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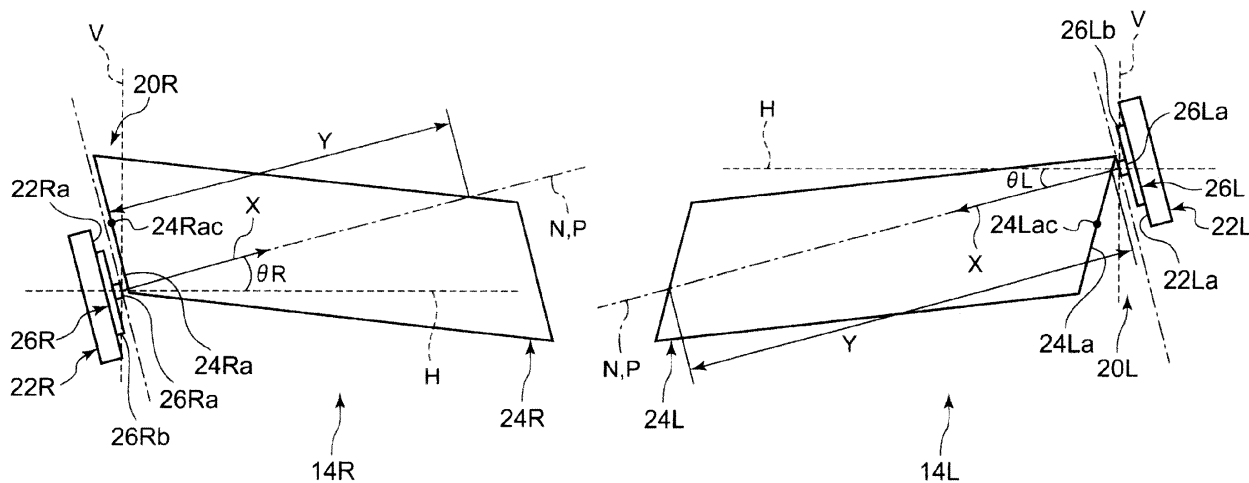
(54) **Optical unit and vehicular lamp**

(57) To provide art for forming a clear oblique cut-off line while reducing restrictions on the shape of a parabolic optical system reflector and preventing an increase of the size of the reflector.

A vehicular lamp includes light emitting elements 26Ra, 26La and parabolic optical system reflectors 24R, 24L, and forms a light distribution pattern including an oblique cut-off line. The parabolic optical system reflectors 24R, 24L have generally rectangular shapes when viewed from the front of the lamp, and the light emitting elements 26Ra, 26La (i) are arranged in the vicinities of

sides 24Ra, 24La of the generally rectangular shapes, and arranged such that normals N to light emitting surfaces of the light emitting elements 26Ra, 26La are inclined with respect to horizontal lines H so that the oblique cut-off line is formed by lights radiated from the light emitting surfaces in the directions of the normals to the light emitting surfaces and reflected by the parabolic optical system reflectors 24R, 24L, and (ii) are offset from the centers 24Ra, 24La of the sides 24Ra, 24La in the directions opposite to the directions in which rays X extending in the directions of the normals to the light emitting surfaces are inclined with respect to the horizontal lines H.

FIG. 3



Description

[0001] The present invention relates to an optical unit and a vehicular lamp provided with the optical unit.

[0002] Patent Documents 1 and 2 describe vehicular lamps for forming a low beam distribution pattern including an oblique cut-off line. These vehicular lamps are so-called parabolic vehicular lamps that include light emitting elements and parabolic optical system reflectors that reflect lights from the light emitting elements to the front of the lamps.

[0003]

[Patent Document 1] Japanese Patent Application Laid-Open (Kokai) No. 2008-226707

[Patent Document 2] Japanese Patent Application Laid-Open (Kokai) No. 2008-226706

[0004] A vehicular lamp used as a vehicular headlamp includes a left lamp arranged on the left side of a vehicle and a right lamp arranged on the right side of the vehicle. The left lamp and the right lamp are normally designed such that the shapes of parabolic optical system reflectors thereof are symmetrical to each other, and the positions of light emitting elements thereof with respect to the parabolic optical system reflectors as well as the orientations of light emitting surfaces of the light emitting elements are also symmetrical to each other.

[0005] Therefore, depending on the shapes of the parabolic optical system reflectors, in at least one of the left lamp and the right lamp, an overlap between the parabolic optical system reflector and an imaginary line, which passes through the light emitting surface of the light emitting element and extends at an angle corresponding to an inclination angle of an oblique cut-off line, may be short when viewed from the front of the lamps. If the overlap is short, it is difficult to form a clear oblique cut-off line. Therefore, a lamp structure that makes it possible to ensure a length of the overlap is required. Accordingly, in a conventional vehicular lamp, in order to ensure a length of the overlap in each of the left and right lamps, it is necessary to restrict the shapes of the parabolic optical system reflectors or to increase the size of the parabolic optical system reflectors. For example, in the case where the parabolic optical system reflectors have the generally rectangular shapes when viewed from the front of the lamps, the overlaps tend to be short. Accordingly, it is necessary to take measures such as increasing the size of the reflectors.

[0006] The present invention was made in light of the above-described situations, and the object of the present invention is to provide art for forming a clear oblique cut-off line while reducing restrictions on the shape of a parabolic optical system reflector and preventing an increase in the size of the reflector.

[0007] To solve the problem described above, an aspect of the present invention provides a vehicular lamp which includes a light emitting element and a parabolic

optical system reflector that reflects light from the light emitting element to a front of the lamp and which forms a light distribution pattern including an oblique cut-off line, **characterized in that:** the parabolic optical system reflector has a generally rectangular shape when viewed from the front of the lamp; and the light emitting element (i) is arranged in a vicinity of a side of the generally rectangular shape, and arranged such that a normal to a light emitting surface of the light emitting element is inclined with respect to a horizontal line so that the oblique cut-off line is formed by light which is radiated from the light emitting surface in a direction of the normal to the light emitting surface and reflected by the parabolic optical system reflector, and (ii) is positioned with respect to the parabolic optical system reflector so as to be offset from a center of the side in a direction opposite to a direction in which a ray extending in the direction of the normal to the light emitting surface is inclined with respect to the horizontal line.

