

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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K/S HIMPP

Petitioner,

v.

Benhov GmbH, LLC

Patent Owner.

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Case IPR2017-00930  
Patent No. 8,170,884

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**PATENT OWNER'S NOTICE OF APPEAL**

Notice is hereby given, pursuant to 35 U.S.C. §§ 141(c), 142, and 319, and 37 C.F.R. §§ 90.2(a) and 90.3(a), that Patent Owner Benhov GmbH, LLC hereby appeals to the United States Court of Appeals for the Federal Circuit from the Final Written Decision entered on August 10, 2018 (Paper 32) in IPR2017-00930 (Exhibit A), and from all underlying orders, decisions, rulings, and opinions that are adverse to Patent Owner, including, without limitation, those within the Decision on Institution of Inter Partes Review, entered on August 14, 2017 (Paper 9).

In accordance with 37 C.F.R. § 90.2(a)(3)(ii), Patent Owner further indicates that the issues on appeal include, but are not limited to, the Board's claim constructions, the Board's determination that claims 9, 10, and 13 are unpatentable as obvious over Wang and Marx, the Board's determination that claim 11 is unpatentable as obvious over Wang, Marx, and Fishman, the Board's determination that claim 12 is unpatentable as obvious over Wang, Marx, and Scofield, the Board's determination that claim 17 is unpatentable as obvious over Wang, Walden, and Kim, and the Board's denial of Patent Owner's motion to exclude Exhibit 1017, and any finding or determination supporting or relating to those issues, as well as all other issues decided adversely to Patent Owner in any orders, decisions, rulings, and opinions.

This Notice of Appeal is timely pursuant to 37 C.F.R. § 90.3, having been duly filed within 63 days after the Final Written Decision.

Simultaneous with this submission, a copy of the Notice of Appeal is being filed with the Patent Trial and Appeal Board. In addition, a copy of this Notice of Appeal is being filed with the Clerk's Office for the United States Court of Appeals for the Federal Circuit, and the required docketing fee will be paid electronically using pay.gov. In addition, pursuant to Fed. Cir. R. 15(a)(1), one paper copy of the notice is also being sent to the Clerk of the Federal Circuit.

If there is any fee due in connection with the filing of this Notice of Appeal, please charge the fee to Deposit Account No. 50-1662.

Respectfully submitted,

Date: October 9, 2018

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## **CERTIFICATE OF SERVICE**

The undersigned hereby certifies that in addition to being filed electronically with the U.S. Patent and Trademark Office, pursuant to 37 C.F.R. §§ 42.6(e)(4) and 90.2, the foregoing PATENT OWNER'S NOTICE OF APPEAL and all accompanying documents, were filed by Express Mail on October 9, 2018, with the Director of the United States Patent and Trademark Office, at the following address:

Director of the U.S. Patent and Trademark Office  
c/o Office of the General Counsel  
P.O. Box 1450  
Alexandria, VA 22313-1450

The undersigned certifies that a copy of the foregoing Patent Owner's Notice of Appeal and accompanying documents, was filed on October 9, 2018, with the United States Court of Appeals for the Federal Circuit through the Court's CM/ECF filing system and the filing fee is being paid electronically using pay.gov, and that a copy of the foregoing Patent Owner's Notice of Appeal and accompanying documents was filed with the Patent Trial and Appeal Board electronically on October 9, 2018, pursuant to 37 C.F.R. 42.6(b), and that the foregoing Notice of Appeal and accompanying documents were served upon the Petitioner pursuant to 37 C.F.R. 42.6(e)(1) via electronic mail on October 9, 2018, by serving the following attorneys of record as follows:

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# **EXHIBIT A**

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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K/S HIMPP,  
Petitioner,

v.

BENHOV GMBH, LLC,  
Patent Owner.

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Case IPR2017-00930  
Patent 8,170,884 B2

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Before BARBARA A. PARVIS, DANIEL N. FISHMAN, and  
CHARLES J. BOUDREAU, Administrative Patent Judges.

FISHMAN, Administrative Patent Judge.

FINAL WRITTEN DECISION  
*35 U.S.C. § 318(a) and 37 C.F.R. § 42.73*  
*and*  
DECISION DENYING PATENT OWNER'S MOTION TO EXCLUDE  
*37 C.F.R. § 42.64*

## I. INTRODUCTION

K/S HIMPP (“Petitioner”), filed a Petition (Paper 2, “Pet.”) for *inter partes* review of claims 1–17 (the “challenged claims”) of U.S. Patent No. 8,170,884 B2 (“the ’884 patent”) (Ex. 1001) pursuant to 35 U.S.C. §§ 311–319. Benhov GmbH, LLC (“Patent Owner”) filed a Patent Owner Preliminary Response (Paper 6, “Prelim. Resp.”). On August 14, 2017, based on the record before us at that time, we instituted an *inter partes* review of *only* claims 9–13 and 17 (denying review of claims 1–8 and 14–16). Paper 9 (“Decision” or “Dec.”), 40.

Patent Owner filed a Patent Owner Response (Paper 12, “Response” or “PO Resp.”) and Petitioner filed a Reply (Paper 14, “Pet. Reply”). Petitioner relies on Declarations of Sayfe Kiaei, Ph.D. (Exs. 1003, 1017) and Patent Owner relies on a Declaration of David V. Anderson, Ph.D. (Ex. 2003).

Responsive to the Supreme Court’s decision in *SAS Institute, Inc. v. Iancu*, 138 S. Ct. 1348 (2018), we issued an Order modifying our Decision to institute review of all claims and all grounds. Paper 27 (“SAS Order”). In the SAS Order, we authorized additional briefing to address issues relating to claims 1–8 and 14–16. Petitioner filed an authorized Supplemental Reply (Paper 29, “Supp. Reply”), Patent Owner filed an authorized Supplemental Response (Paper 30, “Supp. Resp.”), and Petitioner filed an authorized Sur-Reply (Paper 31).

Oral Argument was conducted on April 30, 2018 and a transcript of that hearing is of record. Paper 28 (“Tr.”).

We have jurisdiction under 35 U.S.C. § 6. The Petitioner has the burden of proving unpatentability by a preponderance of the evidence. *See*

35 U.S.C. § 316(e); *see also* 37 C.F.R. § 42.1(d). This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73.

For the reasons expressed below, we conclude that Petitioner has shown by a preponderance of the evidence that claims 9–13 and 17 are unpatentable. Petitioner has not persuaded us by a preponderance of the evidence that claims 1–8 and 14–16 are unpatentable.

#### A. *The '884 Patent*

According to the '884 patent, high-end audio systems include multi-channel amplifiers coupled with multi-speaker systems. Ex. 1001, 1:38–39. Such systems typically include a “center” channel and allow some limited capability to adjust the volume of the center channel independent of other channels. *Id.* at 1:40–43. Further according to the '884 patent, many movies use the center channel for dialog (voice audio signals) and use the other channels for other sound effects. *Id.* at 1:43–44. The adjustment capability of high-end systems, though limited, allows a user to adjust the voice/dialog volume independent of the other audio (i.e., remaining audio signals) to make the dialog more intelligible relative to other, remaining audio such as loud sound effects. *Id.* at 1:45–47.

The '884 patent discloses the high cost of such high-end systems renders adjustment features inaccessible to many people. *Id.* at 1:49–57. Further, the '884 patent discloses that an adjustment suitable for one listener could be unsuitable for other listeners in the same room. *Id.* at 1:58–64. The '884 patent additionally discloses that a static adjustment of the center (dialog/voice) channel that is suitable for one portion of, for example, a

movie may be unsuitable for a different portion of the movie. *Id.* at 1:65–2:5.

The '884 patent purports to resolve these problems by providing a voice to remaining audio (“VRA”) adjustment capability in a personal listening device (“PLD”) for each of multiple users that permits each user to independently adjust the voice audio signal independent of adjustments to the remaining audio signals. *See id.* at 2:64–3:4. According to the '884 patent, the invention discloses a system that allows each individual PLD user to adjust a received voice audio signal relative to received remaining audio signals. *Id.* at 8:27–43. Figures 1 and 2, reproduced below, depict an environment in which the invention is applied.

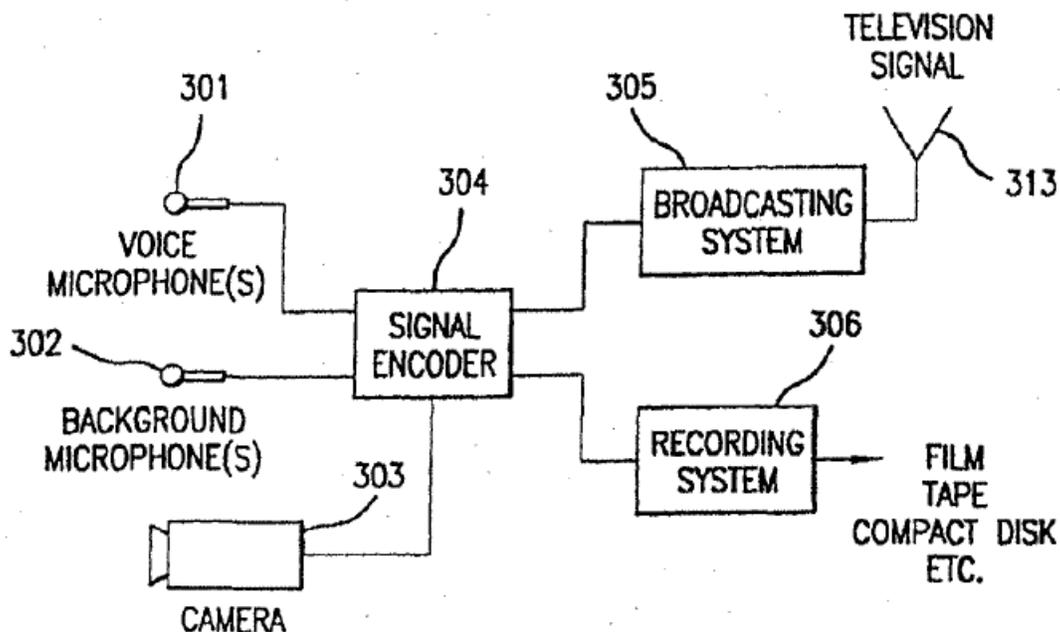


FIG. 1

Figure 1 depicts an exemplary system for generating the encoded audio signals comprising at least a voice audio signal and remaining audio signals. *See id.* at 6:65–7:3. Signal encoder 304 receives an audio input

signal from microphone 301 (“voice signal”), receives background audio signals from microphone(s) 302 (“remaining audio”), and receives a video signal from camera 303. *Id.* at 7:4–34. The encoded voice audio, background audio, and video signals are broadcast through broadcasting system 305 and antenna 313 and/or recorded by recording system 306 on a storage medium for later playback by a listener. *Id.* at 7:35–42.

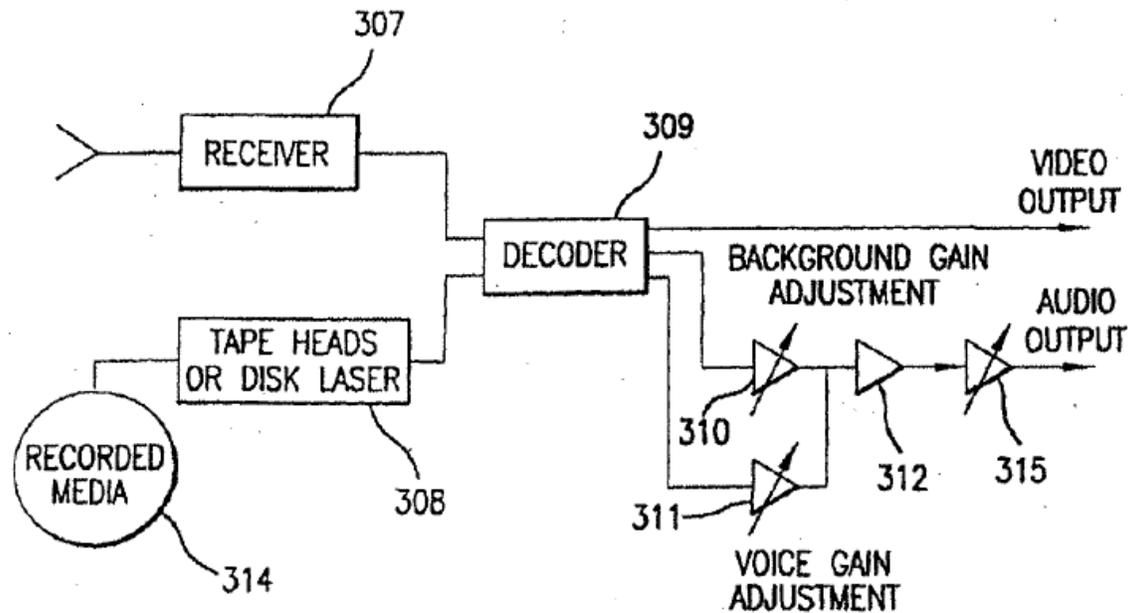


FIG. 2

Figure 2, above, depicts a device for playback (PLD) of the encoded audio and video signals received from broadcast via receiver 307 and/or retrieved from storage media 314 by tape heads or disk laser 308. *Id.* at 7:43–49. The received/retrieved encoded signals are applied to decoder 309 to decode the video, voice audio, and background audio signals. *Id.* at 50–54. The decoded background audio signal is applied to variable gain amplifier 310 that selectively adjusts the gain (i.e., amplitude/volume) of the decoded background audio signal. *Id.* at 7:50–59. In like manner, the decoded voice audio signal is applied to variable gain amplifier 311 that

adjusts the gain of the decoded voice audio signal independent of any adjustments by amplifier 310. *Id.*

The two adjusted signals are summed by a unity gain summing amplifier 132 [sic 312] to produce the final audio output. Alternatively, the two adjusted signals are summed by unity gain summing amplifier 312 and further adjusted by variable gain amplifier 315 to produce the final audio output.

*Id.* at 7:60-64. Thus, the listener can adjust the voice audio signal relative to, and independent of, the background audio signal by varying the gain on amplifiers 310 and 311 and can adjust the overall gain of the sum of the two adjusted signals by varying the gain of amplifier 315. *Id.* at 7:64-8:4.

Figure 4 of the '884 patent, reproduced below, depicts exemplary details of one of multiple personal listening devices usable by multiple users to adjust the received audio signals without affecting adjustments by other users.

