

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

BOSE CORPORATION,
Petitioner,

v.

FREEBIT AS,
Patent Owner.

Case IPR2017-00130
Patent 8,976,995 B2

Before KRISTEN L. DROESCH, DAVID C. McKONE, and
PATRICK M. BOUCHER, *Administrative Patent Judges*.

McKONE, *Administrative Patent Judge*.

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

I. INTRODUCTION

A. *Background*

Bose Corporation (“Petitioner”) filed a Petition (Paper 2, “Pet.”) to institute an *inter partes* review of claims 1–13 of U.S. Patent No. 8,976,995 B2 (Ex. 1001, “the ’995 patent”). Freebit AS (“Patent Owner”) filed a Preliminary Response (Paper 8, “Prelim. Resp.”).

Pursuant to 35 U.S.C. § 314, in our Institution Decision (Paper 10, “Dec.”), we instituted this proceeding as to claims 1–13.

Patent Owner filed a Patent Owner’s Response (Paper 17, “PO Resp.”), and Petitioner filed a Reply to the Patent Owner’s Response (Paper 21, “Reply”). Patent Owner filed a Motion for Observations Regarding the testimony of Dr. John G. Casali (Paper 25) and Petitioner filed a Response to that Motion (Paper 30).

Petitioner relies on the Declarations of John G. Casali, Ph.D. (Ex. 1003, “Casali Decl.”; Ex. 1015, “Supp. Casali Decl.”). Patent Owner relies on the Declarations of Wayne J. Staab, Ph.D. (Ex. 2001, “Staab Decl.”; Ex. 2014, “2nd Staab Decl.”).

An oral argument was held on January 23, 2018 (Paper 33, “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 1–13. Based on the record before us, Petitioner has proved, by a preponderance of the evidence, that claims 1–13 are unpatentable.

B. Related Matters

Bose Corp. v. FreeBit AS, Case IPR2017-00129 (PTAB) challenges U.S. Patent No. 8,630,436 B2 (“the ’436 patent”), a parent of the ’995 patent. We held a consolidated oral argument for IPR2017-00129 and IPR2017-00130. Tr. 3:3–6. Neither party indicates that another matter likely will affect or be affected by this proceeding. Pet. 2; Paper 4, 1.

C. Asserted Prior Art References

Petitioner relies on the following prior art:

Ex. 1004 (“Berg”)	US 6,944,307 B2	Sept. 13, 2005
Ex. 1005 (“Varming”)	WO 2004/100508 A1	Nov. 18, 2004
Ex. 1006 (“Aber”)	US 1,753,817	Apr. 8, 1930
Ex. 1007 (“Marshall”)	US 5,625,171	Apr. 29, 1997

D. The Instituted Grounds

We instituted on the following grounds of unpatentability (Dec. 27):

References	Basis	Claim(s) Challenged
Berg, Varming, and Aber	§ 103(a)	1–5 and 7–13
Berg, Varming, Aber, and Marshall	§ 103(a)	6

E. The ’995 Patent

The ’995 patent is directed to an ear unit (e.g., a microphone/earpiece combination) that stably fits in an ear. Ex. 1001, Abstract. Figure 1 is reproduced below:

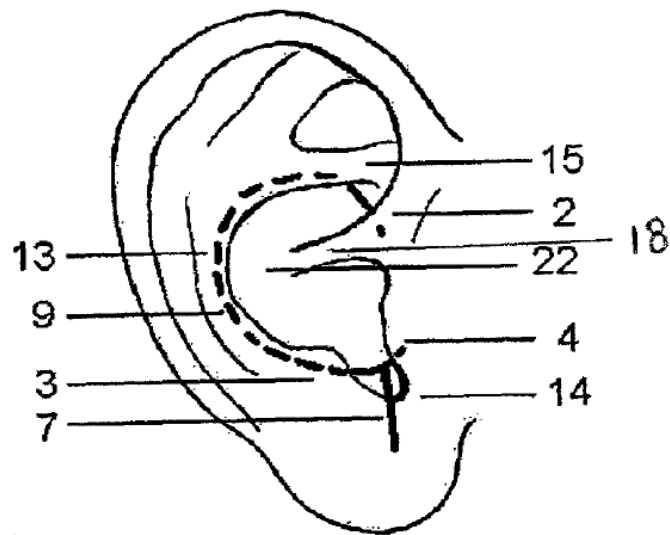


Fig. 1

Figure 1 illustrates pertinent aspects of the external anatomy of the ear discussed in the '995 patent. *Id.* at 2:10. Figure 2 is reproduced below:

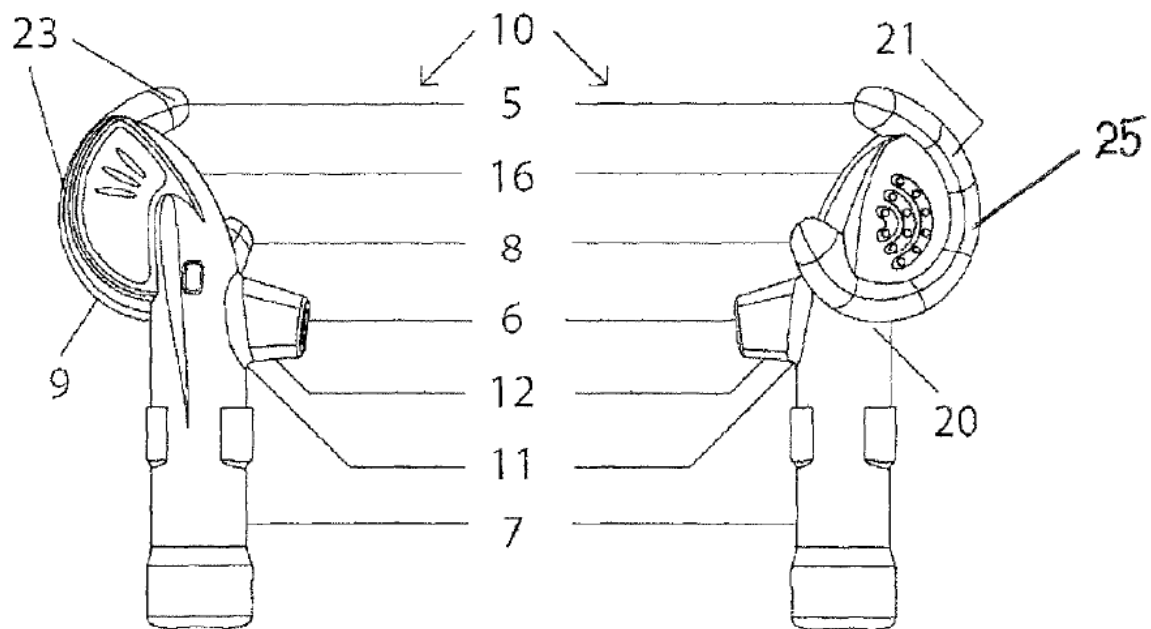


Fig. 2

Figure 2 depicts an ear unit with a microphone device. *Id.* at 2:31–32.

Ear unit 10 includes microphone 6 and microphone rod 12 connected to ear unit 10 at junction point 11. *Id.* at 2:64–67. Microphone rod 12 includes a connection between microphone 6 and a transmitter/receiver arranged in the ear unit. *Id.* at 2:67–3:2. A power supply (e.g., a rechargeable battery) can be included in lower part 7 of ear unit 10. *Id.* at 3:2–9. Microphone rod 12 can include a wireless antenna. *Id.* at 3:13–15. Ear unit 10 can be operated together with a second ear unit to form a stereo effect. *Id.* at 3:15–17.

The '995 patent describes a particular shape of ear unit 10. Specifically, ear unit 10 includes decremental curve 9 with a shape that, when positioned in the ear, falls along the antihelix of the ear (13 in Fig. 1) and is partially positioned under the antitragus of the ear (3 in Fig. 1). *Id.* at 3:18–22. The upper part of decremental curve 9 projects into the cavity covered by the lower node of the antihelix (15 in Fig. 1) and underneath the flap covering the lower part of the cavity (2 in Fig. 1). *Id.* at 3:25–28. Ends 5 and 8 of decremental curve 9 project out from the casing of ear unit 10. *Id.* at 3:31–34. The part of ear unit 10 comprising the hearing element is retracted slightly relative to the curve such that the hearing element does not abut the auditory canal directly. *Id.* at 3:34–38. Ear unit 10 is formed with first surface 25 facing inwardly toward the concha of the ear (22 in Fig. 1); second, opposite, surface 23 that faces outwardly from the concha; and inner circumferential surface 26, opposite to decremental curve 9, that is formed between first surface 25 and second surface 23. *Id.* at 3:39–44.

