UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD., and
SAMSUNG ELECTRONICS AMERICA, INC.,

Petitioners
v.

STATON TECHIYA, LLC,

Patent Owner

Case IPR2022-00302

U.S. Patent No. 9,609,424

PETITIONERS' NOTICE OF APPEAL

By Electronic Filing
Patent Trial and Appeal Board
U.S. Patent & Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

By Hand Delivery
Office of the General Counsel
U.S. Patent & Trademark Office
Madison Building East, 10B20
600 Dulany Street
Alexandria, VA 22314-5793

By Electronic Filing
Circuit Executive and Clerk of Court
United States Court of Appeals for the Federal Circuit
717 Madison Place, NW
Washington, DC 20439

Pursuant to 35 U.S.C. §§ 141(c), 142, and 319; 37 C.F.R. §§ 90.2(a) and 90.3(a); Federal Rule of Appellate Procedure 15; and Federal Circuit Rule 15, Petitioners Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc. ("Petitioners" or "Samsung") hereby appeal to the United States Court of Appeals for the Federal Circuit from the Patent Trial and Appeal Board's ("Board") Final Written Decision entered on July 7, 2023 in IPR2022-00302 (Paper No. 37) ("Final Written Decision"), and from all underlying findings, determinations, rulings, opinions, orders, issues, and decisions regarding the *inter partes* review of U.S. Patent No. 9,609,424 ("the '424 Patent"). A copy of the Final Written Decision is attached as Exhibit 1.

In accordance with 37 C.F.R. § 90.2(a)(3)(ii), Petitioners identify that the issues on appeal include, but are not limited to: (1) whether the Board erred in determining that Petitioners had not shown by a preponderance of the evidence that claims 12 and 15-16 were unpatentable over the combined teachings of U.S. Patent Application Publication No. 2006/0083395 ("Allen") and EPO Publication No. EP1519625A2 ("Victorian"); (2) whether the Board erred in determining that Petitioners had not shown by a preponderance of the evidence that claim 13 was unpatentable over the combined teachings of Allen, Victorian, and U.S. Patent Application Publication No. 2005/0123146 ("Voix"); (3) whether the Board erred in determining that Petitioners had not shown by a preponderance of the evidence that claim 14 was unpatentable over the combined teachings of Allen, Victorian, Voix, U.S. Patent Application Publication No. 2005/0078838 ("Simon"), and U.S. Patent No. 6,567,524 ("Svean"); (4) whether the Board erred in determining that Petitioners had not shown by a preponderance of the evidence that claim 17 was unpatentable over the combined teachings of Allen, Victorian, and U.S. Patent Application Publication No. 2004/0125965 ("Alberth"); (5) whether the Board erred in determining that Petitioners had not shown by a preponderance of the evidence that claims 18 and 20 were unpatentable over the combined teachings of U.S. Patent Application Publication No. 2004/0196992 ("Ryan") and Allen; (6) whether the Board erred in determining that Petitioners had not shown by a

preponderance of the evidence that claims 18 and 20 were unpatentable over the combined teachings of Ryan, Allen, and Svean; (7) whether the Board erred in determining that Petitioners had not shown by a preponderance of evidence that claim 19 was unpatentable over the combined teachings of Ryan, Allen, and Voix; (8) whether the Board erred in determining that Petitioners had now shown by a preponderance of evidence that claim 19 was unpatentable over the combined teachings of Ryan, Allen, Svean, and Voix; (9) the Board's consideration of the expert testimony and other evidence in the record; and (10) any Board finding, determination, judgement or order related to the foregoing issues, as well as all other issues decided adversely to Petitioners, including, without limitation, the Board's construction and application of the claim language, the Board's interpretation of the prior art, the Board's interpretation of expert evidence, and the Board's application of the law.

The Board issued its Final Written Decision on July 7, 2023. This notice is therefore timely filed within sixty-three (63) days of the Board's decision, as prescribed by 35 U.S.C. § 142 and 37 C.F.R. § 90.3(a)(1).

Petitioners are concurrently filing this Notice of Appeal with the Director of the United States Patent and Trademark Office and the Clerk of the United States Court of Appeals for the Federal Circuit, along with the required fees.

Petitioners do not believe that any fees are due to the United States Patent and Trademark Office with this Notice of Appeal. However, if any such fees are due, the Director is authorized to charge the fees to Deposit Account No. 50-2387.

Dated: August 11, 2023

Respectfully submitted,

/Jeffrey A. Miller/

Jeffrey A. Miller (Reg. No. 35,287)
ARNOLD & PORTER KAYE SCHOLER LLP
3000 El Camino Real
Five Palo Alto Square, Suite 500
Palo Alto, CA 94306-3807
Telephone: (650) 319-4500
Facsimile: (650) 319-4700
jeffrey.miller@apks.com

Ali R. Sharifahmadian (Reg. No. 48,202)
Arnold & Porter Kaye Scholer LLP
601 Massachusetts Ave., NW
Washington, DC 20001-3743
Telephone (202) 942-5000
Facsimile: (202) 942-5999
ali.sharifahmadian@arnoldporter.com

David A. Caine (Reg. No. 52,683)
ARNOLD & PORTER KAYE SCHOLER LLP
3000 El Camino Real
Five Palo Alto Square, Suite 500
Palo Alto, CA 94306-3807
Telephone: (650) 319-4500
Facsimile: (650) 319-4700
david.caine@arnoldporter.com

Counsel for Petitioners
Samsung Electronics Co. Ltd. and
Samsung Electronics, America, Inc.

CERTIFICATE OF SERVICE

The undersigned certifies that the original of this PETITIONERS' NOTICE OF APPEAL was filed via hand delivery on August 11, 2023 with the Director of the United States Patent and Trademark Office at the address below:

Office of the General Counsel
U.S. Patent & Trademark Office
Madison Building East, 10B20
600 Dulany Street
Alexandria, Virginia 22314-5793

A copy of this Notice of Appeal is also being filed and served on August 11, 2023 as follows:

USPTO Patent Trial and Appeal Board:

Patent Trial and Appeal Board
U.S. Patent & Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

(via PTAB P-TACTS)

U.S. Court of Appeals for the Federal Circuit:

Clerk of Court
U.S. Court of Appeals for the Federal Circuit
717 Madison Place, N.W.
Washington, DC 20439

(via CM/ECF with filing fee)

Counsel for Patent Owner Techiya Staton LLC

(via email pursuant to 37 C.F.R. § 42.6(e))

Jacob A. Snodgrass
jacob.snodgrass@pvuslaw.com
PV Law LLP
5335 Wisconsin Avenue, NW,
Suite 440
Washington, DC 20015-2052
Telephone: 202.301.5079
Facsimile: 202.888.3163

Bradford A. Cangro
bradford.cangro@pvuslaw.com
PV Law LLP
5335 Wisconsin Avenue, NW,
Suite 440
Washington, DC 20015-2052
Telephone: 202.301.5079
Facsimile: 202.888.3163

Jeremy D. Peterson
jeremy.peterson@pvuslaw.com
PV Law LLP
5335 Wisconsin Avenue, NW,
Suite 440
Washington, DC 20015-2052
Telephone: 202.301.5079
Facsimile: 202.888.3163

Courtesy copy to:
Techiya-Cases@pvuslaw.com

/Jeffrey A. Miller/
Jeffrey A. Miller (Reg. No. 35,287)
Counsel for Petitioners

Exhibit 1

Trials@uspto.gov
571-272-7822

Paper 37
Entered: July 7, 2023

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD, and SAMSUNG ELECTRONICS AMERICA, INC.,
Petitioner,

v.

STATON TECHIYA, LLC,
Patent Owner.

IPR2022-00302
Patent 9,609,424 B2

Before NATHAN A. ENGELS, SCOTT B. HOWARD, and RUSSELL E. CASS, *Administrative Patent Judges.*

CASS, *Administrative Patent Judge.*

JUDGMENT
Final Written Decision
Determining Some Challenged Claims Unpatentable
35 U.S.C. § 318(a)

I. INTRODUCTION

A. Background

In this *inter partes* review, Samsung Electronics Co., Ltd, and Samsung Electronics America, Inc. ("Petitioner") challenge the patentability of claims 1–20 (the "challenged claims") of U.S. Patent No. 9,609,424 B2 (Ex. 1001, "the '424 patent"), which is assigned to Staton Techiya, LLC. ("Patent Owner").

We have jurisdiction under 35 U.S.C. § 6. This Final Written Decision, issued pursuant to 35 U.S.C. § 318(a), addresses issues and arguments raised during the trial in this *inter partes* review. For the reasons discussed below, Petitioner has proven by a preponderance of the evidence that claims 1–11 are unpatentable. Petitioner has not proven by a preponderance of the evidence that claims 12–20 are unpatentable.

B. Procedural History

In this proceeding, Petitioner relies upon the following references:

Ryan, US 2004/0196992 A1, published Oct. 7, 2004 (Ex. 1007, "Ryan");

Svean, US 6,567,524 B1, issued May 20, 2003 (Ex. 1006, "Svean");

Voix, US 2005/0123146 A1, published June 9, 2005 (Ex. 1012, "Voix");

Victorian, EP 1 519 625 A2, published Mar. 30, 2005 (Ex. 1013, "Victorian");

Alberth, US 2004/0125965 A1, published July 1, 2004 (Ex. 1015, "Alberth");

Allen, US 2006/0083395 A1, filed Feb. 18, 2005, published Apr. 20, 2006 (Ex. 1016, "Allen");

Simon, US 2005/0078838 A1, filed Oct. 8, 2003, published Apr. 14, 2005 (Ex. 1022, "Simon");

Pet. v, 2. Petitioner also submits and relies upon the Declaration of Dr. Chris Kyriakakis, Ph.D. (Ex. 1002). Patent Owner submits and relies upon Declarations from Christopher J. Struck (Exs. 2001, 2006).

Petitioner challenges the patentability of claims 1–20 of the '424 patent based on the following grounds:

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
1–2, 5–7, 10–11	103(a)[1]	Ryan
1–2, 5–7, 10–11	103(a)	Ryan, Svean
4	103(a)	Ryan, Voix
4	103(a)	Ryan, Svean, Voix
8	103(a)	Ryan, Svean, Victorian
9	103(a)	Ryan, Alberth
9	103(a)	Ryan, Svean, Alberth
12, 15–16	103(a)	Allen, Victorian
13	103(a)	Allen, Victorian, Voix
17	103(a)	Allen, Victorian, Alberth
18, 20	103(a)	Ryan, Allen
18, 20	103(a)	Ryan, Svean, Allen
19	103(a)	Ryan, Allen, Voix
19	103(a)	Ryan, Svean, Allen, Voix

[1] The Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) ("AIA"), included revisions to 35 U.S.C. § 103 that became effective after the filing of the application that led to the '424 patent. Therefore, we apply the pre-AIA version of 35 U.S.C. § 103.

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
3	103(a)	Ryan, Allen, Simon
3	103(a)	Ryan, Svean, Allen, Simon
14	103(a)	Allen, Victorian, Voix, Simon, Svean

Pet. i–iv, 2–3. Patent Owner filed a Preliminary Response. Paper 8. With our permission, Petitioner filed a Preliminary Reply to the Preliminary Response (Paper 9), and Patent Owner filed a Preliminary Sur-reply (Paper 10). We instituted trial on all grounds of unpatentability. Paper 13 ("Inst. Dec."), 60–61.

During the trial, Patent Owner filed a Response (Paper 18, "PO Resp."), Petitioner filed a Reply (Paper 20, "Pet. Reply"), and Patent Owner filed a Sur-reply (Paper 21, "PO Sur-reply").

An oral hearing was held on April 18, 2023, a transcript of which appears in the record. Paper 34 ("Tr.").

C. Real Parties in Interest

Petitioner states that the real parties in interest are Samsung Electronics Co., Ltd, and Samsung Electronics America, Inc. Pet. 1, 76. Patent Owner states that Staton Techiya, LLC is the real party in interest. Paper 35, 1.

D. Related Proceedings

Petitioner states that the '424 patent was asserted in *Staton Techiya, LLC v. Samsung Electronics Co., Ltd.*, No. 2:21-cv-00413 (E.D. Tex.), which was filed on November 5, 2021, and consolidated with *Staton*

Techiya, LLC v. Samsung Electronics Co., Ltd., Case No. 2:22-cv-00053 (E.D. Tex.), filed February 14, 2022. Pet. 76; Paper 5, 1; Paper 26, 1.

E. The '424 Patent (Ex. 1001)

The '424 patent is directed to "an earpiece that monitors and safely adjusts audio delivered to a user's ear." Ex. 1001, 1:21–22. More specifically, the '424 patent describes an earpiece that includes an Ambient Sound Microphone (ASM) that "capture[s] ambient sound," an Ear Canal Receiver (ECR) that "deliver[s] audio to an ear canal," an ear canal microphone (ECM) that "measure[s] a sound pressure level within the ear canal," and a processor that "can actively monitor a sound exposure level inside the ear canal, and adjust the audio to within a safe and subjectively optimized listening sound pressure level range based on the sound exposure level." *Id.* at 2:1–10. The processor can also "compensate for an ear seal leakage of the device." *Id.* at 2:15–18.

An embodiment of the earpiece of the '424 patent is illustrated in Figure 1, reproduced below.

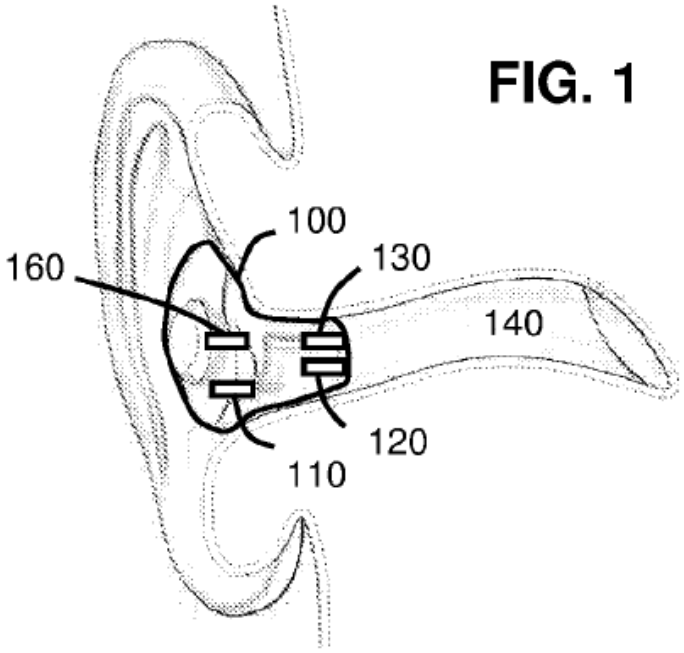


Figure 1 of the '424 patent shows an embodiment of an earpiece of the invention. Ex. 1001, Fig. 1, 3:38–4:7.

