

Title (en)  
LOUDSPEAKER, APPARATUS COMPRISING THE SAME, AND METHOD OF OPERATING A LOUDSPEAKER

Title (de)  
LAUTSPRECHER, VORRICHTUNG DAMIT UND VERFAHREN ZUM BETREIBEN EINES LAUTSPRECHERS

Title (fr)  
HAUT-PARLEUR, APPAREIL LE COMPRENANT ET PROCÉDÉ DE FONCTIONNEMENT D'UN HAUT-PARLEUR

Publication  
**EP 3355590 A1 20180801 (EN)**

Application  
**EP 17153225 A 20170126**

Priority  
EP 17153225 A 20170126

Abstract (en)  
The present invention provides a loudspeaker (10) at least comprising a field coil (4), a plurality of voice coils (6a, 6b, 6c) having different numbers of windings from each other, and a diaphragm (8) having a mechanically adjustable size. The invention also provides an apparatus at least comprising such a loudspeaker, as well as a variable voltage and/or current source (24) connected to the field coil (4), a voice coil drive circuit (26) switchably connectable to at least one of the plurality of voice coils (6a, 6b, 6c), and a mechanical actuator (28) connected to the diaphragm (8) for adjusting its size. The apparatus may further comprise a controller (30, 30a, 30b) of the variable voltage and/or current source (24), of the voice coil drive circuit (26) and of the mechanical actuator (28). Such a controller (30) is configured, in response to a frequency of an input electronic audio signal, to vary the voltage and/or current supplied to the field coil (4) by the variable voltage and/or current source (24) in order to vary the strength of a magnetic field produced by the field coil (4), to select at least one of the plurality of voice coils (6a, 6b, 6c) to be driven by the voice coil drive circuit (26), and/or to control the mechanical actuator (28) to adjust the size of the diaphragm (8). The invention also provides a method of operating a loudspeaker in such a manner. Thus the loudspeaker (10) is effectively an adaptive loudspeaker, which can become any one of a woofer, a mid-range speaker or a tweeter, according to how it is adjusted and controlled. This obviates the need to provide a separate woofer, mid-range speaker and tweeter to cover the whole range of normal human hearing.

IPC 8 full level  
**H04R 7/12** (2006.01); **H04R 9/02** (2006.01)

CPC (source: EP)  
**H04R 1/24** (2013.01); **H04R 3/14** (2013.01); **H04R 9/046** (2013.01); **H04R 7/12** (2013.01); **H04R 2209/041** (2013.01); **H04R 2307/207** (2013.01)

Citation (applicant)  
US 8958597 B2 20150217 - BOYD GEOFFREY A [US]

Citation (search report)  
• [YD] US 2013272563 A1 20131017 - BOYD GEOFFREY A [US]  
• [Y] US 2009028371 A1 20090129 - BAILEY ADAM H [US]  
• [A] US 2014236332 A1 20140821 - YASUDA AKIRA [JP], et al

Cited by  
CN113840214A; CN109547904A; CN116249057A; CN116896713A; CN108882134A; CN110379402A; CN113225658A; US11997467B2; US11102575B1; WO2021007982A1

Designated contracting state (EPC)  
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

Designated extension state (EPC)  
BA ME

DOCDB simple family (publication)  
**EP 3355590 A1 20180801**; TR 201702883 A2 20180827

DOCDB simple family (application)  
**EP 17153225 A 20170126**; TR 201702883 A 20170224