First surface 25 has curvature 21 that follows along the inner surface of the ear mussel or concha (22 in Fig. 1). *Id.* at 3:44–46. Curvature 21 is best illustrated in Figures 3 and 4, reproduced below:

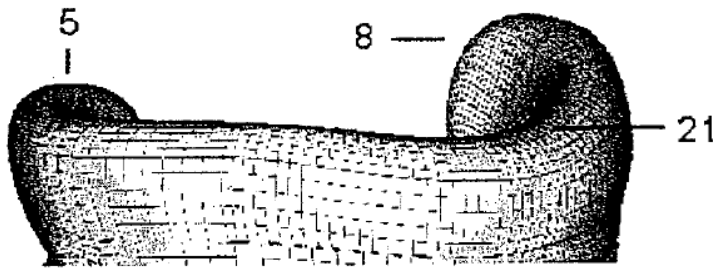


Fig. 3

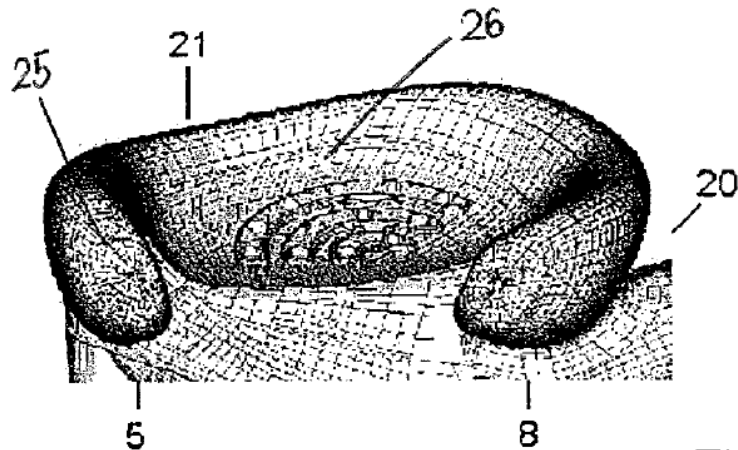


Fig. 4

Figures 3 and 4 depict ear unit 10 at different angles. *Id.* at 3:59–62. According to the '995 patent, the contact surface provided by curvature 21 “provides further stability since a larger area is placed against the ear mussel or concha, and thereby increased comfort.” *Id.* at 3:47–49. Although the '995 patent does not describe it explicitly, the parties appear to agree that curvature 21 follows the extension of the crus of helix (18 of Fig. 1). Pet. 1, 20–21; PO Resp. 1.

The parties do not agree precisely where the crus of helix ends and the extension of the crus of helix begins. Figure 1, reproduced above, shows crus of helix 18 extending approximately one half to two thirds of the way from flap 2 to antihelix 9, but the specification itself does not discuss the crus of helix. Patent Owner, relying on Dr. Staab, argues that the average crus of helix extends about one-half to two-thirds the distance across the

concha. PO Resp. 6 (citing Ex. 2001 ¶ 53). Dr. Staab cites to the Hunter article, which states that “[t]he average crus helix extends about one half to two thirds the distance across the concha.” Ex. 2004, 41. Hunter, however, describes examples that deviate from the average, including a prominent crus helix, which Hunter defines as “[d]evelopment of the crus helix to the same degree as an average antihelix stem or helix” and notes that “[j]udgment of prominence is highly subjective and may be influenced by the relative development of the other ear components” and that “[t]here appears to be a correlation between the length of the crus helix and its relative prominence.” *Id.* at 51.

Petitioner’s expert, Dr. Casali, testifies that the concha bowl is separated into two regions, the cymba concha (above) and the cavum (below), by a “projection [that] is known at its front (i.e., toward the person’s face) as the helix root . . . , also termed crus of the helix, and its rearward projection that bisects the concha is the concha ridge (7), which is also referred to as an extension of the crus of helix.” Ex. 1003 ¶ 20. Dr. Casali testified in deposition, however, that “this feature of the ear that we’re talking about involving the helix root and the concha ridge really can’t be considered as discrete features or regions because they transition gradually into each other” and “where the helix root would end and the concha ridge begin is nondistinct, when they transition into each other in a continuous fashion, not a discrete fashion.” Ex. 2012, 23:1–5, 23:18–24.

Claim 1, reproduced below (additional paragraphing supplied), is illustrative of the claimed subject matter:

1. An ear unit for stably fitting in an ear having an antihelix, a tragus and a concha surrounded by the antihelix,

wherein said ear unit is shaped as a decremental curve, said decremental curve being configured to correspond to the antihelix of the ear with a surface shaped in such a way that the decremental curve falls along an inner part of the antihelix and is partly positioned under the antitragus,

wherein the decremental curve comprises two ends, a distance between the two ends being approximately equal to a distance between a first cavity formed under the tragus of the ear and a second cavity covered by a lower node of the antihelix of the ear, and

wherein, when the ear unit is positioned in the ear, the ear unit is provided with a curvature conforming to an inner surface of the concha, and

wherein the curvature extends to an outer circumferential surface of the ear unit, the outer circumferential surface contacting an inner circumferential surface of the antihelix when the ear unit is positioned in the ear.

II. ANALYSIS

A. Claim Construction

We interpret claims of an unexpired patent using the broadest reasonable construction in light of the specification of the patent in which they appear. *See* 37 C.F.R. § 42.100(b); *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2144–45 (2016). In applying a broadest reasonable construction, claim terms generally are given their ordinary and customary meaning, as would be understood by one of ordinary skill in the art in the context of the entire disclosure. *See In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007).

Patent Owner proposes several related constructions:

Claims 1 and 13 recite “curvature conforming to an inner surface of the concha.” Claim 10 recites “curvature in a direction orthogonal to a normal of the first contact surface and configured to conform to an inner surface of the concha.” Patent Owner contends that these terms mean “a curvature which fits closely against the concha.” PO Resp. 27–28.

Claim 1 recites “wherein the curvature extends to an outer circumferential surface of the ear unit.” Claim 10 recites “wherein the curvature extends to an outer periphery of the first contact surface.” Patent Owner contends that these terms “should exclude a curvature that is not shaped to engage the inner surface of the rear of the concha where the concha floor transitions into the concha wall.” *Id.* at 29–30.

Patent Owner cites the specification for each of these constructions. *See* PO Resp. 28 (citing Ex. 1001, 2:33–42, 3:44–49), 29 (citing Ex. 1001, 3:44–49¹). Specifically, the specification of the ’995 patent states:

FIG. 3 shows an ear unit according to the present invention with a curvature enabling the ear unit to fit closely against the ear mussel.

FIG. 5 shows an embodiment of the present invention comprising the curvature fitting closely against the ear mussel

....

The first surface 25 has a curvature 21 in such a way that it follows along the inner surface of ear mussel or concha 22 when the ear unit 10 is positioned into the ear. This contact

¹ Patent Owner cites Exhibit 1001, 3:25–30, but quotes the portion appearing at 3:44–49.

surface provides further stability since a larger area is placed against the ear mussel or concha, and thereby increased comfort.

Ex. 1001, 2:33–42, 3:44–49. .

Petitioner’s theory of obviousness, however, is that the prior art renders the challenged claims obvious even under Patent Owner’s narrower constructions. Pet. 37–39; Reply 4. For example, Petitioner argues:

What they are saying is that the curvature, this new curvature that they have put into that C-shaped pad has to itself engage and fit closely, in other words touch the concha of the ear. We think that this is a narrow interpretation. When you look at the claim language, we are not really seeing support, Your Honor, for that particular narrow construction. And yet, what we are saying is that nonetheless, if we were to adopt that narrow construction, the prior art renders it obvious.

Tr. 7:8–15. Petitioner does not have a theory of obviousness under broader constructions, should we find that the challenged claims are not rendered obvious under Patent Owner’s proposed constructions. Reply 4; Tr. 7:16–9:2. Accordingly, we evaluate Petitioner’s allegations under Patent Owner’s proposed constructions, and need not determine whether the proper constructions should be broader to resolve the parties’ 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.”).

B. Asserted Grounds of Unpatentability

A claim is unpatentable under 35 U.S.C. § 103(a) 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.² See *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

In an obviousness analysis, some reason must be shown as to why a person of ordinary skill would have combined or modified the prior art to achieve the patented invention. See *Innogenetics, N.V. v. Abbott Labs.*, 512 F.3d 1363, 1374 (Fed. Cir. 2008). A reason to combine or modify the prior art may be found explicitly or implicitly in market forces; design incentives; the “interrelated teachings of multiple patents”; “any need or problem known in the field of endeavor at the time of invention and addressed by the patent”; and the background knowledge, creativity, and common sense of the person of ordinary skill. *Perfect Web Techs., Inc. v. InfoUSA, Inc.*, 587 F.3d 1324, 1328–29 (Fed. Cir. 2009) (quoting *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418–21 (2007)).

1. Level of Ordinary Skill

Petitioner contends that a person of ordinary skill in the art would have had:

a Bachelor of Science degree or Master of Science degree in mechanical engineering, biomedical engineering, physical

² The complete record does not include evidence of secondary considerations.

acoustics, ergonomics, human factors engineering, or industrial design, together with at least 6 months educational practicum or work experience with outer ear-mounted earpieces for communications earphones, music earphones, hearing aids or similar devices that are fitted into the pinna and provide acoustic energy into the ear canal. Alternatively to the aforementioned academic degrees, a [person of ordinary skill in the art] could instead have a Master's degree in Audiology or AuD (Audiology Doctorate), but with the same aforementioned practicum or work experience.

Pet. 9–10.

