# (11) **EP 1 517 108 A3**

(12)

### **EUROPEAN PATENT APPLICATION**

(88) Date of publication A3: **06.05.2009 Bulletin 2009/19** 

(51) Int Cl.: F28D 1/04<sup>(2006.01)</sup> F28F 9/00<sup>(2006.01)</sup>

F28F 9/02 (2006.01)

(43) Date of publication A2: **23.03.2005 Bulletin 2005/12** 

(21) Application number: 04460027.8

(22) Date of filing: 28.06.2004

(84) Designated Contracting States:

AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LI LU MC NL PL PT RO SE SI SK TR Designated Extension States:

AL HR LT LV MK

(30) Priority: 10.09.2003 GB 0321092

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

(72) Inventors:

Filipiak, Marek
 63-400 Ostrow Wielkopolski (PL)

 Borowczyk, Pawel 63-400 Ostrow Wielkopolski (PL)

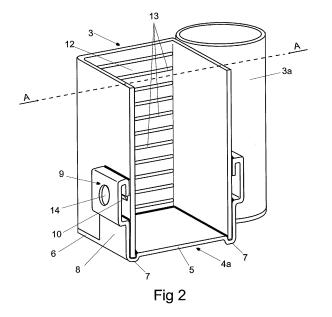
Racz, Robert
 63-440 Raszwok (PL)

(74) Representative: Lukaszyk, Szymon et al Kancelaria Patentowa Lukaszyk ul. Glowackiego 8 40-062 Katowice (PL)

#### (54) A heat exchanger

(57) The invention relates to a heat exchanger comprising a cooling core consisting of a plurality of parallel tubes and cooling fins, two header tanks (3) fluidly connected with opposite ends of each tube and end caps brazed to and tightly closing upper and lower ends of each header tank (3). The invention relates also to an integrated module comprising two heat exchangers of this type and coupled with common end caps (4a), in particular a vehicle CRFM (Condenser, Radiator, cooling

Fan Module). To enable a one-shot brazing operation of the heat exchanger or the integrated module, each end cap (4a) has a flat surface (5) closing and recessed inside the header tank (3) profile and provided with a bead (7) on the periphery thereof, and at least two protrusions (8) adjoining to the side walls of the header tank (3) and provided with C-shaped latches (9), the ends of which engage on the corresponding projections (10) on external side walls of the header tank (3).



EP 1 517 108 A3



## **EUROPEAN SEARCH REPORT**

Application Number EP 04 46 0027

	DOCUMENTS CONSIDEREI	TO BE RELEVANT			
Category	Citation of document with indication of relevant passages	n, where appropriate,	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)	
D,A	US 5 441 100 A (UEDA SH 15 August 1995 (1995-08 * figures *		1-9	INV. F28D1/04 F28F9/02	
А	US 2001/004010 A1 (HALM 21 June 2001 (2001-06-2 * figures *	 IMMANUEL [US]) 1) 	1-9	F28F9/00	
				TECHNICAL FIELDS SEARCHED (IPC)	
	The present search report has been do				
Place of search  Munich		Date of completion of the search 26 March 2009	M <sub>P</sub> 1	lado Ramirez, J	
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 princip E : earlier patent do after the filing de D : document cited L : document cited & : member of the s	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  8: member of the same patent family, corresponding document		

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

EP 04 46 0027

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.

26-03-2009

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
US 5441100	Α	15-08-1995	JP	5332693 A	14-12-199
US 2001004010	A1	21-06-2001	NONE		
more details about this annex					