



(43) International Publication Date  
14 January 2010 (14.01.2010)

(10) International Publication Number  
**WO 2010/004503 A1**

(51) International Patent Classification:

F21V 17/14 (2006.01) F21S 4/00 (2006.01)  
F21V 19/00 (2006.01) F21Y 101/02 (2006.01)  
F21V 29/00 (2006.01)

[NL/NL]; c/o High Tech Campus Building 44, NL-5656 AE Eindhoven (NL).

(21) International Application Number:

PCT/IB2009/052934

(74) Agents: BEKKERS, Joost, J., J. et al.; High Tech Campus, Building 44, NL-5656 AE Eindhoven (NL).

(22) International Filing Date:

6 July 2009 (06.07.2009)

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

08160171.8 11 July 2008 (11.07.2008) EP

(71) Applicant (for all designated States except US): KONINKLIJKE PHILIPS ELECTRONICS N.V. [NL/NL]; Groenewoudseweg 1, NL-5621 BA Eindhoven (NL).

(81) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV,

(72) Inventors; and

(75) Inventors/Applicants (for US only): VAN ELMPT, Rob, F., M. [NL/NL]; c/o High Tech Campus Building 44, NL-5656 AE Eindhoven (NL). SIPKES, Mark, E., J.

[Continued on next page]

(54) Title: LIGHT OUTPUT DEVICE AND ASSEMBLY METHOD

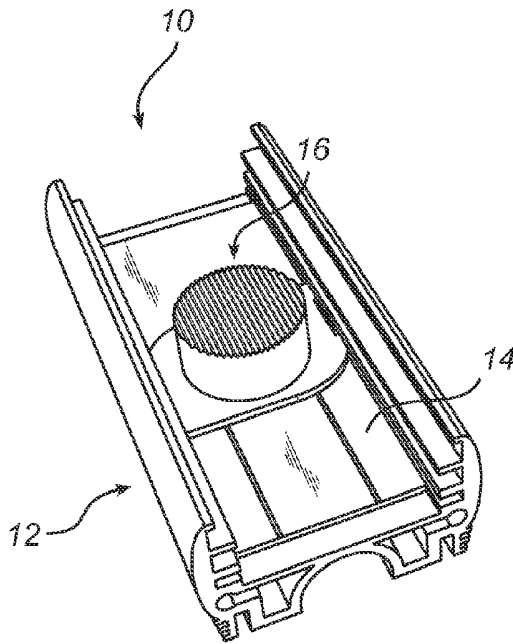


FIG. 5a

(57) Abstract: The present invention relates to a light output device (10) comprising a heat sink (12); a substrate (14) with at least one light emitting element (24) arranged thereon; and an optical component (16), wherein the optical component is mounted to the heat sink by means of a bayonet type mechanism, and wherein the substrate is fixed between the heat sink and the optical component. The present invention also relates to a method of assembling such a light output device.

WO 2010/004503 A1



MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

**Published:**

**Declarations under Rule 4.17:**

- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

- *with international search report (Art. 21(3))*
- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

## Light output device and assembly method

### FIELD OF THE INVENTION

The present invention relates to a light output device, in particular a light output device comprising at least one light emitting diode (LED), as well as a method of assembling such a light output device.

5

### BACKGROUND OF THE INVENTION

Generally, printed circuit boards (PCBs) with LEDs are often glued, screwed or clamped to a heat sink to ensure thermal contact and sufficient heat conduction away from the LEDs. Also, often optics are placed over the LEDs to provide a desired radiation pattern or to protect the LED.

10

US patent no. 7,348,604 (Matheson) discloses a light-emitting module comprising heat dissipation element, a substrate coupled to one or more light emitting elements, and a housing element including fastening means for coupling the housing element to the heat dissipation element, the substrate allegedly being enclosed between the heat dissipation element and the housing element. The housing element is provided with an optical element, and it is flexible to be slid over the heat dissipation element and clutch the latter as it resumes its unstrained shape.

15

A drawback with the solution presented in Matheson is that the flexible property of the housing element imposes design constraints on the housing element with respect to material and shape selection.

20

### SUMMARY OF THE INVENTION

It is an object of the present invention to at least partly overcome this drawback, and to provide an improved light output device.

25

This and other objects that will be apparent from the following description are achieved by a light output device, and a method of assembling such a light output device, according to the appended independent claims.

