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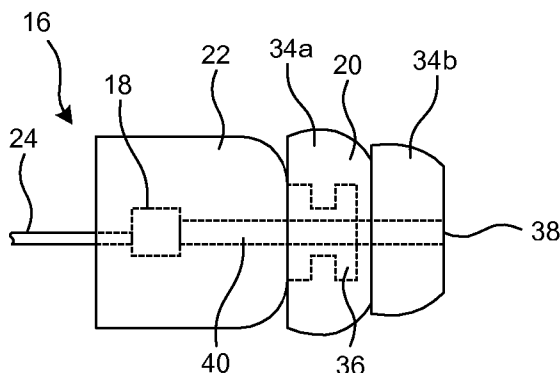
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(54) Title: EAR SENSOR ASSEMBLY FOR SPEECH PROCESSING



(57) Abstract: An ear sensor apparatus includes a microphone po-
sitionable with respect to an ear canal (18) to detect sound signals
from the ear canal and to generate a corresponding output signal.
The apparatus may include a seal (20) for substantially blocking
ambient sound signals from reaching the microphone and an inter-
face (24) to convey the output signal to a remote speech recogni-
tion apparatus. The output signal may be normalized (42) so that
the normalized output signal is more representative of speech from
a user's mouth than speech detected from the user's ear.



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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US07/71209

A. CLASSIFICATION OF SUBJECT MATTER

IPC: **G10L 15/00**(2006.01),**15/20**(2006.01),**11/00**(2006.01);**H04R 25/00**(2006.01),**25/02**(2006.01)
G10L 21/00
 (2006.01)

USPC: 704/224,234,270,270.1,271;381/312,317,328

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)

U.S. : 704/224,234,270,270.1,271;381/312,317,328

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)
 Google Scholar, IEEE Explorer

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5,426,719 A (FRANKS et al) 20 June 1995 (20.06.1995), columns 6, 10-12.	13-16
Y	US 5,774,565 A (BENNING et al) 30 June 1998 (30.06.1998), column 2, lines 41-59.	17, 21
X	US 6,021,207 A (PUTHUFF et al) 01 February 2000 (01.02.2000), columns 3-5, figures 2, 4, 6, 7.	1-8
X	US 6,181,801 B1 (PUTHUFF et al) 30 January 2001 (30.01.2001), columns 5, 7, 8, figures 5, 6, 13, 14.	1-8
Y	US 6,185,309 (ATTIAS) 06 February 2001 (06.02.2001), column 4, lines 39-58.	24
Y	US 6,253,175 B1 (BASU et al) 26 June 2001 (26.06.2001), column 11, lines 1-14.	19
Y	US 6,567,524 B1 (SVEAN et al) 20 May 2003 (20.05.2003), column 9, lines 26-43.	18

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 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		
"P" document published prior to the international filing date but later than the priority date claimed	"&"	document member of the same patent family

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US07/71209

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:
Please See Continuation 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 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.:
- 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.
PCT/US07/71209

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6,647,368 B2 (NEMIROVSKI) 11 November 2003 (11.11.2003), columns 4-6, 11-14, figures 1b, 2b.	1-3, 5, 8-12
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Y		4, 6
A	US 6,671,379 B2 (NEMIROVSKI) 30 December 2003 (30.12.2003), figures 1-3.	1-12
Y	US 2005/0058313 A1 (VICTORIAN et al) 17 March 2005 (17.03.2005), paragraph 0044.	29
Y	US 2005/0117771 A1 (VOSBURGH et al) 02 June 2005 (02.06.2005), paragraph 0037.	25,26
X	WESTERLUND et al. "In-ear Microphone Equalization Exploiting an Active Noise Control, Proceedings of Internoise 2001, August 2001, pages 1-6, especially pages 2-4.	13-16, 20, 22-23, 27-
---		28
Y		-----
		17-19, 21, 24, 29-30

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US07/71209

BOX III. OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING

Group 1, claim(s) 1-12, drawn to a remote speech recognition apparatus.

Group 2, claim(s) 13-30, drawn to a sound processing apparatus that normalizes a microphone input.

The inventions listed as Groups 1 and 2 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: Group 1 is associated with an inventive concept directed to a device that receives and sends speech to a remote speech recognizer and its associated structure, while Group 2 deal with a different inventive concept in how a microphone input can be normalized. Since the two groups are directed to different inventive concepts/features, groups 1 and 2 lack a unity of invention.