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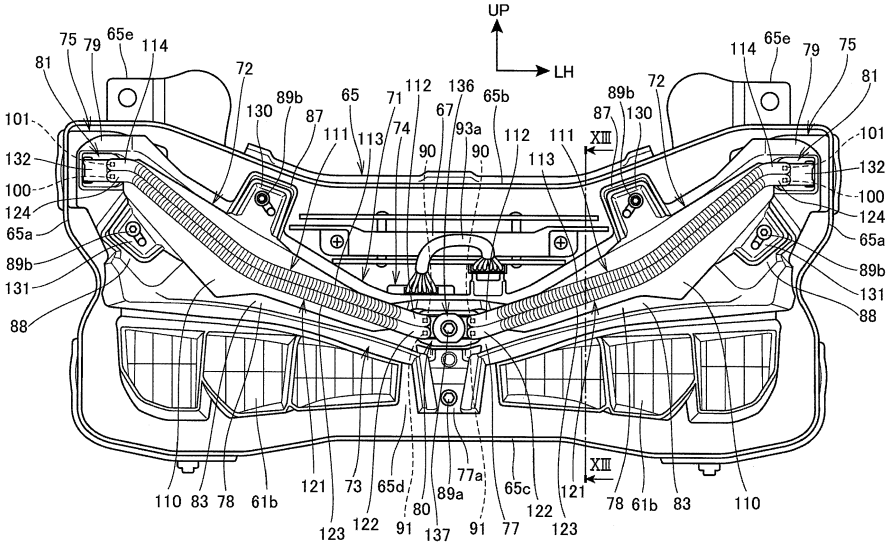
(54) **VEHICULAR LIGHTING WITH LIGHT GUIDES**

(57) To use a simple structure to achieve light emission of different colors in vehicular lighting producing light emission in a manner such that light of a light source including a semiconductor device is guided into a light guide member.

The vehicular lighting includes an inner one-color light source 90 and an outer other-color light source 101 which include semiconductors. The vehicular lighting includes an upper light guide member 111 guiding light from one end toward the other end, the light being launched from the inner one-color light source 90 and the outer other-color light source 101 to an inner entrance 112 and an outer entrance 114 at the one end, the inner and outer entrances 112 and 114 being located at one end. The inner one-color light source 90 and the outer other-color light source 101 enabling launch of respectively different color lights are mounted at both ends of the upper light guide member 111.

Fig.3



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Description

[0001] The present invention relates to vehicular lighting.

[0002] In vehicular lighting for producing light emission in a manner such that light from a light source including a semiconductor device is guided into a light guide member, a technique of causing a single light guide member to emit different color lights is well-known (see, for example, Patent Literature 1). In Patent Literature 1, a first light entrance and a second light entrance are provided at one end of a light guide member. The first light entrance is lineally connected to a light guide of the light guide member. The second light entrance is placed adjacent to the first light entrance and the second light entrance is bent to be connected to the light guide. And, different color lights enter the first light entrance and the second light entrance, respectively. Thereby, different color lights can be emitted from the single light guide member. In the semiconductor light sources, a single light source emits light of a single color. Therefore, for emission of lights of different colors, a plurality of light sources emitting different color lights is required.

[0003] In JP-A No. 2015-53147, however, a plurality of light sources emitting different color lights is provided at one end of the light guide member. This complicates the shape of the light entrance.

[0004] The present invention has been achieved in view of the above-mentioned circumstances, and it is an object thereof to provide simple structure capable of emitting lights of different colors in vehicular lighting for producing light emission in a manner such that light of a light source including a semiconductor device is guided into a light guide member.

[0005] In order to achieve the object, according to the present invention, there is provided vehicular lighting including: light sources (90, 91, 100, 101) including semiconductor devices; and light guide members (111, 121) each guiding light of each of the light sources (90, 91, 100, 101) from one end toward the other end, the light being launched into a light entrance (112, 122, 114, 124) at the one end, characterized in that the light sources (90, 91, 100, 101) enabling launch of respectively different color lights are mounted at both ends of the light guide members (111, 121). As a result, because lights of respectively different colors can be launched into the light guide members from the light sources located at both ends of the light guide members, the shape of the light guide member can be made simple. This makes it possible to emit different color lights by use of the light guide members of simple structure.

[0006] Further in the vehicular lighting according to the present invention, when the light sources (90, 91, 100, 101) for one color may be lit, the light sources (90, 91, 100, 101) for the other color may be extinguished.

[0007] With the configuration of the present invention, when the light source is lit for one color, the light source is extinguished for the other color. This prevents light of a mixture of the one color and the other color from being emitted from the light guide members.

[0008] Further, in the vehicular lighting according to the present invention, the light guide members (111, 121) may be provided in at least two rows. The light guide members (111, 121) may be arranged adjacent to each other. The color light emitted from at least one pair of the light sources (90, 100) may be the same color, and the pair of light sources (90, 100) may be located on a diagonal.

[0009] The light entering one end of the light guide member is attenuated as the light travels toward the other end. However, with the configuration of the present invention, the light guide members are in at least two rows. The light guide members are arranged adjacent to each other, and the same color light is emitted from at least one pair of the light sources located on a diagonal. Because of this, by making the same color light entering from a pair of diagonally located light sources, for an area where the light is attenuated at the other end of each light guide member, the light guide members complement each other by the light of the same color launched from the light source adjacent to the area. This makes it possible to achieve excellent light emission all across the light guide members.

[0010] Further, where the light sources having different colors from each other are installed both ends of the light guide members, when light of the other color launched from the one end reaches the one-color light source located at the other end, the light is reflected off the one-color light source, so that the light of the one color may be emitted at the other end. However, with the configuration of the present invention, since light of the same color is launched from the diagonally located light sources, even if the light is reflected off the one-color light source to cause light of the one color to be emitted at the other end, the light emission of the one color is made almost inconspicuous by light emission from the other-color light source adjacent to the one-color light source. As a result, it is possible to achieve excellent light emission in light guide members.

[0011] Further, in the vehicular lighting according to the present invention, the vehicular lighting may be a headlamp of a saddle-ride type vehicle (1), and the light guide members (111, 121) may include bend portions (112b, 114b, 122b, 124b).

[0012] With the configuration of the present invention, the lighting is the headlamp of the saddle-ride type vehicle and the light guide members includes the bend portions. Because of this, although light is easily attenuated at the bend portions, light of the same color is launched from the pair of diagonally located light sources to achieve efficient light emission from the light guide members. As a result, the headlamp of the saddle-ride type vehicle has good conspicuity.

[0013] Further, in the vehicular lighting according to the present invention, the light guide members (111, 121) may be arranged in plural, one above another and adja-

cent to each other, and the light guide members (111, 121) may be inclined to extend upward and outward in the vehicle width direction from the center of a vehicle body when viewed from front, and also the light guide members (111, 121) may be inclined upwardly toward the rear in side view.

[0014] With the configuration of the present invention, the multiple light guide members are arranged one above another and adjacent to each other. The light guide members are inclined to extend upward and outward in the vehicle width direction from the center of a vehicle body when viewed from front, and also the light guide members are inclined upwardly toward the rear in side view. The light guide members produce intense light emission at a position corresponding to the pair of diagonally located light sources, that is, at a position corresponding to the center of the vehicle body and also a rearward and upward position outward in the vehicle width direction. As a result, improved conspicuity of light emission of the light guide member is achieved in a wide range when viewed from front and viewed from side.

[0015] Further, in the vehicular lighting according to the present invention, the different colors of the light sources (90, 91, 100, 101) may be a white light and an orange light.

[0016] With the configuration of the present invention, because the different colors of the light sources are white and orange, a position lamp and a turn signal indicator can be configured by a single light guide member.

[0017] Further, in the vehicular lighting according to the present invention, the vehicular lighting may include a rear member (73) located rearward of the light guide members (111, 121). The rear member (73) may be provided with a recess (86, 186) in a portion located rearward of the light guide member (111, 121).

[0018] With the configuration of the present invention, the rear member is located rearward of the light guide members. The recess is formed in a portion of the rear member located at the rear of the light guide members. Thus, the direction of light incident to the recess of the rear member behind the light guide members can be changed by the recess such that the incident light is reflected toward a direction rather than forward. As a result, the sunlight can be inhibited from being strongly reflected forward by the rear member, and therefore the conspicuity of the vehicular headlamp can be enhanced.

[0019] Further, in the vehicular lighting according to the present invention, the vehicular lighting may be a headlamp of a saddle-ride type vehicle (1), and the rear member (73) may be arranged to be inclined upwardly toward the rear in side view.

[0020] Where the rear member is inclined upwardly toward the rear in side view, the sunlight is easily reflected forward. However, with the configuration according to the present invention, the forward reflection is reduced by the recess. As a result, the conspicuity of the headlamp of the saddle-ride type vehicle can be improved.

[0021] Further, in the vehicular lighting according to the present invention, the light guide members (111, 121) may be a transparent member allowing light to pass through and the rear member (73) may be a reflective member reflecting light.

[0022] With the configuration according to the present invention, because the light guide members are a transparent member allowing light to pass through and the rear member is a reflective member reflecting light, the sunlight is strongly reflected easily by the rear member. However, because the forward reflection is reduced by the recess, the conspicuity of the headlamp can be improved.

[0023] Further, in the vehicular lighting according to the present invention, the light sources (90, 91, 100, 101) may be configured to emit either a white light or an orange light.

[0024] With the configuration of the present invention, a position lamp is configured by use of white color and a turn signal indicator is configured by use of orange color. The conspicuity of a position lamp is easily affected by sunlight reflection. In the configuration of the present invention, because the reflection can be reduced by the recess, the conspicuity of the position lamp can be enhanced.

[0025] Also, in the vehicular lighting according to the present invention, the light sources (90, 91, 100, 101) enabling launch of respectively different color lights may be configured to be mounted at both ends of the light guide members (111, 121).

[0026] With the configuration of the present invention, because the light sources enabling launch of lights of respectively different colors are mounted at both ends of the light guide member, different color lights can be emitted by use of the light guide members of simple structure.

[0027] Further, in the vehicular lighting according to the present invention, the light guide members (111, 121) may be provided in at least two rows. The light guide members (111, 121) may be arranged adjacent to each other, and the color lights emitted from at least one pair of the light sources (90, 100) may be the same color, and the pair of light sources (90, 100) may be located on a diagonal.

[0028] The light entering one end of the light guide member is attenuated as the light travels toward the other end. However, with the configuration of the present invention, the light guide members are arranged in at least two rows. The light guide members are arranged adjacent to each other, and the same color light is emitted from at least one pair of the light sources located on a diagonal. Because of this, by making the same color light entering from a pair of diagonally located light sources, for an area where the light is attenuated at the other end of each light guide member, the light guide members complement each other by the light of the same color launched from the light source adjacent to the area. This makes it possible to achieve excellent light emission all across the light guide members.

[0029] Further, where the light sources having different

colors from each other are installed at both ends of the light guide members, when light of one color launched from the one end reaches the other-color light source located at the other end, the light is reflected off the other-color light source, so that the light of the other color may be emitted at the other end. However, with the configuration of the present invention, since light of the same color is launched from a pair of the diagonally located light sources, even if the light is reflected off the other-color light source to cause light of the other color to be emitted at the other end, the light emission of the other color is made almost inconspicuous by light emission from the one-color light source adjacent to the other-color light source. As a result, it is possible to achieve satisfactory light emission in light guide members.

[0030] Further, in the vehicular lighting according to the present invention, the recess (86, 186) may have a lower wall including a recess inclined surface (86b, 186b), and the recess inclined surface (86b, 186b) may be inclined upwardly toward the rear in side view.

[0031] With the configuration of the present invention, because the lower wall of the recess includes the recess inclined surface inclined upwardly toward the rear in side view, the recess inclined surface makes it possible to reflect the sunlight toward a direction other than forward.

[0032] In the vehicular lighting according to the present invention, different color lights can be emitted by use of the light guide members of simple structure.

[0033] Further, light of a mixture of one color and the other color can be prevented from being emitted from the light guide members.

[0034] Further, excellent light emission can be achieved from all of the light guide members.

[0035] Further, the conspicuity of the headlamp of the saddle-ride type vehicle can be enhanced.

[0036] In addition, improved conspicuity of light emission of the light guide member is achieved in a wide range when viewed from front and viewed from side.

[0037] Further, by use of a single light guide member, a position lamp and a turn signal indicator can be configured.

[0038] Further, the sunlight can be inhibited from being strongly reflected forward by the rear member, and thus the conspicuity of the vehicular lighting can be enhanced.

[0039] Further, the conspicuity of the headlamp of the saddle-ride type vehicle can be enhanced.

[0040] Further, even if the light guide member is a transparent member, the sunlight reflection can be reduced.

[0041] Further, the conspicuity of the position lamp can be enhanced.

[0042] In addition, the light guide members of simple structure are used to emit different color lights.

[0043] Further, excellent light emission can be accomplished all over the light guide members.

[0044] Further, the sunlight can be reflected toward any direction other than forward by providing the recess inclined surface.

Fig. 1 is a left side view of a motorcycle in accordance with a first embodiment of the present invention.

Fig. 2 is a front view of a headlamp unit when viewed from front.

Fig. 3 is a front view of the headlamp unit when a front cover is removed from the headlamp unit in Fig. 2.

Fig. 4 is a view of a turn signal indicator unit when viewed from rear.

Fig. 5 is a front view of the turn signal indicator unit without a light guide lens when viewed from front.

Fig. 6 is a top view of the turn signal indicator unit when viewed from above.

Fig. 7 is a perspective view of the light guide lens when viewed from front.

Fig. 8 is a top view of the light guide lens when viewed from above.

Fig. 9 is a top view of a central area between the left and right light guide lenses in the vehicle width direction when viewed from above.

Fig. 10 is a schematic diagram describing reflection of light of the outer one-color light source.

Fig. 11 shows schematic diagrams showing the illuminating states of the turn signal indicators.

Fig. 12 shows diagrams illustrating the illuminating states of the turn signal indicators when the front is viewed from multiple different directions.

Fig. 13 is a sectional view of the turn signal indicator unit in Fig. 3 taken along XIII-XIII line.

Fig. 14 is a sectional view taken along XIII-XIII line of Fig. 3 in a second embodiment.

[0045] Embodiments in accordance with the present invention will now be described with reference to the drawings. Throughout the description, directional terms like front, rear, left, right, up and down refer to the directions with reference to the vehicle body unless otherwise specified. Further, in each drawing, reference sign FR denotes the forward side of the vehicle body, reference sign UP denotes the upward side of the vehicle body and reference sign LH denote the leftward side of the vehicle body.

[First Embodiment]

[0046] Fig. 1 is a left side view of a motorcycle in accordance with a first embodiment of the present invention. Note that, of components used in left-right pairs, only the left components are shown in Fig. 1.