As shown in Figure 1, earpiece 100 includes Ambient Sound Microphone (ASM) 110, Ear Canal Receiver (ECR) 120, and Ear Canal Microphone (ECM) 130. Ex. 1001, 3:38–4:7. ASM 110 "capture[s] ambient sound," ECR 120 "deliver[s] audio to an ear canal 140," and ECM 130 "assess[es] a sound exposure level within the ear canal." *Id.* at 3:41–45. Earpiece 100 "can also include an Ear Receiver (ER) 160" that "generate[s] audible sounds external to the ear canal 140." *Id.* at 3:45–47. Earpiece 100 "can partially or fully occlude the ear canal 140 to provide various degrees of acoustic isolation." *Id.* at 3:47–49. Earpiece 100 can also include a processor (not shown in Figure 1) coupled to ASM 110, ECR 120, ECM 130, and ER 160. *Id.* at 4:10–14.

The '424 patent also describes a listening test for the earpiece that can be used to determine the sealing level of the earpiece. Ex. 1001, 4:57–6:11. This listening test can either be self-administered and initiated by the user, or

automatically and intermittently scheduled and performed by the earpiece. *Id.* at 5:6–9. As part of this test, the processor generates a test signal, which is delivered to the user's ear canal via the Ear Canal Receiver (ECR). *Id.* at 5:20–31. The Ear Canal Microphone (ECM) then "capture[s] a sound pressure level (SPL) in the ear canal due to the test signal and a pass-through ambient sound called ambient residual noise." *Id.* at 5:32–36. The processor then "generate[s] an Ear Canal Transfer Function (ECTF) based on the test signal and the sound pressure level," and "determine[s] an ear sealing level of the earpiece based on the ECTF." *Id.* at 5:43–63. For example, the processor "can compare the ECTF to historical ECTFs captured from previous listening tests, or from previous intermittent ear sealing tests." *Id.* at 5:63–65.

F. Illustrative Claims

Of challenged claims 1–20, claims 1, 12, and 18 are independent. For purposes of the issues raised in this proceeding, claim 1 is illustrative and is reproduced below.

> 1. [preamble] An electronic audio device for use with at least one earpiece or a pair of earpieces, or a pair of earpieces in a headphone, each earpiece having a microphone operatively coupled to the earpiece and a speaker located therein, comprising:
>
> [a] circuitry operatively coupled to the microphone and speaker;
>
> [b] a processor operatively coupled to evaluate a seal quality of the earpiece based on seal quality measurements made while driving or exciting a signal into the speaker located in the earpiece; and
>
> [c] wherein the processor is configured to generate a visual or audio message identifying whether the at least one

> earpiece is properly sealed based on the seal quality measurements.

Ex. 1001, 13:25–39 (bracketed paragraph identifiers added).

II. DISCUSSION

A. Claim Construction

A claim "shall be construed using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. § 282(b)." 37 C.F.R. § 42.100(b) (2021).

Petitioner proposes that no express claim construction is necessary and "the claims should be given their plain and ordinary meaning." Pet. 10. Patent Owner also "proposes that all claim terms be afforded [their] plain and ordinary meaning as understood by a person of ordinary skill in the art at the time of the inventions of the '424 patent."[2] PO Resp. 13.

Upon review of the arguments and evidence presented, we construe the meaning of several terms and phrases in the claims, which we defer to later sections of this Decision. *See infra* Sections II.D.3(c) (claim 1, "a processor operatively coupled to evaluate a seal quality of the earpiece based on seal quality measurements made while driving or exciting a signal into the speaker"), II.J.1 (claim 18, "the one or more processors to perform operations comprising . . . delivering audio via an ear canal receiver coupled

[2] Patent Owner also asserts that Petitioner has advanced inconsistent positions on claim construction in this proceeding and in the district court by arguing that no express constructions are necessary in this proceeding but advancing constructions for various terms in the district court. PO Resp. 13–14 (citing Ex. 2004, 19–20). Petitioner responds that Patent Owner has not identified any inconsistencies between how Petitioner is interpreting these terms. Pet. Reply 25–26. We do not see any issues with any alleged inconsistencies that are necessary for us to resolve for purposes of this Decision.

to the one or more processors"). No further explicit construction of any claim term is needed to resolve the patentability issues presented here. *See Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) ("The Board is required to construe 'only those terms . . . that are in controversy, and only to the extent necessary to resolve the controversy.'" (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

B. Principles of Law

A claim is unpatentable under 35 U.S.C. § 103 if "the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains." *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) where in evidence, objective evidence of non-obviousness.[3] *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). When evaluating a combination of teachings, we must also "determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue." *KSR*, 550 U.S. at 418 (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)). Whether a combination of prior art elements would have produced a predictable result weighs in the ultimate determination of obviousness. *Id.* at 416–417.

In an *inter partes* review, the petitioner must show with particularity why each challenged claim is unpatentable. *Harmonic Inc. v. Avid Tech.,*

[3] Patent Owner has not presented objective evidence of non-obviousness.

Inc., 815 F.3d 1356, 1363 (Fed. Cir. 2016); 37 C.F.R. § 42.104(b) (2020). The burden of persuasion never shifts to Patent Owner. *Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015).

We analyze the challenges presented in the Petition in accordance with the above-stated principles.

C. Level of Ordinary Skill in the Art

Petitioner contends that a person of ordinary skill in the art at the time of the alleged invention would have had "a bachelor's degree in electrical engineering, computer science, audio engineering or a similar field and two years of experience in hearing instruments such as earphones, hearing aids and/or hearing protectors." Pet. 9 (citing Ex. 1002 ¶ 22). Petitioner further states that the person of ordinary skill "could have also obtained similar knowledge and experience through other means." *Id.* Patent Owner "applies the level of ordinary skill in the art that is proposed by Petitioners." PO Resp. 13.

We adopt Petitioner's assessment of the level of ordinary skill in the art, which is supported by the '424 patent and the asserted prior art.

D. Ground 1A/1B[4]: Asserted Obviousness of Claims 1–2, 5–7, and 10–11 Based on Ryan Alone or in Combination With Svean

Petitioner contends that claims 1–2, 5–7, and 10–11 would have been obvious over Ryan, either alone or in combination with Svean. Pet. 10–26. Patent Owner disagrees, arguing that Petitioner has failed to establish that

[4] Here, and elsewhere in the Decision, the identification of the grounds using designations such as "Ground 1A" and "Ground 1B" refers to the designation of the grounds as presented in the Petition.

claims 1–2, 5–7, and 10–11 would have been obvious over Ryan or Ryan in view of Svean. PO Resp. 14–30.

1. Overview of Ryan (Ex. 1007)

Ryan discloses "a system and method for detecting the insertion and removal of a hearing instrument from the ear canal." Ex. 1007 ¶ 2. The hearing instrument can be "any hearing aid, listening device or headset having an output that is delivered into a sealed ear (circumaural earcup) or ear canal (insert earphone, hearing aid, etc.)." *Id.* Ryan explains that, when a hearing instrument is initially fitted, or in later use, it "may not form a proper seal," and "an audiologist or user may need to determine whether the hearing instrument has formed a proper seal." *Id.* ¶ 5. To address this problem, Ryan teaches "[a] system for detecting the insertion and removal of a hearing instrument" from the ear canal, including "a loudspeaker driving into a sealed acoustic cavity, a microphone that is acoustically coupled to this sealed cavity, and signal processing circuitry used to determine if the cavity is sealed or not." *Id.* ¶ 20.

An embodiment of Ryan's system is shown in Figure 3, reproduced below.

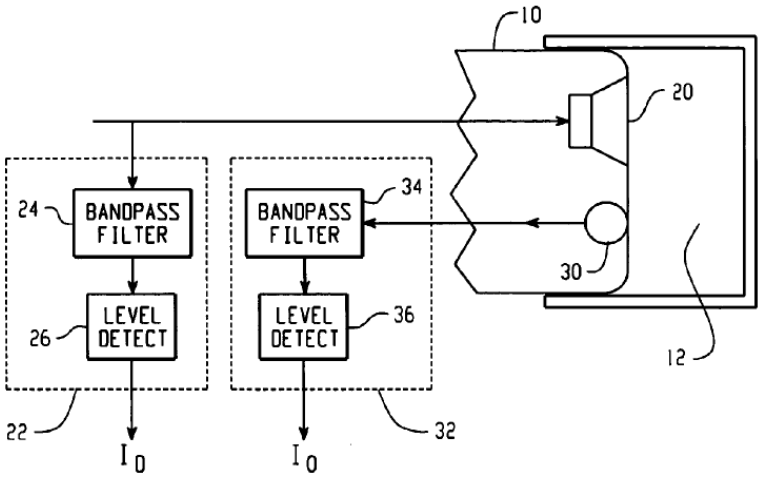


Fig. 3

Ryan's Fig. 3 illustrates a block diagram of Ryan's signal processing system. Ex. 1007 ¶ 25, Fig. 3.

Ryan's Figure 3 depicts hearing instrument 10, having loudspeaker 20 for radiating acoustic energy into sealed acoustic cavity 12, and measuring microphone 30 for receiving a portion of the acoustic energy radiated by loudspeaker 20 and generating an electrical signal in response. Ex. 1007 ¶ 24. The system detects "when the cavity 12 is sealed" and also "simultaneously monitors the low-frequency signal levels at the input to the loudspeaker 20 to obtain a loudspeaker drive level… [and] an acoustic output level." *Id.* ¶ 25. An "automatic system for detecting when the cavity 12 is sealed simultaneously monitors the low-frequency signal levels at the input to the loudspeaker 20 to obtain a loudspeaker drive level, and the low-frequency signal levels at the output of the microphone to obtain an acoustic output level." *Id.*

As further shown in Figure 3, loudspeaker 20 is coupled to first level detection circuitry 22 that receives the signal sent to loudspeaker 20 and generates first intensity signal I_D. Ex. 1007 ¶ 25. Microphone 30 is coupled to second level detection circuitry 32 that receives the signal generated by

microphone 30 and generates second intensity signal I_O. *Id.* ¶ 26. Signal processing circuitry 40 (not shown in Figure 3) compares signals I_D and I_O "to determine if the loudspeaker 20 is driving into a sealed acoustic cavity." *Id.* ¶ 30. For example, "a ratio of these levels" may be "used to decide if the loudspeaker 20 is driving into a sealed acoustic cavity." *Id.* "The expected ratio of the signal levels I_D and I_O under the sealed and unsealed conditions is derived from knowledge of the electro-acoustic transfer function from the loudspeaker 20 to the microphone 30 under the various operating conditions." *Id.* ¶ 31. For example, "at a frequency of 200 Hz, a ratio of acoustic output to loudspeaker drive of about -3 dB would indicate a sealed cavity, and a ratio of -25 dB would indicate an open cavity." *Id.* ¶ 32.

2. Overview of Svean (Ex. 1006)

Svean is directed to an "[e]ar protecting device with a sealing section for acoustically sealing the meatus of a human." Ex. 1006, code (57). The device includes microphone M2 and sound generator SG "arranged in a sealing section 2 arranged for attenuating sounds entering the meatus cavity." *Id.* at 11:61–12:1. Sound generator SG "generates a sound field in the closed part of the meatus," microphone M2 "picks up sound in the meatus cavity," and microprocessor E3 analyzes the signal measured by microphone M2 and compares the results of the analysis to "stored results from previous measurements of the same type in a situation with good sealing conditions." *Id.* at 12:1–11, 12:31–33. Once the comparison is completed, the device generates a "digital 'go'/'no go' real time signal indicating acceptable noise protection attenuation or unacceptable protection conditions." *Id.* at 13:1–4. Processor E3 may also provide "audible or other

messaged confirmation if the leakage is acceptably low, or a warning signal if leakage is unacceptably high." *Id.* at 12:11–14.

3. Analysis of Independent Claim 1

a) 1[preamble]: "[a]n electronic audio device for use with at least one earpiece or a pair of earpieces, or a pair of earpieces in a headphone, each earpiece having a microphone operatively coupled to the earpiece and a speaker located therein, comprising:"

Petitioner argues that, to the extent the preamble is limiting, Ryan discloses or suggests it. Pet. 10 (citing Ex. 1002 ¶ 95). Petitioner asserts that Ryan discloses that the signal processing may be located in a telephone base in communication with a hearing instrument headset, and thus teaches an "electronic audio device for use with at least one earpiece." *Id.* at 10–11 (citing Ex. 1007 ¶ 25). Petitioner also contends that Ryan discloses an earpiece having a microphone operatively coupled to the earpiece (microphone 30) and a speaker (loudspeaker 20) located in the earpiece. *Id.* at 11–12 (citing Ex. 1007 ¶¶ 20, 24; Ex. 1002 ¶ 97).

Patent Owner does not present arguments regarding the preamble. *See* PO Resp. 14–30.

Based on the full trial record, we agree with Petitioner's arguments, and find that the preamble would have been obvious over the prior art.[5]

b) 1[a]: "circuitry operatively coupled to the microphone and speaker;"

Petitioner argues that Ryan discloses or suggests this feature. Pet. 12 (citing Ex. 1002 ¶ 98). Petitioner points to Ryan's disclosure that

[5] Because we are persuaded that Petitioner has shown that Ryan teaches the subject matter recited in the preamble, we need not decide whether the preamble is limiting.

"loudspeaker 20 is coupled to a first level detection circuitry 22," and "microphone 30 is coupled to a second level detection circuitry 32." *Id.* at 12–13 (citing Ex. 1007 ¶¶ 25–26; Ex. 1002 ¶ 98).

Patent Owner does not present arguments directed to this limitation. *See* PO Resp. 14–30.

Based on the full trial record, we agree with Petitioner's arguments, and find that this limitation would have been obvious over the prior art.

c) 1[b]: "a processor operatively coupled to evaluate a seal quality of the earpiece based on seal quality measurements made while driving or exciting a signal into the speaker located in the earpiece;"

(1) The Parties' Arguments

Petitioner argues that Ryan discloses or suggests this feature. Pet. 13 (citing Ex. 1002 ¶ 99). Petitioner points to Ryan's disclosure of "signal processing circuitry [that] may be realized by a programmable microprocessor" as the claimed "processor." *Id.* (citing Ex. 1007 ¶ 30; Ex. 1002 ¶ 99).