[0008] According to this aspect, compared to a conventional structure in which the positions of the light emitting elements are symmetrical to each other and the orientations of the light emitting surfaces are also symmetrical to each other, it is possible to increase the length of an overlap between the parabolic optical system reflector and the normal to the light emitting surface when viewed from the front of the lamp, without increasing the size of the parabolic reflector, even if the parabolic optical system reflector has the generally rectangular shape when viewed from the front of the lamp. Therefore, it is possible to form a clear oblique cut-off line while reducing restrictions on the shape of the parabola optical reflector and preventing the increase in the size of the reflector.

[0009] In the aspect described above, the vehicular lamp may include a first lamp unit and a second lamp unit that are respectively arranged on right and left sides of a vehicle in a vehicle width direction, the first lamp unit and the second lamp unit each including the light emitting element and the parabolic optical system reflector. The shapes of the parabolic optical system reflectors of the first and second lamp units may be generally symmetrical to each other; and positions of the light emitting elements of the first and second lamp units with respect to the parabolic optical system reflectors in the vehicle width direction may be generally symmetrical to each other, and positions of the light emitting elements of the first and second lamp units with respect to the parabolic optical system reflectors in an up-down direction may be reversed. According to this aspect as well, it is possible to form a clear oblique cut-off line while reducing restrictions on the shape of the parabolic optical system reflector and preventing the increase in the size of the reflector.

[0010] In the aspect described above, a direction of light radiated from the light emitting element of the first lamp unit to the parabolic optical system reflector of the first lamp unit is a direction from one end side toward the other end side of the oblique cut-off line; and a direction of light radiated from the light emitting element of the

second lamp unit toward the parabolic optical system reflector of the second lamp unit is a direction from the other end side toward the one end side of the oblique cut-off line. According to this aspect, it is possible to form an oblique cut-off line CL2 that is entirely clear from the one end side to the other end side thereof.

[0011] Another aspect of the present invention provides an optical unit which includes a light emitting element mounting portion and a parabolic optical system reflector that reflects light from a light emitting element fixed on the light emitting element mounting portion to a front of the optical unit, and which is used in a vehicular lamp that forms a light distribution pattern including an oblique cut-off line, **characterized in that:** the parabolic optical system reflector has a generally rectangular shape when viewed from the front of the optical unit; and the light emitting element mounting portion (i) is arranged in a vicinity of a side of the generally rectangular shape, and arranged such that a normal to an element mounting surface is inclined with respect to a horizontal line so that the oblique cut-off line is formed by light which is radiated from a light emitting surface of the light emitting element fixed on the light emitting element mounting portion in a direction of a normal to the light emitting surface and reflected by the parabolic optical system reflector, and (ii) is positioned with respect to the parabolic optical system reflector so as to be offset from a center of the side in a direction opposite to a direction in which a portion of the normal to the element mounting surface, the portion extending from the element mounting surface to a light radiation direction side of the light emitting element, is inclined with respect to the horizontal line.

[0012] According to this aspect as well, it is possible to form a clear oblique cut-off line while reducing restrictions on the shape of the parabolic optical system reflector and preventing the increase in the size of the reflector.

[0013] According to the present invention, it is possible to provide art for forming a clear oblique cut-off line while reducing restrictions on the shape of a parabolic optical system reflector and preventing the increase in the size of the reflector.

[0014]

[FIG 1] FIG 1 is a schematic front view of a vehicular lamp according to a first embodiment.

[FIG 2] FIG 2 is a schematic view of a light distribution pattern formed by an optical unit according to the first embodiment.

[FIG 3] FIG 3 is a schematic front view of an oblique cut portion forming unit of the vehicular lamp according to the first embodiment.

[FIG 4] FIG 4 is a schematic front view of an oblique cut portion forming unit of a vehicular lamp according to a comparative example.

[0015] Hereinafter, the present invention will be described based on preferred embodiments and with reference to the accompanying drawings. Like reference

numerals are used for like or corresponding structural elements, members, and processes shown in the drawings, and duplicate descriptions are omitted as appropriate. The embodiments do not intend to limit the invention, but exemplify the invention. All of the features and the combinations thereof described in the embodiments are not necessarily essential to the invention.

(First Embodiment)

[0016] FIG 1 is a front schematic view of a vehicular lamp according to a first embodiment. As shown in FIG. 1, a vehicular lamp 1 according to the embodiment is a vehicular headlamp apparatus that includes a pair of headlamp units 1L, 1R. The headlamp units 1L, 1R are, respectively, arranged on the left and right sides in a vehicle width direction in the front of a vehicle. The headlamp unit 1R is arranged on the right-hand portion of the vehicle front, and the headlamp unit 1L is arranged on the left-hand portion of the vehicle front. In the vehicular lamp 1, each of the headlamp unit 1R and the headlamp unit 1L includes a lamp body 2 that has an opening portion on a vehicle front side and a translucent cover 4 that is attached so as to cover the opening portion of the lamp body 2. The translucent cover 4 is made of translucent resin or glass. A lamp chamber 3 is formed by the lamp body 2 and the translucent cover 4, and the lamp chamber 3 accommodates a low beam lamp unit 10 for forming a low beam distribution pattern. The low beam lamp unit 10 includes a horizontal cut portion forming unit 12, an oblique cut portion forming unit 14, and a wide diffusion portion forming unit 16. The lamp chamber 3 also accommodates lamp units 50, 52, 54 that form a high beam lamp unit, additional light distribution pattern forming units, turn signal lamp units, or the like.

[0017] FIG 2 is a schematic view of a light distribution pattern formed by the vehicular lamp according to the first embodiment. It should be noted that FIG. 2 shows the light distribution pattern formed on a virtual vertical screen which is set at a predetermined position ahead of the lamp, for example, at a position 25 meters ahead of the lamp.

[0018] A low beam distribution pattern PL shown in FIG 2 is formed by the low beam lamp unit 10 of the vehicular lamp 1 according to the first embodiment. Specifically, the horizontal cut portion forming unit 12 of the low beam lamp unit 10 forms a horizontal cut portion Lo1, the oblique cut portion forming unit 14 forms an oblique cut portion Lo2 (a light distribution pattern including an oblique cut-off line), and the wide diffusion portion forming unit 16 forms a wide diffusion portion Lo3. The horizontal cut portion Lo1, the oblique cut portion Lo2, and the wide diffusion portion Lo3 are combined to form the low beam distribution pattern PL.