[0047] The motorcycle 1 is structured as follows. An engine 10 serving as a power unit is supported by a body frame F. A front wheel 2 is supported by a front fork 11. The front fork 11 is steerably supported at a front end of the body frame F. A rear wheel 3 is supported by a swing arm 12. The swing arm 12 is mounted on the rearward side of the body frame F. The motorcycle 1 is a saddle-ride type vehicle that has a seat 13 mounted above a rear portion of the body frame F so that an occupant is

astride the seat 13.

[0048] The body frame F includes a head pipe 14, a pair of left and right main frames 15, a pair of left and right pivot frames 16, a pair of left and right down frames 17, and a pair of left and right seat frames 18. The head pipe 14 is provided at the front end to support the front fork 11 in a pivotal manner. The main frames 15 are inclined to extend obliquely downward from the head pipe 14 toward the rear. The pivot frames 16 extend downward from the rear ends of the main frames 15. The down frames 17 extend from the front ends of the main frames 15 in the rearward and downward direction. The seat frames 18 extend upward from upper portions of the pivot frames 16 and also rear portions of the main frames 15 to the rear end of the vehicle.

[0049] Referring to Fig. 1, a rider sits on the seat 13 so that the rider steers the front wheel 2 through a handlebar 30. The handlebar 30 is installed to the top end of the front fork 11. The front wheel 2 is journaled at the front wheel axle 2a that is mounted at a lower end portion of the front fork 11.

[0050] The swing arm 12 is pivotally supported by a pivot shaft 31, the left and right pivot frames 16 being coupled to each other in the vehicle width direction by the pivot shaft 31. The swing arm 12 vertically swings about the pivot shaft 31. The swing arm 12 and the body frame F are coupled to each other through a rear suspension (not shown). The rear wheel 3 is journaled at a rear wheel axle 3a that is inserted into a rear end portion of the swing arm 12.

[0051] A fuel tank 39 is placed above the main frames 15 to be contiguous with the front edge of the seat 13.

[0052] A pair of left and right main steps 34 are placed rearward of lower portions of the left and right pivot frames 16.

[0053] The engine 10 is supported in such a manner as to be hung from the body frame F. The engine 10 is placed between the down frames 17 and the pivot frames 16 under the main frames 15.

[0054] An exhaust duct 43 of the engine 10 is connected to a muffler 44 alongside the rear wheel 3.

[0055] The output of the engine 10 is transferred to the rear wheel 3 through a drive chain 46.

[0056] The motorcycle 1 includes a body cover 50 covering the vehicle body, the vehicle body including the body frame F, the engine 10 and the like. The body cover 50 includes a front cowl 51, a pair of left and right middle cowls 52 and a under cowl 53. The front cowl 51 is placed in front of the head pipe 14. The middle cowls 52 extend contiguously from the front cowl 51 toward the rear. The under cowl 53 extends contiguously from lower portions of the middle cowls 52 toward the rear.

[0057] The body cover 50 further includes a tank cover 54, a pair of left and right under-seat cowls 55, and a rear cowl 56. The tank cover 54 covers the fuel tank 39. The under-seat cowls 55 extend contiguously from upper portions of the middle cowls 52 toward the rear. The rear cowl 56 covers the sear frames 18.

[0058] The motorcycle 1 includes a rear fender 57 and a front fender 58.

[0059] The front face of the front cowl 51 is inclined upwardly toward the rear in side view so as to reduce the resistance to traveling air, and also the front face of the front cowl 51 is formed in an overall curved plane shape such that a central portion of the front surface in the vehicle width direction protrudes forward approximately all over the central portion in the up-down direction. A windshield 51a is installed on an upper portion of the front cowl 51 to extend upwardly toward the rear so as to cover around the handlebar 30 from front.

[0060] A headlamp unit 60 is installed within the front cowl 51. A pair of left and right headlights 61, and a pair of left and right turn signal indicators 62 (vehicle lighting, headlamps) are placed in the front of the headlamp unit 60. The front cowl 51 has an opening formed in a lower portion of the front surface, and the headlights 61 and the turn signal indicators 62 are exposed toward the front from the opening, so that light is projected forward.

[0061] Fig. 2 is a front view of the headlamp unit 60 when viewed from front.

[0062] As illustrated in Fig. 2, the headlights 61 are placed as a left-right pair in a lower portion of the front surface of the front cowl 51.

[0063] The turn signal indicators 62 are placed as a left-right pair above the headlights 61 on the front face of the front cowl 51. The turn signal indicators 62 also serve as position lamps as described later. The headlights 61 and the turn signal indicators 62 are placed in left-right symmetry with respect to the center in the vehicle width direction. The turn signal indicators 62 are part of the headlamp unit 60 and are the headlamps projecting light forward.

[0064] Fig. 3 is a front view of the headlamp unit 60 in Fig. 2 when a front cover 63 is removed from the headlamp unit 60.

[0065] As illustrated in Fig. 2 and Fig. 3, the headlamp unit 60 includes the front cover 63, and a box-shaped case 65 having a front face being open. The front cover 63 covers the opening area of the front face of the box-shaped case 65.

[0066] The case 65 is formed in a horizontally long shape with a longer length in the vehicle width direction (left-right direction) than that in the up-down direction. The case 65 includes left and right side walls 65a, an upper wall 65b, a lower wall 65c and a rear wall 65d forming the rear face.

[0067] Stays 65e are mounted on an upper portion of the case 65 to be coupled to the vehicle body.

[0068] The headlights 61 include headlight lenses 61a, headlight light sources (not shown), and headlight reflectors 61b. The headlight lenses 61a are formed integrally with the front cover 63. The headlight light sources are placed at the rear of the headlight lenses 61a. The headlight reflectors 61b reflect light from the headlight light sources toward the front.

[0069] The turn signal indicators 62 are configured to

include a pair of left and right outer lenses 70 and a turn signal indicator unit 71 that is housed in the case 65. The outer lenses 70 are formed integrally with the front cover 63. Each of the outer lenses 70 is inclined to extend outward in the vehicle width direction and also toward a rearward and upward direction from a central portion of the front cover 63 in the vehicle width direction such that the outer lens 70 extends along the shape of the front face of the front cowl 51.

[0070] The headlight reflectors 61b are arranged as a left-right pair in a lower portion of the case 65. The turn signal indicator unit 71 is arranged above the headlight reflectors 61b.

[0071] A light control unit 67 is placed in the case 65 to control illumination of the turn signal indicators 62 and the headlights 61. The light control unit 67 is placed in a central portion in the vehicle width direction between the upper wall 65b and the turn signal indicator unit 71. The light control unit 67 is formed in a horizontally long box shape.

[0072] Fig. 4 is a view of the turn signal indicator unit 71 when viewed from rear.

[0073] As illustrated in Fig. 3 and Fig. 4, the turn signal indicator unit 71 includes a pair of left and right light guide lenses 72, a housing (rear member), an inner light source unit 74 and a pair of left and right outer light source units 75. The light guide lenses 72 each extend outward in the vehicle width direction, from a central portion of the turn signal indicator unit 71. The housing 73 support the light guide lenses 72. The inner light source unit 74 is placed in a central portion of the turn signal indicator unit 71 in the vehicle width direction. The outer light source units 75 are placed at both outer ends of the turn signal indicator unit 71 in the vehicle width direction.

[0074] The turn signal indicator unit 71 projects light forward, after the light is emitted from the inner light source unit 74 and the outer light source units 75 and then the light is guided to the light guide lenses 72.

[0075] Fig. 5 is a front view of the turn signal indicator unit 71 when the light guide lenses 72 is removed from the turn signal indicator unit 71 as viewed from front. Fig. 6 is a top view of the turn signal indicator unit 71 when viewed from above.

[0076] Referring to Fig. 3 to Fig. 6, the housing 73 integrally includes an inner light source unit supporter 77, a pair of left and right lateral extensions 78, and a pair of left and right outer light source unit supporters 79. The inner light source unit supporter 77 supports the inner light source unit 74. The lateral extensions 78 are inclined to extend outward in the vehicle width direction and also toward a rearward and upward direction from the inner light source unit supporter 77. The outer light source unit supporters 79 are placed at outer ends of the respective lateral extensions 78 in the vehicle width direction.

[0077] The inner light source unit supporter 77 of the housing 73 includes a depression 80 formed to have a depth extending rearward from the front surface of the inner light source unit supporter 77. The depression 80 is formed in an approximately rectangular shape when viewed from front. A boss 80b is formed in a central portion of a bottom 80a of the depression 80 and the boss 80b protrudes forward. A pair of left and right light guide holes 80c is formed in both ends of the bottom 80a in the vehicle width direction and the light guide holes 80c penetrate through the bottom 80a. The light guide holes 80c are formed in a long hole shape with a longer diameter in the up-down direction.

[0078] The inner light source unit supporter 77 includes a central side fixing portion 77a. The central side fixing portion 77a extends downward of the depression 80.

[0079] The outer light source unit supporters 79 of the housing 73 include depressions 81 each formed to have a depth extending rearward from the front surfaces of the outer light source unit supporters 79. The depressions 81 are each formed in an approximately rectangular shape when viewed from front. A pair of left and right light guide holes 81b is formed in inner ends of bottoms 81a of the respective depressions 81 in the vehicle width direction and the light guide holes 81b penetrate through the bottoms 81a. The light guide holes 81b are formed in a long hole shape with a longer diameter in the up-down direction.

[0080] Lock holes 81c are formed in outer ends of the bottoms 81a of the respective depressions 81 in the vehicle width direction.

[0081] The lateral extensions 78 of the housing 73 extend in the vehicle width direction to provide a connection between the inner light source unit supporter 77 and the corresponding outer light source unit supporters 79.

[0082] Each of the lateral extensions 78 includes a rear-member front surface 83, an extension upper side 84 and an extension underside 85. The rear-member front surface 83 approximately faces the backside of the outer lens 70 (Fig. 2). The extension upper side 84 extends rearward from the top edge of the rear-member front surface 83. The extension underside 85 extends rearward from the bottom edge of the rear-member front surface 83.

[0083] The rear-member front surfaces 83 correspond to the front surface of the lateral extensions 78. The rear-member front surfaces 83 increase in width in the up-down direction toward the outside in the vehicle width direction when viewed from front.

[0084] Each of the rear-member front surfaces 83 has a recess 86 formed to provide a connection between the depression 80 of the inner light source unit supporter 77 and the depression 81 of the outer light source unit supporter 79. The recess 86 is sunk rearward and the recess 86 is formed in a groove shape extending between the depression 80 and the depression 81.

[0085] Fixing elements 87 are provided in halfway areas of the respective extension upper sides 84 in the vehicle width direction. The fixing elements 87 extend upward.

[0086] Fixing elements 88 are formed under the depressions 81 at the outer ends of the respective rear-

members front surfaces 83 in the vehicle width direction.

[0087] The housing 73 is secured to bosses (not shown) of the case 65 with a fixing bolt 89a (Fig. 3) and fixing bolts 89b (Fig. 3). The fixing bolt 89a is inserted from front into the central side fixing portion 77a. The fixing bolts 89b are inserted from front into the fixing elements 87, 88, respectively.

[0088] The inner light source unit 74 includes inner one-color light sources 90 (light source), inner other-color light sources 91 (light source) and an inner board 93. The inner one-color light sources 90 and the inner other-color light sources 91 are paired and arranged vertically in the up-down direction. The inner one-color light sources 90 and the inner other-color light sources 91 are mounted on the inner board 93. Each inner one-color light source 90 and each inner other-color light source 91 form a set of light sources, and two sets of light sources are placed separately at the two, left and right, ends of the inner board 93. The inner board 93 is mounted with various electronic components required for the supply of power to the inner one-color light sources 90 and the inner other-color light sources 91. A control connection cable 93a is attached to an upper portion of the inner board 93. The control connection cable 93a is connected to the light control unit 67.

[0089] The left and right inner one-color light sources 90 are placed above the inner other-color light sources 91.

[0090] The inner one-color light sources 90 are light sources emitting orange light (one color). The inner other-color light sources 91 are light sources emitting white light (other color), the white light differing in color from that of the inner one-color light sources 90.

[0091] The inner light source unit 74 is secured to the rear face of the inner light source unit supporter 77 of the housing 73 in a manner such that the inner one-color light sources 90 and the inner other-color light sources 91 are mounted on a front face of the inner board 93 and the front face of the inner board 93 is oriented in the traveling direction of the vehicle.

[0092] The two, left and right, sets of the inner one-color light sources 90 and the inner other-color light sources 91 are exposed toward the front from the left and right light guide holes 80c of the depression 80, respectively.

[0093] Each of the outer light source units 75 includes an outer one-color light source 100 (light source), an outer other-color light source 101 (light source) and an outer board 103. The outer one-color light source 100 and the outer other-color light source 101 are paired and arranged vertically in the up-down direction. The outer one-color light source 100 and the outer other-color light source 101 are mounted on the outer board 103.

[0094] The outer one-color light source 100 is placed below the outer other-color light source 101.

[0095] The outer one-color light source 100 is a light source emitting orange light (one color). The outer other-color light source 101 is a light source emitting white light (other color), the white light differing in color from that of the outer one-color light source 100.

[0096] In other words, the color arrangement of light emission of the light sources of the outer light source unit 75 is the reverse of the color arrangement of light emission of the light sources of the inner light source unit 74.

[0097] The inner one-color light sources 90, inner other-color light sources 91, outer one-color light source 100 and the outer other-color light source 101 are of a self-illuminating type semiconductor light source, in other words, a light source including a semiconductor device. Here, the inner one-color light sources 90, inner other-color light sources 91, outer one-color light source 100 and the outer other-color light source 101 are LEDs, but may be organic ELs, by way of example.

[0098] Each of the outer light source units 75 is secured to the rear face of the outer light source unit supporter 79 of the housing 73 in a manner such that the outer one-color light source 100 and the outer other-color light source 101 are mounted on a front face of the outer board 103 and the front face of the outer board 103 is oriented in the traveling direction of the vehicle.

[0099] The outer one-color light source 100 and the outer other-color light source 101 are exposed toward the front from the light guide hole 81b of the depression 81.

[0100] The outer light source units 75 are electrically connected to the inner light source unit 74 through a pair of connection cables 95 respectively extending from the inner board 93 in the left and right outward directions. The connection cables 95 have middle portions supported by clamps 96. The clamps 96 are placed on the rear faces of the lateral extensions 78, respectively.

[0101] Fig. 7 is a perspective view of the light guide lens 72 when viewed from front. Fig. 7 shows both the inner light source unit 74 and the outer light source unit 75. Fig. 8 is a top view of the light guide lens 72 when viewed from above. Since the light guide lenses 72 are configured in left-right symmetry, the left light guide lens 72 is here taken as an example.

[0102] Referring to Fig. 3, Fig. 6, Fig. 7 and Fig. 8, the light guide lens 72 includes a plate 110, a vertical pair of an upper light guide member 111 (light guide member) and a lower light guide member 121 (light guide member), an upper fixing element 130 and a lower fixing element 131. The plate 110 extends outward in the vehicle width direction from the inner light source unit 74 to the outer light source unit 75 along the recess 86 of the housing 73. The upper and lower light guide members 111, 121 are integrally formed on the plate 110. The upper fixing element 130 extends upward from the plate 110. The lower fixing element 131 extends downward from the plate 110.

