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Paper 47
Entered: May 31, 2022

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner,

v.

KOSS COPRORATION,
Patent Owner.

IPR2021-00305
Patent 10,506,325 B1

Before DAVID C. MCKONE, GREGG I. ANDERSON,
and NORMAN H. BEAMER, *Administrative Patent Judges*.

MCKONE, *Administrative Patent Judge*.

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

I. INTRODUCTION

A. Background and Summary

Apple Inc. ("Petitioner") filed a Petition (Paper 2, "Pet.") requesting *inter partes* review of claims 1–4, 9, 10, and 14–18 of U.S. Patent No. 10,506,325 B1 (Ex. 1001, "the '325 patent"). Pet. 1. Koss Corp. ("Patent Owner") filed a Preliminary Response (Paper 9, "Prelim. Resp."). Pursuant to our authorization, Petitioner filed a Preliminary Reply (Paper 12) and Patent Owner filed a Preliminary Sur-Reply (Paper 13). Pursuant to 35 U.S.C. § 314, we instituted this proceeding. Paper 14 ("Dec.").

Patent Owner filed a Patent Owner's Response (Paper 20, "PO Resp."), Petitioner filed a Reply to the Patent Owner's Response (Paper 35, "Reply"), and Patent Owner filed a Sur-reply to the Reply (Paper 42, "Sur-reply"). An oral argument was held in this proceeding on March 3, 2022. Paper 46 ("Tr.").

We have jurisdiction under 35 U.S.C. § 6. This Decision is a final written decision under 35 U.S.C. § 318(a) as to the patentability of claims 1–4, 9, 10, and 14–18. Based on the record before us, Petitioner has proved, by a preponderance of the evidence, that claims 1–4, 9, 10, and 14–17 are unpatentable, but has not proved that claim 18 is unpatentable.

B. Related Matters

1. Lawsuits

Petitioner advises us that it is a defendant in a case filed by Patent Owner asserting the '325 patent in the United States District Court for the Western District of Texas ("Texas court") captioned *Koss Corp. v. Apple Inc.*, Case No. 6:20-cv-00665 (W.D. Tex.) ("Texas case"). Pet. 79; *see also* Paper 11, 1. Patent Owner identifies another three lawsuits where Patent

Owner is plaintiff and the ’325 patent is asserted against other parties. Paper 11, 1. Patent Owner identifies two other cases involving the ’325 patent, including one filed by Petitioner in the United States District Court for the Northern District of California captioned *Apple Inc. v. Koss Corp.*, Case No. 4:20-cv-05504 (N.D. Cal.). Paper 11, 1.

2. Inter Partes Review Proceedings

Patent Owner (Paper 11, 1–2; Paper 30, 1) lists the following *inter partes* review proceedings[1] challenging the ’325 patent or patents related to the ’325 patent:

Bose Corp. v. Koss Corp., IPR2021-00297, filed December 7, 2020, challenging U.S. Patent No. 10,368,155 B2;

Apple Inc. v. Koss Corp., IPR2021-00381, filed January 4, 2021, challenging U.S. Patent No. 10,491,982 B1;

Apple Inc. v. Koss Corp., IPR2021-00546, filed February 22, 2021, challenging U.S. Patent No. 10,206,025 B1;

Apple Inc. v. Koss Corp., IPR2021-00592, filed March 2, 2021, challenging U.S. Patent No. 10,469,934 B1;

Bose Corp. v. Koss Corp., IPR2021-00612, filed March 3, 2021, challenging U.S. Patent No. 10,206,025 B1;

Apple Inc. v. Koss Corp., IPR2021-00626, filed March 17, 2021, challenging U.S. Patent No. 10,206,025 B1;

Bose Corp. v. Koss Corp., IPR2021-00680, filed March 17, 2021, challenging U.S. Patent No. 10,469,934 B1, filed March 17, 2021;

[1] *Apple Inc. v. Koss Corp.*, IPR2021-00255, filed November 25, 2020, and *Apple Inc. v. Koss Corp.*, IPR2021-00600, filed March 7, 2021, both challenging U.S. Patent No. 10,298,451 B1 are also pending.

Apple Inc. v. Koss Corp., IPR2021-00679, filed March 22, 2021, challenging the '325 patent;

Apple Inc. v. Koss Corp., IPR2021-00686, filed March 22, 2021, challenging U.S. Patent No. 10,491,982 B1;

Apple Inc. v. Koss Corp., IPR2021-00693, filed March 23, 2021, challenging U.S. Patent No. 10,469,934 B1;

Apple Inc. v. Koss Corp., IPR2022-00053, filed October 15, 2021, challenging U.S. Patent No. 10,206,025 B1; and

Apple Inc. v. Koss Corp., IPR2022-00188, filed November 15, 2021, challenging U.S. Patent No. 10,469,934 B1.

C. The '325 Patent

The '325 patent describes wireless earphones or headphones. Ex. 1001, 2:3–5. Figure 1D, reproduced below, illustrates an example:

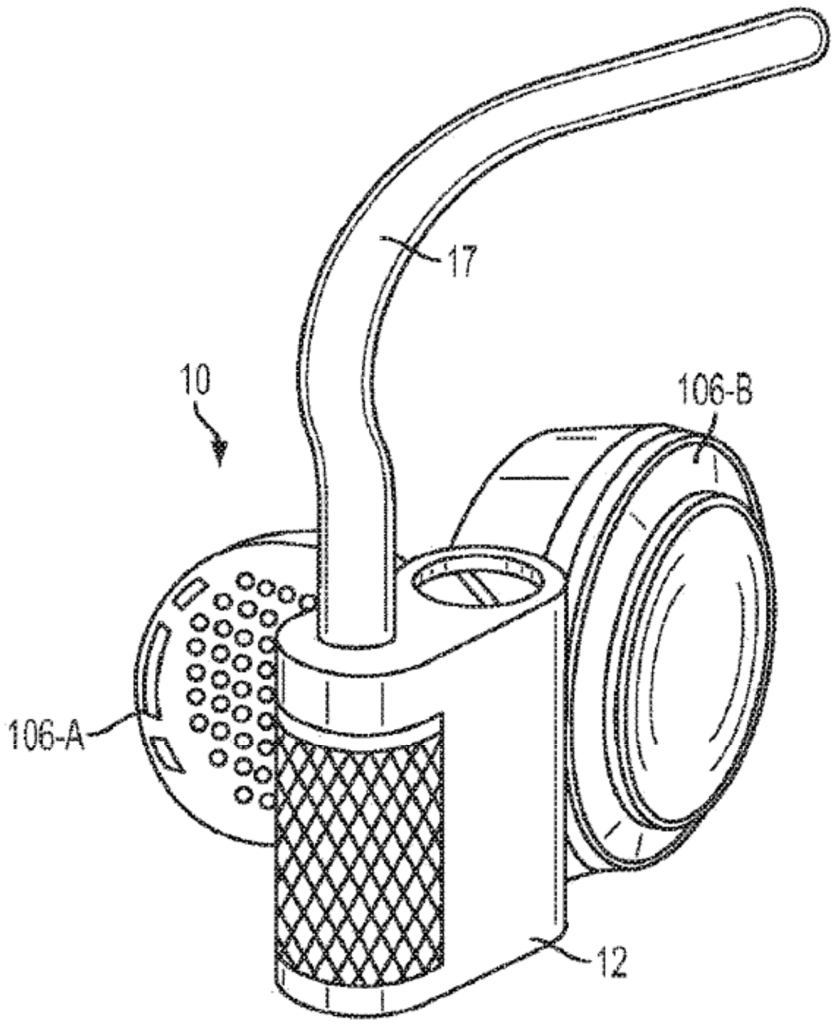

FIG. 1D

Figure 1D is a perspective drawing of a wireless earphone. *Id.* at 2:30–31, 4:7. In this embodiment, earphone 10 includes hanger bar 17 that allows earphone 10 to clip to, or hang on, a listener's ear. *Id.* at 4:4–7. Speaker element 106-A is sized to fit into the cavum concha of the listener. *Id.* at 4:10–12. Hanger bar 17 includes a horizontal section that rests upon the upper external curvature of the listener's ear behind the upper portion of the auricula (or pinna). *Id.* at 4:14–18.

Certain features of an embodiment of a wireless earphone are depicted in Figure 3, reproduced below:

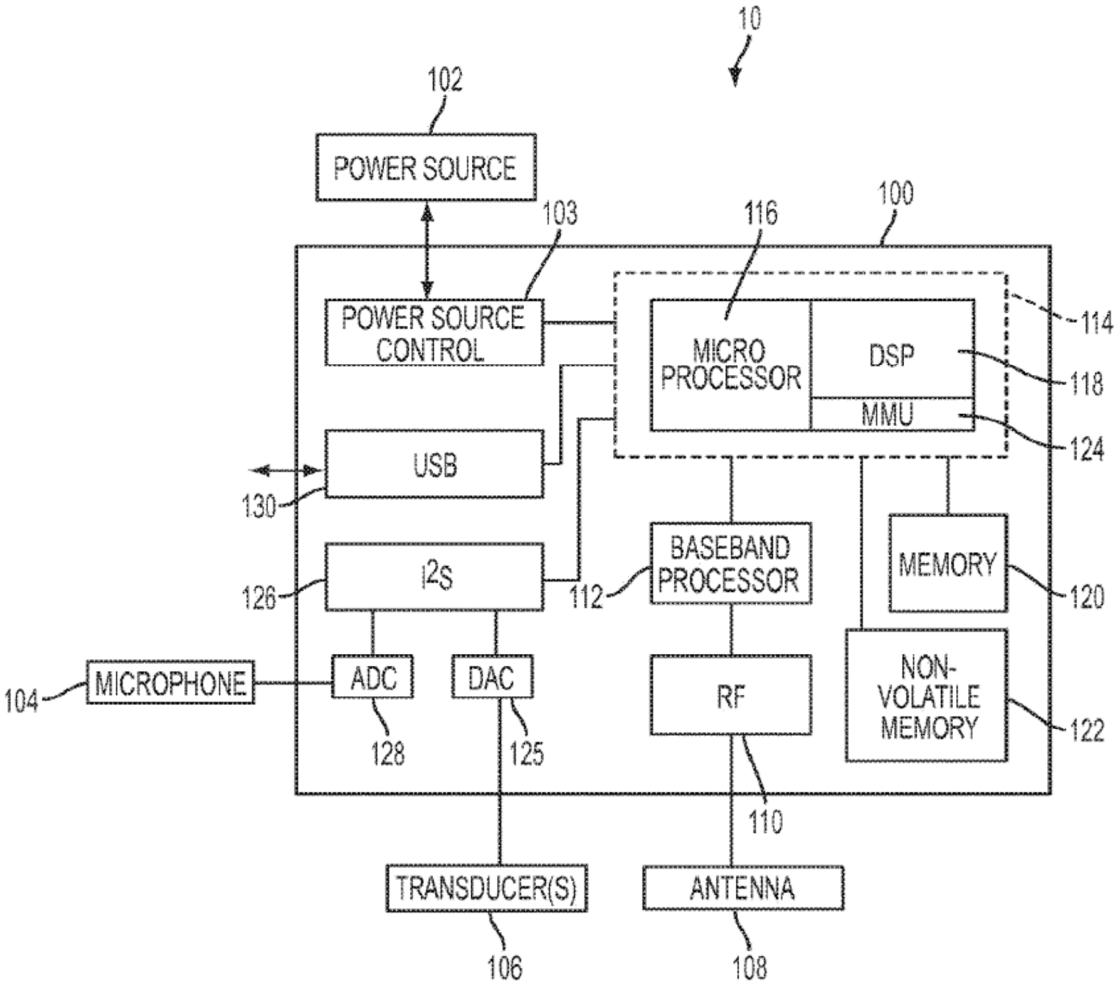

FIG. 3

Figure 3 is a block diagram of a wireless earphone. *Id.* at 2:35–36, 6:30–31.

Earphone 10 includes transceiver circuit 100, power source 102, microphone 104, acoustic transducer 106 (e.g., a speaker), and antenna 108. *Id.* at 6:31–37. Transceiver circuit 100, power source 102, and acoustic transducer 106 may be housed within body 12 of earphone 10 (shown in Fig. 1D above). *Id.* at 6:37–40. Microphone 104 and antenna 108 are external to body 12. *Id.* at 6:40–42. Earphone 10 incudes baseband processor 112 in communication with processor unit 114 which, in turn, includes microprocessor 116 and digital signal processor (DSP) 118. *Id.* at

7:30–32. DSP 118 "may . . . perform various sound quality enhancements to the digital audio received by the baseband processor 112, including noise cancellation and sound equalization." *Id.* at 7:34–38. Processor unit 114 executes firmware that may be stored on memory units 120, 122. *Id.* at 7:43–46. The '325 patent describes headphone 10 receiving firmware upgrades from a host server when earphone 10 is connected to a client computer device through a USB port and/or docking station. *Id.* at 9:50–56. "The power source 102 may comprise, for example, a rechargeable or non-rechargeable battery (or batteries). . . . In embodiments where the power source 102 comprises a rechargeable battery cell . . ., the battery cell . . . may be charged for use, for example, when the earphone 10 is connected to a docking station or computer." *Id.* at 6:56–65.

Earphone 10 may interface with an external device, such as the docking station shown in Figure 4A, reproduced below:

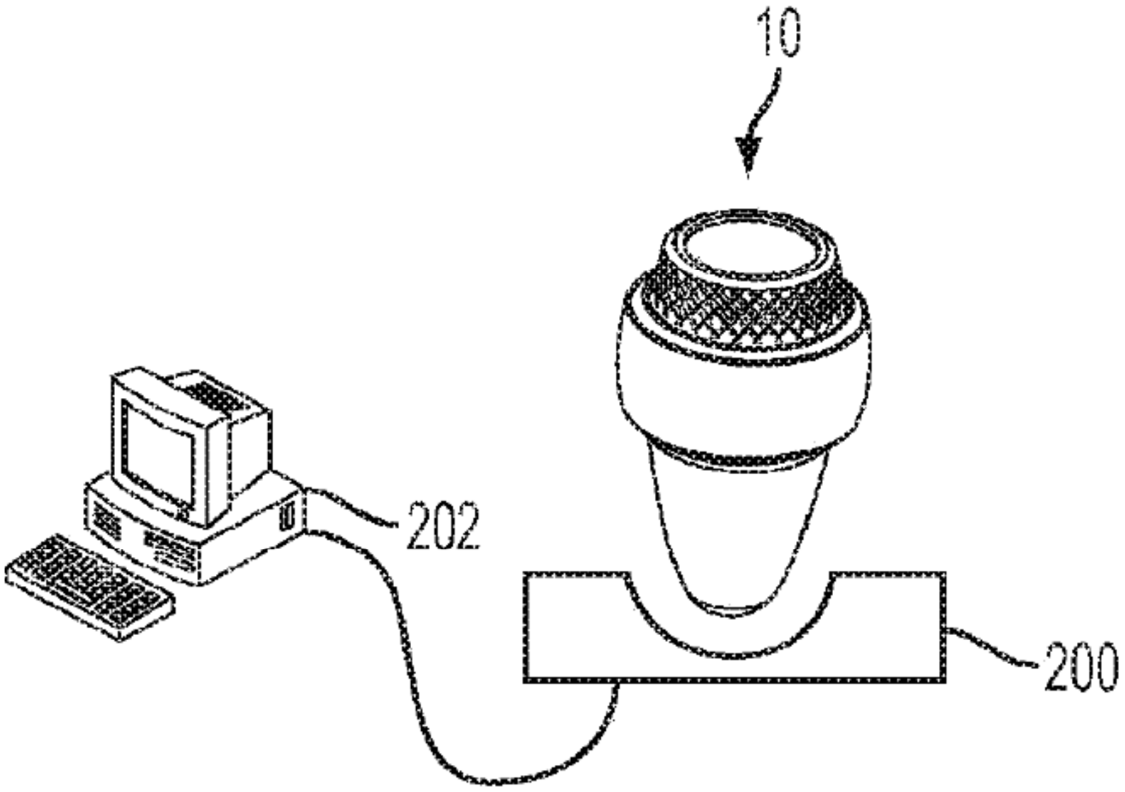

FIG. 4A

Figure 4A is a drawing showing earphone 10 interfacing with docking station 200, which is connected to computer device 202. *Id.* at 7:64–66. Earphone 10 may connect to docking station 102 to charge up power source 102 and to download data or firmware. *Id.* at 8:5–8.

Claims 1, 9, and 18, reproduced below, are illustrative of the claimed subject matter:

> 1. Headphones comprising:
>
> a pair of first and second wireless earphones to be worn simultaneously by a user, wherein the first and

second earphones are separate such that when the headphones are worn by the user, the first and second earphones are not physically connected, wherein each of the first and second earphones comprises:

a body portion;

an earbud extending from the body portion that is inserted into an ear of the user when worn by the user;

a curved hanger bar connected to the body portion, wherein the curved hanger bar comprises a portion that rests upon an upper external curvature of an ear of the user behind an upper portion of an auricula of the ear of the user;

a wireless communication circuit for receiving and transmitting wireless signals;

a processor circuit connected to the wireless communication circuit;

at least one acoustic transducer for producing audible sound from the earbud;

a microphone for picking up utterances of a user of the headphones;

an antenna connected to the wireless communication circuit; and

a rechargeable power source; and

a docking station for holding at least the first wireless earphone, wherein the docking station comprises a power cable for connecting to an external device to power the docking station, and wherein the docking station is for charging at least the first wireless earphone when the first wireless earphone is placed in the docking station.

9. The headphones of claim 1, the processor circuits of the headphones are configured to receive firmware upgrades transmitted from a remote network server.

18. The headphones of claim 1, wherein the processor circuit of each of the first and second earphones comprises:

a digital signal processor that provides a sound quality enhancement for the audio content played by the at least one acoustic transducers of the earphone; and

a baseband processor circuit that is in communication with the wireless communication circuit of the earphone.

D. Evidence

Petitioner relies on the references listed below.

Reference		Date	Exhibit No.
Rosener	US 2008/0076489 A1	pub. Mar. 27, 2008	1004
Huddart	US 7,627,289 B2	pub. Dec. 1, 2009 filed Dec. 23, 2005	1005
Haupt	WO 2006/042749 A2	pub. Apr. 27, 2006	1006[2]
Price	US 2006/0026304 A1	pub. Feb. 2, 2006	1008
Paulson	US 7,551,940 B2	iss. June 23, 2009 filed Jan. 8, 2004	1009
Vanderelli	US 7,027,311 B2	iss. Apr. 11, 2006	1010

Petitioner also relies on the Declaration of Jeremy Cooperstock, Ph.D. (Ex. 1003, "Cooperstock Decl."), and the Supplemental Declaration of Dr. Cooperstock (Ex. 1023, "Supp. Cooperstock Decl.").

[2] We refer to a certified translation of the German language publication of WO 2006/042749.

Patent Owner relies on the Declaration of Joseph C. McAlexander III (Ex. 2035, "McAlexander Decl.") and the Declaration of Nicholas S. Blair (Ex. 2036, "Blair Decl.").

E. The Asserted Grounds

We instituted on the following grounds of unpatentability (Dec. 9):

Reference(s)	Basis	Claims Challenged
Rosener, Huddart	§ 103(a)[3]	1, 2, 16–18
Rosener, Huddart, Haupt	§ 103(a)	3, 4
Rosener, Huddart, Price	§ 103(a)	9, 10, 14
Rosener, Huddart, Paulson	§ 103(a)	15
Rosener, Huddart, Vanderelli	§ 103(a)	16, 17

II. ANALYSIS

A. Claim Construction

We construe a claim

> using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. 282(b), including construing the claim in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.

37 C.F.R. § 42.100(b) (2019); *see also Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc).

[3] The Leahy-Smith America Invents Act ("AIA"), Pub. L. No. 112-29, 125 Stat. 284, 287–88 (2011), amended 35 U.S.C. § 103. Because the '325 patent claims an effective filing date before March 16, 2013, the effective date of the relevant amendment, the pre-AIA version of § 103 applies.

Petitioner contends that no formal claim constructions are necessary. Pet. 18. Patent Owner does not state a position on claim construction, but does not propose any constructions. *See, generally,* PO Resp.

Based on the complete record, we do not find it necessary to provide express claim constructions for any terms. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (noting that "we need only construe terms 'that are in controversy, and only to the extent necessary to resolve the controversy'") (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

B. Obviousness of Claims 1, 2, and 16–18 over Rosener and Huddart

Petitioner contends that claims 1, 2, and 16–18 would have been obvious over Rosener and Huddart. Pet. 18–56. For the reasons given below, Petitioner has made a sufficient showing as to claims 1, 2, and 16, but not claim 18. We do not reach claim 17 as to this ground, but do address claim 17's patentability in Petitioner's ground asserting Rosener, Huddart, and Vanderelli in Section II.F below.

A claim is unpatentable under 35 U.S.C. § 103 if the differences between the claimed subject matter and the prior art are "such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains." We resolve the question of obviousness on the basis of underlying factual determinations, including (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) objective evidence of nonobviousness, i.e., secondary considerations. *See Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

1. Level of Skill in the Art

Dr. Cooperstock testifies that a skilled artisan "would have had at least a Bachelor's Degree in an academic area emphasizing electrical engineering, computer science, or a similar discipline, and at least two years of experience in wireless communications across short distance or local area networks." Ex. 1003 ¶ 34. In the Institution Decision, we found Dr. Cooperstock's testimony to be consistent with the technology described in the Specification and the cited prior art and adopted this level of skill for purposes of that Decision. Dec. 24.

Mr. McAlexander testifies that a skilled artisan "would be someone working in the electrical engineering field and specializing in or knowledgeable of speaker components for small wireless devices," and "would have had a bachelor's degree in electrical engineering and at least two or more years of work experience in the industry. Ex. 2035 ¶ 19. According to Mr. McAlexander, "[s]uch a person would have studied and have practical experience with circuit design, speaker components, and wireless communication." *Id.* Patent Owner states that this proposed level of skill "is not far removed from Petitioner's [person of ordinary skill in the art]." PO Resp. 6.

As Patent Owner acknowledges that the proposed levels of skill are similar, and does not argue that a difference in level of skill would lead to a different result in this proceeding, we continue to adopt Petitioner's proposed level of skill.

2. Scope and Content of the Prior Art

a) Overview of Rosener

Rosener describes wireless systems with "first and second data sinks having no physical or electrical connection therebetween." Ex. 1004, Abstract. The data sinks can be, for example, wireless earphones. *Id.* ¶ 2. Each wireless earphone may be in the form of an earbud designed to fit into the concha of the pinna of the user's ear, and includes a housing containing a speaker, a radio-frequency (RF) transceiver, and a battery. *Id.* ¶ 30.

Each earphone may also include "a clip, earloop, or other suitable securing mechanism to help maintain the earphone . . . on the ear of the user." *Id.* Although Rosener does not have a figure showing a clip or earloop along with a preferred embodiment of the invention, it does depict, in Figure 4 (reproduced below) an earloop used with a prior art Bluetooth-enabled over-the-ear wireless headset:

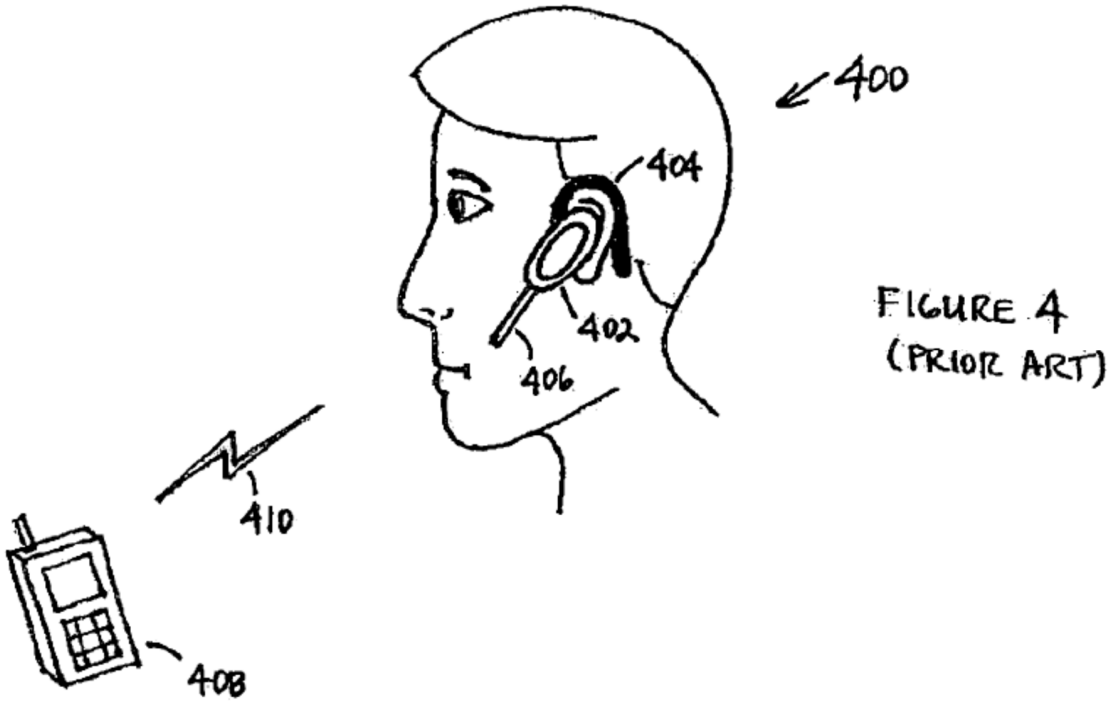

FIGURE 4
(PRIOR ART)

Figure 4 is a drawing of a user wearing a Bluetooth-enabled over-the-ear monaural wireless headset. *Id.* ¶ 17. As shown in Figure 4, headphone 402 includes earloop 404 that is configured to fit around the outer ear of user 400. *Id.* ¶ 8. Figure 5, reproduced below, shows earbuds, but not earloops:

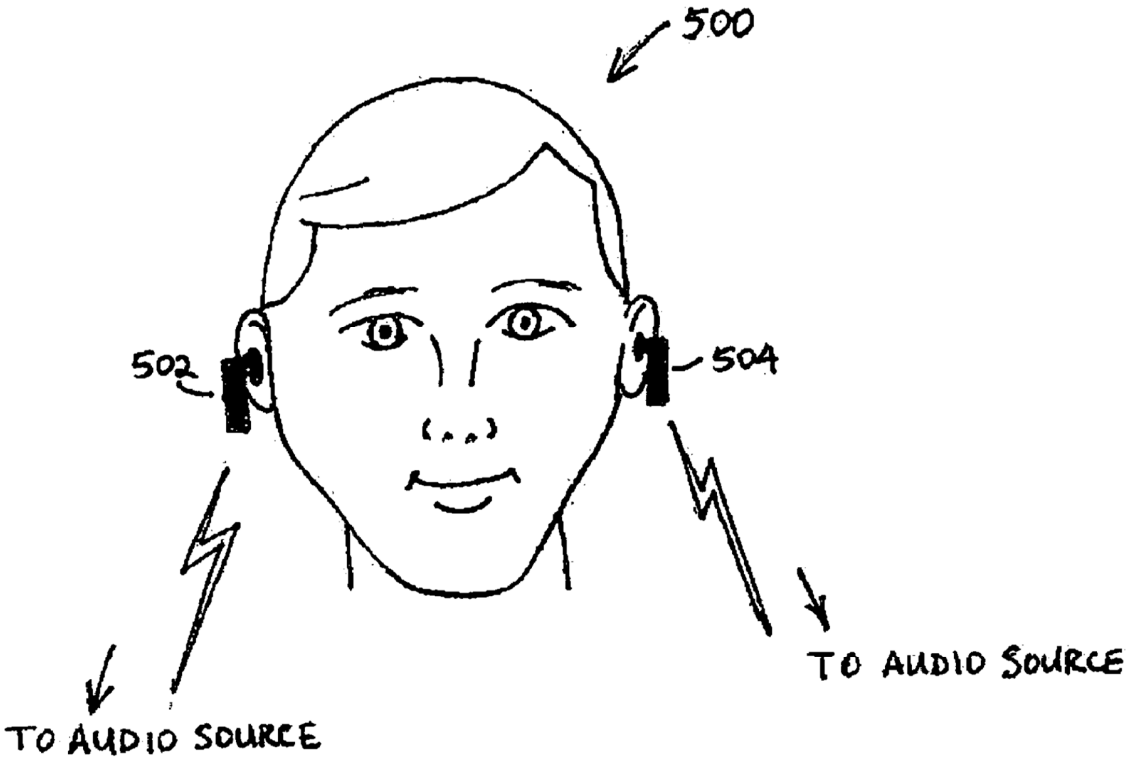

FIGURE 5

Figure 5 is an illustration of the head of a person wearing a headset comprising first and second wireless earphones 502, 504. *Id.* ¶¶ 18, 30.

