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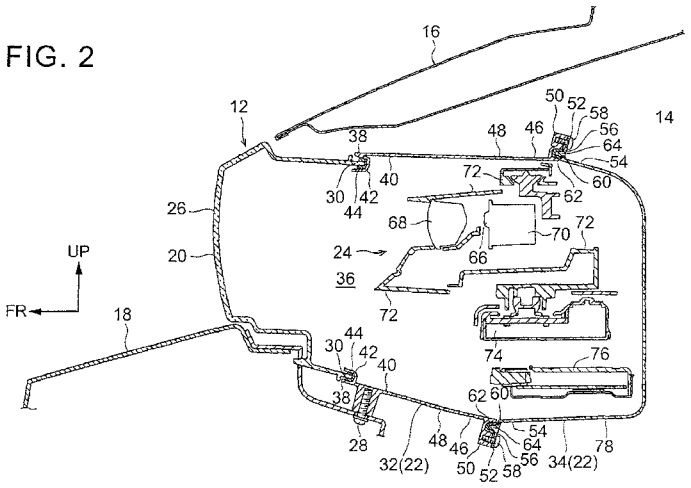
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(54) Title: VEHICLE LAMP STRUCTURE

FIG. 2



(57) Abstract: A vehicle lamp structure includes a lens (20) provided with a plate-shaped mounting portion (30) that is pointed toward a vehicle rear side; and a housing (22) provided with a U-shaped lens joining portion (42) that is open toward a vehicle front side on an inner peripheral side (40) on a side on which the lens (20) is mounted, and in which the mounting portion (30) is retained via a seal member (44).

VEHICLE LAMP STRUCTURE

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The invention relates to a vehicle lamp structure.

2. Description of Related Art

[0002] Japanese Patent Application Publication No. 2013-025970 (JP 2013-025970 A) describes a vehicle lamp structure provided with a housing and a lens that is joined to the housing. More specifically, a lens joining portion that is formed in a U-shape with the opening pointed toward a vehicle front is formed on a front surface opening peripheral edge of the housing. A terminal portion of the lens that extends toward a vehicle rear is fit into this lens joining portion, and the lens and the housing are sealed by a seal member such as hot melt. As a result, the lens is joined to the housing.

[0003] However, with the structure described in JP 2013-025970 A, the lens joining portion provided on the housing to join the lens to the housing is provided on an outside surface of an end portion of the lens side opening of the housing. Therefore, a predetermined space must be provided on the outside of the lens joining portion to prevent this lens joining portion from interfering with other components. That is, an additional space must be provided from the lens joining portion that protrudes from the housing, between the housing and other components, so the mounting positions of this vehicle lamp and other components provided around the vehicle lamp and the like are limited. Therefore, there is room for improvement from the viewpoint of improving the degree of freedom in design.

SUMMARY OF THE INVENTION

[0004] The invention thus provides a vehicle lamp structure capable of improving the degree of freedom in design.

CONFIRMATION COPY

[0005] A first aspect of the invention relates to a vehicle lamp structure that includes a lens provided with a plate-shaped mounting portion, the plate-shaped mounting portion being pointed in one direction, and a housing provided with a U-shaped lens joining portion, the U-shaped lens joining portion being open toward the other direction on an inner peripheral side on a side on which the lens is mounted, the mounting portion being retained in the U-shaped lens joining portion via a seal member.

[0006] According to this vehicle lamp structure, the lens is mounted to the housing by the mounting portion of the plate-shaped lens that is pointed in one direction being retained via the seal member by the lens joining portion that is formed in a U-shape that is open toward the other direction. This lens joining portion is provided on the inner peripheral side of the housing on the side on which the lens is mounted. That is, a lens joining portion that protrudes toward the outside is not provided on the outer peripheral side of the housing, so there is no longer a need to provide a space to avoid interference between the lens joining portion and other components that are provided around the housing, on the outer peripheral side of the housing. Therefore, when determining the mounting position of the vehicle lamp and arranging components around the vehicle lamp, there are no longer restrictions caused by providing the mounting space.

[0007] The vehicle lamp structure has a beneficial effect in which a vehicle lamp structure that improves the degree of freedom in design is able to be obtained.

[0008] The vehicle lamp structure may also be such that the housing includes a housing main body portion and the housing rear end portion, the lens joining portion being provided on the housing main body portion, the housing rear end portion being attached to a rear end side of the housing main body portion from a vehicle rear side, the housing main body portion and the housing rear end portion being separably attached to each other.