According to an aspect of the present invention, there is provided a light output device, comprising: a heat sink; a substrate with at least one light emitting element

arranged thereon; and an optical component, wherein the optical component is mounted to the heat sink by means of a bayonet type mechanism, and wherein the substrate is fixed between the heat sink and the optical component.

A bayonet type mechanism may generally be defined as an arrangement for fastening with a short rotational movement two connecting parts of rotary symmetrical character to each other. By using a bayonet type mechanism, simply twisting the optical component may fixate the optical component in the right position and also fixate the substrate to the heat sink. The latter ensures thermal contact between the substrate and the heat sink. Fixation of the substrate to the heat sink is thus advantageously carried out without having to use flexible elements, or screws, glue or other additional components. Also, the substrate may be forced to the heat sink where it is needed: namely around the at least one LED.

In one embodiment, the bayonet type mechanism comprises two opposite lateral members protruding from the optical component and two opposite grooves in the heat sink adapted to receive said protruding members, as the optical component is rotated appropriately. The optical element may for instance include a base plate having the shape of a rectangle with two diagonally opposite rounded corners, and the heat sink may be formed as a profiled channel with two longitudinal, inner grooves. Thus, the function of fixating the substrate to the heat sink is integrated mainly in the optical element.

Preferably, the substrate is a printed circuit board, the optical component is a collimating lens, and the at least one light emitting element is at least one light emitting diode (chip or package). Benefits of LEDs include high efficiency, long useful life, etc. Alternative substrates include, but are not limited to, a wired circuit board. Alternative optical components include, but are not limited to, a protective transparent or translucent cover, a diffusing cover, a lens, a reflector, etc. Alternative light emitting elements include, but are not limited to, organic light emitting diodes (OLEDs), laser diodes, etc.

According to another aspect of the present invention, there is provided a method of assembling a light output device, the method comprising: providing a heat sink; placing a substrate with at least one light emitting element arranged thereon on the heat sink; and mounting an optical component to the heat sink by means of a bayonet mechanism such that the substrate is fixed between the heat sink and the optical component. In one embodiment, the bayonet type mechanism comprises two opposite lateral members protruding from the optical component and two opposite grooves in the heat sink, wherein mounting the optical component to the heat sink comprises rotating the optical component in relation to the heat sink such that the protruding members are received in the grooves. In

particular, the optical component is preferably mounted to the heat sink by rotating it about 30-150 degrees, preferably about 45 degrees, i.e. a short rotary movement, compared to for instance a screw fitting which requires a long rotary movement for a similar function.

Moreover, this aspect exhibits similar advantages and may exhibit similar features as the aspect discussed above.

#### BRIEF DESCRIPTION OF THE DRAWINGS

These and other aspects of the present invention will now be described in more detail, with reference to the appended drawings showing currently preferred embodiments of the invention.

Figs. 1a-5b are perspective views and side views, respectively, illustrating steps of assembling a light output device according to an embodiment of the present invention.

Fig. 6a is a perspective view and fig. 6b is a cross-sectional side view of an optical element of the present light output device.

#### DETAILED DESCRIPTION

A light output device 10 according to an embodiment of the present invention will now be described with reference to the appended drawings.

The light output device 10 comprises a heat sink 12, a PCB 14, and an optical component 16.

The heat sink 12 is preferably made of a material with high thermal conductivity, such as metal, in particular aluminum. The present heat sink 12 is a profiled channel having a base portion 18 and two side wall portions 20a, 20b. Two opposite grooves 22a, 22b run along the inside of the wall portion 20a, 20b near the base portion 18, as illustrated in e.g. figs 1a-1b. The heat sink 12 may optionally comprise a plurality of fins for enhanced heat dissipation.

The PCB 14 comprises at least one LED 24 thermally connected thereto. The LED 24 may be an LED package, or a chip or die mounted directly on the PCB 14. The PCB 14 further comprises electrically conductive traces 26 or the like for electrically connecting the LED(s) 24 to a power source (not shown), for activation of the LED(s) 24. The PCB 14 rests, preferably directly, on the base portion 18 between the two wall portions 20a, 20b of the heat sink 12. Also, opposite edges 28a, 28b of the PCB 14 may abut the inside of the wall

# 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.