

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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1964 EARS, LLC,  
Petitioner,

v.

JERRY HARVEY AUDIO HOLDING, LLC,  
Patent Owner.

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Case IPR2016-00494  
Patent 8,897,463 B2

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Before JAMESON LEE, BRIAN J. McNAMARA, and  
JOHN F. HORVATH, *Administrative Patent Judges*.

HORVATH, *Administrative Patent Judge*.

FINAL WRITTEN DECISION  
*35 U.S.C. § 318(a) and 37 C.F.R. § 42.73*

## I. INTRODUCTION

### *A. Background*

1964 EARS, LLC (“Petitioner”) filed a Petition (Paper 1, “Pet.”) to institute *inter partes* review of claims 1–16 of U.S. Patent No. 8,897,463 B2 (Ex. 1001, “the ’463 patent”). Jerry Harvey Audio Holdings, LLC (“Patent Owner”) filed a Preliminary Response (Paper 14, “Prelim. Resp.”). Upon consideration of the Petition and Preliminary Response, we instituted an *inter partes* review to determine whether claims 1–16 of the ’463 patent are unpatentable. Paper 21 (“Dec. Inst.”).

Subsequent to institution, Patent Owner filed a Response (Paper 30, “PO Resp.”), and Petitioner filed a Reply (Paper 41, “Pet. Reply”). An oral hearing was held on April 19, 2017, and a transcript of the hearing is included in the record. Paper 54 (“Tr.”).

We have jurisdiction under 35 U.S.C. § 6(b). This is a Final Written Decision under 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons set forth below, we find Petitioner has shown by a preponderance of the evidence that claims 1–16 of the ’463 patent are unpatentable.

### *B. Related Matters*

Petitioner identifies the following as a matter that could affect, or be affected by, a decision in this proceeding: *Jerry Harvey Audio Holding, LLC v. 1964 EARS, LLC*, Case No. 6:14-cv-02083-CEM-KRS (M.D. Fla.). Paper 32, 2. Patent Owner identifies the same matter. Paper 7, 2.

*C. Evidence Relied Upon<sup>1</sup>*

Reference		Publication Date	Exhibit
Warren	US 2008/0031481 A1	Feb. 7, 2008	Ex. 1005
Harvey '806	US 7,317,806 B2	Jan. 8, 2008	Ex. 1006
Mostardo	WO 95/07014	Mar. 9, 1995	Ex. 1009
Van Halteren '223	US 2008/0063223 A1	Mar. 13, 2008	Ex. 1010
Sperrazza	US 3,818,138	June 18, 1974	Ex. 1011
Babb	US 2005/0196012 A1	Sept. 8, 2005	Ex. 1012
Harvey '479	US 2006/0193479 A1	Aug. 31, 2006	Ex. 1013

*D. The Instituted Grounds of Unpatentability*

We instituted trial on the following grounds of unpatentability:

Ground	Reference(s)	Basis	Claims Challenged
1	Warren, Van Halteren '223, and Mostardo	§ 103(a)	1 and 7
2	Warren, Van Halteren '223, Mostardo, and Harvey '806	§ 103(a)	2–4
3	Warren, Van Halteren '223, Mostardo, Sperrazza, and Babb	§ 103(a)	5 and 6
4	Warren, Van Halteren '223, Mostardo, and Harvey '479	§ 103(a)	8
5	Warren, Mostardo, and Sperrazza	§ 103(a)	9
6	Warren, Mostardo, Sperrazza, and Harvey '806	§ 103(a)	10 and 11
7	Warren, Mostardo, Sperrazza, Harvey '806, and Harvey '479	§ 103(a)	12

<sup>1</sup> Petitioner also relies upon the Declaration of Jay Kadis (Ex. 1003).



Canalphone 10 consists of housing 12 containing first 16a and second 16b low frequency drivers (LFDs), first 18a and second 18b midrange frequency drivers (MFDs), and first 14a and second 14b high frequency drivers (HFDs). *Id.* at 3:25–28, 3:38–44. Housing 12 also contains first sound tube 20a connecting first 16a and second 16b LFDs and first 18a and second 18b MFDs to housing outlet 22a, and second sound tube 20b connecting first 14a and second 14b HFDs to housing outlet 22a. *Id.* at 3:44–55.

The first 14a and second 14b HFDs of canalphone 10 can be balanced armature drivers. Ex. 1001, 3:63–4:3. The combined mass of first 14a and second 14b HFDs is “substantially lighter than a standard canalphone high frequency driver’s mass.” *Id.* at 4:10–15. This increases the transient response of first 14a and second 14b HFDs, allows first 14a and second 14b HFDs to reproduce sounds in the 12–18 kHz range, and reduces the power requirements for canalphone 10. *Id.* at 4:10–24. First 14a and second 14b HFDs can be tuned to each other to deliver lower distortion than standard HFDs. *Id.* at 3:26–33. The tuning can be accomplished by adjusting the length of second sound tube 20b, by adjusting an external damper 24 attached to first 14a and second 14b HFDs, or by positioning first 14a and second 14b HFDs so that “the oscillation of one interacts with the oscillation of the other to reduce harmonic distortion.” *Id.* at 4:4–9, 4:28–33.

Canalphone housing 12 also includes first 26a, second 26b, and third 26c crossovers. Ex. 1001, 4:34–48. First crossover 26a connects first 16a and second 16b LFDs with a low frequency portion of input signal 28. *Id.* at 4:35–39. Second crossover 26b connects first 18a and second 18b MFDs with a midrange frequency portion of input signal 28. *Id.* at 4:39–43. And,

third crossover 26c connects first 14a and second 14b HFDs with a high frequency portion of input signal 28. *Id.* at 4:44–48.

Figure 2 of the '463 patent is reproduced below:

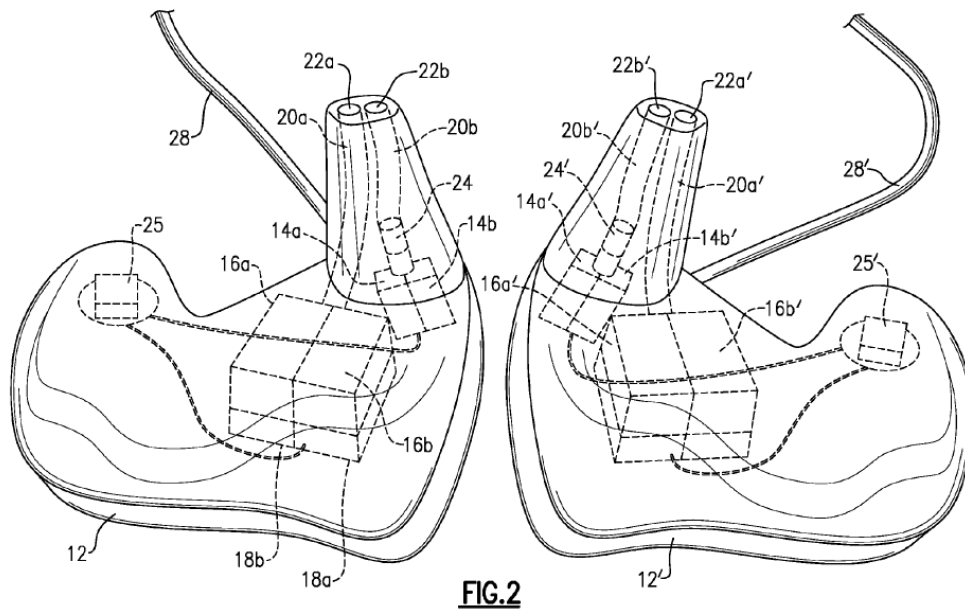


Figure 2 is a schematic illustration showing the arrangement of the components depicted in the block level diagram shown in Figure 1. Ex. 1001, 3:8. Figure 2 depicts left- and right-handed canalphones for respective placement in a listener's left and right ears. Referring to the left-handed canalphone shown on the left-hand side of Figure 2, canalphone housing 12 has a flat island-shaped portion molded to fit the concha of a listener's ear, and a cone-shaped portion molded to fit inside the listener's ear canal. *See* Tr. 60:6–22. All of the canalphone's components, including first 16a and second 16b LFDs, first 18a and second 18b MFDs, first 14a and second 14b HFDs, external damper 24, crossover 25 containing first 26a, second 26b, and third 26c crossovers, and first and second sound tubes 20a and 20b, fit within canalphone housing 12 as shown. *Id.* at 3:25–55, 4:25–48. Thus, at least some canalphone components (e.g., crossover 25,

first 18a and second 18b LFDs, and first 16a and second 16b MFDs) fit in the concha portion of the canalphone housing 12, and do not extend into the listener's ear canal.

Claims 1, 9, and 14 of the '463 patent are independent claims. Other challenged claims depend directly or indirectly from claims 1, 9, and 14.

Claim 1 is reproduced below.

1. A system comprising:

a canalphone housing;

a first low frequency driver carried within the canalphone housing;

a first midrange frequency driver carried within the canalphone housing;

a second low frequency driver carried within the canalphone housing;

a second midrange frequency driver carried within the canalphone housing;

a first high frequency driver carried within the canalphone housing; and

a second high frequency driver carried within the canalphone housing, the first high frequency driver and the second high frequency driver each produce similar frequencies, the first high frequency driver and second high frequency driver are positioned where the oscillation of one interacts with the oscillation of the other to reduce harmonic distortion, and the first high frequency driver and the second high frequency driver produce distinguishable frequencies to a person using the system comprising 12,000 hertz to 18,000 hertz.

Ex. 1001, 5:64–6:18.

Independent claim 9 differs in scope from claim 1 in that it (a) requires the combined mass of the first and second HFDs to be designed lighter to increase the transient response of each of the first and second HFDs, and (b) does not require the first and second HFDs to produce distinguishable frequencies in the 12–18 kHz range. *Compare* Ex. 1001, 5:64–6:18, *with* Ex. 1001, 6:60–7:15. Independent claim 14 differs in scope from claim 1 in that it further requires (a) a first sound tube connecting the first and second LFDs and first and second MFDs to an outlet on the canalphone housing, (b) a second sound tube connecting the first and second HFDs with the outlet on the canalphone housing, (c) a first crossover connecting the first and second LFDs with a low frequency portion of an input signal, (d) a second crossover connecting the first and second MFDs with a midrange frequency portion of the input signal, and (e) a third crossover connecting the first and second HFDs with a high frequency portion of the input signal. *Compare* Ex. 1001, 5:64–6:18, *with* Ex. 1001, 7:54–8:42.

*B. Claim Construction*

The Board interprets claims of an unexpired patent using the broadest reasonable interpretation in light of the specification of the patent in which they appear. *See* 37 C.F.R. § 42.100(b); *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131 (2016). Consistent with the rule of broadest reasonable interpretation, claim terms are generally given their plain and ordinary meaning, as would be understood by one of ordinary skill in the art in the context of the entire disclosure. *See In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). Only those terms which are in controversy need to be construed and only to the extent necessary to resolve the



controversy. *See Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999).

Petitioner argues all terms should be given their plain and ordinary meaning. Pet. 14. In our Decision to Institute, we agreed with Petitioner that all terms should be given their plain and ordinary meaning. Dec. Inst. 16–17. Neither Petitioner nor Patent Owner contests that decision. *See* PO Resp. 7; Pet. Reply *passim*. Based on the full record developed during this proceeding, we find no need to expressly construe any terms of the '463 patent.

### *C. Field of Invention*

The '463 patent identifies the field of invention as canalphones, and defines canalphones to be personal listening devices that are substantially smaller than a person's outer ear. Ex. 1001, 1:6–8, 1:16–18. Relying on these disclosures, Patent Owner argues the field of invention includes canalphones, earbuds, in-ear monitors, and hearing aids, but excludes headphones and conventional speakers because they are not substantially smaller than a person's outer ear. Paper 44, 2–3.

Petitioner argues the field of invention is not limited to what is set forth in the “Field of the Invention” section of the '463 patent. Paper 48, 3. Relying on the testimony of Mr. Kadis, Petitioner argues the '463 patent's field of invention is broader than canalphones because “[t]he acoustic principles are the same in all personal listening devices and conventional speakers, including distortion,” the problem with which the '463 patent is concerned. *Id.* at 4 (quoting Ex. 1003 ¶ 20). Therefore, Petitioner argues, the field of invention of the '463 patent includes headphones, earpieces, and

conventional speakers in addition to canalphones, IEMs, earbuds, and hearing aids. *Id.*

We agree with Petitioner that the field of invention of the '463 patent is broader than canalphones and canalphone-like devices. We note the “Description of the Background” section of the '463 patent specifically identifies headphones, canalphones, and hearing aids as types of personal listening devices. Ex. 1001, 1:10–12. Moreover, the “Field of Classification Search” includes USPC (U.S. Patent Classification) code 381 (electrical audio signal processing systems and devices), and subcodes 23.1 (hearing aids), 74 (headphone circuits), and 370 (headphones).<sup>2</sup> *Id.* at [58].

*D. Level of Skill in the Art*

Petitioner, relying on the testimony of Mr. Kadis, argues a person of ordinary skill in the art at the time of invention of the '463 patent would have had a bachelor of science degree, a working knowledge of the physics and mechanics of sound transmitting devices, and at least three years of experience working with or studying sound transmitting devices. Pet. 13 (citing Ex. 1003 ¶ 19).

Patent Owner, relying on the testimony of Dr. Thompson, argues a person of ordinary skill in the art would have had either: (1) a Master's or Doctorate degree in acoustics, audiology or physics, or mechanical or electrical engineering with an emphasis on acoustics, and three to seven years of experience in the design or construction of personal listening devices that fit inside the ear canal; (2) a bachelor's degree in one of the fields enumerated above and at least ten to fifteen years of experience in the

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<sup>2</sup> For a description of USPC codes, see <https://www.uspto.gov/web/patents/classification/selectnumwithtitle.htm> (last visited July 14, 2017).

design or construction of personal listening devices that fit inside the ear canal; or (3) fifteen to twenty years of experience in the design or construction of personal listening devices that fit inside the ear canal. PO Resp. 5–6 (citing Ex. 2032 ¶ 12).

The person of ordinary skill in the art “is a theoretical construct used in determining obviousness under § 103, and is not descriptive of some particular individual.” *Endress + Hauser, Inc., v. Hawk Measurement Sys. Pty. Ltd.*, 122 F.3d 1040, 1042 (Fed. Cir. 1997). Factors that can be considered in determining the level of ordinary skill in the art include, but are not limited to: (1) the educational level of the inventor; (2) the type of problems encountered in the art; (3) prior art solutions to those problems; (4) the rapidity with which innovations are made in the art; (5) the sophistication of the technology; and (6) the educational level of active workers in the field. *Daiichi Sankyo Co. v. Apotex, Inc.*, 501 F.3d 1254, 1256 (Fed. Cir. 2007).