[0009] According to this vehicle lamp structure, by separating the housing into the housing main body portion and the housing rear end portion, the end portion of the housing main body portion on the side where the housing rear end portion is provided is open toward the vehicle rear side as one direction, and the end portion of the housing main body portion on the side where the lens is joined is open toward the vehicle front side as

the other direction. That is, even if the lens joining portion is provided on the inner peripheral side of one end portion of the housing main body portion, the other end portion is open, so the housing and the lens joining portion are able to be integrally formed with a mold. On the other hand, if the housing main body portion is integrally formed with the housing rear end portion, the housing is only open at one end portion on the side where the lens is joined. As a result, when forming a housing having this structure with a mold, the mold that is arranged inside the housing is extracted through the opening in the one end portion, but when the lens joining portion is provided on the inner peripheral side of the one end portion, the mold is unable to be extracted. Therefore, the lens joining portion must be formed by a separate body and attached by secondary processing after forming. Also, if the housing and the lens joining portion are integrally formed, a mold that uses a slide core or the like must be used, so the mold construction becomes complex. Furthermore, the housing may be small or a slide core may not be able to be used because of the construction of the mold, due to the shape of the housing. However, by having the other end portion of the housing open as it is in the invention, extraction can be performed from this open end. Therefore, the housing is able to be formed with a simple mold construction that enables the lens joining portion to be integrally formed on the inner peripheral side of one end portion, without a complex mold construction that uses a slide core or the like.

[0010] The vehicle lamp structure has a beneficial effect in that productivity improves.

[0011] The vehicle lamp structure may also be such that the lens joining portion of the housing is provided on an entire periphery of the housing on the side on which the lens is mounted.

[0012] According to this vehicle lamp structure, the mounting portion of the lens is retained by the seal member along the entire periphery of the housing, at the lens joining portion of the housing that retains the mounting portion of the lens. Therefore, rainwater and the like is able to be more reliably inhibited from getting into the housing from outside.

[0013] The vehicle lamp structure has a beneficial effect in that the waterproofing property is able to be improved.

[0014] The vehicle lamp structure may also be such that a housing joining portion that joins the housing main body portion to the housing rear end portion is configured such that a vehicle lower portion side of the housing joining portion is positioned farther toward a vehicle front side than a lower portion of a light emitting unit provided inside the housing; and the housing joining portion is configured such that a vehicle upper portion side of the housing joining portion is positioned farther toward a vehicle rear side than the vehicle lower portion side of the housing joining portion.

[0015] According to this vehicle lamp structure, the vehicle upper portion side of the housing joining portion is provided to the vehicle rear side of the vehicle lower portion side of the housing joining portion. Therefore, clearance between the housing joining portion and a hood panel that is provided on the vehicle upper side of the lamp unit is better able to be ensured. That is, the hood panel is provided inclining toward the vehicle upper side as the hood panel extends toward the vehicle rear side, so more clearance between the hood panel, and the housing joining portion is able to be ensured because the housing joining portion that is provided on the outside surface of the lamp unit is provided toward the vehicle rear side. Also, the vehicle lower portion side of the housing joining portion is provided farther toward the vehicle front side than the lower portion of the light emitting unit, so the lower portion of the light emitting unit is able to be covered by the housing rear end portion. That is, the light emitting unit is able to be protected from the outside.

[0016] This vehicle lamp structure has a beneficial effect in that clearance with the hood panel is able to be improved. Also, the vehicle lamp structure also as a beneficial effect in that the light emitting unit is able to be protected from the outside.

[0017] The vehicle lamp structure may also be such that the housing joining portion is formed on a single plane.

[0018] The vehicle lamp structure may also be such that the housing joining portion has a seal structure that uses an O-ring.

[0019] The vehicle lamp structure may also be such that the housing joining portion has a seal structure that uses a waterproofing protrusion.

[0020] According to this vehicle lamp structure, the housing joining structure may have a seal structure that uses an O-ring. That is, typically the O-ring is an annular seal rubber, but when the housing joining portion is formed three-dimensionally and the O-ring that is formed in an annular shape is used, the O-ring may not be able to follow the three-dimensional shape of the housing joining portion, so there may be locations where there are gaps. As a result, water may get in through these gaps, so sufficient sealability is unable to be obtained. However, by forming the housing joining portion on a single plane, even if an O-ring formed in a planar-shape is used, there will be no locations where the O-ring is unable to follow the housing joining portion, so sealability is able to be ensured.

[0021] This vehicle lamp structure has a beneficial effect in that it is able to be made a waterproof structure by a simple structure.

[0022] The vehicle lamp structure may be such that a light emitting unit is mounted inside of a housing rear end portion.

[0023] According to this vehicle lamp structure, the light emitting unit is able to be easily attached / removed at the same time as the housing rear end portion is removed, by removing the housing rear end portion from the housing main body portion, thus facilitating maintenance of the light emitting unit. If at this time a drying agent, not shown, is provided inside the housing in order to inhibit fogging inside the headlamp unit due to moisture or the like, the housing rear end portion is able to be easily removed from the housing main body portion, so fogging inside the headlamp unit is able to be effectively inhibited by replacing the drying agent as appropriate. Also, the housing rear end portion is provided on the outside of the light emitting unit, so when mounting the light emitting unit to the housing, the light emitting unit is able to be attached to the housing without contacting other components inside the engine compartment. That is, the light emitting unit is able to be protected from the outside when being attached / removed.

