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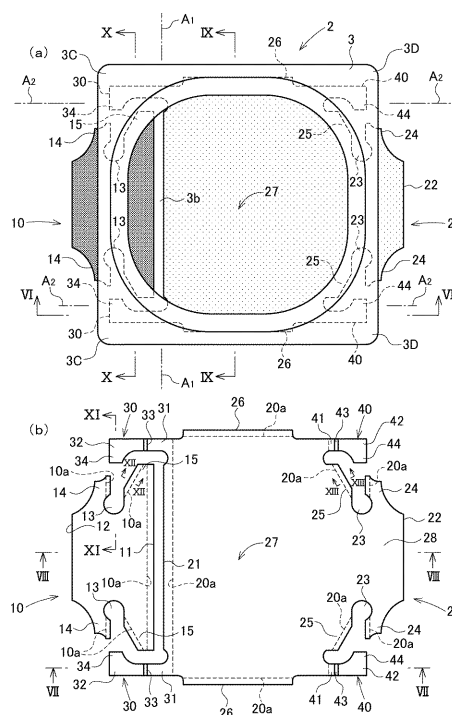
(54) [Title of Invention] PACKAGE FOR LIGHT EMITTING DEVICE AND LIGHT EMITTING DEVICE

(57) [Abstract]

[Problem] To provide a package capable of preventing deformation centered on a resin portion between lead electrodes, and a light emitting device using such a package.

[Resolution Means] A package 2 has lead electrodes 10 and 20, and a resin molded body 3 for resin molding the lead electrodes 10 and 20, wherein the resin molded body 3 is in an annular shape, and a cup portion 3a for disposing light emitting elements is provided inside the resin molded body 3. A light emitting device having a light emitting element 4 mounted on this package. A reinforcing piece 30 extending along the side of the lead electrode 10 is provided on the lead electrode 20. The reinforcing piece 30 is embedded in a corner portion 3C of the resin molded body 3.

[Selected Drawings] FIG. 5



[Scope of Patent Claims]

[Claim 1]

A package for a light emitting device, comprising a first and second lead electrode disposed having one side of each facing each other, and a resin molded body molded to be integrated with the lead electrodes, wherein:

the resin molded body is in an annular shape and a cup portion for disposing a light emitting element is provided in the resin molded body, and

a reinforcing piece extending from both ends in a longitudinal direction of the one side and extending along the vicinity of the first lead electrode is provided on the second lead electrode.

10 [Claim 2]

The package for a light emitting device according to claim 1, wherein a protruding portion protruding toward the first lead electrode is provided at a tip end side of the reinforcing piece in an extending direction.

[Claim 3]

The package for a light emitting device according to claim 1 or 2, wherein at least a tip end side of the reinforcing piece in an extending direction is embedded in the resin molded body.

[Claim 4]

20 The package for a light emitting device according to any one of claims 1 to 3, wherein the first lead electrode has a recessed portion provided in a portion of a side portion along the reinforcing piece that overlaps with the resin molded body.

[Claim 5]

The package for a light emitting device according to any one of claims 1 to 4, wherein the second lead electrode is provided with a second reinforcing piece extending in an opposite direction to the reinforcing piece on both ends of a side length direction of a side portion opposite the one side.

[Claim 6]

30 The package for a light emitting device according to any one of claims 1 to 5, wherein the second lead electrode has a central portion in a longitudinal direction of a side portion opposite to the one side, the central portion being an extending portion extending outward, and a recessed portion is provided in a portion of a side portion of the extending portion that overlaps with the resin molded body.

[Claim 7]

The package for a light emitting device according to any one of claims 1 to 6, wherein a tip end portion of a hanging lead is inserted into the resin molded body, and

the tip end portion of the hanging lead is bent to break away from the bottom of the resin molded body toward the tip end side.

[Claim 8]

The package for a light emitting device according to claim 7, wherein the thickness of the hanging lead is reduced toward the tip end side.

40 [Claim 9]

A light emitting device comprising the package for a light emitting device according to any one of claims 1 to 8 and a light emitting element mounted to the package.

[Detailed Description of Invention]

[Technical Field]

[0001]

The present invention relates to a package for a light emitting device in which a light emitting element such as an LED element is mounted, and a light emitting device using such a package.

[Background Art]

[0002]

50 An example of a resin sealed light emitting device incorporating an LED light emitting element is illustrated in FIGS. 17 to 19. FIG. 17 is a perspective view of a LIGHT emitting device 100, and FIGS. 18(a) and (b) are cross-sectional views taken along lines XVIIIa-XVIIIa and XVIIIb-XVIIIb in FIG. 17. FIG. 19 is a plan view of a package 110.

[0003]

The package 110 of the light emitting device 100 has a first lead electrode 101, a second lead electrode 102, and a resin molded body 103 configured to be integrated with the lead electrodes 101 and 102. The resin molded body 103 is in an annular shape having a hole-like cup portion 103a, and a portion of each of the lead electrodes 101 and 102 is exposed at the bottom of the cup portion 103a. The outer ends of the lead electrodes 101 and 102 extend outward from the outer periphery of the resin molded body 103.

[0004]

10 A light emitting element 104 such as an LED is fixed onto the lead electrode 102 in the cup portion 103a. The light emitting element 104 is connected to the respective lead electrodes 101 and 102 by thin metal wires 105 and 106.

[0005]

A bridge portion 103b made of resin is filled between the facing edges of the lead electrodes 101 and 102. The bridge portion 103b crosses the bottom of the cup portion 103a in a chord direction and is integrated with the resin molded body 103.

