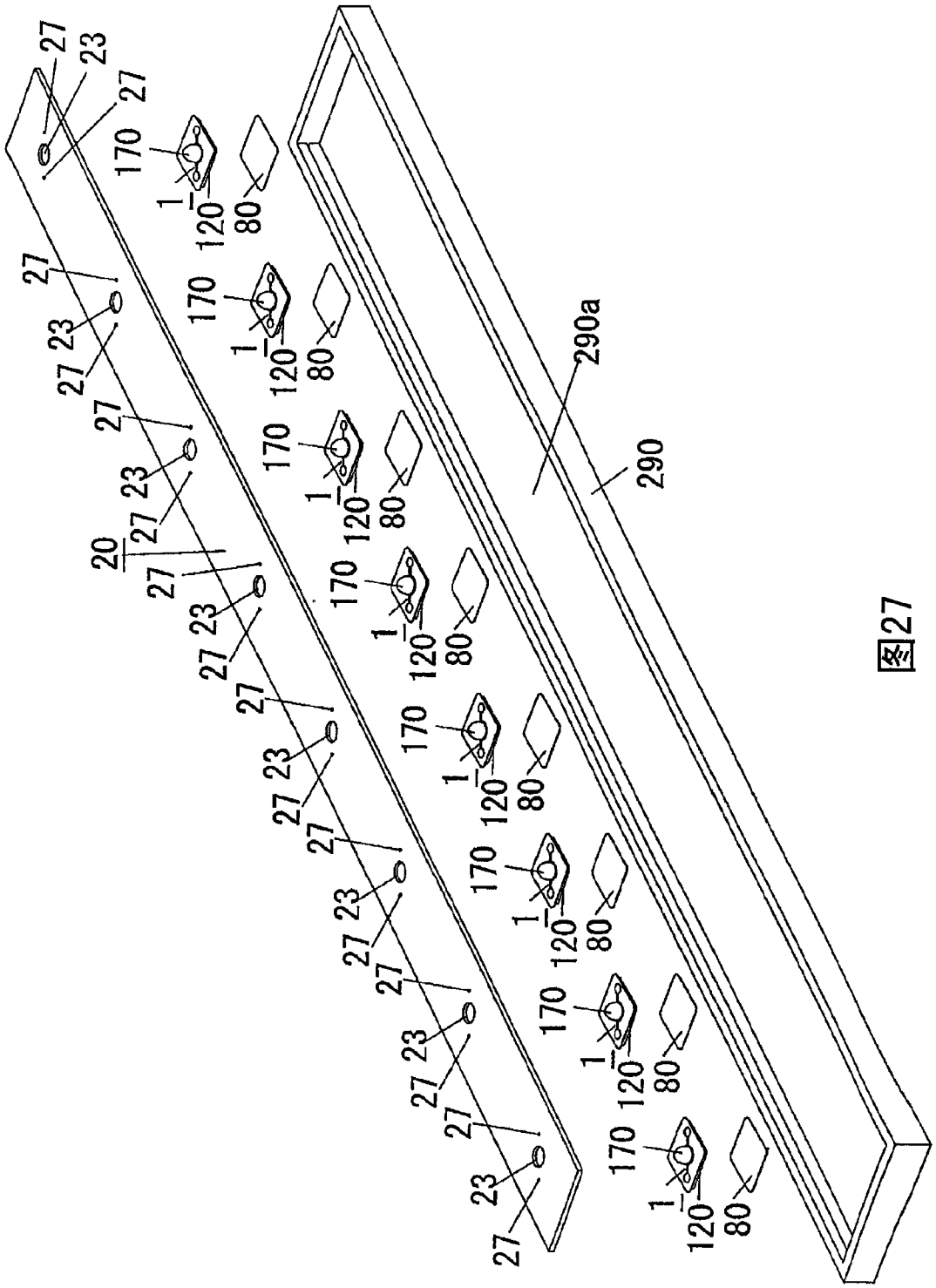


图27

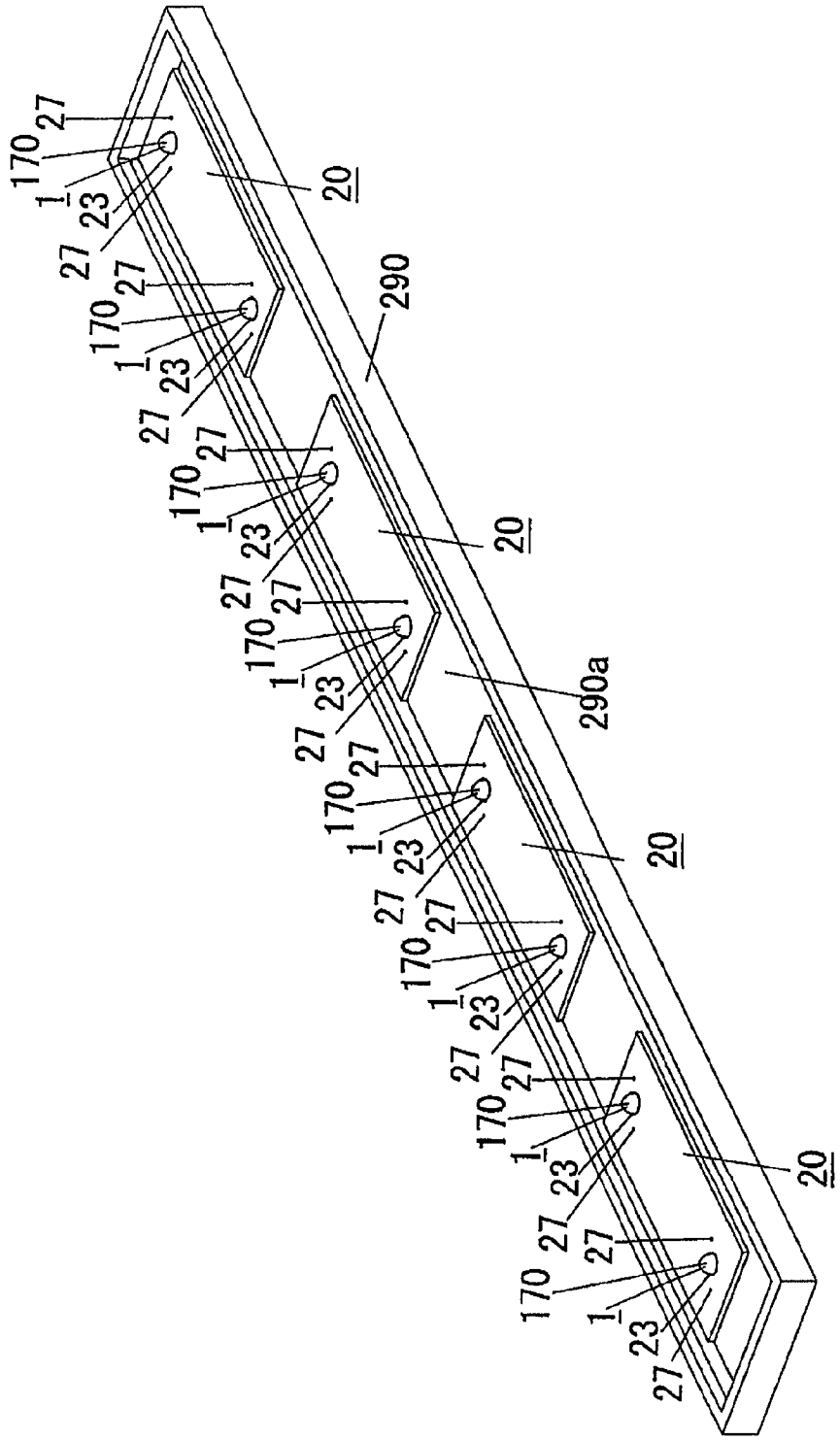


图28

IKEA Supply AG
Exhibit 1002 Page 365 of 519
FH-000365

图29

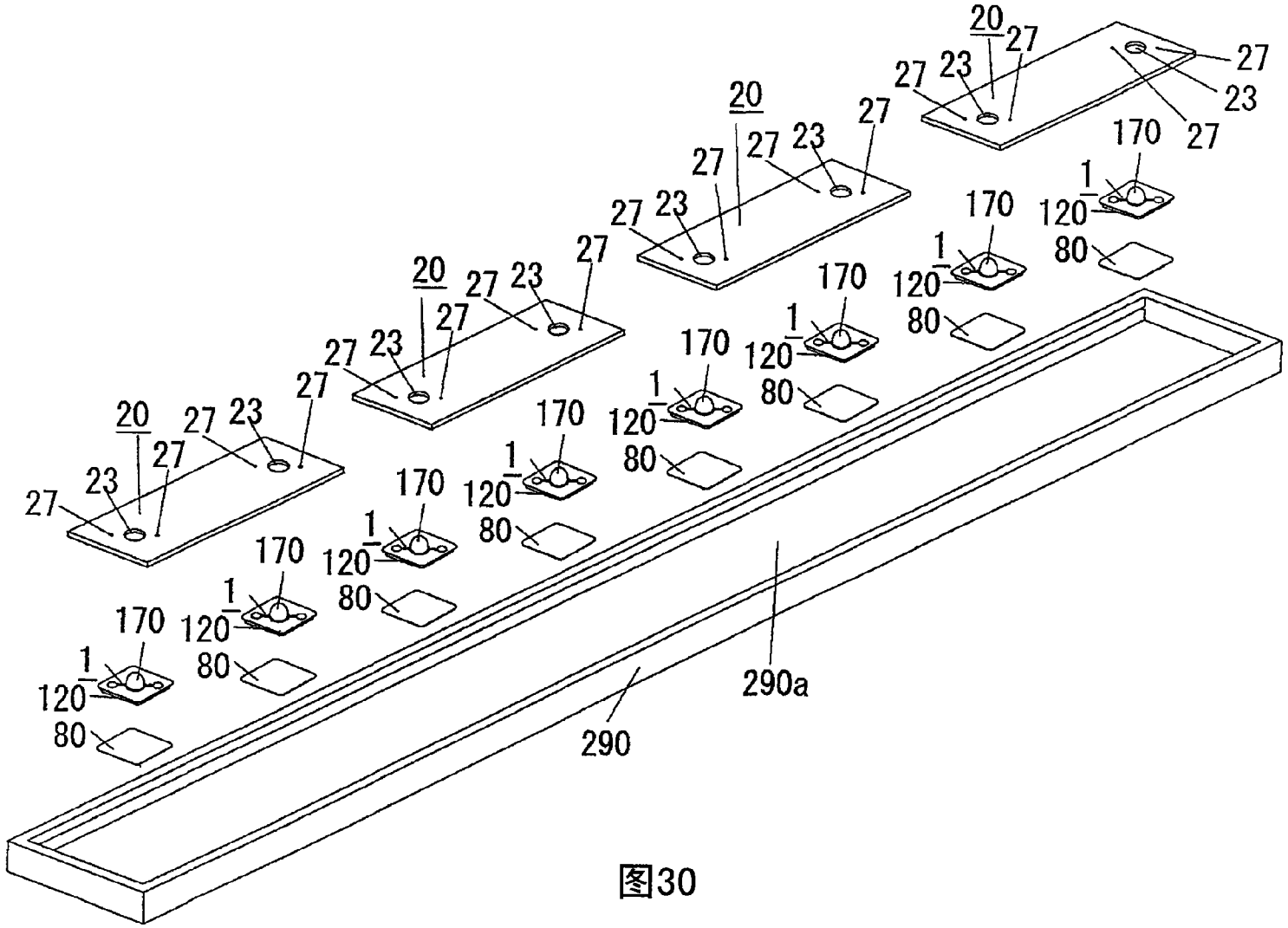


图30

IKEA Supply AG
Exhibit 1002 Page 367 of 519

Electronic Acknowledgement Receipt

EFS ID:	27760993
Application Number:	14720230
International Application Number:	
Confirmation Number:	4909
Title of Invention:	Carrier, Carrier Leadframe, And Light Emitting Device
First Named Inventor/Applicant Name:	Chung-Chuan Hsieh
Customer Number:	13859
Filer:	Andy M. Han
Filer Authorized By:	
Attorney Docket Number:	EL01.0088US
Receipt Date:	12-DEC-2016
Filing Date:	22-MAY-2015
Time Stamp:	13:24:49
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	EL01_0088US_IDS.pdf	611984 57dadfc9a53a51995b6ae2451df71695ffb73d8e	no	4

Warnings:

Information:					
A U.S. Patent Number Citation or a U.S. Publication Number Citation is required in the Information Disclosure Statement (IDS) form for autoloading of data into USPTO systems. You may remove the form to add the required data in order to correct the Informational Message if you are citing U.S. References. If you chose not to include U.S. References, the image of the form will be processed and be made available within the Image File Wrapper (IFW) system. However, no data will be extracted from this form. Any additional data such as Foreign Patent Documents or Non Patent Literature will be manually reviewed and keyed into USPTO systems.					
2	Foreign Reference	CN101346584.pdf	5731833 94d8b30fc97a6dc17381cd4e18ddde7cde7c7886	no	49
Warnings:					
Information:					
			Total Files Size (in bytes):	6343817	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

13859 7590 12/28/2016

Han IP Corporation
4790 Irvine Boulevard Suite 105-347
Irvine, CA 92620

EXAMINER
NARAGHI, ALI

ART UNIT	PAPER NUMBER
2896	

DATE MAILED: 12/28/2016

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/720,230	05/22/2015	Chung-Chuan Hsieh	EL01.0088US	4909

TITLE OF INVENTION: Carrier, Carrier Leadframe, And Light Emitting Device

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960	$0	$0	$960	03/28/2017

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

13859 7590 12/28/2016
Han IP Corporation
4790 Irvine Boulevard Suite 105-347
Irvine, CA 92620

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/720,230	05/22/2015	Chung-Chuan Hsieh	EL01.0088US	4909

TITLE OF INVENTION: Carrier, Carrier Leadframe, And Light Emitting Device

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960	$0	$0	$960	03/28/2017

EXAMINER	ART UNIT	CLASS-SUBCLASS
NARAGHI, ALI	2896	257-099000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
- ❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.
1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. The following fee(s) are submitted:
- ❑ Issue Fee
- ❑ Publication Fee (No small entity discount permitted)
- ❑ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
- ❑ A check is enclosed.
- ❑ Payment by credit card. Form PTO-2038 is attached.
- ❑ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
- ❑ Applicant certifying micro entity status. See 37 CFR 1.29 — NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
- ❑ Applicant asserting small entity status. See 37 CFR 1.27 — NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
- ❑ Applicant changing to regular undiscounted fee status. — NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/720,230	05/22/2015	Chung-Chuan Hsieh	EL01.0088US	4909

13859 7590 12/28/2016

Han IP Corporation
4790 Irvine Boulevard Suite 105-347
Irvine, CA 92620

EXAMINER	
NARAGHI, ALI	
ART UNIT	PAPER NUMBER
2896	

DATE MAILED: 12/28/2016

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Examiner-Initiated Interview Summary	Application No.	Applicant(s)	
	14/720,230	HSIEH ET AL.	
	Examiner	Art Unit	
	ALI NARAGHI	2896	

All participants (applicant, applicant's representative, PTO personnel):

(1) *ALI NARAGHI*.

(3) *Andy M. Han*.

(2) _____.

(4) _____.

Date of Interview: *12 December 2016*.

Type: ☒ Telephonic ☐ Video Conference
☐ Personal [copy given to: ☐ applicant ☐ applicant's representative]

Exhibit shown or demonstration conducted: ☐ Yes ☐ No.
If Yes, brief description: _____.

Issues Discussed ☐101 ☐112 ☐102 ☐103 ☐Others
(For each of the checked box(es) above, please describe below the issue and detailed description of the discussion)

Claim(s) discussed: *11-14*.

Identification of prior art discussed: *Wang et al and etcc,….*

Substance of Interview
(For each issue discussed, provide a detailed description and indicate if agreement was reached. Some topics may include: identification or clarification of a reference or a portion thereof, claim interpretation, proposed amendments, arguments of any applied references etc...)

Amending claim 11 such that it would become allowable.

Applicant recordation instructions: It is not necessary for applicant to provide a separate record of the substance of interview.

Examiner recordation instructions: Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

☐ Attachment

/ALI NARAGHI/ Primary Examiner, Art Unit 2896	

Notice of Allowability	Application No. 14/720,230	Applicant(s) HSIEH ET AL.	
	Examiner ALI NARAGHI	Art Unit 2896	AIA (First Inventor to File) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *10/25/2016*.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on_____.
2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
3. ☒ The allowed claim(s) is/are *11 and 15-25*. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.
4. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☒ All b) ☐ Some *c) ☐ None of the:
   1. ☒ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☒ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date See Continuation Sheet
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
4. ☒ Interview Summary (PTO-413), Paper No./Mail Date *20161217* .
5. ☒ Examiner's Amendment/Comment
6. ☒ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/ALI NARAGHI/
Primary Examiner, Art Unit 2896

Continuation of Attachment(s) 2. Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date: 12/12/2016,10/26/2016,01/13/2016.

The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

DETAILED ACTION

Election/Restrictions

This application is in condition for allowance except for the presence of claim 1-10 directed to species non-elected without traverse. Accordingly, claims 1-10 been cancelled.

EXAMINER'S AMENDMENT

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in an interview with Andy Han on 12/12/2016.

Please cancel claims 12-14.

Please amend claim 11 as following: A light emitting device, comprising: a carrier; a light emitting diode (LED) chip carried within the carrier; and an encapsulant covering the LED chip, wherein the carrier comprises: at least one electrode portion,

each of the at least one electrode portion comprising at least an electrode portion cross section; and a housing comprising a housing cross section, the housing at least partially covering the at least one electrode portion, wherein the housing cross section and the electrode portion cross section are not level with one another ;wherein each of the at least one electrode portion further comprises a central area and two edge areas, and wherein the electrode portion cross section is located on at least one of the two edge areas; wherein the central area and the two edge areas protrude from the housing cross section; wherein the central area protrudes from the two edge areas.

Please amend claim 16 as following: The light emitting device of Claim ~~12~~ 11, wherein the electrode portion cross section and the central area are not coplanar.

Please amend claim 22 as following: The light emitting device of Claim ~~12~~ 11, wherein the two edge areas protrude from the central area.

Allowable Subject Matter

Claims 11, 15-25 are allowed.

The following is the reason for allowance of claim 11, pertinent arts do not alone or in combination disclose: wherein the central area and the two edge areas protrude from the housing cross section; wherein the central area protrudes from the two edge areas.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Wang et al (US Pub No. 20130270588), Watari et al (US Pub No. 20120132949), Hayashi (US Pub No. 20090261374), Yamamoto et al (US Pub No. 20070246841), Kato (US Patent No. 9024514), Wang et al (US Patent No. 8137999).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ALI NARAGHI whose telephone number is (571)270-5720. The examiner can normally be reached on 9AM-6PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Such can be reached on 571-272-8895. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/ALI NARAGHI/
Primary Examiner, Art Unit 2896

Examiner-Initiated Interview Summary	Application No.	Applicant(s)	
	14/720,230	HSIEH ET AL.	
	Examiner	Art Unit	
	ALI NARAGHI	2896	

All participants (applicant, applicant's representative, PTO personnel):

(1) *ALI NARAGHI*.

(2) _____.

(3) *Andy M. Han*.

(4) _____.

Date of Interview: *12 December 2016*.

Type: ☒ Telephonic ☐ Video Conference
☐ Personal [copy given to: ☐ applicant ☐ applicant's representative]

Exhibit shown or demonstration conducted: ☐ Yes ☐ No.
If Yes, brief description: _____.

Issues Discussed ☐101 ☐112 ☐102 ☐103 ☐Others
(For each of the checked box(es) above, please describe below the issue and detailed description of the discussion)

Claim(s) discussed: *11-14*.

Identification of prior art discussed: *Wang et al and etcc,…*.

Substance of Interview
(For each issue discussed, provide a detailed description and indicate if agreement was reached. Some topics may include: identification or clarification of a reference or a portion thereof, claim interpretation, proposed amendments, arguments of any applied references etc...)

Amending claim 11 such that it would become allowable.

Applicant recordation instructions: It is not necessary for applicant to provide a separate record of the substance of interview.

Examiner recordation instructions: Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

☐ Attachment

/ALI NARAGHI/ Primary Examiner, Art Unit 2896	

Notice of References Cited	Application/Control No. 14/720,230	Applicant(s)/Patent Under Reexamination HSIEH ET AL.	
	Examiner ALI NARAGHI	Art Unit 2896	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-2013/0270588 A1	10-2013	WANG; CHIOU-YUEH	H01L33/62	257/91
*	B	US-2012/0132949 A1	05-2012	Watari; Gen	H01L33/54	257/99
*	C	US-2009/0261374 A1	10-2009	Hayashi; Masaki	H01L33/62	257/99
*	D	US-2007/0261374 A1	11-2007	Nelson; Benny Kevin	B01D46/0004	55/434
*	E	US-2007/0246841 A1	10-2007	Yamamoto; Saiki	B29C45/14639	257/784
*	F	US-9,024,514 B2	05-2015	Kato; Hideaki	H05B33/06	257/99
*	G	US-8,137,999 B2	03-2012	Wang; Bily	H01L33/486	257/E21.499
	H	US-				
	I	US-				
	J	US-				
	K	US-				
	L	US-				
	M	US-				

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*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
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	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14720230	HSIEH ET AL.
	Examiner	Art Unit
	ALI NARAGHI	2896

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES		
Search Notes	Date	Examiner
Searched East	12/17/2016	AN

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
	Please refer to east search report	12/17/2016	AN

PTO/SB/08a (01-10)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14720230
Filing Date	2015-05-22
First Named Inventor	Chung-Chuan Hsieh
Art Unit	2847 ~~2896~~
Examiner Name	Ali Naraghi
Attorney Docket Number	EL01.0088US

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Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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	1	CN101346584	CN	A	2009-01-14	MATSUSHITA ELECTRIC WORKS LTD		

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	Art Unit	2847 2896
	Examiner Name	Ali Naraghi
	Attorney Docket Number	EL01.0088US

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Examiner Signature	/ALI NARAGHI/	Date Considered	12/17/2016

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	Examiner Name	Ali Naraghi
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CERTIFICATION STATEMENT

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See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Andy M. Han, Reg. No. 60266/	Date (YYYY-MM-DD)	2016-12-12
Name/Print	Andy M. Han	Registration Number	60266

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

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Application Number	14720230
Filing Date	2015-05-22
First Named Inventor	Chung-Chuan Hsieh
Art Unit	~~2847~~ 2896
Examiner Name	MCALLISTER, MICHAEL F Ali Naraghi
Attorney Docket Number	EL01.0088US

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	1	20130270588		2013-10-17	Wang Chiou-Yueh	
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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	KR20100083907A	KR		2010-07-23	SUL MYUNG SOON		
	2	JP2014017460A	JP		2014-01-30	FUSHENG IND CO LTD		

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14720230
	Filing Date	2015-05-22
	First Named Inventor	Chung-Chuan Hsieh
	Art Unit	~~2647~~ 2896
	Examiner Name	~~MCALLISTER, MICHAEL F~~ Ali Naraghi
	Attorney Docket Number	EL01.0088US

	3	JP2014060343A	JP		2014-04-03	SANKEN ELECTRIC CO LTD		

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Signature	/Andy M. Han, Reg. No. 60266/	Date (YYYY-MM-DD)	2016-01-13
Name/Print	Andy M. Han	Registration Number	60266

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Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

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	1	TW201340410	TW	A	2013-10-01	ADVANCED SEMICONDUCTOR ENG		

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The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these record s.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

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9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	1	("20150340568").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2016/11/10 01:49
S2	4456	h01l33/483.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/10 01:51
S3	4029	S2 and @ad<"20140523"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/10 01:52
S4	73	S3 and lead$1frame and housing	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/10 01:56
S5	23867	h01l33/62.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/10 02:03
S6	259	S5 and lead$1frame and housing	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/10 02:04
S7	233	S6 and @ad<"20140523"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/10 02:04
S8	1130	led and lead$1frame and housing	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/10 02:34
S9	1059	S8 and @ad<"20140523"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/10 02:34
S10	28	led and (lead$1frame with protrusion)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/10 03:26
S11	25	S10 and @ad<"20140523"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/11/10 03:26
S12	1	"14720230"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/12/06 15:11
S13	144735	(h01l33/$$$$$).cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2016/12/06 15:25

			JPO; DERWENT; IBM_TDB			
S14	9848	S13 and (electrode with cover$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/12/06 15:25
S15	765	S13 and (electrode with cover$3) and housing	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/12/06 15:25
S16	578	S15 and @ad<"20140523"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/12/06 15:26
S17	5	("20020011601" | "20040240773" | "20090090926").PN. OR ("8026533").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2016/12/06 17:08
S18	1	("20130270588").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2016/12/06 18:49

12/17/2016 6:33:55 PM
C:\Users\anaraghi\Documents\EAST\Workspaces\14720230.wsp

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BIB DATA SHEET

CONFIRMATION NO. 4909

SERIAL NUMBER	FILING or 371(c) DATE RULE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
14/720,230	05/22/2015	257	2896	EL01.0088US