[0024] This vehicle lamp structure has a beneficial effect in that maintenance is

able to be improved.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025] Features, advantages, and technical and industrial significance of exemplary embodiments of the invention will be described below with reference to the accompanying drawings, in which like numerals denote like elements, and wherein:

FIG. 1 is a perspective view of a vehicle provided with a vehicle lamp structure according to an example embodiment of the invention, viewed from the vehicle front;

FIG. 2 is an enlarged sectional view of a headlamp unit that shows an enlarged view of the vehicle lamp structure shown in FIG. 1 cut along line A – A;

FIG. 3 is an enlarged sectional view of the headlamp unit that shows an enlarged view of a housing joining portion shown in FIG. 2; and

FIG. 4 is an enlarged sectional view of the headlamp unit corresponding to FIG. 2, that shows an enlarged view of a vehicle lamp structure according to a comparative example.

DETAILED DESCRIPTION OF EMBODIMENTS

[0026] Hereinafter, a vehicle lamp structure according to the invention will be described with reference to FIGS. 1 to 4. In the drawings, arrow FR indicates a forward direction with respect to a vehicle (i.e., a vehicle front), arrow OUT indicates a vehicle left side (one side in a vehicle width direction), and arrow UP indicates an upward direction with respect to the vehicle.

[0027] As shown in FIG. 1, a headlamp unit 12 as a vehicle lamp is provided in two locations, one on each end side in the vehicle width direction, at the front of a vehicle 10. A hood panel 16 that covers an engine compartment 14 (see FIG. 2) is provided on a vehicle upper side of the headlamp unit 12. Also, a front bumper 18 is provided below the headlamp unit 12 in the up and down direction of the vehicle.

[0028] As shown in FIG. 2, the headlamp unit 12 is mounted in the engine compartment 14, and formed by a lens 20, a housing 22, and a light emitting unit 24. The

lens 20 provided on the vehicle front side of the headlamp unit 12 is formed by glass or transparent resin or the like that transmits light. An outer design surface 26 of this lens 20 forms an exterior design surface that is continuous with the hood panel 16 and the front bumper 18. Also, a rear end portion of the lens 20 has a plate-shaped mounting portion 30 that is pointed toward the vehicle rear side as one direction.

[0029] The housing 22 provided on a vehicle rear side of the lens 20 is formed by, for example, a housing main body portion 32 made of resin or the like, and a housing rear end portion 34 made of the same kind of resin that the housing main body portion 32 is made of or the like. This housing 22 is formed in a generally box-shaped shape that has an opening 36 toward the vehicle front side and has a bottom on the vehicle rear end side, and the housing 22 is divided from a substantially center portion into the housing main body portion 32 on the vehicle front side and the housing rear end portion 34 on the vehicle rear side. In this example embodiment, the housing 22 is formed in a generally box-shaped shape, but the housing 22 is not limited to this and may be formed in another shape such as a circular cylindrical shape or an angular tube shape.

[0030] The housing main body portion 32 of the housing 22 is attached to the front bumper 18 or a vehicle body, not shown, by a screw 28 or the like. Also, a lens joining portion 42 is provided on an inner peripheral side 40 of a main body portion front end 38 on the vehicle front side (i.e., the side on which the lens is provided) of the housing main body portion 32. This lens joining portion 42 is formed in a U-shape that is open toward the vehicle front side as the other direction. Moreover, the lens joining portion 42 is provided along the entire periphery of the opening in the main body portion front end 38 of the housing main body portion 32.

[0031] When the lens 20 is mounted to the housing main body portion 32, the mounting portion 30 of the lens 20 is inserted into the U-shape of the lens joining portion 42. A seal member 44 is applied beforehand into the lens joining portion 42, so the mounting portion 30 of the lens 20 is retained in the U-shape of the lens joining portion 42 via the seal member 44. As a result, the lens 20 is mounted to the housing main body portion 32 with no space therebetween, and the opening 36 of the housing 22 is covered by

the lens 20.

[0032] A main body portion-side joining flange 50 that protrudes toward the outside of a housing joining portion is provided on an outer peripheral side 48 of a main body portion rear end 46 of a vehicle rear portion of the housing main body portion 32. This main body portion-side joining flange 50 is provided along the entire periphery of the main body portion rear end 46 of the housing main body portion 32. Also, a flange surface 52 of the main body portion-side joining flange 50 is formed on the same plane along the entire periphery, and is provided with a vehicle upper portion of this flange surface 52 inclined toward the vehicle rear. That is, the vehicle upper portion of the main body portion-side joining flange 50 is provided farther toward the vehicle rear side, in a vehicle side view, than a vehicle lower portion of the same main body portion-side joining flange 50.

