

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD., SAMSUNG ELECTRONICS,
AMERICA, INC., and HARMAN INTERNATIONAL INDUSTRIES, INC.

Petitioners

v.

STATON TECHIYA, LLC,

Patent Owner

Case IPR2024-00559

U.S. Patent No. 11,610,587

**DECLARATION OF CHRISTOPHER M. SCHMANDT IN SUPPORT
OF PETITION FOR INTER PARTES REVIEW
OF U.S. PATENT NO. 11,610,587**

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I, Christopher M. Schmandt declare that:

I. ASSIGNMENT

1. I have been retained on behalf of Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc. (together, “Samsung”) and Harman International Industries, Inc. (“Harman”), to offer technical opinions related to U.S. Patent No. 11,610,587 (“the ’587 patent”) (EX1001). I understand that Samsung and Harman are requesting that the Patent Trial and Appeal Board (“PTAB” or “Board”) institute an *inter partes* review (“IPR”) proceeding of the ’587 patent.

2. I have been asked to provide my independent analysis of the ’587 patent based on the prior art publications cited in this declaration.

3. I am not and never have been, an employee of Samsung or Harman. I received no compensation for this declaration beyond my normal hourly compensation based on my time actually spent analyzing the ’587 patent, the prior art publications cited below, and issues related thereto, and I will not receive any added compensation based on the outcome of any IPR or other proceeding involving the ’587 patent.

II. QUALIFICATIONS

4. I am over the age of 18 and am competent to write this declaration. I have personal knowledge, or have developed knowledge, of these technologies based upon education, training, or experience of the matters set forth herein.

5. I retired five years ago after a 40 year career at the Massachusetts Institute of Technology (“MIT”); for which most of that time I was employed as a Principal Research Scientist at the Media Laboratory. In that role I also served as faculty for the MIT Media Arts and Sciences academic program. I was a founder of the Media Laboratory, a research lab which now spans two buildings.

6. I received my B.S. degree in Electrical Engineering and Computer Science from MIT in 1978, and my M.S. in Visual Studies (Computer Graphics) also from MIT the following year. I was employed at MIT since 1980, initially at the Architecture Machine Group which was an early computer graphics and interactive systems research Lab. In 1985, I helped found the Media Laboratory and continued to work there until retirement. I was director of a research group titled “Living Mobile.” My research spanned distributed communication and collaborative systems, with an emphasis on multi-media and user interfaces, with a strong focus on speech-based systems and portable devices, some combined with location-based services. I have over 70 published conference and journal papers and one book in the field of speech technology and user interaction.

7. I was later awarded the prestigious Association for Computing Machinery (“ACM”) Computer Human Interface (“CHI”) Academy membership specifically for those years of work pioneering speech user interfaces.

8. Because of my early work with distributed speech systems, I served for several years in the mid-1990s with a working group on the impact of multimedia systems on the Internet reporting to the Internet Engineering Task Force (“IETF”) and later the Internet Activities Board (“IAB”). This work impacted emerging standards such as Session Initiation Protocol (“SIP”).

9. In my faculty position I taught graduate level courses in speech technology and user interaction design, and directly supervised student research and theses at the Bachelors, Masters, and PhD level. I oversaw the Masters and PhD thesis programs for the entire Media Arts and Sciences academic program during my more senior years. I also served on the Media Laboratory intellectual property committee for many years, including a period during which I was the chair.

10. I was a pioneer in developing voice-based user interfaces, starting with “Put That There” in 1980, which was one of the first systems employing multi-modal input (speech and pointing) as well as conversational ability (hearing speech input and responding with synthetic speech output). Speech input continued to play a role in my research for decades thereafter. I used it to animate a graphic human “avatar” to appear to be speaking a person’s utterances in real time (Lip Sync, 1983). Speech input controlled Phone Slave (1984), one of the earliest unified messaging systems, with local access via a graphical user

interface and remote access over the telephone, to play back both telephone-based voice messages as well as text email. Speech recognition was used to extend information retrieval techniques to recorded radio newscasts in Synthetic News Radio (1999). With my students we also employed speech recognition for hands free user interfaces to a number of mobile, wearable, or portable systems, including Nomadic Radio (1997), comMotion (1999), and Impromptu (2001).

11. In addition to employing speech recognition as an interaction technique, my work explored novel uses of digitized audio, including voice messages as well as “live” environmental audio and “always on” recording techniques. NewsComm (1996) used automatic speaker detection and segmentation techniques to enable rapid skimming of what we call podcasts today. The Audio Notebook (1997) allowed selective retrieval as well as skimming of a recorded lecture, using pitch and time-based prosodic cues to detect portions of the recording that the talker emphasized and topic transitions. Two systems from 1992 implemented always on recording. One, Xcapture, ran on a workstation in an office environment, always recording (when the microphone was not otherwise in use) into a circular audio buffer. A user could click on the application’s icon for immediate recall / replay ability using a graphical user interface for a time slider, and optionally saving audio snippets by copying them into other applications. The Listener was another audio capture

system for telephone conversations, with a time scrolling visual display which distinguished between callers to facilitate selective archiving of a call.

12. We built several systems to detect events in environmental / ambient audio and selectively present these to users. Listen In (2003) performed near real time processing of audio from a distributed network of microphones in a domestic environment to detect activities of daily life (“ADLs”). A similar concept extended this work to Monkey Business (2006) to use audio cues to detect activity in a suite of offices for a group awareness tool. This networked system would listen for novel auditory events and then transmit sort segments thereof, with some randomization of the sound for privacy; the effect was to provide shared awareness of activity between members of a distributed work group. A version which did not randomize the sound was also used to capture and transmit sound activity between a home and office environment; while in my office at MIT I could hear snippets of sound and conversation when my young son came home from school. Impromptu (2001) had two sound awareness applications. A baby monitor application listened for acoustic signatures of a crying baby, and would then play a notification sound and open a two way voice over IP channel to a wireless device for streaming playback. A burglar alarm application was triggered by a sudden loud noise; after the noise was detected, a different notification sound was played (a barking dog) and the triggering sound

would be transmitted for playback, then switching to two-way audio streaming as well.

13. A number of projects explored audio in mobile or wearable configurations. comMotion (1999) was built around a totally wearable system with headphone for audio. Nomadic Radio (1997) used neck worn speakers and microphone for hands free operation as well. Impromptu (2001) was built around a pocket sized mobile computer.

14. My work also included extensive projects in manipulating recorded sound for variations in playback, especially playback speed, also known as time compression. These included Speech Skimmer (1997), Impromptu (2001), and some perceptual experiments as early as 1994. We also explored simultaneous spatial presentation of multiple audio sources for headphone presentation in projects such as Audiostreamer (1995), Audio Hallway (1996) and Dynamic Soundscape (1997).

III. SUMMARY OF CONCLUSIONS FORMED

15. This Declaration explains the conclusions that I have formed based on my analysis. To summarize those conclusions:

- Ground 1A: *Fiedler* and *Broussard* render obvious claims 1, 3, 4, and 12
- Ground 1B: *Fiedler*, *Broussard*, and *Victorian* render obvious claims 5-9
- Ground 1C: *Fiedler*, *Broussard*, *Victorian*, and *Andreasson* render obvious claim 8

- Ground 1D: *Fiedler, Broussard, and Couper* render obvious claims 10-11
- Ground 2: *Fiedler, Broussard, and Bulthuis* render obvious claims 1 and 2

IV. LEVEL OF ORDINARY SKILL IN THE ART

16. I have been informed by Petitioners' counsel that a person having ordinary skill in the art is a hypothetical person who is presumed to have the skill and experience of an ordinary worker in the field at the time of the priority date of the challenged patent. I have been asked to assume for the purposes of this Petition that the priority date is September 22, 2008.

17. Based on my knowledge and experience in the field and my review of the '587 patent and file history, I believe that a person having ordinary skill in the art in this matter would have had at least a Bachelor's of Science Degree (or equivalent) in electrical engineering, computer science, or a similar field and two years of experience in the design of digital audio systems and associated signal processing such as voice or speech processing and/or acoustic pattern recognition. A greater amount of education could compensate for fewer years of work experience, and vice versa.

18. Based on my experiences, I have at least the skills of a person having ordinary skill in the art as well as a good understanding of the capabilities of a person having ordinary skill in the art. To be clear, all of my

opinions in this declaration are from the perspective of one of ordinary skill in the art as I have defined it here during the relevant timeframe.

V. LEGAL PRINCIPLES

19. I am not an attorney and offer no legal opinions, but in the course of my work, I have had experience studying and analyzing patents and patent claims from the perspective of a person skilled in the art.

20. For the purposes of this declaration, I have been informed about certain aspects of the law that are relevant to forming my opinions. My understanding of the law is as follows.

21. Petitioner's counsel has informed me that for the prior art to inherently disclose a claimed limitation, the prior art need not expressly disclose the limitation, so long as the claimed limitation necessarily flows from a disclosure in the prior art. I also understand that it is acceptable to examine evidence outside the prior art reference (extrinsic evidence) in determining whether a feature, while not expressly discussed in the reference, is necessarily present in that reference.

22. Petitioner's counsel has informed me that a patent claim can be considered to have been obvious to a person having ordinary skill in the art at the time the application was filed. I am informed that this means that, even if all of the requirements of a claim are not found in a single prior art reference, the

claim is not patentable if the differences between the subject matter in the prior art and the subject matter in the claim would have been obvious to a person having ordinary skill in the art at the time of the invention.

23. I have been informed by Petitioners' counsel that a determination of whether a claim would have been obvious should be based upon several factors, including, among others:

- the level of ordinary skill in the art at the time the application was filed;
- the scope and content of the prior art; and
- what differences, if any, existed between the claimed invention and the prior art.

24. I have been informed by Petitioners' counsel that a single reference can render a patent claim obvious if any differences between that reference and the claims would have been obvious to a person having ordinary skill in the art. Alternatively, I understand that the teachings of two or more references may be combined in the same way as disclosed in the claims, if such a combination would have been obvious to one having ordinary skill in the art. In determining whether a combination based on either a single reference or multiple references would have been obvious, it is appropriate to consider, among other factors:

- whether the teachings of the prior art references disclose known concepts combined in familiar ways, and when combined, would yield predictable results;

- whether a person having ordinary skill in the art could implement a predictable variation, and would see the benefit of doing so;
- whether the claimed elements represent one of a limited number of known design choices, and would have a reasonable expectation of success by those skilled in the art;
- whether a person having ordinary skill would have recognized a reason to combine known elements in the manner described in the claim;
- whether there is some teaching or suggestion in the prior art to make the modification or combination of elements claimed in the patent; and
- whether the innovation applies a known technique that had been used to improve a similar device or method in a similar way.

25. I have been informed by Petitioners' counsel that one of ordinary skill in the art has ordinary creativity and is not an automaton. Petitioner's counsel has also informed me that in considering obviousness, obviousness may not be determined using the benefit of hindsight, including hindsight derived from the patent being considered.

26. I further understand that a hypothetical person of ordinary skill in the art is assumed to know and to have all relevant prior art in the field of endeavor covered by the patent at issue. I have been informed that there are two criteria for determining whether prior art is analogous and thus can be considered prior art: (1) whether the art is from the same field of endeavor, regardless of the problem addressed, and (2) if the reference is not within the field of the patentee's endeavor, whether the reference still is reasonably pertinent to the particular problem with which the patentee is involved. I have

also been informed that the field of endeavor of a patent is not limited to the specific point of novelty, the narrowest possible conception of the field, or the particular focus within a given field. I have also been informed that a reference is reasonably pertinent if, even though it may be in a different field from that of the patentee's endeavor, it is one which, because of the matter with which it deals, logically would have commended itself to a patentee's attention in considering their problem.

27. I further understand that, in making a determination as to whether the claimed invention would have been obvious to a person of ordinary skill, the Board may consider certain objective factors if they are present, such as: commercial success of products practicing the claimed invention; long-felt but unsolved need; teaching away; unexpected results; copying; and praise by others in the field. These factors are generally referred to as "secondary considerations" or "objective indicia" of nonobviousness. I understand, however, that for such objective evidence to be relevant to the obviousness of a claim, there must be a causal relationship (called a "nexus") between the claim and the evidence and that this nexus must be based on a novel element of the claim rather than something in the prior art. I also understand that even when they are present, secondary considerations may be unable to overcome primary evidence of

obviousness (such as motivation to combine with predictable results) that is sufficiently strong.

VI. MATERIALS CONSIDERED

28. My analysis and conclusions set forth in this declaration are based on my educational background and experiences in the field (see Section II).

Based on my knowledge and experience, I believe that I am considered to be an expert in the field. Also, based on my knowledge and experience, I understand and know of the capabilities of persons of ordinary skill in the field since the early 2000s, and I taught, participated in organizations, and worked closely with many such persons in the field during that time frame.

29. As part of my independent analysis for this declaration, I have considered the following: the background knowledge/technologies that were commonly known to persons of ordinary skill in this art during the time before the earliest claimed priority date for the '587 patent; my own knowledge and experiences gained from my work experience in the field of the '587 patent and related disciplines; and my experience in working with others involved in this field and related disciplines.

30. In addition, I have analyzed the following publications and materials:

- U.S. Patent 11,610,587 (EX1001)

- File History of U.S. Patent 11,610,587 (EX1004)
- U.S. Provisional Application 61/098,914 (EX1005)
- U.S. Application 17/203,731 (EX1006)
- U.S. Patent 6,804,638 (“*Fiedler*”) (EX1007)
- U.S. Publication 2006/0195322A1 (“*Broussard*”) (EX1008)
- EP1519625A2 (“*Victorian*”) (EX1009)
- U.S. Publication 2007/0281744A1 (“*Andreasson*”) (EX1010)
- U.S. Publication 2008/0162133 (“*Couper*”) (EX1011)
- U.S. Publication 2003/0032447A1 (“*Bulthuis*”) (EX1012)
- U.S. Patent 5,930,751 (“*Cohrs*”) (EX1013)
- U.S. Publication 2003/0161097A1 (“*Le*”) (EX1014)
- U.S. Patent 8,209,181 (“*Heckerman*”) (EX1015)
- U.S. Publication 2006/0223547A1 (“*Chin*”) (EX1016)
- U.S. Patent 7,861,008 (“*Batson*”) (EX1017)
- U.S. Patent 8,180,078 (“*Zellner*”) (EX1018)
- U.S. Publication 2002/0116541A1 (“*Parker*”) (EX1019)
- U.S. Patent 6,163,338 (“*Johnson*”) (EX1020)
- U.S. Publication 2003/0138118A1 (“*Stahl*”) (EX1021)
- U.S. Publication 2006/0116175A1 (“*Chu*”) (EX1022)
- U.S. Publication US2007/0043563A1 (“*Comerford*”) (EX1023)

- MICHAEL H. COHEN, VOICE USER INTERFACE DESIGN (2004) (“*Cohen*”) (EX1024)
- ANDREW S. TANENBAUM, STRUCTURED COMPUTER ORGANIZATION (2006) (“*Tanenbaum*”) (EX1025)
- Excerpt from COMPUTER DICTIONARY (2d ed. 1994) (“*Computer Dictionary*”) (EX1026)
- U.S. Patent 8,111,839 (“*Goldstein* ’839”) (EX1027)
- U.S. Patent 10,365,883 (“*Goldstein* ’883”) (EX1028)
- U.S. Patent 10,848,827 (“*Sengupta*”) (EX1029)
- U.S. Publication 2016/0019024A1 (“*Suzuki*”) (EX1030)

and any other materials I refer to in this declaration in support of my opinions.

31. My analysis and conclusions set forth in this declaration are based on the perspective of a person having ordinary skill in the art.

VII. OVERVIEW OF THE ’587 PATENT

A. THE SPECIFICATION

32. The ’587 patent is titled “Personalized Sound Management and Method.” EX1001, Cover.

(12) United States Patent Goldstein et al.	(10) Patent No.: US 11,610,587 B2 (45) Date of Patent: Mar. 21, 2023
(54) PERSONALIZED SOUND MANAGEMENT AND METHOD	(56) References Cited U.S. PATENT DOCUMENTS

EX1001, Cover¹

33. The alleged invention is a “personalized sound management system.” *Id.*, Abstract.

(57)

ABSTRACT

A personalized sound management system for an acoustic space includes at least one transducer, a data communication system, one or more processors operatively coupled to the data communication system and the at least one transducer, and a medium coupled to the one or more processors. The processors access a database of sonic signatures and display a plurality of personalized sound management applications that perform at least one or more tasks among identifying a sonic signature, calculating a sound pressure level, storing metadata related to a sonic signature, monitoring sound pressure level dosage levels, switching to an ear canal microphone in a noisy environment, recording a user’s voice, storing the user’s voice in a memory of an earpiece device, or storing the user’s voice in a memory of a server system, or converting received text received in texts or emails to voice using text to speech conversion. Other embodiments are disclosed.

EX1001, Cover

¹ All annotations and emphases are added unless otherwise noted.

34. Under the header “Field of the Invention,” it states, “[t]he invention relates in general to methods of managing sound, and particularly though not exclusively, is related to personalized sound management.” *Id.*, 1:21-23.

35. The specification discloses methods and a system “for implementing a suite of personalized sound applications for modifying a user's acoustic environment.” *Id.*, 1:43-45. The specification provides “brief overviews of the user selected personalized sound management applications.” *Id.*, 4:62-10:3. More specifically, the specification briefly describes a “Safe Space™” application (*id.*, 4:64-5:38), an “EarGaurd™” application (*id.*, 5:39-6:27), “Quiet Call™” application (*id.*, 6:28-46), the “Hearable™” application (*id.*, 6:47-7:18), the “Always On-Recording” application (*id.*, 7:19-39), the “Earbliss™” application (*id.*, 7:40-8:31), the “Ear Mail™” application (*id.*, 8:32-48), the “Ear Sticky™” application (*id.*, 8:49-9:10), the “Hear & Tell™” application (*id.*, 9:11-51).

36. Relevant to the present matter, the ’587 patent provides the following summary of the “Always On-Recording™” application:

Always On-Recording™ 224 is a personalized sound application that acts as its name implies. A device using the Always On-Recording™ 224 application is recording the most current audio information for user recall. The recording is stored in a buffer that will allow the user to immediately access the audio information.

The buffer will have a finite amount of storage. The recording time will be a function of the buffer or memory available for the Always On-Recording™ 224 application.

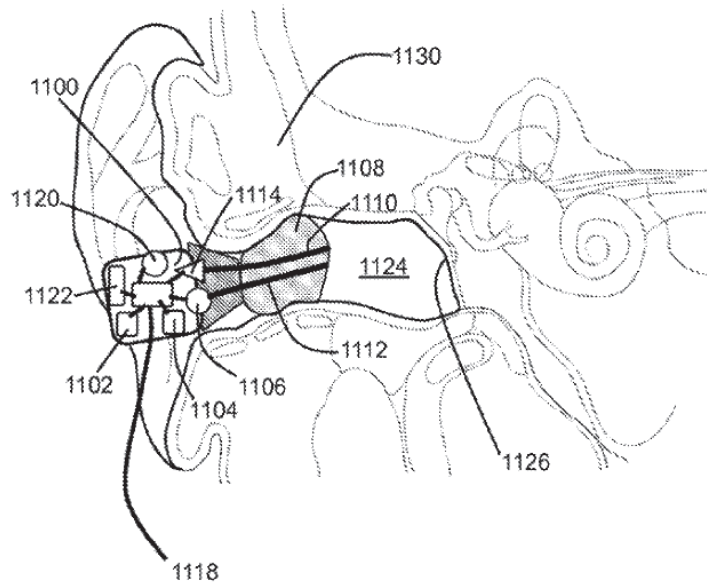
Always On-Recording™ 224 provides utility for short durations of recording. For example, in an application where a user is receiving information such as a phone number or driving directions. The user knows that the device employing Always On-Recording™ 224 has the stored acoustic information and can immediately listen-again to the buffer contents thereby repeating the phone number or driving directions. Similarly, if the user was discussing a contract term and wanted to know exactly what the person said, the user could immediately re-listen to make sure that what they thought they heard is exactly what they heard.

Id., 7:19-39.

37. The '587 patent also discloses in Figure 11 a “device for implementing personalized sound management” in the form of an earpiece. *Id.* 17:48-20:3. “The earpiece includes an Ambient Sound Microphone (ASM) 1120 to capture ambient sound, an Ear Canal Receiver (ECR) 1114 to deliver audio to an ear canal 1124, and an Ear Canal Microphone (ECM) 1106 to capture and assess a sound exposure level within the ear canal 1124.” *Id.*, 17:64-18:1. In one embodiment, the earpiece “is designed to be inserted into the user's ear canal 1124, and to form an acoustic seal with the walls of the ear canal 1124 at a location between the entrance to the ear canal 1124 and the tympanic membrane

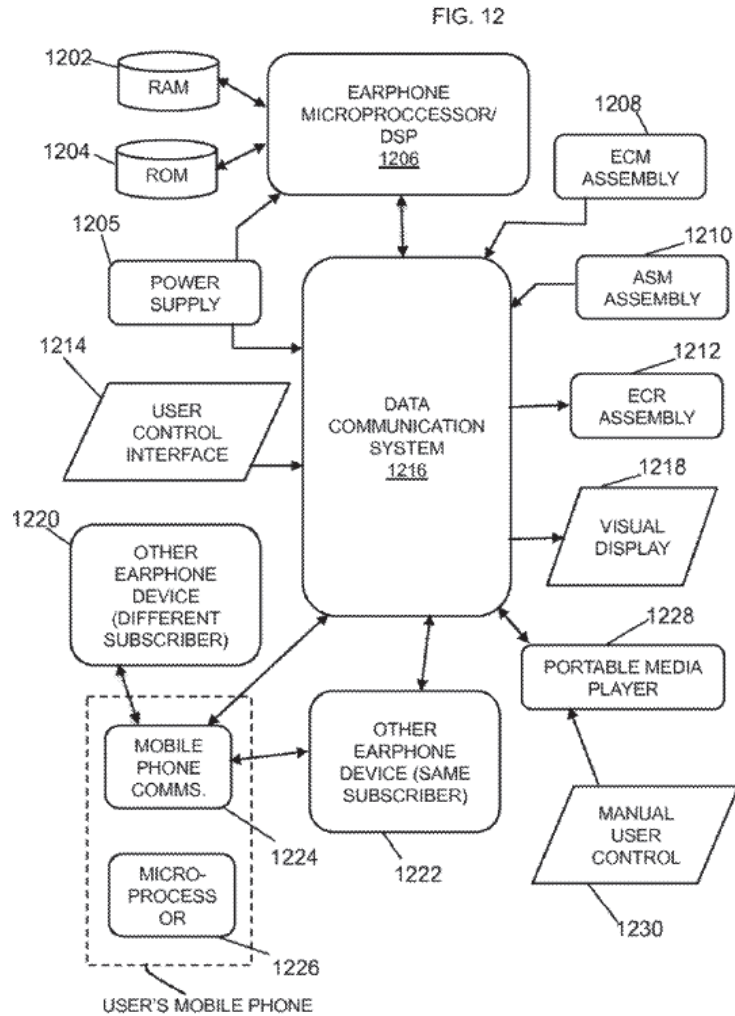
1126 (or ear drum). In general, such a seal is typically achieved by means of a soft and compliant housing of sealing unit 1108.” *Id.*, 18:3-10.

FIG. 11



EX1001, FIG. 11

38. The '587 patent also discloses in Figure 12 “a block diagram of a device for implementing personalized sound management.” *Id.*, 2:43-44, 20:4-21:63.



EX1001, FIG. 12

39. The '587 patent discloses that the “data communication system 1216 can include a voice operated control (VOX) module to provide voice control to one or more subsystems, such as a voice recognition system, a voice dictation system, a voice recorder, or any other voice related processor.” *Id.*, 12:49-61.

B. THE PROSECUTION HISTORY

40. The '587 patent issued from U.S. Application No. 17/736,180 ("the '180 application"). The '180 application was filed on May 4, 2022.

(12) United States Patent Goldstein et al.	(10) Patent No.: US 11,610,587 B2 (45) Date of Patent: Mar. 21, 2023
(54) PERSONALIZED SOUND MANAGEMENT AND METHOD	(56) References Cited
(71) Applicant: Staton Techiya LLC , Delray Beach, FL (US)	U.S. PATENT DOCUMENTS
(72) Inventors: Steven Goldstein , Delray Beach, FL (US); John P. Keady , Fairfax Station, VA (US)	3,876,843 A 4/1975 Moen 3,902,155 A 8/1975 Young (Continued)
(73) Assignee: Staton Techiya LLC , Delray Beach, FL (US)	FOREIGN PATENT DOCUMENTS
(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.	CN 101227759 7/2008 EP 1385324 1/2004 (Continued)
(21) Appl. No.: 17/736,180	OTHER PUBLICATIONS
(22) Filed: May 4, 2022	<i>Samsung Electronics Co., Ltd., and Samsung Electronics, America, Inc., v. Staton Techiya, LLC</i> , IPR2022-00282, Dec. 21, 2021. (Continued)
	Primary Examiner — Xu Mei

EX1001, Cover

41. The '180 application did not receive any rejections during prosecution and the Patent Office mailed a Notice of Allowance on December 15, 2022. EX1004, 38, 42.



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Akerman LLP
777 South Flagler Drive
Suite 1100 West Tower
West Palm Beach, FL 33401

EXAMINER

MEI, XU

ART UNIT

PAPER NUMBER

2654

DATE MAILED: 12/15/2022

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/736,180	05/04/2022	Steven Goldstein	CONT-17203731	5894

EX1004 at 38

Notice of Allowability	Application No. 17/736,180	Applicant(s) Goldstein et al.	
	Examiner XU MEI	Art Unit 2654	AIA (FITF) Status No
-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address-- All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS. This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308. 1. ☒ This communication is responsive to application filed 05/04/2022. ☐ A declaration(s)/affidavit(s) under 37 CFR 1.130(b) was/were filed on ____.			

EX1004 at 42

42. The Notice of Allowance includes a brief discussion of prior art:

Citation of Relevant Prior Art 3. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Goldstein et al (US-8,111,839, 10,365,883) disclose an always on headwear recording system. Poornachandran et al discloses a binaural recording for processing audio signals to enable alert having microphone for ambient noise detection. Suzuki et al discloses a playback device having a first buffer and a second buffer for audio data storage and copy of audio data for playback control.
--

EX1004 at 43

43. I note that the reference to “Poornachandran” is unclear because the Patent Office did not identify that reference in its Notice of References Cited included with the Notice of Allowance. EX1004 at 47. As shown in the image copied below, the Notice of References Cited includes the “Goldstein” references, the “Suzuki” reference, and a reference to “Sengupta.” There is no mention of a “Poornachandran” reference, and the “Sengupta” reference identified in the Notice of References Cited does not correspond to the description of the “Poornachandran” reference. The Sengupta reference is titled “Content onboarding and custom channel lineup provisioning” and does not disclose “binaural recording for processing audio signals to enable alert having microphone for ambient noise detection.” *Compare* EX1029 with EX1004 at 43.

