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# VEHICULAR LIGHTING DEVICE


## Abstract

A vehicular lighting device mounted on an interior component including upper and lower plate members includes LEDs arranged on the vehicular exterior side with respect to the upper plate member and supplying light to a vehicular interior space through a clearance between the upper and lower plate members, a light transmissive member through which light from the LEDs passes toward the vehicular interior space and that includes recessed portions on a plate surface facing the LEDs, and a controller. The LEDs are defined into LED sets each of which includes at least two LEDs arranged at a first interval in the vehicular front-rear direction and the LED sets are arranged in the vehicular front-rear direction at a second interval that is greater than the first interval. The controller is configured to turn on the at least two LEDs included in one of the LED sets at different timings.



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## Background/Summary

CROSS REFERENCE TO RELATED APPLICATION

[0001] This application claims priority from Japanese Patent Application No. 2024-19605 filed on Feb. 13, 2024. The entire contents of the priority application are incorporated herein by reference.

TECHNICAL FIELD

[0002] The present technology described herein relates to a vehicular lighting device.

BACKGROUND

[0003] There have been a lighting device and a lighting structure mounted on a vehicular interior component. In one example of such a lighting structure, multiple LEDs are arranged on a back side of the door trim of a vehicle and light from the LEDs exits through light ejection slits in the door trim. Thus, linear light is supplied to a vehicular interior space.

[0004] In another example, a light guide plate, which is configured as a light emitter, is mounted on a vehicular exterior side of the trim body that has light transmissive properties. Light that exits the light guide plate is supplied to the trim body from a back surface side such that a design pattern appears on a front surface of the trim body.

SUMMARY

[0005] Recently, improvement of the vehicular interior design has been highly demanded and a wide variety of lighting patterns is demanded.

[0006] An object of the present technology described herein is to provide a vehicular lighting device that improves a vehicular interior design.

[0007] The technology described herein is related to a vehicular lighting device to be mounted on an interior component that includes an upper plate member extending in a vehicular front-rear direction and having an interior design surface and a lower plate member disposed below the upper plate member and on a vehicular exterior side with respect to the upper plate member. The vehicular lighting device includes LEDs arranged on the vehicular exterior side with respect to the upper plate member, a light transmissive member that is disposed between a lower edge of the upper plate member and an upper edge of the lower plate member and has a plate shape having a plate surface extending in a vehicular interior-exterior direction, and a controller. The LEDs are defined into LED sets each of which includes at least two LEDs arranged at a first interval in the vehicular front-rear direction and the LED sets are arranged in the vehicular front-rear direction at a second interval that is greater than the first interval. The LEDs emit and supply light to a vehicular interior space. The light transmissive member includes recessed portions on the plate surface facing the LEDs and light from the LEDs passes through the light transmissive member toward the vehicular interior space. The controller is configured to turn on and off each of the LEDs separately and configured to turn on the at least two LEDs included in one of the LED sets at different timings.

## Description

## BRIEF DESCRIPTION OF THE DRAWINGS

[0008] FIG. **1** is a front view of a door trim of a front side door according to one embodiment.

[0009] FIG. **2** is a cross-sectional view along I-I line.

[0010] FIG. **3** is an enlarged plan view of a portion of an LED unit.

[0011] FIG. **4** is a perspective view illustrating the LED unit supplying light to a light transmissive plate.

[0012] FIG. **5** is a perspective view illustrating the LED unit, the light transmissive plate, and an armrest board.

[0013] FIG. **6** is an exploded perspective view illustrating a holding member and the light transmissive plate.

[0014] FIG. **7** illustrates one example of waveforms indicating chronological change of luminous intensity of two LEDs included in a LED set.

[0015] FIG. **8** illustrates another example of waveforms indicating chronological change of luminous intensity of two LEDs included in a LED set.

[0016] FIG. **9** illustrates other example of waveforms indicating chronological change of luminous intensity of two LEDs included in a LED set.

[0017] FIG. **10** illustrates other example of waveforms indicating chronological change of luminous intensity of two LEDs included in a LED set.