[0103] The light guide lens 72 is integrally molded of glass or resin materials having light transparency.

[0104] The upper light guide member 111 is formed in an approximately circular cross-section rod shape extending along the front face of the plate 110 in the vehicle

width direction.

[0105] The lower light guide member 121 is formed in an approximately circular cross-section rod shape extending along the front face of the plate 110 in the vehicle width direction. The lower light guide member 121 is arranged below the upper light guide member 111, and the lower light guide member 121 is placed along the lower edge of the upper light guide member 111.

[0106] That is, the upper light guide member 111 and the lower light guide member 121 are arranged in multiple adjacent rows (two rows in the embodiment) in the up-down direction. Specifically, the upper light guide member 111 and the lower light guide member 121 is inclined to extend outward in the vehicle width direction and also toward the rearward and upward direction along the rear-member front surface 83. The recess 86 of the rear-member front surface 83 is covered from front with the upper light guide member 111 and the lower light guide member 121.

[0107] The upper light guide member 111 is a light guide member placed to provide a connection between the inner one-color light source 90 and the outer other-color light source 101.

[0108] The upper light guide member 111 includes an inner entrance 112 (light entrance), an upper light guide 113 and an outer entrance 114 (light entrance). The inner entrance 112 extends forward from the front position of the inner one-color light source 90 and then the inner entrance 112 bends outward in the vehicle width direction. The upper light guide 113 extends outward in the vehicle width direction from the end of the inner entrance 112 toward the outer other-color light source 101. The outer entrance 114 extends forward from the front position of the outer other-color light source 101 and then the outer entrance 114 bends inward in the vehicle width direction to be connected to the upper light guide 113.

[0109] Light from the inner one-color light source 90 is launched into the inner entrance 112. The inner entrance 112 has a straight portion 112a and a bend portion 112b. The straight portion 112a extends forward in an approximately straight line from a position adjacent to the front face of the inner one-color light source 90. The bend portion 112b bends on the front end side in the vehicle width direction.

[0110] Light from the outer other-color light source 101 is launched into the outer entrance 114. The outer entrance 114 has a straight portion 114a and a bend portion 114b. The straight portion 114a extends forward in an approximately straight line from a position adjacent to the front face of the outer other-color light source 101. The bend portion 114b bends on the front end side in the vehicle width direction.

[0111] The light guided into the inner entrance 112 and the outer entrance 114 is approximately totally reflected in the straight portions 112a, 114a, but portions of the light escapes from the bend portions 112b, 114b to attenuate the amount of light.

[0112] The upper light guide 113 is provided with a light diffusion portion 113a extending along the length of the upper light guide 113. The light diffusion portion 113a diffuses the light guided within the upper light guide 113, toward the front. The light diffusion portion 113a is, for example, a lens cut portion formed as projections and depressions on the front surface of the upper light guide 113. The light diffusion portion 113a diffuses light, so that the light during passage through the upper light guide 113 is caused to exit into space forward of the upper light guide 113.

[0113] After the light enters one end of the upper light guide member 111, while this light travels within the upper light guide 113 toward the other end, the light is attenuated by the light diffusion portion 113a, so that the amount of light is gradually decreased.

[0114] The lower light guide member 121 is a light guide member placed to provide a connection between the inner other-color light source 91 and the outer one-color light source 100.

[0115] The lower light guide member 121 includes an inner entrance 122 (light entrance), a lower light guide 123 and an outer entrance 124 (light entrance). The inner entrance 122 extends forward from the front position of the inner other-color light source 91 and then the inner entrance 122 bends outward in the vehicle width direction. The lower light guide 123 extends outward in the vehicle width direction from the end of the inner entrance 122 toward the outer one-color light source 100. The outer entrance 124 extends forward from the front position of the outer one-color light source 100 and then the outer entrance 124 bends inward in the vehicle width direction to be connected to the lower light guide 123.

[0116] Light from the inner other-color light source 91 is launched into the inner entrance 122. The inner entrance 122 has a straight portion 122a and a bend portion 122b. The straight portion 122a extends forward in an approximately straight line from a position adjacent to the front face of the inner other-color light source 91. The bend portion 122b bends on the front end side in the vehicle width direction.

[0117] Light from the outer one-color light source 100 is launched into the outer entrance 124. The outer entrance 124 has a straight portion 124a and a bend portion 124b. The straight portion 124a extends forward in an approximately straight line from a position adjacent to the front face of the outer one-color light source 100. The bend portion 124b bends on the front end side in the vehicle width direction.

[0118] The light guided into the inner entrance 122 and the outer entrance 124 is approximately totally reflected in the straight portions 122a, 124a, but portions of the light escapes from the bend portions 122b, 124b to attenuate the amount of light.

[0119] The lower light guide 123 is provided with a light diffusion portion 123a extending along the length of the lower light guide 123. The light diffusion portion 123a diffuses the light guided within the lower light guide 123, toward the front. The light diffusion portion 123a is, for

example, a lens cut portion on the front surface of the lower light guide 123. The light diffusion portion 123a diffuses light, so that the light during passage through the lower light guide 123 is caused to exit into space forward of the lower light guide 123. After the light enters one end of the lower light guide member 121, while this light travels within the lower light guide member 121 toward the other end, the light is attenuated by the light diffusion portion 123a, so that the amount of light is gradually decreased.

[0120] The light guide lens 72 includes a lug-shaped lock piece 132 that extends outward in the vehicle width direction from the rear ends of the outer entrance 114 and the outer entrance 124.

[0121] Fig. 9 is a top view of a central portion of the left and right light guide lenses 72 in the vehicle width direction when viewed from above.

[0122] As previously described, the left and right light guide lenses 72 are configured in left-right symmetry, but a central portion in the vehicle width direction differs in configuration between the left and right light guide lenses 72.

[0123] Referring to Fig. 7 and Fig. 9, the left light guide lens 72 includes an one-side leg 133. The one-side leg 133 extends forward after the one-side leg 133 extends inward in the vehicle width direction from inner faces of the rear ends of the inner entrance 112 and the inner entrance 122.

[0124] As illustrated in Fig. 9, the right light guide lens 72 includes an other-side leg 134 and a plate-shaped seat 135. The other-side leg 134 extends forward after the other-side leg 134 extends inward in the vehicle width direction from inner faces of the rear ends of the inner entrance 112 and the inner entrance 122. The seat 135 extends from the front end of the other-side leg 134 toward the one-side leg 133. A hole 135a is formed to pass through the seat 135 from the front to the rear.

[0125] The one-side leg 133 receives a side portion opposite to the other-side leg 134 on the rear face of the seat 135. The one-side leg 133, the other-side leg 134 and the seat 135 form a central side fixing element 136 that is secured to the boss 80b.

[0126] As illustrated in Fig. 3, the light guide lens 72 is arranged to cover the rear-member front surface 83 from front, and the inner entrance 112 and the inner entrance 122 are inserted into the depression 80 that is located at the center of the housing 73 in the vehicle width direction. Further, the outer entrance 114 and the outer entrance 124 are inserted into the depression 81 of the outer end of the housing 73 in the vehicle width direction.

[0127] The light guide lens 72 is secured to the housing 73 via the central side fixing element 136, upper fixing element 130, lower fixing element 131 and the lock piece 132. Specifically, the central side fixing element 136 is secured to the boss 80b (Fig. 5) with a fixing bolt 137 that is inserted into the hole 135a of the seat 135. The upper fixing element 130is secured, together with the fixing element 88, with the common fixing bolt 89b. The lock piece 132 is locked into the lock hole 81c (Fig. 5).

[0128] Referring to Fig. 3, Fig, 5 and Fig. 7, the turn signal indicator unit 71 includes, as a light source for light emission through the light guide lens 72, the inner one-color light source 90 and the inner other-color light source 91, the inner one-color light source 90 and the inner other-color light source 91 being arranged one above the other in an inward position in the vehicle width direction, and further the turn signal indicator unit 71 includes the outer other-color light source 101 and the outer one-color light source 100, the outer other-color light source 101 and the outer one-color light source 100 being arranged one above the other in an outward position in the vehicle width direction, as previously described.

[0129] In this arrangement, the inner one-color light source 90 and the outer one-color light source 100 are placed in diagonal position. Specifically, in the first embodiment, the light sources for emission of the same color light are arranged in diagonal position. Further, the light sources for emission of different color lights are connected to each other through the upper light guide member 111 and the lower light guide member 121 in the vehicle width direction.

[0130] When the upper light guide member 111 is used for light emission in one color (orange), the inner one-color light source 90 emits light. In this case, after light is emitted by the inner one-color light source 90, the light enters the inner entrance 112 at one end, then the light exits into space ahead while passing through the upper light guide 113. Then, the light passes through the outer entrance 114 at the other end, and then the light reaches the outer other-color light source 101.

[0131] When the upper light guide member 111 is used for light emission in the other color (white), the outer other-color light source 101 emits light. In this case, after light is emitted by the outer other-color light source 101, the light enters the outer entrance 114 at one end, then the light exits into space ahead while passing through the upper light guide 113. Then, the light passes through the inner entrance 112 at the other end, and then the light reaches the inner one-color light source 90.

[0132] Further, when the lower light guide member 121 is used for one-color (orange) light emission, the outer one-color light source 100 emits light. In this case, after light is emitted by the outer one-color light source 100, the light enters the outer entrance 124 at one end, then the light exits into space ahead while passing through the lower light guide 123. Then, the light passes through the inner entrance 122 at the other end, and then the light reaches the inner other-color light source 91.

[0133] When the upper light guide member 111 is used for light emission in the other color (white), the inner other-color light source 91 emits light. In this case, after light is emitted by the inner other-color light source 91, the light enters the inner entrance 122 at one end, then the light exits into space ahead while passing through the lower light guide 123. Then, the light passes through the outer entrance 124 at the other end, and then the light

reaches the outer one-color light source 100.

[0134] In this manner, because the inner one-color light source 90 and the outer other-color light source 101 are able to launch mutually different color lights and these light sources 90 and 101 are provided respectively at both ends (one end and the other end) of the upper light guide member 111, different color lights can be projected from the single upper light guide member 111 with a simple structure.

[0135] Likewise, because the inner other-color light source 91 and the outer one-color light source 100 are able to launch mutually different color lights and these light sources 91 and 100 are provided respectively at both ends (one end and the other end) of the lower light guide member 121, different color lights can be projected from the single lower light guide member 121 with a simple structure.

[0136] When the turn signal indicators 62 are used as turn signal indicators, the turn signal indicators 62 operates to emit light in one color (orange). When the turn signal indicators 62 are used as position lamps, the turn signal indicators 62 operates to emit light in the other color (white).

[0137] When the turn signal indicators 62 are used as turn signal indicators, the light control unit 67 activates the inner one-color light source 90 and the outer one-color light source 100 for light emission, and the light control unit 67 does not activate the outer other-color light source 101 and the inner other-color light source 91 for light emission (turning off). The light control unit 67 does not activate mixedly and simultaneously the one-color light sources 90, 100 and the other-color light sources 91, 101.

[0138] As a result, as illustrated in Fig. 7, in the upper light guide member 111, light emission L1 of the inner one-color light source 90 is guided outward in the vehicle width direction to travel toward the outer other-color light source 101. In the lower light guide member 121, light emission L2 of the outer one-color light source 100 is guided inward in the vehicle width direction to travel toward the inner other-color light source 91. In short, when the turn signal indicators 62 are used as turn signal indicators, in the light guide lens 72, light in one color (orange) is emitted from both ends in the vehicle width direction to pass each other in the vehicle width direction.

[0139] The light emission L1 in one color is guided from the inner one-color light source 90 into the upper light guide member 111, and this light emission L1 is attenuated to be weaker as the light emission L1 travels outward in the vehicle width direction, but the amount of attenuation is compensated for by light emission L2 of the outer one-color light source 100. Likewise, the light emission L2 in one color is guided from the outer one-color light source 100 into the lower light guide member 121, and this light emission L2 is also attenuated to be weaker as the light emission L2 travels inward in the vehicle width direction, but the amount of attenuation is compensated for by the light emission L1 of the inner one-color light source 90. This causes the turn signal indicator 62 to emit light satisfactorily all across the turn signal indicator 62 in the vehicle width direction.

[0140] When the turn signal indicators 62 are used as position lamps, the light control unit 67 activates the outer other-color light source 101 and the inner other-color light source 91 for light emission, and the light control unit 67 does not activate the inner one-color light source 90 and the outer one-color light source 100 for light emission (extinguishing).

[0141] As a result, in the upper light guide member 111, light emission L3 of the outer other-color light source 101 is guided inward in the vehicle width direction to travel toward the inner one-color light source 90. In the lower light guide member 121, light emission L4 of the inner other-color light source 91 is guided outward in the vehicle width direction to travel toward the outer one-color light source 100. In short, when the turn signal indicators 62 are used as position lamps, in the light guide lens 72, light in the other color (white) is emitted from both ends in the vehicle width direction to pass each other in the vehicle width direction.

[0142] The light emission L3 in the other color is guided from the outer other-color light source 101 into the upper light guide member 111, and this light emission L3 is attenuated to be weaker as the light emission L3 travels inward in the vehicle width direction, but the amount of attenuation is compensated for by light emission L4 of the inner other-color light source 91. Likewise, the light emission L4 in the other color is guided from the inner other-color light source 91 into the lower light guide member 121, and this light emission L4 is also attenuated to be weaker as the light emission L4 travels outward in the vehicle width direction, but the amount of attenuation is compensated for by the light emission L3 of the outer other-color light source 101. This causes the position lamp to emit light satisfactorily all across the position lamp in the vehicle width direction.

[0143] As illustrated in Fig. 3 and Fig. 6, in the inner light source unit 74 and the outer light source units 75, the inner board 93 and the outer boards 103 are placed in an upright position such that the front faces of the boards face forward, the light sources 90, 91, 100, 101 being installed on the front faces. This makes the turn signal indicator unit 71 compact in the front-rear direction. In this structure, since the direction of light emission of the light sources 90, 91, 100, 101 is forward, the bend portions 112b, 114b, 122b, 124b are required to guide the light into the upper and lower light guide members 111, 121 extending in the vehicle width direction. The light is attenuated in the bend portions 112b, 114b, 122b, 124b, but light of the same color is launched from both ends of the vehicle width direction so as to pass each other in the vehicle width direction as described above in the first embodiment. This can compensate for the effects of the attenuation. As a result, compatibility between compact design of the turn signal indicator unit 71 and favorable light emission can be achieved.

[0144] Further, because the inner light source unit 74 and the outer light source units 75 are located at a distance from each other in the vehicle width direction, the heat liberated from the inner light source unit 74 and the outer light source units 75 can be dissipated with efficiency. This prevents the inner light source unit 74 and the outer light source units 75 from becoming hot.

[0145] Fig. 10 is a schematic diagram describing a reflection of light from the outer one-color light source 100.