<i>Notice of References Cited</i>				Application/Control No. 17/736,180	Applicant(s)/Patent Under Reexamination Goldstein et al.	
				Examiner XU MEI	Art Unit 2654	Page 1 of 1
U.S. PATENT DOCUMENTS						
*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-8111839-B2	02-2012	Goldstein; Steven Wayne	H04R29/00	381/1
*	B	US-10365883-B2	07-2019	Goldstein; Steven Wayne	H04R29/00	1/1
*	C	US-10848827-B2	11-2020	Sengupta; Ballori	H04N21/266	1/1
*	D	US-20160019024-A1	01-2016	SUZUKI; Taiju	G10H1/0033	700/94

EX1004 at 47

44. I have copied the Examiner's Statement of Reasons for Allowance below.

6. The following is an Examiner's Statement of Reasons for Allowance:

Claims 1-12 are allowable over the art of record because the art of record does not teach or suggest at least the combination of interrelated steps or elements for "An always on recording system" recited in independent claim 1.

The closest cited prior art references disclose various audio signal processing and recording devices as discussed in paragraph 3 above. However, none of the cited references discloses the "always on recording system" that specifically including the functional steps of "receiving the microphone signal; sending a portion of the microphone signal to the audio buffer; analyzing the audio buffer for detecting a sonic signature; notifying the user when the sonic signature is detected; sending a modified microphone signal to the data buffer replacing or adding to previously data stored in the data buffer; and sending a portion of the data **stored in the data buffer**, spanning a time period, to the speaker in response to a user request, wherein the user request is one of the sonic signature that is a voice command or a manual input from the user interface", in combination with all the other elements and functional steps as construed in independent claim 1.

EX1004 at 44-45

45. On January 25, 2023, the applicant mailed a "312 Amendment" in response to the Patent Office's Notice of Allowance. EX1004 at 24. The applicant amended claim 1 "reflecting the intended non restrictive nature of the preamble in addition to correction [*sic*] for antecedent issues" and stated that

“[n]o change in scope is intended.” *Id.* The Amendment had the effect of removing the term “An Always On-Recording” from the claim preamble.

312 AMENDMENT

Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22313-1450

Date: January 25, 2023

Sir:

Applicant submits an amendment to claim 1 reflecting the intended non restrictive nature of the preamble in addition to correction for antecedent issues. The Examiner amendments of 15 Dec. 2022 are incorporated.

Applicant submits this corrective amendment and asks that the Examiner accept this correction. No change in scope is intended.

EX1004 at 24

Listing of Claims:

1. (currently amended) ~~An Always On Recording~~ A system comprising:
a user interface; and
an audio device comprising:
a microphone configured to measure ambient sound and generate a microphone signal;
a speaker configured to emit an audio signal;
a memory configured to store instructions;
an audio buffer configured to store at least a portion of the microphone signal;
a data buffer;
a processor operatively coupled to the memory, the processor operatively coupled to the audio buffer, the processor operatively coupled to the data buffer, wherein the processor is configured to execute the instructions to perform operations comprising:
receiving the microphone signal;
sending a portion of the microphone signal to the audio buffer;
analyzing the audio buffer for detecting a sonic signature;
notifying ~~the a~~ user when the sonic signature is detected;
sending a modified microphone signal to the data buffer replacing or adding to previous[[ly]] data stored in the data buffer; and
sending a portion of the data stored in the data buffer, spanning a time period, to the speaker in response to a user request, wherein the user request is one of the sonic signature that is a voice command or a manual input from the user interface.

EX1004 at 25

46. On February 3, 2023, the Patent Office mailed a response to the 312 Amendment, indicating that the applicant's amendment was entered. EX1004 at 19-20.



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/736,180	05/04/2022	Steven Goldstein	11472-30-3_CONT-17203731	5894
150139 7590 02/03/2023 Akerman LLP 777 South Flagler Drive Suite 1100 West Tower West Palm Beach, FL 33401			EXAMINER MEI, XU	
			ART UNIT 2654	PAPER NUMBER
			NOTIFICATION DATE 02/03/2023	DELIVERY MODE ELECTRONIC

EX1004 at 19

Response to Rule 312 Communication	Application No.	Applicant(s)	
	17/736,180	Goldstein et al.	
	Examiner	Art Unit	AIA (FITF) Status
	XU MEI	2654	No
-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --			
1. ☒ The amendment filed on 25 January 2023 under 37 CFR 1.312 has been considered, and has been: a) ☒ entered.			

EX1004 at 20

47. The Patent Office subsequently mailed an Issue Notification on March 21, 2023. EX1004 at 1.



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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/736,180	03/21/2023	11610587	11472-30-3_CONT-17203731	5894

150139 7590 03/01/2023

Akerman LLP
777 South Flagler Drive
Suite 1100 West Tower
West Palm Beach, FL 33401

ISSUE NOTIFICATION

EX1004 at 1

C. THE CLAIMS

48. The table below includes identifiers for the '587 patent claims and limitations, which are referenced throughout.

Claim 1	
1.pre	A system comprising:
1.1	a user interface; and
1.2	an audio device comprising:
1.3	a microphone configured to measure ambient sound and generate a microphone signal;
1.4	a speaker configured to emit an audio signal;
1.5	a memory configured to store instructions;
1.6	an audio buffer configured to store at least a portion of the microphone signal;
1.7	a data buffer;
1.8	a processor operatively coupled to the memory, the processor operatively coupled to the audio buffer, the processor operatively

	coupled to the data buffer, wherein the processor is configured to execute the instructions to perform operations comprising:
1.9	receiving the microphone signal;
1.10	sending a portion of the microphone signal to the audio buffer;
1.11	analyzing the audio buffer for detecting a sonic signature;
1.12	notifying a user when the sonic signature is detected;
1.13	sending a modified microphone signal to the data buffer replacing or adding to previous data stored in the data buffer; and
1.14	sending a portion of the data stored in the data buffer, spanning a time period, to the speaker in response to a user request, wherein the user request is one of the sonic signature that is a voice command or a manual input from the user interface.
Claim 2	
2	The system according to claim 1, wherein the sonic signature is a voice command, and where the voice command is to replay audio.
Claim 3	
3	The system according to claim 1, wherein the time period is less than 30 minutes.
Claim 4	
4	The system according to claim 1, wherein the time period is less than 15 minutes.
Claim 5	
5	The system according to claim 1, wherein the audio device is wirelessly connected to an earpiece.
Claim 6	
6.pre	The system according to claim 5, wherein the earpiece includes:
6.1	an ambient sound microphone; and
6.2	an ear canal receiver.
Claim 7	

7	The system according to claim 6, wherein the earpiece further includes: an ear canal microphone.
Claim 8	
8	The system according to claim 7, wherein the operation of notifying the user sends a notification signal to the ear canal receiver.
Claim 9	
9	The system according to claim 5 wherein the earpiece further includes: a sealing section.
Claim 10	
10	The system according to claim 1, wherein the sonic signature detected is one of a siren or an alarm.
Claim 11	
11	The system according to claim 10 wherein the user interface is a button.
Claim 12	
12	The system according to claim 1, wherein the time period is less than 1 minute.

VIII. OVERVIEW OF THE PRIOR ART

49. The prior art references discussed in my analysis are summarized below. In my opinion, each of these references is within the same field of endeavor as the '587 patent and reasonably pertinent to one or more problems addressed by the '587 patent. For example, the '587 patent states the “Field of the Invention,” relates to “methods of managing sound,” and *Fiedler, Broussard*, and the other secondary references all generally relate to “methods of managing sound,” such as recording sound and/or playing sound. In addition, like the “Always-on Recording” application disclosed in the '587 patent, *Fiedler*,

Broussard, *Couper*, and *Bulthuis* are similarly directed to audio recording devices. And like the earpiece for use with the various applications disclosed in the '587 patent, *Victorian* and *Andreasson* are directed to earpieces and related methods for communicating with portable devices.

A. *Fiedler*

50. *Fiedler* is titled “Device and Method for Selective Recall and Preservation of Events Prior to Decision to Record the Events.” EX1007, Cover.

(12) United States Patent Fiedler	(10) Patent No.: US 6,804,638 B2 (45) Date of Patent: *Oct. 12, 2004
(54) DEVICE AND METHOD FOR SELECTIVE RECALL AND PRESERVATION OF EVENTS PRIOR TO DECISION TO RECORD THE EVENTS	(58) Field of Search 704/201, 231, 704/270, 275; 360/60, 55, 57, 53, 48; 369/56, 57, 47, 61, 32, 54, 58, 72, 48
(75) Inventor: Mark Fiedler, New York, NY (US)	(56) References Cited U.S. PATENT DOCUMENTS

EX1007, Cover

51. A person having ordinary skill in the art would have understood that *Fiedler* describes a device with a function similar to the function of the “Always On-Recording™” application described by the '587 patent. *See* EX1001, 7:19-39 (“A device using the Always On-Recording™ 224 application is recording the most current audio information for user recall. The recording is stored in a buffer that will allow the user to immediately access the audio information. ... [I]f the user was discussing a contract term and wanted to know

exactly what the person said, the user could immediately re-listen to make sure that what they thought they heard is exactly what they heard.”).

52. In the Background of the Invention section, *Fiedler* explains that an earlier patent “discloses a recording method that effectively allows a user to decide to record an event after the event has taken place.” EX1007, 1:32-35.

53. As additional context, *Fiedler* explains that “event-activated recording” was known in the prior art, including, for example, “voice-activated recording of speech” or “sound-activated recording of sound,” but these techniques all had a drawback—“they do not record the often-significant events leading up to the event that triggers the recording process.” *Id.*, 1:43-62.

54. *Fiedler* is directed to overcoming that drawback by “by providing an acquisition buffer (of a rewritable recording medium) in which current events are continuously recorded” and “[o]n detection of a triggering event, a predetermined portion of the current contents of the acquisition buffer (which may be the buffer's entire contents, or may correspond to a time interval that a user may specify) is transferred to the (permanent) recording medium normally used for event-activated recording.” *Id.*, 1:63-2:8. The “event” that triggers recording may be “any auditory or visual events, data or signals, still or moving pictures, machine events, states or signals, and the states, signals or sounds of any musical instrument, any of the foregoing being of a discrete or a continuous

nature.” *Id.*, 14:22-26. *Fiedler* also aims to apply this technique to phone calls, devices with Flash memory, and portable recording devices. *Id.*, 2:11-32.

55. *Fiedler* states that “[t]he essential components of this invention—beyond a minimum of appropriate hardware to detect, acquire and preserve data—are algorithms, which may be implemented as either hardware or software or both.” EX1007, 3:8-11. “The invention may be implemented as a program on a general-purpose computer, using either a single-thread or a multithreaded operating system, as long as means of acquiring and playing back data are provided.” *Id.*, 3:11-15.

56. *Fiedler* shows the major components of an embodiment its disclosed system in Figure 1, as well as describes it. EX1007, 3:66-4:9.

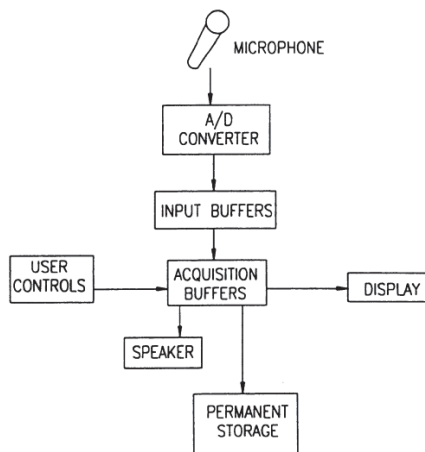


FIG. 1

EX1007, FIG. 1

57. The system includes “an analog input transducer such as a microphone feeding a continuous signal to an analog-digital converter, which in turn passes a train of digital sample values to a set of input buffers.” EX1007, 3:67-4:3. From the input buffers, “the sample train is continuously supplied to a circular set of acquisition buffers.” *Id.*, 4:3-4. “The contents of the acquisition buffers are shown on a periodically updated display, and parts of the contents of the acquisition buffers may, by means of user controls, be played back through an output transducer such as a speaker or selected for preservation in permanent storage.” *Id.*, 4:4-9.

58. In the section “Acquisition and Storage of Audio Data,” *Fiedler* details its buffer management technique. EX1007, 4:10-7:51; *see also* FIGs. 4A-4B. *Fiedler* describes storing digitized audio data in a queue of input buffers, and transferring the audio data to acquisition buffers. *Id.*, 4:11-30. “As audio data are transferred from the input buffers to the acquisition buffers, the successive amplitude values in the audio stream are measured against the amplitude and duration thresholds (FIG. 4, block 15), and the stream is accordingly stored in the acquisition buffers as segments of sound data interspersed with silence nodes.” *Id.*, 5:54-59. More particularly, “[w]hen a sufficient interval of silence has been detected, the recording cursor goes back to

the beginning of the sequence of amplitude values in the acquisition buffers corresponding to this interval and writes a silence node there.” *Id.*, 6:1-11.

59. *Fiedler* provides more detail about how “event-activated recording” works at column 6, line 33 through column 7, line 9. Importantly for present purposes, *Fiedler* explains that, upon detection of a trigger event, audio data may be copied from an “original acquisition buffer” to a “second acquisition buffer.” The “second acquisition buffer” is then “used in place of the original acquisition buffer for all purposes described below, including the presentation of data to the user for selection for recall and/or preservation.” *Id.*, 6:42-47. *Fiedler* states that:

Event-activated recording, as described above, may be effected as follows: On detection of a suitable triggering event, a predetermined portion of the current contents of the acquisition buffer (which may be the buffer's entire contents, or may correspond to a time interval that a user may specify) is transferred to the (permanent) recording medium normally used for event-activated recording. This has the effect of permanently preserving the events leading up to the triggering event.

Alternatively, the portion of the acquisition buffer contents leading up to the triggering event may be transferred to a second acquisition buffer, which will be used in place of the original acquisition buffer for all purposes described below, including the presentation of data to the user for selection for recall and/or preservation.

This record of the events leading up to the triggering event is advantageously placed in the permanent record (or the second acquisition buffer) just prior to the triggering event, and advantageously forms a continuous record with the triggering event and the events following it. It is of further advantage to mark the triggering event in this continuous record.

Such a continuous record may be effected by:

- (1) Continuing to record in the acquisition buffer the triggering event and the events following the triggering event,
- (2) Concurrently with this continuous recording, copying the appropriate portions of the acquisition buffer contents to the permanent record (or second acquisition buffer), preserving the record of events prior to, including, and following the triggering event, and
- (3) Recording events directly to the permanent record (or second acquisition buffer) when the copying process has caught up with the direct recording process by reaching the present moment.

Permanent preservation of the record of events may alternatively be effected by:

- (1) Continuing to record in the acquisition buffer the triggering event and the events following the triggering event, and
- (2) Reserving the appropriate portions of the acquisition buffer contents (i.e., the record of events prior to, including, and/or following the triggering event) from being overwritten by the continuous recording process.

Id., 6:33-7:9.

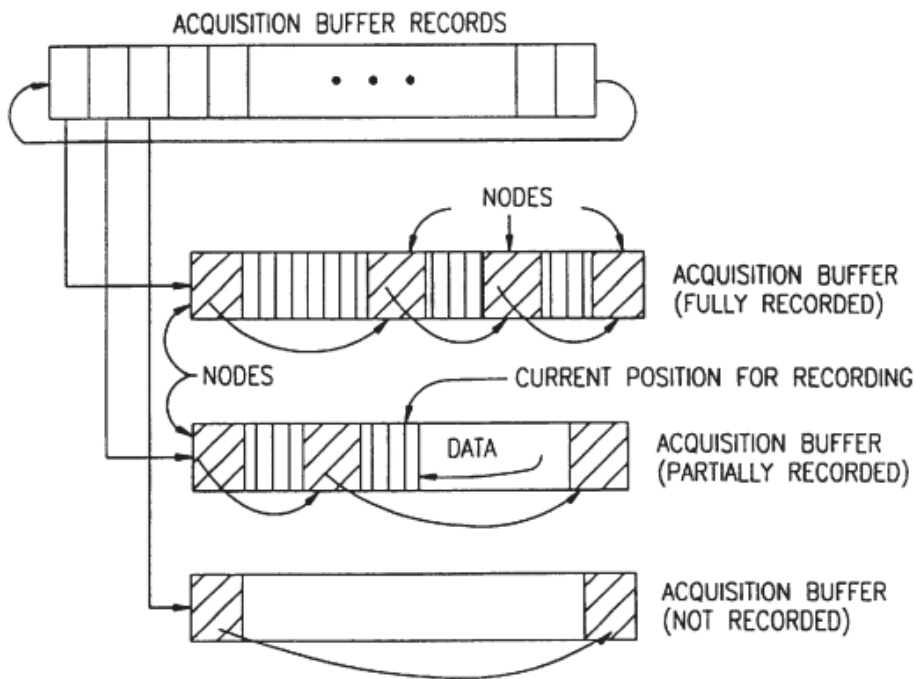
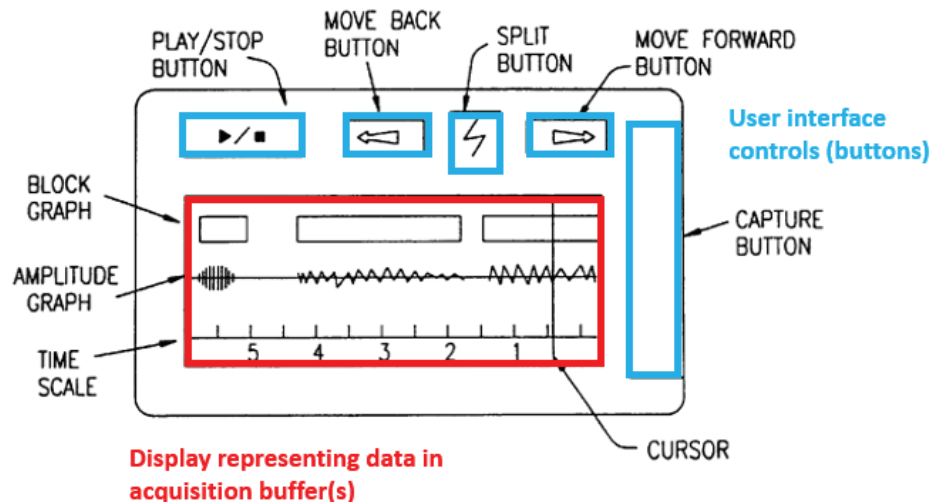


FIG. 2

EX1007, FIG. 2

60. In the section titled “User Interface,” *Fiedler* describes how the user is “provided with a display representing audio data currently in the acquisition buffers, as well as controls to allow the user to recall (play back) data and to mark data for capture or permanent storage.” EX1007, 7:54-8:44; *see also* FIG. 3.



EX1007, FIG. 3 (annotated)

61. As shown in Figure 3, “[a] horizontal time scale marked in minutes and/or seconds” represents “the positions in time relative to the current time of data in the acquisition buffers.” *Id.*, 7:60-64. “Controls (buttons) are provided for manipulating the cursor, playing back portions of recorded blocks, and capturing blocks.” *Id.*, 8:46-48. With respect to the “Move Back” button, if it is held down, it “[m]oves the cursor continuously backward within the current block and previous blocks, as long as it is held down” and “[n]ormal playback continues when the button is released.” *Id.*, 8:49-61; *see also id.*, 9:28-34 (“The behaviors described above apply to playback mode, which is entered by pressing or holding down the Move Back button, then releasing it. While in playback mode, the system continuously plays back material in the acquisition buffers, in a forward direction at the same speed as recorded, as long as no keys are being

pressed or held down.”). The playback process is illustrated in Figure 6A and 6B. *Id.* FIGs 6A, 6B.

62. “Playback is achieved by means of a scheme analogous (in reverse) to the recording scheme.” *Id.*, 11:33-34. Audio data corresponding to the cursor position is “transcribed to a queue of output buffers.” *Id.*, 11:36-38. “In the transcription process, audio data are transcribed identically and silence nodes are expanded to their full durations; the intervals stored as silence nodes may be filled with zero-amplitude values or with a dithering waveform containing values differing from zero by no more than the amplitude threshold (FIG. 6, block 37).” *Id.*, 11:38-44; *see also id.*, FIG. 6A at block 32 (“COPY SAMPLE FROM ACQUISITION BUFFER (AT PLAY CURSOR) TO OUTPUT BUFFER AND INCREMENT PLAY CURSOR.”). “Output buffers are sent, in the order transcribed, to a waveform output device, which in turn routes their contents (via direct memory access (DMA)) through a digital-analog converter to the audio output.” *Id.*, 1:44-47. *Fiedler* discloses that “[a] speaker, earphone or similar transducer or line output is provided for the purpose of playing back data in the acquisition buffers.” *Id.*, 8:21-23.

63. *Fiedler* discloses that a device may be “embodied in a portable device that clips to a pocket.” *Id.*, 13:12-37. “A microphone, camera, camera lens, infrared or radio-frequency receiver, or similar device is attached to the

clip, exposed to the outside environment.” *Id.*, 13:11-16. “[T]he clip physically stabilizes the receiving device, placing it in an advantageous position to record ambient events surrounding a person while avoiding extraneous noises such as might result from handling the microphone or allowing it to ‘flop around’ freely.” EX1007, 13:23-27. “A display and controls for effecting recall and/or preservation of recorded data ... may be advantageously provided on the portion of the device carried in the pocket.” *Id.*, 13:26-30.

64. *Fiedler* also describes a “small device mounted on a wrist band or bracelet” with a “microphone or microphones,” that are “exposed to the outside environment to pick up ambient sounds”:

An alternative embodiment of the present invention is a small device mounted on a wrist band or bracelet to secure the recording device to a human wrist, in the manner of a wristwatch. This device advantageously incorporates an attached microphone or microphones, exposed to the outside environment so as to pick up ambient sounds. This microphone or microphones may be recessed below a projecting lip on the upper surface of the recording device, so as to pick up ambient sounds while avoiding noise from clothing objects that may come into contact with the surface of the recording device. The top surface of the device provides a display, similar to that described above, representing events recorded and/or to be recorded, as well as controls for effecting recall and preservation of events. Display means may be

implemented as an LED or LCD display, and controls may be implemented as discrete buttons and/or as touch-sensitive regions of said display, advantageously manipulated using a stylus.

EX1007, 13:38-55.

B. *Broussard*

65. *Broussard* is titled “System and method for detecting and storing important information.” EX1008, Cover.

(19) United States	(10) Pub. No.: US 2006/0195322 A1
(12) Patent Application Publication	(43) Pub. Date: Aug. 31, 2006
Broussard et al.	
(54) SYSTEM AND METHOD FOR DETECTING AND STORING IMPORTANT INFORMATION	Publication Classification
(76) Inventors: Scott J. Broussard , Cedar Park, TX (US); Eduardo N. Spring , Round Rock, TX (US)	(51) Int. Cl.
	G10L 21/00 (2006.01)
	H04R 29/00 (2006.01)
	H04R 3/00 (2006.01)
	G10L 19/00 (2006.01)
	G10L 17/00 (2006.01)
	(52) U.S. Cl. 704/270 ; 704/201; 704/246; 381/56; 381/110

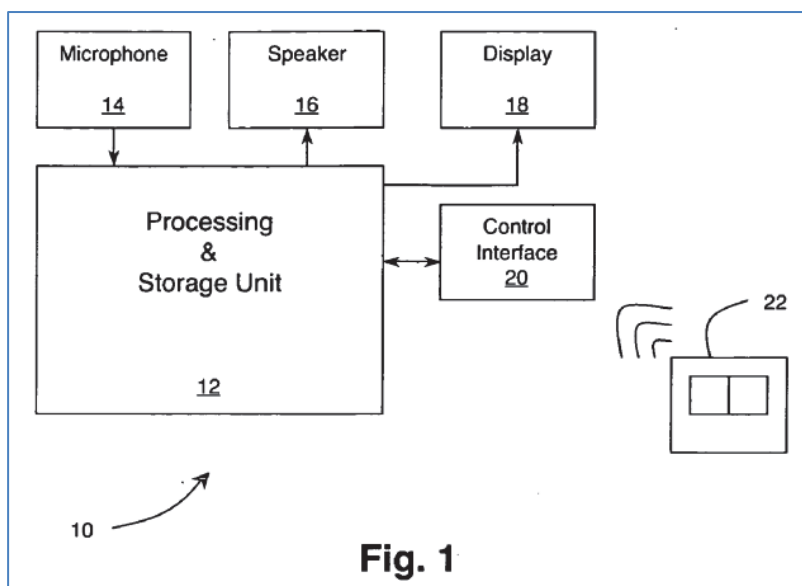
EX1008, Cover

66. In the Background of the Invention section, *Broussard* explains that a recent area of development has been “personal assistance devices which serve to aid or supplement a user's memory—for example, cell phones, PDAs (personal digital assistant) and other memory devices.” EX1008 ¶[0002]. “One particular area of development has been the audio recording of speech in such devices.” *Id.* *Broussard* notes, for example, that recent improvements include using “compression of digital audio recording to improve the storage capacity of

a digital recording device by recognizing silence.” *Id.* *Broussard* explains that “[o]ne major limitation of these prior art devices lies in the inefficiency of retrieving information stored in this manner.” *Id.* ¶[0003]. Thus, “[i]mproved storage of audio-recorded information for easier retrieval is desired.” *Id.*

67. *Broussard*’s disclosure focuses on a “memory assistance device” (such as a cell phone or PDA, as I mentioned above), but *Broussard* emphasizes that its disclosure may be implemented “in any electronic system in which it is desired to record speech into more easily accessible formats.” *Id.* ¶[0010]. *Broussard* notes that “[t]hose with skill in the computing arts will recognize that the disclosed embodiments have relevance to a wide variety of computing environments” and “the methods of the disclosed invention can be implemented in software, hardware, or a combination of software and hardware.” *Id.* “The hardware portion can be implemented using specialized logic; the software portion can be stored in a memory and executed by a suitable instruction execution system such as a microprocessor, personal computer (PC) or mainframe.” *Id.*

68. With reference to Figure 1, *Broussard* provides a block diagram of an exemplary system. *Id.* ¶[0012].

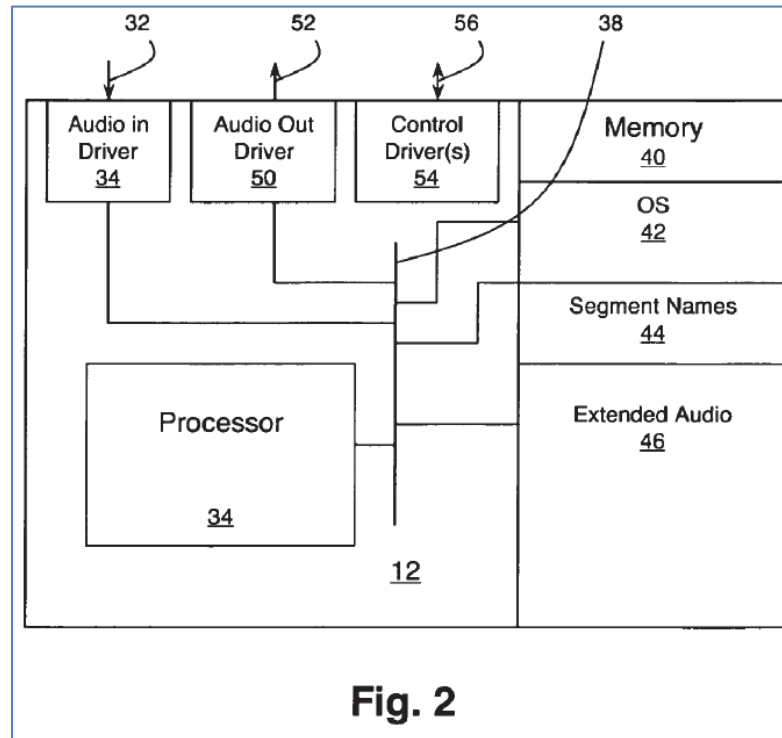


EX1008, FIG. 1

69. “The heart of the devices is a processing and storage unit 12. The Processing and storage unit 12 has direct or indirect access to a microphone 14 for receiving audio input.” *Id.* ¶[0012]. “Likewise the processing and storage unit 12 preferably would have access to a speaker system 16 for converting an electronic audio signal in to an auditory signal (sound).” *Id.* “In some embodiments the speaker system would be auxiliary to processing and storage unit so that the speaker system 16 is only plugged in when desired.” *Id.* “[T]he speaker system 16 is also employed to cue the user” and “may also be used to alert the user about system status —such as an alert that the memory is full or near full.” *Id.* ¶[0013]. A display 18 “can provide various levels of system status information to the user”—“[i]t may indicate that the system is active,” and “it

may cue the user for input in addition to or independent from the speaker system.” *Id.* ¶[0013].