[0018] FIG. **11** illustrates one example of waveforms indicating chronological change of luminous intensity of three LEDs included in a LED set.

## DETAILED DESCRIPTION

[0019] A vehicular lighting device according to one embodiment will be described with reference to FIGS. **1** to **8**. A lighting device **20** that is mounted on a door trim **10** (one example of an interior component) for a vehicle such as an automobile will be described. An X-axis, a Y-axis, and a Z-axis may be present in each drawing and the axes in each drawing correspond to the respective axes in other drawings. The X-axis direction represents a right side or a vehicular exterior side and the Y-axis direction represents an upper side. The directions are not limited to those described in the drawings. One of the same components is represented by a reference symbol and others may not be represented by the reference symbol. A vehicular interior side surface of the door trim **10** corresponds to a vehicular front side surface.

[0020] FIG. **1** is an elevation view of the door trim **10** of a front right side door seen from a vehicular interior side. As illustrated in FIG. **1**, the door trim **10** includes a trim board **11** having a plate shape as a main section. The door trim **10** is mounted on a door inner panel made of metal on a vehicular interior side with clips. Thus, the design and comfort of a vehicular interior are improved. The trim board **11** is made of synthetic resin material (thermoplastic resin material) such as polypropylene. The trim board **11** may be made of composite material obtained by mixing plant fibers (such as kenaf) and synthetic resin.

[0021] As illustrated in FIG. **1**, the trim board **11** includes multiple board members that are joined together. The trim board **11** of this embodiment includes an upper board **12** (one example of an upper plate member), an armrest board **15** (one example of a lower plate member), and a lower board **18**.

[0022] The upper board **12** is an upper section of the trim board **11** and has an elongated shape extending in a vehicular front-rear direction. The width of the upper board **12** decreases in a front section thereof such that a lower edge of the upper board **12** extends upward as it extends frontward. The lower edge of the front section of the upper board **12** is referred to as a slope portion **13**. A rear section of the upper board **12** includes a lower edge that extends along an armrest **17** and the lower edge of the rear section of the upper board **12** is referred to as an opposed portion **14**.

[0023] The upper board **12** including the slope portion **13** has a tapered shape such that the width

decreases as it extends frontward. As illustrated in FIG. **1**, in a front view, most portion of the lower edge of the upper board **12** is disposed adjacent to the armrest board **15** and a rear end portion of the lower edge of the upper board **12** is adjacent to the lower board **18**.

[0024] The armrest board **15** is below and next to the upper board **12**. The armrest board **15** has an elongated shape extending in the vehicular front-rear direction (Y-direction) and is shorter than the upper board **12**.

[0025] As illustrated in FIG. **2**, the armrest board **15** includes a board body **15**A and an armrest **17**. The board body **15**A is a wall portion that extends in the upper-bottom direction and the vehicular front-rear direction and faces the vehicular interior side. The armrest **17** is a lower section of the armrest board **15** and extends from a lower end of the board body **15**A to the vehicular interior side. The armrest **17** extends to be curved toward the vehicular interior side as it extends downward from the board body **15**A. As illustrated in FIG. **1**, the armrest **17** extends along an entire length of the armrest board **15** in the vehicular front-rear direction.

[0026] As illustrated in FIGS. **1** and **5**, The front section of the board body **15**A of the armrest board **15** is configured as a flat surface portion **16**. The frat surface portion **16** is relatively above the armrest **17** and integrally extends upward from the armrest **17**. With the upper board **12** including the slope portion **13** at the lower edge thereof, the flat surface portion **16** has a triangular plate shape that extends in the vehicular front-rear direction (the Y-direction) and the upper-bottom direction (the Z-direction). According to such a configuration, with the vehicular door being closed, right and left end portions of an instrumental panel, which is installed in a front section of the vehicle and protrudes toward the vehicular interior side, are fitted to the flat surface portions **16** as if the trim board **11** and the instrumental panel are configured as one component.