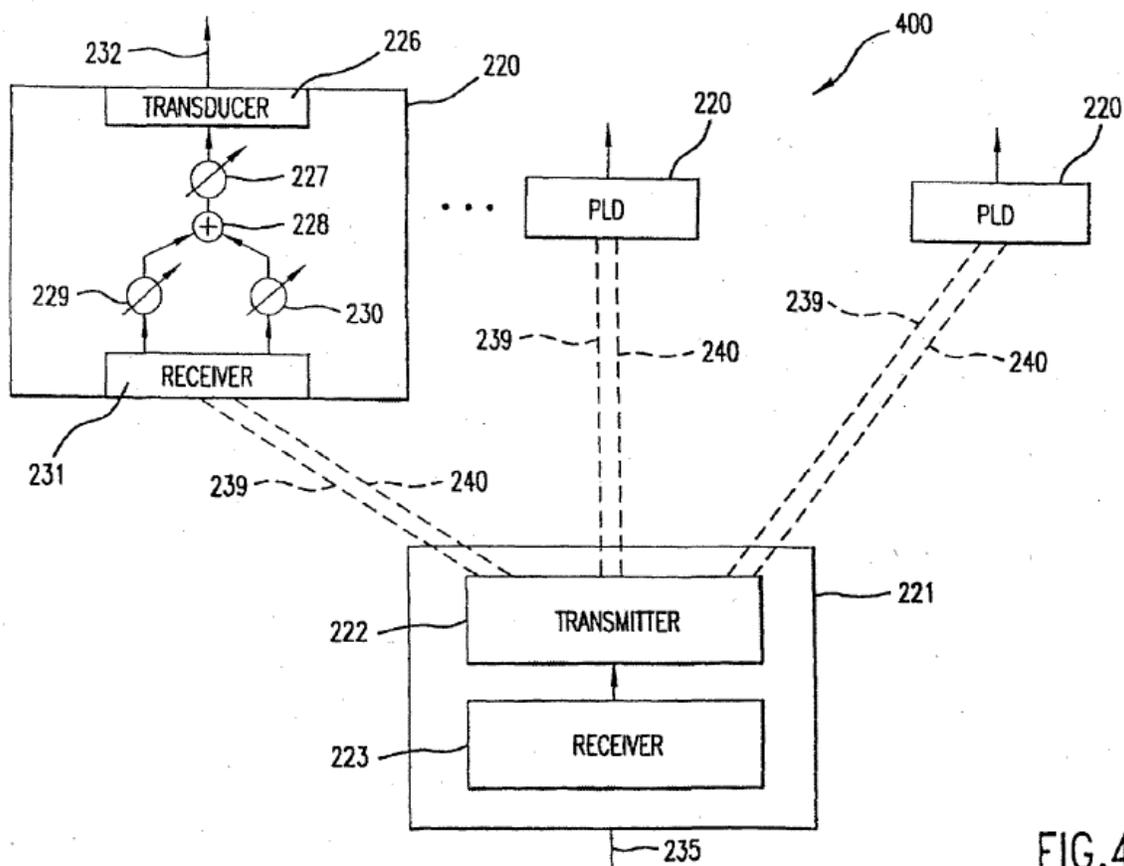


FIG.4

Figure 4 above depicts an exemplary system 400 in which personal listening devices (PLDs) 220 are used to receive and decode signals from transceiver 221.<sup>1</sup> *Id.* at 8:6–15. Transceiver 221 includes receiver 223 for receiving a broadcast or recorded signal 235 and includes transmitter 222 for transmitting voice component (audio signal) 239 and remaining audio component (signal) 240 to PLDs 220. *See id.* at 8:16–26. Received signal 235 may be decoded into its constituent audio signal components by decoder processing within transceiver 221. *See id.* Each PLD 220 includes receiver 231 to receive broadcast signals 239 and 240. *Id.* at 8:29–33. The received

<sup>1</sup> The '884 patent erroneously refers to the transceiver using reference number 210. The context of Figure 4 and the other related descriptions make clear that the transceiver component is labeled with reference number 221.

signals (239 and 240) are applied to respective variable gain amplifiers (229 and 230) to independently adjust the two received audio signals. *See id.* at 33–39. The adjusted signals are then applied to adder 228 to sum (combine) the two adjusted audio signals. *Id.* at 8:39–40. The combined signal may be further adjusted by gain amplifier 227 before being applied to transducer 226 to generate audible acoustic signal 232. *Id.* at 8:40–43.

### *B. Related Matters*

Both parties assert there are no litigations or other post-grant proceedings related to the '884 patent. Pet. 2; Paper 4, 2. Petitioner notes various related patents on the face of the '884 patent but does not indicate any litigation or post-grant proceedings are pending with respect to those patents. Pet. 2.

### *C. Illustrative Claims*

Claims 1, 9, and 17 are the only independent claims among the challenged claims, are reproduced below, and are exemplary of the invention:

1. A personal listening device useful in a listening environment having a plurality of listeners, the personal listening device comprising:

a receiver configured to receive a first audio signal and a second audio signal, the first audio signal including substantially a voice signal and the second audio signal including a remaining audio, the first audio signal being different than the second audio signal;

an adjustment device configured to allow a listener to adjust the first audio signal and the second audio signal independent of each other; and

a transducer configured to receive the adjusted first and/or second audio signals, combine the received first and second audio signals, and output an audible sound based on the combined first and second audio signals to the listener without interfering with other listeners in the listening environment.

9. A broadcasting apparatus, comprising:

a storage medium holding a first audio signal and a second audio signal corresponding to the first audio signal, the first audio signal including substantially a voice signal and the second audio signal including a remaining audio; and

a transmitter configured to transmit the first and second audio signals to a plurality of receivers, wherein the first and/or second audio signals are configured to be independently adjusted at each of the plurality of receivers and subsequently combined to produce an audible sound.

17. A personal listening device useful in a listening environment having a plurality of listeners, the personal listening device comprising:

means for receiving a first audio signal and a second audio signal, the first audio signal including a voice signal and the second audio signal including a remaining audio, wherein the first audio signal is different than the second audio signal;

means for adjusting the first audio signal and the second audio signal independent of each other by a listener; and

means for receiving the adjusted first and/or second audio signals, combining the received first and second audio signals, and outputting an audible sound based on the combined first and second audio signals to the listener without interfering with other listeners in the listening environment.

*D. Asserted Grounds*

The Petition sets forth the following asserted grounds of unpatentability:

Ground No.	References	Basis	Challenged Claims
1	Wang <sup>2</sup>	103(a)	1, 2, and 5
2	Wang and Fishman <sup>3</sup>	103(a)	3
3	Wang and Scofield <sup>4</sup>	103(a)	4
4	Wang and Eggers <sup>5</sup>	103(a)	6 and 7
5	Wang, Webb, <sup>6</sup> and Obara <sup>7</sup>	103(a)	8
6	Wang and Marx <sup>8</sup>	103(a)	9, 10, and 13–15
7	Wang, Marx, and Fishman	103(a)	11
8	Wang, Marx, and Scofield	103(a)	12
9	Wang, Marx, Webb, and Obara	103(a)	16
10	Wang, Walden, <sup>9</sup> and Kim <sup>10</sup>	103(a)	17

II. ANALYSIS

A. *Claim Construction*

As a step in our analysis, we first determine the meaning of the claim terms. In an *inter partes* review, a claim in an unexpired patent shall be given its broadest reasonable construction in light of the specification of the patent in which it appears. 37 C.F.R. § 42.100(b); *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2144–46 (2016). Neither party indicates that

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<sup>2</sup> U.S. Pat. No. 5,563,951 (“Wang”). Ex. 1004.

<sup>3</sup> U.S. Pat. No. 5,734,964 (“Fishman”). Ex. 1010.

<sup>4</sup> U.S. Pat. No. 5,661,812 (“Scofield”). Ex. 1011.

<sup>5</sup> U.S. Pat. No. 5,692,058 (“Eggers”). Ex. 1006.

<sup>6</sup> U.S. Pat. No. 3,350,643 (“Webb”). Ex. 1012.

<sup>7</sup> U.S. Pat. No. 5,867,581 (“Obara”). Ex. 1013.

<sup>8</sup> U.S. Pat. No. 5,734,731 (“Marx”). Ex. 1009.

<sup>9</sup> U.S. Pat. No. 5,130,665 (“Walden”). Ex. 1007.

<sup>10</sup> U.S. Pat. No. 5,764,775 (“Kim”). Ex. 1008.

the challenged patent may expire within 18 months from the February 23, 2017, entry of the Notice of Filing Date Accorded to Petition in this case. Indeed, Patent Owner asserts the parties agree the '884 patent will expire March 6, 2019. Paper 8. Therefore, we apply the broadest reasonable construction standard to interpreting claims in the '884 patent.

Under the broadest reasonable construction standard, we give claim terms their ordinary and customary meaning, as would be understood by one of ordinary skill in the art in the context of the entire disclosure. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). “[A] claim construction analysis must begin and remain centered on the claim language itself.” *Innova/Pure Water, Inc. v. Safari Water Filtration Sys., Inc.*, 381 F.3d 1111, 1116 (Fed. Cir. 2004). “Though understanding the claim language may be aided by the explanations contained in the written description, it is important not to import into a claim limitations that are not a part of the claim.” *SuperGuide Corp. v. DirecTV Enters., Inc.*, 358 F.3d 870, 875 (Fed. Cir. 2004). Only terms that are in controversy need to be construed and only to the extent necessary to resolve the controversy. *See Wellman, Inc. v. Eastman Chem. Co.*, 642 F.3d 1355, 1361 (Fed. Cir. 2011); *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999).

Additionally, claim 17 includes multiple “means-plus-function” elements. Use of the word “means” in a claim gives rise to a rebuttable presumption that 35 U.S.C. § 112, sixth paragraph analysis applies to interpret the claim. *Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1348 (Fed. Cir. 2015). Construing a means-plus-function claim term is a two-step process, wherein we first identify the claimed function and then determine

what structure, if any, disclosed in the specification corresponds to the claimed function. *Id.* at 1351; *Med. Instrumentation & Diagnostics Corp. v. Elekta AB*, 344 F.3d 1205, 1210 (Fed. Cir. 2003); *Cardiac Pacemakers, Inc. v. St. Jude Med., Inc.*, 296 F.3d 1106, 1119 (Fed. Cir. 2002). Our Rules specifically require that a petition for *inter partes* review identify how each challenged claim is to be construed, including identification of the corresponding structure for means-plus-function limitations. In particular, “[w]here the claim to be construed contains a means-plus-function . . . limitation as permitted under 35 U.S.C. 112 [¶ 6], the construction of the claim must identify the specific portions of the specification that describe the structure, material, or acts corresponding to each claimed function.” 37 C.F.R. § 42.104(b)(3). Moreover, “structure disclosed in the specification is ‘corresponding’ structure only if the specification or prosecution history clearly links or associates that structure to the function recited in the claim.” *Golight, Inc. v. Wal-Mart Stores, Inc.*, 355 F.3d 1327, 1334 (Fed. Cir. 2004); *Cardiac Pacemakers*, 296 F.3d at 1113.

Petitioner proposes construction of a number of terms. Pet. 16–26. We address some of Petitioner’s proposed constructions in our Decision on Institution. Dec. 12–16. Patent Owner has adopted our constructions as discussed in the Decision on Institution. PO Resp. 9. We repeat below our construction of various terms.

1. “*Transducer*”

Claim 1 recites “a transducer configured to receive the adjusted first and/or second audio signals, combine the received first and second audio signals, and output an audible sound based on the combined first and second audio signals to the listener without interfering with other listeners in the

listening environment.” Petitioner cites, but does not rely on, a dictionary definition of “transducer” as “[a]ny device or element which converts an input signal into an output signal of a different form,” the definition noting examples such as microphones and speakers. Pet. 19–20, n.2 (citing Ex. 1005, 2053<sup>11</sup>). Based on the recitation of claim 1, Petitioner argues the transducer as recited in claim 1 must perform three specific functions including receiving audio signals, combining the received signals, and transducing the combined signals. Pet. 19 (citing Ex. 1003 ¶ 53). Thus, Petitioner construes “transducer” to include “a component that combines at least two signals and a component that converts an electrical signal into an audible acoustic audio signal.” *Id.* at 21 (citing Ex. 1003 ¶ 54).

As discussed in our Decision on Institution, we disagree with Petitioner’s proposed interpretation because it is inconsistent with the plain meaning of “transducer” as evidenced by the proffered dictionary definition and is inconsistent with the use of “transducer” in the ’884 patent Specification. Dec. 12–13. The ’884 patent Specification uses the noun “transducer” and the verb “transduce” consistent with the proffered dictionary definition. For example, the Abstract refers to “one or more transducers” separate from the adjustment devices and the combining device. Ex. 1001, Abstract. Further, transducer 226 in PLD 220 of Figure 4 of the ’884 patent similarly depicts the transducer as separate from adder 228 (combiner). *Id.* at Fig. 4, 8:39–43. The ’884 patent further refers to separate steps of adjusting, combining, and *then* transducing. *Id.* at 8:63–

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<sup>11</sup> Petitioner is reminded that our rules require each paper filed as an Exhibit must have each page “uniquely numbered in sequence.” 37 C.F.R. § 42.63(d)(2).

9:2. Similarly, Figure 7 of the '884 patent shows transducer 27 separate from mixer 26 and VRA adjust 25. *Id.* at Fig. 7, 10:12–26. Other figures and supporting text are similarly consistent with the plain meaning of “transducer” as supported by the noted dictionary definition. Moreover, Petitioner acknowledges that, outside of claim 1 itself to be construed, the '884 patent does not disclose any structure that supports an interpretation of “transducer” as an element that combines, *within the transducer itself*, all three functions of receiving adjusted signals, combining those signals, as well as the above-defined function of a transducer, outputting the combined signals. *See* Supp. Reply 4 (arguing “the '884 patent does not disclose a single component that can perform each of these functions”). Nor do we discern such a structure.

In view of the above discussion, we adopt the dictionary definition of “transducer” cited by Petitioner and, accordingly, interpret “transducer” to mean “*any device or element which converts an input signal into an output signal of a different form.*” Our interpretation is consistent with the plain meaning as the term is used in the '884 patent Specification as discussed above.

## 2. “Voice Signal”

Petitioner argues “voice signal,” as recited in all independent claims, means “a signal that contains primarily speech or voice.” Pet. 17. Petitioner cites the '884 patent Specification in support of this interpretation. *Id.* The '884 patent refers to “voice signals” as a “pure voice signal” (Ex. 1001, 10:22), “speech or voice” (*id.* at 4:15), and “speech only or mostly speech” (*id.* at 8:46). We find Petitioner’s interpretation supported by the '884

patent and adopt Petitioner’s interpretation of “voice signal” to mean “a signal that contains primarily speech or voice.”