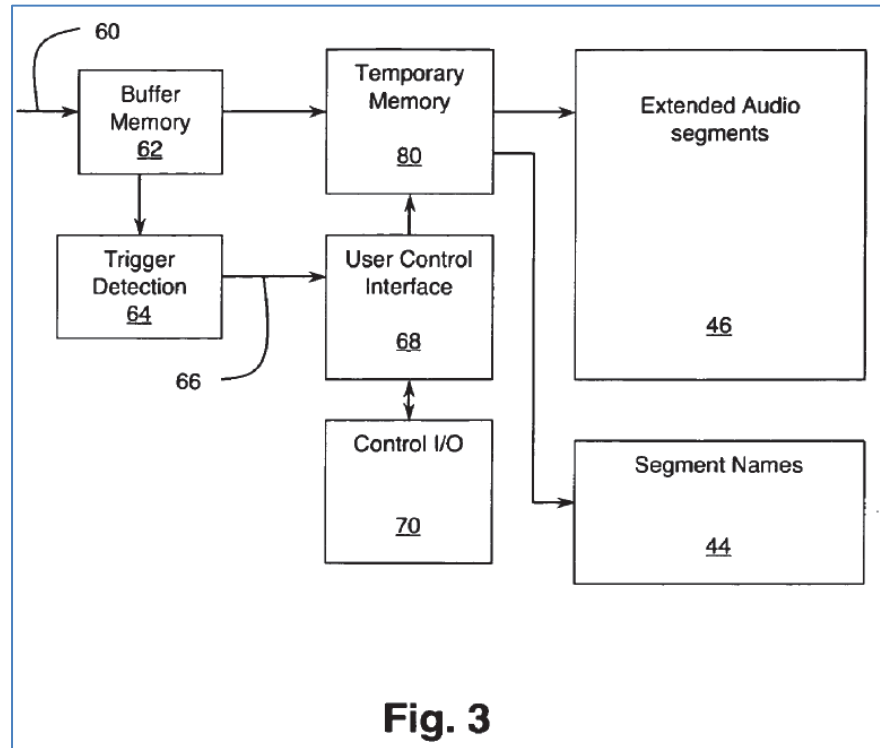
70. Figure 2 “is a block diagram of major components of the processing and storage unit 12.” *Id.* ¶[0015].



EX1008, FIG. 2

71. The components of the system “can be implemented in software, firmware, or hardware or combinations thereof.” *Id.* ¶[0015]. “The unit system would either have to receive the analog signal in digital form or have an analog to Digital (A to D) converter 32 which makes the data available to a data processor 34 possibly through a data bus 38 as shown in the FIG. 2.” *Id.*

72. Figure 3 “provides a block diagram of major system architectural signal processing components of the present system and method.” EX1008 ¶[0019].



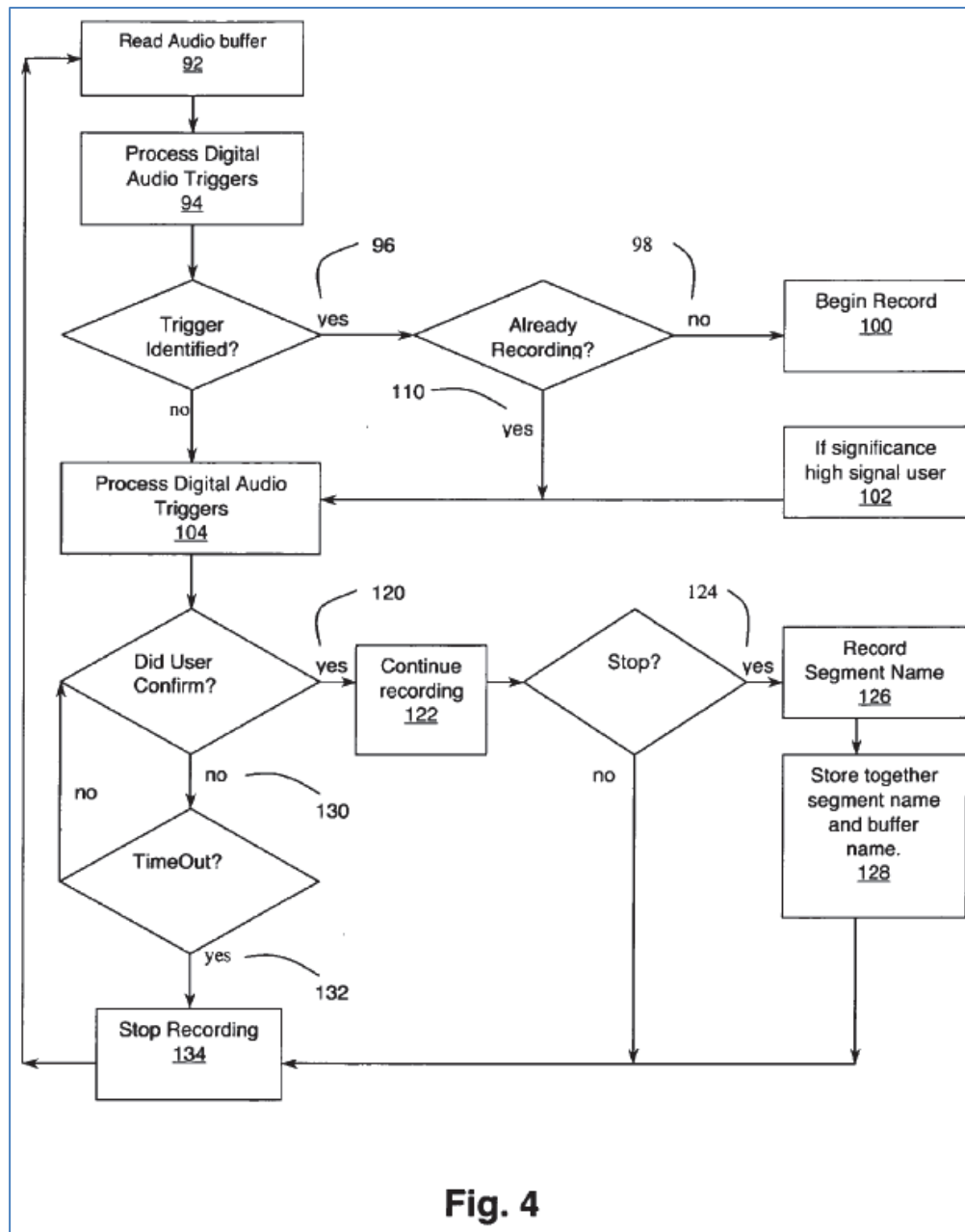
EX1008, FIG. 3

73. *Broussard* explains that “[a]fter having been converted to a digital audio signal as previously described, the audio signal 60 enters a buffer memory 62.” *Id.* ¶[0019]. “A trigger detection subsystems 64 uses the data in the buffer 62 to look for triggers in the data that indicate that the incoming signal contains information which should be recorded in a separate extended audio segment.” *Id.* “If triggers are detected, a signal 66 is sent to the user control interface 68 which provides feedback to the user though the control input/output 70 that the system

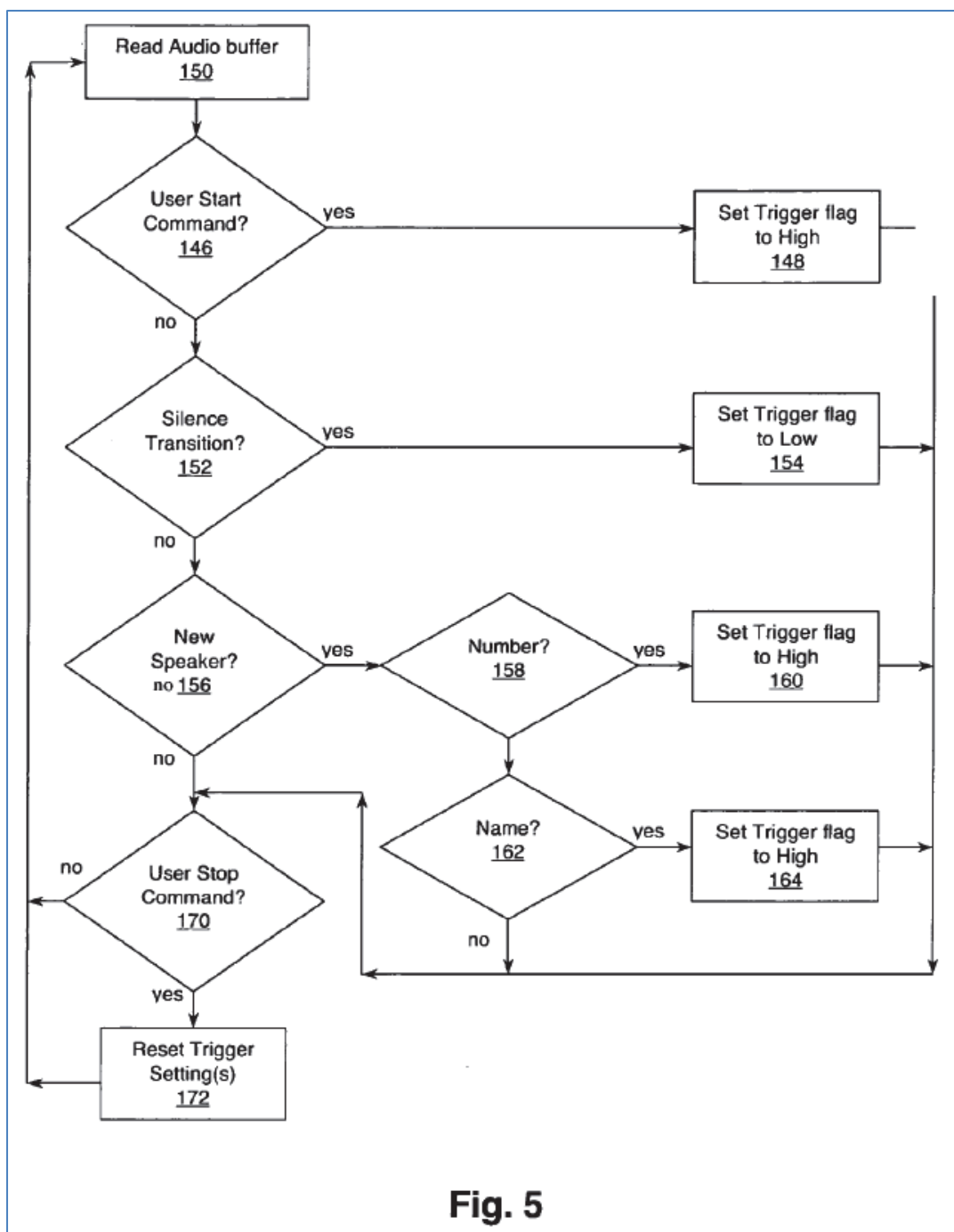
recommends starting to record a new audio segment. If the user assents by inputting a [*sic*] affirmative response in the control I/O 70, then the control interface 68 signals that the data in and flowing through the buffer memory 62 be recorded into a temporary memory section 80 and through to an Extended audio segment 46.” *Id.* ¶[0019].

74. “After the section is done recording either by instruction from the user or firing of a new trigger, then the user is prompted by the user control interface 68 via the control I/O to record a segment name 44.” *Id.* ¶[0020]. “In some embodiments the segment name is mapped to the extended segment memory 46 that has just been place in a memory location.” *Id.*

75. Figures 4 and 5 “illustrate the program flow of one embodiment of the trigger detection system.” *Id.* ¶[0021].



EX1008, FIG. 4



EX1008, FIG. 5

76. As shown in Figure 4, “[t]he audio buffer 62 is read 92 and processed 94 by the digital audio trigger detection routine(s) (an example of which is illustrated in FIG. 5).” EX1008 ¶[0021]. “If a trigger has been

identified 96 and if the system is not already recording 98 then the temporary memory 80 begins to record 100 data in and coming through the buffer 62; and, if the trigger significance value is above a predetermined value 102, then a signal is generated to alert the user; and the recording begins to be stored 104 in the temporary memory 80.” *Id.* “While the audio signal is being stored 104 in the temporary memory 80, the system is waiting for the user to reply to the user prompt and confirm whether to continue storing the audio recording.” *Id.*

¶[0024].

77. Figure 5 illustrates a “program flow for an audio trigger detection routine.” *Id.* ¶[0026]. “First the digital audio signal from the audio buffer is retrieved 150,” and “[i]f at any time the user inputs a record command 146, a detection significance flag is set to high to trigger the main routines to begin recording.” *Id.* *Broussard* also discloses setting the “significance flag” to “high” if a “silence transition” is detected, a “change in speakers,” or any “key words.” *Id.* ¶¶[0027]-[0031]. *Broussard* emphasis that “speech and syntax recognition routines are well known in the art to set off such a trigger flag significance level raising effect.” *Id.* ¶[0031].

C. *Victorian*

78. *Victorian* is titled “External ear canal voice detection.” EX1009, Title (54). *Victorian* “generally relates to ear-level communication systems and

particularly, but not by way of limitation, to such systems communicating with remote devices via full duplex audio.” *Id.* ¶[0001]. “Ear-level communication systems are used for hearing impaired individuals to use a communication device such as a cellular phone or other devices transmitting audio signals. They also allow private, hand-free use of such a communication device by individuals with normal hearing.” *Id.* ¶[0002]. “[T]here is a need for an ear-level communication system that is not easily visible. A need related to miniaturization is the longevity of the system between battery replacements or recharges.” *Id.* ¶[0007].

79. “Ear-level full duplex audio communication systems each include one or two ear attachment devices, such as in-the-ear (ITE) or behind-the-ear (BTE) devices, that wirelessly communicates to a remote device. Such a system allows a hearing impaired individual to communicate with or through the remote device, such as to talk to another person through a cellular phone. Such a system also functions as an ear piece wirelessly extended from the remote device that allows an individual to privately communicate with or through the remote device without the need of holding the device.” *Id.* ¶[0008].

80. “FIG. 1 is an illustration of an embodiment of an ear-level communication system 100 and portions of an environment in which it is used. System 100 includes an ear-level device 110 attached to an ear 101A. Bar-level

device 110 communicates with a remote device 190 through a wireless telemetry link 195. The other ear 101B is free of device attachment. Ear-level device 110 is a self-contained device including its own power source such as a replaceable or rechargeable battery. To maximize battery life or period between recharges, at least a portion of the circuit of ear-level device 110 is voice activated. That is, ear-level device 110 is activated only when it detects a need to transmit or receive a sound.”

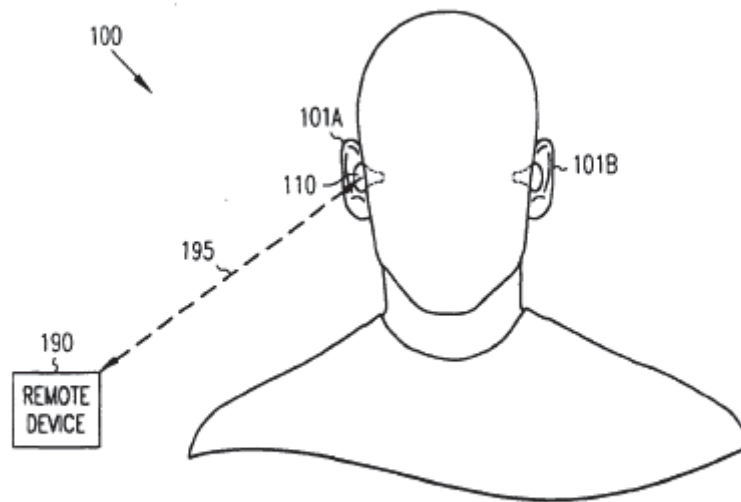


FIG. 1

EX1009 FIG. 1

81. “FIG. 4A is a block diagram showing one embodiment of the circuit of ear-level device shown in FIGS. 3A, 3B, or 3C used as the single ear-level device 110. The circuit is housed in an earmold configured for use as one of the device types illustrated as ear-level devices 310A, 310B, or 310C.” *Id.*

¶[0029]. “Ear-level device 110 includes an external microphone 420, an ear canal microphone 440, an ear canal speaker 470, a processor 460, a wireless transceiver 450, an antenna 455, a voice operated exchange (VOX) circuit 430, and a battery 480.” *Id.* ¶[0030]. “External microphone 420 picks up ambient sound such that a hearing impaired person wearing ear-level device 110 is not “isolated” when communicating to remote device 190.” *Id.* “Ear canal microphone 440 detects sound from the ear canal.” *Id.* “Ear canal speaker 470 transmits sound received from remote device 190 and/or external microphone 420 to the same ear canal.” *Id.*

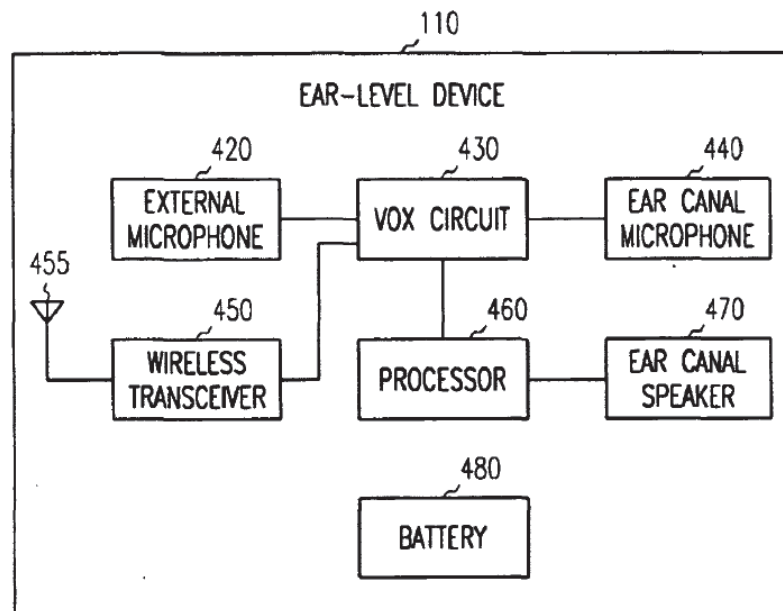
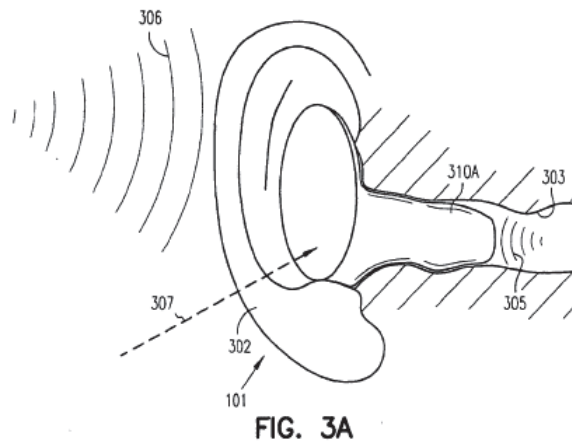


FIG. 4A

EX1009, FIG. 4A

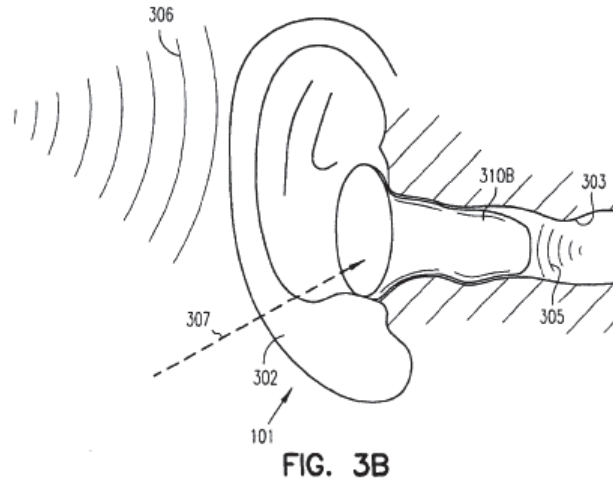
82. “FIG. 3A is an illustration of an exemplary exterior configuration of an in-the-ear (ITE) device 310A used as ear-level device 110 or one of ear-level devices 210A and 210B. As shown in FIG. 3A, ITE device 310A is attached to an ear 101 with a pinna 302 and an ear canal 303. ITE device 310A includes a portion inserted into ear canal 303 and another portion fit into the cavity formed by pinna 302.” *Id.* ¶[0024].



EX1009, Fig. 3A

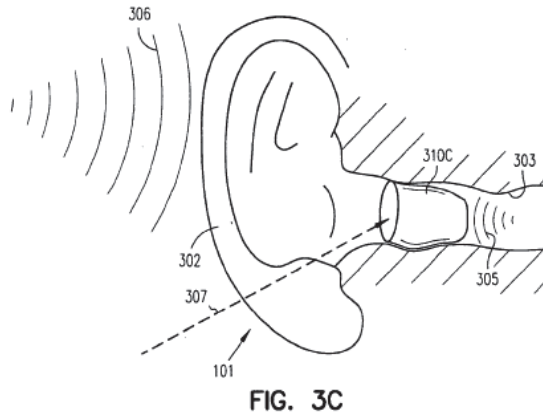
83. “FIG. 3B is an illustration of an exemplary exterior configuration of an in-the-canal (ITC) device 310B used as ear-level device 110 or one of ear-level devices 210A and 210B. As shown in FIG. 3B, ITC device 310B is attached to ear 101 with pinna 302 and ear canal 303. ITC device 310B is a form of ITE device that also includes a portion inserted in ear canal 303 and another portion fit into the cavity formed by pinna 302, but the latter portion is smaller

than that of ITE device 310A. Its overall size is therefore generally smaller than that of ITE device [sic] 310A.” *Id.* ¶[0025].



EX1009, FIG. 3B

84. “FIG. 3C is an illustration of an exemplary exterior configuration of a completely-in-the-canal (CIC) device 310C used as ear-level device 110 or one of ear-level devices 210A and 210B. As shown in FIG. 3C, CIC device 310C is attached to ear 101 with pinna 302 and ear canal 303. CIC device 310C is a form of ITC device but includes only a portion that is completely inserted into ear canal 303. Its overall size is therefore generally smaller than that of ITC device 310B.” *Id.* ¶[0026].



EX1009, FIG. 3C

85. “In one embodiment, each of ITE device 310A, ITC device 310B, and CIC device 310C includes a custom earmold. In another embodiment, each of ITE device 310A, ITC device 310B, and CIC device 310C includes a modular earmold. In one embodiment, the earmold is fully occluded to maximize audio efficiency. In another embodiment, the earmold is vented to remove undesirable low frequency sound.” *Id.* ¶[0027]

86. “FIG. 6 is an illustration of an exemplary exterior configuration of an ear-level device including a behind-the-ear (BTE) device 610 used as ear-level device 110 or one of ear-level devices 210A and 210B. BTE device 610 is attached to ear 101 with pinna 302 and ear canal 303. In one embodiment, BTE device 610 is used when none of ITE device 310A, PTC device 310B, and CIC device 310C provides sufficient space accommodating the required circuit and battery sizes.” *Id.* ¶[0043].

