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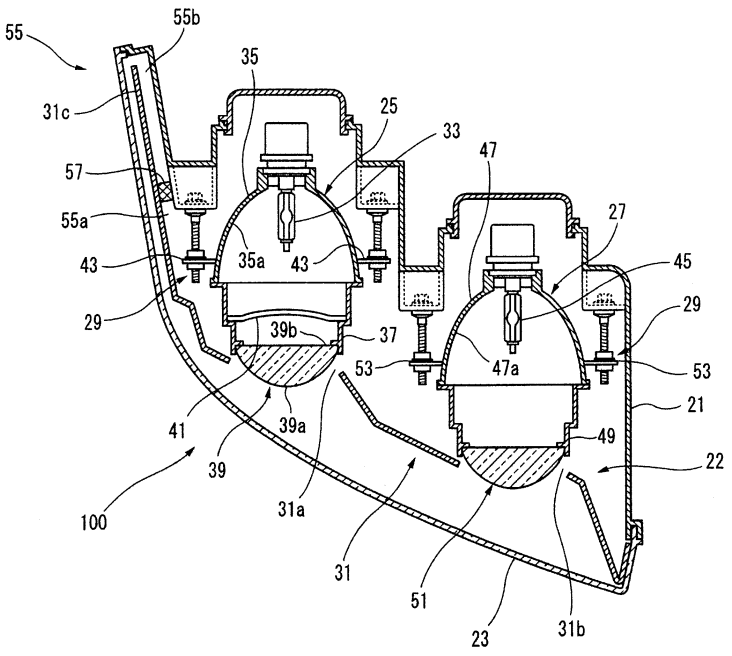
(54) Vehicular headlamp

(57) To block an air flow turning at a terminal end section of an extension from between the extension and a lamp body in a rear section of a lamp chamber end section to blow on a cover, and prevent formation of dew on the cover in the rear section of the lamp chamber end section.

A vehicular headlamp (100) includes two lamp units (25) and (27) as projector-type lamp units and an extension (31) covering gaps among a lamp body (21) and the lamp units (25) and (27). A lamp chamber (22) has a lamp chamber end section (55) extending laterally with respect to the projector-type lamp unit (25) and rearward of a vehicle, and an air flow blocking section (57) that blocks air flowing in a rear section (55b) of the lamp chamber end section (55) from the lamp units (25) and (27) is provided between the extension (31) and the lamp body (21) in a front section (55a) of the lamp chamber end section (55).

FIG. 1



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Description

Background to the Invention

[0001] Some vehicular headlamps have a projector-type lamp unit provided therein. The projector-type lamp unit generally includes a light source, a projection lens, and a reflector that reflects light from the light source forward toward the projection lens. The vehicular headlamp forms a lamp chamber sealed by attaching a cover in front of a lamp body, and the projector-type lamp unit is provided inside the lamp chamber.

[0002] An extension for covering and hiding portions other than the projection lens of the projector-type lamp unit, a gap between the lamp body and the projector-type lamp unit, and the like is provided inside the vehicular headlamp having the projector-type lamp unit provided therein. The extension has an opening section for releasing light from the projector-type lamp unit externally. Thus, the lamp chamber is divided into a space (front chamber) between the cover and the extension and a space (rear chamber) between the extension and the lamp body with the extension being the boundary.

[0003] Since, in the projector-type lamp unit, the opening of the reflector formed of an approximate ellipsoidal curved surface is covered by the projection lens and the light source is heated in a space within the unit not having a large opening, high-temperature air easily flows out externally. The high-temperature air flown out flows between the extension and the lamp body and becomes an ascending current to generate a convective flow.

[0004] For example, in a vehicular headlamp in which a low-beam unit is arranged above a high-beam unit, the low-beam unit is used with high frequency in a normal usage state, and the temperature of a front surface cover on a side of the high-beam unit used with low frequency hardly increases. Therefore, in normal usage, moisture generated in a low-beam radiation surface of the front surface cover temporarily rises due to the convective flow, and then flows below to a low temperature section side to thereby stagnate in a lamp bottom section.

[0005] Therefore, dew is formed on an inner surface of the front surface cover on the high-beam unit side to cause a phenomenon of fogging.

[0006] In order to prevent such formation of dew, an automobile lamp disclosed in, for example, Japanese Patent Application Publication No. JP-A-2004-119198 prevents the dew from being formed particularly on the front surface cover by providing a current plate to change the direction and the flow speed of the convective flow in the lamp.