Figure 9, reproduced below, illustrates some of the components of Rosener's headphones:

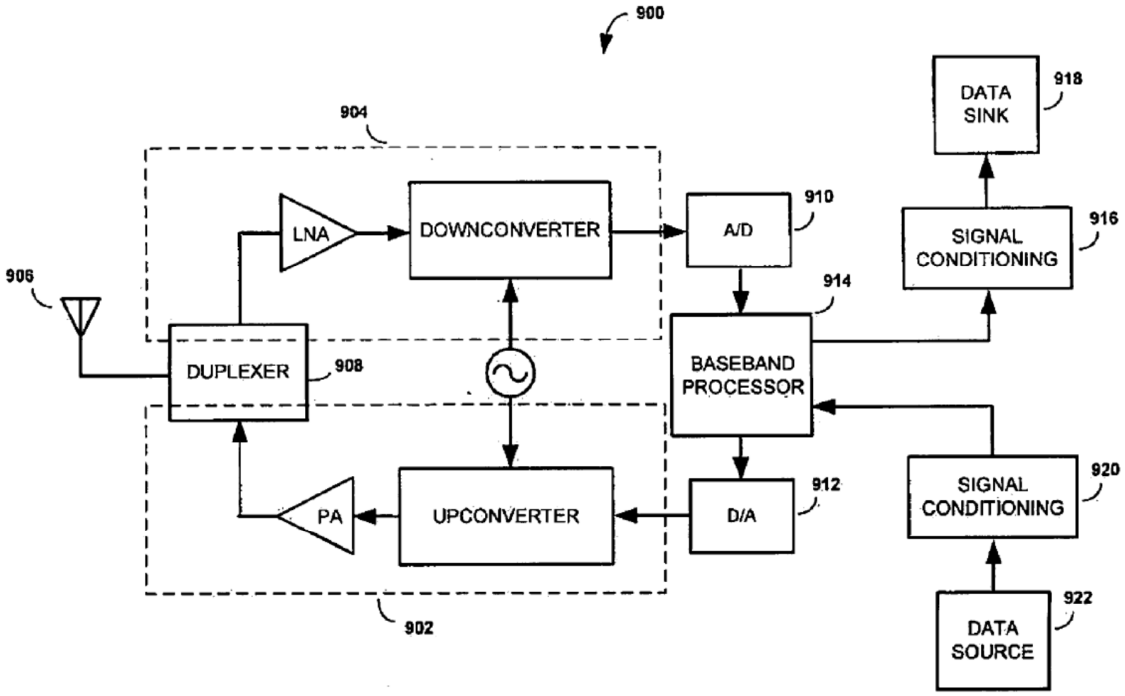

FIGURE 9

Figure 9 is a block diagram of an RF transceiver. *Id.* ¶¶ 24, 49.

RF transceiver 900 includes RF transmitter portion 902, RF receiver portion 904, antenna 906, and duplexer 908. *Id.* ¶ 49. A/D converter 910 receives analog baseband signals from RF transceiver portion 904, digitizes the signals, and sends them to baseband processor 914, which, along with signal conditioning circuit 916, processes the signals into a form suitable to drive data sink (speaker) 918. *Id.* According to Rosener, signal conditioning circuit 916 provides "digital-to-analog conversion, filtering, amplification, and/or other signal processing functions, to ensure that the processed data is in a form suitable to drive the data sink 918." *Id.* Baseband processor 914 receives data from data source 922 (e.g., a microphone) via signal conditioning circuit 920 and provides the data to RF transmitter portion 902 for transmission via antenna 906. *Id.* ¶ 50.

b) Overview of Huddart

Huddart describes wireless stereo headsets. Ex. 1005, Abstract. Figure 1, reproduced below, illustrates an example:

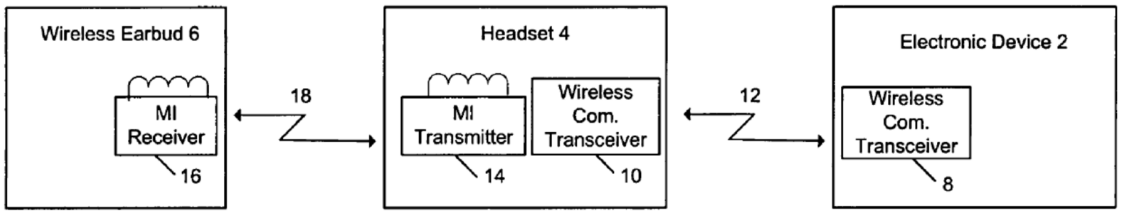

FIG. 1

Figure 1 is a system-view block diagram of a wireless stereo headset system. *Id.* at 1:44–45. Headset 4 is in proximity to electronic device 2 (e.g., a cellular telephone or digital music player), which transmits voice or text data to headset 4. *Id.* at 2:52–3:2. Headset 4 includes a speaker for one ear. "When stereo listening operation is desired by a user, a wireless earbud 6 is used in conjunction with headset 4. Both headset 4 and wireless earbud 6 have wireless communication functionality to form a wireless communication link 18." *Id.* at 3:7–10. "In one example of the invention, a magnetic induction wireless communication link is established between headset 4 and wireless earbud 6. Magnetic induction provides short range wireless communication at low power and cost while providing good audio signal quality." *Id.* at 3:19–23. "In further examples of the invention, other methods of wireless communication may be used to establish wireless communication link 18 between headset 4 and wireless earbud 6. For

example, wireless earbud 6 may be Bluetooth enabled to communicate with either headset 4 or electronic device 2." *Id.* at 3:55–60.

Wireless headset 4 "includes a power source such as a rechargeable battery installed within the housing to provide power to the various components of the receiver." *Id.* at 5:10–12. Similarly, "[w]ireless earbud 6 also includes a power source such as a rechargeable battery and a controller comprising a processor, memory and software to implement functionality as described herein." *Id.* at 5:26–29.

Huddart describes several options for charging the rechargeable batteries of wireless headset 4 and wireless earbud 6, including:

> a charger/carrier, such as a pocket charger, including a small plastic storage case for storing the headset 4 and wireless earbud 6 for protection and charging. The pocket charger includes a battery and charger circuit for charging both the headset battery and wireless earbud battery when inserted into the pocket charger/carrier.

Id. at 8:25–31;

> a charging coil to provide charging current to the wireless earbud battery 84 via receive aerial 52 shown in FIG. 4. The earbud advantageously does not require charging contacts on its small exterior surface when charging is performed with inductive charging. In this example, the single receive aerial 52 functions multiply to receive charging power for battery 84, generate a wake up signal 82, or receive an audio signal carrier.

Id. at 8:35–42; and

> a primary charger to which the pocket charger may be removably attached. The primary charger may be a cable or docking facility connecting the pocket charger/carrier to a wall outlet or primary batter[y] such as a car battery, allowing the headset battery, wireless earbud battery, and the storage case battery to be charged using the wall outlet or primary battery.

Id. at 8:51–57.

3. Differences, if any, Between Claim 1 and the Prior Art; Reasons to Modify or Combine

In essence, Petitioner contends that Rosener teaches the aspects of claim 1 regarding the components of the "pair of first and second wireless earphones," including a power source (although not necessarily a rechargeable power source), and that Huddart teaches the "rechargeable power source" and "docking station" aspects. Pet. 26–30. Patent Owner contests whether Rosener teaches "a curved hanger bar connected to the body portion, wherein the curved hanger bar comprises a portion that rests upon an upper external curvature of an ear of the user behind an upper portion of an auricula of the ear of the user," as recited in claim 1. PO Resp. 11–20. However, Patent Owner does not challenge any of Petitioner's other allegations for claim 1. We first address the contested "hanger bar" limitation of claim 1 and then address the uncontested limitations.

a) Contested "hanger bar" limitation of claim 1

As to "a body portion," as recited in claim 1, Petitioner cites to the "housing" of Rosener's earphones 502, 404. Pet. 32 (citing Ex. 1004 ¶ 30). We find that the housing of earphones 502, 504 is "a body portion." The parties dispute whether Rosener teaches "a curved hanger bar connected to the body portion, wherein the curved hanger bar comprises a portion that rests upon an upper external curvature of an ear of the user behind an upper portion of an auricula of the ear of the user," as recited in claim 1.

Petitioner (Pet. 34–35) points to Rosener's description that "[e]ach of the first and second earphone 502, 504 may further include a clip, earloop, or other suitable securing mechanism to help maintain the earphone 502 or 504 on the ear of the user." Ex. 1004 ¶ 30. According to Petitioner, a

skilled artisan would have understood from this description that each of earphones 502, 504 is connected to an earloop, which is an example of a curved hanger bar. Pet. 35.[4]

Petitioner (Pet. 35–36) argues that this description should be read in the context of Rosener's description of the prior art Bluetooth-enabled over-the-ear wireless headset depicted in Figure 4 (reproduced above), that "[t]he headset includes a headphone 402 and an earloop 404 that is configured to fit around the outer ear of the user 400." Ex. 1004 ¶ 8. *See also* Ex. 1003 ¶ 82 ("Though not shown in Figure 5, a [person of ordinary skill in the art] would have understood through this textual description that Rosener's disclosure contemplates some embodiments in which the housing of each of earphones 502, 504 is connected to, for example, an earloop ('curved hanger bar') to improve the manner in which each of the earphones is secured to the user's ear, as taught in Rosener."). Petitioner included in the Petition the following annotated version of Figure 5 (reproduced below) illustrating what earloops on Rosener's earphones might look like:

[4] In the Institution Decision, we considered competing arguments regarding whether an "earloop" as discussed in Rosener is, in fact, a curved hanger bar or whether, instead, it is more akin to the elastic straps that might hold a face mask in place. Dec. 33–34. We found, on the preliminary record, that Rosener's earloop is a curved hanger bar. *Id.* Patent Owner does not argue in its Response that the earloop is not a curved hanger bar and we maintain that finding that it is a curved hanger bar on the complete record for the reasons given in the Institution Decision. *See* Paper 15, 8 ("Patent Owner is cautioned that any arguments not raised in the response may be deemed waived.").

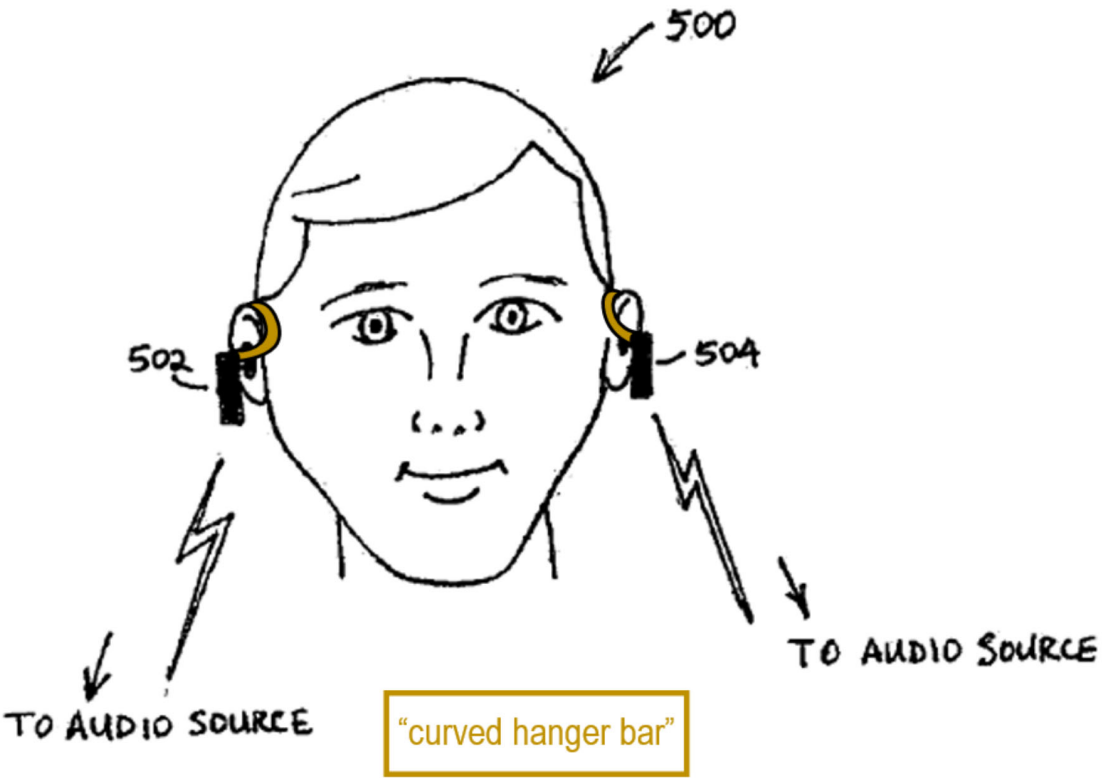

FIGURE 5

The figure above is a version of Rosener's Figure 5, annotated by Petitioner to add gold curved hanger bars to earphones 502, 504. Pet. 36. According to Petitioner, Rosener "thus teaches a system in which each of the elongated portions of the housings of earphones 502, 504 are connected to an earloop providing the same type of securing mechanism as shown for earloop 402," and "discloses this configuration given its teaching that each of earphones 502, 504 can include earloops and acknowledgement that use of earloops was conventional." *Id.* at 37 (citing Ex. 1004 ¶¶ 8, 30; Ex. 1003 ¶ 85).

Patent Owner characterizes Petitioner's position as asserting that "the earloop of Rosener's Figure 4 could be added to the wireless earphones of Rosener's Figure 5," that Petitioner's position relies on its modified version

of Figure 5, and that what Petitioner is arguing is that a skilled artisan would have combined two different embodiments of Rosener, one with the earbud and downwardly extending member of Figure 5 and another with the earloop of Figure 4. PO Resp. 14–15. Characterizing Petitioner's arguments in this way, Patent Owner then argues that a skilled artisan "would not have been motivated to add earloops to the earbud-downwardly extending member combination shown in Figure 5." *Id.* at 5.

Relying on the testimony of Mr. Blair, Patent Owner argues that, if one were to add the earloop of Figure 4 to the earbud and downwardly extending member of Figure 5, the earloop would effectively pry the earbuds out of the listener's ears. PO Resp. 16–18. According to Mr. Blair, the downwardly extending member of the earbud of Figure 5 exerts a downward force that holds the earbud in the ear, while the earloop of Figure 4 exerts a force upward and backward, counteracting the downward force and displacing the earbud from the ear. Ex. 2036 ¶¶ 14–17.[5]

Petitioner replies that Mr. Blair's testimony is conclusory and uncorroborated. Reply 10. Petitioner then argues that Patent Owner mischaracterizes what is shown in its annotated Figure 5 and contends that Mr. Blair's analysis of the various forces exerted on the earbuds is faulty. *Id.* at 10–15. In support, Petitioner offers testimony from Dr. Cooperstock, although that testimony is also conclusory and does not identify the basis for the testimony. Ex. 1023 ¶¶ 11–23.

[5] Mr. McAlexander provides testimony that largely copies the arguments in Patent Owner's Response. Ex. 2035 ¶¶ 37–43. His testimony, however, does not appear to be based upon his own knowledge or expertise and, instead, is based upon his reading of Mr. Blair's testimony. We accord this testimony by Mr. McAlexander little weight.

We need not evaluate which of the experts' views on the various forces on a Figure 4/5 combination would have been correct. Patent Owner improperly limits Petitioner's arguments (and Rosener's disclosure) to a combination of separate embodiments shown alternately in Figures 4 and 5. We agree with Petitioner (Pet. 34–35; Reply 18) and find that Rosener expressly describes earbuds with curved hanger bars. Specifically, Rosener states that "[e]ach of the first and second earphones 502, 504 may be in the form of an earbud designed to fit into the concha of the pinna of the user's ear," and that "[e]ach of the first and second earphone 502, 504 may further include a clip, earloop, or other suitable securing mechanism to help maintain the earphone 502 or 504 on the ear of the user." Ex. 1004 ¶ 30. We read Petitioner's annotated Figure 5 (shown above) as an illustration of how these expressly described features might look together, as Rosener does not have a figure depicting that embodiment. Petitioner relies on Figure 4 to show that "earloops" in fact correspond to "curved hanger bars," not to show precise structure that would be bodily incorporated into the embodiment depicted in Figure 5. We do not read Petitioner's annotated Figure 5 as a proposed physical combination of different embodiments within Rosener. Patent Owner's characterization of Petitioner's combination is not the correct lens through which we analyze obviousness. *See In re Keller*, 642 F.2d 413, 425 (Fed. Cir. 1981) ("To justify combining reference teachings in support of a rejection it is not necessary that a device shown in one reference can be physically inserted into the device shown in the other.").

Patent Owner argues that "Rosener . . . never states which listed earphone forms (e.g., earbud, canalphone, or over-the-ear) could also include an earloop." PO Resp. 19–20. In the Sur-reply, Patent Owner argues that Rosener "describes three separate earphone form factors (i.e.,

earbud, canalphone and over-the-ear circum-aural), but only links one of them—over-the-ear circum-aural—with an earloop. Rosener describes that the first two types—earbuds and canalphones—fit 'into' or 'within' the user's ear." Sur-reply 9–10.

We disagree. Rosener states that earphones 502, 504 could be earbuds and further states that they could include a clip or earloop to help maintain them on the ear of the user. Ex. 1004 ¶ 30. Although other options would be within the scope of this disclosure (e.g., an over-the-ear earphone with an earloop), we see no description in Rosener that would limit Rosener's clip or earloop to only some earphone form factors, and specifically find that Rosener's description of an earloop helping maintain the earphone "on the ear of the user," Ex. 1004 ¶ 30, is not an attempt to exclude earbuds. In sum, we find that Rosener expressly teaches "a curved hanger bar connected to the body portion, wherein the curved hanger bar comprises a portion that rests upon an upper external curvature of an ear of the user behind an upper portion of an auricula of the ear of the user," as recited in claim 1.

b) Uncontested limitations of claim 1

Regarding "a pair of first and second wireless earphones to be worn simultaneously by a user, wherein the first and second earphones are separate such that when the headphones are worn by the user, the first and second earphones are not physically connected," as recited in claim 1, Petitioner (Pet. 30–32) cites to Rosener's earphones 502, 504, which "may be in the form of an earbud designed to fit into the concha of the pinna of the user's ear" and are "physically and electrically-separated" with "no physical or electrical connection" between them. Ex. 1004 ¶¶ 11, 30, Fig. 5. Based

on this evidence, we find that Rosener's earphones 502, 504 teach this limitation.

As to an "earbud extending from the body portion that is inserted into an ear of the user when worn by the user," Petitioner points to earphones 502, 504, shown in Figure 5 as extending from a portion inserted into a user's ear. Pet. 33–34. As Petitioner notes (Pet. 33), Rosener describes earphones 502, 504 as "in the form of an earbud designed to fit into the concha of the pinna of the user's ear." Ex. 1004 ¶ 30. We find that Rosener teaches this limitation as well.

Petitioner contends that Rosener's RF transmitter portion 902, RF receiver portion 904, duplexer 908, A/D converter 910, and D/A converter 912, together constitute "a wireless communication circuit for receiving and transmitting wireless signals." Pet. 37–39 (citing Ex. 1004 ¶¶ 11, 30–36, 49, Figs. 5, 9). We agree. For example, Rosener teaches "[w]ireless systems having a plurality of physically and electrically-separated data sinks . . . . An exemplary wireless system includes first and second data sinks having no physical or electrical connection therebetween." Ex. 1004 ¶ 11.

Petitioner further contends that Rosener's baseband processor 914, signal conditioning circuits 916, 920, and other described circuitry constitute "a processor circuit connected to the wireless communication circuit," as recited in claim 1. *Id.* at 39–41 (citing Ex. 1004 ¶¶ 39–43, 49, 50, Fig. 9). We agree. As noted above, baseband processor 914 receives digitized baseband signals and signal conditioning circuit 916 provides digital-to-analog conversion, filtering, amplification, and other processing. Ex. 1004 ¶ 49.

Petitioner identifies Rosener's "data sink 918" as an "acoustic transducer," as recited in claim 1; Rosener's "data source 922" as "a

microphone for picking up utterances of a user of the headphones"; and Rosener's "antenna 906" as "an antenna connected to the wireless communication circuit." *Id.* at 41–44 (citing Ex. 1004 ¶¶ 2, 30 ("The speaker may comprise, for example, a magnetic element attached to a voice-coil-actuated diaphragm, an electrostatically charged diaphragm, a balanced armature driver, or a combination of one or more of these transducer elements."), 50 ("For the RF transmitter portion 902, a D/A converter 912 is adapted to receive data signals from a data source 922 and operable to convert the data signals into analogs signals, which are upconverted to RF by the RF transmitter in preparation of being radiated over the appropriate wireless link by the antenna 906."), 56 ("a microphone to allow . . . data to be sent back to an external electronic device"), Fig. 9). We find that Rosener teaches each of these limitations.

As to "a rechargeable power source," as recited in claim 1, Petitioner argues that Rosener describes a battery, but concedes that "Rosener does not explicitly describe the batteries being rechargeable." Pet. 44–45 (citing Ex. 1004 ¶ 30). Petitioner contends that Huddart teaches a rechargeable battery. *Id.* at 45 (citing Ex. 1005, 5:26–30). According to Petitioner, "[t]o the extent that Rosener is deemed to not disclose rechargeable batteries, [a person of ordinary skill in the art] would have found it obvious to incorporate a rechargeable battery (e.g., earbud battery) as taught in Huddart into each of Rosener's earphones 502, 504 for providing power to earphone components." *Id.* Citing Dr. Cooperstock's testimony, Petitioner argues that a skilled artisan "would have understood . . . that Rosener's earphones could have incorporated rechargeable batteries since this configuration was conventional around the time of its disclosure, as demonstrated by Huddart." *Id.* at 27 (citing Ex. 1003 ¶ 48). Petitioner contends that rechargeable

batteries would have improved Rosener's earphones "by eliminating or reducing the need to periodically replace the batteries, thereby removing or reducing the cost of doing so and also improving user convenience." *Id.* (citing Ex. 1003 ¶ 49). Dr. Cooperstock further testifies that Rosener's earphones would have benefited from rechargeable batteries in the same manner as Huddart's earbuds, e.g., in that the user could avoid frequent battery replacements. Ex. 1003 ¶ 50. We credit Dr. Cooperstock's testimony and find that a skilled artisan would have had reasons to (e.g., cost, convenience, avoid the need to replace batteries) to incorporate Huddart's teaching of rechargeable batteries into Rosener's earphones, and would have had a reasonable expectation of success in doing so.

Petitioner also cites Huddart for "a docking station for holding at least the first wireless earphone," as recited in claim 1. Pet. 46. Specifically, Petitioner contends that Huddart's charger/carrier and primary charger are examples of a docking station. *Id.* (citing Ex. 1005, 8:25–34). Petitioner contends that Huddart's primary charger can be a cable or docking station facility that allows the charger/carrier to connect to a wall outlet or primary battery, and, thus, teaches "a power cable for connecting to an external device to power the docking station," as recited in claim 1. *Id.* at 46–47 (citing Ex. 1005, 8:51–57). Petitioner argues that Huddart's charger/carrier and primary charger are "for charging at least the first wireless earphone when the first wireless earphone is placed in the docking station," as recited in claim 1. *Id.* at 47 (citing Ex. 1005, 5:9–12, 5:26–30, 8:25–50). Huddart's charger/carrier is described as "a convenient mechanism by which the earbud 6, having a relatively smaller capacity battery due to its limited size, may be recharged in the absence of a primary charger." Ex. 1005, 8:31–34.

Relying on Dr. Cooperstock's testimony, Petitioner argues that Huddart's docking station would have "improve[d] battery capacity when a primary charger is unavailable or to avoid the inconvenience of having to frequently plug the charger into a wall outlet, for instance when traveling." *Id.* at 28 (citing Ex. 1003 ¶ 51). Petitioner also argues that Huddart's charger/carrier would have provided a storage case to prevent Rosener's earphones from being misplaced. *Id.* at 28–29 (citing Ex. 1003 ¶52).

We credit Dr. Cooperstock's testimony and find that Petitioner's proffered reasons to combine Rosener and Huddart have rational underpinning; that a skilled artisan would have combined Huddart's teachings of a docking station with Rosener's earbuds (with rechargeable batteries that would be recharged via the docking station); and that a skilled artisan would have had a reasonable expectation of success in combining these teachings.

Thus, Rosner and Huddart teach each limitation of claim 1.

4. Differences, if any, Between Claims 2 and 16 and the Prior Art; Reasons to Modify or Combine

Petitioner contends that claims 2 and 16 would have been obvious over Rosener and Huddart. Patent Owner does not contest the additional allegations for claims 2 and 16.

Claim 2 depends from claim 1 and adds:

the wireless communication circuits are for receiving, wirelessly, streaming audio content;

the at least one acoustic transducers are for playing the streaming audio content; and

> each of the first and second earphones comprises a buffer for caching the streaming audio content prior to being played by the at least one acoustic transducer.

Petitioner identifies Rosener's RF transmitter portion 902, RF receiver portion 904, duplexer 908, A/D converter 910, and D/A converter 912, collectively, as "wireless communication circuits . . . for receiving, wirelessly, streaming audio content." Pet. 47–49 (citing Ex. 1004 ¶¶ 30, 34, 36, 39–42, 49). Petitioner further identifies Rosener's speaker as "at least one acoustic transducer." *Id.* at 49 (citing Ex. 1004 ¶¶ 30 ("The speaker may comprise, for example, a magnetic element attached to a voice-coil-actuated diaphragm, an electrostatically charged diaphragm, a balanced armature driver, or a combination of one or more of these transducer elements."), 38). As to "a buffer for caching the streaming audio content prior to being played by the at least one acoustic transducer," Petitioner cites to Rosener's description of "data buffers in each of the first and second RF receivers 604, 608." *Id.* at 49–50 (citing Ex. 1004 ¶ 39). Based on the evidence presented in the Petition, we find that Rosener teaches each additional limitation of claim 2.

Claim 16 depends from claim 1 and adds "wherein the rechargeable power source comprises wirelessly chargeable circuit components." We agree with Petitioner (Pet. 50–51) and find that Huddart teaches this limitation through its description of inductive charging and that a skilled artisan would had reasons to combine Huddart's teaching of inductive charging with the teachings of Rosener, with a reasonable expectation of success. Ex. 1005, 8:35–50; Ex. 1003 ¶ 103.

5. Claim 17

Claim 17 recites "wherein the rechargeable power source comprises a passive, wireless rechargeable power source." Petitioner argues that "the claim language is not clear as to how a *passive* wireless rechargeable power source differs from other wireless rechargeable power sources." Pet. 51. Petitioner argues that claim 17 would have been obvious over Rosener, Huddart, and Vanderelli if claim 17 is construed in light of the Specification. Pet. 51. We address these allegations in Section II.F below. In the alternative, Petitioner argues that, if we adopt a broader construction of claim 17 that is "divorced from the '325 patent specification," we should find it taught by Rosener and Huddart. *Id.* at 51–52. Because we find that the combination of Rosener, Huddart, and Vanderelli teaches the additional limitation of claim 17, as explained below, we do not reach whether Rosener and Huddart teach this limitation under a broader construction. *See SAS Inst. Inc. v. Iancu*, 138 S. Ct. 1348, 1359 (2018) (holding that a petitioner "is entitled to a final written decision addressing all of the claims it has challenged"); *Bos. Sci. Scimed, Inc. v. Cook Grp. Inc.*, 809 F. App'x 984, 990 (Fed. Cir. 2020) (non-precedential) (recognizing that the "Board need not address issues that are not necessary to the resolution of the proceeding" and, thus, agreeing that the Board has "discretion to decline to decide additional instituted grounds once the petitioner has prevailed on all its challenged claims").

6. Differences, if any, Between Claim 18 and the Prior Art; Reasons to Modify or Combine

As to claim 18, for "wherein the processor circuit of each of the first and second earphones comprises: . . . a baseband processor circuit that is in

communication with the wireless communication circuit of the earphone," Petitioner cites to a description of Rosener's baseband processor 914 and associated circuitry. *Id.* at 55–56 (citing Ex. 1004 ¶¶ 30, 49, Fig. 9). We agree that baseband processor 914 is a baseband processor circuit, and Figure 9 depicts baseband processor 914 in communication with RF transmitter portion 902, RF receiver portion 904, duplexer 908, A/D converter 910, and D/A converter 912, the alleged "wireless communication circuit of the earphone." Patent Owner does not contest Petitioner's allegations for this limitation of claim 18.

The parties dispute whether Rosener and Huddart teach "wherein the processor circuit of each of the first and second earphones comprises: a digital signal processor that provides a sound quality enhancement for the audio content played by the at least one acoustic transducers of the earphone," as recited in claim 18.

Petitioner cites to description of Rosener's signal conditioning circuit 916 and identifies that component as corresponding to the claimed digital signal processor (DSP). *Id.* at 53–55 (citing Ex. 1004 ¶¶ 30, 34, 36, 38, 49, Fig. 9). In particular, Petitioner points to Rosener's description that signal conditioning circuit 916 provides "digital-to-analog conversion, filtering, amplification, and/or other signal processing functions, to ensure that the processed data is in form suitable to drive the data sink 918." *Id.* at 54 (quoting Ex. 1004 ¶ 49). Dr. Cooperstock testifies that signal conditioning circuit 916 "would have conditioned the signal to, for example, reduce or eliminate the effects of noise on the signal through filtering, which enhances sound quality." Ex. 1003 ¶ 111.

Patent Owner argues that Rosener's signal conditioning circuit 916 is a digital-to-analog converter (DAC), rather than a DSP, as its purpose is to

drive the headphone's speaker (data sink 918). PO Resp. 22–24 (citing Ex. 1004 ¶¶ 30 49; Ex. 2035 ¶ 50). Patent Owner, relying on Mr. McAlexander's testimony, contends that a DSP "is a circuit that performs mathematical functions on digital signals (like digital audio signals when used with speakers and earphones)." *Id.* at 24 (citing Ex. 2035 ¶ 53). Patent Owner further argues that a DSP is a processor and, as such, "typically includes the building blocks of a processor, such as an Arithmetic Logic Unit, shift registers, and memory space." *Id.* (citing Ex. 2035 ¶ 54).