[0019] The low beam distribution pattern PL is a light distribution pattern designed so as not to give glare to other vehicles and pedestrians in an area ahead of the host vehicle when the host vehicle is traveling on the left

side of a road. The horizontal cut portion Lo1 is a generally oblong light distribution pattern that extends in a predetermined region in the vehicle width direction, which is below a horizontal line H and which includes a center portion in the vehicle width direction. A portion of an upper side of the horizontal cut portion Lo1 forms a horizontal cut-off line CL1. The horizontal cut-off line CL1 extends in a horizontal direction, on the right side of a vertical line V. The oblique cut portion Lo2 is a generally oblong light distribution pattern that has a major portion which is located on the left side of the vertical line V and which extends obliquely upward to the left from below the horizontal line H. One side of the oblique cut portion Lo2 forms an oblique cut-off line CL2. The oblique cut-off line CL2 extends at an inclination angle of 15 degrees obliquely upward to the left from the vicinity of an intersection between the horizontal cut-off line CL1 and the vertical line V. The wide diffusion portion Lo3 is a generally oblong light distribution pattern that is located below the horizontal line H and diffuses more outward in the vehicle width direction than the horizontal cut portion Lo1 and the oblique cut portion Lo2.

[0020] Next, the oblique cut portion forming units 14 of the vehicular lamp 1 according to the embodiment will be described in detail. FIG. 3 is a schematic front view of the oblique cut portion forming unit of the vehicular lamp according to the first embodiment. FIG 4 is a schematic front view of an oblique cut portion forming unit of a vehicular lamp according to a comparative example. It should be noted that light emitting element mounting portions are not shown in FIG 4. In the following description, the oblique cut portion forming unit 14 provided in the headlamp unit 1R is referred to as an oblique cut portion forming unit 14R (a first lamp unit), and the oblique cut portion forming unit 14 provided in the headlamp unit 1L is referred to as an oblique cut portion forming unit 14L (a second lamp unit), as appropriate.

[0021] As shown in FIG 3, the oblique cut portion forming unit 14R includes a so-called parabolic optical unit 20R and a light source module 26R. In addition, the oblique cut portion forming unit 14L includes a so-called parabolic optical unit 20L and a light source module 26L. The optical unit 20R includes a light emitting element mounting portion 22R and a parabolic optical system reflector 24R. The light source module 26R is fixed on the light emitting element mounting portion 22R of the optical unit 20R. The optical unit 20L includes a light emitting element mounting portion 22L and a parabolic optical system reflector 24L. The light source module 26L is fixed on the light emitting element mounting portion 22L of the optical unit 20L.

[0022] The light emitting element mounting portions 22R, 22L are each connected to a heat sink (not shown) such that element mounting surfaces 22Ra, 22La thereof, on which the light source modules 26R, 26L are, respectively, fixed, face inward generally in the vehicle width direction. The heat sink is fixed to the lamp body 2 via an aiming screw and a leveling shaft (both are not

shown). It should be noted that a structure for attaching the oblique cut portion forming unit 14 to the lamp body 2 is well known and will be not be described in detail.

[0023] The light source modules 26R, 26L are, for example, light emitting diodes (LEDs), and include light emitting elements 26Ra, 26La and substrates 26Rb, 26Lb that support the light emitting element 26Ra, 26La, respectively. The substrates 26Rb, 26Lb are thermal conductive insulating substrates made of ceramic or the like. On the substrates 26Rb, 26Lb are formed electrodes (not shown) that transfer the power to the light emitting elements 26Ra, 26La. The light source modules 26R, 26L are fixed on the element mounting surfaces 22Ra, 22La of the light emitting element mounting portions 22R, 22L, and, in this state, light emitting surfaces of the light emitting elements 26Ra, 26La are parallel to the element mounting surfaces 22Ra, 22La, respectively. It should be noted that the light emitting surfaces of the light emitting elements 26Ra, 26La have generally rectangular shapes, and the light emitting elements 26Ra, 26La are arranged such that the longitudinal directions of the light emitting surfaces extend in the directions of the optical axes of the oblique cut portion forming units 14R, 14L.

[0024] The parabolic optical system reflectors 24R, 24L are reflective members for reflecting lights from the light emitting elements 26Ra, 26La to the front of the lamps. The parabolic optical system reflectors 24R, 24L have reflective surfaces that use, as reference planes, portions of paraboloids of revolution whose focal points are in the vicinities of the light emitting elements 26Ra, 26La, respectively. One ends of the parabolic optical system reflectors 24R, 24L are each fixed to the heat sink. The parabolic optical system reflectors 24R, 24L have generally rectangular shapes when viewed from the front of the lamps. In the embodiment, the parabolic optical system reflectors 24R, 24L have generally parallelogram shapes that are long in the horizontal direction when viewed from the front of the lamps, and have sides 24Ra, 24La that are the outermost ends thereof in the vehicle width direction. The sides 24Ra, 24La extend generally in the vertical direction and are inclined so as to extend outward in the vehicle width direction from the lower side to the upper side. The shapes of the parabolic optical system reflector 24R and the parabolic optical system reflector 24L are generally symmetrical to each other.

[0025] Lights radiated from the light emitting elements 26Ra, 26La mounted on the light emitting element mounting portions 22R, 22L are reflected from the reflective surfaces of the parabolic optical system reflectors 24R, 24L to the front of the lamps, and the oblique cut portion Lo2 having the oblique cut-off line CL2 is formed by the lights reflected to the front of the lamps.

