

(19)



(11)

EP 1 978 322 A3

(12)

EUROPEAN PATENT APPLICATION

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

(51) Int Cl.:
F28D 7/14 ^(2006.01) **F28F 9/02** ^(2006.01)
F28F 27/02 ^(2006.01)

(43) Date of publication A2:
08.10.2008 Bulletin 2008/41

(21) Application number: **08001368.3**

(22) Date of filing: **24.01.2008**

(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 MT NL NO PL PT
RO SE SI SK TR**
Designated Extension States:
AL BA MK RS

(30) Priority: **22.01.2008 US 17659**
26.04.2007 US 789870
26.01.2007 US 698792

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(54) **Heat exchangers and headers therefor**

(57) A header (1010) for a heat exchanger comprising an inflow side (1018), an outflow side (1020), a bypass chamber (1052) therebetween, and a pressure-sensitive flapper valve (1146) proximal the bypass port. As pressure increases at the inflow side of the header, the flapper valve (1146) opens proportionally, and, as pressure decreases at the inflow side, the flapper valve (1146) closes

proportionally. A tube-in-tube heat exchanger (2020) including a helical tube-in-tube assembly (2046) adapted for-flow therethrough of a plurality of fluids for heat transfer therebetween. A heat system including an embodiment of the header and an embodiment of the tube-in-tube heat exchanger, so as to provide a bypass of the tube-in-tube heat exchanger under a pressure condition.

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EUROPEAN SEARCH REPORT

Application Number

EP 08 00 1368

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 3 227 175 A (REMINGTON JOHN W ET AL) 4 January 1966 (1966-01-04)	1,4,5,7	INV. F28D7/14 F28F9/02 F28F27/02
Y	* column 1, line 12 - line 16 * * column 5, line 8 - line 23; figures 9-14 * * column 5, line 49 - line 56; figure 9 * * column 2, line 55 - line 61; figure 1 *	2,6	
X	WO 2006/040053 A1 (BEHR GMBH & CO KG [DE]; DIGELE JOERG [DE]; GESKES PETER [DE]; IRMLER K) 20 April 2006 (2006-04-20) * page 1, line 13 - line 16 * * page 12, line 18 - line 25; figure 3 * * page 5, line 17 - line 25 *	1,3,4	
X	EP 1 336 736 A2 (DELPHI TECH INC [US]) 20 August 2003 (2003-08-20) * paragraph [0008] * * paragraph [0030]; figures 2,3 * * paragraph [0032]; figures 2,3 *	1	
Y	EP 1 691 117 A1 (HONEYWELL INT INC [US]) 16 August 2006 (2006-08-16) * paragraph [0020] - paragraph [0021]; figures 2,3 *	2	
Y	US 4 008 732 A (FICHTER BARRY S ET AL) 22 February 1977 (1977-02-22) * column 2, line 44 - line 48; figure 1 * * column 4, line 52 - column 5, line 11; figures 1,4 *	6	TECHNICAL FIELDS SEARCHED (IPC) F28F
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 28 January 2014	Examiner Mendão, João
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	

EPO FORM 1503 03.82 (P04C01)



Application Number

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CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☒ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

1-7

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).



**LACK OF UNITY OF INVENTION
SHEET B**

Application Number
EP 08 00 1368

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-7

Header for a heat exchanger comprising a valve regulated bypass.

2. claims: 8-10

Header for a heat exchanger comprising inlet and outlet pressure sensors.

3. claims: 11-17

Service cartridge assembly for a header of a heat exchanger.

4. claims: 18-41

Heat exchanger.

5. claims: 42-61

Heat system.

**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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

28-01-2014

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