[0007] In recent years, along with the increase in size and increase of slanted shapes in vehicular headlamps, a lamp shape in which a lamp chamber end section extends apart from a light source is required. Due to such slanted shape, a lamp chamber has a lamp chamber end section 500, such as that shown in FIG. 6, extending laterally with respect to a projector-type lamp unit provided therein and rearward of a vehicle.

[0008] The lamp chamber end section 500 is formed with a flat space 505 having a thin thickness between a lamp body 501 and a front surface cover (cover) 503. Between the front surface cover 503 and the lamp body 501, an extension 507 is arranged to divide the flat space in the thickness direction.

[0009] Since high-temperature air flows out between the extension 507 and the lamp body 501 from the projector-type lamp unit, an air flow 509 of high-temperature air that turns at a terminal end section 507a of the extension 507 to be blown out toward the front surface cover 503 easily occurs in the lamp chamber end section 500. When the high-temperature air flow 509 occurs, dew 511 is formed on the inner surface of the front surface cover, which is apart from a light source and is cooled by external air. This phenomenon of dew formation became more apparent as the distance from the light source to the lamp chamber end section 500 increased. With the structure in which the high-beam unit and the low-beam unit are not arranged in the up-down direction as in the example of the related art described above, i.e., a structure of horizontal arrangement, the dew formation in the lamp chamber end section also occurred in the same manner.

[0010] The present invention has been made in view of the situation described above, and has an object of providing a vehicular headlamp in which an air flow turning at a terminal end section of an extension from between the extension and a lamp body to blow on a cover can be blocked in a rear section of a lamp chamber end section to prevent formation of dew at the cover in the rear section of the lamp chamber end section.

Summary of the Invention

[0011] The above-described object of the present invention is achieved by a vehicular headlamp including, in a lamp chamber formed of a lamp body and a cover, a projector-type lamp unit having a light source, a projection lens, and a reflector that reflects light from the light source forward toward the projection lens, and an extension that covers a gap between the lamp body and the projector-type lamp unit, wherein the lamp chamber has a lamp chamber end section extending laterally with respect to the projector-type lamp unit and rearward of a vehicle, and an air flow blocking section that blocks air flowing rearward of the lamp chamber end section from the projector-type lamp unit is provided between the extension and the lamp body in a front section of the lamp chamber end section.

[0012] With the vehicular headlamp having the configuration described above, high-temperature air leaking from the projector-type lamp unit is stopped by the air flow blocking section from flowing from a space between the extension and the lamp body toward the rear section of the lamp chamber end section. Accordingly, the high-temperature air does not flow from the front section of the lamp chamber end section into the rear section there-

of, whereby the cover is not blown by the high-temperature air that has flown in and turned at a terminal end section of the extension from between the extension and the lamp body in the rear section of the lamp chamber end section.

[0013] Further in the vehicular headlamp having the configuration described above, it is preferable that the air flow blocking section be formed by causing a portion of the extension or the lamp body to protrude in a direction to reduce the gap between the lamp body and the extension.

[0014] With the vehicular headlamp having such configuration, the air flow blocking section is formed integrally with the lamp body or the extension, whereby formation becomes easy. The gap between the lamp body and the extension can be closed simultaneously with the extension being assembled to the lamp body, and extra assembly work of attaching an exclusive member for a blocking high-temperature air flow is not necessary.

[0015] Further in the vehicular headlamp having the configuration described above, it is preferable that a lower section of the extension below the projector-type lamp unit be provided with a ventilation opening section for causing air between the cover and the extension to flow in between the extension and the lamp body.

[0016] With the vehicular headlamp having such configuration, an ascending current is formed in the space between the extension and the lamp body due to heat of the projector-type lamp unit, and air cooled by the cover to have a low temperature and high humidity flows between the extension and the lamp body from the ventilation opening section, thereby forming dew on a back surface of the extension and a surface of the lamp body. Accordingly, formation of dew due to air having high temperature and humidity hardly occurs on an inner surface of the cover in the lamp chamber end section.

Brief Description of the Drawings

[0017] A preferred embodiment of a vehicular headlamp according to the present invention will be described below in detail with reference to the accompanying drawings, in which:-

FIG. 1 is a horizontal sectional view of a vehicular headlamp according to the present invention.

