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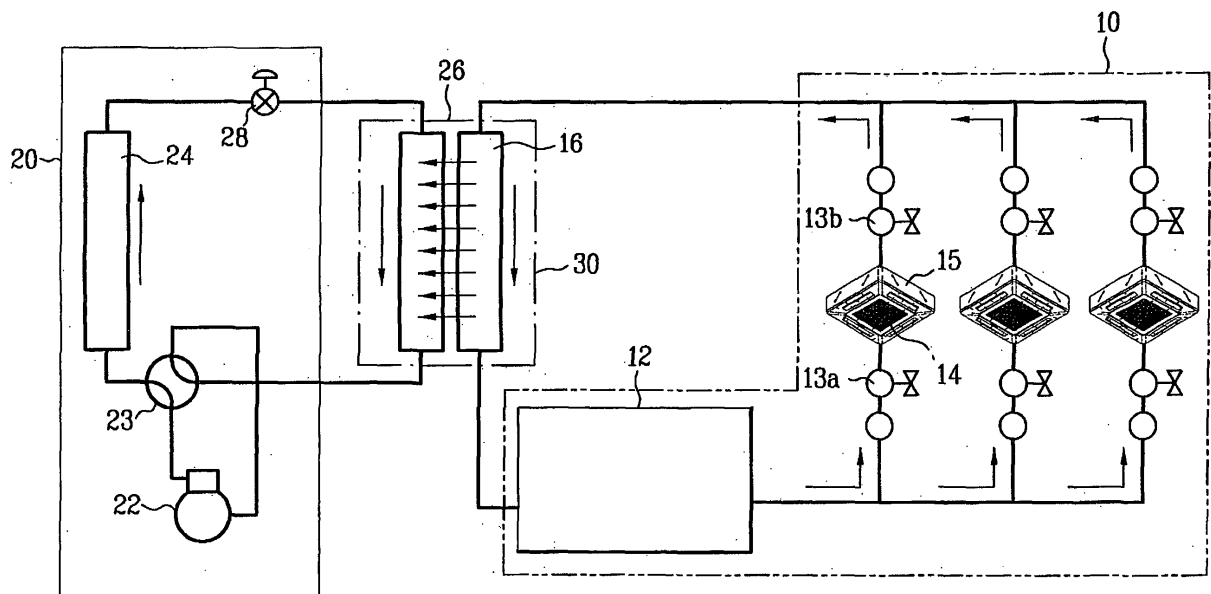
(54) **Air conditioning system and method for controlling the same**

(57) The present invention relates to air conditioning systems, and more particularly, to an air conditioning system which can control a refrigerant flow rate to a heat exchanger exchanging heat with room air to be optimum; and a method for controlling the same.

The air conditioning system includes an outdoor heat exchange part including a compressor for compressing refrigerant, an outdoor heat exchanger for making the refrigerant to heat exchange with outdoor air, and an expansion device for expanding the refrigerant, an indoor heat exchange part including a pump for making refrigerant in a flow path independent from the outdoor heat exchange part to flow, at least one indoor heat exchanger for making the refrigerant heat exchange with room air, and a flow rate control device for controlling a flow rate of the refrigerant, and a hybrid heat exchange part for making the outdoor heat exchange part and the indoor heat exchange part, which are independent from each other, to heat exchange with each other.

According to this, the air conditioning system can be installed on a multistory building without limitation of a height of the building as far as a capacity of the pump permits. Moreover, even if a refrigerant pipe is long, the air conditioning system is applicable even to a system with a refrigerant pipe line longer than the related art as far as the capacity of the pump permits, and fine control of a room air temperature is possible.

FIG. 1





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EUROPEAN SEARCH REPORT

Application Number
EP 05 02 5039

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 0 675 331 A (KABUSHIKI KAISHA TOSHIBA) 4 October 1995 (1995-10-04)	1,2	INV. F25B25/00
Y	* the whole document *	1-6	
X	EP 0 887 599 A (DAIKIN INDUSTRIES, LIMITED) 30 December 1998 (1998-12-30)	1	
Y	* the whole document *	1-6	
Y	EP 0 282 782 A (HITACHI, LTD) 21 September 1988 (1988-09-21)	1-6	
X	DE 43 15 924 A1 (FORSCHUNGSZENTRUM FUER KAELTETECHNIK UND WAERMEPUMPEN GMBH, 3000 HANNO) 17 November 1994 (1994-11-17)	1	
X	US 2 779 171 A (LINDENBLAD NILS E) 29 January 1957 (1957-01-29)	1	TECHNICAL FIELDS SEARCHED (IPC) F25B F25D F24F
	* column 2, line 23 - column 4, line 8; figure 1 *		
X	PATENT ABSTRACTS OF JAPAN vol. 1999, no. 04, 30 April 1999 (1999-04-30) & JP 11 023079 A (MITSUBISHI HEAVY IND LTD), 26 January 1999 (1999-01-26)	1	
X	US 4 644 756 A (SUGIMOTO ET AL) 24 February 1987 (1987-02-24)	7-10	
X	US 4 067 203 A (BEHR ET AL) 10 January 1978 (1978-01-10)	7	
	* the whole document *		
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 1 August 2006	Examiner Valenza, 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			

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European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 05 02 5039

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	PATENT ABSTRACTS OF JAPAN vol. 1999, no. 12, 29 October 1999 (1999-10-29) & JP 11 201560 A (DENSO CORP), 30 July 1999 (1999-07-30) * abstract * -----	7	
			TECHNICAL FIELDS SEARCHED (IPC)
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 1 August 2006	Examiner Valenza, 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			

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EPO FORM 1503 03.82 (P04C01)

**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: 1-6

Air conditioning system with two independent refrigerant circuits coupled by a heat exchanger.

2. claims: 7-10

Method for controlling an air conditioning system by controlling the degree of superheat or subcooling and the flow rate of the refrigerant flowing in the indoor heat exchanger.

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

EP 05 02 5039

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
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01-08-2006

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 0675331	A	04-10-1995	CN 1117568 A	28-02-1996
			JP 3414825 B2	09-06-2003
			JP 7269964 A	20-10-1995
			KR 157693 B1	15-01-1999

EP 0887599	A	30-12-1998	AU 719648 B2	11-05-2000
			AU 5340898 A	31-07-1998
			CN 1216607 A	12-05-1999
			DE 69730125 D1	09-09-2004
			DE 69730125 T2	09-12-2004
			ES 2224282 T3	01-03-2005
			HK 1019167 A1	24-10-2003
			ID 20375 A	03-12-1998
			WO 9829699 A1	09-07-1998
			JP 10197171 A	31-07-1998
			PT 887599 T	29-10-2004
			TW 401507 B	11-08-2000
			US 6119478 A	19-09-2000

EP 0282782	A	21-09-1988	DE 3881242 D1	01-07-1993
			DE 3881242 T2	09-12-1993
			JP 2090372 C	18-09-1996
			JP 7111283 B	29-11-1995
			JP 63233260 A	28-09-1988
			KR 9204952 B1	22-06-1992

DE 4315924	A1	17-11-1994	NONE	

US 2779171	A	29-01-1957	NONE	

JP 11023079	A	26-01-1999	NONE	

US 4644756	A	24-02-1987	AU 564902 B2	27-08-1987
			AU 3710184 A	04-07-1985
			DE 3483533 D1	06-12-1990
			EP 0188630 A2	30-07-1986

US 4067203	A	10-01-1978	NONE	

JP 11201560	A	30-07-1999	NONE	
