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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, IS, JP, KE, KG, KM, 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, 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.

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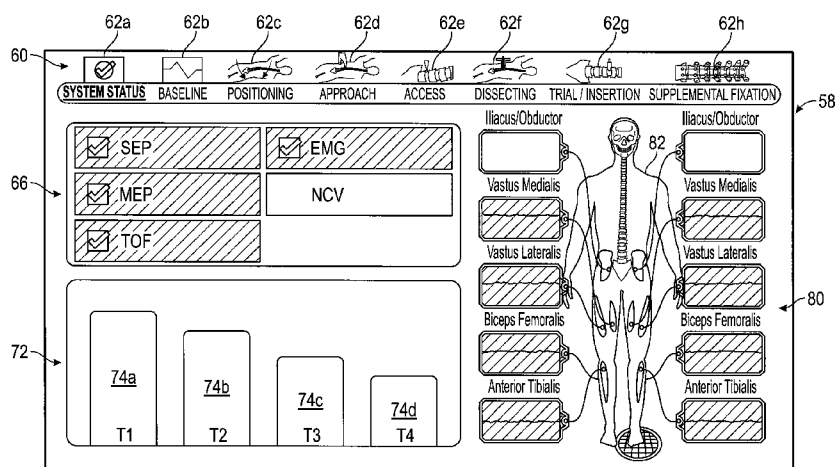
(54) **Title:** INTRAOPERATIVE NEUROPHYSIOLOGICAL MONITORING SYSTEM

FIG. 3

(57) **Abstract:** A surgical system kit is described. The surgical system kit includes a peripheral electrode, a surgical access instrument configured to be placed in a surgical target site, and a control unit. The surgical access instrument has a body with a proximal end, and a distal end, two or more electrodes on the distal end at fixed locations and spaced apart a known distance. The control unit is configured to send a signal to the peripheral electrode, receive information indicative of a neural response from at least one electrode of the surgical access instrument, and interpret the information according to a nerve conduction velocity modality to measure the nerve conduction velocity through the segment of the nerve.

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2012/062809

A. CLASSIFICATION OF SUBJECT MATTER
INV. A61N1/36 A61B5/04
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)
A61N A61B

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 Y	US 6 230 049 B1 (FISCHELL ROBERT E [US] ET AL) 8 May 2001 (2001-05-08) the whole document	1,2,4,7, 13 3,5,6, 8-12,14
Y	----- WO 03/037170 A2 (NUVASIVE INC [US]; MILES PATRICK [US]; MARTINELLI SCOT [US]; FINLEY ER) 8 May 2003 (2003-05-08) page 9, line 32 - page 24, line 29; figures 2-6,23-28	3,5,6, 8-10,14
Y	----- US 5 131 401 A (WESTENSKOW DWAYNE R [US] ET AL) 21 July 1992 (1992-07-21) column 5, line 36 - column 8, line 2; figures 1,6 column 3, lines 18-53 ----- -/-	11

☒ 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

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"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

28 January 2013

Date of mailing of the international search report

14/06/2013

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2012/062809

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.:

1-14

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.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

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

1. claims: 1-14

Neurophysiological monitoring system comprising electrodes, a surgical accessory, a patient module, a control unit and a processor that activates the stimulation electrodes, receives signals of patient response, interprets the signal data according to a plurality of neural monitoring modalities and displays information indicative of the interpretation of the modalities;

2. claims: 15-25

A memory storing a processor executable code which when executed provides an electrode verification indicia on a display of a computer system

3. claims: 26-52

A surgical system comprising electrodes, a patient module, and a control unit for determining nerve conduction velocity

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2012/062809

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5 284 154 A (RAYMOND STEPHEN A [US] ET AL) 8 February 1994 (1994-02-08) the whole document -----	12
X	US 2004/019370 A1 (GLINER BRADFORD EVAN [US] ET AL) 29 January 2004 (2004-01-29) the whole document -----	1,6
A	US 2010/152812 A1 (FLAHERTY J CHRISTOPHER [US] ET AL) 17 June 2010 (2010-06-17) paragraphs [0053] - [0114]; figures 1A,1B -----	1-14
A	WO 2009/105106 A2 (INTEGRITY INTELLECT INC [US]; GEIST WYATT DRAKE [US]; WALSH CHRISTOPHE) 27 August 2009 (2009-08-27) the whole document -----	1-14

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2012/062809

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6230049	B1	08-05-2001	NONE
WO 03037170	A2	08-05-2003	AT 494035 T 15-01-2011
		AU 2002353954 B2	31-07-2008
		AU 2008240341 A1	27-11-2008
		EP 1450681 A2	01-09-2004
		JP 4340153 B2	07-10-2009
		JP 2005507700 A	24-03-2005
		WO 03037170 A2	08-05-2003
US 5131401	A	21-07-1992	EP 0551344 A1 21-07-1993
		JP 2611074 B2	21-05-1997
		JP H06500932 A	27-01-1994
		US 5131401 A	21-07-1992
		WO 9203974 A1	19-03-1992
US 5284154	A	08-02-1994	AT 194470 T 15-07-2000
		AU 680795 B2	07-08-1997
		AU 3977893 A	18-11-1993
		AU 6087496 A	17-10-1996
		CA 2118241 A1	28-10-1993
		DE 69329024 D1	17-08-2000
		DE 69329024 T2	22-03-2001
		EP 0637934 A1	15-02-1995
		ES 2150444 T3	01-12-2000
		JP H07505800 A	29-06-1995
		US 5284153 A	08-02-1994
		US 5284154 A	08-02-1994
		WO 9320751 A1	28-10-1993
US 2004019370	A1	29-01-2004	US 2004019370 A1 29-01-2004
		US 2007043392 A1	22-02-2007
		US 2010131034 A1	27-05-2010
		US 2012150262 A1	14-06-2012
		WO 2004066820 A2	12-08-2004
US 2010152812	A1	17-06-2010	US 2010152812 A1 17-06-2010
		WO 2008002917 A2	03-01-2008
WO 2009105106	A2	27-08-2009	CN 101951848 A 19-01-2011
		EP 2249914 A2	17-11-2010
		WO 2009105106 A2	27-08-2009