3. “*Remaining Audio*”

Petitioner argues “remaining audio,” as recited in all independent claims, means “audio containing primarily non-speech sounds.” Pet. 19. Petitioner cites several portions of the ’884 Specification in support of this interpretation. *Id.* at 18 (citing Ex. 1001, 4:12–18, 5:11–12, 5:30–39, 6:6, 7:51–52, 7:65–66, 11:55–60). We are persuaded by, and adopt, Petitioner’s interpretation. Importantly, the ’884 patent refers to examples of “remaining audio” as including music, sound effects, and laughter and refers to these in a broader group of “other non-speech sounds.” Ex. 1001, 4:12–18. Thus, “remaining audio” can be any non-speech sounds including, by way of example, music, etc. We interpret “remaining audio” to mean “audio containing primarily non-speech sounds.”

4. “*Means for Receiving*”

Claim 17 recites “means for receiving a first audio signal and a second audio signal.” Petitioner identifies the function of this recited means as “receiving a first audio signal and a second audio signal” and identifies multiple structures in the ’884 patent Specification that provide this function, including a “receiver”—a well-known structure to those of ordinary skill in the art. Pet. 21–22 (citing Ex. 1001, 8:29–33, 9:58–61, 10:5–20, 10:42–44, 15:41–46, 18:62–65, Figs. 4, 7, 8, 14); *see also* Ex. 1003 ¶¶ 55–57.

We are persuaded by Petitioner’s arguments and adopt Petitioner’s proposed interpretation. The ’884 patent discloses, for example, “[t]he received signals [(first and second audio signals)] are received by PLD receiver 231 which may be for example, an infrared receiver, a wireless

radio frequency receiver, or a multi-port audio input jack for a wired connection.” Ex. 1001, 8:29–33. We take notice that a receiver, such as the disclosed “wireless radio frequency receiver,” is a well-known structure to those of ordinary skill in the art. Accordingly, we find that the ’884 patent clearly links the disclosed receiver (e.g., a radio frequency receiver) with the identified function of the “means for receiving” (receiving the first and second audio signals). Therefore, we interpret the recited “means for receiving” to include the structure of a wireless radio frequency receiver that receives a first audio signal and a second audio signal.

5. “*Means for Adjusting*”

Claim 17 recites “means for adjusting the first audio signal and the second audio signal independent of each other by a listener.” Petitioner identifies the function of this recited means as “adjusting the first audio signal and the second audio signal independent of each other by a listener,” as the claim reads. Pet. 22–23. Petitioner identifies multiple structures that provide this function including “variable gain amplifiers.” *Id.* (citing Ex. 1001, 7:54–59, 8:33–39, 10:55–11:16, Figs. 2, 4); *see also* Ex. 1003 ¶¶ 58–60.

We agree that the structure includes, at least, a first variable gain amplifier that adjusts the first audio signal (e.g., Ex. 1001, Fig. 2 element 311, Fig. 4 element 229) and a separate variable gain amplifier that adjusts the second audio signal (e.g., Ex. 1001, Fig. 2 element 310, Fig. 4 element 230) independent of the first variable gain amplifier. Specifically, “[t]he background audio signal is sent to a separate variable gain amplifier 310, that the listener can adjust to his or her preference [and the] voice signal is sent to a variable gain amplifier 311, that can be adjusted by the listener to

his or her particular needs.” Ex. 1001, 7:54–58. Thus, a user can adjust variable gain amplifiers 310 and 311 independent of one another to adjust independently the first and second audio signals, respectively.

We find that the ’884 patent clearly links the disclosed variable gain amplifiers with the identified function and, accordingly, we interpret the recited “means for adjusting” to include the structure of a variable gain amplifier that adjusts the first audio and a variable gain amplifier that adjusts the second audio signal independent of the first audio signal.

6. *Means for Receiving, Combining, and Adjusting*

Claim 17 recites, “means for receiving the adjusted first and/or second audio signals, combining the received first and second audio signals, and outputting an audible sound based on the combined first and second audio signals to the listener without interfering with other listeners in the listening environment.” Petitioner identifies the function of this means to be “receiving the adjusted first and/or second audio signals, combining the received first and second audio signals, and outputting an audible sound based on the combined first and second audio signals to the listener without interfering with other listeners in the listening environment,” as recited in the claim. Pet. 23–26. Petitioner identifies multiple structures that perform the identified function, including “an adder/summer and a transducer.” *Id.* at 24 (citing Ex. 1001, 8:39–43, 10:20–26, 11:16–21, Figs. 4, 7, 9); *see also* Ex. 1003 ¶¶ 61–63.

We are persuaded by Petitioner’s argument. Figure 4 of the ’884 patent shows adder 228 receiving adjusted audio signals from variable gain amplifiers 229 and 230, combining the received adjusted signals, and applying the combined audio signal to transducer 226 to convert that signal

to an audio output. Ex. 1001, Fig. 4, 8:39–43. Therefore, we find that the '884 patent clearly links the disclosed adder/summer coupled to a transducer with the identified function of the “means for receiving . . . , combining . . . , and outputting.” Accordingly, we interpret the recited “means for receiving . . . , combining . . . , and outputting” to include the structure of an adder that receives adjusted first and second audio signals, combines the signals by summing them, and outputs the combined signal by applying the signal to a transducer.

### *7. Other Claim Terms*

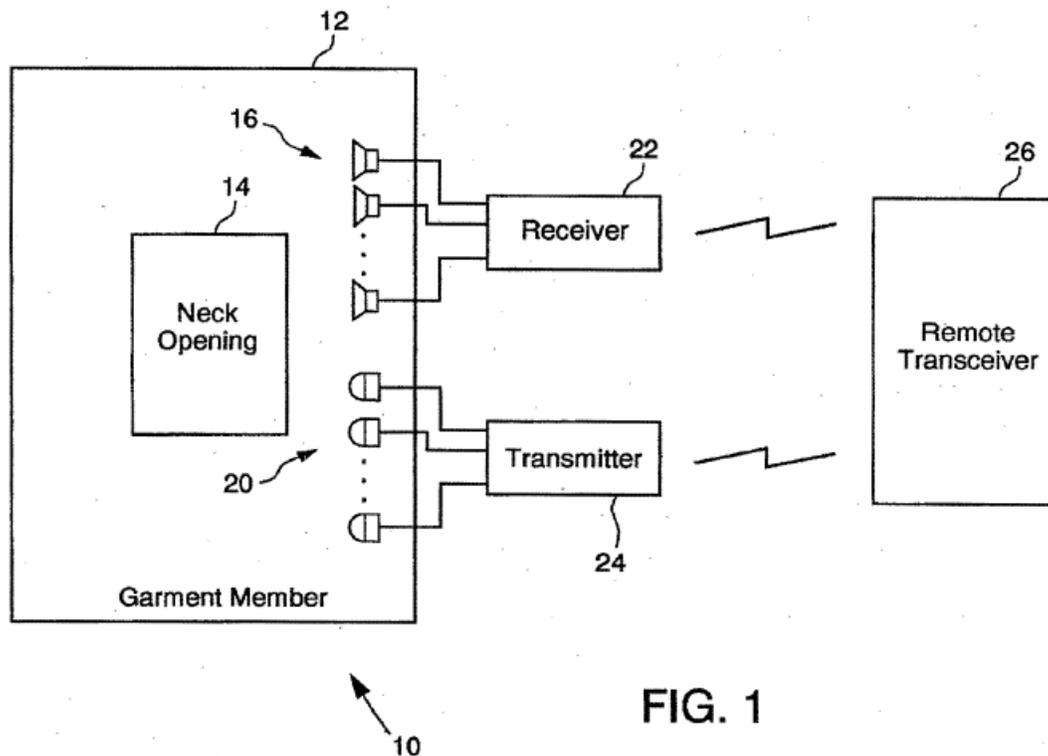
We determine that it is unnecessary to construe expressly any other claim terms.

#### *B. Grounds 1–5 - Claims 1–8*

Petitioner argues claims 1, 2, and 5 are obvious over Wang alone, and argues claims 3, 4, 6, 7, and 8 are obvious over Wang in various combinations with other references.

##### *1. Wang (Ex. 1004)*

Wang discloses a personal communication system that allows for hands free communication without blocking the user's ears. Ex. 1004, 2:17–20. Wang's Figure 1, reproduced below, is a schematic diagram of an embodiment of Wang's invention.



Wang's Figure 1, above, discloses garment based audio interface 10 including garment member 12 worn on the upper torso of a user with neck opening 14 allowing the user's neck to extend there through. *Id.* at 3:40–46. Interface 10 further includes audio output device 16 (e.g., speakers) for producing acoustic audio waves from audio signals applied thereto and audio input device 20 (e.g., microphones) for generating an audio signal from acoustic audio waves received by device 20. “Sound waves generated by the user speaking in a normal manner are converted into an audio signal by the audio input device 20 for transmission by the transmitter 24.” *Id.* at 4:6–9. “Similarly, the audio output device 16 produces sound waves in response to a signal received by the receiver 22 for listening by the user.” *Id.* at 4:9–11.

Where each person of a group of people uses a personal communication device, the system allows users to share their personal

auditory surroundings with other users by each user transmitting their respective audio signals and receiving audio signals from other users. *Id.* at 4:12–16. For example, user A may choose to shut off listening to his/her auditory space and listen to the auditory space of user B by receiving audio signals from user B. *Id.* at 4:22–24. In another example, user A can mix its auditory space with that of user B by selectively adjusting its perception of user B’s audio signals—i.e., by rotating, flipping, augmenting, or weakening user B’s signal relative to user A’s auditory space. *Id.* at 25–35.

Audio input device 20 may be an array of microphones electronically controlled to change directional characteristics of the array to selectively capture sound sources in the 3D space around the user. *Id.* at 4:49–59. At least two microphones of the array of microphones are positioned near the ears of the user to receive acoustic waves (sounds) similar to those heard by the user of the device and others of the microphones may be distributed around the user’s neck to receive other sounds. *Id.* at 4:60–65.

The transmitter may use well-known modulation techniques to multiplex multiple audio signals in a transmission. *Id.* at 7:16–22. Thus, a user may receive a signal that modulates multiple audio signals from a selective mix of multiple audio sources transmitted from another user and demodulates the received signal to reproduce the multiple audio sources at the receiving user’s personal communication device. *Id.* at 7:47–53.

Wang’s Figure 3, reproduced below, is a block diagram providing additional details of an exemplary receiver of the disclosed personal communication device.

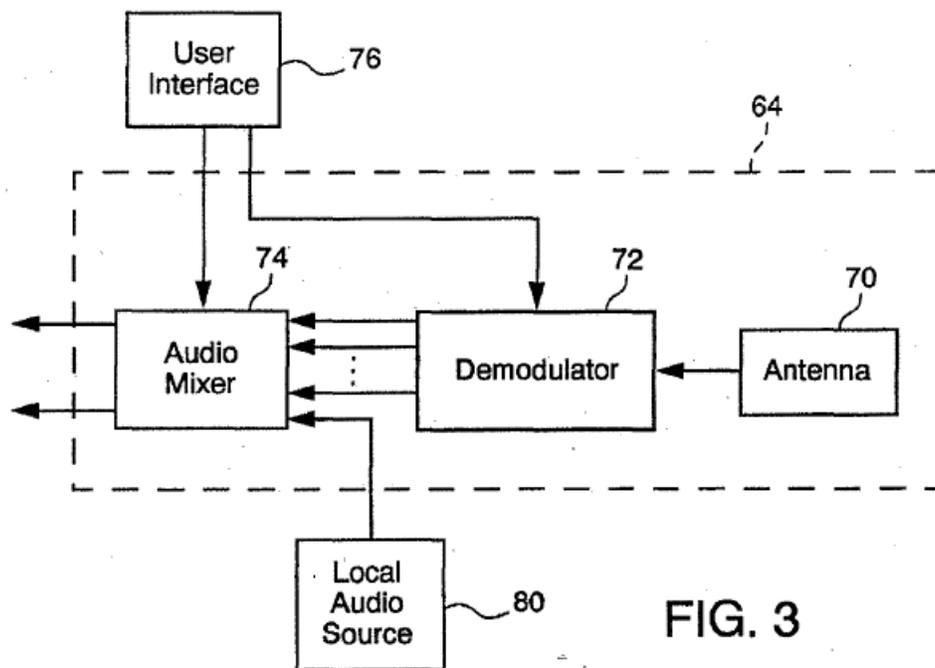


FIG. 3

Figure 3, above, depicts receiver 64 including demodulator 72 to extract each of one or more modulated audio signals from a signal received through antenna 70. *Id.* The one or more extracted audio signals are applied to audio mixer 74 that, under control of user interface 76, selectively mixes the received, demodulated audio sources for output to a transducer (not shown). *Id.* at 7:53–57. Examples of audio signals modulated over a transmitted signal include “audio from a telephone receiver, one or more sources of music, and audio from one or more other users having a like personal communications apparatus.” *Id.* at 8:12–14. User interface 76 allows the user to selectively mix the received audio signals. *Id.* at 8:18–20. “For example, if the telephone rings while the user is listening to music, he/she can reduce the volume of the music and increase the volume of the receiver of the telephone using the user interface 76.” *Id.* at 8:20–23.

2. *Ground 1 - Claims 1, 2, and 5 Obvious over Wang*

Claim 1 is directed to a personal listening device (PLD) comprising a receiver that receives a first and second audio signal, an adjustment device, that independently adjust the first and second audio signals, and a transducer. Petitioner maps the limitations of independent claim 1 to disclosures of Wang. Pet. 26–37. In particular, Petitioner identifies mixer 74 of Wang as the recited adjustment device. Pet. 34–35. Claim 1 specifically recites, “a transducer configured to receive the adjusted first and/or second audio signals, combine the received first and second audio signals, and output an audible sound based on the combined first and second audio signals to the listener without interfering with other listeners in the listening environment.”

The Petition proposes a construction of “transducer” as a device that provides all the recited functionality (receiving adjusted signals, combining the adjusted signals, and generating an audible sound therefrom). Pet. 19–21. Based on that interpretation, Petitioner argues the recited transducer is taught in Wang as the combination of mixer 74 and speakers 42 and 44 coupled thereto. Pet. 37 (“Accordingly, the audio mixer and speakers of Wang in combination (the claimed ‘transducer’) receive the adjusted first audio signal (the voice of the second user) and/or the second audio signal (the ‘3-D auditory space’ of the second user), combine (mix) the received first and second audio signals, and output an audible sound based on the combined first and second audio signals to the listener without interfering with other listeners in the listening environment.”) (citing Ex. 1003 ¶ 119).