FIG. 2 is a front view of the vehicular headlamp shown in FIG. 1.

FIG. 3 is a view on arrow along III-III of FIG. 2.

FIG. 4 is a perspective view of the vehicular headlamp shown in FIG. 1 when seen from the front left-upward direction.

FIG. 5 is an enlarged sectional view of a lamp chamber end section of the vehicular headlamp shown in FIG. 1.

FIG. 6 is an enlarged sectional view of a lamp chamber end section of a vehicular headlamp of the related art.

Detailed Description

[0018] FIG. 1 is a horizontal sectional view of the vehicular headlamp according to the present invention, FIG. 2 is a front view of the vehicular headlamp shown in FIG. 1, FIG. 3 is a view on arrow along III-III of FIG. 2, FIG. 4 is a perspective view of the vehicular headlamp shown in FIG. 1 when seen from the front left-upward direction, and FIG. 5 is an enlarged sectional view of a lamp chamber end section of the vehicular headlamp shown in FIG. 1.

[0019] As shown in FIG. 1, a vehicular headlamp 100 according to this embodiment is a lamp arranged in a front right end section of a vehicle, and two lamp units 25 and 27 are arranged to be adjacent to each other in the vehicle width direction to be stored in a lamp chamber 22 formed of a lamp body 21 and a translucent front surface cover (cover) 23 attached to a front end opening section thereof. In the vehicular headlamp 100, a low-beam distribution pattern is formed by lighting the lamp unit 25, and a high-beam distribution pattern is formed by simultaneously lighting the lamp units 25 and 27.

[0020] The two lamp units 25 and 27 both have an optical axis extending in the vehicle front-rear direction, and are supported to the lamp body 21 through aiming mechanisms 29 so as to be capable of tilting in the up-down direction and the left-right direction. At a stage where aiming adjustments by the aiming mechanisms 29 are completed, the optical axis of the lamp unit 25 extends in a direction approximately 0.5 to 0.6o downward with respect to the vehicle front-rear direction, while the optical axis of the lamp unit 27 extends in the vehicle front-rear direction.

[0021] The front surface cover 23 is formed to curve rearward along the shape of the vehicle on a right side corner section of a front end section of the vehicle from the inside in the vehicle width direction to the outside in the vehicle width direction, and to curve rearward from a lower end edge to an upper end edge thereof. Therefore, as shown in FIG. 4, the two lamp units 25 and 27 are arranged such that the lamp unit 25 located on the outside in the vehicle width direction is displaced to the rearward side to some degree with respect to the lamp unit 27 located on the inside in the vehicle width direction.

[0022] In the lamp chamber 22, an extension 31 covering gaps among the lamp body 21 and the two lamp units 25 and 27 is provided along the front surface cover 23. The extension 31 is formed with opening sections 31a and 31b encompassing projection lenses 39 and 51 of the respective lamp units 25 and 27 in the vicinity of front end sections thereof. The opening sections 31 a and 31 b are openings for releasing light from the lamp units 25 and 27 externally.

[0023] Next, the configurations of the respective lamp units 25 and 27 will be described. First, the configuration of the lamp unit 25 will be described.

[0024] The lamp unit 25 is a projector-type lamp unit, and includes a light source bulb 33, a reflector 35, a lens

holder 37, the projection lens 39, and a shade 41.

[0025] The projection lens 39 is configured as a plano-convex lens having a forward side surface 39a as a curved convex surface and a rear end surface (rearward side surface) 39b as a flat surface, and a lens center axis is arranged on the optical axis. The projection lens 39 projects an image on a focal plane including a rearward focal point thereof forward as an inverted image. The forward side surface 39a of the projection lens 39 emits light reaching the projection lens 39 via the reflector 35 to be approximately parallel with the optical axis.

[0026] The lens holder 37 is formed to extend approximately in a cylinder shape step-tapered forward from a front end opening section of the reflector 35, is fixedly supported by the reflector 35 at a rear end section thereof, and fixedly supports the projection lens 39 at a front end section thereof.

[0027] The light source bulb 33 is a discharge bulb such as a metal halide bulb with a discharge light-emitting section as a light source, and the light source is configured as a line segment light source extending in the center axis direction of the bulb. The light source bulb 33 is inserted and secured to a rear end opening section of the reflector 35 from the rearward side such that the light source is arranged on the optical axis and provided rearward with respect to the rearward focal point of the projection lens 39.

