



(22) Date de dépôt/Filing Date: 2004/08/06

(41) Mise à la disp. pub./Open to Public Insp.: 2005/03/04

(45) Date de délivrance/Issue Date: 2008/08/05

(30) Priorité/Priority: 2003/09/04 (JP2003-312915)

(51) Cl.Int./Int.Cl. *F21S 8/10* (2006.01),
B60Q 1/44 (2006.01), *F21V 5/04* (2006.01)

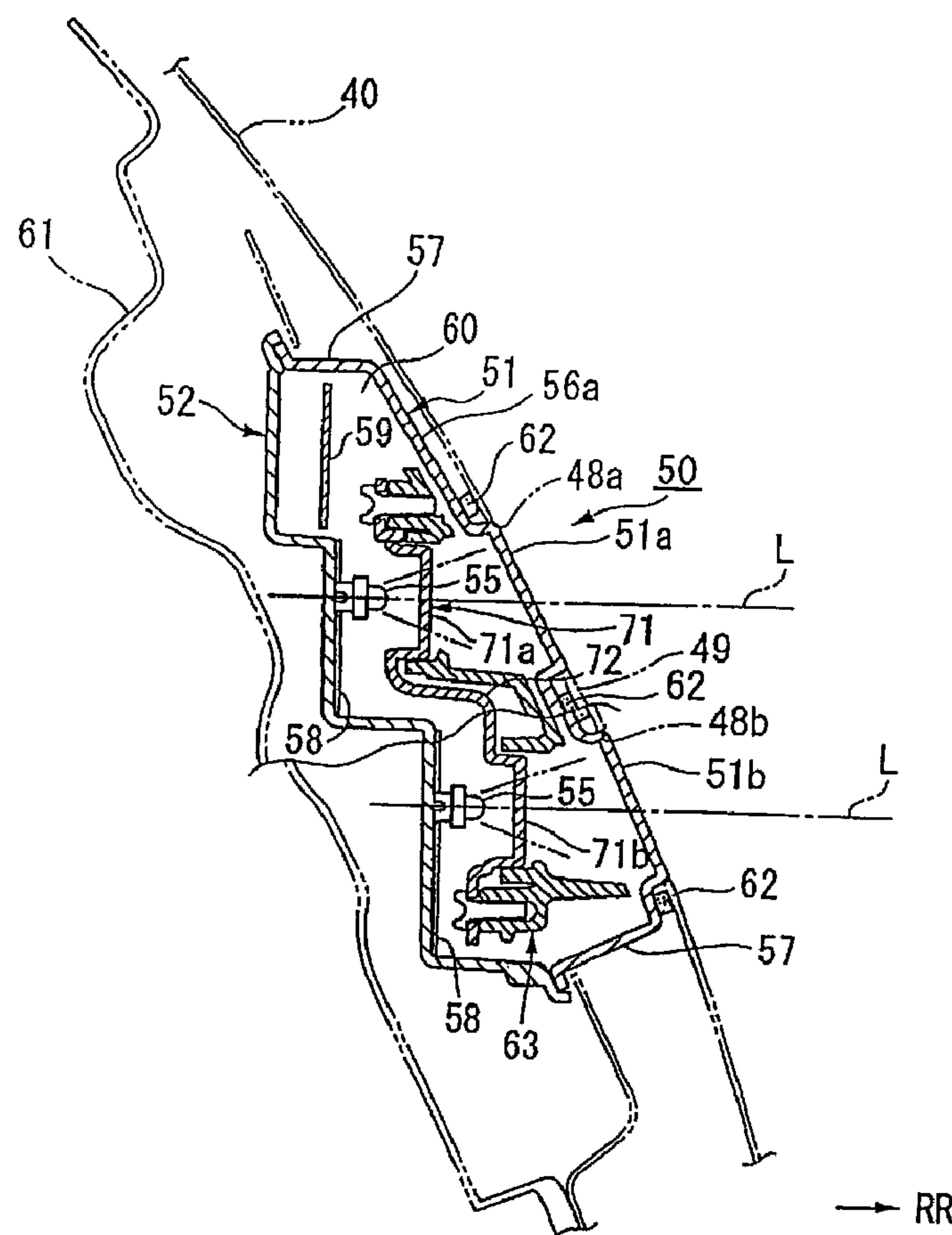
(72) Inventeurs/Inventors:
NAKAYAMA, MASARU, JP;
OSUGI, HIROYUKI, JP;
KANAOKA, YOJI, JP;
MAEDA, SHINICHI, JP;
MIYAGAWA, TORU, JP

(73) Propriétaire/Owner:
HONDA MOTOR CO., LTD., JP

(74) Agent: DENNISON ASSOCIATES

(54) Titre : FEU ARRIERE POUR VEHICULE

(54) Title: REAR LAMP UNIT FOR VEHICLE



(57) Abrégé/Abstract:

To provide a rear lamp unit for a vehicle which is provided with a desired cut pattern on an outer lens so that the light-emitting area can be increased. A rear lamp unit provided with upper and lower outer lenses for guiding light emitted from light-emitting diodes to

(57) **Abrégé(suite)/Abstract(continued):**

the outside the vehicle, characterized in that upper and lower inner lenses are provided between the light-emitting diodes and the upper and lower outer lenses and the upper and lower inner lenses are disposed at locations apart from the upper and lower outer lenses.

ABSTRACT OF THE DISCLOSURE

To provide a rear lamp unit for a vehicle which is provided with a desired cut pattern on an outer lens so that the light-emitting area can be increased. A rear lamp unit provided with upper and lower outer lenses for guiding light emitted from light-emitting diodes to the outside the vehicle, characterized in that upper and lower inner lenses are provided between the light-emitting diodes and the upper and lower outer lenses and the upper and lower inner lenses are disposed at locations apart from the upper and lower outer lenses.

REAR LAMP UNIT FOR VEHICLE

5 FIELD OF THE INVENTION

The present invention relates to a rear lamp unit for a vehicle such as a motorcycle.

BACKGROUND OF THE INVENTION

10 A rear lamp unit for a vehicle such as a motorcycle includes a tail lamp to be illuminated for notifying the presence of the vehicle to the rear, and a brake lamp to be illuminated for notifying that the vehicle is in braking action, and so on. In these rear lamp units, a plurality of light-emitting diodes (so-called LED) are used as a light source (for example, see JP-A-
15 2003-54460). In such a rear lamp unit, since flexibility in design of the rear lamp unit itself and the rear portion of the vehicle body such that the shape of the lens which is large in aspect ratio of can be set easily, it is employed in many of vehicles in recent years.

20 Since illumination of the light-emitting diode has high directivity, there is a case where an outer lens disposed in the illuminating direction thereof is formed with a predetermined cut pattern to diffuse light, hence widening the light-emitting area.

25 However, the cut pattern formed on the outer lens is located close to the outer surface of the vehicle, it can be seen easily from the outside, and hence the pattern may affect the appearance of the vehicle. Therefore, a rear lamp unit which can be provided with the cut pattern in relation to the appearance of the vehicle and can secure a predetermined light-
30 emitting area has been awaited.

Accordingly, the invention provides a rear lamp unit for a vehicle which can be provided with a desired cut pattern on the outer lens and, simultaneously, can increase the light-emitting area.

5 SUMMARY OF THE INVENTION

The present invention is directed to a rear lamp unit for a vehicle including an outer lens for guiding light emitted from a light-emitting diode to the outside of the vehicle, characterized in that an inner lens is provided between the aforementioned light-emitting diode and the outer
10 lens, and the inner lens is provided at a location apart from the aforementioned outer lens.

