



US006680568B2

(12) **United States Patent**
Fujiwara et al.

(10) **Patent No.:** **US 6,680,568 B2**
(45) **Date of Patent:** **Jan. 20, 2004**

(54) **LIGHT SOURCE**

6,060,729 A 5/2000 Suzuki et al. 251/99

(75) Inventors: **Tsubasa Fujiwara**, Tokyo (JP); **Akio Nakano**, Tokyo (JP)

(73) Assignee: **Nippon Leiz Corporation**, Tokyo (JP)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 104 days.

(21) Appl. No.: **09/937,847**

(22) PCT Filed: **Feb. 9, 2001**

(86) PCT No.: **PCT/JP01/00930**

§ 371 (c)(1),
(2), (4) Date: **Nov. 6, 2001**

(87) PCT Pub. No.: **WO01/59851**

PCT Pub. Date: **Aug. 16, 2001**

(65) **Prior Publication Data**

US 2002/0153835 A1 Oct. 24, 2002

(30) **Foreign Application Priority Data**

Feb. 9, 2000 (JP) 2000-032116
Nov. 15, 2000 (JP) 2000-348383

(51) **Int. Cl.**⁷ **H01J 1/62**

(52) **U.S. Cl.** **313/501; 313/512**

(58) **Field of Search** 313/501, 512;
257/98, 99, 100

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,942,504 A * 7/1990 Brotz 362/84

FOREIGN PATENT DOCUMENTS

JP	60-261181	12/1985
JP	3048368	2/1998
JP	10-151794	6/1998
JP	10-308534	11/1998
JP	11-68166	3/1999
JP	11-87772	3/1999
JP	11-087778	3/1999
JP	11-121804	4/1999
JP	11-163419	6/1999
JP	2000-22222	1/2000
JP	2000-31530	1/2000

* cited by examiner

Primary Examiner—Renee Luebke
Assistant Examiner—Ann McCamey

(74) *Attorney, Agent, or Firm*—Kanesaka & Takeuchi

(57) **ABSTRACT**

A light emitting device effectively utilizes the light emanating from a semiconductor luminous element, and can acquire clear and high-luminance light emission without a color dapple. The light emitting device is configured as follows. A transparent resin containing a wavelength converting material is provided on a reflecting surface of a base member such as a case, a board and a lead frame. The transparent semiconductor luminous element is bonded and fixed on the transparent resin. A wavelength of light emitted from a lower surface of the semiconductor luminous element is converted by the wavelength converting material, and the converted light is reflected on the reflecting surface. The reflected light is mixed with light emitted from an upper surface of the semiconductor luminous element, and the mixed light is radiated.

