US010241750B1

(12) **United States Patent**
Ralston, Jr.

(10) **Patent No.: US 10,241,750 B1**
(45) **Date of Patent: Mar. 26, 2019**

(54) **METHOD AND APPARATUS FOR DISABLING AUDIO**

(71) Applicant: **Columbia Network Security Inc**, Camas, WA (US)

(72) Inventor: **Richard Ralston, Jr.**, Camas, WA (US)

(73) Assignee: **Columbia Network Security Inc.**, Camas, WA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **16/003,106**

(22) Filed: **Jun. 7, 2018**

Related U.S. Application Data

(60) Provisional application No. 62/622,957, filed on Jan. 28, 2018.

(51) **Int. Cl.**

H04R 29/00	(2006.01)
H02B 1/00	(2006.01)
G06F 3/16	(2006.01)
H04B 1/3827	(2015.01)
H04W 4/80	(2018.01)
H04R 5/04	(2006.01)

(52) **U.S. Cl.**
CPC ***G06F 3/165*** (2013.01); ***H04B 1/3827*** (2013.01); ***H04R 29/00*** (2013.01); *H04R 5/04* (2013.01); *H04R 2420/07* (2013.01); *H04R 2420/09* (2013.01); *H04W 4/80* (2018.02)

(58) **Field of Classification Search**
CPC H04R 5/04; H04R 29/00; H04R 29/004; H04R 29/005; H04R 2420/00–2420/006
USPC 381/58, 91, 92, 122, 77, 79, 123
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,718,765	A	2/1973	Halaby	
6,229,897	B1	5/2001	Holthaus et al.	
6,595,792	B1	7/2003	Rudolph et al.	
7,024,175	B1	4/2006	Moquin et al.	
8,019,096	B2 *	9/2011	Sander	H04R 1/1041 381/122
8,774,863	B2 *	7/2014	Park	H04M 1/6016 455/557
9,103,866	B2 *	8/2015	Mehrabi	G01R 31/04
9,158,496	B2	10/2015	Soffer	
9,411,379	B2	8/2016	Rinner et al.	
9,497,579	B2	11/2016	Halevi et al.	
9,519,602	B2 *	12/2016	Prentice	H04M 1/72527

(Continued)

FOREIGN PATENT DOCUMENTS

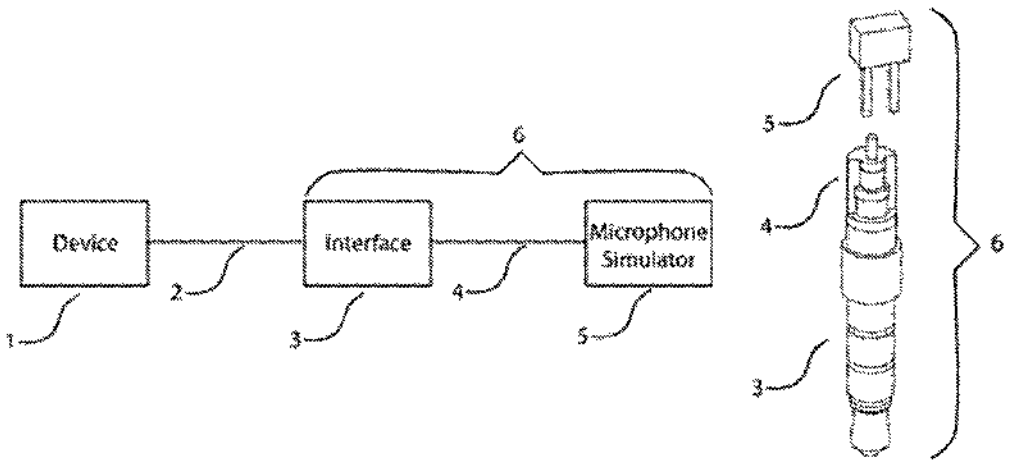
JP H01-146414 A 6/1989

Primary Examiner — Xu Mei
(74) *Attorney, Agent, or Firm* — Kaplan IP Law, PLLC; Jonathan T. Kaplan

(57) **ABSTRACT**

The present invention comprises a microphone simulator or emulator, for use in conjunction with a "personal electronic device" or "PED." The microphone simulator or emulator is used in conjunction with a PED that includes both a built-in microphone, along with an interface by which an external microphone can be utilized. Often, a PED is equipped with no specific user-level interface, by which the built-in microphone of the PED can be disabled. However, the microphone simulator or emulator, when connected to the external microphone interface of a PED, causes the PED to recognize the microphone simulator or emulator as an external microphone. Because of this, the PED disables its built-in microphone.

