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Lee

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(54) **LAMP MODULE FOR VEHICLE AND LAMP FOR VEHICLE INCLUDING THE SAME**

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This patent is subject to a terminal disclaimer.

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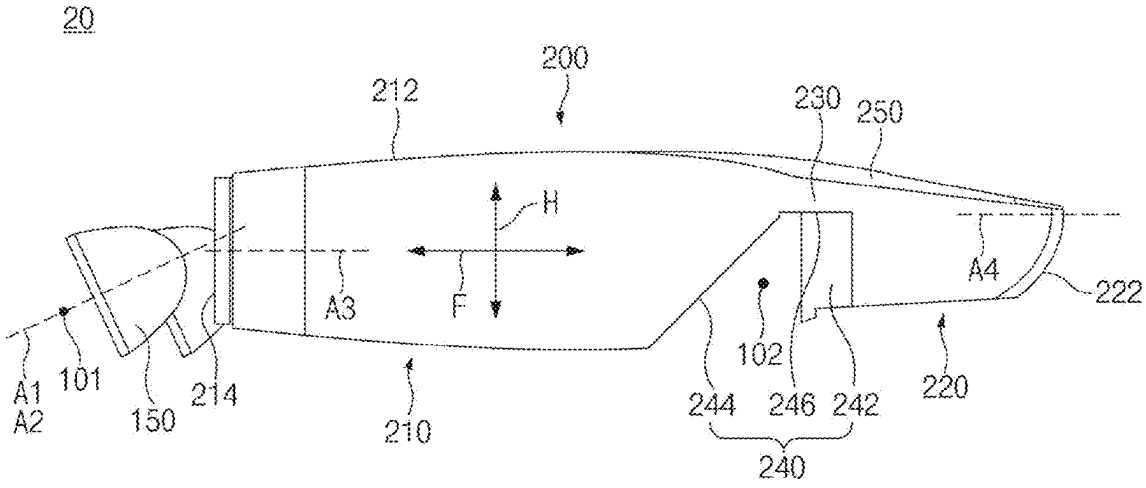
(57) **ABSTRACT**

Disclosed is a lamp module for a vehicle including a first light source that outputs light, and a light guide part provided on a front side of the first light source, and having a first recessed area, to which the light output from the first light source is input and which has a shape that is recessed upwards from a lower surface thereof, the light guide part includes a rear light guide section defining a rear area of the light guide part, and a front light guide section provided on a front side of the rear light guide section, and defining a front area of the light guide part, the rear light guide section includes a total reflection surface, which the light output from the first light source reaches and that totally reflects the light and deliver the light to the front light guide section, the total reflection surface is formed on an upper surface of the rear light guide section, and the light that was reflected by the total reflection surface and reached the front light guide section is output to an outside to form a first light distribution pattern.

9 Claims, 7 Drawing Sheets



(58) **Field of Classification Search**
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See application file for complete search history.

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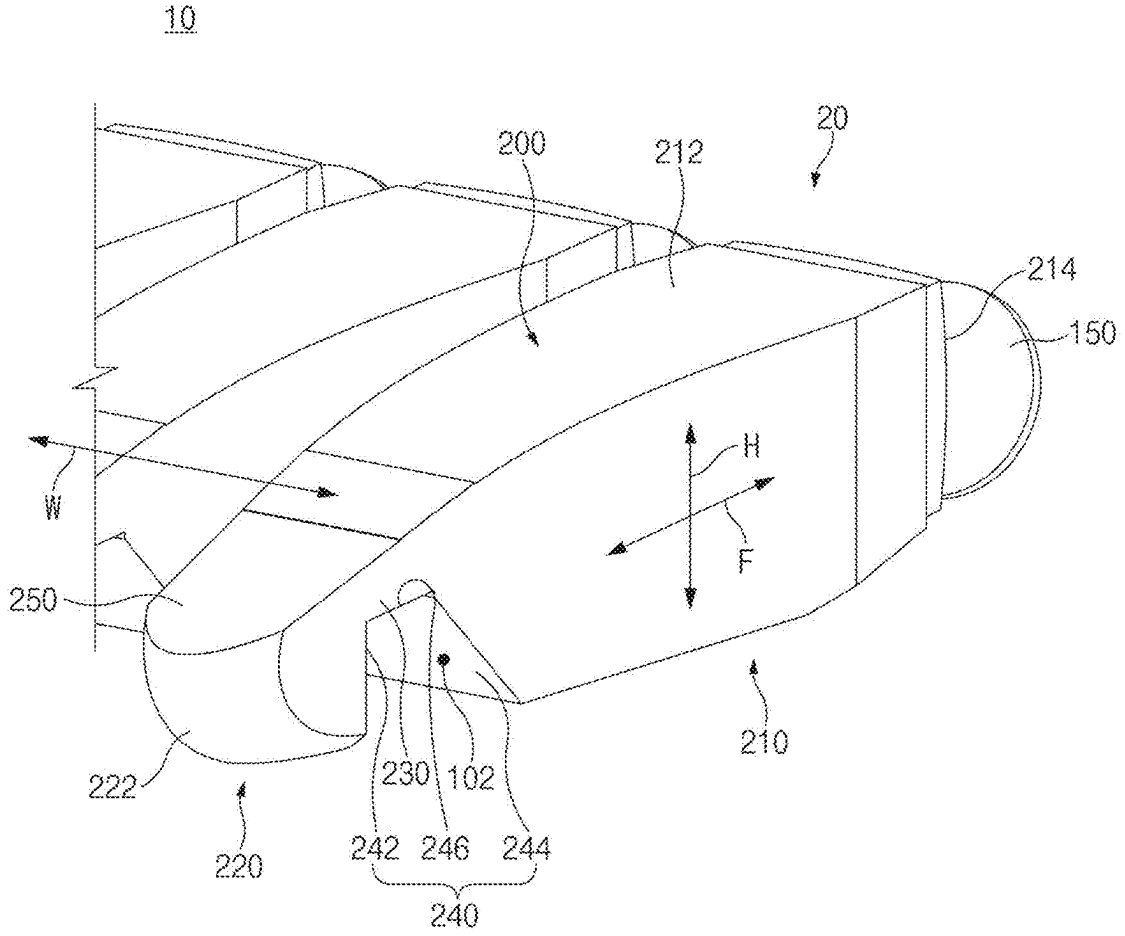

