



(12) **EUROPEAN PATENT APPLICATION**

(88) Date of publication A3:
13.09.2000 Bulletin 2000/37

(51) Int. Cl.⁷: **F28F 9/04**

(43) Date of publication A2:
31.05.2000 Bulletin 2000/22

(21) Application number: **99123593.8**

(22) Date of filing: **26.11.1999**

(84) Designated Contracting States:
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE**
Designated Extension States:
AL LT LV MK RO SI

- **Koizumi, Hiroyasu,**
c/o Calsonic Corporation
Tokyo 164-8602 (JP)
- **Kawai, Yoshihiro,**
c/o Calsonic Corporation
Tokyo 164-8602 (JP)

(30) Priority: **27.11.1998 JP 33712798**
17.12.1998 JP 35868498
26.10.1999 JP 30348499

(74) Representative:
Grünecker, Kinkeldey,
Stockmair & Schwanhäusser
Anwaltssozietät
Maximilianstrasse 58
80538 München (DE)

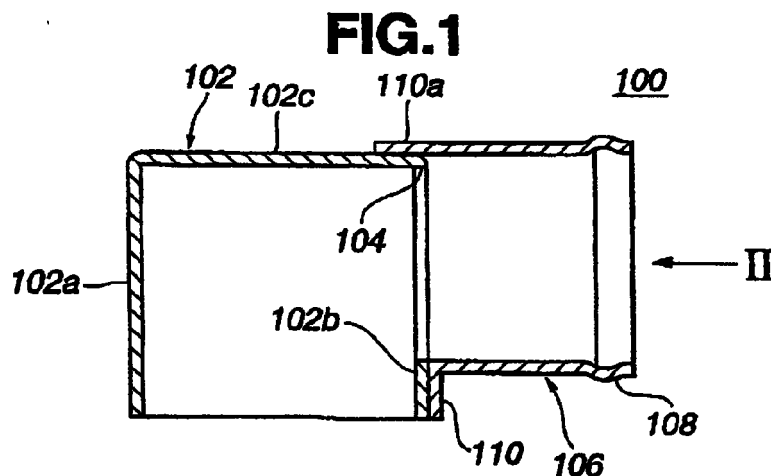
(71) Applicant: **Calsonic Corporation**
Tokyo 164-8602 (JP)

(72) Inventors:
• **Chikuma, Hiroshi,**
c/o Calsonic Corporation
Tokyo 164-8602 (JP)

(54) **Heat exchanger tank**

(57) A tank of heat exchanger (100) comprises a tank body (102) and a pipe member (106). The tank body (108) is made of clad metal and shaped like a channel member with a base wall (102c) and two

opposed side walls (102a,b). The pipe member (106) is first spot welded with its flange (110) to the tank body (102) and then finally brazed in a furnace.





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 99 12 3593

DOCUMENTS CONSIDERED TO BE RELEVANT				
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)	
X	EP 0 821 213 A (CALSONIC CORP) 28 January 1998 (1998-01-28) * column 5, line 50 - column 6, line 5 * * column 6, line 38 - line 43; figures * ---	1,2	F28F9/04	
X	EP 0 863 376 A (SANDEN CORP) 9 September 1998 (1998-09-09) * column 5, line 52 - column 6, line 15; figure 5 * ---	1,2		
A	US 2 639 899 A (FRED M. YOUNG) 26 May 1953 (1953-05-26) * the whole document * ---	1-5		
A	PATENT ABSTRACTS OF JAPAN vol. 006, no. 249 (M-177), 8 December 1982 (1982-12-08) -& JP 57 146436 A (NIPPON RADIATOR KK), 9 September 1982 (1982-09-09) * abstract; figures * ---	1-5		
A	PATENT ABSTRACTS OF JAPAN vol. 1996, no. 10, 31 October 1996 (1996-10-31) -& JP 08 159688 A (ZEXEL CORP), 21 June 1996 (1996-06-21) * abstract; figures * ---	1-5		TECHNICAL FIELDS SEARCHED (Int.Cl.7)
A	US 1 572 916 A (WILLIAM J. GAMBLE) 16 February 1926 (1926-02-16) * page 2, line 33 - line 58; figures * ---	1-5		F28F
A	GB 2 098 313 A (IMI RADIATORS) 17 November 1982 (1982-11-17) * page 2, line 18 - line 38; figures * ---	1-25		
-/--				
The present search report has been drawn up for all claims				
Place of search		Date of completion of the search	Examiner	
THE HAGUE		18 July 2000	Mootz, F	
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)