Petitioner also contends that Ryan's signal processing circuitry is "operatively coupled to evaluate a seal quality." Pet. 13. According to Petitioner, Ryan's signal processing circuitry 40 monitors signal levels I_D and I_O "to decide if the loudspeaker 20 is driving into a sealed acoustic cavity." *Id.* at 15 (citing Ex. 1007 ¶ 30). Petitioner further relies on Ryan's disclosure that the system may "be used to detect or measure how well a hearing instrument forms a seal with a user's ear" by "monitoring the frequency response ratio of I_D and I_O and comparing the monitored ratio to an ideal ratio or a previously measured known ratio." *Id.* at 15–16 (citing Ex. 1007 ¶ 53) (emphasis omitted). Relying on Dr. Kyriakakis, Petitioner

contends that one of ordinary skill "would have understood that 'monitoring the frequency response ratio of I_D and I_O' is a seal quality measurement that results in generation of an ear canal transfer function (ECTF)," which "models the input and output characteristics of the ear canal." *Id.* at 18 (citing Ex. 1002 ¶ 105; Ex. 1001, 5:43–47).

Petitioner also argues that one of ordinary skill "would have recognized Ryan's system 'detect[s] or measure[s] how well a hearing instrument forms a seal with a user's ear' while a signal is being driven into loudspeaker 20." Pet. 18–19. According to Petitioner, Ryan "'simultaneously monitors' signal levels 'at the input to the loudspeaker 20 to obtain the loudspeaker drive level [I_D] . . .' and signal levels 'at the output of the microphone to obtain an acoustic output level [I_O].'" *Id.* at 16 (citing Ex. 1007 ¶ 25). Petitioner further argues that Ryan "teaches that 'frequency response can be measured **as the loudspeaker is operating**.'" *Id.* at 19 (citing Ex. 1007 ¶ 24). "Because the measurements Ryan makes to determine sealing level are based on loudspeaker drive level I_D," Petitioner argues, one of ordinary skill "would have understood that Ryan's seal quality measurements are made 'while driving or exciting a signal into the loudspeaker,' as claimed." *Id.* at 19 (citing Ex. 1002 ¶ 106).

Patent Owner argues that Ryan does not disclose "a processor . . . driving or exciting a signal into the speaker" as claimed. PO Resp. 14. Patent Owner asserts that one of ordinary skill "would understand that the processor performs the 'driving or exciting' of the signal to the speaker" rather than some other component. *Id.* at 15. Petitioner's argument, according to Patent Owner, "is based upon an impermissible broadening of the processor limitation" that "does not require that the recited processor be

configured to drive or excite a signal into the speaker," and effectively re-write's the claim to say that the processor evaluates seal quality based on measurements made "while a signal is driven or excited into the speaker." *Id.*

Turning to the disclosures of the prior art, Patent Owner argues that Petitioner relies on Ryan's "signal processing circuitry 40" for the "processor" recited in claim 1, but this "signal processing circuitry 40 does not drive or excite a signal—either a test signal or any other signal—into the ear canal loudspeaker 20." PO Resp. 16–17. Patent Owner asserts that, "[a]lthough Ryan does not explicitly specify the source of the first electrical signal that is delivered to the ear canal loudspeaker 20, a person of ordinary skill in the art would understand that the source of the first electrical signal is not signal processing circuitry 40." *Id.* at 19–20. In Ryan's hearing aid embodiment, according to Patent Owner, "the source of the first electrical signal is an external microphone that captures ambient noise." *Id.* at 20; *see also id.* at 21–27. Patent Owner argues that this approach "stands in contrast to claim 1 of the '424 patent, which requires that the processor drive or excite the signal that is sent to the speaker." *Id.* at 27.

Petitioner responds that Patent Owner's interpretation of claim 1 "impermissibly *narrows* the claim by requiring that the recited processor is the structure that drives or excites a signal into an earpiece when the claim says no such thing." Pet. Reply 2. Petitioner asserts that "the claim language only requires that the processor evaluate seal quality," and nothing in the claim's grammar "says that the processor ***also*** makes seal quality measurements and drives or excites a signal . . . into the speaker." *Id.* Petitioner also contends that Patent Owner's expert testified that he "did not

analyze the words or grammar of the processor limitation of claim 1," and "relied solely on Figures 2 and 3 of the '424 patent in forming his understanding of the claim," even though Figures 2 and 3 are described as being in "accordance with an exemplary embodiment." *Id.* at 3 (citing Ex. 1027, 20:4–15, 21:20–22:6, 37:22–38:4; Ex. 1001, 2:54–58, 4:8–9, 4:57–58). Petitioner further argues that the portions of the specification describing Figures 2 and 3 use permissive language explaining that the processor "can" carry out various functions (including producing audio from ambient sound captured by the ASM), rather than requiring that the processor carry out these functions. *Id.* at 4–6 (citing Ex. 1001, 4:14–20, 5:20–24; Ex. 1027, 31:10–19).

Patent Owner responds that Petitioner's "attempt to cast doubt on Mr. Struck's opinions because he did not include an 'analysis of the grammar' of the processor limitation is unavailing" because "[t]he issue is not one of esoteric grammar, requiring consultation to a style guide." PO Sur-reply 2. For example, Patent Owner asserts, "[a] person is well advised not to text 'while driving' a car; however, texting while a car 'is being driven' may be okay (if done from the passenger seat)." *Id.* Patent Owner also contends that Mr. Struck did in fact analyze the words and grammar of the "processor" limitation when he explained that claim 1's requirement that a processor supply a signal to be used in an ear seal test "comes from the limitation[] 'a processor . . . driving or exciting a signal into the speaker.'" *Id.* at 2–3 (citing Ex. 2006 ¶ 45). Finally, Patent Owner argues that Mr. Struck did not testify that he "relied solely" on Figures 2 and 3 of the '424 patent specification in forming his understanding of the claim. *Id.* at 3–5.

(2) Analysis

Based on the full trial record, we find that Petitioner has sufficiently proven that Ryan discloses this limitation. We will first discuss the construction of this claim element, and then discuss the application of this construction to the prior art.

(a) Claim Construction

The parties' dispute turns on the construction of the claim language reciting "a processor operatively coupled to evaluate a seal quality of the earpiece ***based on seal quality measurements made while driving or exciting a signal into the speaker*** located in the earpiece." To construe this phrase, we start with the claim language itself. The claim language requires that the "processor" is operatively coupled "to evaluate a seal quality of the earpiece," indicating that the processor evaluates seal quality. The claim also states that this evaluation is performed "based on seal quality measurements made while driving or exciting a signal into the speaker located in the earpiece," indicating that the processor uses seal quality measurements to evaluate seal quality. The phrase "while driving or exciting a signal into the speaker located in the earpiece" modifies "seal quality measurements made," indicating the timing of when the seal quality measurements are made, namely while (at the same time as) a signal is driven or excited into the speaker.

This "while driving or exciting . . ." clause does not specify what component performs the "driving or exciting a signal into the speaker located into the earpiece." Significantly, although the claim language states that the processor "evaluate[s] seal quality," it does not state that the processor drives or excites the signal into the speaker. Had the applicant

wanted to limit the claim in that manner, it could have drafted it to specify that the seal quality measurements are made "while ***the processor is*** driving or exciting a signal into the speaker." The applicant, however, did not do so. Indeed, elsewhere in the claim, the language clearly specifies that certain functions are carried out by the processor, for example:

- "a processor operatively coupled to evaluate a seal quality of the earpiece" (claim [1b]);
- "the processor is configured to generate a visual or audio message identifying whether the at least one earpiece is properly sealed" (claim [1c]);
- "the processor by way of the speaker and microphone adjusts the audio" (claim 3);
- "the processor measures differences in a further sound pressure level between an ambient microphone and the [earpiece] microphone, and determines a sealing profile of the ear canal" (claim 4);
- "the processor determines whether the earpiece is properly inserted . . . and generates the visual or audio message identifying compliance" (claim 5);
- "the processor by way of the speaker and microphone in the earpiece performs in-situ measurement of a user's ear anatomy" (claim 6); and
- "the processor monitors changes in the ECTF to determine a sealing level of the earpiece" (claim 7).

Ex. 1001, 13:25–67. Claim 1, however, does not include any comparable language specifying that the processor performs the "driving or exciting a signal into the speaker located in the earpiece." Therefore, we find that the plain and ordinary meaning of claim 1's language does not require that the processor itself must drive or excite a signal into the speaker.

Our conclusion is supported by the cross-examination testimony of Dr. Kyriakakis, where he testified that claim 1 does not "require that the

processor be configured to drive or excite a signal into the speaker located in the earpiece" and "doesn't specify what is creating that signal." Ex. 2007, 20:11–21:8. Dr. Kyriakakis testified that one of ordinary skill would "understand that something must drive or excite a signal into the speaker located in an earpiece," and further explained that this could be another component generating "an external signal that's driven into [the speaker] for testing or other purposes" which "connects directly to the speaker or to the amplifier driving the speaker." *Id.* at 21:9–22:10. Dr. Kyriakakis contrasted this language with the last element in claim 1, which "very clearly states that the processor's configured to generate a visual or audio message" so "when the patent owner wanted to say that the processor is" carrying out a particular function, "they clearly stated it" in the last claim element and "could have done the same thing in the previous element." *Id.* at 22:11–23:25.

We do not agree with Dr. Struck's testimony that "[a] person of ordinary skill in the art would understand that the processor performs the 'driving or exciting' of the signal to the speaker" and "would not even consider any other component mentioned in claim 1 as a candidate to perform the driving or exciting." *See* Ex. 2006 ¶ 46. Dr. Struck does not discuss the grammar and structure of the claim language, including the fact that the phrase "while driving or exciting a signal into the speaker" modifies "seal quality measurements" and indicates the timing of when the seal quality measurements are made (while (at the same time as) a signal is driven or excited into the speaker). *See id.* Dr. Struck also does not discuss the fact that claim 1 recites that the processor "evaluate[s] a seal quality of the earpiece" but does not say that the same processor "driv[es] or excit[es] a

signal into the speaker located into the earpiece, instead leaving the subject of what component performs the "driving or exciting" unspecified. *See id.* Indeed, Dr. Struck acknowledged at his deposition that his declaration lacks an "analysis of the grammar used in the limitation of [c]laim 1" at issue here. Ex. 1027, 20:4–15. Additionally, Dr. Struck appears to assume that the "driving or exciting" must be performed by some "other component mentioned in claim 1," but there is no requirement that the claim must specify a particular component for carrying out this function. *See* Ex. 2006 ¶ 46.

Additionally, we disagree with Patent Owner's argument that Petitioner is improperly rewriting the claim to say that the seal quality measurements are made "while a signal is driven or excited into the speaker." *See* PO Resp. 15. In both the actual claim language and Patent Owner's hypothetical rewriting, the claim does not specify the component that performs the "driving or exciting" of the signal into the speaker. Consequently, we agree with Dr. Kyriakakis's cross-examination testimony that these two formulations of the claim language would not be materially different in scope. Ex. 2007, 24:16–25. Similarly, we do not find Patent Owner's example of a person texting "while driving a car" persuasive, because Patent Owner's example indicates that the "person" is driving the car, in contrast to the disputed language of claim 1, where the phrase "when driving or exciting a signal" specifies when the seal quality measurements are made and does not specify what component is "driving or exciting" the signal into the speaker. *See* PO Sur-reply 2.

As for the other sources of intrinsic evidence, the parties dispute focuses on the language of claim 1 itself, and neither party relies on the '424

patent specification or prosecution history for its proposed construction of claim 1. Specifically, Patent Owner asserts that its claim construction arguments "did not invoke embodiments from the specification" but rather "'flow from' the claim language." PO Sur-reply 3; *see also id.* at 5 ("even a casual reference to Mr. Struck's declaration reveals that his opinion was informed by consulting the claim language itself"). Petitioner similarly does not rely on the '424 patent specification, and argues that we should not import limitations from the specification into the claims. Pet. Reply 3–5. And, neither party argues that the prosecution history is relevant to claim construction. Consequently, we also focus on the claim language and, as discussed above, find that it does not require the same processor that evaluates the seal quality of the earpiece must also drive or excite a signal into the speaker located in the earpiece.

(b) Application of the Claim Language to the Prior Art

We agree with Petitioner that Ryan discloses the claimed "processor" in the form of "signal processing circuitry [that] may be realized by a programmable microprocessor," and that this signal processing circuitry is "operatively coupled to evaluate seal quality." Pet. 13; Ex. 1007 ¶ 30; Ex. 1002 ¶ 99. Specifically, Ryan discloses that signal processing circuitry 40 monitors signal levels I_D and I_O "to decide if the loudspeaker 20 is driving into a sealed acoustic cavity," and measures "how well a hearing instrument forms a seal with a user's ear" by "monitoring the frequency response ratio of I_D and I_O and comparing the monitored ratio to an ideal ratio or a previously measured known ratio." Pet. 15–16; Ex. 1007 ¶ 53. We agree with and find credible Dr. Kyriakakis's testimony that one of ordinary skill would have understood that "'monitoring the frequency

response ratio of I_D and I_O' is a seal quality measurement that results in generation of an ear canal transfer function (ECTF)," which "models the input and output characteristics of the ear canal." Ex. 1002 ¶¶ 103, 104; Ex. 1001, 5:43–47). Thus, Ryan discloses a processor operatively coupled to evaluate a seal quality of the earpiece based on seal quality measurements. *See* Ex. 1002 ¶¶ 100–105.

We also agree with and find credible Dr. Kyriakakis's testimony that "the monitored 'frequency response ratio of I_D and I_O'" is "captured 'while driving or exciting a signal into the speaker'" located in the earpiece. Ex. 1002 ¶ 106 (citing Ex. 1007 ¶ 25). As Dr. Kyriakakis explains, one of ordinary skill would have recognized that a signal is being driven into loudspeaker 20 while the system is "detect[ing] or measur[ing] how well a hearing instrument forms a seal with a user's ear," because signal I_D, which is used to evaluate seal quality, is monitored at the input to loudspeaker 20. *Id.* ¶¶ 104, 106 (citing Ex. 1007 ¶¶ 24, 25, 53, Fig. 3). Ryan further teaches that "frequency response can be measured ***as the loudspeaker is operating***." Ex. 1007 ¶ 24 (emphasis added); Ex. 1002 ¶ 106. Thus, one of ordinary skill would have understood that Ryan's seal quality measurements are made "while driving or exciting a signal into the loudspeaker," as claimed. *See* Ex. 1002 ¶ 106.

Patent Owner's arguments are based on its proposed claim construction requiring that the same processor that evaluates a seal quality of the earpiece also must "driv[e] or excit[e] a signal into the speaker located in the earpiece." PO Resp. 14–27; PO Sur-reply 2–7. Specifically, Patent Owner argues that Petitioner relies on Ryan's "signal processing circuitry 40" for the "processor limitation," but this "signal processing circuitry 40

does not drive or excite a signal . . . into the ear canal loudspeaker." *Id.* at 16–17. Similarly, Patent Owner argues that "[a]lthough Ryan does not explicitly specify the source of the first electrical signal that is delivered to the ear canal loudspeaker 20, a person of ordinary skill in the art would understand that the source of the first electrical signal is not signal processing circuitry 40." *Id.* at 19–20. As discussed above, however, we reject Patent Owner's proposed construction requiring that the same processor that evaluates the seal quality of the earpiece must also drive or excite a signal into the speaker located in the earpiece. *See* § II.D.3.c(2)(a). Therefore, even if we accept Patent Owner's argument that Ryan's signal processing circuitry 40 does not drive or excite a signal into the speaker located in the earpiece, Ryan nonetheless meets this limitation because the claim language does not require the same processor that evaluates a seal quality of the earpiece must also drive or excite a signal into the speaker located in the earpiece.