FIG.1

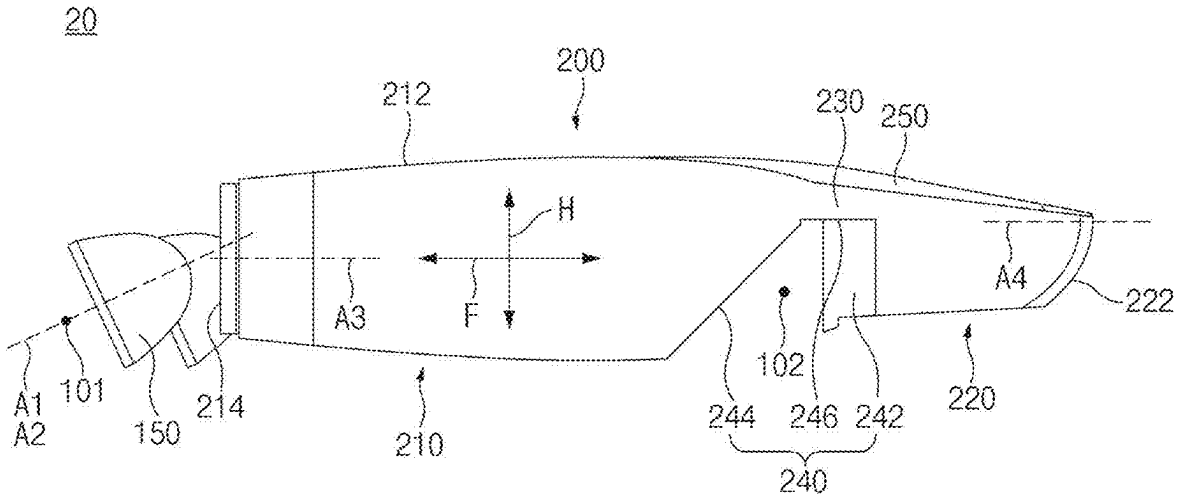
20
200
212
230
250
H
A3
F
A4
222
A1
A2
101
150
214
210
102
244
246
242
240
220

