UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SONOVA USA Inc.,
Petitioner,

v.

STARKEY LABORATORIES, INC.,
Patent Owner.

Case No. PGR2026-00079

U.S. PATENT NO. 12,745,031

PETITION FOR POST-GRANT REVIEW

TABLE OF CONTENTS

Page

I. INTRODUCTION 1

II. STANDING (§42.104(a)) 3

III. RELIEF REQUESTED (§42.104(b)) 3

IV. '031 PATENT OVERVIEW 5

A. Specification 5

B. Prosecution History 6

V. TECHNOLOGY BACKGROUND 7

VI. OVERVIEW OF PRIOR ART 11

A. Chen 11

B. Dannemann 12

C. Kwon 12

D. Thiers 13

E. Wagman 13

VII. LEVEL OF ORDINARY SKILL IN THE ART 14

VIII. CLAIM CONSTRUCTION 15

IX. THE CHALLENGED CLAIMS ARE UNPATENTABLE 15

A. Ground 1: Chen Anticipates Claims 1, 10-12, 14, 20-21 15

1. [1]/[14] 15

2. [10]/[20] 23

3. [11] 23

4. [12] 24

TABLE OF CONTENTS (CONT'D)

Page

5. [21] 25

B. Ground 2: Chen Combined With Thiers Renders Obvious Claims 1-12, 14-21 30

1. Motivation To Combine 30

2. [1]/[14] 33

3. [2]/[3]/[15] 38

4. [4]/[16] 39

5. [5]/[17]/[6]/[18]/[7] 40

6. [8]/[19] 41

7. [9] 41

8. [10]/[20] 43

9. [11] 44

10. [12] 45

11. [21] 45

C. Ground 3: Chen Combined With Thiers and Wagman Renders Obvious Claims 2-3, 15 47

D. Ground 4: Chen Combined With Wagman Renders Obvious Claims 1-21 49

1. Motivation to Combine 49

2. [1]/[14] 57

3. [2]/[3]/[15] 60

4. [4]/[16] 61

5. [5]/[17]/[6]/[18]/[7] 62

6. [8]/[19] 62

TABLE OF CONTENTS (CONT'D)

Page

7. [9] 63

8. [10]/[20] 64

9. [11] 65

10. [12] 65

11. [13] 66

12. [21] 67

E. Ground 5: Dannemann Combined With Thiers Renders Obvious Claims 1, 4-12, 14, 16-21 69

1. Motivation to Combine 69

2. [1]/[14] 74

3. [4]/[16] 82

4. [5]/[17]/[6]/[18]/[7] 82

5. [8]/[19] 82

6. [9] 82

7. [10]/[20] 83

8. [11] 83

9. [12] 84

10. [21] 84

F. Ground 6: Dannemann Combined With Thiers and Kwon Renders Obvious Claims 2-3, 15 86

G. Ground 7: Dannemann Combined With Wagman Renders Obvious Claims 1-21 88

1. Motivation to Combine 88

2. [1]/[14] 95

TABLE OF CONTENTS (CONT'D)

Page

3. [2]/[3]/[15] 97

4. [4]/[16] 98

5. [5]/[17]/[6]/[18]/[7] 98

6. [8]/[19] 99

7. [9] 99

8. [10]/[20] 99

9. [11] 100

10. [12] 100

11. [13] 101

12. [21] 101

H. Ground 8: Kwon Combined With Wagman and Thiers Renders Obvious Claims 1-21 103

1. Motivation to Combine 103

2. [1]/[14] 109

3. [2]/[3]/[15] 115

4. [4]/[16] 116

5. [5]/[17]/[6]/[18]/[7] 116

6. [8]/[19] 116

7. [9] 116

8. [10]/[20] 118

9. [11] 118

10. [12] 119

11. [13] 120

TABLE OF CONTENTS (CONT'D)

Page

12. [21] 120

I. Ground 9: Claims 1-8 and 10-21 Lack Written Description 124

X. SECONDARY CONSIDERATIONS 129

XI. MANDATORY NOTICES UNDER 37 C.F.R. §42.8 129

A. Real Parties-in-Interest 129

B. Related Matters 129

C. Lead and Backup Counsel, Service, and Power of Attorney 130

XII. PAYMENT OF FEES UNDER 37 C.F.R. §42.203 131

TABLE OF AUTHORITIES

Page(s)

Cases

Ariad Pharms., Inc. v. Eli Lilly & Co.,
598 F.3d 1336 (Fed. Cir. 2010) (en banc) 125

Cordis Corp. v. Medtronic AVE, Inc.,
339 F.3d 1352 (Fed. Cir. 2003) 125

Frymaster, LLC, et al. v. Sherwood Sensing Solutions LLC,
IPR2020-00752, Paper No. 41 (PTAB Aug. 23, 2021).....127

Gentry Gallery, Inc. v. Berkline Corp.,
134 F.3d 1473 (Fed. Cir. 1998) 127

ICU Medical, Inc. v. Alaris Medical Systems, Inc.,
558 F.3d 1368 (Fed. Cir. 2009) 126

LIST OF EXHIBITS

Exhibit	Description
1001	U.S. Patent No. 12,745,031 (the "'031 Patent")
1002	Expert Declaration of Dr. Sayfe Kiaei
1003	Curriculum Vitae of Dr. Sayfe Kiaei
1004	File History of U.S. Patent No. 12,745,031
1005	European Patent Application EP3240300A1 ("Chen")
1006	U.S. Patent App. No. 2009/0202093A1 ("Dannemann")
1007	U.S. Patent No. 7,905,006B2 ("Kwon")
1008	PCT Publication No. WO2017/040094A1 ("Thiers")
1009	U.S. Patent No. 10,003,880B2 ("Wagman")
1010	U.S. Patent No. 3,521,216A ("Tolegian")
1011	U.S. Patent No. 4,317,969A ("Riegler")
1012	U.S. Patent No. 7,726,994B1 ("Willey")
1013	U.S. Patent No. 5,586,668A ("Miller")
1014	U.S. Patent Publication No. US2016/0322744A1 ("Murison")
1015	U.S. Patent No. 8,213,651B2 ("Schmidt")
1016	PCT Publication No. WO2016/036309A1 ("Linden")
1017	U.S. Patent No. 12,101,588B2 (the "'588 Patent")
1018	File History of U.S. Patent No. 12,101,588B2
1019	U.S. Patent No. 3,354,271A ("McDermaid")
1020	U.S. Patent No. 5,253,300A ("Knapp")

1021	U.S. Patent No. 5,610,494A (“Grosfilley”)
1022	U.S. Patent No. 9,559,477B2 (“Liu”)
1023	U.S. Patent No. 9,362,766B2 (“Workman”)
1024	U.S. Patent No. 7,335,067B2 (“Lee”)

LIST OF CHALLENGED CLAIMS

Reference Number	Claim Limitation
Claim 1	
[1pre]	A hearing device comprising:
[1a]	a housing that encloses an internal volume and extends from an internal side to an external side, the housing comprising:
[1b]	a shell arranged at the internal side, the internal side configured to be inserted in a wearer's ear canal; and
[1c]	a faceplate arranged at the external side, the external side configured to face away from the wearer;
[1d]	an electrode arrangement disposed in an outer surface of the faceplate, the electrode arrangement comprising: a central contact; and an annular ring contact surrounding the central contact or a plurality of contacts surrounding the central contact, wherein the central contact and the annular ring contact or the plurality of contacts form at least a portion of an exterior surface of the hearing device; and
[1e]	circuitry disposed in the internal volume and coupled to the electrode arrangement.
Claim 2	
[2]	The hearing device of claim 1, further comprising one or more microphone ports disposed in the outer surface of the faceplate.
Claim 3	
[3]	The hearing device of claim 1, further comprising a receiver outlet disposed in the shell.
Claim 4	
[4]	The hearing device of claim 1, wherein the electrode arrangement comprises the plurality of contacts.
Claim 5	
[5]	The hearing device of claim 4, wherein each of the plurality of contacts is arranged the same distance from the central contact as each other contact of the plurality of contacts.
Claim 6	
[6]	The hearing device of claim 4, wherein the plurality of contacts defines a circle.
Claim 7	

Reference Number	Claim Limitation
[7]	The hearing device of claim 4, wherein each of the plurality of contacts comprises a curvilinear, annular, oval, elliptical, or polygonal shape.
Claim 8	
[8]	The hearing device of claim 4, wherein the plurality of contacts comprises three arcuate contacts each arranged at substantially the same distance from the central contact.
Claim 9	
[9]	The hearing device of claim 4, wherein the central contact defines a cathode contact and at least one contact of the plurality of contacts defines an anode contact.
Claim 10	
[10]	The hearing device of claim 1, wherein the electrode arrangement comprises the annular ring contact surrounding the central contact.
Claim 11	
[11]	The hearing device of claim 1, wherein the circuitry comprises charging circuitry, and wherein the electrode arrangement is coupled to the charging circuitry.
Claim 12	
[12]	The hearing device of claim 1, wherein the electrode arrangement is configured to communicate power and one or more information signals.
Claim 13	
[13]	The hearing device of claim 1, wherein the central contact comprises a central contact surface and the annular ring contact or the plurality of contacts comprises a contact surface, wherein one of the central contact surface and the contact surface of the annular ring contact or the plurality of contacts is recessed relative to the other.
Claim 14	
[14pre]	A system comprising:
[14a]	a hearing device comprising:
[14b]	a housing that encloses an internal volume and extends from an internal side to an external side, the housing comprising:
[14c]	a shell arranged at the internal side, the internal side configured to be inserted in a wearer's ear canal; and

Reference Number	Claim Limitation
[14d]	a faceplate arranged at the external side, the external side configured to face away from the wearer;
[14e]	an electrode arrangement disposed in an outer surface of the faceplate, the electrode arrangement comprising: a central contact; and an annular ring contact surrounding the central contact or a plurality of contacts surrounding the central contact, wherein the central contact and the annular ring contact or the plurality of contacts form at least a portion of an exterior surface of the hearing device; and
[14f]	circuitry disposed in the internal volume and coupled to the electrode arrangement; and
[14g]	a charging module comprising a charging interface that comprises: a central charging contact; and an annular ring charging contact or a plurality of charging contacts surrounding the central contact.
Claim 15	
[15]	The system of claim 14, wherein the hearing device further comprises: one or more microphone ports disposed in the outer surface of the faceplate; and a receiver outlet disposed in the shell.
Claim 16	
[16]	The system of claim 14, wherein the electrode arrangement of the hearing device comprises the plurality of contacts.
Claim 17	
[17]	The system of claim 16, wherein each of the plurality of contacts is arranged the same distance from the central contact as each other contact of the plurality of contacts.
Claim 18	
[18]	The system of claim 16, wherein the plurality of contacts defines a circle.
Claim 19	
[19]	The system of claim 16, wherein the plurality of contacts comprises three arcuate contacts each arranged at substantially the same distance from the central contact.
Claim 20	
[20]	The system of claim 14, wherein the electrode arrangement of the hearing device comprises the annular ring contact surrounding the central contact.
Claim 21	

Reference Number	Claim Limitation
[21a]	The system of claim 14, wherein the hearing device comprises a first charging interface comprising the electrode arrangement, wherein the circuitry of the hearing device comprises charging circuitry coupled to the electrode arrangement,
[21b]	wherein the charging interface of the charging module defines a second charging interface configured to detachably couple with the first charging interface of the hearing device;
[21c]	wherein the charging module further comprises charging circuitry coupled to the second charging interface and
[21d]	configured to charge a rechargeable power source of the hearing device that is coupled to the first charging interface.

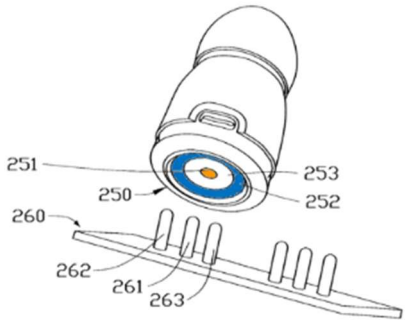
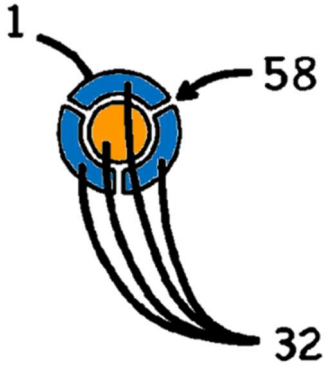
I. INTRODUCTION

One week prior to filing this Petition, Petitioner filed PGR2026-00076 seeking post-grant review of U.S. Patent No. 12,739,553 (the "'553 Patent"), which issued from the child application of the patent at issue here—U.S. Patent No. 12,745,031 (the "'031 Patent"). The '553 Patent and '031 Patent issued in rapid succession and contain claims that are nearly identical, as are the grounds upon which Petitioner challenges them. This Petition challenges the claims of the '031 Patent using the same prior art and Section 112(a) arguments as the petition challenging the '553 Patent.

Like the '553 Patent, the specification of the '031 Patent is directed to a "system for charging an ear-worn electronic device" having electrode contacts configured such that the cathode contact connects with the charger before its anode contact. The '031 Patent teaches that this cathode-first contact configuration results in a "consistent inrush current waveform" and "establish[es] a ground, which can reduce or minimize spurious electrical spikes in the circuitry." Ex1001, 9:17-27, 9:35-38. The '031 Patent does not, however, claim this cathode-first configuration. Instead, the claims generically recite a rechargeable hearing device with well-known features, none of which purport to solve any problem or provide any technical benefit. That is presumably because Patent Owner ("PO") drafted these abstracted claims—years after the specification was written—in a failed attempt to try to cover

competitor products, rather than to document an actual solution to a technical problem.

In prosecution, the Examiner identified just one allegedly novel feature in the Challenged Claims: "a central contact and an annular ring contact or a plurality of contacts that form at least a portion of an exterior surface of the hearing device." Ex1004, 265-273, 433. This claimed geometric arrangement—alone or in combination with the other claimed limitations—does not purport to solve any technical problem, nor is it novel. While this feature was not found in the prior art by the Examiner, it was in fact a well-known design choice. For example, European Patent Publication EP3240300A1 ("Chen") teaches a hearing device with a **central contact** surrounded by an **annular ring contact** as claimed. Even dependent claims requiring **three arcuate contacts** surrounding a **central contact** were well known in the art, for example as taught by PCT Publication No. WO2017/040094A1 ("Thiers"). The art and grounds in this Petition render all claims unpatentable.

