



- (51) **International Patent Classification:**
H02P 1/44 (2006.01) *F25B 49/02* (2006.01)
- (21) **International Application Number:**
PCT/US2014/051389
- (22) **International Filing Date:**
16 August 2014 (16.08.2014)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (30) **Priority Data:**
61/866,766 16 August 2013 (16.08.2013) US
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- (81) **Designated States** (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM,

AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

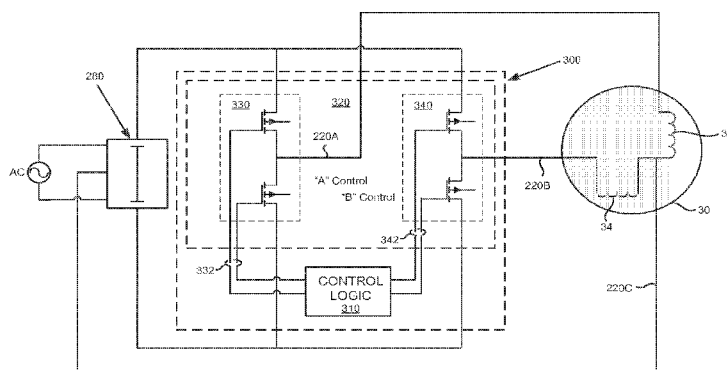
- (84) **Designated States** (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

- with international search report (Art. 21(3))
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))

- (88) **Date of publication of the international search report:**
4 June 2015

(54) **Title:** METHOD AND APPARATUS TO CONTROL A SINGLE-PHASE INDUCTION MOTOR



(57) **Abstract:** A motor drive for and a method of controlling a motor. In one example, the motor drive controls the motor to simulate capacitors and achieve optimal performance of a mechanical machine. In another example, the motor drive controls the motor to operate at a constant speed corresponding to a selected soft-capacity value selected before operating the motor.

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2014/051389

A. CLASSIFICATION OF SUBJECT MATTER
INV. H02P1/44 F25B49/02
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)
H02P F25B

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.
X	EP 2 101 405 A2 (JOHNSON CONTROLS TECH CO [US]) 16 September 2009 (2009-09-16)	21-24
Y	paragraphs [0003] - [0060]	1,3,8, 10-12, 16,19
Y	----- EP 2 458 728 A2 (B D G EL S R L [IT]) 30 May 2012 (2012-05-30)	1,3,8, 11,12, 16,19
	paragraphs [0005], [0017], [0018], [0034], [0035], [0040], [0058], [0065], [0067] - [0069]	
Y	----- US 5 808 441 A (NEHRING DANIEL A [US]) 15 September 1998 (1998-09-15) column 1, line 13 - column 7, line 39 ----- -/-	10



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

"E" earlier application or patent but published on or after the international filing date

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"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

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

10 December 2014

Date of mailing of the international search report

15/04/2015

Name and mailing address of the ISA/

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INTERNATIONAL SEARCH REPORT

International application No

PCT/US2014/051389

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 03/038988 A1 (NAIMAN ARTHUR [IL]; BARNEA ELI [IL]) 8 May 2003 (2003-05-08) page 1, line 11 - page 19, line 12 -----	1,2,5,6, 9,11,14, 15,17
X	EP 0 501 634 A2 (YORK INT CORP [US]) 2 September 1992 (1992-09-02) column 1, line 3 - column 18, line 14 -----	1,6,11, 15,17
X	WO 2010/133513 A1 (ARCELIK AS [TR]; HATIPOGLU ONER [TR]; YUCE AHMET IHSAN [TR]; YUKSEL MU) 25 November 2010 (2010-11-25) paragraph [0002] - paragraph [0031] -----	1,7,11, 18

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2014/051389

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 2101405	A2	16-09-2009	EP 2101405 A2	16-09-2009
			US 2009218981 A1	03-09-2009

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			WO 2010133513 A1	25-11-2010

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-19, 21-24

Operating a single-phase induction motor on the basis of an optimal capacitor selection

2. claim: 20

Method of managing a production efficiency of compressor assemblies

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2014/051389

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-19, 21-24

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.