[0028] The reflector 35 has a reflective surface 35a that reflects light from the light source forward toward the optical axis. The reflective surface 35a has a sectional shape approximately in an elliptical shape, and the light from the light source is reflected by the reflective surface 35a to approximately converge in the vicinity of the rearward focal point of the projection lens 39 in a vertical sectional surface.

[0029] The reflector 35 is supported to the lamp body 21 through the aiming mechanisms 29 using aiming brackets 43 formed at four parts.

[0030] The shade 41 is fixedly supported by the lens holder 37 to be located approximately in a lower half section in an inner section space of the lens holder 37. The shade 41 is formed such that an upper end edge thereof passes through the rearward focal point of the projection lens 39, so that a part of reflected light from the reflective surface 35a of the reflector 35 is blocked to remove a majority of upward light to be emitted forward from the projection lens 39.

[0031] Next, the configuration of the lamp unit 27 will be described.

The lamp unit 27 also is a projector-type lamp unit in the same manner as the lamp unit 25, and includes a light source bulb 45, a reflector 47, a lens holder 49, and a projection lens 51.

[0032] The lamp unit 27 does not include the shade 41 as in the lamp unit 25, but other configurations are approximately the same as in the case of the lamp unit 25. Note that the shape of the reflective surface of the reflector 47 of the lamp unit 27 is set such that the convergence position of light from the light source is slightly closer to the rearward focal point of the projection lens 51 compared with that of the reflector 35 of the lamp unit 25.

[0033] The lamp unit 27 also is supported to the lamp body 21 through aiming mechanisms 29 using aiming brackets 53 formed at four parts of the reflector 47.

[0034] As described above, the front surface cover 23 is formed to curve rearward along the shape of the vehicle on the right side corner section of the front end section of the vehicle from the inside in the vehicle width direction to the outside in the vehicle width direction. Accordingly, as shown in FIGS. 1 to 4, the lamp chamber 22 includes a lamp chamber end section 55 extending laterally with respect to the lamp unit 25 and rearward of the vehicle.

[0035] The lamp chamber 22 is divided into a space (front chamber) between the front surface cover 23 and the extension 31 and a space (rear chamber) between the extension 31 and the lamp body 21 with the extension 31 being the boundary.

[0036] The lamp body 21 and the front surface cover 23 in the lamp chamber end section 55 are arranged to face each other with a flat space therebetween. An extended terminal end section 31 c of the extension 31 is arranged approximately in a center section of the flat space in the thickness direction, and the terminal end section 31c divides the flat space in the thickness direction.

[0037] Between the extension 31 and the lamp body 21 in a front section 55a of the lamp chamber end section 55, an air flow blocking section 57 is provided.

[0038] The air flow blocking section 57 is provided in the vicinity of the aiming bracket 43 securing the lamp unit 25, and extends for a predetermined length in the up-down and left-right directions along the lamp body 21 and the extension 31.

[0039] The air flow blocking section 57 has one end bonded to the lamp body 21 and the other end section arranged to contact the extension 31, so that air 63 (see FIG. 5) flowing from the lamp units 25 and 27 to a rear section 55b of the lamp chamber end section 55 is blocked. At the same time, the displacement of the extension 31 is suppressed.

[0040] Note that the air flow blocking section 57 can be formed by, for example, causing a portion of the extension 31 or the lamp body 21 to protrude in a direction to reduce the gap between the lamp body 21 and the extension 31.

[0041] When the air flow blocking section 57 is formed integrally with the lamp body 21 or the extension 31 in this manner, formation becomes easy, the gap between the lamp body 21 and the extension 31 can be closed simultaneously with the extension 31 being assembled to the lamp body 21, and extra assembly work of attaching an exclusive member for blocking a high-temperature air flow is not necessary.

[0042] As shown in FIGS. 2 to 4, a lower section 31 d of the extension 31 below the lamp unit 25 is provided with a ventilation opening section 59 for causing air 67

(see FIG. 3) between the front surface cover 23 and the extension 31 to flow in between the extension 31 and the lamp body 21. Note that, when the vehicular headlamp 100 is attached to the vehicle, the ventilation opening section 59 is covered by, for example, a bumper 61 as a part of the vehicle and cannot be seen from the front.

