



(12) **EUROPEAN PATENT APPLICATION**

(88) Date of publication A3:
16.01.2002 Bulletin 2002/03

(51) Int Cl.7: **F25B 49/02**, F25B 1/02,
F04B 27/14, B60H 1/00,
F25B 41/04, F04B 27/18

(43) Date of publication A2:
19.07.2000 Bulletin 2000/29

(21) Application number: **00100485.2**

(22) Date of filing: **11.01.2000**

(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

- **Fujii, Toshiro**
Kariya-shi, Aichi-ken (JP)
- **Yokomachi, Naoya**
Kariya-shi, Aichi-ken (JP)
- **Okabe, Takanori**
Kariya-shi, Aichi-ken (JP)
- **Koide, Tatsuya**
Kariya-shi, Aichi-ken (JP)

(30) Priority: **14.01.1999 JP 807599**
12.01.1999 JP 583299

(71) Applicant: **Kabushiki Kaisha Toyota Jidoshokki**
Seisakusho
Aichi-ken (JP)

(74) Representative:
Pellmann, Hans-Bernd, Dipl.-Ing. et al
Patentanwaltsbüro Tiedtke-Bühling-Kinne &
Partner Bavariaring 4-6
80336 München (DE)

(72) Inventors:
• **Ban, Takashi**
Kariya-shi, Aichi-ken (JP)

(54) **Air conditioning systems**

(57) -An air conditioning system 100 may include a compressor 101 having a driving chamber 110, a cooling circuit 151, a heating circuit 152 and capacity controllers 301, 401. The compressor 101 may have a suction port 115, a discharge port 120, a driving unit 130 provided within the driving chamber 110. The driving unit 130 decreases compressor output discharge capacity when pressure within the driving chamber 110 increases. The first capacity controller 301 and the second capacity controller 401 are provided in parallel. Each capacity controller may communicate the discharge port 120 with the driving chamber 110 respectively. This system may release high-pressure refrigerant from the discharge port 120 into the driving chamber 110 when compressor suction pressure results predetermined low-pressure state during operation of the cooling circuit. As the result, the heat exchanger in the cooling circuit 151 is prevented from being frosted. Further, the system may release high pressure refrigerant from the discharge port 120 into the driving chamber 110 when compressor discharge pressure results predetermined high-pressure state during operation of the heating circuit. As the result, the heating circuit 152 is prevented from being damaged by an abnormally high discharge pressure.

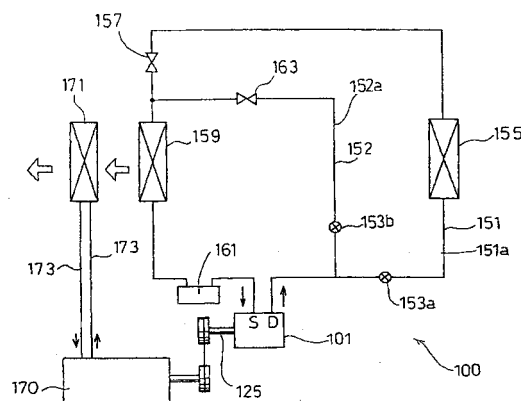


FIG. 2



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 00 10 0485

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)
P, X A	EP 0 894 651 A (DENSO CORP) 3 February 1999 (1999-02-03) * paragraph '0083! - paragraph '0088! * * figure 15 *	1-6, 36-38 9, 17, 18, 33, 34, 39, 40	F25B49/02 F25B1/02 F04B27/14 B60H1/00 F25B41/04 F04B27/18
E	EP 0 992 745 A (TOYODA AUTOMATIC LOOM WORKS) 12 April 2000 (2000-04-12) * paragraph '0028! - paragraph '0064! * * figures 6, 7 *	33-35, 41, 42	
E	EP 1 020 693 A (TOYODA AUTOMATIC LOOM WORKS) 19 July 2000 (2000-07-19) * paragraph '0060! - paragraph '0063! * * figure 7 *	1-3	
A	PATENT ABSTRACTS OF JAPAN vol. 1995, no. 08, 29 September 1995 (1995-09-29) -& JP 07 127569 A (TOYOTA AUTOM LOOM WORKS LTD), 16 May 1995 (1995-05-16) * abstract * * figure 4 *	1, 2, 37	
A	EP 0 486 257 A (SANDEN CORP) 20 May 1992 (1992-05-20) * abstract *	1	
A	EP 0 498 552 A (SANDEN CORP) 12 August 1992 (1992-08-12)		
A	US 5 291 941 A (ENOMOTO MASAYOSHI ET AL) 8 March 1994 (1994-03-08)		
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 23 November 2001	Examiner De Graaf, J.D.
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)

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

EP 00 10 0485

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.

23-11-2001

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 0894651	A	03-02-1999	JP 11180138 A	06-07-1999
			JP 11101514 A	13-04-1999
			EP 0894651 A2	03-02-1999
			US 6148632 A	21-11-2000
			JP 11278045 A	12-10-1999
EP 0992745	A	12-04-2000	JP 2000111179 A	18-04-2000
			EP 0992745 A2	12-04-2000
			US 6247322 B1	19-06-2001
EP 1020693	A	19-07-2000	JP 2000205666 A	28-07-2000
			EP 1020693 A2	19-07-2000
			US 6263687 B1	24-07-2001
JP 07127569	A	16-05-1995	NONE	
EP 0486257	A	20-05-1992	JP 4183980 A	30-06-1992
			SG 158194 G	17-03-1995
			AU 657708 B2	23-03-1995
			AU 8707891 A	21-05-1992
			CA 2055212 A1	17-05-1992
			CN 1062582 A ,B	08-07-1992
			DE 69103378 D1	15-09-1994
			DE 69103378 T2	19-01-1995
			EP 0486257 A1	20-05-1992
			KR 9703249 B1	15-03-1997
			US 5165863 A	24-11-1992
EP 0498552	A	12-08-1992	JP 4252877 A	08-09-1992
			JP 4262074 A	17-09-1992
			AU 639385 B2	22-07-1993
			AU 1049692 A	30-07-1992
			CA 2060130 C	13-08-1996
			CN 1064731 A ,B	23-09-1992
			DE 69200356 D1	06-10-1994
			DE 69200356 T2	16-02-1995
			EP 0498552 A1	12-08-1992
			KR 9703250 B1	15-03-1997
			SG 9590720 A2	01-09-1995
			US 5242274 A	07-09-1993
US 5291941	A	08-03-1994	JP 5223357 A	31-08-1993

EPO FORM P0459

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