APPLICANTS
Everlight Electronics Co., Ltd., New Taipei City, TAIWAN;

INVENTORS
Chung-Chuan Hsieh, New Taipei City, TAIWAN;
Yung Chieh Chen, New Taipei City, TAIWAN;

**** CONTINUING DATA ***************************

**** FOREIGN APPLICATIONS ***************************
TAIWAN 103118060 05/23/2014
TAIWAN 104103527 02/03/2015

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ****
06/19/2015

Foreign Priority claimed ☑ Yes ☐ No 35 USC 119(a-d) conditions met ☑ Yes ☐ No Verified and Acknowledged /ALI NARAGHI/ Examiner's Signature	☐ Met after Allowance Initials	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
		TAIWAN	28	10	2

ADDRESS
Han IP Corporation
4790 Irvine Boulevard Suite 105-347
Irvine, CA 92620
UNITED STATES

TITLE
Carrier, Carrier Leadframe, And Light Emitting Device

FILING FEE RECEIVED	FEES: Authority has been given in Paper	☐ All Fees
1740	No._____ to charge/credit DEPOSIT ACCOUNT	☐ 1.16 Fees (Filing)
	No._____ for following:	☐ 1.17 Fees (Processing Ext. of time)
		☐ 1.18 Fees (Issue)
		☐ Other _____
		☐ Credit

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14720230	HSIEH ET AL.
	Examiner	**Art Unit**
	ALI NARAGHI	2896

CPC								
Symbol							**Type**	**Version**
H01L		33	/	483			F	2013-01-01
H01L		33	/	60			A	2013-01-01
H01L		33	/	62			I	2013-01-01
H01L		2933	/	0033			A	2013-01-01
H01L		2933	/	0066			A	2013-01-01
H01L		24	/	97			I	2013-01-01
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CPC Combination Sets								
Symbol							**Type**	**Set**	**Ranking**	**Version**
			/							
			/							

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	12	
/ALI NARAGHI/ Primary Examiner.Art Unit 2896	12/17/2016	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	5

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14720230	HSIEH ET AL.
	Examiner	**Art Unit**
	ALI NARAGHI	2896

US ORIGINAL CLASSIFICATION		INTERNATIONAL CLASSIFICATION	
CLASS	SUBCLASS	CLAIMED	NON-CLAIMED

CROSS REFERENCE(S)					
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)				

NONE (Assistant Examiner)	(Date)	**Total Claims Allowed:** 12	
/ALI NARAGHI/ Primary Examiner.Art Unit 2896 (Primary Examiner)	12/17/2016 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 5

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14720230	HSIEH ET AL.
	Examiner	**Art Unit**
	ALI NARAGHI	2896

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
	1	4	17												
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	12														
	13														
	14														
2	15														
3	16														

NONE (Assistant Examiner)	(Date)	**Total Claims Allowed:** 12	
/ALI NARAGHI/ Primary Examiner.Art Unit 2896 (Primary Examiner)	12/17/2016 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 5

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/720,230	05/22/2015	Chung-Chuan Hsieh	EL01.0088US	4909

13859 7590 01/20/2017

Han IP Corporation
4790 Irvine Boulevard Suite 105-347
Irvine, CA 92620

EXAMINER
NARAGHI, ALI

ART UNIT	PAPER NUMBER
2896	

NOTIFICATION DATE	DELIVERY MODE
01/20/2017	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

pto@haniplaw.com

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Commissioner for Patents
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P.O. Box 1450
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www.uspto.gov

Application No. : 14720230
Applicant : Hsieh
Filing Date : 05/22/2015
Date Mailed : 01/20/2017

NOTICE TO FILE CORRECTED APPLICATION PAPERS

Notice of Allowance Mailed

This application has been accorded an Allowance Date and is being prepared for issuance. The application, however, is incomplete for the reasons below.

Applicant is given two (2) months from the mail date of this Notice within which to respond. This time period for reply is extendable under 37 CFR 1.136(a) for only TWO additional MONTHS.

The informalities requiring correction are indicated in the attachment(s). If the informality pertains to the abstract, specification (including claims) or drawings, the informality must be corrected with an amendment in compliance with 37 CFR 1.121 (or, if the application is a reissue application, 37 CFR 1.173). Such an amendment may be filed after payment of the issue fee if limited to correction of informalities noted herein. See Waiver of 37 CFR 1.312 for Documents Required by the Office of Patent Publication, 1280 Off. Gaz. Patent Office 918 (March 23, 2004). In addition, if the informality is not corrected until after payment of the issue fee, for purposes of 35 U.S.C. 154(b)(1)(iv), "all outstanding requirements" will be considered to have been satisfied when the informality has been corrected. A failure to respond within the above-identified time period will result in the application being ABANDONED.

See attachment(s).

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(571) 272-4200

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- [ ] There is a hole or the image thereof within the illustration. FIG(s)
- [ ] The illustration is penetrated or traversed by a solid or broken line that is not intended to be part of the drawing, such as a dark line caused by a flaw in the copying process. FIG(s)
- [ ] An ink stamp or the image thereof obscures part of the illustration. FIG(s)
- [ ] The drawing is marred by black smudges, obliterations, or fax/copier marks (for example, speckles or dots in a substantial portion of the drawing). FIG(s)
- [ ] Figure numbers are duplicated or missing. FIG(s)
- [ ] Drawing sheet or figure is missing. FIG(s)
- [ ] Numbers, letters, or reference characters in the drawing have been crossed out or are illegibly handwritten. FIG(s)
- [ ] The character of the lines, numbers, and letters is poor. FIG(s)
- [ ] The drawing's background shows that the original drawing was made on graph paper or other paper with a pattern or decoration. FIG(s)
- [ ] The FIG. number label is placed in a location that causes the drawing to be read upside down. FIG(s)
- [X] Data, a reference number, or part of the drawing is truncated or missing, or a lead line has no reference number. FIG(s) 3
- [ ] The drawing and/or the FIG. label contain(s) foreign language. FIG(s)
- [ ] This utility application contains a photograph of a view that is capable of being illustrated as a line drawing. FIG(s)
- [ ] A petition under 37 CFR 1.84(a)(2) to accept color drawings has been granted, but the brief description of the drawings in the specification does not contain (or has not been amended to contain) the paragraph required by 37 CFR 1.84(a)(2)(iii).
- [ ] This reissue application contains added and/or amended drawings that are not labeled as “New” or “Amended” or “Canceled” as required by 37 CFR 1.173(b)(3). FIG(s)
- [ ] This Design reissue application contains a drawing that is labeled as “Canceled” but is not surrounded by brackets, or a drawing that is surrounded by brackets but is not labeled as “Canceled.” See 37 CFR 1.173(b)(3). FIG(s)
- [ ] OTHER:
- [ ] COMMENTS:

PTO/SB/08a (01-10)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14720230
Filing Date	2015-05-22
First Named Inventor	Chung-Chuan Hsieh
Art Unit	2847
Examiner Name	Ali Naraghi
Attorney Docket Number	EL01.0088US

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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	3020070049380	KR		2007-11-28	LUMENS CO., LTD.		
	2	D149221	TW		2012-09-11			
	3	D154430	TW		2013-07-01			

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14720230
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	First Named Inventor	Chung-Chuan Hsieh
	Art Unit	2847
	Examiner Name	Ali Naraghi
	Attorney Docket Number	EL01.0088US

	4	D154432	TW		2013-07-01			

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NON-PATENT LITERATURE DOCUMENTS Remove

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
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EXAMINER SIGNATURE

Examiner Signature		Date Considered	

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[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Application Number	14720230
Filing Date	2015-05-22
First Named Inventor	Chung-Chuan Hsieh
Art Unit	2847
Examiner Name	Ali Naraghi
Attorney Docket Number	EL01.0088US

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☒ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

☒ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Andy M. Han, Reg. No. 60266/	Date (YYYY-MM-DD)	2017-02-03
Name/Print	Andy M. Han	Registration Number	60266

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5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

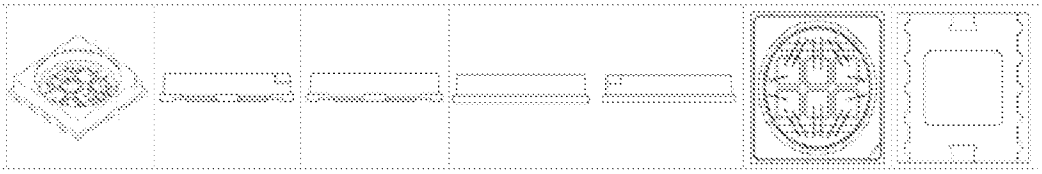
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

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9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

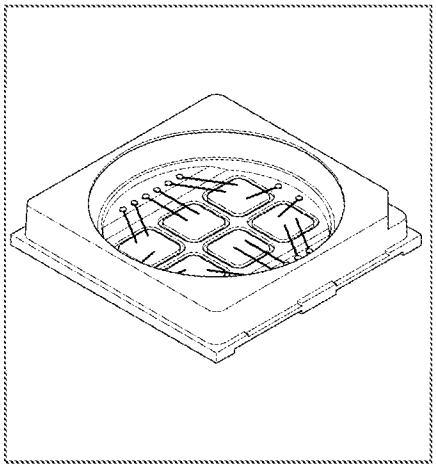
Document Details

[M01]



(21) Application No(Date)	3020070049380(2007.11.28)
(71) Applicant	LUMENS CO., LTD.
(11) Publication No(Date)	(2008.08.05) Full-doc Down
(65) Open Pub. No(Date)	
(11) Registration No(Date)	3005006780000(2008.07.29)
(30) Priority No.(Date)	
Legal Status	Registered
Examination Status(Date)	Decision to grant (General)(2008.04.30)
Retroacted Section(Date)	(2007.11.28)
Trial Info	
Original Application No.	
Related Application No.	
Design Type	Basic Single Public
(52) Design Class.	H171
(51) Locarno Class.	

Zoom



(19) 대한민국특허청(KR)
(12) 등록디자인공보(S)

(45) 공고일자 2008년08월05일
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(51) 국제분류 14-99
(21) 출원번호 30-2007-0049380
(22) 출원일자 2007년11월28일

(73) 등록권자
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유종임
경기 광주시 회덕동 237-5
(74) 대리인
유미특허법인

담당심사관 : 박창훈
[참고]이 디자인등록은 디자인법 제23조(조약에 의한 우선권주장)의 적용을 받고자 하는 타 디자인과의 유사여부에 관한 심사가 일부 이루어지지 않은 것입니다.

(54) 발광 다이오드

입체디자인도면

디자인의 대상이 되는 물품

발광 다이오드

디자인의 설명

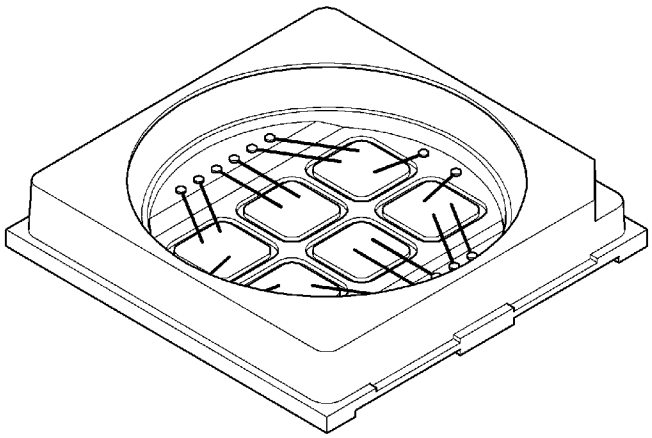
1. 재질은 투명 또는 불투명의 합성수지 및 금속재 임.

2. 본 물품은 발광 다이오드(LED)로써, 인쇄회로기판 상에 실장되어 플래쉬로 사용되거나 일반조명 및 간접조명으로 사용하기 위한 것임.

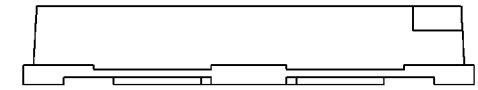
디자인 창작 내용의 요점

본원 발광 다이오드의 디자인은 중앙에 원형의 홈이 형성된 납작한 사각 형상으로 안정적인 느낌과 더불어, 사각형상과 대비하여 중앙의 원형상이 최대한 큰 모양을 이루어 빛이 더 밝게 발산될 것 같은 느낌을 주는 것을 디자인 창작 내용의 요점으로 함.

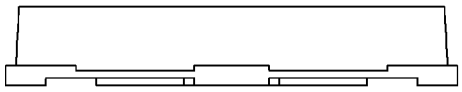
사시도



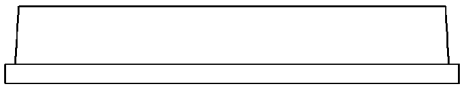
정면도



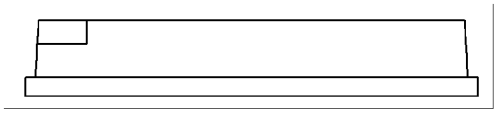
배면도



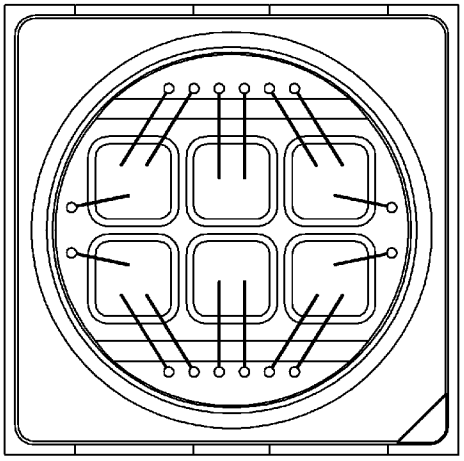
좌측면도



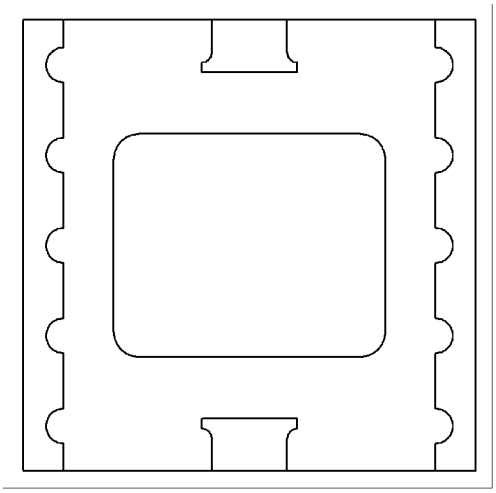
우측면도



평면도



저면도



Search terms：(1) (D149221)@PN 【印出】

Patent/Publication Number	D149221
Issued/Publication Date	2012/09/11
Application Date	2011/12/14
Application Number	100306828
Certification Number	D149221
LOC	14-99

Patent Right Change

Application Number	100306828
Date of Update	20160907
Granting of a license	NO
Registration of patent mortgage	NO
Transfer of patent right	NO
Succession of patent right	NO
Registration of patent trust	NO
Opposition filed	NO
Request for invalidation filed	NO
Date of lapse	
Patent revoked	
Date of grant	20120911
Scheduled expiry date	20231213
Due date of annual fee	20170910
Years of annuities paid	5

Citation

TWD138648
TWD141205
TWD143203
USD566055

Information on this system is for reference only, it cannot be used as grounds for approval or rejection.
In all instances of discrepancy, official publication from TIPO shall prevail and should be consulted.

(19)中華民國智慧財產局

(12)新式樣圖說公告本 **(11)證書號數：TW D149221S1**

(45)公告日： 中華民國 101 (2012) 年 09 月 11 日

(21)申請案號：100306828 (22)申請日： 中華民國 100 (2011) 年 12 月 14 日

(51)LOC.(9)Cl.：14-99

(71)申請人：東貝光電科技股份有限公司 (中華民國) (TW)

新北市三重區光復路 1 段 88 之 8 號 9 樓

(72)創作人：張智超 (TW) ；蔡易祐 (TW) ；陳致宏 (TW)

(74)代理人：蘭超群

(56)參考文獻：

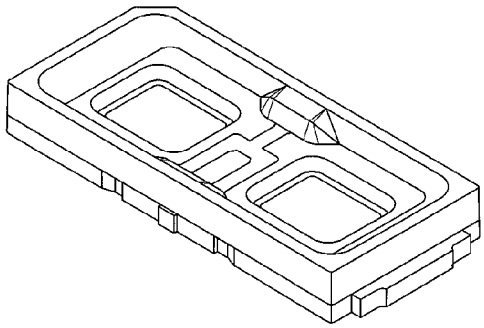
TW	D138648	TW	D141205
TW	D143203	US	D566055

審查人員：劉信邦

圖式數：8 共 7 頁

(54)名稱

發光二極體承載座



立體圖(代表圖)

公告本

新式樣專利圖說

（本圖說格式、順序，請勿任意更動，※記號部分請勿填寫）

※申請案號：100306828

※申請日：100.12.14　　※LOC分類：14-99.

一、新式樣物品名稱：（中文/英文）

發光二極體承載座

二、創作說明：

【物品用途】

本創作係關於一種發光二極體承載座，尤指一種用以承載發光二極體晶片，且係作為背光、照明或訊號光源等之用的發光二極體承載座。

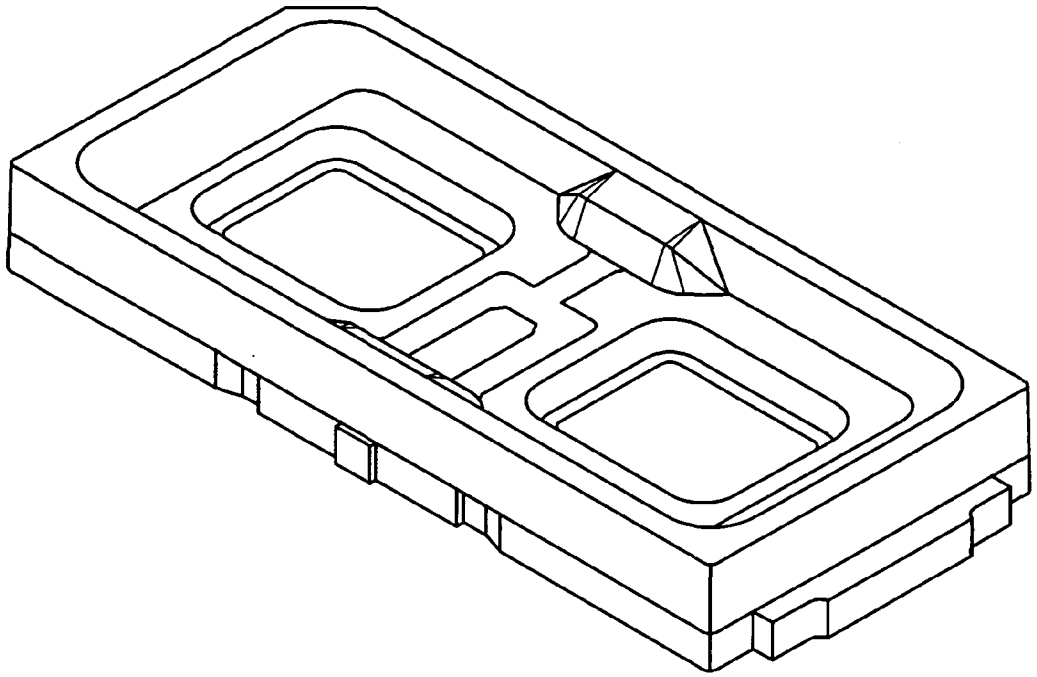
【創作特點】

本創作發光二極體承載座係包含：一本體以及一設置於該本體內的支架（包括第一支架和第二支架，甚或再包括第三支架），該本體頂側係具有一凹陷部，位於該凹陷部內的支架係一左一右各具一凹槽，該凹陷部的兩長邊內緣與該支架之間係各具有一凸塊，該兩凸塊係分別位於所述兩長邊的中間，各該凸塊的頂面係具有漸次下傾的第一斜坡和第二斜坡，各該凸塊的兩端並形成收攏狀；此外，該支架的兩凹槽之間係具有一區隔體，該區隔體係具有一橫段以及第一～三縱段，第一、二縱段係自該橫段的兩端朝前延伸，該第三縱段則自該橫段的兩端之間朝後延伸，且該第三縱段係靠近於該橫段之兩端中的其中一端，而讓另一端得以空出較大的空間。

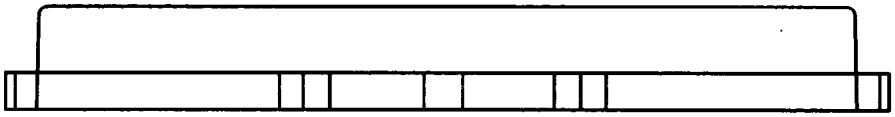
綜上所述，本創作確具有特殊的外觀設計，符合新式樣專利申請要件，爰依法提出申請。

三、圖面說明：

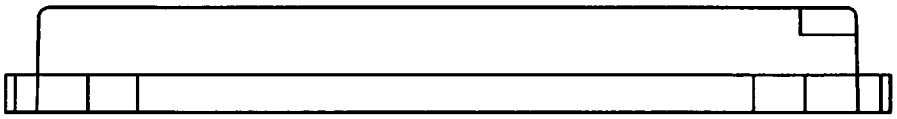
四、圖面：
（指定之代表圖，請單獨置於圖面頁第一頁）



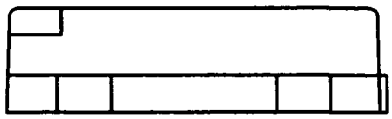
立體圖(代表圖)



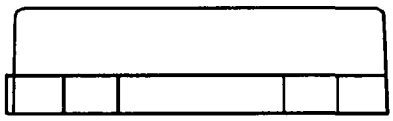
前視圖



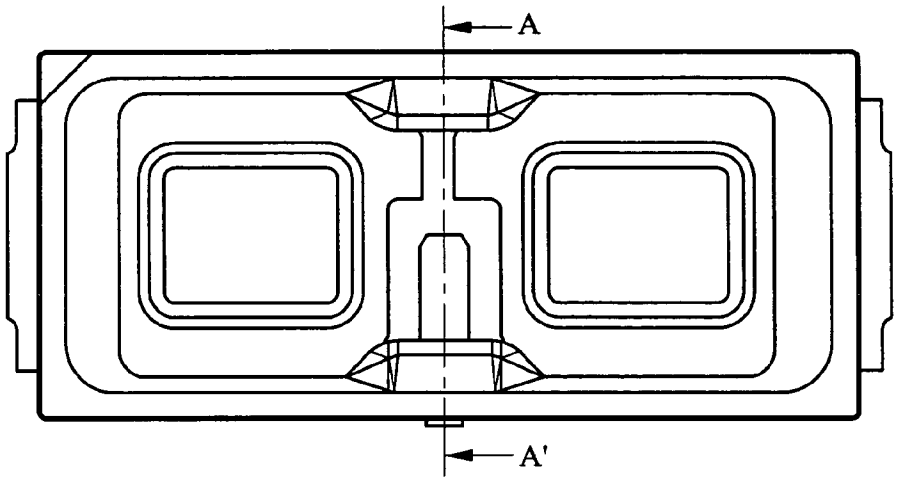
後視圖



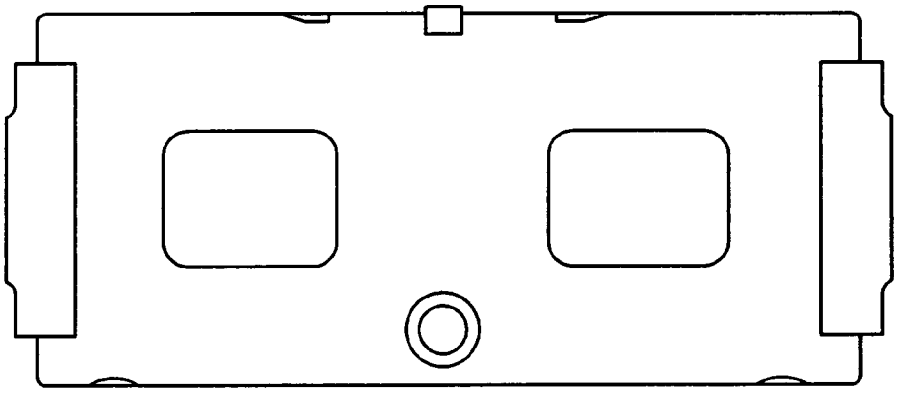
左側視圖



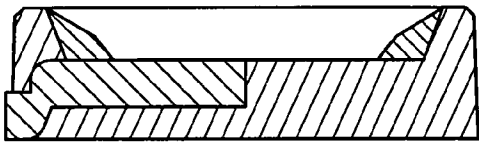
右側視圖



俯視圖



仰視圖



A-A’ 斷面圖

Search terms：(1) (D154430)@PN 【印出】

Patent/Publication Number	D154430
Issued/Publication Date	2013/07/01
Application Date	2012/09/27
Application Number	101305676
Certification Number	D154430
LOC	14-99

Patent Right Change

Application Number	101305676
Date of Update	20160519
Granting of a license	NO
Registration of patent mortgage	NO
Transfer of patent right	NO
Succession of patent right	NO
Registration of patent trust	NO
Opposition filed	NO
Request for Invalidation filed	NO
Date of lapse	
Patent revoked	
Date of grant	20130701
Scheduled expiry date	20240926
Due date of annual fee	20170630
Years of annuities paid	4

Citation

TWD102846
TWD145644
KR3004349000000
KR3004423910000

Information on this system is for reference only, it cannot be used as grounds for approval or rejection.
In all instances of discrepancy, official publication from TIPO shall prevail and should be consulted.

