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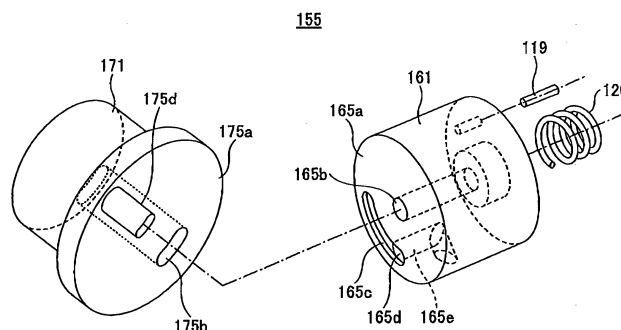
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(54) **Regenerative refrigerator**

(57) A regenerative refrigerator includes a compressor compressing working fluid; a cylinder fed with the compressed working fluid, containing a regenerator material, and having an expansion space; and a rotary valve to switch a first passage and a second passage formed to cause the working fluid to flow from the compressor to the expansion space and from the expansion space to the compressor, respectively. The working fluid ex-

pands in the expansion space to generate cold temperatures in the cylinder. The rotary valve includes a valve body having a first flat surface; and a valve plate having a second flat surface and configured to rotate with the first and second flat surfaces in surface contact. One of the first and second flat surfaces has an arithmetic average roughness of 0.1 μm to 0.9 μm . The other one of the first and second flat surfaces includes resin.

FIG.2





EUROPEAN SEARCH REPORT

Application Number
EP 10 00 9563

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	JP 2001 280728 A (SUMITOMO HEAVY INDUSTRIES) 10 October 2001 (2001-10-10) * paragraph [0017] - paragraph [0018]; figures 1,2 *	1-8	INV. F25B9/14
Y	US 5 829 735 A (IKEDA YASUSHI [JP]) 3 November 1998 (1998-11-03) * the whole document *	1-8	
Y	JP 2001 349630 A (SUMITOMO HEAVY INDUSTRIES; NTN TOYO BEARING CO LTD) 21 December 2001 (2001-12-21) * paragraph [0025] - paragraph [0026]; figures 1,2,3 *	1	
Y	JP 2003 166656 A (KYOCERA CORP) 13 June 2003 (2003-06-13) * the whole document *	1	
A	JP H01 116386 A (KYOCERA CORP) 9 May 1989 (1989-05-09) * the whole document *	1	
			TECHNICAL FIELDS SEARCHED (IPC)
			F25B
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		5 January 2015	de Graaf, Jan Douwe
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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ON EUROPEAN PATENT APPLICATION NO.**

EP 10 00 9563

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05-01-2015

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 2001280728 A	10-10-2001	NONE	
US 5829735 A	03-11-1998	EP 0884509 A1 JP 3217696 B2 JP H09292039 A US 5829735 A	16-12-1998 09-10-2001 11-11-1997 03-11-1998
JP 2001349630 A	21-12-2001	NONE	
JP 2003166656 A	13-06-2003	JP 4091761 B2 JP 2003166656 A	28-05-2008 13-06-2003
JP H01116386 A	09-05-1989	NONE	

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