Neither Petitioner nor Patent Owner introduces specific evidence to support the respective opinions of Mr. Kadis and Dr. Thompson regarding the qualifications of a person of ordinary skill in the art. Accordingly, we look to the evidence to which we have access, including the disclosure and content of the '463 patent, and the prior art relied upon to challenge the claims of the '463 patent. As discussed in § II.C, *supra*, the '463 patent pertains to the structure and function of personal listening devices such as canalphones, earbuds, in-ear monitors, hearing aids, and headphones. Similarly, as discussed in § II.G, *infra*, the prior art relied upon to challenge the claims of the '463 patent pertain to the structure and function of personal listening devices such as canalphones, in-ear monitors, and hearing aids.

Upon reviewing the disclosures in the '463 patent and the prior art, we agree with Dr. Thompson that the design and construction of personal listening devices requires a synthesis of knowledge obtained from multiple disciplines, including electronics, mechanics, materials science, and acoustics. *See* Ex. 2032 ¶ 11. Such knowledge is unlikely to be found in the study of any one scientific or engineering discipline, and is therefore likely to require the study of a relevant discipline (e.g., physics, mechanical engineering, or electrical engineering), and several years of work experience in the design or construction of personal listening devices. Accordingly, we find a person of ordinary skill in the art would have had at least a bachelor's degree or equivalent experience and training in physics, mechanical engineering, electrical engineering, or electronics, and three or more years of experience designing or constructing personal listening devices.

*E. Patent Owner's Motion to Exclude*

Patent Owner seeks to exclude paragraphs 17–284 and Appendix C of the Declaration of Jay Kadis (Ex. 1003, “the Kadis declaration”) under Federal Rule of Evidence 702.<sup>3</sup> Paper 44, 1–6. As the movant, Patent Owner bears the burden to establish it is entitled to the relief requested. 37 C.F.R. § 42.20.

Evidentiary issues that are before the Board are decided based on the Federal Rules of Evidence. *See* 37 C.F.R. § 42.62(a). Federal Rule of Evidence 702 states:

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<sup>3</sup> Although Patent Owner challenges the Kadis declaration under Rules 701–703, Patent Owner's argument is limited to whether Mr. Kadis qualifies as an expert under Rule 702. *See* Paper 44, 1–6.

A witness who is qualified as an expert by knowledge, skill, experience, training, or education may testify in the form of an opinion or otherwise if:

- (a) the expert's scientific, technical, or other specialized knowledge will help the trier of fact to understand the evidence or to determine a fact in issue;
- (b) the testimony is based on sufficient facts or data;
- (c) the testimony is the product of reliable principles and methods; and
- (d) the expert has reliably applied the principles and methods to the facts of the case.

Patent Owner does not argue that Mr. Kadis' testimony should be excluded because it is based on insufficient facts or data, because it is the product of unreliable principles or methods, or because Mr. Kadis has improperly applied otherwise reliable principles and methods to the facts of this proceeding. *See* Paper 44, 1–6. Rather, Patent Owner argues that Mr. Kadis' testimony should be excluded because Mr. Kadis lacks the scientific, technical, or specialized knowledge that would allow him to provide expert testimony in this proceeding. *Id.* Specifically, Patent Owner argues the pertinent art in this proceeding is personal listening devices that are substantially smaller than a person's outer ear, and Mr. Kadis lacks the knowledge, skill, experience, training or education to provide competent expert testimony on the obviousness of an invention in this art. *Id.*

Petitioner argues that the field of invention is broader than personal listening devices that are substantially smaller than a person's outer ear, and that Mr. Kadis is competent to give expert testimony in this proceeding because he qualifies as both an expert and a person of ordinary skill in the art of the '463 patent. Paper 48, 3–5, 10–11. Petitioner further argues that

even if Mr. Kadis were not a person of ordinary skill in the art of the '463 patent, he would nonetheless be competent to provide expert testimony in this proceeding because an expert does not have to be a person of ordinary skill in the art, and an expert's qualifications do not need to completely overlap with the qualifications of a person of ordinary skill in the art. *Id.* at 12–14.

Admission of expert testimony is within the sound discretion of the trial court. *Acoustical Design, Inc. v. Control Electronics Co., Inc.*, 932 F.2d 939, 942 (Fed. Cir. 1991). Trial courts “enjoy ‘wide latitude’ to determine admissibility . . . of evidentiary presentations,” including expert presentations, because they are “in the best place to judge that [a witness has] the ‘knowledge, skill, experience, training, [and] education’ of a ‘specialized’ nature that [is] likely to ‘assist the trier of fact to understand the evidence.’” *SEB S.A. v. Montgomery Ward & Co., Inc.*, 594 F.3d 1360, 1373 (Fed. Cir. 2010) (second alteration in original) (quoting Fed. R. Evid. 702).

Although the admission of expert testimony is within our discretion, our reviewing court has provided guidance regarding the limits of that discretion. For example, in *Sundance*, our reviewing court found it an abuse of discretion to “permit a witness to testify as an expert on the issues of noninfringement or invalidity” when the witness was not “qualified as an expert in the pertinent art.” *Sundance Inc. v. DeMonte Fabricating Ltd.*, 550 F.3d 1356, 1363 (Fed. Cir. 2008). The *Sundance* witness whose testimony was improperly admitted was a patent attorney who was not offered as a technical expert, and was not shown to have work experience in the relevant technical field. *Id.* at 1362. By contrast, in *Montgomery Ward*,

our reviewing court found it was not an abuse of discretion to permit a witness to testify as an expert once the witness had “established an adequate relationship between his experience and the claimed invention,” even though the witness lacked specific experience designing a consumer product embodying the invention. *Montgomery Ward*, 594 F.3d at 1373.

We find that through his testimony, Mr. Kadis has demonstrated that he possesses sufficient knowledge, skill, experience, training, or education in acoustics and audio engineering to establish an adequate relationship between his experience and the invention claimed in the '463 patent, and that Mr. Kadis is therefore qualified to provide expert testimony in this proceeding. *See* Fed. R. Evid. 702; *Montgomery Ward*, 594 F.3d at 1373. Mr. Kadis has been a lecturer and audio engineer at Stanford University’s Center for Computer Research in Music and Acoustics for 30 years. Ex. 1003 ¶ 10. He has developed and taught courses in audio recording at the Center since 1991. *Id.* He has written and published a book titled “The Science of Sound Recording” that covers such concepts as the physics, mechanics, acoustics, and electronics of sound recording. *Id.* ¶ 12. In short, through his testimony, Mr. Kadis has demonstrated that he possesses the types of multi-disciplinary knowledge that Patent Owner’s expert, Dr. Thompson, says would have been needed by a person having ordinary skill in the art. *See* Ex. 2032 ¶ 11. Mr. Kadis’ extensive experience in acoustics, audiology, and the recording and reproduction of sound give him the requisite knowledge and experience needed to qualify as an expert in the field of personal listening devices. Indeed, Dr. Thompson opined that a person having ordinary skill in the art would be expected to have a degree in acoustics or audiology. *See* Ex. 2032 ¶ 12. Although Mr. Kadis does not

have a formal degree in either of these fields, his position and duties at the Center for Computer Research in Music and Acoustics indicates that he possess the equivalent knowledge of someone having such a degree. *See* Fed. R. Evid. 702 (allowing an expert to be qualified based on his “knowledge, skill, experience, training, *or* education” (emphasis added)); *see also Carnegie Mellon University v. Marvell Technology Group, Ltd.*, 807 F.3d 1283, 1303 (Fed. Cir. 2015) (finding Rule 702 does not require an expert’s qualification to include a traditional academic degree, and allows “knowledge,” “skill,” and “experience” as other bases for qualification).

Accordingly, Patent Owner has failed to persuade us that Mr. Kadis is not qualified to provide expert testimony in this proceeding, and Patent Owner’s request to exclude paragraphs 17–284 and Appendix C of the Kadis declaration is denied.

*F. Petitioner’s Motion to Exclude*

Petitioner seeks to exclude several of Patent Owner’s exhibits in whole or in part, including: (1) paragraphs 39–41 of the Declaration of Stephen C. Thompson, Ph.D. (Ex. 2032, “the Thompson declaration”) under Federal Rules of Evidence 401–403, as well as Exhibits 2035 and 2036 referred to in those paragraphs; (2) a portion of the cross-examination of Mr. Kadis (page 52, lines 10–25) under Federal Rule of Evidence 611; and (3) Exhibits 2039–2049 under Federal Rules of Evidence 801 and 802. Paper 45, 3–6. As the movant, Petitioner bears the burden to establish it is entitled to the relief requested. 37 C.F.R. § 42.20.



*1. Portions of the Thompson Declaration and Exhibits 2035 and 2036*

In paragraphs 39–41 of his declaration, Dr. Thompson opines that a person of ordinary skill in the art would not have considered using dual drivers to reduce canalphone distortion at the time of the invention described in the '463 patent because Knowles and Sonion, two well-known manufacturers of canalphone drivers, marketed single drivers rather than dual drivers for having reduced distortion. Ex. 2032 ¶¶ 39–41. Dr. Thompson's opinion is based on a 2010 Knowles' product sheet downloaded from a web archive (Ex. 2035), and a 2010 Sonion product sheet (Ex. 2036).<sup>4</sup> *Id.* ¶¶ 40–41.

Petitioner argues the scope and content of the prior art is not limited to the products that were commercially available in the marketplace at the time of the invention described in the '463 patent. Paper 45, 3–4. Therefore, Petitioner argues, paragraphs 39–41 of the Thompson declaration, as well as Exhibits 2035 and 2036, should be excluded as irrelevant under Federal Rule of Evidence 402. *Id.* at 4. Alternatively, Petitioner argues that this evidence should be excluded under Federal Rule of Evidence 403 because its probative value is substantially outweighed by a danger of confusing the issues, causing undue delay, or wasting time. *Id.*

Patent Owner argues Dr. Thompson's opinion, and Exhibits 2035 and 2036 upon which it is based, are relevant to the motivation to combine references and to the credibility of Mr. Kadis because they directly

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<sup>4</sup> Petitioner does not challenge the authenticity of Exhibits 2035 and 2036, or argue that the products described in these exhibits were not commercially available at the time of the invention of the '463 patent.

contradict Mr. Kadis' opinion that a person of ordinary skill in the art "would have been motivated to use dual drivers, not single drivers, to achieve lower distortion in canalphones." Paper 47, 1.

We are persuaded by Patent Owner's argument. Dr. Thompson's opinion, based on the information described in Exhibits 2035 and 2036, tends to make a fact that is of consequence in determining the patentability of the challenged claims "more or less probable than it would be without the evidence." Fed. R. Evid. 401. It is, therefore, relevant evidence. Moreover, we are unpersuaded by Petitioner's argument, offered without explanation or proof, that the probative value of this evidence is substantially outweighed by a danger of confusing the issues, causing undue delay, or wasting time.

Accordingly, Petitioner's request to exclude paragraphs 39–41 of the Thompson declaration, and Exhibits 2035 and 2036 is denied.

## 2. *Portions of Mr. Kadis' Cross-Examination*

During the cross-examination of Mr. Kadis, Patent Owner questioned Mr. Kadis regarding the scope and content of Van Halteren '223. *See* Ex. 2050, 143:2–169:23; *see also* Ex. 1010. In particular, Patent Owner asked Mr. Kadis whether, looking at Figure 1 of Van Halteren '223, Mr. Kadis could tell whether the oscillations of the two drivers shown in the figure interacted to reduce distortion. Ex. 2050, 149:20–152:25. Mr. Kadis replied that he could not. *Id.* at 152:10–25.

Petitioner argues that Patent Owner's questioning of Mr. Kadis on the positioning of the two drivers shown in Figure 1 of Van Halteren '223 was "beyond the scope of cross-examination permitted by Fed. R. Evid. 611(b)" because Mr. Kadis' opinion that a person of ordinary skill in the art would have known that the two drivers in a dual driver could be positioned so that

their oscillations would interact to reduce distortion was not based on the teachings of Van Halteren '223. Paper 45, 6 (citing Pet. 16–20). Therefore, Petitioner argues, Mr. Kadis' response to that line of questioning should be excluded from evidence. *Id.* Patent Owner argues that this line of questioning was not beyond the scope of Mr. Kadis' direct testimony because Mr. Kadis opined that Van Halteren '223 taught a canalphone having better sound quality, and positioning the drivers in a dual driver to reduce distortion improves canalphone sound quality. Paper 47, 4–5 (citing Ex. 1003 ¶¶ 69, 190).

We are persuaded by Petitioner's argument that Patent Owner's questioning of Mr. Kadis on the position of the drivers in Figure 1 of Van Halteren '223 went beyond the scope of Mr. Kadis' direct testimony. Mr. Kadis' opinion that a person of ordinary skill in the art would have known that the two drivers in a dual driver can be positioned so that their oscillations interact to reduce distortion is based the teachings of Mostardo, U.S. Patent Application Publication 2008/0170732 (Ex. 1007, "Nielsen"), or U.S. Patent Application Publication 2009/0310807 (Ex. 1008, "Van Halteren '807"). *See* Ex. 1003 ¶¶ 48–71. It is not based on the teachings of Van Halteren '223. In particular, Mr. Kadis found that each of Mostardo, Nielsen, and Van Halteren '807 teaches positioning the two drivers in a dual driver to double the output sound pressure level (SPL) of the dual driver. *Id.* ¶¶ 53–58. Based on these teachings, Mr. Kadis opined that:

a person of skill in the art reading the teachings of Nielsen, van Halteren '807, or Mostardo of increased SPL capability in dual receivers would have recognized and appreciated that the increased SPL capability in dual receivers taught by any of these

references would increase headroom and, accordingly, reduce distortion when the signal level is above the nominal operating level. Thus, it would have been obvious to a person of skill in the art to combine the dual receiver taught by any of these references with Warren's IEM, in order to increase the SPL capability of Warren's dual HFDs, thereby increasing headroom and decreasing distortion. Increased SPL capability, increased headroom, and decreased distortion all improve the capability of the IEM, and the fidelity of its sound, as a person of skill in the art would appreciate.

*Id.* ¶ 69. Thus, Mr. Kadis's opinion that the fidelity of canalphones can be increased by positioning the two drivers in a dual driver so that their oscillations interact to reduce distortion was not based on the teachings of Van Halteren '223.

Mr. Kadis did discuss the teachings of Van Halteren '223 in paragraph 190 of his declaration, where Mr. Kadis opined that the challenged claims are also unpatentable over Harvey '806, Van Halteren '223, and any one of Mostardo, Nielsen, or Van Halteren '807. *See* Ex. 1003 ¶¶ 183–199. We did not institute trial on this ground of unpatentability.<sup>5</sup> *See* Dec. Inst. 39–40. In paragraph 190, Mr. Kadis opined that a person of ordinary skill in the art would have found it obvious to replace each of the single drivers (LFD, MFD, and HFD) in Harvey '806 with a corresponding dual driver as taught

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<sup>5</sup> Petitioner argued the claims of the '463 patent were unpatentable on sixteen different grounds, all of which disjointedly relied on the teachings of Mostardo, Nielsen, or Van Halteren '807. *See* Pet. 4–6. Because Petitioner did not identify the relative strengths or weaknesses of these grounds, or state a preference for one ground over another, we instituted trial on only a subset of the grounds argued, and based only on the teachings of Mostardo as representative of the teachings of Mostardo, Nielsen, and Van Halteren '807. *See* Dec. Inst. 11–12, 39–40.

by Van Halteren '223 to save space, not to reduce distortion. *See* Ex. 1003 ¶ 190. Mr. Kadis further opined that Van Halteren '223 teaches using more drivers produces a better sound quality, and therefore a person skilled in the art would have known that replacing the single drivers of Harvey '806 with the dual drivers of Van Halteren '223 would have doubled the number of drivers, and would have therefore “improve[d] the performance of Harvey '806's IEM while still saving space.” *Id.* (citing Ex. 1010 ¶ 81). However, even under this ground of unpatentability, Mr. Kadis continued to rely on Mostardo, Nielsen, or Van Halteren '807 to “teach positioning two same frequency drivers side-by-side or back-to-back such that their oscillations interact to increase SPL capability[,] . . . thereby increasing headroom and decreasing distortion.” *Id.* ¶ 193.