(19)中華民國智慧財產局

(12)設計說明書公告本 **(11)證書號數：TW D154430S1**

(45)公告日： 中華民國 102 (2013) 年 07 月 01 日

(21)申請案號：101305676 (22)申請日： 中華民國 101 (2012) 年 09 月 27 日

(51)LOC.(9)Cl.：14-99

(71)申請人：隆達電子股份有限公司 (中華民國) LEXTAR ELECTRONICS CORPORATION (TW)

新竹市科學工業園區工業東三路 3 號

(72)設計人：陳興國 CHEN, SHING KUO (TW) ；蔡培崧 CAI, PEI SONG (TW) ；柯博喻 KO, BO YU (TW) ；王君偉 WANG, CHUN WEI (TW)

(74)代理人：曾發鎬

(56)參考文獻：

TW	D102846	TW	D145644
KR	3004349000000	KR	3004423910000

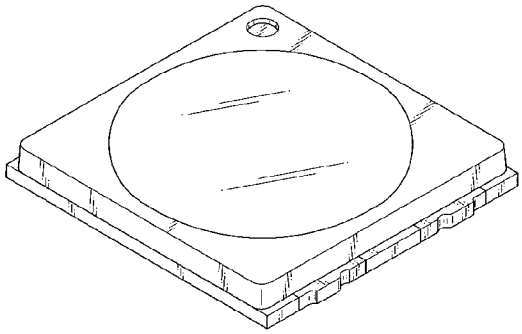
審查人員：劉信邦

圖式數：8 共 11 頁

(54)名稱

發光二極體封裝

LIGHT EMITTING DIODE PACKAGE



立體圖1(代表圖)

公告本

新式樣專利圖說

※記號部分請勿填寫

※申請案號：101305676　　※LOC分類：14-99

※申請日：101. 9. 27

一、新式樣物品名稱：

發光二極體封裝

LIGHT EMITTING DIODE PACKAGE

二、創作說明：

【物品用途】

[0001] 本創作係為一種可應用於一般照明及背光裝置之發光二極體封裝。

【創作特點】

[0002] 如各圖所示，本創作之發光二極體封裝具有四角落含有圓弧導角的正方矩形載具，於該載具頂面設有一概呈圓形窗片，且於一角隅設有一圓形淺槽。

[0003] 如前視圖、後視圖、左視圖及右視圖所示，該載具分為上下兩部份，上半部為底部寬上方窄之形式，並且由俯視圖所示，載具下半部的左右兩側略凸出於上半部的兩側。

[0004] 如仰視圖及立體圖2所示，該載具本體的底部由三個金屬塊組成，其餘由塑料填充完成。其中二金屬塊的輪廓形狀概呈L形之對稱形狀且設於該載具底面的一側，並且分別朝該載具兩外側延伸出一凸出部；而另一金屬塊則概呈一凸字形且單獨設於該載具另一側，且同時朝該載具

兩外側各延伸出一凸出部。凸伸出該載具外側之所有凸出部呈條狀且於表面上形成有凹凸狀的表面變化，載具下半部由塑料填充於四角落以及L 型與凸字型金屬塊之間凸出，並與最接近的金屬塊相互切平。此外，呈凸字形的金屬塊底部更設有一對圓孔和長矩形孔，以及呈L形的兩金屬塊底部亦各設有一長矩形孔，且所有圓孔和長矩形孔皆以塑料填平。

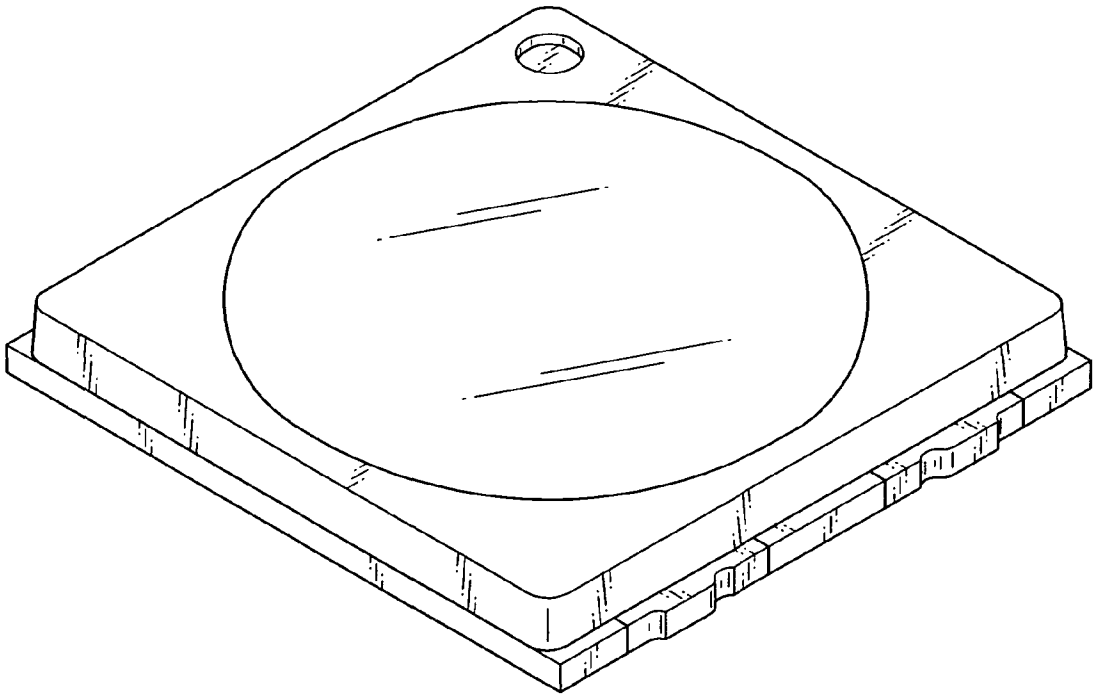
[0005] 本創作之特點尚未揭露於申請日前之公開物品設計，符合新穎性及創作性之新式樣專利要件，爰依法提出新式樣專利申請，請早日核准專利。

三、圖面說明：

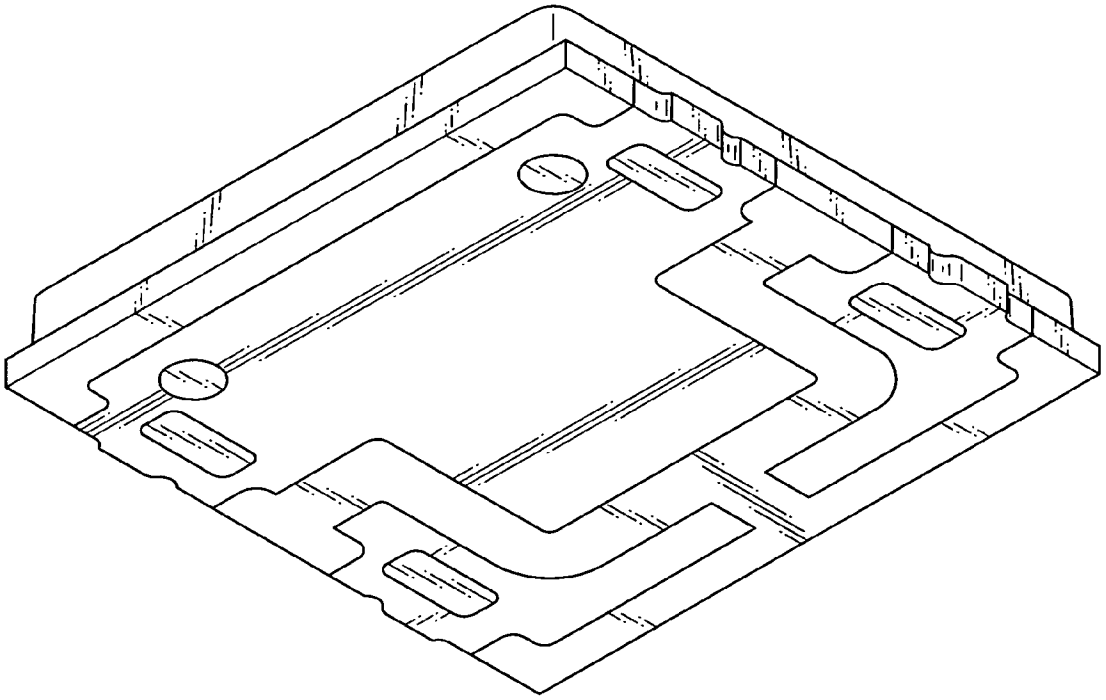
無。

四、圖面：

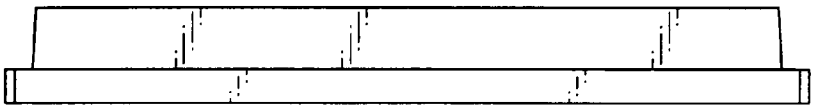
（指定之代表圖，請單獨置於圖面頁第１頁）



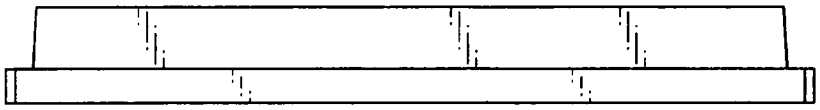
立體圖1(代表圖)



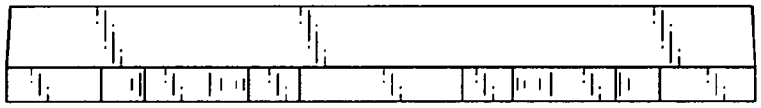
立體圖2



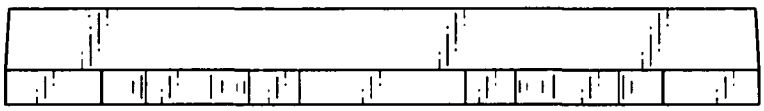
前視圖



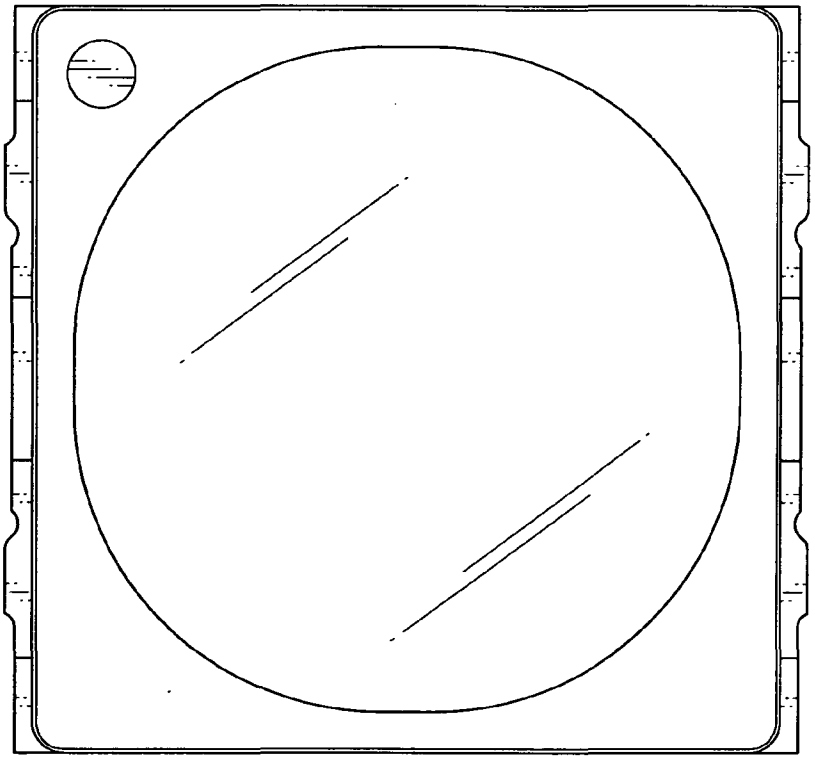
後視圖



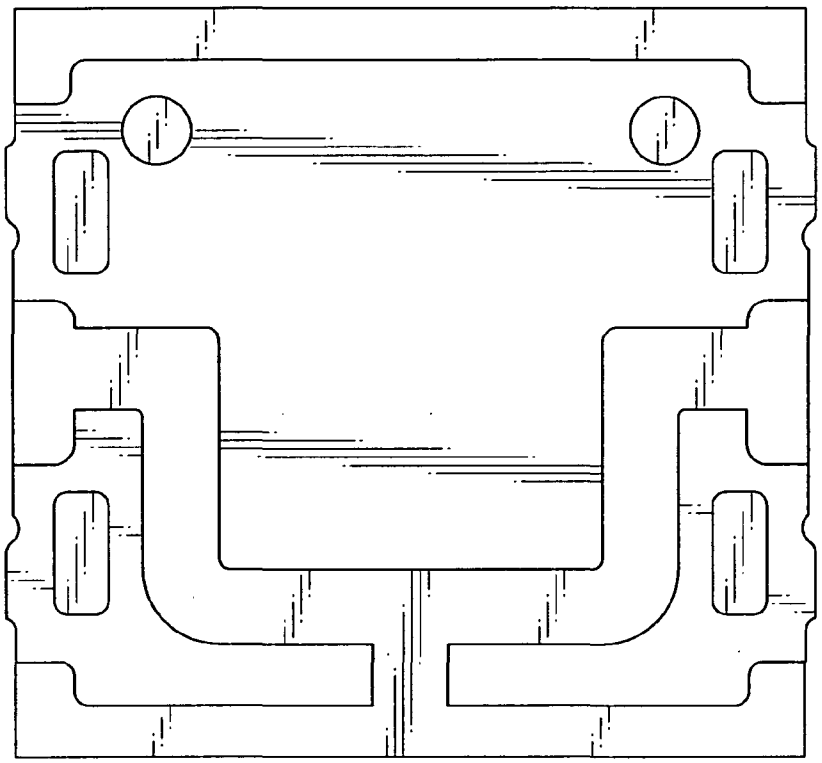
左側視圖



右側視圖



俯視圖



仰視圖

Search terms：(1) (D154432)@PN 【印出】

Patent/Publication Number	D154432
Issued/Publication Date	2013/07/01
Application Date	2012/11/12
Application Number	101306654
Certification Number	D154432
LOC	14-99

Patent Right Change

Application Number	101306654
Date of Update	20160519
Granting of a license	NO
Registration of patent mortgage	NO
Transfer of patent right	NO
Succession of patent right	NO
Registration of patent trust	NO
Opposition filed	NO
Request for invalidation filed	NO
Date of lapse	
Patent revoked	
Date of grant	20130701
Scheduled expiry date	20241111
Due date of annual fee	20170630
Years of annuities paid	4

Citation

TWD102846
TWD145644
KR3004349000000
KR3004423910000

Information on this system is for reference only, it cannot be used as grounds for approval or rejection.
In all instances of discrepancy, official publication from TIPO shall prevail and should be consulted.

(19)中華民國智慧財產局

(12)設計說明書公告本 **(11)證書號數：TW D154432S1**

(45)公告日： 中華民國 102 (2013) 年 07 月 01 日

(21)申請案號：101306654 (22)申請日： 中華民國 101 (2012) 年 11 月 12 日

(51)LOC.(9)Cl.：14-99

(71)申請人：隆達電子股份有限公司 (中華民國) LEXTAR ELECTRONICS CORPORATION (TW)

新竹市科學工業園區工業東三路 3 號

(72)設計人：陳興國 CHEN, SHING KUO (TW) ；蔡培崧 CAI, PEI SONG (TW) ；柯博喻 KO, BO YU (TW) ；王君偉 WANG, CHUN WEI (TW)

(74)代理人：曾發鎬

(56)參考文獻：

TW	D102846	TW	D145644
KR	3004349000000	KR	3004423910000

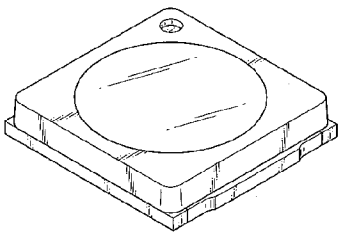
審查人員：劉信邦

圖式數：8 共 11 頁

(54)名稱

發光二極體封裝

LIGHT EMITTING DIODE PACKAGE



立體圖1(代表圖)

專利案號: 101306654

DTD版本：2.0.0

新式樣專利圖說

公告本

※記號部分請勿填寫
※申請案號： 101306654　　※LOC分類： 14-99
※申請日： 101. 11. 12

一、新式樣物品名稱：

發光二極體封裝

LIGHT EMITTING DIODE PACKAGE

二、創作說明：

【物品用途】

[0001] 本創作係為一種可應用於一般照明及背光裝置，用於封裝發光二極體並提供光源效果之發光二極體封裝。

【創作特點】

[0002] 如各附圖所示，本創作之發光二極體封裝為概呈一矩形的載具本體，以及兩金屬支架結合於載具本體下方；再者，該載具本體具有上窄下寬且帶有圓弧邊角的梯形設計，且如立體圖1及俯視圖所示，該載具本體頂面上嵌置一圓形窗片，並於一角落上設有一孔。

[0003] 如立體圖2及仰視圖所示，前述的兩金屬支架突出於載具底部並設計露出於該載具底部左右兩側且對稱的長條狀凸緣，唯兩金屬支架具有相同輪廓但內嵌長度不相同的創作特點，此外，兩金屬支架分別嵌置在該載具本體底部左右兩側且具有呈對稱狀之流線形腰身設計，並且在兩金屬支架內分別設計有兩個對稱圓孔使整體具有對稱協調之平穩設計。

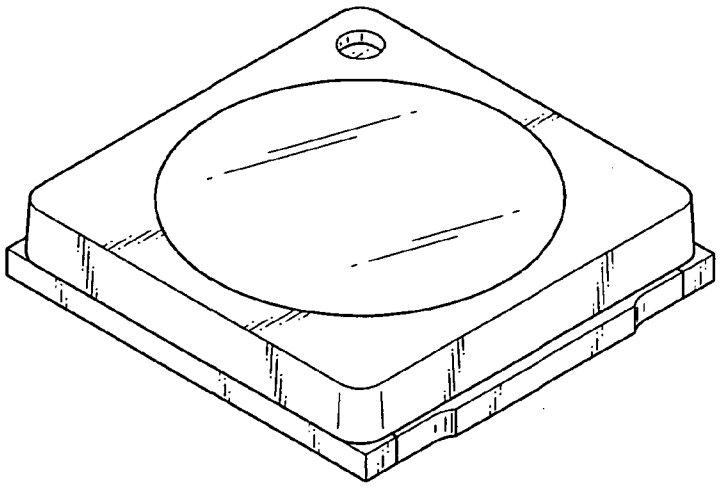
[0004] 本創作尚未揭露於申請日前之公開物品，符合新穎性及創作性之新式樣專利要件，爰依法提出新式樣專利申請。

三、圖面說明：

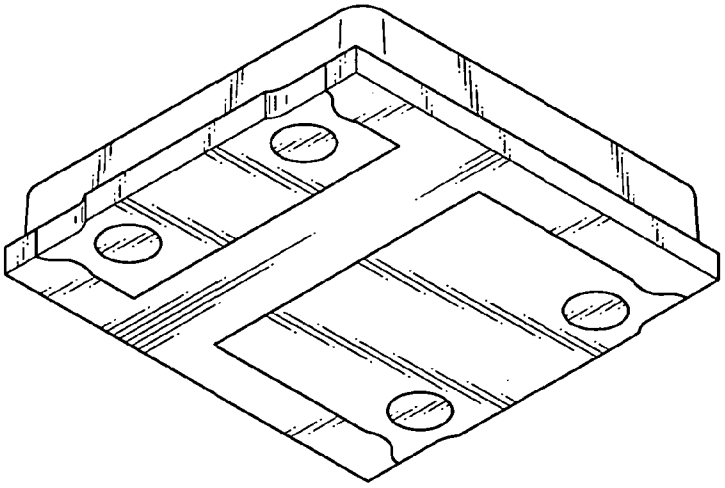
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四、圖面：

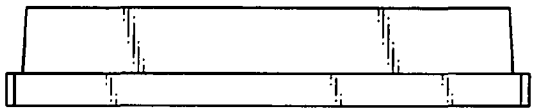
（指定之代表圖，請單獨置於圖面頁第 1 頁）



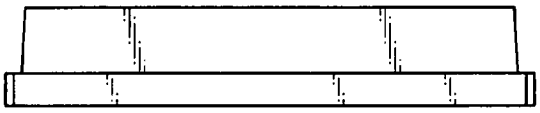
立體圖1(代表圖)



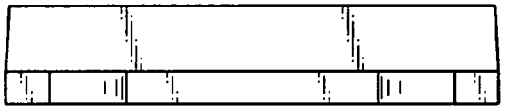
立體圖2



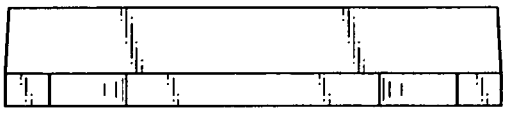
前視圖



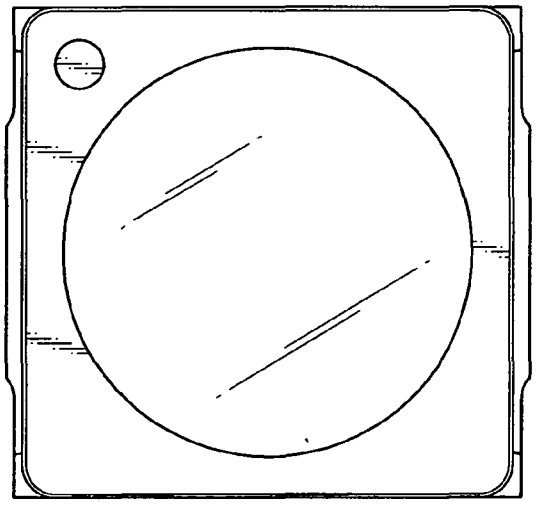
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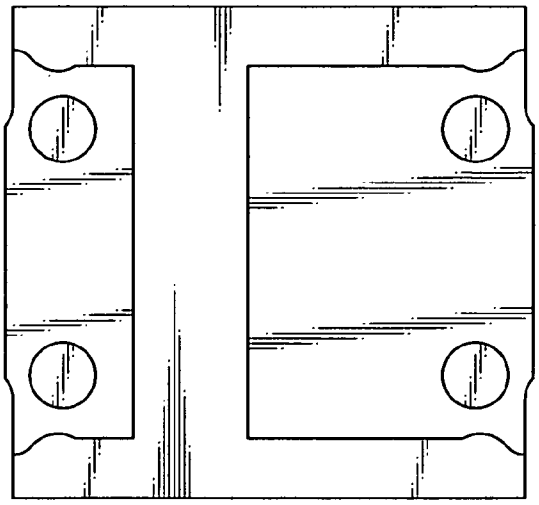
左側視圖



右側視圖



俯視圖



仰視圖

Electronic Patent Application Fee Transmittal

Application Number:	14720230
Filing Date:	22-May-2015
Title of Invention:	Carrier, Carrier Leadframe, And Light Emitting Device
First Named Inventor/Applicant Name:	Chung-Chuan Hsieh
Filer:	Andy M. Han
Attorney Docket Number:	EL01.0088US

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
Submission- Information Disclosure Stmt	1806	1	180	180
		Total in USD ($)		**180**

Electronic Acknowledgement Receipt

EFS ID:	28264755
Application Number:	14720230
International Application Number:	
Confirmation Number:	4909
Title of Invention:	Carrier, Carrier Leadframe, And Light Emitting Device
First Named Inventor/Applicant Name:	Chung-Chuan Hsieh
Customer Number:	13859
Filer:	Andy M. Han
Filer Authorized By:	
Attorney Docket Number:	EL01.0088US
Receipt Date:	03-FEB-2017
Filing Date:	22-MAY-2015
Time Stamp:	19:17:09
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$180
RAM confirmation Number	020617INTEFSW19183300
Deposit Account	
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	EL01_0088US_IDS.pdf	612165 a27cb651502f8d6da2244581024c1746340f80dd	no	4
Warnings:					
Information:					
A U.S. Patent Number Citation or a U.S. Publication Number Citation is required in the Information Disclosure Statement (IDS) form for autoloading of data into USPTO systems. You may remove the form to add the required data in order to correct the Informational Message if you are citing U.S. References. If you chose not to include U.S. References, the image of the form will be processed and be made available within the Image File Wrapper (IFW) system. However, no data will be extracted from this form. Any additional data such as Foreign Patent Documents or Non Patent Literature will be manually reviewed and keyed into USPTO systems.					
2	Foreign Reference	KR3020070049380.pdf	619978 3c43eafa3ca356eebbb69477a1d54395682d09d2	no	4
Warnings:					
Information:					
3	Foreign Reference	TW_D149221.pdf	428546 7e57d37d404ea6c02ba549f3710d5a8f3feb962d	no	9
Warnings:					
Information:					
4	Foreign Reference	TW_D154430.pdf	562809 ced4533079f5965a8eaf4c2cacebacbf2245c766	no	13
Warnings:					
Information:					
5	Foreign Reference	TW_D154432.pdf	501802 27573f9cb2f67887f110daed546d835af560569c	no	13
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Information:					

6	Fee Worksheet (SB06)	fee-info.pdf	29991 5603cc0b404f539b0e8ed33b4109501da2675d7b	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	2755291	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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United States Patent and Trademark Office
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P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/720,230	05/22/2015	Chung-Chuan Hsieh	EL01.0088US	4909

13859 7590 03/08/2017

Han IP Corporation
4790 Irvine Boulevard Suite 105-347
Irvine, CA 92620

EXAMINER
NARAGHI, ALI

ART UNIT	PAPER NUMBER
2896	

NOTIFICATION DATE	DELIVERY MODE
03/08/2017	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

pto@haniplaw.com

Corrected Notice of Allowability	Application No. 14/720,230	Applicant(s) HSIEH ET AL.	
	Examiner ALI NARAGHI	Art Unit 2896	AIA (First Inventor to File) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *10/25/2016*.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on_____.
2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
3. ☒ The allowed claim(s) is/are *11 and 15-25*. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.
4. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☒ All b) ☐ Some *c) ☐ None of the:
   1. ☒ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
5. ☒ Examiner's Amendment/Comment
6. ☒ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/ALI NARAGHI/
Primary Examiner, Art Unit 2896

The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

DETAILED ACTION

Election/Restrictions

This application is in condition for allowance except for the presence of claim 1-10 directed to species non-elected without traverse. Accordingly, claims 1-10 been cancelled.