FIG.2

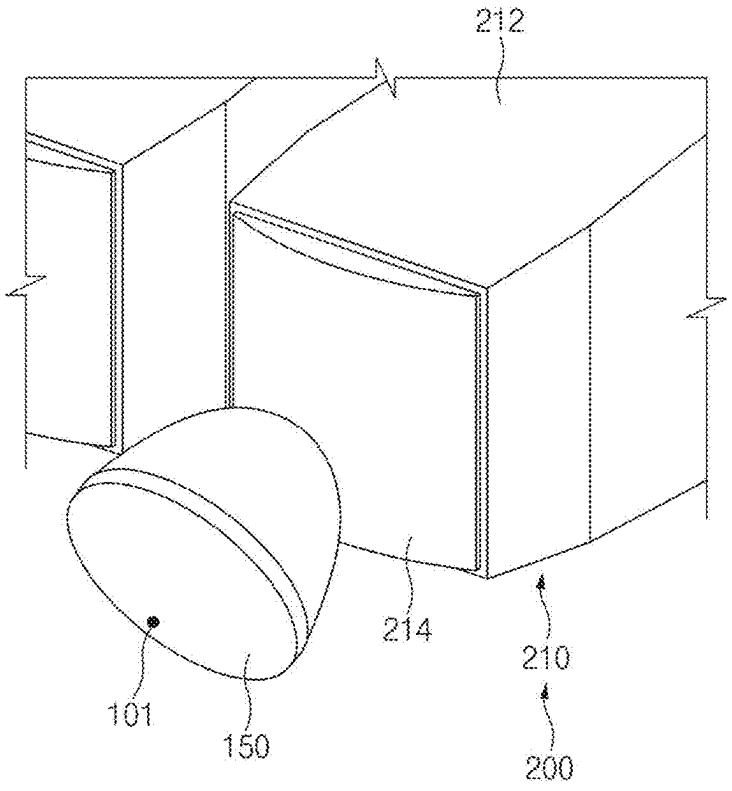

FIG.3

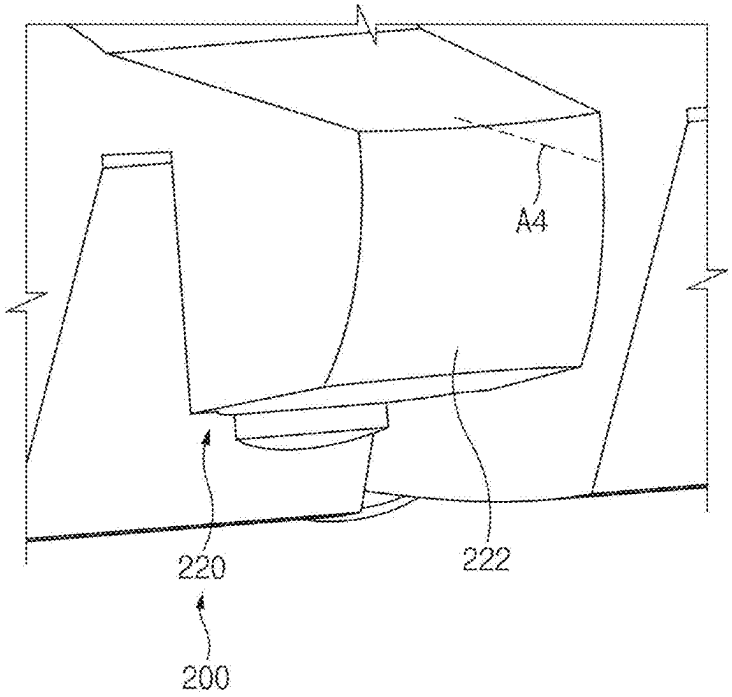

FIG.4

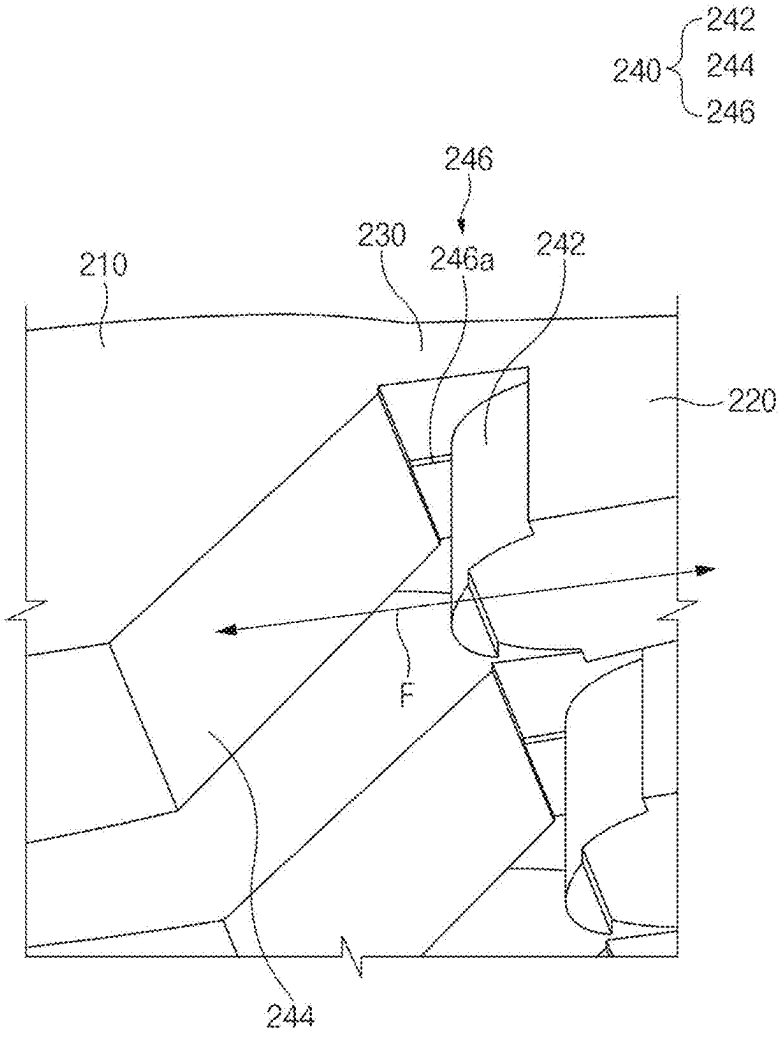

FIG.5

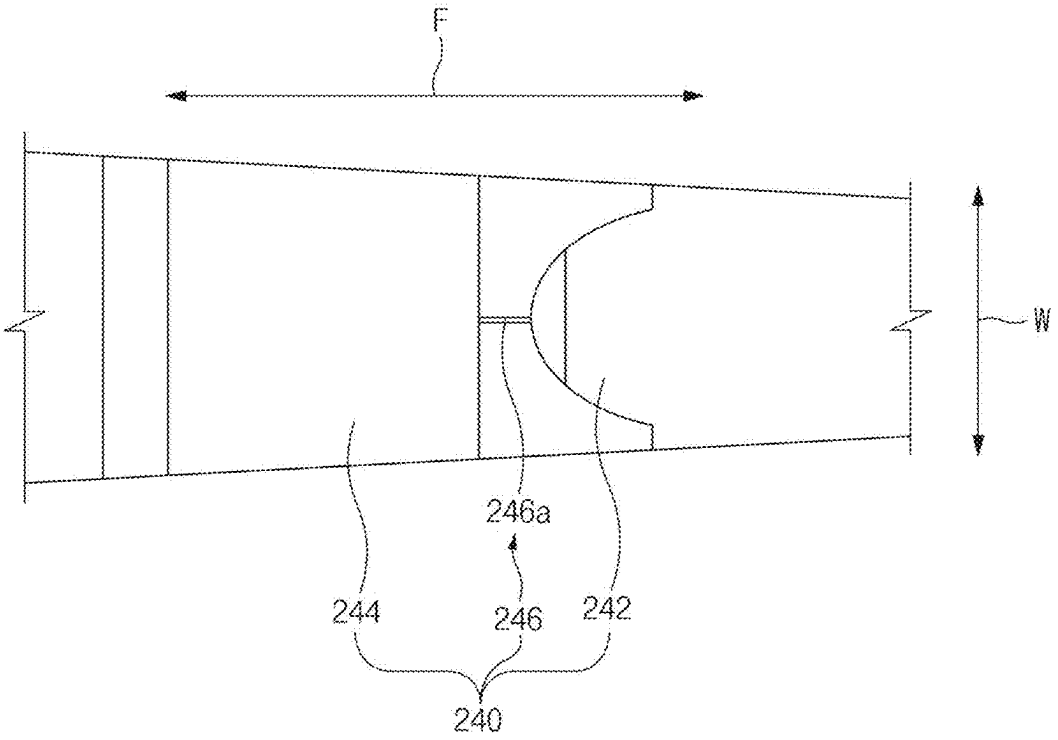

FIG.6

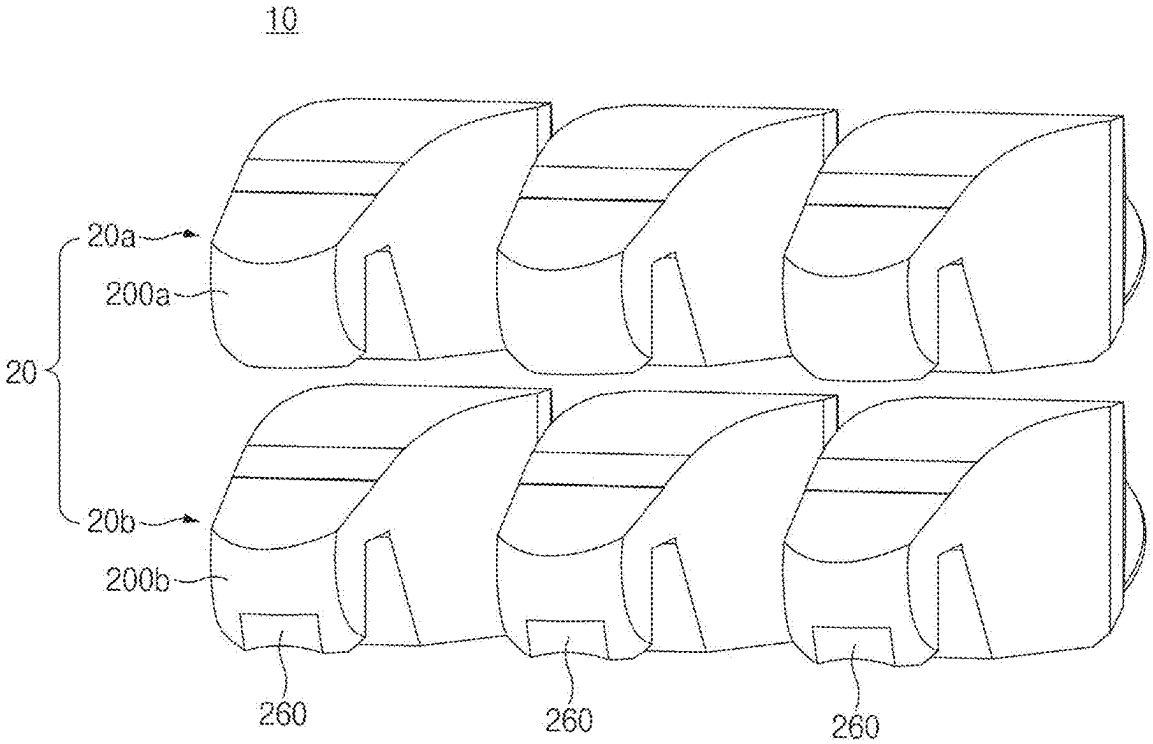

FIG.7

LAMP MODULE FOR VEHICLE AND LAMP FOR VEHICLE INCLUDING THE SAME

CROSS-REFERENCE TO RELATED APPLICATIONS

This is a continuation of application from U.S. patent application Ser. No. 18/345,281 filed on Jun. 30, 2023 and titled "LAMP MODULE FOR VEHICLE AND LAMP FOR VEHICLE INCLUDING THE SAME" which claims the benefit of priority to Korean Patent Application No. 10-2022-0084485, filed in the Korean Intellectual Property Office on Jul. 8, 2022, the entire contents of which are incorporated herein by reference.

TECHNICAL FIELD

The present disclosure relates to a lamp module for a vehicle and a lamp for a vehicle including the lamp module, and more particularly, to a lamp module for a vehicle having a structure of an enhanced optical efficiency and a lamp for a vehicle including the lamp module.

BACKGROUND

Various kinds of lamps for a vehicle are mounted on vehicles according to functions thereof. For example, low beam lamps, high beam lamps, and daytime running light (DRL) lamps, and the like are mounted on a front side of a vehicle.

According to a conventional technology, because various kinds of lamps are mounted on a vehicle together, requirements of users in an aspect of design of a vehicle when lamps are turned on cannot be satisfied as light emission surfaces formed by the lamps are different, and spaces occupied by the lamps in the vehicle are excessively large as the various kinds of lamps are mounted on the vehicle.

Furthermore, according to the conventional technology, chromatic aberrations occur as refractive indexes of lenses provided in the lamp for a vehicle are different, and this deteriorates product values of light distribution patterns.

SUMMARY

The present disclosure has been made to solve the above-mentioned problems occurring in the prior art while advantages achieved by the prior art are maintained intact.

An aspect of the present disclosure provides a lamp module having a structure that may be differentiated in an aspect of design of a vehicle by, one lamp for a vehicle, performing two or more functions such that one light emission surface may be shared even when lamps of different functions are turned on.

Another aspect of the present disclosure provides a lamp module for a vehicle that may enhance a product value of a light distribution pattern by minimizing chromatic aberrations that occur as refraction indexes of lenses are different according to wavelengths of light.

The technical problems to be solved by the present disclosure are not limited to the aforementioned problems, and any other technical problems not mentioned herein will be clearly understood from the following description by those skilled in the art to which the present disclosure pertains.

According to an aspect of the present disclosure, a lamp module for a vehicle includes a first light source that outputs light, and a light guide part provided on a front side of the first light source, and having a first recessed area, to which the light output from the first light source is input and which has a shape that is recessed upwards from a lower surface thereof, the light guide part includes a rear light guide section defining a rear area of the light guide part, and a front light guide section provided on a front side of the rear light guide section, and defining a front area of the light guide part, the rear light guide section includes a total reflection surface, which the light output from the first light source reaches and that totally reflects the light and deliver the light to the front light guide section, the total reflection surface is formed on an upper surface of the rear light guide section, and the light that was reflected by the total reflection surface and reached the front light guide section is output to an outside to form a first light distribution pattern.

