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(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).

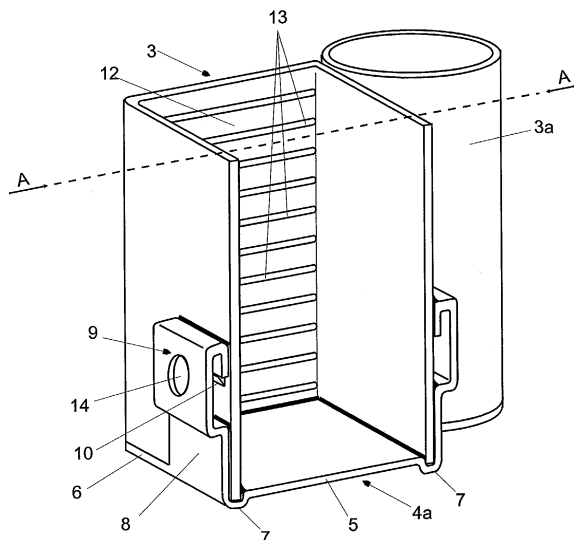


Fig 2

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EUROPEAN SEARCH REPORT

Application Number
EP 04 46 0027

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
D,A	US 5 441 100 A (UEDA SHINICHI [JP] ET AL) 15 August 1995 (1995-08-15) * figures *	1-9	INV. F28D1/04 F28F9/02 F28F9/00
A	----- US 2001/004010 A1 (HALM IMMANUEL [US]) 21 June 2001 (2001-06-21) * figures * -----	1-9	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			F28F
1	Place of search Munich	Date of completion of the search 26 March 2009	Examiner Mellado Ramirez, J
CATEGORY OF CITED DOCUMENTS		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	
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			

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

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26-03-2009

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5441100 A	15-08-1995	JP 5332693 A	14-12-1993
US 2001004010 A1	21-06-2001	NONE	

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