An aspect of the invention is directed to a rear lamp unit for a vehicle which is illuminated by light emitted from the light-emitting diode,
15 characterized in that the inner lens and the outer lens are disposed in the direction of illumination of the aforementioned light-emitting diode.

In this arrangement, light (illumination) emitted from the light-emitting diode is passed through the inner lens and then guided to the outside of
20 the vehicle via the outer lens. In this case, illumination from the light-emitting diode is bent and diffused by the cut pattern on the inner lens and then bent and diffused by the cut pattern on the outer lens. Therefore, even when the cut pattern on the outer lens is aligned in substantially one direction in relation to the appearance of the vehicle, illumination from
25 the light-emitting diode can be diffused over a wide range evenly as long as the cut pattern which can compensate light distribution generated by the cut pattern on the outer lens is formed on the inner lens, and consequently the light-emitting area of the rear light unit itself may be widened. In addition, when the inner lens is disposed at a location apart
30 from the outer lens, the inner lens can hardly be seen from the outside.

Another aspect of the invention is characterized in that the aforementioned outer lens is formed with a lens extending in substantially one direction and the aforementioned inner lens is formed
35 with a lens extending in the direction substantially orthogonal to the lens of the aforementioned outer lens.

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In another aspect of the invention the lens of the aforementioned outer lens extends substantially in the horizontal direction, and the lens of the aforementioned inner lens extends substantially in the perpendicular direction.

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In this arrangement, illumination from the light-emitting diode is bent and diffused by the lens of the inner lens, for example, substantially in the horizontal direction, and then bent and diffused by the lens of the outer lens substantially in the vertical direction. Therefore, illumination from the light-emitting diode can be diffused over a wide range without being biased, and as in the invention set out above, the outer lens can be provided with a desired cut pattern in relation to the appearance of the vehicle and, simultaneously, can increase the light-emitting area of the rear lamp unit itself.

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A further aspect of the invention is characterized in that a plurality of the aforementioned light-emitting diodes are arranged substantially in the horizontal direction, and the aforementioned inner lens is provided between the light-emitting diodes disposed at least on both outer sides out of the plurality of light-emitting diodes and the outer lens.

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In this arrangement, the light-emitting area at least at the both side portions of the outer lens can be increased, and especially, even when the outer lens is formed into a bent shape according to the shape of the vehicle body, light emission of the rear lamp unit itself can easily be recognized when viewing the vehicle from obliquely behind. Also, in comparison with the case in which the inner lens is provided between all the light-emitting diodes and the outer lens, downsizing of the inner lens or reduction of the number of components is achieved.

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Yet another aspect of the invention is characterized in that the aforementioned outer lens is a colored transparent member, and the inner lens is a colorless transparent member, and in that the aforementioned inner lens is disposed in the vicinity of the aforementioned light-emitting diodes.

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In this arrangement, in comparison with the case in which the outer lens is a colorless transparent member, the inner lens can hardly be seen from the outside. Also, since the inner lens is a colorless transparent member, lowering of the amount of light illuminated from the light-emitting diodes is prevented. In addition, since the inner lens is disposed in the vicinity of the light-emitting diode, it is disposed at a location apart from the outer lens, and the inner lens can further hardly be seen from the outside.

10 **BRIEF DESCRIPTION OF THE DRAWINGS**

Preferred embodiments of the invention are shown in the drawings, wherein:

Fig. 1 is a side view of a motorcycle according to an embodiment of the invention viewed from the left side.

Fig. 2 is a side view of a rear fender of the motorcycle when viewed from the left side.

20 Fig. 3 is a back view of the rear fender.

Fig. 4 is a back view of a rear lamp unit.

Fig. 5 is a cross-sectional view taken along the line A-A in Fig. 4.

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Fig. 6 is a cross-sectional view taken along the line B-B in Fig. 4.

Fig. 7 is a cross-sectional view taken along the line C-C in Fig. 4.

30 Fig. 8 is a cross-sectional view of a modification of the rear lamp unit corresponding to Fig. 6.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

35 Referring now to the drawings, an embodiment of the invention will be described. Indication of directions such as front, rear, left, and right in

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description below is the same as the direction based on the direction of the vehicle, and an arrow RR in the drawing indicates the rear of the vehicle.

5 As shown in Fig. 1, the left and right pair of front forks 3 which rotatably support a front wheel 2 of a motorcycle 1 is steerably supported by a head pipe 6 of a vehicle body frame 5 via a steering stem 4 at the upper end thereof, and rear swing arm portions 8 for rotatably supporting a rear wheel 7 are swingably supported by pivot plates 9 provided at the rear portion of the vehicle body frame 5 at the front ends thereof.

10 The vehicle body frame 5 includes a main pipe 10 extending from the upper portion of the head pipe 6 rearward, an upper pipe joint 11 to be joined to the rear portion of the main pipe 10, a pair of left and right center upper pipes 12 branching toward the left and right from the upper pipe joint 11 and extending rearward, and a pair of left and right rear brackets 13 to be connected to the rear portions of the respective center upper pipes 12 respectively, and center pipes 14 extending from the respective center upper pipes 12 downward and rear pipes 15 extending from the respective rear brackets 13 downward are connected to the front side and the rear side of the upper portion of the pivot plates 9, respectively. A gusset 16 is joined to the lower portion of the head pipe 6, and the rear ends of a pair of left and right down pipes 17 branching toward the left and right from the gusset 16, extending downward and then being bent, and extending rearward are connected to the lower front side of the pivot plates 9. 20 Provided between the rear brackets 13 and the rear swing arm portions 8 are rear cushions 18.

An engine 20 is mounted to the portion surrounded by the center upper pipes 12, the down pipes 17, and the pivot plates 9 and the like. The engine 20 is a V-type two-cylinder engine having two cylinder portions 21 disposed into substantially a V-shape in side view, and a mission case 24 for storing a transmission 23 is connected to the rear portion of a crankcase 22 disposed below the respective cylinder portions 21. The engine 20 and the transmission 23 are supported by the vehicle body frame 5 by the front end and the lower end of the crankcase 22 connected to the down pipe 17 via brackets 25, 26 and the upper and lower rear ends of the mission case 24 connected to the pivot plates 9 via brackets 27, 28. A radiator 29 to be 35

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supported by the down pipes 17 is disposed forwardly of the engine 20. The rear swing arms 8 have a pair of left and right fork portions 8a extending rearwardly from the front ends thereof, and a drive shaft, not shown, is inserted into one (left one in this embodiment) of the fork portions 8a. Drive force of the engine 20 is transmitted to the rear wheel 7 via the drive shaft.

Provided at the portions of the front forks 3 closer to the upper ends is a head light 30, and a pair of left and right front wipers 31 are provided downwardly thereof. The front forks 3 are provided with a steering handle 32 attached to the upper ends thereof, and is provided with a front fender 33 for covering the upper side of the front wheel at the lower portions of the front forks 3.

A tear-drop type fuel tank 34 is disposed on the upper portion of the vehicle body frame 5, and a main seat 35 for a rider is disposed behind the fuel tank 34. The front portion of the main seat 35 is placed on the vehicle body frame 5 and the rear portion thereof is placed on a rear fender 40.