An optical axis of the first light source and an optical axis of a first input surface formed on a rear surface facing the first light source in the rear light guide section may be formed to have a specific angle.

The optical axis of the first light source may be formed to be inclined to face an upper side as it goes to a front side.

The optical axis of the first input surface of the rear light guide section may be formed to be parallel to a ground surface.

An optical axis of a front surface of the front light guide section may be formed to be parallel to the ground surface.

The light guide part may further include a connection section, a rear end of which is connected to the rear light guide section and a front end of which is connected to the front light guide section, a width of the connection section in a height direction (H) may be smaller than a width of a section connected to the connection section from the rear light guide section in the height direction (H) and a width of a section connected to the connection section from the front light guide section in the height direction (H), and the front light guide section, the rear light guide section, and the connection section may be integrally formed.

An optical axis of the front surface of the front light guide section may be formed on an upper side of the optical axis of the rear light guide section.

The lamp module may further include a collimator provided between the first light source and the light guide part, and to which the light output from the first light source is input and that outputs the input light to the rear light guide section, and an optical axis of the collimator may be formed to be parallel to the optical axis of the first light source.

The optical axis of the first light source, the optical axis of the collimator, and the optical axis of the first input surface of the rear light guide section may be disposed such that all visual lights that are output from the first light source and is input to the rear light guide section via the collimator are totally reflected by the total reflection surface.

The first light source may be provided on a lower side of the optical axis of the first input surface of the rear light guide section.

A rear surface of the rear light guide section may have a symmetrical shape in a height direction (H), and has a symmetrical shape in a widthwise direction (W).

A rear surface of the rear light guide section may have a four-sided shape when being cut in a direction that is perpendicular to an optical axis of the rear surface.

A front surface of the front light guide section may be a portion of an imaginary figure having a rotational symmetrical shape, a center of which is an imaginary axis.

An optical axis of the front surface of the front light guide section may be the imaginary axis that is a rotational symmetrical axis of the imaginary figure.

The lamp module may further include a second light source that faces a lower surface of the light guide part on a lower side of the light guide part, the first recessed area may include a second input surface provided on a front side of the second light source, and to which at least a portion of the light output from the second light source is input, and the second input surface may have a cross-section of a shape that extends in a height direction (H) when being cut in a direction that is parallel to the height direction (H) and a forward/rearward direction (F).