In our Decision on Institution, we rejected Petitioner’s proposed interpretation of “transducer” as inconsistent with the ’884 patent

Specification and inconsistent with the plain meaning. Dec. 12–13. Instead, consistent with the '884 patent Specification and the plain meaning of the term, we construed “transducer” to be “any device or element which converts an input signal into an output signal of a different form.” *Id.* In our Decision on Institution, we were not persuaded Petitioner had identified a “transducer” in Wang consistent with our interpretation of the term. Dec. 24. Even accepting, *arguendo*, Petitioner’s proposed interpretation of “transducer,” we were not persuaded Petitioner had identified a corresponding structure in Wang. Dec. 24–25. Specifically, we agreed with Patent Owner that some unidentified features of Petitioner’s proposed combination of Wang’s mixer 74 and speakers 42 and 44 must *generate* the adjusted first and second audio signals and must also *receive* the adjusted signals that are to be combined. *Id.* In other words, Wang’s mixer 74 must generate and receive the recited adjusted signals.

In its Supplemental Reply, Petitioner argues “the '884 patent discloses that the adder 228 and the transducer 226 of PLD 220 *collectively* perform the functions of *receiving*, *combining*, and *outputting* recited in claim 1, but the '884 patent does not disclose a single component that can perform each of these functions.” Supp. Reply 4. We agree that the '884 patent Specification does not identify, and we discern no disclosure of, a single device or component in the '884 patent Specification that performs all three recited functions of the transducer as recited in claim 1.<sup>12</sup> Instead, Petitioner again argues the combination of speakers 42 and 44 with mixer 74 is a

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<sup>12</sup> It is beyond the scope of an *inter partes* review to consider whether, in view of the inconsistent use of the term “transducer,” claim 1 complies with the requirements of 35 U.S.C. § 112.

structure that provides the three recited functions of the transducer of claim 1, as well as the function of the claimed adjustment device. *Id.* at 5.

Petitioner further argues,

[A person of ordinary skill in the art] would understand that the audio mixer 74 of Wang would include the necessary components to *adjust* audio signals, and the necessary components to *combine* (mix) audio signals, just like the '884 patent's PLD 220 contains separate components to perform these same functions—variable gain amplifiers 229 and 230, and adder 228.

*Id.* at 6. Petitioner further argues “claim 1 does not require specific structures” and, thus, contends Wang’s mixer 74 in combination with speakers 42 and 44 perform the same function as the recited transducer of claim 1. *Id.* at 7–9.

We are not persuaded by a preponderance of the evidence that Petitioner’s proposed combination of Wang’s mixer 74 and speakers 42 and 44 teaches or suggests the specific structure as recited in claim 1. Contrary to Petitioner’s contentions, claim 1 does recite a particular structure—namely, an adjustment device that adjusts the received first and second audio signals to generate the adjusted first and second audio signals and a separate element (a transducer) that receives those adjusted signals, combines them, and outputs the combined signal as audible sound. We fully understand that components such as adders/summers to combine signals and variable gain amplifiers to adjust signals are well-known to ordinarily skilled artisans. *See* Supp. Reply 7 (citing Pet. 73–74; Ex. 1003 ¶¶ 176–177; Ex. 1008, 1:40–41, 1:63–2:25; Ex. 1016, 44:7–12, 45:2–7).<sup>13</sup> However, Petitioner’s assertion

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<sup>13</sup> We note that Petitioner’s citations here to the Petition, to Dr. Kiaei’s Declaration, and to Exhibit 1008 all relate to discussions of the Kim

that ordinarily skilled artisans would understand that Wang’s mixer 74 necessarily includes such discrete components is a conclusory assertion unsupported by any evidence of record. Wang does not disclose any of the internal structure of mixer 74. If mixer 74 provides all functions of the recited adjustment device and transducer, there would have to be some structure coupling some unidentified portion of mixer 74 that performs the adjustment function with some other unidentified portion that receives those adjusted signals and then combines them. Neither Petitioner’s pleadings nor Dr. Kiaei’s Declarations (Exs. 1003, 1017) point to persuasive evidence that Wang’s mixer 74 *necessarily* includes such a coupling or such well-known components (adder/summer, variable gain amplifiers, etc.). *See* 37 C.F.R. § 42.65 (a) (“Expert testimony that does not disclose the underlying facts or data on which the opinion is based is entitled to little or no weight.”)

Accordingly, we are not persuaded by a preponderance of the evidence that Wang teaches or suggests at least the recited transducer element of independent claim 1.

Claim 2 depends from claim 1 and further recites, “wherein the personal listening device is chosen from a group consisting of a headphone, a hearing aid, an assisted listening device, a cochlear implant, an eyewear, a wearable computer, or a combination thereof.” The Petition identifies this added feature in Wang (Pet. 37–38) but does not further clarify how Wang teaches or suggests the recited transducer of claim 1.

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reference (Ex. 1008) in the context of ground 10 directed to claim 17. These citations are not applied to Petitioner’s analysis of claim 1. The Kim reference is not relied upon or cited in the Petitioner’s analysis of claim 1 or in Dr. Kiaei’s analysis of claim 1. *See* Pet. 26–37; *see also* Ex. 1003 ¶¶ 102–121.

Claim 5 depends from claim 1 and further recites, “wherein the first audio signal and the second audio signal comprise digital signals that require decoding.” The Petition identifies this added feature in Wang (Pet. 38–39) but does not further clarify how Wang teaches or suggests the recited transducer of claim 1.

Therefore, for the reasons discussed *supra* regarding independent claim 1, we are not persuaded by a preponderance of the evidence that independent claim 1 and dependent claims 2 and 5 are unpatentable as obvious over Wang.

3. *Grounds 2–5 - Claims 3, 4, and 6–8 Obvious over Wang in Various Combinations*

Claims 3, 4, and 6–8 depend, directly or indirectly, from independent claim 1 and recite additional features. Claims 3, 4, and 6–8 are alleged to be unpatentable over Wang in combination with one or more other references of record. Pet. 39–56. The Petition relies on the various other cited references, in combination with Wang, to disclose the respective additional features of each dependent claim but does not further clarify how Wang in view of those other references teaches or suggests the recited transducer of claim 1. *See id.*

Therefore, for the same reasons discussed *supra* regarding independent claim 1, we are not persuaded by a preponderance of the evidence that: dependent claim 3 is unpatentable as obvious over Wang in combination with Fishman, that dependent claim 4 is unpatentable as obvious over Wang in combination with Scofield, that claims 6 and 7 are unpatentable over Wang and Eggers, or that claim 8 is unpatentable as obvious over the combination of Wang, Webb, and Obara.

*C. Ground 6 - Claims 9, 10, and 13–15 Obvious Over Wang and Marx*

Petitioner relies on the combined teachings of Wang and Marx in asserting unpatentability of each of claims 9, 10, and 13–15. Pet. 56–66. For the reasons below, we *are persuaded* by a preponderance of the evidence that claims 9, 10, and 13 are unpatentable as obvious over the combined teachings of Wang and Marx, but we *are not persuaded* by a preponderance of the evidence that claims 14 and 15 are unpatentable.

*1. Marx (Ex. 1009)*

Marx discloses a real time audio mixer. Ex. 1009, 1. Marx Figure 1, reproduced below, depicts an embodiment of a real time audio mixer. *Id.* at 3:34–35.

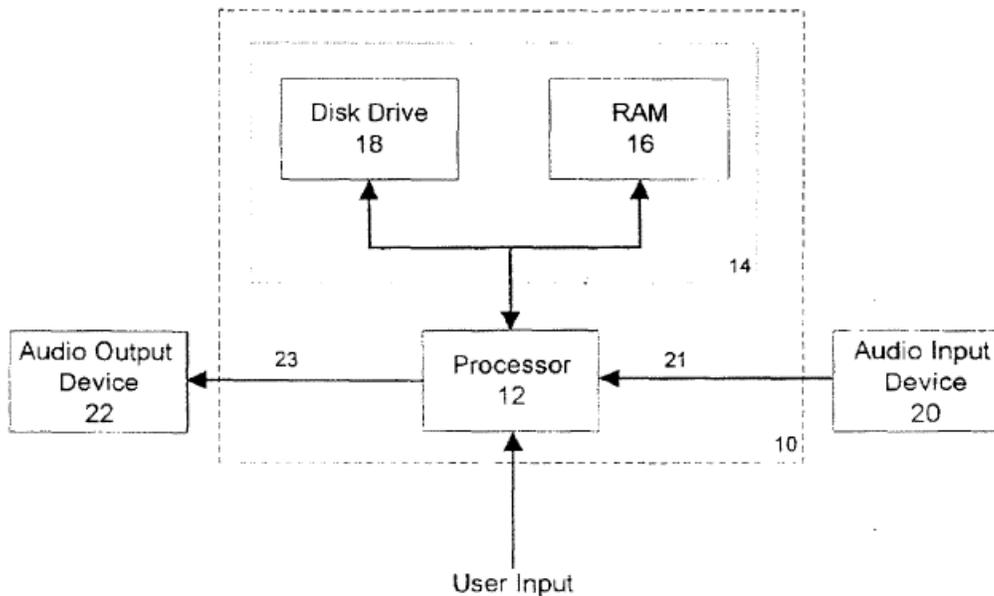


FIGURE 1

Marx's Figure 1 discloses audio input signal 21 received at mixer 10. *Id.* at 4:2–3. Input signal 21 may be an analog voltage representing speech, music, or any other source of audio signal. *Id.* at 4:3–9. Processor 12 in mixer 10 stores the received audio input signal 21 in buffer 14. *Id.* at 4:10–12. Buffer 14 includes random access memory (“RAM”) 16 and disk drive 18 to temporarily store the input signal. *Id.* at 4:12–13. Processor 12 processes the stored input signal, in accordance with direction from user input, to generate processed audio signal 23 and applies the generated signal to audio output device 22 (e.g., a speaker). *Id.* at 4:15–22.

2. *Claims 9, 10, and 13*

Independent claim 9 recites features of a broadcasting apparatus including a storage medium for storing first and second audio signals and a transmitter for transmitting the first and second audio signals. The first and second audio signals are recited as a voice signal and a remaining audio signal, respectively, and can be independently adjusted and combined to produce an audible sound.

Regarding the first and second audio signals of claim 9, the Petition refers back to arguments presented with respect to the same signals as recited in claim 1.<sup>14</sup> Pet. 58–59. The arguments regarding claim 1 are directed to the receiving apparatus that receives the same first and second audio signals as the signals recited to be stored and transmitted by the

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<sup>14</sup> Claim 9 is directed to a broadcasting system that *transmits* the first and second audio signals. Claim 1, by contrast, is directed to a personal listening device that *receives* the first and second audio signals (a voice signal and a remaining audio signal, respectively). Regardless, in addressing claim 9, the Petition refers back to its arguments identifying the received first and second audio signals, as recited in claim 1, as being disclosed by Wang.

broadcasting system of claim 9 (i.e., voice and remaining audio, respectively).

The Petition contends each personal listening device (PLD) of Wang includes both a receiver (to receive signals) and a transmitter (to transmit signals received by one or more receiver PLDs). Pet. 56–58. Thus, the Petition contends “a first one of Wang’s personal listening apparatus transmitting audio to other personal listening apparatuses in a telecommunications environment corresponds to a ‘broadcasting apparatus’” as recited in claim 9. Pet. 58 (citing Ex. 1003 ¶ 149). Petitioner argues that the personal listening device of a transmitting user (a “second user”) in Wang comprises a plurality of directionally controllable microphones and “certain microphones of the second user’s personal listening apparatus . . . [are] aimed at the user to capture her voice.” Pet. 31, 59. Petitioner further argues the second audio signal may be captured by the second user’s PLD in Wang using different microphones of the second user’s PLD to capture the “3-D auditory environment” around the second user. Pet. 32, 59.

Based on the above interpretation of Wang as disclosing the first and second audio signals that may captured by one PLD (and stored for transmission to another PLD), Petitioner maps the recitations of independent claim 9 to the combined disclosures of Wang and Marx, identifying the recited transmitter element in Wang and the recited storage medium in Marx. Pet. 56–64. In particular, Petitioner argues Wang discloses the recited transmitter as transmitter element 24 of Wang’s Figure 1 or transmitter element 54 of Wang’s Figures 2 and 3. *Id.* at 62–63 (citing Ex. 1004, Abstract, 6:53–57, 8:10–15, Figs. 1, 2). Petitioner acknowledges Wang fails to disclose the recited storage medium but argues Marx, in

combination with Wang, discloses the storage medium as buffer 14 in Figure 1 of Marx. *Id.* at 59–60 (citing Ex. 1009, 4:12–14, Fig. 1).

Petitioner contends the ordinarily skilled artisan would have been motivated to combine the storage element of Marx with the communication apparatus of Wang to avoid loss of audio to be broadcast in the event of a loss of connection between users. *Id.* at 60 (citing Ex. 1003 ¶ 153); *see also* Ex. 1009, 8:55–63.

*a. First and Second Audio Signals*

Patent Owner argues Wang fails to disclose the recited first and second audio signals of claim 9 because Wang does not disclose multiple arrays of microphones—e.g., one array directionally controlled to receive the second user’s voice and a separate array directionally controlled to receive sounds from the 3-D auditory environment of the second user. PO Resp. 10–26. More specifically, Patent Owner argues Wang discloses only a single microphone array that consists of all the microphones of Wang and further argues the entire array is directionally controlled to capture audio signals primarily from a single direction—i.e., controlled to acquire sounds from one direction at a time rather than two directions at the same time. *Id.* at 16 (citing Ex. 2003 ¶ 45). In support of this assertion, Dr. Anderson testifies Wang discloses only two microphones in its microphone array and, thus, discloses only a single array that may be directionally controlled—a single array consisting of microphones 50 and 52 in one embodiment or microphones 92 and 94 in another embodiment. *Id.* at 16–17 (citing Ex. 2003 ¶ 42).

Responsive to Patent Owner, Petitioner argues, although Wang refers to “an” or “the” array of microphones, “there is no suggestion in Wang that

all the microphones must operate in a single array and must be pointed in a single direction.” Pet. Reply 2. To the contrary, Petitioner argues Wang teaches an embodiment having three or more microphones, a first portion of which may be directionally controlled to capture the second user’s voice and a second portion of the microphones directionally controlled to capture other sounds surrounding the second user (the “3-D auditory environment”). *Id.* at 5–13. Furthermore, Petitioner argues the claims of the ’884 patent do not require that the first and second audio signals be generated at the same time. *Id.* at 4. Instead, Petitioner contends the claims of the ’884 patent encompass transmission (broadcast) of a stored voice signal (the recited first signal) and transmission (broadcast) of a stored second audio signal (e.g., pre-recorded music) from the second user’s device in Wang to a plurality of receivers. *Id.* at 4–5, 13–14. We consider these arguments below

*i. Wang’s Signals Are Captured “At The Same Time”*

Assuming Patent Owner is correct that, in the context of claim 9, the first and second audio signals must be captured at the same time, we are persuaded that Wang teaches or suggests simultaneous capture of first and second audio signals.