EXAMINER'S AMENDMENT

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in an interview with Andy Han on 12/12/2016.

Please cancel claims 12-14.

Please amend claim 11 as following: A light emitting device, comprising: a carrier; a light emitting diode (LED) chip carried within the carrier; and an encapsulant covering the LED chip, wherein the carrier comprises: at least one electrode portion, each of the at least one electrode portion comprising at least an electrode portion cross section; and a housing comprising a housing cross section, the housing at least partially

covering the at least one electrode portion, wherein the housing cross section and the electrode portion cross section are not level with one another ;wherein each of the at least one electrode portion further comprises a central area and two edge areas, and wherein the electrode portion cross section is located on at least one of the two edge areas; wherein the central area and the two edge areas protrude from the housing cross section; wherein the central area protrudes from the two edge areas.

Please amend claim 16 as following: The light emitting device of Claim ~~12~~ 11, wherein the electrode portion cross section and the central area are not coplanar.

Please amend claim 21 as following: The light emitting device of Claim ~~12~~ 11, wherein the two edge areas protrude from the central area.

Allowable Subject Matter

Claims 11, 15-25 are allowed.

The following is the reason for allowance of claim 11, pertinent arts do not alone or in combination disclose: wherein the central area and the two edge areas protrude from the housing cross section; wherein the central area protrudes from the two edge areas.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Wang et al (US Pub No. 20130270588), Watari et al (US Pub No. 20120132949), Hayashi (US Pub No. 20090261374), Yamamoto et al (US Pub No. 20070246841), Kato (US Patent No. 9024514), Wang et al (US Patent No. 8137999).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ALI NARAGHI whose telephone number is (571)270-5720. The examiner can normally be reached on 9AM-6PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Such can be reached on 571-272-8895. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/ALI NARAGHI/

Primary Examiner, Art Unit 2896

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14720230	HSIEH ET AL.
	Examiner	**Art Unit**
	ALI NARAGHI	2896

CPC								
Symbol							**Type**	**Version**
H01L		33	/	483			F	2013-01-01
H01L		33	/	60			A	2013-01-01
H01L		33	/	62			I	2013-01-01
H01L		2933	/	0033			A	2013-01-01
H01L		2933	/	0066			A	2013-01-01
H01L		24	/	97			I	2013-01-01
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CPC Combination Sets								
Symbol							**Type**	**Set**	**Ranking**	**Version**
			/							
			/							

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	12	
/ALI NARAGHI/ Primary Examiner.Art Unit 2896	12/17/2016	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	5

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14720230	HSIEH ET AL.
	Examiner	**Art Unit**
	ALI NARAGHI	2896

US ORIGINAL CLASSIFICATION		INTERNATIONAL CLASSIFICATION										
CLASS	SUBCLASS	CLAIMED					NON-CLAIMED					
		H	0	1	L	33 / 48 (2010.01.01)						
CROSS REFERENCE(S)												
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)											

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	12	
/ALI NARAGHI/ Primary Examiner.Art Unit 2896	12/17/2016	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	5

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14720230	HSIEH ET AL.
	Examiner	**Art Unit**
	ALI NARAGHI	2896

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
	1	4	17												
	2	5	18												
	3	6	19												
	4	7	20												
	5	8	21												
	6	9	22												
	7	10	23												
	8	11	24												
	9	12	25												
	10														
1	11														
	12														
	13														
	14														
2	15														
3	16														

NONE (Assistant Examiner)	(Date)	**Total Claims Allowed:** 12	
/ALI NARAGHI/ Primary Examiner.Art Unit 2896 (Primary Examiner)	12/17/2016 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 5

U.S. Patent and Trademark Office Part of Paper No. 20170129

SCORE Placeholder Sheet for IFW Content

Application Number: 14720230 Document Date: 03/20/2017

The presence of this form in the IFW record indicates that the following document type was received in electronic format on the date identified above. This content is stored in the SCORE database.

- Drawings – Other than Black and White Line Drawings

Since this was an electronic submission, there is no physical artifact folder, no artifact folder is recorded in PALM, and no paper documents or physical media exist. The TIFF images in the IFW record were created from the original documents that are stored in SCORE.

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At the time of document entry (noted above):

- Examiners may access SCORE content via the eDAN interface.
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Form Revision Date: September 30, 2013

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www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/720,230	05/22/2015	Chung-Chuan Hsieh	EL01.0088US	4909

13859 7590 01/20/2017

Han IP Corporation
4790 Irvine Boulevard Suite 105-347
Irvine, CA 92620

EXAMINER
NARAGHI, ALI

ART UNIT	PAPER NUMBER
2896	

NOTIFICATION DATE	DELIVERY MODE
01/20/2017	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

pto@haniplaw.com

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

Application No. : 14720230
Applicant : Hsieh
Filing Date : 05/22/2015
Date Mailed : 01/20/2017

NOTICE TO FILE CORRECTED APPLICATION PAPERS

Notice of Allowance Mailed

This application has been accorded an Allowance Date and is being prepared for issuance. The application, however, is incomplete for the reasons below.

Applicant is given two (2) months from the mail date of this Notice within which to respond. This time period for reply is extendable under 37 CFR 1.136(a) for only TWO additional MONTHS.

The informalities requiring correction are indicated in the attachment(s). If the informality pertains to the abstract, specification (including claims) or drawings, the informality must be corrected with an amendment in compliance with 37 CFR 1.121 (or, if the application is a reissue application, 37 CFR 1.173). Such an amendment may be filed after payment of the issue fee if limited to correction of informalities noted herein. See Waiver of 37 CFR 1.312 for Documents Required by the Office of Patent Publication, 1280 Off. Gaz. Patent Office 918 (March 23, 2004). In addition, if the informality is not corrected until after payment of the issue fee, for purposes of 35 U.S.C. 154(b)(1)(iv), "all outstanding requirements" will be considered to have been satisfied when the informality has been corrected. A failure to respond within the above-identified time period will result in the application being ABANDONED.

See attachment(s).

A copy of this notice MUST be returned with the reply. Please address response to "Mail Stop Issue Fee, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450".

/Stephanie Smart/
Publication Branch
Office of Data Management
(571) 272-4200

IDENTIFICATION OF DRAWING DEFICIENCIES

- [ ] There is a hole or the image thereof within the illustration. FIG(s)
- [ ] The illustration is penetrated or traversed by a solid or broken line that is not intended to be part of the drawing, such as a dark line caused by a flaw in the copying process. FIG(s)
- [ ] An ink stamp or the image thereof obscures part of the illustration. FIG(s)
- [ ] The drawing is marred by black smudges, obliterations, or fax/copier marks (for example, speckles or dots in a substantial portion of the drawing). FIG(s)
- [ ] Figure numbers are duplicated or missing. FIG(s)
- [ ] Drawing sheet or figure is missing. FIG(s)
- [ ] Numbers, letters, or reference characters in the drawing have been crossed out or are illegibly handwritten. FIG(s)
- [ ] The character of the lines, numbers, and letters is poor. FIG(s)
- [ ] The drawing's background shows that the original drawing was made on graph paper or other paper with a pattern or decoration. FIG(s)
- [ ] The FIG. number label is placed in a location that causes the drawing to be read upside down. FIG(s)
- [X] Data, a reference number, or part of the drawing is truncated or missing, or a lead line has no reference number. FIG(s) 3
- [ ] The drawing and/or the FIG. label contain(s) foreign language. FIG(s)
- [ ] This utility application contains a photograph of a view that is capable of being illustrated as a line drawing. FIG(s)
- [ ] A petition under 37 CFR 1.84(a)(2) to accept color drawings has been granted, but the brief description of the drawings in the specification does not contain (or has not been amended to contain) the paragraph required by 37 CFR 1.84(a)(2)(iii).
- [ ] This reissue application contains added and/or amended drawings that are not labeled as “New” or “Amended” or “Canceled” as required by 37 CFR 1.173(b)(3). FIG(s)
- [ ] This Design reissue application contains a drawing that is labeled as “Canceled” but is not surrounded by brackets, or a drawing that is surrounded by brackets but is not labeled as “Canceled.” See 37 CFR 1.173(b)(3). FIG(s)
- [ ] OTHER:
- [ ] COMMENTS:

Electronic Acknowledgement Receipt

EFS ID:	28676906
Application Number:	14720230
International Application Number:	
Confirmation Number:	4909
Title of Invention:	Carrier, Carrier Leadframe, And Light Emitting Device
First Named Inventor/Applicant Name:	Chung-Chuan Hsieh
Customer Number:	13859
Filer:	Andy M. Han
Filer Authorized By:	
Attorney Docket Number:	EL01.0088US
Receipt Date:	20-MAR-2017
Filing Date:	22-MAY-2015
Time Stamp:	14:10:49
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	EL01_0088US_Transmittal_Letter.pdf	36550 ae5734130d95e7f7166539b5410d437df31f b150	no	2

Warnings:

Information:					
2	Drawings-only black and white line drawings	EL01_0088US_Drawings_Replacement_Sheet.pdf	6659388 5dcf93ce6d1e1053aef03cfaa363b064bf924cfb	no	28
Warnings:					
Information:					
3	Miscellaneous Incoming Letter	14720230_Notice_to_File_Corrected_Application_Papers.pdf	112557 0b4286974ade32e196bb47c27862bb49f1ca9bb0	no	3
Warnings:					
Information:					
			Total Files Size (in bytes):	6808495	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE (USPTO)	
Application Serial Number	14/720,230
Confirmation Number	4909
Filing Date	May 22, 2015
Title of Application	Carrier, Carrier Leadframe, And Light Emitting Diode
First Named Inventor	Chung-Chuan Hsieh
Group Art Unit	2896
Examiner	Naraghi, Ali
Attorney Docket Number	EL01.0088US

To: Mail Stop **Issue Fee**
Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

From: Andy M. Han (Tel: 949-383-5385; Fax: 206-792-5742)
Han IP Corporation
4790 Irvine Boulevard Suite 105-347
Irvine, CA 92620

Customer Number 13859

Response to Notice to File Corrected Application Papers

In response to the Notice to File Corrected Application Papers dated January 20, 2017 (hereinafter the "Notice") regarding the above-identified application, Applicant respectfully submits a Replacement Sheet of Drawings in compliance with 37 CFR 1.121 to amend Fig. 3 by fixing a broken lead line with a solid line. No new matter is introduced by the amendments. Any necessary fees will be paid by credit card through the EFS Web.