[0043] With the vehicular headlamp 100 of this embodiment, the high-temperature air 63 (see FIG. 5) leaking from the lamp units 25 and 27 to flow from the space between the extension 31 and the lamp body 21 toward the rear section 55b of the lamp chamber end section 55 is stopped by the air flow blocking section 57.

[0044] Accordingly, the high-temperature air 63 does not flow into the rear section 55b from the front section 55a of the lamp chamber end section 55, whereby the front surface cover 23 is not blown by the high-temperature air 63 that has flown in and turned at the terminal end section 31 c from between the terminal end section 31c of the extension 31 and the lamp body 21 in the rear section 55b of the lamp chamber end section 55.

[0045] In the space between the extension 31 and the lamp body 21 and the space between the front surface cover 23 and the extension 31, an ascending current 65 (see FIG. 3) is formed due to heat from the opening sections 31 a and 31 b of the lamp units 25 and 27.

[0046] The air 67 cooled by the front surface cover 23 to have a low temperature and high humidity flows between the extension 31 and the lamp body 21 from the ventilation opening section 59, thereby forming dew on an inner surface and the like of the lamp body 21 in the rear chamber. Accordingly, formation of dew due to air having high temperature and humidity hardly occurs on an inner surface of the front surface cover 23 in the lamp chamber end section 55.

[0047] That is, with the vehicular headlamp 100 of this embodiment, the high-temperature air 63 leaking from the lamp units 25 and 27 to flow from the space between the extension 31 and the lamp body 21 toward the rear section 55b of the lamp chamber end section 55 is stopped by the air flow blocking section 57, whereby the air flow 509 (see FIG. 6) can be prevented from turning at the terminal end section 31 c of the extension 31 from between extension 31 and the lamp body 21 in the rear section 55b of the lamp chamber end section 55 to blow on the front surface cover 23, and the formation of the dew 511 (see FIG. 6) on the inner surface of the front surface cover 23 in the lamp chamber end section 55 can be prevented.

[0048] Note that the effect of the present invention is made apparent in a structure in which the lamp chamber end section 55 is apart from the proximate lamp unit 25 by 140 mm or more. That is, when the lamp chamber end section 55 is apart from the lamp unit 25 by 140 mm or more, heat from the light source bulb 33 is barely transmitted, whereby air with humidity is cooled to easily form dew. In such a lamp, the high-temperature air 63 can particularly be prevented from flowing into the lamp chamber end section 55, whereby an apparent effect of preventing the formation of dew is obtained.

[0049] In the embodiment described above, an example has been described for a case where the two lamp units 25 and 27 are both projector-type lamp units. However, the same effect as that described above is obtained as long as the vehicular headlamp according to the present invention includes at least one projector-type lamp unit.

Claims

1. A vehicular headlamp comprising:

in a lamp chamber formed of a lamp body and a cover,
a projector-type lamp unit having a light source, a projection lens, and a reflector that reflects light from the light source forward toward the projection lens; and
an extension that covers a gap between the lamp body and the projector-type lamp unit;
characterized in that:

the lamp chamber has a lamp chamber end section extending laterally with respect to the projector-type lamp unit and rearward of a vehicle, and
an air flow blocking section that blocks air flowing rearward of the lamp chamber end section from the projector-type lamp unit is provided between the extension and the lamp body in a front section of the lamp chamber end section.

2. A vehicular headlamp according to claim 1, **characterized in that** the air flow blocking section is formed by causing a portion of the extension or the lamp body to protrude in a direction to reduce the gap between the lamp body and the extension.

3. A vehicular headlamp according to claim 1 or 2, **characterized in that** a lower section of the extension below the projector-type lamp unit is provided with a ventilation opening section for causing air between the cover and the extension to flow in between the extension and the lamp body.