[0006]

20 The lead electrodes 101 and 102 are exposed at the bottom of the light emitting device 100. In order to prevent the lead electrodes 101 and 102 from separating or rising up from the bottom of the resin molded body 103, step portions 101a and 102a are provided on the side ends of the lead electrodes 101 and 102 as illustrated in FIG. 18(b) (the reference symbol 101a is not shown in the drawings.). The edges of the step portions 101a and 102a are embedded in the resin molded body 103, thereby preventing the lead electrodes 101 and 102 from separating or rising up. Instead of providing the step portions 101a and 102a , the end faces of the side ends of the lead electrodes 101 and 102 may be made downwardly inclined, and the upper sides of the end faces may be embedded in the resin molded body 103.

[0007]

30 FIG. 21 is a cross-sectional view of a mold for molding the resin molded body 103 of the package 110. While the lead electrodes 101 and 102 are interposed between an upper mold 111 and a lower mold 112, a resin is filled into a cavity 113 using an injection device or the like to form the resin molded body 103. Reference numeral 111a in FIG. 21 is a projecting portion provided on the upper mold 111 for forming the cup portion 103a. The lead electrodes 101 and 102 are held between the projecting portion 111a and the lower mold. A portion of the periphery of the lead electrodes 101 and 102 extends into the cavity 113.

[Prior Art Documents]

[Patent Documents]

[0008]

[Patent Document 1] JP 2008-140944 A

[Summary of Invention]

[Problem to be Solved by Invention]

40 [0009]

(1) As illustrated in FIG. 19, in the X direction in FIG. 19 (the direction connecting the lead electrodes 101 and 102), the lead electrodes 101 and 102 are not present in the bridge portion 103b portion. Therefore, due to the difference in the linear expansion coefficient between the resin molded body 103 and the lead electrodes 101 and 102 and the load force during handling, the package 110 may deform so as to bend in the Z direction (the vertical direction in FIG. 20) centered on the bridge portion 103b as illustrated in FIGS. 20(a) and (b), and may break as illustrated in FIG. 20(c). This tendency becomes more pronounced when the resin is soft, such as silicone resin. Moreover, this tendency also becomes more pronounced when the difference in linear expansion coefficient between the resin molded body 103 and the lead electrodes 101 and 102 is large.

50 [0010]

A first object of the present invention is to provide a package for a light emitting device capable of preventing deformation centered on a bridge portion (including suppression thereof; same hereafter), and a light emitting device using such a package.

(2) As illustrated in FIG. 19 , the lead electrodes 101 and 102 are not present on the four corners (corner portions) in a plan view of the package 110, and the four corners of the package 110 are made only of resin. As a result, the strength and bending rigidity of the four corners of package 110 are low, and the resin molded body may be damaged or deformed in the Z direction near the four corners, causing the step portions 101a and 102a of the lead electrodes 101 and 102 to lose their engagement with the resin molded body 103, making it easier for the lead electrodes 101 and 102 to rise up from the resin molded body 103. When the lead electrodes 101 and 102 rise up from the resin molded body 103, outside air will enter the gaps, and the upper surfaces of the lead electrodes 101 and 102 will be prone to deterioration and discoloration. This tendency becomes more pronounced when the resin is soft, such as a silicone resin.
[0011]

A second object of the present invention is to provide a package for a light emitting device and a light emitting device wherein strength and rigidity are high near the corner portions, damage to the resin molded body near the corner portions is prevented, and the lead electrodes are prevented from separating or rising up from the resin molded body.

[0012]
(3) As illustrated in FIG. 21 , in the mold for molding the resin molded body 103, a portion of the edges of the lead electrodes 101 and 102 extend into the cavity 113 and are not restrained by the projecting portion 111a of the upper mold 111. Therefore, the resin gets into the gap between the edge portions of the lead electrodes 101 and 102 and the lower mold 112, and burrs 103B are likely to occur as illustrated in FIG. 22. In a light emitting device 100 having burrs 103B, securing an area for reflow soldering becomes unstable, resulting in reflow soldering defects. This tendency is particularly noticeable when the resin is a silicone resin or the like having high fluidity. Note that FIG. 22 is a bottom view of the package 110.
[0013]

In one aspect, the present invention has the object of providing a package for a light emitting device and a light emitting device that prevent burrs on a rear surface of the lead electrode.
[0014]

Additionally, in another aspect, the present invention has the object of providing a package for a light emitting device and a light emitting device in which holding of the hanging leads is stable.

[Means for Solving Problem]

[0015]
The package of the present invention is a package for a light emitting device, provided with a first and second lead electrode disposed having one side of each facing each other, and a resin molded body molded to be integrated with the lead electrodes, wherein: the resin molded body is in an annular shape and a cup portion for disposing a light emitting element is provided in the resin molded body, and a reinforcing piece extending from both ends in a longitudinal direction of the one side and extending along the vicinity of the first lead electrode is provided on the second lead electrode.

[0016]

It is preferable that a protruding portion protruding toward the first lead electrode is provided at a tip end side of the reinforcing piece in an extending direction.

[0017]

It is preferable that at least a tip end side of the reinforcing piece in an extending direction is embedded in the resin molded body.

[0018]

It is preferable that the first lead electrode has a recessed portion provided in a portion of a side portion along the reinforcing piece that overlaps with the resin molded body.

[0019]

It is preferable that the second lead electrode is provided with a second reinforcing piece extending in an opposite direction to the reinforcing piece on both ends of a side length direction of a side portion opposite the one side.