The rear fender 40 is formed of a thin steel plate, and is supported by the vehicle body frame 5 in a state of being fixed mainly to the rear bracket 13. A pillion seat 36 for a rear fellow passenger continuing from the rear end of the main seat 35 is disposed on the rear fender 40. A pair of left and right rear wipers 37 are provided on both sides of the rear portion of the rear fender 40, and a rear lamp device 50 according to the invention is provided on the rear face at the rear portion of the rear fender 40. A license holder 38 having a license plate mounting portion and a license lamp is provided below the rear lamp unit 50.

Here, the rear lamp unit 50 serves as a tail lamp for notifying the presence of the vehicle, to which it is mounted, to the rear, and a brake lamp for notifying that the vehicle is in braking action to the rear, and differentiates between the aforementioned tail lamp and the brake lamp by changing the brightness of the light-emitting surface thereof.

The rear fender 40 is formed into a U-shape in cross section for covering the outer peripheral side and both sides of the rear wheel 7, and is a

member of an arcuate shape extending substantially along the outer periphery of the rear wheel 7. Here, the portion extending substantially along the outer peripheral surface of the rear wheel 7 at intervals as needed and being arcuate shape in cross section defines an outer peripheral wall 41, and the portions formed substantially into a fan-shape extending from both the left and right edges of the outer peripheral wall 41 toward the center axis of the rear wheel 7 define side walls 42, respectively.

As shown in Fig. 2 and Fig. 3, a tail lamp bracket 43 and a license bracket 44 for mounting the rear lamp unit 50 and the license holder 38 are provided respectively at the rear portion of the rear fender 40 inside the outer peripheral wall 41. The rear lamp bracket 43 is joined to the outer peripheral wall 41 at the joint flange provided on the upper portion thereof by spot welding. Winker brackets 45 for mounting the rear wipers 37 are joined to the insides of both side walls 42 by spot welding, and the rear portions of the winker brackets 45 and both side portions of the rear lamp bracket 43 are joined by arc welding. Furthermore, arcuate-shaped reinforcing plates 46 are joined to the rear portion of the rear fender 40 inside the portion closer to the inner periphery of the both side walls 42 by spot welding, and the reinforcing plates 46 and the front portion of the winker brackets 45 are joined by spot welding. On the lower side of the rear portion of the rear fender 40, a supporting stay 47 of a band shape extending substantially along the inner periphery of the rear fender 40 is provided. The supporting stay 47 connects the lower portion of the both reinforcing plate 46 and supports the license bracket 44.

The rear lamp unit 50 is mounted to the rear fender 40 from the inside thereof and is fixed to the rear lamp bracket 43 with screws or the like. A lens exposing hole 48 for exposing the outer lens of the rear lamp unit 50 is provided on the outer peripheral wall 41 at the rear portion of the rear fender 40. The lens exposing hole 48 is divided into two openings of an upper opening 48a and a lower opening 48b by a dividing beam 49 extending laterally between two side edges at the substantially center in the vertical direction. Both of the upper opening 48a and the lower opening 48b are narrow in the vertical direction and laterally elongated shape being wide substantially along the horizontal direction. The both edges of the lens exposing hole 48 are formed to be inclined so that the lateral width is

decreased as it goes downward and, accordingly, the lateral width of the lower opening 48b is narrower than the upper opening 48a. In addition, the upper opening 48a and the lower opening 48b are formed substantially into a V-shape which is shallow in the vertical direction, and the depth of the V-shape in the vertical direction is gradually decreasing in the range from the lower edge to the upper edge of the lens exposing hole 48.

As shown in Fig. 4, the tail lamp unit 50 defines a lamp chamber 54 by the outer lens cover 51 and a lamp base 52 to be mounted thereto, and a plurality of light-emitting diodes (so-called LED) 55 are arranged in the lamp chamber 54 substantially in the horizontal direction as light sources. The outer lens cover 51 is provided with an upper outer lens (outer lens) 51a and a lower outer lens (outer lens) 51b which are exposed to the outside the rear fender 40 through the upper opening 48a and the lower opening 48b in a state in which the tail lamp unit 50 is mounted to the inside of the rear fender 40, respectively. The upper and lower outer lenses 51a, 51b each are formed into an elongated shape substantially along the horizontal direction as in the case of the upper opening 48a and the lower opening 48b. Here, the outer lens cover 51 is an integrally formed member including the upper and lower outer lenses 51a, 51b with colored (red for example) transparent acryl or the like. Reference numeral 53 designate a fixing portion for mounting the rear lamp unit 50 to the rear lamp bracket 43.

Referring also to Fig. 5 and Fig. 6, the outer lens cover 51 includes a rear face portion 56 formed substantially along the inner surface of the outer peripheral wall 41 of the rear fender 40, and a peripheral walls 57 extending from the peripheral edges of the rear face portion 56 substantially toward the front. The rear face portion 56 is curved to project outwardly of the rear fender 40 according to the shape of the peripheral portion around the lens exposing hole 48 of the outer peripheral wall 41, and inclined so as to face obliquely upward toward the rear. The upper and lower outer lenses 51a, 51b are provided on the rear face portion 56. The lamp base 52 is provided forwardly of the outer lens cover 51, and the peripheral edge portion of the lamp base 52 and front edge of the peripheral wall 57 of the outer lens cover 51 are joined. Fig. 6 is a cross-sectional view of the upper outer lens 51a. Since the cross-section of the

the lower outer lens 51b has the same configuration, the description will be made referring to Fig. 6 as a example. The same types of the hatching are used in the respective cross-sections for convenience.

Six light-emitting diodes 55 are provided in the lamp chamber 54 of the rear lamp unit 50 forwardly of the upper and lower outer lenses 51a, 51b. The respective groups of the light-emitting diodes 55 are arranged substantially along the centerlines of the vertical widths of the upper and lower outer lenses 51a, 51b in rear view of the vehicle body, and are arranged at regular intervals so as to be bilateral symmetry. The respective groups of light-emitting diodes 55 are arranged with the optical axis L thereof extended substantially in the fore-and-aft direction at a substantially constant distance from the upper and lower outer lenses 51a, 51b. In other words, when viewed from the side of the vehicle, the light-emitting diodes 55 are located a similar distance from the respective outer lens to accommodate the curvature of the lens. When viewed from the top of the vehicle, the light-emitting diodes 55 at the lateral center are located rearwardly of the light-emitting diodes 55 located on the laterally outsides corresponding to the rear face 56 of an arcuate shape in cross-section.

The respective light-emitting diodes 55 are retained by the lamp base 52 via a power distribution plate 58. Here, the lamp base 52 is formed in a staircase pattern corresponding to the arrangement of the respective light-emitting diodes 55. The outer lens cover 51 and the lamp base 52 extend upwardly of the upper opening 48a, whereby the lamp chamber 54 protrudes upward to define a storage space 60 for a base plate 59 for adjusting the applied voltage to the light-emitting diode 55 in the upper portion of the lamp chamber 54. A protective cover 61 for covering the rear lamp unit 50 is provided inside the rear fender 40.

The rear face portion 56 of the outer lens cover 51 is disposed in such a manner that a general surface 56a thereof has a substantially uniform clearance from the inner surface of the outer peripheral wall 41 of the rear fender 40. The upper and lower outer lenses 51a, 51b are formed so as to

project rearwardly of the general surface 56a, so that the outer surfaces (light-emitting surfaces) of the upper and lower outer lenses 51a, 51b are substantially flush with the outer surface of the outer peripheral wall 41. A shock absorbing material 62 formed of sponge rubber or the like, which
5 comes into tight contact with the inner surface of the outer peripheral wall 41, is adhered on the general surface 56a including the rear face portion 56 above the upper outer lens 51a, between the upper and lower outer lenses 51a, 51b (the portion facing the dividing beam 49), and below the lower outer lens 51b.