Respectfully Submitted,

Han IP Corporation
Representative for Applicant

/Andy M. Han, Reg. No. 60,266/ Dated: March 20, 2017

Andy M. Han, Esq.
(andyh@haniplaw.com; 949-383-5385)
Registration No. 60266

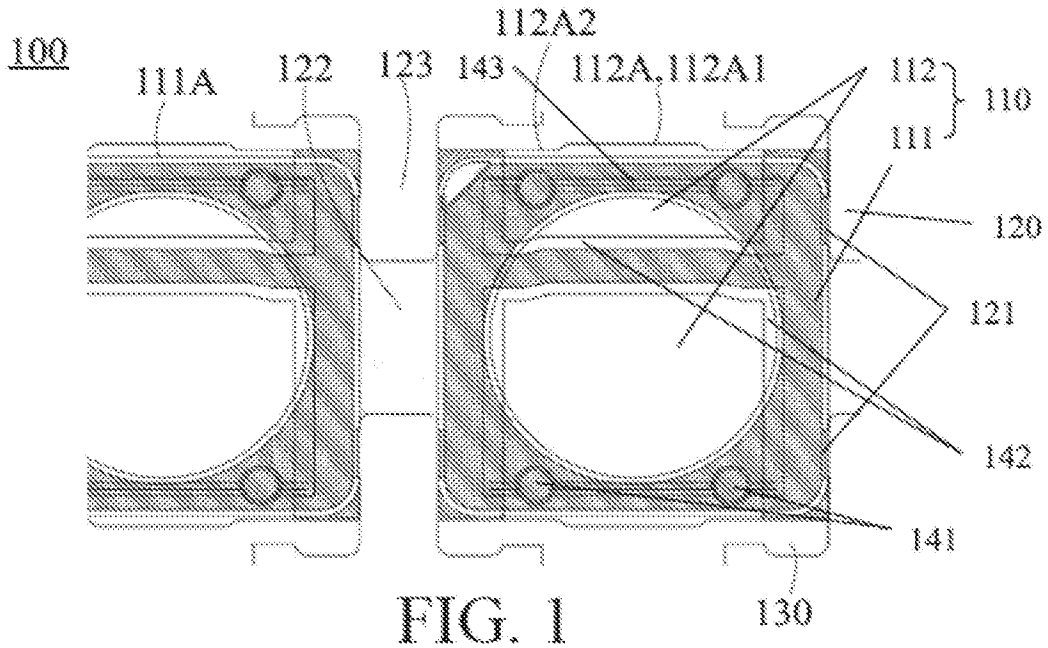

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FIG. 1

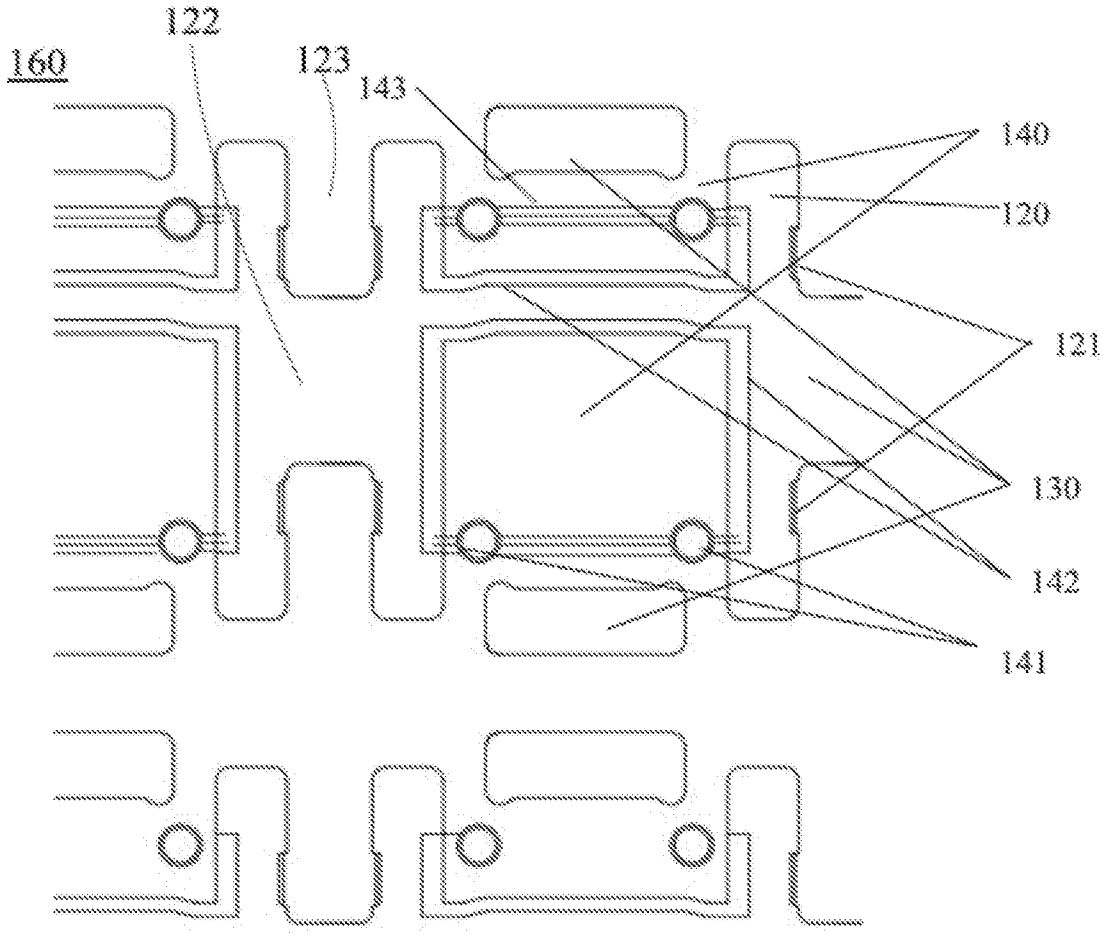

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FIG. 2

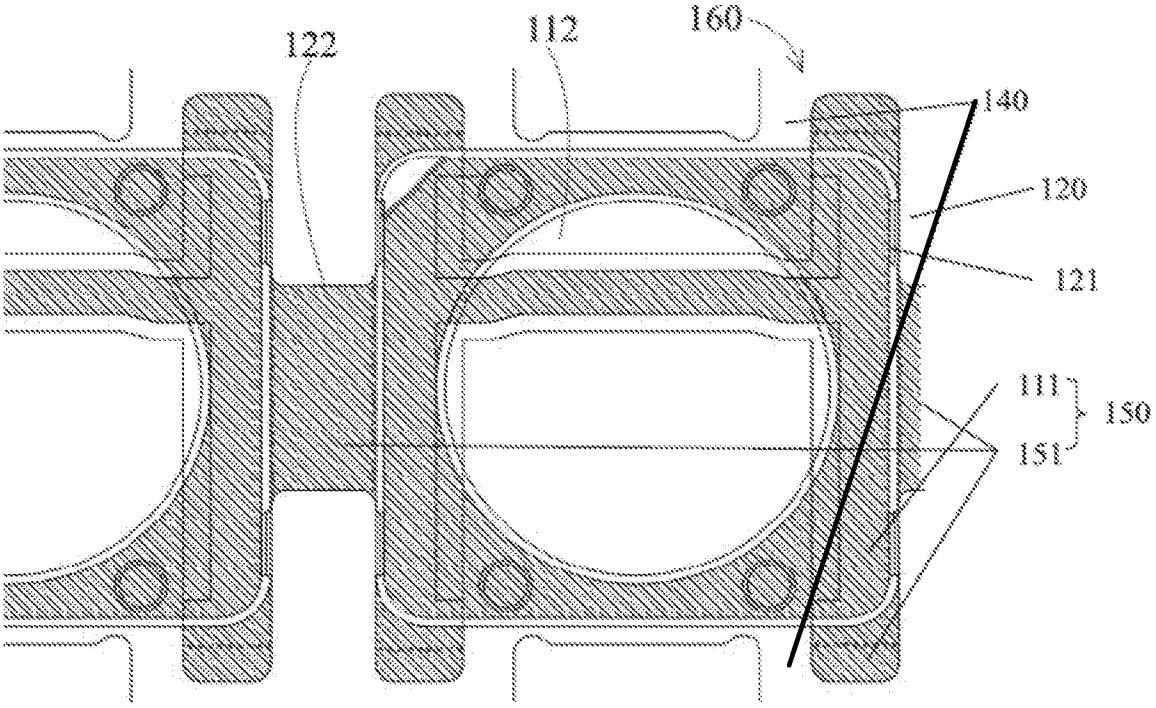


FIG. 3

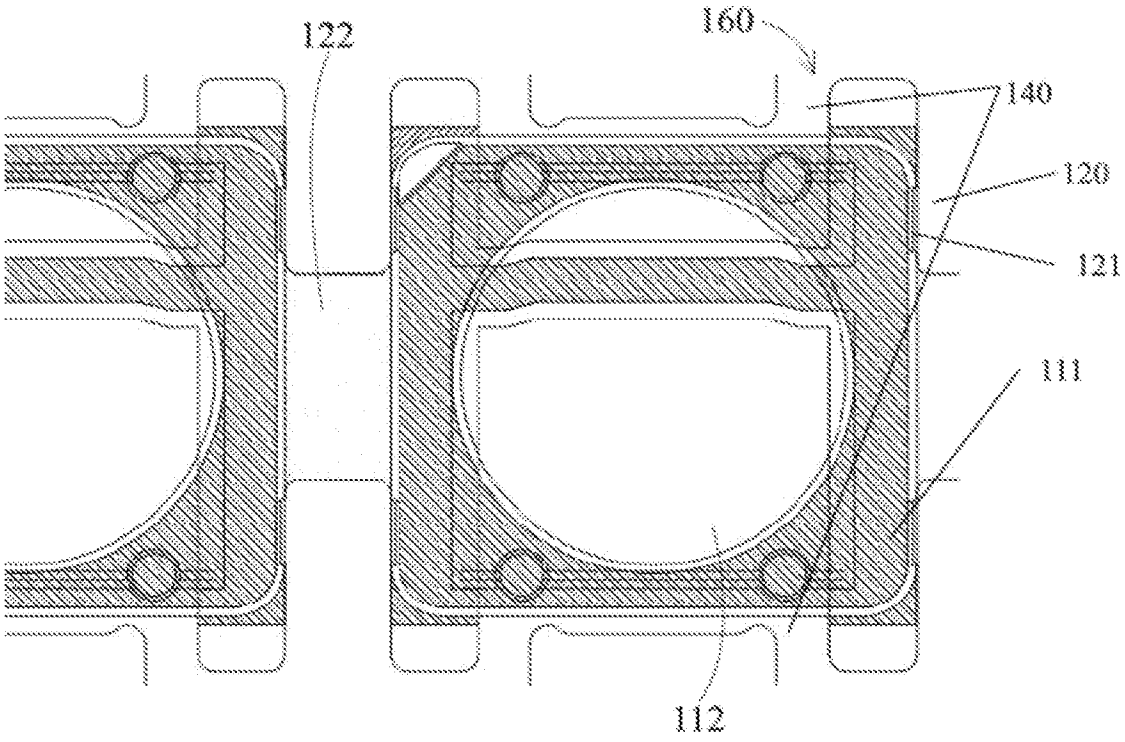


FIG. 4

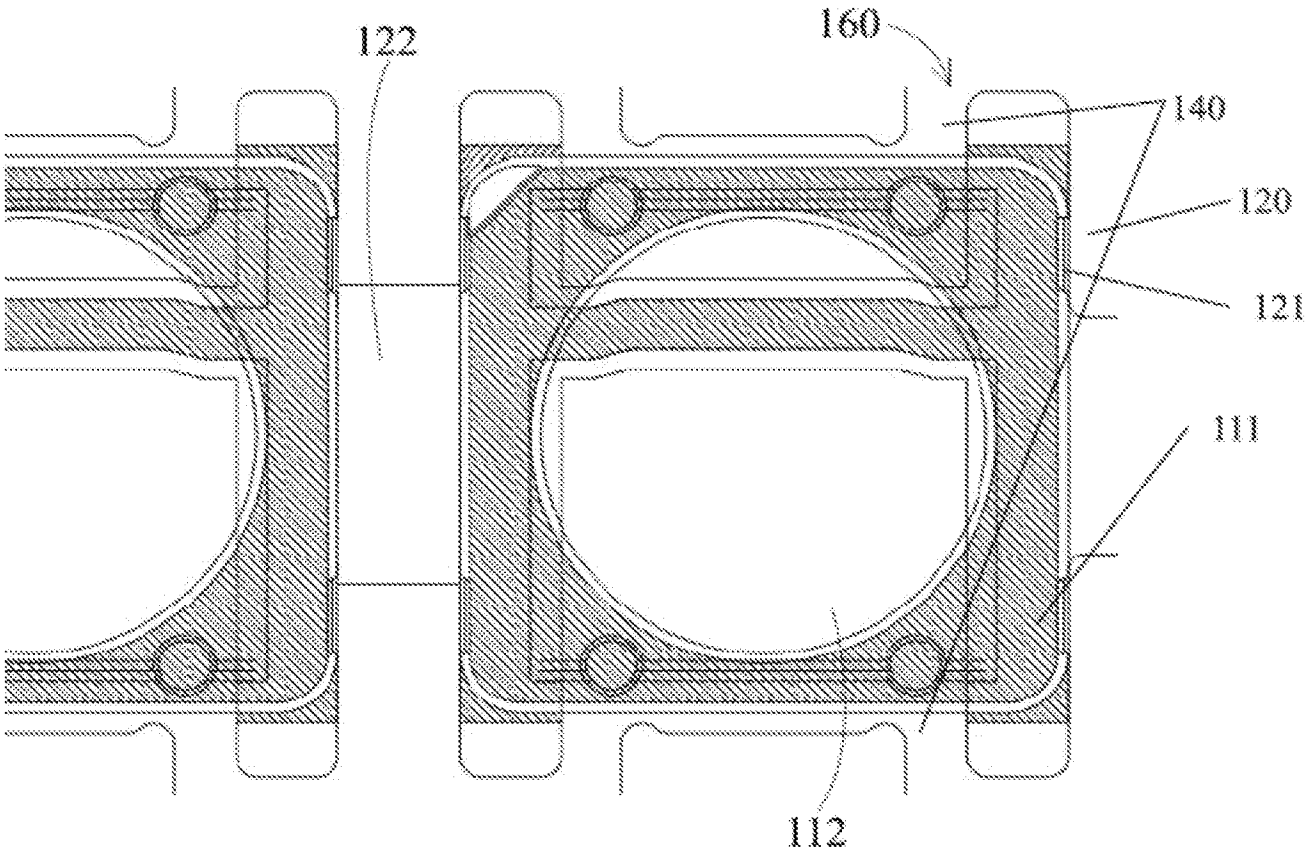


FIG. 4A

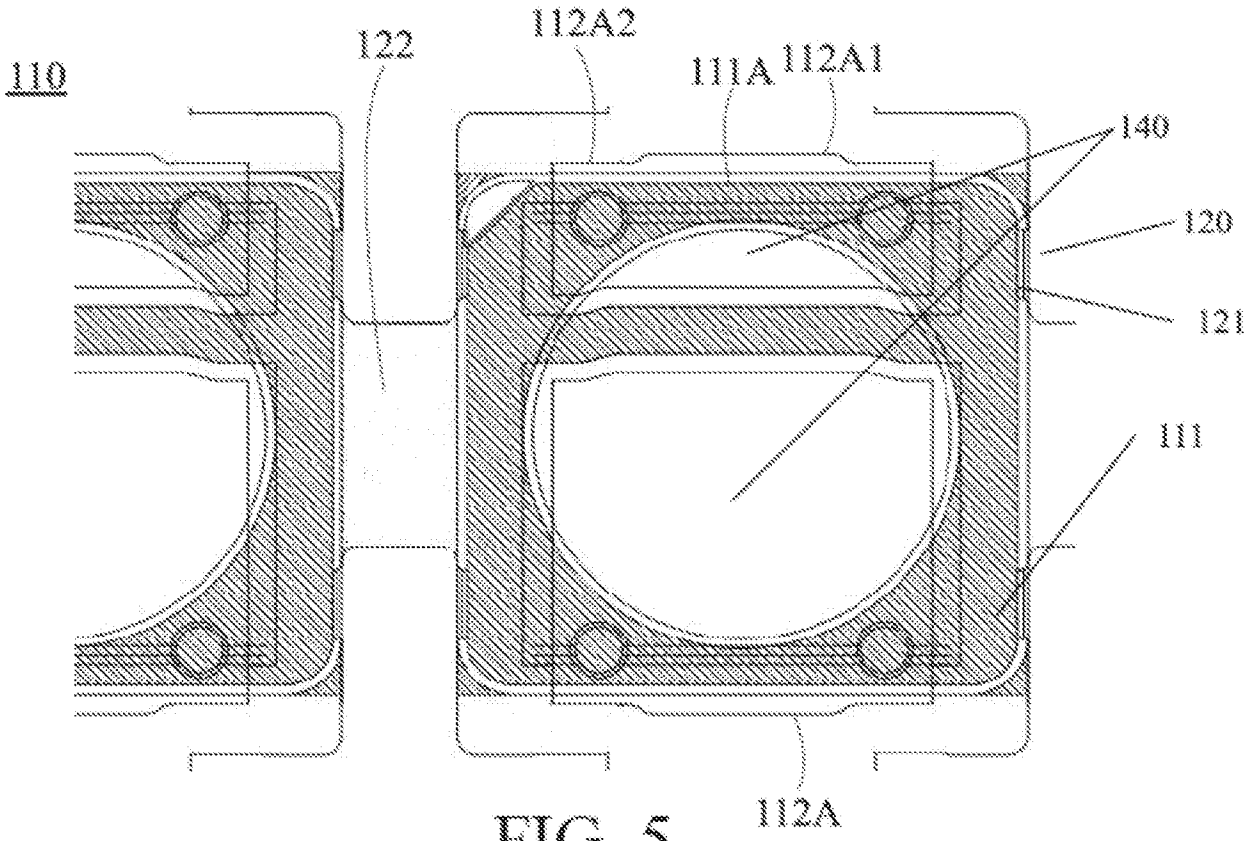

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FIG. 5

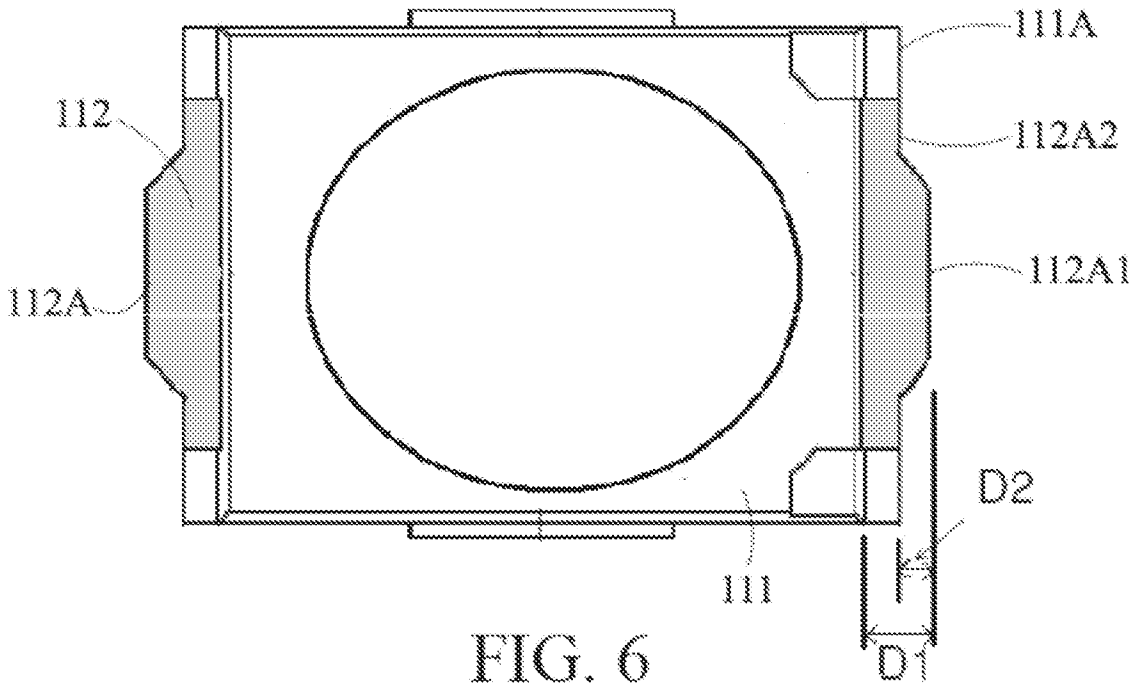

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FIG. 6