[0146] Referring to Fig. 7 and Fig. 10, when the turn signal indicators 62 are used as position lamps, the inner other-color light source 91 is activated to emit light, then the light emission L4 in the other color (white) from the inner other-color light source 91 reaches the outer one-color light source 100, and the light is reflected off the outer one-color light source 100.

[0147] Since the outer one-color light source 100 include an one-color fluorescent material 100a for light emission in one color (orange), when the light emission L4 in the other color (white) is reflected off the fluorescent material 100a, the reflected light L5 changes color to one color (orange).

[0148] In the first embodiment, since the inner other-color light source 91 and the outer other-color light source 101 are placed in diagonal position, the reflected light L5 is made inconspicuous by an intense light emission of the outer other-color light source 101 adjacent to the outer one-color light source 100. Because of this, the position lamp is able to emit light in excellent single color of the other color (white). It is noted that the same advantageous effects are produced in the inner one-color light source 90 as well as the inner other-color light source 91 for the other color and the outer other-color light source 101 for the other color.

[0149] Fig. 11 shows schematic diagrams illustrating the illuminating state of the turn signal indicators 62. Fig. 11(A) is the state used as position lamps. Fig. 11(B) is the state of the right turn signal indicator 62 being used as a turn signal indicator. Fig. 11(C) is the state of the left turn signal indicator 62 being used as a turn signal indicator.

[0150] When the motorcycle 1 travels under normal conditions, the left and right turn signal indicators 62 are switched on as the position lamps and the other-color (white) light is emitted as shown in Fig. 11(A).

[0151] Upon reception of an instruction to light the right turn signal indicator 62, as shown in Fig. 11(B), the light control unit 67 switches on the right turn signal indicator 62 and switches off the right position lamp, so that the left turn signal indicator 62 remains lit on as the position lamp. Specifically, in the right turn signal indicator 62, the inner one-color light source 90 of orange color and the outer one-color light source 100 of orange color are switched on, and the inner other-color light source 91 of white color and the outer other-color light source 101 of white color are switched off.

[0152] In this manner, when the right turn signal indicator 62 is lit as a turn signal indicator, the right position lamp is switched off. Because of this, enhanced conspicuity of the right turn signal indicator 62 is achieved.

[0153] Upon reception of an instruction to light the left turn signal indicator 62, as shown in Fig. 11(C), the light control unit 67 switches on the left turn signal indicator 62 and switches off the left position lamp, so that the right turn signal indicator 62 remains lit on as the position lamp.

[0154] Fig. 12 shows diagrams illustrating the illuminating state of the turn signal indicators 62 when the front is viewed from multiple different directions. Fig. 12(A) is a diagram when viewed from front. Fig. 12(B) is a diagram when viewed from the left side of the vehicle. Fig. 12(C) is a diagram when viewed from the right side of the vehicle.

[0155] In Fig. 12, the left turn signal indicator 62 is lit as the turn signal indicator. Here, assuming that the illuminating side of the turn signal indicator 62 is the inner side in the vehicle width direction, Fig. 12(B) is a diagram when viewed from the inner side in the vehicle width direction, and Fig. 12(C) is a diagram when viewed from the outer side in the vehicle width direction.

[0156] The turn signal indicator 62 produces intense light emission in a portion close to the light source emitting light. In the use as the turn signal indicator 62, the inner one-color light source 90 and the outer one-color light source 100 are the light sources to emit light, and these light sources are located at both ends of the turn signal indicator 62 in the vehicle width direction and stronger light is emitted from the both ends, so that, in particular, the both ends are readily conspicuous.

[0157] As shown in Fig. 12(A), when the turn signal indicator 62 is viewed from front, both of an intense light emission portion 62a of the inner one-color light source 90 and an intense light emission portion 62b of the outer one-color light source 100 are visually seen and recognized, so that excellent front conspicuity is offered.

[0158] Since the light guide lens 72 is included and the turn signal indicator 62 is inclined outward in the vehicle width direction and also toward the rearward and upward direction, as shown in Fig. 12(B), when the turn signal indicator 62 is viewed from the front on the inner side in the vehicle width direction, the intense light emission portion 62a of the inner one-color light source 90 is located in a position enabling ready visual recognition, so that excellent conspicuity is offered.

[0159] Since the light guide lens 72 is included and the turn signal indicator 62 is inclined outward in the vehicle width direction and also toward the rearward and upward direction, as shown in Fig. 12(C), when the turn signal indicator 62 is viewed from the front on the outer side in the vehicle width direction, the intense light emission portion 62b of the outer one-color light source 100 is located in a position enabling ready visual recognition, so that excellent conspicuity is offered.

[0160] In this manner, since the light guide lens 72 is included and the turn signal indicator 62 is inclined outward in the vehicle width direction and also toward the rearward and upward direction, at least either the intense

light emission portion 62a or the intense light emission portion 62b can be visually recognized across a wide range of the front side of the turn signal indicator 62 from the inner side to the outer side in the vehicle width direction. As a result, the turn signal indicator 62 has excellent conspicuity. It is noted that, even when the turn signal indicator 62 is used as the position lamp, the same advantageous effects are produced.

[0161] Fig. 13 is a sectional view of the turn signal indicator unit 71 in Fig. 3 taken along XIII-XIII line.

[0162] Referring to Fig. 3, Fig. 5 and Fig. 13, the rear-member front surface 83 of the housing 73 is provided in a rearward tilting form in side view, and the rear-member front surface 83 is inclined rearward with respect to the vertical line as a whole. The housing 73 is a rear member covering the upper light guide member 111 and the lower light guide member 121 from behind.

[0163] The housing 73 is a reflection member reflecting light, and also the housing 73 is a designed member visually recognized externally through the transparent outer lens 70. In order to improve the design quality of the turn signal indicator unit 71, a silver decorative layer is formed on the surface of the rear-member front surface 83 of the housing 73.

[0164] The recess 86 of the rear-member front surface 83 is formed in a valley form of an approximate V shape depressed rearward. The recess 86 includes an upper reflective surface 86a, a lower reflective surface 86b (recess inclined surface) and a valley bottom 86c. The upper reflective surface 86a is inclined downwardly toward the rear to extend rearward from the upper portion of the rear-member front surface 83 in side view. The lower reflective surface 86b is inclined upwardly toward the rear to extend rearward from the lower portion of the rear-member front surface 83 in side view. The valley bottom 86c is a confluence of the upper reflective surface 86a and the lower reflective surface 86b at their rear ends.

[0165] The lower reflective surface 86b is formed to be longer than the upper reflective surface 86a in side view.

[0166] The recess 86 is covered with the light guide lens 72 from front, so that the recess 86 is hardly discernible from front. The light guide lens 72 which includes the upper light guide member 111 and the lower light guide member 121 is a transparent member allowing light to pass through.

[0167] The sunlight streams down on the motorcycle 1 from above. In general, when the sunlight illuminates the headlamp of the vehicle from front and above, the sunlight is reflected off a reflective surface of the headlamp and/or the like, and the resulting reflected light illuminates the area ahead. This makes it difficult for the light emission of the headlamp to be visually recognized by persons around the motorcycle 1.

[0168] A conventional reflective surface 283 is shown in Fig. 13 by a phantom line. The conventional reflective surface 283 is formed in a flat plate shape inclined rearward.

[0169] When sunlight S1 is obliquely incident on the conventional reflective surface 283 from front and above, the reflected light R1 travels approximately horizontally forward. Because of this, the reflected light R1 easily reaches surrounding persons and/or the like, so that the light emission of the light guide lens 72 itself is made inconspicuous, and the conspicuity of the light emission of the light guide lens 72 is reduced.

[0170] On the rear-member front surface 83 in accordance with the first embodiment, when sunlight S2 is obliquely incident to the recess 86 from front and above, the sunlight S2 is reflected off the lower reflective surface 86b, the lower reflective surface 86b being a lower wall in the recess 86. The resulting reflected light R2 travels in an obliquely forward and upward direction. Because of this, the reflected light R2 hardly reaches surrounding persons and/or the like, so that the light emission of the light guide lens 72 itself is made conspicuous, and the conspicuity of the light emission of the light guide lens 72 is enhanced. Note that the sunlight S1 and the sunlight S2 are identical in incidence angle.

[0171] As described above, according to the first embodiment to which the present invention is applied, the turn signal indicators 62 are vehicle lighting, and each turn signal indicator 62 includes the inner one-color light source 90 and the outer other-color light source 101, and also the upper light guide member 111. The light sources 90 and 101 include semiconductor devices. The upper light guide member 111 guides light of the light sources from one end toward the other end, the light being launched into the inner entrance 112 and the outer entrance 114 at the one end. The inner one-color light source 90 and the outer other-color light source 101 enabling launch of lights of respectively different colors (orange, white) are mounted at both ends of the upper light guide member 111. Further, each of the turn signal indicators 62 includes the outer one-color light source 100 and the inner other-color light source 91, and also the lower light guide member 121. The outer one-color light source 100 and the inner other-color light source 91 include semiconductor devices. The lower light guide member 121 guides light of the light sources from one end toward the other end, the light being launched into the outer entrance 124 and the inner entrance 122 at the one end. The outer one-color light source 100 and the inner other-color light source 91 enabling launch of lights of respectively different colors (orange, white) are mounted at both ends of the lower light guide member 121.

[0172] As a result, the inner one-color light source 90 and the outer other-color light source 101 are the light sources located at both ends of the upper light guide member 111, and respectively different colors can be launched from the inner one-color light source 90 and the outer other-color light source 101 into the upper light guide member 111. The outer one-color light source 100 and the inner other-color light source 91 are the light sources located at both ends of the lower light guide member 121, and respectively different colors can be launched from the outer one-color light source 100 and

the inner other-color light source 91 into the lower light guide member 121. This makes is possible to form the upper light guide member 111 and the lower light guide member 121 in simple shape, and light emission in different colors can be produced from the upper light guide member 111 of simple structure and the lower light guide member 121 of simple structure.

[0173] Further, in the inner one-color light source 90 and the outer other-color light source 101, and in the outer one-color light source 100 and the inner other-color light source 91, when the light of one color is lit, the light of the other color is extinguished. This prevents light of a mixture of the one color and the other color from being emitted from the upper light guide member 111 and the lower light guide member 121.

[0174] Further, the light entering one end of each of the upper light guide member 111 and the lower light guide member 121 is attenuated as the light travels toward the other end. However, with the configuration of the present invention, the upper light guide member 111 and the lower light guide member 121 are arranged in at least two rows, and the upper light guide member 111 and the lower light guide member 121 are arranged adjacent to each other. The inner one-color light source 90 and the outer one-color light source 100 are a pair of diagonally located light sources, and the light sources 90 and 100 emit light of the same color. The inner other-color light source 91 and the outer other-color light source 101 are a pair of diagonally located light sources, and the light sources 91 and 101 emit light of the same color. Accordingly, light of the same color enters the inner one-color light source 90 and the outer one-color light source 100 which are located on a diagonal, and light of the same color enters from the inner other-color light source 91 and the outer other-color light source 101 which are located on a diagonal. Thereby, for areas where the light is attenuated at the other ends of the upper light guide member 111 and the lower light guide member 121, the upper and lower light guide members 111 and 121 complement each other by the light of the same color launched from the light sources adjacent to the areas. This makes it possible to achieve satisfactory light emission all across the upper light guide member 111 and the lower light guide member 121.

[0175] Further, where the different color light sources, i.e., the inner one-color light source 90 and the outer other-color light source 101, are installed respectively both ends of the upper light guide member 111, and also, the different color light sources, i.e., the outer one-color light source 100 and the inner other-color light source 91, are installed respectively both ends of the lower light guide member 121, when the other color light launched from the one ends reaches the outer one-color light source 100 and the inner one-color light source 90 located at the other ends, the light is reflected off the outer one-color light source 100 and the inner one-color light source 90, so that the one color may possibly be emitted at the other ends. However, with the configuration of the present invention, since light of the same color is launched from the inner one-color light sources 90 and the outer one-color light sources 100 that are located on a diagonal, and light of another same color is launched from the inner other-color light sources 91 and the outer other-color light sources 101 that are located on a diagonal, even if the light is reflected off the outer one-color light source 100 and the inner one-color light source 90 and thereby the one color is emitted at the other end, the light emissions of the one color are made almost inconspicuous by light emission from the outer other-color light source 101 adjacent to the outer one-color light source 100, and light emission from the inner other-color light source 91 adjacent to the inner one-color light source 90. As a result, it is possible to achieve satisfactory light emission in the other color from the upper light guide member 111 and the lower light guide member 121.

[0176] Further, the turn signal indicators 62 are the headlamps of the motorcycle 1 and the upper light guide member 111 and the lower light guide member 121 include the bend portions 112b, 114b, 122b, 124b. Because of this, light is easily attenuated at the bend portions 112b, 114b, 122b, 124b. However, light of the same color enters from the inner one-color light source 90 and the outer one-color light source 100 that are located on a diagonal, or light of the same color enters from the inner other-color light source 91 and the outer other-color light source 101 that are located on a diagonal, so that the upper light guide member 111 and the lower light guide member 121 are able to emit light with efficiency. As a result, the turn signal indicators 62 of the motorcycle 1 have improved conspicuity.

[0177] Further, the upper light guide member 111 and the lower light guide member 121 are arranged in plural, one above another and adjacent to each other. The upper light guide member 111 and the lower light guide member 121 are inclined to extend upward and outward in the vehicle width direction from the center of the vehicle body when viewed from front. The upper light guide member 111 and the lower light guide member 121 are inclined upwardly toward the rear in side view. The inner one-color light source 90 and the outer one-color light source 100 that are located on a diagonal, and the inner other-color light source 91 and the outer other-color light source 101 that are located on a diagonal, are arranged at the center of the vehicle body and also at the rearward and upward positions outward in the vehicle width direction. The upper light guide member 111 and the lower light guide member 121 produce intense light emissions at the positions corresponding to the inner one-color light source 90 and the outer one-color light source 100 that are located on a diagonal and also at the positions corresponding to the inner other-color light source 91 and the outer other-color light source 101 that are located on a diagonal, in other words, at the center of the vehicle body and also at the rearward and upward positions outward in the vehicle width direction. As a result, improved conspicuity of the light emission of the upper light guide

member 111 and the lower light guide member 121 is achieved in a wide range when viewed from front and side.

[0178] Further, since an orange color and a white color are used for the different colors between the inner one-color light source 90 and the outer other-color light source 101 and between the outer one-color light source 100 and the inner other-color light source 91, the upper light guide member 111 and the lower light guide member 121 are capable of performing the functions as position lamps and turn single indicators.

[0179] Further, there are well-known vehicular headlamps (vehicular lightings) producing light emission in a manner such that light of a light source including a semiconductor device is guided into a light guide member (see, for example, Patent Literature 2 (JP-A No. 2013-243068)). The vehicular headlamp disclosed in Patent Literature 2 includes a rear member (housing) that is placed along the rear face of the light guide member.

[0180] Now then, in such conventional vehicular headlamps, depending upon the arrangement of the rear member, sunlight may possibly be reflected forward by the rear member to affect conspicuity of the vehicular headlamp.