9 Claims, 1 Drawing Sheet



METHOD AND APPARATUS FOR DISABLING AUDIO

As provided for under 35 U.S.C. § 119(e), this patent claims benefit of the filing date of the following U.S. Provisional Patent Application, herein incorporated it by reference in its entirety:

"Method and Apparatus for Disabling an Audio Input," Application No. 62/622,957, filed Jan. 28, 2018.

FIELD OF THE INVENTION

The present invention relates generally to computing devices equipped with audio inputs, audio outputs, or both, and, more particularly, to disabling such audio capabilities.

BACKGROUND OF THE INVENTION

Personal electronic devices, like smartphones, tablets, and laptops, are equipped with an increasingly wide array of sensors and effectors, including, respectively, microphones and audio outputs (e.g., speakers).

Ever since the introduction of cell phones, users have had to contend with their inadvertent use, such as a phone initiating a call simply because of its location in a user's pocket, when the user is engaged in some activity unrelated to the placing of a phone call.

More recently, with the introduction of smartphones, "hacking" (or unauthorized entry) into one of these devices is becoming an increasingly severe problem (since such phones have become, essentially, pocket-sized general-purpose computer systems, that also offer an ability to make phone calls).

Even where an application service provider's ("ASP's") use of a device has technically been legally authorized by its user (e.g., through a "click-through" license), ASP's are increasingly using such personal electronic devices (and, in particular, the device's sensors) for purposes of which the user is not necessarily aware.

For example, companies such as FACEBOOK (Menlo Park, Calif.) and GOOGLE (Mountain View, Calif.) are able to track a user's Internet search behavior across multiple devices.

This cross-device tracking can be accomplished by causing first and second personal electronic devices to operate as, respectively, an audio modem transmitter and audio modem receiver. The audio transmissions are typically ultrasonic, and therefore inaudible to humans. The cross-device tracking can be used for such purposes as ad tracking, ad targeting, and for other user-profiling purposes.

It would therefore be desirable to give users a reliable way of disabling a personal electronic device's audio, so that privacy can be maintained, and unauthorized or unknown uses can be prevented.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, that are incorporated in and constitute a part of this specification, illustrate several embodiments of the invention and, together with the description, serve to explain the principles of the invention.

FIG. **1**A is a block-diagram-level description of a No Sound Device (or NSD) **6**, when used in conjunction with a Personal Electronic Device (or PED) **1**.

FIG. **1**B depicts a particular embodiment of an NSD.

FIG. **1**C depicts a typical smartphone, with which the NSD can be used.

DETAILED DESCRIPTION

Reference will now be made in detail to various embodiments of the invention, examples of which are illustrated in the accompanying drawings. Wherever possible, the same reference numbers will be used throughout the drawings to refer to the same or like parts.

Please refer to the section titled "Glossary of Selected Terms," for the definition of selected terms used below.

1 Designs and Embodiments

The present invention comprises a new kind of device, that we shall refer to as a No Sound Device (or NSD), for use in conjunction with a "personal electronic device" or "PED" (please see Glossary, for definition of PED). The NSD typically is used in conjunction with a PED that includes a built-in microphone, a built-in speaker, or both, along with at least one interface by which external audio devices can be utilized.

The NSD is typically small, relative to a PED with which it is used, so that other than the audio-blocking function of the NSD, the PED can be used in as normal a manner as possible. Also, to further enhance an NSD's unobtrusiveness and ease of use, it is typically powered by a port (or interface) of the same PED the NSD is affecting. In the case of a wireless NSD, it can be powered by a port of the PED the NSD is affecting, or the NSD can be powered by any port that is suitably nearby (such as the port of another suitably-near PED).

FIG. **10** depicts, as an example PED, a common configuration for a smart phone **1**, that includes a touch screen **10**, and a home button **11**. Smart phone **1** includes a speaker at area **7**, along with a built-in microphone at area **8**. Area **9** is a common location for an audio socket (such as one that accepts a 3.5 mm male plug), at which a wired headset can be connected. Typically, smart phone **1** produces audio output at speaker **7**, and receives audio input at microphone **8**. However, these devices can be disabled by a subsystem of a PED, that we shall refer to as an "audio mixer."

In general, an audio mixer can be described as a subsystem that performs two main functions:

- Routing: In general, a PED can (at any one time) produce one stream of audio output and accept one stream of audio input. Collectively, we can refer to these two streams as the PED's "audio channel." Conversely, audio devices are typically organized in pairs (with one device of the pair providing a microphone function, and the other speaker), with each pair having an audio interface to which the audio channel can be connected.
- Prioritization: Among the various interfaces to audio devices present in a PED, a major function of an audio mixer, is to decide to which audio interface, at any one time, the mixer's audio channel should connect.