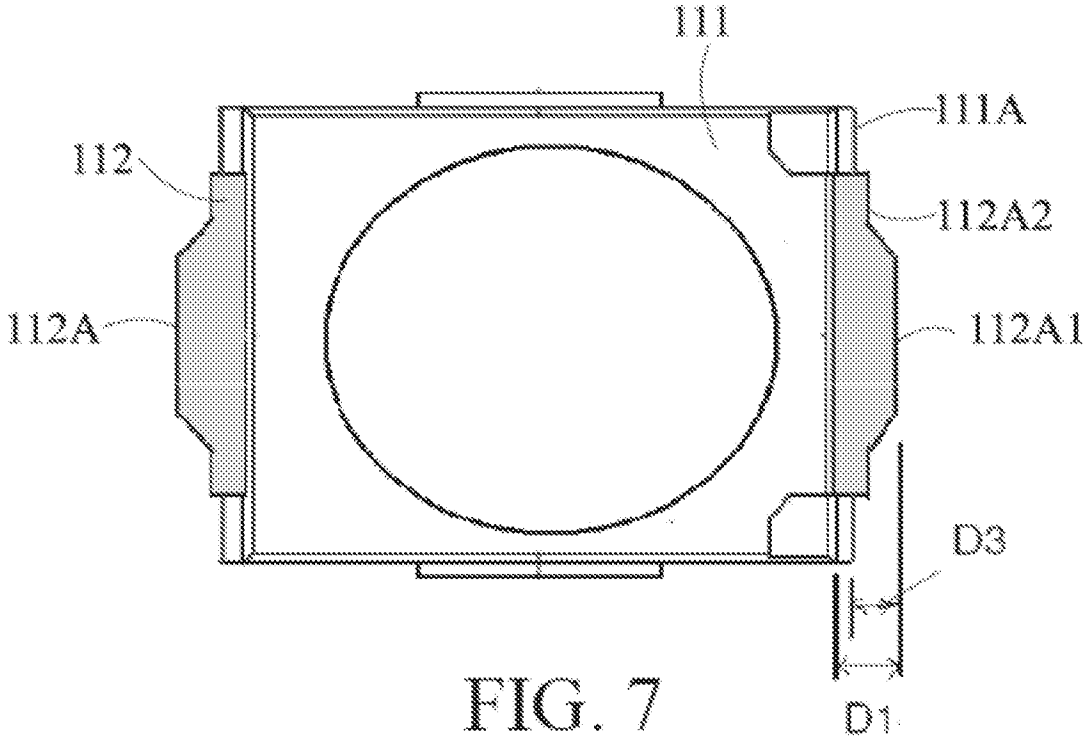

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FIG. 7

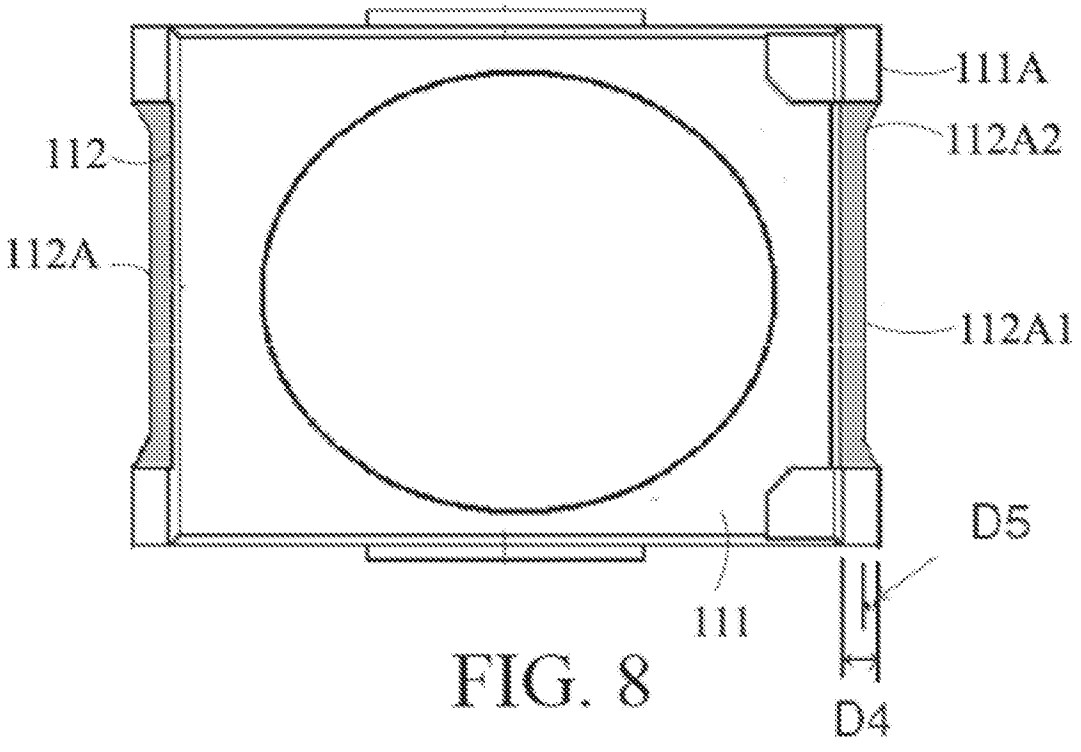

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D4

FIG. 8

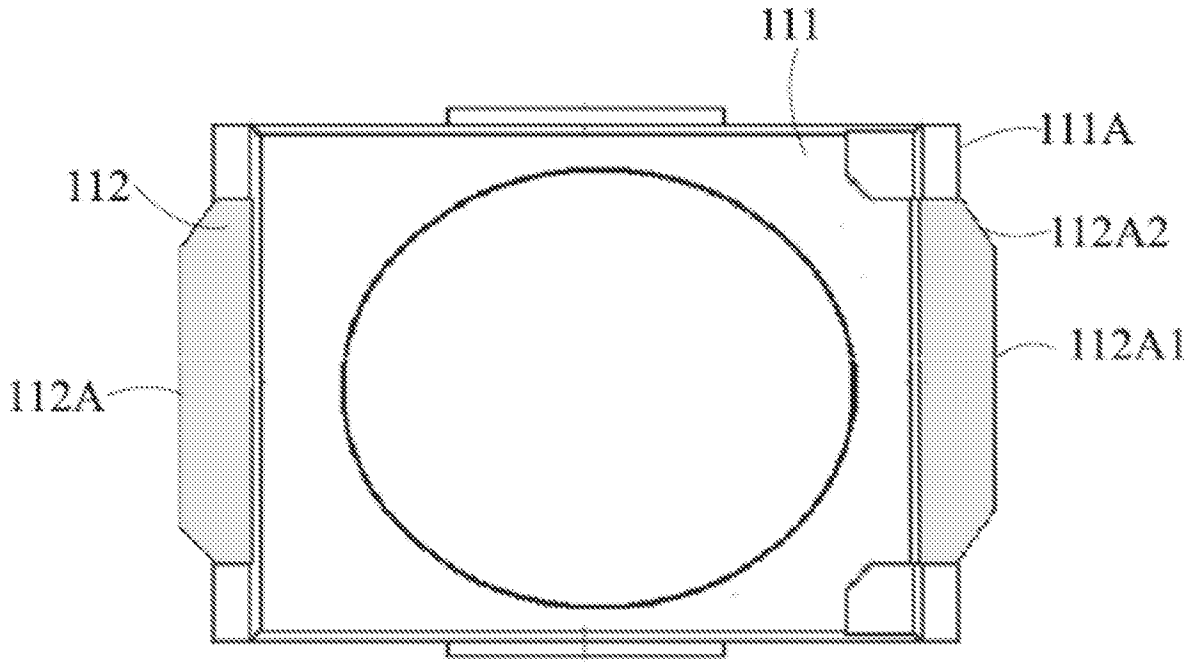


FIG. 9

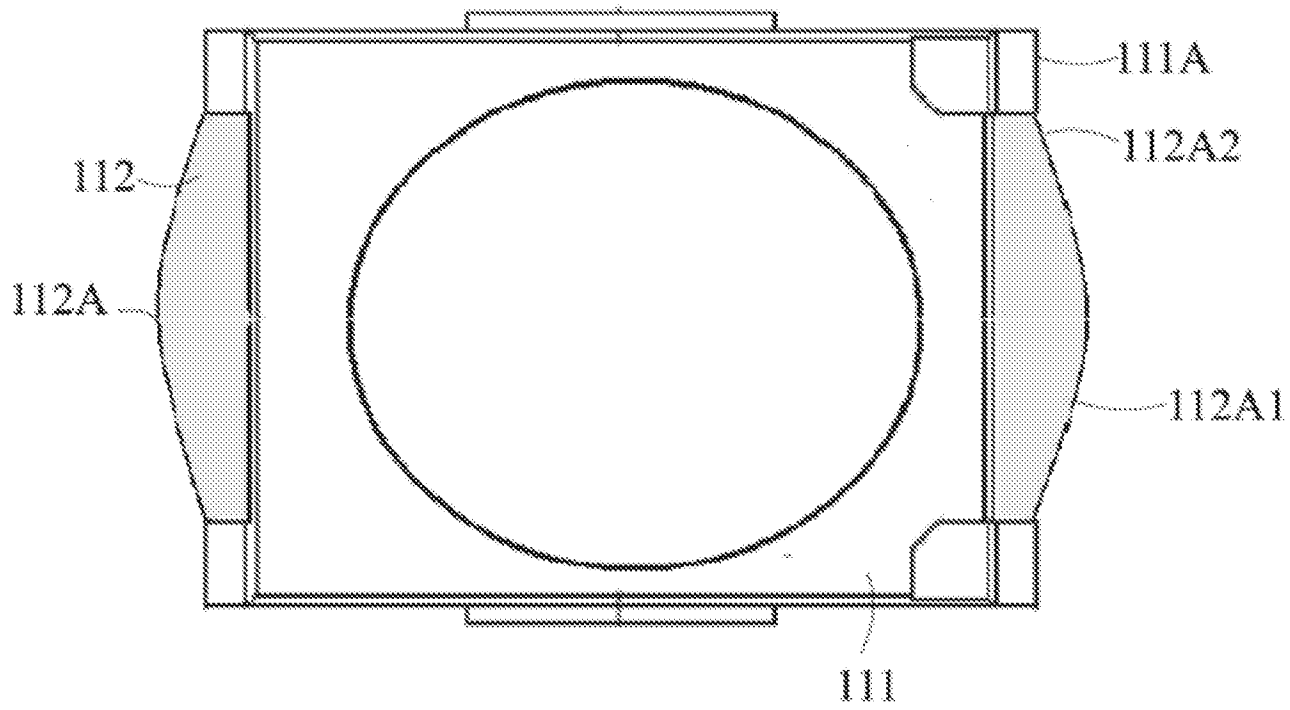


FIG. 10

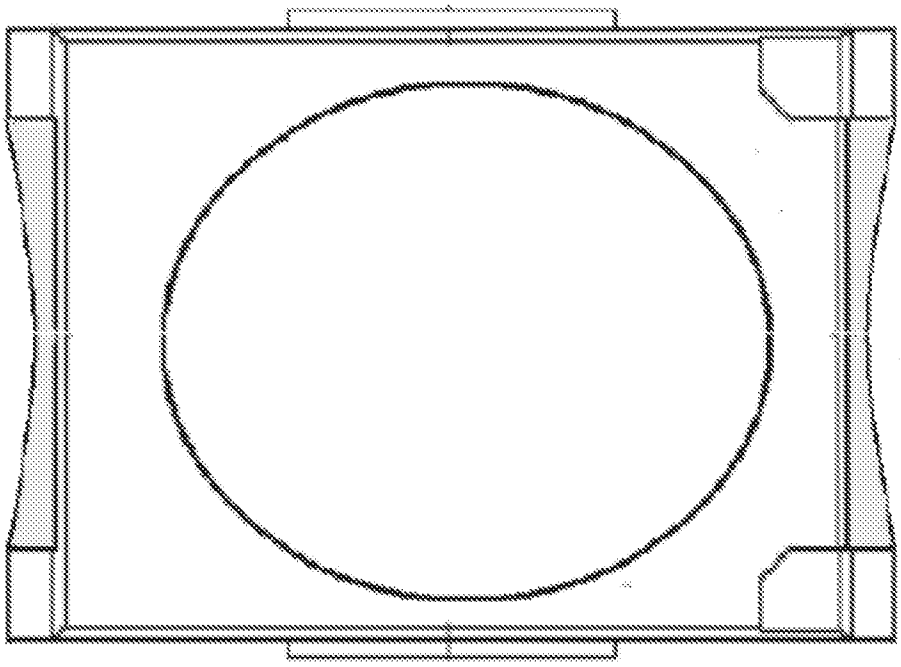


FIG. 11

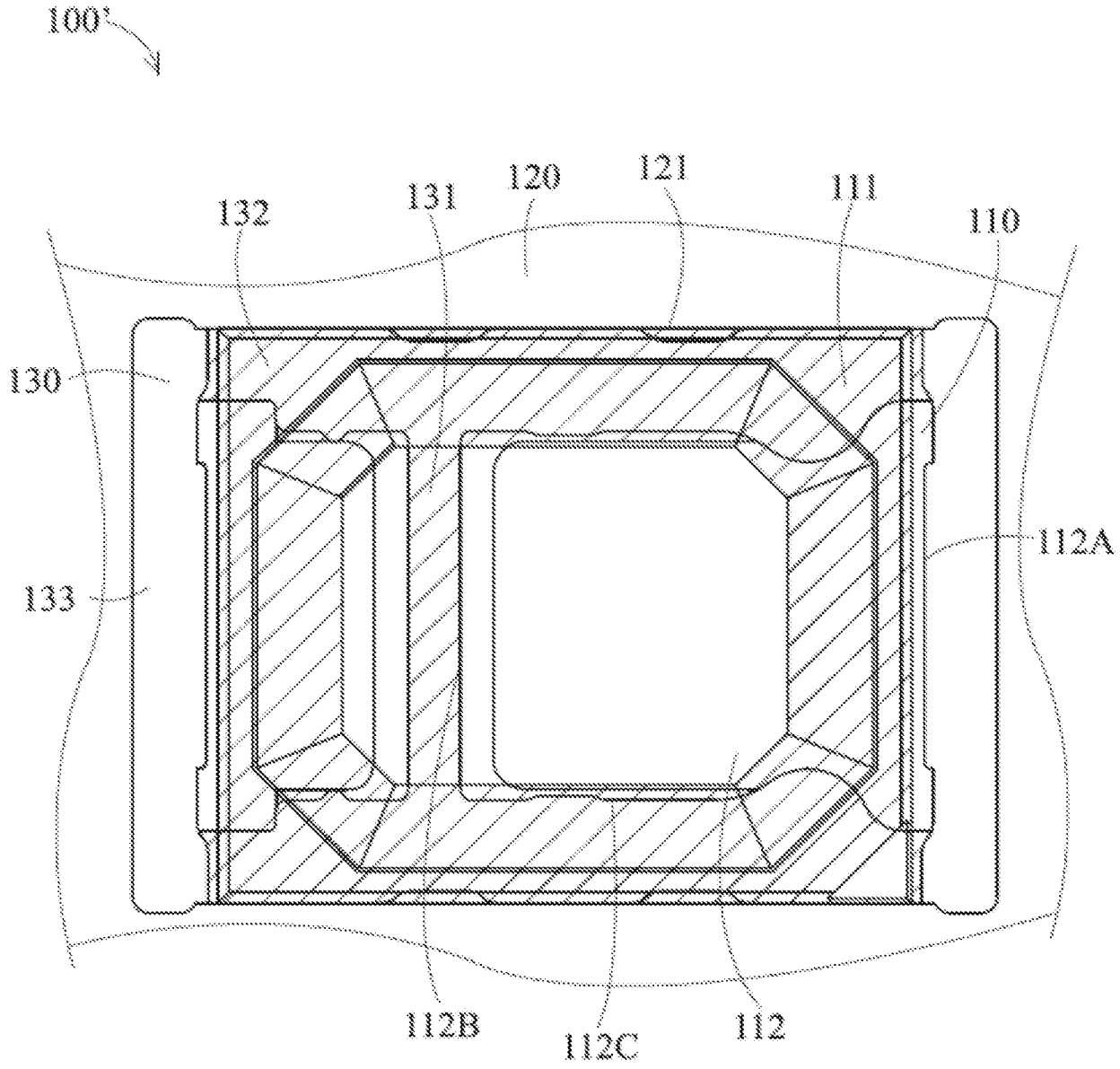


FIG. 12A

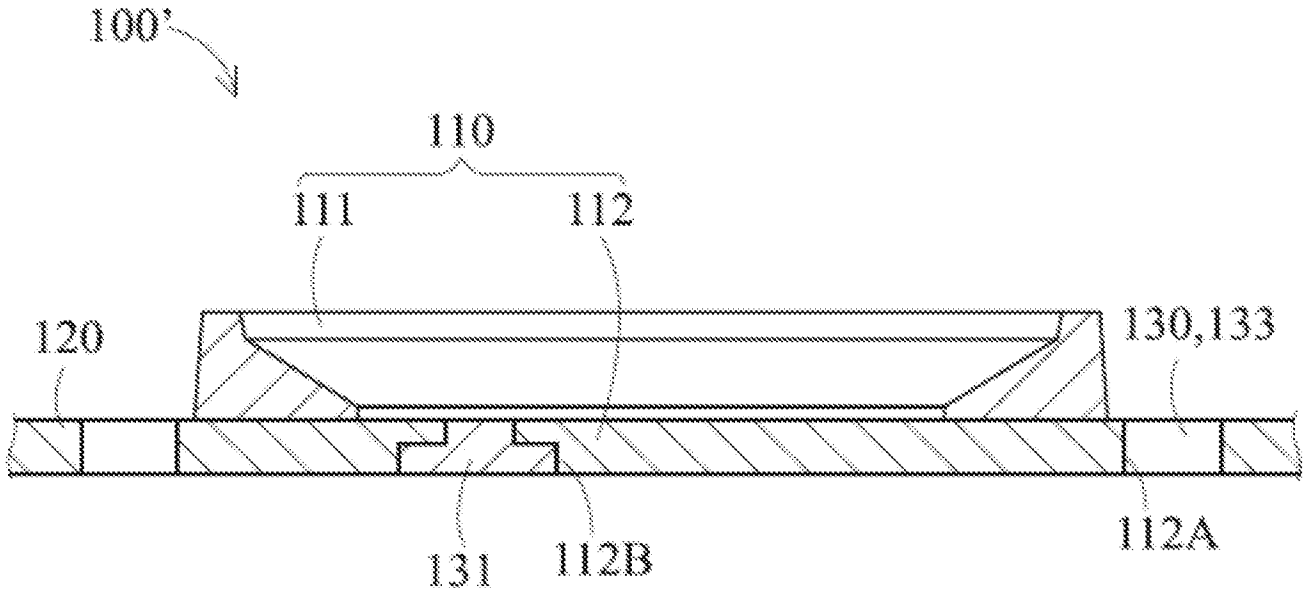


FIG. 12B

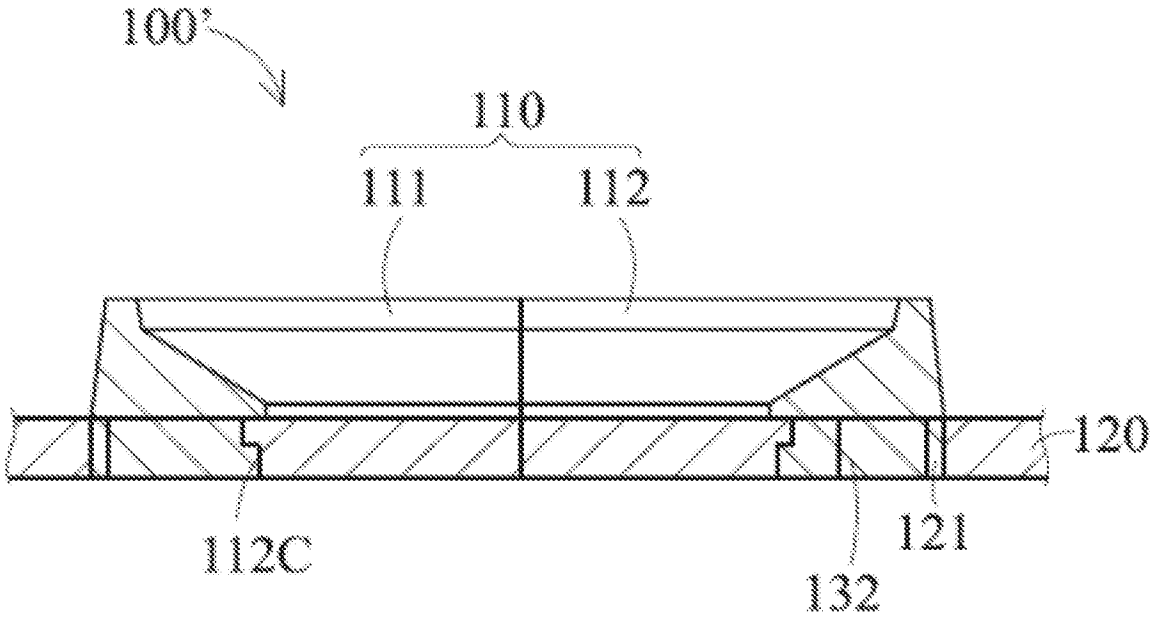


FIG. 12C

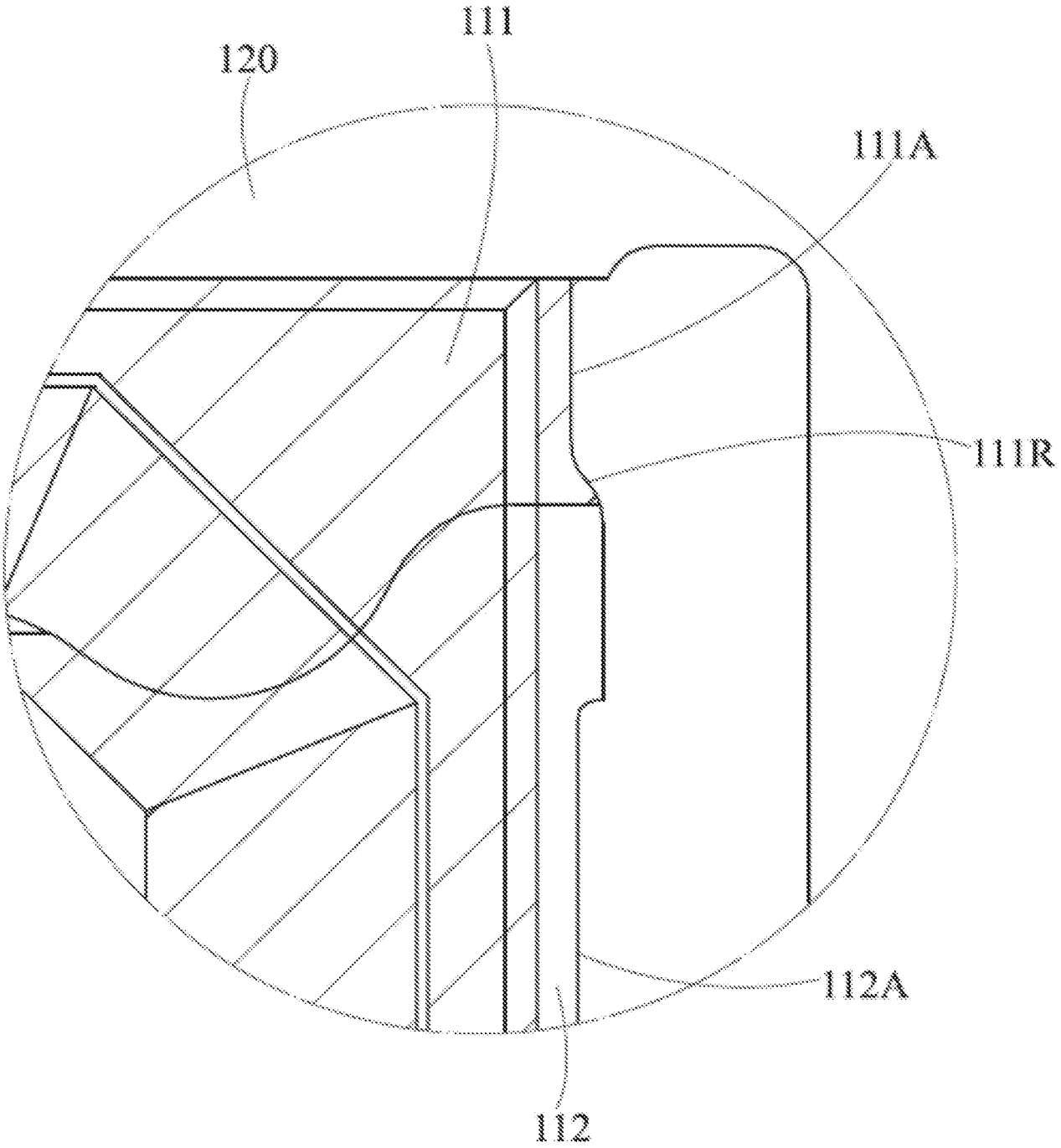


FIG. 12D

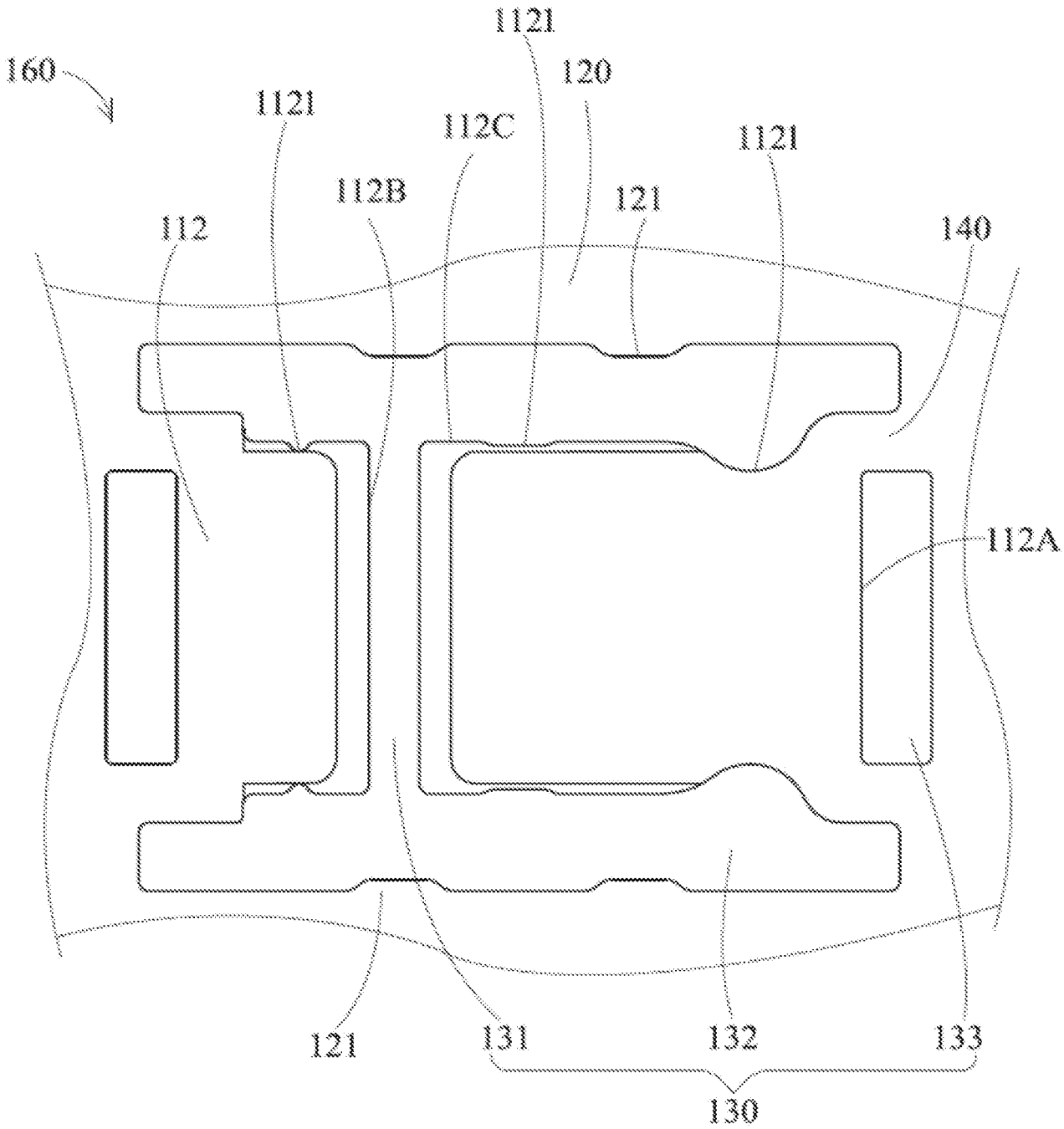

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FIG. 13A

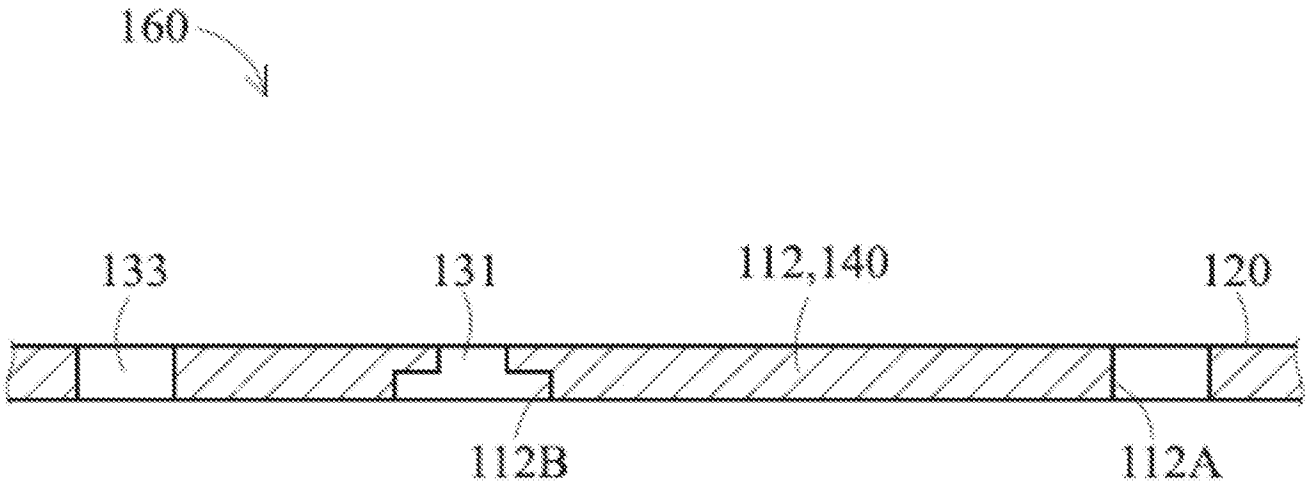


FIG. 13B