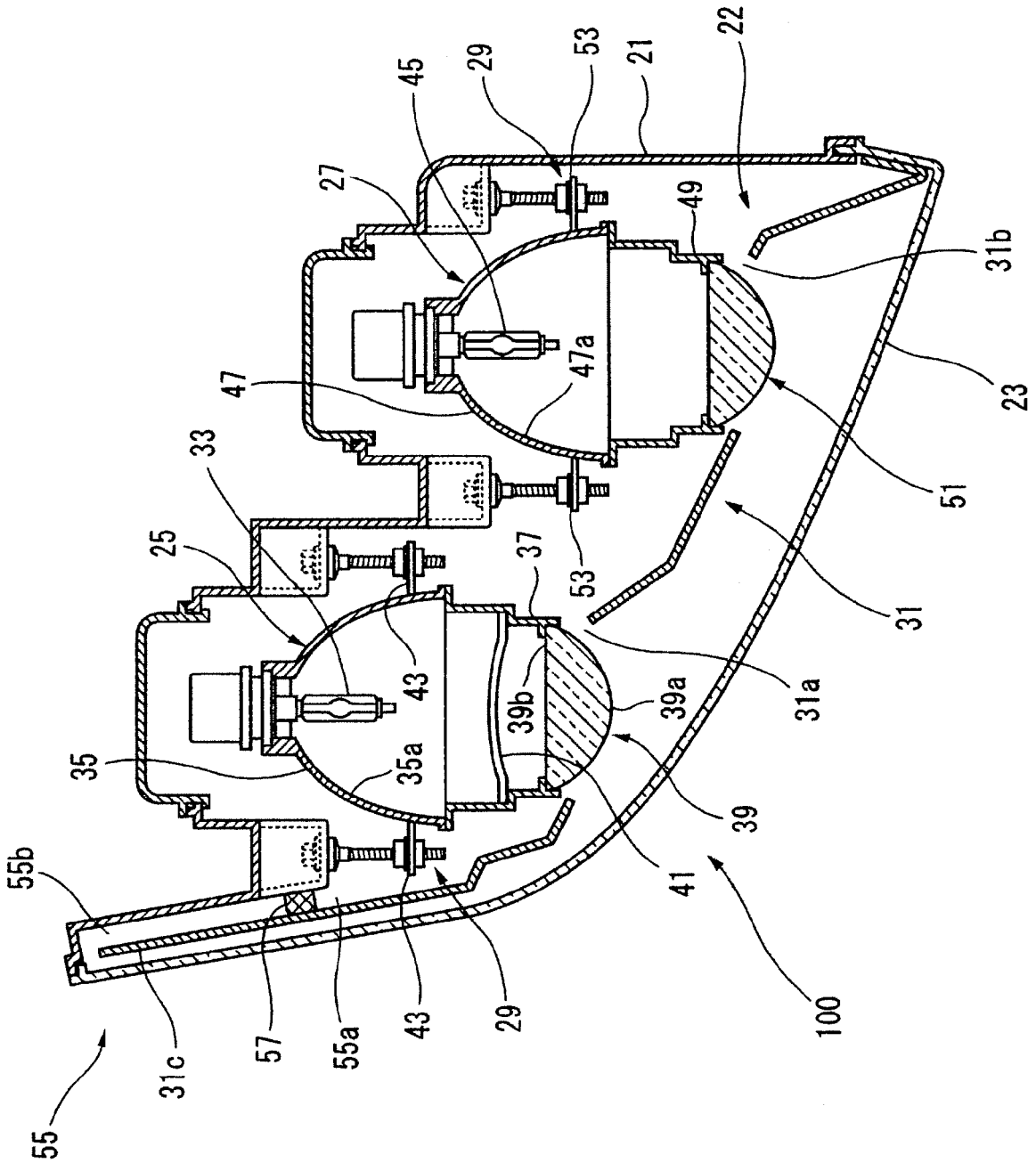
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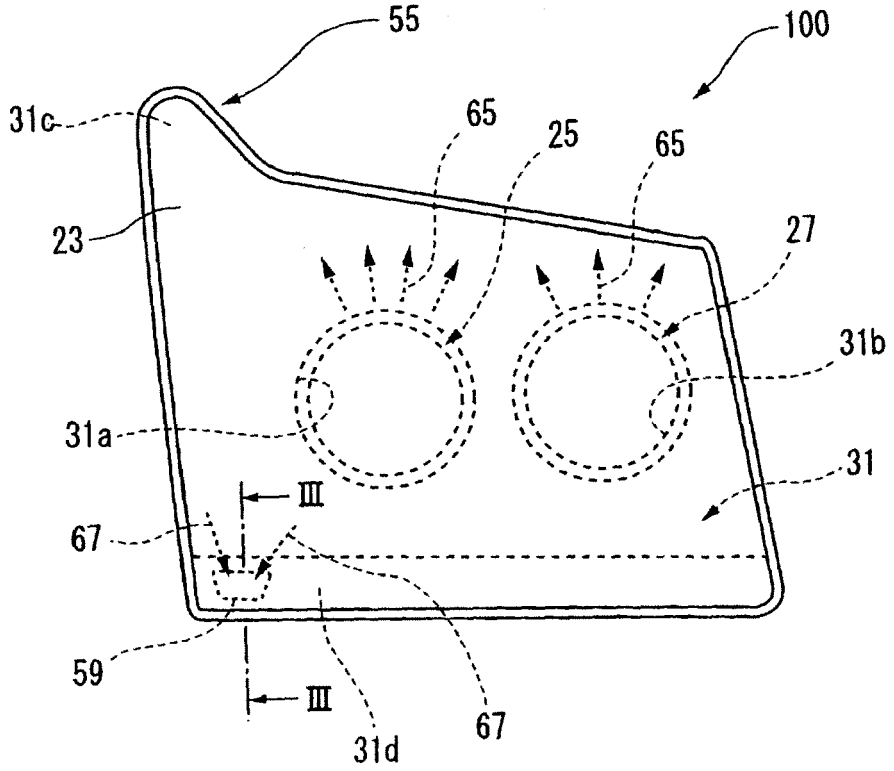
FIG. 1

