



- (51) **International Patent Classification:**  
H01L 31/042 (2006.01)
- (21) **International Application Number:**  
PCT/US2009/001366
- (22) **International Filing Date:**  
4 March 2009 (04.03.2009)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (30) **Priority Data:**  
12/074,523 4 March 2008 (04.03.2008) US
- (63) **Related by continuation (CON) or continuation-in-part (CIP) to earlier application:**  
US 12/074,523 (CON)  
Filed on 4 March 2008 (04.03.2008)
- (71) **Applicant and**  
(72) **Inventor:** COX, Edwin, B. [US/US]; 4611 Powder Mill Road, Chapel Hill, NC 27514 (US).
- (74) **Agents:** TYSVER, Daniel, A. et al.; Beck & Tysver, P.L.L.C., 2900 Thomas Ave. S., Suite 100, Minneapolis, MN 55416 (US).
- (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, 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, 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.

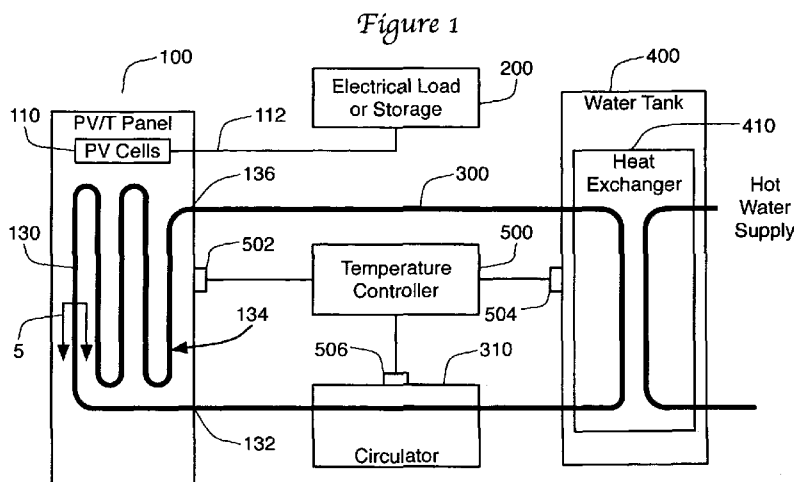
(84) **Designated States** (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, 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))

(88) **Date of publication of the international search report:**  
23 December 2009

(54) **Title:** UNGLAZED PHOTOVOLTAIC AND THERMAL APPARATUS AND METHOD



(57) **Abstract:** A photovoltaic/thermal solar panel is presented which contains no glazing above the photovoltaic array. The absence of glazing allows the photovoltaic cells to operate at a lower temperature and therefore at a higher efficiency. In addition, the absence of glazing allows the present invention PV/T panel to be used to provide nighttime cooling for a building. The panel is constructed by adhering an aluminum heat transfer plate to the rear of the PV array in the panel using a silicone adhesive. PEX tubing is inserted into channels integrally formed into the heat transfer plate again using silicone or other heat-conductive compound.

WO 2009/111017 A3

## INTERNATIONAL SEARCH REPORT

International application No.  
**PCT/US2009/001366****A. CLASSIFICATION OF SUBJECT MATTER****H01L 31/042(2006.01)i**

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: H01L 31/052

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

KOREAN UTILITY MODELS AND APPLICATIONS FOR UTILITY MODELS SINCE 1975

JAPANESE UTILITY MODELS AND APPLICATIONS FOR UTILITY MODELS SINCE 1975

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

eKOMPASS(KIPO internal) &amp; keyword : solar, unglazed, and PEX

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y A	KR 10-2005-0106164 A (PUKYONG NATIONAL UNIVERSITY BUSINESS INCUBATOR CENTER) 09 November 2005 See the abstract; page 3, line 45 - page 5, line 9; claims 1-4; Fig. 2-3	1 2-4, 9 5-8, 10-15
Y A	JAY BURCH et al. 'Low-Cost Residential Solar Thermal Systems.' In: Meeting Record, Solar Energy Technologies Program Peer Review Meeting 2007. Denver, Colorado: DOE/EERE, April 2007. pages 67-69 ( <a href="http://www1.eere.energy.gov/solar/review_meeting/pdfs/p_68_burch_nrel.pdf">http://www1.eere.energy.gov/solar/review_meeting/pdfs/p_68_burch_nrel.pdf</a> )	2-4 1, 5-15
Y A	Y. TRIPANAGNOSTOPOULOS et al. 'Application Aspects of Hybrid PV/T Solar Systems.' In: Congress Record, Proceedings of the ISES 03 World Congress, Goteborg, Sweden: ISES, June 2003, CD-ROM paper pages 265-272	9 1-8, 10-15

 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

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"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

"&amp;" document member of the same patent family

Date of the actual completion of the international search

27 OCTOBER 2009 (27.10.2009)

Date of mailing of the international search report

**27 OCTOBER 2009 (27.10.2009)**

Name and mailing address of the ISA/KR

Korean Intellectual Property Office  
Government Complex-Daejeon, 139 Seonsa-ro, Seo-  
gu, Daejeon 302-701, Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

Chio Sang Won

Telephone No. 82-42-481-5695



**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International application No.

**PCT/US2009/001366**

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
KR 10-2005-0106164 A	09 November 2005	None	