Accordingly, because Mr. Kadis' opinion that a person of ordinary skill in the art would have known how to position the two drivers in a dual driver so that their oscillations interact to reduce distortion was based on the teachings of Mostardo, Nielsen, or Van Halteren '807, and was *not* based on the teachings of Van Halteren '223, Patent Owner's questioning of Mr. Kadis regarding the specific positioning of the two drivers shown in Figure 1 of Van Halteren '223 was beyond the proper scope of cross-examination. *See* Fed. R. Evid. 611(b); *see also* 37 C.F.R. §§ 42.53(d)(5)(ii), 42.62(a). Therefore, we grant Petitioner's request to exclude Mr. Kadis' response to this line of questioning.

### 3. Exhibits 2039 through 2049

Exhibits 2039–2047 are articles Patent Owner relies on to show industry praise for the invention recited in the '463 patent. *See* PO Resp. 45–56. Exhibit 2048 is a copy of Patent Owner's webpage containing links

to additional articles Patent Owner relies on to show industry praise. *Id.* at 56. Exhibit 2049 is a copy of Patent Owner's webpage containing customer testimonials that Patent Owner relies on to show industry praise. *Id.* at 56–57. Patent Owner's Response does not directly cite to any of Exhibits 2039–2049. *See id.* at 45–57. Rather, Patent Owner's Response directly quotes the private/public versions of the Declaration of Jerry Harvey (Exhibit 2037/2038, “the Harvey declaration”), which in turn cites to and discusses the contents of Exhibits 2039 through 2049. *Id.*

Petitioner argues that each of Exhibits 2039–2049 should be excluded under Federal Rules of Evidence 801–802 as hearsay because they are out-of-court statements made by a declarant that have been offered to prove the truth of the matters asserted. Paper 45, 4–5. Petitioner further argues that each of Exhibits 2039–2049 should be excluded under Federal Rules of Evidence 801–802 because Patent Owner introduces and relies on these Exhibits by directly quoting the Harvey declaration, which is itself inadmissible hearsay because Patent Owner failed to make Mr. Harvey available for cross-examination. *Id.* at 5; *see also* PO Resp. 45–57.

Patent Owner argues Exhibits 2039–2049 are not hearsay because they have not been introduced to prove the truth of the matter asserted. Paper 47, 2. Rather, Patent Owner argues, they have been introduced for the non-hearsay purpose of showing what has been said about products that embody the invention claimed in the '463 patent, regardless of the truthfulness of what has been said about those products. *Id.* Patent Owner does not address Petitioner's argument that Exhibits 2039–2049 should also be excluded because they are introduced as evidence via the Harvey declaration, which is itself hearsay. *Id.* at 2–4.

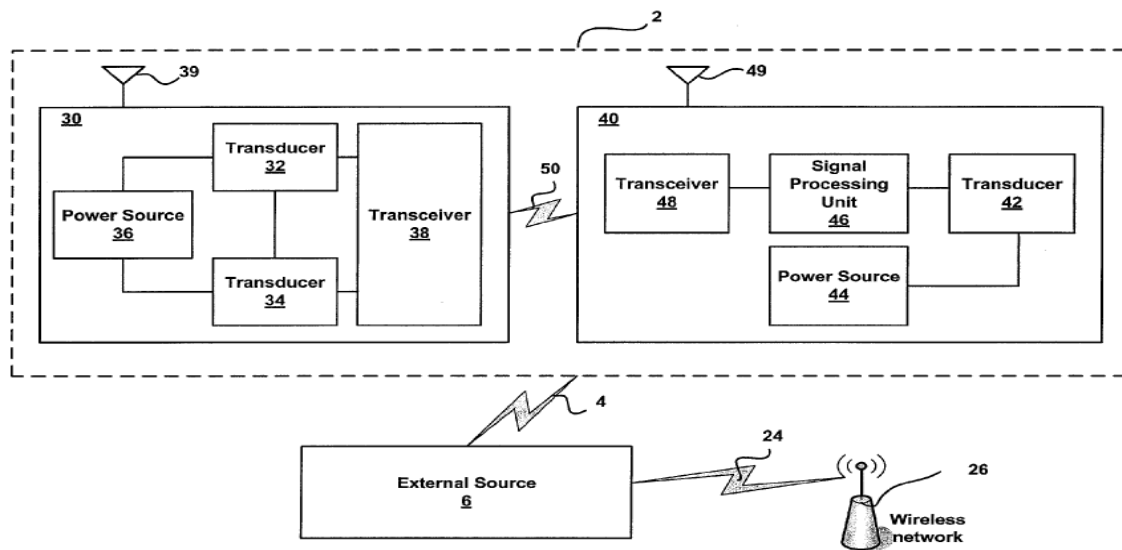
We agree with Petitioner that each of Exhibits 2039–2049 has been introduced into evidence by directly quoting the Harvey declaration. *See* PO Resp. 45–57. We previously struck and expunged the Harvey declaration because Patent Owner failed to make Mr. Harvey available for cross-examination. *See* Paper 40, 2–6. Exhibits 2039–2049, therefore, are excluded from evidence because Patent Owner seeks to admit them via the inadmissible and excluded testimony of Mr. Harvey, and Patent Owner has laid no other foundation on which we can consider them.

*G. Overview of Prior Art*

*1. Warren*

Warren discloses a personal listening device 2 that includes first 30 and second 40 modules that may be linked via communication link 50.

Ex. 1005 ¶ 28. Figure 3 of Warren is reproduced below:



**FIGURE 3**

Figure 3 is a block diagram showing an interface between personal listening device 2 having first 30 and second 40 modules, and external source 6.

Ex. 1005 ¶¶ 10, 28. First 30 and second 40 modules may be in-the-ear

(ITE), in-the-canal (ITC), or completely-in-the-canal (CIC) components of personal listening device 2. *Id.* First module 30 may include one or more devices 32/34 to deliver acoustic energy directly to the ear canal. *Id.* ¶ 29. Each of devices 32/34 may be a receiver or dual receiver, and each may be a low frequency receiver (LFR), midrange frequency receiver (MFR), or high frequency receiver (HFR), and may be, for example, a balanced armature receiver. *Id.*

## 2. Van Halteren '223

Van Halteren '223 discloses a speaker module for a personal communication device that includes two transducers for generating sound. Ex. 1010, Abstract. Figure 1 of Van Halteren '223 is reproduced below:

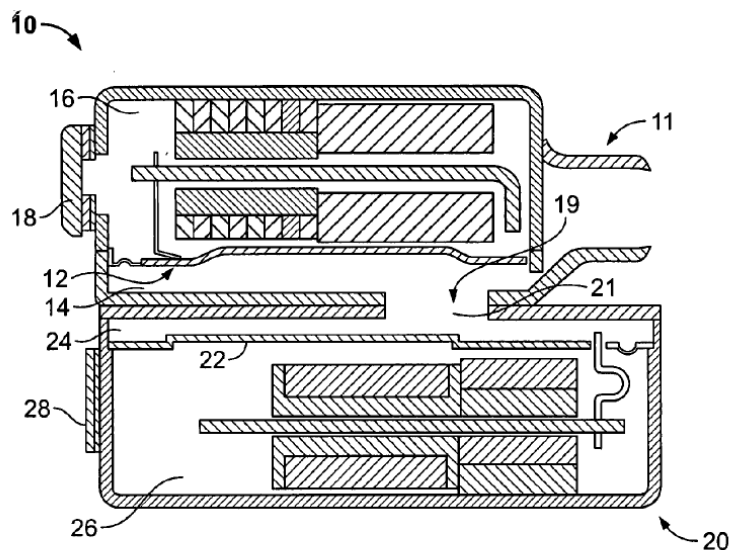


FIG. 1

Figure 1 is a block diagram of a personal listening device that includes two transducers 10 and 20, and a single output 11. Ex. 1010 ¶ 38. Transducer 10 may be a standard receiver used in a personal listening device such as an in-ear-monitor (IEM), where highly efficient and extremely compact sound emitters are required. *Id.* ¶ 48. For example, transducer 10 may be a



balanced armature receiver. *Id.* ¶ 14. Transducer 20, which may be identical to transducer 10, is positioned so that the sound from its outlet 21 is fed into input 19 of transducer 10. *Id.* ¶¶ 50, 54. Transducers 10 and 20 may be tweeters (HFDs), midrange (MFDs), or woofers (LFDs), and if tweeters, may output sound at frequencies of up to 20 kHz. *Id.* ¶¶ 22, 54. An advantage of the single output design for transducers 10 and 20 is the potential reduction in the space needed for sound tubes when they are used in hearing aids or IEMs. *Id.* ¶ 4.

### 3. *Mostardo*

Mostardo discloses a compact receiver for a hearing aid. Ex. 1009, Abstract. The receiver includes a D-shaped housing to permit it to be readily placed in the canal portion of the hearing aid. *Id.* at 2:21–25. An electromagnetic motor forms part of the housing, and includes an armature coupled to a diaphragm to move the diaphragm at frequencies corresponding to an electrical signal applied to the motor. *Id.* at 2:34–3:3. By reducing the effective mass of the diaphragm, the resonance frequency of the receiver is increased. *Id.* at 6:28–30, 10:32–36. In one embodiment, Mostardo teaches placing two of the D-shaped receivers back-to-back to form a generally oval-shaped dual receiver. *Id.* at 14:19–22, Fig. 15. The dual receiver has twice the output of the single receiver, but exhibits reduced mechanical vibration because the respective armatures of each individual D-shaped receiver move 180 degrees out-of-phase, thereby fixing the center-of-mass of the dual receiver. *Id.* at 14:19–28.

### 4. *Harvey '806*

Harvey '806 discloses an earpiece or canalphone that employs two or more balanced armature drivers that are optimized for a particular frequency

range (e.g., low, medium, or high). Ex. 1006, 1:24–26, 1:59–2:5, 6:5–8. A crossover network or filter divides the frequency spectrum of an input signal into low, medium, and high components, and respectively provides these components to low, medium, and high frequency armature drivers. *Id.* at 2:1–5, 3:48–50.

Figure 3 of Harvey '806 is reproduced below:

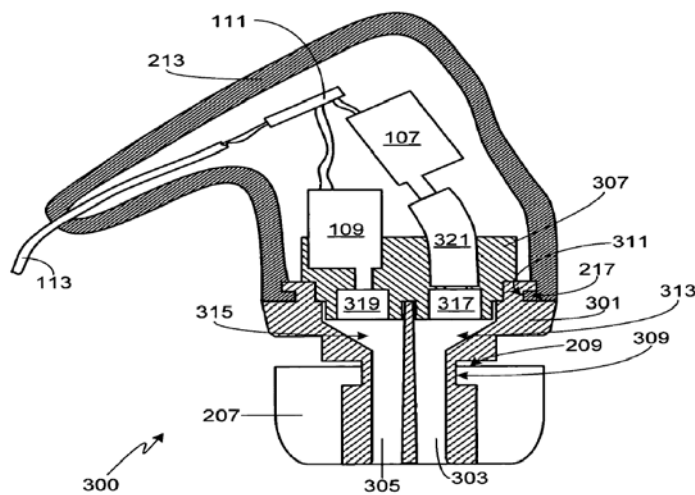


FIG. 3

Figure 3 is a cross-sectional view of earpiece 300 defined by housing 213. Ex. 1006, 5:6–9. Cross-over network 111 provides respective low and high frequency components of an input signal on line 113 to low frequency armature driver 107 and high frequency armature driver 109. *Id.* at 1:66–2:5, 3:46–50. The frequency responses of low and high frequency armature drivers 107 and 109 can be respectively tuned by dampers 317 and 319. *Id.* at 5:29–40, 5:61–65. The sounds produced by armature drivers 107 and 109 are respectively delivered to the ear canal via sound tubes 303 and 305. *Id.* at 5:6–9. When canalphone 300 includes more than two armature drivers, the outputs from the two lower frequency drivers are delivered through a

first sound tube while the output from the third higher frequency driver is delivered through a second sound tube. *Id.* at 2:35–40.

The filtering effects of cross-over network 111, and the relative displacement of armature drivers 107 and 109 within housing 213, can introduce an unwanted phase shift between the sounds produced by the armature drivers. Ex. 1006, 6:12–16, 6:30–36. This phase shift can be minimized by varying the lengths of sound tubes 303 and 305, e.g., by extending sound tube 303 by the length of additional sound tube 321. *Id.* at 6:37–65. In this way, the lengths of sound tubes 303 and 305 are chosen to tune canalphone 300. *Id.* at 5:58–6:2.

#### 5. *Sperrazza*

Sperrazza discloses a barrel-shaped speaker enclosure containing a plurality of loudspeakers. Ex. 1011, Abstract. Sperrazza further discloses the transient response of a speaker is inversely proportional to its moving mass, and that reducing the moving mass of a speaker improves its transient response. *Id.* at 3:36–40.

#### 6. *Babb*

Babb discloses an acoustic loudspeaker. Ex. 1012 ¶ 2. Babb further discloses that the amount of power required for a loudspeaker to produce a given amount of sound pressure or loudness is proportional to the mass of the loudspeaker's driver. *Id.* ¶ 7. Babb further discloses the loudspeaker's ability to produce high frequency sounds is inversely proportional to the mass of its driver. *Id.*

#### 7. *Harvey '479*

Harvey '479 discloses a canalphone employing two or more balanced armature drivers that are optimized for a particular frequency range (e.g.,

low, medium, or high). Ex. 1013 ¶¶ 3, 8, Fig. 2. A cross-over network or filter divides the frequency spectrum of an input signal into low, medium, and high frequency ranges, and respectively provides these frequency ranges to low, medium, and high frequency armature drivers. *Id.* ¶ 8, Fig. 2.

*H. Obviousness of Claims 1–16*

In challenging claims 1–16, Petitioner argues claims 1 and 7 are unpatentable over the combination of Warren, Van Halteren '223, and Mostardo, claims 2–6 and 8 are unpatentable over Warren, Van Halteren '223, and Mostardo in combination with one or more additional references, and claims 9–16 are unpatentable over Warren and Mostardo in combination with one or more additional references. *See* Pet. 14–38.