FIG. 2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III
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III
31d
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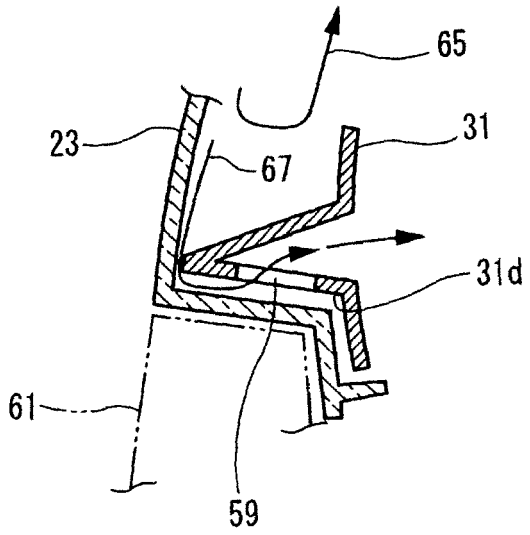
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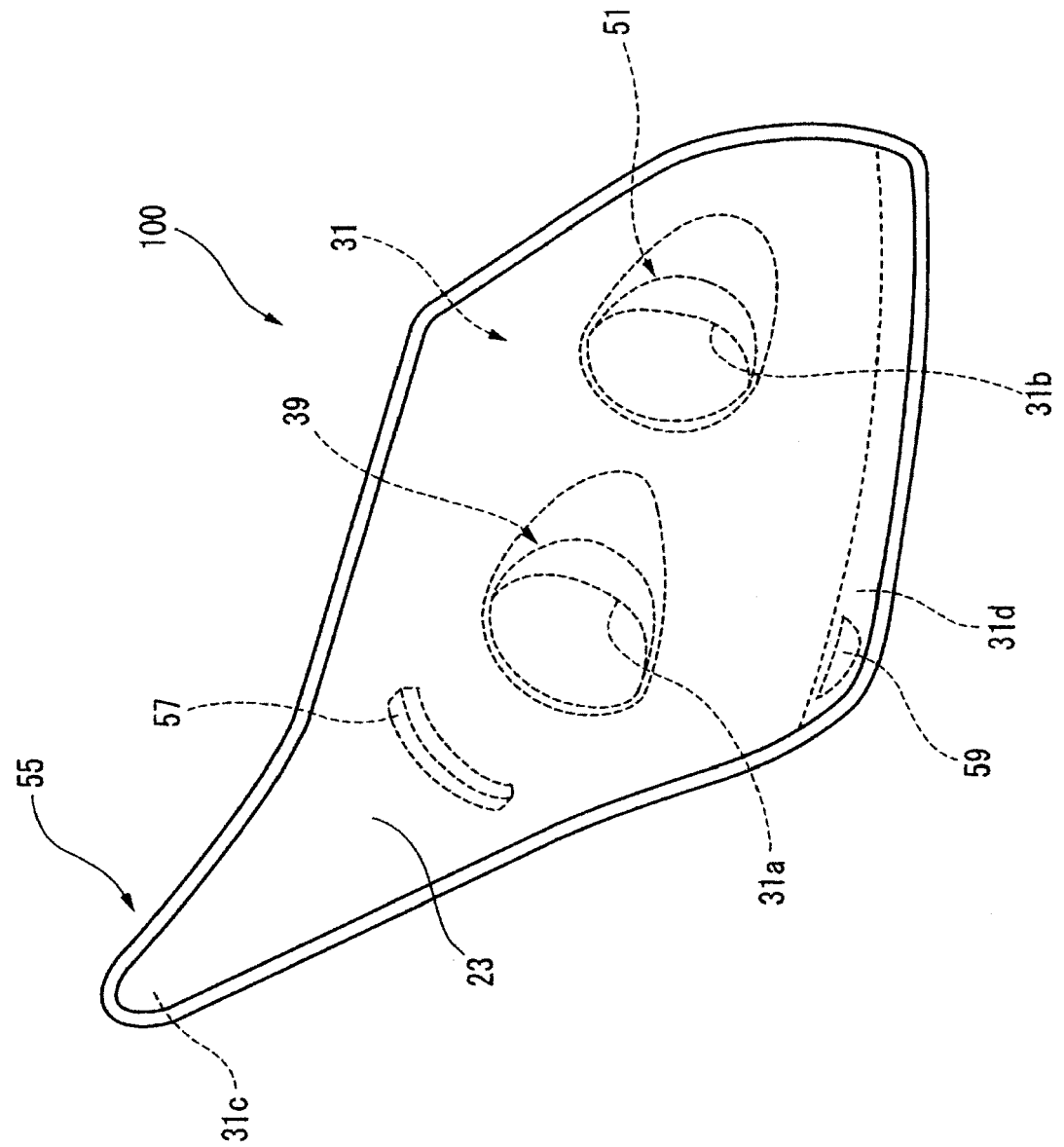


