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(72) Inventors:
• **Numoto, Hironao**
Otsu-shi, Shiga 520-2101 (JP)
• **Nishida, Junichi**
Kurita-gun, Shiga 520-3034 (JP)

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

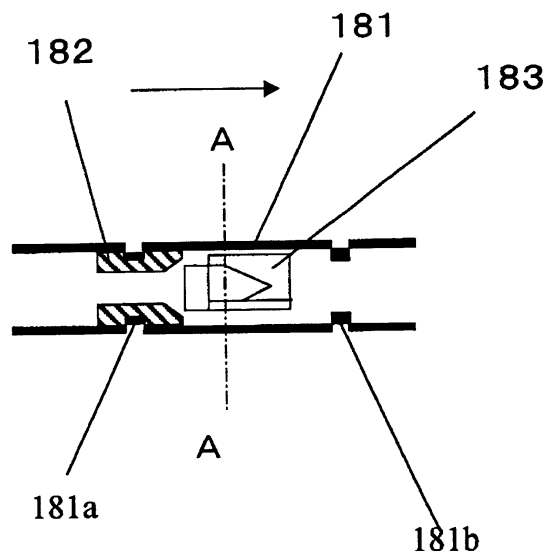
(71) Applicant: **MATSUSHITA ELECTRIC INDUSTRIAL
CO., LTD.**
Kadoma-shi, Osaka 571-8501 (JP)

(54) **Vacuum Pump**

(57) A suction check valve 18a and a discharge check valve 20a are disposed to a top end plate of a cylinder 14. A suction check valve 18b and a discharge check valve 20b are disposed to a bottom end plate in the like manner. The suction check valves 18a and 18b are joined together into one hose for connection to an indoor unit B. A piston 15 divides an interior of the cylinder 14 into two chambers, an upper chamber 14A and

a lower chamber 14B. The upper chamber 14A and the lower chamber 14B alternately suction air from the indoor unit B through the suction check valves 18a and 18b, and discharge the suctioned air to outer space through the discharge check valves 20a and 20b, when the piston 15 is reciprocated. Thus, the indoor unit B is decompressed in preparation for charging refrigerant gas.

FIG. 3



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EUROPEAN SEARCH REPORT

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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)
A	US 5 494 410 A (MAIER-LAXHUBER PETER ET AL) 27 February 1996 (1996-02-27) * column 1, line 39 - column 2, line 6 * * column 2, line 27 - line 60; figures 1A,1B *	1-13	F04B33/00
A	US 5 788 463 A (CHAN KWAN-HO) 4 August 1998 (1998-08-04) * abstract *	1	
A	EP 0 041 225 A (BACKENKOEHLER WILLI) 9 December 1981 (1981-12-09) * abstract *	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			F04B
The present search report has been drawn up for all claims			
Place of search MUNICH		Date of completion of the search 27 June 2003	Examiner Fistas, N
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			

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

EP 01 11 6244

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The members are as contained in the European Patent Office EDP file on
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27-06-2003

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
US 5494410	A	27-02-1996	DE	4304786 A1	18-08-1994
			AT	142309 T	15-09-1996
			DE	59400563 D1	10-10-1996
			EP	0611888 A1	24-08-1994
			JP	6249147 A	06-09-1994

US 5788463	A	04-08-1998	AU	728162 B2	04-01-2001
			AU	1349297 A	17-07-1997
			CA	2240839 A1	03-07-1997
			EP	1076776 A1	21-02-2001
			JP	2000502419 T	29-02-2000
			WO	9723730 A1	03-07-1997

EP 0041225	A	09-12-1981	DE	3020534 A1	03-12-1981
			DK	228681 A	01-12-1981
			EP	0041225 A1	09-12-1981
