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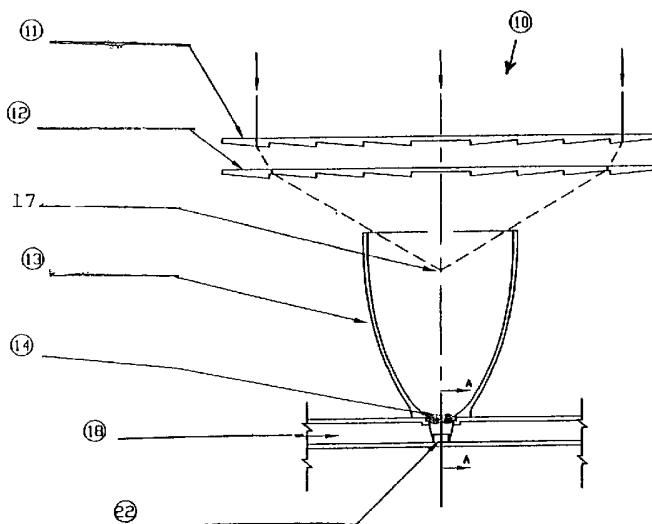
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(54) Title: PHOTOVOLTAIC ARRAY MODULE DESIGN FOR SOLAR ELECTRIC POWER GENERATION SYSTEMS



(57) Abstract: A solar photovoltaic array module design, which can constitute either three or four steps of optical concentrations of photovoltaic electric power generation systems. A compound parabolic concentrator (CPC) (13) is mounted under a first (11) or a first (11) and a second (12) optical concentrating fresnel lens that concentrates the intensity of sunlight. Then the focused sunlight is further concentrated twenty times by the third optical concentrator CPC (13). The high mirror quality of CPC allows 98% of the reflected rays to be focused at the bottom of the CPC. At this point, the intensified sunlight is homogenized as it passes through a fourth optical concentrator glass lens (14) which with anti-reflection coating on the top of the glass lens' surface, incident on the multi-junction solar cell (22) accomplish the fourth optical concentration for the photovoltaic electric energy conversion.



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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US02/33696

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : H01L 31/052
US CL : 136/246, 259; 257/432, 436

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)
U.S. : 136/246, 259; 257/432, 436

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)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X,P	US 6,384,320 B1 (CHEN) 07 May 2002 (07.05.2002), column 1, line 66 through column 2, line 27, and Figure 1.	1-27
X --- A	US 4,114,592 A (WINSTON) 19 September 1978 (19.09.1978), column 2, line 37 through column 3, line 50, and Figures 1, 2, 3, and 7.	21, 26 ----- 1-20, 22-25, 27
X --- A	COLLARES-PEREIRA et al. 'High temperature solar collection of optimal concentration - non-focusing lens with secondary concentrator.' In: Sun, Proceedings of the International Solar Energy Society Congress. India: Pergamon Press, January 1978, p. 1282-1286.	21, 26 ----- 1-20, 22-25, 27
A	US 4,238,246 A (GENEQUAND et al) 09 December 1980 (09.12.1980).	1-27
A	US 5,118,361 A (FRAAS et al) 02 June 1992 (02.06.1992).	1-27
A	US 6,299,317 B1 (GORTHALA) 09 October 2001 (09.10.2001).	1-27

Further documents are listed in the continuation of Box C.

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"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

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"&" document member of the same patent family

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