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Extensions 63 for defining twelve chambers 64 in total corresponding to the respective light-emitting diode 55 arranged on the upper and lower levels are provided in the lamp chamber 54. Each chamber 64 is formed substantially into a rectangular shape when viewed from the rear of the
15 vehicle body and is defined by an upper wall 65, the lower wall 66, and both side walls 67, and the light-emitting diode 55 corresponding to this specific chamber 64 is disposed substantially at the center of each chamber 64 when viewed from the rear of the vehicle body. Also, bottom walls 68, which serve as a reflector, being formed substantially into a paraboloid of
20 revolution about the optical axis L of the light-emitting diode 55 are provided in the respective chambers 64 corresponding to eight light-emitting diodes 55 in total out of the light-emitting diode 55 arranged on the upper and lower levels except for those located at both outer sides. An inner lens cover 71 is attached to the chambers 64 corresponding to the
25 respective light-emitting diodes 55 located on the both outer sides of the upper and lower levels.

As shown in Fig. 7, the inner lens cover 71 includes an upper inner lens (inner lens) 71a and a lower inner lens (inner lens) 71b positioned
30 forwardly of the light-emitting diodes 55 of the respective chambers 64 of the upper and lower levels formed and connected integrally with each other via a relay portion 72, and is formed substantially into a staircase pattern along the lamp base 52 with a clearance interposed therebetween as needed. The upper and lower inner lenses 71a, 71b are provided between
35 the light-emitting diodes 55 and the upper and lower outer lenses 51a, 51b at the position in the vicinity of the light-emitting diodes 55 in the respective chambers 64 and apart from the upper and lower outer lenses

51a, 51b. The inner lens cover 71 is attached to the extension 63 from the front (from the side of the lamp base 52) and fixed with screws or the like. Here, the inner lens cover 71 is a member including the upper and lower inner lenses 71a, 71b formed of colorless transparent material such as acryl
5 or the like and formed integrally therewith.

As shown in Fig. 4, the upper and lower inner lenses 71a, 71b are formed substantially into a rectangular shape almost overlapped with the both sides of the upper and lower outer lenses 51a, 51b when viewed from the
10 rear of the vehicle body. Then, illumination from the respective light-emitting diodes 55 positioned on both outer sides of the upper and lower levels (side light emitting diodes) pass through the upper and lower inner lenses 71a, 71b, then through the both ends of the outer lenses 51a, 51b, and then emitted to the outside from the lamp chamber 54. A number of center
15 diodes are not associated with the inner lenses.

As shown in Fig. 4 and Fig. 5, a cut pattern for forming flute cut lenses (lenses) 73 is provided extending substantially in the horizontal direction between the both side edges on the front face side (the side of the light-emitting diode 55) of the upper and lower outer lenses 51a, 51b. The flute
20 cut lenses 73 form a plurality of triangles substantially in cross section projecting toward the lamp chamber 54, and these flute cut lenses are formed to be vertically symmetry on the respective upper and lower outer lenses 51a, 51b. Ridge lines 74 of the flute cut lenses 73 are formed
25 substantially into a shallow V-shape in the vertical direction corresponding to the upper and lower outer lenses 51a, 51b when viewed from the rear of the vehicle body. In other words, the ridge lines 74 of the flute cut lenses 73 extend substantially in the horizontal direction. The flute cut lenses 73 contribute to diffuse light from the light-emitting diodes 55 substantially in
30 the vertical direction.

As shown in Fig. 6, cut patterns forming vertical flute cut lenses 75 are provided on the rear face side of the upper and lower inner lenses 71a, 71b (on the side of the outer lenses 51a, 51b) so as to extend substantially in the
35 vertical direction between the upper edges and the lower edges thereof. More specifically, the vertical flute cut lenses 75 are formed so as to extend, when viewed from the rear of the vehicle body, in the direction substantially orthogonal to the ridges 74 of the flute cut lenses 73 formed

on the portion of the outer lenses 51a, 51b superimposed with the upper and lower inner lenses 71a, 71b when viewed from the rear of the vehicle body. The illumination from the light-emitting diodes 55 is diffused substantially in the lateral direction by the vertical flute cut lenses 75. A
5 spiral cut pattern about the optical axis L is provided on the front face sides (the side of the light-emitting diode 55) of the upper and lower inner lenses 71a, 71b for diffusing illumination from the light-emitting diodes 55 as needed.

10 According to the aforementioned embodiment, in the rear lamp unit 50 having functions as a tail lamp and a brake lamp of the motorcycle 1 and illuminating by illumination from the plurality of light-emitting diodes 55, since the upper and lower inner lenses 71a, 71b are provided between
15 the light-emitting diodes 55 located at both outer sides and the both sides of the respective outer lenses 51a, 51b respectively, illumination from the light-emitting diodes 55 at both outer sides passes through the corresponding upper and lower inner lenses 71a, 71b, then passes through
the outer lenses 51a, 51b, and then is emitted outside. In this case, illumination from the light-emitting diode 55 is diffused substantially in
20 the lateral direction by the lens cut pattern of the upper and lower inner lenses 71a, 71b and substantially in the vertical direction by the lens cut pattern of the outer lenses 51a, 51b.

Since the ridges 74 of the flute cut lenses 73 formed on the outer lenses
25 51a, 51b can be seen from the outside the outer lens cover 51, the cut pattern of the outer lenses 51a, 51b extending substantially in the horizontal direction is employed in relation to the appearance of the motorcycle 1. However, in such a case as well, light from the light-emitting diode 55 having high directivity can be diffused in the vertical
30 and lateral directions to increase the light-emitting areas at the both side portions of the outer lenses 51a, 51b. Therefore, light emission from the rear lamp unit 50 itself can be recognized easily when viewed obliquely from the rear of the motorcycle 1, and hence visibility of the rear lamp and the brake lamp may be improved and flexibility in modeling of the rear
35 lamp unit 50 itself and design of the vehicle body therearound may be improved.

Also, since the inner lenses 71a, 71b are provided in the vicinity of the light-emitting diodes 55 at locations apart from the outer lenses 51a, 51b, the inner lenses 71a, 71b can hardly be seen from the outside, whereby good appearance of the vehicle can be maintained.

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In addition, since the outer lenses 51a, 51b are red transparent, the inner lenses 71a, 71b can hardly be seen from the outside in comparison with the case in which they are colorless transparent, whereby the good appearance of the vehicle is maintained. Furthermore, when the inner lenses 71a, 71b are colorless transparent members, lowering of the amount of illumination from the light-emitting diode 55 may be prevented in comparison with the case in which they are colored transparent, whereby visibility of the tail lamp, the brake lamp, and so on can be maintained preferably.

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In particular, even when the light-emitting surfaces of the outer lenses 51a, 51b are curved so as to be flush with the outer surface of the outer peripheral wall 41 of the rear fender 40, light emission from the rear lamp unit 50 itself can easily be recognized when viewing the motorcycle 1 obliquely from the rear thereof. Also, in comparison with the case in which the inner lens is provided between all the light-emitting diodes 55 and the outer lenses 51a, 51b, the size of the inner lens and the number of component may be reduced, whereby the weight reduction and cost reduction of the rear lamp unit 50 itself is achieved.

