



(12) **EUROPEAN PATENT APPLICATION**

(88) Date of publication A3:
02.07.2014 Bulletin 2014/27

(51) Int Cl.:
F28F 9/02 (2006.01) **F28D 21/00 (2006.01)**
F28D 1/02 (2006.01) **F28D 1/053 (2006.01)**

(43) Date of publication A2:
07.12.2011 Bulletin 2011/49

(21) Application number: **11167680.5**

(22) Date of filing: **26.05.2011**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

- **Wintersteen, Douglas Charles**
Burt, NY New York 14028 (US)
- **Johnson, Russel Scott**
Tonawanda, NY New York 14150 (US)
- **Xia, Yanping**
North Tonawanda, NY New York 14120 (US)

(30) Priority: **01.06.2010 US 350123 P**
24.05.2011 US 201113114405

(74) Representative: **Robert, Vincent et al**
Delphi France SAS
Bât. le Raspail - ZAC Paris Nord 2
22, avenue des Nations
CS 65059 Villepinte
95972 Roissy CDG Cedex (FR)

(71) Applicant: **Delphi Technologies, Inc.**
Troy, MI 48007 (US)

(72) Inventors:
• **Joshi, Shrikant Mukund**
Williamsville, NY New York 14221 (US)

(54) **Orientation insensitive refrigerant distributor tube**

(57) A heat exchanger assembly (10) having an inlet header (12a), an outlet header (12b) spaced from the inlet header (12a), a plurality of refrigerant tubes (14) hydraulically connecting the inlet header (12a) with the outlet header (12b). A distributor tube (20) having a plurality of orifices (22) disposed in the inlet header (12a), wherein the orifices (22) are arranged along the distributor tube (20) such that at least one orifice is oriented in the liquid phase (24) of the refrigerant pressed against the internal surface of the distributor tube (20) regardless of orientation of the evaporator. The orifices (22) may be arranged in a random order about the distributor tube (20), positioned in groups of at least two at predetermined locations, or spiraled along the distributor tube (20).

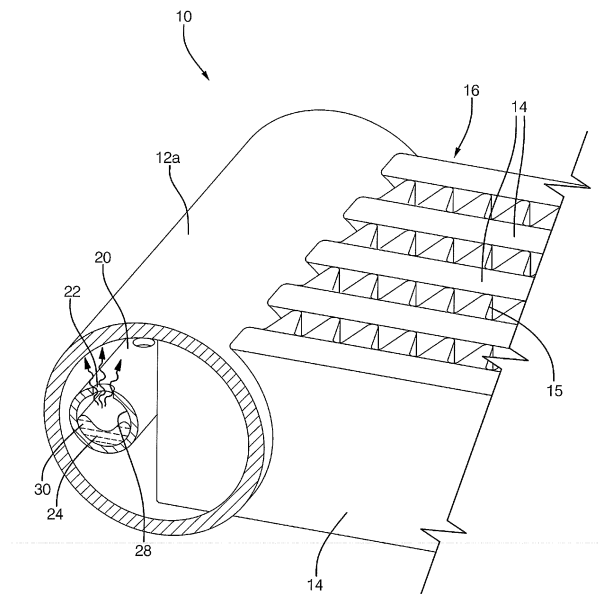


FIG. 2



EUROPEAN SEARCH REPORT

Application Number
EP 11 16 7680

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	JP 2004 278935 A (CALSONIC KANSEI CORP) 7 October 2004 (2004-10-07) * abstract; figures 1-4 *	1-15	INV. F28F9/02 F28D21/00 F28D1/02
X	US 2006/102331 A1 (TARAS MICHAEL F [US] ET AL) 18 May 2006 (2006-05-18) * paragraphs [0023] - [0027]; figures 1, 2a-2d *	1-15	ADD. F28D1/053
X	WO 2008/060270 A1 (CARRIER CORP [US]; JIANG YIRONG [US]; MUNOZ JULES R [US]; PARK YOUNG K) 22 May 2008 (2008-05-22) * paragraphs [0017] - [0024]; figures 2,3 *	1-15	
X	WO 2010/005676 A2 (CARRIER CORP [US]; TARAS MICHAEL F [US]; BENDAPUDI SATYAM [US]; JIANG) 14 January 2010 (2010-01-14) * page 3, line 12 - page 8, line 26; figures 2,3 *	1-15	
A	US 2002/174978 A1 (BEDDOME DAVID W [US] ET AL) 28 November 2002 (2002-11-28) * the whole document *	1-15	TECHNICAL FIELDS SEARCHED (IPC) F28F F28D
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 23 May 2014	Examiner Axters, Michael
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 11 16 7680

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

23-05-2014

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 2004278935 A	07-10-2004	NONE	
US 2006102331 A1	18-05-2006	EP 1809969 A2 US 2006102331 A1 US 2010218924 A1 US 2011042049 A1 WO 2006055276 A2	25-07-2007 18-05-2006 02-09-2010 24-02-2011 26-05-2006
WO 2008060270 A1	22-05-2008	CN 101568792 A EP 2082181 A1 HK 1138637 A1 US 2010282454 A1 WO 2008060270 A1	28-10-2009 29-07-2009 01-06-2012 11-11-2010 22-05-2008
WO 2010005676 A2	14-01-2010	CN 102089612 A EP 2310790 A2 US 2011127023 A1 WO 2010005676 A2	08-06-2011 20-04-2011 02-06-2011 14-01-2010
US 2002174978 A1	28-11-2002	NONE	