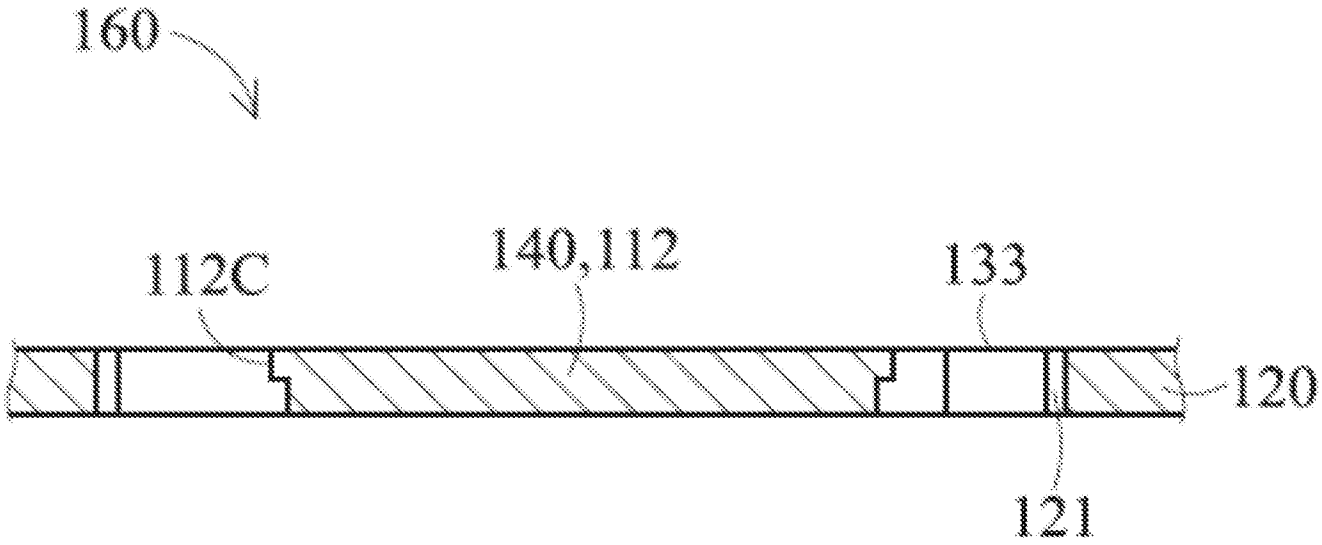


FIG. 13C

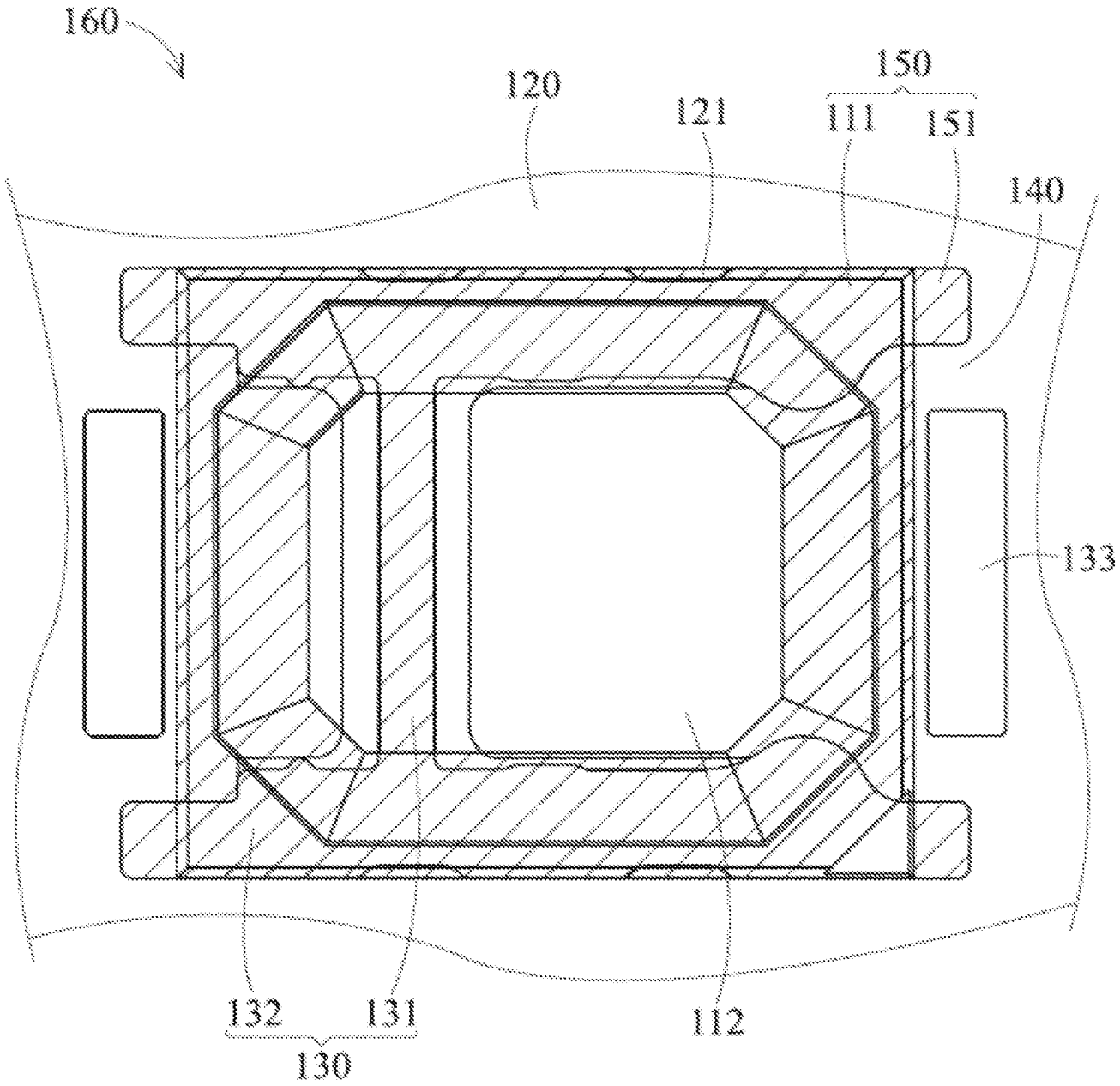


FIG. 14

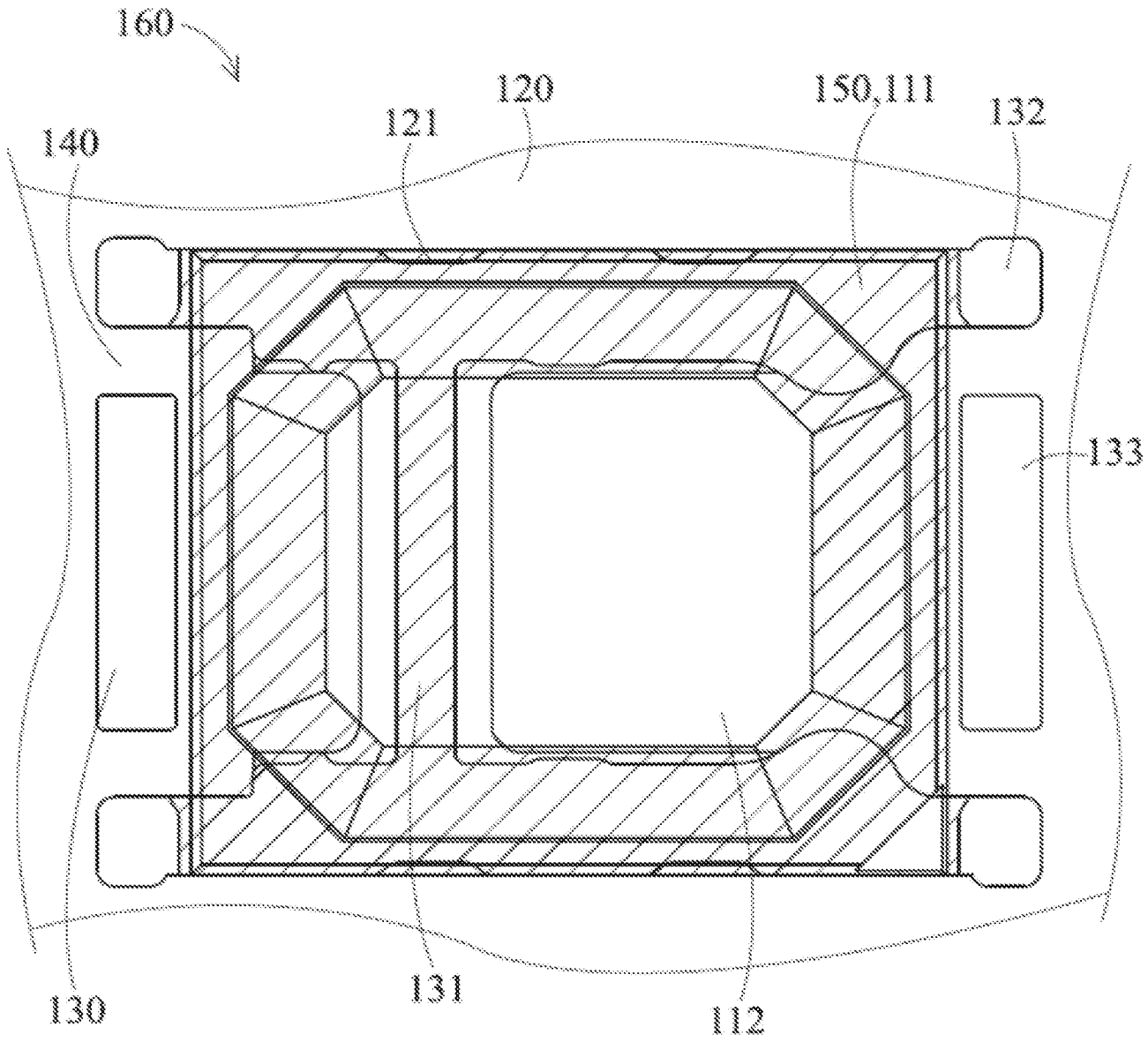


FIG. 15

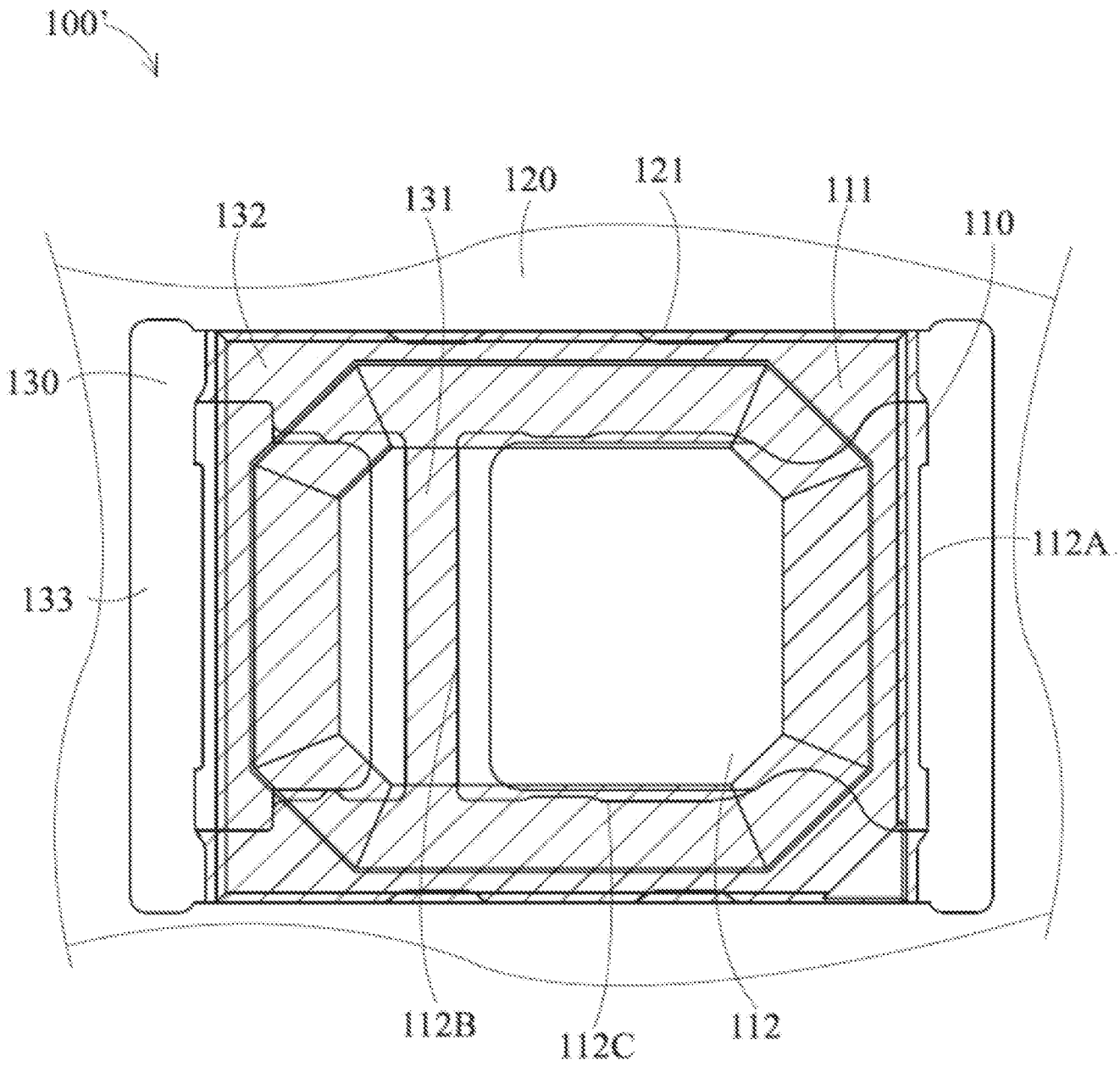


FIG. 16

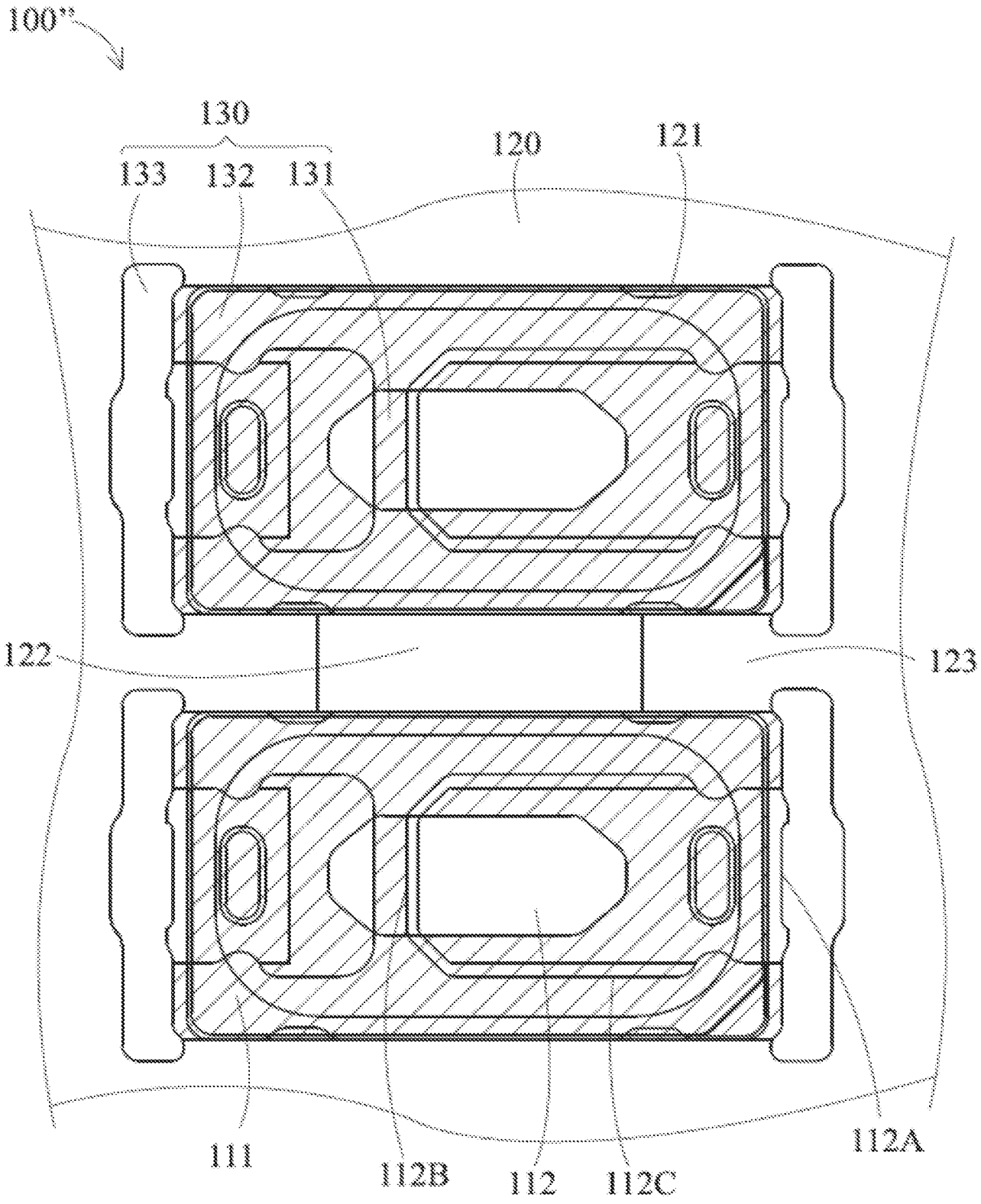


FIG. 17A

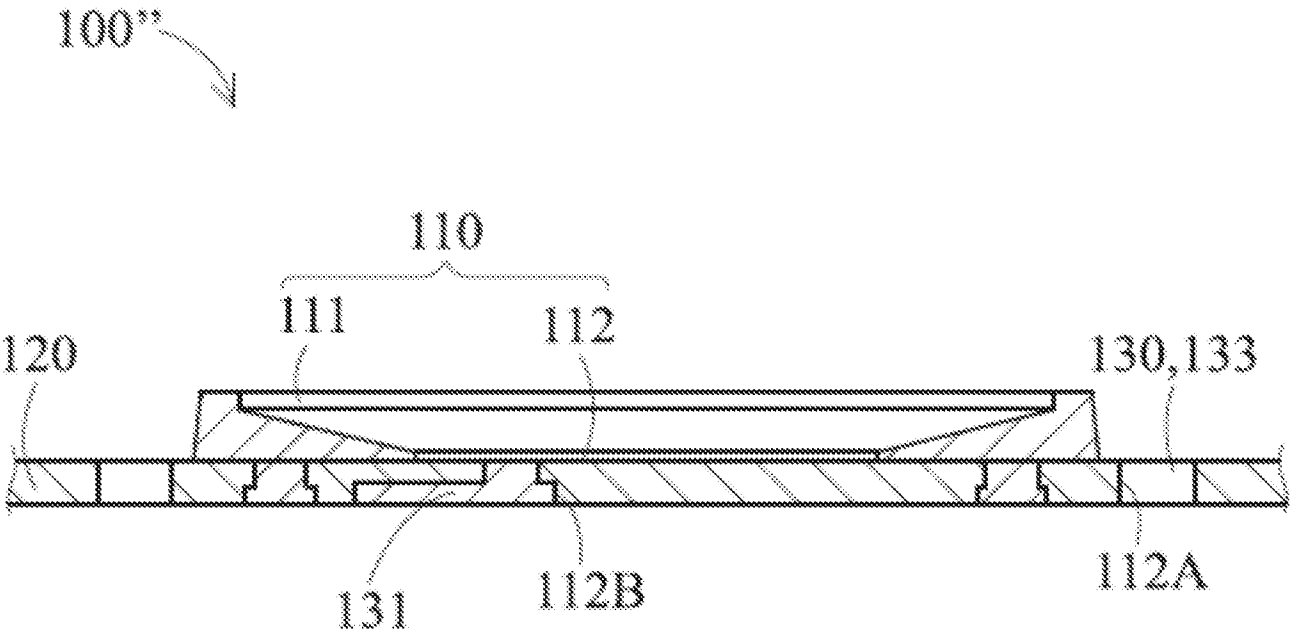


FIG. 17B

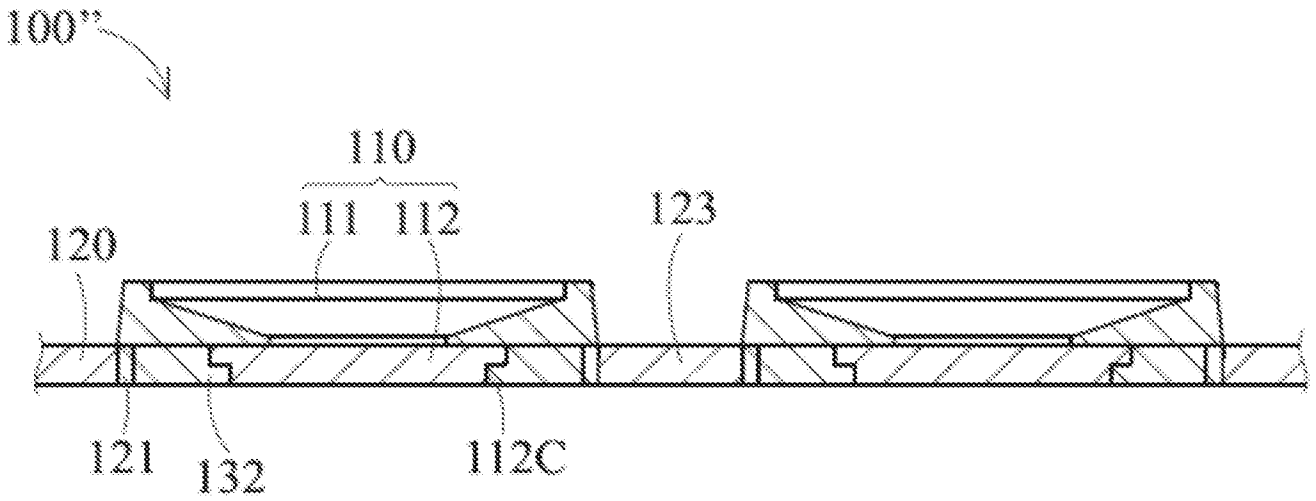


FIG. 17C

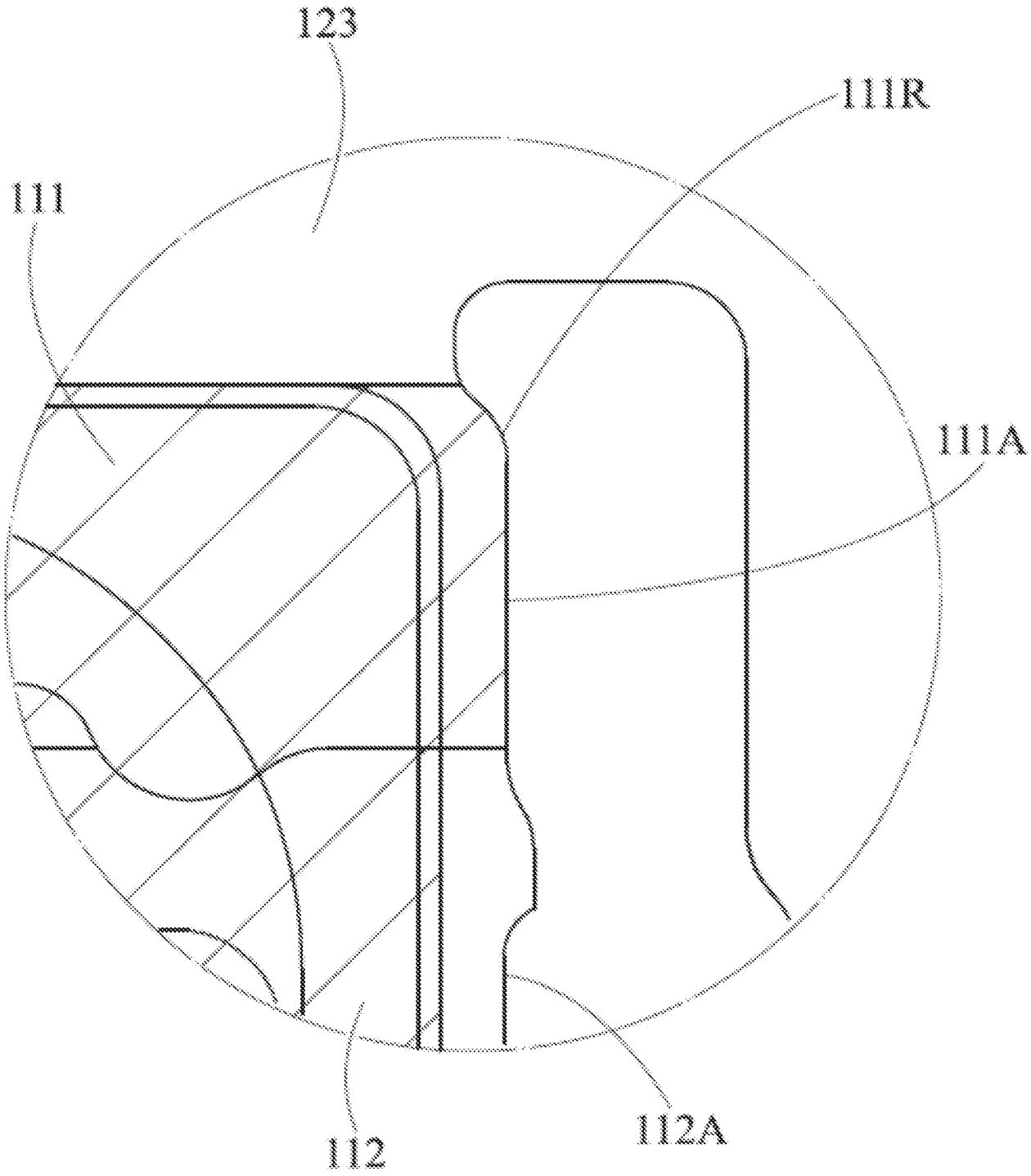


FIG. 17D

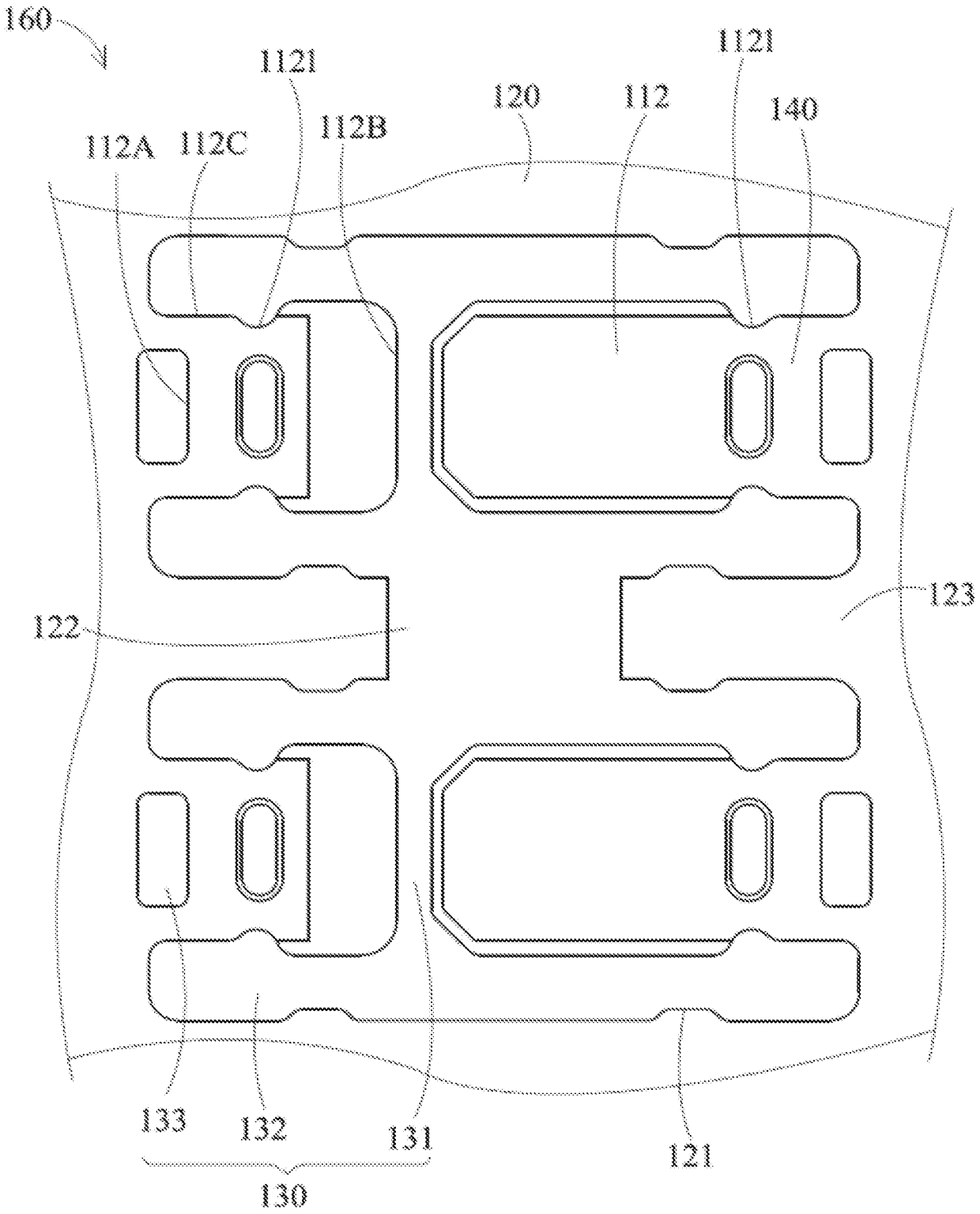

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FIG. 18A

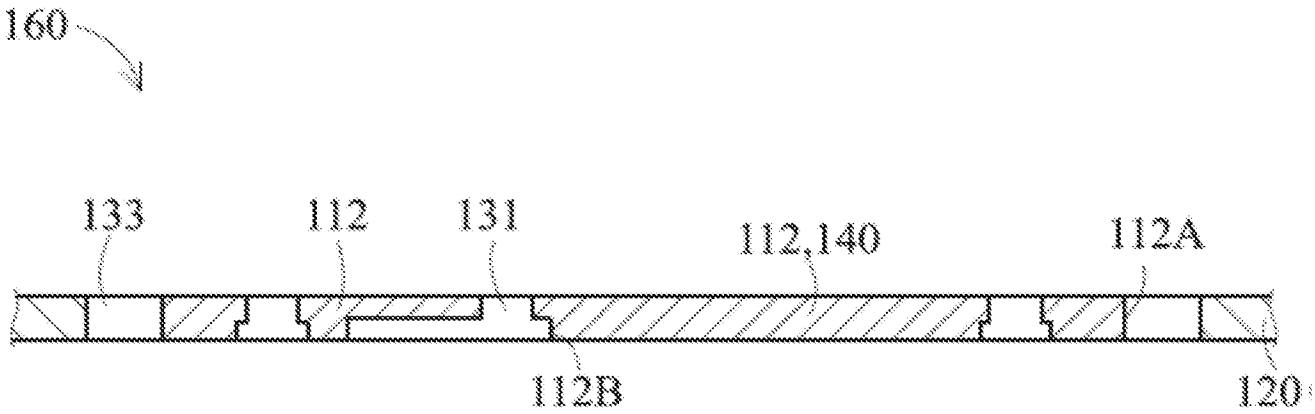


FIG. 18B

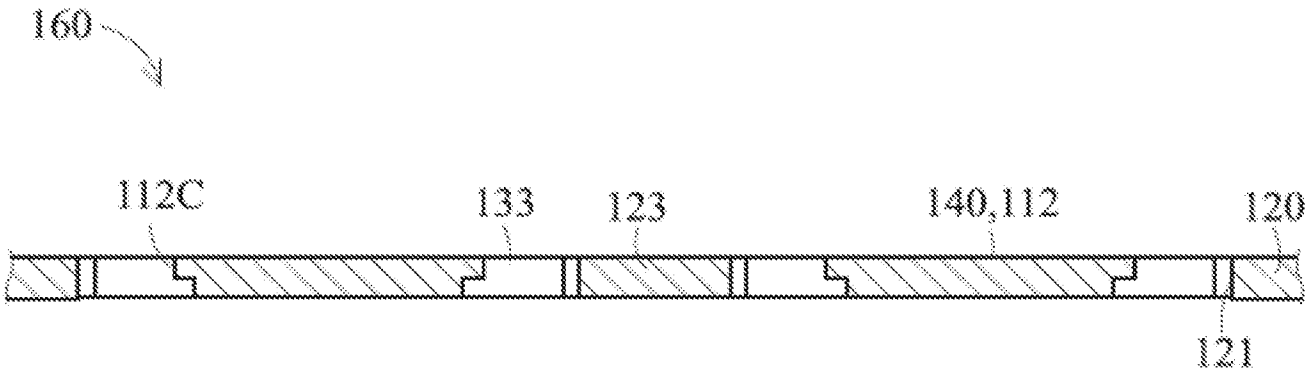


FIG. 18C

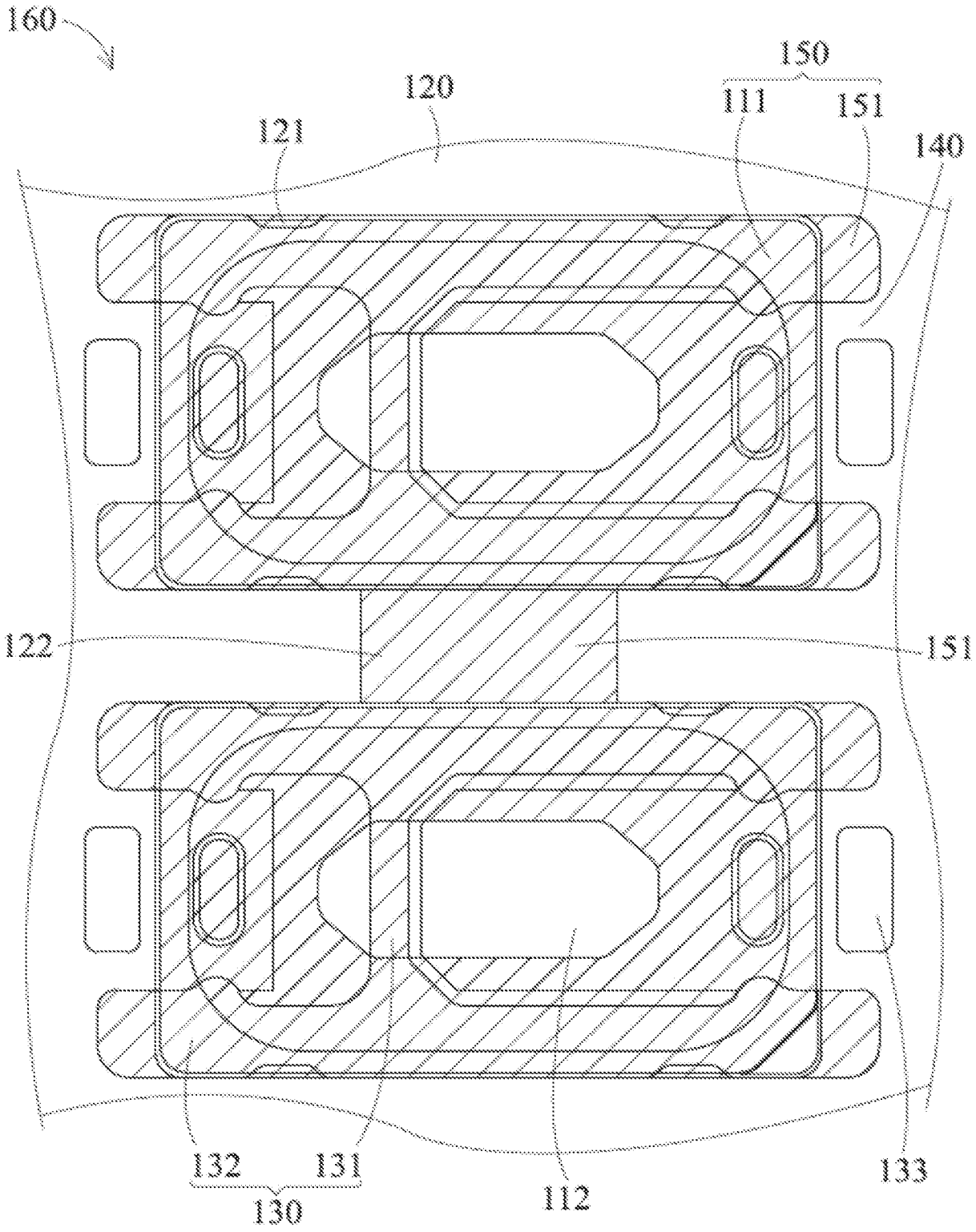


FIG. 19

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Exhibit 1002 Page 494 of 519