Consequently, we determine that, based on the full trial record, this limitation would have been obvious over the prior art.

d) 1[c]: "wherein the processor is configured to generate a visual or audio message identifying whether the at least one earpiece is properly sealed based on the seal quality measurements."

Petitioner argues that Ryan discloses or suggests this feature, either alone or in combination with Svean. Pet. 21–22 (citing Ex. 1002 ¶¶ 109, 111). Petitioner points to Ryan's disclosure that, when the hearing instrument detects an unsealed condition, it "may issue a periodic tone to notify the user that the hearing instrument requires a fitting adjustment or service." *Id.* at 21 (quoting Ex. 1007 ¶ 57, claim 27). Petitioner argues that

one of ordinary skill would have understood that this periodic tone "is a 'message identifying whether the at least one earpiece is properly sealed,' because it identifies 'whether' the earpiece is properly sealed, *i.e.*, that it is not properly sealed." *Id.* (citing Ex. 1002 ¶ 111).

Petitioner further argues that, to the extent one were to argue that the claim requires an explicit message that the earpiece is properly sealed, Ryan in combination with Svean discloses or suggests this feature. Pet. 22. Petitioner argues that Svean discloses a similar system to Ryan's that has a microphone and sound generator arranged in a sealing section, analyzes sound from the microphone and compares the results to previous measurements involving good sealing conditions, and then "generates a 'digital "go"/"no go" real time signal indicating acceptable noise protection or unacceptable protection conditions.'" *Id.* at 23–24 (citing Ex. 1006, 12:1–7, 12:31–33, 13:1–4). According to Petitioner, Svean goes on to teach that a processor "may provide 'audible or other messaged confirmation if the leakage is acceptably low, or a warning signal if leakage is unacceptably high.'" *Id.* (citing Ex. 1006, 12:11–14). Petitioner contends that one of ordinary skill "would have recognized an 'audible or other messaged confirmation' that 'the leakage is acceptably low' is a 'visual or audio message identifying whether the at least one earpiece is properly sealed based on the seal quality measurements,' as claimed." *Id.* (citing Ex. 1002 ¶ 116). Petitioner further argues that one of ordinary skill would have been motivated to modify Ryan to include Svean's "audible or other messaged confirmation" because a person "fitting a hearing instrument like Ryan's would want to know if a user's device was properly sealed." *Id.* (citing Ex. 1002 ¶ 117).

Patent Owner does not present arguments directed to this limitation and does not challenge Petitioner's motivation to combine Ryan and Svean. *See* PO Resp. 14–30.

Based on the full trial record, we agree with Petitioner's arguments, and find that this limitation would have been obvious over the prior art.

e) Summary for Claim 1

Based on the full trial record, Petitioner has proven by a preponderance of the evidence that claim 1 would have been obvious based on Ryan or Ryan in view of Svean.

4. Dependent Claims 2, 5–7, and 10–11

Petitioner contends that claims 2, 5–7, and 10–11 are unpatentable over Ryan alone or Ryan in view of Svean. Pet. 29–35.

Claim 2 depends on claim 1, and further recites that the "electronic audio device" further comprises "a wired or wireless connection that couples to an electronic device to receive audio signals that are used to drive the signal into the speaker located in the at least one earpiece or the pair of earpieces in a headphone." Ex. 1001, 13:40–44. Petitioner argues that one of ordinary skill would have found it obvious to couple Ryan's hearing device to another device via a "wired or wireless connection." Pet. 27. Petitioner asserts that Ryan teaches that its hearing instrument may take the form of a "communications headset," and that "the automatic detection of an insertion can be used to provide a hands-free method of answering an incoming call and the automatic detection of a removal can be used to put the headset into a standby or low-power mode." *Id.* (citing Ex. 1007 ¶ 22). According to Petitioner, Ryan further teaches that its system may be located in associated electronics, such as in a telephone base in communication with

a headset. *Id.* Based on these disclosures, Petitioner argues that one of ordinary skill would have found it obvious to provide communication via either wired or wireless communication, and for such a connection to include received "audio signals" in the signal that drives speaker 20. *Id.* at 27–28 (citing Ex. 1002 ¶¶ 123–124; Ex. 1007 ¶¶ 22, 25). Petitioner further argues that Svean discloses that the earpiece may be connected to electrical units using a wireless link, such as Bluetooth, and that it would have been obvious to use such a link in Ryan. *Id.* at 28–29 (citing Ex. 1006, 7:30–36; Ex. 1002 ¶ 125).

Claim 5 depends from claim 1 and further recites that "the processor determines whether the earpiece is properly inserted based on a sealing profile; and generates the visual or audio message identifying compliance or lack of compliance with the sealing profile." Ex. 1001, 13:55–59. Petitioner argues that Ryan's processor 40 measures how well a hearing instrument forms a seal with a user's ear by monitoring the frequency response ratio of I_D and I_O and comparing it to an ideal ratio or a previously measured known ratio. Pet. 29–31 (citing Ex. 1007 ¶¶ 30, 53–54, Fig. 11; Ex. 1002 ¶¶ 129–130). Petitioner also asserts that Ryan "can detect an unsealed condition, and that when it does so, it 'may issue a periodic tone to notify the user that the hearing instrument requires a fitting adjustment or service.'" *Id.* at 31 (citing Ex. 1007 ¶ 57).

Claim 6 depends from claim 1 and further recites that "the processor by way of the speaker and microphone in the earpiece performs in-situ measurement of a user's ear anatomy to produce an ear canal transfer function (ECTF) when the earpiece is in use." Ex. 1001, 13:60–64. Petitioner argues that Ryan's signal processing unit 40, in conjunction with

loudspeaker 20 and microphone 30, determines a monitored ECTF, which "is obtained when the hearing instrument is in use in a user's ear" as "shown in Fig. 11." Pet. 33 (citing Ex. 1007 ¶¶ 24, 54; Ex. 1002 ¶ 132).

Claim 7 depends from claim 6, and further recites that "the processor monitors changes in the ECTF to determine a sealing level of the earpiece with the ear canal." Ex. 1001, 13:65–67. Petitioner argues that "Ryan teaches that its system, the operation of which is reflected in Fig. 11, 'may be used to monitor the seal of the hearing instrument while in use" using changes in the ECTF reflecting a sealed and unsealed actual response. Pet. 33 (citing Ex. 1007 ¶ 54; Ex. 1002 ¶ 133).

Claim 10 depends from claim 1 and further recites that "the microphone in the earpiece is an ear canal microphone." Ex. 1001, 14:12–13. Petitioner argues that Ryan's microphone 30 is an "ear canal microphone." Pet. 34 (citing Ex. 1007 ¶¶ 21, 40, 47, 53–55, 59; Ex. 1002 ¶ 134).

Claim 11 depends from claim 1 and recites that "the processor is further configured to adjust the circuitry coupled to the microphone and speaker according to the evaluated seal quality." Ex. 1001, 14:14–17. Petitioner argues that Ryan monitors seal quality based on monitored signal levels I_D and I_O, and generates control signals based on monitored signal level. Pet. 34 (citing Ex. 1007 ¶¶ 30, 33; Ex. 1002 ¶ 135). "Ryan's gain control signal," Petitioner asserts, "'may be used to *reduce the gain on an output amplifier driving the* ***loudspeaker 20****, or reduce the gain on a microphone* receiving an input signal to generate a drive signal for the loudspeaker 20 upon detecting that the hearing instrument has been removed.'" *Id.* (citing Ex. 1007 ¶ 33). According to Petitioner, one of

ordinary skill "would recognize that Ryan's system determines that its hearing instrument has been removed upon determination of an unsealed actual response." *Id.* (citing Ex. 1007 ¶¶ 33, 55). "Likewise," Petitioner contends, Ryan's power control signal "may be used to deactivate the hearing instrument 10 after the hearing instrument 10 has been removed from the space and after a period of time has elapsed during which the hearing instrument 10 has not been reinserted into the space." *Id.* at 34–35 (citing Ex. 1007 ¶ 33). According to Petitioner, one of ordinary skill "would have understood that by deactivating hearing instrument 10, Ryan has 'adjust[ed] the circuitry coupled to the microphone and speaker,'" and that "processor 40 performs this adjustment." *Id.* at 35 (citing Ex. 1007 ¶ 35; Ex. 1002 ¶ 135). Accordingly, Petitioner contends, "Ryan discloses using control signals to deactivate ('adjusts') the detection circuitry ('circuitry operatively coupled to the microphone and speaker') based on determining whether the hearing instrument has formed an adequate seal ('according to the evaluated seal quality')." *Id.*

Patent Owner does not provide separate argument for claims 2, 5–7, and 10–11, and instead relies on its argument for claim 1. PO Resp. 30.

Based on the full trial record, we agree with Petitioner's arguments and find that Petitioner has proven by a preponderance of the evidence that claims 2, 5–7, and 10–11 would have been obvious over Ryan alone or Ryan in combination with Svean.

E. Grounds 2A/2B: Asserted Obviousness of Claim 4 Based on Ryan in view of Voix (2A), or Ryan in view of Svean and Voix (2B)

1. Overview of Voix (Ex. 1012)

Voix is directed to a system for "objectively assessing acoustical performance of an in-ear device having a passageway extending

[therethrough] us[ing] a dual microphone probe that removably engages the passageway." Ex. 1012, code (57). The acoustical performance of the device is assessed "with the in-ear device inserted into the ear canal of the user and a reference sound source," and "[a] clip holding the probe in an acoustic near field of the sound source permits real time calibration." *Id.* The system allows "on-site and in-situ measurement of a predicted personal attenuation rating of the device, a subject-fit re-insertion test, an acoustic seal test, a rating test, a stability and reliability test," as well as "a protection test of the device with an assessment of a filtered predicted exposure level at the ear for a specific noise exposure level." *Id.*

2. Claim 4

Claim 4 depends from claim 1, and further recites that "the process measures differences in a further sound pressure level between an ambient microphone and the microphone, and determines a sealing profile of the earpiece with the ear canal based on the differences." Ex. 1001, 13:50–54.

Petitioner argues that one of ordinary skill would have recognized that "Ryan has an ambient microphone because hearing aids like Ryan's receive ambient sound that they process (amplify, etc.) and deliver to users." Pet. 35 (citing Ex. 1002 ¶ 137). Petitioner argues that Voix teaches a first microphone 28 that measures an external sound pressure level in proximity to earplug 12 and a second microphone that measures an internal sound pressure inside ear canal 14 when earplug 12 is inserted therein. *Id.* at 36 (citing Ex. 1012 ¶ 100). Petitioner asserts that Voix further teaches calculating a "noise reduction" level (corresponding to the claimed "sealing profile") by measuring the difference between the sound pressure levels at the external and internal microphones, and "uses the measured noise

reduction value to determine [a] Personal Attenuation Rating that can be used to assure adequate protection (sealing) for an individual." *Id.* (citing Ex. 1012 ¶¶ 106–110; Ex. 1002 ¶ 138). According to Petitioner, one of ordinary skill "would have understood that applying the teachings of Voix to the hearing instrument of Ryan would improve in-situ assessment of the functionality of the hearing device and increase personalized acoustical performance of the hearing device." *Id.* at 36–37 (citing Ex. 1002 ¶ 139).

> Petitioner further argues that one of ordinary skill
>
> would have realized that the combination of *Ryan* and *Voix* would have amounted to no more than applying a known technique (Voix's method of assessing in-ear device acoustical performance) to a known device ready for improvement (Ryan's hearing instrument seeking to improve automatic control of in-ear acoustics) to yield predictable results (a hearing instrument with improved acoustical performance).

Pet. 37 (citing Ex. 1002 ¶ 140).

Patent Owner does not provide separate argument for claim 4 or challenge the motivation to combine Ryan and Voix, and instead relies on its argument for claim 1. PO Resp. 30–31.

Based on the full trial record, we agree with Petitioner's arguments and find that Petitioner has proven by a preponderance of the evidence that claim 4 would have been obvious over Ryan or Ryan/Svean in combination with Voix.

F. Ground 3: Asserted Obviousness of Claim 8 Based on Ryan in view of Svean and Victorian[6]

Claim 8 depends from claim 1, and recites that the earpiece "further compris[es] a transceiver operatively coupled to the processor to receive and transmit signals." Ex. 1001, 14:1–3.

Petitioner argues that Ryan teaches signal processing circuitry "located in associated electronics, such as in a telephone base in electrical communication with a communication headset hearing instrument," and Svean teaches a similar system in which "circuitry in the earpiece may be connected to electrical units by a cable or wireless link." Pet. 37–38 (citing Ex. 1007 ¶ 25; Ex. 1006, 7:30–36; Ex. 1002 ¶ 141). Petitioner asserts that one of ordinary skill would have understood that a wireless communication system would use a transceiver to receive and transmit signals, as demonstrated by Victorian, "which discloses an earpiece that can communicate with an external device, *e.g.*, cellular telephone" using "wireless transceiver 450" that "includes a wireless transmitter and a wireless receiver." *Id.* at 38 (citing Ex. 1002 ¶ 142; Ex. 1013, code (57), 7:47–56, Fig. 4A).

Petitioner asserts that one of ordinary skill "would have been motivated to use Victorian's transceiver in a system like Ryan-Svean" because "an earpiece using a wireless communication system such as Bluetooth, as taught in Svean, would need components to transmit and receive signals to and from an external device such as the telephone base taught by Ryan." Pet. 39 (citing Ex. 1002 ¶ 142). According to Petitioner, "use of a transceiver like Victorian's was one of a limited number of options

[6] Victorian is summarized in Section II.H.2 below.

for transmitting and receiving signals between an earpiece and an external device such as the telephone base," which further demonstrates that one of ordinary skill "would have been motivated to use Victorian with the combination of Ryan and Svean." *Id.* (citing Ex. 1002 ¶ 142).

Patent Owner does not provide separate argument for claim 8 or challenge Petitioner's motivation to make the combination, and instead relies on its argument for claim 1. PO Resp. 31.

Based on the full trial record, we agree with Petitioner's arguments and find that Petitioner has proven by a preponderance of the evidence that claim 4 would have been obvious over Ryan in view of Svean and Victorian.