Chen	Thiers
 FIG. 7A Ex1005, Fig. 7A	 Ex1008, Fig. 3(excerpted)

Claims 1-8 and 10-21 are also unpatentable for lacking adequate written description. The electrode configuration described in the specification is limited to a specific "biasing arrangement" of cathode and anode contacts to facilitate the centrality of the cathode-first charging described above, but all claims except claim 9 lack any information about the nature of these contacts or their role in charging the claimed device. The specification does not evidence possession of the materially broader invention created by eliminating this arrangement of cathode and anode contacts, and thus the claims are unpatentable under Section 112(a).

II. STANDING (§42.104(A))

Petitioners certify that the '031 Patent is available for *post-grant* review, and that Petitioners are not barred or estopped from requesting *post-grant* review to challenge the claims on the grounds herein.

III. RELIEF REQUESTED (§42.104(B))

Petitioners respectfully request review and cancellation under 35 U.S.C. §321 of claims 1-21 as follows:[1]

[1] Petitioners do not concede any claims satisfy other requirements for patentability that cannot be raised in PGR.

Prior Art	Publication	Basis
European Patent Application EP3240300A1 ("Chen")	1/11/2017	AIA §102
U.S. Patent App. No. 2009/0202093A1 ("Dannemann")	8/13/2009	
U.S. Patent No. 7,905,006B2 ("Kwon")	3/15/2011	
PCT Publication No. WO2017/040094A1 ("Thiers")	3/9/2017	
U.S. Patent No. 10,003,880B2 ("Wagman")	6/19/2018	

Grounds	Claims	Basis
1	1, 10-12, 14, 20-21	§102; Chen
2	1-12, 14-21	§103; Chen+Thiers
3	2-3, 15	§103; Chen+Thiers+Wagman
4	1-21	§103; Chen+Wagman
5	1, 4-12, 14, 16-21	§103; Dannemann+Thiers
6	2-3, 15	§103; Dannemann+Thiers+Kwon
7	1-21	§103; Dannemann+Wagman
8	1-21	§103; Kwon+Wagman+Thiers
9	1-8, 10-21	§112(a); Written Description

IV. '031 PATENT OVERVIEW

The '031 Patent issued from Application No. 18/810,014, and claims priority to July 19, 2019.

A. Specification

The '031 Patent relates generally to ear-worn electronic devices, including headsets, hearing aids, and personal listening devices. Ex1001, 1:17-26. The '031 Patent teaches specific arrangements of cathode and anode contacts and "biasing" them so they are positionally offset relative to each other. This offset configuration facilitates the cathode of the charging interface to establish an electrical connection before the anodes, which results in a "consistent inrush current waveform" and "establish[es] a ground, which can reduce or minimize spurious electrical spikes in the circuitry." Ex1001, 9:17-27, 9:35-38.

The claims, however, are not directed to this "biased" cathode-first configuration, and all except claim 9 do not even identify which contacts in the arrangement are anodes and cathodes. Instead, the claims mix-and-match well-known, interchangeable hearing device features—such as a "housing" formed by a "faceplate" and "shell," and an "electrode arrangement" coupled to "circuitry"—that do not purport to solve any problem, much less an alleged problem in the art. *Id.*, Claims; Ex1002, ¶¶45-48, 64-68.

The specification reveals that even the claimed "electrode arrangement[s]" are mere design choices of basic geometries, and disclaims any preference for, or technical benefit of, one arrangement or shape over another. When describing various charging interface configurations, the specification repeatedly emphasizes that the disclosed shapes are optional, illustrative, and non-limiting. Ex1001, 14:50-52 ("contacts 502, 504 can have ***any*** curvilinear or polygonal shape"), 17:40-47 ("electrode elements 842, 844a, 844b, 844c can have different shapes" including "different curvilinear shapes or ***any*** combination of generally curvilinear shapes and generally rectilinear shapes"), 16:25-27, 17:26-30. In short, the specification does not tout any advantages of the disclosed geometric electrode configurations—either over the prior art or among the various configurations disclosed therein.

B. Prosecution History

The claims of the '031 Patent were initially rejected as obvious in view of the prior art. Ex1004, 195-212. The applicant distinguished the prior art, arguing it failed to disclose or render obvious "a central contact and an annular ring contact or a plurality of contacts that form at least a portion of an exterior surface of the hearing device." Ex1004, 265-273. The Examiner allowed claims 1-21 "for the reasons set forth in applicants arguments." Ex1004, 433.

The '031 Patent's broad, polarity-agnostic claims were allowed on a materially different—and weaker—basis than its parent application, U.S. Patent No.

12,101,588B2, which claims a particular "biased" arrangement of a cathode and anode contacts that "facilitate[s] electrical contact between…cathode contacts" of a hearing device and charging module "prior to electrical contact between…anode contacts." Ex1017, Cls. 1-23. PO had previously distinguished the prior art of record with this limitation, relying on the benefit of this arrangement described in the specification:

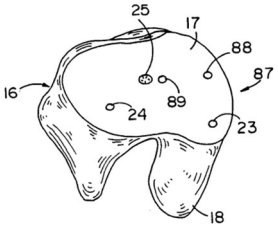
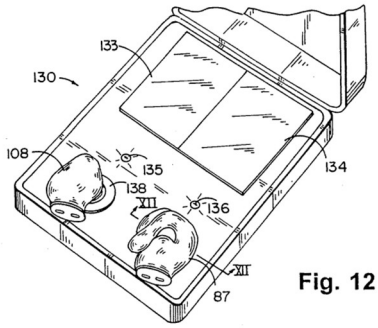
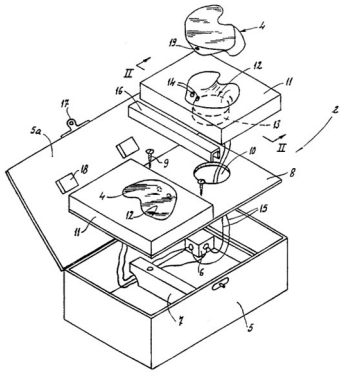
> Applicant's specification teaches that, when placing a hearing device into a charging fixture, it can be advantageous to connect the cathodes prior to connecting the anodes…[because it] provide[s] a consistent inrush current waveform when coupling the hearing devices and charger fixture together…..[Also, c]onnecting the cathodes of the hearing devices and charger fixture prior to connecting the anodes can serve to establish a ground, which can reduce or minimize spurious electrical spikes in the circuitry.

Ex1018, 559, 583. Unlike its parent application, the '031 Patent does not claim this cathode-first arrangement and, other than claim 9, does not even specify the identity or location of cathode or anode contacts.

V. TECHNOLOGY BACKGROUND

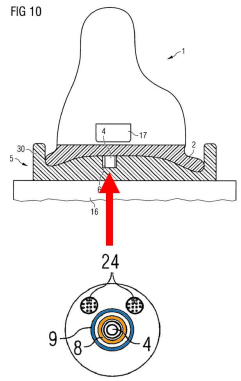
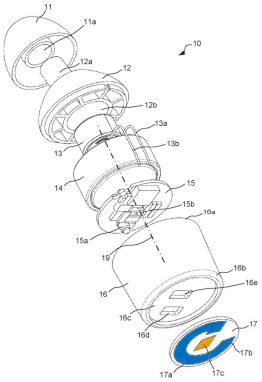
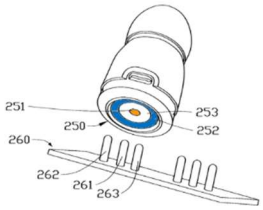
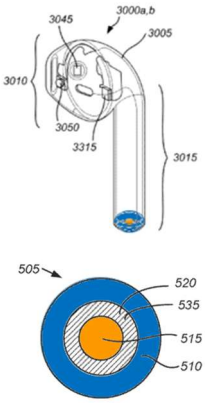
Rechargeable hearing devices date back to at least the 1960s. *See e.g.*, Ex1019 (issued 1967). Rechargeable hearing devices commonly have charging contacts

disposed in an outward-facing faceplate, which interfaces with the contacts of an auxiliary charging case, as shown below. Ex1002, ¶¶49-52.

Knapp (1993)	Grosfilley (1997)
 Fig. 7  Fig. 12 Ex1020, Figs. 7&12	 Ex1021, Fig. 1

These early designs had small charging contacts (88&89 for Knapp and 19 for Grosfilley), and could be difficult to align with the contacts on the charging case, particularly for hearing device users—who are often elderly, visually impaired, or have limited dexterity. Ex1002, ¶¶49-52. More recently, prior art hearing devices have incorporated larger, concentric electrode configurations with an **arcuate contact** surrounding a **central contact** that more reliably mates with the charger:[2]

[2] All color annotations to the figures and emphasis to quotes are added.

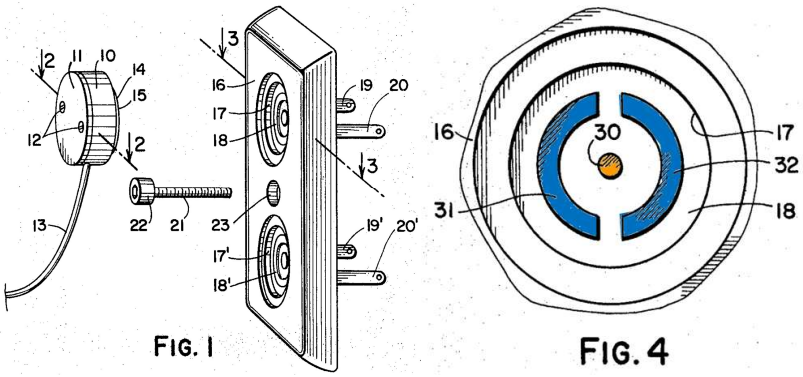
Schmidt (2008)	Linden (2016)	Chen (2018)	Wagman (2018)
 Ex1015, Figs. 8&10(excerpted)	 Fig 6 Ex1016, Fig. 6.	 FIG. 7A Ex1005, Fig. 7A	 Ex1009, Figs. 33&5B(excerpted)

These concentric electrode arrangements are well-suited for hearing devices because they efficiently maximize the device's limited available surface, thereby requiring less precise alignment when users dock them for charging. Ex1002, ¶¶52-53. For example, Chen teaches this design is beneficial because "users may place the rechargeable wireless earphone on the charging case in an arbitrary direction or orientation" and still "complete a charging circuit." Ex1005, [0030]-[0031].

While the figures above show two contacts, electrode configurations with more than two contacts were also known. For example, Wagman, shown above, teaches that "connector configurations can be used that have more than two contacts," including "half rings" or "shorter length arcs." Ex1009, 24:63-65, 25:47-48. There were known benefits in having more than two contact points at the charging interface: ease of manufacturing, robustness and stability of design, faster

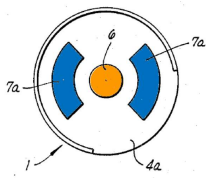
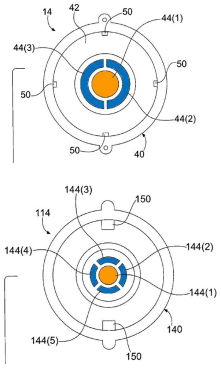
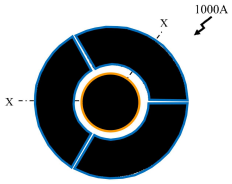
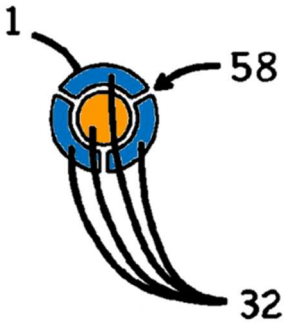
charging, reliability through redundancy, allowing power and data to be transmitted over distinct contacts, and potential for rotational symmetry. Ex1002, ¶¶53-54.

It is therefore unsurprising that concentric charging configurations with more than two contacts have been employed across virtually every segment of the consumer electronics industry for decades. Ex1002, ¶¶55-62. For example, as early as 1970, Tolegian disclosed a magnetic plug and socket assembly with concentric electrical contacts, including embodiments with one or more **arcuate contacts** surrounding a **central contact**:



Ex1010, Figs. 1&4.

This design choice has become commonplace over the last fifty years, with engineers routinely incorporating electrical connectors having multiple **arcuate contacts** surrounding a **central circular contact**:

Riegler (1982)	Willey (2010)	Murison (2016)	Thiers (2017)
			
Ex1011, Fig. 5a(excerpted)	Ex1012, Figs. 9A-B(excerpted)	Ex1014, Fig. 10(excerpted)	Ex1008, Fig. 3(excerpted)

VI. OVERVIEW OF PRIOR ART

A. Chen

Chen discloses a charging system for wireless earphones, with a first charging module having a central "**first charging electrode 251**" surrounded by an annular "**second charging electrode 252**", and a second charging module or dock having corresponding dock electrodes (261-263):

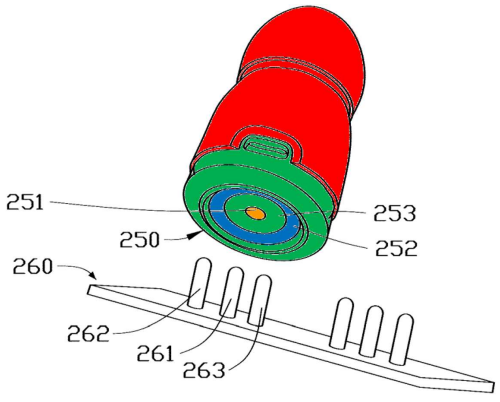


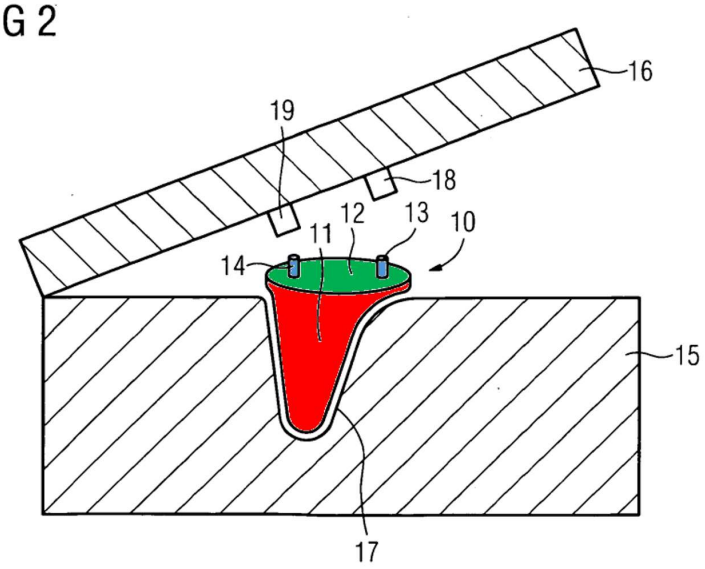
FIG. 7A

Ex1005, Figs. 5&6B&7A, [0004], [0027-28], [0030-33]; Cls. 1, 12. Chen's earphone housing includes a tapered **shell** for insertion in a wearer's ear canal, and an outward-facing **faceplate**, in which the electrodes are disposed. *Id.*

B. Dannemann

Dannemann discloses an in-the-ear ("ITE") hearing device with two charging **contacts 13, 14** arranged on the **faceplate 12**, which are connected to an integrated accumulator (battery) for recharging via a charging case:

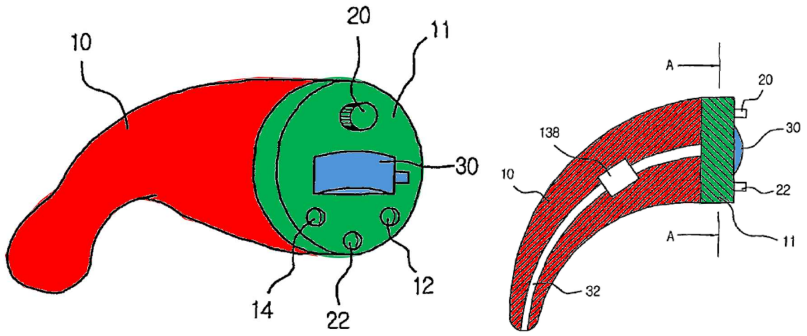
FIG 2



Ex1006, Fig. 2, Ex1006, [0027].