The second input surface may have a cross-section of a shape that is convex rearwards when being cut in a direction that is parallel to the forward/rearward direction (F) and the widthwise direction (W).

The first recessed area may further include an inclined surface provided on a rear side of the second input surface and having a shape that is inclined to be provided on an upper side as it goes to a front side.

The second light source may be provided in a width in a forward/rearward direction (F) of the inclined surface, and an optical axis of the second light source may extend in a direction that faces the second input surface from the second light source.

The first recessed area may further include a connection surface connecting an upper end of the second input surface and an upper end of the inclined surface, and the connection surface may include a cutoff part having a stepped shape, of which heights of opposite surfaces are spaced apart from each other in a widthwise direction (W).

The light guide part may further include an upper inclined part formed on an upper surface of the light guide part, connected to an upper end of a front surface of the light guide part, and formed to be inclined downwards as it goes to a front side.

The upper inclined part may have a planar shape.

According to an aspect of the present disclosure, a lamp for a vehicle including a plurality of lamp modules for a vehicle is provided, the lamp module includes a first light source that outputs light, and a light guide part provided on a front side of the first light source, and having a first recessed area, to which the light output from the first light source is input and which has a shape that is recessed upwards from a lower surface thereof, the light guide part further includes a rear light guide section defining a rear area of the light guide part, and a front light guide section provided on a front side of the rear light guide section, and defining a front area of the light guide part, the rear light guide section includes a total reflection surface, which the light output from the first light source reaches and that totally reflects the light and deliver the light to the front light guide section, the total reflection surface is formed on an upper surface of the rear light guide section, and the light that was reflected by the total reflection surface and reached the front light guide section is output to an outside to form a first light distribution pattern.

The plurality of lamp module may include a plurality of upper lamp modules provided on an upper side and arranged in a horizontal direction, and a plurality of lower lamp modules provided on a lower side of the upper lamp module and arranged in the horizontal direction, and shapes of front surfaces of light guide parts provided in the upper lamp modules and shapes of front surfaces of light guide parts provided in the lower lamp modules may be different.

Second recessed areas provided on lower sides of front surfaces of the light guide parts and having shape that may be recessed upwards are formed, and the second recessed areas may be provided only the plurality of lower lamp modules.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and other objects, features and advantages of the present disclosure will be more apparent from the following detailed description taken in conjunction with the accompanying drawings:

FIG. **1** is a perspective view illustrating a lamp module for a vehicle according to the present disclosure;

FIG. **2** is a side view illustrating a lamp module for a vehicle according to the present disclosure;

FIG. **3** is a view illustrating a vicinity of a rear surface of a light guide part provided in a lamp module for a vehicle according to the present disclosure;

FIG. **4** is a view illustrating a vicinity of a front surface of a light guide part provided in a lamp module for a vehicle according to the present disclosure;

FIG. **5** is a view illustrating a vicinity of a first recessed area of a light guide part provided in a lamp module for a vehicle, when viewed from a bottom, according to the present disclosure;

FIG. **6** is a bottom view of a first recessed area of a light guide part provided in a lamp module for a vehicle according to the present disclosure; and

FIG. **7** is a lamp for a vehicle including a plurality of lamp modules for a vehicle according to the present disclosure.

DETAILED DESCRIPTION

Hereinafter, a lamp module for a vehicle and a lamp for a vehicle according to the present disclosure will be described with reference to the drawings.

Lamp Module for Vehicle

FIG. **1** is a perspective view illustrating a lamp module for a vehicle according to the present disclosure. FIG. **2** is a side view illustrating the lamp module for a vehicle according to the present disclosure. FIG. **3** is a view illustrating a vicinity of a rear surface of a light guide part provided (or disposed) in the lamp module for a vehicle according to the present disclosure. FIG. **4** is a view illustrating a vicinity of a front surface of the light guide part provided in the lamp module for a vehicle according to the present disclosure. FIG. **5** is a view illustrating a vicinity of a first recessed area of the light guide part provided in the lamp module for a vehicle, when viewed from a bottom, according to the present disclosure. FIG. **6** is a bottom view of a first recessed area of the light guide part provided in the lamp module for a vehicle according to the present disclosure.

A lamp module **20** (hereinafter, will be referred to as a 'lamp module') for a vehicle according to the present disclosure may be a lamp module that may form a specific light distribution pattern. For example, the lamp module **20** may be a configuration for forming a low beam pattern. However, in addition to the low beam pattern, the lamp module **20** may additionally form a DRL pattern. However, a kind of the light distribution pattern formed by the lamp module **20** is not limited to the above-described contents, and may be applied to various kinds of beam patterns. Furthermore, the lamp module according to the present disclosure is not mounted only on a vehicle with a limitation.

According to the present disclosure, the lamp module **20** may include a first light source **101** that outputs the light, and

a light guide part **200** that is provided on a front side of the first light source **101** and to which the light output from the first light source **101** is input. In more detail, the light guide part **200** may include an integral lens. In particular, as will be described below, according to the present disclosure, because two kinds or more of light distribution patterns may be formed through the light guide part **200**, one light emission surface may be shared through the one light guide part **200** even when light distribution patterns having different functions are formed. Accordingly, the present disclosure may be differentiated in an aspect of design of a vehicle. Meanwhile, as can be seen from the title, the light guide part **200** may be formed of a material that transmits the light that is output from the first light source **101**. Furthermore, the first light source **101** may be an LED, but the kind of the first light source **101** is not limited to the LED.

According to the present disclosure, the light guide part **200** may be divided into a plurality of areas. In more detail, as illustrated in FIGS. **1** and **2**, the light guide part **200** may include a rear light guide section **210** that defines a rear area of the light guide part **200**, a front light guide section **220** that is provided on a front side of the rear light guide section **210** and defines a front area of the light guide part **200**, and a connection section **230**, a rear end of which is connected to the rear light guide section **210** and a front end of which is connected to the front light guide section **220**.

The rear light guide section **210**, the front light guide section **220**, and the connection section **230** may be divided with respect to a width in a height direction "H" (or a vertical direction). In more detail, as illustrated in FIGS. **1** and **2**, the width of the connection section **230** in the height direction "H" may be smaller than a width of an area connected to the connection section **230** from the rear light guide section **210** in the height direction "H" and a width of an area connected to the connection section **230** from the front light guide section **220** in the height direction "H". This may be understood that the width in the height direction "H" substantially decreases and the width in the height direction "H" becomes minimal in the connection section **230** as the light guide part **200** goes from the rear light guide section **210** to a front side of a forward/rearward direction "F" (or a forward direction), and the width in the height direction "H" substantially increases as it goes to a front side of the forward/rearward direction "F" in the front light guide section **220**.