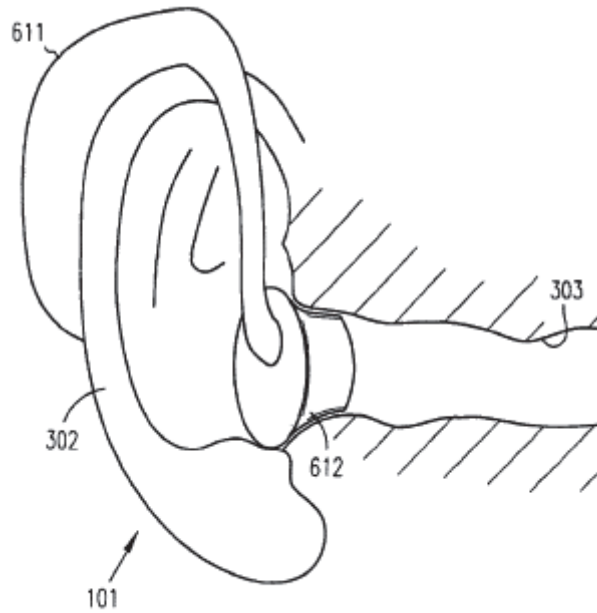


FIG. 6

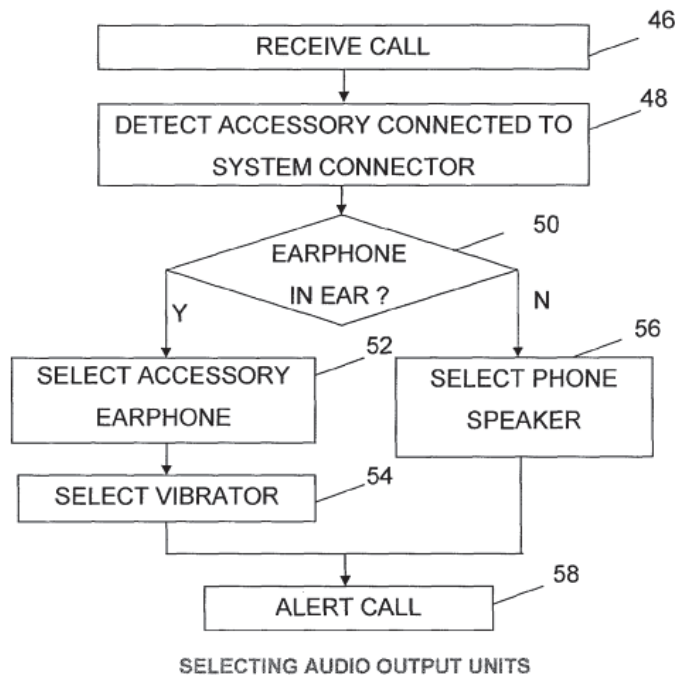
EX1009, Fig. 6

87. “BTE device 610 includes a behind-the-ear module (BTE module) 611 and an in-the-ear module (ITE module) 612. ITE module 612 includes a custom or modular earmold. In one embodiment, the earmold is fully occluded to maximize audio efficiency. In another embodiment, the earmold is vented to remove undesirable low frequency sound.” *Id.* ¶[0044].

D. *Andreasson*

88. *Andreasson* is titled “Audio output device selection for a portable electronic device.” EX1010, Title (54). *Andreasson* “relates to the field of communication devices, such as cellular phones and associated devices, such as accessories to phones. More particularly, the present invention relates to selectively driving output units in phones or in accessories.” *Id.* ¶[0002]. With

reference to the method shown in Figure 5, “[w]hen an event occurs in the phone, for instance when a phone call is received by the application handling unit 38, in step 46, the control unit 36 is notified of this fact. The control unit 36 then determines that the hands-free device 18 is connected to system connector 16 of the phone 10, in step 48.” *Id.* ¶[0046].



EX1010, FIG. 5

89. “When the control unit 36 has determined that the hands-free device 18 is connected to the system connector 16 of the phone 10, it investigates if the first earphone 24 is attached to the ear, in step 50.” *Id.* ¶[0047]. “If the first earphone is attached, in step 50, the control unit 36 selects at least one audio output unit in the accessory 18 to alert the unit of the call, in

step 52. The only audio output units selected are those provided in the accessory, i.e. no audio output unit of the phone.” *Id.* “If the control unit 36 has determined that the first earphone 24 is not attached to the ear, in step 50, it selects at least one audio output unit in the phone for alerting the unit of the call, in step 56. The only audio output units selected are those provided in the phone, (i.e. no audio output unit of the accessory).” *Id.* ¶[0048].

90. According to *Andreasson*, “[t]his process provides an efficient selection of audio output units and of limiting the disturbance to the environment whenever it is possible. This also saves battery power, since signal is output to units are in use. Should the accessory be used for other applications, their use will not be influenced by the selection of the audio output units in accordance with the present invention, unless their use involves sound or audio.” *Id.* ¶[0049].

91. “Alerting signal may be provided not just for incoming calls but also for received messages, such as short message service (SMS), multimedia message service (MMS), or e-mail messages, as well as for events in a calendar.” *Id.* ¶[0054].

E. *Couper*

92. *Couper* is titled “Audio detection using distributed mobile computing.” EX1011, Title (54). *Couper* “relates to a method of identifying

incidents using mobile devices. *Id.* ¶[0004]. *Couper* discloses a mobile device with a microphone. *Id.* ¶[0024], [0048]. The mobile device includes a “sound signature detector” that “can compare audio that is received by the internal microphone of the mobile device” with stored sound signatures. *Id.* ¶[0026]. For example, the sound signatures “can specify audio profiles for sounds including, but not limited, to, gunshots, explosions, sirens, alarms, breaking glass, auto accidents, yelling or screaming, calls for help, etc.” *Id.* ¶[0026]. “In one embodiment, for example, the mobile device can record a continuous loop and, if a detected sound matches a sound signature 120, the signature detector 115 can prevent that audio from being recorded over until the mobile device either provides the audio to the event processor 125 or determines that the audio is not needed by the event processor 125.” *Id.* ¶[0044].

F. *Bulthuis*

93. *Bulthuis* is titled “Conversation Rewind.” EX1012, Title (54). It “relates to the field of recording real-time communications, especially in the consumer electronics field.” *Bulthuis* ¶[0006]. *Bulthuis* discloses a device with a “last-communication rewind mechanism for replay of at least a part, e.g., the last 5 minutes, of the communication recorded most recently.” *Id.* ¶[0016]. “[T]he device is voice-controllable and the rewind mechanism is activated upon a specific voice command, in order to enable hands-free operation. The storage of

the last N minutes is achieved, e.g., through a circular buffer that starts overwriting itself when full.” *Id.* ¶[0016].

IX. INTERPRETATION OF THE ’587 PATENT CLAIMS

94. I have given all the claim terms their plain and ordinary meaning, as would have been understood by a person having ordinary skill in the art, at the time of the alleged invention, having taken into consideration the language of the claims, the specification, and the prosecution history of record.

X. SPECIFIC GROUNDS FOR CHALLENGE

A. GROUND 1A: *FIEDLER* IN COMBINATION WITH *BROUSSARD* RENDERS OBVIOUS CLAIMS 1, 3, 4, AND 12

1. Claim 1

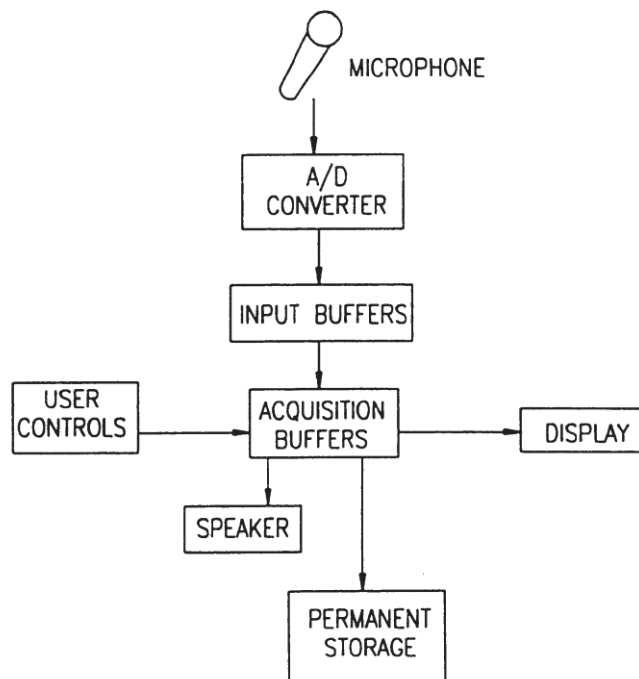
a. 1.pre: “A system comprising:”

95. I understand that “a system comprising” is the preamble to claim 1 of the ’587 patent. I have been asked to assume that the preamble is a claim limitation. It is my opinion that *Fiedler* discloses or suggests “[a] system.”

96. *Fiedler* discloses a multi-component system of hardware and/or software. EX1007, 3:8-11 (“The essential components of this invention—beyond a minimum of appropriate hardware to detect, acquire and preserve data—are algorithms, which may be implemented as either hardware or software or both.”). *Fiedler* also states, “[t]he invention may be implemented as a program on a general-purpose computer, using either a single-thread or a

multithreaded operating system, as long as means of acquiring and playing back data are provided.” *Id.*, 3:11-15.

97. As another example, *Fiedler* discloses that Figure 1 “shows the major components and their interrelationships.” *Id.*, 3:66-4:9; *see also id.*, 7:54-58 (“The user is provided with a display ..., as well as controls to allow the user to recall (play back) data and to mark data for capture or permanent storage.”), 8:21-23 (“A speaker, earphone or similar transducer or line output is provided for the purpose of playing back data in the acquisition buffers.”), 13:11-43 (describing a portable embodiment and a watch embodiment), FIG. 1 (illustrating a multi-component system with user controls and display), FIG. 3 (illustrating a user interface).



EX1007, FIG. 1

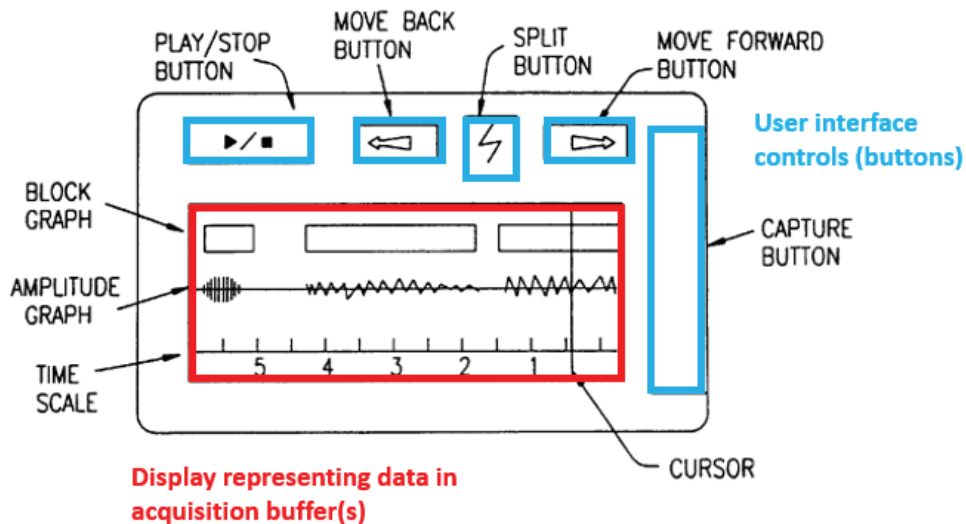
98. This is consistent with how the '587 patent uses the term “system” to describe a collection of components. *See, e.g.*, EX1001, 18:34-39 (“Electronic housing unit 1100 houses system components such as a microprocessor 1116, memory 1104, battery 1102, ECM 1106, ASM 1120, ECR 1114, and user interface 1122.”).

99. Accordingly, in my opinion, a person having ordinary skill in the art would have understood *Fiedler* to disclose or suggest “a system.”

b. 1.1: “a user interface; and”

100. In my opinion, *Fiedler* discloses or suggests “a user interface.”

101. For example, *Fiedler* discloses a “user interface,” and further discloses that “[t]he user is provided with a display” and “controls to allow the user to recall (play back) data.” EX1007, 7:53-57; *see also id.*, 8:45-47 (“[c]ontrols (buttons) are provided for manipulating the cursor, playing back portions of recorded blocks, and capturing blocks”), FIG. 3 (illustrating buttons and display).



EX1007, FIG. 3 (annotated)

102. Accordingly, in my opinion, a person having ordinary skill in the art would have understood *Fiedler* to disclose or suggest a user interface with a display and controls for, among other things, play back of media (“a user interface”).

c. 1.2: “an audio device comprising:”

103. In my opinion, *Fiedler* discloses or suggests “an audio device.”

104. For example, *Fiedler* discloses a “computer-type program to capture audio data” running on a “general-purpose computer.” EX1007, 3:11-15 (“The invention may be implemented as a program on a general-purpose computer.”), 3:16-19 (“Following is a description of an embodiment of this invention as a computer type program to capture audio data, running on an interrupt-driven computer of known type and using digital memory as the

continuous recording medium.”). *Fiedler* also discloses implementations on a “personal computer,” which a person having ordinary skill in the art would have understood to be a type of general-purpose computer. *Id.*, 9:54-58. *Fiedler* also discloses portable form factors for implementing its system, such as a “hand-held device,” “portable device” or “wristwatch.” *Id.*, 3:49-51, 13:11-14:15.

105. *Fiedler* also discloses using the device to both acquire and play back audio data. *Id.*, 3:11-19 (“The invention may be implemented as a program on a general-purpose computer, using either a single-thread or a multithreaded operating system, ***as long as means of acquiring and playing back data are provided.***”), 4:4-15 (“The contents of the acquisition buffers are shown on a periodically updated display, and parts of the contents of the acquisition buffers may, by means of user controls, be played back through an output transducer such as a speaker or selected for preservation in permanent storage.”).

106. A person having ordinary skill in the art would have understood an “audio device” to encompass a device with an audio-related function (for example, capturing, recording, or playing audio), such as *Fiedler*’s general purpose computer. This is consistent with descriptions of ’587 patent devices , including a “a phone, cell phone, PDA, computer, two way radio, smart phone, and earpiece,” and these devices may include a “microphone ... enabled for receiving sound.” EX1001, 22:13-15, 22:45-46. The ’587 patent also uses the

term “device” to encompass multi-component devices. *See, e.g.*, EX1001, FIG. 12, 20:4-6 (describing Figure 12 as a “block diagram of a device” with its various components).

107. Accordingly, in my opinion, a person having ordinary skill in the art would have understood *Fiedler* to disclose or suggest a computer or other portable device that captures and plays back audio (“an audio device”).

d. 1.3: “a microphone configured to measure ambient sound and generate a microphone signal;”

108. In my opinion, *Fiedler* discloses or suggests “a microphone configured to measure ambient sound and generate a microphone signal.”

109. *Fiedler* states: “a microphone feeding a continuous signal to an analog-digital converter, which in turn passes a train of digital sample values to a set of input buffers.” EX1007, 3:66-4:3. A person having ordinary skill in the art would have understood that the “continuous signal” and the digital sample values constitute a “microphone signal” because they were generated from a microphone.

110. *Fiedler* also discloses a microphone to “pick up” and record “ambient events.” *Id.*, 1:36-37 (“continuously recording all ambient events in a continuous logical loop”), 13:23-27 (disclosing a clip that “physically stabilizes the receiving device, placing it in an advantageous position to record ambient events surrounding a person”), 13:38-43 (disclosing “small device mounted on a

wrist band or bracelet to secure the recording device to a human wrist, in the manner of a wristwatch ... incorporate[ing] an attached microphone or microphones, exposed to the outside environment so as to pick up ambient sounds”); *see also id.*, 5:48-53 (referring to “detection and cancellation of ambient noise”), Claim 13 (disclosing “[a] portable device for selectively **recording** events, said device comprising: ... a microphone for acquiring input of speech or other sounds”), 17 (“[a] portable device for selectively **rcalling** [sic] events, said device comprising: ... a microphone for acquiring input of speech or other sounds”).

111. Consistent with *Fiedler*, the ’587 patent describes that an “earpiece includes an Ambient Sound Microphone (ASM) 1120 to capture ambient sound.” EX1001, 17:64-65; *see also id.*, 18:31-33 (“Ambient sound microphone 1120 receives ambient sound from the ambient environment around the user.”), 18:56-60 (“All transducers shown can receive or transmit audio signals to a processor 1116 that undertakes audio signal processing”).

112. In my opinion, *Fiedler* discloses or suggests this limitation even if Patent Owner argues that “measuring” ambient sound requires more than merely “capturing” ambient sound. Specifically, *Fiedler* discloses that the system measures at least amplitudes of the microphone signal. *Fiedler* states that, “[a]s audio data are transferred from the input buffers to the acquisition buffers, the

successive amplitude values in the audio stream *are measured against* the amplitude and duration thresholds (FIG. 4, block 15), and the stream is accordingly stored in the acquisition buffers as segments of sound data interspersed with silence nodes.” EX1007, 5:54-59; *see also id.*, 5:42-53 (discussing amplitude values and detecting intervals of silence). “When a sufficient interval of silence has been detected, the recording cursor goes back to the beginning of the sequence of amplitude values in the acquisition buffers corresponding to this interval and writes a silence node there (blocks 15-16); this may involve going back into a previous acquisition buffer.” *Id.* 6:1-10. Based on that, a person having ordinary skill in the art would have understood that *Fiedler*’s microphone provides another measure of the ambient sound and is further “configured to measure ambient sound.”

113. Accordingly, in my opinion, a person having ordinary skill in the art would have understood *Fiedler* to disclose or suggest an audio device with microphone(s) to pick up ambient sounds (“a microphone configured to measure ambient sound”) and feed a continuous signal to an analog to digital converter (“and generate a microphone signal”).

e. 1.4: “a speaker configured to emit an audio signal;”

114. In my opinion, *Fiedler* discloses or suggests “a speaker configured to emit an audio signal.”

115. *Fiedler* discloses that contents of the acquisition buffers may “be played back through an output transducer such as a speaker.” EX1007, 4:4-9; *see also id.*, 8:21-23 (“*A speaker*, earphone or similar transducer or line output is provided for the purpose of playing back data in the acquisition buffers.”), *see also id.*, 11:33-47 (“Output buffers are sent, in the order transcribed, *to a waveform output device*, which in turn routes their contents (via direct memory access (DMA)) through a digital-analog converter *to the audio output.*”).

Fiedler further discloses that the data in the acquisition buffer is audio data to be played back. *Id.*, 7:54-57 (“The user is provided with a display representing audio data currently in the acquisition buffers, as well as controls to allow the user to recall (play back) data....”). A person having ordinary skill in the art would have understood that *Fiedler*’s disclosure of an audio output refers to the speaker.

116. Accordingly, in my opinion, a person having ordinary skill in the art would have understood *Fiedler* to disclose an audio device with a speaker for audio playback (“a speaker configured to emit an audio signal”).

f. 1.5-1.8

(i) [1.6] and [1.7]

117. As I summarized above in §VIII.A, *Fiedler* discloses multiple buffers and buffer arrangements for selective recall and preservation. *See*

EX1007, 3:66-6:67 (disclosing input buffers, acquisition buffers and output buffers in at least two arrangements for selective recall and preservation).

118. In a first arrangement, a microphone feeds a “continuous signal to an analog-digital converter, which in turn passes a train of digital sample values to a set of input buffers.” *Id.*, 3:66-4:4. From the input buffers, “the sample train is continuously supplied to a circular set of acquisition buffers.” *Id.*, 4:2-4; *see also id.*, 4:11-48. When a user plays back audio data from the acquisition buffers, the data flows from the acquisition buffers to “output buffers” and to the speaker. *Id.*, 11:33-48. If the user desires to permanently preserve data, “captured data may be preserved by writing it to any permanent storage medium, such as a disk, tape or (non-volatile) solid-state memory.” *Id.*, 7:23-25. The data in the acquisition buffer can be preserved at any time between the decision to capture and the buffer being overwritten. *Id.*, 7:25-30.

119. In a second arrangement of *Fiedler*, the audio data flows from the input buffers to the acquisition buffers as in the first arrangement. Upon detection of a triggering event, however, audio data is transferred from the “acquisition buffer” (or “original acquisition buffer”) to a “second acquisition buffer.” *Id.*, 6:42-47 (“Alternatively, the portion of the acquisition buffer contents leading up to the triggering event may be transferred to a second acquisition buffer, which will be used in place of the original acquisition buffer

for all purposes described below, including the presentation of data to the user for selection for recall and/or preservation.”).

120. *Fiedler* explains that the “second acquisition buffer ... will be used in place of the original acquisition buffer for all purposes described below,” including “for selection for recall and/or preservation.” *Id.* In this second arrangement of *Fiedler*, the system continues to record audio data to the “original acquisition buffer” while the audio data preceding and including the trigger event is copied from the “original acquisition buffer” to the second acquisition buffer. *Id.*, 6:54-63 (“Such a continuous record may be effected by: (1) Continuing to record in the acquisition buffer the triggering event and the events following the triggering event, (2) Concurrently with this continuous recording, copying the appropriate portions of the acquisition buffer contents to the permanent record (or Second acquisition buffer), preserving the record of events prior to, including, and following the triggering event.”)

121. Once the process of copying catches up with the real-time direct recording process, the audio data will flow from input buffers directly to the “second acquisition buffer.” *Id.*, 6:64-67 (Recording events directly to the permanent record (or second acquisition buffer) when the copying process has caught up with the direct recording process by reaching the present moment.).

122. *Fiedler*'s description up to column 6, line 32, and in particular its entire section titled "Acquisition and Storage of Audio Data" (starting at column 4, line 10) refers generically to "acquisition buffers." *Id.*, 4:10-6:32. Based on my knowledge and experience, a person having ordinary skill in the art would have understood that, in the second, alternative arrangement, this generic description applies to the "original acquisition buffer" before a trigger event is detected and through completion of the process of copying to the "second acquisition buffer." *See* EX1007, 6:55-67. In my opinion, a person having ordinary skill in the art would have also understood that, after completion of copying to the "second acquisition buffer," and when audio data is recorded directly to the second acquisition buffer, *Fiedler*'s generic descriptions of "acquisition buffer(s)" apply to the "second acquisition buffer." *Id.* ¶ __.

123. In my analysis, I have focused on the second, alternative arrangement with an "original acquisition buffer" and a "second acquisition buffer." A person having ordinary skill in the art would have understood that in this second arrangement, rather than transferring audio data directly from the "acquisition buffer" (or "original acquisition buffer") to permanent storage, the audio data is, upon detection of a trigger event, first transferred to a "second acquisition buffer."

124. *Fiedler* explains that the second acquisition buffer is used in place of the original acquisition buffer for “the presentation of data to the user for selection for recall and/or preservation.” EX1007, 6:42-47 (“Alternatively, the portion of the acquisition buffer contents leading up to the triggering event may be transferred to a second acquisition buffer, which will be used in place of the original acquisition buffer for all purposes described below, including the presentation of data to the user for selection for recall and/or preservation.”). In other words, audio data may be played back from the “second acquisition buffer” (via the output buffers). *Id.*

125. As I will explain further below, in my opinion, *Fiedler*’s “original acquisition buffer” discloses or suggests the claimed “audio buffer” and *Fiedler*’s “second acquisition buffer” discloses or suggests the claimed “data buffer.”

(a) “[1.6] an audio buffer configured to store at least a portion of the microphone signal”

126. In my opinion, *Fiedler* discloses or suggests “an audio buffer configured to store at least a portion of the microphone signal.”

127. As I stated above, *Fiedler* discloses input buffers from which a train of digital audio samples “is continuously supplied to a circular set of acquisition buffers.” EX1007, 4:2-4; *see also id.*, 4:11-48 (describing process of acquiring

analog audio data from a microphone, converting to digital data at a certain sampling frequency, storing in a circular series of input buffers, and then copying to the acquisition buffers). A person having ordinary skill in the art would have understood that, in *Fiedler*'s second arrangement, this description applies to the "original acquisition buffer" before a trigger event is detected and through completion of the process of copying to the "second acquisition buffer." Based on my knowledge and experience, a person having ordinary skill in the art would have understood that the "digital audio samples" that are written to the acquisition buffer(s) correspond to "at least a portion of the microphone signal" because the digital audio samples were derived from the microphone signal.

128. I find that this disclosure in *Fiedler* is consistent with the '587 patent, as the "buffers" disclosed in the '587 patent store at least audio data. *See, e.g.,* EX1001, 7:19-39 ("A device using the Always On-Recording™ 224 application is recording the most current audio information for user recall. ***The recording*** is stored in ***a buffer*** that will allow the user to immediately access the audio information"), 8:58-9:8 ("In a first example of an Ear Sticky™ 230 application, a conversation between a husband and wife occurs and a list of items to pick up at several stores is disclosed. The user of Ear Sticky™ 230 does not need to write down or remember this list. ***The conversation*** is being recorded and ***stored in a buffer***. The user activates Ear Sticky™ 230 to store the

recorded conversation to be reviewed at a later time. Thus, the user of Ear Sticky™ 230 could recall and listen to the list on the way home to ensure that the right items are picked up at the appropriate store.”), 20:66-21:9 (“For instance, memory RAM 1202 and ROM 1204 can ... include *a data buffer* to temporarily *capture the ambient sound and the internal sound*, and a storage memory to save from the data buffer the recent portion of the history in a compressed format responsive to a directive by the processor. The data buffer can be a circular buffer that temporarily *stores audio sound* at a current time point to a previous time point.”), 23:36-38 (“A sound 1402 is received by a microphone on cell phone 1404 and stored in a buffer in a record sounds step 1406.”).

129. Thus, a person having ordinary skill in the art would have understood *Fiedler*’s original acquisition buffer to be an “audio buffer.”

130. Accordingly, in my opinion, a person having ordinary skill in the art would have understood *Fiedler* to disclose or suggest an original acquisition buffer (“an audio buffer”) for storing digitized samples of a microphone signal (“configured to store at least a portion of the microphone signal”).

(b) “[1.7] a data buffer”

131. In my opinion, *Fiedler* discloses or suggests “a data buffer.”

132. As I discussed above in §X.A.1.f(i), *Fiedler* discloses a “second acquisition buffer,” and it further discusses that “[o]n detection of a suitable triggering event ... the portion of the [original] acquisition buffer contents leading up to the triggering event may be transferred to a second acquisition buffer, which will be used in place of the original acquisition buffer for all purposes,” including for “the presentation of data to the user for selection for recall and/or preservation.” *Id.*, 6:33-47.

133. As I also explained in §X.A.1.f(i), the content of the acquisition buffers is audio data, and similarly, the buffers disclosed in the ’587 patent store audio data, which would include the “data buffer.” Thus, in my opinion, a person having ordinary skill in the art would have understood *Fiedler*’s “second acquisition buffer” to be “a data buffer.”

134. Accordingly, in my opinion, a person having ordinary skill in the art would have understood the *Fiedler* to disclose or suggest a second acquisition buffer (“a data buffer”).

- (ii) “[1.5] a memory configured to store instructions ... [1.8] a processor operatively coupled to the memory, the processor operatively coupled to the audio buffer, the processor operatively coupled to the data buffer, wherein the processor is configured to execute the instructions to perform operations comprising”

135. In my opinion, *Fiedler* in combination with *Broussard* discloses or suggests “a memory configured to store instructions ... a processor operatively coupled to the memory, the processor operatively coupled to the audio buffer, the processor operatively coupled to the data buffer, wherein the processor is configured to execute the instructions to perform operations comprising.”

136. For example, *Fiedler* discloses that algorithms are “essential components of this invention ... implemented as either hardware or software or both,” and “the invention may be implemented as a program on a general purpose computer, using either a single-thread or a multithreaded operating system, as long as means of acquiring and playing back data are provided.”