C. Kwon

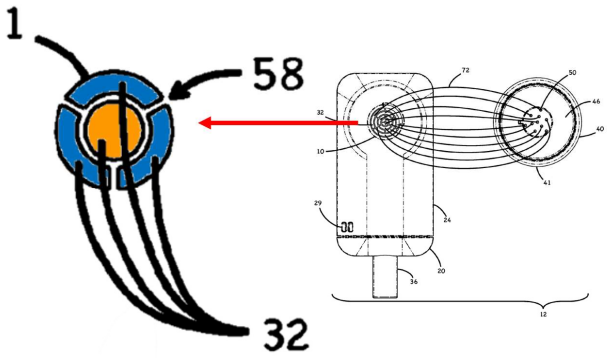
Kwon teaches an ITE hearing aid with a **shell 10** and a **faceplate 11** having a **cover 30** (battery door) for accessing a replaceable battery 26. Ex1007, Fig. 1, 3:54-4:19.



Ex1007, Figs. 1&2.

D. Thiers

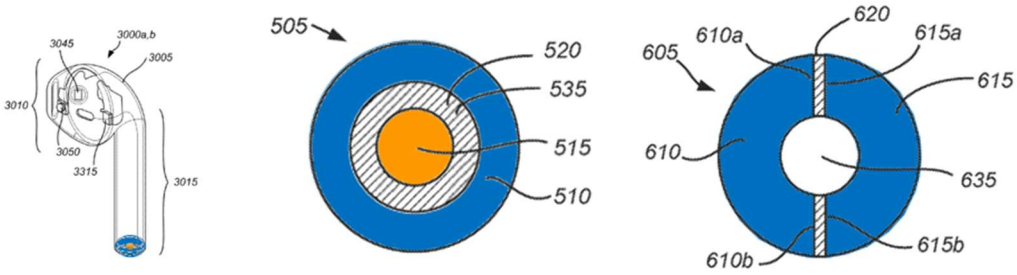
Thiers discloses an electrical interface between an electronic device and a charging dock. The interface of the electronic device includes four conductive traces 32: "**one in the center**" and "**three traces that form a ring**" while the dock interface has four complementary contacts 50. Ex1008, Fig. 2, [0044]-[0049].



Ex1008, Figs. 2-3(excerpted).

E. Wagman

Wagman discloses a wireless earbud with several arrangements of electrical contacts for interfacing with an external charging case, including arrangements with a **central contact**, and arrangements with one or more **outer arcuate contacts**:



Ex1009, Figs. 33, 5B, 6B(excerpted); *see also id.* 24:56-65, 25:9-49, claims 1-17, Figs. 4A-6B, 8A-8B, 36-40. Wagman teaches that "connector configurations can be used that have more than two contacts." Ex1009, 24:63-65. Wagman further explains that, "[w]hile FIG. 6B [(above on the right)] illustrates each of **contacts 610**, 615 as half rings, in other embodiments the contacts can include shorter length arcs and/or have different opposing shapes altogether." *Id.* 25:46-49.

VII. LEVEL OF ORDINARY SKILL IN THE ART

A POSA would have had a bachelor's degree in electrical engineering, mechanical engineering, biomedical engineering, or a related technical field, and 2-3 years of experience in the design, development, or manufacturing of hearing devices or other small-form-factor medical or consumer electronic devices. A POSA would also have familiarity with electrical charging systems and mechanical housing design for ear-worn or similar medical devices. Additional education could offset less experience and vice versa, and a POSA could have also obtained similar knowledge and experience through other means. Ex1002, ¶¶41-44.

VIII. CLAIM CONSTRUCTION

Sonova submits that no terms require construction to resolve the matters in this Petition. Sonova reserves all rights to raise claim construction and other arguments in any litigation.

IX. THE CHALLENGED CLAIMS ARE UNPATENTABLE

A. Ground 1: Chen Anticipates Claims 1, 10-12, 14, 20-21

1. [1]/[14] [3]

a. [1pre]/[14a]

Chen discloses a hearing device ("wireless earphones 300a and 300b"). Ex1005, Fig. 6B, [0030]; Ex1002, ¶82. Earphones, like those disclosed by Chen, are hearing devices because they produce sound that is heard by a listener. Ex1002, ¶82. Further, Chen also teaches that its wireless earphones have a "microphone 140…to receive environmental sound or the user's voice," thereby "serv[ing] as a wireless intercom, a hearing aid, or a sound amplifying device."

[3] *See* LIST OF CHALLENGED CLAIMS for the correlation between the claim language and the abbreviations used in the headers of Section IX.

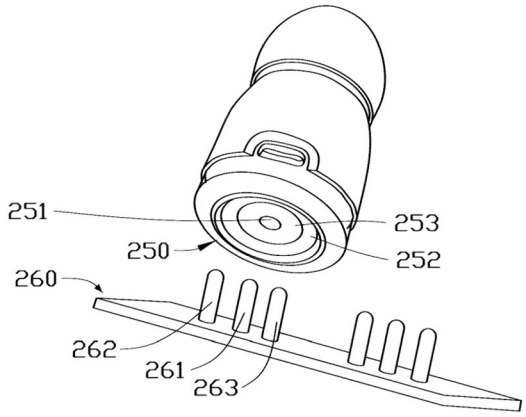


FIG. 7A

Ex1005, Figs. 5&6B&7A; [0005], [0010], [0019], [0021], [0024-25], [0029-32].

b. **[1a]/[14b]**

Chen teaches a housing ("device housing") that encloses an internal volume (space within the "device housing" enclosing "rechargeable battery 130" and "charge controller 120") and extends from an **internal side** (ear-facing surface) to an **external side** (outward-facing surface), as shown below:

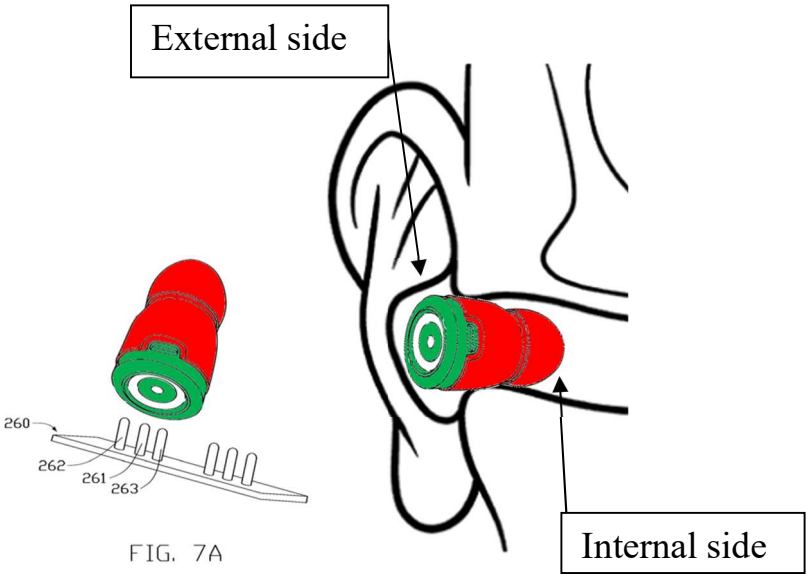


FIG. 7A

Ex1005, Figs. 5&6B&7A, [0019], [0021], [0028-30]; Ex1002, ¶83. When earphone 300 is worn by a user, as depicted above, its internal side is positioned inside a user's ear canal, while its external side faces away from the user's ear canal. Ex1002, ¶84. Chen's housing comprises a **shell** and **faceplate**, as described for limitations [1b]/[14c] and [1c]/[14d].

c. **[1b]/[14c]**

Chen teaches a **shell** arranged at the internal side (ear-facing surface), and the internal side is configured to be inserted in the wearer's ear canal:

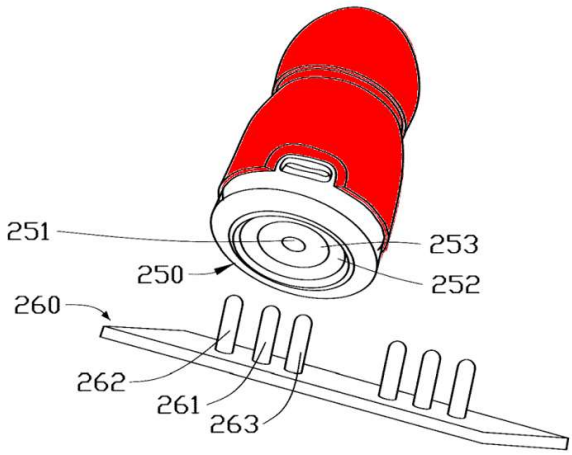


FIG. 7A

Ex1005, Figs. 5&6B&7A; Ex1002, ¶¶85-87. POSAs would understand the ear-facing surface of wireless earphone 300 is tapered for insertion in a wearer's ear canal to ensure the earphone does not fall out when being used by a user. Ex1005, Figs. 1B&5&6B&7A; [0005], [0010], [0019], [0021], [0024-25], [0029-30]; Ex1002, ¶¶86-87.

d. **[1c]/[14d]**

Chen teaches a **faceplate** arranged at the external side (outward-facing surface), and the external side (outward-facing surface) is configured to face away from the wearer:

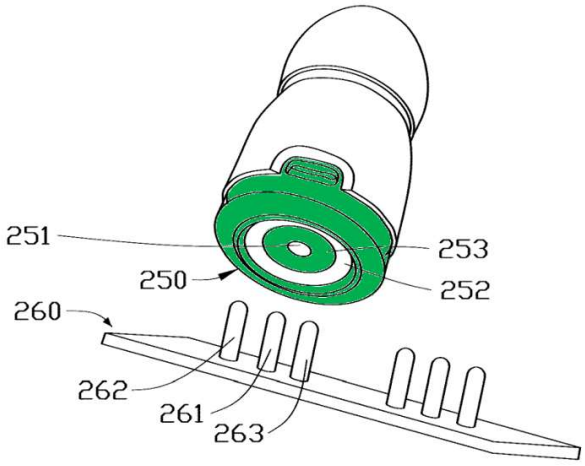


FIG. 7A

Ex1005, Figs. 5&6B&7A; Ex1002, ¶¶88-89.

Chen's **faceplate** includes portions of the outward-facing surface of the "device housing" and "annular insulation wall 253, which prevents short circuiting between the first charging electrode 251 and the second charging electrode 252." Ex1005, [0031]. POSAs would understand that, because the outward-facing side of earphone 300 is opposite of the end that is configured to be inserted into a wearer's ear canal, the outward-facing side is configured to face away from the wearer. Ex1005, Figs. 5&6B&7A; [0005], [0010], [0019], [0021], [0024-25], [0029-30]; Ex1002, ¶89.

e. **[1d]/[14e]**

Chen teaches an electrode arrangement ("**first charging electrode 251**" and "**second charging electrode 252**") disposed in an outer surface of the **faceplate**, the electrode arrangement ("**electrode 251**" and "**electrode 252**") comprising a central contact ("**electrode 251**") and an annular ring contact ("**electrode 252**") surrounding the central contact ("**electrode 251**"), wherein the central contact ("**electrode 251**") and the annular ring contact ("**electrode 252**") form at least a portion of an exterior surface of the hearing device:

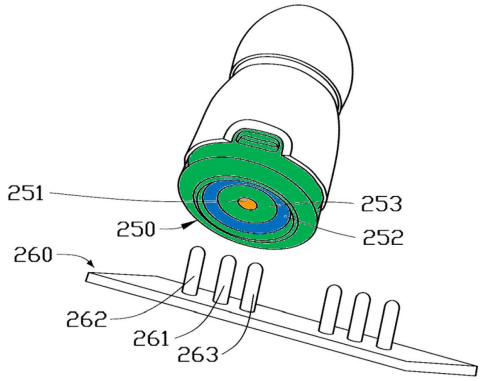


FIG. 7A

Ex1005, Figs. 5&6B&7A; [0004], [0027-28], [0030-33]; Cls. 1, 12; Ex1002, ¶¶90-91.