13 Claims, 17 Drawing Sheets

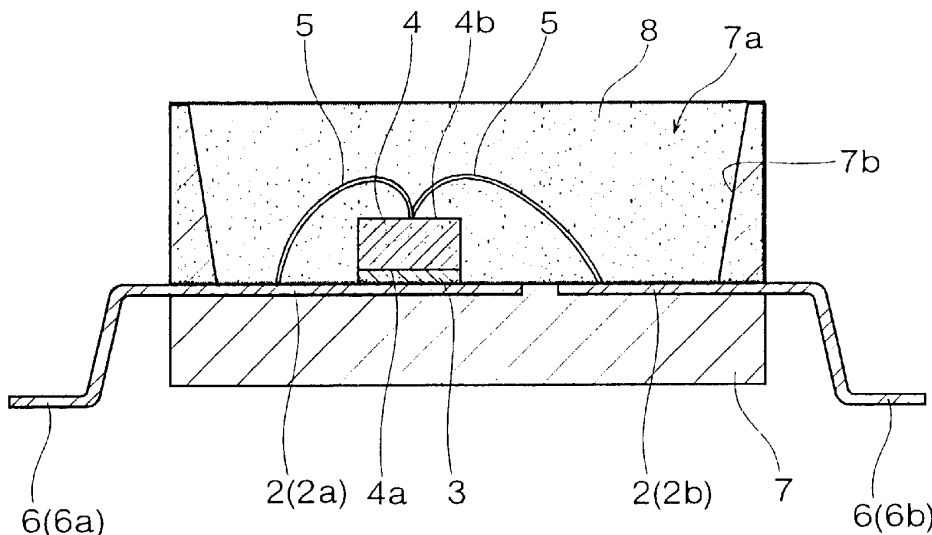


FIG. 1

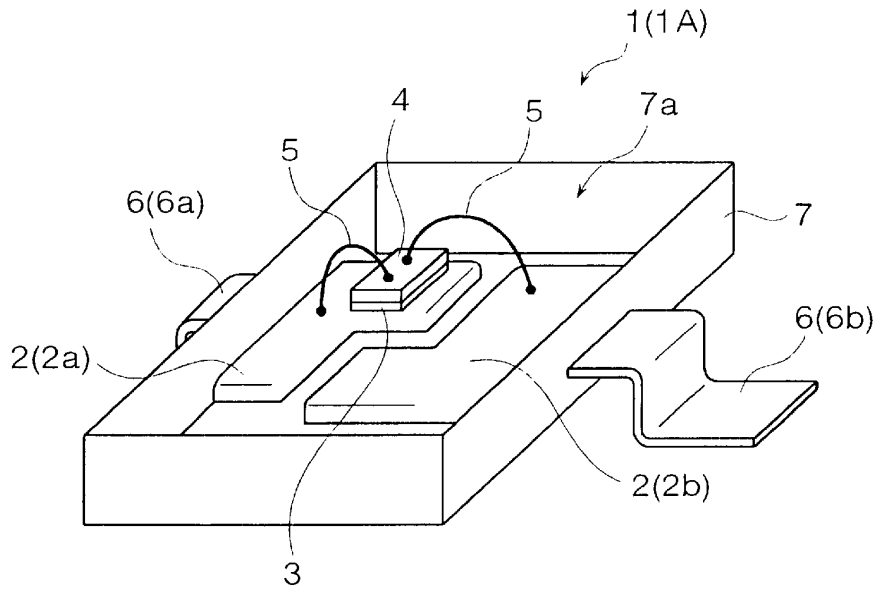


FIG. 2

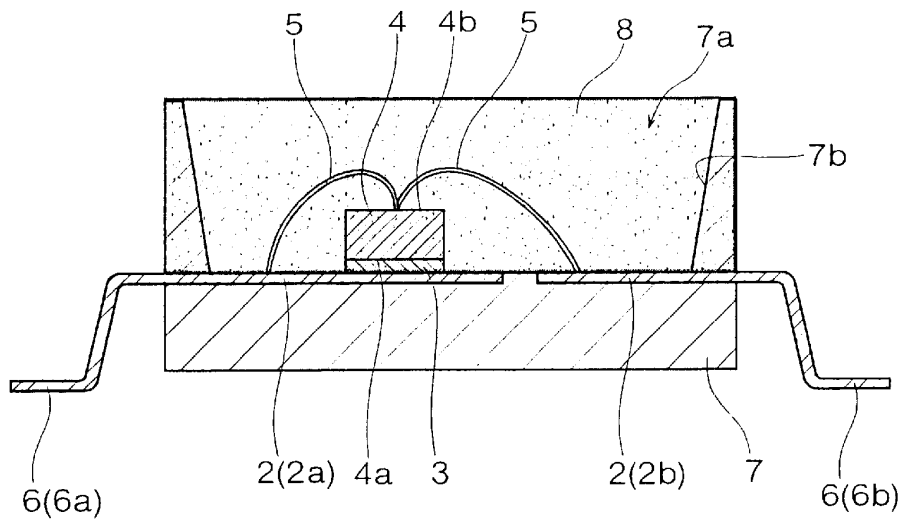


FIG. 3

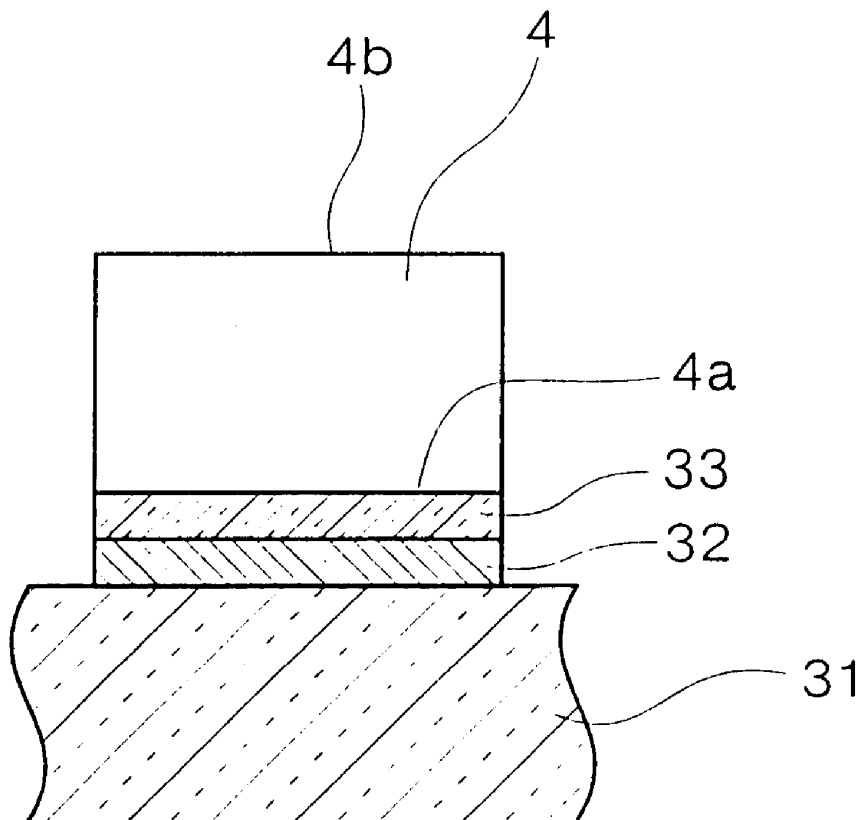
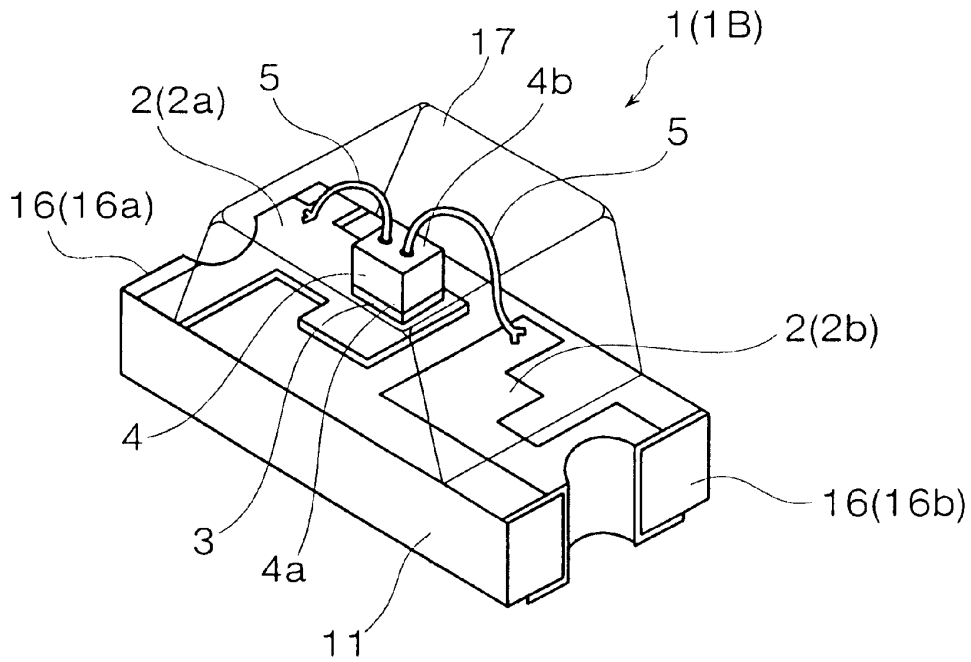


FIG. 4

	CONVENTIONAL TYPE	TYPE IN THIS EMBODIMENT
	LUMINOUS INTENSITY (mcd)	LUMINOUS INTENSITY (mcd)
No.01	53.8	64.3
No.02	42.9	60.6
No.03	45.6	61.1
No.04	46.7	60.3
No.05	44.1	58.2
No.06	36.4	52.9
No.07	44.6	61.0
No.08	39.4	64.0
No.09	42.4	53.6
No.10	46.1	49.6
No.11	51.2	60.6
No.12	48.9	62.6
No.13	40.5	62.8
MAX	53.8	64.3
MIN	36.4	49.2
AVE.	44.20	58.56

FIG. 5



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.