EX1007, 3:8-19. Based on my knowledge and experience, a person having ordinary skill in the art would have understood that programs and software are implemented with computer instructions stored in a memory. This is corroborated, for example, by the *Computer Dictionary*, which defines

“software” as “[c]omputer programs; instructions that cause the hardware—the machines—to do work.” EX1026.²

137. Based on my knowledge and experience, a person having ordinary skill in the art would have also understood that a program running on a “general purpose computer” suggests a processor, coupled to the memory, that executes the instructions representing the program. This is corroborated, for example, by the *Tanenbaum* textbook which explains that “[c]omputer systems are built up from three types of components: processors, memories, and I/O devices. The task of a processor is to fetch instructions one at a time from a memory, decode them, and execute them.” EX1025 at 21. *Tanenbaum* Figure 2-29, copied below, shows the structure of what would have been understood to be a “a simple personal computer,” including a “CPU” (i.e., a processor) and a memory.³

² To be clear, I am relying on *Computer Dictionary* as evidence of the knowledge of a person having ordinary skill in the art and it is not part of the unpatentability ground 1A.

³ To be clear, I am relying on *Tanenbaum* as evidence of the knowledge of a person having ordinary skill in the art and it is not part of the unpatentability ground 1A.

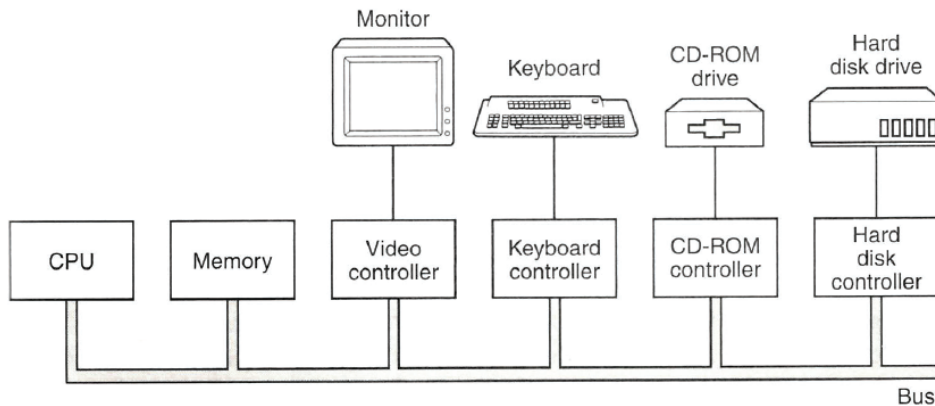


Figure 2-29. Logical structure of a simple personal computer.

EX1025 at 18

138. In view of the above, a person having ordinary skill in the art would have considered *Fiedler*'s disclosure to amount to an express suggestion to use a processor executing program instructions stored in a memory to perform the functions of *Fiedler*'s program.

139. *Fiedler* also suggests that a processor transfers data from the input buffers to the original acquisition buffer, and from the second acquisition buffer to the output buffers. For example, *Fiedler* explains that audio data from a microphone is initially stored via direct memory access into input buffers, and as the input buffers come full, "an interrupt signal" is generated, and that "[w]hen the application program receives this signal, the sound data are transferred from that input buffer to the acquisition buffers." *Fiedler*, 4:24-30.

140. Based on my background and experience, a person having ordinary skill in the art would have understood that an "interrupt signal" is a signal sent to

and received by a processor that triggers the processor to perform an operation. This is corroborated, for example, by *Tanenbaum*, which explains that after transfer by direct memory access is completed, a memory controller “normally causes an **interrupt**, forcing the CPU to immediately suspend running its current program and start running a special procedure, called an interrupt handler, to check for errors, take any special action needed, and inform the operating system that the I/O is now finished.” *Tanenbaum* at 18-19 (emphasis in original). Here, a person having ordinary skill in the art would have understood *Fiedler* to suggest that a processor receives the interrupt signal and then reads the audio data from the input buffers and writes it to the original acquisition buffer.

141. *Fiedler* also explains that playback occurs in a similar manner, reverse to the recording process, with audio data read from the acquisition buffer and transcribed to output buffers. *Fiedler*, 11:33-47 (“Playback is achieved by means of a scheme analogous (in reverse) to the recording scheme”). And because the “second acquisition buffer” is used for playback, a person having ordinary skill in the art would have understood *Fiedler* to suggest that, during playback, the processor reads audio data from the second acquisition buffer and writes it to the output buffers. A person having ordinary skill in the art would have understood that for the processor to read and write data to/from the original acquisition buffer and the second acquisition buffer, the processor must be in

data communication with the buffers. This is consistent with how the '587 patent describes being “operably coupled.” EX1001, 8:52-54 (discussing “cell phone or an earpiece that is operably coupled to other devices”), 18:34-45 (describing an earpiece with a microprocessor “operatively coupled” to other components with reference to Figure 11); 23:4-15 (describing an earpiece and communication device being “operably coupled together”), FIG. 13 (showing earpiece 1310 and communication device 1302 “operably coupled” together).

142. Furthermore, *Fiedler* discloses using “interchangeable memory module” such as “flash memory” as a recording medium for the acquisition buffers. *Id.*, 12:64-13:8. A person having ordinary skill in the art would have understood interchangeable flash memory to be a memory device separate from the processor because it can be removed from the device. *Fiedler* elaborates, explaining that “[w]here such interchangeable memory is used, it is advantageous to use such memory interchangeably in a variety of devices and/or to record a variety of sources of continuously recordable events (e.g., radio, television, live microphone, weather instruments, medical instruments, musical instruments). In this way a single flash memory may be used to acquire, recall and/or preserve data from various sources.” *Id.*, 13:1-7.

143. Thus, because *Fiedler* suggests a processor reading and writing data to/from the original acquisition buffer and the second acquisition buffer, and that

the buffers are implemented in a memory separate from the processor, a person having ordinary skill in the art would have considered *Fiedler*'s disclosure to amount to an express suggestion to use a processor that is operatively coupled to the original acquisition buffer and second acquisition buffer.

144. To the extent that *Fiedler* does not expressly disclose the claimed processor coupled to a memory and the acquisition buffers, a person having ordinary skill in the art would have readily identified *Broussard*, which provides additional details of how to implement a recording device similar to *Fiedler*'s with a general purpose computer. As I summarized above in §VIII.B, *Broussard* discloses a memory assistance device (e.g., “cell phones, PDAs (“personal digital assistant”) and other memory devices”) for recording audio and also discloses techniques for improving prior art recording devices like *Fiedler*. EX1008 ¶[0002] (“memory devices” including “cellphones, PDAs”), ¶[0012] (illustrating a “memory assistance device” in Figure 1 with “[p]rocessing and storage unit [having] direct or indirect access to a microphone”).

145. Further, *Broussard* discloses that “[t]he audio buffer 62 is read 92 and processed 94 by the digital audio trigger detection routine(s)” and “[i]f a trigger has been identified 96” the audio data begins to be recorded into “temporary memory 80” (also called a “temporary buffer”). EX1008 ¶¶[0021], [0024] (referring to “temporary buffer”).

146. Once *Broussard* finishes recording, “the user is prompted to record a segment name 126 and the user name is recorded and stored 128 linked/mapped to the extended audio segment in the system memory.” *Id.* ¶[0024]; *see also id.* ¶[0020] (After recording, “the user is prompted by the user control interface 58 via the control I/O to record a segment name,” and “[i]n some embodiments the segment name is mapped to the extended segment memory.” “In other embodiments both the segment name and the extended audio signal are recorded in their respective memory locations after the segment name has been recorded and placed in the temporary memory.”)

147. *Broussard* discloses software “stored in a memory and executed by a suitable instruction execution system such as a microprocessor, personal computer (PC) or mainframe,” EX1008 ¶[0010], or “**data processor 34**,” *id.* ¶[0015]. The **data processor 34** is coupled to “**memory 40**” through a “**data bus 38**.” *Id.* ¶[0015]; *see also id.* ¶[0011] (disclosing memory to store programs and “for use by ... instruction execution system”); ¶[0002] (“memory devices” include “cellphones, PDAs”), FIG. 2 (illustrating major components of the processing and storage unit, including memory and processor).

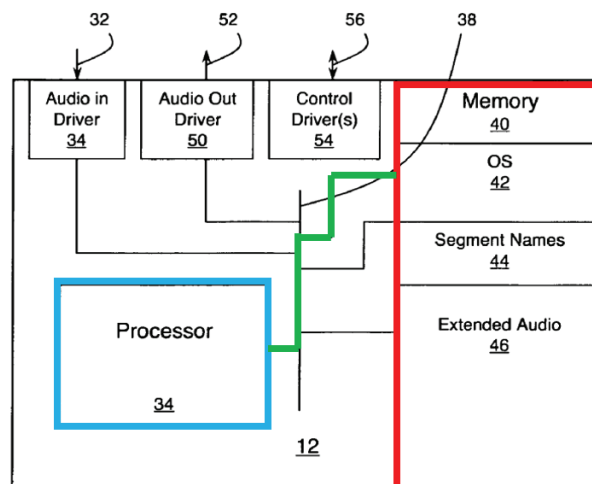


Fig. 2

EX1008, FIG. 2 (annotated)

148. *Broussard*'s Figure 2 is a "block diagram of major components of the processing and storage unit illustrated in FIG. 1" *Id.* ¶[0006]. *Broussard*'s Figure 2 schematically illustrates the processor coupled to the memory, which is further confirmed by its disclosure that the processor executes the instructions stored in memory. Indeed, *Broussard* discloses that the memory "communicates ... with an instruction execution system" and that software stored in the memory is "executed by a suitable instruction execution system such as a microprocessor, personal computer (PC) or mainframe." *Id.* ¶¶[0010]-[0011]. This is consistent with how the '587 patent describes being "operably coupled," as noted above.

149. Moreover, a buffer is a form of storage/memory. This is corroborated, for example, by *Fiedler* itself. *See* EX1007, 3:4-7, 3:16-23, 4:26-30. Therefore, a person having ordinary skill in the art would have understood

Broussard to disclose or suggest that the “audio buffer” and “temporary buffer” are part of the memory to which the processor is coupled. *Broussard* also explains that the audio buffer is “read” and “processed” and that “[i]f a trigger has been identified 96 ... then the temporary memory 80 begins to record 100 data in and coming through the buffer 62.” *Broussard* ¶[0021]. Thus, *Broussard* discloses a processor in communication with the buffers for reading data from them and writing data into them.

150. A person having ordinary skill in the art would have recognized that *Broussard*’s recording device and method is similar to *Fiedler*’s because, for example, both require buffering audio data from a microphone in a first buffer, detecting a trigger event in the buffered audio for the purpose of identifying audio for potential recording, and then recording audio data in a second buffer. Both references also disclose a device with a speaker and a display for providing information to the user.

151. Thus, to the extent that *Fiedler* does not expressly disclose the claimed processor operably coupled to the memory and buffers, a person having ordinary skill in the art looking for additional implementation details for *Fiedler*’s recording device would have readily identified *Broussard* and would have understood the applicability of *Broussard*’s teachings to *Fiedler*’s recording device. And because *Fiedler* and *Broussard* disclose similar devices

with similar functions, a person having ordinary skill in the art would have understood how to predictably apply *Broussard's* teaching of a processor to *Fiedler's* disclosed algorithms and functions.

152. Accordingly, a person having ordinary skill in the art would have considered the combination to amount to the use of a known technique (*Broussard's* teachings of a recording device with a processor that executes software instructions stored in memory and reads and writes data from and to the buffers) to improve similar devices (*Fiedler's* recording device) in the same way (to implement a processor to execute the program instructions stored in memory and to read and write audio data from and to the buffers of a trigger event activated recording device). A person having ordinary skill in the art also would have considered the combination to amount to following *Fiedler's* express suggestion to use a processor coupled to a memory executing program instructions stored in the memory and that is operatively coupled to the original acquisition buffer and second acquisition buffer.

153. Thus, in my opinion, a person having ordinary skill in the art would have understood the *Fiedler-Broussard* combination to disclose or suggest an audio device with software stored in memory (“a memory configured to store instructions”) executed by a microprocessor coupled to the memory to perform the functions of the software (“a processor operatively coupled to the

memory...wherein the processor is configured to execute the instructions to perform operations”) and the microprocessor coupled to the original acquisition buffer and second acquisition buffer in an interchangeable flash memory to read and write data into and out of them (“the processor operatively coupled to the audio buffer, the processor operatively coupled to the data buffer”).

154. In addition, because *Fiedler* discloses that its system may be implemented in software as a program on a general-purpose computer (*Fiedler*, 3:8-15), a person having ordinary skill in the art would have understood the *Fiedler-Broussard* combination to disclose or suggest the processor executing instructions to perform the functions of the combination. Thus, a person having ordinary skill in the art would have understood that the *Fiedler-Broussard* combination discloses or suggests a processor executing instructions to perform the operations that meet claim elements 1.9-1.14 and the dependent claims discussed below.

155. I note that *Fiedler* explains data is transferred from its input buffers to acquisition buffers by “direct memory access.” *Fiedler*, 4:20-24 (“In an arrangement typical of audio on personal computers, a peripheral sound card incorporating an analog-digital converter acquires audio signals and stores them sequentially via direct memory access (DMA) in a queue of input buffers allocated by an application program.”). Similarly, *Fiedler* discloses that during

playback, “[o]utput buffers are sent, in the order transcribed, to a waveform output device, which in turn routes their contents (via direct memory access (DMA)) through a digital-analog converter to the audio output.” *Fiedler*, 11:44-47. A person having ordinary skill in the art would have understood that direct memory access refers to a controller that reads or writes data to or from memory without the processor. *See, e.g., Tanenbaum* at 18. In my opinion, a person having ordinary skill in the art would have understood that, other than the above references to direct memory access, *Fiedler* discloses or suggests that it is the processor that performs data transfer operations, i.e., transferring from the input buffers to the acquisition buffers, from the original acquisition buffer to the second acquisition buffer, and from the second acquisition buffer to the output buffers.

g. 1.9 and 1.10: “receiving the microphone signal” and “sending a portion of the microphone signal to the audio buffer;”

156. In my opinion, *Fiedler* in combination with *Broussard* discloses or suggests “receiving the microphone signal” and “sending a portion of the microphone signal to the audio buffer.”

157. *Fiedler* discloses that digital audio samples are transferred from input buffers to the original acquisition buffer. EX1007, 3:66-4:4 (disclosing “a microphone feeding a continuous signal to an analog-digital converter, which in

turn passes a train of digital sample values to a set of input buffers. From these the sample train is continuously supplied to a circular set of acquisition buffers.”), 4:10-30 (describing process of acquiring analog audio data from a microphone, converted to digital data at a certain sampling frequency, stored in a circular series of input buffer, and then copied to the acquisition buffers).

158. As I explained in §X.A.1.f(i), a person having ordinary skill in the art would have understood the original acquisition buffer is the “audio buffer.” As I explained above in §X.A.1.d, a person having ordinary skill in the art would have understood that the digital sample values are “the microphone signal” because they were generated from the microphone.

159. *Fiedler*’s Figures 4A and 4B illustrate a transfer process—implemented by the processor in the *Fiedler-Broussard* combination (*see* §X.A.1.f(ii))—and includes a step to “**read sample from input buffer**” and “**write sample**” to the acquisition buffer (blocks 2 and 14). EX1007, FIG. 4A-B. In my opinion, a person having ordinary skill in the art would have understood that the *Fiedler-Broussard* processor reads data from the input buffer and writes data to the acquisition buffer. This is corroborated, for example, by *Fiedler*’s description that “[a]s each input in turn becomes full, an interrupt signal ... is generated” and when the “application program receives this signal,” “the sound data are transferred from that input buffer to acquisition buffers.” *Fiedler*, 4:24-

30. As also explained above in §X.A.1.f(ii), person having ordinary skill in the art would have understood “interrupt signals” to be signals sent to a processor to get the processor to perform some operation. *See Tanenbaum* at 18-19). Thus, a person having ordinary skill in the art would have understood the *Fiedler-Broussard* combination to disclose or suggest the processor receiving an interrupt signal and executing the program instructions to transfer the data to the acquisition buffers.

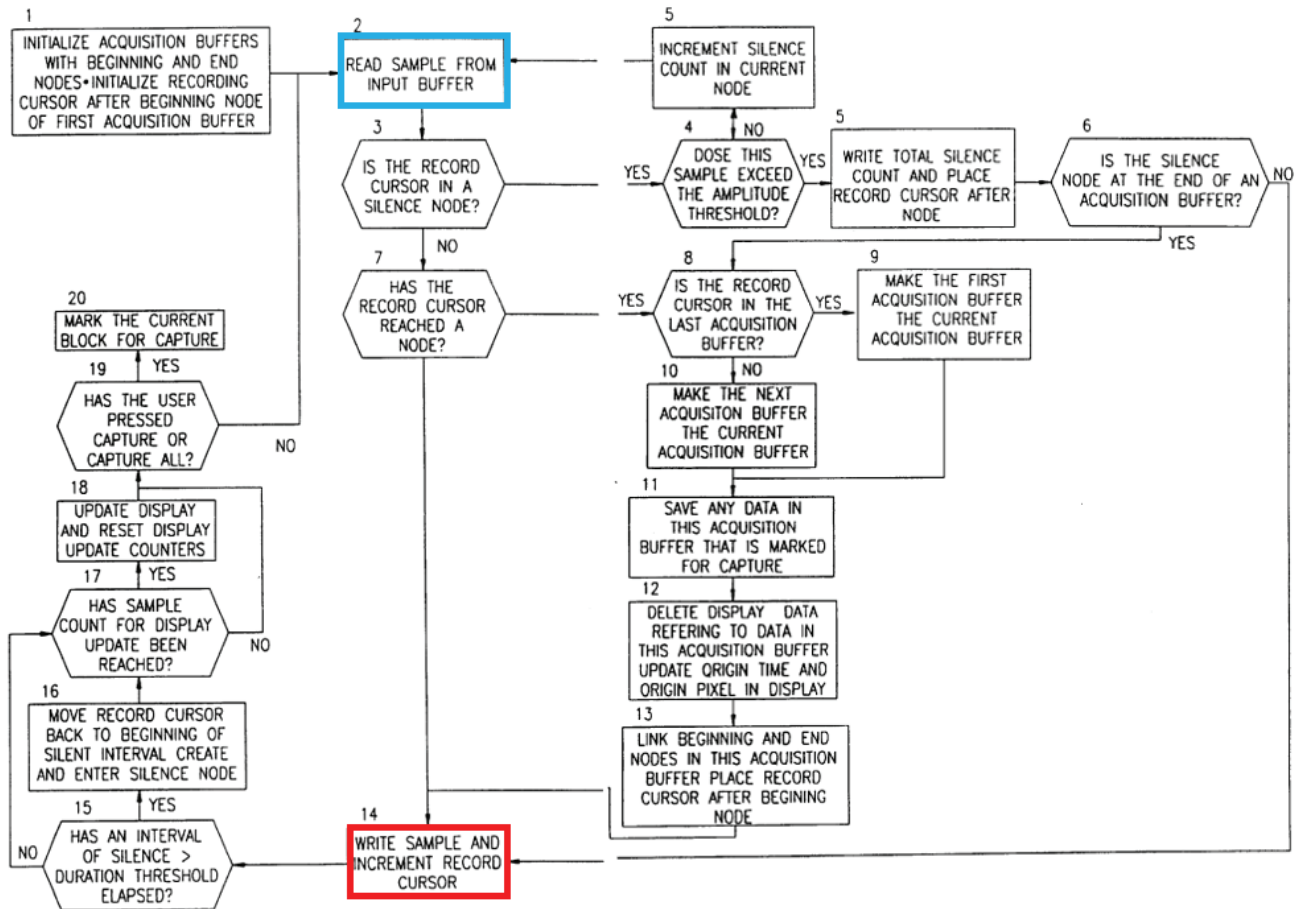


FIG. 4A

FIG. 4B

EX1007, FIGs. 4A, 4B (annotated)

160. Based on my knowledge and experience, a person having ordinary skill in the art would have understood that a processor “reading” the digitized audio samples from the input buffer to constitute “receiving” the digitized audio samples, and the processor transferring (i.e., writing) the digitized audio samples to the acquisition buffer to constitute “sending” the digitized audio samples to the acquisition buffer. Each “sample” is a “portion” of the microphone signal. EX1007 FIGs. 4A-4B.

161. Accordingly, in my opinion, a person having ordinary skill in the art would have understood the *Fiedler-Broussard* combination to disclose or suggest the processor executing instructions to read the digitized audio samples out of the input buffers (“receiving the microphone signal”) and transfer the samples into the original acquisition buffer (“sending a portion of the microphone signal to the audio buffer”).

h. 1.11: “analyzing the audio buffer for detecting a sonic signature;”

162. In my opinion, *Fiedler* in combination with *Broussard* discloses or suggests “analyzing the audio buffer for detecting a sonic signature.”

163. As I summarized above in §VIII.A, *Fiedler* describes “event-activated recording” using a “triggering event” to determine, for example, when to begin transfer from an acquisition buffer to a second acquisition buffer. *See Fiedler*, 6:33-47. *Fiedler* further discloses the triggering event can be

“auditory.” *Id.*, 14:22–26 (“The term ‘events’ includes, without limitation, any auditory or visual events....”). But *Fiedler* does not describe the algorithm used to detect the triggering event in detail and leaves its implementation to a person having ordinary skill in the art.

164. A person having ordinary skill in the art would have been motivated to look for additional information regarding how to implement *Fiedler*’s event-activated recording system and would have readily identified *Broussard*. Specifically, *Broussard* discloses a two-buffer recording scheme similar to *Fiedler*. *Broussard* discloses an “audio buffer 62” and a “temporary buffer” (also called “temporary memory 80”). EX1008 ¶[0021] (disclosing that “[t]he audio buffer 62 is read 92 and processed 94 by the digital audio trigger detection routine(s)” and “[i]f a trigger has been identified 96” the audio data begins to be recorded into “temporary memory 80”), ¶[0024] (referring to “temporary buffer”), FIG. 3.

165. After detection of a trigger in the “audio buffer,” audio data “in and flowing through the buffer memory 62” is recorded into the temporary buffer 80. *Id.* ¶[0019] (describing the “trigger detection subsystems 64” that “uses the data in the buffer 62 to look for triggers in the data that indicate that the incoming signal contains information which should be recorded.”).

166. *Broussard* describes a “signal processing component” named “trigger detection subsystems 64” that “uses the data in the buffer 62 to look for triggers in the data that indicate that the incoming signal contains information which should be recorded.” *Id.* ¶[0020] (“the trigger detection system 64 continues to assess the information coming into the buffer 62”), ¶[0021] (“FIG. 4 and FIG. 5 illustrate the program flow of one embodiment of the trigger detection system. The audio buffer 62 is read 92 and processed 94 by the digital audio trigger detection routine(s).”), ¶[0023] (“Whether or not the trigger is identified the buffer continues to be read 92 and processed 94 by the audio trigger detection routine(s).”).

167. Based on my knowledge and experience, a person having ordinary skill in the art would have understood *Broussard*’s description of processing the audio buffer to “look for triggers in the data” to disclose or suggest the processor “analyzing” the audio buffer for a trigger.

168. *Broussard* discloses various examples of audio triggers, including “record command,” “user start command,” “a proper name,” “numbers spoken,” and/or “key words.” *Id.* ¶[0026] (“FIG. 5 is an illustration of an embodiment of program flow for an audio trigger detection routine. First the digital audio signal from the audio buffer is retrieved 150. If at any time the user inputs a **record command** 146, a detection significance flag is set to high to trigger the main

routines to begin recording.”), ¶[0027] (discussing the detection of silence transition in speech), ¶[0028] (detecting “if there is a change in speakers”), ¶¶[0029], [0030], [0031], FIG. 5.

169. In my opinion, a person having ordinary skill in the art would have understood that a user “record command” or “user start command” is a voice command to start recording because *Broussard* discloses that they are detected in the context of its audio trigger detection routine.

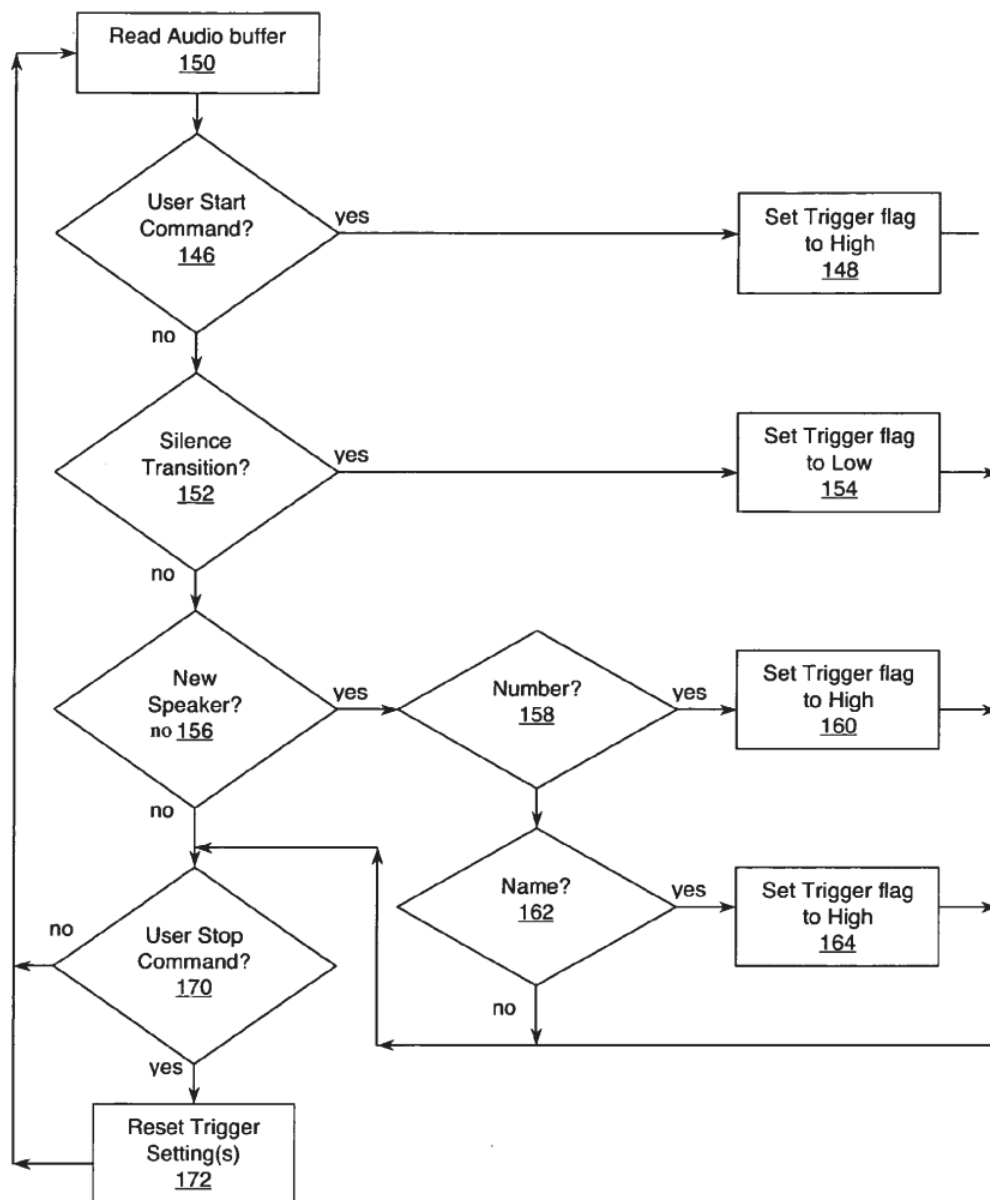


Fig. 5

Broussard, FIG. 5

170. A person having ordinary skill in the art would have understood that analyzing the acquisition buffer for a trigger such as a keyword is consistent with how the '587 patent describes analyzing the audio buffer for a “sonic

signature.” See EX1001, 4:66-67 (“The concept of recognizing sounds is described as Sonic Signature Detection.”), 7:51-52 (“In this example, a sonic signature is acoustic information related to the sounds of a person snoring.”), 9:14-19 (“A user of Hear & Tell™ 232 can record the sound or provide a sound, called herein as a sonic signature”), 22:42-53 (“In at least one exemplary embodiment, a user having communication device 1302 manually or automatically captures and provides a sonic signature to a sonic signature database 1308. For example, a microphone on communication device 1302 is always enabled for receiving sound. *The sound can be stored in a buffer. The sound in the buffer is analyzed and based on a variety of criteria can be configured to be provided to database 1308.* For example, criteria such as sound pressure level, time, frequency of sound, geographic location, *or recognition of a sound (sonic signature detection)* are but a few of the parameters that could be used to determine that the sound in the buffer is worthy of saving.”), 27:38-39 (“A sound 1402 is received by a microphone on cell phone 1404 and stored in a buffer in a record sounds step 1406. The sound in the buffer is analyzed and determined to be saved.”).

