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[Continued on next page]

(54) Title: SYSTEMS FOR SELECTIVELY STIMULATING NERVE ROOTS

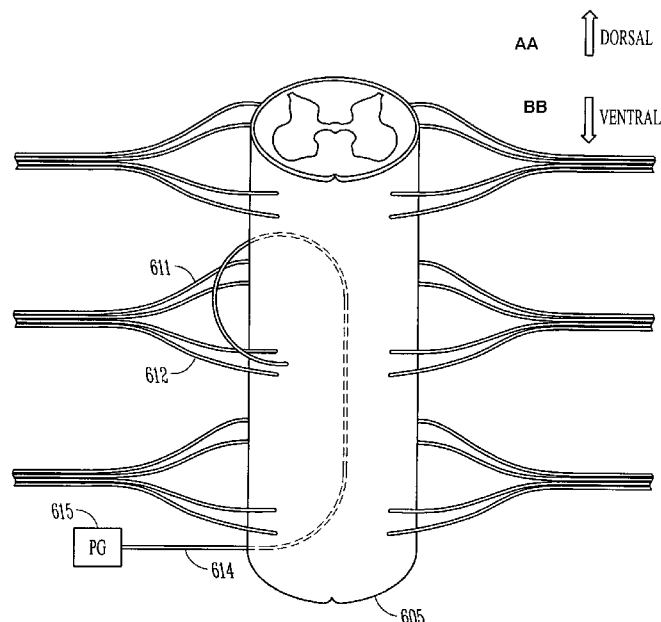


FIG. 6

(57) Abstract: Various system embodiments comprise an implantable lead, an implantable housing, a neural stimulation circuit in the housing, and a controller in the housing and connected to the neural stimulation circuit. The lead has a proximal end and a distal end. The distal end is adapted to deliver neural stimulation pulses to the ventral nerve root and the dorsal nerve root. The proximal end of the lead is adapted to connect to the housing. The neural stimulation circuit is adapted to generate neural stimulation pulses to stimulate the ventral nerve root or the dorsal nerve root using the implantable lead. The controller is adapted to control the neural stimulation circuit to deliver a neural stimulation treatment. systems for selectively stimulating nerve roots

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INTERNATIONAL SEARCH REPORT

International application No

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A. CLASSIFICATION OF SUBJECT MATTER
 INV. A61N1/05 A61N1/36

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

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 practical, 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	WO 2006/133445 A2 (MEDTRONIC INC [US]; ROONEY ETHAN A [US]; WAHLSTRAND CARL D [US]; KING) 14 December 2006 (2006-12-14) abstract paragraphs [0021], [0023] paragraphs [0057], [0066], [0067] paragraphs [0069] - [0072] paragraphs [0082], [0085] - [0087] paragraphs [0093], [0011], [0154] paragraphs [0158], [0168] ----- -/--	1-12

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

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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

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INTERNATIONAL SEARCH REPORT

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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	WO 2008/005142 A1 (MEDTRONIC INC [US]; KING GARY W [US]; TIDEMAND KEVIN K [US]; WESSELINK) 10 January 2008 (2008-01-10) abstract paragraphs [0005], [0009], [0024] paragraphs [0030], [0084], [0102] paragraphs [0105], [0106], [0113] paragraphs [0114], [0128], [0129] -----	1-7, 9-12
X	WO 2006/029257 A2 (SPINAL MODULATION INC [US]; KIM DANIEL H [US]; IMRAN MIR A [US]) 16 March 2006 (2006-03-16) abstract paragraphs [0019], [0077], [0078] paragraphs [0152], [0154], [0155] -----	1-7, 10-12
X A	WO 02/092165 A1 (MEDTRONIC INC [US]) 21 November 2002 (2002-11-21) abstract page 1, line 10 - page 2, line 7 page 3, lines 18-21 page 5, line 27 - page 7, line 10 -----	1, 11 2-10, 12

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2009/002575

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.: 13-25
because they relate to subject matter not required to be searched by this Authority, namely:
Rule 39.1(iv) PCT - Method for treatment of the human or animal body by therapy
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:

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.:

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.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2009/002575

Patent document cited in search report	Publication date	Patent family member(s)	Publication date	
WO 2006133445	A2	14-12-2006	EP 1904154 A2 US 2007150034 A1	02-04-2008 28-06-2007
WO 2008005142	A1	10-01-2008	EP 2043735 A1 EP 2043729 A2 US 2008004674 A1 US 2008046036 A1 US 2008004675 A1 WO 2008005144 A2 WO 2008005153 A2	08-04-2009 08-04-2009 03-01-2008 21-02-2008 03-01-2008 10-01-2008 10-01-2008
WO 2006029257	A2	16-03-2006	AU 2005282379 A1 CA 2579569 A1 CN 101048194 A EP 1793893 A2 JP 2008512197 T US 2008167698 A1 US 2006052828 A1 US 2006052835 A1 US 2006052836 A1 US 2006052837 A1 US 2006052826 A1 US 2006052838 A1 US 2006052827 A1 US 2006052856 A1 US 2006052839 A1 US 2009210041 A1	16-03-2006 16-03-2006 03-10-2007 13-06-2007 24-04-2008 10-07-2008 09-03-2006 09-03-2006 09-03-2006 09-03-2006 09-03-2006 09-03-2006 09-03-2006 09-03-2006 09-03-2006 09-03-2006 20-08-2009
WO 02092165	A1	21-11-2002	AT 283093 T DE 60202063 D1 DE 60202063 T2 EP 1392393 A1 ES 2233822 T3 US 2005149148 A1 US 2004162594 A1	15-12-2004 30-12-2004 10-11-2005 03-03-2004 16-06-2005 07-07-2005 19-08-2004