Petitioner does not appear to contest Patent Owner's arguments that a DSP must be a processor, with components like arithmetic logic units, shift registers, and memory space, that performs mathematical functions on digital signals. Reply 19–22.[6] Indeed, Petitioner provides no proposed construction in either the Petition or the Reply, and contends instead that DSP "should be interpreted based on . . . its plain meaning." Reply 21. Rather, Petitioner argues that signal conditioning circuit 916 is more than a DAC, and performs filtering, amplification, and other signal processing

[6] Petitioner does argue that Patent Owner is incorrect to suggest that a DSP must be embodied as a single chip or integrated circuit. Reply 21–22. We do not read Patent Owner's arguments to limit a DSP to a single chip. PO Resp. 25 (arguing that "[a] DSP is often embodiment as a single chip (i.e., integrated circuit)"). In any case, we see no persuasive evidence that would limit a DSP to a single chip or integrated circuit.

functions. *Id.* at 19–20 (citing Ex. 1004 ¶ 49).[7] Petitioner equates the filtering, amplification, and other signal processing performed by signal conditioning circuit 916 to the "noise cancelation and sound equalization" listed by the '325 patent as examples of "various sound quality enhancements" performed by DSP 114. Reply 22–23; Ex. 1001, 7:34–37.

> Patent Owner responds that
>
> [m]erely because Rosener's signal conditioning circuit can perform amplification and filtering does not mean that the amplification and filtering are of ***digital*** signals. Thus, the amplification and filtering by Rosener's "signal conditioning circuit" do not even necessarily involve processing of digital signals. Also, neither Rosener nor Cooperstock explained why it would have been obvious that the amplification and filtering performed by Rosener's signal conditioning circuit would have been digital.

Sur-reply 12–13. Patent Owner's concern is well-founded. Dr. Cooperstock admits that filtering and amplification are techniques for processing analog as well as digital signals. Ex. 2040, 9:10–10:8. Rosener describes signal conditioning circuit 916 as receiving data (presumably in digital format) from baseband processor 914, performing processing including digital-to-

[7] Petitioner also argues, for the first time in the Reply, that "'digital-to-analog conversion' is an example of a 'signal processing function.'" Reply 20–21. If Petitioner is attempting to argue that a DAC is a DSP, Petitioner did not make such an argument in the Petition and we do not entertain it here. *See* Patent Trial and Appeal Board Consolidated Trial Practice Guide (Nov. 2019) ("TPG"), 73–74 ("While replies and sur-replies can help crystalize issues for decision, a reply or sur-reply that raises a new issue or belatedly presents evidence may not be considered."), *available at* https://www.uspto.gov/TrialPracticeGuideConsolidated. Nevertheless, Petitioner does not articulate that argument clearly or support it with persuasive evidence. Thus, the argument would not be persuasive even if considered.

analog conversion, filtering, and amplification, and producing an output suitable to drive data sink 918. Ex. 1004 ¶ 49. The most logical reading of this description is that signal conditioning circuit 916 receives a digital signal, converts it to an analog signal, and filters and amplifies that signal to condition it to appropriately drive a speaker. In other words, consistent with Mr. McAlexander's testimony, the filtering and amplification are part of the digital-to-analog conversion process that converts and conditions a signal to drive a speaker. Ex. 2035 ¶¶ 49–52. Petitioner does not expressly argue in the Petition or the Reply that the filtering and amplification are performed on digital signals, or provide persuasive evidence that would support such an argument. Pet. 53–55; Reply 19–23; Ex. 1003 ¶¶ 110–111; Ex. 1023 ¶¶ 35–41.

For the first time at the oral argument, Petitioner argues that Rosener's data sink 918 might receive a digital signal instead of an analog signal and, thus, the filtering and amplification performed in signal conditioning circuit 916 could be performed on digital signals. Tr. 22:17–23:13. Petitioner argues that this is taught in paragraph 36 of Rosener. *Id.* Petitioner further argues that Mr. McAlexander admitted on cross-examination that signal conditioning circuit 916 performs filtering in the digital domain. *Id.* at 54:12–57:1 (citing Ex. 1024, 162). Petitioner did not raise these arguments in its Petition or Reply and, therefore, we do not consider them. *See* TPG 85–86; *Dell Inc. v. Acceleron, LLC*, 818 F.3d 1293, 1301 (Fed. Cir. 2016).

Moreover, Petitioner's arguments would not be persuasive even if considered. Paragraph 36 of Rosener describes Rosner's Figure 6, reproduced below:

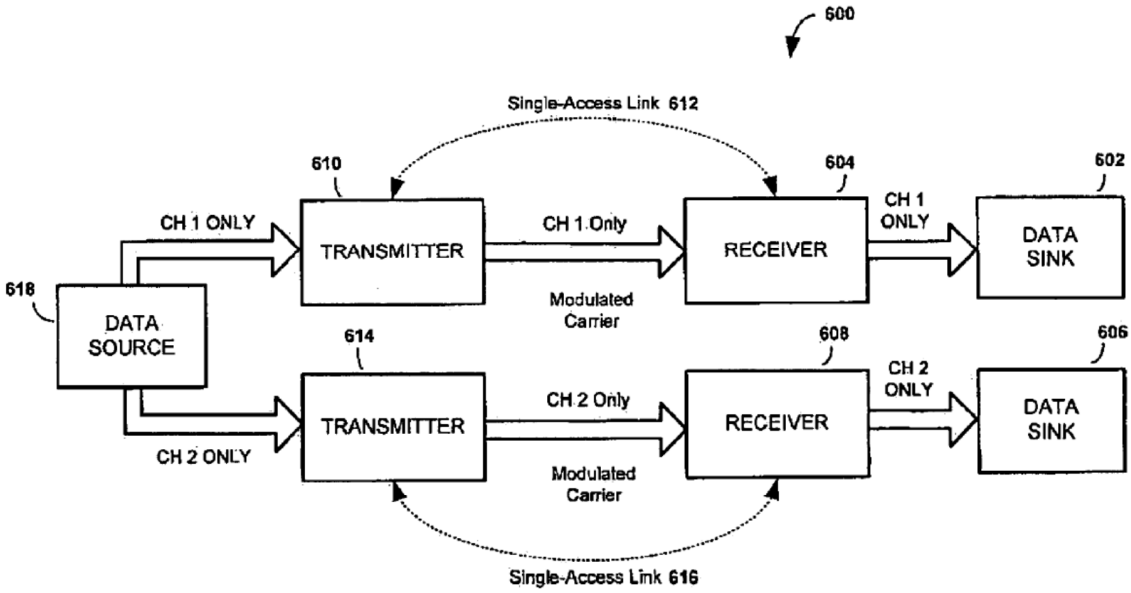

FIGURE 6

Figure 6 is a block diagram of a wireless system used to wirelessly transmit data signals to two or more data sinks. Ex. 1004 ¶19. First and second data streams are modulated onto RF carriers by first and second RF transmitters 601, 614 and transmitted wirelessly to first and second RF receivers 604, 608. *Id.* ¶ 36. RF receivers 604, 608 down-convert the modulated RF carriers and electrically couple the demodulated data streams to first and second data sinks 602, 606. *Id.* According to Rosener, the baseband portions of first and second RF receivers 604, 608 may also contain a DAC and/or other or additional processing circuitry to facilitate the electrical coupling of first and second RF receivers 604, 608 to first and second data sinks 602, 606. *Id.* "Alternatively, such components may be included as part of the data sinks 602, 606 themselves." *Id.*

Petitioner appears to argue that, here, Rosener describes a data sink with a DAC and, by implication, signal conditioning circuit 916 of Figure 9 would operate (filter, amplify) only on digital signals if connected to that

sort of data sink. We are not persuaded. Rosener does not explain how the components of Figure 9 would be used or modified if data sink 918 included a DAC. As noted above, the best reading of Rosener is that signal conditioning circuit 916 converts a digital signal to an analog signal and filters/amplifies that analog signal to put it into condition to drive a speaker. Presumably, if the DAC functionality is moved to data sink 918, the other signal conditioning functionality, such as filtering and amplification, would be moved as well, rendering signal conditioning circuit 916, as depicted, unnecessary (or incorporated into data sink 918). Petitioner offers no persuasive evidence that signal conditioning circuit 916 would perform sound quality enhancing digital signal processing in this scenario.

Mr. McAlexander's cross-examination testimony is not inconsistent with our reading of Rosener. Mr. McAlexander testifies that a signal conditioning circuit would have resistor-capacitor filters both before and after a DAC as part of signal conditioning, not digital signal processing. Ex. 1024, 162:2–164:12. Petitioner does not show persuasively that this would be digital signal processing to provide a sound quality enhancement for the audio content played by the speaker.

In sum, Petitioner has not shown, by a preponderance of the evidence, that the combination of Rosener and Huddart teaches "wherein the processor circuit of each of the first and second earphones comprises: a digital signal processor that provides a sound quality enhancement for the audio content played by the at least one acoustic transducers of the earphone," as recited in claim 18.

Patent Owner raises a second dispute as to this claim limitation. Although it is not necessary to reach this dispute to assess the patentability of claim 18, Patent Owner refers to its claim 18 arguments when responding

to Petitioner's challenge to claims 9 and 10 (discussed in detail below). PO Resp. 34–35. Thus, we discuss Patent Owner's second argument for claim 18.

As noted above for claim 1, Petitioner contends that, "[t]o the extent that Rosener is deemed to not disclose rechargeable batteries, [a person of ordinary skill in the art] would have found it obvious to incorporate a rechargeable battery (e.g., earbud battery) as taught in Huddart into each of Rosener's earphones 502, 504 for providing power to earphone components." Pet. 45. Patent Owner does not contest these allegations for claim 1 and, for the reasons given above, we find that a skilled artisan would have combined the teachings of Rosener and Huddart for the limitation of claim 1, "a rechargeable power source."

Nevertheless, Patent Owner contests this limitation as it pertains to claim 18. Specifically, Patent Owner argues that Huddart does not describe a rechargeable battery that would be capable of powering Rosener's earbud if the earbud were to include a DSP and a baseband processor. PO Resp. 27–32. Patent Owner contends that Huddart describes a "relatively ***smaller capacity battery due to its limited size***." *Id.* at 28 (quoting Ex. 1005, 8:32–33). Patent Owner argues that Huddart's battery is recharged using a small plastic storage case and that "[i]f a larger-capacity battery was needed to power the additional components of the earbud, such as a DSP and baseband processor per claim 18, Huddart's pocket charger would not be suitable for charging the battery of the wireless earbud." *Id.* Patent Owner does not cite to evidence for this contention.

To support its contention that Huddart's battery is "low-power," Petitioner argues that Huddart describes its headset and wireless earbud as communicating using magnetic induction, which Huddart characterizes as

providing short range wireless communication at low power. *Id.* at 29 (citing Ex. 1005, 3:8–14, 3:21–23, 3:43–46). In contrast, Patent Owner argues, a DSP and a baseband processor are high-level integrated circuits that "consume and require a greater amount of battery power than a magnetic inductance receiver." *Id.* at 29–30 (citing Ex. 2035 ¶ 62). According to Patent Owner, "[g]iven the significant power requirements of a DSP and baseband processor, a [person of ordinary skill in the art] would not be motivated to use Huddart's low-power battery, which is designed to merely power a low-power magnetic inductance receiver and the related components of Huddart's earbud." *Id.* at 30. Patent Owner argues that "Huddart's low-power battery [would] be unreliable, undesirable, and/or incompatible for use to power the claimed DSP and baseband processor due to its small capacity." *Id.*

As noted above, communication via magnetic induction is only one example contemplated by Huddart, and Bluetooth communication is another described option. Ex. 1005, 3:19–60. Patent Owner dismisses this alternative, arguing that "Huddart fails to disclose whether a Bluetooth enabled earbud would be compatible with the low power battery discussed solely in connection with the magnetic induction communication system or whether a larger, higher power battery would be needed." PO Resp. 31. However, we see nothing in Huddart to suggest that the battery it describes would be insufficient to power its alternative embodiment.

Patent Owner also argues that the additional power needed for a DSP and baseband processor would increase the drain on Huddart's battery, causing it to generate heat that would be undesirable in an earbud worn on the face. PO Resp. 30–31 (citing Ex. 2035 ¶ 63). Patent Owner further

argues that a battery with a larger capacity than that of Huddart would have been too heavy to be used in a wireless earphone. *Id.* (citing Ex. 2035 ¶ 63).

Petitioner argues that Patent Owner misinterprets Petitioner's mapping of Rosener and Huddart to the claims. Reply 23–24. Specifically, Petitioner argues that Rosener teaches a rechargeable power source and that it "relie[s] on Huddart for its disclosure of an earbud battery being rechargeable and proposed modifying Rosener's battery to be similarly rechargeable." *Id.* at 23. In the Petition, Petitioner argues that

> While Rosener does not explicitly describe the batteries being rechargeable, a [person of ordinary skill in the art] would have understood that earphones 502, 504 could have been configured with rechargeable batteries since the use of such batteries in wireless devices was well-known before the Critical Date as shown, for example, Huddart's disclosure of its "wireless earbud" including a "power source such as a rechargeable battery."

Pet. 44–45. Petitioner continues, "[t]o the extent that Rosener is deemed to not disclose rechargeable batteries, [a person of ordinary skill in the art] would have found it obvious to incorporate a rechargeable battery (e.g., earbud battery) as taught in Huddart into each of Rosener's earphones 502, 504 for providing power to earphone components." *Id.* at 45; *see also id.* at 27 ("A [person of ordinary skill in the art] would have understood, however, that Rosener's earphones could have incorporated rechargeable batteries since this configuration was conventional around the time of its disclosure, as demonstrated by Huddart."). Petitioner further argues that Patent Owner does not contest that Rosener's battery, when modified to be rechargeable, would have been sufficient to power a digital signal processor. *Id.* at 23.

We agree with Petitioner. Petitioner did not contend in the Petition that a skilled artisan would have swapped Huddart's battery for Rosener's.

Indeed, that is not how we typically evaluate obviousness. *See In re Mouttet*, 686 F.3d 1322, 1332–33 (Fed. Cir. 2012) ("It is well-established that a determination of obviousness based on teachings from multiple references does not require an actual, physical substitution of elements. . . . Rather, the test for obviousness is what the combined teachings of the references would have suggested to those having ordinary skill in the art."). Instead, Petitioner argues that a skilled artisan would have made Rosener's battery rechargeable, as that would have eliminated the need to replace batteries and would have been more convenient to users, and that Huddart showed that it was well-known that earbuds could be equipped with rechargeable batteries. Pet. 27. We credit Dr. Cooperstock's testimony in support of these arguments. Ex. 1003 ¶¶ 48–50. Setting aside the issue whether signal conditioning circuit 916 is a DSP (above, we find that it is not), Patent Owner does not contest that Rosener's battery is at least sufficient to power the circuitry specifically described in Rosener, including signal conditioning circuit 916 and baseband processor 914. Tr. 46:17–21. We find that a skilled artisan would have had reasons, with rational underpinning, to use a rechargeable battery with Rosener's earphones (Huddart shows that this was conventional), and that the skilled artisan would have selected a rechargeable battery sufficient to power Rosener's circuitry.

7. Objective Indicia of Nonobviousness

Patent Owner argues that the commercial success of the invention of the challenged claims evidences nonobviousness. PO Resp. 37–42.

"[E]vidence of secondary considerations may often be the most probative and cogent evidence in the record." *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1538 (Fed. Cir. 1983). For example,

> Commercial success is relevant because the law presumes an idea would successfully have been brought to market sooner, in response to market forces, had the idea been obvious to persons skilled in the art. Thus, the law deems evidence of (1) commercial success, and (2) some causal relation or "nexus" between an invention and commercial success of a product embodying that invention, probative of whether an invention was non-obvious.

Merck & Co. v. Teva Pharms. USA, Inc., 395 F.3d 1364, 1376 (Fed. Cir. 2005). "[T]o be accorded substantial weight in the obviousness analysis, the evidence of secondary considerations must have a 'nexus' to the claims, *i.e.*, there must be 'a legally and factually sufficient connection' between the evidence and the patented invention." *Henny Penny Corp. v. Frymaster LLC*, 938 F.3d 1324, 1332 (Fed. Cir. 2019) (quoting *Demaco Corp. v. F. Von Langsdorff Licensing Ltd.*, 851 F.2d 1387, 1392 (Fed. Cir. 1988)).

"[A] patentee is entitled to a rebuttable presumption of nexus between the asserted evidence of secondary considerations and a patent claim if the patentee shows that the asserted evidence is tied to a specific product and that the product '*is* the invention disclosed and claimed.'" *Fox Factory, Inc. v. SRAM, LLC*, 944 F.3d 1366, 1373 (Fed. Cir. 2019) (quoting *Demaco*, 851 F.2d at 1392). "That is, presuming nexus is appropriate 'when the patentee shows that the asserted objective evidence is tied to a specific product and that product embodies the claimed features, and is coextensive with them.'" *Id.* (quoting *Polaris Indus., Inc. v. Arctic Cat, Inc.*, 882 F.3d 1056, 1072 (Fed. Cir. 2018) (additional internal quotation marks omitted)). "Conversely, '[w]hen the thing that is commercially successful is not

coextensive with the patented invention—for example, if the patented invention is only a component of a commercially successful machine or process,' the patentee is not entitled to a presumption of nexus." *Id.* (quoting *Demaco*, 851 F.2d at 1392) (alteration by Federal Circuit). "'The patentee bears the burden of showing that a nexus exists.'"[8] *Id.* (quoting *WMS Gaming Inc. v. Int'l Game Tech.*, 184 F.3d 1339, 1359 (Fed. Cir. 1999)).

If we do not presume nexus, "[t]o establish a proper nexus between a claimed invention and the commercial success of a product, a patent owner must offer 'proof that the sales were a direct result of the unique characteristics of the claimed invention—as opposed to other economic and commercial factors unrelated to the quality of the patented subject matter.'" *SightSound Techs., LLC v. Apple Inc.*, 809 F.3d 1307, 1319 (Fed. Cir. 2015) (quoting *In re Huang*, 100 F.3d 135, 140 (Fed. Cir. 1996)); *accord Fox Factory*, 944 F.3d at 1373–74 ("A finding that a presumption of nexus is inappropriate does not end the inquiry into secondary considerations. To the contrary, the patent owner is still afforded an opportunity to prove nexus by showing that the evidence of secondary considerations is the 'direct result of the unique characteristics of the claimed invention.'" (quoting *Huang*, 100 F.3d at 140)).

[8] The parties agree that Patent Owner bears the burden of persuasion on nexus. Reply 31–32; Tr. 51:3–22. In a related hearing conducted on the same day between the same parties, Patent Owner expressly agreed that it bears the burden of persuasion on the issue of nexus. IPR2021-00255, Paper 53 (Mar. 3, 2022, Oral Argument Transcript) at 43:8–23. Patent Owner stated that we can rely on that agreement in this proceeding. Tr. 51:3–22.

Patent Owner argues that the commercial success of the Powerbeats Pro, a product by Petitioner's subsidiary Beats by Dr. Dre, is objective evidence of the nonobviousness of the challenged claims.[9] PO Resp. 37–42. The parties dispute whether Patent Owner has shown a nexus between the commercial success of the Powerbeats Pro and the claimed invention.

Patent Owner argues that "[i]n light of the extreme coextensiveness between the Powerbeats Pro and claims 1–18 of the '325 Patent, the Board should presume a nexus between the commercial success of the Powerbeats Pro and claims 1–18." PO Resp. 41. In support of this argument that the Powerbeats Pro product is coextensive with the claimed invention, Patent Owner cites to its infringement contentions served in the Texas case, and argues that "claims 1–18 of the '325 Patent read on the Powerbeats Pro." *Id.* at 38 (citing Ex. 1014, 1079–113), 40 (same); Sur-reply 19 ("The [Patent Owner Response] cited an exhibit, APPLE-1014, 1079–1113, that includes a detailed claim chart showing that the PowerBeats Pros possess all the elements of the Challenged Claims."). Patent Owner does not provide a detailed comparison of the Powerbeats Pro with the challenged claims in its Response. PO Resp. 37–42. At most, Patent Owner points out certain features of the Powerbeats Pro, such as being "completely wireless" and having a "a signature earhook design." *Id.* at 37–38, 40. However, Patent Owner's attempt to incorporate its infringement contentions by reference into the Response is contrary to our rules, and those infringement

[9] Patent Owner's evidence of commercial success shows success at the level of a category that would include the Powerbeats Pro, but does not break out the Powerbeats Pro individually. PO Resp. 38, 41–42 (citing Exs. 2037, 2038). Nevetheless, Petitioner does not contest that the Powerbeats Pro product has been commercially successful.

contentions will be disregarded. *See* 37 C.F.R. § 42.6(a)(3) ("Arguments must not be incorporated by reference from one document into another document."). Accordingly, Patent Owner has not shown that the Powerbeats Pro practices the invention of the challenged claims and, for that reason, has not shown that the Powerbeats Pro is coextensive with the challenged claims.

Additionally, Petitioner points to features of the Powerbeats Pro, not recited in the challenged claims, that it alleges are responsible for the commercial success of that product. Reply 32–34. "Although we do not require the patentee to prove perfect correspondence to meet the coextensiveness requirement, what we do require is that the patentee demonstrate that the product is essentially the claimed invention." *Fox Factory*, 944 F.3d at 1374. On one hand, "if the unclaimed features amount to nothing more than additional insignificant features, presuming nexus may nevertheless be appropriate." *Id.* On the other, a claim is not coextensive with a product that includes a "critical" unclaimed feature that materially impacts the product's functionality. *Id.* at 1375.

In particular, Petitioner argues that the Powerbeats Pro includes a speech-detecting accelerometer in each earbud, two beam-forming microphones per side to help filter out sounds such as wind and ambient noise, a proprietary chip package that provides a faster and more stable wireless connection, and wireless audio sharing functionality and location tracking using a phone to determine if the headphones are lost or missing. Reply 32–33 (citing Ex. 1028; Ex. 2039, 3–4). Petitioner argues that these unclaimed features materially impact the Powerbeats Pro's functionality and points to product reviews to show that the proprietary chip package improves quality and latency. *Id.* at 33 (citing Exs. 1029, 1030).

Patent Owner responds that much of what Petitioner argues are unclaimed features are, in fact, claimed. Sur-reply 19–20. Specifically, Patent Owner argues that claim 1's recitation of a "microphone" corresponds to the two beam-forming microphones in Powerbeats Pro; the "processor circuit" of claim 1 corresponds to the proprietary chip package of Powerbeats Pro; and that claim 18's recitation of a "digital signal processor that provides a sound quality enhancement" corresponds to the speech-detecting accelerometer and two-beam forming microphones of Powerbeats Pro. *Id.* Patent Owner, however, offers no evidence to support these arguments.[10] *Id.* Patent Owner's attorney argument is not persuasive to meet its burden to show that the challenged claims are coextensive with Powerbeats Pro. In any case, we agree with Petitioner that these particular features of Powerbeats Pro do not appear to be coextensive with the recitations in claims 1 and 18. *Cf. Fox Factory*, 944 F.3d at 1376 ("On a broader note, if we were to agree . . . that the coextensiveness requirement is met so long as the patent claim broadly covers the product that is the subject of the secondary considerations evidence, irrespective of the nature of any

[10] We recognize that, ordinarily, "[t]he sur-reply may not be accompanied by new evidence other than deposition transcripts of the cross-examination of any reply witness." TPG 73. In this instance, it is Patent Owner's burden to prove that the challenged claims are coextensive with the Powerbeats Pro in order to show nexus via coextensiveness. *See Fox Factory*, 944 F.3d at 1373. Thus, Patent Owner should have marshaled evidence of coextensiveness, including evidence as to unclaimed features, with its Response. Paper 15 (Scheduling Order) 8 (Patent Owner is cautioned that any arguments not raised in the response may be deemed waived."); TPG 73–74 ("Sur-replies should only respond to arguments made in reply briefs, comment on reply declaration testimony, or point to cross-examination testimony."). In any case, Patent Owner did not request an opportunity to submit additional evidence with its Sur-reply.

unclaimed features—then the coextensiveness requirement would rest entirely on minor variations in claim drafting."). Moreover, Patent Owner does not contest that other features, such as wireless audio sharing functionality and location tracking using a phone, are features of Powerbeats Pro but not claimed in the challenged claims.

Patent Owner also argues that, even if the features of Powerbeats Pro are not claimed in the challenged claims, those features "are not for improving the 'heart,' or purpose, of the '325 Patent." Sur-Reply 20–21. In a similar argument, Patent Owner contends that "even if any of the Powerbeats Pro's features identified in the Reply could be considered unclaimed, there is no evidence that they are critical or significant to performing the function of the '325 Patent's earphones better." *Id.* at 21. Specifically, Patent Owner argues, "Petitioner . . . did not introduce any evidence to show that the speech-detecting accelerometer, beam-forming microphones, ambient noise filtering, wireless audio sharing and/or location tracking are critical to securing a pair of independently wireless earphones to the user." *Id.* at 21–22. This misstates the law. *Fox Factory* did not hold that unclaimed features must be critical to or for improving the heart of the challenged claims. Rather, we look to whether the unclaimed features "materially impact[] the product's functionality." *Fox Factory*, 944 F.3d at 1375. Thus, when *Fox Factory* states that "if the unclaimed features amount to nothing more than additional insignificant features, presuming nexus may nevertheless be appropriate," *id.* at 1374, it means insignificant to the product, not insignificant to the challenged claims. Patent Owner does not argue, and has not presented evidence, that the unclaimed features of Powerbeats Pro are insignificant to, or do not materially impact, the Powerbeats Pro product and its success.

For these reasons, even if we consider Patent Owner's improperly incorporated claim charts, we still conclude that Patent Owner has not met its burden to prove that the challenged claims and Powerbeats Pro are coextensive. Thus, Patent Owner has not shown a nexus between the commercial success of Powerbeats Pro and the invention of the challenged claims by virtue of coextensiveness.

As noted above, Patent Owner may still show nexus by showing that the commercial success of the Powerbeats Pro is the direct result of the unique characteristics of the claimed invention. *See Fox Factory*, 944 F.3d at 1373–74; *Huang*, 100 F.3d at 140. To that end, Patent Owner argues in the Response that "[a]t a minimum, a nexus between the Powerbeats Pro [and] the Challenged Claims exists because the commercial success is the direct result of the unique characteristics of the claimed invention." PO Resp. 41. Patent Owner does not cite to evidence to support this statement, and does not identify, in the Response which "unique characteristics" it relies on. *Id.*

In its arguments regarding coextensiveness, Patent Owner identified the "completely wireless" nature and "signature earhook design" of the Powerbeats Pro. *Id.* at 37–38, 40. In the Sur-reply, Patent Owner attempts to tie these two features to "unique characteristics" of the challenged claims. Sur-reply 23 ("The [Patent Owner Response] explained how Petitioner's press releases touted the 'completely wireless' nature of the headphones as well as the 'signature earhook design' of the PowerBeats Pros.") (citing PO Resp. 37–38; Ex. 2039, 1). Patent Owner has not shown persuasive evidence to support an argument that the commercial success of the Powerbeats Pro was the direct result of these features. The press release of Exhibit 2039 characterizes the Powerbeats Pro as

> completely wireless earphones that deliver powerful sound for the world's most passionate music lovers and motivated athletes. The result of a deep integration between Beats and Apple engineering, Powerbeats Pro features industry-leading battery life, advanced functionality, reliable connectivity, exceptional fit via the signature earhook design and beautiful fidelity.

Ex. 2039, 2. This press release purportedly published on April 3, 2019, (Ex. 2039, 2), while Patent Owner relies on commercial success that took place after this date, in "Q3 2019" (PO Resp. 41). Patent Owner does not explain persuasively why a press release published before the period of alleged commercial success is evidence of the reasons for that success.

In sum, we conclude that Patent Owner has not shown a nexus between the challenged claims and the alleged commercial success of the Powerbeats Pro. Accordingly, Patent Owner's objective indicia of nonobviousness is particularly weak and unpersuasive.

8. Conclusion of Obviousness

As explained above, the combination of Rosener and Huddart teaches each limitation of claims 1, 2, and 16, but not claim 18. Petitioner has introduced persuasive evidence that a skilled artisan would have had reasons to combine the teachings of Rosener and Huddart with a reasonable expectation of success. We have considered Patent Owner's arguments and evidence of objective indicia of nonobviousness, but do not find it persuasive, for the reasons explained above. In sum, upon consideration of all the evidence, we conclude that Petitioner has proved by a preponderance of the evidence that claims 1, 2, and 16 would have been obvious over Rosener and Huddart. Petitioner has not proved, by a preponderance of the evidence, that claim 18 would have been obvious over Rosener and Huddart.

C. Obviousness of Claims 3 and 4 over Rosener, Huddart, and Haupt

Petitioner contends that claims 3 and 4 would have been obvious over Rosener, Huddart, and Haupt. Pet. 57–64. Patent Owner does not challenge Petitioner's additional allegations for claims 3 and 4.