For example, Chen teaches the "**first charging electrode 251** is surrounded by the **second charging electrode 252**" and that "the **second charging electrode 252** is annular." Ex1005, [0031]. The "**first charging electrode 251**" and "**second charging electrode 252**" are disposed in an outer surface of the **faceplate**, and form

at least a portion of an exterior surface of the hearing device, because they are shown recessed in the outer surface of the faceplate portion of the housing, as shown in Fig. 7A. Ex1002, ¶91. Further, Chen teaches the faceplate includes an "annular insulation wall 253," as shown in Fig. 7A, "which prevents short circuiting between the **first charging electrode 251** and the **second charging electrode 252**." Ex1005, [0031].

f. **[1e]/[14f]**

Chen teaches circuitry ("**rechargeable battery 130**," "**charge controller 120**," and associated wiring) disposed in the internal volume (space within the "device housing") and coupled to the electrode arrangement ("**electrode 251**" and "**electrode 252**"):

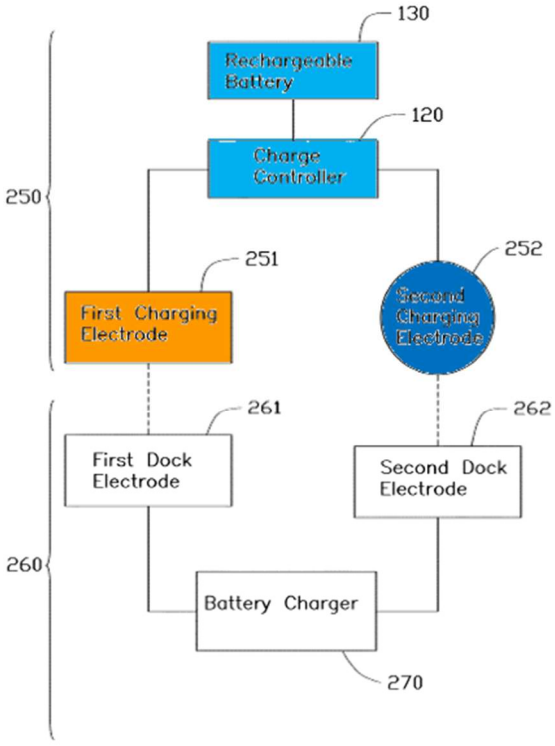


FIG. 5

Ex1005, Figs. 5&6B&7A; [0027-28]; Cls. 1, 12; Ex1002, ¶¶92-93. Chen teaches "[t]he charge controller may be configured as a charge integrated circuit." Ex1005, [0015]. Chen further teaches that "the device housing is configured to accommodate the **rechargeable battery** [and] the **charge controller**" and that the "**first charging electrode 251** and the **second charging electrode 252** are coupled to the cathode or the anode of the **charge controller 120**." Ex1005, [0027-28].

g. **[14pre]**

To the extent claim 14's preamble is limiting, Chen teaches a system. Ex1002, ¶94. Chen "generally relates to a charging system and an electronic device having the charging system." Chen further describes Figures 5, 6B, and 7A as "an exemplary embodiment of a charging system." Ex1005, Title, Abstract, [0001], [0004]-[0005], [0026]-[0028], [0031]-[0034]; Cls. 1-11.

h. **[14g]**

Chen teaches a charging module ("second charging module 260") comprising a charging interface ("**electrode 261**," "electrode 262," and "electrode 263") that comprises a central charging contact ("**electrode 261**") and a plurality of charging contacts ("electrode 262" and "electrode 263") surrounding the central contact ("**electrode 251**"):

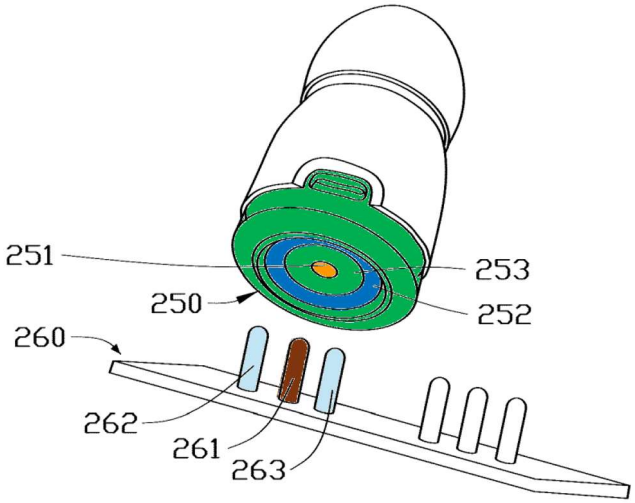


FIG. 7A

Ex1005, Figs. 5&6B&7A; [0027]-[0033]; Cls. 1, 12; Ex1002, ¶¶95-96. Chen teaches that "[w]hen the first charging module 250 and the second charging module 260 are electrically coupled, electrical connections by the **second dock electrode 262** and the **third dock electrode 263** to the **second charging electrode 252** are assured." Ex1005, [0031]. As seen in Fig. 7A, the **electrode 251** is at the center of the **electrode 252**, so when the **electrodes 262** and **263** electrically connect to the **electrode 252**, the **electrodes 262** and **263** will surround the **electrode 251**. To the extent this claim is interpreted to require a plurality of charging contacts that surround the "central charging contact," this limitation is also met because Chen's outer **electrodes 262 and 263** surround the middle **electrode 261**. Ex1005, Fig. 7A; Ex1002, ¶96.

2. **[10]/[20]**

Chen teaches the electrode arrangement comprises the annular ring contact ("**second charging electrode 252**") surrounding the central contact ("**first charging electrode 251**"):

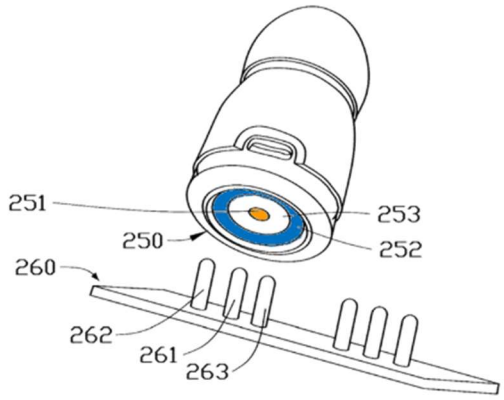


FIG. 7A

Ex1005, Figs. 5&6B&7A; [0004], [0031]; Ex1002, ¶97. Chen states the "**first charging electrode 251** is surrounded by the **second charging electrode 252**" and that "the **second charging electrode 252** is annular." Ex1005, [0031].

3. **[11]**

Chen teaches the circuitry ("**rechargeable battery 130**," "**charge controller 120**," and associated wiring) comprises charging circuitry, and the electrode arrangement ("**electrode 251**" and "**electrode 252**") is coupled to the charging circuitry. Ex1002, ¶¶98-99.

Chen's circuitry comprises charging circuitry because it is used to charge "**rechargeable battery 130**." Ex1002, ¶99. For example, Chen teaches "[t]he

charge controller may be configured as a charge integrated circuit." Ex1005, [0015]. Further, Chen teaches that "[t]he **rechargeable battery** is coupled to the **charge controller**" and "[t]he **charge controller** is coupled to both the **first charging electrode** and the **second charging electrode**:"

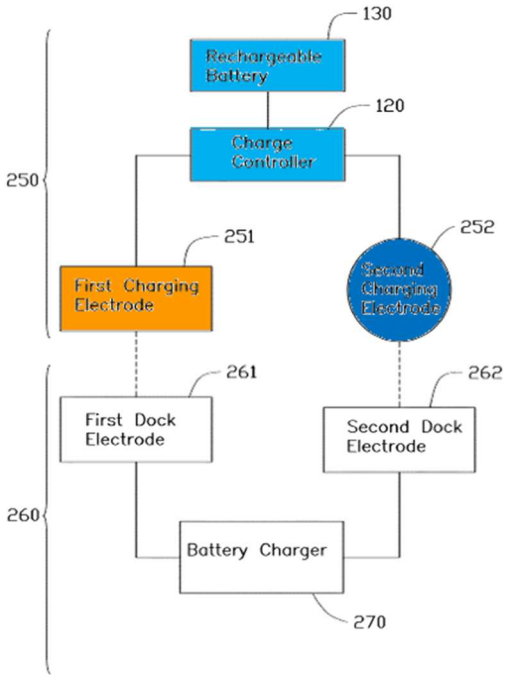


FIG. 5

Ex1005, [0028], Figs. 5&6B&7A.

4. **[12]**

Chen teaches the electrode arrangement ("**first charging electrode 251**" and "**second charging electrode 252**") is configured to communicate power and one or more information signals. Ex1002, ¶¶100-103.

Chen teaches that "[t]he **first charging electrode 251** and the **second charging electrode 252** are coupled to the cathode or the anode of the charge

controller 120." Ex1005, [0027]. Thus, the "**first charging electrode 251**" and "**second charging electrode 252**" are configured to communicate power from "second charging module 260" to "rechargeable battery 130." Ex1005, [0027]-[0028]; Ex1002, ¶101.

Chen further teaches that "the **second charging electrode 252** could be a closed-loop antenna electrode to provide communication functions," including via "BLUETOOTH and WI-FI." Ex1005, [0031], [0011]-[0012]. Chen teaches a "switching module" that can selectively "make the antenna electrode work as a charging electrode or as an antenna." Ex1005, [0017]. When in "communication mode" the **electrode 252** "receive[s] electromagnetic wave[s], convert[s] [them] into electrical power, and deliver[s] the electrical power to a transceiver module" for communicating information signals. Ex1005, [0012], [0020]; Ex1002, ¶¶102-103.

5. **[21]**

a. **[21a]**

Chen teaches the hearing device comprises a first charging interface ("**electrode 251**" and "**electrode 252**") comprising the electrode arrangement, wherein the circuitry ("**rechargeable battery 130**," "**charge controller 120**," and associated wiring) of the hearing device comprises charging circuitry coupled to the electrode arrangement:

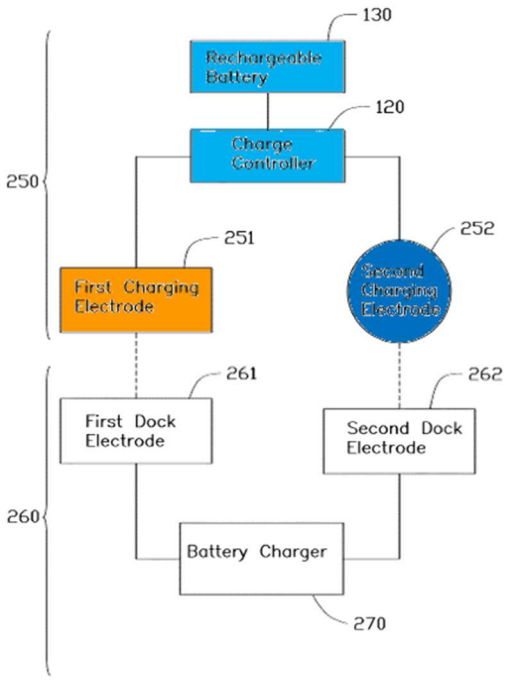


FIG. 5

Ex1005, Figs. 5&6B&7A, [0027-28]; *id.* Cls. 1, 12; Ex1002, ¶¶104-105. The "**electrode 251**" and "**electrode 252**" are a "first charging interface" because they interface with the electrodes of the "second charging module 260" and the wireless earphone 300's circuitry is coupled to the electrode arrangement and comprises "charging circuitry" because it is used for charging "**rechargeable battery 130**." *Id.*; §IX.A.3.

b. **[21b]**

Chen teaches the charging interface of the charging module ("**electrode 261**," "**electrode 262**," and "**electrode 263**") defines a second charging interface configured to detachably couple with the first charging interface ("**electrode 251**" and "**electrode 252**") of the hearing device:

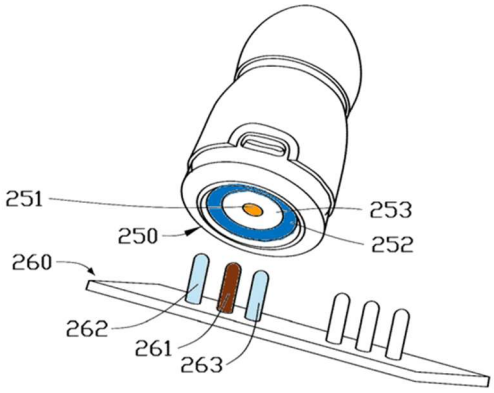


FIG. 7A

Ex1005, Figs. 5&6B&7A; Ex1002, ¶¶106-107. The "**electrode 261**," "electrode 262," and "electrode 263" "electrically couple[]" with "**first charging electrode 251**", and "**second charging electrode 252**" when a user places the rechargeable wireless earphone into the charging case. Ex1005, [0028], [0030]-[0031]. These surfaces "detachably" couple because wireless earphones 300 (which include the "first charging module 250"), are removed from the charging case (which includes the "second charging module 260"), when the earphones 300 are worn by the user. Ex1005, [0027]-[0028], [0030]-[0031]; Cls. 1, 6, 12, 15-16; Ex1002, ¶107.

c. **[21c]**

Chen teaches the charging module ("second charging module 260") further comprises charging circuitry ("**battery charger 270**") coupled to the second charging interface ("**electrode 261**," "electrode 262," and "electrode 263"). Ex1002, ¶¶108-110.

POSAs would understand that the "**battery charger 270**" comprises charging circuitry because Chen teaches that "**battery charger 270**" is part of a charging circuit:

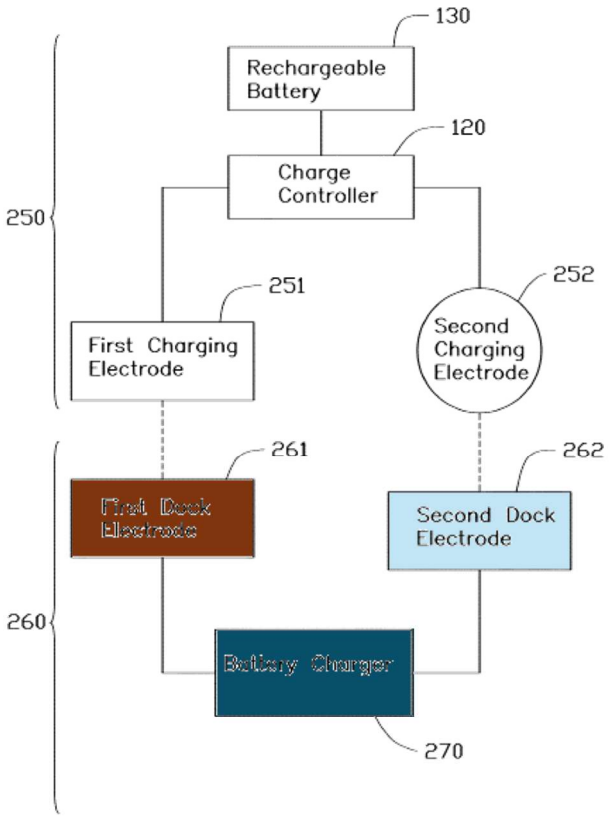


FIG. 5

Ex1005, Figs. 5&6B&7A; [0027-28]; Cls. 1, 6, 12, 15-16; Ex1002, ¶¶109-110. Chen describes the "**first dock electrode 261**" and "**second dock electrode 262**" "are coupled to the cathode or the anode of the **battery charger 270**." Ex1005, [0027].

d. **[21d]**

Chen teaches the charging module ("second charging module 260") is configured to charge a rechargeable power source ("**rechargeable battery 130**") of

the hearing device that is coupled to the first charging interface ("**electrode 251**" and "**electrode 252**"). Ex1002, ¶¶111-112.