Meanwhile, the front light guide section **220**, the rear light guide section **210**, and the connection section **230** of the light guide part **200** may be integrally formed. Then, the fact that the configurations are integrally formed may be understood that the above-described configurations are in an inevitable coupling relationship that is as close enough such that they cannot be separated from each other as long as they are not irreversibly destructed.

A first recessed area **240** having a shape that is recessed upwards may be formed on a lower surface of the light guide part **200**. As illustrated in FIGS. **1** and **2**, the first recessed area **240** may be formed over a lower surface of the above-described rear light guide section **210**, a lower surface of the front light guide section **220**, and a lower surface of the connection section **230**.

As described above, the lamp module **20** may form a low beam pattern. In this case, the light output from the first light source **101** may be output externally (e.g., to an outside of the lamp module **20**) via the light guide part **200** to form a low beam pattern.

The first recessed area **240** may be a configuration for shielding a portion of the light output from the first light source **101** to form a low beam pattern required by the rules. Contents of a detailed shape of the first recessed area **240** will be described below.

Referring now to FIGS. **1** and **2**, the present disclosure may further include a collimator **150** that is provided between the first light source **101** and the light guide part **200**, to which the light output from the first light source **101** is input and from which the input light is output to the rear light guide section **210**. The collimator **150** may be a configuration for converting the light output from the first light source **101** to parallel light and outputting the parallel light to the light guide part **200**.

Meanwhile, the light output from the light source including the LED outputs visual rays of several wavelength bands. Accordingly, in a process of the light output from the first light source **101** being refracted by the collimator **150**, a degree, by which the light is refracted by the collimator **150**, rather varies according to the wavelength of the light. This is called a chromatic aberration, and due to the chromatic aberration, an optical path of the light output from the first light source **101** and input to the collimator **150** varies according to a wavelength of the light while the light is output to an outside, and thus, a deviation of the color may occur for areas of the light distribution pattern formed by the light output from the light guide part **200**. This may be a cause of degradation of a product value of the light distribution pattern.

To solve the above-described problem, according to the present disclosure, a feature for solving deviations in the colors for the areas of the light distribution pattern according to the above-described chromatic aberrations may be applied by mixing the light output from the collimator **150** and input to the light guide part **200** in the light guide part **200**.

In more detail, referring to FIGS. **1** and **2**, the rear light guide section **210** may include a total reflection surface **212** that mixes the light output from the collimator **150** by reflecting a substantially entire portion of the light after the light output from the first light source **101** arrives. The light reflected by the total reflection surface **212** may reach the front light guide section **220**.

As illustrated in FIGS. **1** and **2**, the total reflection surface **212** may be formed on an upper surface of the rear light guide section **210**, and the light that is reflected by the total reflection surface **212** and reaches the front light guide section **220** may be output to an outside to form a first light distribution pattern. The first light distribution pattern may be the above-described low beam pattern. In a preferred embodiment, the total reflection surface **212** may be formed on an upper surface of the rear light guide section **210** and an upper surface of the connection section **230**. According to the present disclosure, because lights of different wavelengths may be mixed while the substantially entire portion of the light output from the collimator **150** is reflected by the total reflection surface **212**, a problem of a product of the light distribution pattern being degraded according to the above-described chromatic aberrations may be solved.

Meanwhile, as illustrated in FIGS. **1** and **2**, an optical axis A**1** of the first light source **101** and an optical axis A**2** of the collimator **150** may be formed in parallel to each other. More preferably, as illustrated in FIGS. **1** and **2**, the optical axis A**1** of the first light source **101** and the optical axis A**2** of the collimator **150** may coincide with each other.

Furthermore, the optical axis A**1** of the first light source **101** and an optical axis A**3** of a first input surface **214** formed on a rear surface **214** that faces the first light source **101** while the collimator **150** being interposed between the rear surface **214** and the rear light guide section **210** may be

formed to have a specific angle. In more detail, the optical axis A1 of the first light source **101** and the optical axis A2 of the collimator **150** may be formed to be inclined upwardly in a forward direction of the lamp module (i.e., inclined to face an upper side as it goes to a front side). As described above, the total reflection surface **212** may be formed on an upper surface of the light guide part **200**, and because the light output from the first light source **101** and output via the collimator **150** faces an upper side when the optical axis A1 of the first light source **101** and the optical axis A2 of the collimator **150** faces an upper side as it goes to a front side, the light may efficiently reach the total reflection surface **212**, and thus, the lights of the different wavelength bands also may be effectively mixed. Meanwhile, the optical axis A3 of the first input surface **214** of the rear light guide section **210** may be formed in parallel to a ground surface.

Meanwhile, to reflect the substantially entire portion of the lights that are output from the first light source **101** and reach the total reflection surface **212** via the collimator **150**, the optical axis A1 of the first light source **101**, the optical axis A2 of the collimator **150**, the optical axis A3 of the first input surface **214** of the rear light guide section **210** may be disposed such that the substantially entire portion of the visual rays output from the first light source **101** and input to the rear light guide section **210** via the collimator **150** are reflected by the total reflection surface **212**. This is because incident angles of all the visual rays that are output from the first light source **101** and reach the total reflection surface **212** via the collimator **150** when they reach the total reflection surface **212** are larger than a critical angle. Furthermore, the first light source **101** may be provided on a lower side of the optical axis A3 of the first input surface **214** of the rear light guide section **210** whereby an amount of the light output from the first light source **101**, which reaches the total reflection surface **212** becomes maximal.

Hereinafter, the first input surface formed on the rear surface of the rear light guide section **210** will be described with reference to FIG. **3**.

As illustrated in FIG. **3**, the rear surface **214** of the rear light guide section **210** may have a symmetrical shape in the widthwise direction "W" while having a symmetrical shape in the height direction "H". Furthermore, the rear surface **214** of the rear light guide section **210** may have a rectangular (i.e., four-sided) cross-sectional shape when intersected (i.e., being cut) in a direction that is perpendicular to the optical axis A3 of the rear surface **214** or the forward/rearward direction "F". More preferably, as illustrated in FIG. **3**, the rear surface **214** of the rear light guide section **210** may have a cross-sectional shape that is convex rearwards when being cut in a direction that is perpendicular to the height direction "H". In this case, because the light input to the rear surface **214** may be input to the light guide part **200** after being concentrated, an intensity of light of the light distribution pattern formed by the first light source **101** may be maximized. However, a shape of the rear surface is not limited to the above-described contents, and may have various shapes.