Patent Owner argues that Petitioner has failed to demonstrate the unpatentability of claims 1–16 because a person of ordinary skill in the art at the time of the invention would not have known that six drivers would fit into a canalphone housing, and would have had no reason to try to fit six drivers into a canalphone housing. PO Resp. 10–24. Patent Owner further argues that a person of ordinary skill in the art would have had no reason to combine the teachings of Mostardo or Van Halteren '223 with the teachings of Warren. *Id.* at 25–31. Lastly, Patent Owner argues that claims 1–16 are patentable when the entirety of the evidence is considered, including evidence of secondary considerations of non-obviousness. *Id.* at 3, 31–59.

Evidence of secondary considerations of non-obviousness must be considered before reaching a legal conclusion of obviousness. *See Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1538 (Fed. Cir. 1983). Accordingly, we discuss Patent Owner's secondary considerations evidence

of non-obviousness in § II.H.1, *infra*. We then discuss Petitioner’s arguments that a proper combination of references discloses each of the limitations of claims 1–16, Patent Owner’s arguments that Petitioner has failed to demonstrate the prior art teaches all the limitations of these claims, and our reasoning for concluding that Petitioner has demonstrated, by a preponderance of evidence, the unpatentability of claims 1–16 of the ’483 patent in §§ II.H.2–11, *infra*.

We note that Patent Owner argues for the patentability of independent claims 1, 9, and 14 for reasons that are common to each of these claims, and argues the dependent claims are patentable due to their dependence from the independent claims. *See* PO Resp. 10–60. Accordingly, we only explicitly address Patent Owner’s arguments for the non-obviousness of claims 1–16, including Patent Owner’s evidence of secondary considerations of non-obviousness, in our analysis of independent claim 1, discussed in § II.H.2, *infra*. The same analysis, however, applies to each of claims 1–16.

*1. Secondary Considerations of Non-obviousness*

Patent Owner argues, despite any evidence of obviousness presented by Petitioner, that claims 1–16 of the ’463 patent are not unpatentable due to secondary considerations of non-obviousness, and in particular, due to evidence of copying, commercial success, and industry praise for the inventions claimed in the ’463 patent. PO Resp. 31–59.

Patent Owner bears the burden of producing evidence in the form of secondary considerations of non-obviousness. *See Pfizer, Inc. v. Apotex, Inc.*, 480 F.3d 1348, 1360 (Fed. Cir. 2007) (“[O]nce a challenger has presented a prima facie case of [obviousness], the patentee has the burden of going forward with rebuttal evidence.”); *see also Demaco Corp. v. F. Von*

*Langsdorff Licensing Ltd.*, 851 F.2d 1387, 1392 (Fed. Cir. 1988) (“The phrase ‘prima facie case’ . . . may be used by courts to describe the [challenger’s] burden of producing enough evidence to permit the trier of fact to infer the fact at issue.”) (citation omitted).

To be given substantial weight, evidence of secondary considerations of non-obviousness must have a nexus to the claimed invention. *See Wyers v. Master Lock Co.*, 616 F.3d 1231, 1246 (Fed. Cir. 2010). Patent Owner bears the burden of showing this nexus. *See WMS Gaming, Inc. v. Int’l Game Tech.*, 184 F.3d 1339, 1359 (Fed. Cir. 1999). Patent Owner is entitled to a rebuttable presumption of nexus between evidence of secondary considerations of non-obviousness and a claimed invention if the evidence “is tied to a specific product and that product ‘is the invention disclosed and claimed in the patent.’” *WBIP, LLC v. Kohler Co.*, 829 F.3d 1317, 1329 (Fed. Cir. 2016). Because questions of nexus are highly fact-dependent, it is within the province of the fact-finder to determine nexus and the relative weight or significance to bestow upon Patent Owner’s proffered evidence. *Id.* at 1331.

*a. Presumption of Nexus*

Patent Owner, relying on the excluded testimony of Mr. Harvey, argues that the JH13 and JH16 products embody the claims of the ’463 patent. PO Resp. 34–40. Therefore, Patent Owner argues, “secondary considerations tied to JH Audio’s JH13 and JH16 products should be presumed to have nexus to the ’463 patent.” *Id.* at 40. Petitioner argues Patent Owner is not entitled to a presumption of nexus between the JH13 and JH16 products and the claims of the ’463 patent because Patent Owner’s

evidence of such a nexus “relies on [the] expunged Harvey declarations.”  
Pet. Reply 10.

We are persuaded by Petitioner’s argument. The only evidence proffered by Patent Owner to establish a nexus between the JH13 and JH16 products and the claims of the ’463 patent is the excluded testimony of Mr. Harvey.<sup>6</sup> *See* PO Resp. 34–40 (citing or quoting Exs. 2037/2038); *see also* Paper 40, 2–6. Therefore, we do not presume a nexus between any evidence of secondary considerations regarding the JH13 or JH16 products and the invention claimed in the ’463 patent.

*b. Commercial Success*

Patent Owner, relying on the excluded testimony of Mr. Harvey, argues several years of sales data for the JH13 and JH16 products show the commercial success of the products, and therefore support a finding that claims 1–16 of the ’463 patent are non-obvious. PO Resp. 40–42 (citing Exs. 2037/2038). Petitioner argues that because the Harvey declaration was expunged and excluded from evidence, there is no evidence to support Patent Owner’s claim of commercial success. Pet. Reply 20.

We are persuaded by Petitioner’s argument. The only evidence proffered by Patent Owner to show the commercial success of the JH13 and JH16 products, and a nexus between these products and the invention claimed in the ’463 patent is the excluded testimony of Mr. Harvey. *See* PO Resp. 34–42; *see also* Paper 40, 2–6. Therefore, we find no evidence of the

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<sup>6</sup> Patent Owner’s reliance on the JH13-1709 markings that are stamped on the canalphones shown in originally filed Figure 2 of the application that issued as the ’463 patent also relies on the testimony of Mr. Harvey, who declares that the markings “confirm[] it was the JH13.” PO Resp. 34–35.

commercial success of the JH13 or JH16 products, or of any product having a nexus to the invention claimed in the '463 patent.

*c. Copying*

Patent Owner argues Petitioner copied the invention claimed in the '463 patent. PO Resp. 57–59. In particular, relying on testimony of Mr. Harvey that has not been excluded, Patent Owner argues that at a 2012 trade show “Petitioner’s owner and former CEO, Mr. Belonozhko, visited Patent Owner’s booth and inspected Patent Owner’s JH13 product[,] . . . and told Mr. Harvey that he could copy it.” *Id.* at 58 (citing Ex. 2028 ¶ 9). Patent Owner further argues that whenever Patent Owner’s company, JH Audio, “releases a new product, Petitioner soon thereafter releases a copy,” and that “Petitioner has released at least six products copying JH Audio’s products since the 2012 trade show.” *Id.* at 58–59 (citing Ex. 1004 ¶¶ 6, 46; Ex. 1019). Patent Owner further argues that evidence of Petitioner’s copying can be inferred from the similarity between Petitioner’s business name, “64 Audio,” and Patent Owner’s business name, “JH Audio,” and from the fact that Petitioner obtains its drivers from the same company as Patent Owner. *Id.* at 59 (citing Ex. 2028 ¶ 15).

Petitioner argues two of the Exhibits Patent Owner relies on to show copying (Exhibits 1004 and 1019) are insufficient because they are “from the [underlying] lawsuit, are silent on copying, and infringement has not been proven.” Pet. Reply 22. Petitioner further argues that the evidence in Exhibit 2028 that Mr. Belonozhko told Mr. Harvey that he could copy the JH13 product is entitled to little to no weight because Petitioner has repeatedly denied that allegation as false, and has never had the opportunity to depose Mr. Harvey on the veracity of the allegation. *Id.* at 23.



We are persuaded by Petitioner's arguments. First, Patent Owner's evidence that Petitioner has released six products allegedly copying JH Audio's products is based on Patent Owner's amended complaint in the underlying District Court litigation, and on a declaration Mr. Harvey submitted in support of a motion for preliminary injunction in that litigation. *See* PO Resp. 58–59; *see also* Exs. 1004, 1019. The amended complaint and declaration do not allege that Petitioner copied the JH13 or JH16 products. *See* Ex. 1004 ¶¶ 7–41; Ex. 1019 ¶¶ 35–57. Rather, they allege that Petitioner's products infringe the '463 patent. *Id.* Such allegations are insufficient evidence of copying. *See Iron Grip Barbell Co., Inc. v. USA Sports, Inc.*, 392 F.3d 1317, 1325 (Fed. Cir. 2004) (“Not every competing product that arguably falls within the scope of a patent is evidence of copying. Otherwise every infringement suit would automatically confirm the nonobviousness of the patent.”).

Second we give little to no weight to Mr. Harvey's non-excluded testimony that Mr. Belonozhko stated that he could copy the JH13 product because Petitioner challenges this allegation as false, and Petitioner has not had an opportunity to cross-examine Mr. Harvey in this or the underlying District Court proceeding. *See* PO Resp. 57–58; Pet. Reply 23. Moreover, regardless of any weight we give to Mr. Harvey's non-excluded testimony, Patent Owner has failed to establish a nexus between the allegedly copied JH13 product and the invention claimed in the '463 patent for the reasons discussed in § 11.H.1.a, *supra*.

Finally, Patent Owner's evidence of the similarity between Petitioner's business name and Patent Owner's business name is not evidence of copying. As our reviewing Court has found:

[C]opying requires the replication of a specific product. This may be demonstrated either through internal documents; direct evidence such as disassembling a patented prototype, photographing its features, and using the photograph as a blueprint to build a virtually identical replica; or access to, and substantial similarity to, the patented product (as opposed to the patent).

*Iron Grip Barbell*, 392 F.3d at 1325 (citations omitted).

Accordingly, for the reasons discussed above, we find insufficient evidence that the invention claimed in the '463 patent was copied.

*d. Industry Praise*

Patent Owner argues the JH13 and JH16 products have received substantial industry praise. PO Resp. 42–57. As evidence, Patent Owner cites to several comments left by attendees of an audio conference (“CanJam”) on the conference’s webpage, a product review article published on a CNET webpage, and, relying on the excluded testimony of Mr. Harvey, comments posted on various general interest (e.g., Chicago Tribune), consumer electronics (e.g., Wired), and audiophile (e.g., Audio Discourse) webpages, as well as on Patent Owner’s own webpage. *Id.* (citing Exs. 1020, 2030, 2037/2038, and 2039–2049).

Petitioner argues “[a]side from three examples the Board already found insufficient, Patent Owner’s ‘industry praise’ argument consists entirely of [the] expunged Harvey declaration.” Pet. Reply 20 (citation omitted). Petitioner further argues that the evidence that does not rely on the excluded Harvey declaration “fail to establish industry praise because they do not acclaim or reasonably refer to the claimed features” of the recited invention. *Id.* at 21–22. Therefore, Petitioner argues, there is “no argument in support of, and insufficient evidence of industry praise.” *Id.* at 20.

We are persuaded by Petitioner's arguments. With the exclusion of Exhibits 2037/2038 and 2039–2049 for the reasons discussed in § II.F.3, *supra*, Patent Owner's only evidence of industry praise lies in the comments made by two attendees of the CanJam conference (Ex. 1020) and the author of the CNET review article (Ex. 2030). *See* PO Resp. 42–44. In our Decision to Institute, we found the praise of the JH13 product found in these exhibits lacked sufficient nexus to the claims of the '463 patent to constitute meaningful industry praise. *See* Dec. Inst. 36–38.

Patent Owner argues we erred in making these findings in our Decision to Institute because (1) we failed to presume nexus between the JH13 product and the claimed invention, (2) we failed to cite evidence that better grounding or ohmic contacts can reduce distortion, (3) user LFF's comments were based on a comparison of the JH13 to the UE-10, also invented by Mr. Harvey, who testifies that the JH13 does not have better grounding, better shielding, or better ohmic contacts than the UE-10, and (4) Mr. Harvey testifies that a random positioning of two HFDs would not be expected to lead to reduced distortion. PO Resp. 43–44 (quoting excluded Ex. 2037/2038 ¶¶ 18, 20).

Upon reconsideration of the non-excluded evidence of industry praise, and Petitioner's and Patent Owner's arguments regarding the same, we find the comments made on the CanJam webpage and in the CNET article are insufficient to constitute industry praise of the invention claimed in the '463 patent. In particular, we find the comments made on the CanJam webpage and in the CNET article fail to show the JH13 product embodies any claim of the '463 patent, and fail to show the JH13 product includes the feature the '463 patent claims to be responsible for a canalphone having reduced

harmonic distortion, namely, first and second HFDs that are positioned so that the oscillation of one interacts with the oscillation of the other to reduce harmonic distortion. *See* Ex. 1001, 6:13–16, 7:9–13, 8:7–10. During prosecution, the Examiner found it was this feature, which is common to all independent claims of the '463 patent, that distinguished the claims over the nearest prior art. *See* Ex. 1002, 198–199. Consequently, we find the praise of the JH13 product found in the comments on the CanJam webpage and in the CNET article have no nexus to the invention claimed in the '463 patent.

For example, on the CanJam webpage, although user LFF praises the “detail, clarity, and balance” of the JH13 product, and user IronDreamer praises the “speed, detail, amazing low distortion, and clear, clean, neutral tone” of the JH13 product, neither user ascribes the praised attributes to any particular component of the JH13 product, neither user demonstrates the JH13 product embodies any claim of the '463 patent, and neither user demonstrates the JH13 product contains two HFDs that are positioned to reduce distortion as required by all of the claims of the '463 patent. *See* Ex. 1020, 2, 6. Patent Owner argues the comments made by user LFF and user IronDreamer about the JH13 product have a strong nexus to the invention claimed in the '463 patent because it is the positioning of the two HFDs to reduce distortion that results in the “detail, clarity, and balance” and the “speed, detail, amazing low distortion, and clear, clean, neutral tone” of the JH13 product. *See* PO Resp. 42–43. Patent Owner’s argument, however, is based entirely on the excluded testimony of Mr. Harvey. *Id.*

Similarly, although the CNET article describes the JH 13 Pro as a very different type of in-ear design that “uses six drivers--two woofers, two midranges, and two tweeters--to lower distortion compared with other in-ear

designs,” the CNET article does not demonstrate the JH13 Pro embodies any claim of the ’463 patent, and does not demonstrate the JH13 Pro includes two HFDs that are positioned to reduce distortion as required by all of the claims of the ’463 patent. Patent Owner argues the comments made in the CNET article have a strong nexus to the invention claimed in the ’463 patent because a random positioning of the two HFDs in the JH13 Pro would not be expected to lead to reduced distortion, and the JH13 Pro “had reduced distortion because its two high drivers are positioned as claimed by the ’463 patent.” *See* PO Resp. 44. Patent Owner’s arguments, however, are based entirely on the excluded testimony of Mr. Harvey. *Id.*

Accordingly, because Patent Owner has failed to provide any non-excluded evidence showing the JH13 product embodies any claim of the ’463 patent, and has failed to provide any non-excluded evidence showing the JH13 product includes the claimed feature that distinguishes the ’463 patent over the closest prior art and to which the ’463 patent attributes the improved performance and reduced harmonic distortion of the claimed canalphone, we find Patent Owner has failed to show a sufficient nexus between the industry praise for the JH13 product and the claims of the ’463 patent. *See WMS Gaming*, 184 F.3d at 1359 (“The patentee bears the burden of showing that a nexus exists between the *claimed features* of the invention and the objective evidence offered to show non-obviousness.”) (emphasis added); *see also South Alabama Medical Science Foundation v. Gnosis S.P.A.*, 808 F.3d 823, 827 (Fed. Cir. 2015) (finding evidence that was “not reasonably commensurate with the scope of the claims” was insufficient evidence of industry praise because the patentee “failed to connect the evidence of industry praise to the novel elements of the claims”).