[0181] Therefore, it is desired to enhance vehicular headlamp's conspicuity for vehicular lighting producing light emission in a manner such that light from a light source including a semiconductor device is guided into a light guide member.

[0182] According to the first embodiment to which the present invention is applied, the turn signal indicators 62 are vehicle lighting, and each the turn signal indicator 62 includes the inner one-color light source 90, the outer other-color light source 101, the outer one-color light source 100 and the inner other-color light source 91, and also the upper light guide member 111 and the lower light guide member 121. The light sources 90, 101, 100 and 91 include semiconductor devices. The upper light guide member 111 and the lower light guide member 121 guide light of the light sources from one end toward the other end, the light being launched into the inner entrances at the one end. The housing 73 which is a rear member is located rearward of the upper light guide member 111 and the lower light guide member 121. The recess 86 is formed in a portion of the housing 73 located at the rear of the upper light guide member 111 and the lower light guide member 121. Thus, the direction of light incident to the recess 86 of the housing 73 behind the upper light guide member 111 and the lower light guide member 121 can be changed by the recess 86 such that the incident light is reflected toward a direction other than forward. As a result, the sunlight can be inhibited from being strongly reflected forward by the housing 73, and therefore enhanced conspicuity of the turn signal indicators 62 can be achieved.

[0183] Further, the housing 73 is inclined upwardly toward the rear, so that the sunlight is easily reflected forward. However, according to the first embodiment, the forward reflection is reduced by the recess 86. As a result, it is possible to improve the conspicuity of the turn signal indicators 62 of the motorcycle 1 including the upward and rearward inclined housing 73.

[0184] Further, since the upper light guide member 111 and the lower light guide member 121 are transparent members allowing light to pass through and the housing 73 is a reflective member reflecting light, the sunlight is strongly reflected easily by the housing 73. However, because the forward reflection is reduced by the recess 86, enhanced conspicuity of the turn signal indicators 62 can be achieved.

[0185] Further, since the lower wall of the recess 86 includes the lower reflective surface 86b inclined upward toward the rear in side view, the sunlight can be reflected upward by the lower reflective surface 86b. Thus, enhanced conspicuity of the turn signal indicators 62 can be achieved.

[Second Embodiment]

[0186] A second embodiment to which the present invention is applied will now be described with reference to Fig. 14. In the second embodiment, the same reference signs are used for the components structured in an analogous fashion to the first embodiment, and the description is omitted.

[0187] The second embodiment differs from the above-described first embodiment in that a recess 186 is formed and the recess 186 has a different shape from the recess 86.

[0188] Fig. 14 is a sectional view taken along XIII-XIII line of in Fig. 3 in the second embodiment.

[0189] The rear-member front surface 83 has a recess 186 formed to be sunk rearward.

[0190] The recess 186 is formed a valley form of an approximate U shape depressed rearward. The recess 86 includes an upper reflective surface 186a, a lower reflective surface 186b (recess inclined surface) and a rear reflective surface 186c. The upper reflective surface 186a is inclined downwardly toward the rear in side view to extend rearward from the upper portion of the rear-member front surface 83. The lower reflective surface 186b is inclined upwardly toward the rear in side view to extend rearward from the lower portion of the rear-member front surface 83. The rear reflective surface 186c establishes a vertical connection between the rear end of the upper reflective surface 186a and the rear end of the lower reflective surface 186b. The rear reflective surface 186c is an approximately vertical plane inclined slightly rearward.

[0191] When sunlight S3 is obliquely incident on the conventional reflective surface 283 from front and above, the reflected light R3 travels approximately horizontally forward. Because of this, the reflected light R3 easily reaches surrounding persons and/or the like, so that the light emission of the light guide lens 72 itself is made inconspicuous, and the conspicuity of the light emission

of the light guide lens 72 is reduced.

[0192] On the rear-member front surface 83 in accordance with the second embodiment, when sunlight S4 is obliquely incident to the recess 186 from front and above, the sunlight S4 is reflected off the lower reflective surface 186b, the lower reflective surface 186b being the lower wall in the recess 186, and in turn the resulting reflected light R4 is reflected off the rear reflective surface 186c and the upper reflective surface 186a in this order, the upper reflective surface 186a being the upper wall. Then, the reflected light R4 travels in an obliquely forward and downward direction.

[0193] Because of this, the reflected light R4 hardly reaches surrounding persons and/or the like, so that the light emission of the light guide lens 72 itself is made conspicuous, and the conspicuity of the light emission of the light guide lens 72 is enhanced. Note that the sunlight S3 and the sunlight S4 are identical in incidence angle.

[0194] It should be noted that the above-described first and second embodiments are provided as an implementation to which the present invention is applied, and the present invention is not limited to the embodiments.

[0195] In the configuration described as an example in the first and second embodiments, the recess 86, 186 is provided in the housing 73 serving as a rear member mounted at the rear of the upper light guide member 111 and the lower light guide member 121. However, the present invention is not limited to this configuration. The rear member is required to cover the upper light guide member 111 and the lower light guide member 121 from rear, and therefore the rear member may be, for example, a decorative plate as a designed member, an interior member of the front cowl 51, or the like. Further, in the above-described embodiments, it has been described that the rear member is a reflective member reflecting light. However, the present invention is not limited this configuration. Because the upper light guide member 111 and the lower light guide member 121 are capable of providing the right amount of light as turn signal indicators and position lamps by only using light emitted forward from the upper light guide 113 and the lower light guide 123, the rear member may be configured to be provided with no silver decorative layer and/or the like to reflect light actively.

[0196] Further, in the first and second embodiments, the upper light guide member 111 and the lower light guide member 121 are arranged in two rows in the up-down direction, but the light guide members may be in multiple, three or more rows.

1... Motorcycle (Saddle-ride type vehicle)
62... Turn signal indicator (vehicular lighting)
73... Housing (rear member)
86, 186... Recess
86b, 186b... Lower reflective surface (recess inclined surface)
90... Inner one-color light source (light source)
91... Inner other-color light source (light source)
100... Outer one-color light source (light source)
101... Outer other-color light source (light source)
111... Upper light guide member (light guide member)
112, 122... Inner entrance (light entrance)
112b, 114b, 122b, 124b... Bend portion
114, 124... Outer entrance (light entrance)
121... Lower light guide member (light guide member)

Claims

1. Vehicular lighting, comprising:

   light sources (90, 91, 100, 101) including semiconductor devices; and
   light guide members (111, 121) each guiding light of each of the light sources (90, 91, 100, 101) from one end toward the other end, the light being launched into a light entrance (112, 122, 114, 124) at the one end,
   characterized in that the light sources (90, 91, 100, 101) enabling launch of respectively different color lights are mounted at both ends of the light guide members (111, 121).

2. The vehicular lighting according to claim 1, wherein, when the light sources (90, 91, 100, 101) for one color are lit, the light sources (90, 91, 100, 101) for the other color are extinguished.

3. The vehicular lighting according to claim 1 or 2,
   wherein the light guide members (111, 121) are in at least two rows,
   the light guide members (111, 121) are arranged adjacent to each other, and
   the color light emitted from at least one pair of the light sources (90, 100) is the same color, the pair of light sources (90, 100) being located on a diagonal.

4. The vehicular lighting according to claim 3, wherein the vehicular lighting is a headlamp of a saddle-ride type vehicle (1), and the light guide members (111, 121) include bend portions (112b, 114b, 122b, 124b).

5. The vehicular lighting according to claim 4, wherein the light guide members (111, 121) are arranged in plural, one above another and adjacent to each other, and the light guide members (111, 121) are inclined to extend upward and outward in the vehicle width direction from the center of a vehicle body when viewed from front, and also the light guide members (111, 121) are inclined upwardly toward the rear in side view.

6. The vehicular lighting according to any one of claims

1 to 5, wherein the different colors of the light sources (90, 91, 100, 101) are a white light and an orange light.

7. The vehicular lighting according to claim 1, wherein the vehicular lighting including a rear member (73) located rearward of the light guide members (111, 121), and
the rear member (73) includes a recess (86, 186) in a portion located rearward of the light guide members (111, 121).

8. The vehicular lighting according to claim 7, wherein the vehicular lighting is a headlamp of a saddle-ride type vehicle (1), and the rear member (73) is arranged to be inclined upwardly toward the rear in side view.

9. The vehicular lighting according to claim 7 or 8, wherein the light guide members (111, 121) are a transparent member allowing light to pass through, and the rear member (73) is a reflective member reflecting light.

10. The vehicular lighting according to any one of claims 7 to 9, wherein the light sources (90, 91, 100, 101) emit either a white light or an orange light.

11. The vehicular lighting according to any one of claims 7 to 10, wherein the light sources (90, 91, 100, 101) enabling launch of respectively different color lights are mounted at both ends of the light guide members (111, 121).

12. The vehicular lighting according to claim 11, wherein the light guide members (111, 121) are in at least two rows,
the light guide members (111, 121) are arranged adjacent to each other, and
the color light emitted from at least one pair of the light sources (90, 100) is the same color, the pair of light sources (90, 100) being located on a diagonal.

13. The vehicular lighting according to any one of claims 7 to 12, wherein the recess (86, 186) has a lower wall, the lower wall including a recess inclined surface (86b, 186b), the recess inclined surface (86b, 186b) being inclined upwardly toward the rear in side view.

Fig.1

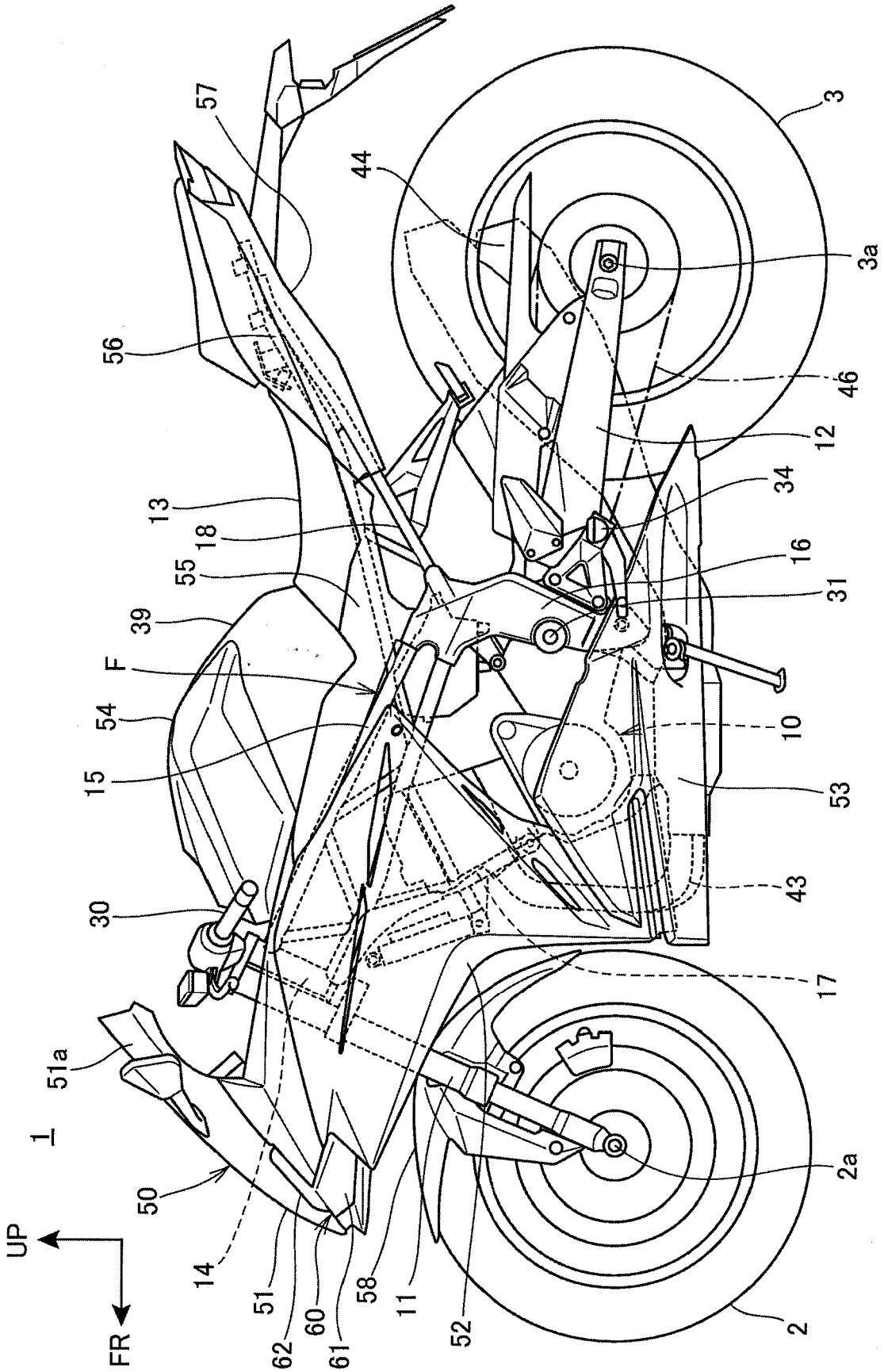
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Fig.2