[0027] As illustrated in FIG. **2**, the upper edge of the armrest board **15** is on a vehicular exterior side with respect to the lower edge of the upper board **12** in the vehicular interior-exterior direction (the X-direction). Namely, a slit **19** (one example of a clearance) is between the lower edge of the upper board **12** and the upper edge of the armrest board **15**. The slit **19** has an elongated opening extending in the vehicular front-rear direction. The slit **19** extends from a front edge of the trim board **11** to a rear edge of the armrest board **15**. The lighting device **20** is disposed above the silt **19** and light emitted by the lighting device **20** is supplied downward through the slit **19** to the door trim **10**. The light from the lighting device **20** travels directly toward the slit **19** and is supplied to a light transmissive plate **40**. The light transmissive plate **40** is disposed below the LEDs **23** and light emitting surfaces of the LEDs **23** face the light transmissive plate **40**.

[0028] As illustrated in FIGS. **1**, **2**, **4**, and **6**, the lighting device **20** includes LED units including a first LED unit **21**A and a second LED unit **21**B, a holding member **30** holding the LED units, the light transmissive plate **40** (one example of a light transmissive member), and a controller **50**. In this embodiment, as illustrated in FIGS. **1** and **5**, the LED units include the first LED unit **21**A that is mounted in a front section of the trim board **11** and the second LED unit **21**B that is mounted in a rear section of the trim board **11**.

[0029] The first LED unit **21**A and the second LED unit **21**B have a substantially same configuration. In the following, the second LED unit **21**B will be described with reference to FIGS. **2** to **4**. The second LED unit **21**B includes a second board LED **22**B having a long belt shape extending in the front-rear direction and the LEDs **23** that are arranged in the elongated direction on the second LED board **22**B. As illustrated in FIG. **2**, the second LED unit **21**B is disposed on the vehicular exterior side of the lower edge of the upper board **12** with being arranged in the holding member **30** (a second holding portion **32**). The LEDs **23** are arranged in a line along the lower edge of the upper board **12**, which is along the vehicular front-rear direction (the Y-direction), as illustrated with a broken line in FIG. **1**. The first LED unit **21**A and the second LED unit **21**B may differ in the length and the number of LEDs **23**.

[0030] As illustrated in FIG. **4**, the LEDs **23** are top surface LEDs and light emitted from a light emitting surface radially spreads three-dimensionally around an optical axis L within a certain

angle range. The LEDs **23** of this embodiment have a directivity angle of 120 degrees. The directivity angle of the LEDs **23** is not limited to 120 degrees but may be other than 120 degrees.

[0031] As illustrated in FIG. **3**, on the second LED board **22**B, multiple LED sets **24** are arranged in the elongated direction. Each LED set **24** includes two LEDs **23**. Each LED set **24** may include three or more LEDs **23**. The LED sets **24** include a first LED set **24**A and a second LED set **24**B that are adjacent to each other. The two LEDs **23** included in each of the first LED set **24**A and the second LED set **24**B are spaced with an interval L1. The interval between the first LED set **24**A and the second LED set **24**B is defined as L2. The LED sets **24**, which include the first LED set **24**A and the second LED set **24**B, are arranged at intervals L2 in a line on the second LED board **22**B. The interval L2 between the first LED set **24**A and the second LED set **24**B is determined such that the irradiation range of the LEDs **23** included in the first LED set **24**A and the irradiation range of the LEDs **23** included in the second LED set **24**B do not overlap when the light emitted by the LEDs **23** passes through the light transmissive plate **40**. A distance between one of the two LEDs **23** included in the first LED set **24**A and one of the two LEDs **23** included in the second LED set **24**B that are closer to each other is defined as L3 (L3=L2−L1). The distance L3 is greater than the interval L1 (L3>L1). Namely, the distance L3 between the first LED set **24**A and the second LED set **24**B is greater than the interval L1 between the two LEDs **23** included in each of the first LED set **24**A and the second LED set **24**B.

