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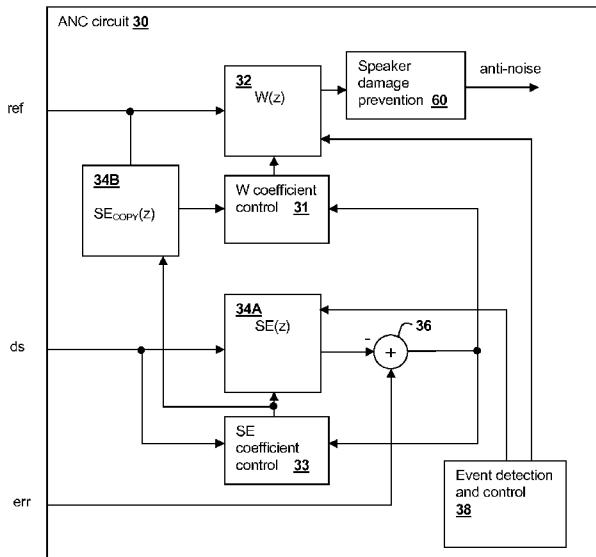
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Declarations under Rule 4.17:

— as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(H))

[Continued on nextpage]

(54) Title: SPEAKER DAMAGE PREVENTION IN ADAPTIVE NOISE-CANCELING PERSONAL AUDIO DEVICES



(57) Abstract: A personal audio device, such as a wireless telephone, includes noise canceling circuit (30) that adaptively generates an anti-noise signal from a reference microphone signal (ref) and injects the anti-noise signal into the speaker or other transducer output to cause cancellation of ambient audio sounds. A processing circuit (60) monitors a level of the anti-noise signal, determines that the anti-noise signal may cause damage to the transducer and adjusts the generation of the anti-noise signal such that damage to the transducer is prevented.

Fig. 3



- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(Hi))
- 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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ADD.

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)
G10K

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)

EPO-Internal , WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2009/245529 AI (ASADA KOHEI [JP] ET AL) 1 October 2009 (2009-10-01) abstract; figures 3-6 paragraphs [0002] - [0005] , [0044] , [0065] , [0115] , [0116] , [0137] - [0149] -----	1-28
X	US 2010/274564 AI (BAKALOS PERICLES NICHOLAS [US] ET AL) 28 October 2010 (2010-10-28) abstract; figures 2a-f,3a paragraphs [0003] , [0009] , [0077] , [0153] , [0161] , [0169] -----	1,2,5, 9-12 ,15 , 19-22 ,25
X	US 5 586 190 A (TRANTOW JERRY J [US] ET AL) 17 December 1996 (1996-12-17) abstract; figures 2,5 column 1, lines 44-53 column 2, line 19 - column 3, line 29 ----- -/- -	1,9-11 , 19-21



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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 6 418 228 B1 (TERAI KENICHI [JP] ET AL) 9 July 2002 (2002-07-09) abstract; figures 1,5,8, 13 , 14,21 column 9, lines 17-51 column 10, line 58 - column 14, line 17 ----- 	1,2, 9-12 , 19-22
A	US 2010/310086 A1 (MAGRATH ANTHONY JAMES [GB] ET AL) 9 December 2010 (2010-12-09) abstract; figure 2 paragraphs [0071] , [0072] -----	1,11,21

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No PCT/US2012/037449

Patent document cited in search report	Publication date	Patent family member(s)				Publication date
US 2009245529	AI 01-10-2009	CN 101547389	A 30-09-2009	EP 2105917	A2 30-09-2009	
		JP 4572945	B2 04-11-2010			
		JP 2009246431	A 22-10-2009			
		US 2009245529	AI 01-10-2009			
<hr style="border-top: 1px dashed black;"/>						
US 2010274564	AI 28- 10 -2010	NONE				
<hr style="border-top: 1px dashed black;"/>						
US 5586190	A 17- 12 -1996	CA 2150053	AI 24-12 -1995	US 5586190	A 17-12 -1996	
<hr style="border-top: 1px dashed black;"/>						
US 6418228	BI 09- 07 -2002	EP 0973151	A2 19-01 -2000	US 6418228	BI 09-07 -2002	
<hr style="border-top: 1px dashed black;"/>						
US 2010310086	AI 09- 12 -2010	CN 101903941	A 01-12 -2010	CN 102881281	A 16-01 -2013	
		GB 2455822	A 24-06 -2009			
		US 2010310086	AI 09-12 -2010			
		Wo 2009081187	AI 02-07 -2009			
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