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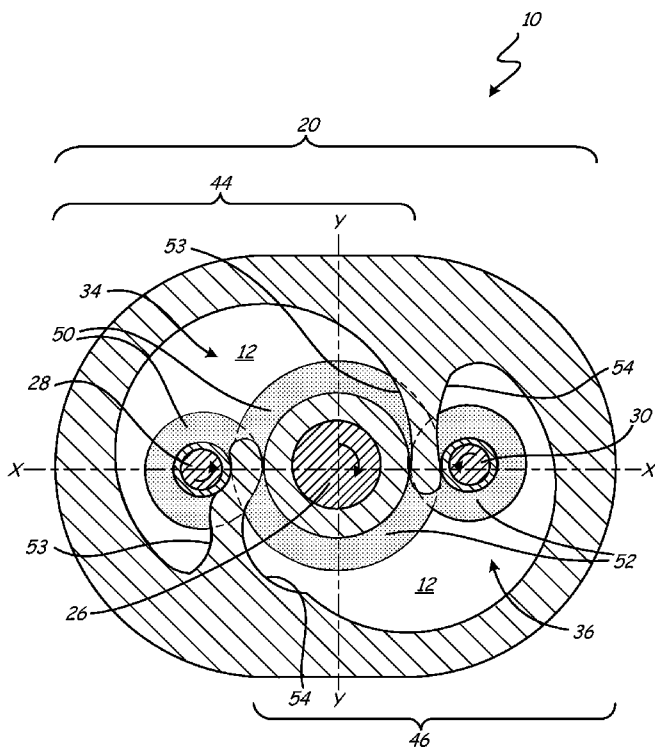
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[Continued on next page]

(54) Title: SCREW COMPRESSOR WITH ASYMMETRIC PORTS



**Fig. 2B**

(57) **Abstract:** A multi-rotor screw compressor includes a housing, a sun rotor, and first and second planet rotors. The first planet rotor intermeshes with the sun rotor to define a first compression pair. The second planet rotor intermeshes with the sun rotor to define a second compression pair. The first and second compression pairs are rotatably mounted in the housing. The housing includes a first port, a portion of which is in communication with the first compression pair, and a second port, a portion of which is in communication with the second compression pair. The portions of the first and second ports which communicate with the first and second compression pairs have a different geometry for offsetting pulsations in a working fluid flowing through the ports.



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**A. CLASSIFICATION OF SUBJECT MATTER***F04C 18/16(2006.01)i, F04C 2/16(2006.01)i*

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC : F04C 18/16, F04C 2/16

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean Utility models and applications for Utility models since 1975

Japanese Utility models and applications for Utility models since 1975

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKIPASS (KIPO internal) &amp; keywords: "offset", "pulsation"

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4907954 A (SLUPSKI, S.) 13 March 1990 See abstract and Figure 1	1-19
A	US 5028221 A (MALFIT, J.) 02 July 1991 See abstract and Figure 1	1-19
A	US 2001/0010800 A1 (KOHOKABE, H. et al.) 02 August 2001 See abstract and Figure 1	1-19
A	US 6632145 B2 (VANMOOR, A.) 14 October 2003 See abstract and Figure 1	1-19

 Further documents are listed in the continuation of Box C. See patent family annex.

\* Special categories of cited documents:

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**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International application No.

**PCT/US2009/045178**

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 049079541 A	13.03.1990	None	
US 05028221 A	02.07.1991	None	
US 2001-0010800 A1	02.08.2001	EP 0943806 A1 EP 0943806 B1 JP 11-264383 A KR 10-0318157 B1 TW 409165 A US 06213743 B1 US 06406279 B2	22.09.1999 21.12.2005 28.09.1999 22.12.2001 21.10.2000 10.04.2001 18.06.2002
US 06632145 B2	14.10.2003	AU 2001-72061 A1 EP 1421282 A1 EP 1421282 A4 EP 1421282 B1 US 2004-0159089 A1 US 06257195 B1 US 06530365 B2 US 06725644 B2 US 2001-0009150 A1 US 2002-0068002 A1 US 2002-0092289 A1 WO 2001-059260 A1 WO 2003-019009 A1	12.02.2001 26.05.2004 09.03.2005 07.11.2007 19.08.2004 10.07.2001 11.03.2003 27.04.2004 26.07.2001 06.06.2002 18.07.2002 16.08.2001 06.03.2003