Hereinafter, a front surface **222** of the front light guide section **220** will be described with reference to FIG. **4**.

The front surface **222** formed on a front side of the front light guide section **220** may be a part of an imaginary figure having a rotational symmetrical shape about an imaginary axis. For example, the front surface **222** may have a shape, in which a ratio of an area of, among an upper area located on an upper side of the imaginary axis and a lower area located on a lower side thereof in the imaginary figure, the lower area is larger. Then, an optical axis A4 of the front surface **222** of the front light guide section **220** may be defined as the imaginary axis that is the rotational symmetrical axis of the imaginary figure. The front surface **222**, as illustrated, has the shape, in which the ratio of the area of the lower area of the imaginary figure having the rotational symmetrical shape is larger so that the intensity of light of the first light distribution pattern is maximized by causing a larger amount of the light output from the first light source **101** and reflected by the total reflection surface **212** to reach to the front surface. Meanwhile, the optical axis A4 of the front surface **222** of the front light guide section **220** may be formed to be parallel to the ground surface, and the optical axis A4 of the front surface **222** of the front light guide section **220** may be parallel to the optical axis A3 of the rear surface **214** of the rear light guide section **210**. As an example, FIGS. **1** and **2** illustrate a state, in which the optical axis A4 of the front surface **222** of the front light guide section **220** is formed on an upper side of the optical axis A3 of the rear surface **214** of the rear light guide section **210**. In this case, because a larger amount of the light output from the first light source **101** and reflected by the total reflection surface **212** may reach the front surface **222**, an intensity of light of the first light distribution pattern may be enhanced.

Meanwhile, as illustrated in FIGS. **1** and **2**, the lamp module **20** according to the present disclosure may further include a second light source **102** that is provided to face the lower surface of the light guide part **200** on a lower side of the light guide part **200**. The second light source **102** may be a configuration for irradiating light that forms a second light distribution pattern that is a separate light distribution pattern from the first light distribution pattern formed by the first light source **101**. In more detail, the light irradiated from the second light source **102** may form the second light distribution pattern while being output to an outside through the front surface **222** of the light guide part **200** after being input to the light guide part **200**. For example, the second light distribution pattern may be a DRL pattern, but a kind of the second light distribution pattern is not limited thereto.

However, the second light source **102** is not an essential configuration of the lamp module **20** according to the present disclosure, and unlike the illustration of FIG. **1** and FIG. **2**, the second light source **102** may not be provided in the lamp module **20**. More preferably, the second light source **102** may be configured to face the first recessed area **240**.

Meanwhile, the first recessed area **240** may include a plurality of surfaces. In more detail, the first recessed area **240** may include a second input surface **242**, which is provided on a front side of the second light source **102** and to which at least a portion of the light output from the second light source **102** is input, an inclined surface **244** that is provided on a rear side of the second input surface **242** in the forward/rearward direction "F" and has a shape that is inclined to be provided on an upper side as it goes to a front side, and a connection surface **246** that connects an upper end of the second input surface **242** and an upper end of the inclined surface **244**. Accordingly, the light guide part **200** may have a substantially "U" shape that is inverse in the height direction as the first recessed area **240** includes the second input surface **242**, the connection surface **246**, and the inclined surface **244** when the light guide part **200** is viewed from one side in a widthwise direction "W".

As illustrated in FIG. **2**, as an example, the second input surface **242** may have a cross-section of a shape that extends in the height direction "H" when being cut in a direction that is parallel to the height direction "H" and the forward/rearward direction "F". This may be understood that the

second input surface **242** has a cross-sectional shape that extends substantially downwards perpendicularly to an upper end connected to the connection surface **246**.

However, the above-described contents do not mean that the second input surface **242** has a planar shape that extends perpendicularly. Rather, as illustrated in FIGS. **2**, **5**, and **6**, it may be preferable that the second input surface **242** has a cross-section of a shape that is convex rearwards when being cut in a direction that is parallel to the forward/rearward direction "F" and the widthwise direction "W". This is because an intensity of light of the second light distribution pattern formed by the second light source **102** is maximized by concentrating the light output from the second light source **102** in the second input surface **242** after the light being input to the second input surface **242**. However, the second input surface **242** may have a planar shape that extends perpendicularly unlike the above description.

Meanwhile, as illustrated in FIG. **2**, the second light source **102** may be provided in a width of the inclined surface **244** in the forward/rearward direction "F". In more detail, the optical axis of the second light source **102** may extend from the second light source in a direction that faces the second input surface **242**. In this case, the light output from the second light source **102** may not be reflected by the other configurations but proceeds straight to be input to the second input surface **242**, and thus an intensity of light of the second light distribution pattern may be maximized.

Meanwhile, in a preferred embodiment of the present disclosure, a focus of the front surface **222** of the front light guide section **220** may be located at a location corresponding to a front end of the connection surface **246**. This is because an intensity of light of the first light distribution pattern may be maximized by outputting the substantially entire portion of the light output from the first light source **101** and reflected by the total reflection surface **212** to the front surface **222** after the light is concentrated at the focus of the front surface **222**.

Meanwhile, as described above, the first light distribution pattern formed by the light output from the first light source **101** may be a low beam pattern. Meanwhile, a cutoff line having a stepped shape is required to be formed in an upper area of the low beam pattern by the rules.

To satisfy the above-described requirements of the rules, which are required for the low beam pattern, referring to FIGS. **5** and **6**, the connection surface **246** may include a cutoff part **246***a* having a stepped shape, in which heights of opposite side surfaces thereof, which are spaced apart from each other in the widthwise direction "W", are different. A portion of the substantially entire portion of the light reflected by the total reflection surface **212** may be shielded by the cutoff part **246***a* to form a cutoff line having a shape corresponding to the cutoff part **246***a* in the first light distribution pattern. Meanwhile, a portion of the light output from the first light source **101** also may be shielded by the inclined surface **244** of the first recessed area **240**. Accordingly, the light may not reach an upper area of the cutoff line of the low beam pattern or only an amount of the light, by which it may be identified whether an object is present at night, may reach it.