G. Ground 4A/4B: Asserted Obviousness of Claim 9 Based on Ryan or Ryan/Svean in view of Alberth

1. Overview of Alberth (Ex. 1015)

Alberth is directed to a system for providing background audio during a communication session. Ex. 1015, code (54). The system locally inserts non-noise background audio information, such as music or other suitable information, with other audio information, such as voice, to produce a combined audio signal. *Id.* at code (57). The combined audio signal is transmitted over a communication channel (such as a wired or wireless channel) or output locally via a speaker on a user's device. *Id.* The system may select stored non-noise background audio information from local memory of the sending device or real-time audio (such as an audio stream) from a live broadcast received by a radio, cable, or television tuner. *Id.*

2. Claim 9

Claim 9 depends from claim 1, and recites:

> The earpiece of claim 1, wherein the processor audibly mixes a received mobile device communication with the audio content

> depending on a user context that is at least one among receiving a phone call while the audio content is playing, receiving a voice mail or voice message while the audio content is playing, receiving a text-to-speech message while the audio content is playing, and receiving the voice mail during a phone call.

Ex. 1001, 14:4–11.

Petitioner argues that Ryan teaches that its hearing instrument may communicate with a telephone and, based on this, one of ordinary skill would have understood that mixing audio from a telephone (*i.e.*, a mobile device) with audio content "would have provided benefits to a user because it would eliminate the need to remove their hearing aid or listening device to receive a phone call." Pet. 40 (citing Ex. 1007 ¶ 25; Ex. 1002 ¶ 144). Petitioner asserts that Alberth "teaches this same feature in the context of a phone and a wireless headset," namely a method that "inserts non-noise background audio information (104), such as music . . . with other audio information (110), such as voice, to produce a combined audio signal (112)." *Id.* at 40–41 (citing Ex. 1015, code (57). According to Petitioner, "Alberth further teaches that a mixer 'receives the non-noise background audio information 104 and also receives audio information from a down link communication," which one of ordinary skill would have understood "is from another party speaking during a telephone call." *Id.* at 41 (citing Ex. 1015 ¶¶ 15, 27; Ex. 1002 ¶ 146).

Petitioner argues that one of ordinary skill would have been motivated to combine Alberth with Ryan because "Ryan teaches placing its hearing instruments in communication with a telephone," and one of ordinary skill "would have understood that users would have expected hearing instruments such as hearing aids and listening devices that communicate with telephones would be able to receive telephone calls while listening to audio content

such as ambient audio or music." Pet. 41–42 (citing Ex. 1002 ¶ 147). Furthermore, Petitioner asserts,

> this combination would have amounted to no more than applying a known technique (the mixing of audio content and a voice call into a single combined audio signal and outputting that combined audio signal to a wireless hearing device) to a known device ready for improvement (the hearing device of Ryan or Ryan-Svean that can be used to wirelessly receive a phone call audio signal from a telephone) to yield predictable results (a hearing device capable of receiving a combined audio signal comprising audio content and phone call audio).

Pet. 42 (citing Ex. 1002 ¶ 147).

Patent Owner does not provide separate argument for claim 9 or challenge Petitioner's motivation to make the combination, and instead relies on its argument for claim 1. PO Resp. 31.

Based on the full trial record, we agree with Petitioner's arguments and find that Petitioner has proven by a preponderance of the evidence that claim 9 would have been obvious over Ryan or Ryan Svean in view of Alberth.

H. Ground 5: Asserted Obviousness of Claims 12 and 15–16 Based on Allen in view of Victorian

Petitioner contends that claims 12 and 15–16 would have been obvious over Allen in view of Victorian. Pet. 42–57. Patent Owner disagrees, arguing that the combination would not have rendered claims 12 and 15–16 obvious. PO Resp. 31–56.

1. Overview of Allen (Ex. 1016)

Allen discloses "a method and system for automatically adjusting acoustic devices based on acoustic reflectance," which "is a relationship between reflected waves and incident waves." Ex. 1016 ¶ 29. Allen

explains that this method can be carried out using an automated fitting process for a hearing aid that "can automatically adjust its parameters to the hearing impaired ear, in situ." *Id.* ¶ 32. Allen also explains that its hearing aid "can improve the overall quality of a hearing aid fitting, efficiency of hearing compensation, and/or delivery of acoustic signals to cochlea." *Id.*

Allen explains that "various characteristics of the ear or the hearing aid and their changes over time" may be "monitored and used to identify problems with the . . . hearing aid." Ex. 1016 ¶ 66. For example, "the change of reverse transfer function over time may reveal leakage in the seal of the hearing aid or the ear canal." *Id.* Allen explains that "[t]he reverse transfer function may be measured with a microphone inside the ear canal relative to a microphone outside the ear canal." *Id.*

Allen provides an embodiment of a simplified hearing aid in Figure 7, which is reproduced below.

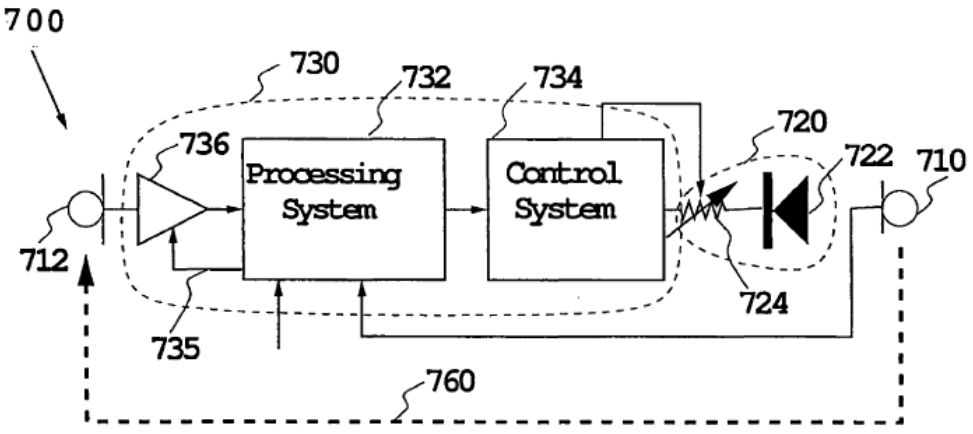


Fig. 7

Figure 7 shows an embodiment of a simplified hearing aid. Ex. 1016, Fig. 7, ¶ 73.

Allen's Figure 7 describes an embodiment of its hearing aid that includes microphone 710 placed into the ear canal, microphone 712 placed in the outer ear, and earphone 720 including speaker 722 to output an acoustic

pressure. Ex. 1016 ¶¶ 73–75. Figure 7 also depicts system 730 including processing system 732, control system 734, and amplifier 736. *Id.* ¶ 76. Processing system 732 sends signals to control system 734 and receives signals from microphone 710 and other sources. *Id.* Processing system 732 and control system 734 may be used "for measuring acoustic reflectance and acoustic impedance of the ear canal and processing the measurement results to determine fitting parameters of the hearing aid." *Id.* ¶ 77.

2. Overview of Victorian (Ex. 1013)

Victorian is directed to an "[e]ar-level full duplex audio communication system" including "ear attachment devices" such as "in-the-ear (ITE) or behind-the-ear (BTE) devices" that "wirelessly communicate[] to a remote device" such as "a cellular phone." Ex. 1013, code (57). The 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." *Id.* Victorian explains that "[f]or appearance or secrecy reasons, minimal visibility is generally desirable." *Id.* ¶ 6.

An embodiment of Victorian's ear-level system is shown in Figure 1, reproduced below.

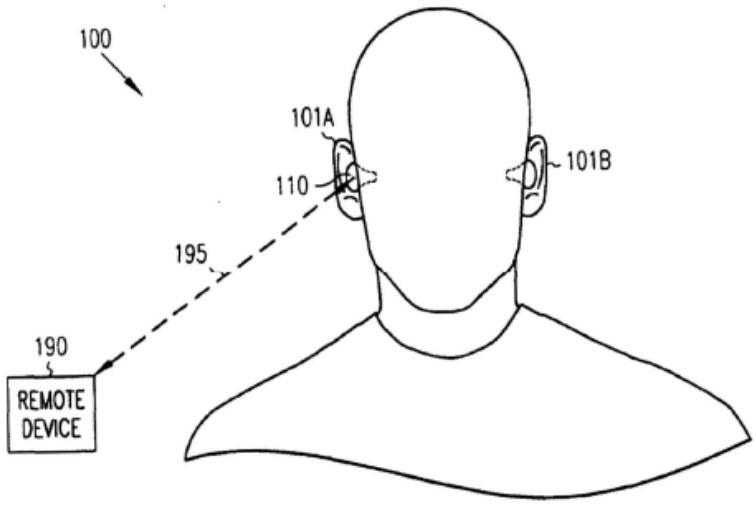


FIG. 1

Victorian's Fig. 1 illustrates an embodiment of the ear-level communication system 100. Ex. 1013 ¶ 18, Fig. 1.

As shown in Figure 1, ear-level communication system 100 includes ear-level device 110 attached to ear 101A. Ex. 1013 ¶ 18. Ear-level device 110 "communicates with a remote device 190 through a wireless telemetry link 195," and is "a full duplex audio device that allows two-way simultaneous conversation between ear 101A and remote device 190." *Id.* ¶¶ 18–19. Ear-level device 110 "picks up sound from the ear canal of ear 101A and delivers sound to the same ear canal." *Id.* ¶ 19. It also "detects the occluded sound from the ear canal when the person speaks and transmits to the same ear canal a sound received from remote device 190 and/or a sound picked up from the environment surrounding the person." *Id.*

An exemplary exterior configuration of an in-the-canal version 310B of ear level device 110 is illustrated in Figure 3B, reproduced below.

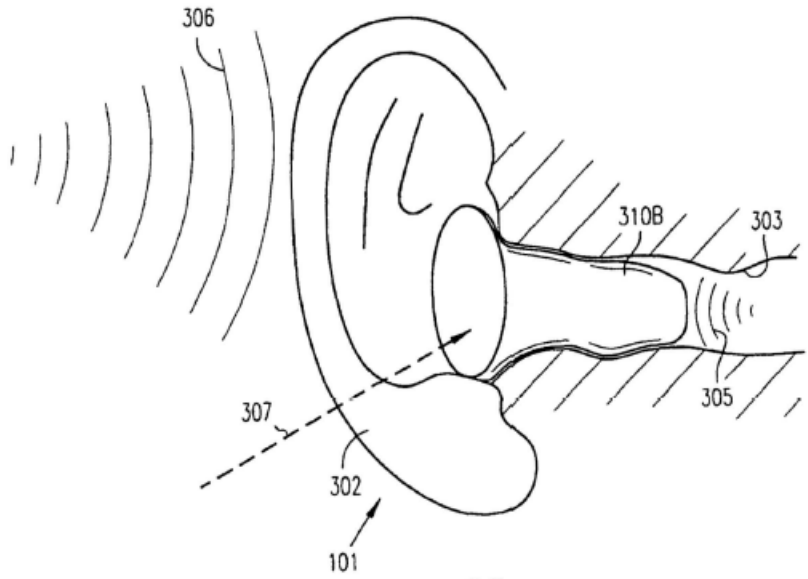


FIG. 3B

Victorian's Fig. 3B illustrates an exemplary exterior configuration of an in-the-canal version of ear-level device 110. Ex. 1013, Fig. 3B, ¶ 25.

As shown in Figure 3B, device 310B is attached to ear 101 having pinna 302 and ear canal 303. Ex. 1013 ¶ 25. A portion of device 310B is inserted into ear canal 303 and another smaller portion is fit into the cavity formed by pinna 302. *Id.* Figure 3B also shows occluded sound 305, ambient sound 306, and remote sound 307 (represented by a wireless radio signal transmitted to the ear-level device). *Id.* ¶ 23.

A block diagram of an embodiment of the circuit of the ear-level device is illustrated in Figure 4A, reproduced below.

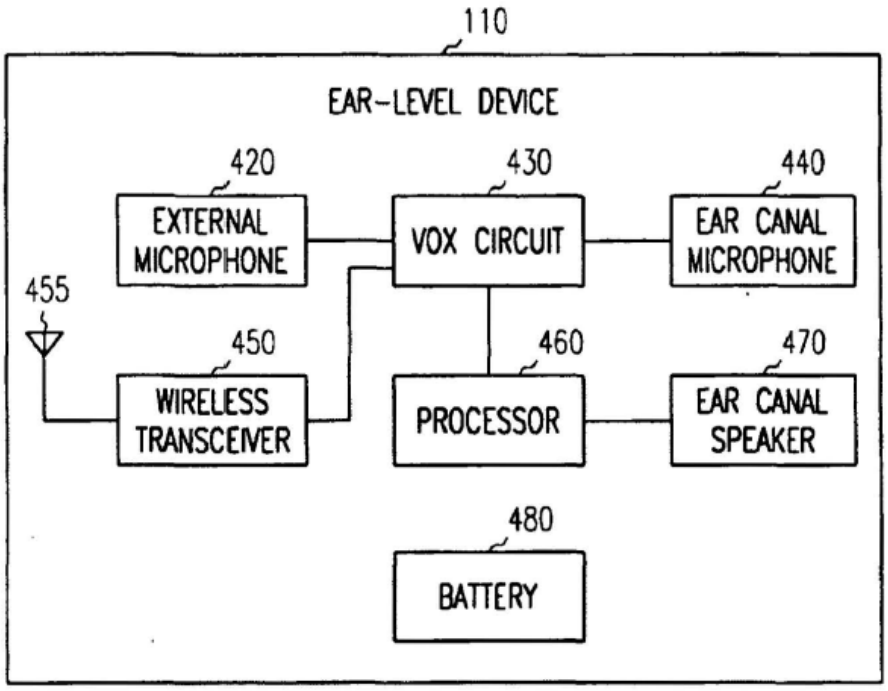


FIG. 4A

Victorian's Figure 4A depicts an embodiment of the circuit of ear-level device 110. Ex. 1013, Fig. 4A, ¶ 29.

As shown in Figure 4A, ear-level device 110 includes external microphone 420, ear canal microphone 440, and ear canal speaker 470. Ex. 1013 ¶ 30. Ear-level device 110 also includes wireless transceiver 450, processor 460, antenna 455, battery 480, and voice operated exchange (VOX) circuit 430. *Id.* 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," primarily "speech of the person wearing ear-level device 110." *Id.* Ear canal speaker 470 "transmits sound received from remote device 190 and/or external microphone 420" to the ear canal. *Id.* Processor 460 "converts the sound picked up from the ear canal to an electrical signal to be transmitted to remote device 190, and converts the

signals received from remote device 190 and/or external microphone 420 to a sound audible to the person wearing ear-level device 110." *Id.* VOX circuit 430 "activates a major portion of ear-level device 110 only when sound is detected by at least one of external microphone 420, ear canal microphone 440, [a]nd wireless transceiver 450." *Id.*

3. Analysis of Independent Claim 12

Independent claim 12 recites:

> 12. [preamble] A hearing measurement and listening device, comprising:
>
> [a] an ambient sound microphone (ASM) configured to capture ambient sound;
>
> [b] a processor configured to produce audio from at least in part the ambient sound and an audio content;
>
> [c] at least one ear canal receiver (ECR) configured to deliver the audio to the ear canal, wherein the ECR is operatively coupled to the processor;
>
> [d] an ear canal microphone (ECM) configured to measure a sound pressure level (SPL) of the audio within the ear canal;
>
> [e] wherein the processor by way of at least one ECR and ECM adjusts the audio to compensate for an ear seal leakage; and
>
> [f] wherein the processor is configured to monitor changes in a sealing level of the earpiece with the ear canal.