171. A person having ordinary skill in the art would have been motivated to implement *Broussard*’s audio buffer analysis technique in *Fiedler* for implementing *Fiedler*’s event-activated recording and would have had a

reasonable expectation of success in doing so. *Fiedler* and *Broussard* describe similar trigger-event activated recording devices. Moreover, *Broussard* provides more detail about what trigger events may initiate capture or preservation, and how they are detected, i.e., by having a processor analyze the buffered audio data for particular sounds such as keywords. EX1008 ¶[0031] (disclosing that “the mention of key words may cause an increase in the detection trigger flag setting”).

172. A person having ordinary skill in the art looking to implement *Fiedler*’s event-activated recording would have readily understood that *Broussard*’s technique of analyzing the audio in a buffer would have been a suitable option for implementing its “event-activated recording” triggering means.

173. Indeed, *Fiedler* already describes recording audio data in the acquisition buffer and processing the audio data to, for example, compare it against amplitude and duration thresholds. EX1007, 7:34-51.

The capture interval, i.e., the time interval that may be captured before the user's decision to record, is a function of the quantity of recording medium and the recording density (i.e., length of recording time stored in a given quantity of recording medium). If captured data, rather than being transferred out of the acquisition buffer, are stored in a newly reserved area of the acquisition buffer, then the capture interval will diminish as this area becomes filled with captured data. Compression algorithms may be employed

concurrently with recording the Sound (as with the silence node scheme described above), and/or on captured data in permanent storage, in order to maximize both the capture interval and the total recording time capacity of the device.

In addition to data compression, captured data may be further processed for quality or compactness, for example via phonetic transcription or any signal-enhancing postprocessing method. (Within practical limits, these techniques may be used on the continuously recorded data as well.)

Id. 7:34-51.

174. In my opinion, a person having ordinary skill in the art would have considered it obvious to implement *Broussard's* audio buffer analysis technique by analyzing *Fiedler's* original acquisition buffer for audio triggers. As evidenced at least by *Broussard* as I cited above, signal processing techniques for detecting audio triggers in buffered audio data were well-known, and therefore, this modification would have been within the skill of a person having ordinary skill in the art to implement.

175. To note, that the audio data in *Broussard's* audio buffer 62 does not undergo processing like *Fiedler's* silence-node scheme would not have dissuaded a person having ordinary skill in the art from implementing *Broussard's* audio buffer analysis technique by analyzing *Fiedler's* original acquisition buffer for audio triggers. A person having ordinary skill in the art would have understood that trigger detection would still work on *Fiedler's* audio data including the silence

nodes. In particular, a person having ordinary skill in the art would have understood that audio triggers would be detected in the audio data that was not replaced by silence nodes, as it is precisely within this non-silent audio data that acoustic trigger events would occur.

176. Therefore, a person having ordinary skill in the art would have considered the combination to amount to use of a known technique (analyzing an audio buffer for a trigger, such as a keyword, to identify portions of audio for potential longer-term storage) to improve similar devices (*Fiedler's* event-activated audio recording device having an acquisition buffer) in the same way (to implement event-activated recording using audio data saved in a buffer).

177. Accordingly, in my opinion, a person having ordinary skill in the art would have understood the *Fiedler-Broussard* combination to disclose or suggest the processor executing instructions to analyze the original acquisition buffer to detect a trigger such as a keyword (“analyzing the audio buffer for detecting a sonic signature”).

i. 1.12: “notifying a user when the sonic signature is detected;”

178. In my opinion, *Fiedler* in combination with *Broussard* discloses or suggests “notifying a user when the sonic signature is detected.”

179. As I summarized above in § VIII.B, *Broussard* discloses that “[i]f triggers are detected, a signal 66 is sent to the user control interface 68 which

provides feedback to the user though [sic] the control input/output 70 that the system recommends starting to record a new audio segment,” and “[i]f the user assents by inputting an affirmative response in the control I/O 70, then the control interface 68 signals that the data in and flowing through the buffer memory 62 be recorded into a temporary memory section 80 and through to an Extended audio segment 46.” EX1008 ¶[0019].

180. Most notably, *Broussard* discloses that “[i]f a trigger has been identified 96 and if the system is not already recording 98 then the temporary memory 80 begins to record ... and, if the trigger significance value is above a predetermined value 102, then a signal is generated to alert the user” for certain triggers. *Id.* ¶[0021]. And the alert may be in the form of “notifying user of potentially recordable event.” *Id.* Claim 1.

181. A person having ordinary skill in the art would have understood where *Broussard* discloses processing trigger detection routine(s) and alerting the user, that these actions are performed by the processor. EX1008 ¶[0021], FIGs 4-5.

182. A person having ordinary skill in the art would have been motivated to further incorporate *Broussard*’s teaching of providing an alert, notification and user feedback into the *Fiedler-Broussard* combination and would have had a reasonable expectation of success in doing so. In my opinion,

a person having ordinary skill in the art would have understood that it would have been helpful to do so because audio trigger detection systems may be prone to detection errors, such as false recognitions. For example, automatic speech recognition systems may falsely determine that a particular user utterance corresponds to a particular command. This is corroborated, for example, by *Cohrs*, which explains:

Like all automatic speech recognition systems, speech command systems are subject to an error commonly known as false recognition. False recognition occurs when a speech command system incorrectly identifies a user's utterance as a particular verbal command. For example, if the user is speaking to another person while using the speech command system, one of the user's phrases may be incorrectly interpreted by the speech command system as a verbal command. In cases where a verbal command includes or activates an additional command operator, false recognition of verbal commands can have significant effects. For example, a telephone equipped with a speech command recognition system for placing calls will typically have a verbal command "call" that directs the telephone system to place a call and a command operator set of one or more names with associated telephone numbers to which the call is to be placed. Thus, to place a call to a person named Bill King using a speech recognition-equipped telephone, the user simply speaks "call Bill King" to thereby instruct the telephone to dial Bill King's telephone number. However, if the same user were to tell another person

“You should call Bill King tomorrow” when the user is in close proximity to the telephone, then this speech may be incorrectly interpreted and acted upon as a verbal command to dial Bill King's telephone number, causing the user (and perhaps Bill King) inconvenience and unnecessary expense.

EX1013, 1:58-2:15. In addition, because *Broussard* discloses audio triggers that may not be an explicit user input, such as a name or keyword, and a person having ordinary skill in the art would have understood the importance of notifying the user when the device changed operation.

183. To address the problem of false recognition *Cohrs* explains that known systems would prompt the user to confirm the command by saying “yes” or “no.” *Id.*, 2:16-23. *Cohrs* explains that such a solution is “workable,” and purports to disclose another solution. *Id.*, 2:23-56.

184. Based on my knowledge and experience, a person having ordinary skill in the art would have understood that *Broussard*'s user-feedback technique would alleviate the problem of false recognition by asking the user to confirm the decision to make a recording.

185. Moreover, a person having ordinary skill in the art would have further understood that *Broussard*'s technique would be helpful because *Fiedler* teaches the preservation of “events selected by [the] user,” (EX1007, Claim 1), and a person having ordinary skill in the art would have understood *Broussard*'s

technique to enable the user to timely select recordings that included detected triggers for recall or preservation.

186. Therefore, a person having ordinary skill in the art would have considered the combination to amount to the use of a known technique (*Broussard*'s user-feedback technique, notification, and alerting) to improve similar devices (*Fiedler*'s event-activated recording system) in the same way (to reduce the risk of false detections and recordings and allow timely preservation or recall of events).

187. Accordingly, in my opinion, a person having ordinary skill in the art would have understood the *Fiedler-Broussard* combination to disclose or suggest the processor executing instructions to alert or prompt the user (e.g., by cueing the user) when a trigger event was detected ("notifying a user when the sonic signature is detected.").

j. 1.13: "sending a modified microphone signal to the data buffer replacing or adding to previous data stored in the data buffer; and"

188. In my opinion, *Fiedler* in combination with *Broussard* discloses or suggests "sending a modified microphone signal to the data buffer replacing or adding to previous data stored in the data buffer."

189. *Fiedler* discloses transferring data from an acquisition buffer to a second acquisition buffer. *Fiedler*, 6:42-44 ("[T]he portion of the acquisition

buffer contents leading up to the triggering event may be transferred to a second acquisition buffer...”). *Fiedler* further explains that the device will “continu[e] to record in the [original] acquisition buffer the triggering event and the events following the triggering event,” and, “[c]oncurrently with this continuous recording, copying the appropriate portions of the [original] acquisition buffer contents to the ... second acquisition buffer.” *Fiedler*, 6:55-63.

190. As I explained above in §§X.A.1.f(i)(a) and X.A.1.g, a person having ordinary skill in the art would have understood that the audio data initially written to the original acquisition buffer correspond to at least a portion of the microphone signal.

191. *Fiedler* also discloses modifying the audio data after writing it to the acquisition buffer but before sending it to the second acquisition buffer. Specifically, Figures 4A and 4B disclose that, after each sample of audio data is initially written to the acquisition buffer, the amplitude and duration thresholds are checked, and “[w]hen a sufficient interval of silence has been detected, the recording cursor goes back to the beginning of the sequence of amplitude values in the acquisition buffers corresponding to this interval and writes a silence node there (**blocks 15-16**).” *Id.*, 6:1-10.

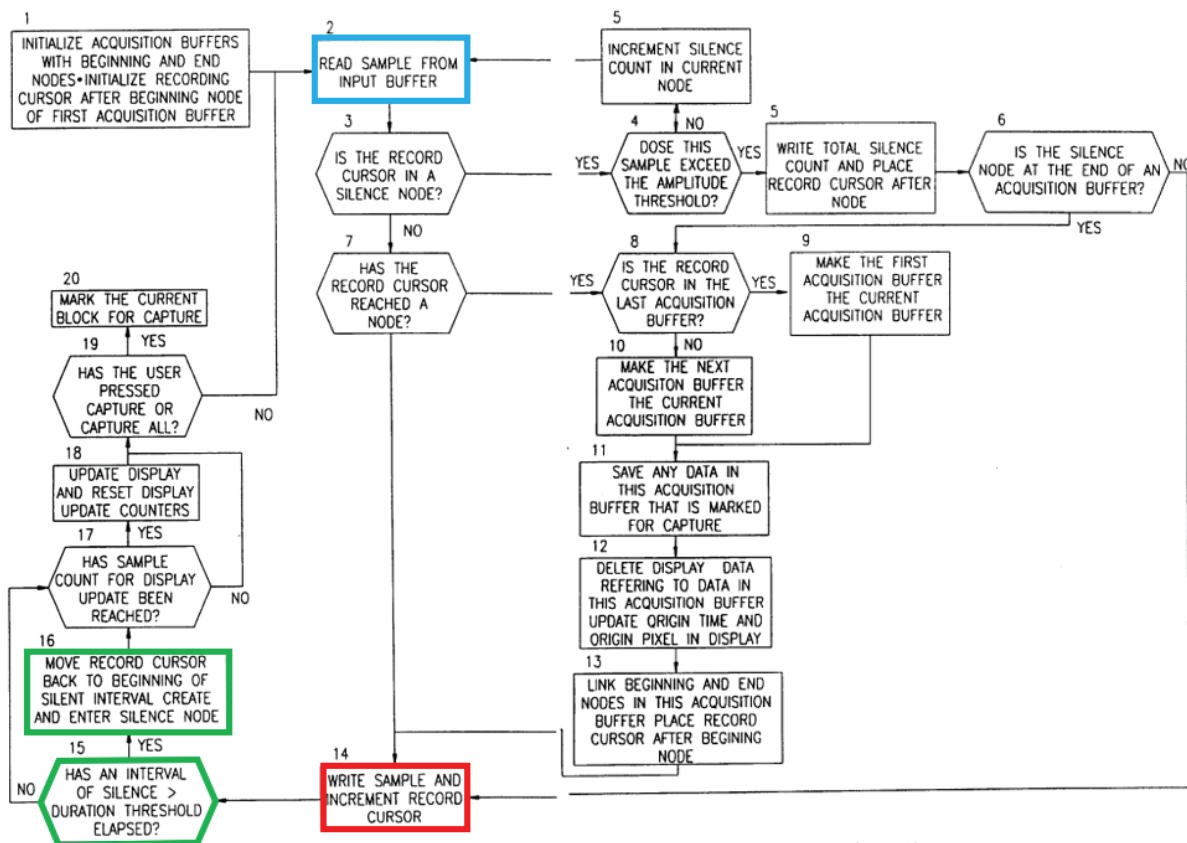


FIG. 4A

FIG. 4B

EX1007, FIGs. 4A, B (annotated)

192. A person having ordinary skill in the art would have understood that *Fiedler*'s silence node scheme “modifies” the captured data (i.e., the microphone signal) because it replaces parts of the captured data with a silence node.

193. Based on my background and experience, a person having ordinary skill in the art would have understood *Fiedler* to disclose or suggest that when the modified audio data in the original acquisition buffer is transferred to the second acquisition buffer (“data buffer”), the transferred data replaces or adds to

data previously stored in the second acquisition buffer. For example, *Fiedler* explains that the acquisition buffers are overwriteable and designed to permit recording in a “continuous logical loop.” EX1007, 1:36-40, 1:63-2:1 (“The present invention overcomes this drawback by providing an acquisition buffer (of a rewritable recording medium) in which current events are continuously recorded. When the recording process fills the acquisition buffer, it overwrites the record of the earliest events recorded in the buffer with current events.”); *see also id.*, 2:38-44, 6:19-32.

194. This is consistent with how the ’587 patent describes this feature, as the ’587 patent describes the “data buffer can be a circular buffer that temporarily stores audio sound.” EX1001, 21:5-7 (“It should also be noted that the data buffer can in one configuration reside on the processor 1206 to provide high speed data access.”). Specifically, based on my knowledge and experience, a person having ordinary skill in the art would have understood a circular buffer to be a buffer that forms a logical loop, like *Fiedler*’s acquisition buffers, and in which old data is overwritten after the buffer is filled. *See* EX1023 ¶[0030] (“As is known, the terms ‘circular buffer’ or ‘ring buffer’ refer to a commonly used programming method in which a region of memory is managed by a software module so that when the region has been filled with incoming data, new data is written beginning again at the start of the memory region.”) Thus, a person

having ordinary skill in the art would have understood *Fiedler* to disclose that the modified microphone signal transferred from the original acquisition buffer to the second acquisition buffer will be “replacing or adding to previous data stored” in the second acquisition buffer.

195. As a separate and independent example, a person having ordinary skill in the art would have understood that the transfer in *Fiedler* of audio data from the original acquisition buffer to the second acquisition buffer would not occur instantaneously and audio data is transferred from the original buffer to the second buffer in sequence. For example, *Fiedler* discloses that it continues to concurrently record to an acquisition buffer and copy from the acquisition buffer to the second acquisition buffer until “the copying process has caught up with the direct record process by reaching the present moment.” *Fiedler*, 6:64-67. Thus, a person having ordinary skill in the art would have understood that the process of transferring audio data from the original acquisition buffer to the second acquisition buffer involves sending audio data to the second acquisition buffer in sequence, each portion adding to audio data that was previously stored in the second acquisition buffer.

196. Based on my knowledge and experience, a person having ordinary skill in the art would have understood that transferring audio data from the original acquisition buffer to the second acquisition buffer requires the processor

to retrieve the modified audio data (“a modified microphone signal”) from the initial acquisition buffer and send it to the second acquisition buffer (“data buffer”). Moreover, a person having ordinary skill in the art would have understood *Fiedler-Broussard* to disclose or suggest the processor executing program instructions to transfer the data from the original acquisition buffer to the second acquisition buffer because *Fiedler* at least suggests it is a processor that writes data into the acquisition buffers (*see* §X.A.1.f(ii)) and *Fiedler* does not state that it is done, for example, by direct memory access.

197. Accordingly, in my opinion, a person having ordinary skill in the art would have understood the *Fiedler-Broussard* combination to disclose or suggest the processor executing instructions to transfer (“sending”) audio data that has been interspersed with silence nodes (“a modified microphone signal”) in sequence from the original acquisition buffer to a second acquisition buffer (“to the data buffer replacing or adding to previous data stored in the data buffer”).

- k. **1.14: “sending a portion of the data stored in the data buffer, spanning a time period, to the speaker in response to a user request, wherein the user request is one of the sonic signature that is a voice command or a manual input from the user interface.”**

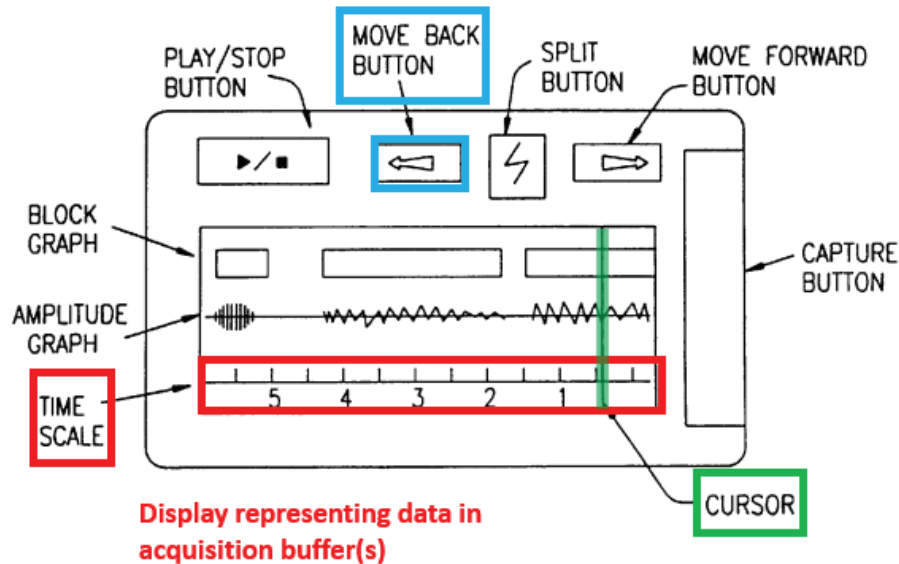
198. In my opinion, *Fiedler* in combination with *Broussard* discloses or suggests “sending a portion of the data stored in the data buffer, spanning a time

period, to the speaker in response to a user request, wherein the user request is one of the sonic signature that is a voice command or a manual input from the user interface.”

199. *Fiedler* discloses that the second acquisition buffer “will be used in place of the original acquisition buffer for all purposes described below,” including “for recall,” i.e., playback. EX1007, 6:42-47 (“Alternatively, the portion of the acquisition buffer contents leading up to the triggering event may be transferred to a second acquisition buffer, which will be used in place of the original acquisition buffer for all purposes described below, including the presentation of data to the user for selection for recall and/or preservation.”); *see also id.*, 7:56 (equating “recall” with “play back”). Thus, a person having ordinary skill in the art would have understood *Fiedler*’s disclosure relating to playback of audio data stored in an acquisition buffer to be applicable to the “second acquisition buffer” after detection of a triggering event.

200. Further, I note that *Fiedler* explains that the acquisition buffer may hold “minutes and/or seconds” of audio data. EX1007, 7:60-64 (“A horizontal time scale marked in minutes and/or seconds, representing the positions in time relative to the current time of data in the acquisition buffers. (Alternatively, this scale may be marked with absolute time-of-day markings.)”). As further illustrated by the time scale in Figure 3, which runs from 0 to at least 5, a person

having ordinary skill in the art would have understood *Fiedler* to disclose storing at least 0-5 “minutes and/or seconds” of audio data in the acquisition buffer. *Id.*



EX1007, FIG. 3 (annotated)

201. *Fiedler* discloses that a user can trigger playback by pressing the “Move Back” button, which moves a user interface cursor backward through the recorded audio in the acquisition buffer. EX1007, 8:46-59. *Fiedler* explains that the user may move the cursor back to the beginning of the current block of audio or further back, arbitrarily as the user wishes. *Id.* (If the “move back” button is held down, it “[m]oves the cursor continuously backward within the current block and previous blocks, as long as it is held down. (Optionally, plays back in reverse through this.) Normal playback continues when the button is released”). Thus, a person having ordinary skill in the art would have understood *Fiedler* to disclose or suggest that the user can arbitrarily trigger playback of anywhere

from, for example, 0–5 minutes or seconds of audio stored in the second acquisition buffer. *Fiedler*, 7:60-64 (“A horizontal time scale marked in minutes and/or seconds, representing the positions in time relative to the current time of data in the acquisition buffers. (Alternatively, this scale may be marked with absolute time-of-day markings.)”).

202. Based on my background and experience, a person having ordinary skill in the art would have understood a “user request” encompasses a user pressing the “Move Back” button, because the user’s press of the button is a request from the user to playback the data.

203. As I explained above in §X.A.1.f(i)(b), *Fiedler* discloses that, during playback, in a scheme analogous and in reverse to the recording scheme, the audio data in the second acquisition buffer is transcribed to a queue of output buffers. EX1007, 11:33-44 (“Playback is achieved by means of a scheme analogous (in reverse) to the recording scheme: The Place represented by the current pixel record (as indicated by the current cursor position) is found in the acquisition buffer, and the audio data following it is transcribed to a queue of output buffers allocated by the application program. In the transcription process, audio data are transcribed identically and silence nodes are expanded to their full durations, the intervals stored as silence nodes may be filled with zero-amplitude values or with a dithering waveform containing values differing from zero by no

more than the amplitude threshold (FIG. 6, block 37).”). And next, the output buffers “are sent, in the order transcribed, to a waveform output device, which in turn routes their contents (via direct memory access (DMA)) through a digital-analog converter to the audio output.” *Id.*, 11:44-47.

204. As discussed in §X.A.1.f(ii), in my opinion, a person having ordinary skill in the art would have understood the *Fiedler-Broussard* combination to disclose or suggest that it is the processor that transfers the audio data from the second acquisition buffer to the output buffers. This is corroborated, for example, by the fact that *Fiedler* discloses that playback occurs in a scheme analogous to and in reverse to the recording scheme. As detailed in §X.A.1.g, the *Fiedler-Broussard* combination discloses or suggest that, in the recording scheme, the processor reads audio data from the input buffer and writes it to the acquisition buffer. A person having ordinary skill in the art would have understood that performing that process in reverse to mean reading data from the acquisition buffer and writing it to the output buffer. It is also noteworthy that *Fiedler* explains that the audio data that are already in the output buffers are sent to waveform output device and routed to the audio output via direct memory access. That is, *Fiedler* **does not** say that the audio data is transferred to the output buffers by direct memory access, which further suggests that it is done by the processor. And it makes sense that direct memory access is

used to route the audio data from the output buffers to the audio output because that operation is time synchronous with the playback of audio samples through the waveform output device, and the waveform output device has that timing information.

205. As I explained in §X.A.1.e, a person having ordinary skill in the art would have understood *Fiedler* to disclose that the “audio output” is a speaker. *See also id.*, 4:4-9 (disclosing that “parts of the contents of the acquisition buffers may, by means of user controls, be played back through an output transducer such as a speaker”), 8:21-23 (“A speaker, earphone or similar transducer or line output is provided for the purpose of playing back data in the acquisition buffers.”), FIG. 1 (illustrating a speaker). Thus, transferring the audio data from the second acquisition buffer to the output buffers would have been understood by a person having ordinary skill in the art to constitute sending the audio data “to the speaker” because the data in the output buffers is ultimately sent to the speaker for playback.

206. Because *Fiedler* discloses that the user can arbitrarily trigger playback of anywhere from, for example, 0–5 minutes or seconds of audio stored in the second acquisition buffer, a person having ordinary skill in the art would have understood that the audio data transcribed to the output buffer that is

ultimately sent to a waveform output device and the audio output, spans the time period selected by the user.

207. Accordingly, in my opinion, a person having ordinary skill in the art would have understood the *Fiedler-Broussard* combination to disclose or suggest the processor executing instructions to send at least 0-5 minutes or seconds of audio data in the second acquisition buffer to an output buffer that is ultimately sent to a waveform output device and the audio output (“sending a portion of the data stored in the data buffer, spanning a time period, to the speaker”) when the user presses the Move Back button on the user interface (“in response to a user request, wherein the user request is ... a manual input from the user interface.”).