[0020]

It is preferable that the second lead electrode has a central portion in a longitudinal direction of a side portion opposite to the one side, the central portion being an extending portion extending outward, and that a recessed portion is provided in a portion of a side portion of the extending portion that overlaps with the resin molded body.

[0021]

10 It is preferable that a tip end portion of a hanging lead is inserted into the resin molded body, and the tip end portion of the hanging lead is bent to break away from the bottom of the resin molded body toward the tip end side.

[0022]

It is preferable that the thickness of the hanging lead is reduced toward the tip end side.

[0023]

The light emitting device of the present invention has the package of the present invention and a light emitting element mounted to this package.

[Effect of Invention]

[0024]

20 In the package for a light emitting device of the present invention, a reinforcing piece extending along the side portion of the first lead electrode is provided on the second lead electrode. The reinforcing piece extends across a resin portion (bridge portion) formed between the first and second lead electrodes. Therefore, when a force is applied so as to bend the package around the bridge portion, this force is resisted by the reinforcing piece, and bending deformation of the package is prevented.

[0025]

Furthermore, by having this reinforcing piece reinforce the corner portion of the resin molded body, the strength and rigidity of the corner portion of the package are improved, thereby preventing deformation or damage to the resin molded body on the corner portion and preventing the lead electrodes from separating or rising up due to this.

30

[0026]

Furthermore, at least the tip end side of the reinforcing piece in the extending direction is embedded in the resin molded body, which is more effective against the deformation and damage to the resin molded body and the separating and rising up of the lead electrodes, also facilitates resin flow into the resin made portion (bridge portion) formed between the first and second lead electrodes when the resin molded body is molded, and prevents outside air from flowing in between the first and second lead electrodes due to resin filling defects of the bridge portion and preventing sealant leakage defects.

[0027]

40 Providing a protruding portion that protrudes toward the first lead electrode on the reinforcing piece makes it possible to increase the strength and rigidity of the package. Furthermore, this makes it possible to prevent a gap from forming in the resin portion (bridge portion) formed between the first and second lead electrodes.

[0028]

Providing not only a reinforcing piece extending to the first lead electrode side, but also a second reinforcing piece extending to the opposite side, makes it possible to further increase the strength and rigidity of the package, prevent deformation of the resin molded body, and prevent the lead electrodes from separating or rising up due to this.

[0029]

50 By providing a recessed portion in a portion of the side portion of the first lead electrode that overlaps with the resin molded body, the generation of burrs in this portion is prevented. By providing a similar recessed portion in the second lead electrode, the generation of burrs in that

portion is prevented. This makes it possible to reliably secure a reflow soldering area for mounting on a substrate even in a resin molded body having good fluidity, and to prevent reflow soldering connection defects.

[0030]

By bending the tip end portion of the hanging lead that supports the package, the package is held more stably. In particular, by making the tip end portion (hook portion) of the hanging leads thinner toward the tip end side, the thickness of the resin present below the hook portion (on the bottom side of the package) increases, thereby increasing the holding strength of the package. Moreover, while ensuring the holding strength of the hanging leads, the electrode lead in the resin molded body can be secured near the tip end portion (hook portion) of the hanging lead, and the strength and rigidity of the resin molded body near the tip end portion (hook portion) of the hanging lead can be secured.

[Brief Description of Drawings]

[0031]

[FIG. 1] is a plan view of the light emitting device according to an embodiment.

[FIG. 2] is a cross-sectional view taken along line II-II in FIG. 1.

[FIG. 3] is an arrow view taken along line III-III in FIG. 1.

[FIG. 4] is a bottom view of the light emitting device in FIG. 1.

[FIG. 5] (a) is a plan view of a package configuring the light emitting device in FIG. 1, and (b) is a plan view of lead electrodes of the package.

[FIG. 6] is a cross-sectional view taken along line VI-VI in FIG. 5(a).

[FIG. 7] is a cross-sectional end view taken along line VII-VII in FIG. 5(b).

[FIG. 8] is a cross-sectional end view taken along line VIII-VIII in FIG. 5(b).

[FIG. 9] is a cross-sectional view taken along line IX-IX in FIG. 5(a).

[FIG. 10] is a cross-sectional view taken along line X-X in FIG. 5(a).

[FIG. 11] (a) is a cross-sectional perspective view taken along line XI-XI in FIG. 5(b), and (b) is a cross-sectional view of the same.

[FIG. 12] is a cross-sectional view taken along line XII-XII in FIG. 5(b).

[FIG. 13] is a cross-sectional view taken along line XIII-XIII in FIG. 5(b).

[FIG. 14] is a plan view of a package to which hanging leads are connected.

[FIG. 15] is a cross-sectional view taken along line XV-XV in FIG. 14.

[FIG. 16] is an expanded view of the vicinity of the hanging leads in FIG. 15.

[FIG. 17] is a perspective view of a conventional light emitting device.

[FIG. 18] (a) is a cross-sectional view taken along line XVIIIa-XVIIIa in FIG. 17, and (b) is a cross-sectional view taken along line XVIIIb-XVIIIb.

[FIG. 19] is a plan view of a package of the light emitting device in FIG. 17.

[FIG. 20] is a cross-sectional view taken along line XX-XX in FIG. 19.

[FIG. 21] is a cross-sectional view of a mold for manufacturing a package.

[FIG. 22] is a bottom view of a manufactured package.

[FIG. 23] is a cross-sectional view of an end portion of a lead electrode.

[FIG. 24] is a cross-sectional view of an edge of the lead electrode.

[FIG. 25] is a configuration diagram of a lead electrode.

[FIG. 26] is a configuration diagram of a lead electrode and a package.