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 99 12 3593

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	GB 1 387 673 A (CHAUSSON USINES SA) 19 March 1975 (1975-03-19)	1	
Y	* page 2, line 22 - line 59; figures * ---	6,7	
Y	US 5 662 162 A (FUKUOKA MIKIO ET AL) 2 September 1997 (1997-09-02) * column 5, line 34 - line 48; figure 3 *	6,7	
X	EP 0 860 676 A (SANDEN CORP) 26 August 1998 (1998-08-26)	1	
A	* column 4, line 57 - column 5, line 6; figures 1-3 *	9-18	
X	EP 0 854 346 A (SANDEN CORP) 22 July 1998 (1998-07-22)	1	
A	* claims 1,3,4; figures *	19-24	
Y	FR 2 681 421 A (BEHR GMBH & CO) 19 March 1993 (1993-03-19)	25	
A	* page 4, line 1 - line 27; figures * * page 6, line 23 - line 33 *	6-18	
Y	GB 1 095 731 A (ERIC WINSTON DICKSON ET AL) 20 December 1967 (1967-12-20)	25	
A	* claims 1,5-9; figures *	1	
A	EP 0 825 404 A (CALSONIC CORP) 25 February 1998 (1998-02-25) * column 10, line 7 - line 24; figures 9-11 * * column 17, line 25 - line 51; figures 31,32,35 *	1,9-25	
A	EP 0 718 580 A (NIPPON DENSO CO) 26 June 1996 (1996-06-26) * column 5, line 3 - line 20; figures *	1,6,25	
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 18 July 2000	Examiner 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			

EPO FORM 1503 03 82 (P04C01)



European Patent
Office

Application Number
EP 99 12 3593

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

- Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims 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 the first ten claims.

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:



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: 1-5

Joining of pipe to heat exchanger tank

2. Claims: 6-8

Joining of header plate to heat exchanger tank

3. Claims: 9-18

Joining of end cap to heat exchanger tank

4. Claims: 19-24

Joining of mounting pin to heat exchanger tank

5. Claim : 25

Heat exchanger tank and its method of assembly

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

EP 99 12 3593

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.

18-07-2000

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0821213 A	28-01-1998	JP 10038496 A US 5941304 A	13-02-1998 24-08-1999
EP 0863376 A	09-09-1998	JP 10246591 A	14-09-1998
US 2639899 A	26-05-1953	NONE	
JP 57146436 A	09-09-1982	NONE	
JP 08159688 A	21-06-1996	NONE	
US 1572916 A	16-02-1926	NONE	
GB 2098313 A	17-11-1982	ZA 8203096 A	30-03-1983
GB 1387673 A	19-03-1975	FR 2148346 A FR 2153165 A BE 787265 A DE 2238858 A ES 405662 A IT 963750 B	23-03-1973 04-05-1973 01-12-1972 22-03-1973 16-01-1976 21-01-1974
US 5662162 A	02-09-1997	JP 8042989 A	16-02-1996
EP 0860676 A	26-08-1998	JP 10238991 A US 5975197 A	11-09-1998 02-11-1999
EP 0854346 A	22-07-1998	JP 10206068 A US 5868196 A	07-08-1998 09-02-1999
FR 2681421 A	19-03-1993	DE 4130517 A ES 2065824 A JP 5302794 A	18-03-1993 16-02-1995 16-11-1993
GB 1095731 A		NONE	
EP 0825404 A	25-02-1998	JP 10054690 A JP 10148123 A JP 10170185 A JP 10185485 A AU 3412897 A	24-02-1998 02-06-1998 26-06-1998 14-07-1998 19-02-1998
EP 0718580 A	26-06-1996	JP 8226786 A AU 702047 B AU 4057895 A CN 1131270 A	03-09-1996 11-02-1999 27-06-1996 18-09-1996

EPC FORM P0459

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

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

EP 99 12 3593

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.

18-07-2000

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0718580 A		DE 69511835 D	07-10-1999
		DE 69511835 T	16-12-1999
		US 5678628 A	21-10-1997

EPO FORM P046B

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