Meanwhile, referring to FIGS. **1** and **2**, the light guide part **200** provided in the lamp module **20** may further include an upper inclined part **250** that is formed on an upper surface of the light guide part **200**, is connected to an upper end of the front surface **222** of the light guide part **200**, and is inclined downwards as it goes to a front side. In more detail, a front end of the upper inclined part **250** may be connected to the front surface **222**, and a rear end of the upper inclined part **250** may be connected to the total reflection surface **212**.

A portion of the substantially entire portion of the light that is output from the first light source **101** and is reflected by the total reflection surface **212** to reach the focus of the front surface **222** may be reflected by the connection surface **246** to proceed upwards, and the light that proceeded upwards may be reflected again by the upper inclined part **250** to be output to an outside while proceeding downwards. Meanwhile, an inclination of the total reflection surface **212** and an inclination of the upper inclined part **250** at a point, at which the total reflection surface **212** and the upper inclined part **250** are connected to each other, may be different. As an example, the upper inclined part **250** may have a planar shape.

Lamp for Vehicle

FIG. **7** is a lamp for a vehicle including a plurality of lamp modules for a vehicle according to the present disclosure.

Referring to FIGS. **1** to **7**, a lamp **10** (hereinafter, will be referred to as a 'lamp') for a vehicle according to the present disclosure may include a plurality of lamp modules **20**.

Each of the plurality of lamp modules **20** may include the first light source **101** that outputs light, and the light guide part **200**, which is provided on a front side of the first light source **101**, to which the light output from the first light source **101** is input, and in which the first recessed area **240** having a shape that is recessed upwards from the lower surface. Meanwhile, the contents of the lamp modules **20** provided in the lamp **10** according to the present disclosure will be replaced by the contents described above with reference to FIGS. **1** to **6**.

The light guide part **200** may include the rear light guide section **210** that defines a rear area of the light guide part **200**, and the front light guide section **220** that is provided on a front side of the rear light guide section **210** and defines a front area of the light guide part **200**. Then, the rear light guide section **210** may include the total reflection surface **212**, which the light output from the first light source **101** reaches and which reflects the light to deliver the light to the front light guide section **220**. The total reflection surface **212** may be formed on an upper surface of the rear light guide section **210**. According to the present disclosure, the light that is reflected by the total reflection surface **212** and reaches the front light guide section **220** may be output to an outside to form the first light distribution pattern. As described above, the first light distribution pattern may be a low beam pattern.

Meanwhile, as illustrated in FIG. **7**, the plurality of lamp modules **20** may include a plurality of upper lamp modules **20***a* that are provided on an upper side and are arranged in a horizontal direction, and a plurality of lower lamp modules **20***b* that are provided on a lower side of the upper lamp modules **20***a* and are arranged in a horizontal direction. Then, according to the present disclosure, a shape of the front surface **222** (see FIG. **2** and the like) of an upper light guide part **200***a* provided in the upper lamp module **20***a* and a shape of the front surface **222** (see FIG. **2** and the like) of a lower light guide part **200***b* provided in the lower lamp module **20***b* may be different.

In more detail, referring to FIGS. **1**, **2**, and **7**, the front surface **222** of the lower light guide part **200***b* may have a second recessed area **260** that is provided on a lower side of the front surface **222** and has a shape that is recessed upwards. Meanwhile, the upper light guide part **200***a* may not have the above-described second recessed area. That is,

according to the present disclosure, the second recessed area **260** may be formed only in the plurality of lower lamp modules **20***b*.

According to the present disclosure, a lamp module having a structure that may be differentiated in an aspect of design of a vehicle by, one lamp for a vehicle, performing two or more functions such that one light emission surface may be shared even when lamps of different functions are turned on is provided.

According to the present disclosure, a lamp module for a vehicle that may enhance a product value of a light distribution pattern by minimizing chromatic aberrations that occur as refraction indexes of lenses are different according to wavelengths of light is provided.

Although the present disclosure has been described above with reference to the limited embodiments and drawings, the present disclosure is not limited thereto, and it is apparent that various embodiments may be made within the technical spirits of the present disclosure and an equivalent range of the claims, which will be described below.

What is claimed is:

1. A lamp module for a vehicle, comprising:

a first light source configured to output light; and

a light guide part disposed in front of the first light source and including:

a lower surface;

a first recessed area recessed upwardly from the lower surface, wherein the light output from the first light source is transmitted to the first recessed area;

a rear light guide section defining a rear area of the light guide part; and

a front light guide section disposed in front of the rear light guide section and defining a front area of the light guide part,

wherein the rear light guide section has an upper surface including a total reflection surface configured to reflect a substantially entire portion of the light output from the first light source toward the front light guide section, and

wherein the light reflected by the total reflection surface toward the front light guide section is externally output to form a light distribution pattern,

wherein the rear light guide section has a rear surface facing the first light source and having a first input surface, and a first optical axis of the first light source and a second optical axis of the first input surface intersect each other to form an angle,

wherein the front light guide section has a front surface having a third optical axis, and

wherein the third optical axis of the front surface of the front light guide section extends above the first optical axis of the first input surface of the rear light guide section.

2. The lamp module of claim **1**, wherein the first light source is disposed below the second optical axis.

3. The lamp module of claim **1**, further comprising a second light source disposed in the first recessed area.

4. The lamp module of claim **1**, wherein the first optical axis is inclined upwardly in a forward direction of the lamp module.

5. The lamp module of claim **4**, further comprising a collimator disposed between the first light source and the light guide part and configured to transmit the light output from the first light source toward the rear light guide section,

wherein the collimator has a fourth optical axis parallel to the first optical axis of the first light source.

6. The lamp module of claim **5**, wherein the first optical axis, second optical axis and the fourth optical axis are arranged such that the substantially entire portion of the light transmitted from the first light source toward the rear light guide section via the collimator is reflected by the total reflection surface.

7. The lamp module of claim **1**, wherein the second optical axis is parallel to a ground surface.

8. The lamp module of claim **7**, wherein the third optical axis is parallel to the ground surface.

9. The lamp module of claim **8**, wherein:

the light guide part further includes a connection section having (1) a rear end portion connected to the rear light guide section and (2) a front end portion connected to the front light guide section, and

the connection section has a thickness smaller than thicknesses of a first section of the rear light guide section connected to the connection section and a second section of the front light guide section connected to the connection section.

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