[Modes For Carrying Out Invention]

[0032]

Embodiments will be described below with reference to FIGS. 1 to 16.

[0033]

A light emitting device 1 has a package 2 made up of a first lead electrode 10, a second lead electrode 20, and a resin molded body 3 molded to be integrated with the lead electrodes 10 and 20. The resin molded body 3 is in an annular shape having a cup portion 3a, and the outer periphery thereof is substantially square.

[0034]

A portion of each of the lead electrodes 10 and 20 is exposed at the bottom of the cup portion 3a. The outer ends of the lead electrodes 10 and 20 extend outward from the outer periphery of the resin molded body 3.

[0035]

10 In the cup portion 3a, a light emitting element 4 such as an LED is fixed on the lead electrode 20. The light emitting element 4 is connected to the respective lead electrodes 10 and 20 by thin metal wires 5 and 6. A bridge portion 3b made of resin is filled between the facing edges of the lead electrodes 10 and 20. The bridge portion 3b crosses the bottom of the cup portion 3a in a chord direction and is integrated with the resin molded body 3. Note that there may be one or a plurality of light emitting elements 4 on the lead electrode 20. FIG. 1 illustrates an example having a plurality.

[0036]

The lead electrodes 10 and 20 are exposed at the bottom of the light emitting device 1. In order to prevent the lead electrodes 10 and 20 from separating or rising up from the resin molded body 3, step portions 10a and 20a are provided on the required location on the periphery on the bottom side of the lead electrodes 10 and 20. The edges of the step portions 10a and 20a are embedded in the resin molded body 3, thereby preventing the lead electrodes 10 and 20 from separating or rising up.

[0037]

20 Note that the angle of the corners of the step portions 10a and 20a is not limited to a right angle. Moreover, as illustrated in FIG. 23, the corners may have an arc-shaped cross section. Instead of providing the step portions 10a and 20a, the end faces of the side ends of the lead electrodes 10 and 20 may be made downwardly inclined, and the upper sides of the end faces may be embedded in the resin molded body 3, as in FIG. 24.

[0038]

30 The configuration of the lead electrodes 10 and 20 will be described in detail with reference to FIGS. 5 to 8. Note that FIG. 5(a) is a plan view of a package for a light emitting device 2 before mounting the light emitting element 4, FIG. 5(b) is a plan view of the lead electrodes 10 and 20, and the arrangement of the lead electrodes 10 and 20 in FIG. 5(b) is the same as the arrangement of the lead electrodes 10 and 20 in the package 2 in FIG. 5(a).

[0039]

40 As illustrated in 5(b), the lead electrode 10 is a thin plate having a substantially trapezoidal shape in a plan view, having a rear edge 11 facing the bridge portion 3b, a front edge 12 protruding from the resin molded body 3, and side edges connecting these. Partway along these side edges, at part of a position overlapping the resin molded body 3, a recessed portion 13 is provided that sticks into the center direction of the plate (the direction connecting the side edges). As illustrated in detail in FIGS. 11 and 12, a step portion 10a is provided on the sides facing the recessed portion 13 on a first side edge 14 more to the front edge side than the recessed portion 13 and a second side edge 15 more to the rear edge side. The step portion 10a is also provided across the entire side of the rear edge 11.

[0040]

50 It is preferable for the recessed portion 13 to be provided at positions that are not exposed to the bottom of the cup portion 3a of the resin molded body 3 and to arrange the recessed portions 13 closer to each other with respect to the line VIII-VIII in FIG. 5(b), since this can suppress the occurrence of burrs. In this case, the recessed portion 13 may be extended and the edges thereof may be disposed closer to the VIII-VIII line, but it is particularly preferable to extend the second side edge 15 and provide the recessed portion 13 at the tip end thereof, thereby disposing the recessed portions 13 closer to each other relative to the VIII-VIII line, which also improves the effect of preventing separating and rising up due to the step portion 10a.

[0041]

Furthermore, the step portion 10a may be either a first side edge 14 on the front edge side or a second side edge 15 on the rear edge side. By providing both the first side edge 14 on the front edge side and the second side edge 15 on the rear edge side, reinforcement against separation and

rising up is improved.

[0042]

The lead electrode 20 is a thin plate having a rear edge 21 facing the bridge portion 3b, a front edge 22 protruding from the resin molded body 3, and side edges connecting these. A center portion in the longitudinal direction of the front edge 22 forms an extending portion 28 that extends outward in a substantially trapezoidal shape. Partway along the side edge of the extending portion 28, at a position overlapping the resin molded body 3, a recessed portion 23 is provided that sticks into the center direction of the plate (the direction connecting the side edges). A step portion 20a is provided on the sides facing the recessed portion 23 on a first side edge 24 more to the front edge side than the recessed portion 23 and a second side edge 25 more to the rear edge side. The step portion 20a is also provided across the entirety of each side of the rear edge 21.

[0043]

It is preferable for the recessed portion 23 to be provided at positions that are not exposed to the bottom of the cup portion 3a of the resin molded body 3 and to arrange the recessed portions 23 closer to each other with respect to the line VIII-VIII in FIG. 5(b), since this can suppress the occurrence of burrs. In this case, the recessed portion 23 may be extended and the edges thereof may be disposed closer to the VIII-VIII line, but it is particularly preferable to extend the second side edge 25 and provide the recessed portion 23 at the tip end thereof, thereby disposing the recessed portions 23 closer to each other relative to the VIII-VIII line, which improves the effect of preventing separating and rising up due to the step portion 20a.