Haupt describes techniques for downloading digital data (e.g., MP3 music files) from the Internet using a computer (e.g., a PDA or notebook computer wirelessly connected to a network) and distributing those digital data to wireless headphones. Ex. 1006, 1.

Claim 3 depends from claim 1 and adds "wherein the processor circuit for the first earphone is for, upon activation of a user control of the headphones, initiating transmission of a request to a remote network server that is remote from the headphones." Claim 4 depends from claim 3 and adds "wherein the processor circuit of the first earphone is further for receiving a response to the request."

As we find above, Rosner teaches a processor circuit, for example broadband processor 914, signal conditioning circuits 916, 920, and other processing circuitry. Ex. 1003 ¶ 114. Petitioner contends that Haupt teaches activation of a user control of headphones and corresponding transmission of a request to a remote network server, after which the server sends, and the headphones receive, a response (e.g., downloaded audio content). Pet. 61–64. In particular, Petitioner cites to Haupt's description of interacting with control buttons on wireless headphones to connect with a server and retrieve audio files over a network. *Id.* (citing Ex. 1006, 2–5, 10–14, 21). Petitioner, relying on Dr. Cooperstock's testimony, contends that a skilled artisan would have combined Haupt's teachings with those of Rosener and Huddart to "improve[] performance when streaming data streams with high throughput requirements due to the increased data transmission rates,"

"impart[] new and useful functionality to [Rosener's] earphones 502, 504 as audio playback devices," and "provid[e] Internet access to the headphones." *Id.* at 58–61 (citing Ex. 1003 ¶¶ 57–61). We credit Dr. Cooperstock's uncontroverted testimony on this point.

Based on the evidence presented in the Petition, we find that the combination of Rosener, Huddart, and Haupt teaches each limitation of claims 3 and 4. Petitioner has introduced persuasive evidence that a skilled artisan would have had reasons to combine the teachings of Rosener, Huddart, and Haupt with a reasonable expectation of success. We have considered Patent Owner's arguments and evidence of objective indicia of nonobviousness, but do not find it persuasive, for the reasons explained above. In sum, upon consideration of all the evidence, we conclude that Petitioner has proved by a preponderance of the evidence that claims 3 and 4 would have been obvious over Rosener, Huddart, and Haupt.

D. Obviousness of Claims 9, 10, and 14 over Rosener, Huddart, and Price

Petitioner contends that claims 9, 10, and 14 would have been obvious over Rosener, Huddart, and Price. Pet. 65–71. Patent Owner disputes whether claims 9 and 10 would have been obvious, but does not contest Petitioner's allegations for claim 14. We find that the combination of Rosener, Huddart, and Price teaches each limitation of claims 9, 10, and 14.

Price "relates generally to collecting data from, sending data to, and/or updating software or digital data in electronic devices." Ex. 1008 ¶ 3. In one example, updated software code (including firmware) is retrieved by a computer from a data store on a network and delivered (wirelessly) to an electronic device. *Id.* ¶¶ 29, 38–39, Fig. 1. Exemplary electronic devices

include personal computers, digital cameras, TiVo-like devices, and personal digital assistants (such as Palm and Pocket PC devices). *Id.* ¶¶ 25, 33.

Claim 9 depends from claim 1 and adds "the processor circuits of the headphones are configured to receive firmware upgrades transmitted from a remote network server." Claim 10 depends from claim 9 and adds "wherein the headphone[s] are configured to receive the firmware upgrades wirelessly."

As to claims 9 and 10, Petitioner contends that Price teaches a coordinating computer obtaining software update code representing firmware upgrades from a server and transmitting those firmware upgrades to devices wirelessly. Pet. 69–71 (citing Ex. 1008 ¶¶ 26, 30, 33, 37, 38). According to Petitioner, a skilled artisan would have modified Rosener's transceiver 900 to implement processing related to the receipt of software update code for firmware upgrades, per the teachings of Price. *Id.* at 70 (citing Ex. 1003 ¶ 124). Petitioner argues that this feature of Price would have "provided the benefits of improving reliability, functionality, or compatibility" to Rosener's earphones. *Id.* at 70 (citing Ex. 1008 ¶¶ 5, 11; Ex. 1003 ¶¶ 124, 125).

In arguments similar to those presented for claim 18, discussed above, Patent Owner contends that "a [person of ordinary skill in the art] would not have attempted to use a low-power, pocket-charger-rechargeable battery as in Huddart, with wireless earphones that have the additional power consumption associated with receiving firmware upgrades, including wirelessly with respect to claim 10." PO Resp. 32–33 (citing Ex. 2035 ¶ 65). Here, Patent Owner mischaracterizes Petitioner's obviousness allegations as bodily incorporating Huddart's rechargeable battery into Rosener's earphone. *See also id.* at 34–35 ("As with dependent claim 18,

. . . the Petition and Cooperstock rely on Huddart's low-power earbud battery as a motivation to power the firmware-receiving earphones of claims 9 and 10. . . . Put another way, to the extent that a [person of ordinary skill in the art] might be motivated to power Rosener's earphone with Huddart's low-power, pocket-charger-rechargeable battery, neither Petitioner nor Cooperstock revisited whether the [person of ordinary skill in the art] would be motivated to use a rechargeable battery, like Huddart's low-power, pocket-charger-rechargeable battery, in a wireless headphone that additionally receives firmware upgrades (including wirelessly)."); Reply 28 n.3 ("[Patent Owner] misinterprets the Petition as incorporating Huddart's battery into Rosener"). This argument is unpersuasive, as Patent Owner's attempt to recast Petitioner's argument as a physical substitution of elements fails to take into account the teachings of Rosener and Huddart. *See Mouttet*, 686 F.3d at 1332–33.

Patent Owner further argues that "updating a device's firmware requires that the device be sufficiently powered throughout the firmware upgrade process," and that "[o]ften, if the device loses power during the firmware upgrade process, the device can become inoperable (a so-called 'brick')." PO Resp. 33. Patent Owner then argues that the '325 patent's solution is to implement the transceiver circuit on a single integrated circuit (IT), which it refers to as system-on-chip (SoC or SOC), implying that a SoC design is required by the patent's claims. *Id.* at 35–36 (citing Ex. 1001, 6:45–49; Ex. 2035 ¶¶ 70–71); *see also* Sur-reply 17–18 ("[T]the [Patent Owner Response's] description of the SOC described in the '325 Patent demonstrates how the '325 Patent enables a wireless earphone with a rechargeable battery to receive firmware upgrades."). According to Patent Owner, without a teaching of "an earphone with a SoC for reduced power

consumption," a person of ordinary skill in the art "would realize that for claims 9 and 10, the battery would need to power non-SOC wireless earphones throughout the firmware update process; and if the battery ran out of power, the wireless earphones likely would become 'bricked.'" PO Resp. 35–36. Patent Owner concludes:

> If a [person of ordinary skill in the art] were truly motivated to use small, low-power rechargeable batteries in Rosener, the [person of ordinary skill in the art] would want to keep power requirements low by implementing lower power receiver technologies (like magnetic inductance or Bluetooth), and not additionally burdening the low power rechargeable battery with having to power the wireless device throughout a firmware update.

Id. at 36–37 (citing Ex. 2035 ¶ 72).

Petitioner faults Patent Owner for not presenting evidence showing that firmware upgrades involve significant power consumption. Reply 27. In any case, Petitioner argues, a skilled artisan would have known how to implement a Rosner-Huddart-Price combination in a way that does not require high power consumption, such as incrementally upgrading firmware. *Id.* at 29–30 (citing Ex. 1023 ¶¶ 50–51). In its Sur-reply, Patent Owner changes its argument, contending instead that it is the reliability of the

battery, rather than its power, that poses the risk of a device "becoming a brick." Sur-reply 17.[11]

Patent Owner's arguments are unpersuasive. First, as Petitioner argues (Reply 28), Patent Owner points to no persuasive evidence that the claims of the '325 patent require a SoC design for a transceiver. Mr. McAlexander's testimony, which merely copies the Patent Owner Response without identifying any basis for the testimony, is of little value. Ex. 2035 ¶¶ 70–72. Moreover, the '325 patent makes clear that a SoC design is only an example. Ex. 1001, 1001, 6:45–49 ("In various embodiments, the transceiver circuit 100 may be implemented as a single integrated circuit (IC), such as a system-on-chip (SoC), which is conducive to miniaturizing the components of the earphone 10, which is advantageous if the earphone 10 is to be relatively small in size.").

Second, Patent Owner's argument that the power source must be high-power or reliable assumes that the battery would be used for the entire firmware upgrade process, including both receiving the firmware update and installing it. PO Resp. 33. Claim 9 only recites a processor circuit "configured to receive firmware upgrades," and says nothing about installing firmware. Patent Owner provides no persuasive argument or evidence suggesting that a high-power or more reliable battery would be necessary to

[11] Patent Owner repeatedly argued in its Response that it was the "low-power" nature of Huddart's battery that made it unsuitable for firmware upgrades. PO Resp. 32–37. Patent Owner's mention of an "unreliable power source" was in the context of Huddart's battery being low power. *Id.* at 37; *see also id.* at 30 (arguing that Huddart's "low-power battery" would be "unreliable" "due to its small capacity"). We decline to consider Patent Owner's new argument that Huddart's battery would have been unreliable. However, even if we did, it would not be persuasive, as we explain.

receive firmware, or that a power failure while receiving firmware (as opposed to a power failure during installation of the firmware) would result in "bricking" a device. Moreover, as Petitioner argues, a skilled artisan could have implemented the combination such that the firmware installation takes place while the earphone is connected to a charger, such as described in Huddart (primary charger and pocket charger). Reply 30–31 (citing Ex. 1023 ¶¶ 52–53; Ex. 1005, 8:28–34). Thus, even if firmware installation were required by claims 9 and 10, Patent Owner's argument still would be unpersuasive.

As explained for claims 1 and 18 (Sections II.B.3.b) and II.B.6 above), we find that a skilled artisan would have had persuasive reasons to incorporate Huddart's teaching of rechargeable batteries into Rosener's earphones, would have selected a rechargeable battery sufficient to power Rosener's circuitry (including transceiver 900, which would receive firmware upgrades), and would have had a reasonable expectation of success in doing so.

Claim 14 depends from claim 10, but otherwise adds limitations that are substantially the same as those added by claim 2. Petitioner incorporates by reference its arguments and evidence for claim 2. Pet. 71. As explained in Section II.B.4 above, we find that Rosener teaches each additional limitation of claim 2. For the same reasons, Rosener teaches each additional limitation of claim 14.

In conclusion, the combination of Rosener, Huddart, and Price teaches each limitation of claims 9, 10, and 14. Petitioner has introduced persuasive evidence that a skilled artisan would have had reasons to combine the teachings of Rosener, Huddart, and Price with a reasonable expectation of success. We have considered Patent Owner's arguments and evidence of

objective indicia of nonobviousness, but do not find it persuasive, for the reasons explained above. In sum, upon consideration of all the evidence, we conclude that Petitioner has proved by a preponderance of the evidence that claims 9, 10, and 14 would have been obvious over Rosener, Huddart, and Price.

E. Obviousness of Claim 15 over Rosener, Huddart, and Paulson

Petitioner contends that claim 15 would have been obvious over Rosener, Huddart, and Paulson. Pet. 71–75. Patent Owner does not contest Petitioner's additional allegations for claim 15.

Paulson describes a voice communication device, such as an earphone assembly with an ear tip that inserts in the ear canal and a microphone attached at the end of a boom. Ex. 1009, 5:1–8, Figs. 1A, 1B, 2. In one example, Paulson describes a push-button switch that can be pushed to enable and mute the microphone. *Id.* at 6:18–49.

Claim 15 depends from claim 1 and adds

> wherein the processor circuit of the first earphone is configured to:
>
> > process audible utterances by the user picked by the microphone in response to activation of the microphone by the user; and
> >
> > transmit a communication based on the audible utterances via the Bluetooth wireless communication links.

Petitioner argues that Paulson's unmute feature corresponds to enabling a microphone and processor circuit to "process audible utterances by the user picked by the microphone in response to activation of the microphone by the user," as recited in claim 15. Pet. 73–74 (citing Ex. 1009, 6:18–49). Petitioner cites Rosener for the ability to "transmit a

communication based on the audible utterances via the Bluetooth wireless communication links," as recited in claim 15. *Id.* at 74–75 (citing Ex. 1004 ¶¶ 11, 35, 49, 56). According to Petitioner and Dr. Cooperstock (Pet. 73; Ex. 1003 ¶ 71), a skilled artisan would have combined Paulson's and Rosener's features in light of Paulson's statements that its "feature is important for users in a noisy environment, to allow them to reduce the noise heard by the distant party." Ex. 1009, 6:33–35. We credit Dr. Cooperstock's uncontested testimony on this point.

In light of Petitioner's evidence, we find that the combination of Rosener, Huddart, and Paulson teaches each limitation of claim 15. Petitioner has introduced persuasive evidence, including Dr. Cooperstock's testimony, that a skilled artisan would have had reasons to combine the teachings of Rosener, Huddart, and Price with a reasonable expectation of success. We have considered Patent Owner's arguments and evidence of objective indicia of nonobviousness, but do not find them persuasive for the reasons explained above. In sum, upon consideration of all the evidence, we conclude that Petitioner has proved by a preponderance of the evidence that claim 15 would have been obvious over Rosener, Huddart, and Paulson.

F. Obviousness of Claims 16 and 17 over Rosener, Huddart, and Vanderelli

Petitioner contends that claims 16 and 17 would have been obvious over Rosener, Huddart, and Vanderelli. Pet. 75–78. Patent Owner does not contest Petitioner's additional allegations for this ground.

Vandereilli describes a wireless power supply that rectifies RF energy and stores it in a group of capacitors. Ex. 1010, Abstract, 2:1–51, 4:9–17, Fig. 1.

For claim 16, Petitioner cites Vanderelli for additional examples, beyond those shown in Huddart, of "wirelessly chargeable circuit components." Pet. 77. As explained above, we conclude that claim 16 would have been obvious over Rosener and Huddart. Thus, we do not reach whether claim 16 also would have been obvious over Rosener, Huddart, and Vanderelli. *See SAS*, 138 S. Ct. at 1359); *Bos. Sci. Scimed*, 809 F. App'x at 990.

As to claim 17, Petitioner contends that a "passive, wireless rechargeable power source" is a rechargeable power source that "may comprise capacitors passively charged with RF radiation." Pet. 51 (quoting Ex. 1001, 7:3–5; citing Ex. 1003 ¶ 104), 78 (quoting Ex. 1001, 7:3–5; citing Ex. 1003 ¶ 134). Petitioner contends that a skilled artisan would have incorporated Vanderelli's technique of rectifying RF energy and storing it in capacitors because it would have provided the "advantages of obtaining energy from a range of RF frequencies." *Id.* at 78 (citing Ex. 1003 ¶ 134). We credit Petitioner's evidence, including Dr. Cooperstock's uncontested testimony.

In light of Petitioner's evidence, we find that the combination of Rosener, Huddart, and Vanderelli teaches each limitation of claim 17. Petitioner has introduced persuasive evidence, including Dr. Cooperstock's testimony, that a skilled artisan would have had reasons to combine the teachings of Rosener, Huddart, and Vanderelli with a reasonable expectation of success. We have considered Patent Owner's arguments and evidence of objective indicia of nonobviousness, but do not find it persuasive, for the reasons explained above. In sum, upon consideration of all the evidence, we conclude that Petitioner has proved by a preponderance of the evidence that claim 17 would have been obvious over Rosener, Huddart, and Vanderelli.

III. CONCLUSION[12]

Petitioner has shown by a preponderance of the evidence that claims 1–4, 9, 10, and 14–17 would have been obvious. Petitioner has not shown by a preponderance of the evidence that claim 18 would have been obvious.

In summary:[13]

Claims	35 U.S.C. §	Reference(s)/ Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1, 2, 16–18	103(a)	Rosener, Huddart	1, 2, 16	18
3, 4	103(a)	Rosener, Huddart, Haupt	3, 4	
9, 10, 14	103(a)	Rosener, Huddart, Price	9, 10, 14	
15	103(a)	Rosener, Huddart, Paulson	15	
16, 17	103(a)	Rosener, Huddart, Vanderelli	17	
Overall Outcome			1–4, 9, 10, 14–17	18

[12] Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner's attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. *See* 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. *See* 37 C.F.R. § 42.8(a)(3), (b)(2).

[13] For the reasons explained above, we do not reach whether claim 17 would have been obvious over Rosener and Huddart, or whether claim 16 would have been obvious over Rosener, Huddart, and Vanderelli.

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED, based on a preponderance of the evidence, that claims 1–4, 9, 10, and 14–17 have been shown to be unpatentable;

FURTHER ORDERED, based on a preponderance of the evidence, that claim 18 has not been shown to be unpatentable; and

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

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Paper 43
Date: June 27, 2022

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE, INC.,
Petitioner,

v.

KOSS CORPORATION,
Patent Owner.

IPR2021-00381
Patent 10,491,982 B1

Before DAVID C. McKONE, GREGG I. ANDERSON, and NORMAN H. BEAMER, *Administrative Patent Judges*.

ANDERSON, *Administrative Patent Judge*.

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

I. INTRODUCTION

Apple, Inc. ("Petitioner") filed a Petition requesting *inter partes* review of claims 1–5 and 14–20 of U.S. Patent No. 10,491,982 (Ex. 1001, "the '982 patent"). Paper 2 ("Pet."). Koss Corporation ("Patent Owner") filed a Preliminary Response. Paper 10 ("Prelim. Resp."). Upon our authorization, Petitioner filed a Preliminary Reply relating to discretionary denial based on the factors set forth in *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 (PTAB Mar. 20, 2020) (precedential). Paper 11 ("Prelim. Reply"). Patent Owner filed a Preliminary Sur-Reply. Paper 12 ("Prelim. Sur-Reply"). We instituted *inter partes* review on July 2, 2021. Paper 15 ("Inst. Dec."). Patent Owner filed a Response (Paper 19, "PO Resp."), Petitioner filed a Reply (Paper 31, "Reply"), and Patent Owner filed a Sur-Reply (Paper 34, "Sur-Reply"). A hearing was held on April 5, 2022, and a transcript has been made of record. Paper 42 ("Tr.").

We have jurisdiction under 35 U.S.C. § 6. This Decision is a final written decision under 35 U.S.C. § 318(a) as to the patentability of claims 1– 5 and 14–20. Based on the record before us, Petitioner has proved, by a preponderance of the evidence, that claims 1–5 and 14–18 are unpatentable, but has not proved that claims 19 and 20 are unpatentable.

II. BACKGROUND

A. Real Parties in Interest

Petitioner states it is the real party-in-interest. Pet. 85. Patent Owner states it is the real party-in-interest. Paper 4 ("Mandatory Notice by Patent Owner"), 1; *see also* Papers 6–9 (Updates to Mandatory Notice).

B. Related Matters

Both parties list a related lawsuit alleging infringement of the '982 patent, *Koss Corporation v. Apple Inc.*, Case No. 6:20-cv-00665 (W.D. Tex.) ("District Court Lawsuit"). Pet. 86. Patent Owner lists the District Court Lawsuit and other lawsuits involving the '982 patent, United States applications to which the '982 patent claims priority, and pending *inter partes* reviews as Related Matters. Paper 9, 1–2.

1. Other Lawsuits

Patent Owner identifies five other lawsuits involving the '982 patent: *Koss Corporation v. PEAG LLC d/b/a JLab Audio*, Case No. 6:20-cv-00662 (W.D. Tex.); *Koss Corporation v. Skullcandy, Inc.*, Case No. 6:20-cv-00664 (W.D. Tex); *Apple Inc. v. Koss Corporation*, Case No. 4:20-cv-05504 (N.D. Cal.); *Koss Corporation v. Apple Inc.*, Case No. 6-20-cv-00665 (W.D. Tex.); and *Koss Corporation v. Skullcandy, Inc.*, Case No. 2:21-cv-00203 (D. Utah). Paper 9, 1.

2. United States Applications

Patent Owner lists the following as Related Applications to which the '982 patent claims priority: PCT application No. PCT/US2009/039754, filed April 7, 2009 (the "PCT Application") and provisional application Serial No. 61/123,265, filed April 8, 2008 (the "Provisional Application"). Paper 9, 1.

3. Inter Partes Review Proceedings

Patent Owner lists the following *inter partes* review proceedings[1] challenging patents that claim priority to the PCT Application and the Provisional Application:

Bose Corporation v. Koss Corporation, IPR2021-00297, filed December 7, 2020, challenging US Patent 10,368,155 B2;

Apple Inc. v. Koss Corporation, IPR2021-00305, filed December 15, 2020, challenging US Patent 10,506,325 B1;

Apple Inc. v. Koss Corporation, IPR2021-00546, filed February 22, 2021, challenging US Patent 10,206,025 B2;

Apple Inc. v. Koss Corporation, IPR2021-00592, filed March 2, 2021, challenging US Patent 10,469,934 B2;

Apple Inc. v. Koss Corporation, IPR2021-00612, filed March 3, 2021, challenging U.S. Patent 10,206,025;

Apple Inc. v. Koss Corporation, IPR2021-00626, filed March 17, 2021, challenging US Patent 10,206,025 B2;

Bose Corporation v. Koss Corporation, IPR2021-00680, filed March 17, 2021, challenging US Patent 10,469,934 B2;

Apple Inc. v. Koss Corporation, IPR2021-00679, filed March 22, 2021, challenging US Patent 10,506,325 B1; and

[1] *Apple Inc. v. Koss Corporation*, IPR2021-00255, filed November 25, 2020, and *Apple Inc. v. Koss Corporation*, IPR2021-00600, filed March 7, 2021, both challenging US Patent 10,298,451 B1, and *Apple Inc. v. Koss Corporation*, IPR2021-00686, filed March 22, 2021, challenging US Patent 10,491,982 B1, are also pending *inter partes* reviews between these same parties.

Apple Inc. v. Koss Corporation, IPR2021-00693, filed March 23, 2021, challenging US Patent 10,469,934 B2.

Paper 9. 1–2.

C. The '982 Patent

The application for the '982 patent's earliest priority dates are April 7, 2009, to the PCT Application and April 8, 2008[2], to the Provisional Application. Ex. 1001, codes (60), (63). See Section II.B.2 above.

1. Background Technology

The '982 patent explains that wired headphones interconnecting headphones and a data storage unit are "cumbersome." Ex. 1001, 1:56–59. "Recently, cordless headphones that connect wirelessly via IEEE 802.11 to a WLAN-ready laptop or personal computer (PC) have been proposed, but "such headphones are also quite large and not in-ear type phones." *Id.* at 1:66–2:4.

2. The '982 Patent's Wireless Earphones

The '982 patent describes and claims "a wireless earphone that receives streaming audio data via ad hoc wireless networks and infrastructure wireless networks, and that transitions seamlessly between wireless networks." Ex. 1001, 2:64–66. "[T]he earphone may transition automatically from an ad hoc wireless network to an infrastructure wireless network, without user intervention." *Id*. at 3:8–11. The '982 patent defines "ad hoc wireless network" as "a network where two . . . wireless-capable devices, such as the earphone and a data source, communicate directly and wirelessly, without using an access point." *Id.* at 3:8–14. The '982 patent defines "infrastructure wireless network" as "a wireless network that uses

[2] The priority date is not in dispute. See Pet. 2.

one or more access points to allow a wireless-capable device, such as the wireless earphone, to connect to a computer network, such as a LAN or WAN (including the Internet)." *Id*. at 3:14–19.

Two discrete wireless earphones are described, each having a body and an "ear canal portion for insertion into the canal of the user of the earphone." *Id.* at 3:25–27, 3:54–56. Figure 2A of the '982 patent is reproduced below.

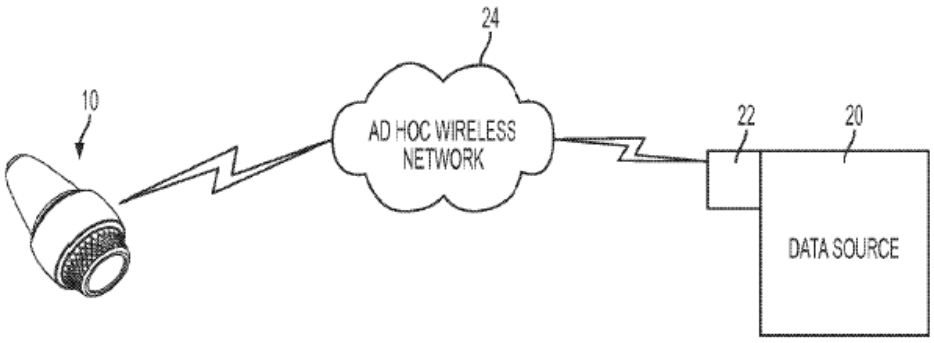


FIG. 2A

Figure 2A illustrates one of the communication modes for the wireless earphone.

Ex. 1001, 2:36–38. Figure 2A illustrates a wireless network adapter 22 connected to a data source 20 in communication with earphone 10 over ad hoc wireless network 24. *Id.* at 4:33–37. The earphone has a transceiver circuit to communicate wirelessly with a data source. *Id.* at 4:35–37. The data source may be a digital audio player (DAP). *Id.* at 4:39–40. The DAP transmits audio wirelessly to earphone(s) via an ad hoc network if the DAP and earphone(s) are "in range" of that network. *Id.* at 4:63–65. "When in range, the data source 20 may communicate with the earphone 10 via the ad

hoc wireless network 24 using any suitable wireless communication protocol, including Wi-Fi (e.g., IEEE 802.lla/b/g/n), WiMAX (IEEE 802.16), Bluetooth" and other communication protocols. *Id.* at 4:63–5:1.

Figure 2B of the '982 patent is reproduced below.

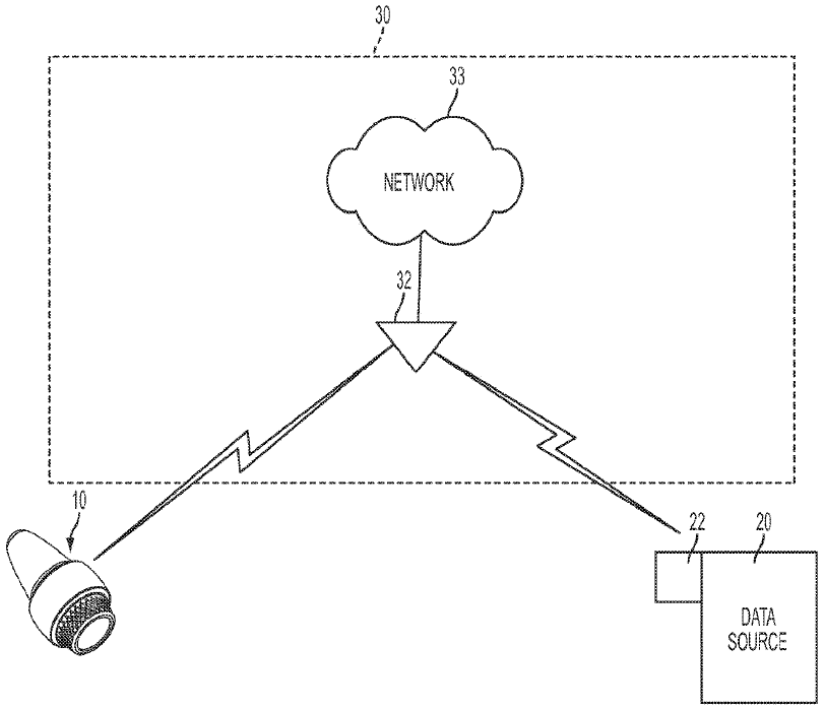


FIG. 2B

Figure 2B illustrates another of the communication modes for the wireless earphone.

Ex. 1001, 2:36–38. The data source and wireless network adapter may transmit digital audio wirelessly through an access point 32 over "an infrastructure wireless network (such as a wireless LAN (WLAN) 30". *Id.* at 4:34–40. "[T]he wireless network adapter 22 may comprise a wireless network interface card (WNIC) or other suitable transceiver that plugs into a USB port or other port or jack of the data source 20 (such as a TRS connector) to stream data, e.g., digital audio files, via a wireless network

(e.g., the ad hoc wireless network 24 or an infrastructure wireless network)." *Id*. at 4:50–56.

D. Illustrative Claim

Claims 1–5 and 14–20 of the '982 patent are challenged. Pet. 1–2, 18–85. Claim 1 is the only independent claim challenged. Claims 2–5 and 14–20 depend directly or indirectly from claim 1. All claims are directed to a "system." Claim 1 is reproduced below as illustrative.

[1.P][3] 1. A system comprising:

[1.a] headphones comprising a pair of first and second wireless earphones to be worn simultaneously by a user,

[1.b] wherein the first and second earphones are separate such that when the headphones are worn by the user, the first and second earphones are not physically connected,

[1.c] wherein each of the first and second earphones comprises:

[1.c.i] a body portion that comprises:

[1.c.i.A] a wireless communication circuit for receiving and transmitting wireless signals;

[1.c.i.B] a processor circuit in communication with the wireless communication circuit; and

[1.c.i.C] an ear canal portion that is inserted into an ear of the user when worn by the user; and

[3] For purposes of this Decision, we follow Petitioner's format where each claim is identified by claim number followed by a letter or combination of letters and Roman numerals for each limitation. *See* Pet. 32–53 (limitations 1.P– 1.d).

