

(19)



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11)

EP 1 070 846 A3

(12)

EUROPEAN PATENT APPLICATION

(88) Date of publication A3:
14.08.2002 Bulletin 2002/33

(51) Int Cl. 7: **F04B 27/18**

(43) Date of publication A2:
24.01.2001 Bulletin 2001/04

(21) Application number: **00115764.3**

(22) Date of filing: **21.07.2000**

(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

(30) Priority: **23.07.1999 JP 20935799**

(71) Applicant: **Kabushiki Kaisha Toyota Jidoshokki Kariya-shi, Aichi-ken (JP)**

(72) Inventors:

- **Hidaka, Shigeyuki**
Kariya-shi, Aichi-ken (JP)

- **Sonobe, Masanori**
Kariya-shi, Aichi-ken (JP)
- **Suitou, Ken**
Kariya-shi, Aichi-ken (JP)
- **Adaniya, Taku**
Kariya-shi, Aichi-ken (JP)

(74) Representative:

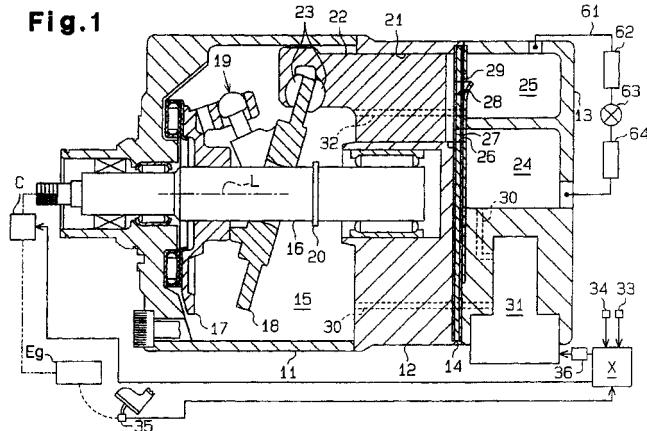
**Leson, Thomas Johannes Alois, Dipl.-Ing. et al Patentanwälte
Tiedtke-Bühling-Kinne & Partner,
Bavariaring 4
80336 München (DE)**

(54) Displacement control device for variable displacement compressor

(57) A controller (X) normally supplies current the magnitude of which corresponds to a required cooling performance of a refrigeration circuit to a displacement control valve (31). As a result the compressor displacement is adjusted in accordance with the required cooling performance (usual displacement control). When a vehicle is quickly accelerated, the controller (X) temporarily eliminates the current value to the control valve (31) to minimize the compressor displacement (displacement limiting control). When the control is switched from

the displacement limiting control to the usual displacement control, the controller (X) changes the current value from zero to a target value, which corresponds to the required cooling performance, taking a predetermined restoration time (T). For an initial period of the restoration period (T), the current value is set greater than a corresponding value on a direct proportional line (H), which represents a constant rate of change from zero to the target value. As a result, the control is smoothly and quickly switched from the displacement limiting control to the usual displacement control.

Fig.1





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 00 11 5764

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
A	US 4 815 300 A (SUZUKI NOBUHIKO) 28 March 1989 (1989-03-28) * abstract; claim 1; figures 9-13 * ---	1-14	F04B27/18
A	EP 0 396 017 A (NISSAN MOTOR) 7 November 1990 (1990-11-07) * abstract; figures 14,15 * * column 18, line 56 - column 19, line 14 * * column 19, line 26 - column 22, line 57 * ---	1-14	
A	US 5 577 894 A (SONOBE MASANORI ET AL) 26 November 1996 (1996-11-26) * abstract * * column 1, line 36 - column 2, line 39 * -----	1,12	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			F04B
<p>The present search report has been drawn up for all claims</p>			
Place of search	Date of completion of the search		Examiner
MUNICH	6 May 2002		Pinna, S
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			

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

EP 00 11 5764

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.

06-05-2002

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
US 4815300	A	28-03-1989	JP	2551416 B2	06-11-1996
			JP	63093614 A	23-04-1988
			DE	3731944 A1	21-04-1988
			US	4864832 A	12-09-1989
EP 0396017	A	07-11-1990	JP	2096036 C	02-10-1996
			JP	2290715 A	30-11-1990
			JP	8005310 B	24-01-1996
			DE	69002273 T2	04-11-1993
			EP	0396017 A2	07-11-1990
			US	5014522 A	14-05-1991
US 5577894	A	26-11-1996	JP	3254853 B2	12-02-2002
			JP	7127566 A	16-05-1995
			US	6142745 A	07-11-2000
			DE	4439512 A1	11-05-1995
			DE	4447648 C2	01-02-2001
			KR	127087 B1	03-04-1998
			US	5603610 A	18-02-1997
			US	5529461 A	25-06-1996
			US	5584670 A	17-12-1996
			US	5681150 A	28-10-1997
			US	5713725 A	03-02-1998
			US	5797730 A	25-08-1998