[0033] A rear end portion-side joining flange 56 as a housing joining portion that corresponds to the main body portion-side joining flange 50 is provided on a rear end portion front end 54 of a vehicle front portion of the housing rear end portion 34. As shown in FIG. 3, a fastening hole is provided in a direction orthogonal to the flange surface 52, in the main body portion-side joining flange 50 and the rear end portion-side joining flange 56, such that the main body portion-side joining flange 50 and the rear end portion-side joining flange 56 are able to be fastened together by a screw 58. Also, a packing groove 60 formed in a general U-shape in the thickness direction of the flange is provided along the entire periphery of the main body portion-side joining flange 50, and an O-ring 62 is provided in this packing groove 60. Furthermore, a waterproofing protrusion 64 that is a protrusion formed so as to protrude in a direction orthogonal to the flange surface 52 is provided along the entire periphery of the rear end portion-side joining flange 56. Therefore, when the main body portion-side joining flange 50 and the rear end portion-side joining flange 56 are fastened together by the screw 58, a gap between the main body portion-side joining flange 50 and the rear end portion-side joining flange 56 will be filled by the waterproofing protrusion 64 elastically deforming the O-ring 62 provided in the packing groove 60. As a result, the housing main body portion 32 and the

housing rear end portion 34 are able to be joined together with no gap therebetween.

[0034] As shown in FIG. 2, the light emitting unit 24 is provided in the housing 22. This light emitting unit 24 is mounted to the housing rear end portion 34 by means not shown. Therefore, the light emitting unit 24 is able to be removed together with housing rear end portion 34 when the housing rear end portion 34 is removed from the housing main body portion 32. Similarly, the light emitting unit 24 is integrally provided inside the housing 22 when the housing rear end portion 34 is mounted to the housing main body portion 32.

[0035] The light emitting unit 24 has an LED 66 that is a light emitter provided in a position on the vehicle rear side opposite the lens 20. Also, a projection lens 68 that diffuses light emitted by the LED 66 toward the vehicle outside is provided between the lens 20 and the LED 66. Cooling fins 70 made of aluminum, for example, are attached to the vehicle rear side of this LED 66. As a result, heat generated by the LED 66 when LED 66 emits light is able to be efficiently dissipated. The LED 66, the cooling fins 70, and the projection lens 68 are attached to a design cover 72.

[0036] The design cover 72 is connected to an actuator 74 provided in a center portion of the light emitting unit 24 in the up and down direction of the vehicle. Therefore, the orientation of the LED 66 and the projection lens 68 is able to be changed via the design cover 72 by operating the actuator 74, thus enabling the irradiation direction of light emitted by the LED 66 to be adjusted.

[0037] Also, a driver module 76 that stabilizes current flowing to the LED 66 when illuminating the LED 66 is provided below the actuator 74. A length in the vehicle front-rear direction of a lower surface wall 78 formed on a vehicle lower side of the housing rear end portion 34 is substantially the same as the length in the vehicle front-rear direction of this driver module 76. That is, the driver module 76 is covered from the outside of the housing 22 by the lower surface wall 78 of the housing rear end portion 34.

[0038] (Operation and effects)

Next, the operation and effects of this example embodiment will be described.

[0039] Here, the operation and effects of the example embodiment will be

described using a comparative example shown in FIG. 4. Component parts that are the same as those in the example embodiment will be denoted by like reference characters, and a description of these parts will be omitted.

[0040] As shown in FIG. 5, in the comparative example, the lens joining portion 42 is provided on the outer peripheral side 48 of a housing 100. Therefore, because the space for the hood panel 16 and other components such as a headlamp cleaner unit, not shown, is smaller, the lens joining portion 42 may interfere with the hood panel 16 and the other components. Therefore, the mounting position of the headlamp unit 12 and the mounting positions of the peripheral components must be determined with consideration given to ensuring space in order to avoid this interference. In other words, the headlamp unit 12, the mounting position of the headlamp unit 12 and the mounting positions of the peripheral components are limited. Also, the lens 20 of the headlamp unit 12, the hood panel 16, and the front bumper 18 and the like must be designed so as to ensure space to avoid interference. Thus, there is room for improvement in terms of improving the degree of freedom in design.

[0041] Also, the housing 100 of this comparative example is formed in a typical generally box-shaped shape. That is, the housing 100 is open at only one end portion on the side on which the lens 20 is joined. Therefore, when forming the housing 100 having this structure with a mold, a mold arranged inside the housing 100 is extracted through this opening in one end portion, but when the lens joining portion 42 is provided on the inner peripheral side 40 of the one end portion, the mold is unable to be extracted. Therefore, the lens joining portion 42 must be formed by a separate body and attached by secondary processing after forming. Also, if the housing 100 and the lens joining portion 42 are integrally formed without forming the lens joining portion 42 by a separate body, a mold that uses a slide core or the like must be used, so the mold construction becomes complex. Furthermore, the housing 100 may be small or a slide core may not be able to be used because of the construction of the mold, due to the shape of the housing 100.

[0042] On the other hand, as shown in FIG. 2, with the example embodiment, the lens 20 is mounted to the housing 22 by the plate-shaped mounting portion 30 of the lens

20 that is pointed toward the vehicle rear being retained via the seal member 44 by being inserted into the lens joining portion 42 that is formed in a U-shape that is open toward the vehicle front. This lens joining portion 42 is provided on the inner peripheral side 40 of the housing 22. That is, the lens joining portion 42 that protrudes toward the outside is not provided on the outer peripheral side 48 of the housing 22, so there is no need to provide a space to avoid interference between the lens joining portion 42 and other components provided around the housing 22, on the outer peripheral side 48 of the housing 22. Therefore, when determining the mounting position of the headlamp unit 12 and arranging components around the headlamp unit 12, there are no restrictions caused by providing the mounting space. As a result, the headlamp unit 12 according to this example embodiment is able to improve the degree of freedom in design.