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The invention is not limited to the above-described embodiment, and as a rear lamp unit 150 shown in Fig. 8, for example, the structure in which an inner lens cover 171 is mounted so as to cover all the light-emitting diodes 55 arranged in the lamp chamber 54 from the illuminating direction (from the rear of the vehicle), so that an inner lens 171a is provided between all the light-emitting diodes 55 and the outer lenses 51a, 51b may be employed. Lenses formed on the outer lenses 51a, 51b and the inner lenses 71a, 71b may be cylindrical lenses. Further, for example, the cut pattern extending substantially in the vertical direction may be employed for the outer lenses 51a, 51b, and the cut pattern extending substantially in the horizontal direction may be employed for the inner lenses 71a, 71b. Furthermore, the rear lamp unit having a structure in which the light-

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emitting diodes 55 may be differentiated for the tail lamp and for the brake lamp, or the structure in which the rear wipers 37 or the back lamp are included may also be applicable. The structure of the aforementioned embodiment is only an example, and modifications may be made as
5 needed without departing the scope of the invention as a matter of course.

According to the preferred embodiments of the invention, since the inner lens is provided between the light-emitting diode and the outer lens, the outer lens may be formed with a cut pattern which is suitable to the
10 appearance of the vehicle and simultaneously the light-emitting area of the rear lamp unit itself may be increased, whereby visibility of the tail lamp, the brake lamp, and so on may be improved and flexibility in modeling of the rear lamp unit itself and design of the vehicle body therearound may be improved.

15 Also, in another embodiment of the invention, since the inner lens is provided at a location apart from the outer lens, the inner lens can hardly be seen from the outside, and hence good appearance of the vehicle can be maintained.

20 Furthermore, in a preferred embodiment of the invention, when the outer lens is a colored transparent member, the inner lens can hardly be seen from the outside, and the good appearance of the vehicle can be maintained, and when the inner lens is a colorless transparent member,
25 lowering of the light amount illuminated from the light-emitting diode is prevented to maintain a good visibility of the tail lamp, the brake lamp, and so on.

According to another embodiment of the invention, since the inner lens
30 is provided between the light-emitting diode located at least on both outer sides out of the plurality of light-emitting diodes and the outer lens, light emission from the rear lamp unit itself can easily be recognized even when viewing the vehicle from obliquely behind. Also, by downsizing the inner lens or reducing the number of components, weight reduction
35 and cost reduction of the rear lamp unit itself are achieved.

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Although various preferred embodiments of the present invention have been described herein in detail, it will be appreciated by those skilled in the art, that variations may be made thereto without departing from the spirit of the invention or the scope of the appended claims.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A rear lamp unit for a vehicle comprising:
 - an outer lens for guiding light emitted from a plurality light-emitting diodes to the outside the vehicle;
 - said plurality of light emitting diodes comprising side light emitting diodes positioned either side of said rear lamp unit and centre light emitting diodes located between said side light emitting diodes;
 - said side light-emitting diodes including an inner lens positioned between said side light emitting diodes and said outer lens;
 - wherein said inner lens is provided at a location apart from said outer lens;
 - wherein said outer lens has cuts extending in substantially a first direction and said inner lens has cuts extending in a second direction substantially orthogonal to the cuts of said outer lens,
 - wherein said inner lens is arranged in relation to said outer lens such that light emitted from said side light-emitting diodes passes through said inner lens and is diffused in the second direction and then passes through said outer lens and is diffused in the first direction; and
 - wherein said inner lens is provided only in association with said side light emitting diodes.
2. A rear lamp unit for a vehicle which is illuminated by light emitted from a plurality of light-emitting diodes comprising:
 - said plurality of light emitting diodes comprising side light emitting diodes positioned either side of said rear lamp unit and centre light emitting diodes located between said side light emitting diodes;

an inner lens and an outer lens are disposed in an illuminating direction of said plurality of light-emitting diodes,

wherein said outer lens has cuts extending in substantially a first direction and said inner lens has cuts extending in a second direction substantially orthogonal to the cuts of said outer lens,

wherein said inner lens is arranged in relation to said outer lens such that light emitted from said side light-emitting diodes passes through said inner lens and is diffused in the second direction and then passes through said outer lens and is diffused in the first direction, and

wherein said inner lens is provided only in association with said side light emitting diodes.

3. The rear lamp unit for a vehicle according to claim 1, wherein the cuts of said outer lens extends substantially in a horizontal direction and the cuts of said inner lens extends substantially in a perpendicular direction.

4. The rear lamp unit for a vehicle according to claim 2, wherein the cuts of said outer lens extends substantially in a horizontal direction and the cuts of said inner lens extends substantially in a perpendicular direction.

5. The rear lamp unit for a vehicle according to claim 1, 2, 3 or 4 wherein said plurality of said light-emitting diodes are arranged substantially in a horizontal direction.

6. The rear lamp unit for a vehicle according to claim 1, 2, 3 or 4, wherein a plurality of said light-emitting diodes are arranged substantially in horizontally extending rows.

7. The rear lamp unit for a vehicle according to claim 1, 2, 3 or 4 wherein said outer lens is a colored transparent member and said inner lens is a colorless transparent member.

8. A rear lamp unit for a vehicle comprising:

a lamp base mounting a plurality of light emitting diodes;

said plurality of light emitting diodes comprising side light emitting diodes positioned either side of said rear lamp unit and centre light emitting diodes located between said side light emitting diodes;

an inner lens mounted adjacent to said lamp base for enabling light emitted from said side light emitting diodes to be transmitted therethrough;

an outer lens mounted adjacent to said lamp base with said inner lens being disposed between said lamp base and said outer lens, said outer lens permits light emitted from said plurality of light emitting diodes to be transmitted outside the vehicle; and

wherein the inner lens is provided at a location apart from said outer lens,

wherein said outer lens has cuts extending in substantially a first direction and said inner lens has cuts extending in a second direction substantially orthogonal to the cuts of said outer lens,

wherein said inner lens is arranged in relation to said outer lens such that light emitted from said side light-emitting diodes passes through said inner lens and is diffused in the second direction and then passes through said outer lens and is diffused in the first direction, and