[0044]

Furthermore, the step portion 20a may be either a first side edge 24 on the front edge side or a second side edge 25 on the rear edge side. By providing both the first side edge 24 on the front edge side and the second side edge 25 on the rear edge side, reinforcement against separation and rising up is improved.

[0045]

A protruding part 26 extending outward is provided on a side portion of a main plate portion 27 between the rear edge 21 and the front edge 22 of the lead electrode 20. A step portion 20a is formed on the bottom side of the protruding part 26.

[0046]

Reinforcing pieces 30 respectively extend from both ends of the rear edge 21 of the lead electrode 20 (both ends in the extending direction of the bridge portion 3b) in a direction perpendicular to the bridge portion 3b. The reinforcing pieces 30 extend near to the corner portion 3C of the resin molded body 3. Each reinforcing piece 30 has a base end portion 31 on the base end side in the extending direction, and the tip end portion 32 more to the tip end side than the base end portion 31. The upper surface of the base end portion 31 is flush with the main plate portion 27, but the upper surface of the tip end portion 32 is higher than this, forming a step-shaped portion 33 between the two.

[0047]

As in FIGS. 7 and 11(b), the bottom of the reinforcing piece 30 is higher than the bottom of the main plate portion 27 by a height difference d, and when the resin molded body 3 is molded, resin flows under the reinforcing piece 30, so the entire reinforcing piece 30 is embedded within the resin molded body 3. However, only the tip end portion 32 of the reinforcing piece 30 may be embedded in the resin molded body 3.

[0048]

The thickness of the tip end portion 32 may be thinned by coining or the like, so that the upper surface of the tip end portion 32 is flush with the main plate portion 27 and the bottom of the tip end portion 32 is higher than the bottom of the main plate portion 27 to ensure the height difference d.

[0049]

Furthermore, ensuring the height difference d is effective against the deformation and damage to

the resin molded body and the separating and rising up of the lead electrodes, also facilitates resin flow from the gap in a portion of the height difference d into the resin portion (bridge portion) formed between the first and second lead electrodes, and prevents outside air from flowing in between the first and second lead electrodes due to resin filling defects of the bridge portion and preventing sealant leakage defects.

[0050]

The side portion of the tip end portion 32 on the lead electrode 10 side forms a protruding portion 34 that protrudes toward the lead electrode 10.

[0051]

10 Reinforcing pieces 40 respectively extend from both ends of the front edge 22 of the lead electrode 20 in the extension direction of the extending portion 28 (direction perpendicular to the bridge portion 3b). The reinforcing piece 40 extends near to the corner portion 3D of the resin molded body 3. Each reinforcing piece 40 has a base end portion 41 on the base end side in the extending direction, and the tip end portion 42 more to the tip end side than the base end portion 41. The upper surface of the base end portion 41 is flush with the main plate portion 27, but the upper surface of the tip end portion 42 is higher than this, forming a step-shaped portion 43 between the two.

[0052]

20 As in FIG. 7, the bottom of the reinforcing piece 40 is higher than the bottom of the main plate portion 27 by the height difference d , and when the resin molded body 3 is molded, resin flows under the reinforcing piece 40, so the entire reinforcing piece portion 40 is embedded within the resin molded body 3. However, only the tip end portion 42 of the reinforcing piece 40 may be embedded in the resin molded body 3. The side portion of the tip end portion 42 on the extending portion 28 side forms a protruding portion 44 that protrudes toward the extending portion 28.

[0053]

The thickness of the tip end portion 42 may be thinned by coining or the like, so that the upper surface of the tip end portion 42 is flush with the main plate portion 27 and the bottom of the tip end portion 42 is higher than the bottom of the main plate portion 27 to ensure the height difference d .

30 [0054]

The package 2 is manufactured by molding the resin molded body 3 by disposing lead electrodes 1 and 2 in the mold as illustrated in FIG. 21 above and supplying resin to the cavity.

[0055]

In the present embodiment, because the recessed portions 13 and 23 are provided on the lead electrodes 10 and 20, no burrs occur on the recessed portions 13 and 23 when the resin molded body 3 is molded. Note that the sides of the front edges 12 and 22 of the first side edges 14 and 24 of the lead electrodes 10 and 20 are held between the upper mold and lower mold when the resin molded body 3 is molded, so no burrs occur on the bottom side of the first side edges 14 and 24.

[0056]

40 Because the second side edges 15 and 25 are disposed to follow the contour of the projecting portion 111a of the upper mold 111 provided for forming the cup portion 3a of the resin molded body 3, the closest portion thereof is interposed between the upper mold projecting portion 111a (FIG. 21) and the lower mold 112, so no burrs occur on the bottom side of the second side edges 15 and 25.

[0057]

50 Because the spaces between the recessed portions 13 and 13 and between the recessed portions 23 and 23 of each lead electrode 10 and 20 form a narrow neck-shaped portion, there is no rising up from the lower mold when molding the resin molded body 3 due to the spaces between 14 and 14 and 24 and 24, being held between the upper mold and the lower mold, which are larger than the space between the recessed portions 13 and 13 and the recessed portions 23 and 23, and burrs are prevented.

[0058]

In the package 2 and the light emitting device 1 configured as described above, as illustrated

in FIG. 5(a), the reinforcing piece 30 extends toward the corner portion 3C so as to cross both ends of the bridge portion 3b. Therefore, when a force is applied so as to bend the package 2 around a shaft A₁ along the bridge portion 3b, this force is resisted by the reinforcing piece 30, and deformation of the package 2 is prevented.