[0043] Also, by separating the housing 22 into the housing main body portion 32 and the housing rear end portion 34, not only is the main body portion front end 38, which is an end portion of the housing main body portion 32 on the side on which the lens 20 is joined, open toward the vehicle front side, but also the main body portion rear end 46, which is an end portion of the housing main body portion 32 on the side on which the housing rear end portion 34 is provided, is open toward the vehicle rear side. That is, even if the lens joining portion 42 is provided on the inner peripheral side 40 of one end portion of the housing main body portion 32, the other end portion is open, so the housing 22 and the lens joining portion 42 are able to be integrally formed with a mold, and extraction is able to be performed through this opening. Therefore, the housing 22 is able to be formed with a simple mold construction that enables the lens joining portion 42 to be integrally formed on the inner peripheral side 40 of one end portion, without a complex mold construction that uses a slide core or the like. As a result, productivity is able to be improved.

[0044] Moreover, the entire periphery of the joining portion of the lens 20 and the housing 22 is able to be joined via the seal member 44. Therefore, rainwater and the like is able to be more reliably inhibited from getting into the housing 22 from outside. As a result, the waterproofing property is able to be improved.

[0045] In addition, the vehicle upper portions of the main body portion-side joining flange 50 and the rear end portion-side joining flange 56 are provided to the vehicle rear side of the vehicle lower portions of the main body portion-side joining flange 50 and the rear end portion-side joining flange 56. Therefore, clearance between the hood panel 16 that is provided on the vehicle upper side of the headlamp unit 12, and the main body portion-side joining flange 50 and the rear end portion-side joining flange 56, is better able to be ensured. That is, the hood panel 16 is provided inclining toward the vehicle upper side as the hood panel 16 extends toward the vehicle rear side. Therefore, more clearance between the hood panel 16, and the main body portion-side joining flange 50 and the rear end portion-side joining flange 56, is able to be ensured because the main body portion-side joining flange 50 and the rear end portion-side joining flange 56 that are provided on the outside surface of the headlamp unit 12 are provided toward the vehicle rear side. Also, the vehicle lower portion side of the main body portion-side joining flange 50 and the rear end portion-side joining flange 56 is provided farther toward the vehicle front side than the lower portion of the light emitting unit 24, so the lower portion of the light emitting unit 24 is able to be covered by the housing rear end portion 34. That is, the light emitting unit 24 is able to be protected from the outside. As a result, clearance with the hood panel 16 is able to be improved. Also, the light emitting unit 24 is able to be protected from the outside.

[0046] Also, a seal structure using the O-ring 62 may be used on the main body portion-side joining flange 50 and the rear end portion-side joining flange 56. That is, typically the O-ring 62 is an annular seal rubber, but when the main body portion-side joining flange 50 and the rear end portion-side joining flange 56 are formed three-dimensionally and the O-ring 62 that is formed in an annular shape is used, the O-ring 62 may not be able to follow the three-dimensional shapes of the main body portion-side joining flange 50 and the rear end portion-side joining flange 56, so there may be locations where there are gaps. As a result, water may get in through these gaps, so sufficient sealability is unable to be obtained. However, by forming the main body portion-side joining flange 50 and the rear end portion-side joining flange 56 on the same

plane (i.e., on a single plane), even if the O-ring 62 that is formed in a planar-shape is used, there will be no locations where the O-ring 62 is unable to follow the main body portion-side joining flange 50 and the rear end portion-side joining flange 56, so sealability is able to be ensured. As a result, the structure is able to be made waterproof by a simple structure.

[0047] Further, the light emitting unit 24 is able to be easily attached / removed by removing the housing rear end portion 34 from the housing main body portion 32, thus facilitating maintenance of the light emitting unit 24. If at this time a drying agent, not shown, is provided inside the housing 22 in order to inhibit fogging inside the headlamp unit 12 due to moisture or the like, the housing rear end portion 34 is able to be easily removed from the housing main body portion 32, so fogging inside the headlamp unit 12 is able to be effectively inhibited by replacing the drying agent as appropriate. Also, the housing rear end portion 34 is provided on the outside of the light emitting unit 24, so when mounting the light emitting unit 24 to the housing 22, the light emitting unit 24 is able to be attached to the housing 22 without contacting other components inside the engine compartment 14. That is, the light emitting unit 24 is able to be protected from the outside when being attached / removed. Thus, maintenance is able to be improved.

[0048] In this example embodiment, the lens joining portion 42 is provided inside of the housing 22 of the headlamp unit 12 of the vehicle, but the lens joining portion 42 is not limited to this. That is, this structure may also be applied to a joining portion of a lamp that is formed by two or more components such as a lens and a housing or the like of a tail lamp or a room lamp or the like.

