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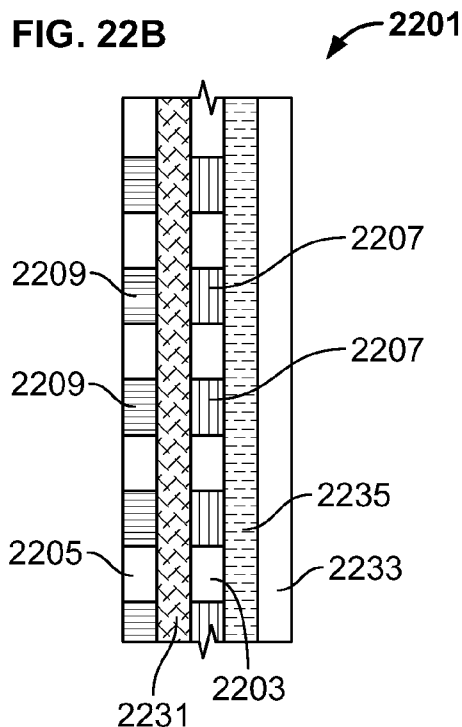
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[Continued on next page]

(54) Title: SYSTEM FOR LIGHTING APPARATUS UTILIZING LIGHT ACTIVE SHEET MATERIAL WITH INTEGRATED LIGHT EMITTING DIODE, WINDOW WITH LIGHTING APPARATUS, CONVEYANCE WITH LIGHTING APPARATUS, AND METHOD OF PROVIDING LIGHTING APPARATUS



(57) Abstract: A dual lighting apparatus includes a principal substrate (2201), a first lighting device and a second lighting device. The first lighting device is integrated into a first plane (2203) of the principal substrate (2201), the first lighting device having one or more first light emitting diode (LED) chips (2207) embedded therein. The second lighting device is integrated into a second plane (2205) of the principal substrate (2201), the second lighting device having one or more second light emitting diode (LED) chips (2209) embedded therein. The first LED chip(s) emit light photons having a different wavelength than light photons emitted from the second LED chip(s).



TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

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see Notice of 27 February 2014

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2012/048569

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - H01L 33/00 (2012.01)

USPC - 257/89

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC(8) - H01L 33/00, 33/02, 33/06, 33/08, 33/50 (2012.01)

USPC - 257/79, 88, 89, 90, 94, 100

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

PatBase, Google Scholar, Google Patents

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2008/0079012 A1 (GROTE et al) 03 April 2008 (03.04.2008) entire document	11
Y		1-10, 12-27
Y	US 2005/0211998 A1 (DANIELS et al) 29 September 2005 (29.09.2005) entire document	1-10, 12-21
Y	US 5,241,457 A (SASAJIMA et al) 31 August 1993 (31.08.1993) entire document	22-27
A	US 2003/0016543 A1 (AKIYAMA) 23 January 2003 (23.01.2003) entire document	1-27
A	US 2006/0221637 A1 (CHIKUGAWA et al) 05 October 2006 (05.10.2006) abstract; figure 1; paragraphs 20-22.	1-27

☐ Further documents are listed in the continuation of Box C.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

24 November 2012

Date of mailing of the international search report

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2012/048569

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:
See extra sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☒ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2012/048569

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I, claims 1-10, 12-21, drawn to a dual lighting apparatus and method, comprising a second lighting device integrated into a second plane of the principal substrate, the second lighting device having at least one second light emitting diode (LED) chip embedded therein, wherein the at least one first LED chip emits light photons having a different wavelength than light photons emitted from the at least one second LED chip.

Group II, claim 11, drawn to a window with incorporated lighting device, comprising plural glass substrates that form the window, wherein the lighting apparatus is sandwiched between plural glass substrates that form the window and laminated therebetween.

Group III, claims 22-27, drawn to a method of providing a conveyance with low profile integrated lighting, comprising mounting the lighting apparatus on a portion of an interior or exterior surface of the conveyance so that the substrate is substantially parallel to and in continuous contact with the interior or exterior surface of the conveyance, an electrical connection powering the lighting apparatus extending along the interior or exterior surface, and a profile of the lighting apparatus being less than 1 inch.

The inventions listed as Groups I, II and III do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: the special technical feature of the Group I invention: a second lighting device integrated into a second plane of the principal substrate, the second lighting device having at least one second light emitting diode (LED) chip embedded therein, wherein the at least one first LED chip emits light photons having a different wavelength than light photons emitted from the at least one second LED chip, as claimed therein is not present in the invention of Groups II and III. The special technical feature of the Group II invention: a window comprising plural glass substrates that form the window, wherein the lighting apparatus is sandwiched between plural glass substrates that form the window and laminated therebetween, as claimed therein is not present in the invention of Groups I or III. The special technical feature of the Group III invention: mounting the lighting apparatus on a portion of an interior or exterior surface of the conveyance so that the substrate is substantially parallel to and in continuous contact with the interior or exterior surface of the conveyance, an electrical connection powering the lighting apparatus extending along the interior or exterior surface, and a profile of the lighting apparatus being less than 1 inch, as claimed therein is not present in the invention of Groups I or II.

Groups I, II and III lack unity of invention because even though the inventions of these groups require the technical feature of a lighting device comprising a principal substrate, a first lighting device integrated into a first plane of the principal substrate, the first lighting device having at least one first light emitting diode (LED) chip embedded therein, this technical feature is not a special technical feature as it does not make a contribution over the prior art in view of US 2006/0221637 A1 (CHIKUGAWA et al) 05 October 2006 (05.10.2006) abstract; figure 1; paragraphs 20-22.

Since none of the special technical features of the Group I, II or III inventions are found in more than one of the inventions, unity of invention is lacking.