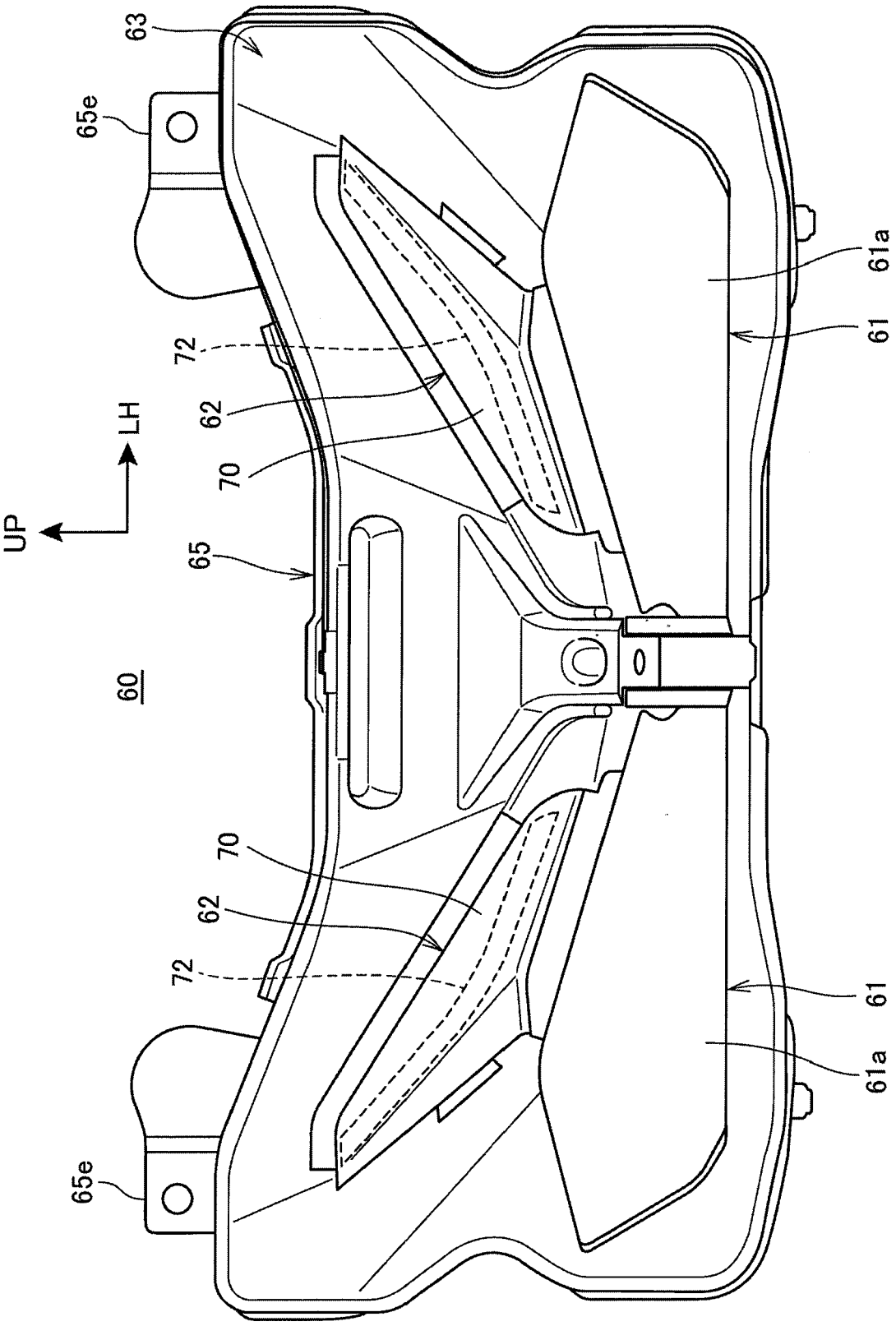
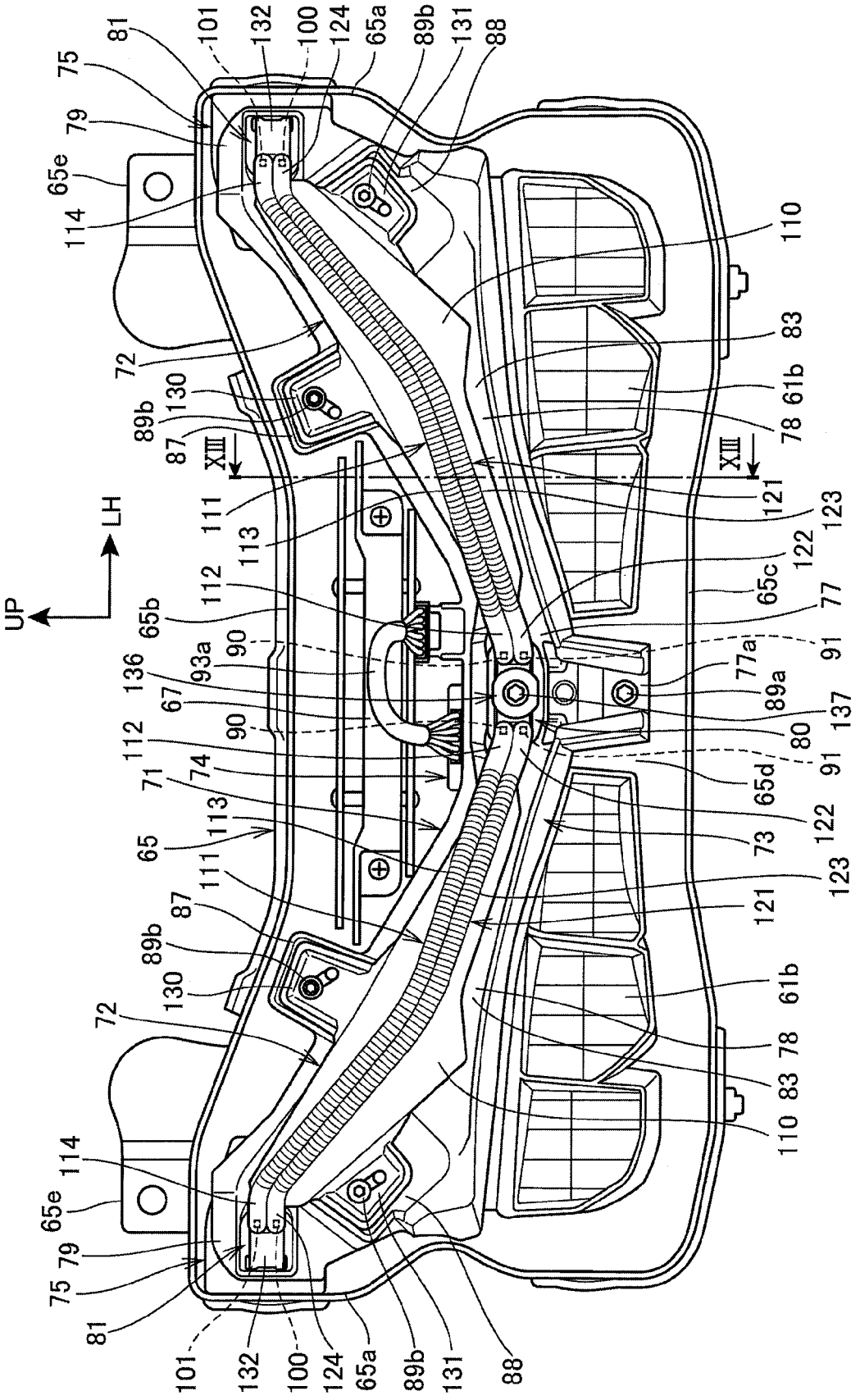


Fig.3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113
112
65b
90
93a
136
67
71
74
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121
123

Fig.4

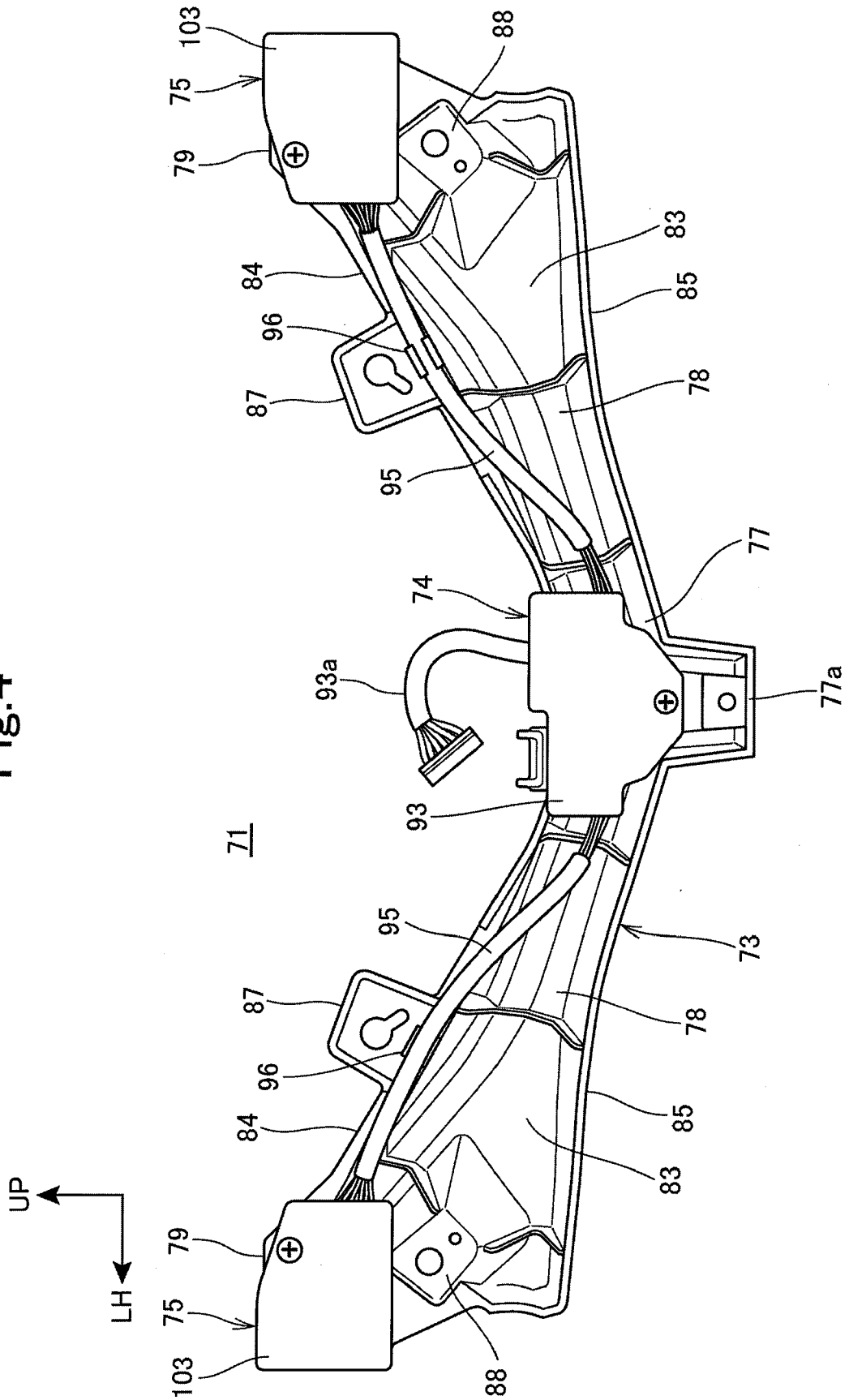
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Fig.5

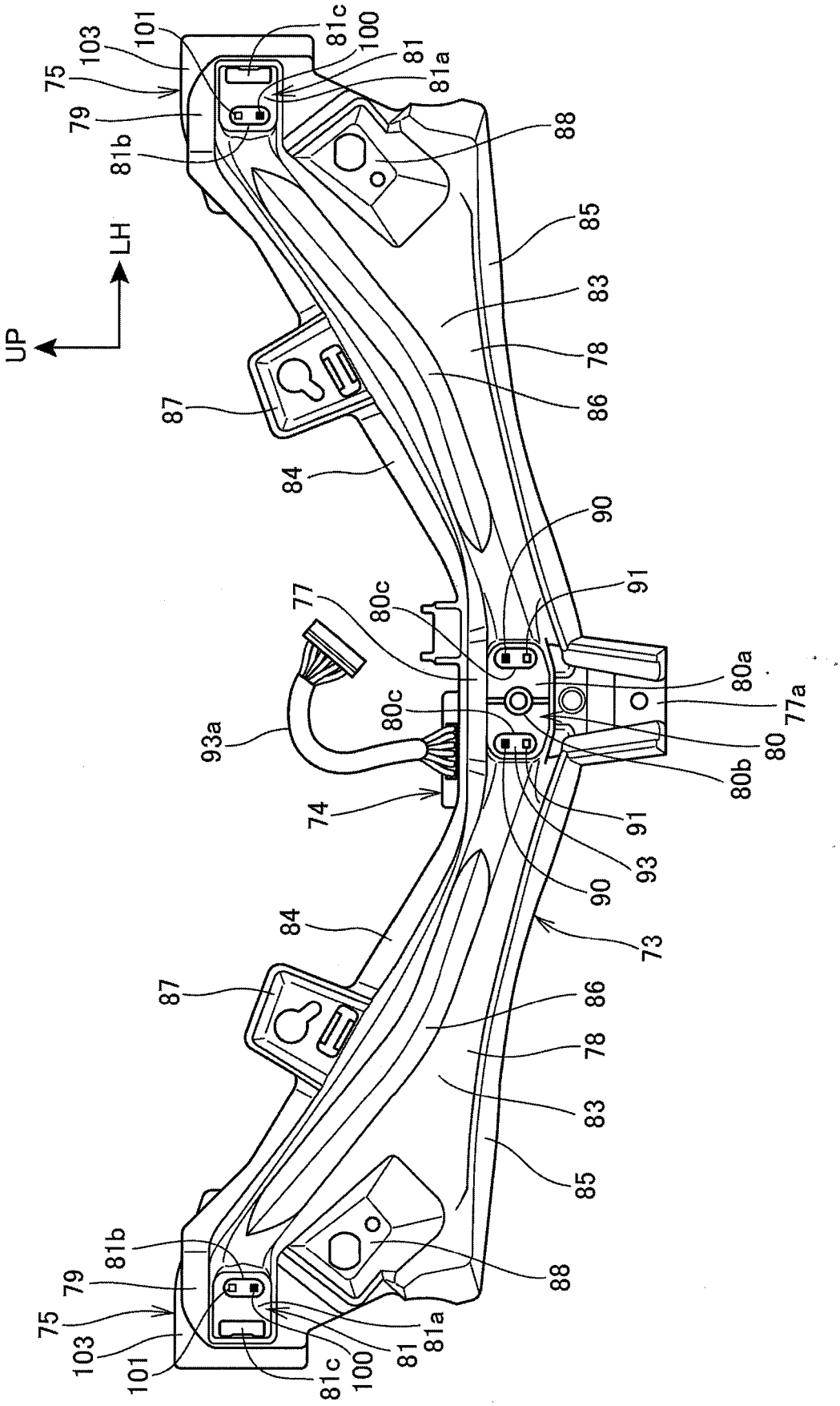
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Fig.6