[1.c.i.D] at least one acoustic transducer connected to the processor circuit; and

[1.c.ii] an elongated portion[4] that extends away from the body portion such that the elongated portion extends downwardly when the ear canal portion is inserted in the ear of the user;

[1.c.iii] a microphone connected to the processor circuit and for picking up utterances of a user of the headphones;

[1.c.iv] an antenna connected to the wireless communication circuit; and

[1.c.v] a rechargeable power source; and

[1.d] a mobile, digital audio player that stores digital audio content and that comprises a wireless transceiver for transmitting digital audio content to the headphones via Bluetooth wireless communication links, such that each earphone receives and plays audio content received wirelessly via the Bluetooth wireless communication links from the mobile, digital audio player.

Ex. 1001, 18:8–40.

E. Evidence of Record

This proceeding relies on the following prior art references and expert testimony:

Rosener, US 2008/0076489 A1, published Mar. 27, 2008 (Ex. 1004);

[4] This limitation recites "elongated portion," which does not appear in the Specification.

Hankey, US 2008/166001 A1, published July 10, 2008 (Ex. 1005);

Dyer, US 8,031,900 B2, issued Oct. 4, 2001 (Ex. 1006);

Huddart, US 7,627,289 B2, issued Dec. 1, 2009 (Ex. 1007);

Hankey Provisional,[5] US 60/879,177, filed Jan. 6, 2007 (Ex. 1008);

Price, US 2006/0026304 A1, published Feb. 2, 2006 (Ex. 1009);

Paulson, US 7,551,940 B2, issued June 23, 2009 (Ex. 1010);

Marek, US 5,371,454, issued Dec. 6, 1994 (Ex. 1011);

Vanderelli, US 7,027,311 B2, issued Apr. 11, 2006 (Ex. 1012); and

Haupt, EP 2006/042749 A2, issued Apr. 27, 2006 (Ex. 1020, including English translation).

Petitioner also relies on the Declaration of Dr. Jeremy Cooperstock (Ex. 1003, "Cooperstock Declaration") and the Supplemental Declaration of Dr. Jeremy Cooperstock (Ex. 1024, "Cooperstock Supplemental Declaration").

Patent Owner relies on the Declaration of Joseph C. McAlexander III (Ex. 2038, "McAlexander Declaration") and the Declaration of Nicholas S. Blair (Ex. 2039, "Blair Declaration").

F. Prior Art and Asserted Grounds

Petitioner asserts that claims 1–5 and 14–20 would have been unpatentable on the following grounds (Pet. 1–2, 18–85):

[5] Hankey Provisional is a US provisional application related to Hankey. *See* Ex. 1005 code (60).

Claim(s) Challenged	35 U.S.C. §[6]	Reference(s)/Basis
1, 2, 18–20	103	Rosener, Hankey or Rosener, Hankey, Dyer
3–5	103	Rosener, Hankey, Haupt or Rosener, Hankey, Dyer, Haupt
14	103	Rosener, Hankey, Price or Rosener, Hankey, Dyer, Price
15	103	Rosener, Hankey, Paulson or Rosener, Hankey, Dyer, Paulson
16–17	103	Rosener, Hankey, Huddart or Rosener, Hankey, Dyer, Huddart
17	103	Rosener, Hankey, Huddart, Vanderelli or Rosener, Hankey, Dyer, Huddart, Vanderelli

III. ANALYSIS

A. Level of Ordinary Skill in the Art

Petitioner's expert Dr. Cooperstock, testifies that, based on his experience and the references used to challenge the '982 patent, a person of ordinary skill in the art at the time of the critical date for the '982 patent

> would have had at least a Bachelor's Degree in an academic area emphasizing electrical engineering, computer science, or a similar discipline, and at least two years of experience in wireless communications across short distance or local area networks. Superior education could compensate for a deficiency in work experience, and vice-versa.

[6] The Leahy-Smith America Invents Act ("AIA"), Pub. L. No. 112-29, 125 Stat. 284, 287–88 (2011), amended 35 U.S.C. §§ 102 and 103, effective March 16, 2013. Because the application that resulted in the '982 patent has an effective filing date before this date, the pre-AIA versions of §§ 102 and 103 apply.

Ex. 1003 ¶ 30. This level of skill was adopted in the Institution Decision. Inst. Dec. 33. Patent Owner agrees we "should maintain this standard for the proceeding as Patent Owner agrees that it is an appropriate standard." PO Resp. 5–6 (citing Ex. 2038 ¶ 20). At the Final Hearing, all parties agreed the above level of skill is the correct one for this proceeding. Tr. 73:1–74:13.

Dr. Cooperstock's proposal is consistent with the level of ordinary skill in the art reflected by the prior art. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001); *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995). As per the agreement of the parties, including their experts, and consistent with the prior art, we adopt the above level of ordinary skill for this Decision.

B. Claim Construction

The Petition was accorded a filing date of January 4, 2021. Paper 5. For petitions filed on or after November 13, 2018, a claim shall be construed using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. § 282(b), including construing the claim in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent. 37 C.F.R. § 42.100 (2019). Thus, we apply the claim construction standard as set forth in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc).

Petitioner cites 37 C.F.R. § 42.100, asserts construction is unnecessary, and does not propose any term for express construction in the claim construction section of the Petition. Pet. 18. Notwithstanding the preceding, Petitioner raises a construction issue with respect to claim 17's

recitation of "passive, wireless rechargeable power source." Pet. 80–81. We preliminarily agreed with Petitioner's proposed construction and determined that a "passive" power source 102 "may comprise capacitors passively charged with RF radiation." Inst. Dec. 34 (citing Pet. 80–81 (quoting Ex. 1001, 7:7–9)[7]). Patent Owner does not dispute our preliminary construction or identify any other claim term for express construction. *See generally* PO Resp.

The papers filed since institution do not raise a dispute regarding "passive, wireless rechargeable power source." For completeness of the record, we maintain our preliminary construction of "passive, wireless rechargeable power source." We also determine construction is unnecessary for any other claim term in order to resolve the dispute. *See Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999) ("[O]nly those terms need be construed that are in controversy, and only to the extent necessary to resolve the controversy."). On all other claim terms we proceeded based on the plain and ordinary meaning as understood by a person of ordinary skill in the art. Inst. Dec. 34.

C. Legal Standard for Obviousness

A patent claim is invalid as obvious if the differences between the claimed subject matter and the prior art are "such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains." 35 U.S.C. § 103(a).

> The ultimate determination of obviousness is a question of law, but that determination is based on underlying factual

[7] The Cooperstock Declaration does not provide a construction for any claim term. *See* Ex. 1003 ¶ 29.

> findings. . . . The underlying factual findings include (1) "the scope and content of the prior art," (2) "differences between the prior art and the claims at issue," (3) "the level of ordinary skill in the pertinent art," and (4) the presence of secondary considerations of nonobviousness such "as commercial success, long felt but unsolved needs, failure of others," and unexpected results.

In re Nuvasive, Inc., 842 F.3d 1376, 1381 (Fed. Cir. 2016) (citing *inter alia*, *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966)).

"To satisfy its burden of proving obviousness, a petitioner cannot employ mere conclusory statements. The petitioner must instead articulate specific reasoning, based on evidence of record, to support the legal conclusion of obviousness." *In re Magnum Oil Tools Int'l, Ltd.*, 829 F.3d 1364, 1380 (Fed. Cir. 2016). Furthermore, in assessing the prior art, the Board must consider whether a person of ordinary skill would have been motivated to combine the prior art to achieve the claimed invention. *Nuvasive*, 842 F.3d at 1381.

As the Federal Circuit found, in quoting from the Supreme Court's decision in *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418–419 (2007),

> because inventions in most, if not all, instances rely upon building blocks long since uncovered, and claimed discoveries almost of necessity will be combinations of what, in some sense, is already known," "it can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does."

Personal Web Technologies, LLC v. Apple, Inc., 848 F.3d 987, 991–92 (Fed. Cir. 2017).

D. Obviousness of Claims 1–2 and 18–20 over Rosener and Hankey or Rosener, Hankey, and Dyer[8]

Petitioner alleges claims 1–2 and 18–20 would have been obvious over Rosener and Hankey or Rosener, Hankey, and Dyer. Pet. 1, 18–58. Petitioner also relies on the Cooperstock Declaration. Ex. 1003 ¶¶ 16–57, 59–91.

1. Rosener (Ex. 1004)

Rosener relates to wireless communication between an external data or audio device, like a cell phone or PDA, MP3 or CD player, radio personal computer or game console, and first and second earphones. Ex. 1004 ¶¶ 1, 30. Rosener explains that conventional wireless earphones came in different designs, each with "its own unique benefits and drawbacks." *Id.* ¶¶ 5–10, Figs. 2–4. Rosener focuses on wireless "earbuds." *Id.* at Abs., ¶¶ 11, 30, Fig. 5.

Each earbud is designed to fit into the concha of the pinna of the user's ear, and includes a housing containing a speaker, a radio-frequency (RF) transceiver, and a battery. Ex. 1004 ¶ 30. The transceiver of each is "configured to receive data signals over one or more single-access wireless links or over a multi-access wireless link." *Id.* ¶ 11. The Bluetooth industrial specification (IEEE 802.15.1 standard) is one communication protocol disclosed that allows each of the earphones to communicate with the external data or audio data devices. *Id.* ¶¶ 4, 35.

[8] We have analyzed commercial success for all challenges. See Section III.J below.

Figure 9, reproduced below, illustrates some of the components of Rosener's headphones:

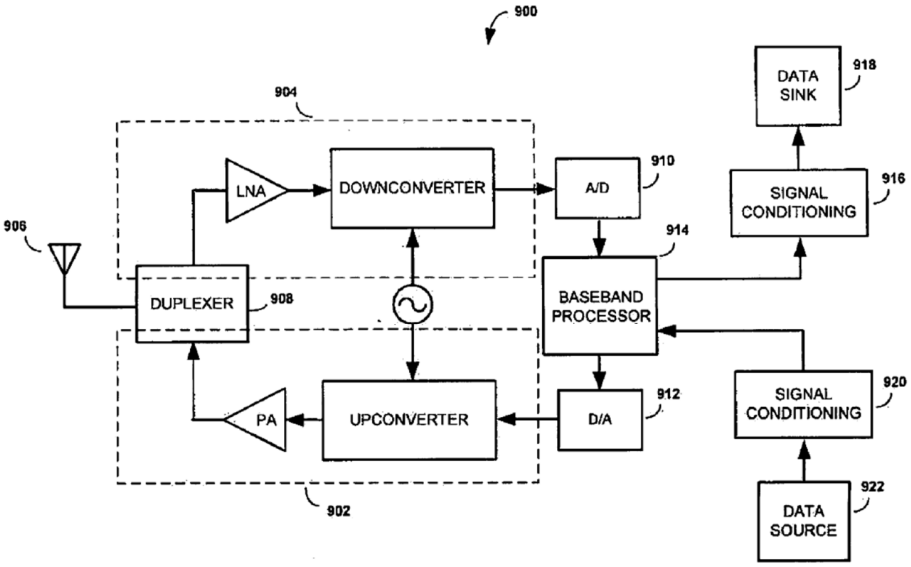


FIGURE 9

Figure 9 is a block diagram of an RF transceiver.

Ex. 1004 ¶¶ 24, 49. As shown above, RF transceiver 900 includes RF transmitter portion 902, RF receiver portion 904, antenna 906, and duplexer 908. *Id.* ¶ 49. A/D converter 910 receives analog baseband signals from RF transceiver portion 904, digitizes the signals, and sends them to baseband processor 914, which, along with signal conditioning circuit 916, processes the signals into a form suitable to drive data sink (speaker) 918. *Id.* Baseband processor 914 receives data from data source 922 (e.g., a microphone) via signal conditioning circuit 920 and provides the data to RF transmitter portion 902 for transmission via antenna 906. *Id.* 1650.

2. Hankey[9] (Ex. 1005)

Hankey describes a headset within "a small compact unit." Ex. 1005 ¶¶ 93, 103. The techniques disclosed in Hankey include integrating electronic components/assemblies (e.g., speaker, antenna) into the limited volume of a small headset, by dividing the headset's electronic components/assemblies "into small multiple [groups of] components that can be positioned at different locations (discretely) within the headset." *Id.* ¶ 98. Similarly, "electronic assemblies that are partially flexible or bendable such that the assemblies can be folded into a small compact form in order to fit inside tightly spaced internal volumes." *Id.* ¶ 99.

Hankey divides the headset's electronic components/assemblies between the earbud and the primary housing. Ex. 1005 ¶¶ 130–131. For example, the processor and speaker may be placed inside the earbud while the microphone "can be electrically coupled to primary housing flexible circuit board." *Id.* ¶ 131.

Figures 10A and 10B of Hankey are reproduced below.

[9] In describing Hankey, Petitioner also cites to Ex. 1008, the Hankey Provisional. Pet. 21; Ex. 1005, code (60); Section II.E above. Petitioner cites to the Hankey Provisional to prove "Hankey is entitled to the benefit of its provisional filing date, *i.e.*, the January 6, 2007 filing date." Pet. 3 (quoting Ex. 1003 ¶ 43; citing Ex. 1008 ¶¶ 89–90, 208–212, Figs 1A, 40A, 41–44). We cite only to Hankey, not the Hankey Provisional. Patent Owner does not dispute that Hankey is prior art and we find the filing date of the Hankey Provisional is the priority date for Hankey.

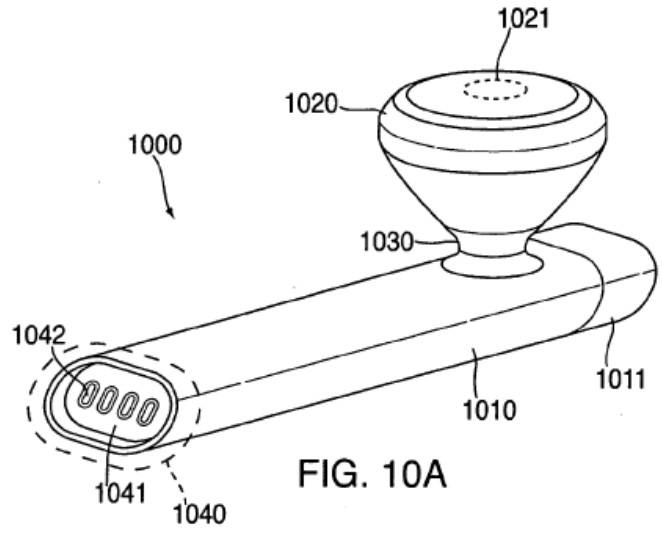


FIG. 10A

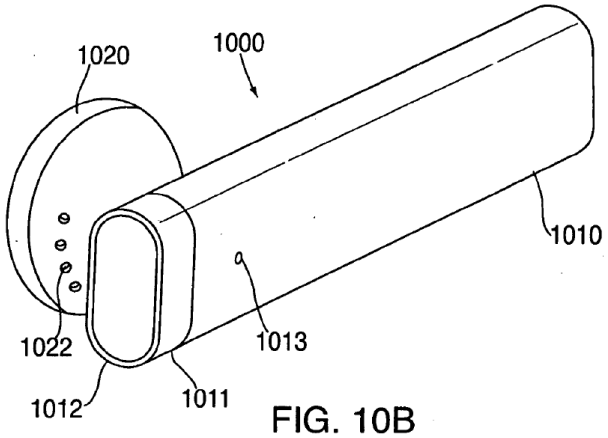


FIG. 10B

Figures l0A and 10B are perspective views of Hankey's headset.

Ex. 1005 ¶ 143. Figure 10A shows headset 1000 for enclosing "electronic and other elements of the headset." *Id.* ¶ 144. The headset "can include earbud 1020, neck 1030, primary housing 1010, antenna cap 1011 and connector 1040." *Id.* "Earbud 1020 can include perforations (e.g., acoustic ports) 1021 and 1022 for allowing air to pass into and out of the earbud 1020." *Id.* "Front port 1021 can allow sound waves from a receiver located in earbud 1020 to reach a user's ear and/or the outside environment." *Id.* Button 1012 can control the headset. *Id.* ¶ 145.

3. Dyer (Ex. 1006)

Dyer describes a "canalphone" type including an eartip that fits within a user's ear canal. Ex. 1006, 3:4–6, 4:37–39, Fig. 1. The eartip is "attachable to a standard generic earphone." *Id.* at 1:10–11, 2:21–24.

Dyer's Figure 1 is reproduced below.

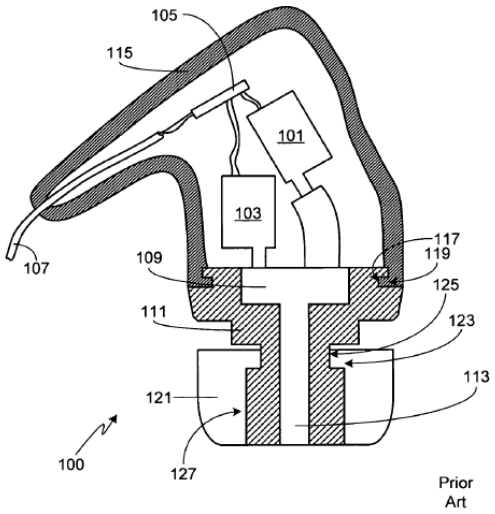


FIG. 1

Figure 1 is a cross-sectional view of a generic earphone in accordance with the prior art.

Ex. 1006, 2:48–49. Figure 1 illustrates an example of "canalphone" 100 that includes a sound delivery member 111 with an eartip 121 attached to an end portion of it. *Id.* at 3:4–6, 3:26–28, 4:4–14. Sound delivery member 111 is attached to earphone enclosure 115 that protects "any required earphone circuitry" of canalphone 100 from damage. *Id*. at 3:57–66. Intermediary member 111 includes a sound delivery tube 113 that delivers audio from circuitries in enclosure 115 to eartip 121. *Id.* at 3:22–25.

4. Claim 1

Patent Owner disputes that a person of ordinary skill, as determined above in Section III.A, would have had sufficient skill to combine Rosener and Hankey with a reasonable expectation of success. PO Resp. 12–21. Patent Owner disputes the reasons for combining Rosener, Hankey, and Dyer. *Id*. at 34–40. Patent Owner also disputes that the Rosener and Hankey or Rosener, Hankey, and Dyer combinations teach two wireless earphones, each having a microphone. *Id*. at 21–34.

a. Rosener and Hankey Reasons for the Combination and Expectation of Success

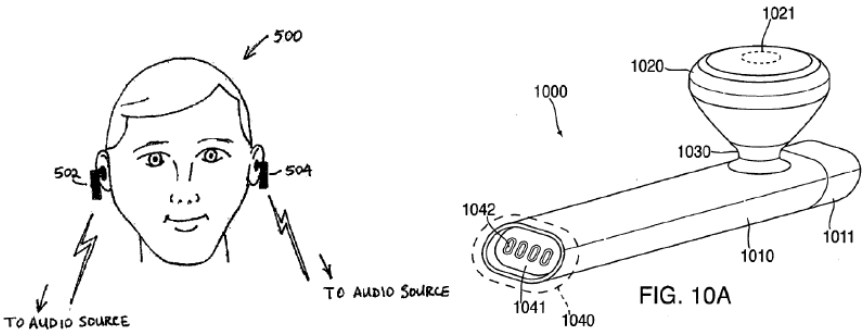
Petitioner's reasons for combining Rosener and Hankey start with Rosener's teaching of "providing 'high-quality stereo,' i.e., binaural, functionality." Pet. 24 (citing Ex. 1004 ¶¶ 30, 3–8, Fig. 5; Ex. 1003 ¶ 44). Petitioner relies on Rosener as teaching two "earpieces/earphones" 502 and 504 in wireless communication with an "audio source." *Id*. at 25 (citing Ex. 1004, Fig. 5; *see also id.* ¶ 30 (describing Fig. 5)). Petitioner relies on Hankey for details of the form factor for the earphones 502 and 505, thus implementing the combination of Rosener's earphones and Hankey's "small compact earpiece[s]."[10] Pet. 25–27 (citing Ex. 1003 ¶¶ 45, 47). Petitioner argues "Hankey considers the size and weight of prior art headsets as a 'key issue' that causes an uncomfortable fit of the headsets on a user's ear." *Id*. at 26 (citing Ex. 1005 ¶ 11; Ex. 1008[11] ¶ 3). Petitioner

[10] Hankey uses the term "headset" but Petitioner uses "earpiece" for "consistency and to avoid confusion." *See* Pet. 24, n.6. We find that convention reasonable and adopt it here.

[11] Sanford, US Provisional Application No. 60/879,177, filed Jan. 6, 2007 (Ex. 1008). Provisional application for Hankey. *See* Ex. 1005 code (60).

argues that "Hankey discloses a compact earpiece capable of communicating with external audio devices wirelessly." *Id*. (citing Pet. 22–23 (describing Hankey)).

Petitioner argues Hankey "provides techniques to package electronics within 'a small compact unit' to alleviate the size and shape hassles of conventional headsets." Pet. 26 (citing Ex. 1005 ¶¶ 92–98; Ex. 1008 ¶¶ 93, 144–150). Petitioner alleges a person of ordinary skill in the art would have been motivated to arrange the components of Hankey in a "small, compact form factor" as shown in Figure 5 of Rosener. *Id*. (citing Ex. 1003 ¶ 46). Petitioner provides a side-by-side comparison of Rosener's Figure 5 as compared to Hankey's Figure 10A, which is reproduced below.



Petitioners compare shows Rosener's Figure 5 on the left and Hankey's Figure 10A on the right.

Pet. 27. Petitioner alleges a person of ordinary skill in the art "would have recognized the similarities between the earpieces shown in Hankey's FIGs. 5 or 10A and earphones 502, 504 shown in Rosener's FIG. 5, and would have been motivated to use Hankey's component arrangement techniques to implement internal components and external features of earphones 502, 504." *Id*. at 27–28 (citing Ex. 1003 ¶ 48).

Petitioner alleges Rosener's earphones 502, 504 are "physically and electrically" separate and a person of ordinary skill in the art "would have

recognized that Hankey's techniques are readily applicable to Rosener's earphones 502, 504." Pet. 28 (citing Ex. 1004 ¶ 30). Dr. Cooperstock is relied on for his testimony that latency compensation processing would "enable stereo play when both earphones are being simultaneously used." *Id*. at 28–29 (citing Ex. 1004 ¶¶ 11, 39–42; Ex. 1003 ¶ 49).

We find that Petitioner has shown sufficiently that a person of ordinary skill in the art would have had reason to combine Hankey's "small form factors" with Rosener's earphones. Pet. 25–29. Patent Owner argues stereo input by the microphones to the earphones is an insufficient reason for the combination and the Cooperstock Deposition testimony supporting it is speculative. PO Resp. 32 (citing Ex. 2037, 104:12–18). Mr. McAlexander testifies Rosener is intended for "communication purposes" and not music. Ex. 2038 ¶ 71. Mr. McAlexander testifies that Rosener and Hankey would be for communication and not "capturing high-quality, stereo audio recordings." Ex. 2038 ¶ 71; *see also* PO Resp. 32–33 (making same argument).

Patent Owner also argues a second microphone (see Section III.D.4.c below, analyzing the "microphone limitation") would "add significant complexity" to the combination. PO Resp. 33 (citing Ex. 2038 ¶ 73). The argument is based on the earphones being physically spaced apart, along with the associated microphone, resulting in different signal strengths. *Id*. at 34 (citing Ex. 2038 ¶ 74). Thus, there is a need to determine which signal is stronger for communication with the external device. *Id*. at 33–34 (citing Ex. 2038 ¶ 74). According to Patent Owner, the need to accommodate the difference in signal strength requires additional signal processing and complexity. *Id*. at 34 (citing Ex. 2038 ¶ 74). Patent Owner

concludes by arguing a person of ordinary skill in the art "would not modify the Rosener-Hankey combination (or Rosener-Hankey-Dyer combination) to include a microphone in each earphone." *Id*. (emphasis omitted).

We adopt as our findings Petitioner's argument and evidence summarized above. We find that the addition of stereo audio reception is a reason to combine Hankey with Rosener. Rosener discloses "high quality stereo sound" with two separate earpieces/earphones. Ex. 1004 ¶¶ 10–11 ("left-ear and right-ear circum-aural over-the-ear headphones, stereo speakers, speakers for a surround sound system, etc."). "[H]igh-quality stereo sound" is an advantage over the prior art in "allowing each of the two earpieces/earphones to be 'physically and electrically separated' from the other." Ex. 1003 ¶ 44 n.2 (citing Ex. 1004 ¶¶ 10–11).

The McAlexander testimony that Rosener's microphone would be understood by a person of ordinary skill in the art as intended "exclusively for communication purposes," and not "stereo audio recordings," is not persuasive. Ex. 2038 ¶ 71. Why the alleged distinction makes a difference is not explained. The '982 patent does not discuss the difference in the context of the written description nor is it part of any claim. Indeed, Mr. McAlexander points to recent smartphone products, not the '982 patent, for their teachings of "using multiple microphones." *Id*. (examples including Apple XSW and XR).

In connection with the challenge to claim 1 based on Rosener and Hankey or Rosener, Hankey, and Dyer (this combination is analyzed in Section III.D.4.b below), Patent Owner makes several arguments that a person of ordinary skill would not have a level of skill sufficient to combine the references as Petitioner proposes. PO Resp. 1, 12–21; *see also* Pet. 24–

31 (reasons for the combination). More specifically, Patent Owner argues that Dr. Cooperstock's "experience [is] superior" to a person of ordinary skill in the art yet he does not understand the operation of the prior art, highlighting the "complexity of designing wireless earphones." PO Resp. 1; *see also id*. at 14–16 (citing Ex. 2037, 37:17–43:17 (Dr. Cooperstock "could not explain how the speaker elements disclosed in Rosener operate or even how they compare to one another.")).

Patent Owner argues a person of ordinary skill in the art "would not necessarily have any skills or knowledge specific to designing the acoustic transducer for a wireless earphone, fitting all of the components into a small form factor earphone, or suitably powering a wireless earphone given the safety and size constraints." PO Resp. 6–7 (citing Ex. 2038 ¶ 20); *see also id*. at 16 (alleging Dr. Cooperstock, has skills superior to a person of ordinary skill in the art, "could not explain how the speaker elements disclosed in Rosener operate" (citing Ex. 2037, 37:17–43:17)). Patent Owner argues a person of ordinary skill would need to overcome problems relating to the design and construction of "operative wireless earphones," including sound quality and "form factor[12]" considerations. *Id*. at 16 (citing Ex. 2038 ¶ 50).

Because of these alleged complexities as compared to the relatively low level of skill applicable here, Patent Owner argues generally that "it would not have been obvious to a [person of ordinary skill in the art] . . . to make the combinations proposed by Petitioner for claim 1." PO Resp. 18 (citing Ex. 2038 ¶ 56). Patent Owner contends specifically that Dr.

[12] We find "form factor" refers to the physical design of the "earphone." *See*, *e.g.*, Ex. 1003 ¶ 45; Ex. 2038 ¶ 20.

Cooperstock could not discern a difference between separately numbered "DATA SOURCE" 618 in Figure 6 and "DATA SOURCE" 922 in Figure 9 of Rosener. *Id*. at 19 (citing Ex. 2037, 102:21–103, 12 ("they're referring to the same data source")). Patent Owner argues the described "DATA SOURCE[S]" 618 and 922 are different. *Id*. (citing Ex. 2037, 102:10–18 (DATA SOURCE 922 could be a "sensor or a microphone.")). According to Patent Owner the "DATA SOURCE 618," which Rosener explains "may be provided from a digital audio data output of an MP3 player, CD player, PC, PDA, mobile telephone, game console, component of an entertainment system, etc." *Id*. at 19–20 (citing Ex. 2038 ¶ 68 (quoting Ex. 1004 ¶ 33)).

Patent Owner argues that Dr. Cooperstock has a skill level beyond that of the person of ordinary skill and cannot "ascertain whether data source 922 is a sensor/microphone incorporated into a wireless earphone or is a digital or audio data source like an MP3 player that is external to the wireless earphone." PO Resp. 19. As a result of this complexity, as evidenced by Dr. Cooperstock's alleged lack of understanding, Patent Owner alleges the person of ordinary skill "would not have a reasonable expectation of success implementing Rosener's headset within the compact form factor of Hankey." *Id*. at 19–20 (citing Ex. 2038 ¶ 68). Patent Owner also cites Dr. Cooperstock's inability to identify a "suitable material for the flexible electrical connector" as disclosed in Hankey. PO Resp. 20 (citing Ex. 2037, 67:1–68:4).

We agree with Petitioner and find that Rosener's Figure 5 expressly discloses "each of earphones 502, 504 ***is inserted into an ear of the user when worn by the user***. Since '[e]ach of the first and second earphones 502, 504 may be . . . a canalphone, which can be fitted within the ***ear canal***

of the user's ear,' each of the earphones has ***an ear canal portion***." Pet. 44 (citing Ex. 1003 ¶¶ 34, 109; Ex. 1004 ¶ 30) (alteration in original). Patent Owner's complexity arguments are predicated on bodily incorporation. That is not the test for obviousness. As noted below, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. *In re Keller*, 642 F.2d 413, 425 (C.C.P.A. 1981).

We agree with Petitioner and find that design and implementation details of the headphones would have been well-known, i.e., "suggested to those of ordinary skill in the art." Reply 9. As Petitioner argues specifically, a person of ordinary skill in the art would have understood how to make the claimed headphones. *Id*. (citing Ex. 1024 ¶ 13); *see also* Ex. 2037, 39:11–17 (Dr. Cooperstock Deposition testimony regarding availability of "many references" to an engineer regarding speaker technology).

