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(54) Title of the Invention VEHICLE LAMP

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SPECIFICATION

1. Title of the Invention

Vehicle Lamp

2. Scope of Claim for Utility Model Registration

A vehicle lamp comprising a lens closing a front opening portion of a lamp body and a light source disposed inside the lamp body to illuminate the lens, characterized in that a light emitting diode is disposed inside a thick wall portion of the lens, and in that an indentation and protrusion portion to reflect light of the light emitting diode that has been guided inside the lens is formed on an inner surface of the lens.

3. Detailed Explanation of the Invention

[Industrial Field of Application]

The present invention relates to a vehicle lamp suitable for use in a lens of a tail lamp, a stop lamp and the like

[Conventional Art]

A vehicle lamp, such as a tail lamp and a stop lamp, attached to a rear part of a vehicle has a front lens having a retroreflector in one-piece or in an integrally provided manner. This retroreflector retro-reflects light from a following vehicle and makes a driver of the following vehicle aware of the existence of the own vehicle so as to prevent a rear-end accident or the like before it happens and to ensure traffic safety, and Fig.7 shows a conventional example of a lamp in which this kind of retroreflector is formed integrally with a lens. Briefly explaining this based on the same figure, the lamp 1 comprises a lamp socket 3 holding a bulb (a light source) 2, a back cover (reflector) 4 to which the lamp socket 3 accommodating the bulb 2 is attached and having an inner surface forming a reflecting surface which forwardly reflects a part of light emitted from the bulb 2, and a front lens 6 disposed at a front opening portion of this back cover 4 via a gasket 5, wherein a recess portion 7 is formed in a surface of a portion of the front lens 6, and the retroreflector 8 is fitted in this recess portion 7 and is fixed by

ultrasonic welding or the like.

The retroreflector 8 has a surface which is a flat surface, is formed on an inner surface thereof with many well known (see JP S54-4273 U) retroreflective elements 9 configured as cube corner shaped projections having orthogonal three planes, and is configured to retro-reflect incoming light 12 incoming from an outside in the same direction as an incident direction thereof by this reflective element 9.

An inner surface of the front lens 6 is formed with diffusing lenses 10 configured as many small convex lenses.

[Problem that the Invention is to Solve]

In the meantime, in the lamp having the configuration described above, direct light and reflected light from the bulb 2 do not penetrate through the retroreflector 8 portion, and therefore, there is such a drawback that the portion becomes a dark and is not good in visibility.

[Means for Solving the Problem]

A vehicle lamp according to the present invention has been made in view of the points described above, in which a light emitting diode is embedded in a portion of a thick wall portion of a lens where light from a light source does not penetrate or illuminate, and an indentation and protrusion portion to reflect light that has been guided inside the thick wall portion from the diode is formed on an inner surface of the lens.

[Effect]

According to the present invention, edge-light illumination is applied, by means of the light emitting diode, to the thick wall portion of the lens where light from the light source does not penetrate or the light source does not illuminate, so that it is possible to prevent a dark portion from being generated in the lens, and also, the light emitting diode is used as a reflector light source independently from the lamp light source, so that it is possible to provide a lamp having good visibility without worrying about an influence of heat generation.

[Embodiments]

Hereinafter, the present invention will be described in detail based on embodiments shown in drawings.

Fig.1 is a main part cross-sectional view showing one embodiment of a

vehicle lamp according to the present invention. In the drawing, components and portions that are the same is those of Fig.5 are denoted by the same reference numerals, and explanations thereof will be omitted. The retroreflector 8 disposed in the recess portion 7 of the front lens 6 has many retroreflective elements 9 formed on its inner surface and a light emitting diode 20 disposed on one side face of the reflector 8 to correspond to the retroreflective elements 9, thereby forming a semi-transmissive retroreflector. The retroreflective elements 9 are formed in a concentrated manner, and are formed in a stepped manner such that a distance from the surface of the reflector 8 becomes large sequentially. Therefore, a wall thickness of the retroreflector 8 is, as shown in the drawing, the thinnest at its left end, and is gradually increased toward the right end. A diode accommodating concave portion 21 is formed in the right end face where the wall thickness becomes the maximum, and in this concave portion 21, the light emitting diode 20 applying lateral irradiation, i.e., edge-light illumination to each of the retroreflective elements 9 is accommodated.

22 denotes a connector, and 23, 24 denote cords.

In the vehicle lamp having the foregoing configuration, when the light source 2 is turned on to illuminate the front lens 6, the light emitting diode 21 is turned on simultaneously to illuminate the retroreflector 8. Among the irradiation light, the light 25 directed in a direction toward the retroreflective element 9 and almost parallel to the surface of the reflector 8 travels inside the reflector 8 to irradiate, as shown with a thick line in Fig.2, a portion of a reflective surface a of each of the retroreflective element 9 that faces the light emitting diode 21, i.e., a portion 30 not shadowed by another retroreflective elements 9 disposed on the diode 21 side, adjacent to the reflective element 9. Lateral irradiation of this portion 30 is enabled only by forming the retroreflective elements 9 in a stepped manner and displacing the respective reflective elements 9 by Δd in a plate-thickness direction of the reflector 8. Then, the irradiation light 25 irradiating the portion 30 is reflected forward and output to the outside of the retroreflector 8. Therefore, when viewed from the front, the retroreflector 8 is partially illuminated with a given brightness by the irradiation light 25, and forms the semi-transmissive retroreflector 8.

On the other hand, among light from a following vehicle, the light 12 penetrating through the retroreflector 8 is retro-reflected in the same direction as the incident direction by the respective retroreflective elements 9.

Thus, according to the vehicle lamp of the present invention, by turning on the light emitting diode 20, it is possible to reflect light by the indentation and protrusion portion of the retroreflective element 9 by the edge light effect, and therefore, it does become a particularly dark portion with respect to a dark portion of a peripheral lens part, so that it is possible to improve visibility of the lamp. Further, to illuminate the retroreflector 8, the light emitting diode 20 is used independently from the light source 2 for the lamp itself, and therefore, by providing a structure that is not affected by the heat from the light source, it is not necessary to configure the retroreflector 8 to have a special heat resistance structure, as an increase in temperature by heat generation of the light emitting diode 20 is about 5°C at the highest, and it is possible to realize a minimum plate-thickness. In addition, the light emitting diode does not have a filament generally unlike an electric bulb, and therefore, there is no worry about burnout, and it has a semi-permanent life.

Fig.3 is a main part cross-sectional view showing another embodiment for a case where the present invention is applied to a lamp having a wraparound lens. On an inner surface of a so-called wraparound portion 31A of a wraparound lens 31, many indentations and protrusions (stippled marks or line marks) 32 are formed, and the light emitting diode 20 is embedded in a rear end face of this wraparound portion 31A.

According to this configuration, even if light from the light source 2 is blocked by a side wall portion 4A of the back cover 4 and the wraparound portion 31A is not illuminated by the light source 2, it is possible to prevent the wraparound portion 31 from becoming dark since, by turning on the light emitting diode 20, the light passes through the inside of the wraparound portion 31A, and is reflected by the indentations and protrusions 32 and is output to the outside. In this case, as shown in Fig.4, two light emitting diodes 20 may be used, and by doing so, the wraparound portion 31A can be illuminated more brightly.

Fig.5 and Fig.6 are cross-sectional views showing other embodiments

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