Moreover, even if Patent Owner had shown sufficient nexus between the praise of the JH13 product on the CanJam and CNET webpages and the claims of the '463 patent, the limited nature of that evidence makes a weak showing of non-obviousness. It is widespread industry praise and recognition that constitutes meaningful evidence of non-obviousness, not isolated examples of praise. *See, e.g., Kloster Speedsteel AB v. Crucible Inc.*, 793 F.2d 1565, 1574 (Fed. Cir. 1986) (overruled on other grounds). Patent Owner produces insufficient evidence showing widespread peer recognition of the invention claimed in the '463 patent. Thus, as further explained below, the limited evidence produced by Patent Owner showing the JH13 product has received praise from three users is insufficient to outweigh the strong evidence Petitioner has produced, discussed in §§ II.H.2–11, *infra*, to show the claims of the '463 patent are obvious.

2. *Obviousness of Claims 1 and 7 over Warren, Van Halteren '223 and Mostardo*

Petitioner argues claims 1 and 7 of the '463 patent would have been obvious over the combination of Warren, Van Halteren '223, and Mostardo, and maps the teachings of these references to the limitations required by claims 1 and 7. Pet. 20–38.

Claim 1 requires a canalphone housing containing first and second low frequency drivers, first and second mid frequency drivers, and first and second high frequency drivers. Ex. 1001, 5:64–6:10. Petitioner demonstrates how Warren discloses these limitations. *See* Pet. 16.

Warren discloses a personal listening device 2 having first 30 and second 40 components, which may be in-the-ear (ITE), in-the-canal (ITC), or completely-in-the-canal (CIC) components. Ex. 1005 ¶ 28, Fig. 3.

Module 30 includes one or more devices 32/34 within housing 28. *Id.* ¶¶ 29, 32. Each of devices 32/34 may be either a single receiver or a dual receiver, and may be a low, mid, or high frequency receiver. *Id.* ¶ 29. Petitioner, relying on the testimony of Mr. Kadis, contends that “receiver” is another name for “driver,” and that a dual receiver is a single unit containing two identical receivers. Pet. 16; Ex. 1003 ¶¶ 25, 32, 46. Therefore, relying on the testimony of Mr. Kadis, Petitioner contends that Warren teaches a canalphone having two LFDs, two MFDs, and two HFDs. Pet 16; Ex. 1003 ¶ 46.

Patent Owner argues that Warren not only fails to teach a canalphone having six drivers, but teaches away from a canalphone having six drivers. *See* PO Resp. 10–24. First, relying on the testimony of Dr. Thompson, Patent Owner argues that “[b]ecause canalphones are ‘personal listening devices that are substantially smaller than a person’s outer ear’ . . . it was not expected that they could contain six drivers.” PO Resp. 10 (citing Ex. 2032 ¶ 19). Patent Owner further argues “Warren did not teach how to manufacture drivers small enough to fi[t] six in a canalphone housing.” *Id.* at 21. Patent Owner argues this contention is supported by Mr. Kadis’ admission that Figures 7A–C, 8, 9A–C, 10A–C, 11A–C, 12, and 13A–B of Warren show there is no room to accommodate more than one or two drivers in a canalphone housing. *Id.* at 17–18.

According to Patent Owner’s expert, Dr. Thompson, a person of ordinary skill in the art at the time of the invention claimed in the ’463 patent

would not have expected . . . to be able to squeeze six drivers into a canalphone[,] . . . not only because of the limited amount of

volume in a canalphone housing, but also because the location and arrangement of drivers within a canalphone housing must take into consideration the requirements of other components, such as crossovers and tubes, that are often carried within a canalphone housing.

Ex. 2032 ¶ 19. Dr. Thompson finds support for his opinion by contrasting Figure 3 of Warren with Figures 7A–C, 8, 9A–C, 10A–C, 11A–C, 12, and 13A–B. *See* Ex. 2032 ¶¶ 22, 24. According to Dr. Thompson, Figure 3 of Warren is a *block diagram* that “does not show a physical implementation of a canalphone and, . . . would not have taught . . . that a canalphone could have six drivers.” *Id.* ¶ 24. Dr. Thompson opines that Figure 3 does not even teach a canalphone because Warren, in paragraph 29, teaches that the devices 32/34 shown in the figure “*could* be a microphone/receiver or a microphone, neither of which would be appropriate for a canalphone.” *Id.* (emphasis added). By contrast, Dr. Thompson opines that Figures 7A–C, 8, 9A–C, 10A–C, 11A–C, 12, and 13A–B of Warren disclose “*actual* devices, instead of just a system schematic as in Fig. 3,” and further disclose “at most two drivers contained within a single housing.” *Id.* ¶ 22 (emphasis added).

Petitioner argues that because the ’463 patent does not teach how to make drivers small enough to fit six into a canalphone housing, a person of ordinary skill in the art at the time of the invention would have known how to do so. Pet. Reply 9 (citing *Hybritech Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 1384 (Fed. Cir. 1986) (finding that a patentee “need not teach, and preferably omits, what is well known in the art”)); *see also* Ex. 1001.

We are persuaded by Petitioner’s argument that a person of ordinary skill in the art would have known how to fit six drivers in a canalphone



housing at the time of the invention claimed in the '463 patent. First, Patent Owner acknowledges that the '463 patent does not teach how to manufacture drivers small enough to fit six in a canalphone housing. *See* Tr. 72:17–73:2. We find this teaching is absent from the Specification of the '463 patent because the patentee did not need to teach what was already well known in the art. *See Hybritech*, 802 F.2d at 1384.

Second, both the Harvey '806 and Harvey '479 patents disclose canalphones having three single drivers (i.e., a LFD, MFD, and HFD). *See* Ex. 1006, 1:66–2:5; Ex. 1013 ¶¶ 8, 25, Fig. 2. According to Patent Owner's expert, Dr. Thompson, Knowles was the largest and most well-known manufacturer of canalphone drivers at the time of the invention of the '463 patent, and Exhibit 2035 is a listing of the single and dual drivers commercially available from Knowles at that time. *See* Ex. 2032 ¶ 40. Exhibit 2035 is a Knowles product sheet for "Subminiature Speakers" that are "[i]deal for premium in-ear designs" and that "can be designed to fit inside ear molds." Ex. 2035. Dr. Thompson identifies the Knowles' BK, EC/FEC, and ES as single drivers, and the Knowles' DTEC as a dual driver that embodies the invention described in Mostardo. *See* Ex. 2032 ¶ 40; *see also* Ex. 1030, 122:8–123:9. The BK driver, the largest of the single drivers identified by Dr. Thompson, has dimensions of 7.87 mm x 5.59 mm x 4.04 mm, and occupies a volume of approximately 178 mm<sup>3</sup>. *See* Ex. 2035. The DTEC dual driver has nearly identical dimensions of 7.87 mm x 4.09 mm x 5.59 mm, and occupies a nearly identical volume of approximately 180 mm<sup>3</sup>. *See* Ex. 1029 (disclosing the DTEC "[c]ase size is equivalent to BK/EF"). This evidence shows that a canalphone having three single drivers, like the canalphone shown in Harvey '806 or Harvey '479,

could have had its three single drivers replaced with three dual drivers that take up approximately the same amount of space, thereby resulting in a canalphone having six drivers.

Moreover, we do not find that Figures 3, 7A–C, 8, 9A–C, 10A–C, 11A–C, 12, and 13A–B of Warren teach that canalphones at the time of the invention could only have had one or two drivers. Warren is prior art for *all* that it discloses. *See Amgen, Inc. v. Hoechst Marion Roussel, Inc.*, 314 F.3d 1313, 1357 (Fed. Cir. 2003). Warren discloses that although its invention is described in “certain embodiments . . . by way of example in the drawings,” these disclosures are “not intended to limit the invention to the particular forms described.” Ex. 1005 ¶ 25. Thus, accepting as true Dr. Thompson’s opinion that device 30 in Figure 3 of Warren *may* not be a canalphone in certain embodiments because Warren discloses that devices 32/34 in device 30 *may be* microphone/receivers or microphones that are not suitable for canalphone use, we disagree with Dr. Thompson’s conclusion that this teaches that device 30 *cannot* be a canalphone. *See* Ex. 2032 ¶ 24. Indeed, paragraph 29 of Warren also discloses that devices 32/34 *may be* receivers or dual receivers, including low frequency, mid-frequency, and high frequency receivers. *See* Ex. 1005 ¶ 29, Fig. 3. Warren further discloses that device 30 may be an ITE (In-the-Ear), ITC (In-the-Canal) or CIC (Completely-in-the-Canal) device. *Id.* ¶ 28. The housings 28 of the devices shown in Figures 7A–C, 8, 9A–C, 10A–C, 11A–C, 12, and 13A–B of Warren are “shaped to fit into the external auditory canal.” *Id.* ¶¶ 36, 41–43. They are, therefore, examples of in-the-ear-canal (ITC) or completely-in-the-canal (CIC) devices, rather than examples of in-the-ear (ITE) devices

that are more broadly described in Warren's discussion of Figure 3. *See id.* ¶¶ 25, 28–29.

Petitioner also persuasively argues that canalphone housings are large enough to accommodate six drivers (three dual drivers) because they are designed to fit in both the ear canal of the inner ear and concha of the outer ear (i.e., the spiral shaped concavity of the outer ear). *See* Pet. Reply 7–8. Patent Owner agrees that canalphone drivers can be seated in both the ear canal and concha. Tr. 61:10–19. This is shown, for example, in Figure 2 of the '463 patent, in which a portion of dual HFDs 14a/b are seated in the ear canal portion of housing 12, and the remaining portion of dual HFDs 14a/b and all of dual LFDs 16a/b and MFDs 18a/b are seated in the concha portion of housing 12. *See* Ex. 1001, Fig. 2; *see also* Pet. 9; Tr. 60:6–61:9. It is also shown in the prior art. For example, Figure 1 of Harvey '806 shows canalphone 100 having drivers 107/109 that are seated in concha portion 105 rather than ear canal portion 103 of the canalphone housing. *See* Ex. 1006, 3:42–50, Fig. 1. Consequently, the dual LFDs, MFDs, and HFDs required by the '463 patent need not be seated entirely within the ear canal as shown in Figures 7A–C, 8, 9A–C, 10A–C, 11A–C, 12, and 13A–B of Warren, but can be seated in both the ear canal and concha portions of a canalphone housing.

Neither Petitioner nor Patent Owner provides evidence indicating the size of the ear canal and concha. However, we take judicial notice that the average size of the concha alone is about 2.63 cm x 1.80 cm x 1.29 cm, having a volume of approximately 4.3 cm<sup>3</sup> (i.e., 4300 mm<sup>3</sup>), which is more than 23 times the volume of the Knowles' DTEC driver that Dr. Thompson

testified embodies Mostardo's dual driver. *See* Ex. 3001, 216 (Table II)<sup>7</sup>; *see also* Ex. 1030, 121:25–123:9.

Patent Owner next argues that Warren does not teach a canalphone having two LFDs, MFDs, and HFDs because Warren's teaching to use two or more drivers, each of which can be a single or dual driver, and each of which can be a LFD, MFD, or HFD, creates too many combinatoric possibilities to lead one of ordinary skill in the art to select six drivers where two are LFDs, two are MFDs, and two are HFDs. PO Resp. 22–24. In particular, Patent Owner argues that a six driver canalphone can contain three dual drivers, two dual drivers and two single drivers, or six single drivers.<sup>8</sup> *Id.* at 23. Patent Owner argues that given the different types of drivers taught by Warren (i.e., single or dual, LFDs, MFDs, HFDs, or combinations thereof):

Warren teaches 3,663 different possible combinations of devices in a canalphone that could have six drivers. Of all those possibilities, only 25 would result in a canalphone with six receivers, where two are low, two are midrange and two are high. Warren does not provide any guidance to select one of those 25 options out of its 3,663 possibilities.

*Id.* at 23–24. Accordingly, Patent Owner argues a person of ordinary skill in the art reading Warren would not have found it obvious to produce a canalphone having two LFDs, two MFDs, and two HFDs, because such a person would be “merely throw[ing] metaphorical darts at a board filled with

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<sup>7</sup> M.D. Burkhard and R.M. Sachs, Anthropometric Manikin for Acoustic Research, 58 J. Acoust. Soc. Am. 214, 216 (1975).

<sup>8</sup> Patent Owner appears to neglect the possibility of having one dual driver and four single drivers.

combinatorial prior art possibilities.” *Id.* at 24 (alteration in original) (quoting *In re Kubin*, 561 F.3d 1351, 1359 (Fed. Cir. 2009)).

Petitioner argues Patent Owner’s argument is flawed for two reasons. First, Petitioner argues it is merely attorney argument offered without evidentiary support. Pet. Reply 9. Second, Petitioner argues a person of ordinary skill in the art would select two LFDs, two MFDs, and two HFDs for Warren’s IEM 30 not as a result of throwing metaphorical darts at combinatorial possibilities, but rather as the result of following the teachings in the prior art. *Id.* at 9–11. Specifically, Petitioner argues that Warren teaches IEM 30 can have one or more drivers, which can be single or dual drivers, Mostardo teaches the advantages of using dual drivers to reduce distortion, and the prior art teaches the advantages of using at least three drivers in the low, mid, and high frequency ranges. *Id.* Thus, Petitioner argues, the combination and “claimed invention is merely the result of pursuing known options from a finite number of identified, predictable solutions.” *Id.* at 11.

We are persuaded by Petitioner’s arguments. Patent Owner offers its mathematical, combinatorial argument without proof or evidentiary support in the form of expert testimony. “Attorney[] argument is no substitute for evidence.” *Johnston v. IVAC Corp.*, 885 F.2d 1574, 1581 (Fed. Cir. 1989). Moreover, Patent Owner’s argument is based on the teachings of Warren alone, and fundamentally misconstrues Petitioner’s argument for combining the teachings of Warren and Mostardo as further discussed below. “Non-obviousness cannot be established by attacking references individually where the [challenge] is based upon the teachings of a combination of references.” *In re Merck & Co., Inc.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986).

