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- (21) **International Application Number:**
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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, 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, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, 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))

Published:

— with international search report (Art. 21(3))

[Continued on next page]

(54) **Title:** ACOUSTIC DETECTION MASK SYSTEMS AND/OR METHODS

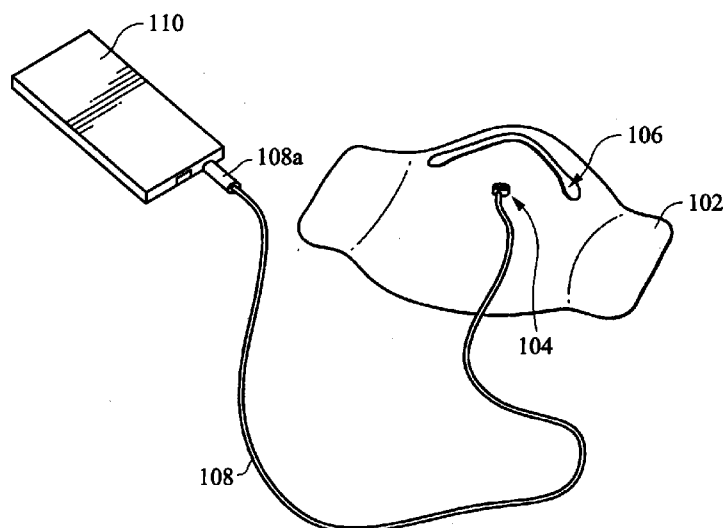


FIG. 2

(57) **Abstract:** Certain examples described herein relate to acoustic detection mask systems and/or methods. In certain examples, an acoustic detection mask system is provided. An example acoustic detection mask system includes a mask having a microphone located therein or thereon. The microphone is connected to a data logger that is configured to capture vibrations and/or sounds registered by the microphone. The data logger may store such information in a computer readable storage media thereof for subsequent analysis, e.g., via a computer program accessing such data after the data logger is connected to a separate computer system. The microphone may be positioned and the data analyzed so as to determine differences between oral and nasal breathing, as well as sleep-disordered breath and/or snoring. Such components may be provided as a part of a system or in any suitable combination or sub-combination. Associated methods also are described herein as a part of the technology.



— *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:
30 August 2012

INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU2011/001417

A. CLASSIFICATION OF SUBJECT MATTER

A61B 5/097 (OCT 2005) A61M 16/06 (OCT 2005)

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)

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)

WPI, EPODOC: A61B5 A61M16 A62B18 log collate record store process cpu computer memory storage sound vibrat snore apn osa audio audible microphone microfon sens transduc logger mask interface.

EPODOC: A61B5/681B A61B5/097 A61B5/68B2B A61B5/48C8 A61B5/48+ sound vibrate snore apn osa audio audibl

Patent lens, Google Scholar: face facial microscope envelope signature hilbert cloth textile mask snore snoring noise apnea patient absolute value

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
	Documents are listed in the continuation of Box C	



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	"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
"E" earlier application or patent but published on or after the international filing date	"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
"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)	"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
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search
22 June 2012Date of mailing of the international search report
27 June 2012

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU2011/001417**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:

See Supplemental Box for Details

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.

INTERNATIONAL SEARCH REPORT		International application No.
C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		PCT/AU2011/001417
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	US 5199424 A (SULLIVAN et al) 06 April 1993 Figures 1A, 1B, 2B, 3; column 8 lines 50 to 68, column 9 lines 30 to 46, column 10 line 1 to 4, 54 Figures 1A, 1B	1-7, 9-21, 29-51, 53, 54, 62-66, 69-78, 80, 99, 100 6, 8, 11-15, 19, 21-28, 35, 37, 40-44, 52, 54-61, 67, 68, 77, 79, 81-98
X Y	WO 1996/019142 A1 (SNAP LABORATORIES L.L.C.) 27 June 1996 Figures 1, 2, 4, page 6 lines 11-25, page 7 lines 1-21, page 8 line 9 to page 9 line 23 figure 2	1-5,7,9,15-23,25-28,30-34,36,38,44-51,53-56,59-65,68,99,100 6,8,10-14,24,35,37,39-43,52,57,58,66,67,69
X Y	US 6213955 B1 (KARAKASOGLU et al) 10 April 2001 Figures 1, 2, 5, column 1 lines 40-56, column 4 lines 12-15, column 3 lines 35-45, column 4 lines 13 to 48, column 5 lines 32 to 52, column 7 line 59 to column 9 line 57, column 10 lines 35 to 39 Column 3 lines 52 to 55	1-5,7,9,16 to 21,26-34,38,45-54,59-76,78-81,84-88,98-100 6,8,10-14,22-25,35-37,39-44,55-58,77,82,83,89-97
Y	US 2809633 A (SWEARINGEN et al) 15 October 1957 Figure 5A	6,8,35,37
Y	US 5918598 A (BELFER et al) 06 July 0199 Figure 3	6,11-14,35,40-43
Y	US 2002/0185134 A1 (BISHOP) 12 December 2002 Figure 1	6,35
Y	DE 102008039645 A1 (WEINMANN GERATE FUR MEDIZIN GBMH & CO. KG) 25 March 2010 Figure 1	8,37
Y	WO 2009/026627 A1 (RESMED LTD) 05 March 2009 Abstract	8,37
Y	WO 2009/146412 A1 (FILLIGENT LIMITED) 03 December 2009 Pages 11 and 12	11-14,40-43
Y	CA 2584258 A1 (TELECOMMUNICATIONS RESEARCH LABORATORY) 29 September 2008 Abstract, page 18 lines 1 to 10	19,52,66,67,79,95
Y	WO 2004/047618 A2 (JEFFERIES et al) 10 June 2004 Page 7 line 22 to page 8 line 12, page 12,	21-28,54-61,68,69,81-85,86-98
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Y	WO 2006/133548 A1 (BRAEBON MEDICAL CORPORATION) 21 December 2006 Paragraphs 0054, 0065-0068	21-28,54-61,68,69