We also agree with Petitioner and find that "the properties, characteristics, and use of audio transducers (the transducer types disclosed in Rosener) were all well-known by the Critical Date." Reply 10 (citing Ex. 2037, 39:6–17, 38:3–9; Ex. 1025, 182:13–194:4 (Mr. McAlexander deposition testimony that different speakers have different transducers and different applications)). We find that materials for flexible electrical connectors were also well-known by the Critical Date. *See* Reply 12 (citing Ex. 1025, 199:15–201:4 (the '982 patent disclosure "is sufficient to enable a person of ordinary skill in the art to make a set of headphones as claimed in the patent")). Dr. Cooperstock cites to prior art on flexible wiring circuit

boards. Ex. 1024 ¶ 22 (identifying Exs. 1027[13], 1028[14], and 1029[15] as prior art references disclosing exemplary materials). For example, Exhibit 1027 discloses "[a] flexible wiring board." Ex. 1027, Abs. We find that if a person of ordinary skill in the art could make the invention described and claimed in the '982 patent, the combination would likewise be made based on the same level of disclosure in Rosener. *In re Epstein*, 32 F.3d 1559, 1568 (Fed. Cir. 1994).

In sum, Patent Owner's argument is that if the expert cannot succeed in making the combination then neither can the person of ordinary skill in the art.

> The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art.

In re Keller, 642 F.2d at 425.

The claims do not include limitations regarding design and operability. Our inquiry is what the combined teachings of the references would have suggested to those of ordinary skill in the art who

> would have had at least a Bachelor's Degree in an academic area emphasizing electrical engineering, computer science, or a similar discipline, and at least two years of experience in wireless communications across short distance or local area networks.

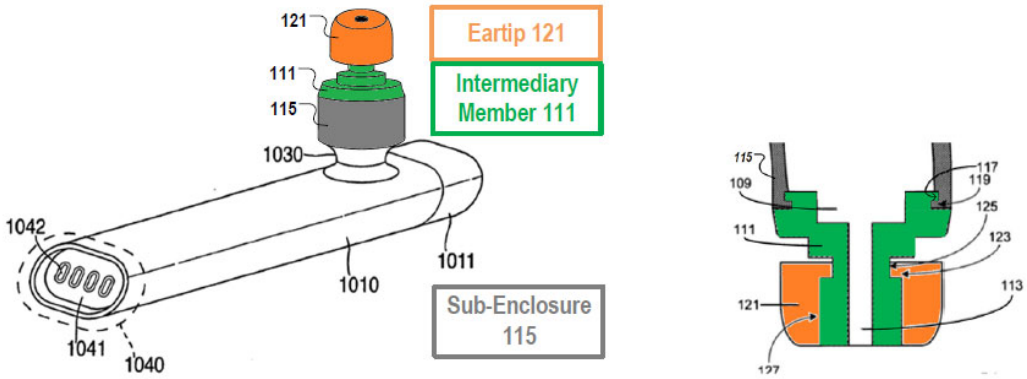
[13] Sera, US Patent No. 5,733,598, issued Mar. 31, 1998 (Ex. 1027).
[14] Lee, US Patent No. 7,281,328 B2, issued Oct. 16, 2007 (Ex. 1028).
[15] Myoung, US Patent No. 7,453,045 B2, issued Nov. 18, 2008 (Ex. 1029).

Section III.A above. We are not persuaded that the design and operational issues raised by Patent Owner would have precluded a person of ordinary skill in the art from understanding the references and any differences between the references and claim 1. Patent Owner does not allege the references teach away from the combination.

Based on the preceding findings, including Petitioner's argument and evidence summarized above, which we adopt, we determine that a person of ordinary skill in the art would have had a reasonable expectation of success in making the asserted combination of Rosener and Hankey.

b. Rosener, Hankey, and Dyer Reasons for Combination

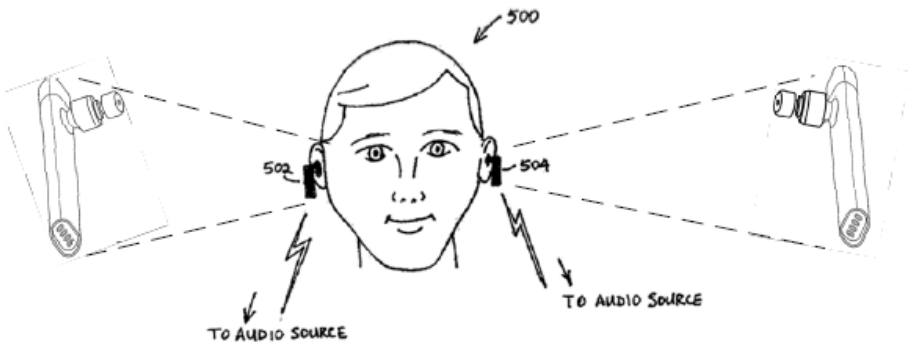
To the extent any structure is argued as necessary by Patent Owner, Petitioner cites to Dyer.[16] Pet. 29 (citing Ex. 1003 ¶ 54). Petitioner alleges motivation to add Dyer based on Dyer and Rosener both describing a "'canal phone' with an element that extends into the user's ear canal." *Id.* at 30 (citing Ex. 1003 ¶ 54). This combination is illustrated by an annotation showing the Rosener, Hankey, and Dyer canalphone compared to Dyer's canalphone, which is reproduced below.



[16] Petitioner adds Dyer as an alternative to the combination of Rosener and Hankey contending "Rosener alone sufficiently shows . . . insertion of a canalphone into a user's ear." Reply 14–15.

Comparison on the left of the canalphone combining Rosener, Hankey, and Dyer and on the right part of Dyer's canalphone.

Pet. 31. Referring to the above annotation, Petitioner explains that a person of ordinary skill in the art "would employ Hankey's techniques of arranging circuitry within small housings to configure the supporting circuitry within sub-enclosure 115 of the Rosener-Hankey-Dyer canalphone." *Id*. (citing Ex. 1005 ¶¶ 202–204, Figs. 20A–C). Petitioner further explains "Dyer's acoustic elements, including its sound delivery tube 113 in intermediary member 111, would deliver sound from the circuitries in sub-enclosure 115 to eartip 121." *Id.* (citing Ex. 1005 ¶¶ 202–204, Figs. 20A–C; Ex. 1003 ¶ 57). An illustration from page 32 of the Petition is reproduced below.



Rosener-Hankey-Dyer system.

Combination of Rosener Figure 5 and annotation of Rosener, Hankey and Dyer (reproduced immediately above).

The illustration above shows a one for one substitution of the Rosener, Hankey, and Dyer canalphone for the earpieces of the Rosener, showing the "Rosener-Hankey-Dyer system." *Id*. at 32.

Patent Owner argues the addition of Dyer's canalphone to the Rosener and Hankey combination "would not stay in a user's ear" and would cause discomfort "because the 'canalphone does not include an adequate securing mechanism, and the 'body portion' thereof forms an extended cantilevered arm between the in-ear portion of the canalphone and the primary housing 1010, which would generate a significant torque at the in-ear portion from the offset weight of the primary housing." PO Resp. 35 (citing Ex. 2039 (Blair Declaration) ¶ 20). Mr. Blair testifies to significant experience designing earphones and headphones. Ex. 2039 ¶ 4.

Relying on the Blair Declaration, Patent Owner argues how each of Rosener, Hankey and Dyer are supported in the ear. PO Resp. 37 (citing Ex. 2039 ¶¶ 10, 12–13). Patent Owner argues Rosener and Hankey are kept in place by the weight of the earbud hanging in the "intratragal notch" of the ear. *Id*. at 36–37 (citing Ex. 2039 ¶¶ 10, 12). Patent Owner argues

Dyer relies on a different method of support where the "earphone 100 is secured within a user's ear by 'a seal between the eartip 121 and the user's ear canal.'" *Id*. at 37 (citing Ex. 2039 ¶ 13). Patent Owner alleges the failure to stay in the user's ear argument would worsen the performance of the earbud and motivation to make the combination would be absent. *Id*. at 39 (citing Ex. 2038 ¶ 62).

Patent Owner criticizes Dr. Cooperstock's testimony, arguing the "entire 'body portion' in Cooperstock's Rosener-Hankey-Dyer canalphone would ***not*** fit in a user's ear because the 'body portion' defines a straight structure that 'does not account for the ear canal's geometry' and 'does not complement the shape of the user's ear canal.'" PO Resp. 37–38 (citing Ex. 1003 ¶ 98 (the body portion of Rosener's earphones "is inserted into an ear of user"); Ex. 2039 ¶ 16 ("Cooperstock's 'body portion' does not account for the ear canal's geometry.")). Patent Owner also asserts that the securing method where the "body portion" of Rosener is inserted into the ear would not be secure. *Id*. at 39 (citing Ex. 2039 ¶ 18). Patent Owner concludes that "performance of the earbud" is worse in the Rosener, Hankey, and Dyer combination and a person of ordinary skill in the art would not be motivated to make such a modification. *Id*. (citing Ex. 2038 ¶¶ 57–62).

Hankey discloses small earpieces capable of communicating with external audio devices wirelessly. Ex. 1005 ¶¶ 93, 103 ("wireless connection"). We find Hankey's small form factor wirelessly connected earpieces resolve the problems identified by Rosener, i.e., "single earpiece monaural devices" or "bulky . . . wired connections" between earpieces, and is a reason to combine the two references. *See* Pet. 24–25 (citing Ex. 1004 ¶¶ 3–10, Figs. 1–4).

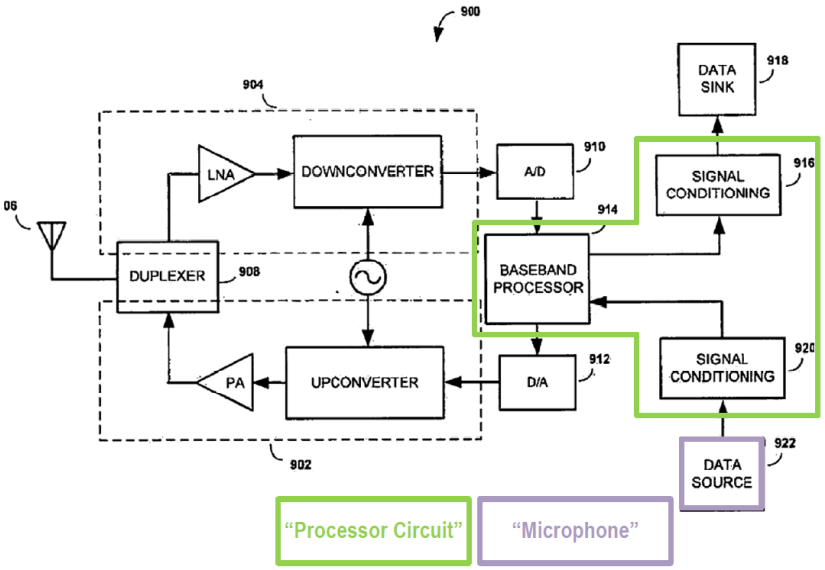
We are not persuaded we should discount the Blair Declaration because he is an employee of Patent Owner and thus is the "testimony of an interested Declarant." *See* Reply 15. Petitioner further argues that Mr. Blair's testimony is conclusory and uncorroborated. *Id*. In support, Petitioner offers testimony from Dr. Cooperstock, although that testimony is also conclusory and does not identify the basis for the testimony. *Id*. at 16 (citing Ex. 1024 ¶¶ 29–31). We give neither expert conclusive weight on the design issues presented.

We are not persuaded by Patent Owner's argument that the Rosener, Hankey, and Dyer combination would not stay in the ear of a user. We find a person of ordinary skill in the art "would have recognized that Rosener's disclosure of a canalphone could be implemented in the Rosener-Hankey combination as advanced in the Petition to provide a superior securing mechanism than an earphone configuration, like that disclosed in Hankey." Reply 18. Patent Owner's response is based on the Blair Declaration, which we determined above is not conclusive on this point. *See* Sur-Reply 13–14. We adopt as our findings Petitioner's argument and evidence summarized above in the Petition and Reply. Pet. 48–49; Reply 11–12. As We find the Rosener, Hankey, and Dyer obviousness claim to be supported by rational underpinnings.

c. Limitation 1.c.iii

Limitation 1.c.iii recites "a microphone connected to the processor circuit and for picking up utterances of a user of the headphones." Petitioner's evidence includes Rosener's teaching that earphones 502 and 504 may include a microphone connected to a processor. Pet. 48 (citing Ex. 1004 ¶ 56; Ex. 1003 ¶¶ 119–120). Petitioner's Annotated Figure 9 is

reproduced below.



Rosener Annotated Figure 9 showing a diagram of an RF transceiver.

Pet. 49. As shown in Annotated Figure 9, Rosener discloses a data source 922 which "provides an input to signal conditioning circuit 920 and baseband processor 914 ("***connected to the processor circuit***"), which process the inputted data prior to providing it to RF transmitter portion 902 for transmission via antenna 906. *Id*. at 48–49 (citing Ex. 1004 ¶ 50). Petitioner contends Rosener's data source 922 is "***a microphone for picking up utterances of a user of the headphones***." *Id*. at 48 (citing Ex. 1003 ¶ 120; Ex. 1004 ¶ 56). The connection between the microphone and processor is illustrated by Petitioner's annotation of Rosener's Figure 9 showing the "Processor Circuit" and "Microphone." *Id.* at 49 (citing Ex. 1004 ¶ 50).

Patent Owner disputes limitation 1.c.iii has been shown. *See* PO Resp. 21–31. Patent Owner argues Rosener does not teach that "both earphones include its own microphone." *Id*. at 21.

> Paragraph 56 of Rosener is set forth below.
>
> According to an embodiment of the invention, either or both the first and second data sinks of the various embodiments may ***include (or be coupled to) a data source*** such as, for example, ***a sensor or a microphone*** to allow a data to be sent back to an external electronic device.

Ex. 1004 ¶ 56 (emphasis added). Patent Owner contends the above quotation from Rosener, upon which Petitioner relies for the limitation, simply provides "examples of generic data sources for the data sinks." PO Resp. 22 (citing Pet. 48 (quoting Ex. 1004 ¶ 56). Patent Owner argues that none of those arrangements conclusively includes a microphone in each earphone. *Id*. Patent Owner further argues paragraph 56 means "in one embodiment, one of the data sinks includes the data source and, in another embodiment, both data sinks are coupled to the data source." *Id*. (citing Ex. 2038 ¶ 64).

For example, one arrangement Patent Owner identifies is "[b]oth earphones being coupled to a data source, which can be the same data source or different data sources." PO Resp. 23. Another arrangement Patent Owner identifies is "[o]ne earphone including a data source, and the other earphone being coupled to a data source." *Id*. Patent Owner disputes that a person of ordinary skill in the art would find it obvious to include a microphone in each of Rosener's earphones. Resp. 32–34. Patent Owner alleges that "[w]ithout the benefit of the '982 Patent's disclosure, a [person of ordinary skill in the art] would not have modified the Rosener-Hankey combination (or the Rosener-Hankey-Dyer combination) to include a microphone in each wireless earphone." *Id*. at 32 (citing Ex. 2038 ¶ 70).

For reasons discussed below, we find both of Patent Owner's examples teach that the "data source" is a microphone, one for each earphone.

We are not persuaded that separate embodiments where Rosener has a single microphone limit its disclosure to a single microphone. Patent Owner relies on Figure 13 as such an instance. PO Resp. 23–25. Patent Owner acknowledges Rosener's paragraph 56 describes "the *particular embodiment* shown in Figure 13, which includes a single microphone and two data sinks." *Id*. at 23–24 (reproducing Figure 13) (emphasis added). Patent Owner makes a similar argument for Figures 6 and 9 of Rosener, contending a microphone is never mentioned in the description of either. *Id*. at 26. We find paragraph 56 broadly discloses the data source may be a microphone in teaching that "either or both the first and second data sinks of the various embodiments may include (or be coupled to) a data source." Ex. 1004 ¶ 56. The first and second data sinks are disclosed as "speakers." *Id*. ¶ 38. As a result, two data sinks may include or be coupled to two speakers. *See* Ex. 1004 ¶ 56 ("either or both . . . data sinks").

Paragraph 56 applies to "various embodiments," which we find includes the separate embodiments shown in Figures 6 and 9. *See* Reply 11 (citing Ex. 1024 ¶¶ 18–19); *see also* Ex. 1003 ¶ 120[17] (citing Ex. 1004 ¶ 56). Beyond asserting the disclosed "data source" is not a microphone in the earphone, Patent Owner does not respond to the separate embodiment issue. Sur-Reply 12 (citing Ex. 1004 ¶¶ 33–34). Paragraphs 33 and 34 of

[17] The relevant Cooperstock Declaration testimony is "[i]n the earphone of FIG. 9, data source 922 can be a microphone (***a microphone for picking up utterances of a user of the headphones***) 'to allow a data to be sent back to an external electronic device.'"

Rosener are not relevant in that they only describe the data source of Figure 6. See Section III.D.4.a above.

Patent Owner cites alleged inconsistencies in Dr. Cooperstock's testimony regarding the "data sources" shown in Rosener's Figures 6 and 9. Sur-Reply 12 (citing Ex. 1003 ¶ 120; Ex. 2038 ¶¶ 65–66; Ex. 1024 ¶ 18). Dr. Cooperstock's original declaration stated that Rosener's "data source" is "a sensor/microphone incorporated within an earphone" and any inconsistency testified to at his deposition "slipped his eyes." Ex. 1024 ¶ 18 (citing Ex. 1003 ¶ 120). A mistake was made and clarified. We do not find the mistake diminishes the Cooperstock Declaration, which is based on the compelling evidence of Rosener's paragraph 56. Ex. 1003 ¶¶ 119–120. We discussed the Cooperstock testimony above in Section III.D.4.a. We find the arguments based on a mistake in the Cooperstock Deposition unpersuasive. *See* Ex. 1024 ¶ 28 (Dr. Cooperstock's testimony explaining his mistake).

Based on the preceding findings, including Petitioner's argument and evidence summarized above, which we adopt, we determine that a person of ordinary skill in the art would have found Rosener and Hankey or Rosener, Hankey, and Dyer teach Limitation 1.c.iii.

d. Claim 1 Remaining Undisputed Limitations

We summarize Petitioner's argument and evidence on the remaining limitations of claim 1 below. Patent Owner does not dispute the remaining limitations. *See* PO Resp. 12–40.

Recitation 1.P, the preamble of claim 1, recites "a system comprising." Although we do not find the preamble to be limiting, Petitioner cites to Rosener as disclosing "a wireless system." Pet. 32 (citing

Ex. 1004 ¶¶ 30, 56; Ex. 1003 ¶ 89. Even if the preamble was limiting, we find that Rosener teaches the recited system.

Limitation 1.a recites "headphones comprising a pair of first and second wireless earphones to be worn simultaneously by a user." Rosener teaches "a wireless headset comprising first and second wireless earphones." Ex. 1004 ¶ 30. The '982 patent states earphones may be "in-ear type headphones," such as disclosed by Rosener. Ex. 1001, 1:50–2:3. Petitioner relies on the preceding as teaching limitation 1.a. Pet. 32–33 (citing Ex. 1004 ¶ 30; Ex. 1003 ¶ 91).

Limitation 1.b recites "wherein the first and second earphones are separate such that when the headphones are worn by the user, the first and second earphones are not physically connected." Petitioner cites to Rosener's earphones 502 and 504 in Figure 5 as "physically and electrically" separated when worn. Pet. 33 (quoting Ex. 1004 ¶ 11; Ex. 1003 ¶ 92).

Limitation 1.c recites "wherein each of the first and second earphones comprises." Petitioner points to the fact that a person of ordinary skill would have understood Rosener's earphones each have identical components. Pet. 33–34 (citing Ex. 1004 ¶¶ 30, 46, 49, Figs. 6, 8A–B; Ex. 1003 ¶ 93).

Limitation 1.c.i recites "a body portion that comprises." Petitioner argues Rosener teaches "[e]ach of the first and second wireless earphones 502, 504 comprises a housing containing a speaker, an RF receiver or transceiver and a battery." Pet. 34 (quoting Ex. 1004 ¶ 30). Petitioner contends that Hankey adds teachings regarding the arrangement of electronic components, i.e., "a top portion (***body portion***) of the earpiece,

and a longitudinal member (***elongated portion***) extending away from the top portion." *Id.* (citing Ex. 1005 ¶¶ 94–98, 107–115, 143–144; Ex. 1008,[18] Figs. 1A–B, 20A–C, ¶¶ 89–91; Ex. 1003 ¶ 95).

Limitation 1.c.i.A recites "a wireless communication circuit for receiving and transmitting wireless signals." Petitioner alleges "Rosener discloses that each of earphones 502, 504 includes an RF transceiver circuit (***wireless communication circuit***)." Pet. 36 (citing Ex. 1004 ¶¶ 11, 30). Relying on the Cooperstock Declaration and Figure 9 of Rosener, Petitioner further alleges "[t]he transceiver 900 includes RF transmitter portion 902, RF receiver portion 904, duplexer 908, analog-to-digital (A/D) converter 910, and digital-to-analog converter (D/A) (collectively '***a wireless communication circuit***')." *Id.* at 37 (citing Ex. 1004 ¶¶ 30–36, 49, Fig. 9 (annotated at Pet. 37 to show "Wireless Communication Circuit"); Ex. 1003 ¶¶ 99–100). Petitioner also cites to Hankey as teaching "RF circuitry 1520 is part of a processor 20, which is located inside the earpiece's body portion, a [person of ordinary skill] would have been led to similarly position Rosener's transceiver circuitry (***wireless communication circuit***) in the ***body portion*** of the earphone." *Id.* at 38 (citing Pet. 39, annotated Figs. 1, 15 (Figures 1 and 15 annotated to show "Body portion," "Hankey's Processor 20," "Wireless Communication Circuit," and "Hankey's Processor 20"); Ex. 1008, Fig. 5; Ex. 1003 ¶¶ 92–93, 122).

Limitation 1.c.i.B recites "a processor circuit in communication with the wireless communication circuit." Petitioner relies Rosener's Figure 9 to show this limitation. Pet. 40. Specifically, Petitioner alleges Figure 9

[18] As noted above, the Hankey Provisional cite is for purposes of establishing entitlement to its earlier priority date. See Section II.E above.

includes "components that perform signal processing functions, such as a baseband processor 914 and signal conditioning circuits 916 and 920, and 'additional circuitry and processing capabilities' that 'operate in accordance with different wireless technologies,'" which is a "processor circuit." Pet. 40 (quoting Ex. 1004 ¶¶ 49–51, Fig. 9 (annotated at Pet. 41 to show "Wireless Communication Circuit" and "Processor Circuit"); Ex. 1003 ¶ 104). Petitioner also cites to Hankey's teaching of a processing circuitry located in the body portion of Hankey's earpiece. *Id.* at 41–42 (citing Ex. 1005 ¶¶ 176, 178, Fig. 15; Ex. 1008 ¶¶ 122, 124, Fig. 5; Ex. 1003 ¶ 106–107).

Limitation 1.c.i.C recites "an ear canal portion that is inserted into an ear of the user when worn by the user." As discussed above (Section IV.E), we find this limitation is taught by Rosener. *See* Pet. 44 (citing Ex. 1004 ¶ 30 (earphones may be an earbud "designed to fit into the concha of the pinna of the user's ear; a canalphone, which can be fitted within the ear canal of the user's ear"); Ex. 1003 ¶¶ 34, 109).

Limitation 1.c.i.D recites "at least one acoustic transducer connected to the processor circuit." Petitioner cites Rosener's teaching that each earphone has a speaker in the form of an "acoustic transducer" electrically connected to receivers or transceivers. Pet. 45 (citing Ex. 1004 ¶¶ 2, 30–31, 38, 49 (transceiver connect to other components of the earphone), Fig. 6). Relying on the Cooperstock Declaration, Petitioner alleges that the data sink 918 shown in Figure 9 of Rosener is a speaker, i.e., the claimed acoustic transducer, connected to a processor circuit. *Id.* at 45 (citing Ex. 1004, Fig. 9 (annotated at Pet. 45 showing "Acoustic transducer," "data sink," and "Processor Circuit")).

Petitioner also cites to Hankey as teaching this limitation. Pet. 45–46. Petitioner argues Hankey teaches speakers in the earbud which would have suggest to a person of ordinary skill in the art to "position[ed] Rosener's acoustic transducer in the earphone's body portion as well." *Id.* at 46 (citing Ex. 1005, Fig. 1 (annotated at Pet. 46 showing "Body portion" and "Acoustic transducer"); Ex. 1008 ¶¶ 2, 89; Ex. 1003 ¶ 113).

Limitation 1.c.ii recites "an elongated portion that extends away from the body portion such that the elongated portion extends downwardly when the ear canal portion is inserted in the ear of the user." Petitioner relies largely on Rosener's Figure 5 showing both an "elongated portion" and an "ear canal portion" to teach the limitation. Pet. 47 (citing Ex. 1004, Fig. 5 (annotated at Pet. 47 showing "Elongated portion" and "Body portion"); Ex. 1003 ¶ 115). Hankey is also cited for its teaching of "a ***body portion*** that includes earbud 12, and a longitudinal member ('***an elongated portion'***) ***that extends away from the body portion***." *Id.* (citing Ex. 1003 ¶¶ 116–117).

Limitation 1.c.iv recites "an antenna connected to the wireless communication circuit." Petitioner relies on each of Rosener's earphones including "an ***antenna*** 906 ***connected to the wireless communication circuit*** (i.e., transmitter portion 902, receiver portion 904, duplexer 908, A/D 910, D/A 912)." Pet. 49 (citing Ex. 1004 ¶ 50, Fig. 9 (annotated at Pet. 50 showing "Antenna" and "Wireless communication circuit"); Ex. 1003 ¶ 121).

Limitation 1.c.v recites "a rechargeable power source." Rosener is cited for its disclosure that "each of the earphones includes a battery (***power source***)." Pet. 50 (citing Ex. 1004 ¶ 30). According to Petitioner a

rechargeable battery would have been obvious to a person of ordinary skill because it would "extend the use of the battery and reduce or remove the hassle and cost of periodically replacing non-rechargeable empty batteries." *Id.* (quoting Ex. 1003 ¶ 122). Petitioner also relies on Hankey's teaching "that using rechargeable batteries in headsets was 'traditional[].'" *Id.* (citing Ex. 1005 ¶ 190; Ex. 1008 ¶ 136; Ex. 1003 ¶123).

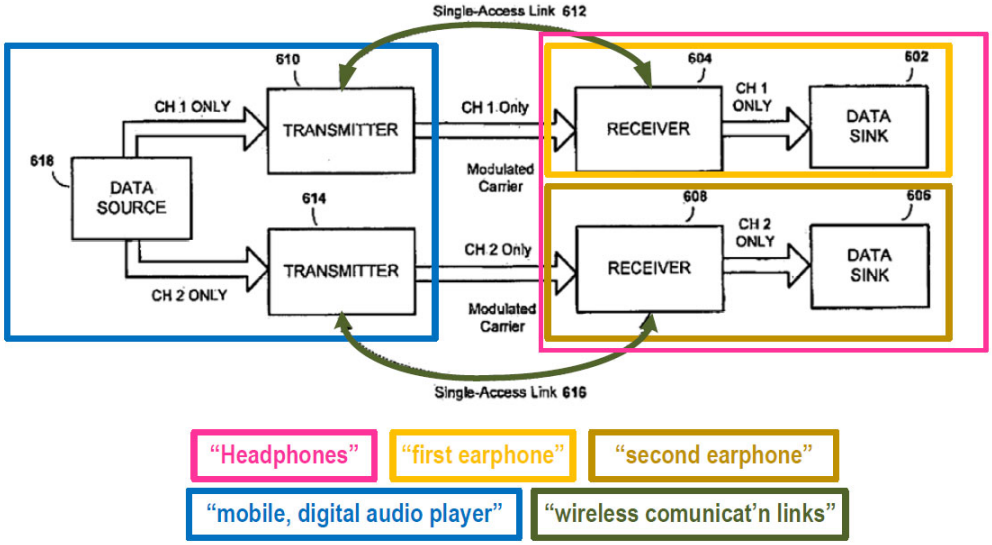
Limitation 1.d recites

> a mobile, digital audio player that stores digital audio content and that comprises a wireless transceiver for transmitting digital audio content to the headphones via Bluetooth wireless communication links, such that each earphone receives and plays audio content received wirelessly via the Bluetooth wireless communication links from the mobile, digital audio player.

Petitioner argues Rosener discloses the claimed "mobile, digital audio player" in describing that the earphones communicate with "exemplary external audio devices, including audio players (e.g., MP3 player) that are both digital and mobile." Pet. 51 (citing Ex. 1004 ¶ 2; Ex. 1003 ¶ 124). Petitioner argues a person of ordinary skill in the art "would have understood that a typical MP3 player is mobile and stores digital audio content in the form of, for example, MP3 files and transmits such content to the earphones to be played." *Id.* (citing Ex. 1001, 4:39–43 ("providing MP3 player as an example data source for wirelessly sending and receiving digital audio to and from earphone 10"); Ex. 1003 ¶ 125; *see also* Ex. 1004 ¶ 2 (disclosing mobile, digital audio player to store audio content)).

