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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, 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.
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Declarations under Rule 4.17:

— of inventorship (Rule 4.17(iv))

[Continued on next page]

(54) Title: BRAIN STIMULATION TOOL CONFIGURATION

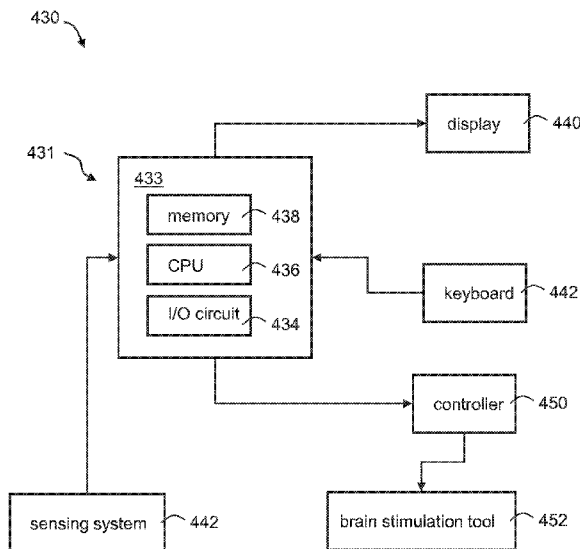


FIG. 32

(57) Abstract: A method of configuring a local brain stimulation tool is disclosed. The method comprises: obtaining a reference brain network activity (BNA) pattern, and a BNA pattern describing a neurophysiological state of the subject, each of the BNA patterns having a plurality of nodes and each node representing a brain location and at least one brain wave frequency. The method further comprises comparing the BNA patterns; and configuring the local brain stimulation tool to apply local brain stimulation at a frequency selected based on the comparison.



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INTERNATIONAL SEARCH REPORT

International application No.

PCT/IL 15/50972

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - A61B 5/048 (2016.01)

CPC - A61B 5/4848

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): A61B 5/048 (2016.01);

CPC: A61B 5/4848

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

IPC (8): A61B 5/00 5/0476 5/0478 5/048 5/0482; G06F19/00 (2016.01);

CPC: A61B 5/4848 5/4064; G06F 19/30 19/34

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

Google (Web, Patents); PatBase; Search Terms: brain, stimulation, tool, BNA, configurable, concussion, electrode, treatment, comparison, controller, device, neurophysiologic, analysis, varying, time, location, frequency, multifocal, transcranial, local, node, wise, network, system, grid, stimulate, excite, cerebral, neuron, cortex, cortical, enceph

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y -- A	WO 2014/076698 A1 (ELMINDA LTD.) 22 May 2014 (22.05.2014), entire document, especially fig 2, 32; pg 3, ln 24-30; pg 5, ln 1-9; pg 5, ln 22-23; pg 6, ln 5-7; pg 9, ln 1-6; pg 2-, ln 5-22; pg 30, ln 3-11; pg 31, ln 23-32; pg 34, ln 24-29; pg 40, ln 30 - pg 41, ln 4; pg 41, ln 30 - pg 42, ln 7; pg 42, ln 19-32; pg 43, ln 26-31; pg 44, ln 3-14; pg 54, ln 3-9; pg 55, ln 27- pg 56, ln 8; pg 56, ln 16-27; pg 59, ln 21-28; pg 65, ln 13-27; pg 80, ln 1-11; pg 80, ln 15-32; pg 81, ln 1-18; pg 82, ln 9-21	1-13, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 46-70 ----- 14, 15, 38, 40, 42, 44
Y -- A	US 2009/0318747 A1 (Fischell et al.) 24 December 2009 (24.12.2009), entire document, especially fig 1; para [0012]-[0013]	1-13, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 46-70 ----- 14, 15, 38, 40, 42, 44
Y	US 2010/0087698 A1 (Hoffman) 08 April 2010 (08.04.2010), entire document, especially abstract	53
Y	US 2014/0249352 A1 (Zangen et al.) 04 September 2014 (04.09.2014), entire document, especially para [0035], [0089]	55
Y	US 7,769,463 B2 (Katsnelson) 03 August 2010 (03.08.2010), entire document, especially abstract	62
Y	US 2013/0331685 A1 (Liu et al.) 12 December 2013 (12.12.2013), entire document, especially abstract; fig 4d	63

 Further documents are listed in the continuation of Box C.

* 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

13 April 2016

Date of mailing of the international search report

03 MAY 2016

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/IL 15/50972

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 2005/0165458 A1 (Boveja et al.) 28 July 2005 (28.07.2005), entire document, especially abstract; fig 1a	64
A	US 2014/0163328 A1 (Geva et al.) 12 June 2014 (12.06.2014), entire document	1-16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46-70
A	US 2013/0066394 A1 (Saab) 14 March 2013 (14.03.2013), entire document	1-16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46-70

INTERNATIONAL SEARCH REPORT

International application No.

PCT/IL 15/50972

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.: 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45 and 71-92
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 1-16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46 and 49-70 (in part) directed to a system and method of configuring a local brain stimulation tool based on frequency.

Group II: Claims 47, 48 and 49-70 (in part), directed to a method of configuring a local brain stimulation tool based on time.

--- see extra 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 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.

--- Continuation of Box. III. This International Searching Authority found multiple inventions in this international application, as follows: ---

The inventions listed as Groups I-III 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:

SPECIAL TECHNICAL FEATURES

The invention of Group I includes the special technical feature of configuring the local brain stimulation tool to apply local brain stimulation at a frequency selected based on said comparison, not required by the claims of Group II.

The invention of Group III includes the special technical feature of configuring the local brain stimulation tool to apply local brain stimulation at a time or synchronization selected based on said comparison, not required by the claims of Groups I.

COMMON TECHNICAL FEATURES

Groups I-II share the common technical feature of obtaining a reference brain network activity (BNA) pattern, and a BNA pattern describing a neurophysiological state of the subject, each of said BNA patterns having a plurality of nodes and each node representing a brain location and at least one brain wave frequency; comparing said BNA patterns; and configuring the local brain stimulation tool to apply local brain stimulation based on said comparison. However, this shared technical feature does not represent a contribution over prior art as being anticipated by US 2014/0163328 A1 to Geva et al. (hereinafter "Geva").

Geva discloses obtaining a reference brain network activity (BNA) pattern (para [0121]), and a BNA pattern describing a neurophysiological state of the subject (para [0121]), each of said BNA patterns having a plurality of nodes and each node representing a brain location and at least one brain wave frequency (para [0121]-[0123]); comparing said BNA patterns (para [0131]); and configuring the local brain stimulation tool to apply local brain stimulation based on said comparison (para [0182]).

As the common technical features were known in the art at the time of the invention, these cannot be considered special technical feature that would otherwise unify the groups.

Therefore, Groups I-II lack unity under PCT Rule 13 because they do not share a same or corresponding special technical feature.

Note:

Claim(s) Nos. 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45 and 71-92 have been found to be unsearchable because they are not drafted in accordance with the second and third sentences of Rule 6.4(a).