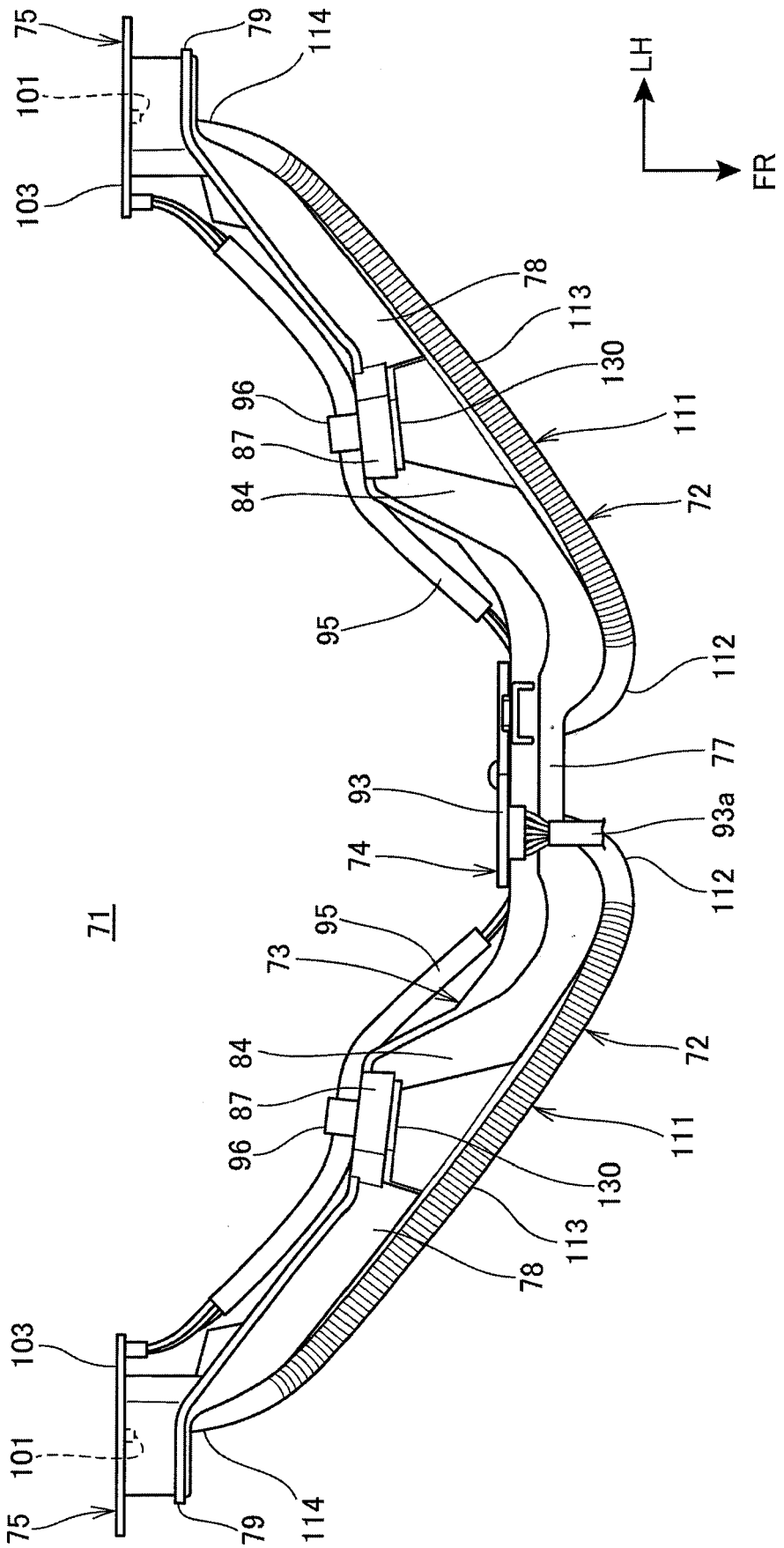
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Fig.7

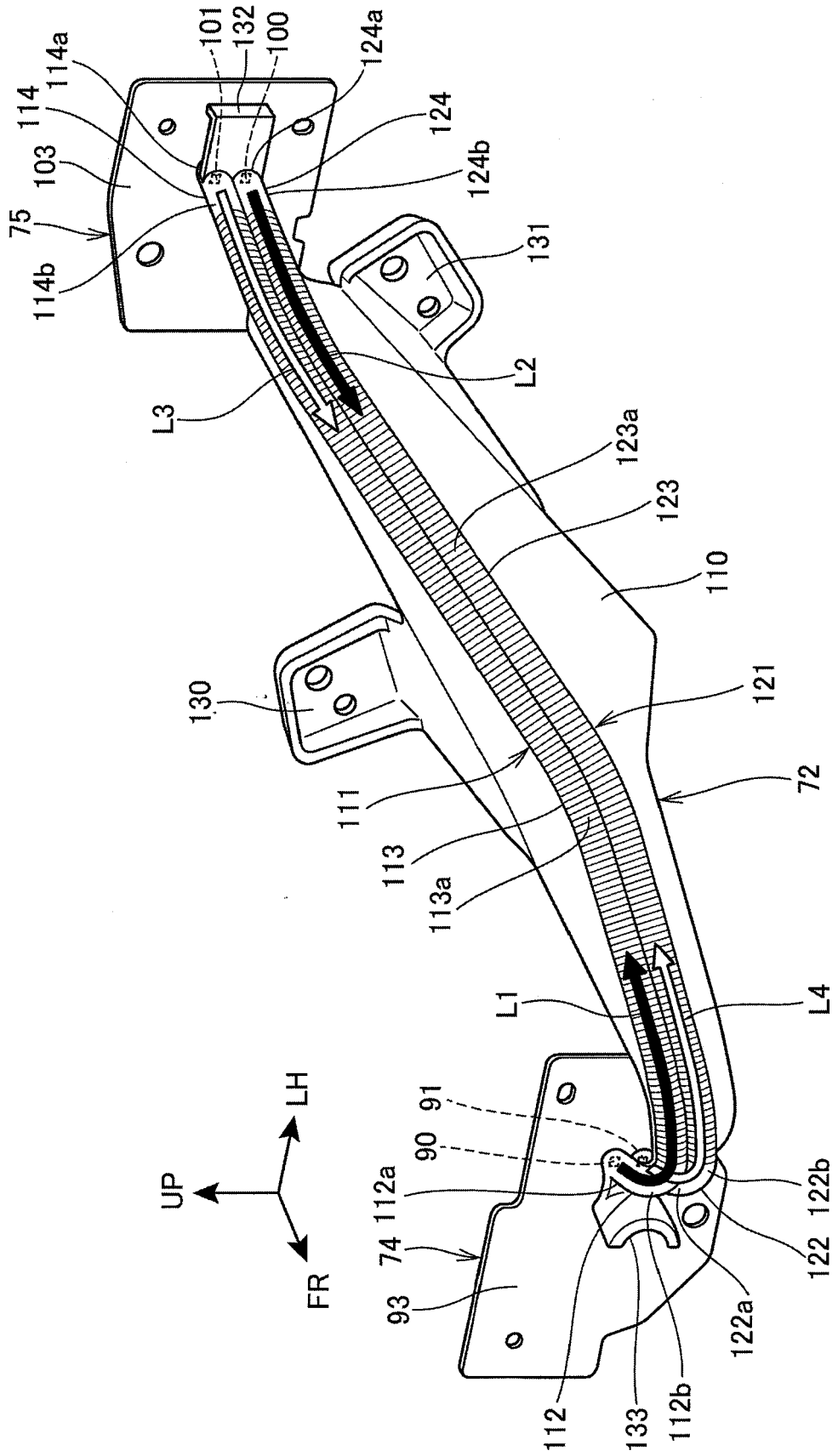
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Fig.8

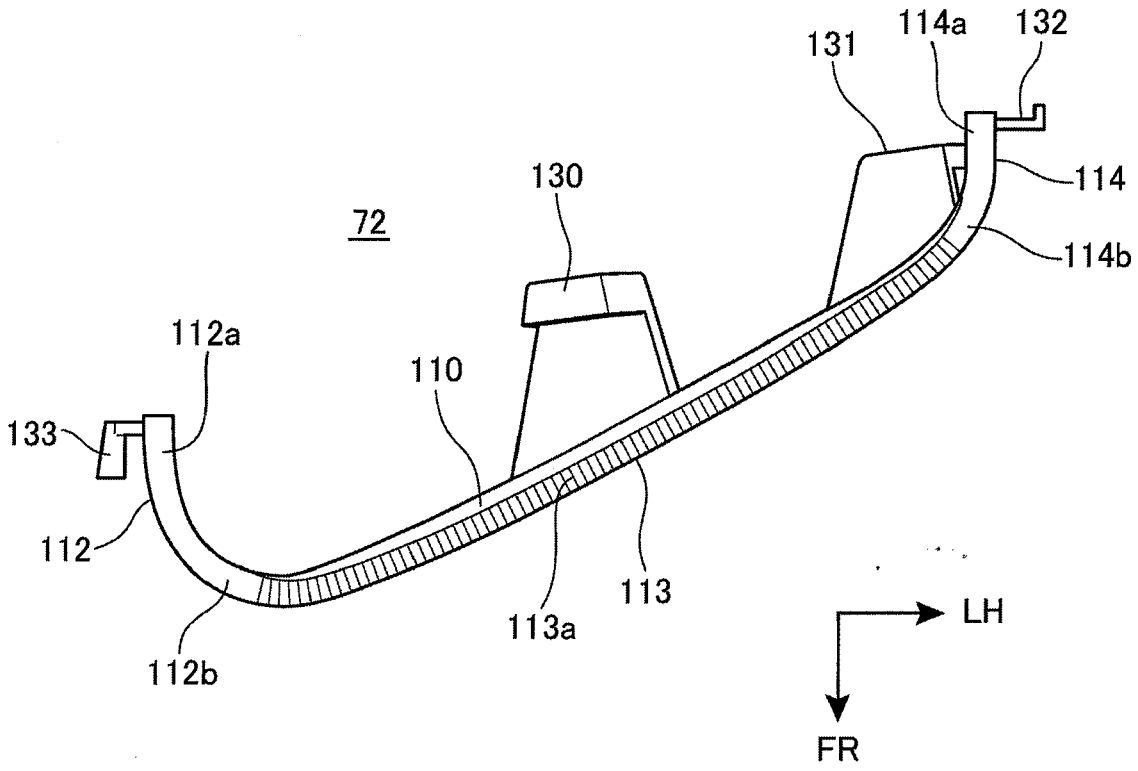
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Fig.9

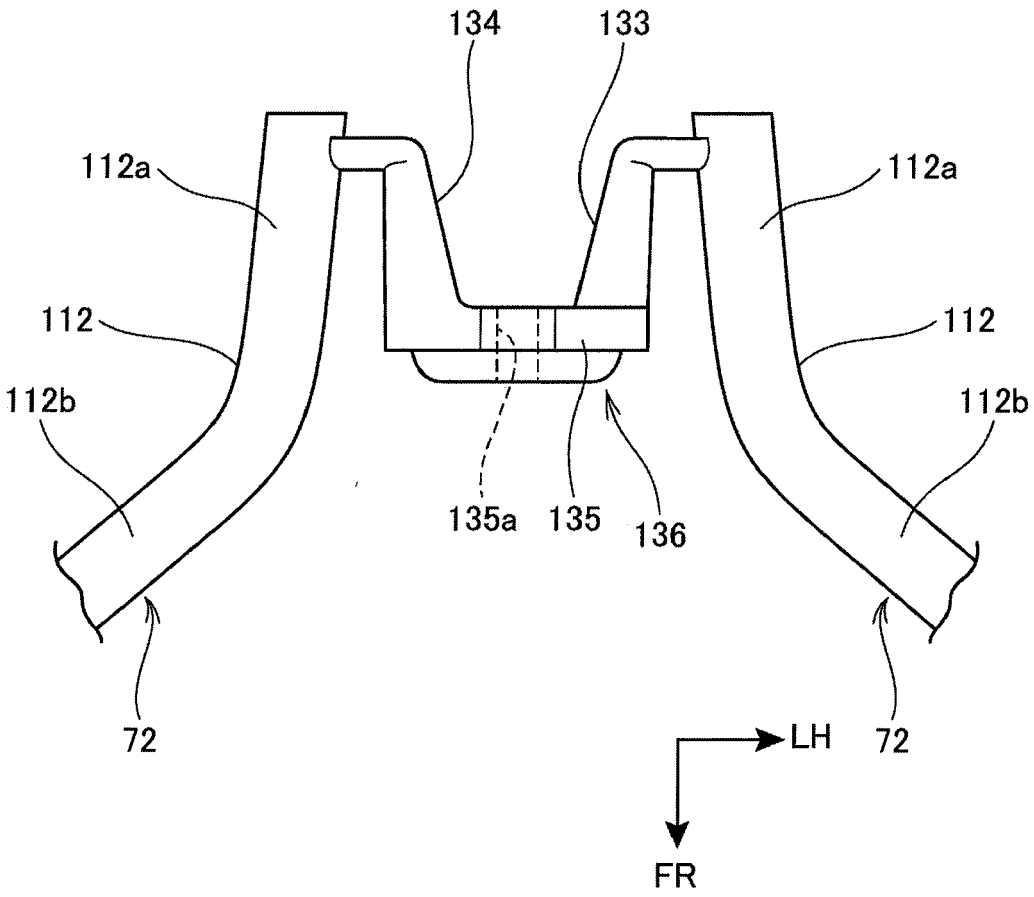


Fig.10

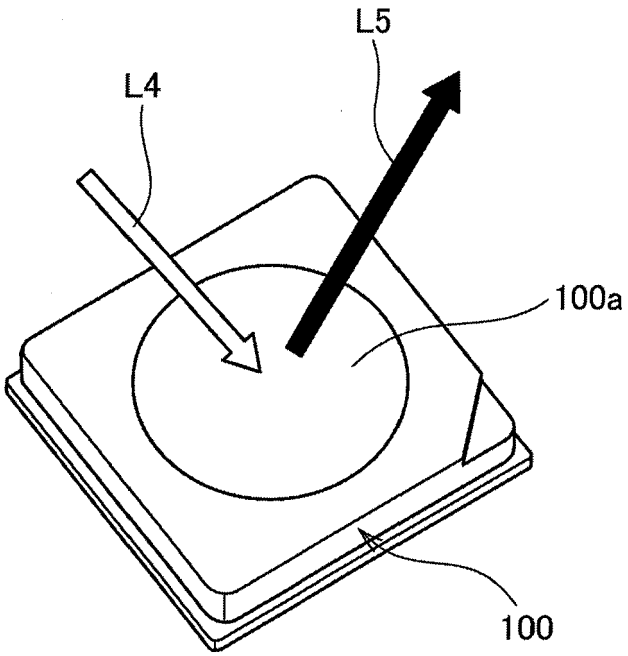
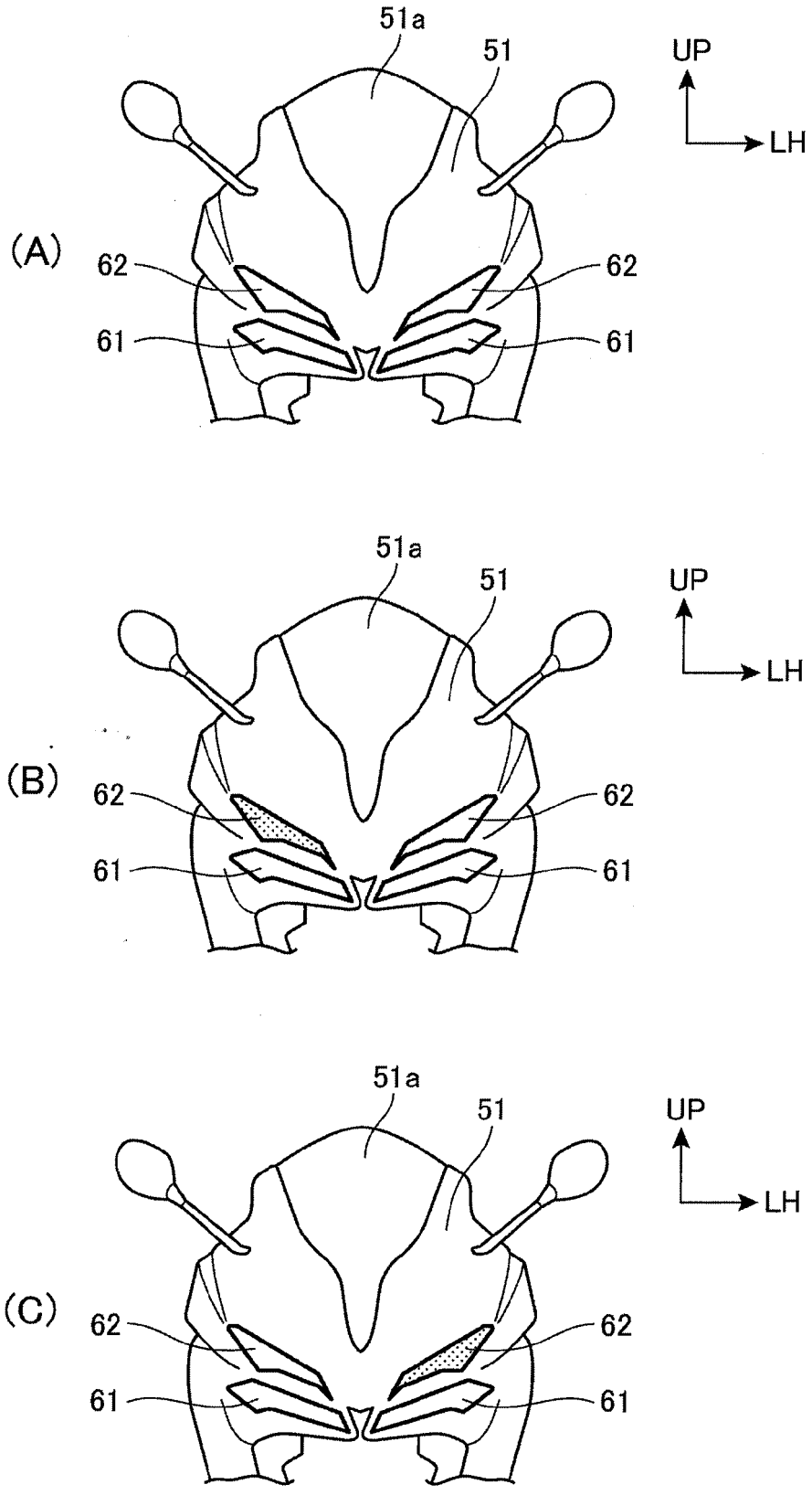