2. **Claim 3 (“The system according to claim 1, wherein the time period is less than 30 minutes”), Claim 4 (“The system according to claim 1, wherein the time period is less than 15 minutes.”), and Claim 12 (“The system according to claim 1, wherein the time period is less than 1 minute.”)**

208. In my opinion, *Fiedler* in combination with *Broussard* discloses or suggests claims 3, 4, and 12.

209. As I explained above in §X.A.1.k, *Fiedler* discloses that a user can chose to start playback by moving a cursor to a recorded block, and the playback, may span 0-5 “minutes and/or seconds.” *See also Fiedler* 7:60-64 (“A horizontal time scale marked in minutes and/or seconds, representing the

positions in time relative to the current time of data in the acquisition buffers. (Alternatively, this scale may be marked with absolute time-of-day markings.)”), 8:46-9:34 (discussing the controls and operation of the cursor, playback and capture), FIGs. 3, 6, 7; *supra* §VIII.A (for my description and explanation of these functions). Of note, the smallest depicted recorded block on Figure 3 is less than one unit, whether the time scale is in seconds or minutes. In particular, at the top of the display on Figure 3, there is a “BLOCK GRAPH.” EX1007, FIG. 3. The smallest block displayed in this row is less than one (minute or second). *Id.* *Fiedler* contemplates that a user would move the cursor to the beginning of any of these blocks to play back that block. *See id.* 4:45-50. Thus, a person having ordinary skill in the art would have understood that *Fiedler* discloses the user playing back, e.g., 5 seconds of audio, which is less than 1, 15 and 30 minutes.

210. Accordingly, in my opinion, a person having ordinary skill in the art would have understood the *Fiedler-Broussard* combination to disclose or suggest the processor executing instructions to send seconds (e.g., 5 seconds) of audio data in the second acquisition buffer to the speaker (“wherein the time period is less than 30 minutes,” “wherein the time period is less than 15 minutes,” “wherein the time period is less than 1 minute”).

B. GROUND 1B: *FIEDLER* IN COMBINATION WITH *BROUSSARD* AND *VICTORIAN* RENDERS OBVIOUS CLAIMS 5-9

1. Motivation to combine *Fiedler* and *Broussard* with *Victorian*

211. A person having ordinary skill in the art would have been motivated to modify the *Fiedler-Broussard* combination to use *Victorian*'s wireless earpiece and would have had a reasonable expectation of success in doing so.

212. *Fiedler* discloses that a “speaker, earphone *or* similar transducer” is “provided for the purpose of playing back data in the acquisition buffers.” EX1007, 8:21-23. My opinions in Ground 1A rely on *Fiedler*'s disclosure of a “speaker” in Ground 1A for claim 1 (*see* §X.A.1.e). By the 2008 timeframe, pairing an audio device that had its own speaker with an earphone as an additional speaker was known. This is corroborated, for example, by *Batson*, which states, “many computing devices also have multiple possible outputs for playback of the media” and “a handheld computing device may have a line out port, a headphone port, a docking port, and multiple speakers, each of which may serve a different function and have different capabilities.” EX1018, 1:35-40.⁴

⁴ To be clear, I am relying on *Batson* as evidence of the knowledge of a person having ordinary skill in the art and it is not part of the unpatentability ground 1B.

213. Based on my knowledge and experience, a person having ordinary skill in the art would have been familiar with the advantages of that arrangement, such as providing the user the flexibility to use the audio device speaker in some contexts and the earpiece speaker in other contexts, such as for private listening in public spaces. Thus, in my opinion, despite *Fiedler* disclosing *either* a speaker or earphone, a person having ordinary skill in the art would have been motivated to modify the *Fiedler*-Broussard combination to incorporate *both* a speaker and an earphone (as opposed to having a speaker and earphone as alternatives). A person having ordinary skill in the art would have understood such a combination to include the components described above in claim 1 for the *Fiedler*-Broussard combination, including the speaker and a processor and memory with relevant instructions for replaying audio at the speaker as required for element [1.14], and would also have an earpiece *and* additional instructions to send audio to the earpiece when the earpiece is wirelessly connected.

214. The modification to the *Fiedler*-Broussard combination would have amounted to applying a known technique (adding an earpiece) to a known device (the *Fiedler*-Broussard combination with a speaker) ready for improvement (*Fiedler* already discloses compatibility with an earphone) to yield

predictable results (the *Fiedler-Broussard* combination with an earphone in addition to a speaker).

215. Based on my background and experience, by at least as early as the 2008 timeframe, a person having ordinary skill in the art would have been aware of a design trend of using wireless earpieces and would have been aware of the various advantages of using a wireless earpiece, such as reduced obtrusiveness. *Id.* This is corroborated, for example, by *Zellner*, which is directed to improvements in wireless earbuds. EX1018, 1:7-35.⁵ As background, *Zellner* explains that “[u]sers of audio sources, such as personal audio and communications devices, typically use some form of a headset or earbud in order to maintain privacy and/or to avoid annoying bystanders.” *Id.*, 1:11-14. And *Zellner* explains that “earbuds and headsets [had] advanced so that the ultimate connection to the audio source may be wireless,” and “[u]sers often prefe[rred] a wireless earbud because there is little structure to wear, and, in some cases, the earbud may be nearly unnoticeable while being worn.” *Id.*, 1:15-20. *Zellner* further notes that wireless earbuds were “becoming commonplace” because “users desire handsfree operation and no clutter from wires.” *Id.*, 1:21-23. *Zellner* goes on to explain that wireless earbuds could be improved, for example,

⁵ To be clear, I am relying on *Zellner* as evidence of the knowledge of a person having ordinary skill in the art and it is not part of the unpatentability ground 1B.

by giving them the ability to provide stereo sound over the wireless connection.
Id., 1:23-39.

216. Furthermore, *Fiedler* discloses implementing its techniques in a portable device or wrist watch (EX1007, 13:11-14:15), and a person having ordinary skill in the art would have understood the particular advantages of using a wireless earpiece with such devices, as the absence of wires is even more convenient with mobile form factors.

217. A person having ordinary skill in the art also would have been aware of wireless earpieces including an ear canal receiver, ear canal microphone, and ambient sound microphone, such as that disclosed by *Victorian*. *Victorian* is directed to an “ear-level communication system” that “allow[s] private, hand-free use” of a remote device such as a computer, a personal digital assistant or a cellular phone. *Victorian* ¶[[0002]; see also *id.*, Abstract, ¶¶[0008], [0009], [0016]. The ear-level device may be used as an “ear piece wirelessly extended from the remote device.” *Id.* ¶[0016].

218. In Figure 4A, *Victorian* discloses an embodiment that includes an ear-level device “that wirelessly communicates to a remote device such as ... a cellular phone. *Id.* Abstract. The ear-level device includes “an external microphone 420, an ear canal microphone 440, an [e]ar canal speaker 470 [and] a wireless transceiver 450.” *Id.* ¶[0030]. The “[e]xternal microphone 420

picks up ambient sound such that a hearing impaired person wearing ear-level device 110 is not ‘isolated’ when communicating to remote device 190.” *Id.* Further, the “ear canal microphone 440 detects sound from the ear canal,” including speech from the user, and the “[e]ar canal speaker 470” can play sound from a remote device or the external microphone. *Id.*

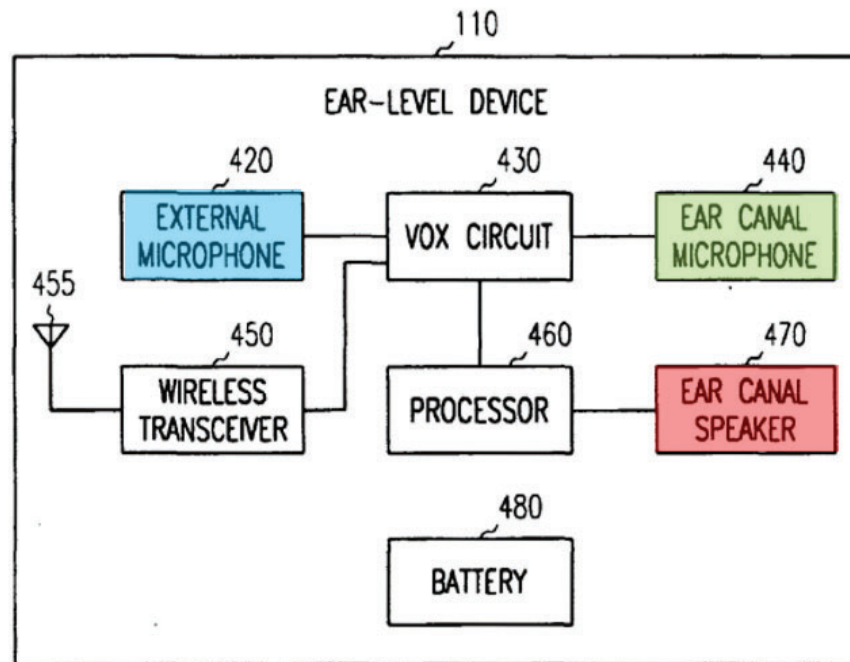


FIG. 4A

EX1009, FIG. 4A (annotated)

219. In my opinion, a person having ordinary skill in the art would have considered modifying the *Fiedler-Broussard* combination to further include *Victorian*’s teaching of a wireless ear-level device to amount to combining prior art elements (the *Fiedler-Broussard* combination with *Victorian*’s wireless ear-level device) according to known methods (a person having ordinary skill in the

art was very familiar with techniques for implementing wireless communication with an earpiece) to yield predictable results (the *Fiedler-Broussard-Victorian* combination comprising an audio device and a wireless earpiece).

220. In my opinion, a person having ordinary skill in the art also would have considered the combination to amount to the applying a known technique (*Victorian's* wireless ear-level device) to a known device (the *Fiedler-Broussard* device) ready for improvement (*Victorian* discloses that its earpiece can be used with a variety devices including devices like the *Fiedler-Broussard* combination) to yield predictable results (the *Fiedler-Broussard-Victorian* combination comprising an audio device that communicates wirelessly with an earpiece).

221. A person having ordinary skill in the art also would have considered the combination to amount to following a well-known design incentive or market force to implement a wireless earpiece with an audio device.

222. Accordingly, in my opinion, the *Fiedler-Broussard-Victorian* combination discloses or suggests the *Fiedler-Broussard* device wirelessly connected with *Victorian's* ear-level device.

2. **Claims 5-7: Claim 5 (“The system according to claim 1, wherein the audio device is wirelessly connected to an earpiece.”); Claim 6 (“The system according to claim 5, wherein the earpiece includes: an ambient sound microphone; and an ear canal receiver.”); Claim 7 (“The**

system according to claim 6, wherein the earpiece further includes: an ear canal microphone.”)

223. In my opinion, *Fiedler* in combination with *Broussard* and *Victorian* discloses or suggests claims 5-7. As I explained above in §X.B.1, the *Fiedler-Broussard-Victorian* combination discloses or suggests the *Fiedler-Broussard* device wirelessly connected with *Victorian*’s ear-level device.

224. *Victorian*’s ear-level device may be used as an “ear piece” and “wirelessly communicates” and exchanges wireless signals with a remote device such as a computer, PDA, or cellular phone. *Victorian* ¶¶[0009] (“The earmold houses a microphone for use in an ear canal, a processor, and a wireless transmitter. The microphone receives an occluded sound from about the ear canal. The processor processes the occluded sound. The wireless transmitter receives the processed occluded sound from the processor and transmits a wireless signal representing the occluded sound.”), [0016] (“When being used as an ear piece wirelessly extended from the remote device, such system allows an individual with normal hearing to privately communicate with or through the remote device without the need of holding the device or wearing any device wired to the remote device”); [0030] (“Ear-level device 110 includes an external microphone 420, an ear canal microphone 440, an ear canal speaker 470, a processor 460, a wireless transceiver 450, an antenna 455, a voice operated exchange (VOX) circuit 430, and a battery 480.”). A person having ordinary

skill in the art would have understood that for *Victorian*'s ear-level device to wirelessly communicate with a remote device, it is wirelessly connected to the remote device.

225. *Victorian*'s "[e]xternal microphone 420 picks up ambient sound such that a hearing impaired person wearing ear-level device 110 is not 'isolated' when communication to remote device 190 [and] enables the hearing impaired person to talk ... through a device such as a cell phone." EX1009 ¶[0030]. I find this description to be consistent with how the '587 patent describes an "ambient sound microphone." EX1001, 17:64-65 ("The earpiece includes an Ambient Sound Microphone (ASM) 1120 to capture ambient sound."); *see also id.*, 18:31-33 ("Ambient sound microphone 1120 receives ambient sound from the ambient environment around the user.")

226. *Victorian*'s "Ear canal speaker 470 transmits sound received from remote device 190 and/or external microphone 420 to the same ear canal." *Id.* ¶[0030]. I find this to be consistent with how the '587 patent describes an "ear canal receiver." EX1001, 17:64-66 (requiring only that "an Ear Canal Receiver (ECR) 1114 to deliver audio to an ear canal 1124" not even necessarily located in the ear canal); *see also id.*, 8:13-19 (disclosing that the sounds are "reproduce[ed] within the ear canal," but not requiring that the ECR need be located in the ear canal).

227. And *Victorian*'s "Ear canal microphone 440 detects sound from the ear canal." EX1009 ¶[0030]. I find this to be consistent with how the '587 patent describes an "ear canal microphone." '587*Pat.*, 17:67-18:1 (disclosing "an Ear Canal Microphone (ECM) 1106 to capture and assess a sound exposure level within the ear canal 1124").

228. Accordingly, a person having ordinary skill in the art would have understood the *Fiedler-Broussard-Victorian* combination to disclose or suggest the *Fiedler-Broussard* combination wirelessly connected to the *Victorian* ear-level device ("wherein the audio device is wirelessly connected to an earpiece"), wherein the ear-level device includes an external microphone ("wherein the earpiece includes: an ambient sound microphone; and) and a speaker ("an ear canal receiver") and also includes an ear canal microphone ("wherein the earpiece further includes an ear canal microphone").

3. Claim 8 ("The system according to claim 7, wherein the operation of notifying the user sends a notification signal to the ear canal receiver.")

229. In my opinion, *Fiedler* in combination with *Broussard* and *Victorian* discloses or suggests "[t]he system according to claim 7, wherein the operation of notifying the user sends a notification signal to the ear canal receiver."

230. As I explained above in §X.A.1.i, a person having ordinary skill in the art would have understood the *Fiedler-Broussard* combination to disclose or suggest the processor executing instructions to alert or prompt the user (e.g., by cueing the user) when a trigger event was detected (“notifying a user when the sonic signature is detected.”).

231. *Broussard* discloses using “a speaker system 16 for converting an electronic audio signal in to an auditory signal sound,” which may be “auxiliary” and “plugged in when desired.” EX1008 ¶[0012]. *Broussard* discloses that “the speaker system 16 is also employed to cue the user,” e.g., “for input.” *Id.*

¶[0013] (“In most of the embodiments described herein the speaker system 16 is also employed to cue the user as will be described in greater detail below. ...

This visual output 18 can take many forms and can provide various levels of system status information to the user. It may indicate that the system is active; it ***may cue the user for input in addition to or independent from the speaker system*** as mentioned above.”). Thus, a person having ordinary skill in the art would have understood *Broussard* to disclose or suggest audibly cueing the user through the speaker.

232. A person having ordinary skill in the art would have been motivated to use *Victorian*’s ear canal speaker to implement *Broussard*’s audible alert or cue because it would have been a less obtrusive way of prompting the user than

outputting the cue through the speaker of the audio device. More specifically, a person having ordinary skill in the art would have understood that there are some contexts in which a user of the *Fiedler-Broussard* device would not want the cue to be played publicly. For example, a person having ordinary skill in the art would have known that one known application of recording devices like the *Fiedler-Broussard* device is for live meetings and/or classroom lectures. This is corroborated, for example by *Le* and *Heckerman*.⁶ For example, *Le* describes a system similar to *Fiedler* and *Broussard* that allows a user to “passively record data of certain events that the user may recall at a later time.” EX1014 ¶[0012]. The system may be used to record live conversations with another person, or at a meeting. *Id.* ¶¶[0035], [0040], [0041]. *Heckerman* is another example of a similar device. *Heckerman* discloses a “recording system and method that facilitates recording live meetings, discussions or conversations whereby such recordings are available for immediate or near immediate playback is provided.” *Heckerman*, Abstract.

233. Based on my background and experience, a person having ordinary skill in the art would have understood the importance of using unobtrusive notifications in the settings described by *Le* and *Heckerman*, both of which were

⁶ To be clear, I am relying on *Le* and *Heckerman* as evidence of the knowledge of a person having ordinary skill in the art and they are not part of the unpatentability ground 1B.

well-known and predictable use-cases for the *Fiedler-Broussard* combination.

This is corroborated, for example, by *Parker*. See EX1019(*Parker*) ¶[0004]

(pointing out that certain notifications, such as a “chime,” “may not be appropriate when the user is in a meeting”).⁷

234. And if a user of the *Fiedler-Broussard* device was trying to record a live meeting or a class lecture, a person having ordinary skill in the art would have understood that it would be less obtrusive to prompt the user through the earpiece receiver than through the speaker of the device because the notification would be audible to the user through the earpiece, and not audible to others through the speaker. This is corroborated, for example, by *Andreasson*, which discloses a technique to selectively output event notifications to an earphone, thus “limiting the disturbance to the environment whenever it is possible.” *Andreasson* ¶[0049].⁸ *Victorian* also discloses that earpieces were used for “private” communication with a remote device. *Victorian* ¶[0002](ear-level communication systems “allow private, hand-free use of such a communication device by individuals with normal hearing”); ¶[0008](“Such a system also functions as an ear piece wirelessly extended from the remote device that allows

⁷ To be clear, I am relying on *Parker* as evidence of the knowledge of a person having ordinary skill in the art and it is not part of the unpatentability ground 1B.

⁸ To be clear, I am relying on *Andreasson* here as evidence of the knowledge of a person having ordinary skill in the art and they are not part of the unpatentability ground 1B. *Andreasson* is part of the unpatentability ground 1C.

an individual to privately communicate with or through the remote device without the need of holding the device.”); ¶[0016](“When being used as an ear piece wirelessly extended from the remote device, such system allows an individual with normal hearing to privately communicate with or through the remote device without the need of holding the device or wearing any device wired to the remote device.”).

235. Moreover, a person having ordinary skill in the art would have been aware of techniques for sending sending an audible notification to an earpiece. For example, *Andreasson* discloses “a method for selecting audio output units for an application within portable electronic device and for driving audio output units.” EX1010 ¶[0045], FIGs. 1-5. Using this method, *Andreasson*’s control unit “determines that the hands-free device 18 is connected to the system connector 16 of the phone,” which “may be done ... through detecting that the earphone is electrically connected.” *Id.* ¶[0046]. And if “the hands-free device 18 is not connected, the control unit 36 uses the ordinary audio output units of the phone for alerting a user.” *Id.* Next, *Andreasson* determines whether or not the earphone is in the ear to determine if it is to select audio from the earphone or phone speaker. *Id.* ¶¶[0047]-[0048], FIG. 5; *see also id.* ¶[0049] (determining if earphone is attached to body before selecting audio output), ¶[0050]

(describing the control unit functionality including microprocessor and program code).

236. Another example showing that a person having ordinary skill in the art was aware of techniques for implementing the functionality is demonstrated by *Chin*. In *Chin*, the system determines from its surroundings which audio output to use—the earpiece or the mobile computing device. EX1016 ¶[0051] (selecting the earpiece because mobile device is in the pocket or fanny pack of a jogger and the earpiece is detected as already in use), ¶[0057] (selecting “one or more notification output devices” based on “parameters” which may “us[e] the sensor information and location information”)⁹

237. Therefore, a person having ordinary skill in the art would have been motivated to implement *Victorian*’s technique of sending audio through an auxiliary speaker (e.g., an earpiece) to improve the *Fiedler-Broussard*.

238. A person having ordinary skill in the art would have considered the combination to amount to the use of a known technique (*Victorian*’s technique to send audio to an auxiliary speaker such as an earphone) to improve similar devices (the *Fiedler-Broussard-Victorian* combination is a similar recording

⁹ To be clear, I am relying on *Chin* as evidence of the knowledge of a person having ordinary skill in the art and it is not part of the unpatentability ground 1B.

device) in the same way (to provide an audible cue that is not disruptive to live meetings or class lectures that the user is trying to record).

239. Accordingly, in my opinion, a person having ordinary skill in the art would have understood the *Fiedler-Broussard-Victorian* combination to disclose or suggest the processor executing instructions to send an audible cue to the ear canal receiver in the earpiece when a trigger event is detected (“wherein the operation of notifying the user sends a notification signal to the ear canal receiver.”).

4. Claim 9 (“The system according to claim 5 wherein the earpiece further includes: a sealing section.”)

240. In my opinion, *Fiedler* in combination with *Broussard* and *Victorian* discloses or suggests “[t]he system according to claim 5 wherein the earpiece further includes: a sealing section.”

241. *Victorian* discloses the ear-level device includes a “custom earmold” that is “fully occluded to maximize audio efficiency.” EX1009 ¶[0027] (“In one embodiment, each of ITE device 310A, ITC device 310B, and CIC device 310C includes a custom earmold. In another embodiment, each of ITE device 310A, ITC device 310B, and CIC device 310C includes a modular earmold. In one embodiment, the earmold is fully occluded to maximize audio efficiency. In another embodiment, the earmold is vented to remove undesirable low frequency sound.”). And in one embodiment, ear-level device is comprised

of a behind-the-ear (BTE) module and an in-the-ear (ITE) module, and the ITE module is a “custom or modular earmold” that is “fully occluded to maximize audio efficiency.” *Id.* ¶[0044], FIG. 6.

242. I find this to be consistent with how the ’587 patent describes a “sealing section,” also called a “sealing unit.” EX1001, 18:9-10 (“In general, such a seal is typically achieved by means of a soft and compliant housing of sealing unit 1108.”), 8:11-26 (“Sealing unit 1108 is an acoustic barrier having a first side corresponding to ear canal 1124 and a second side corresponding to the ambient environment. ... This seal also serves to significantly reduce the sound pressure level at the user's eardrum 1126 resulting from the sound field at the entrance to the ear canal 1124. This seal is also a basis for a sound isolating performance of the electro-acoustic assembly.”); 19:61-62 (referring to “sealing section 1108”).

243. Accordingly, in my opinion, a person having ordinary skill in the art would have understood the *Fiedler-Broussard-Victorian* combination to disclose or suggest an ear-level device (“earpiece”) with a custom earmold that is fully occluded to maximize audio efficiency by insulating the ear canal microphone from external noise (“wherein the earpiece further includes: a sealing section.”).

C. GROUND 1C: *FIEDLER* IN COMBINATION WITH *BROUSSARD*, *VICTORIAN*, AND *ANDREASSON* RENDERS OBVIOUS CLAIM 8

1. Claim 8 (“The system according to claim 7, wherein the operation of notifying the user sends a notification signal to the ear canal receiver.”)

244. As I explained above in §X.B.3, the combination of *Fiedler*, *Broussard*, and *Victorian* renders claim 8 obvious. Although, the *Fiedler-Broussard-Victorian* combination discloses this claim, I was asked by counsel to also analyze whether claim 8 would have been obvious in view of *Fiedler*, *Broussard*, *Victorian*, and *Andreasson*.

245. *Andreasson* “relates to selectively driving output units in phones or in accessories.” EX1010 ¶[0002]. *Andreasson* explains that the prior art involving portable electronic devices (e.g., cellular phone, a laptop computer, or smartphone) may output audio signals to notify or alert users of events (e.g., incoming phone call or calendar event) to a hands-free accessory such as an earphone whenever the accessory is connected to the portable device. *See id.* ¶¶[0003] (“Today’s portable communication devices, such as cellular phones [which] are designed to operate in conjunction with other devices known as accessories, such as portable hands-free devices. A portable hands free device may be connected to the phone ... through wireless sort range communication interfaces [and] [s]uch accessories may comprise a microphone and one or two

ear phones.), [0004] (“In some portable electronic devices, audio signals may be outputted from its application to an accessory to notify or alert its user of events, such as the arrival of an incoming call to a cellular phone, the arrival of a message, or the occurrence of a scheduled event on a calendar. The audio signals may drive the audio output units (e.g., ear phones) of the accessory whenever the accessory is connected to the phone.”), [0041] (disclosing that implementations of the system can relate to “a portable communication device like a cellular phone,” as an example). *Andreasson* disclosed that the problem with this design is that “it is possible that the user is not listening to the earphones” even though they are connected to the portable device, so that design “wastes power and drains phone battery.” *Id.* ¶[0004].

246. *Andreasson* discloses a portable electronic device with a “control unit for performing a method including” (1) determining if an earphone is connected; and (2) determining if the earphone is attached to the user’s ear, and if attached to the ear, selecting the earphone to output an audio signal of an event, and if not, transmitting the audio signal to the speaker of the portable device. *Id.* ¶¶[0016] (“selecting either the first audio output unit of the accessory or a second audio output unit of the portable electronic device, based on determining if the first audio output unit is attached to the body, and transmitting an audio output signal to the first set of audio output units”), [0041] (disclosing

that implementations of the system can relate to “a portable communication device like a cellular phone,” as an example), [0047]-[0049] (determining if earphone is connected and/or attached and selecting earphone or phone speaker outputs), FIG. 5 (illustrating block diagram in which device sends audio output to the earphone if earphone is in the ear and to the phone speaker if the earphone is not in the ear).

247. *Andreasson* discloses implementing a wireless connection to the earphone and using a “pressure receiving unit 32” in the earphone to detect if the earphone is attached to the user’s ear. *Id.* ¶¶[0003], [0042] (describing Figure 2 which “is a portable hands-free device” connected to “a first and a second earphone” in which “[t]he first earphone 24 also includes a pressure receiving unit 32”), [0043] (describing Figure 3 which is a “hands-free device” with a “pressure receiving unit 32 [that] is mechanically connected to” the hands-free device), [0055] (disclosing detectors for determining if an “earphone is attached to the ear or not”). Other sensors for detecting if the earpiece is being worn are possible, too. *Id.* ¶[0055] (disclosing detectors for determining if an “earphone is attached to the ear or not”).