[0026] The light emitting element mounting portions 22R, 22L are arranged in the vicinities of the sides 24Ra, 24La of the generally rectangular shapes of the parabolic optical system reflectors 24R, 24L such that the element mounting surfaces 22Ra, 22La, respectively, face the reflective surface sides of the parabolic optical system re-

flectors 24R, 24L when viewed from the front of the lamps. In the embodiment, the light emitting element mounting portions 22R, 22L are arranged such that the element mounting surfaces 22Ra, 22La face the sides 24Ra, 24La, respectively. Normals N to the element mounting surfaces 22Ra, 22La of the light emitting element mounting portions 22R, 22L are inclined with respect to horizontal lines H such that the oblique cut-off line CL2 is formed by the lights radiated from the light emitting surfaces of the light emitting elements 26Ra, 26La in directions of the normals to the light emitting surfaces and reflected by the parabolic optical system reflectors 24R, 24L. Therefore, the light emitting elements 26Ra, 26La fixed to the light emitting element mounting portion 22R are arranged in the vicinities of the sides 24Ra, 24La such that the light emitting surfaces of the light emitting elements 26Ra, 26La, respectively, face the reflective surface sides of the parabolic optical system reflectors 24R, 24L when viewed from the front of the lamps, and normals N to the light emitting surfaces are inclined with respect to the horizontal lines H such that the oblique cut-off line CL2 is formed by lights radiated in the directions of the normals to the light emitting surfaces and reflected by the parabolic optical system reflectors 24R, 24L.

[0027] Specifically, the light emitting element 26Ra of the oblique cut portion forming unit 14R is arranged in the vicinity of the side 24Ra, which is the outermost end in the vehicle width direction, such that the light emitting surface faces inward in the vehicle width direction. The light emitting element 26Ra is inclined such that the light emitting surface faces obliquely upward, that is, such that a portion of the normal N, which extends from the light emitting surface to the light radiating direction side, is inclined upward with respect to the horizontal line H. Meanwhile, the light emitting element 26La of the oblique cut portion forming unit 14L is arranged in the vicinity of the side 24La, which is the outermost end in the vehicle width direction, such that the light emitting surface faces inward in the vehicle width direction. The light emitting element 26La is inclined such that the light emitting surface faces obliquely downward, that is, such that a portion of the normal N, which extends from the light emitting surface to the light radiating direction side, is inclined downward with respect to the horizontal line H. In the embodiment, the normals N to the element mounting surfaces 22Ra, 22La and the normals N to the light emitting surfaces of the light emitting elements 26Ra, 26La coincide with (are parallel to) imaginary lines P passing through the light emitting surfaces and extending parallel to the oblique cut-off line CL2. That is, the element mounting surfaces 22Ra, 22La and the light emitting elements 26Ra, 26La are inclined such that angles θ_R , θ_L , which are formed between the normals N and the horizontal lines H, are equal to 15 degrees that is the inclination angle of the oblique cut-off line CL2. The angles θ_R , θ_L , which are formed between the normals N to the light emitting surfaces and the horizontal lines H, are preferably

set to be within a range from 7.5 to 22.5 degrees.

[0028] In addition, the light emitting element mounting portions 22R, 22L are positioned with respect to the parabolic optical system reflectors 24R, 24L so as to be offset from the centers 24Rac, 24Lac of the sides 24Ra, 24La in the directions opposite to the directions in which the portions of the normals N to the element mounting surfaces 22Ra, 22La, which extend from the element mounting surfaces 22Ra, 22La in the directions to the light radiating direction side of the light emitting elements 26Ra, 26La, are inclined with respect to the horizontal lines H. Therefore, the light emitting elements 26Ra, 26La are offset from the centers 24Rac, 24Lac of the sides 24Ra, 24La in the directions opposite to the directions in which rays X extending in the directions of the normals to the light emitting surfaces are inclined with respect to the horizontal lines H. Specifically, the ray X extending in the direction of the normal to the light emitting surface of the light emitting element 26Ra is inclined upward with respect to the horizontal line H, and therefore, the light emitting element 26Ra is offset along the side 24Ra downward from the center 24Rac of the side 24Ra. Meanwhile, the ray X extending in the direction of the normal to the light emitting surface of the light emitting element 26La is inclined downward with respect to the horizontal line H, and therefore, the light emitting element 26La is offset along the side 24La upward from the center 24Lac of the side 24La.

[0029] Therefore, the position of the light emitting element 26Ra of the oblique cut portion forming unit 14R with respect to the parabolic optical system reflector 24R and the position of the light emitting element 26La of the oblique cut portion forming unit 14L with respect to the parabolic optical system reflector 24L in the vehicle width direction are generally symmetrical to each other, and the position of the light emitting element 26Ra with respect to the parabolic optical system reflector 24R and the position of the light emitting element 26La with respect to the parabolic optical system 24L in the up-down direction are reversed. It should be noted that the light emitting element mounting portions 22R, 22L and the light emitting elements 26Ra, 26La are arranged such that at least the centers of the light emitting surfaces are offset from the centers 24Rac and 24Lac.

[0030] One of the light emitting surfaces of the light emitting element 26Ra and the light emitting element 26La is inclined with respect to a corresponding one of the side 24Ra and the side 24La, or both the light emitting surfaces of the light emitting element 26Ra and the light emitting element 26La are inclined with respect to the side 24Ra and the side 24La, respectively. In the embodiment, the light emitting surface of the light emitting element 26Ra is inclined so as to face obliquely upward as described above. In addition, the side 24Ra of the parabolic optical system reflector 24R is inclined outward in the vehicle width direction from the lower side to the upper side. An inclination angle of the side 24Ra with respect to the vertical line is substantially the same as

the inclination angle θ_R of the normal N to the light emitting surface with respect to the horizontal line H. Therefore, the light emitting surface of the light emitting element 26Ra and the side 24Ra are generally parallel to each other. On the other hand, the light emitting element 26La is inclined such that the light emitting surface thereof faces obliquely downward. In addition, the shapes of the parabolic optical system reflector 24L and the parabolic optical system reflector 24R are symmetrical to each other, and the side 24La is inclined so as to extend outward in the vehicle width direction from the lower side to the upper side. Therefore, the light emitting surface of the light emitting element 26La is inclined with respect to the side 24La. In the case where the sides 24Ra, 24La extend in the vertical direction, the light emitting surfaces of the light emitting element 26Ra and the light emitting element 26La are inclined with respect to the sides 24Ra, 24La, respectively.