As noted above, Patent Owner argues Wang discloses only a single microphone array that may be controlled to capture a user’s voice signal or a remaining audio signal, but not both. *See* PO Resp. 10–26. Indeed, in one embodiment, Wang discloses controlling *an* array of microphones. For example, Wang discloses, “another object of the present invention is to provide *an* array of microphones to capture sound from a selected direction.” Ex. 1004, 2:35–37 (emphasis added). Wang further discloses,

[The microphones of the array] are electronically controlled such that the amplitude and phase of the signal coming out from each microphone can be varied electronically. One benefit of the electronically controlled audio input device is that users can easily change the directivity of *the* array so that it will selectively capture the sound sources in the 3-D space.

*Id.* at 4:53–59 (emphasis added). In other words, the directivity of an/the array of microphones is determined by changing the phase relationship of output signals from microphones of the array. At oral argument, Petitioner’s counsel answered a question as follows:

[MR. STEINBERG:] . . . So I think there can be no question it’s talking about controlling each individual microphone, not simply the entire group together.

JUDGE FISHMAN: Counselor, I’ll pose a question on that issue.

It doesn’t actually say that the microphone has directivity that can be programmed, it says, “amplitude and phase can be programmed to determine direction -- directivity.”

I presume it requires at least two microphones to determine phase difference; is that correct?

MR. STEINBERG: That's right, Your Honor.

Tr. 64:10–18. In other words, Wang discloses controlling the directivity of an array of microphones and at least two microphones must be in an array to determine (control) a phase difference between two or more microphones. Thus, a microphone array that consists of *only two microphones* can be controlled *only for a single direction* and cannot be directionally controlled to capture sounds from two different directions at the same time (by controlling the phase of the microphone output signals).

Relying largely on the embodiments of Wang's Figures 2 and 4, Patent Owner argues Wang discloses only a single array consisting of only two microphones. PO Resp. 16 (citing Ex. 2003 ¶ 42 ("Wang only details the use of two microphones 50 and 52 (or 92 and 94 when the necklace embodiment is used) for the array")). Patent Owner is correct that the exemplary embodiments disclosed by Wang's Figures 2 and 4 each depict only a single microphone array consisting of only two microphones. Patent Owner further argues,

As illustrated in each of Wang Figures 2 and 4, Petitioner's allegation that there are "different microphones" to capture voice and the 3-D auditory environment in Wang is simply incorrect. *See* Exh. 1004, Wang at 6:36–38 (describing "an audio input device comprising a pair of stereo microphones 50 and 52 located adjacent the neck opening 34"), 8:32–34 (for alternate "necklace" embodiment describing "an audio input device comprising a pair of microphones 92 and 94 located at opposite sides of the necklace 82.").

PO Resp. 23.

Regardless of Patent Owner's arguments emphasizing embodiments of Wang disclosing only two microphones, we disagree with Patent Owner because Wang's Figure 1 discloses an embodiment with at least three microphones. Petitioner's counsel and Dr. Anderson (Patent Owner's expert) engaged in the following colloquy (with Patent Owner's counsel's objections removed for clarity) during a deposition based on a proposed hypothetical scenario with more than two microphones—a scenario we find consistent with the disclosures of Wang's Figure 1:

Q. And just so I don't have to say the whole scenario each time, my hypothetical is that there is a first set of microphones that captures -- and let's actually, we'll use the claim language a little bit. There's a first set of microphones in

my hypothetical that captures primarily the user's speech and a second set of microphones that captures primarily environmental sounds.

You got that?

A. Okay.

...

Q. Okay. If my hypothetical were correct, then Wang would disclose a first audio signal, the signal that corresponds to the user's speech, correct?

A. Continue.

Q. (By Mr. Steinberg) I need a --

A. Okay.

Q. That's the end of the question.

A. That's the end.

So you're saying that if Wang could, in this hypothetical, detect the speech without the noise or substantially without the background sounds, would he have collected a voice signal, that is a signal containing primarily speech or voice.

Q. Yes.

A. So you have set it up that way, so -- so the answer would be yes in that hypothetical.

Q. Okay. And again sticking with my hypothetical, if that's correct, Wang would disclose a second audio signal which would be the signal corresponding to the captured environmental sounds. Correct?

A. So in this case, you have set it up so that the second signal somehow is devoid or substantially devoid of any of the speech signal, but it has captured the rest of the environmental sounds. And then you're asking, which is of this hypothetical,

if that signal would be audio containing primarily the nonspeech sounds.

Q. (By Mr. Steinberg) Yes.

A. So that's how you have set it up. And so I think, obviously, that's where you are going with it, the answer is if that's what you have, that's what you have.

Q. Okay. Again, sticking to my hypothetical, if that's correct, the first audio signal and the second audio signal would represent different signals obtained around the user at the same time, correct?

A. So, so far what you have described is just that, right, detecting different signals in the user's auditory space that are mutually exclusive. And now you are asking did I -- have you got two signals that are different, but collected from the same space. Is that what you are asking?

Q. (By Mr. Steinberg) Yes. So my --

A. Yes.

Q. Correct, okay. If my hypothetical were correct, the first audio signal would be different from the second audio signal, correct?

A. Yes.

Q. (By Mr. Steinberg) And if my hypothetical were correct, Wang would disclose a second audio signal corresponding to the first audio signal, correct?

A. Yes.

Q. (By Mr. Steinberg) If my hypothetical were correct, the first audio signal would include substantially a voice signal, correct?

A. Yes.

Q. (By Mr. Steinberg) If my hypothetical were correct, the second audio signal would include a remaining audio, correct?

A. Yes.

Q. If my hypothetical were correct, Wang would disclose a transmitter configured to transmit the first and second audio signals to a plurality of receivers, correct?

A. Yes. Well, I assume there could be a plurality of receivers if you are sending a signal broadcast.

Q. (By Mr. Steinberg) If my hypothetical were correct, Wang would disclose that the first and/or second audio signals are configured to be independently adjusted at each of the plurality of receivers. Correct?

A. Yes.

Q. (By Mr. Steinberg) If my hypothetical were correct, Wang would disclose that the first and second audio signals are configured to be subsequently combined to produce an audible sound, correct?

A. Yes.

Ex. 1016, 153:10–158:2. Dr. Anderson's answers are, of course, based on his interpretation of Wang that there cannot be two sets/groups of microphones that can be directionally controlled but, instead, only a single array with two microphones that can be directionally controlled only in a single direction. However, as discussed further below, we are persuaded by Petitioner's arguments that, consistent with the hypothetical scenario, Wang teaches or at least suggests three or more microphones such that two sets/groups of microphones may be controlled to primarily pick up sounds from two directions. Thus, Dr. Anderson's testimony regarding the proposed hypothetical is consistent with Petitioner's, and our, understanding

of what Wang teaches or suggests to the ordinarily skilled artisan where Wang discloses three or more microphones such that two sets of microphones may be controlled to capture sound from two directions.

Petitioner argues input device 20 of Wang's Figure 1 discloses at least three microphones. Pet. Reply 5 ("Wang teaches that three or more microphones 20 are used to capture audio, as shown below in Figure 1. Wang, Ex. 1004, 3:53-54, 6:49-50 ('... any number of microphones greater than two could also be used ...'); see also Pet. 31 ("certain microphones . . . to capture her voice"), 32 ("3-D auditory environment . . . captured by different microphones"). Patent Owner's expert, Dr. Anderson, testifies that Wang's Figure 1 depicts at least three microphones:

Q. Okay. Great.

And if we turn to the transmitter side, Figure 1 of Wang shows at least three microphones identified as items 20 in communication with transmitter 24, correct?

A. Once again, I interpret that as being an indeterminate number, but multiple microphones.

Q. Okay. With three actually depicted in Figure 1.

A. It's -- it shows three microphones with ellipses between two of them.

Ex. 1016, 47:5–15. Based on Wang's disclose of three or more microphones, Petitioner further argues,

[Patent Owner] inaccurately concludes that the microphones of Wang must *all* operate in a single array that can only be pointed in a single direction, alleging that "the microphone array in Wang can be tuned to capture a *single specific direction* of the 3-D auditory space" and thus cannot generate the "first audio signal" and the "second audio signal" at the same time. [PO Resp.] 18 (emphasis added). A [person of ordinary skill in the

art] would have instead understood from the teaching of Wang that each microphone (or a subset of microphones) could be pointed in any number of directions by electronically controlling the phase or physically positioning them to capture desired audio and generate representative audio signals at the same time. Kiaei Reply Decl., Ex. 1017, at ¶ 10.

Pet. Reply 6. Petitioner further contends Wang discloses as its objective the sharing of “auditory spaces” (citing Ex. 1004, 6:57–59, 6:65–7:6) and accomplishes that objective by

utilizing two sets (or arrays) of microphones in the personal listening apparatus on the upper torso where “*at least two* of [the microphones] are as close to the two ears respectively as possible, so that the sound received by the two microphones is similar in nature to that received by the two ears” to capture the background audio and “*the rest* of the microphones are distributed around the neck and two shoulders” to capture the user’s voice. Wang, Ex. 1004, at 4:49–51, 4:60–65 (emphasis added).

Pet. Reply 7 (bracketed text in original). Petitioner further asserts Patent Owner’s expert, Dr. Anderson, acknowledges two such sets of microphones disclosed in Wang. *Id.* at 7–8 (citing Ex. 1016, 88:24–89:12 (“Q. Okay. And in this passage in Column 4, line 60 to 65, Wang is distinguishing between two microphones close to the ears and the rest of the microphones, correct? A. Yes.”)).

We are persuaded by Petitioner’s arguments that Wang discloses an embodiment of a personal listening device having at least three microphones and discloses that at least two groups/sets of the three or more microphones may be directionally controlled to capture sound from two directions—a first set directed to primarily pick up the user’s voice and a second set to primarily pick up sounds surrounding the user (“3-D auditory

environment”).<sup>15</sup> As noted *supra*, Petitioner argues Wang discloses that different sets or groups of the microphones in the array may be controlled such that a first set/group of microphones (“certain microphones”) is directionally controlled to pick up primarily the user’s voice while a different set/group of microphones (“rest of the microphones” or “different microphones”) is positioned to pick up sounds of the “3-D auditory environment” surrounding the user.

Dr. Anderson also questions whether Wang sufficiently discloses how such microphones are controlled for directionality. His testimony focuses narrowly on the express disclosures of Wang. Dr. Anderson testifies “[Wang] provides no guidance to a [a person or ordinary skill in the art] on how to actually steer the array to selectively capture sound sources.” Ex. 2003 ¶ 42. Further regarding directional control of microphones by changing the phase of its output signal, Dr. Anderson testifies, “I would say that a person of ordinary skill in the art would not know, based on what Wang has disclosed, how those should be controlled or how they should be hooked up” (Ex. 1016, 85:3–6); “Wang provides no guidance and a person of ordinary skill in the art would likely not know what he intended” (*id.* at 86:3–5); “I’m saying that Wang provides no guidance as to the manner of the control in any way whatsoever” (*id.* at 86:15–17); “he has provided no guidance as to how this might operate” (*id.* at 87:24–25).

We are not persuaded by Dr. Anderson’s testimony. A reference qualifies as prior art under § 103 for what is disclosed, even if the disclosure

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<sup>15</sup> Patent Owner moved to exclude these arguments in Petitioner’s Reply and new arguments as not being responsive to issues raised by Patent Owner’s Response. As discussed *infra*, we deny Patent Owner’s motion to exclude these arguments.

is not a comprehensive disclosure of a complete, operative device. *See Beckman Instruments, Inc. v. LKB Produkter AB*, 892 F.2d 1547, 1551 (Fed. Cir. 1989) (“[e]ven if a reference discloses an inoperative device, it is prior art for all that it teaches”); *Symbol Techs., Inc. v. Opticon, Inc.*, 935 F.2d 1569, 1578 (Fed. Cir. 1991) (“[A] non-enabling reference may qualify as prior art for the purpose of determining obviousness under § 103.”). We are persuaded that Wang teaches or at least suggests that the phase of output signals from multiple sets of multiple microphones may be controlled to directionally control the sets of microphones. *See* Pet. Reply 2–3 (citing Ex. 1004, 4:43–65, 6:65–7:6; Ex. 1017 ¶¶ 10–12).

We are persuaded by a preponderance of the evidence that Wang teaches or reasonably suggests capturing a first audio signal and a second audio signal at the same time where the first signal is substantially voice and the second signal is a remaining audio signal.

*ii. Audio Signals Need Not Be Captured “At The Same Time”*

As discussed *supra*, we are persuaded Wang teaches or suggests the recited first and second audio signals wherein the signals are captured at the same time. In the alternative, we find the parties’ arguments are misdirected relative to the clear language of claim 9. The parties’ arguments, discussed above, primarily focus on whether or not Wang discloses a capability to capture first and second audio signals from *two different directions at the same time*. However, claim 9 merely recites that two audio signals are stored on a storage medium and transmitted to a plurality of receivers. Specifically, the elements of claim 9 comprise a storage medium that holds the first and second signals and a transmitter that transmits the first and second signals. Ex. 1001, 28:43–54. The claim further recites that the

second audio signal “correspond[s] to the first audio signal,” that the first audio signal includes “substantially a voice signal,” and that the second audio signal includes “a remaining audio.” *Id.* The claim additionally recites that the transmitter element is configured to transmit the two audio signals in a manner “to be independently adjusted at each of the plurality of receivers and subsequently combined.” *Id.*

We find the recitations characterizing the first and second audio do not limit the structure or operation of the storage medium or transmitter elements of claim 9. The first audio signal is substantially voice and the second is remaining audio. The two signals are configured to be individually adjustable at the receivers. We discern no functional relationship between the structure or operation of the storage medium and the particular types of audio signals stored thereon. In like manner, we discern no functional relationship between the structure or operation of the recited transmitter and the particular type of audio signals to be transmitted. Such non-functional descriptive material is deserving of little or no patentable weight to distinguish claim 9 from the prior art. *See Ex parte Nehls*, 88 USPQ2d 1883, 1887–90 (BPAI 2008) (precedential); *Ex parte Curry*, 84 USPQ2d 1272 (BPAI 2005) (informative) (Federal Circuit Appeal No. 2006-1003), *aff'd*, Rule 36 (June 12, 2006)); *Ex parte Mathias*, 84 USPQ2d 1276 (BPAI 2005) (informative), *aff'd*, 191 Fed. Appx. 959 (Fed. Cir. 2006); MPEP § 2111.05(III) (“[W]here the claim as a whole is directed to conveying a message or meaning to a human reader independent of the intended computer system, and/or the computer-readable medium merely serves as a support for information or data, no functional relationship exists. For example, a claim to a memory stick containing tables of batting

averages, *or tracks of recorded music*, utilizes the intended computer system merely as a support for the information. Such claims are directed toward conveying meaning to the human reader rather than towards establishing a functional relationship between recorded data and the computer.”) (emphasis added).