[0032] As illustrated in FIG. **4**, the interval L1 between the two LEDs **23** included in each of the first LED set **24**A and the second LED set **24**B is determined such that most of the irradiation ranges of the two LEDs **23** included each of the LED sets **24**A and **24**B overlap when the light emitted by the two LEDs **23** passes through the light transmissive plate **40**. Most of the irrigation ranges of the two LEDs **23** on the light transmissive plate **40** overlap. The distance L3 between one of the LEDs **23** included in the first LED set **24**A and one of the LEDs **23** included in the second LED set **24**B is determined such that the irradiation range of the LED **23** included in the first LED set **24**A and the irradiation range of the LED **23** included in the second LED set **24**B do not overlap when the light emitted by the two LEDs **23** passes through the light transmissive plate **40**. The distance L3 is preferably determined such that the light emitted by the LEDs **23** included in the first LED set **24**A and the light emitted by the LEDs **23** included in the second LED set **24**B cross after passing through the light transmissive plate **40**. Namely, the irradiation ranges of the LEDs **23** included in the first LED set **24**A and the irradiation ranges of the LEDs **23** included in the second LED set **24**B preferably overlap near the vehicular interior surface (a lower surface in FIG. **4**) of the light transmissive plate **40**. According to such a configuration, the light rays emitted by the LEDs **23** included in the first LED set **24**A and the light rays emitted by the LEDs **23** included in the second LED set **24**B are less likely to have interference and a continuous optical design extending in the vehicular front-rear direction is provided.

[0033] The first LED board **22**A, the second LED board **22**B, and the LEDs **23** on each of the first LED board **22**A and the second LED board **22**B are electrically connected to a controller **50**. The controller **50** is configured to control each of the LEDs **23** independently. With an operator selecting a lighting mode through an operation portion **52**, which is electrically connected to the controller **50**, the controller **50** receives a signal related to the selected lighting mode and is configured to control each of the LEDs **23** to be on and off or change luminous intensity according to the program stored in the controller **50**.

[0034] In this embodiment, the first LED unit **21**A on the front extends along the slope portion **13** of the upper board **12** and the second LED unit **21**B on the rear extends along the opposed portion **14**. Namely, the first LED board **22**A of the first LED unit **21**A slopes so as to extend upward (the Z-direction) with respect to the horizontal direction as it extends frontward. The first LED board **22**A is disposed such that the lower surface thereof faces substantially frontward. The second LED board **22**B of the second LED unit **21**B is disposed such that plate surfaces thereof extend horizontally and face upward and downward, respectively.

[0035] The first LED board **22**A and the second LED board **22**B are held by the holding member **30** in the determined posture. As illustrated in FIG. **6**, the holding member **30** has a long box shape extending in the vehicular front-rear direction and opens downward. As illustrated in FIG. **2**, a vehicular interior side wall portion **33** of the holding member **30** is fixed to the lower edge of the upper board **12** via a fixing member **60**.
[0036] More specifically, as illustrated in FIG. **6**, the holding member **30** includes a first holding portion **31** that extends along the slope portion **13** of the upper board **12** and the second holding portion **32** that extends along the opposed portion **14**. The first holding portion **31** and the second holding portion **32** are integrally formed as the holding member **30** so as to be curved at an intermediate portion between the first holding portion **31** and the second holding portion **32**. As illustrated in FIG. **2**, the first LED board **22**A is held on a lower surface of an upper wall portion **34** of the first holding portion **31** and the second LED board **22**B is held on a lower surface of the upper wall portion **34** of the second holding portion **32**. According to such a configuration, the LEDs **23** emit light downward.
[0037] As illustrated in FIG. **2**, an opening of the holding member **30** is covered by the light transmissive plate **40** (one example of the light transmissive member). The light transmissive plate **40** is made of synthetic resin having high light transmissive properties (high transparency) such as acrylic, PET, polycarbonate. Light emitted by the LEDs **23** passes through the light transmissive plate **40**.
[0038] As illustrated in FIG. **6**, the light transmissive plate **40** has an elongated band shape and includes a first portion **41** that covers the opening of the first holding portion **31** and a second portion **42** that covers the opening of the second holding portion **32**. The first portion **41** and the second portion **42** are integrally formed with and configured as the light transmissive plate **40** so as to be curved at an intermediate portion between the first portion **41** and the second portion **42**. Thus, the light transmissive plate **40** has a substantially L-shape as a whole. As illustrated in FIG. **5**, the second portion **42** has a plate surface that extends horizontally and parallel to the second LED board **22**B. The first portion **41** slopes upward (the Z-direction) from a front end of the second portion **42** as it extends frontward and extends parallel to the first LED board **22**A.
[0039] As illustrated in FIGS. **4** to **6**, the light transmissive plate **40** includes recessed portions **45** (one example of a lens portion) having curved surfaces. The recessed portions **45** are recessed toward the vehicular interior side and have an arched cross-sectional shape having different size and height. The recessed portions **45** are formed at random and successively and has a surface of a waveform. Protrusion portions **46** protruding upward and having a top are formed in intermediate portions of the adjacent recessed portions **45**.
[0040] As illustrated in FIG. **4**, the recessed portions **45** are formed such that the optical axes L of the LEDs **23** held in the holding member **30** extend through the recessed portions **45** with the light transmissive plate **40** covering the opening of the holding member **30**. One of the recessed portions **45** is formed to be in a position and have a size so as to face the two LEDs **23** included in the first LED set **24**A or the second LED set **24**B. Namely, the recessed portion **45** is formed to be in a position and have a size such that the optical axes L of the two LEDs **23** included in each of the first LED set **24**A or the second LED set **24**B pass through the recessed portion **45**.
[0041] With such a configuration, the light rays emitted by the two LEDs **23** included in each of the first LED set **24**A and the second LED set **24**B are collected by the recessed portion **45** when passing the light transmissive plate **40** and exit the light transmissive plate **40** toward the vehicular interior space with being dispersed. Accordingly, a pattern corresponding to the recessed portions **45** and the protrusion portions **46** (the intermediate portions between the adjacent recessed portions **45**) appears on the armrest board **15** and a bright and beautiful design can be provided.
[0042] Next, an operation of the lighting device **20** of this embodiment will be described. The controller **50** is configured to control the LEDs **23** to gradually increase the luminous intensity after turning on the LEDs **23** and thereafter gradually decrease the luminous intensity and turn off the

