



(12) **EUROPEAN PATENT APPLICATION**

(88) Date of publication A3:
18.09.2013 Bulletin 2013/38

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

(43) Date of publication A2:
10.02.2010 Bulletin 2010/06

(21) Application number: **09166888.9**

(22) Date of filing: **30.07.2009**

(84) Designated Contracting States:
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 SE SI SK SM TR
Designated Extension States:
AL BA RS

- **Corser, Don Clair**
Lockport, NY 14094 (US)
- **Smith, Gregory Ronald**
Lockport, NY 14094 (US)

(30) Priority: **06.08.2008 US 221703**

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

(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)

(72) Inventors:
• **Oddi, Frederick Vincent**
Orchard Park, NY 14127 (US)

(54) **Cross-counterflow heat exchanger assembly**

(57) A manifold for use in a heat exchanger assembly (20) and a method of forming the manifold is disclosed herein. The method starts with the step of separately forming a first member (22) at least partially defining an interior and having a spaced set of first tube slots (30) and a second member (32) having a wall (36) positioned against the first tube slots (30) and dividing the interior into a plurality of chambers (38, 40). The method is finalized with the step of permanently fixing the first member (22) to the second member (32) to define an first manifold (42) after the separately forming step.

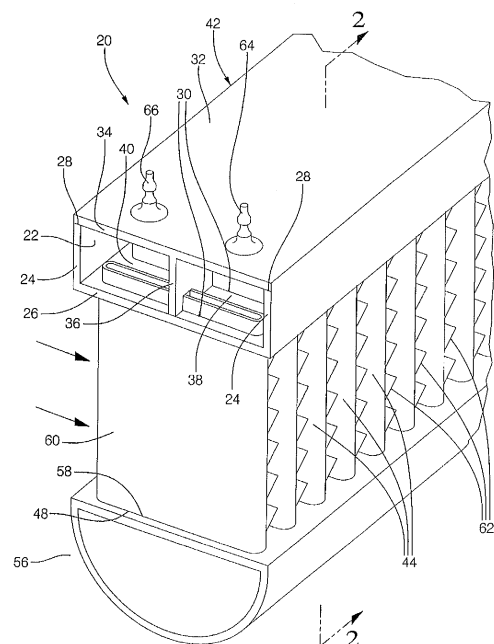


FIG. 1



EUROPEAN SEARCH REPORT

Application Number
EP 09 16 6888

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	US 2007/267185 A1 (LEE HONG YEOL [KR] ET AL) 22 November 2007 (2007-11-22) * paragraph [0024] - paragraph [0031]; figures 2-5 * * paragraph [0034] * -----	1,2,5-8	INV. F28D1/053 F28F9/02
X	EP 0 859 209 A1 (ZEXEL CORP [JP]) 19 August 1998 (1998-08-19) * column 25, line 7 - line 42; figures 37,38 * * column 29, line 1 - line 15; figures 45-48 * -----	1-3,5-10	
X	US 6 343 645 B1 (BAUMANN RAINER [DE] ET AL) 5 February 2002 (2002-02-05) * column 2, line 37 - line 41 * * column 5, line 9 - line 12 * * column 3, line 16 - line 46; figures 1a-h * * column 5, line 36 - line 45; figures 2-6 * -----	1-12	TECHNICAL FIELDS SEARCHED (IPC)
X	KR 2003 0035513 A (HALLA CLIMATE CONTROL CORP [KR]) 9 May 2003 (2003-05-09) * abstract; figures * -----	1,2,5,6	F28F
X	JP H07 305991 A (ZEXEL) 21 November 1995 (1995-11-21) * abstract; figures 4,5 * -----	1,2,5-9	
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 19 July 2013	Examiner Mootz, Frank
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			

 3
EPO FORM 1503 03.02 (P04C01)

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

EP 09 16 6888

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.

19-07-2013

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 2007267185	A1	22-11-2007	EP 1857763 A2	21-11-2007
			US 2007267185 A1	22-11-2007

EP 0859209	A1	19-08-1998	CN 1199458 A	18-11-1998
			EP 0859209 A1	19-08-1998
			WO 9809124 A1	05-03-1998

US 6343645	B1	05-02-2002	DE 19920102 A1	09-11-2000
			JP 2000320995 A	24-11-2000
			US 6343645 B1	05-02-2002

KR 20030035513	A	09-05-2003	NONE	

JP H07305991	A	21-11-1995	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82