FIG. 4

FIG. 5

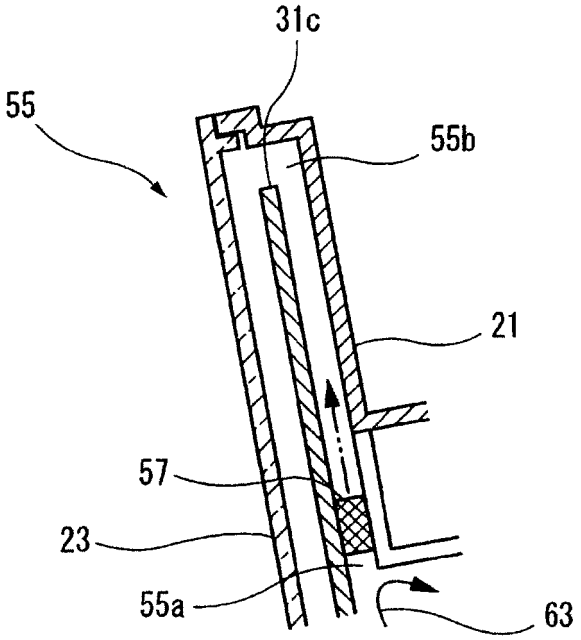
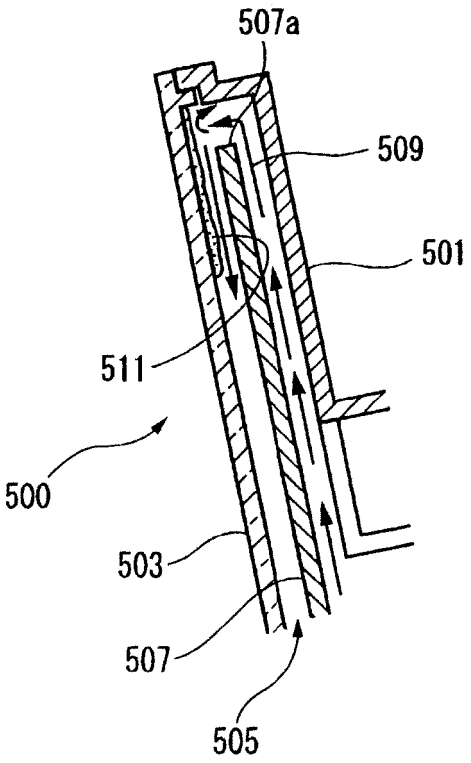


FIG. 6



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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