LEDs **23**. The controller **50** is configured to control the two LEDs **23** included in each of the first LED set **24**A and the second LED set **24**B to be turned on at different timings and have highest luminous intensity at different timings.

[0043] FIG. **7** illustrates a graph indicating a chronological change of the luminous intensity of the two LEDs **23** of the first LED set **24**A, for example. According to the graph, the two LEDs **23** have the highest luminous intensity at different timings. In FIG. **7**, a bold line indicates the chronological change of the luminous intensity of one of the two LEDs **23** and a thin line indicates the chronological change of the luminous intensity of other one of the two LEDs **23**. For example, when a first lighting mode is selected by an operator via the operation portion **52** and the controller **50** receives a signal related to the first lighting mode, the controller **50** controls one of the two LEDs **23** of the first LED set **24**A to be on, and after time t1 passes, the controller **50** controls other one of the two LEDs **23** of the first LED set **24**A to be on. According to such an operation, as illustrated in FIG. **7**, the luminous intensity of the LEDs **23** gradually increases after the LEDs **23** are turned on and after increasing to the highest level, the luminous intensity gradually decreases until the LEDs **23** are turned off. The waveforms of the luminous intensity of the two LEDs **23** are displaced from each other by the time t1. Namely, the two LEDs **23** are turned on at different timings. The two LEDs **23** are turned on with time difference t1. The controller **50** intermittently and repeatedly turns on the two LEDs **23** included in each LED set **24** at different timings. According to such a configuration, a flickering light image pattern like flickering flame and aurora is projected on the vehicular interior according to the recessed portions **45** of the light transmissive plate **40**.

[0044] When a second lighting mode is selected by an operator via the operation portion **52** and the controller **50** receives a signal related to the second lighting mode, the controller **50** successively and repeatedly turns on one of the two LEDs **23** of the first LED set **24**A and turns on other one of the two LEDs **23** after time t1 passes after turning on the one of the two LEDs **23**. Every two LEDs **23** are turned on at different timings successively and repeatedly. The two LEDs **23** are turned on with time difference t1 and have the highest luminous intensity at different timings with the time difference t1. In the second lighting mode, a flickering light image pattern different from that in the first lighting mode can be obtained.

