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[Continued on next page]

(54) Title: IMPROVEMENTS IN OR RELATING TO ROTOR POSITION DETECTION

(57) Abstract: Three windings (12) of a permanent magnet synchronous motor 10 are connected from a common point (22) to respective feed points (24) and driven as a different phase of the motor 10 by pwm excitation voltages from a switching circuit (28) under the control of a control circuit (38). Eight possible excitations state combinations exist for the circuit in Fig. 2 depending on whether the output of the circuit (28) is at supply voltage or ground for each of the three phases. Measurements are made of ratios of the voltage at the common point (22) as a proportion of the supply voltage, during various excitation states, and a comparison of these ratio values is used to derive position information for the rotor 16 of the motor (10).

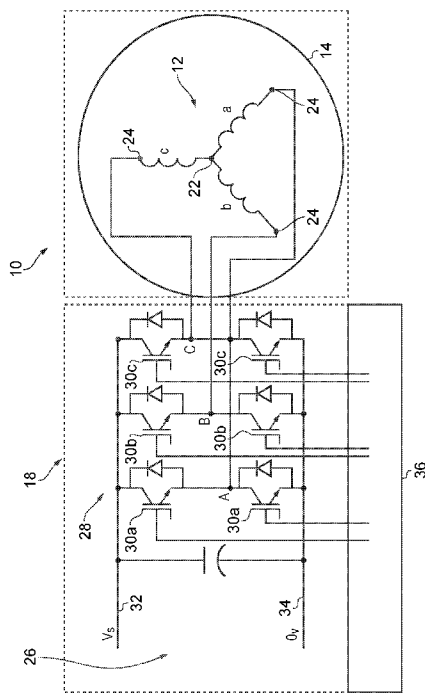


FIG. 2

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TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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A. CLASSIFICATION OF SUBJECT MATTER
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ADD.
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B. FIELDS SEARCHED
Minimum documentation searched (classification system followed by classification symbols)
H02P
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)
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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2009/136381 A2 (TRW AUTOMOTIVE US LLC [US]; WILLIAMS CONNELL BRETT [GB]; DIXON CHRISTOP) 12 November 2009 (2009-11-12) page 1, line 4 - page 2, line 2; claims 1-3,5-9; figures 1-8,10 page 6, line 1 - line 15 page 8, line 2 - line 7 page 10, line 21 - page 27, line 20 ----- -/--	1-24

Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
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"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

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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 Gospodinova, M
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INTERNATIONAL SEARCH REPORT

International application No
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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	<p>US 2010/066284 A1 (IWAJI YOSHITAKA [JP] ET AL) 18 March 2010 (2010-03-18)</p> <p>paragraph [0003] - paragraph [0007]; claims 1-5; figures 1,4,5,6,7,8,12A,12B paragraph [0057] - paragraph [0058] paragraph [0081] paragraph [0094] - paragraph [0115] paragraph [0122] paragraph [0135] paragraph [0183]</p> <p>-----</p>	<p>1-5,7,8, 10,11, 13-17, 19,20, 22,23</p>

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	
WO 2009136381	A2	12-11-2009	EP 2286509 A2	23-02-2011
			US 2011057593 A1	10-03-2011
			WO 2009136381 A2	12-11-2009

US 2010066284	A1	18-03-2010	CN 101677223 A	24-03-2010
			JP 2010074898 A	02-04-2010
			US 2010066284 A1	18-03-2010
