



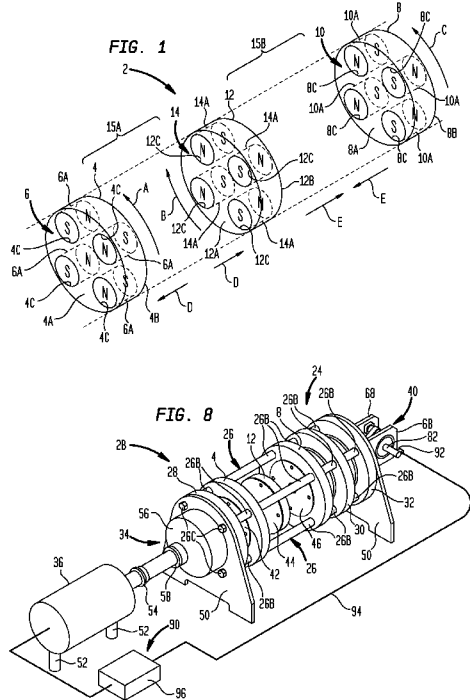
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[Continued on next page]

(54) Title: PERMANENT MAGNET DRIVE APPARATUS AND OPERATIONAL METHOD



(57) Abstract: A magnetic drive apparatus includes first and second magnet carriers carrying first and second permanent magnet arrangements. An intermediate magnet carrier disposed between the first and second magnet carriers carries a third permanent magnet arrangement. The magnet carriers are arranged for rotation relative to each other such that the magnet arrangements produce magnetic interactions that result in power stroke forces causing the magnet carriers to undergo relative reciprocation in first and second stroke directions during power zone portions of the relative rotation. The magnetic interactions impart substantially no power stroke forces during dead zone portions of the relative rotation. The dead zones include magnet carrier relative rotation positions wherein opposing magnetic poles are mutually coaxially aligned but produce a substantially equal balance of push and pull magnetic forces. The apparatus may be synchronized so that the dead zones coincide with top dead center and bottom dead center relative reciprocation positions.

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INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER  
INV. H02K33/00 H02K7/06 H02K49/10  
ADD.  
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)  
H02K  
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2 790 095 A (ALPHONSUS PEEK JOHANNES JOSEPH ET AL) 23 April 1957 (1957-04-23)	1-6, 8-10,12, 15,17, 18,27
A	column 1, lines 23-31 and 47-69; column 2, lines 17-29; column 3, lines 36-53; figures 1,3	7,11,13, 14,16, 19-21
X	----- US 4 196 365 A (PRESLEY DOY [US]) 1 April 1980 (1980-04-01)	22-26
Y	column 1, line 57 to column 2, line 4; column 3, lines 29-39; figure 2	1-6, 8-10,12, 15,17, 18,27
A	----- ----- -/--	7,11,13, 14,16, 19-21

Further documents are listed in the continuation of Box C.

See patent family annex.

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Date of the actual completion of the international search  11 December 2014	Date of mailing of the international search report  19/12/2014
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer  Fernandez, Victor

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 31 17 377 A1 (AMD VERTRIEB ANTRIEBSTECH [DE]) 30 December 1982 (1982-12-30) page 10, line 20 to page 11, line 5; page 12, lines 2-5; figures 1,2 -----	26

# INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2790095	A	23-04-1957	NONE
US 4196365	A	01-04-1980	NONE
DE 3117377	A1	30-12-1982	NONE