[0045] According to such a lighting operation of the lighting device **20**, light is emitted by the LEDs **23** included in each LED set **24** at different timings. The luminous intensity of the light emitted by the LEDs **23** of each LED set **24** changes with time difference t1. Namely, the light emitted by the LEDs **23** of each LED set **24** has highest luminous intensity at different timings. Such light rays pass through the light transmissive plate **40** having the recessed portions **45** and the flickering light image is projected on the vehicular interior like flickering flame and aurora. The controller **50** is configured to simultaneously control the LED sets **24** such that the LEDs **23** of each LED set **24** are turned on at different timings.

[0046] Next, configurations, operations, and effects of this embodiment will be described. The lighting device **20** of this embodiment is mounted on the door trim **10** (the trim board **11**) that includes the upper board **12** having an elongated shape extending in the vehicular front-rear direction and having an interior design surface and the armrest board **15** disposed below the upper board **12** and on the vehicular exterior side with respect to the upper board **12**. The upper edge of the armrest board **15** is disposed on the vehicular exterior side with respect to the lower edge of the upper board **12**. The lighting device **20** supplies light to the vehicular interior through the slit **19** between the upper board **12** and the armrest board **15**. The lighting device **20** includes the light transmissive plate **40**, the LEDs **23**, and the controller **50**. The light transmissive plate **40** includes the recessed portions **45** that are recessed on a plate surface facing the LEDs **23** and have an arched cross-sectional shape. The recessed portions **45** are formed at random. The LEDs **23** are arranged on the vehicular exterior side with respect to the upper board **12**. The LEDs **23** are divided into groups of the LED sets **24** each of which includes two LEDs **23** arranged next to each other at the

interval L1 in the vehicular front-rear direction. The LED sets **24** are arranged in the vehicular front-rear direction at the interval L3 that is greater than the interval L1. The controller **50** is configured to control each of the LEDs **23** to turn on and off separately and configured to turn on the two LEDs **23** of one of the LED sets **24** at different timings.

[0047] According to such a configuration, an image is projected on the vehicular interior with light that is emitted by the LED sets **24** and passes through the light transmissive plate **40** having the recessed portions **45**. Such an image is a flickering light image like flickering flame or aurora.

[0048] The controller **50** is configured to control the LEDs **23** such that the luminous intensity gradually increases after turning on and then gradually decreases to be off and control the two LEDs **23** of one of the LED sets **24** to be turned on at different timings so as to have a highest luminous intensity at different timings.

[0049] According to such a configuration, a natural and continuous flickering light image pattern can be obtained compared to the configuration of just turning on and off the LEDs.

[0050] The irradiation ranges of the LEDs **23** included in one of the LED sets **24** overlap. According to such a configuration, a natural and continuous flickering light image pattern can be obtained compared to the configuration in which the irradiation ranges of the LEDs included in one of the LED sets do not overlap.

[0051] The two LEDs **23** included in one of the LED sets **24** are disposed to opposite one of the recessed portions **45**. According to such a configuration, an image pattern formed with one recessed portion **45** can be a clear flickering image.

Other Embodiments

[0052] The technology described herein is not limited to the embodiments described above with reference to the drawings. The following embodiments may be included in the technical scope. The technology described herein may be modified within the technical scope.

[0053] (1) In the above embodiment, the two LEDs **23** of one of the LED sets **24** are turned on at different timings with the luminous intensity change of a same waveform and a same time difference t1 of the different timings and such an operation is repeated intermittently or successively. However, the time difference of the timings when the two LEDs **23** included in each LED set **24** are turned on may be varied and a waveform of the luminous intensity change of the two LEDs **23** may be varied for each LED **23**. For example, as illustrated in FIGS. **9** and **10**, the time difference between the timings when the LEDs are turned on may be varied. Particularly, in FIGS. **9** and **10**, the time difference increases from t1 to t3 ($t1<t2<t3$). The LEDs may have different luminous intensities (different heights of waveforms). The lighting device may have any configurations as long as the two LEDs included in one of the LEDs have different luminous intensities or different turning-on timings.