Patent Owner disagrees with Petitioner and argues that a skilled artisan would have had “a bachelor's degree or master's degree in audiology or hearing science and at least three years of experience with developing earphone and hearing instrument products.” PO Resp. 26.

We do not discern a meaningful difference between the parties' proposals, and the parties do not contend that any such difference has an impact on this proceeding. In any case, our findings and conclusions are the same under either party's proposed level of skill.

2. Alleged Obviousness over Berg, Varming, and Aber

Petitioner contends that claims 1–5 and 7–13 would have been obvious over Berg, Varming, and Aber. Pet. 14–62. Under Petitioner's theory, Berg teaches each limitation of these claims except a “single feature,” in particular, “a curvature added to the earpiece to accommodate a certain anatomical feature of the human ear—namely, the extension of the crus of helix.” *Id.* at 1. Petitioner contends that Varming expressly describes the problem with the earpiece described in Berg and that, “[w]hile Varming did not describe using a curvature to accommodate the extension of

the crus of helix, using a curvature in an earpiece to accommodate anatomical features of the ear such as the extension of the crus of helix was well-known and disclosed in numerous references, including . . . Aber.” *Id.*

For the reasons given below, we agree with Petitioner.

a. Scope and Content of the Prior Art

(1) Overview of Berg

Berg names the same inventor as the '995 patent and describes a similar microphone/earpiece device. Ex. 1004, [75], Abstract. Berg's Figure 2, is reproduced below:

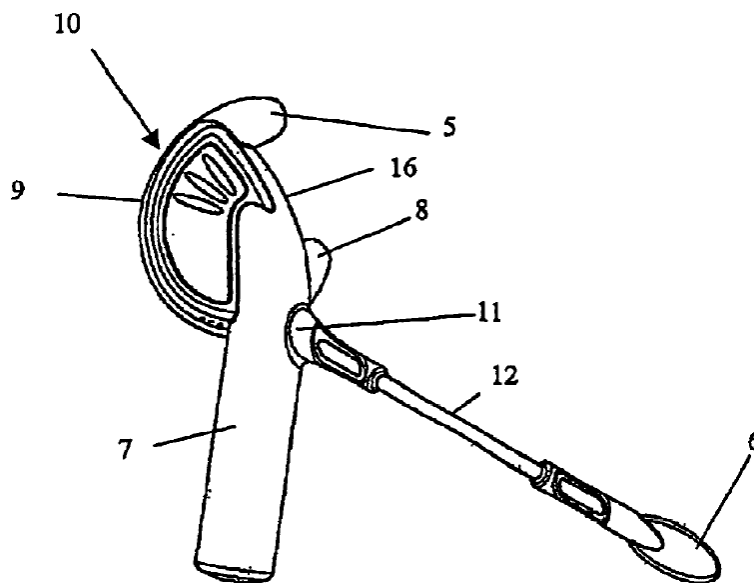


Fig. 2

Figure 2 depicts earpiece 10 with microphone rod 12. *Id.* at 1:54–55.

Earpiece 10 is C-shaped, with curve 9 having a sloping surface such that, when positioned in the ear, the C shape follows the inner part of the antihelix of the ear and the lower part of the C is positioned partly underneath the

antitragus of the ear. *Id.* at 2:21–24. Ends 5 and 8 of curve 9 project out from the casing of earpiece 10. *Id.* at 2:35–36. The part of earpiece 10 containing the hearing element is retracted slightly relative to curve 9 such that the hearing element does not abut the auditory canal directly. *Id.* at 2:36–39.

During prosecution of the '436 patent, the '995 patent's parent, the applicant argued that Berg does not teach a second curvature, in addition to the described decrimental curve 9, that provides a contact surface that substantially conforms to the concha. Ex. 1002, 222–23. Petitioner agrees that Berg does not teach this second curvature. Pet. 1, 19.

(2) Overview of Varming

Varming describes an audio headset for two-way communication via a separate mobile phone. Ex. 1005, Abstract. Varming's Figure 2 is reproduced below:

Fig. 2

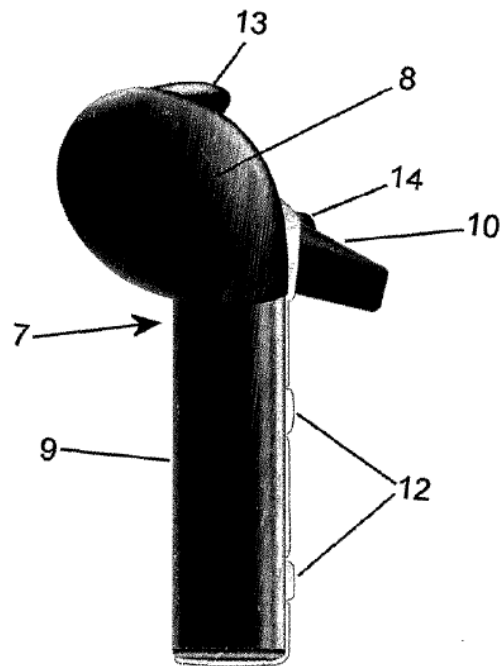


Figure 2 is a side view of headset 7. *Id.* at 4:15–16, 5:11–13. A loudspeaker grill on loudspeaker housing 8 faces the ear of a user. *Id.* at 5:13–14. Battery compartment 9 extends downwardly from loudspeaker housing 8. *Id.* at 5:14–16. A cable connects headset 7 with the mobile telephone. *Id.* at 5:17–18. Microphone 10, integral with loudspeaker housing 8, provides two-way communication. *Id.* at 5:20–23.

Varming describes its invention in the context of its presentation of the anatomy of the ear, shown in Figure 1, reproduced below:

Fig. 1

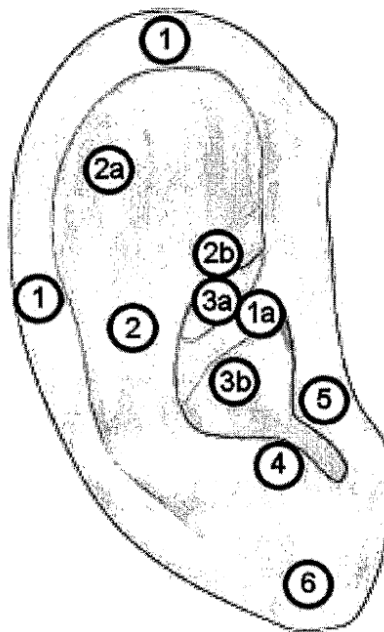


Figure 1 is a diagram of important anatomic details of a typical human ear. *Id.* at 4:14, 4:23–25. According to Varming, “[r]eference numeral 3 designates the Concha below the inferior Crux 2b, and the Concha is divided by the Crus of the Helix 1a into the Cymba Concha 3a thereabove and the Cavum Concha 3b therebelow, leading to the Auditory Canal.” *Id.* at 5:1–3.

Before describing its invention in detail, Varming specifically discusses earpieces described in Mauney (Ex. 2010), Feldman (Ex. 2011), and Berg. Ex. 1005, 1–2. As to Mauney, Varming states that its “earmold has a protrusion intended to penetrate into the area under the Crus of the Helix of the user’s ear, while the complete housing of the device substantially fills up the Cavum Concha and the area between the Tragus and Antitragus.” *Id.* at 1:18–21. Varming continues that “this earmold is intended to be seated relatively deep in toward the Auditory Canal of the user, and even has a protrusion that enters the canal.” *Id.* at 1:21–23.

Varming concludes that “it seems clear that this device nevertheless will be seated relatively deep in toward the Auditory Canal, thereby providing poor ambient sound penetration and problems regarding blocked perspiration, leading to skin irritation.” *Id.* at 1:25–28.

As to Feldman, Varming states that it describes a device similar to that in Mauney, “with a protrusion intended to penetrate into the area between the upper base region of the Antihelix and the Crus Helix, i.e. into the Cymba Concha.” Ex. 1005, 1:29–2:1. According to Varming, “[t]his device also protrudes into the auditory canal, and clearly suffers from the same problems as the previously mentioned device regarding blocking of ambient sound and blocking of perspiration.” *Id.* at 2:3–6.

Varming describes Berg³ differently from Mauney and Feldman. Specifically, Berg’s device “does not have the character of an ‘ear plug’ like the two previously discussed devices” of Mauney and Feldman, “but is arranged with a loudspeaker grille outside the Auditory Canal.” *Id.* at 2:8–

10. According to Varming, Berg’s device

is equipped with a C-shaped, large pad that is intended to provide support by engaging the edge of the Antihelix substantially all the way and protruding with its upper end into the Cymba Concha area between the inferior Crux of the Antihelix and the Crus of the Helix, and with its lower end in

³ Varming references WO 02/45390, which lists Berg as an inventor and lists a Norwegian priority application, NO 0005512, and a PCT application, WO2001NO00430. Berg lists a different corresponding PCT publication, WO 02/01985 (Ex. 1004, [87]), but the same Norwegian priority application and PCT application (Ex. 1004, [30], [86]). The parties agree that the PCT application listed in Berg is a typographical error and that WO 02/45390 is a publication of the PCT application corresponding to Berg. Pet. 21–22 & n.3; PO Resp. 34.

along/under the Antitragus and into the cavity formed below the Tragus.