Ex. 1001, 14:18–34 (bracketed paragraph identifiers added).

The parties dispute whether Petitioner's proposed combination teaches limitation 12[b]. Petitioner argues that the combination of Allen and Victorian teaches this feature. Pet. 43–48. Petitioner argues that Allen's "hearing aid has processing system 732 and control system 734 that 'can perform signal processing and computation' and 'deliver[s] electrical

signals,' respectively," and that "Allen's 'processing system 732 can select an incident acoustic pressure, [and] instruct the earphone 720 to output such an acoustic pressure.'" *Id.* at 43–44 (citing Ex. 1016 ¶ 77) (alterations in original). According to Petitioner, one of ordinary skill "would have understood that 'incident acoustic pressure' is ambient sound because, as Allen states, it is output by earphone 720, the purpose of a hearing aid is to amplify ambient sound, and there would be no reason for earphone 720 to output sound received by microphone 710, which, like earphone 720, is also in the user's ear canal." *Id.* at 44 (citing Ex. 1002 ¶ 150). Thus, Petitioner, contends, "Allen discloses/suggests that processing system 732 and controller 734 produces audio from ambient sound, as claimed." *Id.*

Petitioner relies on Victorian to teach a hearing aid that communicates with remote devices, such as a "'computer, a personal digital assistant (PDA), a cellular phone, a walkie talkie, or a language translator' that is wirelessly coupled to its hearing device." Pet. 43–45 (citing Ex. 1013, 4:17–33). Petitioner argues that one of ordinary skill "would have understood that any of the remote devices Victorian identified would be transmitting audio content to Victorian's device, as Victorian's device 'receives an incoming wireless signal *representing a remote sound* from remote device 190'" (corresponding to the claimed "audio content") and "'transmits an electrical signal representing the remote sound to processor 460.'" *Id.* at 46 (citing Ex. 1013, 7:52–56; Ex. 1002 ¶ 152).

Petitioner further argues that "[b]ecause Victorian teaches that ear canal speaker 470 transmits sound received from [a] remote device, *e.g.*, a cell phone, *and* external microphone 420, Victorian teaches production of 'audio from at least in part the ambient sound and an audio content.'"

Pet. 46. "Indeed," Petitioner contends, "Victorian explicitly states it has an operation mode that 'allows the transmission of both the remote sound and the ambient sound to [the] ear canal,' which 'prevents the remote sound from being detected by [the] ear canal microphone,' and echoing." *Id.* (citing Ex. 1013, 10:22–26) (alteration in original). "Moreover," Petitioner asserts, "Victorian's processor 460 produces audio, just like Allen's processing system/controller 732/734, as Victorian teaches that audio content from the remote device is wirelessly received and that a signal representing the remote sound is sent to processor 460." *Id.* (citing Ex. 1013, 7:52–56). Additionally, Petitioner argues, "Victorian's Fig. 4A shows ear canal speaker 470 coupled to processor 460, which [one of ordinary skill in the art] would recognize means that processor 460 'produce[s] audio from at least in part the ambient sound and an audio content.'" *Id.* (second alteration in original).

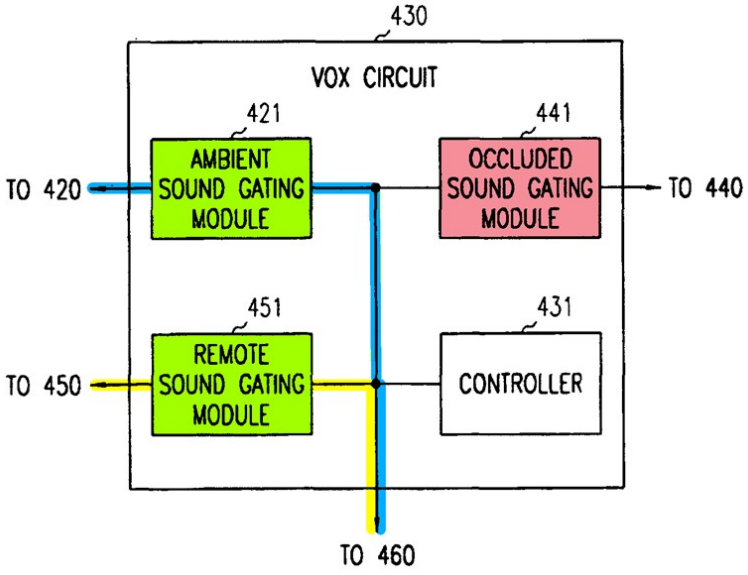
Petitioner argues that one of ordinary skill would have been motivated to combine Allen and Victorian because "combining Allen's ability to produce ambient audio in the ear with Victorian's ability to produce both ambient audio and remote sound from the connected device would greatly improve the range and functions" of Allen's hearing aid, because it would be capable of providing both "face-to-face communication" and "access to the audio functions of a cellular phone." Pet. 47 (citing Ex. 1002 ¶ 153). Petitioner also asserts that adding Victorian's voice operated exchange (VOX) to Allen's hearing aid would preserve its battery and help control echoes, ringing, and overall sound quality. *Id.*

Thus, according to Petitioner, the combination of Allen and Victorian "would have amounted to no more than combining known prior art elements

(Allen's hearing aid comprising an ear canal microphone, speaker, ambient microphone, and processor with Victorian's hearing device comprising an ear canal microphone, speaker, ambient microphone, processor, and VOX) according to known methods (providing a VOX to the circuitry in the hearing aid) to yield predictable results (a hearing aid capable of playing both ambient sound and audio content from a connected device)." Pet. 48 (citing Ex. 1002 ¶ 154).

In response, Patent Owner argues, *inter alia*, that "adopting the VOX as taught by Victorian in the hearing aid of Allen would render Allen or Victorian inoperable for their respective purposes" because "the proposed combination would either (1) prevent the hearing aid from measuring the sound pressure level in the ear canal, determining the Reverse Transfer function, and monitoring for ear seal leakage, which is a primary purpose of Allen, or (2) prevent the suppression of an echo, which is a primary purpose of Victorian." PO Resp. 42 (citing Ex. 2006 ¶ 95). With respect to Allen, Patent Owner argues that Allen requires "acoustic measurements from ***two*** microphones" to continuously determine the Reverse Transfer function, and discloses ambient microphone 712 and ear canal microphone 710 for this purpose. *Id.* at 45. However, according to Patent Owner, Victorian's VOX turns off the ear canal microphone when the transceiver and the external microphone are outputting a signal to the VOX circuit in order to prevent an echo from being retransmitted to the audio device through the ear canal speaker. *Id.* at 45–46 (citing Ex. 1013, 10:19–26).

Patent Owner includes an annotated version of Victorian's VOX circuit, reproduced below, to illustrate this operation:



Patent Owner's annotated version of Victorian's Figure 4B illustrating VOX circuit 430. PO Resp. 46.

As shown in Patent Owner's annotated Figure 4B, remote sound (yellow) and ambient sound (blue) are able to be transmitted to the user's ear canal, while sound from ear canal microphone 440 is blocked. *Id.* Patent Owner argues that, "[i]n this arrangement, the system would not be able to monitor for ear seal leakage using changes in the reverse transfer function of Allen (or detect when the hearing instrument is inserted or removed)," because "Allen must measure ear canal pressure to monitor for ear seal leakage, and the ear canal pressure cannot be measured if the ear canal microphone is blocked." *Id.* (citing Ex. 2006 ¶ 103).

Thus, Patent Owner argues, "combining the teachings of Victorian and Allen would instruct a [person of ordinary skill in the art] to disable the ear canal microphone 710 of Allen when signals from an ambient sound microphone and a transceiver are being provided to the ear canal as taught by Victorian." PO Resp. 47. However, according to Patent Owner, "[t]his would preclude the detection of sound pressure in the ear canal" which is necessary for Allen to determine a reverse transfer function. *Id.* (citing

Ex. 2006 ¶ 104). "Alternatively," Patent Owner asserts, "if the teachings of Allen are followed and the ear canal microphone 710 is not blocked when both (1) ambient sound and (2) audio content from a remote device are provided to the ear canal by processing system 732, the sound from the remote device will be delivered to the ear canal by earphone 720, detected by the ear canal microphone 710, and echoed back to [the] remote device," an outcome that "Victorian goes to great lengths to prevent." *Id.* (citing Ex. 2006 ¶ 105; Ex. 1013, 10:22–26). Patent Owner contends that the echo discussed in Victorian is not a problem in Allen because Allen does not capture sound in the user's ear canal and transmit it back to its source, but adding a transceiver to Allen, as Petitioner proposes, would invite that problem. *Id.* at 47–48 (citing Ex. 2007, 75:15–20; Ex. 2006 ¶ 105).

Petitioner responds that Patent Owner "erroneously asserts that applying Victorian's teachings to Allen would instruct a [person of ordinary skill in the art] to 'disable' Allen's ear canal microphone when signals from an ambient microphone and a transceiver are received." Pet. Reply 14 (citing PO Resp. 47). To the contrary, Petitioner argues, Victorian does not require that that the microphones are disabled when gated off, because Victorian explains that a sound "is 'gated off' when it is blanked ***or substantially attenuated***." *Id.* at 14–15 (citing Ex. 1013 ¶ 32; Ex. 1027, 119:13–17); *see id.* at 20 (citing PO Resp. 47; Ex. 1013 ¶ 32). According to Petitioner, Victorian defines "substantial attenuation" as "refer[ring] to an attenuation after which the attenuated sound does not cause any echo or tinging having an intolerable intensity." *Id.* at 15 (citing Ex. 1013 ¶ 32; Ex. 1027, 120:1–8). Petitioner contends that Mr. Struck admitted that, when gated off, Victorian's gating module would not necessary block all sound,

and therefore Victorian teaches an embodiment in which its ear canal microphone is not disabled, and can reach Victorian's processor. *Id.* (citing Ex. 1013 ¶ 32; Ex. 1027, 121:3–9). Thus, Petitioner argues, "applying Victorian's teachings to Allen would not require disabling Allen's ear canal microphone." *Id.* Petitioner also argues that Mr. Struck testified that, as of the critical date, designing hearing aids that prevent echoing and ringing "was well known in the industry" and "this feature would have been desired in any hearing aid, including Allen's." Pet. Reply at 15–16.

Petitioner further argues that Victorian discloses an embodiment in which the VOX "does not perform ***any gating at all***" in Figure 9. Pet. Reply 16–19. Figure 9 of Victorian is reproduced below:

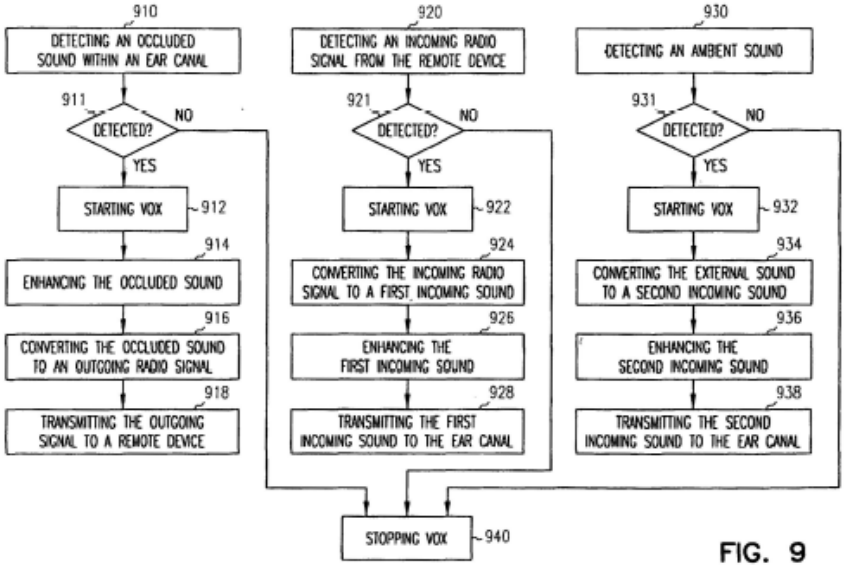


Figure 9 of Victorian is a flowchart illustrating a method for audio communication. Ex. 1013 ¶ 49, Fig. 9.

Petitioner asserts that in the embodiment of Figure 9, the "VOX is used for power management," and the "portions that implement gating" in Figure 10 "are absent from Fig. 9." *Id.* at 18 (citing Ex. 1013 ¶ 49; Ex. 1027, 125:10–126:7). Petitioner further contends that Mr. Struck conceded that the

embodiment of Figure 9 does not use gating, and that the system could simultaneously: (1) detect and process an occluding sound from the ear canal (steps 910–918); (2) detect and convert an incoming radio signal into a first sound, and transmit it to the ear canal (steps 920-928); and (3) detect and convert an ambient sound into a second sound and transmit it to the ear canal (steps 930–938). *Id.* at 19 (citing Ex. 1027, 126:8–11, 126:17–127:1). Additionally, according to Petitioner, Mr. Struck conceded that one of ordinary skill could have implemented Victorian's Figure 9 VOX embodiment in Allen's hearing aid without inhibiting Allen's hearing aid's measuring of ear sealing. *Id.* (citing Ex. 1027, 130:10–18).

Patent Owner responds that Petitioner's Reply "take[s] a fresh view on what gating 'off' means" by relying on the '424 patent specification's "substantially attenuated" language to argue that Victorian's VOX "need not block the sound at the ear canal microphone while the ambient microphone and transceiver are gated on." PO Sur-reply 13–14 (citing Pet. Reply 14–15). Patent Owner argues that this argument is "contrary to the Petition, Dr. Kyriakakis's declaration, and Dr. Kyriakakis's deposition testimony." *Id.* at 14. According to Patent Owner, the Petition relied on the gating embodiment of Victorian, which "allows the transmission of both the remote sound and the ambient sound to [the] ear canal," and "***prevents the remote sound from being detected by [the] ear canal microphone 440***." *Id.* (citing Pet. 46; Ex. 1013, 10:22–26). Patent Owner also points to an excerpt from Dr. Kyriakakis's declaration citing the same potion of Victorian. *Id.* (citing Ex. 1002 ¶ 152). According to Patent Owner, the phrase "***prevents*** the remote sound from being detected by ear canal microphone 440" cannot mean that "Victorian's VOX allows sound detected by the ear canal

microphone to reach Victorian's processor." *Id.* at 15 (citing Pet. Reply 15). Patent Owner further argues that, in his deposition, Dr. Kyriakakis "testified that the rule by which the inner microphone is turned off while remote sound and ambient sound are transmitted to the speaker is employed in the proposed Allen-Victorian combination," and that "Allen does not 'have access' to the inner microphone signal when that rule is employed." *Id.* (citing Ex. 2007, 61:2–16, 63:16–23).

