

(11) Japanese Unexamined Utility Model Registration

Application Publication No. 6-025802

(43) Publication Date: April 8, 1994

(21) Application No. 4-061246

(22) Application Date: August 31, 1992

(71) Applicant: Copal Co., Ltd.

(72) Creator of Device: Yoshikawa et al.

(74) Agent: Patent Attorney, Ohtsuka et al.

(54) [Title of the Device] SURFACE EMISSION APPARATUS

(57) [Abstract]

[Object] An object is to provide a surface emission apparatus that realizes uniform brightness on its light-emitting surface.

[Construction] Light emitted from an LED 4 enters a light-guide plate 1 as incident light. Having entered the light-guide plate 1, the light is totally reflected at the upper surface 1a and the bottom surface 1b of the light-guide plate 1, or is reflected by a reflection frame 3, and impinges on projecting portions 31. The projecting portions 31 are formed integrally with said bottom surface. Each of the projecting portions 31 has a shape of a funnel. The light impinging on the projecting portions 31 is reflected, emerges from the upper surface 1a, and is diffused by the diffusion plate 2. An illumination target object is illuminated with the diffused output light.

[Claims]

[Claim 1] A surface emission apparatus for outputting light from its light-emitting surface, incident light coming from a light source arranged near a side of the light-emitting surface,

characterized by,

said surface emission apparatus comprising a transparent light-guide plate, reflecting shape portions being arranged on a bottom surface portion of the light-guide plate, said bottom surface being a surface that is the opposite of the light-emitting surface, the reflecting shape portions being formed as small projecting portions, the reflecting shape portions being arranged in such a way that array density of the small projecting portions increases gradually in accordance with a distance from the light source;

the incident light having entered the light-guide plate from the light source being reflected by the reflecting shape portions; and

the light reflected by the reflecting shape portions emerging from the light-emitting surface.

[Claim 2] The surface emission apparatus according to Claim 1,

further characterized in that,

the reflecting shape portions are arranged in a

staggered array with respect to a direction of going away from the light source to increase the distance therefrom.

[Claim 3] The surface emission apparatus according to Claim 1,

further characterized in that,

each of the reflecting shape portions is formed as the small projecting portion that has a contiguous portion, which is a portion that is contiguous from its vertex portion to its bottom surface portion; and

the contiguous portion has a curved surface.

[Brief Description of the Drawings]

[Fig. 1] Fig. 1 is a sectional view of a surface emission apparatus according to an exemplary embodiment of the present device;

[Fig. 2] Fig. 2 is a top view of the surface emission apparatus; and

[Fig. 3] Fig. 3 is an enlarged view of the bottom surface of a light-guide plate.

[Reference Numerals]

- 1 light-guide plate
- 2 diffusion plate
- 3 reflection frame
- 4 light source
- 31 projecting portion

[Detailed Description of the Device]

[0001]

[Technical Field of the Device]

The present device relates to a surface emission apparatus used for illuminating, from the back, a liquid crystal display panel or the like serving as a body to be illuminated.

[0002]

[Description of the Related Art]

Conventionally, in a surface emission apparatus, in order to guide light emitted from a light source to a light-emitting surface, light from the light source is made to be incident on a light-guide plate and emerges toward the light-emitting surface. As the technique to form such a light-guide plate by subjecting a surface of the light-guide plate opposing the light-emitting surface to hairline formation so as to randomly reflect light incident on this surface, thereby efficiently guiding light from the light source to the light-emitting surface, one disclosed in, e.g., Japanese Examined Patent Application Publication No. 58-17957 is known.

[0003]

[Problems to be Solved by the Device]

In recent years, however, the size of, e.g., the liquid crystal panel, is increasing, and the size of a surface

emission apparatus that serves as the backlight of the liquid crystal panel is also increasing. As the size of the surface emission apparatus increases, in a surface emission apparatus using a conventional light-guide plate, a portion of the light-emitting surface closer to the light source is bright while a portion thereof farther from the light source is dark since light does not easily reach there, leading to a non-uniformity in brightness of the light-emitting surface. Thus, it is difficult to obtain light emission with entirely uniform brightness.

[0004]

The present device has been made in view of the state of the prior art described above. An object of the device is to provide a surface emission apparatus that receives light coming from a light source and can output surface-emission light throughout the entire emission area of its light-emitting surface uniformly, thereby realizing uniform illumination.

[0005]

[Means for Solving the Problems]

In order to achieve the object described above, a surface emission apparatus according to the present device has the following structure. The surface emission apparatus receives incident light coming from a light source arranged near a side of its light-emitting surface and outputs light

# Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

## Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

## Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

## Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

## API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

## LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

## FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

## E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.