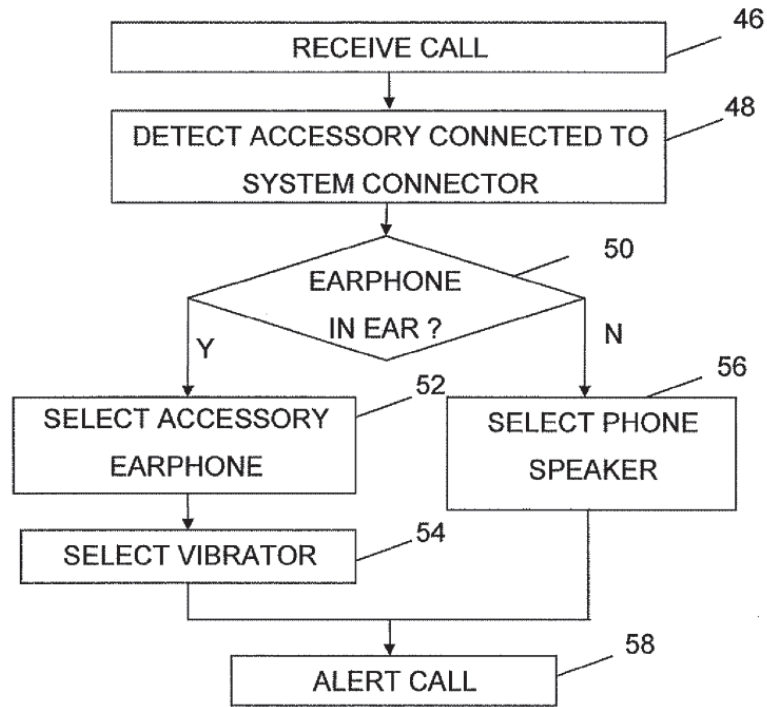
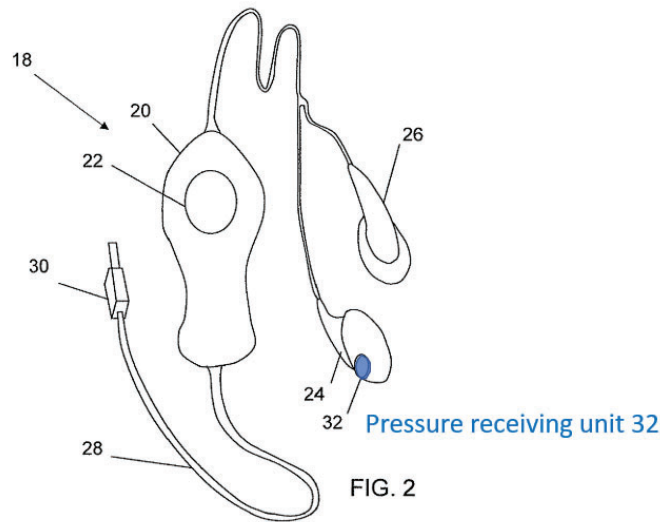


FIG. 5

EX1010, FIG. 5

248. As *Andreasson* discloses: “This process provides an efficient selection of audio output units and of limiting the disturbance to the environment whenever it is possible. This also saves battery power, since signal is output to units are in use.” *Id.* ¶[0049].



EX1010 FIG. 2 (annotated)

249. *Andreasson* discloses that the “control unit” of the portable device is “preferably provided in the form of a microprocessor with corresponding program code for performing method steps.” *Id.* ¶[0050]. Based on my knowledge and experience, a person having ordinary skill in the art would have understood that “program code” constitutes instructions to be executed by the microprocessor. Therefore, a person having ordinary skill in the art would have understood *Andreasson* to disclose or suggest a portable device connected to an earphone with instructions to (1) determine if an earphone is connected; and (2) determine if the earphone is attached to the user’s ear, and if attached to the ear, selecting the earphone to output an audio signal of an event, and if not, transmitting the audio signal to the speaker of the portable device.

250. In my opinion, a person having ordinary skill in the art would have been motivated to modify the *Fiedler-Broussard-Victorian* combination to implement *Andreasson's* teachings. As shown by *Andreasson*, a person having ordinary skill in the art would have understood that with hands-free devices like *Victorian's* ear-level device, there was a need to implement a technique to manage routing of the output of audio signals as between the speaker of the audio device and the ear canal receiver of the earpiece, and a person having ordinary skill in the art would have considered *Andreasson's* technique a suitable option in the *Fiedler-Broussard-Victorian* combination.

251. Based on my knowledge and experience, a person having ordinary skill in the art also would have understood that it would be advantageous to give the user the flexibility to selectively output audio signals to the ear canal receiver or the speaker of the audio device without having to disconnect the earpiece from the audio device. For example, by using the recording functionality of the *Fiedler-Broussard-Victorian-Andreasson* combination, a user could use the device with minimal disturbance in a classroom lecture or meeting, and then playback the recording through the speaker of the audio device by simply removing the earpiece from the ear.

252. Based on my knowledge and experience, a person having ordinary skill in the art would have understood that implementing *Andreasson's*

technique would have been within the skill of an ordinary artisan. *Andreasson* discloses implementing its teachings with portable electronic devices similar to those disclosed by *Fiedler* and *Broussard*. For example, *Andreasson* states that the implementations of the system described by *Andreasson* relates to accessory to a variety of portable electronic devices, including at least “a portable communication device like a cellular phone [where] [a] cellular phone is just one example of a portable electronic device,” which also can be “things such as a lap top computer, a palm top computer, an electronic organizer, a smartphone, or a communicator.” EX1010 ¶[0041].

253. In my opinion, a person having ordinary skill in the art would have understood that *Victorian*’s ear-level device design was compatible with a sensor like those disclosed by *Andreasson*, such as a pressure sensor. Thus, all it would require to modify *Victorian*’s ear-level device is to implement one of the sensors identified by *Andreasson* to detect whether the earpiece was inserted into the user’s ear or not. Next, it would only require programming the processor of the *Fiedler-Broussard-Victorian* combination to implement *Andreasson*’s control unit instructions for routing audio signals so that the audio signal was routed to the earpiece when *Victorian*’s ear-level device was being worn, and routed to the speaker of the audio device when the earpiece was not being worn.

254. Therefore, in the *Fiedler-Broussard-Victorian-Andreasson* combination, the memory of the *Fiedler-Broussard-Victorian* combination would be modified to include instructions to: first, determine if the earpiece is wirelessly connected to the audio device and second, determine if the earpiece is placed in the user's ear. If the earpiece is in the user's ear, the output audio signals go to the ear canal speaker ("ear canal receiver"), and if not, to output audio signals to the audio device's speaker. Thus, the *Fiedler-Broussard-Victorian-Andreasson* combination discloses or suggests that when an earpiece is wirelessly connected to the audio device, there are instructions to perform operations including sending a notification signal to the ear canal receiver and instructions to perform the operation of sending a portion of the data stored in the data buffer to the speaker as required by limitation 1.14 when the user is not wearing the earpiece.

255. Accordingly, in my opinion, a person having ordinary skill in the art would have understood the *Fiedler-Broussard-Victorian-Andreasson* combination to disclose or suggest "wherein the operation of notifying the user sends a notification signal to the ear canal receiver."

D. GROUND 1D: *FIEDLER* IN COMBINATION WITH *BROUSSARD*, AND *COUPER* RENDERS OBVIOUS CLAIMS 10 AND 11

1. Claim 10 (“The system according to claim 1, wherein the sonic signature detected is one of a siren or an alarm.”)

256. *Fiedler* in combination with *Broussard* and *Couper* discloses or suggests “[t]he system according to claim 1, wherein the sonic signature detected is one of a siren or a an alarm.”

257. As I explained above in §X.A.1.h, a person having ordinary skill in the art would have understood the *Fiedler-Broussard* combination to disclose or suggest the processor executing instructions to analyze the original acquisition buffer to detect a trigger such as a keyword (“analyzing the audio buffer for detecting a sonic signature”).

258. *Fiedler* explains that its disclosure relates to an improvement in “event-activated recording,” and that event-activated recording may be “[s]ound-activated” and/or used in a “security system.” EX1007, 1:43-54 (disclosing “event-activated recording” as the “present invention,” in which the “recording process is initiated on the occurrence of some event that is recognized by some mechanism, algorithm or other automated means,” including “in a security system” and/or “[s]ound-activated.”). In my opinion, a person having ordinary skill in the art would have been motivated to consider different types of auditory

triggering events in a security system, for example, that may be used in connection with the *Fiedler-Broussard* combination.

259. *Couper* teaches such auditory triggering events in a security system. For example, *Couper* discloses mobile devices that include a microphone for picking up audio (*id.* ¶¶[0024], [0026]) and that detect incidents by comparing the audio received by the microphone with “sound signatures” indicative of an incident, such as “sirens” and “alarms.” *Id.* ¶[0026] (“In general, the signature detector 115 can compare audio that is received by the internal microphone of the mobile device 105 with the sound signatures 120. ... For example, the sound signatures 120 can specify audio profiles for sounds including, but not limited, to, gunshots, explosions, sirens, alarms, breaking glass, auto accidents, yelling or screaming, calls for help, etc.”)

260. A person having ordinary skill in the art would have been motivated to apply *Couper*’s use of sound signatures to detect sirens and alarms to the *Fiedler-Broussard* combination. *Couper* is similar to the ’587 patent and the *Fiedler-Broussard* combination because all relate to the use of a trigger in connection with recording audio. For example, *Couper* discloses an audio recording embodiment with functionality very similar to the preservation scheme described by *Fiedler*, explaining that “the mobile device can record a continuous

loop and, if a detected sound matches a sound signature 120,” the mobile device can “prevent that audio from being recorded over.” *Id.* ¶[0044].

261. A person having ordinary skill in the art would have understood that modifying the *Fiedler-Broussard* combination to detect sounds indicative of an incident, such as a siren or alarm, would make the *Fiedler-Broussard* combination more useful in more contexts, including in the security system context disclosed by *Fiedler*.

262. In addition, a person having ordinary skill in the art also would have understood that the modification could be more useful to the user, for example, in post-incident investigations and litigation associated with the detected incidents. For example, in an automobile accident, [e]veryone involved would benefit greatly if there were a device that recorded actual sound” that occurs “just before and/or after an unexpected event, such as a collision.”

EX1020 *Johnson*, 2:9-47 (disclosing further the benefit to “accident investigations . . . insurance claims and litigation . . . [m]edical doctors [who] may . . . be more aware of what injuries they should look for”), 6:56-58 (“It will also be apparent that the device could be triggered by an alarm, the deployment of an airbag, or some other event detection mechanism.”).¹⁰ Thus, a person

¹⁰ To be clear, I am relying on *Johnson* as evidence of the knowledge of a person having ordinary skill in the art and it is not part of the unpatentability ground 1D.

having ordinary skill in the art would have been motivated to implement such a functionality by analyzing the original acquisition buffer to detect a siren or alarm as a trigger event.

263. In view of the above, a person having ordinary skill in the art would have considered modifying the *Fiedler-Broussard* combination to detect a siren or alarm as disclosed by *Couper* to amount to the use of a known technique (detecting the sound signature of a siren or alarm) to a known device (the *Fiedler-Broussard* combination) ready for improvement (the *Fiedler-Broussard* combination is already configured to detect sonic signatures but does not explicitly describe the sonic signatures to use in *Fiedler's* security system application) to yield predictable results (the *Fiedler-Broussard* combination configured to detect the sonic signature of a siren or alarm).

264. Moreover, a person having ordinary skill in the art also would have considered the combination to amount to the use of a known technique (detecting the sound signature of a siren or alarm) to improve similar devices (*Couper's* audio recording device is similar to the *Fiedler-Broussard* combination) in the same way (to provide mobile devices with the ability to detect sonic signatures indicative of incidents that may require emergency dispatch).

265. A person having ordinary skill in the art would have understood that adapting the *Fiedler-Broussard* combination to detect a siren or alarm as a trigger event would have merely required using similar processing and analysis techniques used to detect the types of trigger events disclosed by *Broussard* (e.g., a keyword), except that the target sound to be identified would be a siren or alarm. That is, a person having ordinary skill in the art would have understood that modifying the *Fiedler-Broussard* combination to detect a siren or alarm would have been well within the skill of an ordinary artisan because the *Fiedler-Broussard* combination is already designed to detect particular sounds.

266. Accordingly, in my opinion, a person having ordinary skill in the art would have understood the *Fiedler-Broussard-Couper* combination to disclose or suggest the processor executing instructions to analyze the original acquisition buffer to detect a trigger such as a siren or alarm (“wherein the sonic signature detected is one of a siren or an alarm”).

2. Claim 11 (“The system according to claim 10, wherein the user interface is a button.”)

267. *Fiedler* in combination with *Broussard* and *Couper* discloses or suggests “[t]he system according to claim 10, wherein the user interface is a button” for the same reasons discussed in §X.A.1.b.

E. GROUND 2: *FIEDLER* IN COMBINATION WITH *BROUSSARD* AND *BULTHUIS* RENDERS CLAIMS 1 AND 2 OBVIOUS

1. Claim 1

a. 1.pre through 1.10

268. In my opinion, *Fiedler* in combination with *Broussard* and *Bulthuis* renders obvious claim 1. *Fiedler* in combination with *Broussard* discloses or suggests 1[pre] through 1.10 for the same reasons I discussed above in §§X.A.1.a (1[pre]) through X.A.1.h (1.10), respectively.

b. 1.11: “analyzing the audio buffer for detecting a sonic signature;”

269. In my opinion, *Fiedler* in combination with *Broussard* and *Bulthuis* discloses or suggests “analyzing the audio buffer for detecting a sonic signature.”

270. As I explained above in §X.A.1.h, a person having ordinary skill in the art would have understood the *Fiedler-Broussard* combination to disclose or suggest the processor executing instructions to analyze the original acquisition buffer to detect a trigger such as a start record voice command. As explained below, the *Fiedler-Broussard-Bulthuis* combination discloses or suggests analyzing the original acquisition buffer *for a voice command to replay audio*.

271. *Fiedler* describes initiating playback of audio data (e.g., of telephone conversations) in the acquisition buffer by pressing a button on a user

interface. EX1007, 6:42-47 (“Alternatively, the portion of the acquisition buffer contents leading up to the triggering event may be transferred to a second acquisition buffer, which will be used in place of the original acquisition buffer for all purposes described below, including the presentation of data to the user for selection for recall and/or preservation.”), 8:46-61 (disclosing the control button operations), 12:26-63 (disclosing the recording of telephone conversations, to include the use of “a display and controls similar to those described above, or more simply using well-known voice response methods and telephone keypad buttons”). *Fiedler* does not disclose using a voice command to play back audio data.

272. It was well-known that the playback function of devices could be controlled by user voice command. For example, *Bulthuis* is titled “Conversation Rewind.” EX1012, Cover, 53. *Bulthuis* discloses that the user may instantly rewind and replay the last N minutes of a conversation stored in a circular buffer by either a “physically actuatable selector mechanism” or a “specific voice command.” *Id.* ¶[0016]. *Bulthuis* specifically discloses:

Preferably, the device comprises a last-communication rewind mechanism for replay of at least a part, e.g., the last 5 minutes, of the communication recorded most recently. For example, the last-communication rewind mechanism comprises a distinct, respective, physically actuatable selector mechanism located on an

exterior of the device to retrieve this part. *As another example, the device is voice-controllable and the rewind mechanism is activated upon a specific voice command*, in order to enable hands-free operation. The storage of the last N minutes is achieved, e.g., through a circular buffer that starts overwriting itself when full.

Id.

273. *Bulthuis's* replay feature allows taking notes or clarifying points the user may have not understood. *Id.* ¶[0047] (“For instance, a ‘last conversation rewind’ feature may be implemented. Such a feature may be activatable, for instance, by button 106, and would allow a user to replay the conversation most recently recorded. Such replay would allow taking notes or clarifying points that the user did not understand.”).

274. By the 2008 timeframe, a person having ordinary skill in the art would have been aware of a well-known trend to implement speech or voice user interfaces on devices so that devices could be controlled with voice commands and there were well-known benefits of doing so. For example, speech user interfaces enable users to interact with their computing devices with less dedicated attention. This allows products to be used in a wider range of scenarios, even where a user needs to focus their hands and eyes on other activities. This is corroborated, for example, by *Stahl*. *Stahl* was published in 2003 and discloses that “[t]o increase the user-friendliness and options for use of

devices, in particular devices in the field of consumer electronics and thus to make the devices more attractive, an ever increasing number of devices are so equipped that control of the device is possible by means of acoustic command signals.” *Id. Stahl* further explains:

As speech recognition systems develop, devices have also become available which may recognize and accept various voice commands as command signals, so that complicated control of such devices is also possible. Such voice-controllable devices are highly convenient, since the operator may operate the respective device without having to use his/her hands. This control method consequently has considerable advantages wherever the operator needs his/her hands for other activities, for instance in the case of control of a car radio, where the operator must not take his/her hands off the steering wheel to change the volume or the channel. In addition, this method is also more generally attractive with regard to device operation, because such voice control enables the man-machine interface (MMI) to be shifted from the hitherto conventional plane of communication with machines, namely operation by buttons and controllers, to the communication plane normal to humans, namely information transfer via speech

Id.

275. Similarly, the authors of *Cohen* explain that companies were, at the time, increasingly deploying speech interfaces in their applications because they “increas[e] consumer satisfaction” as “[n]umerous surveys and deployment

studies have shown higher user satisfaction with speech systems.” EX1024 at 9-10. The authors further explain that “there are many appealing advantages of using speech systems compared with other access modes” including that that they can be “hands-free, eyes-free” as “[a]ctivities such as driving occupy the user’s hands and eyes,” “[s]peech is an ideal solution for accessing services while engaged in such tasks.” *Id.* at 10-11.

276. *Chu*, which was published in June 2006, also notes that “[m]any cell phones also include a ‘hands-free’ or voice command setting that may be utilized when the user is ... unable to manually operate the device.” EX1022 ¶[0003].

277. As corroborated by *Stahl*, *Cohen*, and *Chu*, a person having ordinary skill in the art would have been motivated to implement *Bulthuis*’s teachings of a voice-command controlled replay functionality to the *Fiedler-Broussard* combination and would have had a reasonable expectation of success in doing so.¹¹

278. A person having ordinary skill in the art would have understood that the modification would have merely required programming the *Fiedler-Broussard* combination to detect, in the original acquisition buffer, voice

¹¹ To be clear, I am relying on *Cohen*, *Chu*, and *Stahl* as evidence of the knowledge of a person having ordinary skill in the art and they are not part of the unpatentability ground 2.

commands to replay audio, for example, “Playback the last one minute of audio.” Moreover, *Fiedler* discloses implementing event-activated recording such that, after detection of a trigger event, audio data leading up to the trigger event are copied from the original acquisition buffer to the second acquisition buffer, and that this process involves “[c]ontinuing to record in the [original] acquisition buffer the triggering event and the events following the triggering event.” *Fiedler*, 6:48-63. Thus, the combination discloses or suggests analyzing the original acquisition buffer (“audio buffer”) for a replay voice command to playback audio data.

279. In my opinion, a person having ordinary skill in the art would have considered the combination of *Fiedler*, *Broussard*, and *Bulthuis* to amount to the use of known technique (*Bulthuis*’s technique to use voice commands to initiate replay of buffered audio) to improve similar devices (*Fiedler-Broussard*’s audio data playback device) in the same way (to enable voice command operation of a replay or playback feature).

280. Further, a person having ordinary skill in the art would have understood that the *Fiedler*, *Broussard*, and *Bulthuis* combination also amounts to applying a known technique (implementing a voice command to control replay of buffered audio) to a known device (the *Fiedler-Broussard* device) ready for improvement (*Fiedler-Broussard* already discloses or suggests

analyzing the original acquisition buffer for a voice command) to yield predictable results (a device that analyzes the audio data stored in the original acquisition buffer for a voice command to initiate playback of audio data in the second acquisition buffer).

281. A person having ordinary skill in the art would have understood that analyzing the original acquisition buffer for a voice command to replay audio is consistent with how the '587 patent describes analyzing the audio buffer for a "sonic signature." *See* EX1001, 4:66-67 ("The concept of recognizing sounds is described as Sonic Signature Detection."), 7:51-52 ("In this example, a sonic signature is acoustic information related to the sounds of a person snoring."), 9:14-19 ("A user of Hear & Tell™ 232 can record the sound or provide a sound, called herein as a sonic signature."), 22:42-53 ("In at least one exemplary embodiment, a user having communication device 1302 manually or automatically captures and provides a sonic signature to a sonic signature database 1308. For example, a microphone on communication device 1302 is always enabled for receiving sound. ***The sound can be stored in a buffer. The sound in the buffer is analyzed and based on a variety of criteria can be configured to be provided to database 1308.*** For example, criteria such as sound pressure level, time, frequency of sound, geographic location, ***or recognition of a sound (sonic signature detection)*** are but a few of the parameters that could

be used to determine that the sound in the buffer is worthy of saving.”), 27:38-39 (“A sound 1402 is received by a microphone on cell phone 1404 and stored in a buffer in a record sounds step 1406. The sound in the buffer is analyzed and determined to be saved.”).

282. Accordingly, in my opinion, a person having ordinary skill in the art would have understood the *Fiedler-Broussard-Bulthuis* combination to disclose or suggest the processor executing instructions to analyze the original acquisition buffer (“analyzing the audio buffer”) to detect a voice command to replay audio (“for detecting a sonic signature”).

c. 1.12: “notifying a user when the sonic signature is detected;”

283. In my opinion, *Fiedler* in combination with *Broussard* and *Bulthuis* discloses or suggests “notifying a user when the sonic signature is detected.”

284. As I explained above in §X.E.1.b, the *Fiedler-Broussard-Bulthuis* combination discloses or suggests starting the playback of audio data from a buffer upon detection of a replay voice command. This is consistent with how the ’587 patent describes “notifying a user when the sonic signature is detected.” For example, the ’587 patent discloses an embodiment in which “***Processor 1116 analyses the acoustic information for a sound similar to the sonic signature. Once identified, the earpiece will provide a response to the sound based on the application. In a first exemplary embodiment, the earpiece will***

reduce music or telephone call (or the dominant source of sound being provided by the earpiece) and *amplify the identified signal (ambulance or police car) thereby notifying the user of the approaching vehicle.*”).

285. In another embodiment, “[s]onic signatures related to emergency vehicles such as fire trucks, ambulances, and police cars are stored in the system. Safe Space™ 216 analyses sounds from the microphone. A response is provided if one of the stored sonic signatures is detected.” ’587Pat., 5:23-27. And “upon detecting a fire truck siren, Safe Space™ 216 can initiate playing the identified signal through the car stereo system for the car driver to hear and respond to.” *Id.*, 5:27-30.

286. A person having ordinary skill in the art would have understood that the claim language merely limits the timing of the notification, i.e., at the time “*when* a sonic signature is detected” and does not necessarily require, for example, notifying a user *that* a sonic signature was detected or notifying a user *of* the sonic signature that was detected. Thus, as long as the device provides a notification at the time that the sonic signature is detected, this limitation is met. To be clear, because the audio in the acquisition buffer is replayed when a voice command to replay the audio data is detected, a person of ordinary skill in the art would have understood that the replaying of the audio performs the step of notifying a user—for example, notifying the user of the audio that was just

recorded, or implicitly notifying the user that the user's voice command was recognized—when a sonic signature is detected.

287. Counsel has asked me to also address an alternative, in case the Patent Owner argues that this replaying of the audio data does not meet this limitation. In my opinion, it would have nevertheless been obvious to further modify the *Fiedler-Broussard-Bulthuis* device to incorporate *Broussard's* feedback/alert/notification technique (described in §X.A.1.i) for the purpose of confirming the user's replay voice command. Based on my knowledge and experience, the same motivation for implementing *Broussard's* feedback/alert/notification technique in confirming the user's voice command to start recording would apply to the *Fiedler-Broussard-Bulthuis* voice command to start replay. As was known at the time, speech recognition systems were vulnerable to false recognitions, and implementing a user feedback mechanism to confirm the user's voice command was commonplace. For example, in *Cohrs*, titled "Method of Implicit Confirmation for Automatic Speech Recognition," a method is taught for "automatically confirming verbal commands issued by a user and received by an automatic speech recognition system." EX1013, Abstract.¹² Further, *Cohrs* further discusses that "speech recognition systems are

¹² To be clear, I am relying on *Cohrs* as evidence of the knowledge of a person having ordinary skill in the art and it is not part of the unpatentability ground 2.

well known in the art,” *id.*, 1:12-13, and in particular, *Cohrs* discloses how “prior art speech data systems have incorporated a required second or confirmation verbal command to confirm “ the initial command, *id.*, 2:16-20. *Id.*

288. Accordingly, in my opinion, a person having ordinary skill in the art would have considered the combination to amount to applying a teaching or suggestion in the prior art (prompting the user to confirm a user voice command) to modify the *Fiedler-Broussard-Bulthuis* device to arrive at the claimed invention (a device that notifies the user when a sonic signature is detected).

289. Accordingly, in my opinion, a person having ordinary skill in the art would have understood the *Fiedler-Broussard-Bulthuis* combination to disclose or suggest the processor executing instructions to alert or cue the user to confirm the replay voice command or merely replaying audio data from the acquisition buffer upon detection of the voice command (“notifying a user when the sonic signature is detected.”)

d. 1.13: “sending a modified microphone signal to the data buffer replacing or adding to previous data stored in the data buffer; and”

290. In my opinion, *Fiedler* in combination with *Broussard* and *Bulthuis* discloses or suggests “sending a modified microphone signal to the data buffer replacing or adding to previous data stored in the data buffer” for the same reasons I discussed above in §X.A.1.j.

- e. **1.14: “sending a portion of the data stored in the data buffer, spanning a time period, to the speaker in response to a user request, wherein the user request is one of the sonic signature that is a voice command or a manual input from the user interface.”**

291. In my opinion, *Fiedler* in combination with *Broussard* and *Bulthuis* discloses or suggests the processor executing instructions to send at least 0-5 minutes or seconds of audio data in the second acquisition buffer to an output buffer that is ultimately sent to a waveform output device and the audio output (“sending a portion of the data stored in the data buffer, spanning a time period, to the speaker”) when the user presses the Move Back button on the user interface (“in response to a user request, wherein the user request is ... a manual input from the user interface.”) for the same reasons I discussed above in §X.A.1.k.

- 2. **Claim 2 (“The system according to claim 1, wherein the sonic signature is a voice command, and where the voice command is to replay audio.”)**

292. In my opinion, *Fiedler* in combination with *Broussard* and *Bulthuis* discloses or suggests “[t]he system according to claim 1, wherein the sonic signature is a voice command, and where the voice command is to replay audio” for the same reasons discussed in §X.E.1.b.

XI. SECONDARY CONSIDERATIONS

293. I am not aware of any evidence in the '587 patent's prosecution history or elsewhere supporting any secondary considerations arguments, or evidence of nexus of such alleged evidence to the challenged claims. See generally EX1004, §VII.B. To the extent Patent Owner asserts the existence of any secondary considerations in its responses, I reserve the right to address any such evidence.

XII. CONCLUSION

294. The findings and opinions set forth in this declaration are based on my work and examinations to date.

295. I may continue my examinations. I may also receive additional documentation and other factual evidence over the course of this IPR that will allow me to supplement and/or refine my opinions. I reserve the right to add to, alter, or delete my opinions and my declaration upon discovery of any additional information. I reserve the right to make such changes as may be deemed necessary.

296. In signing this declaration, I recognize that the declaration will be filed as evidence in an IPR before the PTAB. I also recognize that I may be subject to cross-examination in the case and that cross-examination will take place within the United States. If cross-examination is required of me, I will

appear for cross-examination within the United States during the time allotted for cross-examination.

297. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Date: 9 Feb 2024

A handwritten signature in black ink, appearing to read 'Chris Schmandt', written over a horizontal line.

Christopher Schmandt