[0031] As shown in FIG 4, oblique cut portion forming units 114R, 114L of a vehicular lamp according to a comparative example, respectively, include parabolic optical system reflectors 124R, 124L having the same shapes as the oblique cut portion forming units 14R, 14L according to the embodiment. In the oblique cut portion forming units 114R, 114L according to the comparative example, the positions of the light emitting element 126Ra, 126La in the vehicle width direction are symmetrical to each other, and the positions of the light emitting element 126Ra, 126La in the up-down direction are also symmetrical to each other. Specifically, the light emitting element 126Ra is provided at a center 124Rac of a side 124Ra, which is the outermost end of the parabolic optical system reflector 124R in the vehicle width direction, such that a light emitting surface of the light emitting element 126Ra faces obliquely upward. In addition, the light emitting element 126La is provided at a center 124Lac of a side 124La, which is the outermost end of the parabolic optical system reflector 124L in the vehicle width direction, such that the light emitting surface of the light emitting element 126La faces obliquely upward. The light emitting surface of the light emitting element 126Ra extends parallel to the side 124Ra, and the light emitting surface of the light emitting element 126La extends parallel to the side 124La.

[0032] Therefore, in the oblique cut portion forming unit 114R, a normal N to the light emitting surface of the light emitting element 126Ra coincides with an imaginary line P which passes through the light emitting surface and extends parallel to the oblique cut-off line CL2. However, a length Y of an overlap between the imaginary line P and the parabolic optical system reflector 124R when viewed from the front of the lamp is extremely shorter than that in the oblique cut portion forming unit 114L. On the other hand, in the oblique cut portion forming unit 114L, a length Y of an overlap between an imaginary line P and the parabolic optical system reflector 124L when viewed from the front of the lamp is longer than that in the oblique cut portion forming unit 114R. However, a

normal N to the light emitting surface of the light emitting element 126La does not coincide with the imaginary line P. The light emitting element 126La of the oblique cut portion forming unit 114L is inclined but not in such a manner that the oblique cut-off line CL2 is formed by light which is radiated in the direction of the normal to the light emitting surface and reflected by the parabolic optical system reflector 124L.

[0033] On the other hand, in the vehicular lamp 1 according to the embodiment, the normals N to the light emitting surfaces of the light emitting elements 26Ra, 26La are inclined with respect to the horizontal lines H such that the oblique cut-off line CL2 is formed by the lights radiated in the directions of the normals to the light emitting surfaces. Therefore, both the oblique cut portion forming unit 14R and the oblique cut portion forming unit 14L can form the oblique cut-off line CL2 using the lights radiated in the directions of the normals to the light emitting surfaces. Here, a light emitting element has an orientation characteristic that the luminous intensity is normally highest in the direction of the normal to a light emitting surface thereof. Therefore, the oblique cut portion forming unit 14L according to the embodiment can form an oblique cut-off line CL2 that is clearer than that formed by the oblique cut portion forming unit 114L according to the comparative example. In addition, it is possible to increase the utilization factor of the luminous flux of the light radiated by the light emitting element 26La.

[0034] In addition, the light emitting elements 26Ra, 26La are arranged so as to be offset from the centers 24Rac, 24Lac of the sides 24Ra, 24La in the directions opposite to the directions in which the rays X extending in the directions of the normals to the light emitting surfaces are inclined with respect to the horizontal lines H. That is, the light emitting elements 26Ra, 26La are offset from the centers 24Rac, 24Lac in such directions that the overlaps between the parabolic optical system reflectors 24R, 24L and the normals N to the light emitting surfaces when viewed from the front of the lamps increase. In addition, the light emitting elements 26Ra, 26La are offset from the centers 24Rac, 24Lac such that the normals N to the light emitting surfaces approach diagonals of the generally rectangular shapes of the parabolic optical system reflectors 24R, 24L. Thus, compared to the comparative example, it is possible to increase the lengths Y of the overlaps between the oblique cut portion forming units 14R, 14L and the imaginary lines P, which pass through the light emitting surfaces of the light emitting elements 26Ra, 26La and extend parallel to the oblique cut-off line CL2, when viewed from the front of the lamps. In particular, the length Y of the overlap in the oblique cut portion forming unit 14R according to the embodiment can be made longer than the length Y of the overlap in the oblique cut portion forming unit 114R according to the comparative example. Therefore, according to the embodiment, it is possible to form an oblique cut-off line CL2 that is clearer than that in the comparative example.

[0035] In the embodiment, the light radiation direction of the oblique cut portion forming unit 14R from the light emitting element 26Ra to the parabolic optical system reflector 24R, that is, the light radiation direction of the light emitting element 26Ra is a direction from one end side toward the other end side of the oblique cut-off line CL2. Specifically, the light radiation direction of the light emitting element 26Ra is a direction obliquely upward to the left from the vicinity of the intersection between the horizontal cut-off line CL 1 and the vertical line V. On the other hand, the light radiation direction of the oblique cut portion forming unit 14L from the light emitting element 26La to the parabolic optical system reflector 24L, that is, the light radiation direction of the light emitting element 26La is a direction from the other end side toward the one end side of the oblique cut-off line CL2. Specifically, it is a direction from an obliquely upper left side to the vicinity of the intersection between the horizontal cut-off line CL 1 and the vertical line V.

[0036] Here, the luminous intensity of light radiated from a light emitting element normally decreases as the light advances from a light emitting surface thereof. Therefore, the one end side of the oblique cut-off line CL2 formed by the oblique cut portion forming unit 14R is clearer than the other end side thereof. In addition, the other end side of the oblique cut-off line CL2 formed by the oblique cut portion forming unit 14L is clearer than the one end side thereof. The oblique cut-off line CL2 formed by the oblique cut portion forming unit 14R and the oblique cut-off line CL2 formed by the oblique cut portion forming unit 14L are combined to form the oblique cut-off line CL2 that is entirely clear from the one end side to the other end side thereof.

[0037] As explained above, in the vehicular lamp 1 according to the embodiment, the parabolic optical system reflectors 24R, 24L have generally rectangular shapes when viewed from the front of the lamps. The light emitting elements 26Ra, 26La (i) are arranged in the vicinities of the sides 24Ra, 24La of the generally rectangular shapes such that the normals N to the light emitting surfaces thereof are inclined with respect to the horizontal lines H so that the oblique cut-off line CL2 is formed by the lights radiated from the light emitting surfaces in direction of the normals to the light emitting surfaces and reflected by the parabolic optical system reflectors 24R, 24L, and (ii) are offset from the centers 24Rac and 24Lac of the sides 24Ra, 24La in the directions opposite to the directions in which the rays extending in the directions of the normals to the light emitting surfaces are inclined with respect to the horizontal lines H.