Id. at 2:11–16. Varming describes two problems with Berg’s device. First, the large pad of the device “necessarily must give rise to similar problems as mentioned with regard to” Mauney and Feldman, “even if it maintains some distance from the entrance to the Auditory Canal.” *Id.* at 2:17–19. Second, “many people have a distinct and emphasized Crus of Helix, and the C-shaped, large pad will tend to interfere with the Crus of Helix, thereby leading to discomfort and soreness after some period of use” or “the device may not stay fixed as intended in the outer ear, but will be forced outwards by the Crus of Helix.” *Id.* at 2:20–23.

Varming characterizes its solution as “a 2 or 3 pad shaped form, with specifically the area around the Crus of Helix removed, in comparison with the devices of the prior art that utilize a continuous form like a C-shape or similar.” *Id.* at 4:1–3. Varming’s Figures 3a and 3b are reproduced below:

Fig. 3a

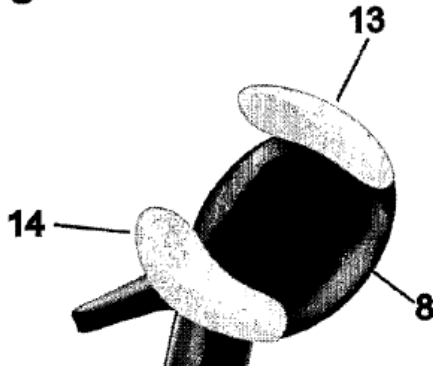
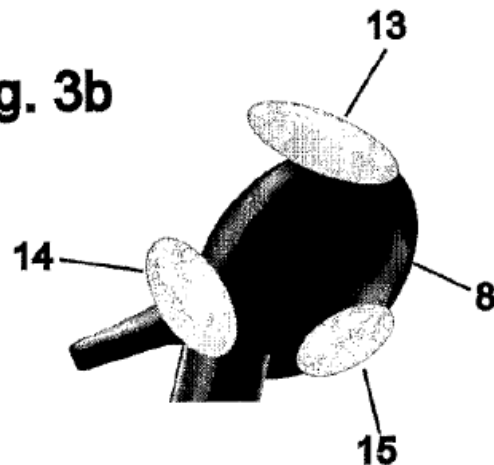


Fig. 3b



Figures 3a and 3b depict earpieces with two and three support pads, respectively. *Id.* at 4:17–18.

In Figure 3a, pads 13 and 14 “fit into selected areas of the user’s ear,” and engage the cymba concha and area between the tragus and antitragus, respectively. *Id.* at 6:8–12. According to Varming, “[u]sing only two pads 13, 14 for support will ensure good comfort as regards ventilation and perspiration for the user, and provide very good conditions regarding the user’s ability to hear environment sounds.” *Id.* at 6:12–14.

Varming notes that choosing a pad size involves a trade-off, “with a gain regarding ventilation and sound” for a small pad size, “but at a cost regarding stability and firm support.” *Id.* at 6:24–26. To address this, as shown in Figure 3b, pads 13 and 14 can be made smaller and a third pad 15, “positioned to engage the circumferential wall region at the rear of the Concha” can be added “to provide better stability but nevertheless good ventilation and sound conditions.” *Id.* at 6:26–7:1. Varming summarizes this embodiment as follows:

The pads are formed as one penetrating the area in the Cymba Concha from the area below the inferior Crux of the Antihelix and above the Crus of Helix, another pad between the Tragus and the Antitragus, and a third pad is place against the circumferential wall region of the Concha. The two first-mentioned pads block the headset from rotation around a horizontal axis, while the third pad provides further stability.

Id. at 8:23–28.

(3) Overview of Aber

Aber relates to caps and holding pieces for audiophones supported in the human ear. Ex. 1006, 1:1–4. Aber’s Figures 3–5 are reproduced below:

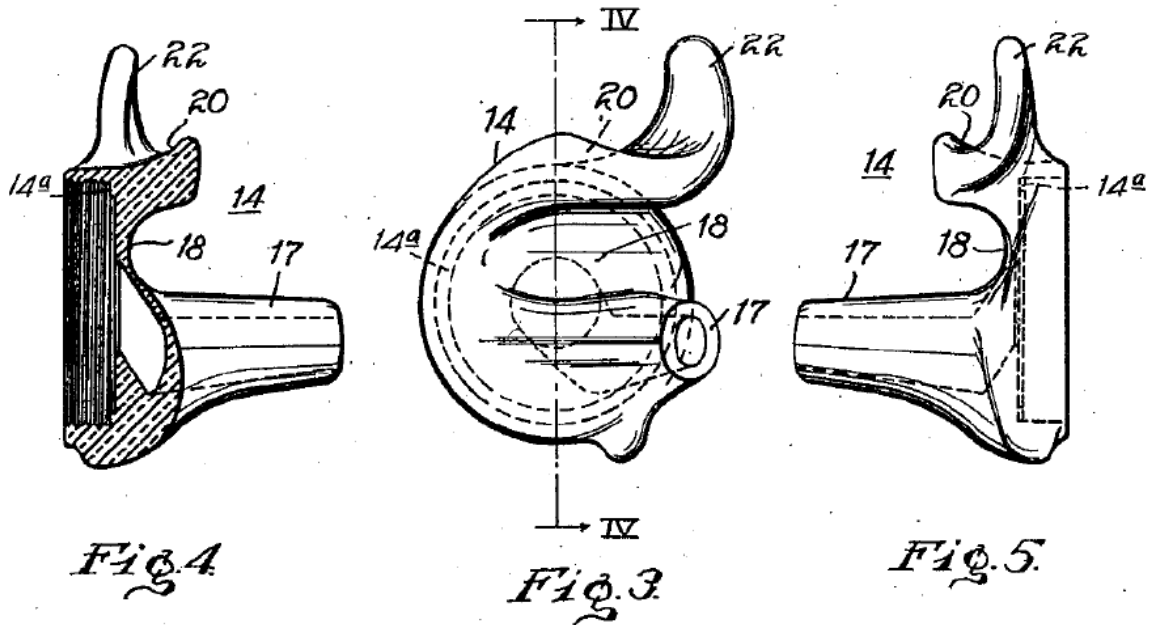


Figure 3 is an inner elevation view of audiophone cap 14; Figure 4 is a view taken on the line IV—IV of Figure 3; and Figure 5 is an elevation view of audiophone cap 14 looking from the right side of Figure 3. *Id.* at 1:27–32.

Audiophone cap 14 is formed in a mold as a single piece. *Id.* at 1:37–40. The base of audiophone cap 14 is grooved or recessed at 18 in a direction generally tangential to the axis of the base to accommodate the rib-like portion of the ear (shown as 19 in Fig. 2) that is located directly above the entrance to the auditory passage (6 in Fig. 2). *Id.* at 1:58–62. The upper portion of the body of audiophone cap 14 has an upwardly-inclined groove 20 that partially embraces the rib-like portion (21 of Fig. 2) disposed beneath the fossa (10 of Fig. 2). *Id.* at 1:62–66. According to Aber,

The grooves 18 and 20 by reason of the fact that they *partially embrace* the rib-like portions 19 and 21 of the ear also assist in firmly retaining the audiophone in place in the ear. Furthermore, there is a *much greater area of contact* between the cap 14 and the ear than is commonly found in devices of this kind, which results in *less strain on the ear*.

Id. at 1:75–83 (emphases added). As shown in Figure 2 of Aber (reproduced below), rib-like portion 19 is the crus of helix:

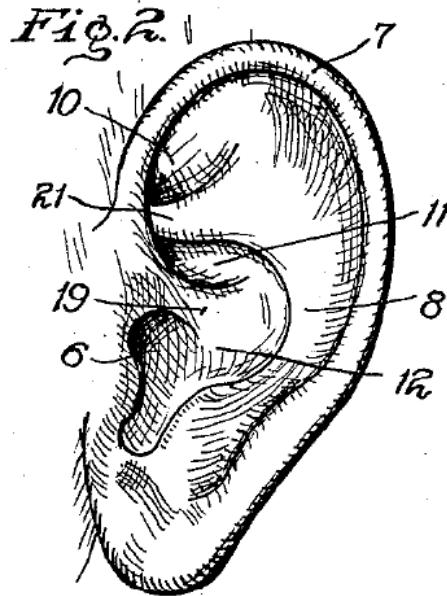


Figure 2 is a view of an ear with the audiophone removed. *Id.* at 1:26–27.

b. Differences Between the Claimed Subject Matter and the Prior Art, and Reasons to Modify or Combine

(1) Claims 1, 8, 10, 11, and 13

Independent claims 1, 10, and 13 are substantially similar, each differing primarily in its phrasing of the “curvature” limitation.⁴ Petitioner’s arguments and evidence for claims 10 and 13 are largely the same as those presented for claim 1. Pet. 34–40, 52–62. Patent Owner refers back to its analysis of claim 1 for claims 10 and 13. PO Resp. 70–71.