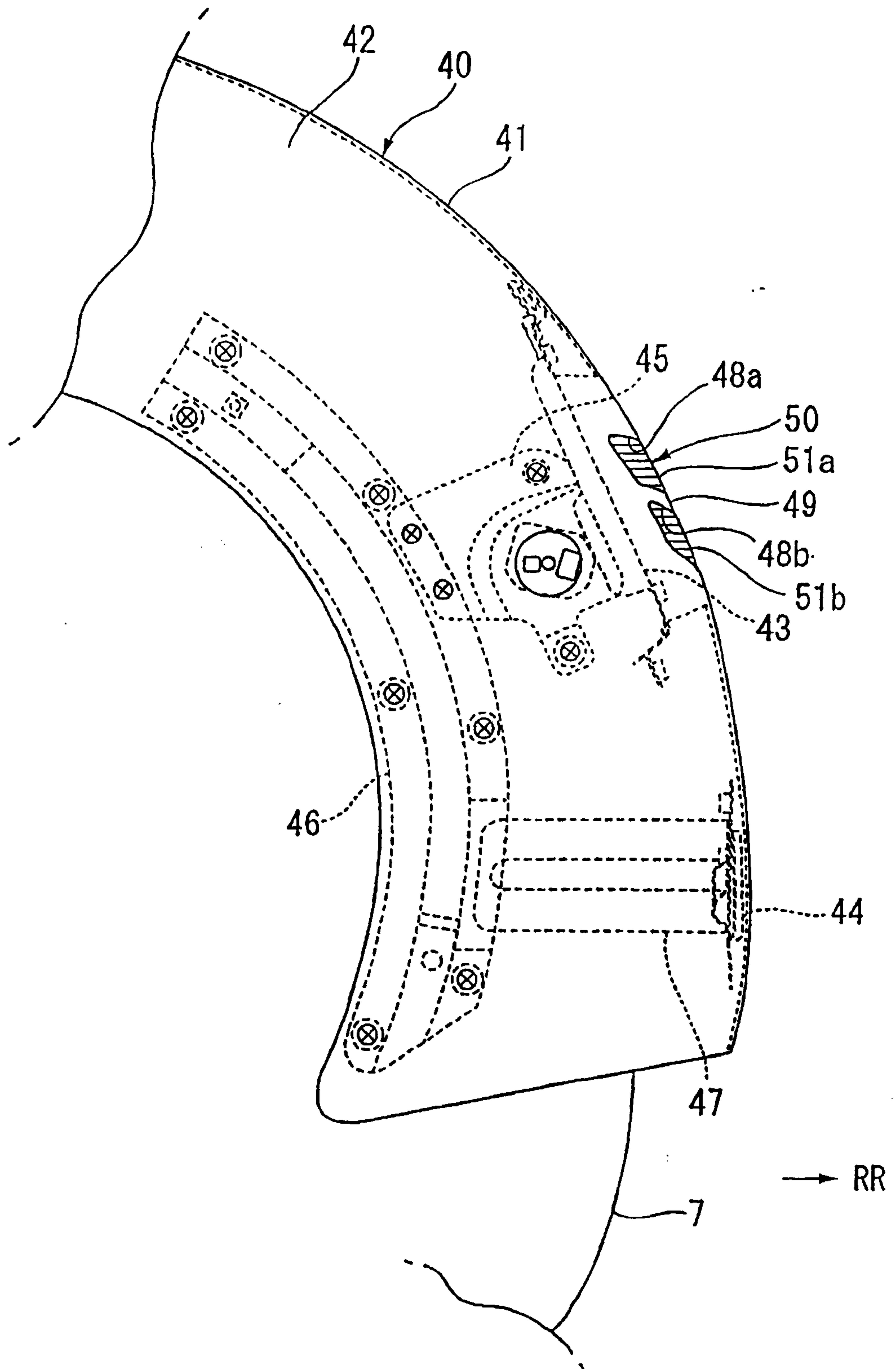
wherein said inner lens is only associated with said side light emitting diodes.

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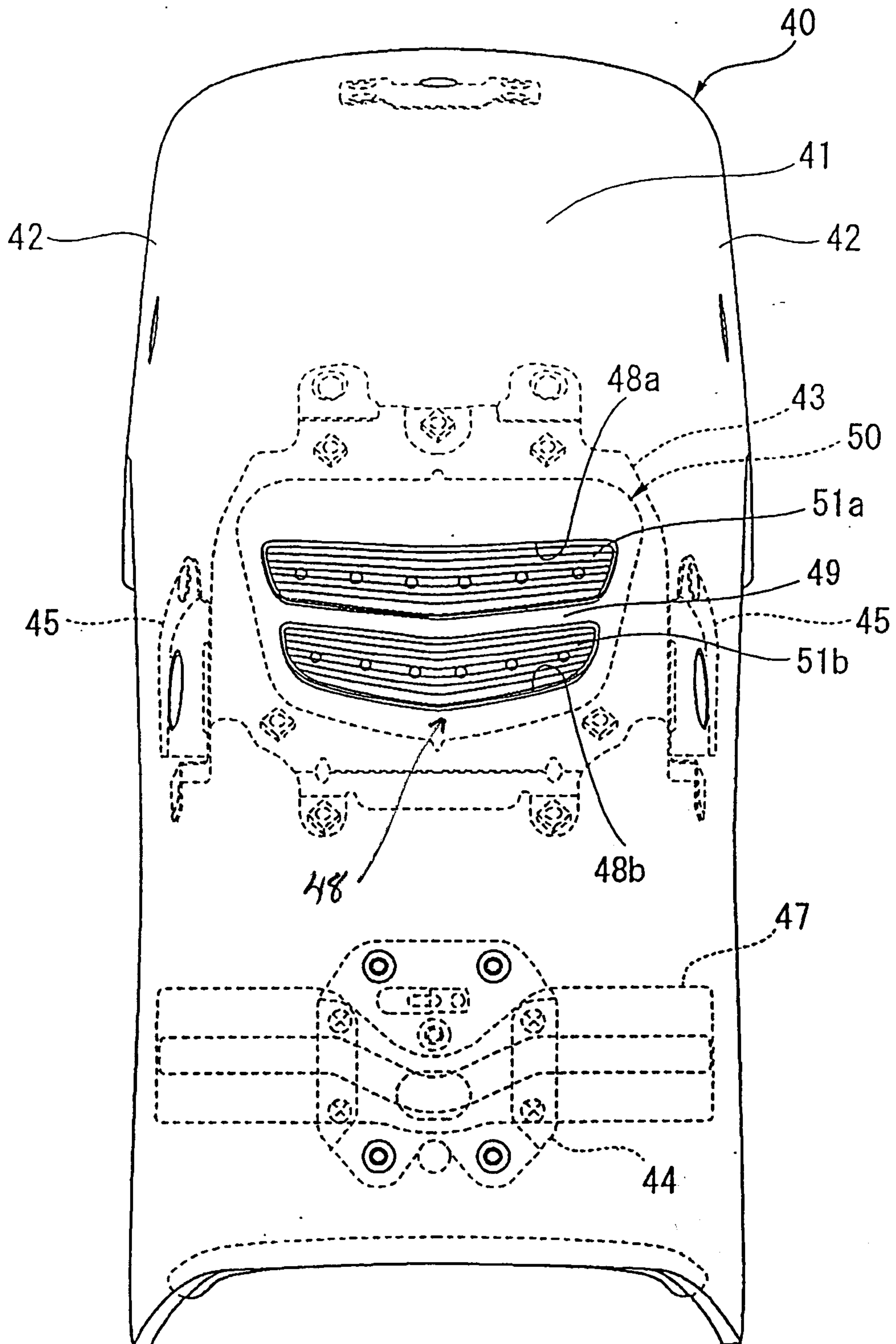
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9. The rear lamp unit for a vehicle according to claim 8, wherein the cuts of said outer lens extend substantially in a horizontal direction and the cuts of said inner lens extend substantially in a perpendicular direction.
10. The rear lamp unit for a vehicle according to claim 8 or 9, wherein said plurality of said light-emitting diodes are arranged substantially in a series of horizontally extending rows.
11. The rear lamp unit for a vehicle according to claim 8, 9 or 10, wherein said outer lens is a colored transparent member and the inner lens is a colorless transparent member and said inner lens is disposed in the vicinity of said illuminating means.