[0038] In addition, in the optical units 20R and 20L according to the embodiment, the parabolic optical system reflectors 24R, 24L have the generally rectangular shapes when viewed from the front of the units. The light emitting element mounting portions 22R, 22L (i) are arranged in the vicinities of the sides 24Ra, 24La of the generally rectangular shapes such that the normals N to the element mounting surfaces 22Ra, 22La are inclined

with the respect to the horizontal lines H so that the oblique cut-off line CL2 is formed by the lights radiated from the light emitting surfaces of the light emitting elements 26Ra, 26La in the directions of the normals to the light emitting surfaces of the light emitting elements 26Ra, 26La and reflected by the parabolic optical system reflectors 24R, 24L, and (ii) are offset from the centers 24Rac, 24Lac of the sides 24Ra, 24La in the directions opposite to the directions in which portions of the normals N to the element mounting surfaces 22Ra, 22La, which extend from the element mounting surfaces 22Ra, 22La to the light radiation direction side of the light emitting elements 26Ra, 26La, are inclined with respect to the horizontal lines H.

[0039] Thus, compared to a conventional structure in which the positions of the light emitting elements 126Ra, 126La are symmetrical to each other, and the orientations of the light emitting surfaces are also symmetrical to each other, it is possible to increase the utilization amount of high intensity lights advancing in the directions of the normals to the light emitting surfaces when the oblique cut-off line CL2 is formed. Also, compared to the conventional structure, it is possible to increase the lengths Y of the overlaps between the parabolic optical system reflectors 24R, 24L and the normals N to the light emitting surfaces when viewed from the front of the lamps, without increasing the size of the parabolic optical system reflectors 24R, 24L, even if the parabolic optical system reflectors 24R, 24L have the generally rectangular shapes when viewed from the front of the lamps. Therefore, it is possible to form the clear oblique cut-off line CL2 while reducing restrictions on the shape of a parabolic reflector and preventing increase in the size of a parabolic optical system reflector.

[0040] The present invention is not limited to the embodiment described above, and various modifications such as design changes based on the knowledge of persons having ordinary skill in the art may be added to the embodiment, and embodiments with such added modifications are also included in the scope of the present invention. The embodiments with such added modifications have the same effects as those of the combined embodiments and the modifications.

[0041]

1	VEHICULAR LAMP
20R, 20L	OPTICAL UNITS
22R, 22L	LIGHT EMITTING ELEMENT MOUNTING PORTIONS
22Ra, 22La	ELEMENT MOUNTING SURFACES
24R, 24L	PARABOLIC OPTICAL SYSTEM REFLECTORS
24Ra, 24La	SIDES
24Rac, 24Lac	CENTERS
26Ra, 26La	LIGHT EMITTING ELEMENTS
CL2	OBLIQUE CUT-OFF LINE
H	HORIZONTAL LINE
N	NORMAL

X

RAY

are generally symmetrical to each other.

Claims

1. A vehicular lamp (1) which includes a light emitting element (26Ra, 26La) and a parabolic optical system reflector (24R, 24L) that reflects light from the light emitting element (26Ra, 26La) to a front of the lamp (1) and which forms a light distribution pattern (Lo2) including an oblique cut-off line (CL2), **characterized in that:**

the parabolic optical system reflector (24R, 24L) has a generally rectangular shape when viewed from the front of the lamp (1); and
the light emitting element (26Ra, 26La)

- (i) is arranged in a vicinity of a side of the generally rectangular shape, and arranged such that a normal (N) to a light emitting surface of the light emitting element (26Ra, 26La) is inclined with respect to a horizontal line (H) so that the oblique cut-off line (CL2) is formed by light which is radiated from the light emitting surface in a direction of the normal (N) to the light emitting surface and reflected by the parabolic optical system reflector (24R, 24L), and
(ii) is positioned with respect to the parabolic optical system reflector (24R, 24L) so as to be offset from a center (24Rac, 24Lac) of the side in a direction opposite to a direction in which a ray (X) extending in the direction of the normal (N) to the light emitting surface is inclined with respect to the horizontal line (H).

2. The vehicular lamp (1) according to claim 1, comprising a first lamp unit (1R) and a second lamp unit (1L) that are respectively arranged on right and left sides of a vehicle in a vehicle width direction, the first lamp unit (1R) and the second lamp unit (1L) each including the light emitting element (26Ra, 26La) and the parabolic optical system reflector (24R, 24L), wherein:

the shapes of the parabolic optical system reflectors (24R, 24L) of the first and second lamp units (1R, 1L) are generally symmetrical to each other.

3. The vehicular lamp (1) according to claim 2, wherein:

positions of the light emitting elements (26Ra, 26La) of the first and second lamp units (1R, 1L) with respect to the parabolic optical system reflectors (24R, 24L) in the vehicle width direction

4. The vehicular lamp (1) according to claim 2 or 3, wherein:

positions of the light emitting elements (26Ra, 26La) of the first and second lamp units (1R, 1L) with respect to the parabolic optical system reflectors (24R, 24L) in an up-down direction are reversed.

5. The vehicular lamp (1) according to any one of claims 2 to 4, wherein:

a direction of light radiated from the light emitting element (26Ra) of the first lamp unit (1R) to the parabolic optical system reflector (24R) of the first lamp unit (1R) is a direction from one end side toward the other end side of the oblique cut-off line (CL2).

6. The vehicular lamp (1) according to any one of claims 2 to 4, wherein:

a direction of light radiated from the light emitting element (26La) of the second lamp unit (1L) to the parabolic optical system reflector (24L) of the second lamp unit (1L) is a direction from the other end side toward the one end side of the oblique cut-off line (CL2).

7. The vehicular lamp (1) according to any one of claims 2 to 6, wherein:

at least one of the light emitting surfaces of the light emitting elements (26Ra, 26La) is inclined with respect to a corresponding side (24Ra, 24La) of the respective parabolic optical system reflector (24R, 24L).