[0059]

Furthermore, because the reinforcing pieces 30 and 40 are present within the corner portions 3C and 3D of the resin molded body 3, the strength and rigidity of the resin molded body 3 are high in the vicinity of the corners 3C and 3D. In particular, in the present embodiment, the entirety of the reinforcing pieces 30 and 40 are embedded within the resin molded body 3, so the reinforcing pieces 30 and 40 and the resin molded body 3 are firmly integrated, and the strength and rigidity of the resin molded body 3 are high at the corner portions 3C and 3D.

[0060]

Additionally, in the present embodiment, protruding pieces 34 and 44 are provided on the reinforcing pieces 30 and 40. Therefore, the bending rigidity of the package 2 around the shaft A₂ including the protruding pieces 34 and 44 is high.

[0061]

Moreover, even when a deforming force is applied in the tensile direction with the bridge portion 3b illustrated in FIG. 20(c) as the boundary, locking occurs due to the protruding pieces 34 and 44, preventing gaps from occurring between the bridge portion 3b and the rear edge 21 of the lead electrode 20 and between the bridge portion 3b and the rear edge 11 of the lead electrode 10, and outside air can be prevented from entering and the leakage of sealing material can be prevented.

[0062]

As illustrated in FIGS. 14 to 16, a large number of packages 2 are connected to a lead frame (not illustrated in the drawings) via hanging leads 50. In the present embodiment, as illustrated in FIGS. 15 and 16, the tip end portion 2 of the hanging lead 50 is bent so as to separate from the bottom of the package 2 toward the tip end side to form a hook portion 51, and the hook portion 51 is inserted into the resin molded body 3. In this case, a bending angle θ of the bottom side of the hook portion 51 is preferably around 10 to 80°, and more preferably around 30 to 60°. By providing the hook portion 51, the package 2 is stably held by the hanging leads 50 without the need to excessively increase the insertion depth of the hook portion 51, and the package 2 is less likely to fall out.

[0063]

In the present embodiment, a thickness b of the tip end of the hook portion 51 is made smaller than a thickness a of the main body side of the hanging lead 50, and the thickness becomes smaller toward the tip end side of the hook portion 51. This makes it possible to increase the thickness of the resin present on the bottom side of the hook portion 51, and increase the holding force of the package 2 by the hanging lead 50.

[0064]

In the present embodiment, as described above, the reinforcing pieces 30 and 40 are embedded in the corner portions 3C and 3D of the package 2 to increase the rigidity of the package 2 at the corner portions, thereby preventing the package 2 from deforming and causing the hook portions 51 to fall out, and stably holding the package 2. Furthermore, because the holding force of the package 2 can be increased without excessively increasing the insertion depth of the hook portion 51, when the hook portion 51 of the hanging lead 50 is disposed near the corner portions 3C and 3D of the package 2, space can be secured for embedding the reinforcing pieces 30 and 40 of the corner portions 3C and 3D of the package 2, so a hanging lead can be configured that increases the holding force of the package 2 while ensuring high strength and rigidity of the resin molded body 3 at the corner portions 3C and 3D.

[0065]

FIG. 25(a) is a plan view of a lead electrode used in a package according to another embodiment, and (b) and (c) are cross-sectional views taken along lines B-B and C-C of (a).

[0066]

In the present embodiment, a notch 26k is provided in the protruding part 26A of the lead

electrode 20A. A plurality of notches 26k (three in the present embodiment) are provided at intervals in the longitudinal direction of the protruding part 26A. The number of notches 26k is not limited to a plurality, and may be one.

[0067]

Other configurations of the lead electrode 20A in FIG. 25 and the configuration of the lead electrode 10 are the same as those in the embodiment described above, and the same reference numerals are given to the same parts.

[0068]

10 By providing the notch 26k, the integration of the resin below and above the step portion 20a is improved, and the protruding part 26A is held more strongly by the resin molded body 3. Furthermore, the filling of the resin below the step portion 20a is improved.

[0069]

The lead electrode 20B used in the package 2 of FIG. 26 has a rib shape in which the protruding part 26B is bent upward relative to the main plate portion 27. Other configurations of the lead electrode 20B and the configuration of the lead electrode 10 are the same as those in the embodiment described above, and the same reference numerals are given to the same parts. Note that FIG. 26(b) is a plan view of the package, and (a) is a cross-sectional view taken along line A-A of (b).

[0070]

20 The lead electrode 20B has high bending rigidity in the vicinity of the protruding part 26B, and prevents the package 2 from being deformed.

[0071]

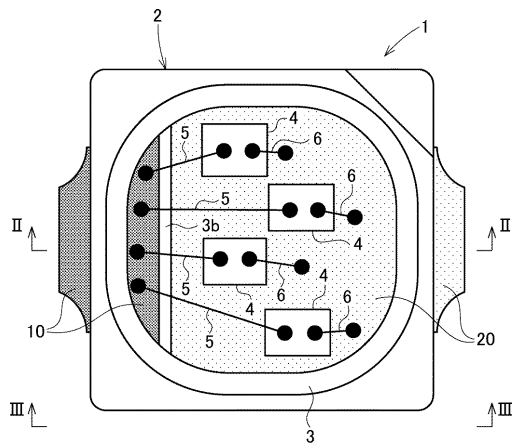
The embodiment described above is merely an example of the present invention, and the present invention may take other forms than those illustrated in the drawings. The resin for the resin molded body is preferably a silicone resin, but is not limited thereto. The material of the lead electrode is, for example, a copper alloy, but is not limited to thereto.