Chen teaches that "[t]he **rechargeable battery** is coupled to the **charge controller**" and "[t]he **charge controller** is coupled to both the **first charging electrode** and the **second charging electrode**." Ex1005, [0028]. Chen also teaches that "**first charging electrode 251**" and "**second charging electrode 252**" are electrically connected to the "**first dock electrode 261**" and "**second dock electrode 262**," respectively. Ex1005, [0028]. Figure 5 illustrates how the "first charging module 250" delivers power from an external power source to the "rechargeable battery 130:"

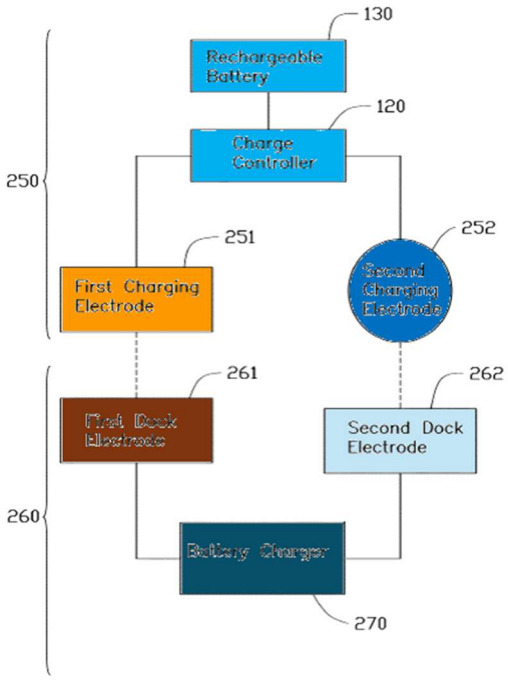


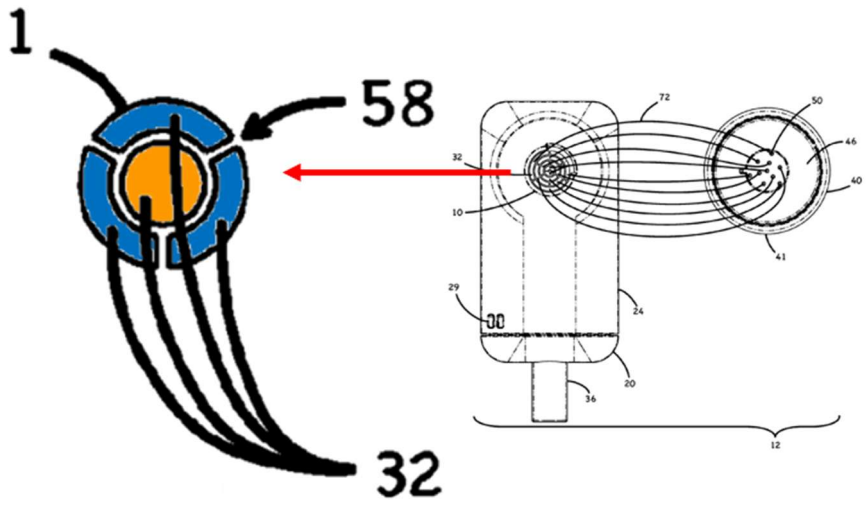
FIG. 5

Ex1005, Figs. 5&6B&7A, [0027]-[0028], [0031]; *id.* Cls. 1, 12.

B. Ground 2: Chen Combined With Thiers Renders Obvious Claims 1-12, 14-21

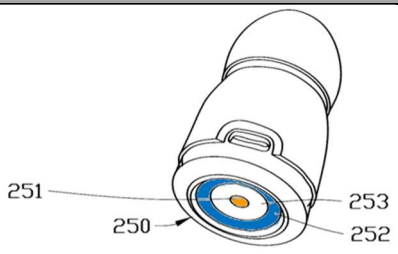
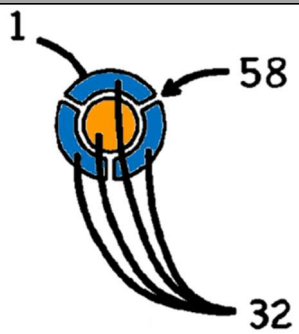
1. Motivation To Combine

POSAs would have been motivated to combine Chen and Thiers. Ex1002, ¶¶113-122. Thiers teaches a multi-contact charging interface for a rechargeable electronic device. Ex1008, Figs. 1&2, [0044]-[0045].



Ex1008, Figs. 2-3(excerpted).

POSAs would have been motivated to substitute Chen's charging interface with Thiers' charging interface:

Chen	Thiers	Chen+Thiers
		

Ex1005, Figs. 7A(excerpted); Ex1008, Figs. 3(excerpted); Ex1005, Figs. 7A(modified); Ex1002, ¶¶114-115.

This modification would have been prompted by several converging design incentives recognized by POSAs. First, Thiers teaches that there was a "need in the art for a connecting system for an electronic device that allows a conductor dense connection…" but which "provides the same speed of charging and data transmission." Ex1008, [0013]. Thiers teaches that dense, multi-contact connectors were also desirable because the "consumer electronic industry is moving toward fewer connector ports on devices by combining the functions of what previously took multiple connectors into one," including "data and power" transmission. *Id.* [0002], [0006]. Hearing devices, like Chen, have a small and constrained faceplate surface area, and present an acute need for conductor-dense connections like those provided by Thiers. Ex1002, ¶116.

Second, because Chen's faceplate presents a circular geometry, a concentric three-arc arrangement of the type taught by Thiers is a geometrically natural solution: it exploits the rotational symmetry of the circular faceplate surface, ensuring reliable contact with the charging device regardless of the angular orientation when it is inserted into the charging cradle. Ex1002, ¶118.

Third, expanding Chen's central-and-surrounding-ring contact interface to Thiers' central-and-three-surrounding-arcs arrangement would have resulted in the

possible known advantages of increasing electrical contacts: ease of manufacturing, robustness and stability of design, faster charging, reliability through redundancy, allowing power and data to be transmitted over distinct contacts, and potential for rotational symmetry. Ex1002, ¶¶119, 55-62. Thiers' concentric configuration achieves these benefits within the same limited surface area, making it particularly well-suited for the constrained form factor of a hearing-device faceplate. Ex1008, [0044]; Ex1002, ¶119.

POSAs would have understood that Thiers' central "**trace 32**" and three outer "**traces 32**" would be compatible with Chen's dock electrodes 261, 262, and 263 or, alternatively, the "contacts 50" on Thiers' "dock interface assembly 40" (*i.e.*, the charging interface on the charging module of both references), and would have been motivated to use either charging interface in the combination. Ex1002, ¶117. For example, interfacing Thiers' central "**trace 32**" and three outer "**traces 32**" with Chen's "second charging module 260" would ensure central "**trace 32**" always contacts middle "electrode 261" and at least one of outer "**traces 32**" always contacts outer "electrode 262" or "electrode 263." Ex1005, Figs. 7A; [0027]-[0028], [0031]; Ex1002, ¶120. Alternatively, POSAs would have been motivated to modify Chen's "second charging module 260" to use Thiers' "dock interface assembly 40" because it is designed for use with Thiers' electrode arrangement with central "**trace 32**" and three outer "**traces 32**." Ex1002, ¶121; Ex1008, [0037-38], [0043-44], Fig. 2. For

example, POSAs would be motivated to align four "contacts 50" from Thiers' "dock interface assembly 40" with the four "traces 32" from "connector 1" to provide four distinct "electrical paths…from each respective contact 50 to each corresponding trace 32" for the reasons stated above. Ex1002, ¶121; Ex1008, [0043-45].

POSAs would have had a reasonable expectation of success because Chen and Thiers have similar electrode geometry: a central electrode surrounded by one or more arcuate electrodes arranged in a circle. Ex1002, ¶122. Substituting Thiers' electrodes for Chen's would have merely involved using a known technique (dividing an annular ring contact into several arcuate contacts) to improve a similar device in the same way. Ex1002, ¶122. And Thiers further emphasizes that its charging system applies "generally to electronic devices," which includes electronic hearing devices like those disclosed by Chen. Ex1008, [0001]. In the combination, POSAs would understand Thiers' charging interface would be coupled to Chen's circuitry, including its charge controller and dock-electrode architecture to utilize the additional electrical paths. Ex1002, ¶122.

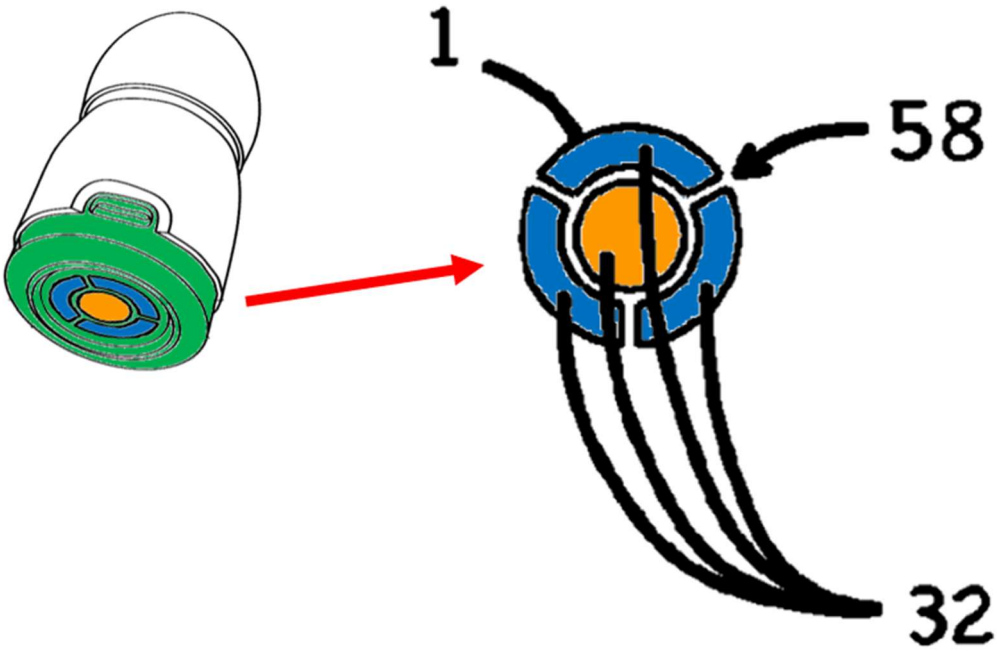
2. **[1]/[14]**

a. **[1pre]/[14a]/[1a]/[14b]/[1b]/[14c]/[1c]/[14d]/[14pre]**

Chen teaches these limitations and Chen combined with Thiers teaches these limitations. §§IX.A.1.a-d, IX.A.1.g; Ex1002, ¶123.

b. **[1d]/[14e]**

Chen teaches these limitations and Chen combined with Thiers teaches these limitations. Ex1002, ¶¶124-125; §IX.A.1.e. Chen combined with Thiers has an electrode arrangement (Thiers' "connector 1") disposed in an outer surface of the faceplate (Chen's **faceplate**), the electrode arrangement comprising a central contact (Thiers' central "**trace 32**") and an annular ring contact surrounding the central contact or a plurality of contacts (Thiers' outer "**traces 32**") surrounding the central contact, wherein the central contact and the annular ring contact or the plurality of contacts form at least a portion of an exterior surface of the hearing device:



Ex1005, Fig. 7A(modified); Ex1008, Fig. 3(excerpted); §§IX.B.1; IX.A.1.d. Thiers teaches that "[c]onnector 1 includes four traces: one in the center with the surface in the form of a circle, and three traces that form a ring around the circle and axis of

rotation" and that "nonconductive separating spaces 58 may divide the otherwise ***annular*** shaped 32 into a multitude of smaller traces." Ex1008, [0044-45] (emphasis added). Thiers further states "[t]he conductive traces 32…may be directly built into the case housing 24 of the [] electronic device 14b." *Id.* [0042], Fig. 1.

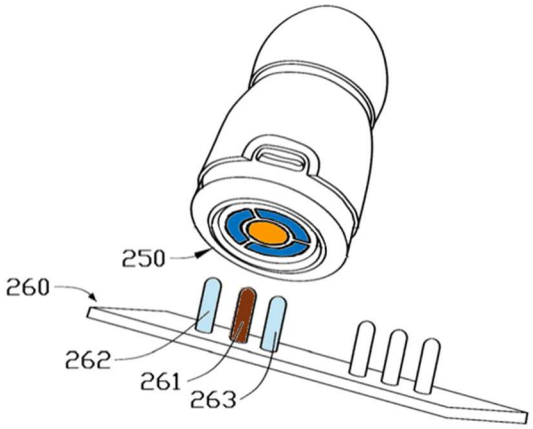
c. **[1e]/[14f]**

Chen teaches these limitations and Chen combined with Thiers teaches these limitations. Ex1002, ¶126; §IX.A.1.f. Chen combined with Thiers has circuitry (Chen's "rechargeable battery 130," "charge controller 120," and associated wiring) disposed in the internal volume (space within Chen's "device housing") and coupled to the electrode arrangement (Thiers' "connector 1"). §§IX.B.1, §IX.A.1.b, IX.B.2.b.

d. **[14g]**

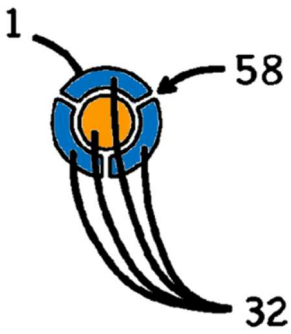
Chen teaches this limitation and Chen combined with Thiers teaches this limitation. Ex1002, ¶¶127-131; §IX.A.1.h. Chen combined with Thiers has a charging module (Chen's "second charging module 260") comprising a charging interface (Chen's electrodes 261-263 or Thiers' contacts 50) that comprises: a central charging contact and a plurality of charging contacts surrounding the central contact. Ex1002, ¶¶127-128. This limitation is met by several teachings from these references. §IX.B.1.