As Petitioner notes, Warren teaches a canalphone having one or more drivers, each of which can be a single or dual driver, and each of which can be a LFD, MFD, HFD. *See* Pet. 16; Ex. 1005 ¶ 29. The prior art teaches that persons of ordinary skill in the art at the time knew to split a canalphone's input signal into three frequency ranges (low, middle, and high), and to deliver each frequency range to a corresponding driver optimized to reproduce sound in that range. *See* Pet. Reply 10; Ex. 1013 ¶ 8; *see also* Ex. 1006, 1:62–2:5. Thus, a person of ordinary skill in the art reading Warren would have been motivated to split Warren's input signal into low, medium, and high frequency ranges, and to use some combination of two or more single or dual drivers that included at least one LFD, MFD, and HFD. Mostardo teaches the advantages of using dual drivers to reduce distortion. *See* Pet. 17–19; Ex. 1009, 14:19–27; Ex. 1003 ¶¶ 55–69. Patent Owner and Dr. Thompson agree that reducing distortion in a canalphone is a desirable goal. *See* Tr. 53:7–22; Ex. 1030, 111:19–113:9. Thus, a person of ordinary skill in the art, wanting to accurately reproduce sound with reduced distortion in Warren's canalphone, would have been led by the teachings of the prior art and Mostardo to use a minimum of three dual drivers: a dual LFD, a dual MFD, and a dual HFD; resulting in a six driver canalphone. *See* Pet. Reply 10–11. Consequently, Petitioner's argument does more than simply throw metaphorical darts at prior art combinatorial possibilities. Rather, it follows clear teachings of the prior art that indicate critical parameters (e.g., using at least one LFD, MFD, and HFD to accurately reproduce sound over a broad frequency range), and a direction to pursue to achieve a desired result (e.g., using dual drivers to reduce distortion). *See Kubin*, 561 F.3d at 1359 (finding a patent challenger only throws

metaphorical darts when the prior art gives “either no indication of which parameters were critical or no direction as to which of many possible choices is likely to be successful” (citation omitted)).

Finally, Patent Owner argues that Warren teaches away from seating six drivers in a canalphone housing. PO Resp. 18–20. Patent Owner’s argument is based on Figure 14 of Warren, which discloses a personal listening device in which a HFD is seated in first housing 30 disposed in the ear canal, and a LFD is seated in second housing 40 disposed outside the ear canal. *See* Ex. 1005 ¶ 47, Fig. 14. Patent Owner argues, with respect to Figure 14 of Warren:

[B]ecause the ear canal is so small . . . a personal listening device with both a high frequency driver and a low frequency driver requires the use of two separate housings, only one of which fits in the ear canal. This figure, therefore, teaches away from the idea of a canalphone being able to contain six drivers.

PO Resp. 20.

Petitioner argues Warren does not teach away from a six driver canalphone because it does not criticize, discredit, or otherwise discourage investigation into a six driver canalphone. Pet. Reply 7. We agree. Warren describes Figure 14 as “a sectional view of *another exemplary* personal listening device.” Ex. 1005 ¶ 21 (emphasis added). Thus, not only is Figure 14 an *exemplary* device that is “susceptible to various modifications and alternative forms,” but it is one of several exemplary devices disclosed. *Id.* ¶¶ 7–23, 25. In discussing the device shown in Figure 14, Warren neither criticizes, discourages, nor discredits the canalphone shown in Figure 3, described as having one or more single or dual drivers seated in a single canalphone housing. *Id.* ¶¶ 29, 47. Thus, Warren does not teach away from

a canalphone having six drivers. *See In re Fulton*, 391 F.3d 1195, 1201 (Fed. Cir. 2004) (“The prior art’s mere disclosure of more than one alternative does not constitute a teaching away from . . . alternatives because such disclosure does not criticize, discredit, or otherwise discourage the solution claimed . . .”).

Accordingly, for the reasons discussed above, having considered all the arguments and evidence both for and against, we find Petitioner has shown that Warren teaches a canalphone having two LFDs, two MFDs, and two HFDs.

Claim 1 further requires the first and second high frequency drivers to produce similar frequencies, and to be positioned so that the oscillation of one interacts with the oscillation of the other to reduce harmonic distortion. Ex. 1001, 6:9–15. Petitioner contends that the combination of Warren and Mostardo teaches this limitation. *See* Pet. 16–19.

Mostardo discloses a compact hearing aid receiver 10' having a D-shaped housing that allows it to be readily placed in an ear canal. Ex. 1009, 2:21–25. Mostardo discloses placing two identical receivers 10' back-to-back to make dual receiver 10'' in which the armatures in receivers 10' move 180 degrees out-of-phase. *Id.* at 14:19–24, Fig. 15. This arrangement makes the output of dual receiver 10'' double that of single receiver 10'. *Id.* Petitioner, relying on the testimony of Mr. Kadis, contends that an increase in the total output or sound pressure level (SPL) of a receiver, such as Mostardo's dual receiver 10'', increases its headroom, which reduces the likelihood that a given input signal will overdrive and clip its output. *See* Pet. 18–19; Ex. 1003 ¶¶ 52–70. This reduces the harmonic distortion generated by dual receiver 10''. *Id.* Petitioner, relying on the testimony of



Mr. Kadis, argues that Warren teaches an IEM 30 having a dual receiver that is a HFD, and that it would have been obvious to replace Warren's dual HFD with Mostardo's dual receiver 10", thereby reducing the distortion of IEM 30 and improving its capability. *See* Pet. 19–20; Ex. 1003 ¶¶ 69, 71.

Patent Owner argues a person skilled in the art would have had no reason to combine the teachings of Mostardo with the teachings of Warren. PO Resp. 27–31. In particular, relying on the testimony of Dr. Thompson, Patent Owner argues that because Mostardo's dual driver is made to reduce vibrations that can be picked up by a hearing aid microphone rather than to reduce driver distortion, there would have been no reason to use Mostardo's dual driver in a canalphone. PO Resp. 27 (quoting Ex. 2032 ¶¶ 31–32). According to Dr. Thompson, because hearing aid users did not have problems with distortion at the time of the invention and canalphones do not have microphones that pick up driver vibrations, a person of ordinary skill in the art would have had no reason to include Mostardo's dual driver in Warren's IEM or canalphone. *Id.*

Petitioner argues Mostardo teaches more than a solution to the specific problem Mostardo was designed to solve, and that these additional teachings would have been considered by a person of ordinary skill in the art because such a person “need not see the identical problem addressed in a prior art reference to be motivated to apply its teachings.” Pet. Reply 13 (quoting *Cross Med. Prods., Inc. v. Medronic Sofamar Danek, Inc.*, 424 F.3d 1293, 1323 (Fed. Cir. 2005)). We agree with Petitioner.

Mostardo is prior art for all it discloses. *See Amgen*, 314 F.3d at 1357. In addition to disclosing that a dual driver reduces vibration, Mostardo discloses that a dual driver doubles the driver's output or SPL. *See* Ex.

1009, 14:19–27. According to Mr. Kadis, this increases the dual driver’s headroom, reduces the likelihood that an input signal will clip the dual driver’s output, and therefore reduces the dual driver’s distortion. *See* Ex. 1003 ¶¶ 55–68. Therefore, Mr. Kadis opines a person of ordinary skill in the art would have found it obvious to use Mostardo’s dual drivers in Warren’s canalphone to reduce distortion. *Id.* ¶ 59. Patent Owner and Dr. Thompson do not deny that Mostardo teaches a dual driver increases SPL, and do not challenge Mr. Kadis’ opinion that increasing SPL reduces distortion. Moreover, Patent Owner and Dr. Thompson acknowledge that reducing canalphone distortion was a desirable goal in the market. *See* Tr. 53:7–22. As the Supreme Court noted in *KSR*:

When a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one. If a person of ordinary skill can implement a predictable variation, § 103 likely bars its patentability. For the same reason, if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill.

*KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 417 (2007).

Patent Owner, relying on the testimony of Dr. Thompson, further argues that “[n]ot only was there no motivation to include two receivers of the same frequency band in a canalphone at the time of invention, there were actually several reasons not to do so.” PO Resp. 28 (quoting Ex. 2032 ¶ 34). According to Dr. Thompson, these reasons included increased difficulty of manufacturing, increased cost, increased weight causing discomfort to the

user, increased power consumption, and a reduction in available space for other components in the canalphone housing. Ex. 2032 ¶ 34.

The mere fact that a combination of elements that is advantageous in some areas may be disadvantageous in others does not obviate the combination. *See Medichem, S.A. v. Rolabo S.L.*, 437 F.3d 1157, 1165 (Fed. Cir. 2006). Rather, the costs and benefits of the combination have to be weighed. *Id.* We do not find the dual driver costs identified by Dr. Thompson outweigh the benefit Petitioner identifies for combining the teachings of Warren and Mostardo, or negates Petitioner's rationale for combining the references. For example, the fact that a dual driver would cost more is not relevant to the question of obviousness. *See Orthopedic Equip. Co., Inc. v. United States*, 702 F.2d 1005, 1013 (Fed. Cir. 1983) (“[T]he fact that the two disclosed apparatus would not be combined by businessmen for economic reasons” is not “telling on the issue of nonobviousness.”). Similarly, the fact that Knowles manufactured and sold the DTEC dual driver for use in “Subminiature Speakers” that are “[i]deal for premium in-ear designs” and that “can be designed to fit inside ear molds,” and that Dr. Thompson acknowledged that the DTEC dual driver is an embodiment of Mostardo, contradicts Dr. Thompson's opinion that the increased weight, power consumption, or difficulty of manufacturing dual drivers would have lead a person of ordinary skill in the art to *not* use dual drivers in a canalphone. *See* Ex. 2035; *see also* Ex. 1030, 122:8–123:9. Lastly, as discussed above, Knowles' dual drivers did not occupy appreciably more volume than Knowles' single drivers. *See* Exs. 1029 and 2035 (showing the DTEC dual driver occupied a volume of ~180 mm<sup>3</sup>, the

BK/EF single drivers occupied volumes of  $\sim 178 \text{ mm}^3$ , and indicating the DTEC “[c]ase size is equivalent to BK/EF”).

Accordingly, for the reasons discussed above, having considered the evidence both for and against, we are persuaded that Petitioner has demonstrated the combination of Warren and Mostardo teaches first and second high frequency drivers positioned so that the oscillation of one interacts with the oscillation of the other to reduce harmonic distortion as required by claim 1. The combination falls under the rubric that “when a patent claims a structure already known in the prior art that is altered by the mere substitution of one element for another known in the field, the combination must do more than yield a predictable result.” *KSR*, 550 U.S. at 416.

Claim 1 further requires the first and second high frequency drivers to produce distinguishable frequencies to a person using the system in the range of 12–18 kHz. Ex. 1001, 6:15–18. Petitioner contends the combination of Warren, Mostardo, and Van Halteren ’223 teaches this limitation. *See* Pet. 20.

Although Warren discloses a canalphone having a dual HFD, Petitioner acknowledges that “Warren does not disclose a frequency range for its dual HFD.” Pet. 20. Petitioner argues Van Halteren ’223 teaches a dual high frequency driver having a resonance frequency of 2–5 kHz that can output sound at frequencies up to 20 kHz. *Id.*; Ex. 1010 ¶¶ 22, 54. Petitioner, relying on the testimony of Mr. Kadis, therefore argues it would have been obvious to manufacture the dual HFD of Warren/Mostardo to output sound in the 2–20 kHz range as taught by Van Halteren ’223. *See* Pet. 20; Ex. 1003 ¶ 73.

Patent Owner argues a person skilled in the art would have had no reason or motivation to combine the teachings of Van Halteren '223 with the teachings of Warren and Mostardo. PO Resp. 25–31. First, relying on the testimony of Dr. Thompson, Patent Owner argues that Figures 1–3 and 6 of Van Halteren '223 teach a dual driver having two drivers with different resonant frequencies. PO Resp. 25–26; Ex. 2032 ¶ 29. According to Dr. Thompson, this would teach a person of ordinary skill in the art “to *not* use a single speaker module with two drivers of the same frequency range, but rather use a single speaker module with a tweeter [HFD] and a woofer [LFD].” Ex. 2032 ¶ 42 (emphasis added).

Petitioner argues that Patent Owner’s argument improperly limits Van Halteren '223 to its figures, and that Van Halteren '223 more broadly teaches that “transducers 10, 20 may be identical including as to ‘frequency output (e.g., tweeter/midrange/woofer),’” and thus teaches “a dual, same-frequency driver.” Pet. Reply 11–12. We are persuaded by Petitioner’s arguments.

Van Halteren '223 is prior art for *all* that it discloses. *See Amgen*, 314 F.3d at 1357. Although Figures 1–3 of Van Halteren '223 disclose a dual driver having two transducers (i.e., drivers) 10/20 having different resonant frequencies, Van Halteren '223 also discloses “the invention is not intended to be limited to the particular forms disclosed,” and includes “all modifications, equivalents, alternatives, combinations and/or sub-combinations of the disclosed concepts.” Ex. 1010 ¶ 44. As Petitioner recognizes, among the alternative concepts disclosed is one in which the two drivers 10/20 “may be identical or different,” including in their “frequency output.” Ex. 1010 ¶ 54.

Accordingly, considering all the evidence both for and against, we find Petitioner has shown that Van Halteren '223 teaches a dual driver containing identical drivers 10/20 that have identical resonant frequencies, and produce identical output frequencies in the 2–20 kHz range. Moreover, Petitioner has provided a rationale for combining the teachings of Van Halteren '223 with the combined teachings of Warren and Mostardo. In particular, relying on the testimony of Mr. Kadis, Petitioner argues a person of skill in the art would have made the combination in order “to improve the fidelity of Warren’s IEM by providing [a] more faithful reproduction of sound throughout the human hearing range.” Pet. 20. “When a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it . . . . If a person of ordinary skill can implement a predictable variation, § 103 likely bars its patentability.” *KSR*, 550 U.S. at 417.

Upon consideration of Petitioner’s arguments and evidence for the obviousness of claim 1, and Patent Owner’s arguments and evidence that claim 1 is not obvious, we find Petitioner has shown how the combination of Warren, Van Halteren '223, and Mostardo teaches every limitation required by claim 1, and has provided reasoning with a rationale underpinning for combining the teachings of these references. We further find Patent Owner has produced scant evidence of the non-obviousness of claim 1 due to secondary considerations of non-obviousness. In particular, we find that because Patent Owner has relied nearly exclusively on the excluded testimony of Mr. Harvey, Patent Owner has produced no evidence supporting a presumption of nexus between the JH13 and JH16 products and the invention recited in claim 1, has produced no evidence that the invention

recited in claim 1 was commercially successful or copied, and has produced scant evidence of industry praise of the invention recited in claim 1. Patent Owner's only evidence of industry praise (i.e., the CanJam comments and the CNET article) fails to attribute the sound quality of the JH13 product to the positioning of its two HFDs to reduce distortion as required by claim 1. *See Geo. M. Martin Co. v. Alliance Machine Sys. Int'l, LLC*, 618 F.3d 1294, 1305 (Fed. Cir. 2010) ("Industry praise must also be linked to the patented invention."). Moreover, the limited amount of industry praise proffered by Patent Owner fails to show the type of widespread industry recognition that constitutes meaningful evidence of non-obviousness. *See, e.g., Kloster Speedsteel*, 793 F.2d at 1574 (overruled on other grounds).