[Description of Reference Numerals]

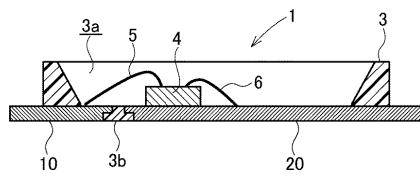
[0072]

1, 100	Light emitting device
2, 110	Package
30 3, 103	Resin molded body
3b, 103b	Bridge portion
4, 104	Light emitting element
5, 6, 105, 106	Thin metal wire
10, 20, 20A, 20B, 101, 102	Lead electrode
10a, 20a, 101a, 102a	Step portion
13, 23	Recessed portion
26, 26A, 26B	Protruding part
30, 40	Reinforcing piece
34, 44	Protruding portion
40 50	Hanging lead
51	Hook portion
111	Upper mold
112	Lower mold
113	Cavity

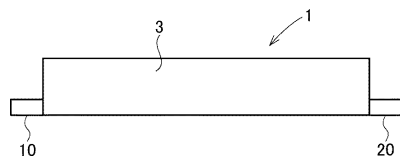
[FIG. 1]



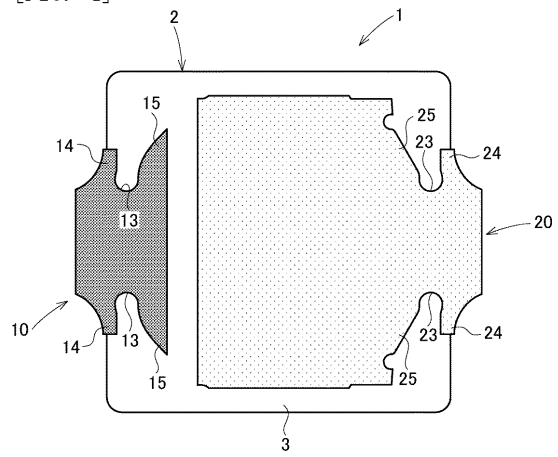
[FIG. 2]



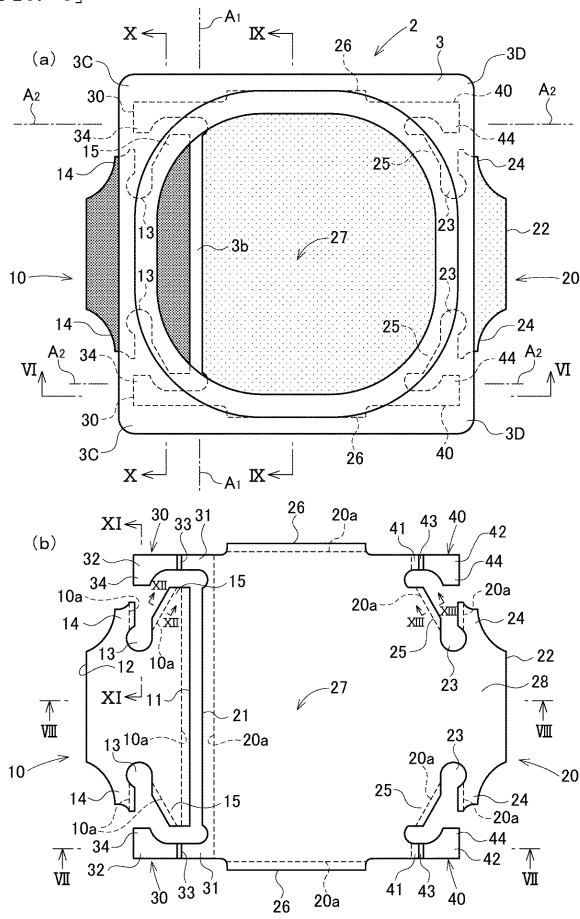
[FIG. 3]



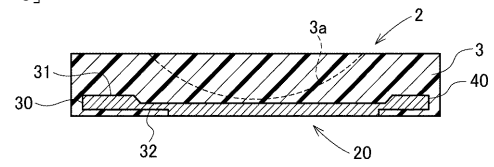
[FIG. 4]



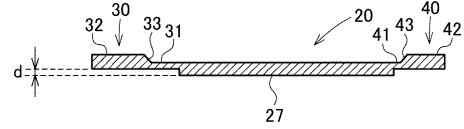
[FIG. 5]



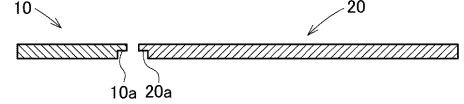
[FIG. 6]



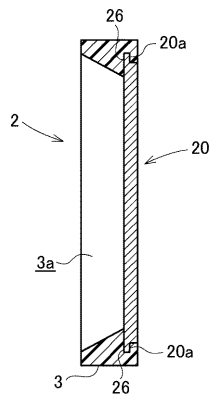
[FIG. 7]



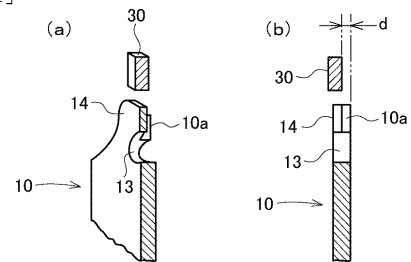
[FIG. 8]



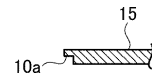
[FIG. 9]



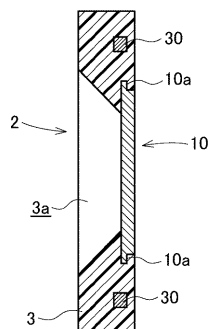
[FIG. 11]



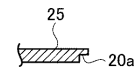
[FIG. 12]



