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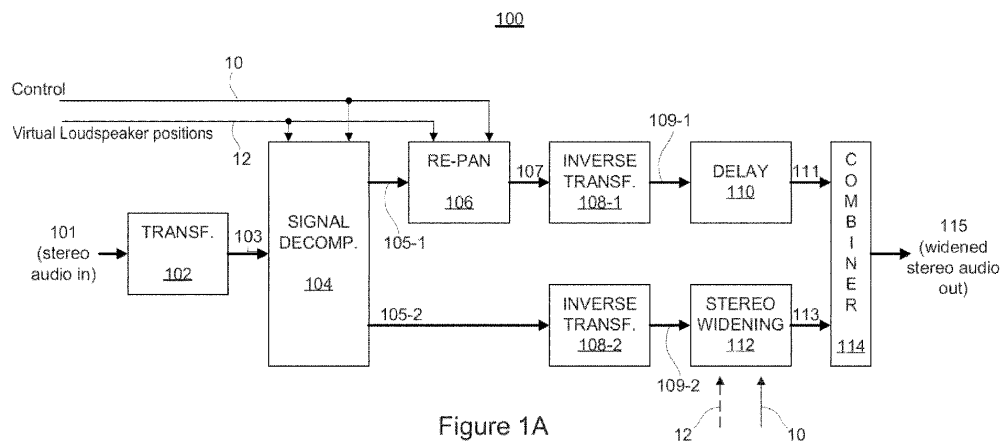
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(54) **AUDIO PROCESSING**

(57) An apparatus for processing an input audio signal comprising multiple channels, the apparatus comprising: means for deriving, based on the input audio signal, a first signal component, comprising at least one input channel, and a second signal component, comprising multiple input channels, wherein the first signal component is dependent upon at least a first portion of a spatial audio image conveyed by the input audio signal, and the second signal component is dependent upon at least a second portion of the spatial audio image that is different to the first portion; cross-channel mixing means for cross-channel mixing of a plurality of input channels; means for directing the second signal component to the cross-channel mixing means for cross-channel mixing of at least some of the multiple input channels of the second signal component to produce a modified second signal component; bypass means for enabling the first signal component to bypass the cross-channel mixing means; and means for combining the first signal component and the modified second signal component into an output audio signal comprising two output channels configured for rendering by headphone apparatus.



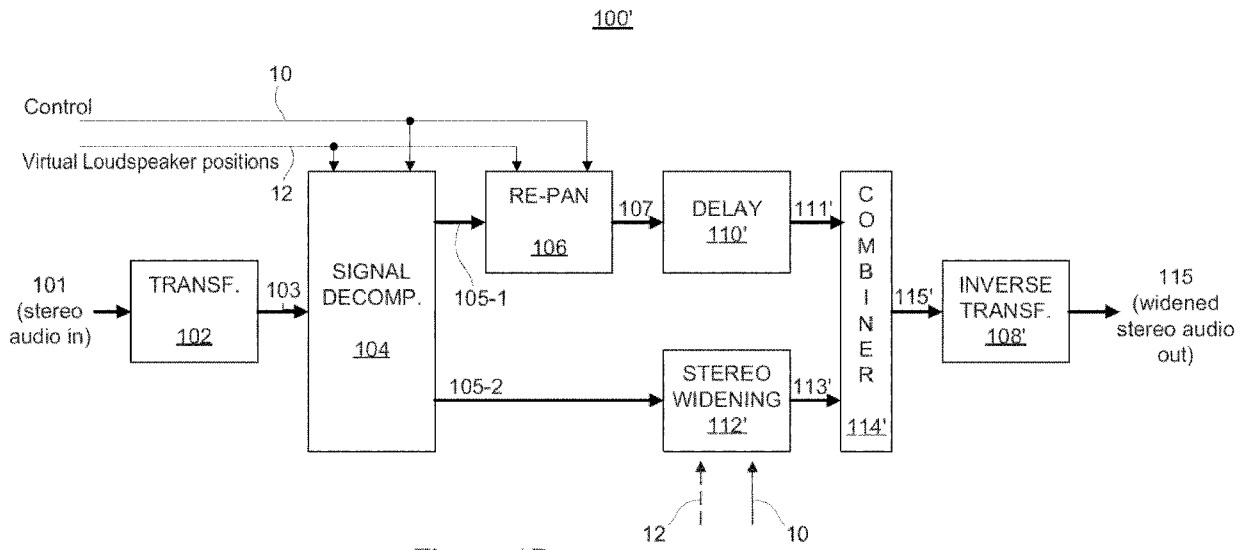


Figure 1B



EUROPEAN SEARCH REPORT

 Application Number
 EP 20 17 6223

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2014/270185 A1 (WALSH MARTIN [US]) 18 September 2014 (2014-09-18)	1,2,7, 13,15	INV. H04S3/00
Y	* the whole document *	8-10,14	

X	US 2004/136554 A1 (KIRKEBY OLE [FI]) 15 July 2004 (2004-07-15)	1,2,7, 13,15	
Y	* the whole document *	3-6	

A	EP 1 194 007 A2 (NOKIA CORP [FI]) 3 April 2002 (2002-04-03)	1-7,13, 15	
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Y	US 8 374 365 B2 (CREATIVE TECH LTD [SG]; GOODWIN MICHAEL M [US] ET AL.) 12 February 2013 (2013-02-12)	3-6	
A	* the whole document *	10,14	

A	MENZER FRITZ ET AL: "Stereo-to-Binaural Conversion Using Interaural Coherence Matching", AES CONVENTION 128; MAY 2010, AES, 60 EAST 42ND STREET, ROOM 2520 NEW YORK 10165-2520, USA, May 2010 (2010-05), XP040509369, * the whole document *	3-6,10, 14	TECHNICAL FIELDS SEARCHED (IPC) H04R H04S

Y	US 2015/256958 A1 (NGUYEN KHOA-VAN [FR] ET AL) 10 September 2015 (2015-09-10)	8-10,14	
	* the whole document *		

The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 18 February 2021	Examiner Bücker, Martin
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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 EPO FORM 1503 03.82 (P04C01)



Application Number

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CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☒ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

1-10, 13-15

☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).

**LACK OF UNITY OF INVENTION
SHEET B**

Application Number

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The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-7, 13, 15

Apparatus/method according to US 2014/270185 A1 with an improved implementation of the cross-channel mixing means.

2. claims: 8-10, 14

Apparatus according to US 2014/270185 A1 with an alternative to derive the first and second signal components.

3. claim: 11

Apparatus according to US 2014/270185 A1 with the further feature of a control input.

4. claim: 12

Apparatus according to US 2014/270185 A1 with the input audio signal comprising a same sound source that is repeated at different positions, wherein the input audio signal is repeated at a second position that is relatively peripheral and is not front and central to a user of the headphone apparatus.

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 20 17 6223

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

18-02-2021

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