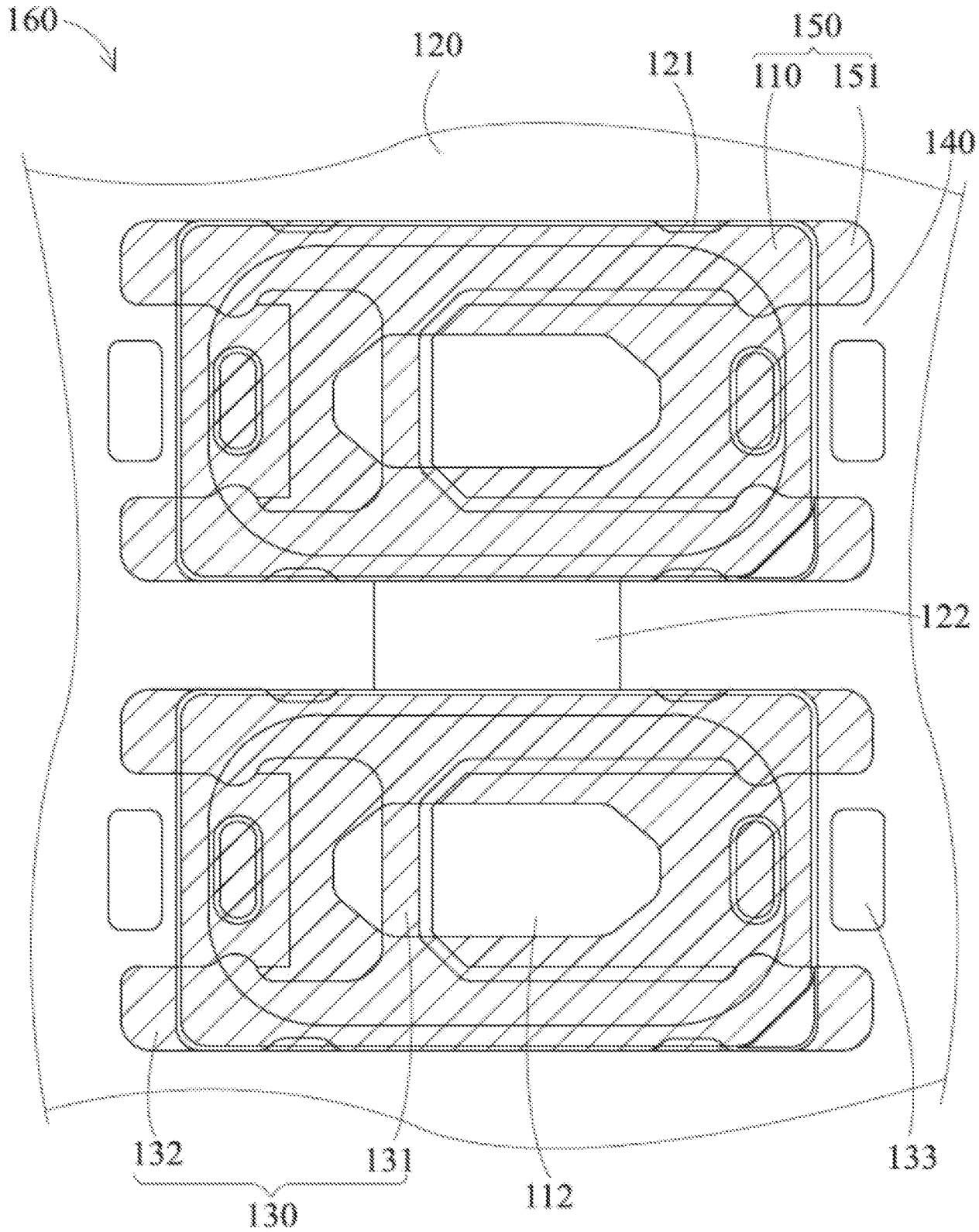


FIG. 20

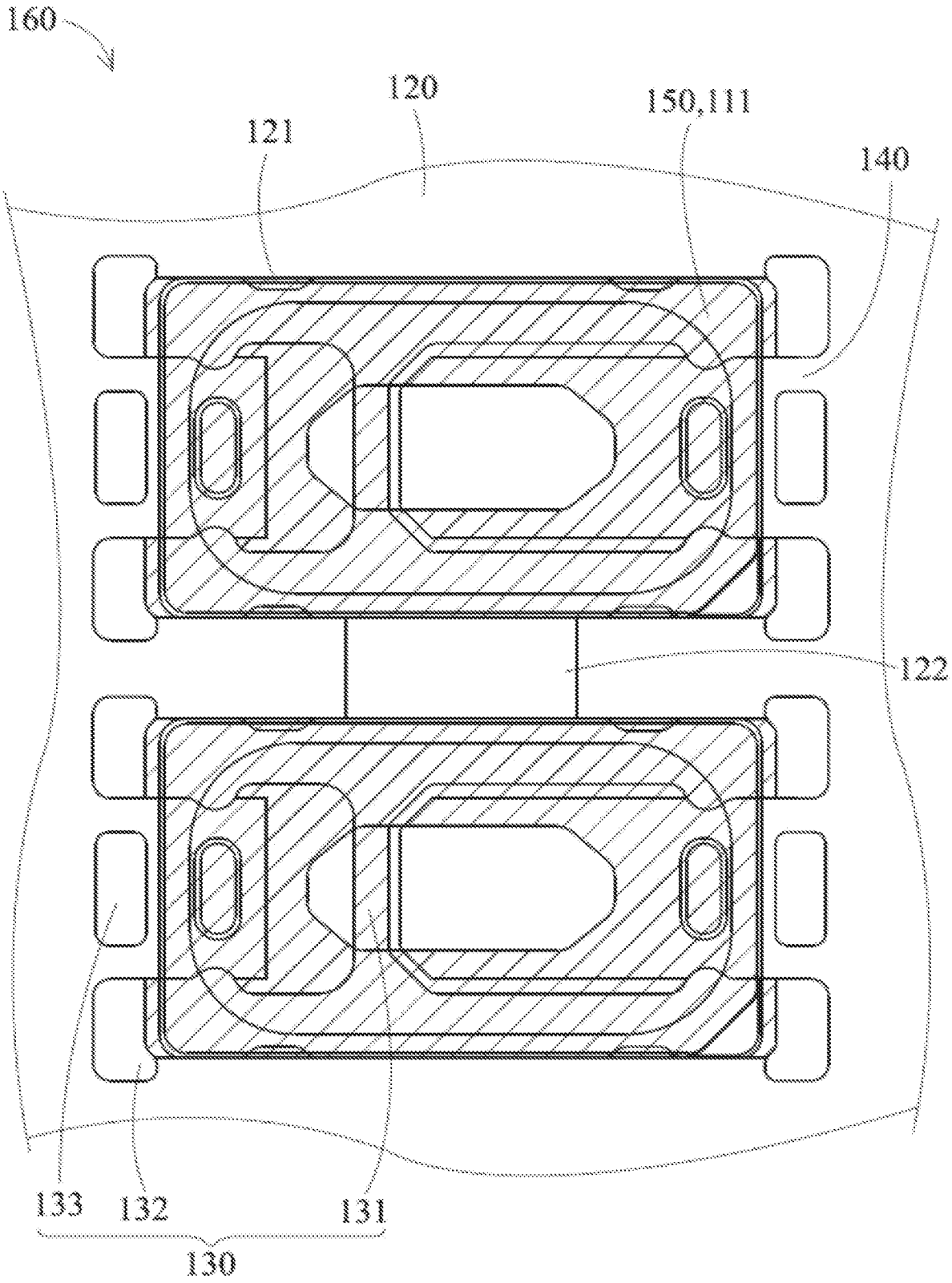


FIG. 21

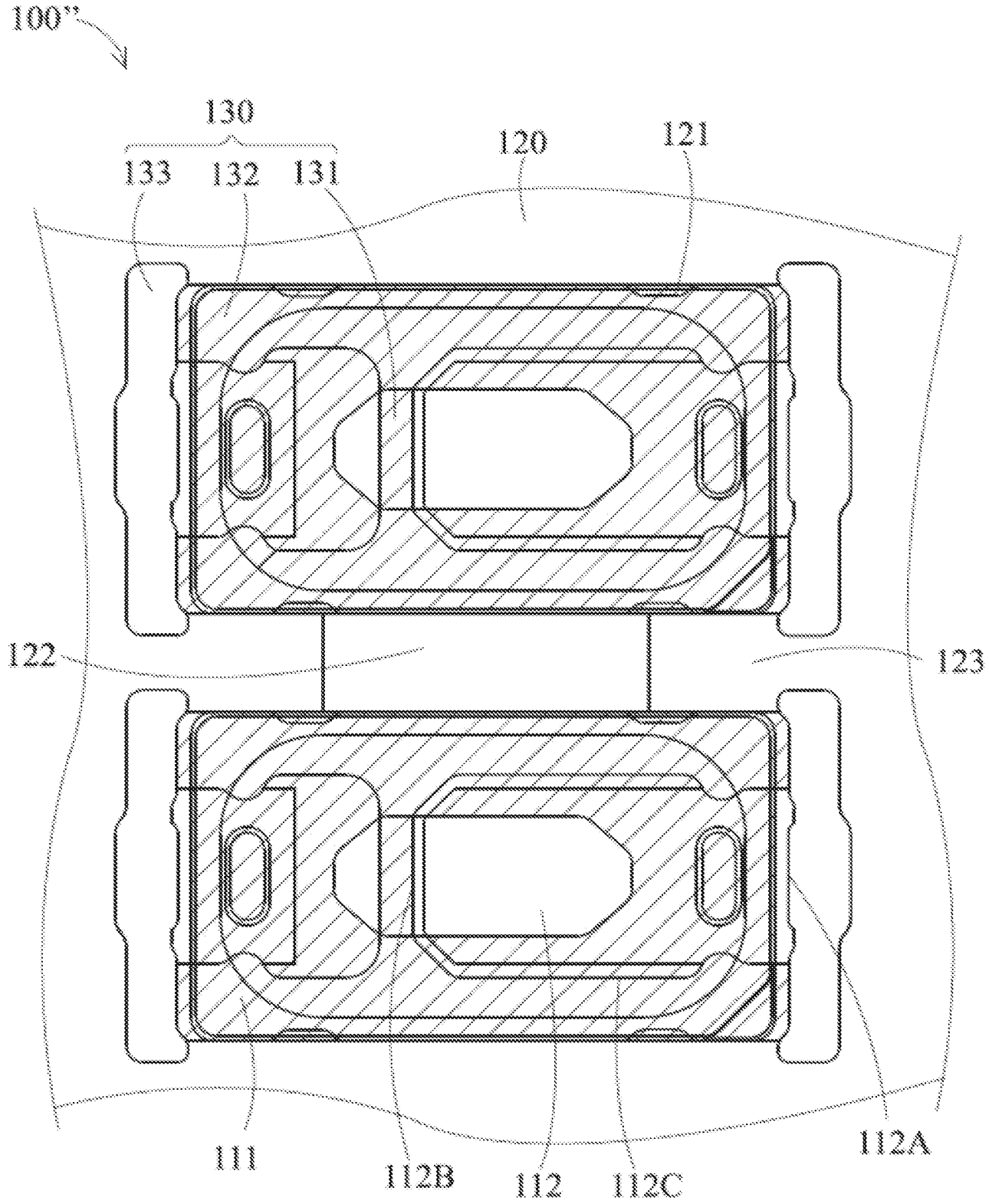


FIG. 22

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (01-10)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14720230
Filing Date	2015-05-22
First Named Inventor	Chung-Chuan Hsieh
Art Unit	2847 2896
Examiner Name	Ali Naraghi
Attorney Docket Number	EL01.0088US

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	3020070049380	KR		2007-11-28	LUMENS CO., LTD.		
	2	D149221	TW		2012-09-11			
	3	D154430	TW		2013-07-01			

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FH-000498

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.N/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14720230
	Filing Date	2015-05-22
	First Named Inventor	Chung-Chuan Hsieh
	Art Unit	~~2847~~ 2896
	Examiner Name	Ali Naraghi
	Attorney Docket Number	EL01.0088US

	4	D154432	TW		2013-07-01			

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NON-PATENT LITERATURE DOCUMENTS [Remove]

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1		

If you wish to add additional non-patent literature document citation information please click the Add button [Add]

EXAMINER SIGNATURE

Examiner Signature	/ALI NARAGHI/	Date Considered	03/26/2017

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.N/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14720230
Filing Date	2015-05-22
First Named Inventor	Chung-Chuan Hsieh
Art Unit	~~2847~~ 2896
Examiner Name	Ali Naraghi
Attorney Docket Number	EL01.0088US

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☒ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

☒ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Andy M. Han, Reg. No. 60266/	Date (YYYY-MM-DD)	2017-02-03
Name/Print	Andy M. Han	Registration Number	60266

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.N/

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these record s.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

FH-000501

IKEA Supply AG

EFS Web 2.1.17

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.N/

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

Han IP Corporation
4790 Irvine Boulevard Suite 105-347
Irvine, CA 92620

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/720,230	05/22/2015	Chung-Chuan Hsieh	EL01.0088US	4909

TITLE OF INVENTION:

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
Nonprovisional	Undiscounted	$960	$0	$0	$960	03/28/2017

EXAMINER	ART UNIT	CLASS-SUBCLASS

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

☑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

(1) the names of up to 3 registered patent attorneys or agents OR, alternatively,

(2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 Han IP Corporation
2 Andy M. Han
3

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE: Everlight Electronics Co., Ltd.

(B) RESIDENCE: (CITY and STATE OR COUNTRY): Taiwan, R.O.C.

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ■ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

☑ Issue Fee

☑ Publication Fee (No small entity discount permitted)

☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**

☐ A check is enclosed.

☑ Payment by credit card. Form PTO-2038 is attached.

☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)

☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27.

☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature /Andy M. Han, Reg. No. 60,266/ Date 03/27/2017

Typed or printed name Andy M. Han Registration No. 60266

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
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PTO/SB/47 (03-09)
Approved for use through 05/31/2015. OMB 0651-0016
U.S. Patent and Trademark Office; U. S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

"FEE ADDRESS" INDICATION FORM

Address to:
Mail Stop M Correspondence
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

- OR -

Fax to:
571-273-6500

INSTRUCTIONS: The issue fee must have been paid for application(s) listed on this form. In addition, only an address represented by a Customer Number can be established as the fee address for maintenance fee purposes (hereafter, fee address). A fee address should be established when correspondence related to maintenance fees should be mailed to a different address than the correspondence address for the application. **When to check the first box below**: If you have a Customer Number to represent the fee address. **When to check the second box below**: If you have no Customer Number representing the desired fee address, in which case a completed Request for Customer Number (PTO/SB/125) must be attached to this form. For more information on Customer Numbers, see the Manual of Patent Examining Procedure (MPEP) § 403.

For the following listed application(s), please recognize as the "Fee Address" under the provisions of 37 CFR 1.363 the address associated with:

☑ Customer Number: 13859

OR

☐ The attached Request for Customer Number (PTO/SB/125) form.

PATENT NUMBER (if known)	APPLICATION NUMBER
	14/720,230

Completed by (check one):

☐ Applicant/Inventor

/Andy M. Han, Reg. No. 60,266/
Signature

☑ Attorney or Agent of record 60266 (Reg. No.)

Andy M. Han
Typed or printed name

☐ Assignee of record of the entire interest. See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96)

949-383-5385
Requester's telephone number

☐ Assignee recorded at Reel _____ Frame_____

03/27/2017
Date

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more that one signature is required, see below*.

☐ * Total of _____forms are submitted.

This collection of information is required by 37 CFR 1.363. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1. 11 and 1.14. This collection is estimated to take 5 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313- 1450. DO NOT SEND COMPLETED FORMS TO THIS ADDRESS.
SEND TO: Mail Stop M Correspondence, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.
If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

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5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
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9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Patent Application Fee Transmittal

Application Number:	14720230
Filing Date:	22-May-2015
Title of Invention:	Carrier, Carrier Leadframe, And Light Emitting Device
First Named Inventor/Applicant Name:	Chung-Chuan Hsieh
Filer:	Andy M. Han
Attorney Docket Number:	EL01.0088US

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
UTILITY APPL ISSUE FEE	1501	1	960	960
PUBL. FEE- EARLY, VOLUNTARY, OR NORMAL	1504	1	0	0
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**960**

Electronic Acknowledgement Receipt

EFS ID:	28752692
Application Number:	14720230
International Application Number:	
Confirmation Number:	4909
Title of Invention:	Carrier, Carrier Leadframe, And Light Emitting Device
First Named Inventor/Applicant Name:	Chung-Chuan Hsieh
Customer Number:	13859
Filer:	Andy M. Han
Filer Authorized By:	
Attorney Docket Number:	EL01.0088US
Receipt Date:	27-MAR-2017
Filing Date:	22-MAY-2015
Time Stamp:	21:24:01
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$960
RAM confirmation Number	032817INTEFSW21254200
Deposit Account	
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	EL01_0088US_ptol85b.pdf	74847 7e3f51545230a079875786f170a57bb639305e6c	no	2
Warnings:					
Information:					
2	Miscellaneous Incoming Letter	EL01_0088US_sb0047.pdf	203847 a4110b19539ca50f8fe8cc5b49c39c44495af936	no	2
Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	32180 8cc25c84648222a73291c5481ef9af1d2d6c36af	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	310874		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/720,230	05/02/2017	9640733	EL01.0088US	4909

13859 7590 04/12/2017

Han IP Corporation
4790 Irvine Boulevard Suite 105-347
Irvine, CA 92620

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment is 0 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site http://pair.uspto.gov for additional applicants):

Chung-Chuan Hsieh, New Taipei City, TAIWAN;
Everlight Electronics Co., Ltd., New Taipei City, TAIWAN;
Yung Chieh Chen, New Taipei City, TAIWAN;

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.

PTO/AIA/122 (08-12)
Approved for use through 11/30/2014. OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

CHANGE OF CORRESPONDENCE ADDRESS
Application

Address to:
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Application Number	14/720,230
Filing Date	May 22, 2015
First Named Inventor	Chung-Chuan HSIEH
Art Unit	2896
Examiner Name	Ali NARAGHI
Attorney Docket Number	021317

Please change the Correspondence Address for the above-identified patent application to:

☒ The address associated with Customer Number: 23373

OR

☐ Firm or Individual Name

Address

City	State	Zip

Country

Telephone	Email

This form cannot be used to change the data associated with a Customer Number. To change the data associated with an existing Customer Number use "Request for Customer Number Data Change" (PTO/SB/124).

I am the:

☒ Applicant

☒ Attorney or agent of record. Registration Number 38,584.

☒ Registered practitioner named in the application transmittal papers who acts in a representative capacity under 37 CFR 1.34. See 37 CFR 1.33(a)(1). Registration Number _____.

Signature /John F. Rabena/

Typed or Printed Name John F. Rabena

Date	Telephone
November 2, 2017	202-293-7060

NOTE: This form must be signed in accordnace with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. Submit multiple forms if more than one signature is required, see below*.

☐ *Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

TRANSMITTAL FOR POWER OF ATTORNEY TO ONE OR MORE REGISTERED PRACTITIONERS			
NOTE: This form is to be submitted with the Power of Attorney by Applicant form (PTO/AIA/82B) to identify the application to which the Power of Attorney is directed, in accordance with 37 CFR 1.5, unless the application number and filing date are identified in the Power of Attorney by Applicant form. If neither form PTO/AIA/82A nor form PTO/AIA82B identifies the application to which the Power of Attorney is directed, the Power of Attorney will not be recognized in the application.			
Application Number	14/720,230		
Filing Date	May 22, 2015		
First Named Inventor	Chung-Chuan HSIEH		
Title	Carrier, Carrier Leadframe, And Light Emitting Device		
Art Unit	2896		
Examiner Name	Ali NARAGHI		
Attorney Docket Number	021317		
SIGNATURE of Applicant or Patent Practitioner			
Signature	/John F. Rabena/	Date (Optional)	November 2, 2017
Name	John F. Rabena	Registration Number	38,584
Title (if Applicant is a juristic entity)			
Applicant Name (if Applicant is a juristic entity)			
NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.			
☑ *Total of 1 forms are submitted.			

POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in the attached transmittal letter.

I hereby appoint:

Patent Practitioner(s) associated with the following Customer Number:

WASHINGTON OFFICE
23373
CUSTOMER NUMBER

as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (Form PTO/AIA/82A).

Please recognize or change the correspondence address for the application identified in the attached transmittal letter to:

The address associated with the above-mentioned Customer Number.

I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

EVERLIGHT ELECTRONICS CO., LTD

- ☐ Inventor or Joint Inventor (title not required below)
- ☐ Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)
- ☑ Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)
- ☐ Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a Petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document)(provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature	Hsien Chia Lin	Date (Optional)	
Name	Hsien Chia LIN		
Title	Manager		

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. If more than one applicant, use multiple forms.

☑ Total of 1 forms are submitted.

Electronic Acknowledgement Receipt

EFS ID:	30838125
Application Number:	14720230
International Application Number:	
Confirmation Number:	4909
Title of Invention:	Carrier, Carrier Leadframe, And Light Emitting Device
First Named Inventor/Applicant Name:	Chung-Chuan Hsieh
Customer Number:	13859
Filer:	John F. Rabena/Shannon Shenton
Filer Authorized By:	John F. Rabena
Attorney Docket Number:	EL01.0088US
Receipt Date:	02-NOV-2017
Filing Date:	22-MAY-2015
Time Stamp:	14:32:21
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Change of Address	021317ChangeofCorresponden ceAddress.pdf	250176 145e9ee9ba75c74bbb096ae28f8fa3380caa 6fc6	no	2

Warnings:

Information:					
2	Power of Attorney	021317TransmittalforPowerofAttorney.pdf	16965 cbacaed8a2e56c22a64785b47d8e43ed0c7c1ebd	no	1
Warnings:					
Information:					
3	Power of Attorney	021317ExecutedEverlightPowerofAttorney.pdf	85892 11631d531fbd35af6da69b62b4f9631ba6d08d77	no	1
Warnings:					
Information:					
			Total Files Size (in bytes):	353033	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/720,230	05/22/2015	Chung-Chuan Hsieh	EL01.0088US

CONFIRMATION NO. 4909

POWER OF ATTORNEY NOTICE

13859
Han IP Corporation
4790 Irvine Boulevard Suite 105-347
Irvine, CA 92620

OC000000095399683

Date Mailed: 11/14/2017

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 11/02/2017.

- The Power of Attorney to you in this application has been revoked by the assignee who has intervened as provided by 37 CFR 3.71. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/nbekele/

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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Alexandria, Virginia 22313-1450
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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/720,230	05/22/2015	Chung-Chuan Hsieh	021317

CONFIRMATION NO. 4909

23373
SUGHRUE MION, PLLC
2100 PENNSYLVANIA AVENUE, N.W.
SUITE 800
WASHINGTON, DC 20037

POA ACCEPTANCE LETTER

OC000000095399702

Date Mailed: 11/14/2017

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 11/02/2017.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/nbekele/

United States Patent and Trademark Office

Office of the Chief Financial Officer

Document Code:WFEE

User :67142

Sale Accounting Date:11/12/2020

Sale Item Reference Number	Effective Date
14720230	11/10/2020

Document Number	Fee Code	Fee Code Description	Amount Paid	Payment Method
I2020ABA36501056	1551	MAINTENANCE FEE DUE AT 3.5 YEARS	$2,000.00	Wire
I2020ABA36501056	1554	MNTCE FEE SURCHARGE-3.5 YR LATE PMT 6 MO	$500.00	Wire