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<i>A61M 21/02</i> (2006.01)	<i>H04R 1/10</i> (2006.01)
<i>A61H 9/00</i> (2006.01)	<i>G06F 19/00</i> (2011.01)
<i>A61H 23/04</i> (2006.01)	<i>A61M 21/00</i> (2006.01)

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English

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(71) Applicant: **NOCIRA, LLC** [US/US]; 1305 W Auto Drive, Tempe, AZ 85284 (US).

(72) Inventors: **GEORGE, David, Mager**; 1305 W Auto Drive, Tempe, AZ 85284 (US). **CLAUDE, John, Patrick**; 1305 W Auto Drive, Tempe, AZ 85284 (US). **WILLEY, Kevin**; 1305 W Auto Drive, Tempe, AZ 85284 (US).

(74) Agent: **DELANEY, Karoline, A.**; Knobbe, Martens, Olson & Bear, LLP, 2040 Main Street, 14th Floor, Irvine, CA 92614 (US).

(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, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ,

(54) Title: SYSTEMS AND METHODS FOR TREATING NEUROLOGICAL DISORDERS

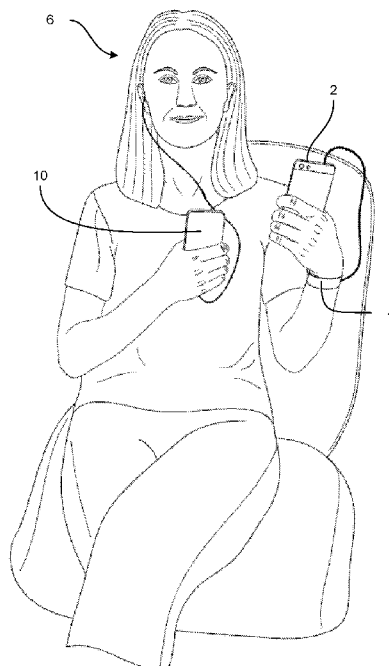


FIG. 1

(57) **Abstract:** Methods, systems, and apparatus, including computer programs encoded on computer storage media for treating medical conditions such as neurological disorders. A user device can be used to communicate with a user and can be used to control a treatment device. The treatment device can be an ear pressure treatment device. The system can execute treatment parameter profiles, and selection of the treatment parameter profiles can depend, at least in part, on feedback provided by the user, such as via the user device. One, two, or more nerves associated with target anatomical locations (e.g., one or both ears) can be stimulated. Some embodiments involve combination therapy including stimulating one or more nerves associated with at least one ear with a first stimulus modality, and a second stimulus modality that is the same as, or different from the first stimulus modality.



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.

- (84) Designated States** (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

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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))*

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2017/064964**A. CLASSIFICATION OF SUBJECT MATTER****A61F 11/00(2006.01)i, A61M 21/02(2006.01)i, A61H 9/00(2006.01)i, A61H 23/04(2006.01)i, A61H 21/00(2006.01)i, H04R 1/10(2006.01)i, G06F 19/00(2011.01)i, A61M 21/00(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)

A61F 11/00; A61H 23/02; A61N 1/18; G06T 17/00; A61N 1/365; A61M 21/02; A61B 5/00; A61H 9/00; A61H 23/04; A61H 21/00; H04R 1/10; G06F 19/00; A61M 21/00

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:neurological disorder, earpiece, pressure generator, pressure treatment parameter profile, user interface, wireless communication interface, audio generator**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2016-0128897 A1 (GBS VENTURES LLC) 12 May 2016 See abstract; paragraphs [0076]-[0086], [0099], [0105]-[0115], [0128], [0141], [0159], [0164], [0171], [0185]-[0190]; and figures 1-40.	1-60
Y	US 2014-0275827 A1 (PACESETTER, INC.) 18 September 2014 See abstract; paragraphs [0056], [0075]-[0084], [0090]; claims 1, 2; and figures 10, 11.	1-60
Y	US 8963914 B2 (RAWAT, R. et al.) 24 February 2015 See abstract; column 5, lines 21-36; column 6, lines 23-50; column 9, line 4 - column 10, line 9; column 17, lines 10-26; column 19, line 46 - column 20, line 9; column 23, line 53 - column 24, line 18; and figures 5, 14, 15.	28-37
Y	US 2005-0165460 A1 (ERFAN, O.) 28 July 2005 See abstract; paragraphs [0029], [0030], [0053]-[0055]; and figure 5.	53-55
Y	US 8442632 B2 (KULLOK, S. et al.) 14 May 2013 See abstract; column 5, line 24 - column 6, line 28; column 13, lines 39-42; and figure 1.	56-60
A	WO 2015-074060 A1 (THE REGENTS OF THE UNIVERSITY OF CALIFORNIA) 21 May 2015 See the whole document.	1-60



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

07 June 2018 (07.06.2018)

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International Application Division

Korean Intellectual Property Office

189 Cheongsa-ro, Seo-gu, Daejeon, 35208, Republic of Korea



Facsimile No. +82-42-481-8578

Authorized officer

CHOI, Sang Won

Telephone No. +82-42-481-8291



INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2017/064964

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:

I. Claims 1-60 are directed to a system for treating a medical condition associated with pain comprising: an earpiece; a pressure generator; computer-readable memory; a user interface; and at least one computer hardware processor.

II. Claims 61-63 are directed to a system for treating a medical condition comprising: a treatment device comprising: a treatment device comprising a wireless communication interface; a user device comprising a user interface and a wireless communication interface; at least one computer hardware processor; and computer-readable memory.

III. Claims 64-75 are directed to a treatment device comprising: an earpiece; a pressure generator; and a wireless communication interface.

IV. Claims 76-81 are directed to a treatment system comprising: an earpiece; a pressure generator; and an audio generator.

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.:
1-60

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/US2017/064964

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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		WO 2014-210457 A4	26/02/2015
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