Claim 1 recites “[a]n ear unit for stably fitting in an ear . . . , wherein said ear unit is shaped as a decremental curve, said decremental curve being configured to correspond to the antihelix of the ear with a surface shaped in such a way that the decremental curve falls along an inner part of the antihelix and is partly positioned under the antitragus.” Claim 13 includes a similar limitation. Claim 10 recites “a first contact surface contacting an inner circumferential surface of the antihelix, said first contact surface being shaped as a decremental curve conforming to the inner part of the antihelix.” We find that these limitations are taught by Berg’s description of C-shaped earpiece 10, with “the curve 9 of the outer C corresponding to the antihelix

⁴ Claim 1 recites “a curvature conforming to an inner surface of the concha” wherein “the curvature extends to an outer circumferential surface of the ear unit, the outer circumferential surface contacting an inner circumferential surface of the antihelix when the ear unit is positioned in the ear”; claim 10 recites “a curvature in a direction orthogonal to a normal of the first contact surface and configured to conform to an inner surface of the concha, thereby enabling the ear unit to fit closely against the concha when the ear unit is positioned into the ear, wherein the curvature extends to an outer periphery of the first contact surface”; and claim 13 recites “a curvature conforming to an inner surface of the concha, said curvature being orthogonal to the decremental curve.”

13 of the ear and having a sloping surface, so that the C follows the inner part of the antihelix 13, with the lower part of the C being located partly underneath the antitragus 3 of the ear.” Ex. 1004, 2:21–25. Berg also states, in its claim 1, that its C-shaped portion “decrementally decreases its radius from its first, upper end (5) to its lower end (8).” *Id.* at 3:7–9. Our finding is reinforced by Patent Owner’s admission, during the prosecution of the ’436 patent, that Berg “discloses an ear unit having an outer circumferential surface that is shaped as a decremental curve.” Ex. 1008, 222–23.

Claim 1 further recites “wherein the decremental curve comprises two ends, a distance between the two ends being approximately equal to a distance between a first cavity formed under the tragus of the ear and a second cavity covered by a lower node of the antihelix of the ear.” Claims 10 and 13 include similar limitations. This is taught by Berg’s disclosure that “the distance between said portion ends (5, 8) being approximately equal to the distance between the person’s ear flap (2) and tragus (4).” Ex. 1004, 3:10–13.

As to “a second contact surface contacting the concha,” as recited in claim 10, Petitioner concedes that “Berg ’307 does not include a figure explicitly showing the side of the earpiece 10 that faces inward toward the concha,” but argues that Berg’s C-shaped earpiece nevertheless would have had a surface that interfaces with the concha. Pet. 54. We agree that this is the logical conclusion from Berg’s disclosure. Further confirming our finding, Patent Owner conceded during prosecution of the ’436 patent, the ’995 patent’s parent, that Figure 2 of Berg shows a surface facing away from the ear and would have had a surface “toward and contacting the concha.” Ex. 1008, 45–46.

Patent Owner does not challenge the above-discussed aspects of claims 1, 10, and 13. The parties' dispute is whether Berg, Varming, and Aber teach

wherein, when the ear unit is positioned in the ear, the ear unit is provided with a curvature conforming to an inner surface of the concha, and

wherein the curvature extends to an outer circumferential surface of the ear unit, the outer circumferential surface contacting an inner circumferential surface of the antihelix when the ear unit is positioned in the ear,

as recited in claim 1, and the similar limitations of claims 10 and 13. As to "wherein, when the ear unit is positioned in the ear, the ear unit is provided with a curvature conforming to an inner surface of the concha," Petitioner argues that lower part 8 of Berg's C-shaped curve is located partly underneath the antitragus and upper part 5 projects into the cavity covered by the lower node of the antihelix and underneath the flap covering the lower part of that cavity. Pet. 36 (citing Ex. 1004, 2:24–33. 3:10–15). According to Petitioner, a skilled artisan would have understood from this disclosure that Berg's C-shaped curve includes an inner surface that contacts the concha. *Id.*

Regarding the "curvature conforming to the inner surface of the concha," as recited in claim 1, Petitioner cites to Varming and Aber. As to Varming, Petitioner contends that it identified a problem with Berg's device, namely, that Berg's large C-shaped pad would interfere with the crus of helix, causing discomfort and causing the device not to stay fixed in the outer ear. Pet. 21–23 (citing Ex. 1005, 2), 37–38. According to Petitioner, Varming describes solutions to this problem that involve a gap between pads in the area that spans the crus of helix. *Id.* at 23–24.

Petitioner contends that Aber describes an alternative approach to accommodating ridges in the concha of the ear using grooves or curvatures in the earpiece's contact surface. Pet. 25. Petitioner argues that Aber identifies advantages of groove 18, such as “assist[ing] in firmly retaining the audiophone in place in the ear” and allowing for “a much greater area of contact between the cap 14 and the ear than is commonly found in devices of this kind.” *Id.* at 26, quoting Ex. 1006, 1:75–83. According to Petitioner, “Varming expressly teaches a [person of ordinary skill in the art] to include a feature in Berg 307's device to accommodate the extension of crus of helix, and using the groove taught by Aber instead of the gap taught by Varming would have been a simple substitution of one known feature (Aber's groove) for accommodating a ridge in the concha of the ear for another (Varming's between-pad gap).” *Id.* at 28 (citing Ex. 1003 (Casali Decl.) ¶ 70), 37. Dr. Casali testifies that a skilled artisan

Would have found it desirable to increase the contact surface of the earpiece with the ear by incorporating the Aber-described groove into the C-shaped, concha-facing surface of Berg '307 (rather than utilize Varming's pads with a gap), because Aber teaches that such a groove could be formed to “embrace” a portion of the ear structure that Varming sought to accommodate with its gap between pads 13 and 14, which would “assist in firmly retaining the [earpiece 10] in place in the ear.”

Ex. 1003 ¶ 71 (quoting Ex. 1006, 1:75–79). Petitioner contends that, “in the proposed and obvious modification of Berg '307's earpiece, a first surface of the C-shaped portion of earpiece 10 would have included a curvature conforming to an inner surface of the concha.” *Id.* at 37. Petitioner presents similar arguments and evidence for claim 10, “the second contact surface being provided with a curvature in a direction orthogonal to a normal of the

first contact surface and configured to conform to an inner surface of the concha, thereby enabling the ear unit to fit closely against the concha when the ear unit is positioned into the ear,” and claim 13 “when the ear unit is positioned in the ear, the ear unit is provided with a curvature conforming to an inner surface of the concha.” *Id.* at 56–58, 60–62.

Petitioner further argues that the incorporated groove, per Aber, would have been extended “to an outer circumferential surface of the ear unit,” as recited in claim 1, to accommodate a wearer with a crus of helix that extends to the antihelix. *Id.* at 38 (citing Ex. 1003 ¶¶ 62, 70–72). Petitioner cites to Berg’s disclosure that “**the curve 9 of the outer C corresponding to the antihelix 13 of the ear** and having a sloping surface, so that **the C follows the inner part of the antihelix 13**, with the lower part of the C being located partly underneath the antitragus 3 of the ear” as teaching “the outer circumferential surface contacting an inner circumferential surface of the antihelix when the ear unit is positioned in the ear,” as recited in claim 1. *Id.* at 39 (quoting Ex. 1004, 2:21–25, emphases Petitioner’s). Dr. Casali testifies that

failure to extend the groove radially an entire distance from the inner circumferential surface to the outer circumferential surface would result in the groove not fully accommodating the extension of the crus of helix and, as a result, the problems with the C-shaped pad that Varming described would still exist, at least when the length of the extension extends to the back of the ear as shown by Varming.

Ex. 1003 ¶ 72. Petitioner advances similar argument and evidence for claim 10, “the curvature extends to an outer periphery of the first contact surface.” Pet. 58–59.

We note that independent claims 1, 10, and 13 do not recite curvature relative to the crus of helix of the ear. That feature is reflected in dependent claims 8 and 11, each of which recites “wherein the curvature is aligned with an extension of a crus of helix of the ear when the ear unit is positioned in the ear.” Nevertheless, as to the independent claims, Petitioner’s theory is that Varming identifies a problem with Berg’s device at the position of an extension of the crus of helix and that a curvature placed there (per Aber’s teaching) would have resulted in “a curvature conforming to an inner surface of the concha, and wherein the curvature extends to an outer circumferential surface of the ear unit,” as recited in claim 1 and similarly recited in claims 10 and 13. Patent Owner challenges Petitioner’s characterization of Varming and Aber’s applicability to Berg’s earpiece. Thus, the parties argue extensively Varming’s and Aber’s teachings as to the crus of helix, and we address those arguments.

Patent Owner contends that Petitioner has misrepresented Varming and that, when properly understood, it does not support Petitioner’s combination. PO Resp. 43–50. As noted above, Figure 1 of Varming (reproduced above) “depicts a typical human ear and the anatomical details thereof.” Ex. 1005, 4:23–24. Figure 1 places the numerical label 1a, corresponding to the crus of helix, at the front of the ear, on a structure that extends from the front of the concha to the antihelix, and Varming notes that “the Concha is divided by the Crus of Helix 1a into the Cymba Concha 3a thereabove and the Cavum Concha 3b therebelow.” *Id.* at 5:1–3. Nevertheless, Patent Owner contends that a skilled artisan would understand the crus of helix in a “typical human ear” to extend only one-half to two-thirds the distance across the concha. PO Resp. 50–51 (citing Ex. 2004

(Hunter), 41; Ex. 2014 (2nd Staab Decl.) ¶¶ 32–35). In his testimony, Dr. Staab reproduces Hunter’s statement that “[t]he average crus helix extends about one half to two thirds the distance across the concha.” Ex. 2014 ¶ 33 (quoting Ex. 2004, 41).