Accordingly, weighing as a whole Petitioner's arguments and evidence for the obviousness of claim 1, and Patent Owner's arguments and evidence that claim 1 is not obvious, including Patent Owner's evidence of secondary considerations of non-obviousness, we find Petitioner has shown, by a preponderance of evidence, that claim 1 is obvious over the combination of Warren, Van Halteren '223, and Mostardo.

Claim 7 depends from claim 1, and further requires the first and second high frequency drivers each comprise balanced armatures. Ex. 1001, 6:44–46. Petitioner demonstrates how Warren teaches this limitation. *See* Pet. 23. Warren teaches each of devices 32/34 may be a dual, high frequency, balanced armature receiver.<sup>9</sup> Ex. 1005 ¶ 29. As noted above,

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<sup>9</sup> Van Halteren '223 and Mostardo similarly teach dual, balanced-armature receivers. *See* Ex. 1010 ¶¶ 14, 20, 22, 54; Ex. 1009, 14:19–28.

Patent Owner argues dependent claim 7 is patentable for the same reasons as independent claim 1, from which it depends. *See* PO Resp. 60.

Accordingly, for the same reasons discussed above for claim 1, weighing as a whole Petitioner's arguments and evidence for the obviousness of claim 7, and Patent Owner's arguments and evidence that claim 7 is not obvious, including Patent Owner's evidence of secondary considerations of non-obviousness, we find Petitioner has shown, by a preponderance of evidence, that claim 7 is obvious over the combination of Warren, Van Halteren '223, and Mostardo.

*3. Obviousness of Claims 2–4 over Warren, Van Halteren '223, Mostardo, and Harvey '806*

Petitioner argues that claims 2–4 of the '463 patent are unpatentable over Warren, Van Halteren '223, Mostardo, and Harvey '806, and maps the teachings of these references to the limitations required by claims 2–4. Pet. 23–27.

Claim 2 depends from claim 1, and further requires a first sound tube connecting the first and second low frequency drivers and the first and second mid frequency drivers to an outlet on the canalphone housing, and a second sound tube connecting the first and second high frequency drivers to the outlet. Ex. 1001, 6:19–26. Petitioner contends Harvey '806, in combination with Warren, Van Halteren '223, and Mostardo as discussed above, teaches this limitation. *See* Pet. 23–24. Patent Owner argues dependent claim 2 is patentable for the same reasons as independent claim 1, from which it depends. *See* PO Resp. 60.

Harvey '806 discloses a canalphone having an LFD, an MFD, and an HFD, where the output from the LFD and MFD are delivered to the



canalphone housing via a first sound tube, and the output from the HFD is delivered to the canalphone housing via a second sound tube. Ex. 1006, 2:35–40, 6:2–11. Petitioner, relying on the testimony of Mr. Kadis, argues that it would have been obvious to combine Harvey '806's first and second sound tubes with the dual LFD and MFD of Warren, and the dual HFD of the Warren/Mostardo/Van Halteren '223 combination, because Harvey '806 teaches the canalphone housing is large enough to accommodate two sound tubes, and how to direct the sound from the LFD, MFD, and HFD to those two sound tubes. *See* Pet. 24; Ex. 1003 ¶ 84. According to Mr. Kadis, “a person of skill in the art . . . would be motivated to combine Harvey '806's sound tubes with Warren's IEM,” because the combination would allow a configuration that “more readily fits in the limited space of the tip” of Warren's IEM housing. Ex. 1003 ¶ 84.

We are persuaded by Petitioner's argument, which falls under the rubric that “if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill.” *KSR*, 550 U.S. at 417. As Mr. Kadis declares, Harvey '806 teaches using two rather than three sound tubes in a three driver IEM to save space, and this same principle would improve Warren's three driver IEM in the same way.

Accordingly, for the reasons discussed above, weighing as a whole Petitioner's arguments and evidence for the obviousness of claim 2, and Patent Owner's arguments and evidence that claim 2 is not obvious, including Patent Owner's evidence of secondary considerations of non-obviousness, we find Petitioner has shown, by a preponderance of evidence,

that claim 2 is obvious over the combination of Warren, Van Halteren '223, Mostardo, and Harvey '806.

Claim 3 depends from claim 2, and further requires an external damper in the canalphone housing to externally damp the first and second high frequency drivers. Ex. 1001, 6:27–30. Petitioner contends Harvey '806, in combination with Warren, Van Halteren '223, and Mostardo as discussed above, teaches this limitation. *See* Pet. 24–25. Patent Owner argues dependent claim 3 is patentable for the same reasons as independent claim 1, from which it indirectly depends. *See* PO Resp. 60.

Harvey '806 discloses externally damping armature drivers 107 and 109 with respective dampers 317 and 319. Ex. 1006, 5:29–34. Petitioner, relying on the testimony of Mr. Kadis, argues it would have been obvious to combine Harvey '806's dampers with the dual high frequency drivers of Warren/Mostardo/Van Halteren '223 because Harvey '806 teaches the dampers allow the drivers to be tuned “to obtain the best possible performance from an earpiece.” Pet. 25 (quoting Ex. 1006, 2:14–17); Ex. 1003 ¶ 88.

We are persuaded by Petitioner's argument, which falls under the rubric that “[w]hen a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it . . . . If a person of ordinary skill can implement a predictable variation, § 103 likely bars its patentability.” *KSR*, 550 U.S. at 417. Petitioner has identified just such a design incentive—using dampers to tune Warren's HFDs to obtain the best possible performance from Warren's IEM.

Accordingly, for the reasons discussed above, weighing as a whole Petitioner's arguments and evidence for the obviousness of claim 3, and

Patent Owner's arguments and evidence that claim 3 is not obvious, including Patent Owner's evidence of secondary considerations of non-obviousness, we find Petitioner has shown, by a preponderance of evidence, that claim 3 is obvious over the combination of Warren, Van Halteren '223, Mostardo, and Harvey '806.

Claim 4 depends from claim 3, and further requires tuning the first and second high frequency drivers by at least one of the length of the sound tube, the external damper, and the positioning of each high frequency driver with respect to the other high frequency driver.<sup>10</sup> Ex. 1001, 6:31–35.

Petitioner contends Harvey '806, in combination with Warren, Van Halteren '223, and Mostardo, teaches this limitation. *See* Pet. 25–26. Patent Owner argues dependent claim 4 is patentable for the same reasons as independent claim 1, from which it indirectly depends. *See* PO Resp. 60.

Harvey '806 teaches tuning HFD 109 via external damper 319. Ex. 1006, 5:29–34, 5:61–65. Harvey '806 also teaches tuning HFDs relative to LFDs and MFDs by choosing the proper length of the sound tubes for the drivers. *Id.* at 5:65–6:2, 6:24–65. Relying on the testimony of Mr. Kadis, Petitioner argues it would have been obvious to tune the dual HFDs of the Warren/Mostardo/Van Halteren '223 combination by choosing the length of the second sound tube and also by using external dampers, because Harvey

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<sup>10</sup> Neither party has asked for this limitation to be explicitly construed. *See* § II.B, *supra*. We have construed it to have its plain and ordinary meaning. *Id.* Although the plain and ordinary meaning only requires the first and second HFDs to be tuned using one or more of the sound tube length, the external damper, *or* the relative positioning of the two HFDs, Petitioner has demonstrated how the combination of references teaches tuning the first and second HFDs via each of these mechanisms.

'806 teaches doing so to improve an IEM's performance and quality of sound. *See* Pet. 25–27; Ex. 1003 ¶¶ 91–94. According to Mr. Kadis, a person of skill in the art would have been motivated by the teachings of Harvey '806 to tune the dual HFDs by choosing the sound tube length in order to “correct[]the [phase] offset” of the dual HFDs relative to the dual LFDs and MFDs, and to tune the dual HFDs by dampers in order to “tailor the frequency response of the dual HFDs, thereby improving the quality of sound delivered by Warren's IEM.” Ex. 1003 ¶¶ 92, 94.

Regarding tuning the first and second HFDs via their relative positioning, Petitioner argues the antecedent basis for “the positioning” of the HFDs in claim 4 is to be found claim 1, which requires the first and second HFDs to be positioned so that their oscillations interact to reduce distortion. Pet. 27. Relying on the testimony of Mr. Kadis, Petitioner argues that “tuning” refers to optimizing audio performance, and that a person of ordinary skill in the art would have known that positioning first and second HFDs to reduce distortion would have optimized and therefore “tuned” the audio performance of the HFDs. *Id.* (citing Ex. 1003 ¶ 95). Therefore, Petitioner argues, tuning the first and second HFDs by positioning them with respect to one another as required by claim 4 would have been obvious in view of the teachings of Warren, Van Halteren '223, and Mostardo for the reasons discussed above with respect to positioning the two drivers so that their oscillations interact to reduce distortion as required by claim 1. *Id.* We agree for the reasons discussed in § II.H.2, *supra*.

Accordingly, for the reasons discussed above, weighing as a whole Petitioner's arguments and evidence for the obviousness of claim 4, and Patent Owner's arguments and evidence that claim 4 is not obvious,

including Patent Owner's evidence of secondary considerations of non-obviousness, we find Petitioner has shown, by a preponderance of evidence, that claim 4 is obvious over the combination of Warren, Van Halteren '223, Mostardo, and Harvey '806.

*4. Obviousness of Claims 5 and 6 over Warren, Van Halteren '223, Mostardo, Sperrazza, and Babb*

Claim 5 depends from claim 1, and further requires the first and second high frequency drivers to have a lighter combined mass, thereby increasing each drivers' transient response. Ex. 1001, 6:36–39. According to the '463 patent, the combined mass of HFDs 14a/b is “substantially lighter than a standard canalphone high frequency driver's mass.” *Id.* at 4:10–24. Petitioner contends the teachings of Sperrazza, in combination with the Warren/Van Halteren '223/Mostardo combination discussed above, and further in combination with the teachings of Babb discussed below, teaches this limitation.<sup>11</sup> *See* Pet. 28–29. Patent Owner argues dependent claim 5 is patentable for the same reasons as independent claim 1, from which it depends. *See* PO Resp. 60.

Mostardo teaches the resonance frequency of an armature based driver can be increased by reducing the effective mass seen by the armature, and combining two such armature based drivers into a dual armature driver having an effectively reduced mass. Ex. 1009, 6:28–30, 10:32–36, 14:19–21. Sperrazza teaches the transient response of a speaker is inversely proportional to its moving mass, and can be increased by reducing the

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<sup>11</sup> Although Petitioner argues claim 5 is unpatentable over a combination of references that includes Babb, Petitioner does not rely on any disclosure from Babb in its challenge of claim 5. *See* Pet. 28–29.

moving mass of the speaker. Ex. 1011, 3:34–45. Petitioner, relying on the testimony of Mr. Kadis, argues it would have been obvious to combine the teachings Sperrazza with the Warren/Van Halteren '223/Mostardo combination. *See* Pet. 29. According to Mr. Kadis, Sperrazza's teaching that reducing a receiver's mass increases its transient response "is a basic principle of physics that a person of skill in the art would have known," and that a person skilled in the art would have therefore found it obvious to combine the teachings of Warren, Van Halteren '223, Mostardo, and Sperrazza "to improve the overall fidelity of Warren's IEM by improving the transient response of the dual HFDs." Ex. 1003 ¶¶ 105–106.

We are persuaded by Petitioner's argument, which falls under the rubric that "if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill." *KSR*, 550 U.S. at 417. As Mr. Kadis declares, Sperrazza teaches reducing a drivers mass increases its transient response, and this same principle would increase the transient response of the dual HFD in the Warren/Van Halteren '223/Mostardo combination.

Accordingly, for the reasons discussed above, weighing as a whole Petitioner's arguments and evidence for the obviousness of claim 5, and Patent Owner's arguments and evidence that claim 5 is not obvious, including Patent Owner's evidence of secondary considerations of non-obviousness, we find Petitioner has shown, by a preponderance of evidence, that claim 5 is obvious over the combination of Warren, Van Halteren '223, Mostardo, Sperrazza, and Babb.

Claim 6 depends from claim 5, and further requires the lighter mass of the combined first and second high frequency drivers to reduce the system's power requirements. Ex. 1001, 6:40–43. Petitioner contends the teachings of Babb, when combined with the teachings of Sperrazza and the Warren/Van Halteren '223/Mostardo combination as discussed above, teaches this limitation. *See* Pet. 29–30. Patent Owner argues dependent claim 6 is patentable for the same reasons as independent claim 1, from which it indirectly depends. *See* PO Resp. 60.

Babb teaches reducing the mass of a loudspeaker's driver reduces the loudspeaker's power requirements. Ex. 1012 ¶¶ 7, 33. Petitioner, relying on the testimony of Mr. Kadis, argues it would have been obvious to combine the teachings of Babb with the Warren/Van Halteren '223/Mostardo/Sperrazza combination. *See* Pet. 30. According to Mr. Kadis, Babb's teaching that reducing speaker mass reduces power consumption "is a basic principle of physics that a person of skill in the art would have known," and that a person skilled in the art would therefore have found it obvious to combine the teachings of Babb with the Warren/Van Halteren '223/Mostardo/Sperrazza combination to reduce the power consumption of the Warren/Van Halteren '223/Mostardo/Sperrazza IEM because IEMs are typically battery powered. Ex. 1003 ¶¶ 112–114. Reducing power consumption would, therefore, increase battery lifetime of the IEM.

We are persuaded by Petitioner's argument, which falls under the rubric that "if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill." *KSR*, 550 U.S. at 417. As Mr. Kadis

declares, Babb teaches reducing a drivers mass reduces its power consumption, and this same principle would reduce the power consumption of the dual HFD in the Warren/Van Halteren '223/Mostardo/Sperrazza combination, and, therefore, the power consumption of the IEM.

Accordingly, for the reasons discussed above, weighing as a whole Petitioner's arguments and evidence for the obviousness of claim 6, and Patent Owner's arguments and evidence that claim 6 is not obvious, including Patent Owner's evidence of secondary considerations of non-obviousness, we find Petitioner has shown, by a preponderance of evidence, that claim 6 is obvious over the combination of Warren, Van Halteren '223, Mostardo, Sperrazza, and Babb.

*5. Obviousness of Claim 8 over Warren, Van Halteren '223, Mostardo, and Harvey '479*

Claim 8 depends from claim 1, and further requires a first crossover connecting the first and second LFDs with a low frequency portion of an input signal, a second crossover connecting the first and second MFDs with a midrange frequency portion of the input signal, and a third crossover connecting the first and second HFDs with the high frequency portion of the input signal. Ex. 1001, 6:47–59. Petitioner contends Harvey '479, in combination with Warren, Van Halteren '223, and Mostardo as discussed above, teaches this limitation. *See* Pet. 30–32. Patent Owner argues dependent claim 8 is patentable for the same reasons as independent claim 1, from which it depends. *See* PO Resp. 60.

Warren teaches providing a crossover network to transducers 32/34, which may be dual LFDs, MFDs, or HFDs. *See* Ex. 1005 ¶¶ 29, 49. Harvey '479 teaches a crossover network that provides low frequency components



of an input signal to an LFD, midrange frequency components of the input signal to an MFD, and high frequency components of the input signal to an HFD. *See* Ex. 1013 ¶¶ 8, 25, Fig. 2. Petitioner, relying on the testimony of Mr. Kadis, argues it would have been obvious to combine the crossover network of Harvey '479 with the dual LFDs, MFDs, and HFDs of the Warren/Van Halteren '223/Mostardo combination. *See* Pet. 31–32.