For example, Chen's electrodes 261-263 comprise a central charging contact ("**electrode 261**") and a plurality of charging contacts ("electrode 262" and "electrode 263") surrounding the central contact (Thiers' central "**trace 32**"), at least when Chen's earphones are docked:



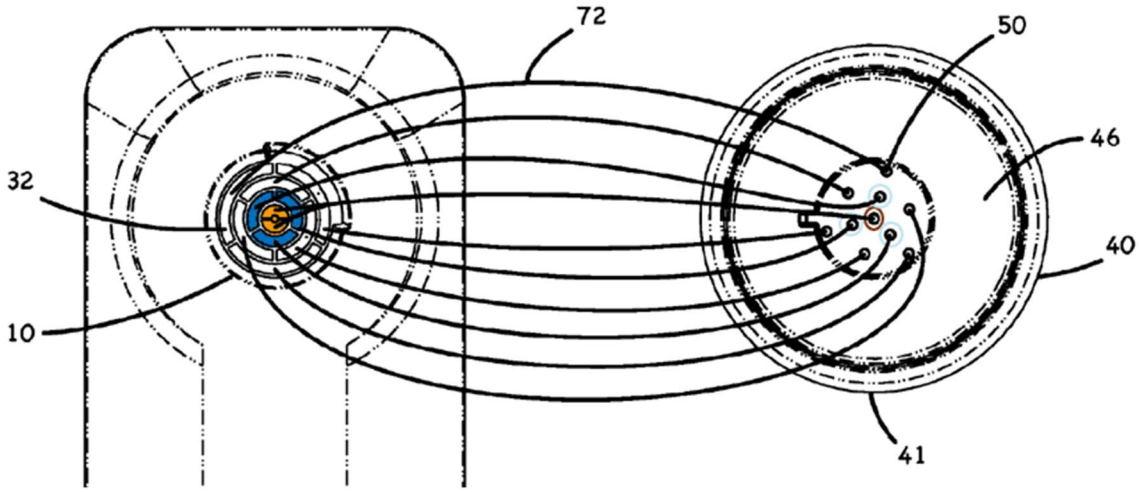
Ex1005, Fig. 7A(modified). "Electrode 262" and "electrode 263" also surround "**electrode 261**," as shown in Fig. 7A. §IX.A.1.h.

Alternatively, Thiers' "contacts 50" comprise a central charging contact (middle-most "contact 50") and a plurality of charging contacts (three outer "contacts 50") that surround the central contact (central "**trace 32**"), at least when Chen's earphones are docked. Ex1008, Figs. 1-3. Thiers' Fig. 3 shows outer "**traces 32**" surround the central "**trace 32**" and Thiers teaches "contacts 50" of the "dock interface assembly 4" "may be arranged in such a manner that each one of the contacts 50 is aligned with a conductive trace 32." Ex1008, [0037]-[0039], [0043]-[0045].



Ex1008, Fig. 3(excerpted). Thus, Thiers teaches that three outer "contacts 50" surround **(1)** a middle "contact 50" and **(2)** central "trace 32" when docked so that each trace 32 aligns with a contact 50. Ex1002, ¶¶129-130.

This is confirmed by Thiers' Fig. 1, which depicts an embodiment with more than four traces 32 and contacts 50, and shows three outer "**contacts 50**" surround middle "**contact 50**" and central "**trace 32**" when the interfaces are docked.



Ex1008, Fig. 2(excerpted). To the extent PO argues Thiers does not teach this limitation, it also would have been obvious to configure Thiers such that three outer "**contacts 50**" surround **(1)** middle "**contact 50**" or **(2)** central "**trace 32**" when

docked so that each trace 32 aligns with a contact 50 to create four "electrical path[s]" for charging and data transmission, as taught by Thiers. Ex1002, ¶¶130-131; Ex1008, Fig. 2, [0043-45]; §IX.B.1.

3. **[2]/[3]/[15]**

Chen combined with Thiers renders obvious claims 1 and 14 (§IX.B.2), and the limitations of these claims. Ex1002, ¶¶132-133. Chen renders obvious one or more **microphone ports** (ports for "microphone 140") disposed in the outer surface of the **faceplate** and a **receiver outlet** (outlet for "speaker 145") disposed in the shell:

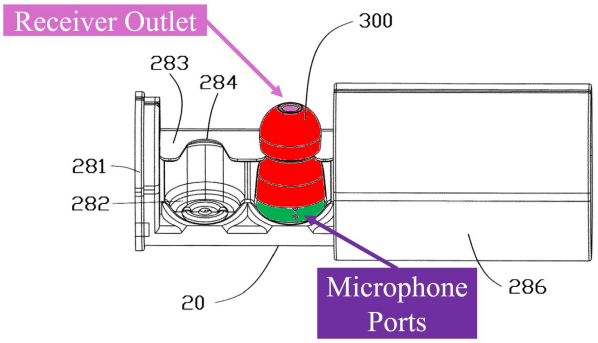


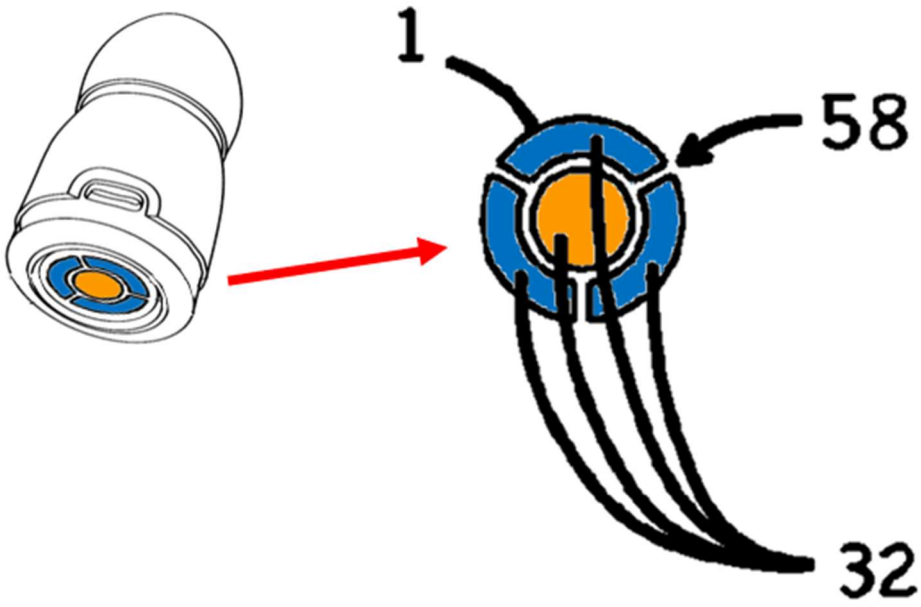
FIG. 6A

Ex1005, Fig. 6A, [0025]. Chen teaches a "microphone 140" and "speaker 145," but does not expressly describe the location of their ports in the housing. Ex1005, [0025]. As shown above, Chen's Fig. 6A depicts an outlet on the shell and port(s) on the faceplate. POSAs would understand these structures to be a receiver outlet and microphone port(s). Ex1002, ¶133. Nevertheless, it also would have been obvious to use these structures as a receiver outlet and microphone port(s). *Id.*

POSAs would have been motivated to dispose a receiver outlet in the shell, as shown above, to deliver quality sound to a user's ear drum via speaker 145. *Id.*; Ex1005, [0025]. POSAs also would have been motivated to dispose port(s) for Chen's microphone 140 in Chen's faceplate to create an unobstructed channel for capturing "environmental sound or the user's voice," thereby "delivering high[er] quality sound." *Id.*

4. **[4]/[16]**

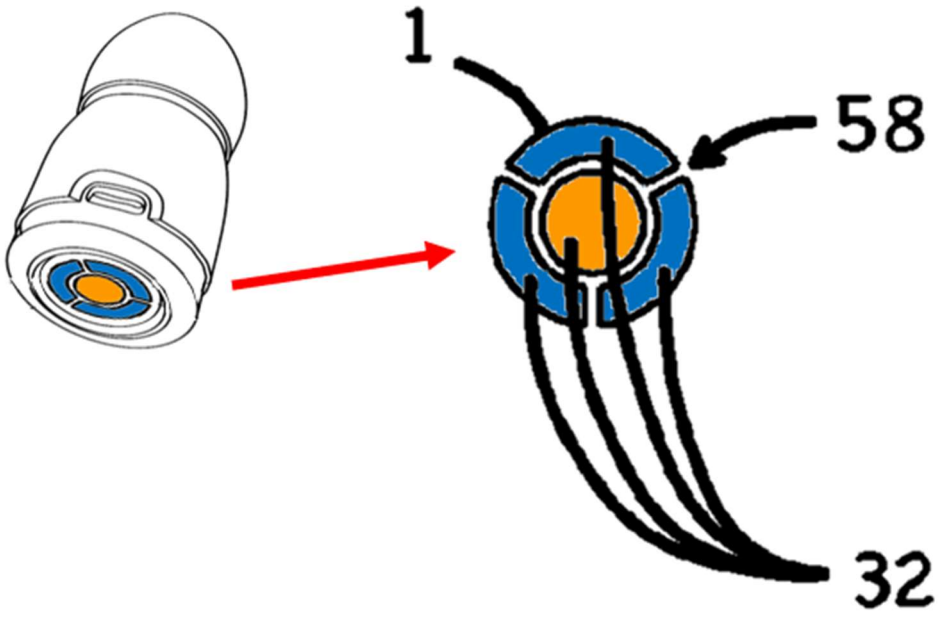
Chen combined with Thiers renders obvious claims 1 and 14 (§IX.B.2), and the limitations of these claims. Ex1002, ¶134. Thiers teaches the electrode arrangement comprises the plurality of contacts (Thiers' three outer "**traces 32**"):



Ex1005, Fig. 7A(modified); Ex1008, Fig. 3(excerpted); Ex1008, [0044-45].

5. **[5]/[17]/[6]/[18]/[7]**

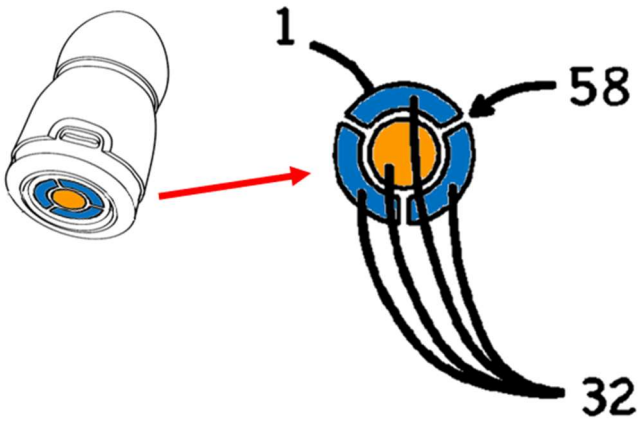
Chen combined with Thiers renders obvious claims 4 and 16 (§IX.B.4) and the limitations of these claims. Ex1002, ¶¶135-136. Thiers (and its combination with Chen) teaches **(1)** that each of the plurality of contacts (Thiers' outer "**traces 32**") is arranged the same distance from the central contact (Thiers' central "**trace 32**") as each other contact of the plurality of contacts; **(2)** the plurality of contacts (Thiers' outer "**traces 32**") defines a circle; and **(3)** each of the plurality of contacts comprises a curvilinear, annular, oval, elliptical, or polygonal shape:



Ex1005, Fig. 7A(modified); Ex1008, Fig. 3(excerpted); Ex1002, ¶¶135-136. Thiers' Fig. 3 shows outer "**traces 32**" "form a ring"/circle, and each outer **trace 32** is curvilinear in shape and equidistant to central "**trace 32**". Ex1008, Fig. 3, [0044-45]; §IX.B.2.b.

6. **[8]/[19]**

Chen combined with Thiers renders obvious claims 4 and 16 (§IX.B.4), and the limitations of these claims. Ex1002, ¶¶137-138. Thiers teaches the plurality of contacts comprises three arcuate contacts (Thiers' three outer "**traces 32**") each arranged at substantially the same distance from the central contact (Thiers' central "**trace 32**"), as does its combination with Chen:



Ex1005, Fig. 7A(modified); Ex1008, Fig. 3(excerpted); Ex1002, ¶¶137-138. Thiers teaches that the central "**trace 32**" is "in the form of a circle," which is annular, and that the outer "three **traces [32]** form a ring around the circle and axis of rotation." Ex1008, [0045]; §IX.B.6. Each outer **trace 32** is arcuate because it is a 120-degree arc. Ex1002, ¶138.

7. **[9]**

Chen combined with Thiers renders obvious claim 4 (§IX.B.4) and the limitations of claim 9. Ex1002, ¶¶139-141. Chen combined with Thiers teaches the central contact (Thiers' central "**trace 32**") defines a cathode contact and the at least

one contact of the plurality of contacts (Thiers' outer "**traces 32**") defines an anode contact. Ex1002, ¶139.

Chen teaches that "[t]he **first charging electrode 251** and the **second charging electrode 252** are coupled to the cathode or the anode of the charge controller 120." Ex1005, [0027]. In other words, Chen teaches two configurations: **(1)** "**electrode 251**" is coupled to the charge controller 120's cathode and "**electrode 252**" is coupled to its anode, or **(2)** "**electrode 251**" is coupled to the charge controller 120's anode and "**electrode 252**" is coupled to its cathode. In the first configuration, the "**electrode 251**" is a cathode contact because it is connected to the charge controller 120's cathode and the "**electrode 252**" is an anode contact because it is connected to the charge controller 120's anode.