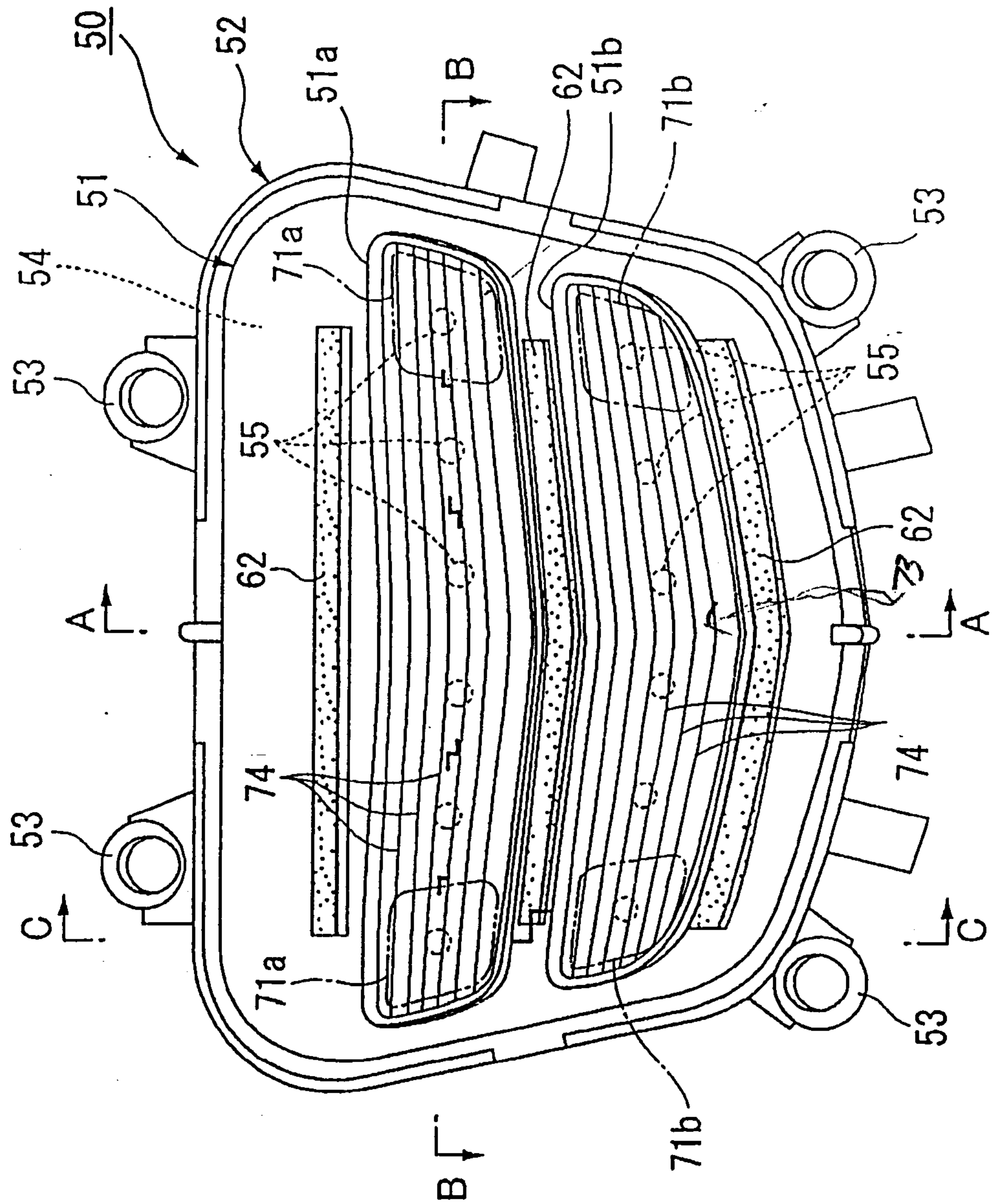
[Fig.2]



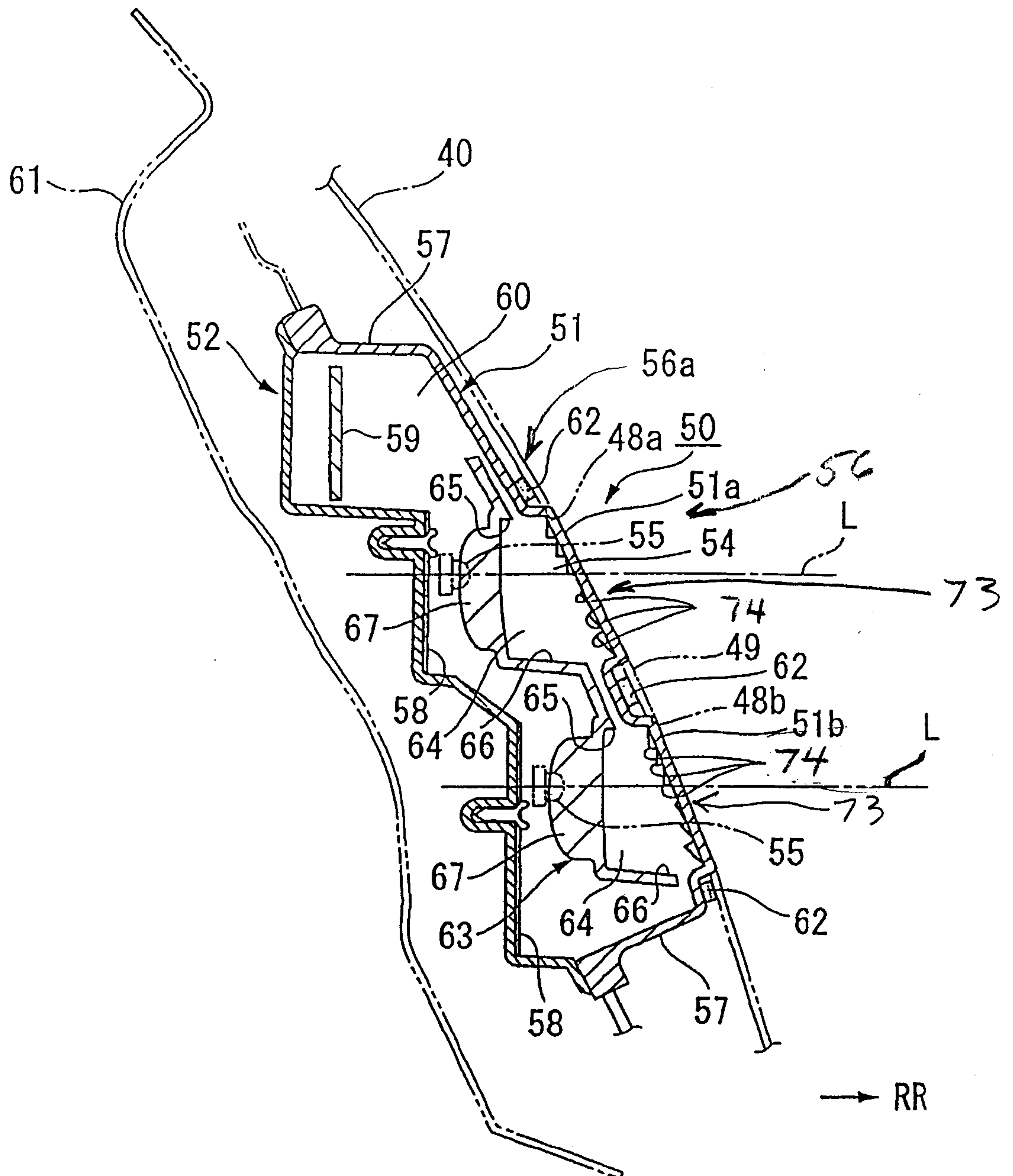
[Fig.3]