Fig.11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61

Fig12

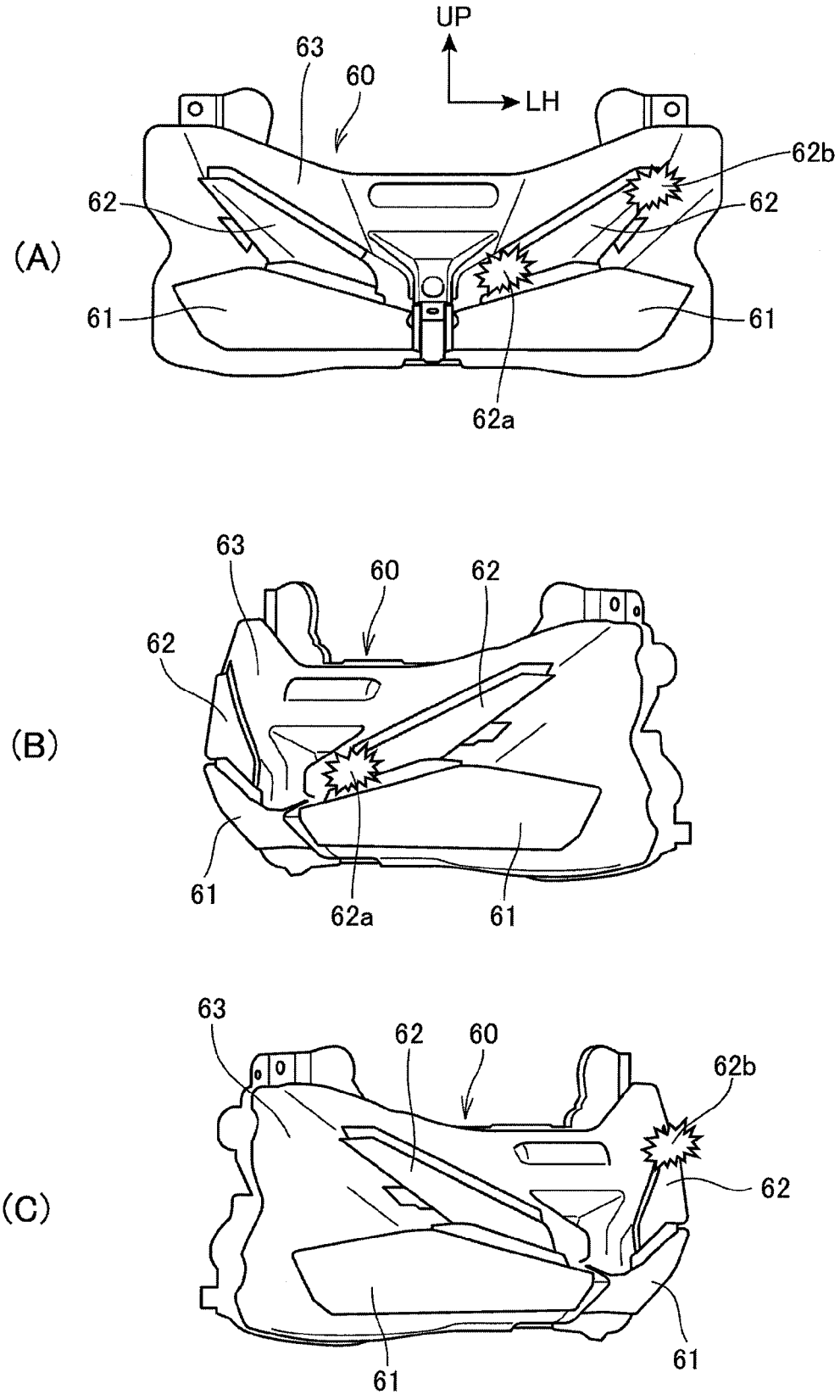
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Fig.13

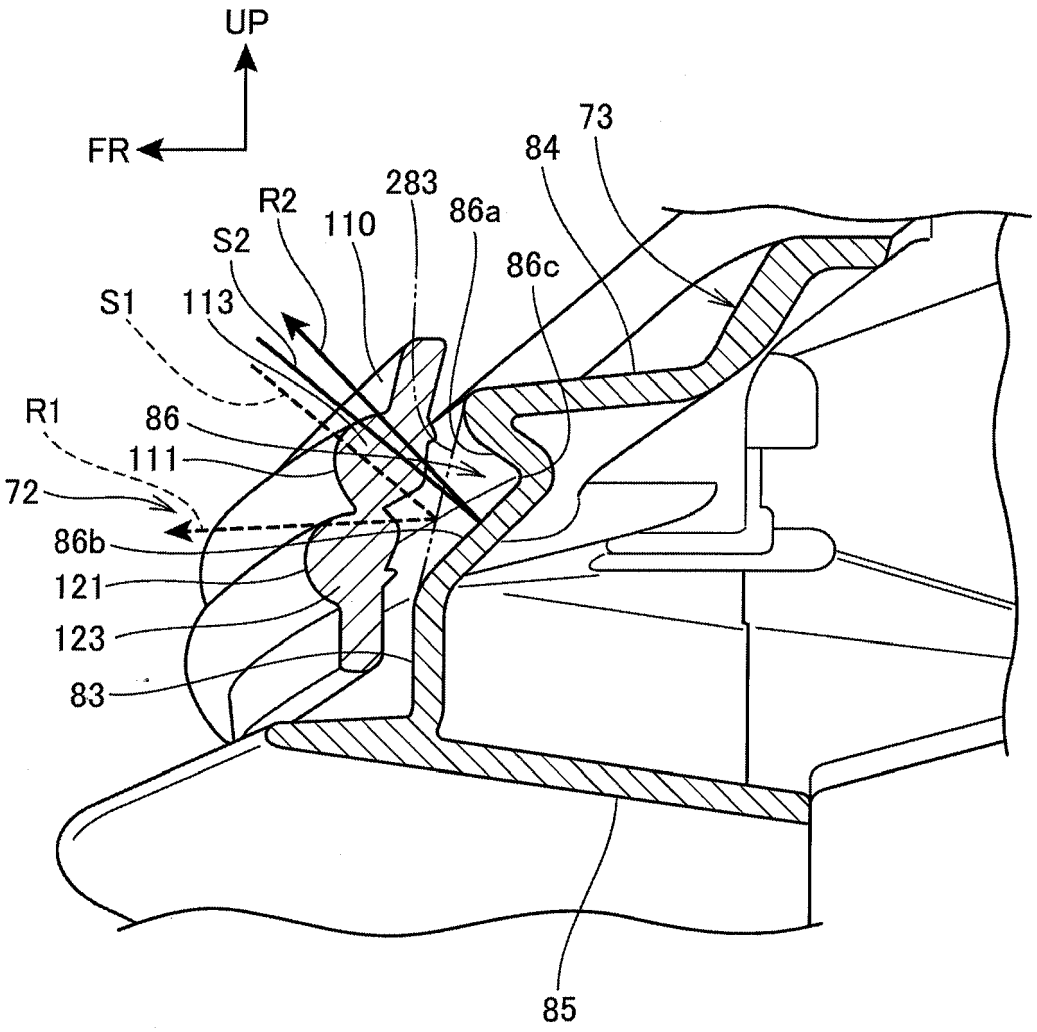
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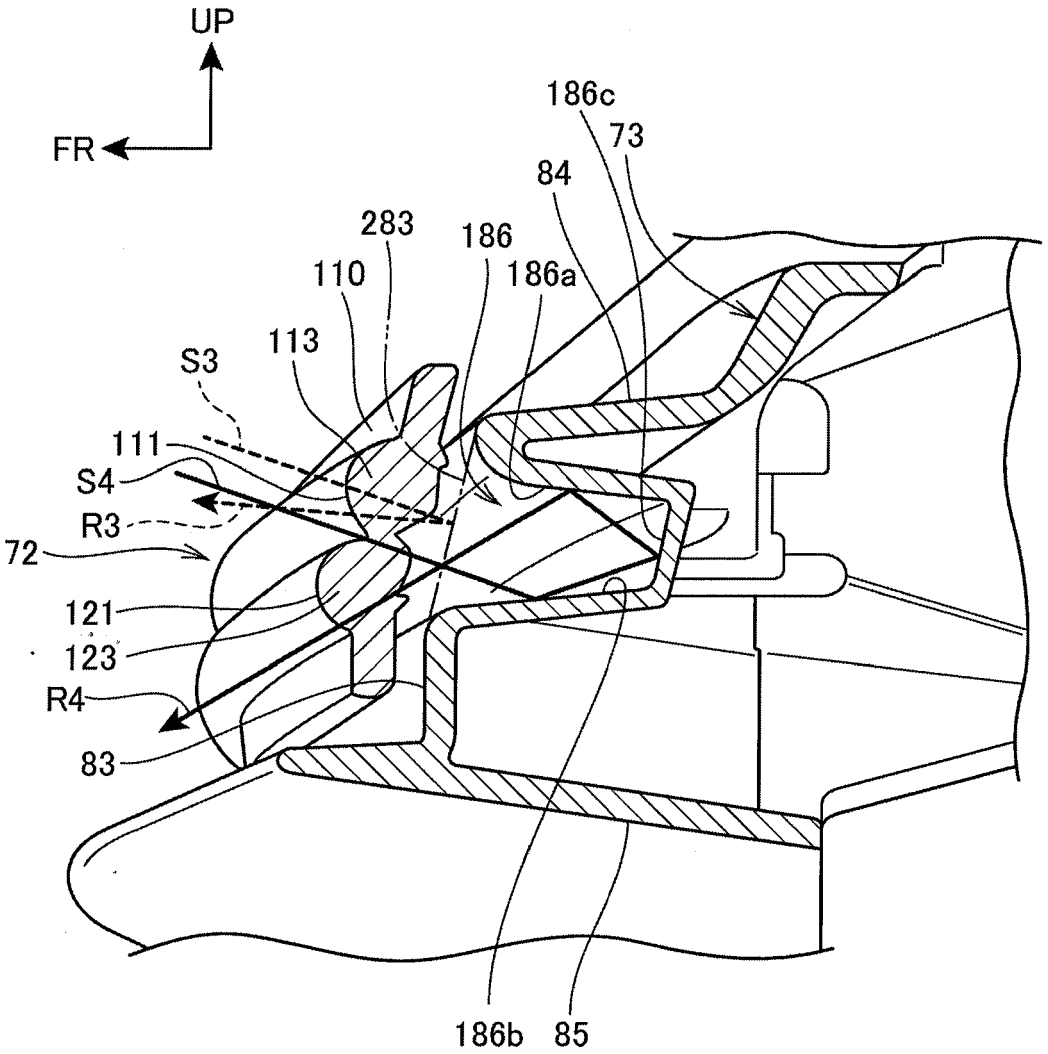
Fig.14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EUROPEAN SEARCH REPORT

Application Number
EP 17 17 3931

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X Y	EP 1 970 250 A1 (ODELO GMBH [DE]) 17 September 2008 (2008-09-17) * paragraphs [0013] - [0025]; figures *	1-6 7-13	INV. F21S8/10
X	DE 10 2012 220696 A1 (HELLA KGAA HUECK & CO [DE]) 15 May 2014 (2014-05-15) * paragraphs [0057], [0071] - [0074]; figures 9,10 *	1-6,9,12	
X	US 2012/224385 A1 (GODBILLON VINCENT [FR] ET AL) 6 September 2012 (2012-09-06) * paragraphs [0063], [0088]; figures 1-2 *	1	
X	EP 2 980 469 A1 (VALEO VISION BELGIQUE [BE]) 3 February 2016 (2016-02-03) * paragraphs [0009], [0025], [0026]; figures 1,3 *	1	
X	JP 2013 206875 A (KOITO MFG CO LTD) 7 October 2013 (2013-10-07) * abstract; figures *	1	TECHNICAL FIELDS SEARCHED (IPC) F21S B60Q
Y	EP 2 977 672 A1 (STANLEY ELECTRIC CO LTD [JP]) 27 January 2016 (2016-01-27) * figures 3,4 *	7-13	
Y	WO 2013/008215 A1 (AUTOMOTIVE LIGHTING ITALIA SPA [IT]; DOMINI CHIARA [IT]; MARCORI FRANC) 17 January 2013 (2013-01-17) * figures 1-2 *	7-13	
A	US 8 118 460 B2 (-) 21 February 2012 (2012-02-21) * abstract *	4,5,8	

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	27 October 2017	Panatsas, Adam

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

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EUROPEAN SEARCH REPORT

Application Number
EP 17 17 3931

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 2 360 425 A1 (STANLEY ELECTRIC CO LTD [JP]) 24 August 2011 (2011-08-24) * abstract; figures *	4,5,8	
A	CN 1 945 107 A (HONDA MOTOR CO LTD [JP]) 11 April 2007 (2007-04-11) * abstract; figures *	4,5,8	
			TECHNICAL FIELDS SEARCHED (IPC)

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	27 October 2017	Panatsas, Adam

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X : particularly relevant if taken alone
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