An audio mixer can be comprised of hardware, software, or any combination of the two. It is unusual to find a PED where its audio mixer is equipped with a user-level interface, by which there can be a specific user-selected disabling of the connection, between its audio channel and its built-in microphone or speaker. Typically, an audio mixer responds to the connection of an audio accessory to a PED's wired or wireless external ports (or interfaces), giving control of the audio channel to the last external accessory connected. For example, if a wired headset is connected to smart phone **1** at

FIGURE 1A

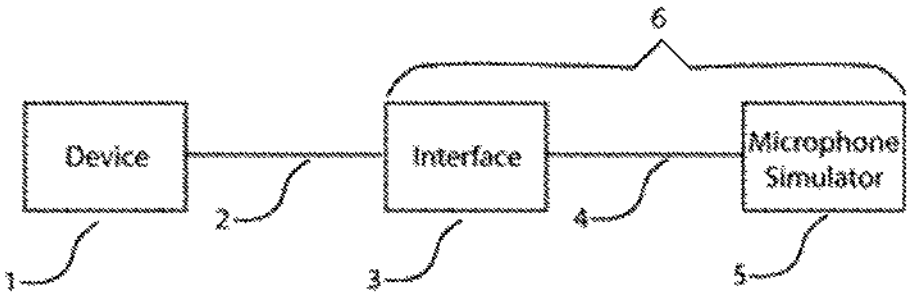


FIGURE 1B

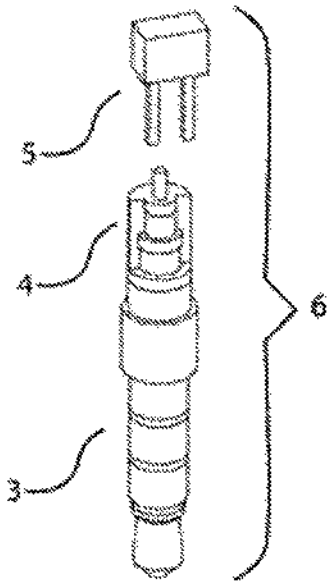
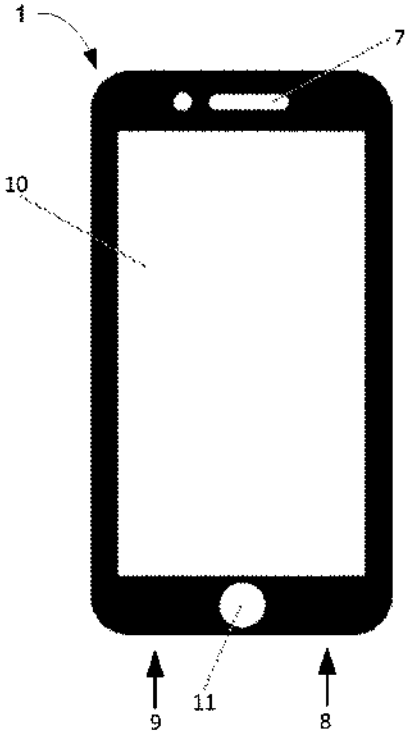


FIGURE 1C



tablets (also called a "tablet computer"), television sets, and a wide variety of devices under the category of "IoT" (Internet of Things).

Audio Accessory: any system, external to the PED to be blocked, providing microphone functionality, speaker functionality, or both.

While the invention has been described in conjunction with specific embodiments, it is evident that many alternatives, modifications and variations will be apparent in light of the foregoing description. Accordingly, the invention is intended to embrace all such alternatives, modifications and variations as fall within the spirit and scope of the appended claims and equivalents.

What is claimed is:

1. A method for a personal electronic device, comprising:

selecting, with a first audio mixer of the personal electronic device, a first audio interface for connection to a first audio channel of the personal electronic device, wherein the first audio interface couples to at least a first built-in microphone of the personal electronic device;

coupling a first electronic device to a second audio interface of the first personal electronic device, wherein the first electronic device is external to the first personal electronic device;

providing first signals, from the first electronic device to the second audio interface, that emulate a microphone in an approximately silent environment;

switching, with the first audio mixer and in response to the provision of the first signals of the first electronic device to the second audio interface, the first audio channel from the first audio interface to the second audio interface.

2. The method of claim **1**, wherein the second audio interface comprises a socket, adapted to receive a tip-ring-sleeve type plug.

3. The method of claim **2**, wherein the tip-ring-sleeve type socket is adapted to receive a TRRS 3.5 mm plug.

4. The method of claim **1**, wherein the second audio interface includes a first wireless transceiver.

5. The method of claim **4**, wherein the first wireless transceiver complies with the Bluetooth standard.

6. The method of claim **4**, wherein the first electronic device includes a second wireless transceiver.

7. The method of claim **1**, wherein the first electronic device produces the first signals with a constant current source.

8. The method of claim **7**, wherein the constant current source is an appropriately configured MOSFET.

9. The method of claim **1**, wherein the first electronic device produces digital signals indicative of a microphone in the approximately silent environment.

* * * * *