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(54) [Title of the Invention] DISPLAY SURFACE BACKLIGHTING APPARATUS

(57) [Abstract]

[Object] An object is to provide a display surface backlighting apparatus that can keep display surface brightness uniform irrespective of a distance to a display plate such as a liquid crystal panel.

[Construction] A display surface backlighting apparatus comprises: a light source holder 1; a groove 2 that is formed as a recessed peripheral surface of the light source holder 1; a light source 3 that is mounted in the groove 2; a light-guiding member 7 that has transparency to light and has a shape like a plate, a reflection surface 8 being

formed at back of the light-guiding member 7, an end of the light-guiding member 7 being fixed inside the groove 2; and a light control plate 9 that is provided at a front-surface side of the light-guiding member 7 and is made of a film or a plate-like material serving as a light emission surface, wherein an irregular surface is formed at back of the light control plate 9; and wherein the irregular surface is an array 11 of convex portions and concave portions, which constitute a serrated shape in cross-sectional view.

[Claims]

[Claim 1] A display surface backlighting apparatus, comprising:

a light source holder (1);

a groove (2) that is formed as a recessed peripheral surface of the light source holder (1);

a light source (3) that is mounted in the groove (2);

a light-guiding member (7) that has transparency to light and has a shape like a plate, a reflection surface (8) being formed at back of the light-guiding member (7), an end of the light-guiding member (7) being fixed inside the groove (2); and

a light control plate (9) that is provided at a front-surface side of the light-guiding member (7) and is made of a film or a plate-like material serving as a light emission surface,

wherein an irregular surface is formed at back of the light control plate (9).

[Claim 2] The display surface backlighting apparatus according to Claim 1, wherein the irregular surface is an array (11) of convex portions and concave portions, which constitute a serrated shape in cross-sectional view.

[Claim 3] The display surface backlighting apparatus according to Claim 1, wherein an inner surface of the groove (2) is formed as a reflection surface.

[Detailed Description of the Invention]

[0001]

[Field of Industrial Application] The present invention relates to a backlight apparatus for applying light to a liquid crystal display surface, a photo film / drawing see-through plate, etc. for illumination from behind.

[0002]

[Description of the Related Art] As an apparatus for backlighting a display surface in a liquid crystal display plate, a see-through plate, etc., a device that is an assembled combination of the following components has been known in the art. A light-guiding plate 7, which is made of an acrylic plate or the like, is mounted in/on a light source holder 1, on which a light source 3 made up of plural light emission elements (LED), etc. as illustrated in Figs. 3 and 4 is fixed. A light-diffusing plate (not shown) is provided at the front-surface side of the light-guiding plate 7, with a predetermined clearance left therebetween.

[0003]

[Problems to be Solved by the Invention] The prior-art example described above has the following disadvantages. Brightness decreases gradually from the base edge of the light-guiding plate 7, that is, an edge that is closer to the light source 3, toward the opposite edge, resulting in the lack of uniformity in brightness. Between the base edge

and the center of the light-guiding plate 7, there are differences between the brightness of illuminated areas 5a corresponding to the respective light-source elements 3, the brightness of non-illuminated areas 5b, which are areas where no light is applied, and the brightness of overlapping illuminated areas 5c, which are areas where respective beams emitted from adjacent light-source elements 3 overlap. The brightness differences cause irregularities as a whole; therefore, it is not possible to ensure uniformity in brightness throughout the entire display surface. In order to improve uniformity in brightness over the display surface, it is necessary to install a liquid crystal panel at a sufficient distance from the light-guiding plate 7 of the backlight apparatus. This increases not only the thickness of the backlight apparatus but also cost inefficiently so as to ensure sufficient light-source brightness.

[0004]

[Means for Solving the Problems] In order to solve the above problems, as a first feature of the present invention, a display surface backlighting apparatus comprises: a light source holder 1; a groove 2 that is formed as a recessed peripheral surface of the light source holder 1; a light source 3 that is mounted in the groove 2; a light-guiding member 7 that has transparency to light and has a shape like a plate, a reflection surface 8 being formed at back of the

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