[0049] Also, in this example embodiment, the light emitting unit 24 is formed using the LED 66 as the light emitter, but the light emitting unit 24 is not limited to this. That is, another light emitter such as a halogen bulb or a HID (High Intensity Discharge) bulb may also be used.

[0050] While example embodiments of the invention have been described, the invention is not limited to these and may of course be carried out with various other modifications without departing from the scope thereof.

CLAIMS:

1. A vehicle lamp structure comprising:

a lens provided with a plate-shaped mounting portion, the plate-shaped mounting portion being pointed in one direction; and

a housing provided with a U-shaped lens joining portion, the U-shaped lens joining portion being open toward the other direction on an inner peripheral side on a side on which the lens is mounted, the mounting portion being retained in the U-shaped lens joining portion via a seal member.

2. The vehicle lamp structure according to claim 1, wherein

the housing includes a housing main body portion and a housing rear end portion, the lens joining portion being provided on the housing main body portion, the housing rear end portion being attached to a rear end side of the housing main body portion from a vehicle rear side, the housing main body portion and the housing rear end portion being separably attached to each other.

3. The vehicle lamp structure according to claim 1 or 2, wherein

the lens joining portion of the housing is provided on an entire periphery of the housing on the side on which the lens is mounted.

4. The vehicle lamp structure according to claim 2 or 3, wherein

a housing joining portion that joins the housing main body portion to the housing rear end portion is configured such that a vehicle lower portion side of the housing joining portion is positioned farther toward a vehicle front side than a lower portion of a light emitting unit provided inside the housing; and

the housing joining portion is configured such that a vehicle upper portion side of the housing joining portion is positioned farther toward a vehicle rear side than the vehicle lower portion side of the housing joining portion.

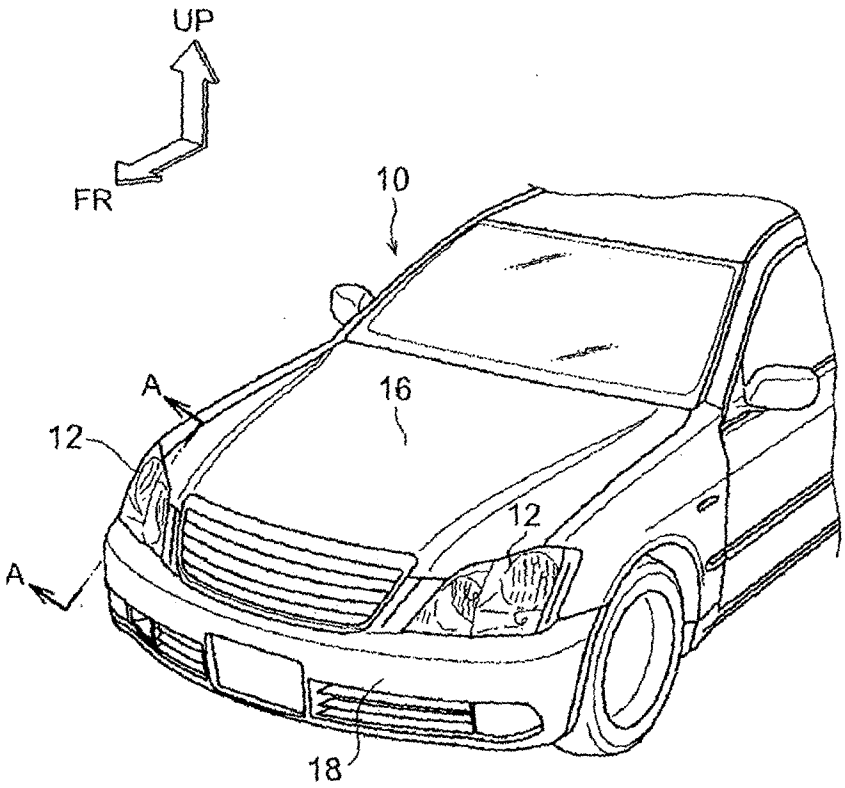
5. The vehicle lamp structure according to any one of claims 1 to 4, wherein the housing joining portion is formed on a single plane.

6. The vehicle lamp structure according to claim 5, wherein the housing joining portion has a seal structure that uses an O-ring.

7. The vehicle lamp structure according to claim 6, wherein the housing joining portion has a seal structure that uses a waterproofing protrusion.

8. The vehicle lamp structure according to any one of claims 1 to 7, wherein a light emitting unit is mounted inside of a housing rear end portion.

