

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
18 February 2010 (18.02.2010)

PCT

(10) International Publication Number  
**WO 2010/019401 A3**

(51) International Patent Classification:

*F28F 9/00* (2006.01) *F28F 17/00* (2006.01)  
*F28F 1/32* (2006.01)

(21) International Application Number:

PCT/US2009/052542

(22) International Filing Date:

3 August 2009 (03.08.2009)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

61/089,084 15 August 2008 (15.08.2008) US

(71) Applicant (for all designated States except US): **CARRIER CORPORATION** [US/US]; One Carrier Place, P.O. Box 4015, Farmington, CT 06034-4015 (US).

(72) Inventor; and

(75) Inventor/Applicant (for US only): **ALAHYARI, Abbas, A.** [US/US]; 186 Walek Farms Rd., Manchester, CT 06040 (US).

(74) Agent: **BUTCHKO, Karin, H.**; Carlson, Gaskey & Olds, P.C., 400 West Maple Road, Suite 350, Birmingham, MI 48009 (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, CL, 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, PE, 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, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))
- of inventorship (Rule 4.17(iv))

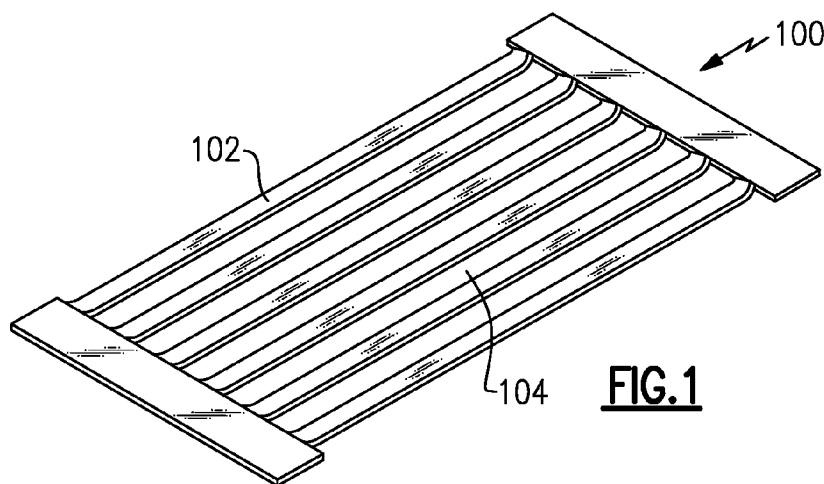
Published:

- 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))

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

6 May 2010

(54) Title: HEAT EXCHANGER FIN INCLUDING LOUVERS



(57) Abstract: A heat exchanger includes a first header, a second header and heat exchange tubes that extend between the first header and the second header. A fin is located between two adjacent heat exchange tubes, and the fin includes fin plates each having louvers. Each of the louvers includes a first louver section, a second louver section and a third louver section between the first louver section and the second louver section. The third louver section includes a drain portion that extends downwardly relative to the first louver section and the second louver section.

WO 2010/019401 A3

## INTERNATIONAL SEARCH REPORT

International application No.  
**PCT/US2009/052542****A. CLASSIFICATION OF SUBJECT MATTER*****F28F 9/00(2006.01)i, F28F 1/32(2006.01)i, F28F 17/00(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)

F28F 9/00; F25B 39/02; F28D 1/02; F28D 1/053; F28F 1/30

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

Japanese utility models and applications for utility models

(Chinese Patents and application for patent)

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

eKOMPASS(KIPO internal) &amp; Keywords: louver, drain

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	JP 2007-232246 A (DENSO CORP) 13 September 2007 See Paragraph [0011]-[0026], Figures.	1-3, 11-12 4-10, 13-19
A	US 2002-0079092 A1 (AJIT R. SHEMAKAR et al.) 27 June 2002 See Paragraph [0008]-[0011], Figures.	1-19
A	JP 01-305296 A (DIESEL KIKI CO LTD) 08 December 1989 See abstract and figures.	1-19
A	JP 61-140790 A (NIPPON DENSO CO LTD) 27 June 1986 See abstract and figures.	1-19



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 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

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

Date of the actual completion of the international search

15 MARCH 2010 (15.03.2010)

Date of mailing of the international search report

**16 MARCH 2010 (16.03.2010)**

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

KWON, In Sup

Telephone No. 82-42-481-8560



**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International application No.

**PCT/US2009/052542**

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 2007-232246 A	13.09.2007	CN 101029807 A CN 101029807 C0 DE 102007009535 A1 US 2007-0199686 A1	05.09.2007 05.09.2007 06.09.2007 30.08.2007
US 2002-0079092 A1	27.06.2002	US 6672376 B2	06.01.2004
JP 01-305296 A	08.12.1989	None	
JP 61-140790 A	27.06.1986	None	