As noted above, Varming’s “invention suggests a 2 or 3 pad shaped form, with specifically the area around the Crus of Helix removed, in comparison with the devices of the prior art that utilize a continuous form like a C-shape or similar.” Ex. 1005, 4:1–3. Petitioner relies on this statement to argue that Varming teaches accommodating the extension of crus of helix from the crus to the outer rim of the concha bowl. Pet. 28, 36–38; Ex. 1003 (Casali Decl.) ¶¶ 61, 70–71. Petitioner (Pet. 37–38) reads this passage of Varming in conjunction with Varming’s description of Berg’s disadvantage, specifically,

many people have a distinct and emphasized Crus of Helix, and the C-shaped, large pad will tend to interfere with the Crus of Helix, thereby leading to discomfort and soreness after some period of use. Or, the device may not stay fixed as intended in the outer ear, but will be forced outwards by the Crus of Helix.

Ex. 1005, 2:20–23. In other words, Petitioner reads Varming to describe Berg’s C-shaped pad interfering with the crus of helix at the rear of the concha as the problem, and a 2 or 3 pad shaped form with the area around the extension of the crus of helix removed as the solution.

Patent Owner argues that Petitioner misreads Varming and is improperly influenced by hindsight. PO Resp. 2, 43–44. Patent Owner contends that Varming’s solution was intended to address the problems identified in additional background references Mauney and Feldman, namely, “an end or protrusion which interferes with the crus of helix in the

void or cavity created by the crus of helix and the inferior crus of the antihelix (hereinafter referred to as ‘void or cavity’) **at the front of the ear.**”

Id. at 43–44. Patent Owner (*id.* at 45) argues that Varming recognizes the same problem in Berg in its statement that Berg’s

C-shaped, large pad . . . is intended to provide support by engaging the edge of the Antihelix substantially all the way and protruding with its upper end into the Cymba Concha area between the inferior Crux of the Antihelix and the Crus of the Helix, and with its lower end in along/under the Antitragus and into the cavity formed below the Tragus.

Ex. 1005, 2:11–16. Patent Owner concludes that “it is clear that each of the background references discussed by Varming is directed to an earpiece having structure designed to protrude into and engage the void or cavity defined in part by the crus of helix at the front of the ear.” PO Resp. 48. Patent Owner points to deposition testimony of Dr. Casali confirming that overfilling the region created by the crus of helix and inferior crus of the antihelix at the front of the ear could cause discomfort. PO Resp. 45–47 (citing Ex. 2012, 51:1–22).

Patent Owner contends that this problem, rather than the extension of the crus of helix at the back of the ear, drives Varming’s solution:

The passage where Varming suggests a 2 or 3 pad shaped form with specifically the area of the crus of helix removed refers to the gap between pads 13 and 14 **above** and below the crus of helix at the **front of the concha** where the crus of the helix is located, not the location of the ’995 patent’s claimed “curvature” at the rear of the concha.

PO Resp. 52. According to Patent Owner, “[i]n order to avoid this interference with the crus of helix, Varming discloses a small pad 13 designed to fit into the cymba concha avoiding engagement with the crus of

helix.” *Id.* at 48. Patent Owner argues that Varming’s discussion of a two or three pad form with the area around the crus of helix removed actually refers to a device in which “[t]he pads of Varming are . . . distended away from the crus of helix at the front of the concha.” *Id.* at 35. The gap between pads 13 and 14 of Varming’s solution was not intended to address the crus of helix, Patent Owner argues. Rather, “Varming provides pad separation at the *rear of the concha* in order to improve ventilation and sound quality, not to avoid interference with the crus of helix. This is clear since the crus of the helix in the ‘typical ear’ is not present at the rear of the concha.” *Id.* at 53. We have considered the testimony of Dr. Staab (Ex. 2014 ¶¶ 18–41), and it largely repeats Patent Owner’s arguments.

In reply, Petitioner argues that, although Varming identifies at least one problem with each of Mauney, Feldman, and Berg, “Varming does not identify the protrusion intended to penetrate into the ‘void or cavity’ of a user’s ear as a drawback of any one of these three devices.” Reply 6–7. We agree with Petitioner. As to Mauney and Feldman, Varming identifies protrusions that enter the ear canal as problematic because they block ambient sound and perspiration. Ex. 1005, 1:23–27, 2:1–6. As to Berg, Varming states that Berg’s large C-shaped pad interferes with the crus of helix, at least for those users with “a distinct and emphasized Crus of Helix,” causing discomfort or preventing the device from staying fixed in the ear. *Id.* at 2:20–23. Contrary to Patent Owner’s arguments, Varming does not identify interference with the crus of helix at the front of the ear as a problem in any of the three references it discusses in its background.

Petitioner also points out that “Varming teaches quite the opposite, because its own device ‘penetrates’ into the void or cavity at the front of a

user's ear.” Reply 9–10 (citing Ex. 1005, 3:8–12 (“a first one of the pads being shaped and positioned to fit into the area of the Cymba Concha by penetration from the area below the Inferior Crux of the Antihelix and above the Crus of Helix”), 8:23–25 (“The pads are formed as one penetrating the area in the Cymba Concha from the area below the inferior Crux of the Antihelix and above the Crus of Helix.”)). After considering Varming's background discussion and the description of its own invention, we are not persuaded that Varming's discussion of Berg's interference with the crus of helix refers to interference at the front of the ear. Rather, Varming clearly describes a device that protrudes into the void or cavity at the front of the ear, a fact that undermines Patent Owner's argument and the testimony of Dr. Staab.

Petitioner characterizes Varming's background as identifying a problem in Mauney and Feldman (blocked ear canal) that Berg partially solved through its C-shaped pad. Berg, according to Petitioner, introduced a different problem, namely, interference with the crus of helix at the back of the ear, which Varming solved with multiple pads that still engaged the voids at the front of the ear, for stability, but did not interfere with the crus of helix at the back of the ear. Reply 13–14. Petitioner's characterization of Varming is correct. Varming describes Berg as lacking an “ear plug” like those of Mauney and Feldman, but, because of its C-shaped large pad, it interferes with the crus of helix. Ex. 1005, 2:8–10, 2:20–23. To solve this problem, Varming “suggests a 2 or 3 pad shaped form, with specifically the area around the Crus of Helix removed, in comparison with the devices of the prior art that utilize a continuous form like a C-shape or similar.” *Id.* at 4:1–3. Berg is the background reference Varming refers to as having a C-

shape, and that C-shape is described as interfering with the crus of helix for those with a distinct and emphasized crus of helix. We find that Varming describes removing the area between its pads to accommodate the crus of helix at the back of the ear to avoid a problem that Varming observed with Berg's device. In other words, Varming expressly teaches modifying Berg's device to remove a portion that interferes with an extension of the crus of helix at the back of the ear.

We have considered Patent Owner's argument that a typical ear has a crus of helix that extends only one-half to two-thirds of the way across the concha, but are not persuaded. Varming itself depicts the crus of helix (1a in Figure 1) as extending the entire length across the concha and dividing the concha into two regions. Ex. 1005, 5:1–3. Varming also describes addressing the problem of a “distinct and emphasized Crus of Helix.” *Id.* at 2:20. As Patent Owner's evidence shows, a “prominent” crus of helix can extend the entire length of the concha. Ex. 2004 (Hunter), 51. Dr. Casali testifies that the crus of helix and extension of crus of helix (or concha ridge) are not discrete anatomical features and, instead, gradually transition into one another. Ex. 2012, 23:1–5. Although the parties may disagree as to nomenclature, Varming clearly describes accommodating the ridge at the back of the ear by removing a portion of Berg's C-shaped pad, whether that ridge be termed the crus of helix or the extension of crus of helix. Thus, we find that Varming teaches modifying Berg's C-shaped pad to accommodate the extension of the crus of helix.

As noted above, Petitioner argues that a skilled artisan, guided by Varming's identification of Berg's deficiency, would have placed a groove, similar to the groove taught by Aber, at the position of Varming's gap to

accommodate the extension of the crus of helix. Pet. 28. Patent Owner responds with arguments that fall into two categories.

