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- (71) Applicant (for all designated States except US): **WAGNER SPRAY TECH CORPORATION** [US/US]; 1770 Fernbrook Lane North, Plymouth, MN 55447 (US).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): **JONES, Michael, B.** [US/US]; 7350 Rolling Acres Road, Excelsior, MN 55331 (US). **PARKHURST, Gregory, Wayne** [US/US]; 9125 Hampshire Avenue North, Brooklyn Park, MN 55445 (US). **ZEIGLER, Timothy, Woodward** [US/US]; 558 Game Farm Road, Independence, MN 55359 (US).

- (74) Agents: **VOLKMANN, Christopher, J.** et al.; Westman, Champlin & Kelly, P.A., 900 Second Avenue South, Suite 1400, Minneapolis, MN 55402-3319 (US).
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(54) Title: DYNAMIC CONTROL OF AN ELECTRIC DRIVE

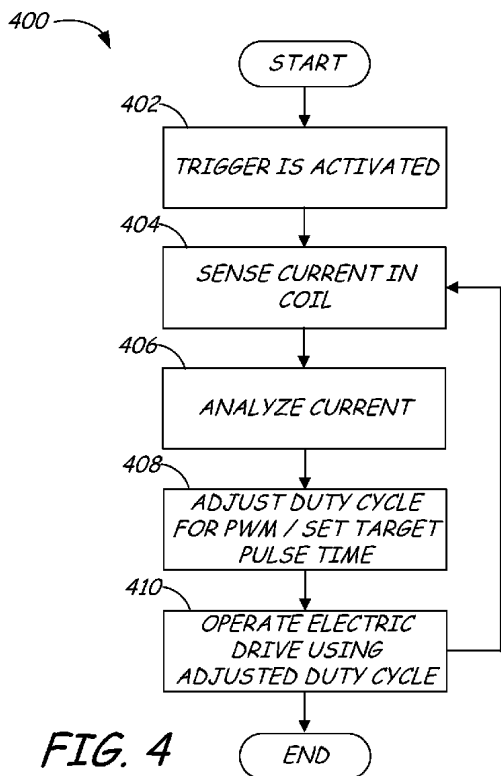


FIG. 4

(57) Abstract: A fluid delivery system (100) includes a pump (224) operably coupleable to a source of fluid (256). A reciprocating electromagnetic actuator (222) is coupled to the pump (224) and has a coil (220) that when energized causes the actuator (222) to drive the pump (224). Coil current sensing circuitry (332) is configured to provide an indication of current flowing in the coil (220). A controller (330) is coupled to the coil current sensing circuitry (332) and is configured to calculate a coil drive parameter based upon a plurality of coil current indications from the coil current sensing circuitry (332). Coil drive circuitry is coupled to the controller (330) and is configured to supply current to the coil (220) based on the coil drive parameter.

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B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

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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, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2004/005222 A1 (YOSHIDA MAKOTO [JP] ET AL) 8 January 2004 (2004-01-08) paragraphs [0060] - [0082]; figures 1-3,13 -----	1-8, 11-15
X	US 5 658 132 A (AKAZAWA NAOKI [JP] ET AL) 19 August 1997 (1997-08-19) column 11, line 14 - column 12, line 12; figures 9,16,17 column 16, line 57 - column 18, line 9 -----	1-15
X	US 6 441 571 B1 (IBUKI YASUO [JP] ET AL) 27 August 2002 (2002-08-27) column 2, lines 28-46; figures 1-12 column 5, line 8 - column 7, line 15 -----	1-6, 12-15



Further documents are listed in the continuation of Box C.



See patent family annex.

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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

Gusia, Sorin

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
US 2004005222	A1	08-01-2004	CN	1459921 A	03-12-2003
			JP	2003339188 A	28-11-2003
			US	2004005222 A1	08-01-2004

US 5658132	A	19-08-1997	AU	672335 B2	26-09-1996
			AU	7448594 A	25-05-1995
			DE	69429963 D1	04-04-2002
			EP	0652632 A2	10-05-1995
			US	5658132 A	19-08-1997

US 6441571	B1	27-08-2002	AT	357771 T	15-04-2007
			DE	60034001 T2	06-12-2007
			EP	1096660 A2	02-05-2001
			JP	3932741 B2	20-06-2007
			JP	2001128487 A	11-05-2001
			US	6441571 B1	27-08-2002