8. An optical unit (20R, 20L) which includes a light emitting element mounting portion (22R, 22L) and a parabolic optical system reflector (24R, 24L) that reflects light from a light emitting element (26Ra, 26La) fixed on the light emitting element mounting portion (22R, 22L) to a front of the optical unit (20R, 20L), and which is used in a vehicular lamp (1R, 1L) that forms a light distribution pattern (Lo2) including an oblique cut-off line (CL2), **characterized in that:**

the parabolic optical system reflector (24R, 24L) has a generally rectangular shape when viewed from the front of the optical unit; and
the light emitting element mounting portion (22R, 22L)

- (i) is arranged in a vicinity of a side of the generally rectangular shape, and arranged

such that a normal (N) to an element mounting surface (22Ra, 22La) is inclined with respect to a horizontal line (H) so that the oblique cut-off line (CL2) is formed by light which is radiated from a light emitting surface of the light emitting element (26Ra, 26La) fixed on the light emitting element mounting portion (22R, 22L) in a direction of a normal (N) to the light emitting surface and reflected by the parabolic optical system reflector (24R, 24L), and

(ii) is positioned with respect to the parabolic optical system reflector (24R, 24L) so as to be offset from a center (24Rac, 24Lac) of the side in a direction opposite to a direction in which a portion of the normal (N) to the element mounting surface (22Ra, 22La), the portion extending from the element mounting surface to a light radiation direction side of the light emitting element (26Ra, 26La), is inclined with respect to the horizontal line (H).

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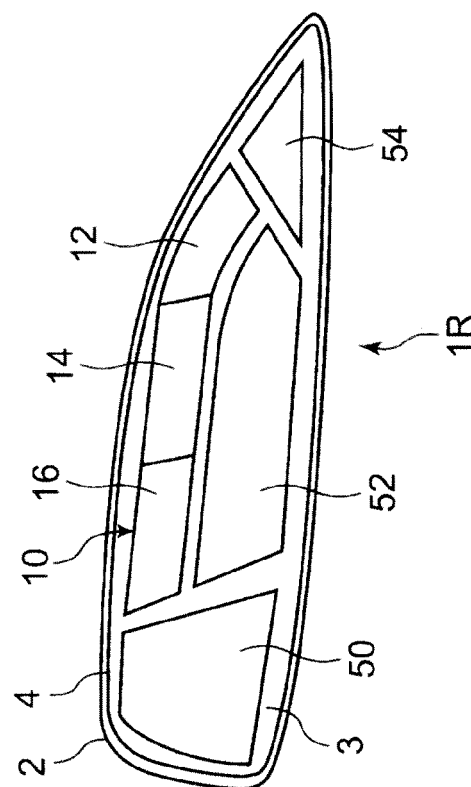
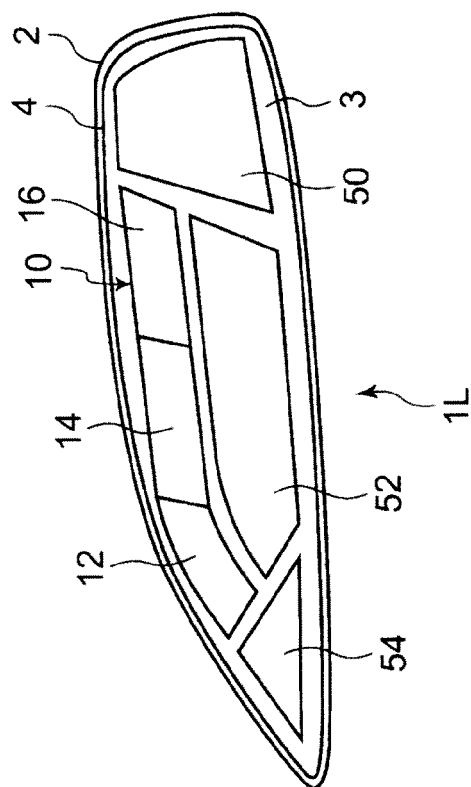
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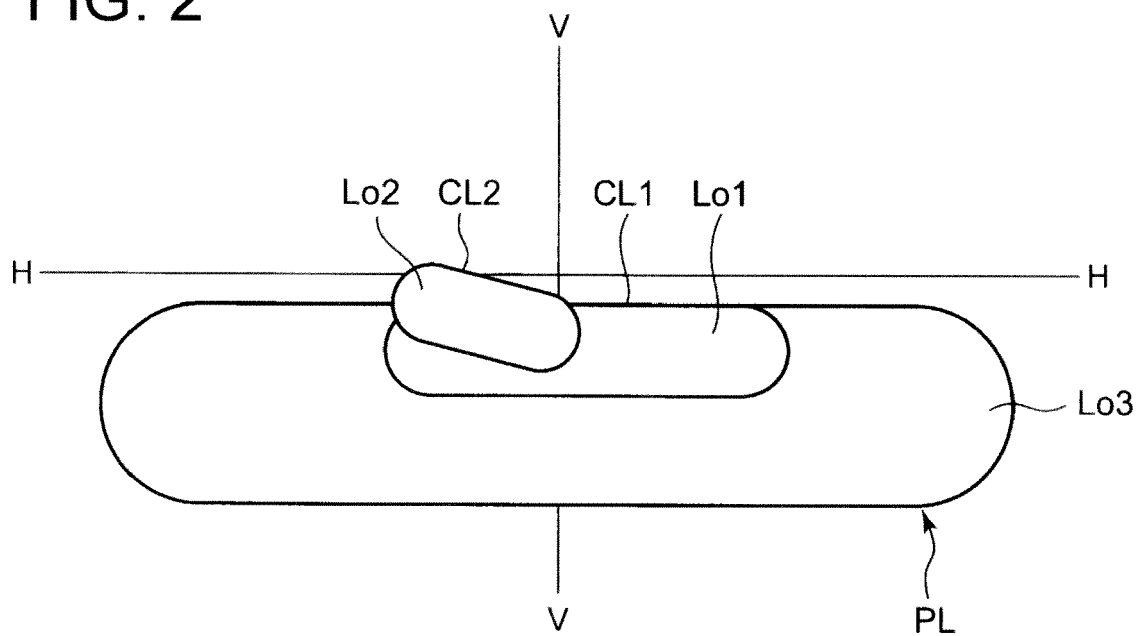
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FIG. 1