First, Patent Owner argues that Aber describes a device that is fitted for the front of the ear, and that the groove accommodating the crus of helix at the front of the ear would not have been appropriate for accommodating the extension of the crus of helix at the back of the ear. PO Resp. 55 (Aber's groove 18 is positioned "on the front side of the concha, on the opposite side of the concha from antihelix 8 . . . where the curvature of the claimed invention engages the inner surface of the rear of the concha."), 56 ("[N]either Berg '307, Varming nor Aber teach or suggest 'using' curvature at the rear of the concha for the purpose of avoiding the crus of the helix or otherwise."), 58 ("[T]he rear portion of the Aber device (near reference numeral 14a in Figures 4 and 5), which corresponds to the C-shaped inner surface of Berg '307, overlaps the antihelix and does not contact the inner surface of the concha."), 54 ("[T]he grounds set forth in the Petition erroneously extend the shape of the crus of helix essentially **horizontally** across the entire width of the concha, without accounting for the substantial change in the shape of the crus as it extends and traverses the concha."), 59 ("Aber . . . teaches a vertical 'climb' up the front side of the ear that embraces the crus of helix, not a more horizontal traverse across the concha to the antihelix."), 59–60 ("Aber's grooves at the front of the ear are partly inside and partly outside the antihelix (i.e., partly outside the concha). . . . The curved portion that produces a 'secure holding effect' in Aber by fitting above and over the wall of the antihelix and under the helix is completely different from the curvature of the claimed invention inside the rear of the concha."), 64 ("Aber's groove is akin to the curvature of Mauney and Smith,

which were distinguished during prosecution because their alleged curved contact surfaces ‘do **not** extend to the respective outer circumferential surface . . . and are clearly **not** aligned with an extension of the crus of helix.’” (quoting Ex. 1008, 51 (emphasis in original))).

As noted in the Institution Decision, however, Petitioner does not propose simply incorporating groove 18 from Aber into Berg’s C-shaped earpiece. Dec. 22. *Cf. In re Mouttet*, 686 F. 3d 1322, 1332 (“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, Petitioner argues that a skilled artisan would have modified Berg’s C-shaped earpiece by adding a groove at the location of the gap specified in Varming. Pet. 31–32. As Dr. Casali observes, “Aber teaches a known alternative feature for accommodating ridges of the outer ear, which include the extension of the crus of helix.” Ex. 1003 ¶ 70. According to Dr. Casali, “as a result of this modification, the concha-facing contact surface of earpiece 10 would substantially conform to the concha and enable the ear unit to fit closely against the concha when the ear unit is positioned into the ear.” *Id.* ¶ 71. We find Dr. Casali’s testimony credible and persuasive. As Dr. Casali notes (Ex. 1003 ¶ 71), Berg states that groove 18 partially embracing the crus of helix “assist[s] in firmly retaining the audiophone in place in the ear” and provides “a much greater area of contact between the cap 14 and the ear than is commonly found in devices of this kind, which results in less strain on the ear.” Ex. 1006, 1:75–83. We find that Aber provides a teaching that a groove embracing a ridge of the ear helps hold a device in place in the ear and find that this teaching would have been applicable to Berg’s earpiece. Because the extension of the crus of

helix at the location of Varming's gap is less pronounced than the crus of helix at the front of the ear, a groove at Varming's gap providing the benefits expressly specified by Aber would be correspondingly less pronounced. Ex. 1003 ¶ 71; Ex. 1015 ¶¶ 22–23.

Second, Patent Owner argues that Aber's groove 18, which "accommodate[s]," "partially embrace[s]," or "partially surround[s]" the crus of helix (Ex. 1006, 1:58–62, 1:75–78, 2:38–40), does not substantially conform to or fit closely against the concha. PO Resp. 56 ("A [person of ordinary skill in the art] would have understood the term 'accommodate' in the context of Aber to require at the very most partially embracing or partially surrounding the subject anatomical structure."), 57 ("In light of the high arcing configuration of groove 18 (see e.g., Figure 5) and Aber's repeated assertion that the groove 18 is intended to partially embrace the crus of helix at the front of the ear, Aber clearly would not have suggested to a [person of ordinary skill in the art] to proportion the groove 18 to fit closely against any anatomical structure of the ear."); Ex. 2014 (2nd Staab Decl.) ¶¶ 48–49.

Patent Owner's argument is not persuasive. Aber's terms "partially embrace" and "partially surround" connote structure that closely fits against ridges of the ear. This understanding is reinforced by Aber's description that its grooves "assist in firmly retaining the audiophone in place in the ear" and provide "a much greater area of contact between the cap 14 and the ear than is commonly found in devices of this kind, which results in less strain on the ear." Ex. 1006, 1:75–83. We find that Aber's groove 18 substantially conforms to and fits closely against the crus of helix. It follows that a

groove, per Aber's teaching, placed on Berg's C-shaped curve at the location specified by Varming would conform to and fit closely against the concha.

Patent Owner further argues that Varming, which describes a gap between its pads 13 and 14, teaches away from a C-shaped earpiece with a curved portion that fits closely against the concha. PO Resp. 67–69. As Patent Owner observes (PO Resp. 68), Varming states that small size pads provide “a gain regarding ventilation and sound, but at a cost regarding stability and firm support.” Ex. 1005, 6:24–26. According to Patent Owner, “Varming’s two-pad embodiment is wholly inconsistent with the concept behind the present invention, *i.e.*, increasing the surface area contacting the ear (which includes the curvature engaging the inner surface of the rear concha wall where the concha floor transitions to the concha wall).” PO Resp. 68–69.

“A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant.” *In re Gurley*, 27 F.3d 551, 553 (Fed. Cir. 1994). Nevertheless, “a given course of action often has simultaneous advantages and disadvantages, and this does not necessarily obviate motivation to combine.” *Medichem, S.A. v. Rolabo, S.L.*, 437 F.3d 1157, 1165 (Fed. Cir. 2006) (“Where the prior art contains ‘apparently conflicting’ teachings (*i.e.*, where some references teach the combination and others teach away from it) each reference must be considered ‘for its power to suggest solutions to an artisan of ordinary skill. . . . consider[ing] the degree to which one reference might accurately discredit another.’” (quoting *In re Young*, 927 F.2d 588, 591 (Fed. Cir. 1991))). We find that,

under either party's proposed level of skill (either of which includes an experienced engineer or scientist), weighing the relative advantages and disadvantages would have been within the level of skill in light of the guidance given by Varming and Aber. We agree with Dr. Casali (Ex. 1003 ¶ 71) that a skilled artisan motivated to prioritize stability and support over ventilation and passage of sound (e.g., for users seeking to wear Berg's earpiece during athletic activities requiring vigorous movement), would have desired to increase the contact surface of the earpiece by incorporating Aber's technique into Berg's earpiece at the position identified by Varming for its gap.

Regarding Varming's three-pad embodiment, Patent Owner, relying on Dr. Staab's testimony, argues that pad 15 is "in the same spot as the invention's curvature." PO Resp. 69 (citing Ex. 2001 ¶ 88–89). As explained above, Varming "suggests a 2 or 3 pad shaped form, *with specifically the area around the Crus of Helix removed.*" Ex. 1005, 4:1–3 (emphasis added). As we explained in the Institution Decision, Dr. Staab's testimony to the contrary is inconsistent with Varming's disclosure and, therefore, not credible on this point. Dec. 19.

After considering the parties' respective arguments and evidence, we find that Berg, Varming, and Aber teach "wherein, when the ear unit is positioned in the ear, the ear unit is provided with a curvature conforming to an inner surface of the concha . . . the outer circumferential surface contacting an inner circumferential surface of the antihelix when the ear unit is positioned in the ear," as recited in claim 1, and similarly recited in claims 10 and 13. In particular, we find that the curvature of the modified earpiece would have been "a curvature which fits closely against the concha," as

Patent Owner construes this term (PO Resp. 27–28). Moreover, we agree with Dr. Casali (Ex. 1003 ¶ 76) that the curvature of the combination would be approximately perpendicular to the plane laying across the outermost surfaces of the pinna, and, thus, “orthogonal to a normal of the first contact surface,” as recited in claim 10, and “orthogonal to the decriminal curve,” as recited in claim 13.

Dr. Casali testifies that “[s]uch an extension of the groove of the modified C-shaped portion of earpiece 10 would be consistent with FIG 3a of Varming . . . , which shows that the gap between pads 13 and 14 extends radially . . . an entire distance to the outer circumferential surface . . . of the earpiece.” Ex. 1003 ¶ 72. We credit this testimony and find that Berg, Varming, and Aber teach “wherein the curvature extends to an outer circumferential surface of the ear unit,” as recited in claim 1, and similarly recited in claim 10. For the reasons given above, the resulting ear unit would have been “shaped to engage the inner surface of the rear of the concha where the concha floor transitions into the concha wall,” as Patent Owner proposes construing this term (PO Resp. 29).

Accordingly, Petitioner’s evidence is sufficient to support a finding that Berg, Varming, and Aber teach

wherein, when the ear unit is positioned in the ear, the ear unit is provided with a curvature conforming to an inner surface of the concha, and

wherein the curvature extends to an outer circumferential surface of the ear unit, the outer circumferential surface contacting an inner circumferential surface of the antihelix when the ear unit is positioned in the ear,

as recited in claim 1, and the corresponding limitations of claims 10 and 13.

Claim 8 depends from claim 1, and claim 11 depends from claim 10. Claims 8 and 11 each add “wherein the curvature is aligned with an extension of a crus of helix of the ear when the ear unit is positioned in the ear.” As explained above, and noted by Petitioner (Pet. 48–51), Petitioner relies on Varming to suggest modifying Berg’s ear unit to accommodate an extension of the crus of helix and Aber to show a groove for accommodating the crus of helix. We find that, in order to accommodate the extension of the crus of helix at the location taught by Varming, the curvature of the resulting ear unit would have been aligned with the extension of the crus of helix when positioned in the ear. Thus, Berg, Varming, and Aber teach “wherein the curvature is aligned with an extension of a crus of helix of the ear when the ear unit is positioned in the ear,” as recited in claims 8 and 11.