According to Mr. Kadis, a person of ordinary skill in the art would have found it obvious to combine the crossover network of Harvey '479 with the Warren/Van Halteren '223/Mostardo combination because doing so would “yield an IEM that accurately reproduces sound across the entire frequency range by directing different frequency portions of the [input] signal to the drivers optimized for that [portion of the] frequency range, thereby improving the high- fidelity performance of the IEM.” Ex. 1003 ¶ 121.

We are persuaded by Petitioner’s argument, which falls under the rubric that “[t]he combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.” *KSR*, 550 U.S. at 416.

Accordingly, for the reasons discussed above, weighing as a whole Petitioner’s arguments and evidence for the obviousness of claim 8, and Patent Owner’s arguments and evidence that claim 8 is not obvious, including Patent Owner’s evidence of secondary considerations of non-obviousness, we find Petitioner has shown, by a preponderance of evidence, that claim 8 is obvious over the combination of Warren, Van Halteren '223, Mostardo, and Harvey '479.

6. *Obviousness of Claim 9 over Warren, Mostardo, and Sperrazza*

Claim 9 is an independent claim that is similar in scope to claim 5, which depends from claim 1. *Compare* Ex. 1001, 5:64–6:18 and 6:36–39, *with* Ex. 1001, 6:60–7:15. Claim 9 requires all the limitations required by claim 5, but does not require the first and second high frequency drivers to produce frequencies in the 12–18 kHz range. *Id.* Petitioner applies the same teachings from Warren, Mostardo, and Sperrazza that Petitioner applied to the corresponding limitations of claim 5 to argue the unpatentability of claim 9 over this combination of references.<sup>12</sup> *See* Pet. 32–34; *see also* Pet. 15–23 and 28–29. Patent Owner argues claim 9 is patentable for the same reasons as claim 1, discussed in § II.H.2, *supra*. *See* PO Resp. 7–60.

Accordingly, for the same reasons discussed in §§ II.H.2 and II.H.4, *supra*, weighing as a whole Petitioner’s arguments and evidence for the obviousness of claim 9, and Patent Owner’s arguments and evidence that claim 9 is not obvious, including Patent Owner’s evidence of secondary considerations of non-obviousness, we find Petitioner has shown, by a preponderance of evidence, that claim 9 is unpatentable over the combination of Warren, Mostardo, and Sperrazza.

7. *Obviousness of Claims 10 and 11 over Warren, Mostardo, Sperrazza, and Harvey ’806*

Claim 10 depends from claim 9, and further requires a first sound tube connecting the first and second LFDs and the first and second MFDs to an

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<sup>12</sup> Petitioner does not rely on the teachings of Van Halteren ’223, relied on in Petitioner’s challenge of claims 1 and 5 to teach a HFD outputting frequencies in the 12–18 kHz frequency range, because claim 9 does not require the HFDs to output frequencies in that range. *Compare* Ex. 1001, 5:64–6:18 and 6:36–39, *with* Ex. 1001, 6:60–7:15.

outlet of the canalphone housing, and a second sound tube connecting the first and second HFDs to the outlet of the canalphone housing. Ex. 1001, 7:16–24. Claim 10 thus combines limitations recited in claims 1, 2, and 5. *Compare* Ex. 1001, 5:64–6:26 and 6:36–39, *with* Ex. 1001, 6:60–7:24. Petitioner applies the same teachings from Warren, Mostardo, Sperrazza, and Harvey '806 that Petitioner applied to the corresponding limitations required by claims 1, 2, and 5 to argue the unpatentability of claim 10 over this combination of references. *See* Pet. 34–35, 51–57. Patent Owner argues claim 10 is patentable for the same reasons as claim 9. *See* PO Resp. 60.

Accordingly, for the same reasons discussed in §§ II.H.2–II.H.4, *supra*, weighing as a whole Petitioner's arguments and evidence for the obviousness of claim 10, and Patent Owner's arguments and evidence that claim 10 is not obvious, including Patent Owner's evidence of secondary considerations of non-obviousness, we find Petitioner has shown, by a preponderance of evidence, that claim 10 is unpatentable over the combination of Warren, Mostardo, Sperrazza, and Harvey '806.

Claim 11 depends from claim 10, and further requires an external damper to externally damp the first and second high frequency drivers, and tuning the first and second high frequency drivers by at least one of the length of the second sound tube, the external damper, and the respective positioning of the first and second high frequency drivers. Ex. 1001, 7:25–32. Claim 11 thus combines limitations recited in claims 1–5. *Compare* Ex. 1001, 5:64–6:39, *with* Ex. 1001, 6:60–7:32. Petitioner applies the same teachings from Warren, Mostardo, Sperrazza, and Harvey '806 that Petitioner applied to the corresponding limitations required by claims 1–5 to

argue the unpatentability of claim 11 over this combination of references. *See* Pet. 34–35, 51–57. Patent Owner argues claim 11, which indirectly depends from claim 9, is patentable for the same reasons as claim 9. *See* PO Resp. 60.

Accordingly, for the same reasons discussed in §§ II.H.2–II.H.4, *supra*, weighing as a whole Petitioner’s arguments and evidence for the obviousness of claim 11, and Patent Owner’s arguments and evidence that claim 11 is not obvious, including Patent Owner’s evidence of secondary considerations of non-obviousness, we find Petitioner has shown, by a preponderance of evidence, that claim 11 is unpatentable over the combination of Warren, Mostardo, Sperrazza, and Harvey ’806.

8. *Obviousness of Claim 12 over the combination of Warren, Mostardo, Sperrazza, Harvey ’806, and Harvey ’479*

Claim 12 depends from claim 10, and further requires a first crossover connecting the first and second LFDs with a low frequency portion of an input signal, a second crossover connecting the first and second MFDs with a midrange frequency portion of the input signal, and a third crossover connecting the first and second HFDs with the high frequency portion of the input signal. Ex. 1001, 7:33–45. Claim 12 thus combines limitations recited in claims 1, 2, 5, and 8. *Compare* Ex. 1001, 5:64–6:26, 6:36–39, and 6:47–59, *with* Ex. 1001, 6:60–7:24 and 7:33–45. Petitioner applies the same teachings from Warren, Mostardo, Sperrazza, Harvey ’806, and Harvey ’479 that Petitioner applied to the corresponding limitations required by claims 1, 2, 5, and 8 to argue the unpatentability of claim 12 over this combination of references. *See* Pet. 35, 51–57. Patent Owner argues claim 12, which

indirectly depends from claim 9, is patentable for the same reasons as claim 9. *See* PO Resp. 60.

Accordingly, for the same reasons discussed in §§ II.H.2–II.H.5, *supra*, weighing as a whole Petitioner’s arguments and evidence for the obviousness of claim 12, and Patent Owner’s arguments and evidence that claim 12 is not obvious, including Patent Owner’s evidence of secondary considerations of non-obviousness, we find Petitioner has shown, by a preponderance of evidence, that claim 12 is unpatentable over the combination of Warren, Mostardo, Sperrazza, Harvey ’806, and Harvey ’479.

*9. Obviousness of Claim 13 over Warren, Mostardo, Sperrazza, Van Halteren ’223, and Babb*

Claim 13 depends from claim 9, and further requires the first and second high frequency drivers each comprise balanced armatures, produce frequencies in the 12–18 kHz range, and have a lighter combined mass that reduces the canalphone’s power requirements. Ex. 1001, 7:46–53. Claim 13 thus combines limitations recited in claims 1, 2, and 5–7. *Compare* Ex. 1001, 5:64–6:26 and 6:36–46, *with* Ex. 1001, 6:60–7:15 and 7:46–53. Petitioner applies the same teachings from Warren, Mostardo, Sperrazza, Van Halteren ’223, and Babb that Petitioner applied to the corresponding limitations required by claims 1, 2, and 5–7 to argue the unpatentability of claim 13 over this combination of references. *See* Pet. 35–36, 51–58. Patent Owner argues claim 13, which depends from claim 9, is patentable for the same reasons as claim 9. *See* PO Resp. 60.

Accordingly, for the same reasons discussed in §§ II.H.2–II.H.4, *supra*, weighing as a whole Petitioner’s arguments and evidence for the

obviousness of claim 13, and Patent Owner's arguments and evidence that claim 13 is not obvious, including Patent Owner's evidence of secondary considerations of non-obviousness, we find Petitioner has shown, by a preponderance of evidence, that claim 13 is unpatentable over the combination of Warren, Mostardo, Sperrazza, Van Halteren '223, and Babb.

*10. Obviousness of Claims 14 and 16 over Warren, Mostardo, Harvey '806, Harvey '479, and Van Halteren '223*

Claim 14 is an independent claim that substantially combines the limitations recited in independent claim 1 and claims 2 and 8, which depend from claim 1. *Compare* Ex. 1001, 5:64–6:26 and 6:47–59, *with* Ex. 1001, 7:54–8:42. Claim 14 therefore requires all the limitations required by claims 1, 2, and 8, and further requires the second high frequency driver to be tuned with the first high frequency driver to deliver lower distortion than two canalphone high frequency drivers that do not interact with one another. *Id.*

Petitioner applies the same teachings from Warren, Mostardo, Harvey '806, Harvey '479, and Van Halteren '223 that Petitioner applied to the corresponding limitations required by claims 1, 2, and 8 to argue the unpatentability of claim 14 over this combination of references. *See* Pet. 36–37, 51–55, and 58–59. Petitioner further argues that the additional limitation required by claim 14—that the second high frequency driver be tuned with the first high frequency driver to lower distortion—encompasses reducing distortion by “positioning the two HFDs, as well as tuning via sound tube length or external dampers.” Pet. 37. Petitioner, relying on the testimony of Mr. Kadis, therefore argues that this additional high frequency driver “tuning” limitation is obvious in view of Warren and Mostardo for the same reason discussed above with respect to claim 1 because positioning the

first and second HFDs so that their oscillations interact to reduce distortion as required by claim 1 also “tunes” the first and second HFDs. *See* Pet. 17–20 and 37; Ex. 1003 ¶¶ 52–71 and 171–172. Patent Owner does not dispute Petitioner’s contention that tuning the first and second high frequency drivers to reduce distortion, as required by claim 14, can be achieved by positioning the first and second high frequency drivers to reduce distortion, as required by claim 1. Moreover, we agree with Petitioner’s interpretation of this limitation. Patent Owner argues claim 14 is patentable for the same reasons as claim 1, discussed in § II.H.2, *supra*. *See* PO Resp. 60.

Accordingly, for the same reasons discussed in §§ II.H.2, II.H.3, and II.H.4, *supra*, weighing as a whole Petitioner’s arguments and evidence for the obviousness of claim 14, and Patent Owner’s arguments and evidence that claim 14 is not obvious, including Patent Owner’s evidence of secondary considerations of non-obviousness, we find Petitioner demonstrates, by a preponderance of evidence, that claim 14 is unpatentable over Warren, Mostardo, Harvey ’806, Harvey ’479, and Van Halteren ’223.

Claim 16 depends from claim 14, and further requires an external damper to damp the first and second high frequency drivers, and tuning the first and second high frequency drivers by at least one of the length of the second sound tube, the external damper, and the positioning of each high frequency driver with respect to the other high frequency driver. Ex. 1001, 8:51–58. Claim 16 thus substantially combines the limitations recited in claims 1–4 and 8. *Compare* Ex. 1001, 5:64–6:35 and 6:47–59, *with* Ex. 1001, 7:54–8:42 and 8:51–58. Petitioner applies the same teachings from Warren, Mostardo, Harvey ’806, Harvey ’479, and Van Halteren ’223 that Petitioner applied to the corresponding limitations required by claims 1–

4 and 8 to argue the unpatentability of claim 16 over this combination of references. *See* Pet. 38, 51–55, and 58–60. Patent Owner argues claim 16, which depends from claim 14, is patentable for the same reasons as claim 14. *See* PO Resp. 60.

Accordingly, for the same reasons discussed in §§ II.H.2, II.H.3, and II.H.4, *supra*, weighing as a whole Petitioner’s arguments and evidence for the obviousness of claim 16, and Patent Owner’s arguments and evidence that claim 16 is not obvious, including Patent Owner’s evidence of secondary considerations of non-obviousness, we find Petitioner has shown, by a preponderance of evidence, that claim 16 is unpatentable over the combination of Warren, Mostardo, Harvey ’806, Harvey ’479, and Van Halteren ’223.

*11. Obviousness of Claim 15 over Warren, Mostardo, Harvey ’806, Harvey ’479, Van Halteren ’223, Sperrazza, and Babb*

Claim 15 depends from claim 14, and further requires the first and second high frequency drivers each comprise balanced armatures, and have a lighter combined mass that increases the transient responses of the first and second high frequency drivers and reduces the canalphone’s power requirements. Ex. 1001, 8:43–50. Claim 15 thus combines limitations recited in claims 1, 2, and 5–8. *Compare* Ex. 1001, 5:64–6:26 and 6:36–59, *with* Ex. 1001, 7:54–8:50. Petitioner applies the same teachings from Warren, Mostardo, Harvey ’806, Harvey ’479, Van Halteren ’223, Sperrazza, and Babb that Petitioner applied to the corresponding limitations required by claims 1, 2, and 5–8 to argue the unpatentability of claim 15 over this combination of references. *See* Pet. 38, 51–55 and 58–60. Patent



Owner argues claim 15, which depends from claim 14, is patentable for the same reasons as claim 14. *See* PO Resp. 60.

Accordingly, for the same reasons discussed in §§ II.H.2–II.H.5, *supra*, weighing as a whole Petitioner’s arguments and evidence for the obviousness of claim 15, and Patent Owner’s arguments and evidence that claim 15 is not obvious, including Patent Owner’s evidence of secondary considerations of non-obviousness, we find Petitioner has shown, by a preponderance of evidence, that claim 15 is unpatentable over the combination of Warren, Mostardo, Harvey ’806, Harvey ’479, and Van Halteren ’223.

### III.CONCLUSION

We have reviewed the Petition, Patent Owner’s Response, and Petitioner’s Reply. We have considered all of the arguments made by Petitioner and Patent Owner, as well as the evidence for and against obviousness, including the evidence of secondary considerations of non-obviousness. We have weighed and assessed the entirety of this evidence as a whole.

We are persuaded, for the reasons discussed in § II.H.1–11 *supra*, that Petitioner has demonstrated, by a preponderance of evidence, the unpatentability of claims 1–16 of the ’463 patent.

IV. ORDER

It is ORDERED that claims 1–16 of the '463 patent are unpatentable;  
and

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

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Patent 8,897,463 B2

For PETITIONER:

Hillary A. Brooks  
Delfina S. Homen  
hillary@brooksquinn.com  
delfina@brooksquinn.com

For PATENT OWNER:

Daniel B. Ravicher  
ravicher@gmail.com