Patent Owner also responds that Petitioner's argument that Victorian's Figure 9 discloses a VOX that "does not perform any gating at all" is a "new theory" not raised in the Petition. PO Sur-reply 16. According to Patent Owner, "[n]either an embodiment of Victorian in which no gating is performed nor Figures 9 and 10, upon which this new argument is based (see Reply at 17–18) are mentioned in the Petition." *Id.* "Indeed," Patent Owner argues, "Petitioner[] ***relied upon the gating capabilities*** of Victorian's VOX circuit in arguing for a motivation to combine." *Id.* (citing Pet. 47). Patent Owner further asserts that "Dr. Kyriakakis confirmed that at least the gating rule at column 10, lines 19–22 is employed in the proposed Allen-Victorian combination." *Id.* (citing Ex. 2007, 61:2–16). "Finally," Patent Owner contends, "Petitioner's new theory that no gating is employed would frustrate the purpose of Victorian of preventing an echo being sent to a remote device 190." *Id.* (citing Ex. 1003 ¶ 38). Thus, according to Patent Owner, "Petitioner[] should not be permitted to argue a new theory based on a previously-uncited embodiment of Victorian." *Id.*

Based on the full trial record, we find that Petitioner has failed to meet its burden to prove, by a preponderance of the evidence, that this limitation would have been obvious based on the Allen-Victorian combination. First,

we agree with Patent Owner that the Petition relies on the embodiment of Victorian in which the VOX is used for gating to define the Victorian-Allen combination. Specifically, the Petition argues that

> Victorian explicitly states it has an operation mode that "allows the transmission of both the remote sound and the ambient sound to [the] ear canal," which "***prevents the remote sound from being detected by [the] ear canal microphone***," and echoing.

Pet. 46 (emphasis added) (citing Ex. 1013, 10:22–26); *see id.* at 45 (arguing that Victorian's VOX circuit "gates or attenuates one or more sounds detected" by external microphone 42, ear canal microphone 440, and wireless transceiver 450 "'to eliminate or reduce echo and ringing caused by the loop' between the ECM and speaker"). Dr. Kyriakakis also relied on the same portion of Victorian in his declaration. Ex. 1002 ¶ 152 (citing Ex. 1013, 10:22–26). The cited portion of Victorian discloses that this operation mode of the VOX circuit utilizes gating, explaining that "ambient sound gating module 421 is on, occluded sound gating module 441 is off, and remote sound gating module 451 is on." Ex. 1013, 10:19–22).

Similarly, the Petition relies on the gating capabilities of Victorian's VOX circuit in arguing for a motivation to combine Victorian with Allen:

> [Persons of ordinary skill in the art] would have been further motivated to employ Victorian's VOX with Allen's hearing aid, as ***the VOX works with the processor to combine and/or gate certain sounds*** sent to the user's ear, which can help control echoes, ringing, and overall sound quality.

Pet. 47. Dr. Kyriakakis includes a corresponding statement in his declaration. Ex. 1002 ¶ 153.

Additionally, Dr. Kyriakakis testified at his deposition that the proposed Allen-Victorian combination employs Victorian's gating rule by

which the inner microphone is turned off while remote sound and ambient sound are transmitted to the speaker:

> Q: But sticking with Column 10, lines 19 through 22, there is a rule that requires the ambient sound gating module 421 to be on, occluded sound gating module 441 to be off, and remote sound gating module 451 to be on; correct?
>
> A: Correct.
>
> Q: And that's just a rule. That's how it's going to be, with or without speech, in the loudspeaker; correct?
>
> A: In this embodiment, yes.
>
> Q: ***Is this embodiment also in the Allen-Victorian combination that you envisioned in your declaration?***
>
> A: ***Yes.***

Ex. 2007, 61:2–16 (emphasis added).

We also agree with Patent Owner that, in Petitioner's proposed combination, the above rule that gates off the ear canal microphone would frustrate Allen's purpose of comparing the signals from the inner and outer microphones to determine a reverse transfer function and perform a seal fit analysis. *See* PO Resp. 53–54; PO Sur-reply 13. In reaching this conclusion, we credit the testimony of Mr. Struck that "[w]hen this rule is in force, the Allen-Victorian combination would not be able to measure a reverse transfer function" and, accordingly, "would be incapable of performing the automatic adjustments that the Allen hearing aid can perform based on the reverse transfer function." Ex. 2006 ¶ 114. Dr. Kyriakakis also confirmed at his deposition that, when this rule is in effect, Allen would not be able to use the reflectance method, which relies on signals from the inner and outer microphones:

> Q: So while the rule at Column 10, lines 19 through 22, of Victorian is being employed, Allen is not able to solve any of

> the problems that it solves by the reflectance method; is that correct?
>
> A: If Allen doesn't have access to the signals, that is correct, to the two microphone signals.

Ex. 2007, 63:16–23.

We are not persuaded by Petitioner's argument that Victorian's VOX circuit would not interfere with Allen's seal fit analysis, because Victorian states that gating off may cause microphone signals to be "blanked or ***substantially attenuated***," and "[s]ubstantial attenuation refers to an attenuation after which the attenuated sound does not cause any echo or tinging[7] having an intolerable intensity." *See* Pet. Reply 14–15 (citing Ex. 1013 ¶ 32; Ex. 1027, 120:1–8, 121:3–9). As noted above, the Petition relies on the embodiment of Victorian's VOX that "***prevents*** the remote sound from being detected by ear canal microphone 440," rather than an embodiment that simply attenuates that sound. *See* Pet. 46; Ex. 1002 ¶ 152; Ex. 2007, 61:2–16. Petitioner's shift to relying on a different embodiment of Victorian that "substantially attenuat[es]" the sound rather than blocking it is a new argument that is presented for the first time in Petitioner's Reply, and we therefore need not consider it. *See* Patent Trial and Appeal Board Consolidated Trial Practice Guide (Nov. 2019), at 73 ("Petitioner may not submit new evidence or argument in reply that it could have presented earlier, e.g. to make out a prima facie case of unpatentability.").[8] Moreover,

[7] The quoted portion of Victorian refers to "tinging," but this appears to be intended to refer to "ringing." For example, the previous sentence states that "[b]lanking refers to a substantially complete blockage of a sound, or in other words, that a detected sound is practically ignored by processor 460 such that it does not cause any echo or ***ringing*** which is audible by an ear." *See* Ex. 1013 ¶ 32 (emphasis added).

[8] *Available at* https://www.uspto.gov/TrialPracticeGuideConsolidated.

even if we were to consider this new argument, Petitioner does not submit evidence from Dr. Kyriakakis or otherwise explain how "substantially attenuat[ing]" the signal from the ear canal microphone would impact Allen's determination of the reverse transfer function and corresponding analysis of seal fit. For example, Allen discloses determining the reverse transfer function by measuring the acoustic pressure at the outer microphone and the acoustic pressure at the ear canal microphone, but Petitioner does not provide evidence explaining how substantially attenuating the sound from the ear canal microphone would affect that determination. Without such evidence, we find that Petitioner has failed to make the requisite evidentiary showing that combining Allen with a version of Victorian's VOX that "substantially attenuat[es]" the ear canal microphone signal would work for its intended purpose.

We also are not persuaded by Petitioner's argument relying on Victorian's Figure 9. *See* Pet. Reply 16–19. As discussed above, the Petition and Dr. Kyriakakis rely on an embodiment of Victorian in which the VOX uses gating and "***prevents*** the remote sound from being detected by ear canal microphone 440," rather than an embodiment that lacks gating. *See* Pet. 46; Ex. 1002 ¶ 152; Ex. 2007, 61:2–16. Petitioner's shift to relying on a different embodiment of Victorian in Figure 9 that purportedly lacks gating is a new argument presented for the first time in its Reply, and we therefore need not consider it. *See* Consolidated Trial Practice Guide 73.

Additionally, even if we were to consider this new argument, Petitioner does not submit evidence from Dr. Kyriakakis (or otherwise) explaining how the embodiment of Victorian's Figure 9 would be combined with Allen, or how reliance on Victorian's Figure 9 embodiment would

impact the motivation to combine set forth in the Petition which, as discussed above, relies on an embodiment of Victorian's VOX that uses gating. *See* Pet. 43–48; Pet. Reply 16–19. Without such evidence, we find that Petitioner has failed to make the requisite evidentiary showing that one of ordinary skill would have been motivated to combine Allen with Victorian's Figure 9 embodiment that purportedly lacks gating, or that such a combination would have worked for its intended purpose.

Furthermore, we are not persuaded by Petitioner's reliance on the cross-examination testimony of Mr. Struck. Petitioner criticizes Mr. Struck for not considering Victorian's Figure 9 embodiment, but this criticism rings hollow in light of Petitioner's and Mr. Kyriakakis's failure to rely on the Figure 9 embodiment in the Petition and accompanying declaration as part of the proposed combination. *See* Pet. Reply 16–19; Pet. 46; Ex. 1002 ¶ 152. Petitioner also argues that Mr. Struck conceded at his deposition that Victorian's Figure 9 VOX embodiment does not utilize gating and that the conditions shown in the figure could be performed simultaneously, but this does not rectify Petitioner's failure to offer evidence that one of ordinary skill would have been motivated to combine this embodiment with Allen or that the combination would have worked for its intended purpose. *See* Pet. Reply 19 (citing Ex. 1027, 126:8–11, 126:17–127:1).

Finally, we are not convinced by Petitioner's attempt to rely on the cross-examination testimony of Mr. Struck as support for its belated combination based on Victorian's Figure 9 embodiment. Petitioner argues that Mr. Struck conceded in cross-examination that one of ordinary skill "could implement Victorian's Fig. 9 VOX embodiment in Allen's hearing aid, and that doing so would not inhibit the ability of Allen's hearing aid to

measure seal." Pet. Reply 19 (citing Ex. 1027, 130:10–18). The actual testimony from Mr. Struck is as follows:

> Q: Isn't it conceivable that a person having ordinary skill in the art could take Allen's device and implement a VOX like it in Figure 9 of Victorian so that the seal could be measured while audio is playing in the ear?
>
> A: The Vox wouldn't – as implemented in 9 wouldn't inhibit that, but the measurement of the seal isn't indicated anywhere in Victorian or Allen.

Ex. 1027, 130:10–18. Petitioner's question asked whether it is "conceivable" that one of ordinary skill could carry out the proposed implementation, but that is not the standard for obviousness; rather, the proper inquiry is whether it would have been obvious for one of ordinary skill to modify the prior art as proposed. Additionally, Mr. Struck's cursory response that the VOX "wouldn't inhibit that" fails to provide sufficient detail about how one of ordinary skill would have combined Victorian's Figure 9 with Allen, or what the motivation would have been to do so, particularly in light of Petitioner's failure to offer evidence from Dr. Kyriakakis on this issue.[9]

For the foregoing reasons, we find that Petitioner has failed to prove by a preponderance of the evidence that this limitation, and therefore claim 12, would have been obvious over the combination of Allen and Victorian.

[9] In a footnote, Petitioner also asserts that Mr. Struck's testimony regarding Victorian's Figure 9 "is consistent with Dr. Kyriakakis's testimony regarding this embodiment." Pet. Reply 19, n.4 (citing Ex. 2007, 97:15–99:3). The cited testimony from Dr. Kyriakakis, however, also fails to provide a sufficient explanation of how or why one of ordinary skill would have combined Victorian's Figure 9 embodiment with Allen. *See* Ex. 2007, 97:15–99:3.

4. Dependent Claims 15–16

Claims 15 and 16 are dependent on claim 12. Because Petitioner has failed to prove that claim 12 is unpatentable, Petitioner necessarily has also failed to prove that dependent claims 15 and 16 are unpatentable.

I. Ground 6 (Allen in view of Victorian and Voix (Claim 13)), Ground 7 (Allen in view of Victorian and Alberth (Claim 17)), and Ground 11 (Allen in view of Victorian, Voix, Simon, and Svean (Claim 14)).

Claims 13, 14, and 17 all depend from claim 12. Because Petitioner has failed to prove that claim 12 is unpatentable, Petitioner necessarily has also failed to prove that dependent claims 13, 14, and 17 are unpatentable.

J. Ground 8A/8B: Asserted Obviousness of Claims 18 and 20 Based on Ryan in view of Allen (8A) or Ryan/Svean in view of Allen (8B)

Petitioner contends that claims 18 and 20 would have been obvious over Ryan or Ryan/Svean in view of Allen. Pet. 61–69. Patent Owner disagrees, arguing that the combination would not render claims 18 and 20 obvious. PO Resp. 56–59.

1. Analysis of Independent Claim 18

Independent claim 18 recites as follows:

> 18. [preamble] A non-transitory memory containing instructions for personalized hearing measurement and listening for an ear-piece, the execution of the instructions by one or more processors of a computer system causing the one or more processors to perform operations comprising:
>
> [a] delivering audio via an ear canal receiver coupled to the one or more processors;
>
> [b] measuring a sound pressure level (SPL) of the audio using an ear canal microphone configured to measure the SPL with an ear canal;

> [c] wherein the one or more processors by way of the ear canal microphone and ear canal receiver adjusts the audio to compensate for an ear seal leakage; and
>
> [d] wherein the processor is configured to determine whether the earpiece is or was properly inserted and to generate an audible or visual message identifying whether the earpiece is properly inserted.

Ex. 1001, 14:63–15:12 (bracketed paragraph identifiers added).

The parties dispute whether Petitioner's proposed combination teaches limitation 18[a]. Petitioner argues that Ryan discloses or suggests this feature. Pet. 62 (citing Ex. 1002 ¶ 183). Petitioner asserts that, as discussed with respect to claim 1, Ryan teaches an earpiece with a loudspeaker that drives an audio signal into a sealed acoustic cavity. *Id.* (citing Ex. 1002 ¶ 183). Petitioner also contends that Ryan's speaker is coupled to its processor because the "acoustic data associated with the loudspeaker . . . is processed by signal processing circuitry to automatically control the power consumption or acoustical gain of the hearing instrument." *Id.* at 62–63 (citing Ex. 1007 ¶ 20). According to Petitioner, one of ordinary skill "would have understood that but for coupling between Ryan's signal processing circuitry and loudspeaker, the 'acoustical gain of the hearing instrument' could not be controlled." *Id.* at 63. "Indeed," Petitioner argues, "Ryan teaches gain control signals C_p are used to control amplifiers driving its loudspeaker." *Id.* (citing Ex. 1007 ¶ 33).