In sum, Berg, Varming, and Aber teach each limitation of claims 1, 8, 10, 11, and 13, and a skilled artisan would have had reasons, with rational underpinning, to combine the teachings of these references.

(2) Claims 2–5, 7, 9, and 12

Claim 2 depends from claim 1 and recites “a part extending downwards, the transition between said part and the ear unit is formed in such a way that it aligns along the intertragic notch of the ear.” We find that Berg’s battery part 7 teaches this limitation. Ex. 1004, 2:24–27 (“The battery part 7, is laying, projects down from the C while providing a guide and a weight for the correct position of the earpiece 10 by more or less lying in the intertragic notch 14 of the ear.”).

Claim 3 depends from claim 1 and adds “at least one unit from the group comprising ear phone and microphone.” Claim 4 depends from

claim 2 and adds the same limitation. We find that Berg's description of microphone 6 teaches this limitation. Ex. 1004, 2:3–6 (“The earpiece 10 according to the present invention is shown schematically in FIG. 2, with a microphone 6 and a microphone rod 12 connected to the earpiece 10 at the junction point 11.”).

Claim 5 depends from claim 1 and adds “a unit from the group of: a wireless communication unit for use with a mobile piece, and a wired communication unit for use with a music system.” We find that Berg teaches this limitation. Ex. 1004, 1:5–8 (“a device by wireless transmission between a microphone/earpiece and a mobile telephone, telephone, switchboard or similar”), 2:19–20 (“The antenna of the wireless part may be positioned e.g. in the microphone rod.”).

Claim 7 depends from claim 1 and adds:

wherein the ear unit further comprises a first surface facing the concha and a second surface opposite to the first surface, the first surface includes a contact surface, contacting the concha, to provide the curvature, and a distance between the first surface and the second surface varies along the contact surface.

Taking the second surface first, and looking at earpiece 10 of Berg's Figure 2 from above (for an earpiece in use, looking at the portion of the earpiece that faces away from the ear), Petitioner contends that the upper surface of the C-shape, shown by the ends 5 and 8 projecting out from the casing, is “a second surface opposite to the first surface,” as recited in claim 7. Pet. 43–44.

As to the first surface, Petitioner concedes that the opposite side of earpiece 10 is not shown explicitly, but argues that, because earpiece 10 interfaces with surfaces of the ear, such as the concha, the opposite side is “a

first surface facing inwardly toward the concha of the ear.” *Id.* at 42. We agree with Petitioner and find that Berg teaches the first surface and second surface of claim 7. Further confirming our finding, Patent Owner conceded during prosecution of the ’436 patent, the ’995 patent’s parent, that Figure 2 of Berg shows a surface facing away from the ear and would have had a surface “toward and contacting the concha.” Ex. 1008, 45–46. As explained in detail for claim 1 above, we find that the surface contacting the concha (the first surface of claim 7) provides the curvature.

As to “a distance between the first surface and the second surface varies along the contact surface,” as recited in claim 7, Petitioner argues that Aber’s Figure 5 shows a distance between the first surface (surface facing away from the concha) and the second surface (groove 18) that varies. Pet. 46–48. We agree, and find that, in a combination of Berg, Varming, and Aber, the first surface of Berg’s earpiece would be modified to vary according to the curve taught by Aber while the second surface would remain unchanged, resulting in a distance between the first surface and the second surface varying along the contact surface.

Claim 9 depends from claim 1 and claim 12 depends from claim 10. Claims 9 and 12 each add “wherein the curvature is formed independently of a shape of an ear canal of the ear.” As to this limitation, Berg expressly states that “the part of earpiece 10 containing the hearing element is retracted slightly relative to the C-shaped part, ensuring that the hearing element does not abut the auditory canal directly, allowing the formation of an opening between the auditory canal and the surroundings.” Ex. 1004, 2:37–42. We find that this teaches “wherein the curvature is formed

independently of a shape of an ear canal of the ear,” as recited in claims 9 and 12.

We note that Patent Owner does not present separate arguments for claims 2–5, 7, 9, and 12. PO Resp. 70–71.

In sum, on the complete record, Berg, Varming, and Aber teach each limitation of claims 2–5, 7, 9, and 12.

c. Conclusion of Obviousness

As explained above, Berg, Varming, and Aber teach each limitation of claims 1–5 and 7–13. Petitioner has introduced persuasive evidence that a skilled artisan would have had reasons to combine the teachings of Berg, Varming, and Aber. Patent Owner does not argue or introduce evidence of objective indicia of nonobviousness. In sum, upon consideration of all the evidence, we conclude that Petitioner has proved by a preponderance of the evidence that claims 1–5 and 7–13 would have been obvious over Berg, Varming, and Aber.

3. Alleged Obviousness over Berg, Varming, Aber, and Marshall

a. Scope and Content of the Prior Art—Overview of Marshall

Marshall describes an interchangeable earpiece for stereo listening while using a portable AM/FM radio, cassette player, or CD player.

Ex. 1007, 2:14–16. Marshall’s Figure 1 is reproduced below:

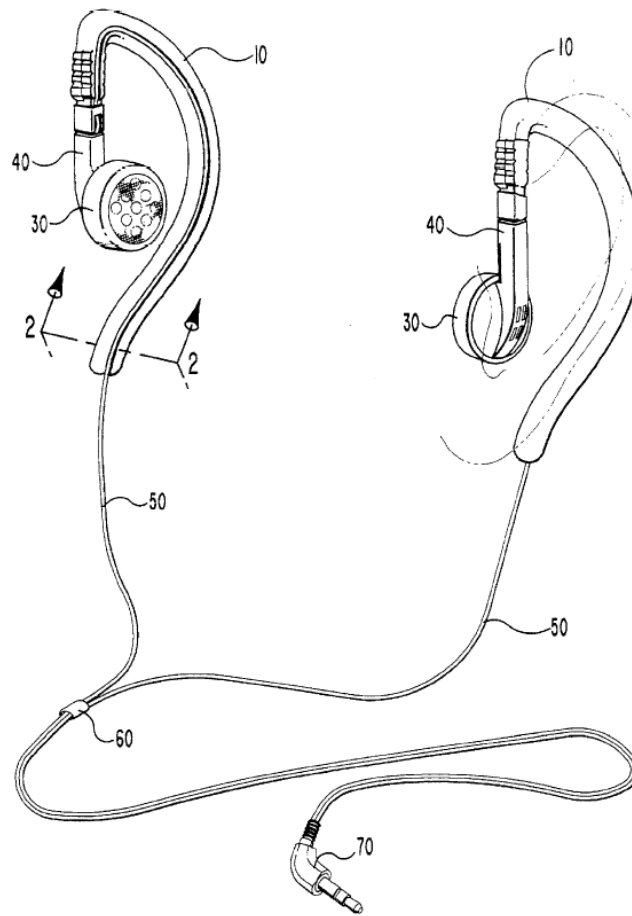


FIG. 1

Figure 1 is a perspective view of an interchangeable earpiece. *Id.* at 2:30–31. Each earpiece 10 is connected to a speaker 30 and to plug 70 via a conductor 50. *Id.* at 2:38–43.

b. Claim 6, Differences Between the Claimed Subject Matter and the Prior Art, and Reasons to Modify or Combine

Claim 6 depends from claim 1 and adds “wherein said ear unit is operated together with at least a second ear unit to form a stereo effect.” Petitioner contends that Marshall demonstrates that it would have been

obvious to pair a Berg earpiece with a second earpiece that is its mirror image in order to accommodate stereo listening. Pet. 63. According to Petitioner, modifying Berg per the teachings of Marshall would have been nothing more than applying a known technique to a known device to yield a predictable improvement. *Id.* at 63–64. Petitioner relies on the testimony of Dr. Casali, which is uncontested. *Id.* at 63–64 (citing Ex. 1003, ¶¶ 77–80). Patent Owner does not raise additional arguments particular to claim 6. PO Resp. 72. On the complete record, we find that combining Marshall’s teaching of stereo earpieces with the teachings of Berg, Varming, and Aber would have been the application of a known technique to a known device to yield a predictable result.

c. Conclusion of Obviousness

As explained above, Berg, Varming, Aber, and Marshall teach each limitation of claim 6. Petitioner has introduced persuasive evidence that a skilled artisan would have had reasons to combine the teachings of Berg, Varming, Aber, and Marshall. Patent Owner does not argue or introduce evidence of objective indicia of nonobviousness. In sum, upon consideration of all the evidence, we conclude that Petitioner has proved by a preponderance of the evidence that claim 6 would have been obvious over Berg, Varming, Aber, and Marshall.

III. CONCLUSION

Petitioner has proved by a preponderance of the evidence that claims 1–13 are unpatentable.

IV. ORDER

For the reasons given, it is:

ORDERED, based on a preponderance of the evidence, that claims 1–13 are 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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