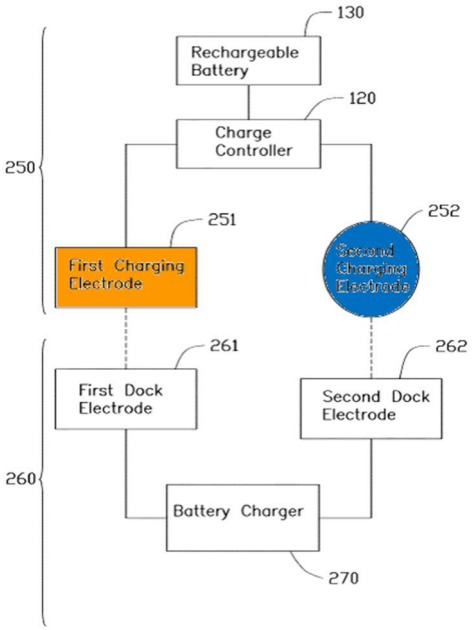


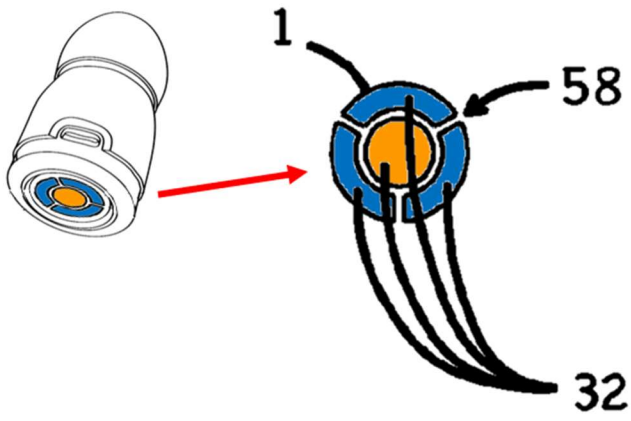
FIG. 5

Ex1005, Figs. 5&6B&7A; [0027]; Ex1002, ¶¶140-141. POSAs would be motivated to maintain this arrangement in the combination with Thiers such that Thiers' central "**trace 32**" defines a cathode contact and at least one of Thiers' outer "**traces 32**" defines an anode contact. Ex1002, ¶141. And at a minimum, it would have been obvious to try because it was one of a limited number of ways to arrange the anode and cathode in a four-contact arrangement. Ex1002, ¶141.

8. **[10]/[20]**

Chen combined with Thiers renders obvious claims 1 and 14 (§IX.B.2), and the limitations of these claims. Ex1002, ¶¶142-143; §IX.A.2. Thiers (and its combination with Chen) teaches the electrode arrangement comprises the annular ring contact (Thiers' three outer "**traces 32**") surrounding the central contact (Thiers' central "**trace 32**"), at least to the extent that this claim encompasses a plurality of arcuate contacts which collectively form an annular ring:[4]

[4] Petitioner does not concede or adopt any particular construction of "annular ring contact" as recited in claims 10 and 20. For purposes of this Petition only, Petitioner submits that the prior art satisfies claims 10 and 20 under any reasonable construction of "annular ring contact," including a construction that requires a single continuous annular ring and a construction that encompasses contacts that are collectively annular in arrangement. Petitioner has established



Ex1005, Fig. 7A(modified); Ex1008, Fig. 3(excerpted). Thiers teaches that **outer traces 32** "form a ring" and that "nonconductive separating spaces 58 may divide the otherwise ***annular*** shaped traces 32 into a multitude of smaller traces." Ex1008, [0044-45].

9. **[11]**

Chen combined with Thiers renders obvious claim 1 (§IX.B.2) and the limitations of claim 11. Ex1002, ¶¶144-145. Chen combined with Thiers has charging circuitry (Chen's "rechargeable battery 130," "charge controller 120," and associated wiring) that is coupled to the electrode arrangement (Thiers' "connector 1"). *See* §IX.B.1, IX.B.2.c, IX.B.7. POSAs would understand that Chen's

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that claims 10 and 20 are unpatentable under either construction and reserves all rights to argue for any claim construction in any other proceeding, including but not limited to any construction that may differ from the positions set forth herein.

"rechargeable battery 130," "charge controller 120," and associated wiring comprise charging circuitry. §IX.A.3; Ex1002, ¶¶144-145.

10. **[12]**

Chen combined with Thiers renders obvious claim 1 (§IX.B.2) and the limitations of claim 12. Ex1002, ¶¶146-147. Chen combined with Thiers teaches the electrode arrangement (Thiers' "connector 1") is configured to communicate power and one or more information signals. As discussed in §§IX.B.1 and IX.B.9, when modified, Thiers' central "**trace 32**" and outer "**traces 32**" are coupled to Chen's charging controller 120 and configured to communicate power to "rechargeable battery 130." Ex1005, [0027]-[0028]; Ex1002, ¶146.

Further, when combined with Chen, at least one of Thiers' outer "**traces 32**" function as an "antenna electrode to provide communication functions," including via "BLUETOOTH and WI-FI." Ex1005, [0031], [0011]-[0012]; Ex1002, ¶147; §IX.A.4. Chen teaches a "switching module" that can selectively "make the antenna electrode work as a charging electrode or as an antenna." Ex1005, [0017], [0012], [0020]. And Thiers teaches each of the traces in "connector 1" can "transmit data and power." Ex1008, Fig. 8, [0031], [0040]-[0043], [0055].

11. **[21]**

Chen combined with Thiers renders obvious claim 14 (§IX.B.2) and the limitations of claim 21. Ex1002, ¶¶148-152.

a. **[21a]**

Chen combined with Thiers teaches a first charging interface (Thiers' "traces 32" of "connector 1") comprising the electrode arrangement, wherein the circuitry (Chen's "rechargeable battery 130," "charge controller 120," and associated wiring) of the hearing device comprises charging circuitry coupled to the electrode arrangement. §§IX.B.2.c, IX.B.9; Ex1005, Figs. 5&6B&7A, [0027-28]; Cls. 1, 12. Thiers' "traces 32" are a "first charging interface" because, in the combination with Chen, they interface with Chen's "second charging module 260" and are coupled to the charging circuit used to charge Chen's "rechargeable battery 130." *Id.*; §§IX.B.1, IX.A.3; Ex1002, ¶149.

b. **[21b]**

Chen combined with Thiers teaches the charging interface of the charging module (Chen's electrodes 261-263 or Thiers' contacts 50) defines a second charging interface configured to detachably couple with the first charging interface (Thiers' "traces 32") of the hearing device. Ex1002, ¶150. Chen's electrodes 261-263 are a second charging interface and Thiers' contacts 50 are a second charging interface because either is configured to detachably couple with Thiers' "traces 32." §IX.B.1; Ex1002, ¶150; Ex1005, [0027]-[0028], [0030]-[0031]; Cls. 1, 6, 12, 15-16; Ex1008, Fig. 3, [0037]-[0038], [0045].

c. **[21c]**

Chen combined with Thiers teaches the charging module (Chen's "second charging module 260") further comprises charging circuitry (Chen's "battery charger 270") coupled to the second charging interface (Chen's electrodes 261-263 or Thiers' contacts 50). Ex1002, ¶151. POSAs would understand that the "battery charger 270" comprises charging circuitry. §IX.A.5.c. In the combination, Chen's electrodes 261-263 or Thiers' contacts 50 are coupled to Chen's "battery charger 270." §IX.B.1; Ex1005, Fig. 5&6B&7A, [0027-28].

d. **[21d]**

Chen combined with Thiers teaches the charging module (Chen's "second charging module 260") is configured to charge a rechargeable power source (Chen's "rechargeable battery 130") of the hearing device that is coupled to the first charging interface (Thiers' "traces 32"). Ex1002, ¶152. When Chen and Thiers are combined, Thiers' "traces 32" are coupled to Chen's "rechargeable battery 130," which is charged by "battery charger 270." Ex1005, Figs. 5&6B&7A; [0027-28]; §§IX.B.1, IX.B.9, IX.A.5.d.

C. Ground 3: Chen Combined With Thiers and Wagman Renders Obvious Claims 2-3, 15

Chen teaches a microphone 140 and speaker 145, but does not expressly teach the location of their ports in the earphone housing. Ex1005, [0025]. Wagman teaches a **microphone 535** port in the surface of the earbud (between contacts **510** and **515**)

and a **directional sound port 3020** on the end of the earbud that is inserted into the wearer's ear. Ex1009, 25:23-26, 40:65-67.

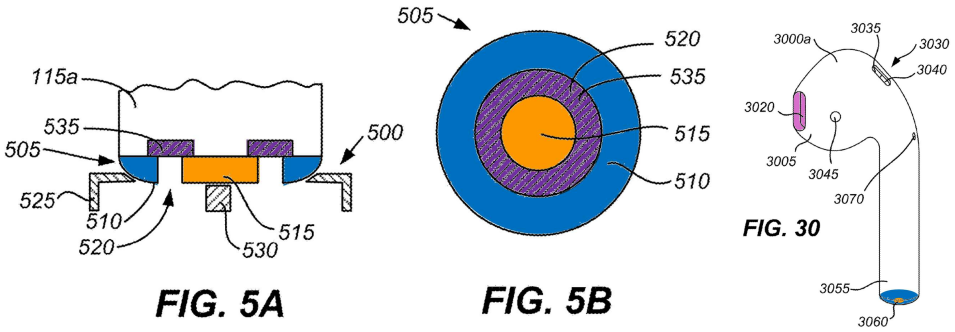
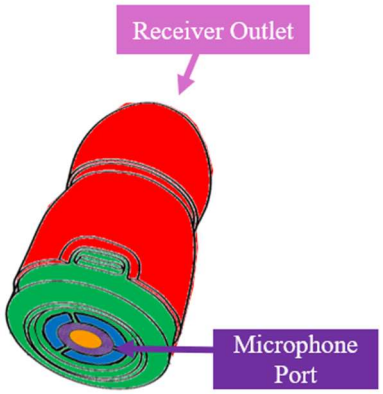


FIG. 5A FIG. 5B FIG. 30

POSAs would have been motivated to further modify the Chen-Thiers combination with these teachings from Wagman so that 1) microphone 140's port forms an opening in the faceplate between Thiers' central "trace 32" and outer "traces 32" and 2) speaker 145's port is on Chen's shell, which is inserted into a wearer's ear. Ex1002, ¶¶153-155. POSAs would have been motivated to position the microphone port on Chen's faceplate such that it faces outward, or away from the user's ear canal, to best capture environmental sound or the user's voice. Ex1002, ¶154. POSAs also would have been motivated to place the microphone between central "**trace 32**" and outer "**traces 32**", as taught by Wagman, because it is a space-efficient way to arrange the microphone port on the faceplate. Ex1002, ¶154. Further, POSAs would have been motivated to include a receiver port on Chen's shell, which is inserted into a wearer's ear, so that the wearer can clearly hear sound from the speaker 145. POSAs would have had a reasonable expectation of success

incorporating these features into Chen because Wagman demonstrates the feasibility of placing a microphone port between concentric charging contacts on a small earphone surface without compromising acoustic or electrical functions. Ex1002, ¶154. Implementing this design in Chen's earphone would have merely required applying a known arrangement to improve a similar device in the same way. Ex1002, ¶154.

Therefore, Chen combined with Thiers renders obvious claims 1 and 14 (§IX.B.2), and Chen combined with Thiers and Wagman teach a **microphone port** (port for "microphone 140") disposed in the outer surface of Chen's **faceplate** and a **receiver outlet** (port for "speaker 145") disposed in Chen's **shell**:



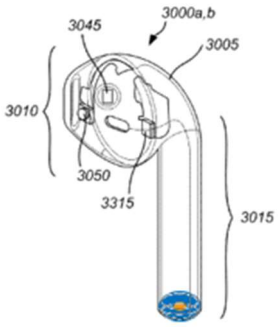
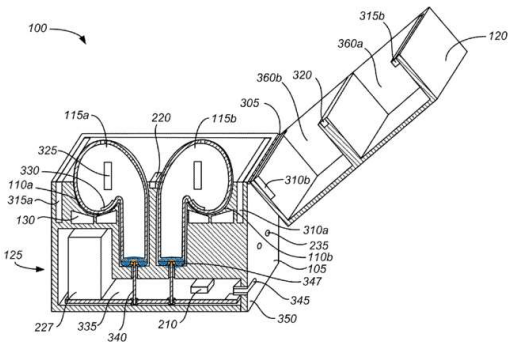
Ex1005, Fig. 7A(modified), [0025]; §§IX.B.1, IX.A.1.c-d; Ex1002, ¶155.

D. Ground 4: Chen Combined With Wagman Renders Obvious Claims 1-21

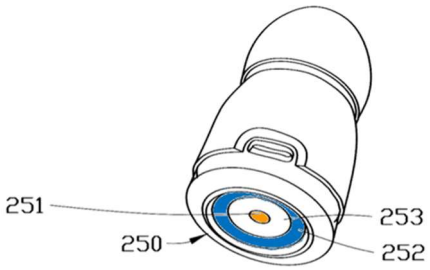
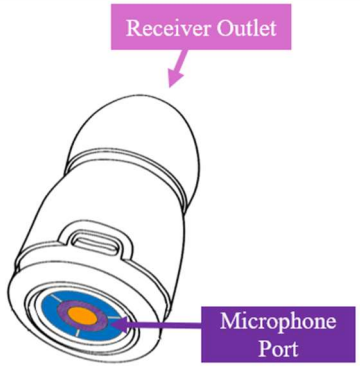
1. Motivation to Combine

POSAs would have been motivated to combine Chen and Wagman. Ex1002, ¶¶156-170. Wagman teaches a wireless earbud with an electrode arrangement

including a **central contact** surrounded by one or more **outer arcuate contacts** and a case with electrical contacts that interface with them, as shown below. *See e.g.*, Ex1009, 24:56-65, 25:9-49, claims 1-17.

Ex1009, Fig. 33	Ex1009, Fig. 3
	

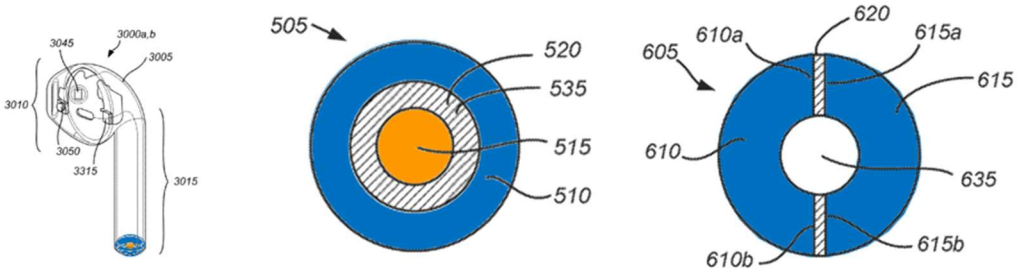
POSAs would have been motivated to modify the electrical interface between Chen's earphones 300 and case 20 with a **central contact** surrounded by three **outer arcuate contacts**, as taught by Wagman. Ex1002, ¶157. Further, Wagman teaches a **microphone port** (*e.g.*, 535, 635) arranged between the **central** and **outer contacts**, as well as a **receiver outlet** 3020 on the end of the earbud inserted into a wearer's ear. Ex1009, Cls. 7&12, 25:23-26, 40:65-67, Figs. 5-5B&30. POSAs would have been motivated to combine these features with Chen, as shown below:

Chen	Wagman	Chen+Wagman
		

Ex1005, Fig. 7A(excerpted); Ex1009, 5B(modified), 5A(modified); Ex1005, Fig. 7A(modified); Ex1002, ¶157.