In addition, we discern no limitations in claim 9 that require the first and second audio signals must be captured at the same time. Claim 9 recites that the second audio signal corresponds to the first audio signal. As above, we find no reason to afford this term patentable weight. Assuming the recitation that the second audio signal corresponds to the first audio signal is deserving of patentable weight, the Petition asserts the ordinarily skilled artisan would have understood that the first and second audio signals may “correspond” in that the signals have been recorded at the same time for later broadcast. Pet. 61. Specifically, Petitioner contends,

The word “corresponding” indicates some correlation between the items which correspond to each other. (Kiaei Decl., Ex. 1003, ¶155). Here, the voice of a second user of Wang corresponds to the 3-D auditory environment of Wang similarly to, for example, dialog from the announcers and background noise from cheering fans at a football game in the ’884 patent (“For example, a football game contains dialog from the announcers and background noise from the cheering fans”) or dialog and separate dialog track in the ’884 patent (“the dialog in the production mix and the separate dialog track . . . recorded or broadcast simultaneously (i.e. time aligned).” (’884 patent, Ex. 1001, 11:58-60, 21:49-55). (Kiaei Decl., Ex. 1003, ¶155).

Pet. 61–62. However, claim 9 is not limited to any specific device or method to capture and record the recited first and second audio signals *at the same time* so long as the signals stored on the storage medium are in some manner “corresponding.” More specifically, nothing in claim 9 requires that

the first and second audio signals be captured simultaneously (“at the same time”) by separate, directionally controlled microphones as alleged in Patent Owner’s arguments regarding Wang. *See* PO Resp. 16, 19–20, 23–25.

Petitioner argues the claims do not require such simultaneous capture of the first and second audio signals. Pet. Reply 4. We agree. The Petition identifies an embodiment of the ’884 patent in which two signals are pre-recorded and, thus, could have been captured at different times, stored on a storage medium, and then broadcast so that the two pre-recorded, stored signals are “time aligned.” Pet. 62 (citing Ex. 1004, 21:49–55); *see also* Ex. 1004, 11:12–22:59. Such a broadcasting system embodiment, within the scope of claim 9, does not require that the two signals be captured at the same time.

Accordingly, we are persuaded by a preponderance of the evidence that Wang teaches or suggests the recited first and second audio signals because claim 9 does not require the two signals be captured “at the same time” as alleged by Patent Owner.

*b. Storage Medium*

The Petition acknowledges Wang does not disclose a storage medium for storing the first and second audio signals. Pet. 59. Petitioner argues Marx discloses “audio mixer 10 having a buffer 14 which is ‘a combination of random access memory (“RAM”) 16 and a disk drive 18.’” *Id.* (citing Ex. 1009, Fig. 1, 4:12–14). Petitioner notes that buffer 14 is within a transmitting portion of Marx’s mixer 10 in that the stored signals may be processed and then “transmitted to an audio output device 22.” *Id.* at 60 (citing Ex. 1009, 4:15–22; Ex. 1003 ¶ 152). Petitioner argues it would have been obvious to the ordinarily skilled artisan to add the storage medium

(buffer 14) of Marx's audio mixer 10 to Wang's mixer 74 "for storing the first and second audio signals prior to transmission as taught by Marx" and thereby avoid data loss when a connection between users is lost. *Id.*

Patent Owner argues the proposed combination fails to disclose the recited storage medium because it would not be obvious to modify Wang's mixer 74 to incorporate the buffer of the mixer within the transmitter of Marx. PO Resp. 26–30. Specifically, Patent Owner argues mixer 74 of Wang is depicted as a part of Wang's receiver element 64—not part of transmitter 54. *Id.* at 26–27. Patent Owner contends Wang's transmitter has no mixer and Wang discloses only that transmitter 54 "can be formed using a custom-designed transmitter such as a custom FM stereo transmitter, a custom-designed digital radio that can transmit more than two audio streams, or a more conventional transmitter such as one employed in a cellular telephone or a cordless telephone." *Id.* at 27–28 (quoting Ex. 1004, 7:16–25). Thus, Patent Owner argues the proposed combination would only result in incorporating Marx's buffer into mixer 74 of Wang's *receiver*—a combination that does not help prevent data loss as Petitioner alleges. *Id.* at 29. Further, Patent Owner argues there is no "objective evidence" that the proposed combination would be within the capabilities of the ordinarily skilled artisan, principally because Wang's mixer 74 is within the receiving device of that system and the Marx's mixer is within a transmitting component thereof. *See* PO Resp. 31–38.

In response to Patent Owner, Petitioner argues an ordinarily skilled artisan would have understood that "Wang teaches audio mixers on both the transmitter side and the receiver side to provide the same functionality . . .

and that it would have been obvious to provide a buffer in the mixer on the transmitter side of Wang.” Pet. Reply 15–16. Petitioner reasons:

Wang discloses using an audio mixer 74 to control the phase of audio signals and their corresponding directionality: “audio mixer 74 may be used to control the phase of each audio signal output such that speakers 42 and 44 can focus the sound to a desired direction.” Wang, Ex. 1004, 7:62-65; Anderson Tr., Ex. 1016, at 139:19-14. Wang teaches that the phase of the audio signals can be controlled on the receiver side for the speakers. Wang, Ex. 1004, at 5:4-9 (“The speaker array has the following characteristics: a) The speakers are electronically controlled such that the amplitude and phase of the signal going to the speakers from the audio outputs of the communication system can be varied electronically.”) Wang similarly teaches that the phase of the audio signals can be controlled on the transmitter side for the microphones. *Id.* at 4:51-55 (“The microphones in the array have the following characteristics: a) They are electronically controlled such that the amplitude and phase of the signal coming out from each microphone can be varied electronically.”). Kiaei Reply Decl., Ex. 1017, at ¶ 18.

Since Wang discloses controlling the phase of the audio signal on the receiver side and on the transmitter side, and since Wang discloses controlling the phase of the audio signal using an audio mixer (Wang, Ex. 1004, at 7:62-65), a [person of ordinary skill in the art] would have understood that the personal communication apparatus of Wang would have included an audio mixer on both the transmitter side and the receiver side to provide the described functionality. Kiaei Reply Decl., Ex. 1017, at ¶¶ 18-20.

Pet. Reply 16–18.

Initially, we find the proposed combination of Wang and Marx does not require that Marx’s mixer 10 be completely integrated into Wang’s PLD. Marx discloses use of a storage medium, buffer 14, in a transmitting element—a storage medium that an ordinarily skilled artisan would have

been motivated to add to Wang’s transmitter to avoid data loss as Petitioner asserts. Pet. 60; Ex. 1003 ¶ 153. Claim 9 does not recite any element that actually performs the adjusting or combining of received audio signals and, thus, does not require the operation of Marx’s mixer 10 to utilize the storage medium (buffer 14) disclosed in Marx. Instead, claim 9 is directed to storage and transmission of audio signals and merely recites that the transmitted first and second audio signals are *configured* (in some unspecified manner) to allow them to be adjusted and combined at Wang’s receivers—receivers that are not an element of claim 9. In other words, there is no element of claim 9 that actually performs mixer operations to adjust or combine the signals. The recited audio signals need only be *configured* to allow such adjusting and combining of the signals by receivers of the transmitted signals.

We agree with Patent Owner that Wang does not expressly disclose that transmitter 54 includes a mixer or is associated with mixer 74. PO Resp. 27. Although Petitioner argues Marx’s buffer would have been combined “*in the audio mixer* of Wang for storing the first and second audio signals” (Pet. 60) (emphasis added), we are not persuaded the Petition asserts that Marx’s entire mixer 10 *must* be combined with Wang’s mixer 74. The Petition also asserts the ordinarily skilled artisan would have understood “that by providing a storage medium *in the personal communication apparatus of Wang . . .*” Thus, the Petition also asserts that the proposed combination of Marx’s buffer could be added to Wang’s apparatus at some appropriate location within the apparatus—i.e., an appropriate location in Wang’s PLD “prior to transmission.” *Id.* The buffer need not be integrated within Wang’s mixer 74 of receiver 54.

Therefore, we are persuaded by a preponderance of the evidence that the ordinarily skilled artisan would have modified Wang's transmitter 54 to incorporate the storage medium of Marx (buffer 14) to avoid loss of data when a connection between a transmitting PLD and the receiving PLDs is lost.

In the alternative, if the Petition is understood to assert that Marx's buffer *must be* integrated with Wang's mixer 74, Patent Owner is correct that Wang discloses mixer 74 as a component within receiver 54 and does not expressly teach that mixer 74, or a similar mixer, is within transmitter 64. However, our analysis for obviousness must consider what the references reasonably suggest to the ordinarily skilled artisan. "All of the disclosures in a reference must be evaluated for what they fairly teach one of ordinary skill in the art." *In re Boe*, 355 F.2d 961, 965 (CCPA 1966). "The use of patents as references is not limited to what the patentees describe as their own inventions or to the problems with which they are concerned. They are part of the literature of the art, relevant for all they contain." *In re Heck*, 699 F.2d 1331, 1333 (Fed. Cir. 1983) (quoting *In re Lemelson*, 397 F.2d 1006, 1009 (CCPA 1968)). Here, Petitioner argues, and we agree, that Wang expressly discloses controlling the phase of output signal applied to speakers. Pet. Reply 16 (citing Ex. 1004, 5:4–9). Petitioner further argues, and we agree, that Wang expressly discloses controlling the phase of input signals received from microphones. *Id.* at 16–17 (citing Ex. 1004, 4:51–55; Ex. 1017 ¶ 18). Petitioner further argues, and we again agree, that Wang expressly discloses mixer 74 performs phase control for output signals applied to the speakers. *Id.* at 16 (citing Ex. 1004, 7:62–65). Patent Owner does not dispute these express teachings of Wang. Based on these

undisputed teachings of Wang, Petitioner contends an ordinarily skilled artisan would have understood Wang to also use mixer 74, or a similar mixer circuit (within transmitter 24 or 54), to control the phase of input signals received from microphones. *Id.* at 17–18 (citing Ex. 1003 ¶¶ 18–20). Dr. Kiaei’s Reply Declaration clarifies this contention explaining that other prior art evidences that use of buffer memory was a known technique to avoid loss of data (Ex. 1017 ¶ 22) and, thus, concludes:

[I]t would have been obvious to a [person of ordinary skill in the art] to provide a storage medium as taught by Marx in the personal communications apparatus of Wang to store the audio signals to prevent loss of audio. Moreover, providing a storage medium in the personal listening apparatus of Wang would have been well within the technical ability of a [person of ordinary skill in the art] and would have been the use of a known technique (*i.e.*, a storage device for audio) in similar devices (*i.e.*, audio mixers) to obtain predictable results.

Ex. 1017 ¶ 22.

A portion of Dr. Anderson’s deposition testimony, reproduced below (with objections removed), discusses his view of what element in Wang controls the phase of the microphones:

Q. Okay. When you were talking about the control in the audio input device, what does that?

A. This is what we spent so much time on before. Microphones in the array have the following characteristics. They are electronically controlled such that the amplitude and phase coming out of each microphone can be varied electronically. One benefit of the electronically controlled audio input device is that users can easily change the directivity of the array, so that it will selectively capture the sound sources in the 3-D space.

Q. (By Mr. Steinberg) And what is the thing that does this electronic control?

A. I don't recall that he disclosed it.

Q. What would a person of ordinary skill in the art expect?

A. Maybe a bunch of dials. I don't know.

Q. That's what you think, a bunch of dials?

A. I -- we have spent a lot of time talking about this. And as we have discussed, he says that there's control that can control these things so that it will steer the array. And we have talked about steering the array. We have talked about some of the "pie in the sky" type optimistic views he has on what you can do with the audio. I'm just saying that -- he's saying there's something, there's some sort of -- I associate control with a type of processing, and that was the point of the last answer.

Q. (By Mr. Steinberg) And I'm just trying to understand what the processor is. Is this a mixer? Is this a microprocessor? Is this -- what is it?

A. Well, as we have discussed, he does disclose a mixer in the receiver, but not in the transmitter.

Q. (By Mr. Steinberg) Right. So now we are talking about the transmitter. What would you expect to be doing this processing?

A. Well -- I could probably, with time, invent something to go there. But Wang describes that the microphones are coupled with wires to the transmitter. And that the transmitter, then, takes the signals and modulates them to radio frequency. That's it. I don't know what he's talking about. He's kind of contradictory. It makes me sound contradictory because I'm reading what he said, but it's -- it's what's going on.

Q. (By Mr. Steinberg) And so what would a person of ordinary skill in the art, they read Wang, what do they expect is doing the control in Wang in the transmitter that you mentioned?

A. I would probably say nothing. He mentions that there's some control, but he doesn't indicate where that might happen or how a user would know-how to control something if there was a control. He mentions that there's one, but he doesn't show it and he doesn't give it any direction.

Q. (By Mr. Steinberg) So you don't know?

A. Could I develop something? Perhaps. But it would be a departure from what Wang has disclosed.

Q. (By Mr. Steinberg) Is that a way of saying you don't know what Wang is referring to for what controls the transmitter side?

A. I don't recall seeing in Wang any control as he's described. He's described that there is some way to control, but I don't recall him saying or showing anything that controls the transmitted side.

Q. (By Mr. Steinberg) I understand that. So let's take as a given for this question that Wang does not describe what does the control. So I'm asking a different question which is how does a person of ordinary skill in the art now understand, when Wang refers to control, what does he understand does this control.

A. I would say that a person of ordinary skill in the art reading this specification would understand that although it's mentioned, there is no control on the transmitter side.

Tr. 124:25–128:13. We find Dr. Anderson's testimony less credible than the Petitioner's arguments (supported by Dr. Kiaei's testimony). Dr. Anderson correctly discerns no express disclosure of a mechanism in Wang's transmitter to provide the disclosed phase control of microphone output signals input from microphones 20 to transmitter 24 or 54. Without an express disclosure, Dr. Anderson essentially opines that the ordinarily skilled artisan would have no idea how such phase control could be

implemented. Dr. Anderson's opinion appears to ignore that which would be suggested to the ordinarily skilled artisan based on Wang's express disclosure of mixer 74 providing similar phase control (of signals received from a sound source to be applied to speakers). Dr. Anderson's answer also appears to discount what would be suggested to the ordinarily skilled artisan viewings Marx's use of storage within a mixer. Instead, Dr. Anderson's opinion, in essence, stops at the express disclosures of Wang and fails to consider what would be suggested to the ordinarily skilled artisan by such disclosures of the prior art.

