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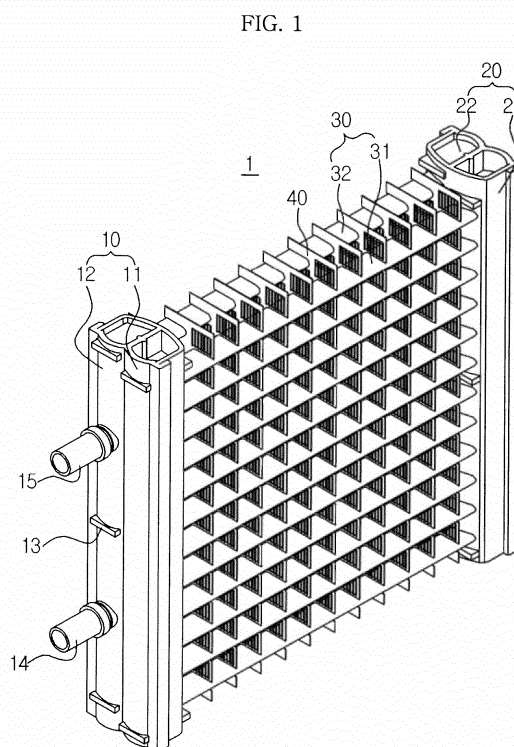
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(54) **Heat Exchanger and Micro-Channel Tube Thereof**

(57) A heat exchanger having a structure in which micro-channel tubes are respectively fitted into both sides of corresponding flat fins for heat exchange, thereby achieving enhancements in drainage and heat transfer performance. The heat exchanger includes a first header extending vertically and connected with an inflow tube and an outflow tube, a second header spaced apart from the first header by a desired distance and arranged parallel to the first header, and a plurality of flat micro-channel tubes arranged horizontally while being vertically spaced apart from one another by a desired clearance and arranged in a front row and a rear row between the first header and the second header. Micro-channels are formed in each of the micro-channel tubes.



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EUROPEAN SEARCH REPORT

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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 6 286 590 B1 (PARK JONG-JIN [KR]) 11 September 2001 (2001-09-11) * column 2, line 25 - column 3, line 11; figures 3a,3b,3c,4,5a,5b *	1-11	INV. F28F1/32 F28D1/053
X	WO 2007/037670 A1 (SEASONAIR M SDN BHD [MY]; LIOW SENG ONG [MY]) 5 April 2007 (2007-04-05) * page 5, line 6 - page 8, line 11; figures 1-9 *	1-11	
A	US 2005/241327 A1 (DADDIS EUGENE D JR [US] ET AL DADDIS JR EUGENE DUANE [US] ET AL) 3 November 2005 (2005-11-03) * the whole document *	1-11	
A	JP H10 89870 A (NIPPON LIGHT METAL CO) 10 April 1998 (1998-04-10) * abstract; figures 1-10 *	1-11	
A	JP H02 75892 A (SHOWA ALUMINUM CORP) 15 March 1990 (1990-03-15) * abstract *	1-11	TECHNICAL FIELDS SEARCHED (IPC)
A	DE 30 20 424 A1 (NIPPON DENSO CO [JP]) 5 November 1981 (1981-11-05) * the whole document *	1-11	F28F F28D
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 26 January 2015	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			

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

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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
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26-01-2015

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6286590	B1	11-09-2001	CN 1164638 A 12-11-1997
			JP 3371071 B2 27-01-2003
			JP H1062091 A 06-03-1998
			US 6286590 B1 11-09-2001

WO 2007037670	A1	05-04-2007	CN 201173710 Y 31-12-2008
			RU 79990 U1 20-01-2009
			WO 2007037670 A1 05-04-2007

US 2005241327	A1	03-11-2005	AU 2005244255 A1 24-11-2005
			BR PI0510276 A 30-10-2007
			CN 1946318 A 11-04-2007
			EP 1744651 A1 24-01-2007
			HK 1105340 A1 02-09-2011
			KR 20070006868 A 11-01-2007
			NZ 550273 A 31-05-2009
			US 2005241327 A1 03-11-2005
			WO 2005110164 A1 24-11-2005

JP H1089870	A	10-04-1998	NONE

JP H0275892	A	15-03-1990	NONE

DE 3020424	A1	05-11-1981	DE 3020424 A1 05-11-1981
			JP S56155391 A 01-12-1981
			US 4332293 A 01-06-1982

EPO FORM P0459

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