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A61N 1/05 (2006.01)

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(54) Title: MULTI-FACTOR CONTROL OF EAR STIMULATION

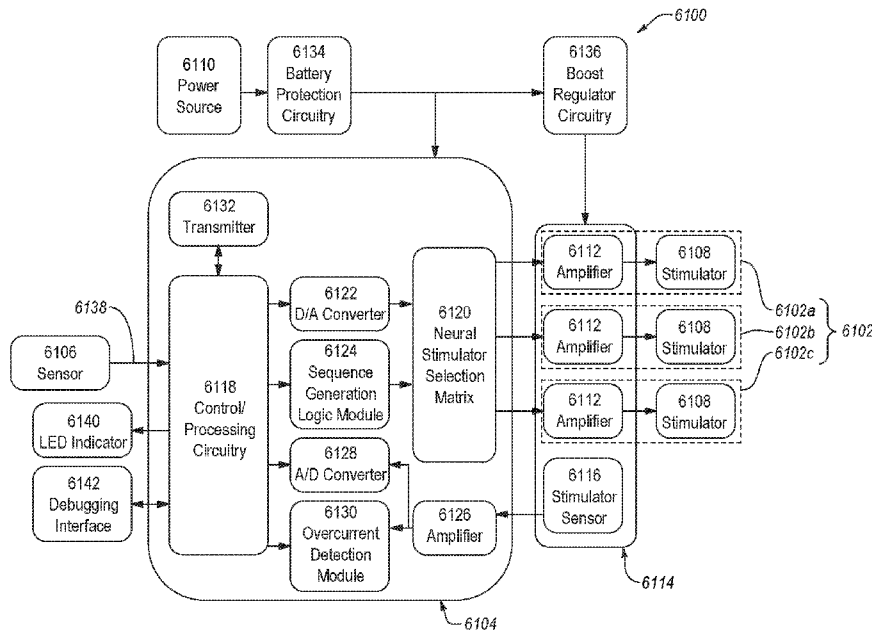


FIG. 61

(57) Abstract: An ear stimulation device and related systems and methods for operating an ear stimulation device in connection with a computing device are described. Multiple factors are used in controlling the ear stimulation device, including a variety of factors relating to or influencing the state of the user. In various aspects, the system is also responsive to inputs from sensors or computing networks. System features include fault detection, stimulus cycling and sequencing, integration with other devices in a networked system, device control based on playlists, battery charging, and device status display features.



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Published:

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16 May 2019 (16.05.2019)

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.: 9-13,17-22,27-33,44-50
because they relate to subject matter not required to be searched by this Authority, namely:
Claims 9-13, 17-22, 27-33 and 44-50 pertain to a method for treatment of the human body by therapy and thus relate to a subject matter which this International Searching Authority is not required, under PCT Article 17(2)(a)(i) and PCT Rule 39.1(iv), to search.
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 Extra Page.

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 any 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.: 1-8, 34-43

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.

A. CLASSIFICATION OF SUBJECT MATTER**A61N 1/04(2006.01)i, A61N 1/05(2006.01)i, A61N 1/36(2006.01)i**

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 1/04; A61B 5/04; A61B 5/0478; A61H 23/00; A61N 1/00; A61N 1/36; A61N 2/00; A61N 2/02; H05K 13/00; A61N 1/05

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

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

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

eKOMPASS(KIPO internal) & Keywords: wearable neural stimulation device, ear stimulator, securing member, computing device, wireless communication, control circuitry, remote system, physiological sensor

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2017-0027812 A1 (ELWHA LLC) 02 February 2017 See paragraphs [0090]-[0246]; figures 1-42.	1-8,34-43
A	US 4966164 A (COLSEN, R. et al.) 30 October 1990 See the whole document.	1-8,34-43
A	US 2016-0175605 A1 (NERVIVE, INC.) 23 June 2016 See the whole document.	1-8,34-43
A	US 2012-0209101 A1 (KIDMOSE, P. et al.) 16 August 2012 See the whole document.	1-8,34-43
A	US 2008-0249594 A1 (DIETRICH, S. et al.) 09 October 2008 See the whole document.	1-8,34-43

 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

11 April 2019 (11.04.2019)

Date of mailing of the international search report

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Name and mailing address of the ISA/KR

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2018/045940

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

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Continuation of : Box No. III

Group I: Claims 1-8 and 34-43 relate to a nerve stimulation system comprising a wearable neural stimulation device including at least one neural stimulator configured to deliver first and second stimuli, a computing device, and at least one of hardware and/or software.

Group II: Claims 14-16 relate to a nerve stimulation system comprising a wearable neural stimulation device, a computing device, and fault detection hardware and/or software configured to detect a fault in system function and cease application of a stimulus.

Group III: Claims 23-26 relate to a nerve stimulation system comprising a wearable neural stimulation device, a computing device, and at least one sensor configured to detect one or more characteristics of a sleeping disorder.

Group IV: Claim 51 relates to a computer program product comprising a non-transitory computer readable medium bearing one or more instructions for retrieving instructions for first and second stimulation patterns from a playlist stored in a wearable neural stimulation device, and delivering first and second transdermal stimuli to an ear according to the instructions for the first and second stimulation patterns, respectively.

Group V: Claims 52-57 relate to a battery charger for charging a neural stimulation system comprising a housing configured to hold the neural stimulation system.

Group VI: Claims 58-62 relate to a neural stimulation earpiece comprising a main body, a user interface, and at least one extension.