FIG. 1



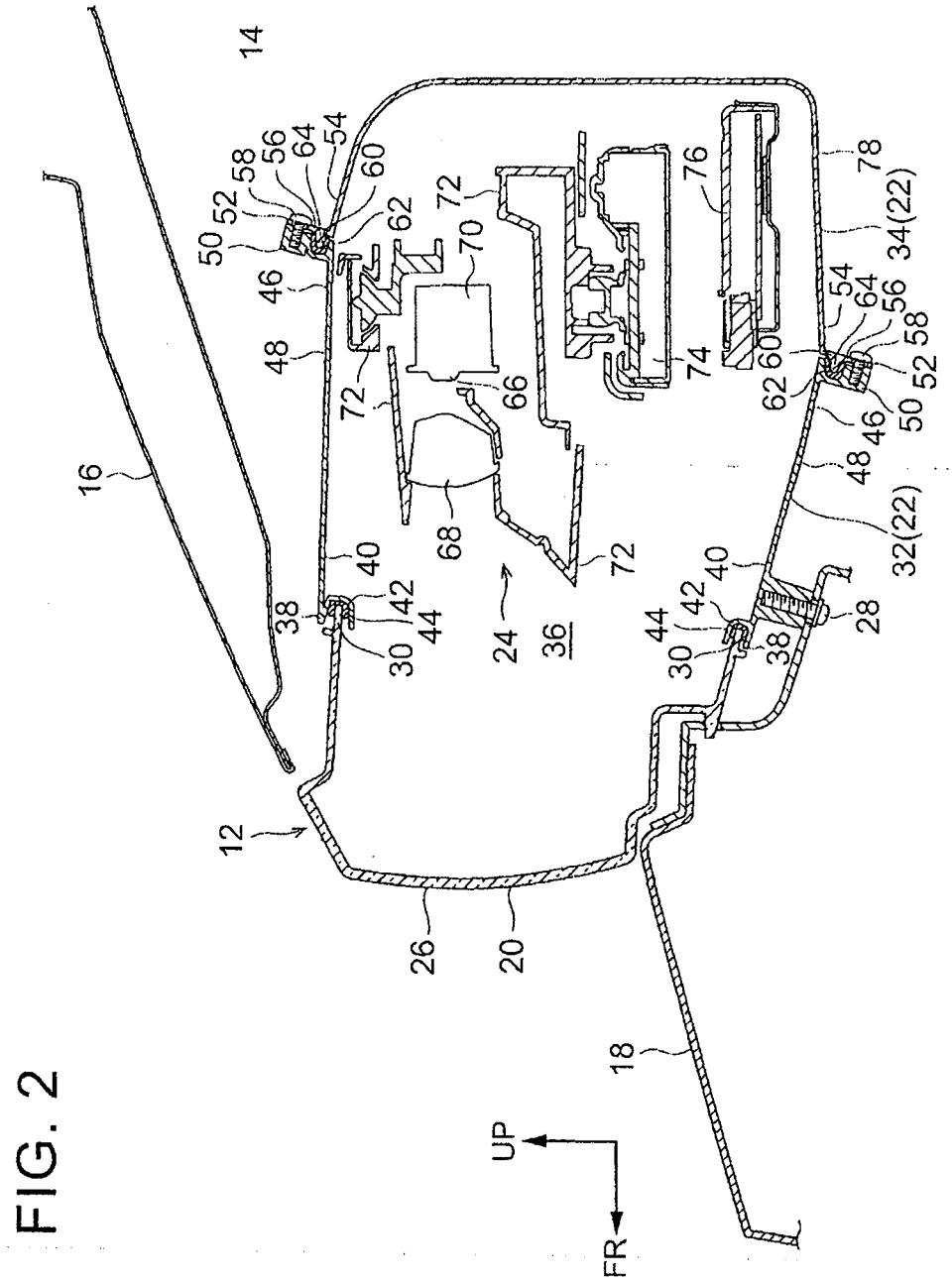
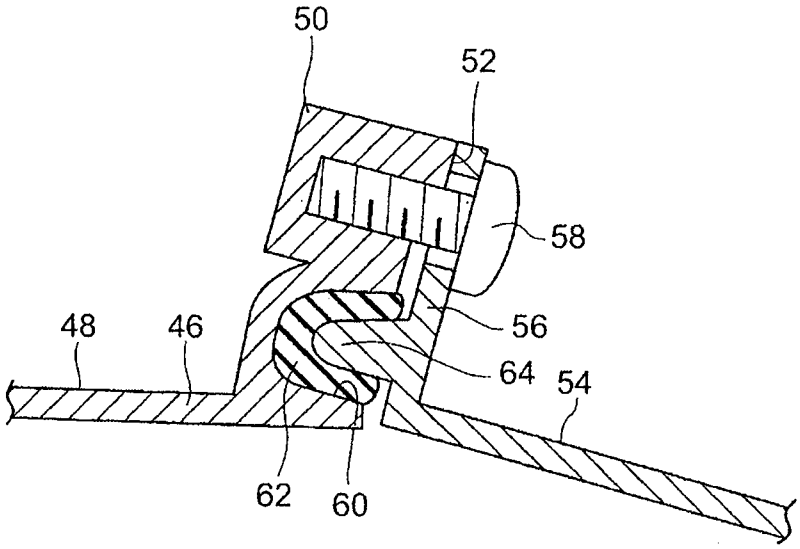