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FIG. 2



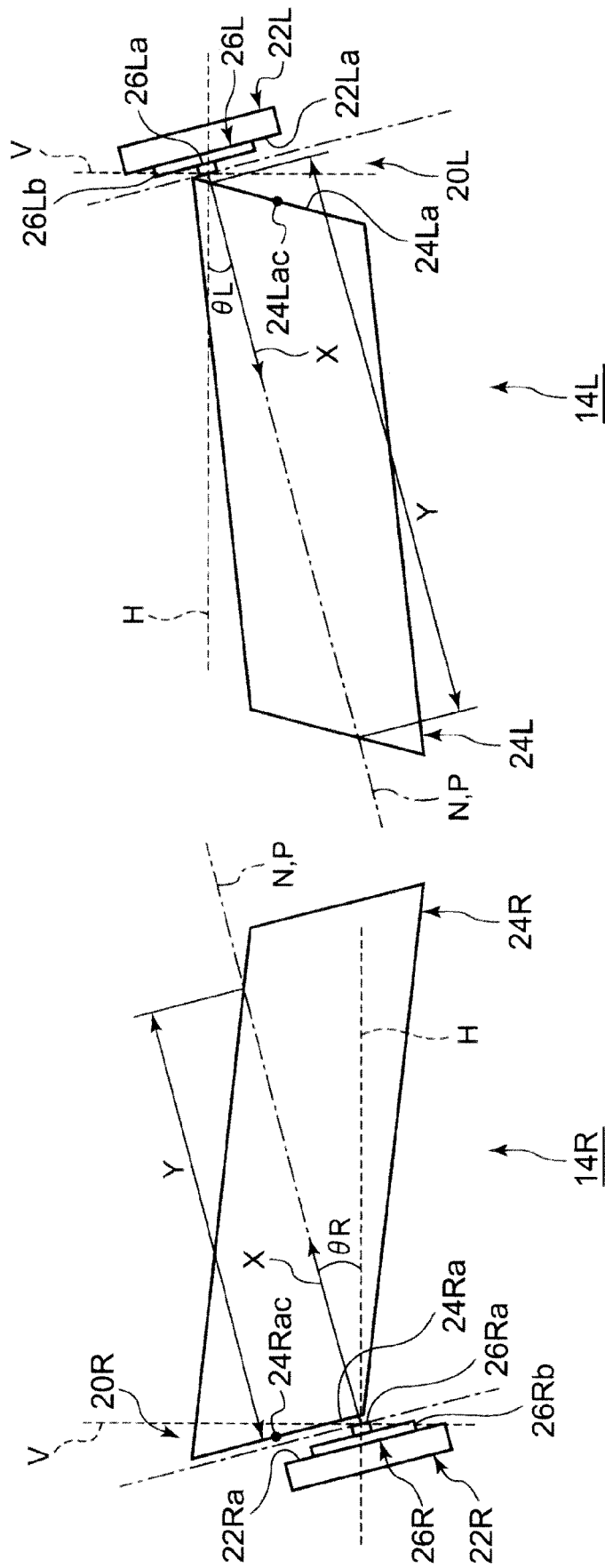
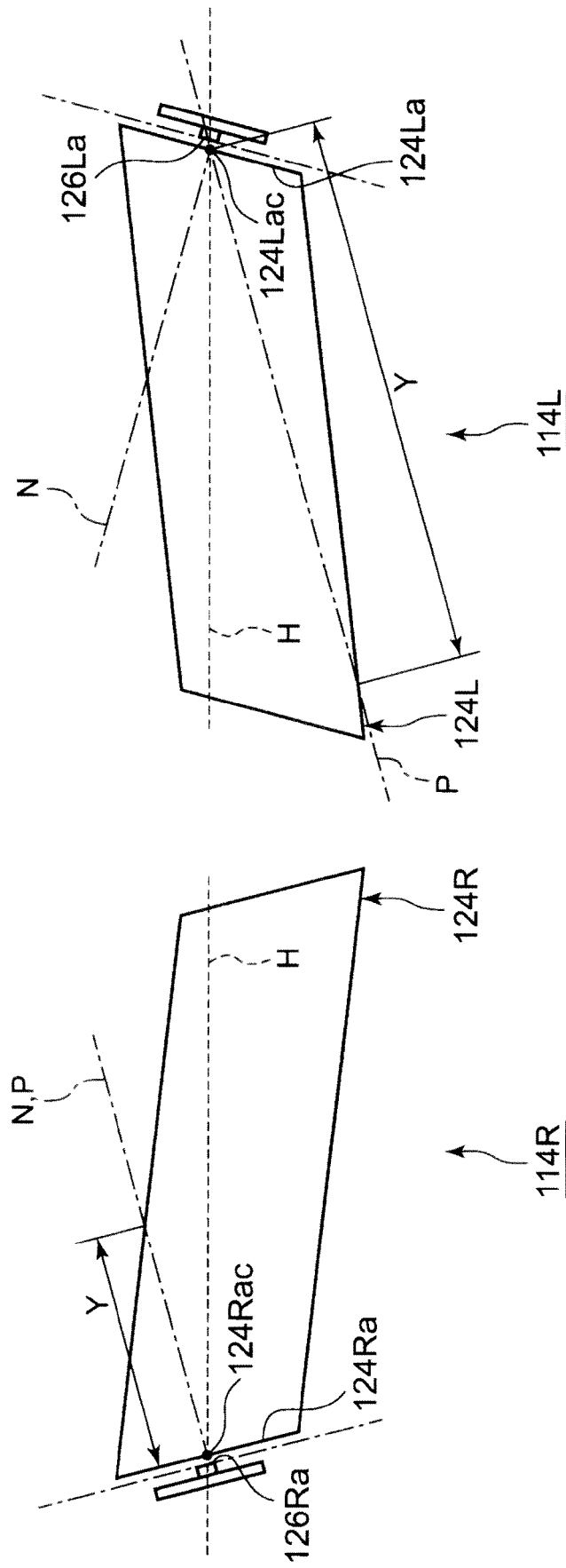


FIG. 3

FIG. 4



REFERENCES CITED IN THE DESCRIPTION

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