Petitioner relies on Rosener's teaching that the "wireless communication links can be in the form of Bluetooth communication links." Pet. 52 (citing Ex. 1004 ¶ 35). Petitioner also cites the RF

transmitter and RF receivers used in Rosener's earphones as well as bidirectional transmission over wireless communication links as illustrated in Petitioner's annotation of Rosener's Figure 6 reproduced below.



APPLE-1004, FIG. 6 (annotated).

Rosener's Annotated Figure 6 showing a wireless system.

Pet. 52. As shown in Annotated Figure 6, Petitioner alleges "Rosener also discloses that an external device sends audio content to the earphones through multiple ***wireless communication links*** 612 and 616." Pet. 51–52 (citing Ex. 1004 ¶ 32). Petitioner also asserts the "wireless communication links can be in the form of ***Bluetooth*** communication links." Id. at 52 (citing Ex. 1004 ¶ 35). Petitioner relies on the Cooperstock Declaration for the assertion that a person of ordinary skill would have been motivated to use transmitters/transceivers to "improve processing and communication speed, and to reduce noise." *Id.* at 53 (citing Ex. 1003 ¶ 127). Additional reasons for including a wireless transceiver are also provided by the Cooperstock Declaration and further include that the external devices

disclosed in Rosener "were known to include both wireless transceivers and data storage." *Id*. (citing Ex. 1003 ¶ 127; Ex. 1004 ¶ 30).

If Dyer is necessary for Petitioner to make its showing, which we do not find necessary as summarized above, Petitioner has sufficiently shown a person of ordinary skill would have been motivated to combine Dyer and Rosener because both teach "the same type of earphone – a 'canal phone' with an element that extends into the user's ear canal." Pet. 29–30 (citing Ex. 1003 ¶ 54). This proposed combination of "the Rosener-Hankey canalphone is implemented using Dyer's canalphone elements, including a portion of Dyer's enclosure 115 (which is referred to as the 'sub-enclosure 115' herein) that supports intermediary member 111, along with intermediary member 111 and eartip 121." *Id.* at 30 (citing Ex. 1003 ¶¶ 55–56; Ex. 1006, 2:21–24); *see also* Pet. 31 (annotation at Pet. 31 showing "Eartip 121," "Intermediary Member 111," and "Sub-Enclosure 115"); see also annotation in Section III.D.4.b above (depicting elements 111, 115 and 121).

As summarized above, we adopt Petitioner's argument and evidence regarding claim 1 as our own findings. Petitioner has sufficiently shown recitation 1.P and limitations 1.a, 1.b, 1.c, 1.c.i, 1.c.i.A, 1.c.i.B, 1.c.i.C, 1.c.i.D, 1.c.ii, i.c.iv, 1.c.v and 1.c. are taught by the combination of Rosener and Hankey or Rosener, Hankey, and Dyer.

5. Claims 2 and 18

Claims 2 and 18 depend from claim 1. We have reviewed Petitioner's showing with respect to claims 2 and 18. Pet. 53–55. Patent Owner does not dispute Petitioner's showing with respect to claims 2 and 18. We summarize our findings below.

Claim 2 depends from claim 1. Petitioner shows that the "docking station" recited in limitation 2.a is taught by Hankey's charging device 6600. Pet. 53–54 (citing Ex. 1005 ¶¶ 315–320). Limitation 2.b's recited "power cable for connecting to an external device for charging the at least the first wireless earphone" is sufficiently shown by Hankey's charging device. *Id.* at 54–55 (citing Ex. 1005 ¶ 320; Ex. 1003 ¶¶ 128–130).

Claim 18 depends from claim 1 and recites, in pertinent part, "a buffer for caching the audio content received by the earphone prior to being played by the at least one acoustic transducer of the earphone." Petitioner cites Rosener's teaching that "'the first and second data streams' [are] sent to the first and second earphones 502, 504 by using the data buffer ('***buffer'***) included in each of the earphones." Pet. 55 (citing Ex. 1004 ¶ 39–42).

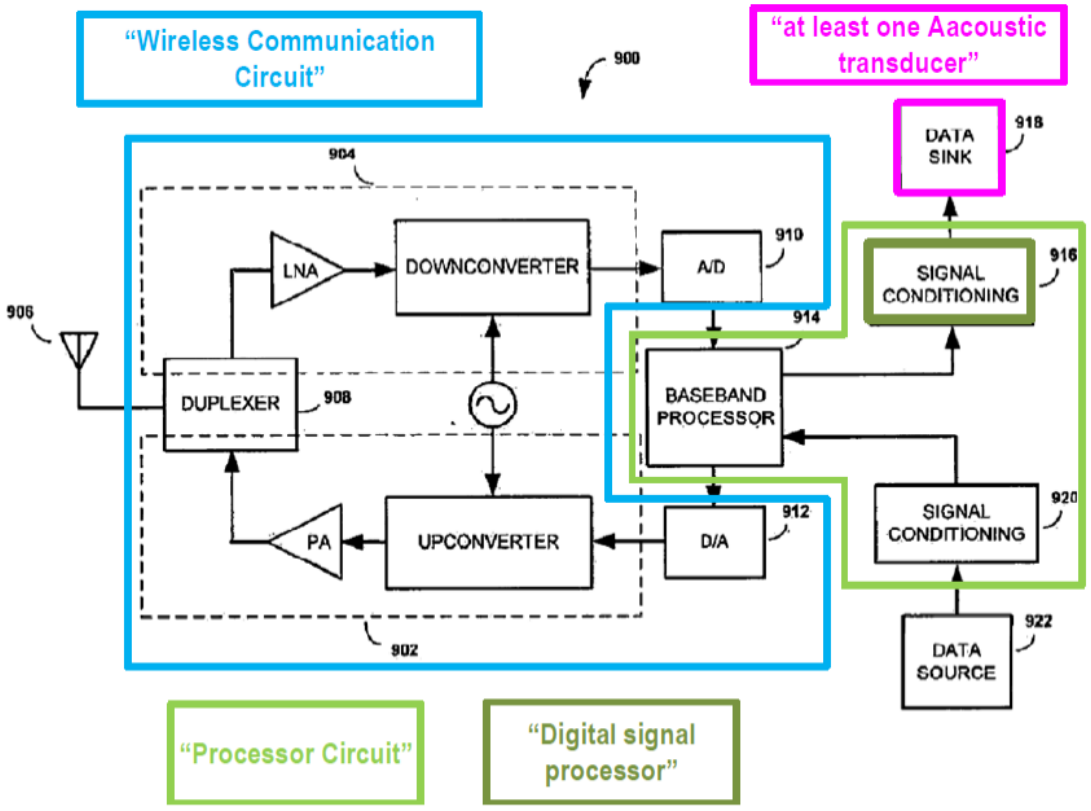
As summarized above, we adopt Petitioner's argument and evidence regarding claims 2 and 18 as our own findings. Pet. 53–55. Petitioner has sufficiently shown that the combination of Rosener and Hankey or Rosener, Hankey, and Dyer teaches claims 2 and 18.

6. Claims 19 and 20

Claim 19 depends from claim 1 and claim 20 depends from claim 19. We have reviewed Petitioner's showing with respect to claims 19 and 20. Pet. 55–58. Claim 19 recites, in pertinent part, that each of the claimed headphones have a "processor circuit" where "the first and second earphones comprises a digital signal processor" for "sound quality enhancement." Rosener is relied on by Petitioner, as it was for limitation 1.c.i.B, for, among other things, its teaching of "signal conditioning circuitry 916 [that] filters and amplifies the audio content to enhance the

sound quality to be played by data sink 918." Pet. 56 (citing Ex. 1004 ¶ 49, *see also* Ex. 1004 ¶¶ 10–11 ("indicating that Rosener's earphones provide 'high-quality stereo sound'")).

Petitioner provides an annotation of Rosener's Figure 9 in support of its arguments. Annotated Figure 9 is reproduced below.



APPLE-1004, FIG. 9 (annotated).

Annotated Figure 9 of Rosener showing an RF transceiver that may be used in place of one or more of the RF transmitters and receivers.

Pet. 57; Ex. 1004 ¶ 24. Specifically, Annotated Figure 9 shows a "digital signal processor," as per claim 19. Ex. 1003 ¶ 132 ("The signal conditioning circuitry ***provides a sound quality enhancement of the audio content*** to be played by data sink 918 (***at least one acoustic transducer of the earphone***).").

Claim 20 depends from claim 19 and recites, in pertinent part, "a baseband processor circuit that is in communication with the wireless communication circuit of the earphone." Petitioner cites to Rosener's teaching "that A/D converter 910 (a component of '***wireless communication circuit***') 'digitizes the signals, and sends the digitized baseband signals to a baseband processor 914.'" Pet. 57 (quoting Ex. 1004 ¶ 49; *see also* Ex. 1003 ¶¶ 133–134).

With reference to Annotated Figure 9, Patent Owner argues "Rosener's signal conditioning circuit converts the digital signal from the baseband processor 914 to an analog signal because the data sink/speaker 918 is driven by an analog signal." PO Resp. 62 (citing Ex. 2039 ¶ 90). Patent Owner argues that the signal conditioning circuit describes a digital-to-analog converter (DAC) and not a digital signal processor. *Id*. at 62–63 (citing Ex. 2039 ¶¶ 35, 91; Ex. 1004 ¶ 49). Patent Owner contends "[t]he 'P' in DSP stands for processor." *Id*. at 63 (citing Ex. 2038 ¶ 93). According to Patent Owner, the difference is important because neither "Rosener's baseband processor nor signal conditioning circuit . . . is a processor that performs signal processing operations, including providing a noise quality enhancement." *Id.* (citing Ex. 2038 ¶93). Patent Owner then asserts that:

> claim 19 recites that the DSP "provides a sound quality enhancement . . . ." [Ex. 1001, 20:29–30]. The '982 Patent lists several sound quality enhancements that could be performed by the DSP, such as "noise cancellation and sound equalization." APPLE-1001, 7:41. A person of ordinary skill in the art would understand that these are sound quality enhancements performed by a DSP, because that is what DSPs do in speakers – improve audio signal prior to delivery to a speaker. [citing Ex. 2038 ¶ 96]. A [person of ordinary skill in the art] would also understand that

> the DSP does not "drive" the speaker because it does not control the voltage and current of the drive signal; i.e., a DSP circuit that improves the signal quality does not convert that digital signal to analog, like a DAC, in order to drive a speaker element. *Id*.

Id. at 64.

Petitioner responds that although Rosener's signal conditioning circuit 916 is a digital-to-analog converter it also performs "signal processing functions." Reply 26 (citing PO Resp., 61–62 (agreeing that signal processing functions occur)); *see also id*. at 29–30 (similarly arguing the signal condition circuit performs the functions alleged to be performed by the DSP). According to Petitioner, this argument is supported by Rosener's disclosure of "signal processing functions." *Id*. (citing Ex. 1004 ¶¶44, 47, 50). Petitioner also argues a person of ordinary skill in the art "would have understood that signal conditioning circuit 916 includes a DSP that processes the digital signal before converting the signal to analog." *Id*. (citing Ex. 1025, 160:2–161:4 (Mr. McAlexander testifying filtering of a signal occurs before and after digital-to-analog conversion); Ex. 1004 ¶ 61).

Petitioner also argues Patent Owner construes digital signal processor to distinguish it from a digital-to-analog converter. Reply 28–29. In sum, Petitioner argues the DSP should be interpreted on its plain meaning. *Id*. at 28. Patent Owner does not propose a construction beyond arguing that a digital-to-analog converter is not a digital signal processor and a person of ordinary skill in the art "would not understand that Rosener's signal conditioning circuit 916 is a digital signal processor as recited in claim 19." *See*, *e.g*., PO Resp. 61 (citing Ex. 2038 ¶ 90). Petitioner argues that Patent Owner's contention that a DSP is "embodied as a single chip (i.e., integrated circuit)" is also improperly narrow. Reply 29 (citing PO Resp.

64). Patent Owner responds that "amplifiers and filters can be analog." Sur-Reply 20 (Ex. 2047, 10:3–8). Patent Owner argues neither Petitioner nor its expert, Dr. Cooperstock, "[ever] explained why it would have been obvious that the amplification and filtering performed by Rosener's signal conditioning circuit would have been digital." *Id*. Patent Owner also argues the examples cited by Petitioner in paragraphs 44, 47, 49, and 50 of Rosener are "are converters, either digital-to-analog or analog-to-digital." *Id*. at 21.

We find Patent Owner's response is persuasive as the cites from Rosener, paragraphs 44, 47, and 50, all involve conversions between analog and digital signals. Sur-Reply 21. It is not disputed that "sound quality enhancement" is being performed by the signal conditioning circuitry of Rosener on analog signals. Figure 9 unannotated clearly shows analog to digital and digital to analog signals processed by a baseband "processor." We are not persuaded that digital-to-analog conversion or analog-to-digital processing would be understood by a person of ordinary skill in the art to be digital processing as performed by a DSP. For example, Petitioner does not show that analog signals of the RF transceiver of Figure 9 are the same as those processed by a "digital signal processor."

As summarized above, we adopt Patent Owner's argument and evidence regarding claim 19. Petitioner has not sufficiently shown that the combination of Rosener and Hankey teaches claim 19 and its dependent claim 20. We need not rely on the Rosener, Hankey, and Dyer combination.

7. Conclusion

We find that the prior art teaches each limitation of claims 1, 2, and 18–20 and that a skilled artisan would have had reason to combine the teachings of Rosner, Hankey, and Dyer. As explained below, Patent Owner's objective indicia of nonobviousness are not persuasive. Petitioner has not shown by a preponderance of the evidence that claim 19 and its dependent claim 20 would have been obvious over Rosener and Hankey or over Rosener, Hankey, and Dyer.

E. Obviousness of Claims 3–5 over Rosener, Hankey, and Haupt or Rosener, Hankey, Dyer, and Haupt

Petitioner alleges claims 3–5 would have been obvious over Rosener, Hankey, and Haupt or over Rosener, Hankey, Dyer, and Haupt. Pet. 1, 58–66. Petitioner also relies on the Cooperstock Declaration. Ex. 1003 ¶¶ 135–154.

1. Rosener (Ex. 1004)

Rosener was described in Section III.D.1 above.

2. Hankey (Ex. 1005)

Hankey was described in Section III.D.2 above.

3. Dyer (Ex. 1006)

Dyer was described in Section III.D.3 above.

4. Haupt (Ex. 1020)

Haupt describes "WLAN headphones" to which data (e.g., audio data) can be wirelessly transmitted from a server through an access point. Ex. 1020[19], 2–3. When the headphone is within transmission range of a

[19] Citations are to the native page numbering.

WLAN access point, a connection is made to the server, which permits the headphone to wirelessly receive data from the server. *Id.* at 2.

A private server PS a private sector "connected by a hardwire . . . to an access point APP." Ex. 1020, 6. APP "has a WLAN interface, and communicates wirelessly with a playback device WG located within the transmission range of the access point APP." *Id*. There is also a "public server OS in the public sector" connected wirelessly to the internet. *Id*. "Communication between the playback device WG in the transmission range of the public access point APO and a public or private server OS, PS, takes place wirelessly until reaching the public access point APO, and then takes place via the internet to reach the public server OS or the private server PS." *Id*. at 7.

Haupt also discloses an audio forwarding mode in which a headphone "perform[s] as a local server, providing . . . stored audio files to other playback devices." Ex. 1020, 10. The headphone "can therefore receive data wirelessly from an access point, and then send this data to another playback device." *Id*.

5. Claims 3–5

Claims 3 and 4 depend directly from claim 1 while claim 5 depends from claim 4. We have reviewed Petitioner's showing with respect to claims 3–5. Pet. 58–66. As summarized below, Petitioner has sufficiently shown all the limitations of claims 3–5. Patent Owner does not dispute the showing made on claim 3 or claim 5 beyond the arguments on the claim from which each depends. *See* PO Resp. 46–52 (disputing claim 4).

Claim 3 depends from claim 1 and recites, in pertinent part,

> in a *first operational mode*, the pair of first and second earphones play audio content stored on the mobile, digital audio player and

> transmitted to the first and second earphones from the mobile, digital audio player via the Bluetooth wireless communication links; and in a *second operational mode*, the pair of first and second earphones play audio content streamed from a remote network server." (emphases added).

Petitioner relies on Rosener to teach the "first operational mode," as discussed in above in Section III.D.4.d for limitation 1.d. Pet. 61. Petitioner cites to Haupt's disclosure of "headphones that can receive data from ***a remote network server*** through WLAN communications" for the "second operational mode." *Id.* (citing Ex. 1020, 7–8). Petitioner adds, among other evidence and argument, that "[i]t would have been obvious to a [person of ordinary skill in the art] to incorporate Haupt's techniques and its Bluetooth/WLAN multicommunication-interfaces in Rosener's earphones." *Id.* (citing Ex. 1003 ¶ 135). Petitioner argues the combination "would enable Rosener's earphones to both receive audio from Rosener's disclosed external devices via Bluetooth (in a first operational mode) and audio from Haupt's network server via WLAN communications (in a second operational mode)." *Id.* (citing Ex. 1003 ¶ 135).

> Claim 4 depends from claim 1 and recites, in pertinent part
>
> the processor circuit of the first earphone is for, *upon activation of a user control of the headphones, initiating transmission of a request to a remote network server* that is remote from the mobile, digital audio player and *in communication with* the mobile, digital audio player via a data communication network.

Ex. 1001, 18:56–62 (emphases added). Petitioner cites to Haupt's disclosure of "wireless headphones [with] control buttons ('user control') used to initiate connection to a server." Pet. 65 (citing Ex. 1020, 11–12,

22). Petitioner also alleges "user control" as claimed would have been obvious based on Haupt. *Id.* (citing Ex. 1020, 2–4, 9–13, 22; Ex. 1003 ¶ 150).

Claim 5 depends from claim 4 and recites, in pertinent part, "the processor circuit of the first earphone is further for receiving a response to the request." Petitioner quotes from Haupt as teaching "in order to upload [stored music] to the wireless headphones for playback," "[a] playlist [for stored music] can be compiled on the network server" and then "sent from there to the headphones." Pet. 66 (quoting Ex. 1020, 22). Petitioner also asserts claim 5 would have been obvious to a person of ordinary skill in the art based in part on Haupt's teachings of processing received data from a server. *Id.* (citing Ex. 1003 ¶ 154).

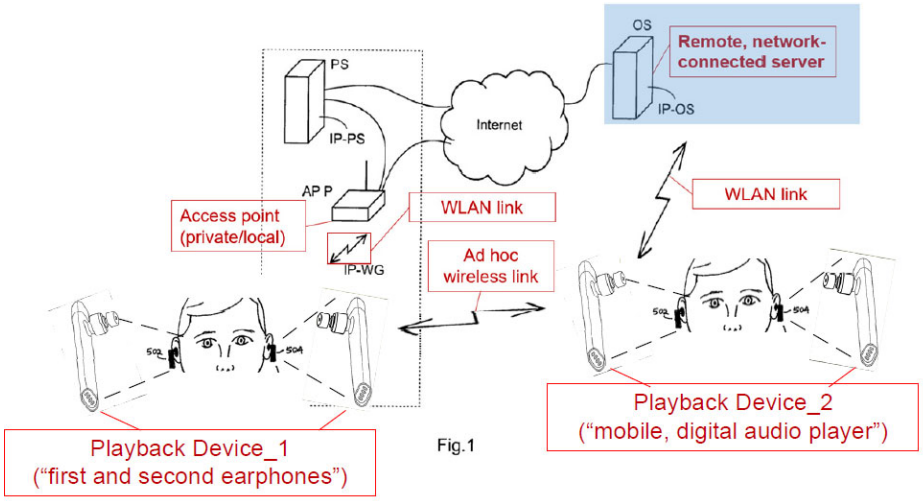
Patent Owner disputes that claim 4 and its dependent claim 5 have been shown to be unpatentable. PO Resp. 46–52. Patent Owner summarizes Petitioner's showing as follows:

> Petitioner's proposed combination is limited, at best, to a system in which the headphones communicate wirelessly with a remote network server (Haupt's PS or OP) to receive digital audio content from that server (per Haupt) and, separately, connects to a mobile DAP (e.g., Rosener's external data source) that provides the digital audio content to the headphones.

Id. at 48. Patent Owner argues that Petitioner "does not explain why Haupt's remote server to which the request is transmitted in Petitioner's proposed Rosener-Hankey-Haupt (-Dyer) combination would be in communication with Rosener's external data source 618." *Id*.

Petitioner argues claim 4 was shown in "the master/slave configuration discussed in the Petition, the headphone recited in claim 4 is mapped to a slave headphone (or Playback Device_1), and the mobile DAP

recited in claim 4 is mapped to a master headphone (or Playback Device_2)." Reply 19 (citing Pet. 61–66). An annotation based on Haupt's figures[20] (Ex. 1003 ¶ 141) is reproduced below.



Annotated schematic showing audio forwarding mode in which one pair of the canalphones (the "master") acts as a mobile, digital audio player for another pair of canalphones.

Pet. 63; Reply 20. Petitioner argues that a person of ordinary skill in the art "would have understood that the master earphone in Haupt is another example of Rosener's data source 618 (which was mapped to mobile DAP in claim 1) because the master earphone is a device that sends audio to another earphone, which is the same function that Rosener lists for data source 618." Reply 20 (citing Ex. 1024 ¶ 43).

Patent Owner responds that the "slave" in Petitioner's master/slave theory

[20] We take notice that the figure also includes the annotated drawing at page 32 of the Petition of the "Rosener-Hankey-Dyer system," illustrating "Playback Device_1" and "Playback Device_2." The annotation is reproduced in Section III.D.4.b above.

> cannot initiate transmission of a request to the server that is connected to the "master." At a minimum, Petitioner never explained how the slave initiates transmission of a request to the server that is communication with the master in light of Haupt's teaching that the server interrupts communications from devices with IP addresses other than the master device.

Sur-Reply 16.

Patent Owner does not cite any evidentiary support for its interruption of communication argument based on Haupt. Haupt explains that "[i]f the IP address of the data receiver is not the IP address IP-WG for the playback device, the respective data transfer *can be interrupted*." Ex. 1020, 7 (emphasis added). If Patent Owner is arguing this excerpt for support, it states that "data transfer" is not necessarily interrupted.

Patent Owner does not respond to the combination of Rosener and Haupt, on which Petitioner relies. Specifically, Petitioner alleges a person of ordinary skill in the art "would have understood that the master earphone in Haupt is another example of Rosener's data source 618." Reply 20. Patent Owner does not dispute, and we find, Haupt and Rosener teach the two operational modes of claim 3. See above Section III.E.5 (re: claim 3). We also find that Haupt discloses "wireless headphones . . . control buttons ('user control') used to initiate connection to a server." Pet. 65 (citing Ex. 1020, 11–12, 22) (emphasis omitted).

Petitioner argues a person of ordinary skill in the art would have had reason to combine Haupt with Rosener and Hankey. One reason is that Rosener's earphones would have been improved by accessing WLAN technology in order for communication over the

Internet to occur. Pet. 59–60 (citing Ex. 1003 ¶¶ 65–66). Patent Owner does dispute the rationale for the combination, citing an institution decision in another *inter partes* review between the same parties on a different patent. PO Resp. 49–52 (citing *Apple Inc. v. Koss Corp.*, IPR2021-00546, Paper 10 at 6–7, 14–16 (PTAB Sept. 7, 2021) ("'546 IPR")).

We agree with Petitioner that the grounds under consideration here are not the same as in the '546 IPR. Reply 21. The '546 IPR challenge included the reference to Seshardri, alleged prior art which is not at issue here. *See* PO Resp. 50. Patent Owner does not explain how Seshardri is relevant here and the argument is not persuasive.

As summarized above, we adopt Petitioner's argument and evidence regarding claims 3–5 as our own findings. Petitioner has sufficiently shown that the combination of Rosener, Hankey, and Haupt or Rosener, Hankey, Haupt, and Dyer teaches claims 3–5.

6. Conclusion

We find that the prior art teaches each limitation of claims 3–5 and that a skilled artisan would have combined the teachings of Rosner, Hankey, Haupt, and Dyer. As explained below, Patent Owner's objective indicia of nonobviousness are not persuasive. After considering the complete record, we conclude that Petitioner has shown by a preponderance of the evidence that claims 3–5 would have been obvious over Rosener, Hankey, and Haupt or over Rosener, Hankey, Dyer, and Haupt.

F. Obviousness of Claim 14 over Rosener, Hankey, and Price or Rosener, Hankey, Dyer, and Price

Petitioner alleges claim 14 would have been obvious over Rosener, Hankey, and Price or over Rosener, Hankey, Dyer, and Price. Pet. 1, 67–

72. Petitioner also relies on the Cooperstock Declaration. Ex. 1003 ¶¶ 155–157. Patent Owner disputes the showing on claim 14. PO Resp. 52–57.

1. Rosener (Ex. 1004)

Rosener was described in Section III.D.1 above.

2. Hankey (Ex. 1005)

Hankey was described in Section III.D.2 above.

3. Dyer (Ex. 1006)

Dyer was described in Section III.D.3 above.

4. Price (Ex. 1009)

Price describes a "software updating system" for updating software on electronic devices. Ex. 1009 ¶¶ 37, 7–11. The system includes a "coordinating computer" (or "proxy server"), which is an intermediary device between (i) a server providing software update codes and (ii) one or more devices to be updated using the software update codes. *Id.* ¶¶ 7, 25. The coordinating computer can provide software update codes to each device "without requiring user intervention." *Id.* ¶ 35. One example of software content is "firmware typically stored in an EEPROM." *Id.* ¶ 29.

Figure 1 of Price is reproduced below.

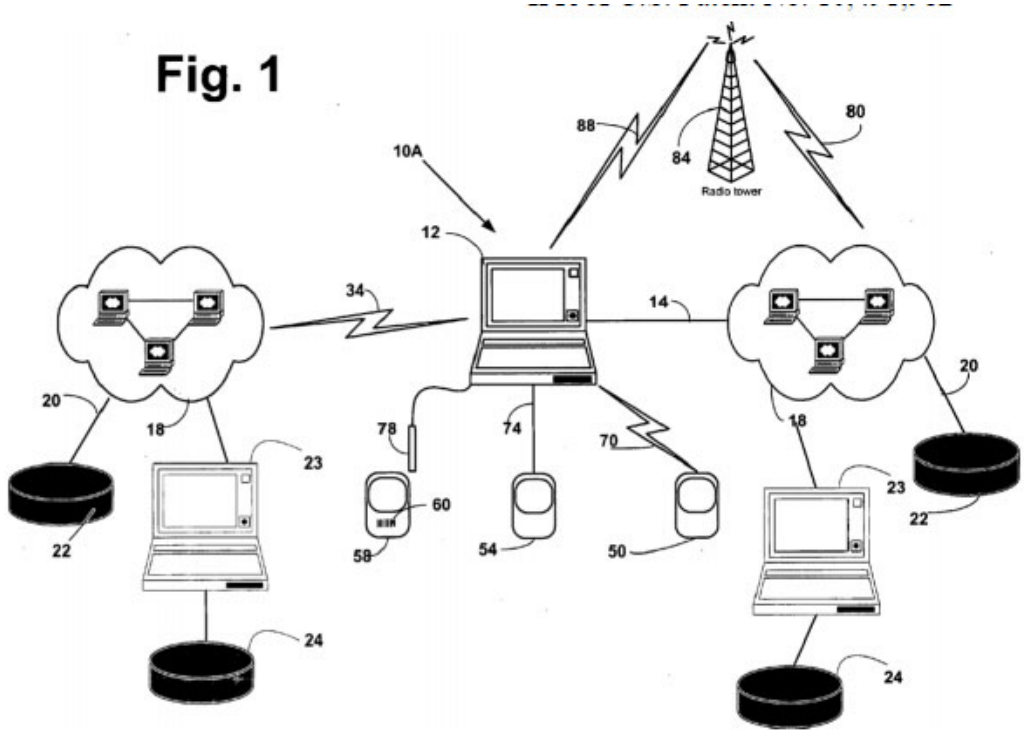


Figure 1 is a schematic of a particular embodiment of Price's system.

Ex. 1009 ¶ 13. Figure 1 illustrates a system 10A, with a coordinating computer 12 is in communication 14 with a network 18 in communication 20 with a network data store 22. *Id.* ¶ 37. Server 23 provides software update codes to computer 12 through network 18 using wired communication 14 or wireless communication 34. *Id.* ¶ 38. Computer 12 then processes the software update codes and delivers them to devices 50, 54, 58. *Id.* ¶ 39. Once the software update codes are delivered, software in devices 50, 54, 58 are updated. *Id.*

5. Claim 14

Claim 14 depends from claim 1 and recites "wherein the processor circuits of the headphones are configured to receive firmware upgrades pushed from a remote network server."

Petitioner alleges that Price describes that "'[c]omplex digital devices' requiring 'microprocessors,' and 'firmware, an operating system, or other device-specific software' benefit from receiving software updates by improving reliability, functionality, or compatibility." Pet. 68–69 (quoting Ex. 1009 ¶¶ 5, 11). According to Petitioner, Rosener's headphones 502, 504 could be configured to "'***receive***' software update code for firmware updates transmitted from a remote server, via a coordinating computer (e.g., computer 12)." *Id.* at 69–71 (regarding Rosener headphones). Further, Petitioner alleges a person of ordinary skill in the art "would have understood that a firmware upgrade is one example of a firmware update and, therefore, would have found it obvious to configure earphones 502, 504 to receive software update code representing '***firmware upgrades***' in order to upgrade the capabilities of earphones 502, 504." *Id.* at 71 (citing Ex. 1003 ¶ 155).