"Moreover," Petitioner asserts, "Ryan's claims 4 and 6 recite that 'signal processing circuitry' is 'operable' to both 'reduce a gain associated with the first acoustic transducer,' and 'increase the gain associated with the first acoustic transducer.'" Pet. 63. According to Petitioner, this "'first acoustic transducer' is a loudspeaker because claim 1, from which claims 4

and 6 depend, recites that the first acoustic transducer 'receive[s] a first electrical signal and in response radiate[s] acoustic energy.'" *Id.* (citing Ex. 1002 ¶ 183) (alteration in original). Petitioner argues that one of ordinary skill "would recognize this means that Ryan's signal processing circuitry is coupled to its loudspeaker, and its loudspeaker delivers audio into a user's ear canal." *Id.*

Patent Owner argues that "Petitioner['s] theory is premised on an erroneous interpretation of the claim language" that "does not require the processor to deliver audio via an ear canal receiver." PO Resp. 56–57. Patent Owner asserts that the language of claim 18 makes it clear that the claim includes such a limitation, and that "[n]one of the cited references disclose a processor that performs the operation of delivering audio via an ear canal receiver." *Id.* at 58. Specifically, according to Patent Owner, "[i]n Ryan, the audio signal is from an ambient microphone, not delivered by processing circuitry 40." *Id.* Signal processing circuitry 40, Patent Owner contends, "does not deliver audio content to speaker 20 even if it controls a gain of that signal," much as "[a] window shade does not 'deliver' sunlight into a house simply because it has the ability to let in only a certain amount or block it completely." *Id.* at 59 (citing Ex. 2006 ¶ 71).

Petitioner responds that "[t]he words of the claim" do not "require the audio to come 'from' the processor." Pet. Reply 22. Petitioner also argues that "Ryan teaches that its signal processing circuitry 40 generates control signals" C_G (gain control) and C_P (power control), which "are used to control an amplifier that drives Ryan's loudspeaker 20" in the ear canal. *Id.* at 23. Relying on Dr. Kyriakakis, Petitioner asserts that one of ordinary skill "would have understood that signal processing circuitry 40's controlling of

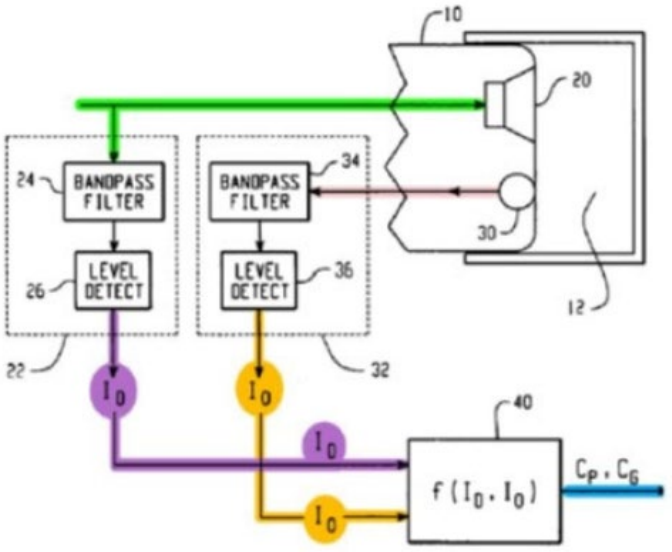
the gain (or power) of Ryan's amplifier, which directly drives Ryan's loudspeaker 20, meets the requirement of 'delivering audio via an ear canal receiver coupled to the one or more processors." *Id.* at 23–24 (citing Ex. 1002 ¶ 183). According to Petitioner, this design is similar to how the '424 patent's processor 206 drives ear canal receiver (ECR) 120 "indirectly" via digital to analog converter (DAC) 203. *Id.* at 24 (citing Ex. 1027, 33:10–16, 37:5–16; Ex. 1001, 9:13–15).

Patent Owner responds that Ryan "fails to disclose a processor that performs the 'delivering' operation regardless of the source of the signal." PO Sur-reply 17. Patent Owner argues that Dr. Kyriakakis testified that "Ryan's loudspeaker 20 plainly delivers audio," and did not point to a processor as performing this function. *Id.* at 18–20 (citing Ex. 1002 ¶ 183; Ex. 2007, 86:20–24). Relying on Mr. Struck, Patent Owner contends that "[t]he output of signal processing circuitry 40 is not audio and therefore cannot be the input signal to speaker 20." *Id.* at 21 (citing Ex. 2006 ¶ 70). Patent Owner also contrasts Ryan's design with the '424 patent's use of a DAC which "resides directly between the processor 206 and ECR 120 and is necessary to convert the digital signal from the processor into an analog form that can be used by the loudspeaker." *Id.* (citing Ex. 1001, Fig. 2; Ex. 1027, 3–5). In Ryan, on the other hand, "signal processing circuitry does not reside between the source of the signal . . . and speaker 20." *Id.* at 22 (citing Ex. 2006 ¶ 70).

We agree with Patent Owner. The dispute between the parties as to this claim element largely reduces to one of claim construction—whether the claim requires that "one or more processors" perform the function of "delivering audio via an ear canal receiver." Although neither party directly

addresses the issue, we determine that the "one or more processors" recited in the preamble is a claim limitation, because the "one or more processors" language is repeated in the body of the claim. *See* Ex. 1001, 15:2, 15:6. Thus, the claim requires that the "one or more processors" must be able to "perform operations comprising . . . delivering audio via an ear canal receiver." *Id.* at 14:63–15:2; *see* Ex. 2006 ¶¶ 66–67. This claim language therefore requires that the "one or more processors" performs the "delivering" function, and stands in contrast to claim 1, which does not specify what component performs the function of "driving or exciting a signal into the speaker located in the earpiece." *Id.* at 13:25–35; *see* § II.D.3(c).

We find that Petitioner has failed to sufficiently prove that Ryan discloses "one or more processors" that "deliver[] audio via an ear canal receiver." The relevant portion of Ryan is illustrated in Patent Owner's annotated and modified version of Ryan's Figures 3 and 4, reproduced below.



Patent Owner's annotated and modified version of Ryan's Figures 3 and 4 highlighting signals sent to ear canal speaker 20 (green), to signal

processing circuitry 40 (purple and orange), and from signal processing circuitry 40 (blue). PO Sur-reply 22; Ex. 1006 ¶ 70.

As shown in Patent Owner's annotated version of Ryan's Figures 3 and 4, a signal (green) is sent to speaker 20, and monitored signal levels I_D (purple, from the signal sent to speaker 20) and I_O (orange, from the signal received by microphone 30) are sent to signal processing circuitry 40. Ex. 1007, Figs. 3, 4, ¶ 30. From signals I_D and I_O, signal processing circuitry 40 generates control signals C_P and C_G (blue) used to control an amplifier. *Id.* ¶ 33. Specifically, gain control signal C_G "may be used to reduce the gain on an output amplifier driving the loudspeaker 20, or reduce the gain on a microphone receiving an input signal to generate a drive signal for the loudspeaker 20 upon detecting that the hearing instrument 10 has been removed from [a] space." *Id.* Power control signal C_P "may be used to deactivate the hearing instrument 10" after being removed from the space after a period of time has elapsed. *Id.*

Based on the above, we find that Petitioner has failed to sufficiently prove that this operation of Ryan discloses signal processing circuitry 40 "delivering audio via an ear canal receiver." In reaching this conclusion, we rely on and find credible Mr. Struck's testimony that "[t]he output of signal processing circuitry 40 is not audio and therefore cannot be the input signal to speaker 20 or an amplifier for speaker 20." Ex. 2006 ¶ 70. To the contrary, signals C_P and C_G are control signals that are used to adjust the power and gain of an amplifier, rather than audio signals fed to the amplifier itself in order to drive a speaker. Ex. 1007 ¶¶ 30–33. We also are not persuaded by Petitioner's argument that Ryan's operation is comparable to the '424 patent's use of DAC 203 between processor 206 and ear canal receiver 120. *See* Pet. Reply 24. Unlike in Ryan, processor 206 sends a

digital audio signal to ear canal receiver 120 via DAC 203, which merely converts the digital audio signal to an analog audio signal that can be fed directly to drive the speaker. Ex. 1001, Fig. 2, 4:8–20. This operation differs significantly from the operation of Ryan's signal processing circuitry 40, which merely provides gain and power controls to an amplifier, rather than supply a signal which is (directly or indirectly) used to drive a speaker. Ex. 1007 ¶¶ 30–33.

For the foregoing reasons, we find that Petitioner has failed to prove by a preponderance of the evidence that claim 18 would have been obvious over the combination of Ryan or Ryan/Svean in view of Allen.

2. Dependent Claim 20

Claim 20 is dependent on claim 18. Because Petitioner has failed to prove that claim 18 is unpatentable, Petitioner necessarily has also failed to prove that dependent claim 20 is unpatentable.

K. Grounds 9A/9B: Asserted Obviousness of Claim 19 Based on Ryan or Ryan/Svean in view of Allen and Voix

Claim 19 is dependent on claim 18. Because Petitioner has failed to prove that claim 18 is unpatentable, Petitioner necessarily has also failed to prove that dependent claim 19 is unpatentable.

L. Grounds 10A/10B: Asserted Obviousness of Claim 3 Based on Ryan or Ryan/Svean in view of Allen and Simon

1. Overview of Simon (Ex. 1022)

Simon is directed to a hearing adjustment appliance for electronic audio equipment. Ex. 1022, code (54). In the disclosed system, an electronic device with audio output, such as a television, is adjusted to the customized listening profile of a user with a user interface module and a control module. *Id.* at code (57). A user may set the amplification level for

the center or test frequency of a number of audio frequency bands, and the control module generates tones at the test frequencies. *Id.* The user adjusts the amplification of each tone until satisfied with hearing that tone. *Id.* The other frequencies in the band are then adjusted by the same amount as the test tone. *Id.*

2. Claim 3

Claim 3 depends from claim 1, and recites:

> The electronic audio device of claim 1, wherein the processor by way of the speaker and microphone adjusts the audio in accordance with a personalized hearing level (PHL) to compensate for an ear seal leakage.

Ex. 1001, 13:45–49.

Petitioner argues that, as previously discussed, the Ryan-Allen combination "teaches that 'the processor by way of the speaker and microphone adjusts the audio' to 'compensate for an ear seal leakage,'" and one of ordinary skill in the art would have been motivated "to incorporate Allen's teachings in this regard into Ryan." Pet. 69. Petitioner asserts that Simon teaches a PHL "because its system determines personalized 'minimum threshold and maximum level,' which will compensate for hearing variations 'by producing a hearing adjustment profile.'" *Id.* at 69–70 (citing Ex. 1022 ¶¶ 35, 38, Fig. 4). According to Petitioner, a person of ordinary skill in the art "would have recognized Simon's hearing adjustment profile corresponds to the claimed PHL," and "would have been motivated to combine Simon's hearing adjustment profile with Ryan-Allen's hearing instrument and compensation method to prevent a volume level high enough to harm the user (or cause discomfort) or too low, wasting battery by

delivering inaudible sound." *Id.* at 70–71 (citing Ex. 1022 ¶ 37; Ex. 1002 ¶ 198).

> Petitioner further asserts that one of ordinary skill
>
> would have realized the combination of Ryan and Simon would amount to no more than applying a known technique (Simon's method of creating a hearing adjustment profile) to a known device ready for improvement (Ryan's hearing instrument seeking to improve automatic control of in-ear acoustics) to yield predictable results (hearing instrument "capable of measuring and compensating for an individual's hearing profile").

Pet. 71 (citing Ex. 1022 ¶ 10; Ex. 1002 ¶ 199).

Patent Owner does not provide separate argument for claim 3 or challenge Petitioner's motivations to make the proposed combination, and instead relies on its argument for claim 1. PO Resp. 31.

Based on the full trial record, we agree with Petitioner's arguments and find that Petitioner has proven by a preponderance of the evidence that claim 3 would have been obvious over Ryan or Ryan/Svean in view of Allen and Simon.

III. CONCLUSION

For the reasons discussed above, Petitioner has proven, by a preponderance of the evidence, that the challenged claims are unpatentable, as summarized in the following table:[10]

[10] Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner's attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. *See* 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent

Claim(s)	35 U.S.C. §	Reference(s)/Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1–2, 5–7, 10–11	103(a)	Ryan	1–2, 5–7, 10–11	
1–2, 5–7, 10–11	103(a)	Ryan, Svean	1–2, 5–7, 10–11	
4	103(a)	Ryan, Voix	4	
4	103(a)	Ryan, Svean, Voix	4	
8	103(a)	Ryan, Svean, Victorian	8	
9	103(a)	Ryan, Alberth	9	
9	103(a)	Ryan, Svean, Alberth	9	
12, 15–16	103(a)	Allen, Victorian		12, 15–16
13	103(a)	Allen, Victorian, Voix		13
17	103(a)	Allen, Victorian, Alberth		17
18, 20	103(a)	Ryan, Allen		18, 20
18, 20	103(a)	Ryan, Svean, Allen		18, 20
19	103(a)	Ryan, Allen, Voix		19
19	103(a)	Ryan, Svean, Allen, Voix		19
3	103(a)	Ryan, Allen, Simon	3	
3	103(a)	Ryan, Svean, Allen, Simon	3	
14	103(a)	Allen, Victorian, Voix, Simon, Svean		14
Overall Outcome			1–11	12–20

Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. *See* 37 C.F.R. § 42.8(a)(3), (b)(2).

IV. ORDER

Accordingly, it is

ORDERED that claims 1–11 of the '424 patent have been proven by a preponderance of the evidence to be unpatentable;

FURTHER ORDERED that claims 12–20 of the '424 patent have not been proven by a preponderance of the evidence to be unpatentable; and

FURTHER ORDERED that, because this is a Final Written Decision, parties to the proceeding seeking judicial review of the Decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

For PETITIONER:

Jeffrey A. Miller
Ali R. Sharifahmadian
David A. Caine
ARNOLD & PORTER KAYE SCHOLER LLP
ali.sharifahmadian@arnoldporter.com
jmillerptab@apks.com
david.caine@arnoldporter.com

For PATENT OWNER:

Jacob A. Snodgrass
Bradford A. Cangro
Jeremy D. Peterson
PV LAW LLP
jacob.snodgrass@pvuslaw.com
bradford.cangro@pvuslaw.com
jeremy.peterson@pvuslaw.com
Techiya-Cases@pvuslaw.com