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Declarations under Rule 4.17:

— of inventorship (Rule 4.17(iv))

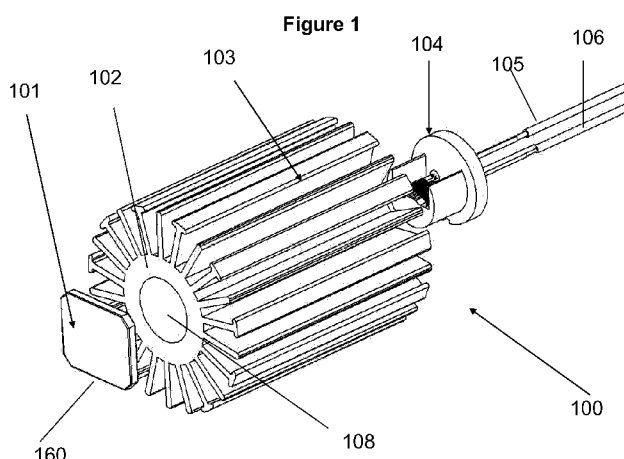
Published:

— 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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29 September 2011

(54) Title: SEMICONDUCTOR LASER ASSEMBLY AND PACKAGING SYSTEM



(57) Abstract: A system for self-aligning assembly and packaging of semiconductor lasers allows reduction of time, cost and testing expenses for high power density systems. A laser package mounting system (100), such as a modified TO-can (transistor outline can), has modifications that increase heat transfer from the active laser to a heat exchanger (103) or other heat sink. A pre-fabricated heat exchanger assembly mounts both a laser package and one or more lenses (101). Direct mounting of a fan assembly to the package further minimizes assembly steps. Components may be physically and optically aligned during assembly by clocking and other indexing means, so that the entire system (100) is self-aligned and focused by the assembly process without requiring post-assembly adjustment. This system (100) can lower costs and thereby enable the use of high powered semiconductor lasers in low cost, high volume production, such as consumer items.



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INTERNATIONAL SEARCH REPORT

International application No
PCT/US2010/057411

A. CLASSIFICATION OF SUBJECT MATTER INV. H01S5/022 H01S5/024 ADD.		
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) H01S F21L		
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 practical, search terms used) EPO-Internal		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 870 133 A (NAIKI TOSHIO [JP]) 9 February 1999 (1999-02-09) column 8, line 57 - column 9, line 22; figures 7, 8	1,7,17
X	US 5 440 574 A (SOBOTTKE MARK D [US] ET AL) 8 August 1995 (1995-08-08) figure 1	1,7
X	US 5 255 167 A (TOUSSAINT GREGORY J [US] ET AL) 19 October 1993 (1993-10-19) figure 3	1,7
X	US 4 953 171 A (NAKAJIMA TOMOHIRO [JP] ET AL) 28 August 1990 (1990-08-28) column 2, lines 41-50; figures 1,2	1,2,16
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<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> 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 document 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 23 March 2011		Date of mailing of the international search report 05/08/2011
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 Cortona, Anna

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2010/057411

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.:

1-19

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/US2010/057411

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 1 689 054 A1 (FUNAI ELECTRIC CO [JP]) 9 August 2006 (2006-08-09) paragraphs [0015], [0020], [0023] - [0025]; figures 1-7 -----	1-4, 7-15,18, 19
A	JP 60 009188 A (FUJITSU LTD) 18 January 1985 (1985-01-18) figures 1,2 -----	1-19
A	US 2005/130342 A1 (ZHENG TIEYU [US] ET AL) 16 June 2005 (2005-06-16) figures 1-4b -----	1-19

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No PCT/US2010/057411

Patent document cited in search report	Publication date	Publication date	Patent family member(s)	Publication date
US 5870133	A	09-02-1999	NONE	
US 5440574	A	08-08-1995	WO 9534110 A1	14-12-1995
US 5255167	A	19-10-1993	NONE	
US 4953171	A	28-08-1990	JP 1305587 A JP 2682641 B2	08-12-1989 26-11-1997
EP 1689054	A1	09-08-2006	CN 1815584 A JP 3110158 U US 2006171441 A1	09-08-2006 16-06-2005 03-08-2006
JP 60009188	A	18-01-1985	NONE	
US 2005130342	A1	16-06-2005	NONE	

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

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

1. claims: 1-19

Laser system with an heat exchanger having a bore; a carrier on which a semiconductor gain chip is mounted, the carrier being at least partly mounted in the bore; lens mounted on the heat exchanger over the bore.

2. claims: 20-41

Method for assembling self-aligned laser systems, comprising: affixing a semiconductor laser chip to a carrier; placing the carrier in thermal contact with an heat exchanger; affixing an optical element to the heat exchanger or the carrier. Each laser chip has a beam output having a predefined direction without post-fabrication adjustment.

3. claims: 42-45

An enclosure for a laser system, with at least one contact located at the interface where the light is emitted to permit operation of the system.
