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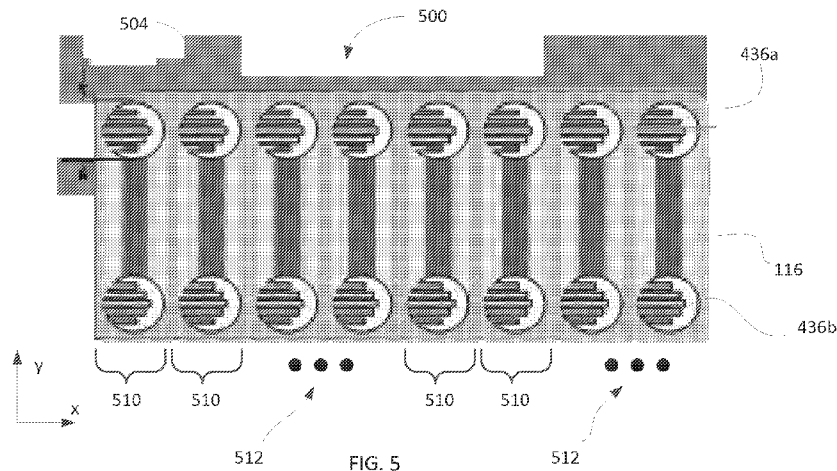
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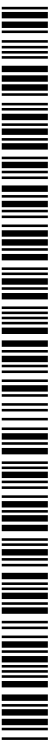
- with international search report (Art. 21(3))
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))

(88) Date of publication of the international search report:
27 November 2014

(54) Title: ELECTROMAGNETIC CORTICAL STIMULATION DEVICE



(57) Abstract: An electromagnetic cortical stimulation array structured to stimulate cortical regions during a presurgical localization of eloquent areas. The device includes array of miniature elongated magnetic coils (optionally overlaid on an array of electrodes) oriented substantially parallel to one another and structured to be inserted under the dura during an open cranial neurosurgery. Each coil and electrode is activated (optionally, selectively) to subdurally stimulate different regions of the cortex to determine functions of each cortical area.



A. CLASSIFICATION OF SUBJECT MATTER IPC(8) - A61N 1/04, 1/05, 1/20, 2/02, 2/04, 2/10; H01F 41/04 (2014.01) USPC - 600/9, 12, 13, 14; 607/1, 2, 45, 46, 48, 115, 116, 117, 118 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) IPC(8): A61N 1/04, 1/05, 1/20, 2/02, 2/04, 2/10; H01F 41/04 (2014.01) USPC: 600/9, 12, 13, 14; 607/1, 2, 45, 46, 48, 115, 116, 117, 118; CPC: A61N 2/002, 2/004, 2/02 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) MicroPatent (US-G, US-A, EP-A, EP-B, WO, JP-bib, DE-C,B, DE-A, DE-T, DE-U, GB-A, FR-A); Google/Google Scholar, IP.com, ProQuest; Search terms used: stimulate, modulate, excitation, neural, tissue, biocompatible, dielectric, coil, array, layer, core		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2009/0254146 A1 (BONMASSAR, G et al.) October 8, 2009; figures 1-2, 4; paragraphs [0023]-[0025], [0030], [0032], [0034]-[0035], [0040], [0042]-[0043]; claims 3, 7	1-13
Y	US 2011/0172733 A1 (LIMA, MG et al.) July 14, 2011; figures 3-4; paragraphs [0045]-[0046]; claim 1	1-13
Y	US 2012/0232613 A1 (KIEVAL, RS et al.) September 13, 2012; figure 10; paragraphs [0125], [0132], [0135], [0148], [0177]	4
Y	US 2010/0191316 A1 (BUHLMANN, F et al.) July 29, 2010; figure 8; paragraphs [0041], [0113]; claims 1, 15	5-6
Y	US 2009/0045820 A1 (SHIMAZAWA, K) February 19, 2009; figure 4C; paragraphs [0058]-[0059]	9
Y	US 2009/0306728 A1 (WRIGHT, JN et al.) December 10, 2009; figures 1-2; paragraphs [0039], [0043]	10
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/>		
* 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 03 September 2014 (03.09.2014)		Date of mailing of the international search report 19 SEP 2014
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201		Authorized officer: Shane Thomas PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

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:

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I: Claims 1-13 are directed toward a device for stimulating a biological tissue.

Group II: Claims 14-19 are directed toward a spinal cord stimulation device, comprising a power source to produce electric pulses.

Continued in the next Supplemental Box

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 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.:
1-13

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.

.-***-Continued from Box No. III: Observations where unity of invention is lacking-***-

The inventions listed as Groups I-II do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: the special technical features of Group I includes a biocompatible element containing a plurality of substantially equal segments extending along an axis between a first and second ends, the immediately neighboring segments adjoining one another along the axis; a microcoil array oriented substantially transversely to the axis; wherein each segment of said element is associated with a microcoil system that extends between the first and second ends, and wherein said element is pliable to enable bending of the first sheet to define a cylindrical surface, which are not present in Group II; the special technical features of Group II include a power source operable to produce electric pulses; from ambient medium and structured to receive the electric pulses and generate, in response to said electric pulses, respectively corresponding magnetic fields directed to induce corresponding electrical fields adjacent to the implant sheet and suitable to perform subdural cortical stimulation., which are not present in Group I.

The common technical features of Groups I and II are a stimulation device comprising: an element structured as a sheet containing an array of electrically insulated microcoil systems.

These common technical features are disclosed by US 2009/0254146 A1 to Bonmassar, et al. (hereinafter 'Bonmassar'). Bonmassar discloses a stimulation device tissue (implant device for stimulation of tissue (biological tissue); abstract) comprising: an element structured as a sheet (implant device 14 has a biocompatible coating 36 (element) that is dielectric (non-conductive material); figures 1, 4; paragraphs [0030], [0032], [0034]-[0035]) containing an array of electrically insulated microcoil systems (microcoils 16 (micro coil systems) are placed within (juxtaposed with) biocompatible coating 36 (element) in an array pattern, which with dielectric layer 50 helps with insulation (electrically insulated) between the implant 14 with microcoils 16 (micro coil systems), making them insulated from surrounding tissue and implant 14 with base 48 (first surface), the biocompatible coating 36 (element) with an external surface (second surface); figures 2, 4; paragraphs [0030], [0032], [0034]-[0035]).

Since the common technical features are previously disclosed by the Bonmassar reference, the common features are not special and so Groups I and II lack unity.