*c. The Proposed Combination of Wang and Marx and Expectation of Success*

Patent Owner argues:

The Petition contends that (1) the "loss" of audio could be prevented when the real-time connection is lost between the users; (2) the proposed modification was "well within" the technical ability of a POSITA because the audio storage technique was known for similar devices (audio mixers) to provide predictable results; and (3) the first and second audio signals must be recorded simultaneously to capture the user's full auditory space. Petition at 60-61. There is no objective evidence to support any of these contentions, only conclusory assertions by Dr. Kiaei. And each of those contentions by Petitioner is wrong because (1) using the Marx buffer in the Wang receiver would not prevent "loss" of audio if the real-time connection is lost because only *received* audio would be buffered, at best; (2) there is no showing of a relationship between the Wang and Marx audio mixers, used for different purposes, other than that the two are labeled audio mixers; and (3) and as explained below, the Petition does not address important aspects of how to record simultaneously captured audio.

PO Resp. 33.

We disagree with Patent Owner's arguments. Regarding the first allegation of error, as discussed *supra*, Petitioner's arguments are directed to combining Wang's apparatus with the buffer of Marx at some location "prior to transmission." Pet. 60; Supp. Reply 15–18. Thus, Patent Owner's assertion that data loss cannot be prevented by adding Marx's buffer to Wang's *receiver*, while possibly true, is not responsive to Petitioner's argument that Marx's buffer would be added to Wang's *transmitter*, i.e., "prior to transmission". As discussed *supra*, we are persuaded Petitioner has explained how and why the ordinarily skilled artisan would have added Marx's buffer 14 to Wang's transmitter 54. In like manner, Patent Owner's assertion that there is no showing of a relationship between Wang's mixer 74 and Marx's mixer 10 is not relevant to Petitioner's arguments that the ordinarily skilled artisan would have combined Marx's buffer with Wang's transmitter to avoid data loss. There need be no "relationship" between the respective mixers of Wang and Marx. Furthermore, we are also persuaded Petitioner has adequately explained that Wang's mixer 74, or another mixer added within transmitter 54, would have provided control of the phase of signals output from microphones. Thus, according to Petitioner, Marx's mixer 10, or simply buffer 14 of Marx, would have been added to Wang's transmitter to provide the benefit of avoiding data loss between Wang's transmitter and Wang's receivers.

Regarding Patent Owner's argument that, "as explained below, the Petition does not address important aspects of how to record simultaneously captured audio," we find no such argument "below" within Patent Owner's Response. PO Resp. 33. Regardless, as discussed *supra*, we discern no requirements in claim 9 that the first and second audio signals need be in any

relationship of simultaneity. Claim 9 merely requires the signals are stored on a storage medium, transmitted by the transmitter, and in some manner are “corresponding” with one another. As discussed *supra*, we are persuaded by Petitioner’s arguments that these recitations are met by the prior art. Furthermore, as discussed *supra*, we are also persuaded the Petition has shown that the first and second audio signal are captured simultaneously by the plurality of directionally controlled sets of microphones disclosed in Wang.

Patent Owner argues the Petition fails to provide objective evidence “specifying why one of ordinary skill in the art could have, or would have modified Wang with Marx to achieve the claimed apparatus . . . with a reasonable expectation of success.” PO Resp. 33. Patent Owner further argues, “[n]either the Petition, nor Dr. Kiaei, state what questions and factors were considered and addressed for the proposed addition of the Marx buffer.” PO Resp. 35. Patent Owner then lists factors Dr. Anderson identifies as suggesting difficulties in implementing the proposed combination. *Id.* at 35–37 (quoting from Ex. 2003 ¶¶ 62–70).

We disagree. Petitioner specifically argued the ordinarily skilled artisan “would have understood that by providing a storage medium in the personal communications apparatus of Wang to store the first and second audio signals, loss of audio could be prevented in the event of a lost connection between the users.” Pet. 60 (citing Ex. 1003 ¶ 153). Further supporting this assertion, and responsive to the numerous design difficulties suggested by Dr. Anderson, Dr. Kiaei testifies that the ordinarily skilled artisan would recognize use of a buffer to avoid data loss as a well-known technique and cites a discussion of “skip protection” in Exhibit 1018 as

evidence that such techniques were well-known at the time of the '884 patent. Ex. 1017 ¶ 22 (citing Ex. 1018, 1:29–37, 1:52–57, 4:37–42, 5:35–36, 5:61–65, 10:49–55). We further note that the Marx reference itself expressly discloses the use of buffer 14 to avoid data loss. Specifically, Marx discloses its buffer may be filled prior to transmission and transmission would commence automatically when the buffer is filled (Ex. 1009, 6:31–35), and Marx avoids interruption of data transmission (no data loss) by assuring its buffer is large enough to adjust for the slower speed of emptying the buffer versus filling the buffer (*id.* at 8:55–63). Dr. Anderson's alleged difficulties are not supported by evidence sufficient to overcome Petitioner's showing (which itself appears to be supported at least by Marx) that use of a buffer would have been a well-known technique. Thus, we credit Dr. Kiaei's explanation that, as evidenced by Exhibit 1018, use of a buffer to avoid data loss would have been a well-known technique to the ordinarily skilled artisan at the time of the '884 patent.

On the record before us, we are persuaded that Petitioner has established by a preponderance of the evidence that independent claim 9 is unpatentable as obvious over Wang and Marx.

Claim 10 depends from claim 9 and recites that the apparatus further comprises a “personal listening device chosen from a group consisting of a headphone, a hearing aid, an assisted listening device, a cochlear implant, an eyewear, a wearable computer, or a combination thereof.” Petitioner persuasively argues this feature is disclosed by Wang's garment member that may be a shirt or a necklace with speakers and microphones integrated therewith. Pet. 64–65 (citing Ex. 1004, 3:63–4:2, 5:39–41, 7:61–62, 8:25–27, 8:38–41; Ex. 1003 ¶ 159). Patent Owner does not respond to Petitioner's

mapping of this additional limitation. PO Resp. *passim*. Thus, Patent Owner has waived its opportunity to respond to these arguments. *See* Paper 10 § 2 (“The patent owner is cautioned that any arguments not raised in the response will be deemed waived.”).

On the record before us, we are persuaded that Petitioner has established by a preponderance of the evidence that dependent claim 10 is unpatentable as obvious over Wang and Marx.

Claim 13 depends from claim 9 and further recites, “the first audio signal and the second audio signal are digital signals that require decoding.” Referring to an earlier argument regarding a similar limitation in claim 5, Petitioner persuasively argues Wang discloses this feature as a modulated transmission from one user to another that is demodulated (i.e., decoded) by the receiving personal communications apparatus. Pet. 38–39, 65 (citing Ex. 1004, 7:16–20, 7:32–35, 8:1–5; Ex. 1003 ¶¶ 121, 160). Patent Owner does not respond to Petitioner’s mapping of this additional limitation. PO Resp. *passim*. Thus, Patent Owner has waived its opportunity to respond to these arguments. *See* Paper 10 § 2 (“The patent owner is cautioned that any arguments not raised in the response will be deemed waived.”).

On the record before us, we are persuaded that Petitioner has established by a preponderance of the evidence that dependent claim 13 is unpatentable as obvious over Wang and Marx.

### 3. *Claims 14 and 15*

Claim 14 depends from claim 9 and further recites, “the adjustment comprises adjusting the second audio signal and adjusting a sum of the first audio signal and the adjusted second audio signals.” Petitioner argues, “[a]s

discussed in Section VIII.D, claim 6, Wang renders this limitation obvious. *See supra* Section VIII.D, claim 6. (Kiaei Decl., Ex. 1003, ¶ 161).” Pet. 66. However, as noted in our Decision on Institution (Dec. 31), the argument Petitioner incorporates relating to claim 6 does not assert that Wang discloses this feature but, instead, admits that Wang fails to expressly teach this feature and relies on Eggers, in combination with Wang, to disclose this feature. *Id.* at 47. In other words, Petitioner’s asserted ground for unpatentability of claim 14, which does not rely on Eggers but instead relies only on Wang in combination with Marx as applied to claim 9, admits that Wang fails to disclose the additional features of claim 14 (through argument incorporated regarding claim 6) and does not provide any further argument that either Wang or Marx discloses the additional features of claim 14. *Id.* at 66.

Petitioner’s Supplemental Reply argues claims 6 and 14 are asserted to be obvious over Wang alone or in combination with Eggers. Supp. Reply 9. Specifically, Petitioner argues “the Petition expressly asserts for claim 6 the ‘*Wang alone* or modified in view of Eggers *renders this claim obvious.*’” *Id.* (citing Pet. 46) (emphasis in original). Petitioner further contends “The Petition relies on Eggers merely to confirm what Dr. Kiaei established: that providing a master volume control, as recited in claim 6, was known in the art.” *Id.* at 9–10.

We are unpersuaded by Petitioner’s argument in its Supplemental Reply. The Petition presents a number of ambiguities regarding claims 6, 7, 14, and 15. The section heading in the Petition for claims 6 and 7 clearly states: “Claims 6 and 7 are Obvious over Wang in view of Eggers.” Pet. 46. The Petition also states, “Wang does not explicitly disclose adjusting ‘a sum

of the first audio signal and the adjusted second audio signal.” Pet. 47. The Petition also states “Wang alone” renders the claim obvious. Pet. 46. The Petition also asserts that the arguments regarding claims 14 and 15 are the same as the arguments for claims 6 and 7 (Pet. 66) but the grounds applied to claims 14 and 15 are directed to the combination of Wang and Marx (Pet. 56).

We decline to sort out the ambiguity in the contentions of the Petition. The Petition clearly intended to assert a single ground regarding claims 6 and 7—namely that the claims are obvious over the combination of Wang and Eggers. We do not accept Petitioner’s new assertion that Eggers is relied upon only to establish that a master volume control was known in the art. The grounds asserted against claims 6 and 7 (and therefore against claims 14 and 15) clearly rely on Eggers to disclose that which is missing in Wang.

Thus, we discern no reason to modify our Decision on Institution regarding claims 14 and 15 and, on this record, we are not persuaded Petitioner has established by a preponderance of the evidence that claims 14 and 15 are unpatentable as obvious over Wang and Marx without also combining Eggers.

*D. Ground 7 - Claim 11 Obvious Over Wang, Marx, and Fishman*

Claim 11 depends from claim 9 and further recites “wherein the receivers are chosen from a group consisting of Digital Theater Sound (DTS) receiver, Sony Dynamic Digital Sound (SDDS) receiver, Dolby Digital receiver, and other multi-channel format decoder.” Petitioner argues claim 11 is obvious over Wang and Marx as applied to claim 9 further

combining Fishman as applied to the same limitation in claim 3 (dependent from claim 1). Pet. 66–67 (incorporating arguments relating to claim 3 at Pet. 39–43). Petitioner argues Wang discloses receiver 64 including demodulator 72 that decodes a modulated signal to extract multiple audio sources therefrom. *Id.* at 40 (citing Ex. 1004, Fig. 3, 8:3–17). Petitioner contends the recited receiver comprising a “multi-channel format decoder” is taught by Wang’s receiver 64 with its demodulator 72. *Id.* at 41.

We are persuaded by Petitioner’s argument that Wang’s receiver discloses the recited “multi-channel format decoder.” Wang expressly teaches that decoder 72 produces (decodes) one or more audio signals modulated on the signal received from a transmitter. Ex. 1004, 7:50–53.

On this record, we are persuaded by a preponderance of the evidence that Petitioner has demonstrated that Wang and Marx (without Fishman), as applied to claim 9, discloses the features of claim 11.

Petitioner further argues in the alternative, to the extent Wang is determined to not teach the recited “multi-channel format decoder,” Fishman teaches well-known personal listening devices (such as headphones) that include a Dolby sound processor as also recited in the list of receiver types. Pet. 41–42 (citing Ex. 1010, 6:5–25, 6:57–7:1). Petitioner reasons that the ordinarily skilled artisan would have been motivated to combine Wang and Marx with Fishman to allow a user to “experience high-quality Dolby audio.” *Id.* at 42 (citing Ex. 1004, 4:40–41). Wang discloses a user’s desire for high-quality sound in a personal listening device (i.e., for movies, music, and television shows) but does not present any particular technique for achieving such quality. Ex. 1004, 4:40–41. Fishman discloses use of Dolby noise reduction as a known technique for improved quality in a personal

listening device (a hearing aid). Ex. 1010, 2:22–24, 6:5–25. Petitioner has articulated a reason for combining Fishman with Wang and Marx based on rational underpinnings.

On this record, we are persuaded by a preponderance of the evidence that the combination of Wang, Marx, and Fishman discloses the features of claim 11.

In sum, on this record, we are persuaded Petitioner has established a by a preponderance of the evidence that claim 11 is unpatentable as obvious over Wang and Marx or over Wang, Marx, and Fishman. Patent Owner does not respond to Petitioner’s mapping of this additional limitation. PO Resp. *passim*. Thus, Patent Owner has waived its opportunity to respond to these arguments. *See* Paper 10 § 2 (“The patent owner is cautioned that any arguments not raised in the response will be deemed waived.”).

*E. Ground 8 - Claim 12 Obvious Over Wang, Marx, and Scofield*

Claim 12 depends from claim 9 and further recites, “wherein the second audio signal is a combination of left, right, left surround, right surround, center, and subwoofer analog outputs.” Petitioner argues claim 12 is obvious over Wang and Marx as applied to claim 9 further combining Scofield as applied to the same limitation in claim 4 (dependent from claim 1). Pet. 67 (incorporating arguments relating to claim 4 at Pet. 43–46). As above, Petitioner argues Wang discloses a desire for high quality sound for a personal listening apparatus to hear music, movies, and television shows. *Id.* at 43 (citing Ex. 1004, 4:40–41). Petitioner acknowledges Wang does not explicitly disclose the recited audio analog outputs but asserts Scofield discloses generating the recited surround sound analog outputs. *Id.* at 43–45

(citing Ex. 1011, Abstract, Fig. 14, 11:16–22, 13:37–42). Petitioner argues the ordinarily skilled artisan would have been motivated to combine Scofield with Wang and Marx “to allow the user to experience high quality surround sound using a personal listening device.” *Id.* at 44 (citing Ex. 1003 ¶ 131); *see also id.* at 46 (citing Ex. 1003 ¶ 133).

Wang specifically discloses exemplary audio sources may include recordings such as “music, movies, and TV shows.” Ex. 1004, 4:40–41. Scofield specifically discloses that the audio output signal generated by a videocassette recorder (“VCR”) comprises left and right audio signals. Ex. 1011, 10:40–42, 11:16–19. Thus, we are persuaded it would have been obvious to the ordinarily skilled artisan for Wang’s receipt of an audio source comprising “music, movies, and TV shows” to comprise audio outputs from a VCR including left and right audio signals as taught by Scofield.

