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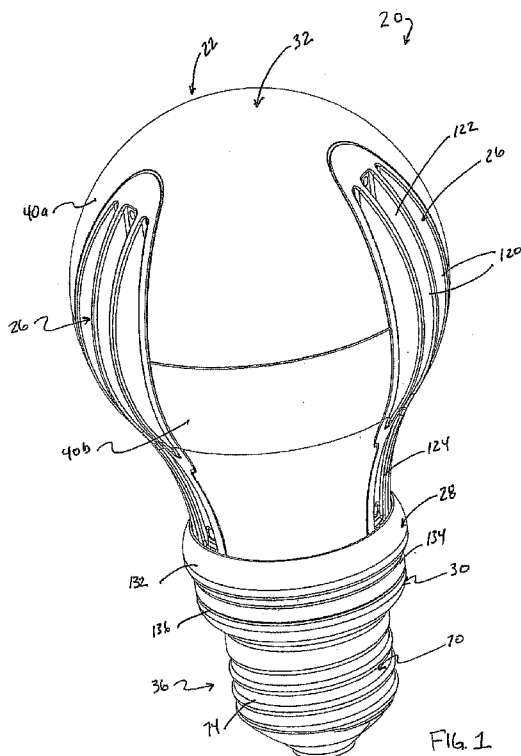
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[Continued on next page]

(54) Title: HEAT TRANSFER ASSEMBLY FOR LED-BASED LIGHT BULB OR LAMP DEVICE



(57) Abstract: A LED-based light bulb (20) or lamp device including a bulb body (22), an LED assembly (24), an LED heatsink (26), and a power conversion heatsink (28). The LED assembly (24) includes a plurality of LEDs (34) and circuitry (102). The circuitry (102) includes power converting components adapted to modify applied power for powering the LEDs via conductive wiring. The LED heatsink is mounted to the bulb body in close proximity to at least one of the LEDs. The power conversion heatsink is provided apart from the LED heatsink and is mounted to the bulb body in close proximity to at least one of the power converting components. The LED heatsink dissipates heat from at least some of the light emitting diode lights whereas the separate power conversion heatsink dissipates heat from the power converting circuitry components, thereby separating the heat - generating components and their mounting zones, heat paths and heatsink surface areas.





TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

**Published:**

- *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))*

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

**(88) Date of publication of the international search report:**

15 November 2012

INTERNATIONAL SEARCH REPORT

International application No  
PCT/US2012/030422

A. CLASSIFICATION OF SUBJECT MATTER  
INV. F21V29/00  
ADD. F21Y101/02

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)  
F21V F21K

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)  
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2010/032181 A1 (KONINKL PHILIPS ELECTRONICS NV [NL]; WEEKAMP JOHANNES W [NL]; EGGINK H) 25 March 2010 (2010-03-25) page 4, line 3 - page 7, line 20 figures 3,5	1,2,4,5, 7-10, 14-16,19
Y	WO 2009/149263 A1 (FOREVER BULB LLC [US]; CARROLL DAVID W [US]; CARROLL WENDELL L [US]) 10 December 2009 (2009-12-10) paragraph [0031] - paragraph [0082] figures 1-18	1-10, 14-19
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Further documents are listed in the continuation of Box C.

See patent family annex.

\* 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 September 2012	Date of mailing of the international search report  05/10/2012
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer  Blokland, Russell

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US2012/030422

## 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 additional 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 an 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/US2012/030422

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP 2 228 587 A1 (TOSHIBA LIGHTING & TECHNOLOGY [JP]; TOSHIBA KK [JP]) 15 September 2010 (2010-09-15) paragraph [0010] paragraph [0022] paragraph [0042] paragraph [0061] figures 6,7	1-10, 14-19
Y	----- JP 2009 004130 A (SHARP KK) 8 January 2009 (2009-01-08)	4,5
A	paragraph [0042] figure 5	1
A	----- US 2007/242461 A1 (REISENAUER WILLIAM [US] ET AL) 18 October 2007 (2007-10-18) figures 8a-d paragraph [0041] -----	1

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2012/030422

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US 2007242461 A1	18-10-2007	NONE	
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**FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210**

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-9, 14-19

A LED light bulb device having as special technical feature that the power conversion heatsink forms a protective cover for the conductive wiring. With this special technical feature the problem is solved of how to protect the conductive wiring. A LED light bulb having as a special technical feature that the heatsinks are formed along the exterior of a common incandescent bulb shape. A LED light bulb having as special technical feature that at least a majority of a mass of the LED heatsink is located in a widest portion of the bulb body. A LED light bulb having as special technical feature a plurality of LED heatsinks. A LED light bulb having as special technical feature that the LED heatsink comprises a plastic with a coating of copper. By these special technical features the problem is solved of improving the heat transfer to the ambient atmosphere. A LED light bulb having as special technical feature that the circuitry includes a flexible substrate that commutes heat from at least one of the power converting components to the power conversion heatsink. By this special technical feature the problem is solved of how to provide a widened path to specific zones of the power conversion heatsink. A LED light bulb having as special technical feature that the LED heatsink is mounted at an exterior of the bulb body, and further wherein the bulb body exterior does not extend over the at least one light emitting diode light. By this special technical feature the problem is solved of how to prevent that the LED heatsink projects outwardly from the bulb.

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2. claims: 10-13

A LED light bulb having as special technical feature a base assembled to the bulb body, wherein the power conversion components are located within the base. By this special technical feature the problem is solved of how to hide the power conversion components so that they cannot be seen from outside the bulb.

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