[0054] (2) In the above embodiment, each LED set **24** includes two LEDs **23**; however, the LED set may include three LEDs. In such a configuration, the three LEDs of the LED set may be turned on at different timings and have a highest luminous intensity at different timings. Thus, a flickering image pattern is obtained.

[0055] (3) In the above embodiment, the controller **50** is configured to control the LEDs **23** such that the luminous intensity gradually increases after turning on and then gradually decreases to be off. However, the control or change of the luminous intensity of the LEDs may be varied as appropriate.

[0056] (4) The above embodiment includes the first LED board **22**A and the second LED board **22**B that face different directions. The LEDs **23** on the first LED board **22**A and the LEDs **23** on the second LED board **22**B emit light in different directions. However, the LEDs on the LED boards may emit in a same direction.

[0057] (5) In the above embodiment, the light transmissive plate **40** includes the recessed portions **45** having an arched cross-sectional shape on the vehicular exterior side surface. However, the light transmissive plate may include protruding portions having a semicircular cross-sectional shape on a

vehicular interior side surface. Furthermore, the light transmissive plate may include recessed portions and protruding portions on a surface or a pattern on a surface.
[0058] (6) The two or three LEDs included in one LED set may be disposed opposite multiple lens portions.
[0059] (7) In the above embodiment, the distance L2 between the first LED set **24**A and the second LED set **24**B, which are adjacent to each other, is determined such that the irradiation ranges of the LED **23** included in the first LED set **24**A and the LED **23** included in the second LED set **24**B do not overlap when the light emitted by the LEDs **23** passes through the light transmissive plate **40**. A distance between adjacent two LED sets may be determined such that the irradiation ranges of the LED included in the adjacent two LED overlap when the light emitted by the LEDs passes through the light transmissive plate.
[0060] (8) In the above embodiment, the lighting device **20** is mounted on the door trim **10** for a vehicle as a vehicular lighting device. However, the present technology may be applied to other vehicular interior components such as a pillar garnish, a ceiling member, a console box, a dashboard, various kinds of instrument panels, and a deck trim, and may be applied to interior components for trains, aircrafts, ships and also applied to a lighting structure mounted on members other than vehicular interior components.

## Claims

**1**. A vehicular lighting device to be mounted on an interior component that includes an upper plate member extending in a vehicular front-rear direction and having an interior design surface and a lower plate member disposed below the upper plate member and on a vehicular exterior side with respect to the upper plate member, the vehicular lighting device comprising: LEDs arranged on the vehicular exterior side with respect to the upper plate member, the LEDs being defined into LED sets each of which includes at least two LEDs arranged at a first interval in the vehicular front-rear direction and the LED sets being arranged in the vehicular front-rear direction at a second interval that is greater than the first interval, the LEDs emitting and supplying light to a vehicular interior space; a light transmissive member that is disposed between a lower edge of the upper plate member and an upper edge of the lower plate member and has a plate shape having a plate surface extending in a vehicular interior-exterior direction and through which light from the LEDs passes toward the vehicular interior space, the light transmissive member including recessed portions on the plate surface facing the LEDs; and a controller configured to turn on and off each of the LEDs separately and configured to turn on the at least two LEDs included in one of the LED sets at different timings.
**2**. The vehicular lighting device according to claim 1, wherein the controller is configured to control the LEDs to gradually increase luminous intensity after turning on the LEDs and subsequently gradually decrease the luminous intensity and turn off, and the controller is configured to turn on the at least two LEDs included in the one of the LED sets to have highest luminous intensity at different timings.
**3**. The vehicular lighting device according to claim 1, wherein irradiation ranges of the at least two LEDs included in the one of the LED sets overlap.
**4**. The vehicular lighting device according to claim 1, wherein the at least two LEDs included in the one of the LED sets are disposed opposite one of the recessed portions.
**5**. The vehicular lighting device according to claim 1, wherein optical axes of the at least two LEDs extend through one of the recessed portions.
**6**. The vehicular lighting device according to claim 1, wherein the light transmissive member is disposed below the LEDs and light emitting surfaces of the LEDs face the light transmissive member.