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FIG. 2

FIG. 3



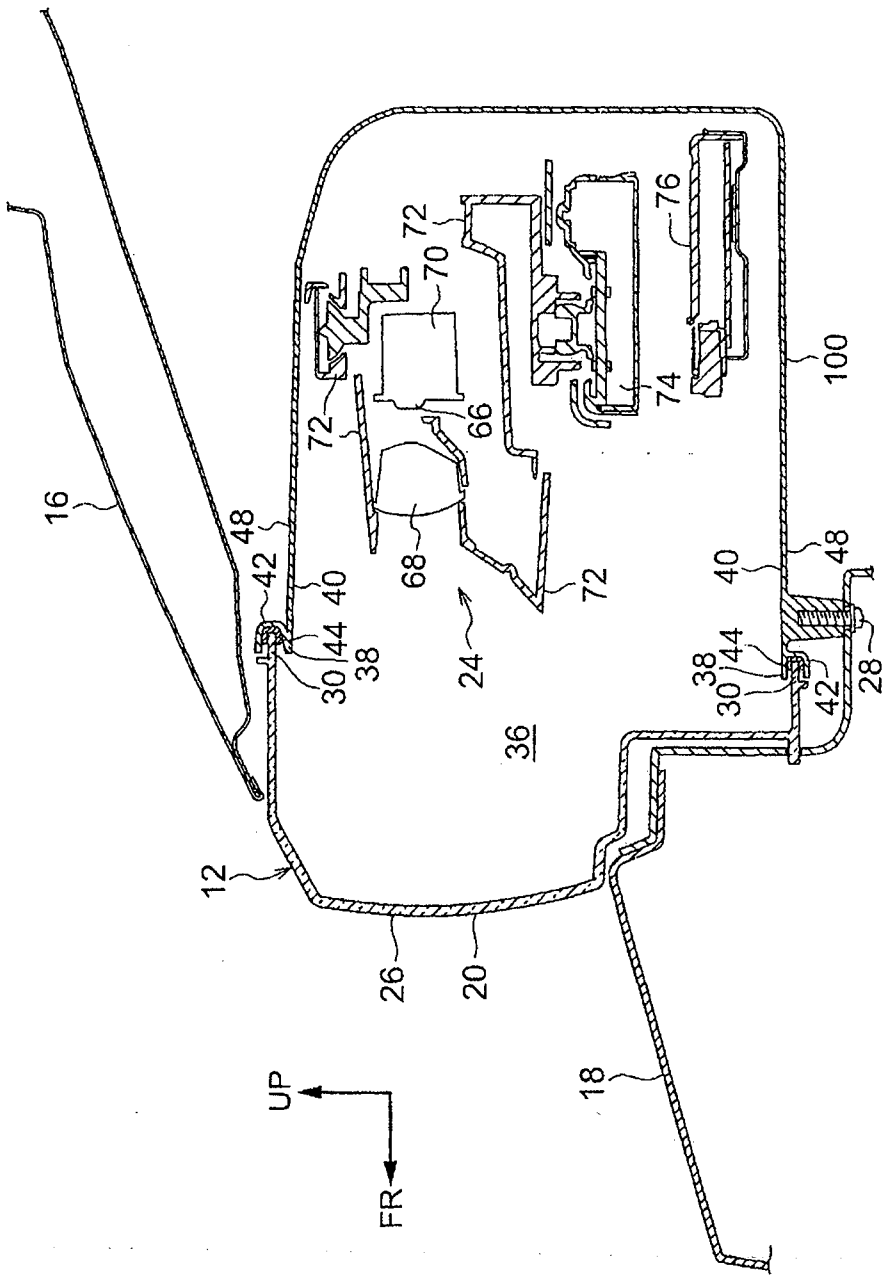


FIG. 4 RELATED ART

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2014/001923

A. CLASSIFICATION OF SUBJECT MATTER
INV. F21S8/10 F21V3/00 F21V17/10 F21V31/00
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
F21S

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 44 14 901 C1 (HELLA KG HUECK & CO [DE]) 1 June 1995 (1995-06-01) column 4, lines 11-32; figures 1, 2	1,3
X	DE 101 43 676 A1 (AUTOMOTIVE LIGHTING REUTLINGEN [DE]) 27 March 2003 (2003-03-27) paragraph [0033]; figure 1	1,3
X	SI 21 197 A (SATURNUS AVTOOPREMA D D [SI]) 31 October 2003 (2003-10-31) figure 1	1-3,8
X	DE 40 36 031 C1 (HELLA KG HUECK & CO [DE]) 27 February 1992 (1992-02-27) figure 1	1-8

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
20 January 2015	27/01/2015

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	von der Hardt, M

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/IB2014/001923

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 4414901 C1	01-06-1995	DE 4414901 C1	01-06-1995
		IT TO950320 A1	30-10-1995
DE 10143676 A1	27-03-2003	NONE	
SI 21197 A	31-10-2003	NONE	
DE 4036031 C1	27-02-1992	BR 9104899 A	23-06-1992
		CS 9103423 A3	13-05-1992
		DE 4036031 C1	27-02-1992
		EP 0485832 A2	20-05-1992
		ES 2062642 T3	16-12-1994
		US 5136482 A	04-08-1992