Petitioner argues the combination of Price with Rosener "would have involved applying conventional techniques within the [person of ordinary skill in the art's] skill level." Pet. 70. Petitioner provides, as an example, Price's description "that device 50 can receive software update code from computer 12 using wireless channel communication 70, which coincides with the one or more wireless links Rosener's earphones 502, 504 already have with an external data device." *Id.* (citing Ex. 1003 ¶ 72; Ex. 1004 ¶ 30; Ex. 1009 ¶ 39).

Patent Owner alleges that "updating a device's firmware requires that the device be sufficiently powered throughout the firmware upgrade process." PO Resp. 53 (citing Ex. 2038 ¶ 70). Patent Owner acknowledges Hankey's earpiece downloads updates but requires power from an external

power supply. *Id*. (citing Ex. 1005 ¶¶ 182–188). According to Patent Owner "Hankey does not disclose using the earpiece's battery to power the earpiece during a firmware upgrade and Rosener does not disclose a way to connect to an external power supply." *Id*. at 53–54. Patent Owner argues Rosener's earphones would have to be modified to include a power source, i.e., a battery, which would be beyond the level of ordinary skill determined previously. *Id*. at 54. Patent Owner notes that none of the other references in this challenge address this power issue, resulting in no expectation of success from the combination. *Id*. at 55–56.

We agree with Petitioner that the argument Patent Owner makes is not supported by the evidence. Reply 24. Furthermore, as Petitioner argues, a person of ordinary skill in the art "would have understood how to implement configuration options that would have addressed any power consumption issues associated with firmware upgrades." *Id*. (citing Ex. 1024 ¶¶ 49–50).

Patent Owner's argument is predicated on bodily incorporating a battery into Hankey or Rosener's earpieces. As already stated, how to put together a device based on the combined references is not required in order to find a claim obvious. *In re Keller*, 642 F.2d at 425. In addition, Patent Owner did not dispute that Rosener and Hankey taught a "rechargeable power source," limitation 1.c.v. *See* Section III.D.4.d (limitation 1.c.v above). Claim 14 itself does not recite a power source. All that is required by claim 14 is that "the headphones are configured to receive firmware upgrades pushed from a remote network server." How the firmware is "pushed" is left to the understanding of a person of ordinary skill in the art and is not directly recited.

Patent Owner attempts to distinguish "charging" from "powering during use." Sur-Reply 16–17 (emphasis omitted). Other than timing, we are not persuaded there is a difference and Patent Owner does not support its argument with evidence. Patent Owner's responses to Petitioner's other arguments, "conditional or incremental firmware upgrades" and improper incorporation "system-on-chip (SOC)" from the written disclosure into the claims of the '982 patent, do not persuade us that our determination is erroneous. *See* Sur-Reply 17–18.

We find that the prior art teaches each limitation of claim 14 and that a skilled artisan would have combined the teachings of Rosner, Hankey, Price, and Dyer. As explained below, Patent Owner's objective indicia of nonobviousness are not persuasive. After considering the complete record, we conclude that Petitioner has shown by a preponderance of the evidence that claim 14 would have been obvious over Rosener, Hankey, and Price or over Rosener, Hankey, Dyer, and Price.

G. Obviousness of Claim 15 over Rosener, Hankey, and Paulson or Rosener, Hankey, Dyer, and Paulson

Petitioner alleges claim 15 would have been obvious over Rosener, Hankey, and Paulson or over Rosener, Hankey, Dyer, and Paulson. Pet. 1, 72–75. Petitioner also relies on the Cooperstock Declaration. Ex. 1003 ¶¶ 158–159. Patent Owner disputes that claim 15 would have been obvious. PO Resp. 57–60.

1. Rosener (Ex. 1004)

Rosener was described in Section III.D.1 above.

2. Hankey (Ex. 1005)

Hankey was described in Section III.D.2 above.

3. Dyer (Ex. 1006)

Dyer was described in Section III.D.3 above.

4. Paulson (Ex. 1010)

Paulson describes a "two-way voice communication device" with a "switch supporting a push-to-talk" operation. Ex. 1010, 2:51–67. The device includes "earphone assembly 105" with housing 110 and microphone 130 located at one end of boom 120. *Id.* at 5:1–13, Fig. 1B.

Paulson describes that an "electrical signal from a microphone" (e.g., microphone 130) can be "carried on conductors 343 and 344." Ex. 1010, 6:17–19, Fig. 3. Paulson also describes that "switch 330 may be arranged to provide push-to-talk functionality." *Id.* at 6:43–44. "When activated, switch 330 may stop the electrical signals of microphone 130 from reaching the designated conductors of multi-conductor cable 350, effectively muting microphone 130." *Id.* at 6:30–33.

5. Claim 15

Limitation 15.1 of claim 15, which depends from claim 1, recites "wherein the processor circuit of the first earphone is configured to: process audible utterances by the user picked by the microphone in response to activation of the microphone by the user." Pet. 74. Petitioner contends that Rosener's earphones 502, 504 include "a microphone to collect '***audible utterances by the user***.'" *Id*. (quoting Ex. 1004 ¶ 56). Petitioner argues Paulson's teaching that a switch is "important for users in a noisy environment, to allow [users] to reduce the noise heard by [a] distant party." *Id.* at 73–74 (citing Ex. 1010, 6:33–49; Ex.1003 ¶ 76).

Limitation 15.2 of claim 15 recites "transmit a communication based on the audible utterances via the Bluetooth wireless communication links."

Pet. 75. Petitioner cites Rosener's teaching that "earphones 502, 504 can provide 'two-way communications between a user and an external data device (e.g., a cellular telephone),' e.g., via Bluetooth connections." Pet. 75 (citing Ex. 1004 ¶¶ 11, 35). According to Petitioner, a person of ordinary skill in the art "would have understood that earphones 502, 504 would have been configured to provide two-way communications with an external device using Bluetooth connections ('***Bluetooth wireless communication links***') such that audio generated by a user's voice ('***communication based on the audible utterances***') are transmitted from earphones 502, 504 to the cellular telephone." *Id.* at 75 (citing Ex. 1004 ¶ 50; Ex. 1003 ¶ 159).

Patent Owner argues that Paulsen's earphone is not wireless. PO Resp. 58 (citing Ex. 1010, Fig. 3 (switch 330); Ex. 2038 ¶ 85). Patent Owner argues Petitioner has not shown "how Paulson's pressure-actuated, mechanical switch would be implemented into Rosener's small form factor earphones. Mechanical switches are typically larger in size than solid-state or MEMS (microelectromechanical systems) switches because mechanical switches have (non-micro) moving parts." *Id*. at 59 (citing Ex. 2038 ¶ 87). Again, Patent Owner argues such an implementation would be beyond the level of ordinary skill we have determined for the '982 patent in this proceeding. *Id*. at 59–60 (citing, *inter alia*, Ex. 2038 ¶ 87).

Bodily incorporation is not required in order to meet the test of obviousness. *In re Keller*, 642 F.2d at 425. Petitioner's argument is in accord, arguing, as we also find, Paulson's mechanical button "does not mean that [a person of ordinary skill in the art] would have had to physically incorporate the exact mechanical button from Paulson into Rosener-Hankey earphone." Reply 24–25 (citing Ex. 1024 ¶¶ 53–54).

Petitioner argues a person of ordinary skill in the art "reading Paulson would get the idea of incorporating the push-to-talk button to Hankey's device." Reply 24 (citing Ex. 1024 ¶¶ 53–54). Patent Owner argues that the "button" would provide the idea recited in claim 15 raises a new argument not presented in the Petition. Sur-Reply 19. We disagree. The argument was a response to the argument raised in pages 59 through 60 of Patent Owner's Response. Patent Owner does not respond to the bodily incorporation argument made by Petitioner. We find that bodily incorporation is dispositive of the positions raised by Patent Owner.

6. Conclusion

We find that the prior art teaches each limitation of claim 15 and that a skilled artisan would have combined the teachings of Rosner, Hankey, Paulson, and Dyer. As explained below, Patent Owner's objective indicia of nonobviousness are not persuasive. After considering the complete record, we conclude that Petitioner has shown by a preponderance of the evidence that claim 15 would have been obvious over Rosener, Hankey, and Paulson or over Rosener, Hankey, Dyer, and Paulson.

H. Obviousness of Claims 16 and 17 over Rosener, Hankey, and Huddart or Rosener, Hankey, Dyer, and Huddart

Petitioner alleges claims 16 and 17 would have been obvious over Rosener, Hankey, and Huddart or over Rosener, Hankey, Dyer, and Huddart. Pet. 1, 76–82. Petitioner also relies on the Cooperstock Declaration. Ex. 1003 ¶ 160. Patent Owner does not dispute Petitioner's showing regarding claims 16 and 17.

1. Rosener (Ex. 1004)

Rosener was described in Section III.D.1 above.

2. Hankey (Ex. 1005)

Hankey was described in Section III.D.2 above.

3. Dyer (Ex. 1006)

Dyer was described in Section III.D.3 above.

4. Huddart (Ex. 1007)

Huddart describes a wireless stereo system that includes a headset component and a wireless earbud component. Ex. 1007, 2:13–15. Headset 4 communicates with electronic device 2 over a wireless communication link 12. *Id.* at 2:52–3:6. During a "stereo listening operation," wireless earbud 6 is used in conjunction with headset 4 through wireless communication link 18. *Id.* at 3:7–18. In this mode, headset 4 and earbud 6 can be used in conjunction for stereo listening from "a cellular telephone 100, digital music player 106," among other electronic devices. *Id.* at 7:62–8:8.

Huddart describes embodiments in which the wireless stereo system includes a "charger/carrier" with "a small plastic storage case for storing headset 4 and wireless earbud 6 for protection and charging." Ex. 1007, 8:25–27. The charger/carrier includes "a battery and charger circuit for charging both the headset battery and wireless earbud battery when inserted into the . . . charger/carrier." *Id.* at 8:27–31. The charger/carrier can be pocket size, providing "a convenient mechanism" to charge the batteries frequently. *Id*. at 8:31–33. Since the earbud can have "a relatively small[] capacity battery due to its limited size," the pocket charger/carrier provides the convenience of frequent charging of the earbud "in the absence of a primary charger." *Id*. at 8:31–34. The pocket charger/carrier is portable. *Id*. "The primary charger may be a cable or docking facility connecting the

pocket charger/carrier to a wall outlet or [a] primary batter[y]" to allow a storage case battery on the pocket charger/carrier to be charged. *Id*. at 8:52–57.

The charger/carrier is capable of charging the earbud's and the headset's batteries wirelessly. Ex. 1007, 8:37–40. As a result, "the earbud advantageously does not require charging contacts on its small exterior surface when charging is performed with inductive charging." *Id.*

5. Claims 16 and 17

Claim 16 depends from claim 1 and recites "wherein the rechargeable power source comprises a wirelessly chargeable circuit." Huddart teaches a wireless battery and enabling circuitry. Ex. 1007, 8:35–50. Petitioner relies on this teaching to show claim 16. Pet. 80 (citing Ex. 1007, 8:35–50; Ex. 1003 ¶ 160).

Claim 17 depends from claim 1 and recites "wherein the rechargeable power source comprises a passive, wireless rechargeable power source." Petitioner argues "passive" is described in a prior art United States patent and is "not inventive." Pet. 80–81 (citing Ex. 1001, 7:7–9 (referencing US Patent No. 7,027,311 toVanderelli (Ex. 1012); *see also* Section III.I.5 (describing Vanderelli).

According to Petitioner, a person of ordinary skill in the art would have looked to Huddart "to reduce the number of components needed on the surface area of small compact Rosener-Hankey/Rosener-Hankey-Dyer earphones," thus "eliminating the charging contacts on the surface of the earphones." Pet. 78 (citing Ex. 1003 ¶¶ 81–82; Ex. 1007, 8:38–45).

We find that the prior art teaches each limitation of claims 16 and 17 and that a skilled artisan would have combined the teachings of Rosner,

Hankey, Huddart, and Dyer. As explained below, Patent Owner's objective indicia of nonobviousness is not persuasive. After considering the complete record, we conclude that Petitioner has shown by a preponderance of the evidence that claims 16 and 17 would have been obvious over Rosener, Hankey, and Huddart or over Rosener, Hankey, Dyer, and Huddart.

I. Obviousness of Claim 17 over Rosener, Hankey, Huddart, and Vanderelli or Rosener, Hankey, Dyer, Huddart, and Vanderelli

Petitioner alleges claim 17 would have been obvious over Rosener, Hankey, Huddart, and Vanderelli or over Rosener, Hankey, Dyer, Huddart, and Vanderelli. Pet. 1, 82–85. Petitioner also relies on the Cooperstock Declaration. Ex. 1003 ¶¶ 166–167. Patent Owner does not dispute Petitioner's showing regarding claim 17.

1. Rosener (Ex. 1004)

Rosener was described in Section III.D.1 above.

2. Hankey (Ex. 1005)

Hankey was described in Section III.D.2 above.

3. Dyer (Ex. 1006)

Dyer was described in Section III.D.3 above.

4. Huddart (Ex. 1007)

Huddart was described in Section III.H.4 above.

5. Vanderelli (Ex. 1012)

Vanderelli describes circuitry for wireless charging that converts radiation energy obtained from "a range of RF radiation" into direct current (DC) output. Ex. 1012, 1:40–45, Fig. 1.

The circuitry includes antenna 12 for receiving RF radiation and inductor 18 for converting RF radiation into a storable form. Ex. 1012, 2:1–58. To allow energy to be obtained from a range of frequencies,

inductor 18 is divided into taps 20, which are calculated to match "the inductor's impedance to [the] desired RF range." *Id.* Diodes 26 direct converted energy to capacitors C1–Cx, where the energy is stored as DC voltage. *Id.* "The sum of the voltages available from C1–Cx is stored in any storage device 28 such as a capacitor [and is] made available for immediate use." *Id.* at 4:9–17

6. Claim 17

Claim 17 is described above in Section III.H. With respect to Vanderelli, Petitioner argues it would be added to the combination "to thereby enjoy advantages of obtaining energy from a range of RF frequencies." Pet. 85. "[T]he resulting system would have provided earphones 502, 504, each with a rechargeable power source that may comprise capacitors passively charged with RF radiation ('***passive, wireless rechargeable power source***')." *Id.* (citing Ex. 1003 ¶ 167).

We find that the prior art teaches each limitation of claim 17 and that a skilled artisan would have combined the teachings of Rosner, Hankey, Huddart, Vanderelli, and Dyer. As explained below, Patent Owner's objective indicia of nonobviousness are not persuasive. After considering the complete record, we conclude that Petitioner has shown by a preponderance of the evidence that claim 17 would have been obvious over Rosener, Hankey, Huddart, and Vanderelli or over Rosener, Hankey, Dyer, Huddart, and Vanderelli.

J. Objective Indicia of Nonobviousness

Patent Owner argues that the sales of Petitioner's AirPods and AirPods Pro products (collectively "AirPods Products") have achieved significant sales and are thus evidence of commercial success that confirms

that the '982 patent claim 1 would not have been obvious. PO Resp. 41 (citing Ex. 2044[21], 15). Patent Owner also alleges that dependent claims 4, 5, 14, 15, 19, and 20 are embodied by commercially successful products based on "record evidence" showing that the AirPods Products "when used with an iPhone as the mobile DAP, possess the elements of these claims." *Id*. at 65 (citing Ex. 1014[22], 1018–1019,1033–1035, 1038–1039, 1056–1057, 1071–1073, 1076–1077).

Notwithstanding what the teachings of the prior art would have suggested to one skilled in the art, objective evidence of non-obviousness (so called "secondary considerations") may lead to a conclusion that the challenged claims would not have been obvious. *In re Piasecki*, 745 F.2d 1468, 1471–72 (Fed. Cir. 1984). Objective evidence of non-obviousness "may often be the most probative and cogent evidence in the record" and "may often establish that an invention appearing to have been obvious in light of the prior art was not." *Transocean Offshore Deepwater Drilling, Inc. v. Maersk Drilling USA, Inc.*, 699 F.3d 1340, 1349 (Fed. Cir. 2012) (quoting *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1538 (Fed. Cir. 1983)). Objective evidence may include long-felt but unsolved need, failure of others, unexpected results, commercial success, copying, licensing, and praise. *See Graham*, 383 U.S. at 17–18; *Leapfrog Enters., Inc. v. Fisher–Price, Inc.*, 485 F.3d 1157, 1162 (Fed. Cir. 2007).

Commercial success is typically shown with evidence of "significant sales in a relevant market." *Ormco Corp. v. Align Tech., Inc.*, 463 F.3d

[21] Available at https://www.businessofapps.com/data/apple-statistics/
[22] District Court Lawsuit, "Plaintiff Koss Corporation's Preliminary Infringement Contentions" (Ex. 1014).

1299, 1312 (Fed. Cir. 2006) (citation omitted). "When a patentee can demonstrate commercial success, usually shown by significant sales in a relevant market, and that the successful product is the invention disclosed and claimed in the patent, it is presumed that the commercial success is due to the patented invention." *J.T. Eaton & Co. v. Atlantic Paste & Glue Co.*, 106 F.3d 1563, 1571 (Fed. Cir. 1997).

To give substantial weight to objective indicia of nonobviousness such as commercial success, a proponent must establish a nexus between the evidence and the merits of the claimed invention. *ClassCo, Inc. v. Apple, Inc.*, 838 F.3d 1214, 1220 (Fed. Cir. 2016). Nexus is a legally and factually sufficient connection between the objective evidence and the claimed invention, such that the objective evidence should be considered in determining non-obviousness. *Demaco Corp. v. F. Von Langsdorff Licensing Ltd.*, 851 F.2d 1387, 1392 (Fed. Cir. 1988). "[T]here is no nexus unless the evidence presented is 'reasonably commensurate with the scope of the claims.'" *ClassCo*, 838 F.3d at 1220 (quoting *Rambus Inc. v. Rea*, 731 F.3d 1248, 1257 (Fed. Cir. 2013)). A patentee is entitled to a presumption of nexus "when the patentee shows that the asserted objective evidence is tied to a specific product and that product 'embodies the claimed features, and is coextensive with them.'" *Fox Factory, Inc. v. SRAM, LLC*, 944 F.3d 1366, 1373 (Fed. Cir. 2019) (quoting *Polaris Indus., Inc. v. Arctic Cat, Inc.*, 882 F.3d 1056, 1072 (Fed. Cir. 2018)). "[T]he patentee retains the burden of proving the degree to which evidence of secondary considerations tied to a product is attributable to a particular claimed invention." *Fox Factory*, 944 F.3d at 1378. The Federal Circuit has held that "if the marketed product embodies the claimed features, and is

coextensive with them, then a nexus is presumed and the burden shifts to the party asserting obviousness to present evidence to rebut the presumed nexus." *Brown & Williamson Tobacco Corp. v. Philip Morris Inc.*, 229 F.3d 1120, 1130 (Fed. Cir. 2000).

"[T]he purpose of the coextensiveness requirement is to ensure that nexus is only presumed when the product tied to the evidence of secondary considerations is the invention disclosed and claimed." *Lectrosonics, Inc. v. Zaxcom, Inc.*, IPR2018-01129, Paper 33 at 32 (PTAB Jan. 24, 2020) (precedential) (citing *Fox Factory*, 944 F.3d at 1374) (emphasis and internal quotation marks omitted) (alteration in original). "[T]he degree of correspondence between a product and the patent claim falls along a spectrum. At one end of the spectrum lies perfect or near perfect correspondence. At the other end lies no or very little correspondence." *Id.* (alteration in original). Also, "[a] patent claim is not coextensive with a product that includes a 'critical' unclaimed feature that is claimed by a different patent and that materially impacts the product's functionality." *Id.* (citing *Fox Factory*, 944 F.3d at 1375).

"A finding that a presumption of nexus is inappropriate does not end the inquiry into secondary considerations"; rather, "the patent owner is still afforded an opportunity to prove nexus by showing that the evidence of secondary considerations is the 'direct result of the unique characteristics of the claimed invention.'" *Fox Factory*, 994 F.3d at 1374 (quoting *In re Huang*, 100 F.3d 125, 140 (Fed. Cir. 1996)).

"Ultimately, the fact finder must weigh the [objective indicia] evidence presented in the context of whether the claimed invention as a whole would have been obvious to a skilled artisan." *See Lectrosonics*,

Paper 33 at 33 (citing *WBIP, LLC v. Kohler Co.*, 829 F.3d 1317, 1331–32 (Fed. Cir. 2016)).

As evidence of commercial success, Patent Owner relies on public sources to estimate that Petitioner sold: 15 million AirPods in 2017; 35 million AirPods in 2018; 60 million AirPods in 2019; and 114 million AirPods in 2020. PO Resp. 41 (citing Ex. 2044[23], 15). Patent Owner argues that "[a]t $159 USD apiece, that amounts to more than $35 billion in sales in four years. This estimate is exceedingly great because the AirPod[s] Products dominate the market for 'true wireless' stereo headphones." *Id*. at 43 (citing Ex. 2046[24], 1). Patent Owner also alleges the market for wireless headphones is growing, "which is an important component of . . . commercial success.'" *Id*. at 43–44 (citing Ex. 2046, 2; *In re Applied Materials, Inc*., 692 F.3d 1289, 1300 (Fed. Cir. 2012)).

Patent Owner argues that nexus exists between the AirPods Products and claim 1 based on a November 6, 2020, infringement claim chart, comparing the AirPods Products to the '982 patent claims, that it had submitted in the District Court Lawsuit. PO Resp. 44 (citing Ex.1014, 1003–1014 (AirPods Pro), 1041–1052 (AirPods)). Patent Owner also relies on the instructions to "Connect your AirPods and AirPods Pro to your iPhone." *Id.* at 42–44 (citing Ex. 2045[25], 1). Patent Owner does not provide a detailed comparison of the AirPods with the challenged claims in its Response. *Id*. at 44–45. Nevertheless, Petitioner does not contest, in this

[23] *Available at* https://www.businessofapps.com/data/apple-statistics/.
[24] *Available at* https://9to5mac.com/2021/01/27/airpods-dominate-wireless-headphone-market/.
[25] *Available at* https://support.apple.com/en-us/HT207010.

proceeding at least, that its products meet all the claim limitations. Tr. 66:11–26.

Petitioner argues that Patent Owner has failed to meet its burden to establish nexus, because Patent Owner has not shown the required coextensiveness between the AirPods Products and the claims. Reply 30. Petitioner argues that Patent Owner does not allege the coextensiveness aspect of nexus. *Id*. Petitioner argues the evidence of nexus is based on a "subset of features recited in claim 1" and the setup process for the AirPods Products. *Id*. at 31 (citing PO Resp. 43–44). Petitioner concludes by arguing the allegations are conclusory and fail to establish a prima facie nexus. *Id*. (citing *Demaco Corp. v. F. Von Langsdorff Lic. Ltd.*, 851 F.2d 1387, 1392 (Fed. Cir. 1988)).

Petitioner also lists several unclaimed features of the AirPods products including:

> (a) the first-generation AirPods had sensors that "detect when AirPods are in ear and can automatically play and pause music" [Ex. 2040], (b) the second generation AirPods had a proprietary system-in-package (SiP) chip (Apple H1 chip) that delivered "performance efficiencies, faster connect times, more talk time" [Ex. 2041], (c) the AirPods Pro had adaptive noise cancelling feature that "uses two microphones" on a single earphone "combined with advanced software. to continuously adapt to each individual ear and headphone fit" [Ex. 2042], and (d) all AirPods Products "feature the same great battery life . . . with up to five hours of listening time" [Ex. 2042].

Reply 31–32; *see also id*. at 32 (citing Ex. 1025, 240:12–15 (Mr. McAlexander testifying as to other unclaimed features of the AirPods Products)).

Petitioner also argues Patent Owner's evidence does not demonstrate commercial success that results directly from the "unique characteristics" of the claimed invention. Reply 32 (citing *In re Huang*, 100 F. 3d 135, 140 (Fed. Cir. 1996)).

In response, Patent Owner alleges it need not prove the claims are coextensive with the AirPods Products where there is proof "that ***the patentee demonstrate[s] that the product is essentially the claimed invention***." Sur-Reply 22–23 (citing *FOX Factory*, 944 F.3d at 1374). Notwithstanding the preceding argument, Patent Owner contends "several" of the alleged unclaimed features are claimed. *Id*. at 23. As an example, Patent Owner cites unclaimed feature (b) above from the Reply, the "(SiP) chip (Apple H1 chip)," arguing claim 1 recites a "processor circuit." *Id.* at 23. Patent Owner also argues claim 1 recites a "rechargeable battery," as meeting the alleged "great battery life" of unclaimed feature (d) above. *Id*. Noise cancelling is identified in unclaimed feature (c) above and is argued as the "sound quality enhancement" of claim 19. *Id*. Patent Owner argues it has shown three of the four unclaimed features are claimed. *Id*.

We find that Patent Owner has not met its burden of showing the requisite nexus — that the AirPods Products embody "the claimed features, and is coextensive with them." *Fox Factory*, 944 F.3d at 1373. Patent Owner's sole basis for asserting that the AirPods Products embody the claims is a claim chart from a separate litigation. Ex. 1014, 1003–1014, 1041–1052.

In any case, we agree with Petitioner that the Response did not allege the AirPods Products are coextensive with any claim. Reply 30. Further, Patent Owner misapprehends *Fox Factory* in alleging coextensiveness is

not required. *See Fox Factory*, 944 F.3d at 1376 ("On a broader note, if we were to agree . . . that the coextensiveness requirement is met so long as the patent claim broadly covers the product that is the subject of the secondary considerations evidence, irrespective of the nature of any unclaimed features — then the coextensiveness requirement would rest entirely on minor variations in claim drafting."). Moreover, we are not persuaded that the alleged unclaimed features, (a) through (d) of the Reply, are claimed. Patent Owner treats the claim language too broadly. Beyond attorney argument, we are not presented with proof that a "processor circuit" is coextensive with a chip is used on the AirPods to enhance "performance efficiencies, faster connect times, more talk time." Similarly, "great battery life" is not swallowed up by a claim limitation to a "rechargeable battery." Neither do we agree that Patent Owner has sufficiently shown that "sound quality enhancement" is noise cancellation.

Moreover, the question is whether the unclaimed features "materially impact the functionality of the . . . products." *Fox Factory*, 944 F.3d at 1376. *Fox Factory* did not hold that unclaimed features must be critical to or for improving the heart of the challenged claims. Rather, we look to whether the unclaimed features "materially impact[] the product's functionality." *Id.* at 1375. Thus, when *Fox Factory* states that "if the unclaimed features amount to nothing more than additional insignificant features, presuming nexus may nevertheless be appropriate," *id.* at 1374, it means insignificant to the product, not insignificant to the challenged claims. Patent Owner does not argue, and has not presented evidence, that the unclaimed features of AirPods Products are insignificant to, or do not materially impact, the AirPods Products. In sum, Patent Owner has not

shown nexus by virtue of the claims being coextensive with the allegedly successful products.

As noted above, Patent Owner may still show nexus by showing that the commercial success of AirPods Products is the direct result of the unique characteristics of the claimed invention. *See Fox Factory*, 944 F.3d at 1373–1374; *Huang*, 100 F.3d at 140. Although Patent Owner cites case law regarding nexus based on unique characteristics of the claimed invention, it does not argue what the characteristics are or provide supporting evidence. *See* PO Resp. 42–43 (citing *Demaco,* 851 F.2d at 1392; *Fox Factory,* 994 F.3d at 1373–1374).

Because Patent Owner has not shown a nexus between the claimed invention and the alleged commercial success, Patent Owner has not made a persuasive showing that commercial success evidences non-obviousness.

IV. CONCLUSION[26]

For the reasons discussed above, Petitioner has shown by a preponderance of the evidence that claims 1–5 and 14–18 of the '982 patent are unpatentable as summarized in the table below. Petitioner has not shown that challenged claims 19 and 20 are unpatentable.

[26] Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner's attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding. See* 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. *See* 37 C.F.R. §§ 42.8(a)(3), (b)(2).

In summary:

Claims	35 U.S.C. §	Reference(s)/Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1, 2, 18–20	103	Rosener, Hankey or Rosener, Hankey, Dyer	1, 2, 18	19, 20
3–5	103	Rosener, Hankey, Haupt or Rosener, Hankey, Dyer, Haupt	3–5	
14	103	Rosener, Hankey, Price or Rosener, Hankey, Dyer, Price	14	
15	103	Rosener, Hankey, Paulson or Rosener, Hankey, Dyer, Paulson	15	
16, 17	103	Rosener, Hankey, Huddart or Rosener, Hankey, Dyer, Huddart	16, 17	
17	103	Rosener, Hankey, Huddart, Vanderelli or Rosener, Hankey, Dyer, Huddart, Vanderelli	17	
Overall Outcome			1–5, 14–18	19, 20

V. Order

In consideration of the foregoing, it is hereby:

ORDERED that Petitioner has shown that challenged claims 1–5 and 14–18 are unpatentable;

FURTHER ORDERED that Petitioner has not shown that challenged claims 19 and 20 are unpatentable; and

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

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