INTERNATIONAL SEARCH REPORT		International application No.
C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		PCT/AU2011/001417
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 2001/043804 A1 (COMPUMEDICS SLEEP PTY LTD) 21 June 2001 Pages 8 and 9	95
Y	LESZCZYNSKI P., 'Advanced Instrumentation/Signal Processing for the Detection and Intervention of Obstructive Sleep Apnea' The University of Queensland, 2003, October Pages 26, 27	88,89,92
Y	US 6718301 B1 (WOODS) 06 April 2004 Figure 5D	88,89,92
Y	KULKAS, A. et al., 'Tracheal sound parameters of respiratory cycle phases show differences between flow-limited and normal breathing during sleep', Physiological Measurement, 2010, Vol 31, pages 427-438 Section 2.3	88-94
Y	US 2010/0240945 A1 (BIKKO) 23 September 2010 Paragraphs 0060-0062	88-94
A	DE 636117 A (DRAGERWERK et al) 02 October 1936 Figure	1,29,30,31,70
A	WO 2009/066202 A2 (KONINKLIJKE PHILIS ELECTRONICS N.V.) 28 May 2009 Abstract	1,29,30,31,70
A	US 4802485 A (BOWERS et al) 07 February 1989 Figures 3 and 4	48,63,70,81,86
A	WO 2003/000133 A1 (C-LECT MEDICAL LTD) 03 January 2003 Abstract, figure 1	1
A	PEVERNAGIE D. et al., 'The acoustics of snoring', Sleep Medicine Reviews, 2010, Vol 14, pages 131-144 Entire document	86
A	US 2004/0065328 A1 (AMARASINGHE et al) 08 April 2004 paragraph 0008	1, 29, 30, 31, 70
Form PCT/ISA/210 (fifth sheet) (July 2009)		

Supplemental Box

Continuation of: **Box III**

This International Application does not comply with the requirements of unity of invention because it does not relate to one invention or to a group of inventions so linked as to form a single general inventive concept.

This Authority has found that there are different inventions based on the following features that separate the claims into distinct groups:

- Claims 1 to 28, 30 to 69, 99 and 100 are directed to mask systems and components to register sounds from a patient using a microphone in the mask. The feature of the sounds being directly registered by the microphone is specific to this group of claims.
- Claims 29 and 70 to 98 are directed to a mask and methods of data capture/analysis. The feature of the microphone detecting vibrations in the mask caused by patient produced sounds is specific to this group of claims.

PCT Rule 13.2, first sentence, states that unity of invention is only fulfilled when there is a technical relationship among the claimed inventions involving one or more of the same or corresponding special technical features. PCT Rule 13.2, second sentence, defines a special technical feature as a feature which makes a contribution over the prior art.

When there is no special technical feature common to all the claimed inventions there is no unity of invention.

In the above groups of claims, the identified features may have the potential to make a contribution over the prior art but are not common to all the claimed inventions and therefore cannot provide the required technical relationship. The only feature common to all of the claimed inventions and which provides a technical relationship among them is a microphone within a respiratory style mask

However this feature does not make a contribution over the prior art because it is disclosed in: any one of documents D1 to D3 and is further considered to be common in the art.

Therefore in the light of this document this common feature cannot be a special technical feature. Therefore there is no special technical feature common to all the claimed inventions and the requirements for unity of invention are consequently not satisfied *a posteriori*.

INTERNATIONAL SEARCH REPORT		International application No.	
Information on patent family members		PCT/AU2011/001417	
This Annex lists known patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.			
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Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.
Form PCT/ISA/210 (Family Annex)(July 2009)

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