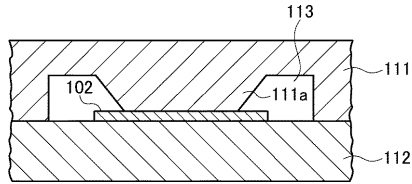
[FIG. 10]



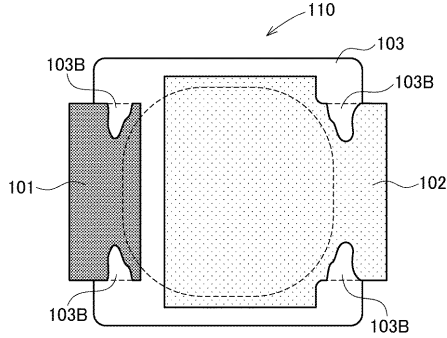
[FIG. 13]



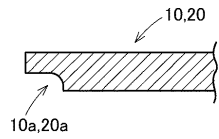
[FIG. 21]



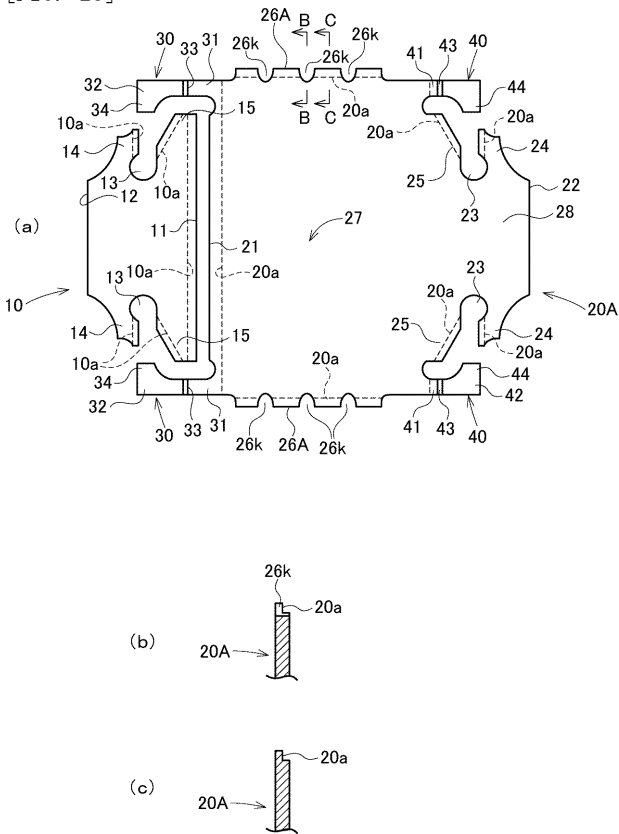
[FIG. 22]



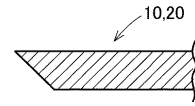
[FIG. 23]



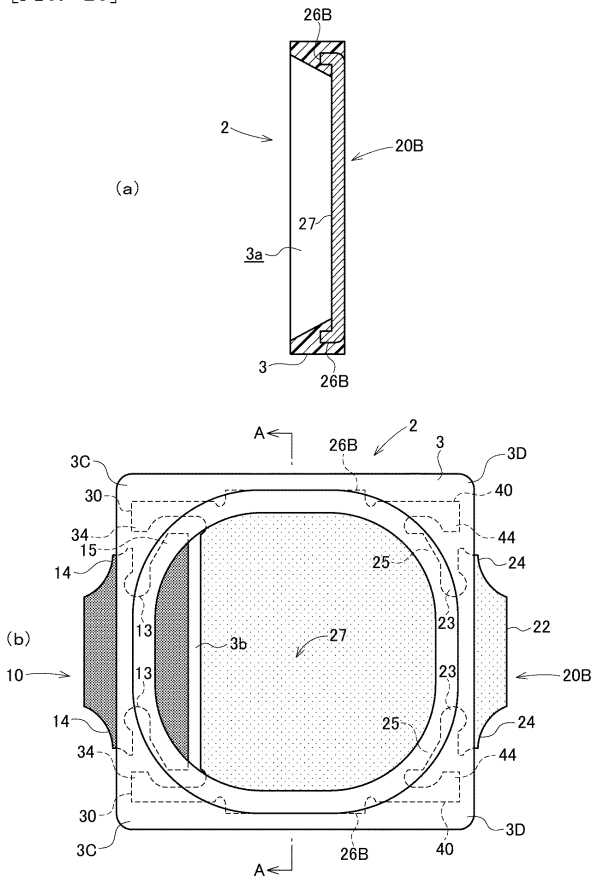
[FIG. 25]



(15)
[FIG. 24]



[FIG. 26]



Continued From First Page

F Term (Reference) 5F142 AA52 AA58 AA65 AA86 BA02 BA24 CA02 CB16 CB23 CC04 CC14
CC16 CC26 CD17 CD45 CD47 FA01



May 21, 2024

Certification

Welocalize Translations

TRANSLATOR'S DECLARATION:

I, Travis Huntsman, hereby declare:

1. I personally prepared the attached translation, from Japanese into English, of Japanese Patent Publication No. JP 2014-41966.
2. The attached translation is, to the best of my knowledge and ability, a true, full, and accurate translation of the attached Japanese document.
3. I am competent to perform this translation, because I have advanced knowledge of the Japanese and English languages as a professional Japanese-to-English patent translator.
4. All statements made of my own knowledge are true.
5. All statements made on information and belief are believed to be true.
6. I declare under the penalty of perjury under the laws of the United States that the foregoing is true and correct.
7. I further declare that I am aware that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

A handwritten signature in black ink, appearing to read "Travis Huntsman", written over a horizontal line.

Travis Huntsman

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