



(19)

Europäisches Patentamt
European Patent Office
Office européen des brevets



(11)

EP 0 822 381 A3

(12)

EUROPEAN PATENT APPLICATION

(88) Date of publication A3:
19.08.1998 Bulletin 1998/34

(51) Int Cl. 6: **F28D 1/03, F28F 9/18**

(43) Date of publication A2:
04.02.1998 Bulletin 1998/06

(21) Application number: 97305236.8

(22) Date of filing: 15.07.1997

(84) Designated Contracting States:
**AT BE CH DE DK ES FI FR GB GR IE IT LI LU MC
NL PT SE**

Designated Extension States:
AL LT LV RO SI

(30) Priority: 31.07.1996 JP 217983/96

(71) Applicant: **Sanden Corporation**
Iseaki-shi, Gunma 372-8502 (JP)

(72) Inventor: **Shinmura, Toshiharu**
Isesaki-shi, Gunma 372 (JP)

(74) Representative: **Jackson, Peter Arthur**
GILL JENNINGS & EVERY
Broadgate House
7 Eldon Street
London EC2M 7LH (GB)

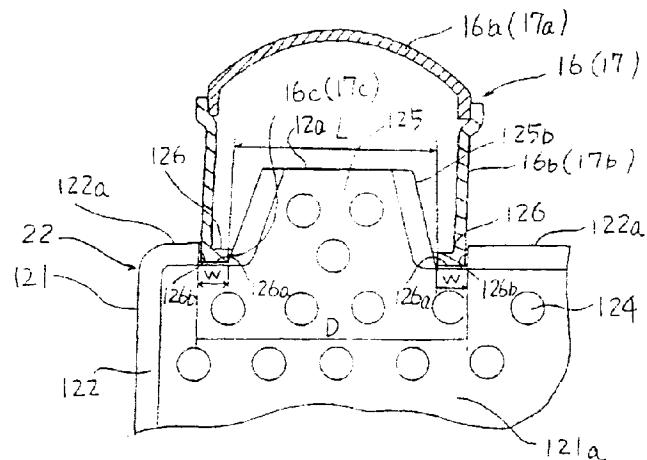
(54) Heat exchanger

(57) A heat exchanger (10) comprises at least one conduit (16,17) which has a plurality of slots (16C,17C) therein. A plurality of tube units (12,22) each has at least one open end (12A,22A) thereof. The open end (12A, 22A) of each the tube units (12,22) is fixedly and hermetically coupled to the slots (16C,17C) of at least one conduit (16,17). The tube units (12,22) in fluid communication with the interior of the conduit (16,17) through the open end (12A,22A) of each tube unit (12,22). A lim-

iting mechanism (126,226) is provided adjacent to the open end (12A,22A) of the tube units (12,22) for limiting the conduit (16,17) to have a predetermined position without inclining related to the tube units (12,22).

Thereby, the heat exchanger (10) could be temporally assembled without any relative sliding motion between the plurality of tubes and tanks while simultaneously non-decreasing the efficiency of manufacturing costs of the heat exchanger.

FIG. 7





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 97 30 5236

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
X	US 3 920 069 A (MOSIER JAMES A) 18 November 1975 * the whole document *	14-16	F28D1/03 F28F9/18
Y	EP 0 694 747 A (SANDEN CORP) 31 January 1996 * column 12, line 14 - column 14, line 31; figures 15,16 *	1-13	
X	US 5 052 479 A (NAKAJIMA ICHIO ET AL) 1 October 1991 * column 2, line 50 - column 3, line 8; figures 1-3 *	14-16	
A	US 5 318 114 A (SASAKI KENICHI) 7 June 1994 * column 2, line 56 - column 3, line 33; figures 1-3 *	1-16	
A	EP 0 632 245 A (THERMAL WAERME KÄLTEL KLIMA) 4 January 1995 * abstract; figures 1-3 *	1-16	TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			F28D F28F
<p>The present search report has been drawn up for all claims</p>			
Place of search	Date of completion of the search	Examiner	
THE HAGUE	19 June 1998	Mootz, F	
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			