Patent Owner does not respond to Petitioner’s mapping of this additional limitation. PO Resp. *passim*. Thus, Patent Owner has waived its opportunity to respond to these arguments. *See* Paper 10, 2 (“The patent owner is cautioned that any arguments not raised in the response will be deemed waived.”).

For the above reasons, on this record, we are persuaded Petitioner has established a by a preponderance of the evidence that claim 12 is unpatentable as obvious over Wang, Marx, and Scofield.

*F. Ground 9 - Claim 16 Obvious Over Wang, Marx, Webb, and Obara*

Claim 16 depends from claim 15 and further recites “wherein the balance adjustment is based on a sum of: a ratio of actual and stored values

of a first audio signal standard deviation, and a ratio of actual and stored values of a second audio signal standard deviation.” Petitioner argues claim 16 is rendered obvious over the combination of Wang and Marx, as applied to claim 9 and, regarding the additional limitations of claim 16, Petitioner argues, “as discussed in Section VIII.E, claim 8, Wang as modified in view of Webb and Obara teaches this limitation. *See supra* Section VIII.E, claim 8. (Kiaei Decl., Ex. 1003, ¶168).” Pet. 68. As discussed above, Petitioner fails to demonstrate unpatentability of claim 15 (from which claim 16 depends), at least because Petitioner does not demonstrate how the combination of Wang and Marx alone, without Eggers, discloses the detailed adjustment requirements. Petitioner’s analysis for claim 16 does not explain how the proposed combination of Wang, Marx, Webb, and Obara cures the acknowledged deficiency in Wang—the deficiency for which Petitioner relies on Eggers in the incorporated arguments of claims 7 and 15. Thus, on this record, we are not persuaded Petitioner has established by a preponderance of the evidence that claim 16 is unpatentable as obvious over Wang, Marx, Webb, and Obara without also combining Eggers.

*G. Ground 10 - Claim 17 Obvious Over Wang, Walden, and Kim*

Independent claim 17 is similar to claim 1 but recites its elements in mean-plus-function format. Specifically, whereas claim 1 recites “a receiver,” claim 17 recites “means for receiving.” Similarly, the “adjustment device” in claim 1 is recited in claims 17 as “means for adjusting.” Claim 1 recites a “transducer” that performs three functions as discussed *supra*. By contrast, claim 17 recites a “means for receiving . . . , combining . . . , and outputting.”

As discussed above, we are not persuaded by Petitioner’s arguments attempting to read the “transducer” of claim 1 on a combination of Wang’s mixer 74 and a speaker because Petitioner has not persuasively shown that Wang discloses that its mixer 74 includes structure both to generate the adjusted first and second audio signals *and* then to receive and combine those adjusted signals. *See* Section II.A.1 *supra*; *see also* Dec. 12–13.

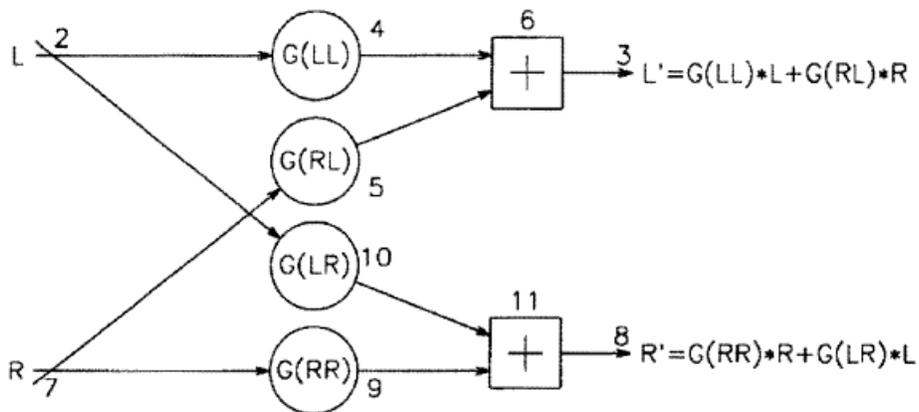
Consistent with our interpretation of the three recited means elements (sections II.A.4–6 *supra*), Petitioner identifies the elements in the combined teachings of Wang, Walden, and Kim. Pet. 69–74. Specifically, as discussed above with respect to the corresponding element of independent claims 1 and 9, Petitioner maps the recited means for receiving to Wang’s receiver 64 to receive a signal with multiple signals modulated therein and demodulator 72 for demodulating the received, modulated signal to extract the one or more audio signals modulated therein. *Id.* at 70–71 (citing Ex. 1004, 7:47–53).

Petitioner identifies the recited means for adjusting as Wang’s user interface 76 that controls mixer 74 to adjust the demodulated first and second audio signals. *Id.* at 71–72 (citing Ex. 1004, 4:28–30, 8:18–20). Petitioner acknowledges that Wang does not disclose the specific structure within mixer 74 that independently adjusts the first and second audio signals but argues Walden discloses the use of variable gain amplifiers to adjust (amplify) an audio signal to be applied to a speaker. *Id.* at 72 (citing Ex. 1007, Abstract). Petitioner further argues an ordinarily skilled artisan would have been motivated to use Walden’s variable gain amplifier structure in Wang’s mixer because it “would have been the use of a known technique (*i.e.*, variable gain amplifiers to amplify audio signals) to improve similar

devices (*i.e.*, audio output devices) in the same way to obtain predictable results (*i.e.*, controlled amplification of audio signals).” *Id.*

Lastly, Petitioner identifies that the recited “means for receiving . . . , combining . . . , and outputting” is disclosed by Wang’s mixer 74 outputting an adjusted, combined signal to speakers 42 and 44. *Id.* at 73 (citing Ex. 1004, 7:54–57). Petitioner acknowledges Wang fails to disclose the specific structure within mixer 74 that receives, combines, and outputs an audio signal as recited, but argues Kim discloses such a structure in an audio mixer having adders (6 and 11) to receive adjusted signals, mix (combine) the adjusted signals, and output the combined signal. *Id.* at 73–74 (citing Ex. 1008, 1:40–41, 1:63–2:25, Fig. 1). Kim Figure 1, reproduced below, is a block diagram of audio signal mixing procedures between L channel and R channel in a conventional audio processing unit (“APU”).

FIG. 1(Prior Art)



Kim Figure 1 above depicts left audio signal 2 and right audio signal 7 attenuated (adjusted) by attenuators 4, 5, 10, and 9, the outputs of which are applied to adders 6 and 11 to combine the adjusted signals to generate output signals 3 and 8. Ex. 1008, 1:63–2:25.

Petitioner persuasively argues the ordinarily skilled artisan would have been motivated to combine Kim with Wang and Walden because it “would have been the use of a known technique (*i.e.*, adder) to improve similar devices (*i.e.*, audio mixers) in the same way to obtain predictable results (*i.e.*, combined audio signals).” Pet. 74.

Patent Owner does not respond to Petitioner’s mapping of this additional limitation. PO Resp. *passim*. Thus, Patent Owner has waived its opportunity to respond to these arguments. *See* Paper 10 § 2 (“The patent owner is cautioned that any arguments not raised in the response will be deemed waived.”).

On this record, we agree with and adopt as our own Petitioner’s arguments and reasoning regarding independent claim 17.

For the above reasons, on this record, we are persuaded Petitioner has established a by a preponderance of the evidence that claim 17 is unpatentable as obvious over Wang, Walden, and Kim.

#### *H. Conclusions Regarding Obviousness*

For the above reasons, we are persuaded by a preponderance of the evidence that claims 9–13 and 17 are unpatentable. Petitioner has not persuaded us by a preponderance of the evidence that claims 1–8 and 14–16 are unpatentable.

### III. MOTION TO EXCLUDE

Patent Owner timely objected (Paper 14) to Petitioner’s Exhibit 1017 (Dr. Kiaei’s Reply Declaration) and filed a Motion to Exclude Exhibit 1017 (Paper 20, “Mot.” or “Motion”). Patent Owner argues:

[T]he Reply Declaration of Sayfe Kiaei [(Ex. 1017)] . . . contains new evidence to support the new arguments made for the first time in Petitioner’s Reply. The new arguments and evidence should have been presented in the original Petition and accompanying Declaration so that Patent Owner could have had the opportunity to respond to them.

Mot. 1. Specifically, Patent Owner argues Exhibit 1017 (and Petitioner’s reliance thereon in its Reply) introduces a new argument that Wang discloses two microphone arrays rather than one array (Mot. 3–6) and introduces a new argument that Wang discloses an audio mixer within its transmitter portion (Mot. 6–7). Still further, Patent Owner argues that Exhibit 1017 should be excluded as unfairly prejudicial to Patent Owner. Mot. 8 (relying on Federal Rules of Evidence §§ 402, 403). Petitioner filed an Opposition to Patent Owner’s Motion (Paper 25, “Opp.” or “Opposition”) to which Patent Owner replied (Paper 26, “PO Reply”).

For the reasons discussed below, we deny Patent Owner’s Motion to Exclude.

A. *“Two-Array” Argument*

Patent Owner argues Petitioner’s Reply, relying on Dr. Kiaei’s Reply Declaration, puts forth a new argument that Wang discloses two microphone arrays rather than a single array as expressly disclosed in Wang. Mot. 4. Patent Owner further argues, “[t]he Petition never alleged that directionality of the microphones could be independently adjusted between ‘groups’ of microphones.” *Id.*

Petitioner argues, “[a] review of the record in this proceeding confirms that Petitioner’s position—relying on the multiple groups (and, synonymously, the sets, or arrays) of microphones taught by Wang—has not

changed and is not new.” Opp. 4. Petitioner contends the Petition and Dr. Kiaei’s initial declaration argued that the first and second audio signals could be captured by two different sets of microphones. Opp. 4–5.

Specifically, Petitioner contends the Petition argues certain microphones of Wang’s array, placed on either side of the user’s collarbone, are controlled to pick up primarily the use’s speech. Opp. 4 (citing Pet. 31–32 (citing Ex. 1004, 6:57–64, 7:2–6); Ex. 1003 ¶ 110). Petitioner further contends the Petition argues other microphones of Wang’s array (different from those directed to the user’s voice) are controlled to pick up primarily non-speech audio surrounding the user. Opp. 4–5 (citing Pet. 32 (citing Ex. 1004, 4:12–24, 4:51–65, 6:65–7:2, 9:39–43); Ex. 1003 ¶ 111).

Patent Owner, as the moving party with respect to its Motion to Exclude, “has the burden of proof to establish that it is entitled to the requested relief.” 37 C.F.R. § 42.20(c). We are not persuaded by Patent Owner’s argument that Exhibit 1017, relied upon in Petitioner’s Reply, should be excluded as raising new arguments. To the contrary, the Petition, as noted above, merely argues certain microphones of Wang may be directionally controlled to pick up primarily a users’ voice and other, different, microphones of Wang may be directionally controlled to pick up primarily sounds other than the user’s voice. *See, e.g.*, Pet. 31–32. Patent Owner raised an issue in its Response arguing that Wang discloses only a single microphone array that encompasses all microphones in Wang and that such a single array can only be controlled to pick up sounds from a single direction (and, thus, there is no first and second audio signals disclosed in Wang). PO Resp. 11–26. Dr. Kiaei’s Reply Declaration (Ex. 1017) and Petitioner’s arguments in its Reply reliant on Dr. Kiaei’s Reply Declaration

are, therefore, in direct response to arguments first raised by Patent Owner in its Response. Whether the different microphones of Wang are referred to as a “set,” a “group,” a “subarray,” or an “array,” seems a trivial point of nomenclature, elevating form over substance, rather than a new argument. In addition, although Wang only discloses (expressly) a single array, we agree with Petitioner that nothing in Wang limits the invention to all microphones operating *only* within a single array. Opp. 2–3 (“there is no suggestion in Wang that the microphones must all operate in a *single* array and must be pointed in a *single* direction”).

*B. Audio Mixer in Transmitter*

Patent Owner argues Petitioner’s Reply, relying on Dr. Kiaei’s Reply Declaration, puts forth a new argument that Wang discloses an audio mixer within its transmitter portion. Mot. 6–7. Patent Owner argues in its Response that the audio mixer is disclosed in Wang as an element of the receiver portion of its device—not in the transmitter portion. Mot. 6. Patent Owner contends Petitioner’s Reply and Dr. Kiaei’s Reply Declaration raise a new argument that “it would have been obvious to also make the audio mixer a component of the transmitter.” Mot. 7 (citing Reply 15–16; Ex. 1017 ¶ 20). Specifically, Patent Owner argues that an annotated version of Wang’s Figure 3, showing a hypothetical addition of a mixer to the transmitter of Wang’s device, appears for the first time in paragraph 20 of Exhibit 1017. *Id.*

Petitioner argues the Petition argues it would be obvious to provide such a mixer in a transmitter where, in reference to the storage medium element of claim 9, Petitioner argues, “[i]t would have been obvious to a

[person of ordinary skill] to provide a storage medium (*e.g.*, a buffer) in the audio mixer of Wang for storing the first and second audio signals prior to *transmission* as taught by Marx.” Opp. 7 (citing Pet. 60). In other words, Petitioner argues its reference to adding a memory, such as in Marx, to a mixer, such as the mixer of Wang, to store signals prior to transmission would necessarily imply such a mixer is in the transmit side of Wang’s device. *Id.*

We are not persuaded by Patent Owner’s argument that Petitioner’s Reply and its reliance on Dr. Kiaei’s Reply Declaration present a new argument that a mixer could be present in Wang’s transmitter—as well as the mixer expressly disclosed as within Wang’s receiver. We agree with Petitioner that its argument in the Petition that adding a memory to a mixer to store data prior to transmission necessarily implies Petitioner is arguing the addition of an audio mixer into the transmission side of Wang’s device. Accordingly, we are not persuaded that Petitioner has presented a new argument regarding adding such a mixer to the transmission side of Wang’s device.

### C. Conclusion

For the above reasons, we are not persuaded that Exhibit 1017 should be excluded as raising new arguments, and for the foregoing reasons, Patent Owner’s Motion to Exclude Exhibit 1017 is *denied*.

#### IV. ORDER

After due consideration of the record before us, and for the foregoing reasons, it is:

ORDERED that claims 9–13 and 17 of U.S. Patent No. 8,170,884 B2 are held *unpatentable*;

FURTHER ORDERED that claims 1–8 and 14–16 of U.S. Patent No. 8,170,884 B2 have not been shown to be unpatentable;

FURTHER ORDERED that Patent Owner's Motion to Exclude Exhibit 1017 is *denied*; 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.

IPR2017-00930  
Patent 8,170,884 B2

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