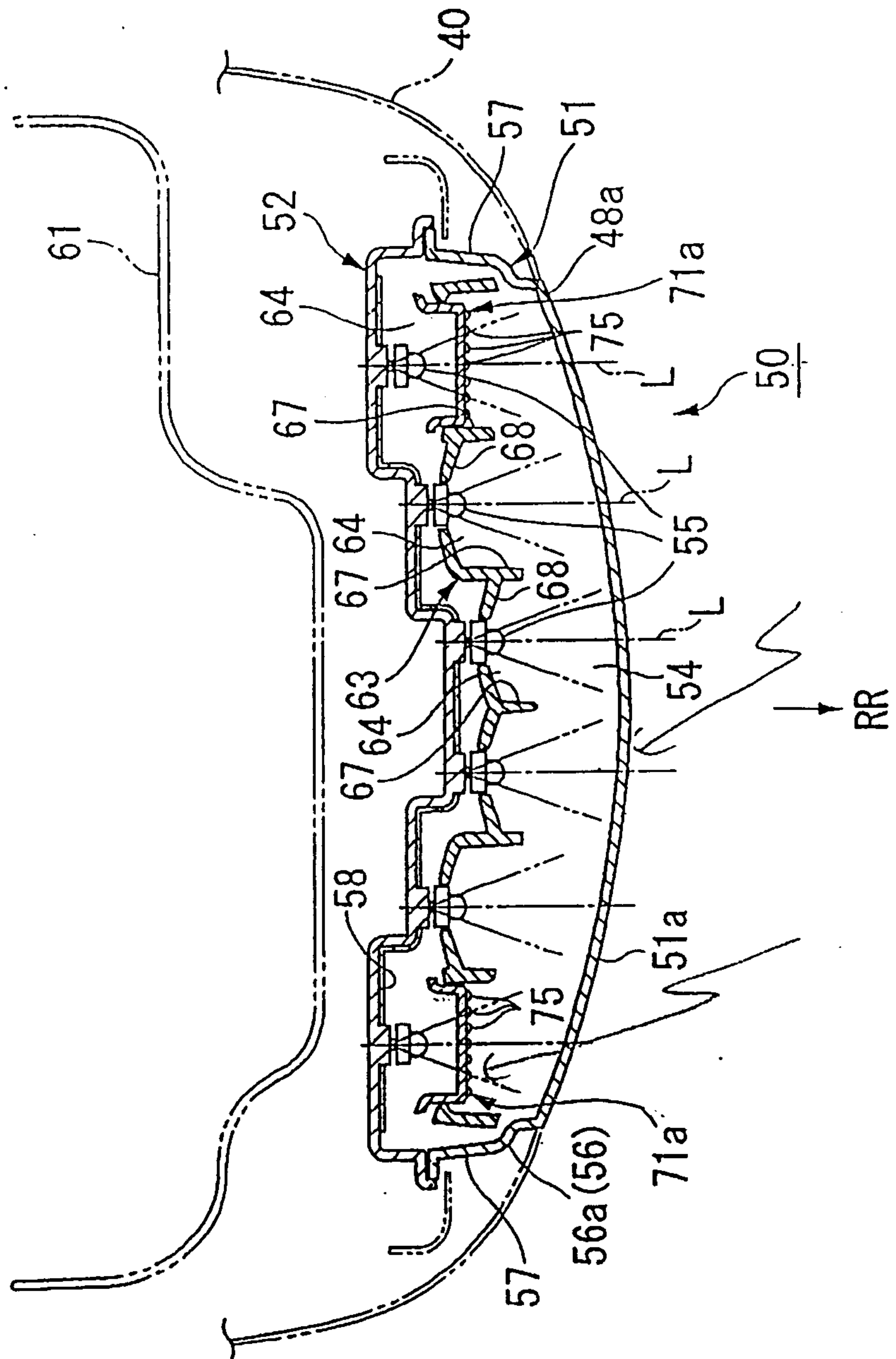
[Fig. 4]



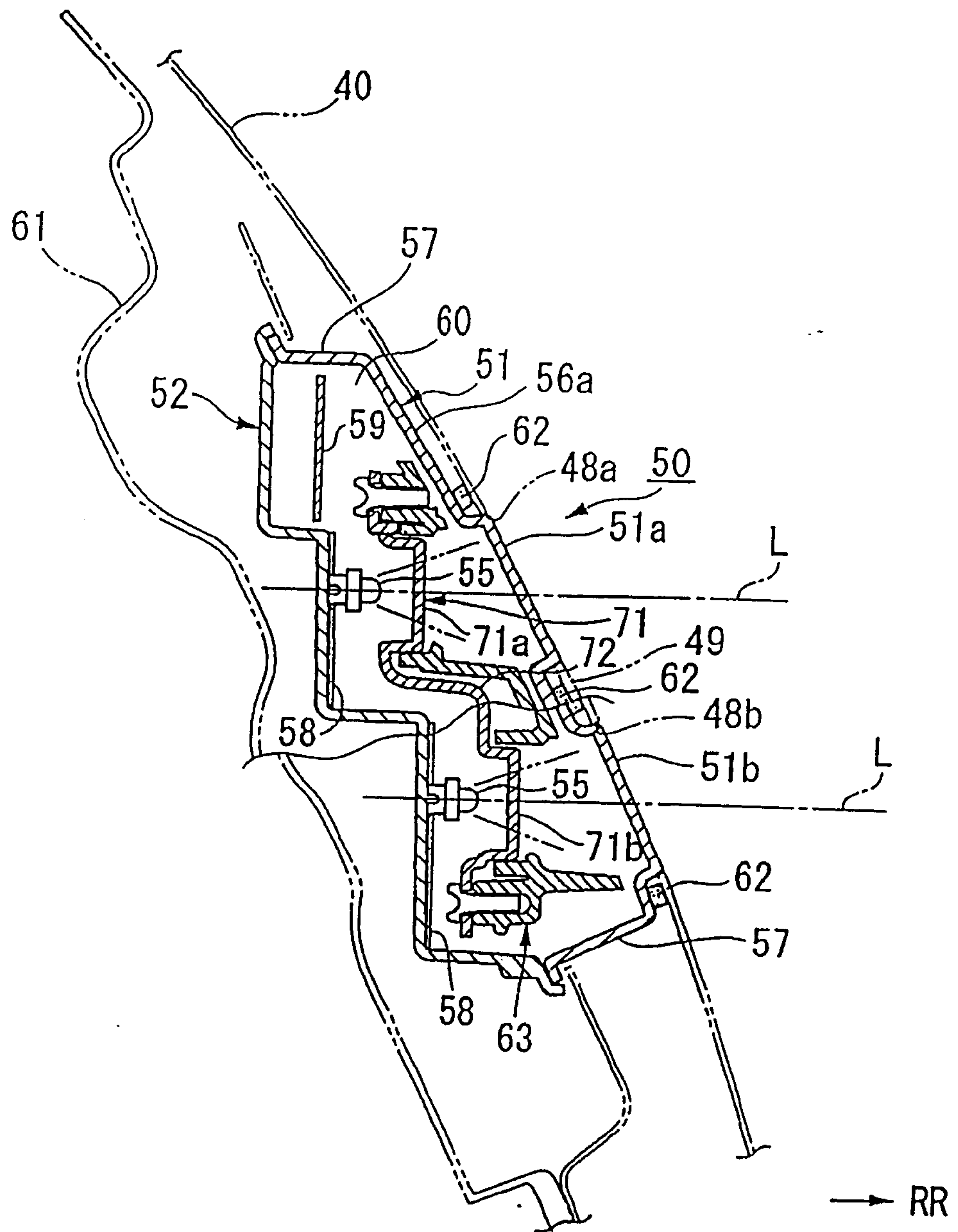
[Fig. 5]



[Fig.6]



[Fig.7]



[Fig. 8]