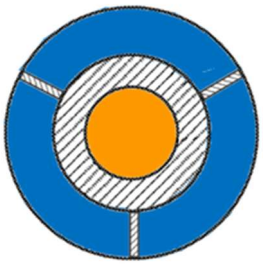
a. **Charging Interface**

Wagman teaches several arrangements of electrical contacts, including arrangements with a **central contact**, and arrangements with one or more **outer arcuate contacts**:



Ex1009, Figs. 33, 5B, 6B(excerpted); *id.*, 24:56-65, 25:9-49, claims 1-17, Figs. 4A-6B, 8A-8B, 36-40; Ex1002, ¶¶158-167. The figures above show two electrical contacts, but Wagman teaches that, "[i]n various embodiments other connector configurations can be used that have ***more than two contacts***." Ex1009, 24:63-65. Wagman further explains that, "[w]hile FIG. 6B [(above on the right)] illustrates

each of **contacts 610**, 615 as half rings, in other embodiments the contacts ***can include shorter length arcs*** and/or have different opposing shapes altogether." *Id.* 25:46-49. Wagman teaches that one reason for these additional contacts is so that "separate power and data contacts can be used" rather than running power and data through the same contacts. Ex1009, 20:49-55. Wagman thus teaches or at least suggests an electrode configuration with **three arcuate contacts** surrounding a **central contact**: [5]



Ex1009, Fig. 5B(modified); Ex1002, ¶¶158-159.

POSAs would have been motivated to modify Chen to use Wagman's electrode arrangement, as shown below:

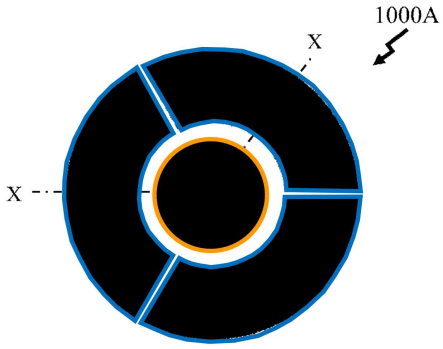
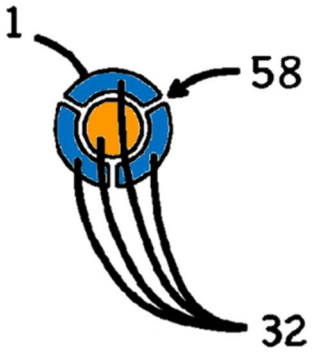


[5] Throughout Ground 4, the numeral "**510'**" references the contacts created by dividing Wagman's earbud contact 510 into three contacts.

Ex1005, Fig. 7A(modified). When combined, the modified electrode arrangement would be coupled to the internal circuitry of Chen's earphones to perform charging and data transfer functions. Ex1002, ¶160.

POSAs would have been motivated to make this modification for the known advantages of increasing the number of contacts in power and data transmission. §§IX.B.1, V; Ex1002, ¶¶161, 55-62. Wagman's electrode arrangement is a space-efficient way of increasing the number of electrical contacts (from two to four) between Chen's earphones 300 and case 20. Ex1002, ¶161. For example, this would allow "separate power and data contacts [to] be used," rather than running power and data through a single contact, as taught by Wagman. Ex1009, 20:49-55.

POSAs also would have been motivated to modify Chen's electrode arrangement because electrode arrangements with a central contact surrounded by a plurality of arcuate contacts were widely used in power and data transmission applications in the prior art. Ex1002, ¶162; §V. For example, Thiers and Murison (Ex1014) propose use of an arrangement with three outer arcuate contacts for charging electronic devices:

Ex1014, Fig. 10(excerpted)	Ex1008, Fig. 3(excerpted)
	

The broad use of this electrode arrangement in the prior art would have also given POSAs a reasonable expectation of success. Ex1002, ¶163. Further, Chen's and Wagman's electrodes have similar geometry: a central electrode surrounded by one or more arcuate electrodes arranged in a circle. Ex1002, ¶163. And because the underlying contact architecture is physically compatible, the substitution does not require redesigning the housing, internal wiring paths, or charging-circuit topology. Ex1002, ¶163. Substituting Chen's electrodes with Wagman's would have merely involved using a known technique (dividing an annular ring contact into several arcuate contacts) to improve a similar device in the same way. Ex1002, ¶163.

POSAs would have understood that Wagman's central **contact 515** and three outer arcuate **contacts 510'** would be compatible with Chen's dock electrodes 261-263 or, alternatively, "contact 525" and "contact 530" on Wagman's "connector 500" (*i.e.*, the charging interface on the charging module of both references), and would have been motivated to use either charging interface in the combination. Ex1002, ¶¶164-165. For example, interfacing Wagman's **contact 515** and three

outer **contacts 510'** with Chen's "second charging module 260" would ensure central **contact 515** always contacts middle "electrode 261" and at least one outer **contact 510'** always contacts outer "electrode 262" or "electrode 263." Ex1005, Figs. 7A; [0027]-[0028], [0031]; Ex1002, ¶¶164-165. Alternatively, POSAs would have been motivated to substitute Chen's charging electrodes 261-263 with Wagman's charging "connector 500," which includes "**contact 525**" and "**contact 530**" because it is designed for use with Wagman's electrode arrangement having central **contact 515** and outer **contact 510**:

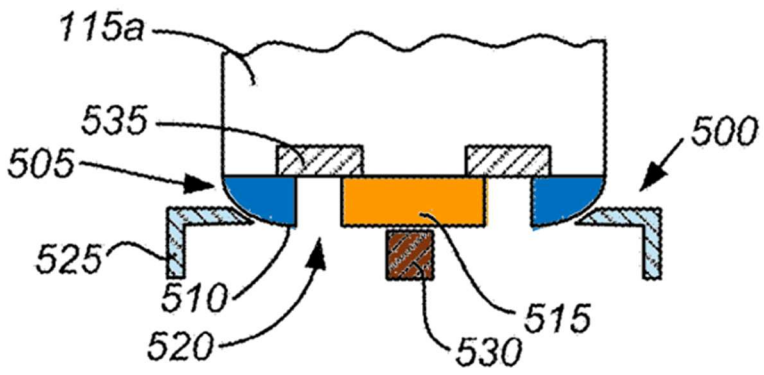


FIG. 5A

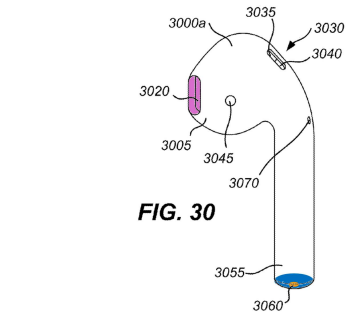
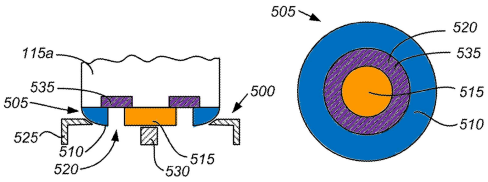
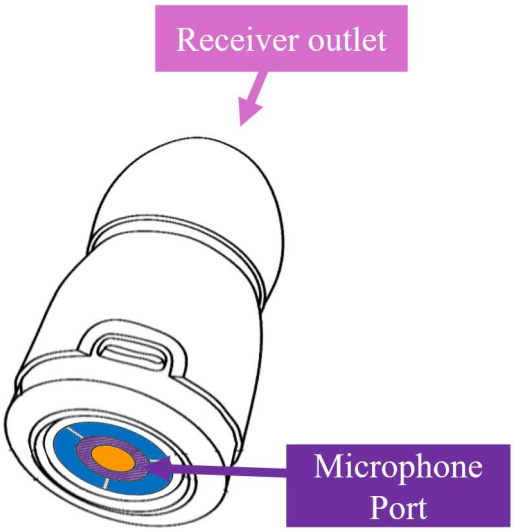
Ex1009, Fig. 5A, 25:9-27; Ex1002, ¶¶164-165. POSAs also would have been motivated to divide Wagman's **contact 525** into three segments so that they correspond and align with the three arcuate contacts formed by dividing Wagman's **contact 510**, as described above. Ex1002, ¶166. For example, Thiers teaches this is beneficial so that there are distinct "electrical paths…from each respective contact [on the charger] to each corresponding trace" on the device. Ex1008, [0043-45].

POSAs would have recognized these were alternative design choices that POSAs would have been motivated to use depending upon the application (*e.g.*, how many independent data/power lines might be desired). Ex1002, ¶166.

POSAs would have had a reasonable expectation of success implementing any of these design choices, particularly because Wagman had already demonstrated a charging interface with a ring-central contact arrangement and Thiers had already successfully implemented one with four contacts on each side. §IX.B.2.d. When modified, this interface would be coupled to the internal circuitry of Chen's "second charging module 260" to perform charging and data transfer functions. Ex1002, ¶167.

b. **Microphone and Receiver**

Chen teaches a microphone 140 and speaker 145, but does not expressly teach the location of their ports in the earphone housing. Ex1005, [0025]. For the same reasons provided in Ground 3 (§IX.C), POSAs would have been motivated to modify Chen so that 1) microphone 140's **port** forms an opening in the faceplate between Wagman's **outer contacts** and **central contact** and 2) its speaker 145 **outlet** is on Chen's shell, as taught by Wagman. Ex1002, ¶¶168-170.

Wagman	Chen + Wagman
 FIG. 30  FIG. 5A FIG. 5B	

Ex1009, Figs. 30&5A-5B(excerpted); Ex1005, Fig. 2(modified).

2. **[1]/[14]**

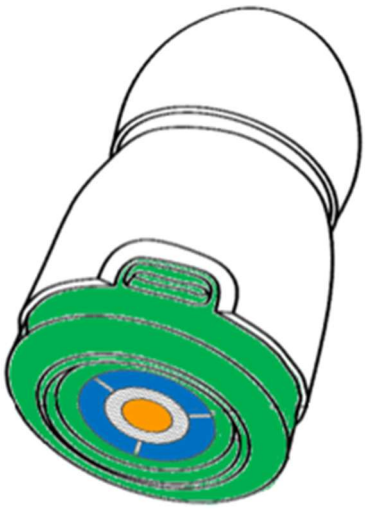
a. **[1pre]/[14a]/[1a]/[14b]/[1b]/[14c]/[1c]/[14d]/[14pre]**

Chen teaches these limitations and Chen combined with Wagman teaches these limitations. §§IX.A.1.a-d, IX.A.1.g; Ex1002, ¶171.

b. **[1d]/[14e]**

Chen teaches these limitations and Chen combined with Wagman teaches these limitations. Ex1002, ¶172; §IX.A.1.e. Chen combined with Wagman teaches or renders obvious an electrode arrangement (Wagman's **contacts 510'** and **contact 515**) disposed in an outer surface of the faceplate (Chen's **faceplate**), the electrode arrangement comprising a central contact (**contact 515**) and an annular ring contact surrounding the central contact or a plurality of contacts (**contacts 510'**) surrounding

the central contact, wherein the central contact and the annular ring contact or the plurality of contacts form at least a portion of an exterior surface of the hearing device:



Ex1005, Fig. 7A(modified); §§IX.D.1.a, IX.A.1.d. Wagman further teaches its contacts are "flush with an exterior surface" of the housing. Ex1009, Cls. 2&4, 26:9-13, 28:37-40, 29:1-4. Alternatively, Wagman's "ring **contact 510**" (undivided) is an annular ring contact because it is "ring shaped." Ex1009, 25:41-49, Fig. 5B.

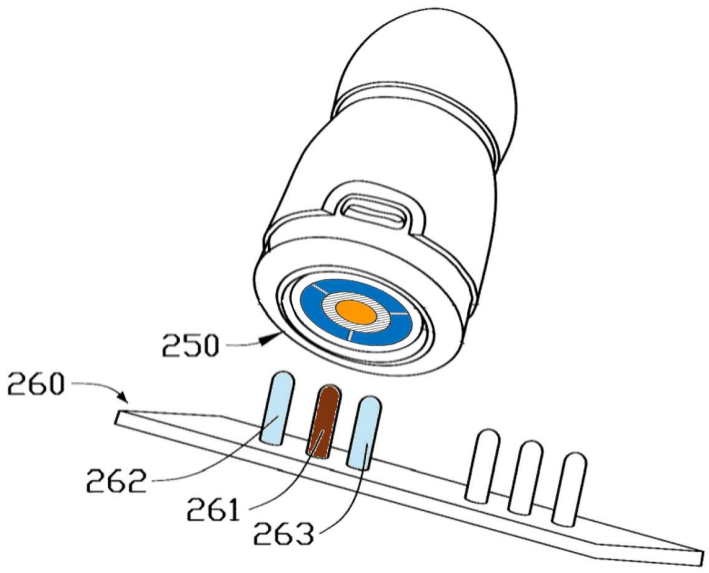
c. **[1e]/[14f]**

Chen teaches these limitations and Chen combined with Wagman teaches these limitations. Ex1002, ¶173; §IX.A.1.f. Chen combined with Wagman has circuitry (Chen's "rechargeable battery 130," "charge controller 120," and associated wiring) disposed in the internal volume (space within Chen's "device housing") and coupled to the electrode arrangement (Wagman's three arcuate contacts and central contact). §§IX.D.1.a, IX.A.1.b.

d. **[14g]**

Chen teaches these limitations and Chen combined with Wagman teaches these limitations. Ex1002, ¶¶174-176; §IX.A.1.h. Chen combined with Wagman has a charging module (Chen's "second charging module 260") comprising a charging interface (Chen's electrodes **261**-263 or Wagman's **contact 530** and contact(s) 525) that comprises a central charging contact and an annular ring charging contact or a plurality of charging contacts surrounding the central contact. Ex1009, Fig. 2&3&5A, 19:4-30, 20:44-21:11. This limitation is met by several teachings from these references. §IX.D.1.a.

For example, Chen's electrodes 261-263 comprise a central charging contact ("**electrode 261**") and a plurality of charging contacts ("electrode 262" and "electrode 263") that surround the central contact (Wagman's "**contact 515**"), at least when Chen's earphones are docked:



Ex1005, Fig. 7A(modified); Ex1002, ¶175. "**Electrode 262**" and "**electrode 263**" also surround "**electrode 261**," as shown in Fig. 7A. §IX.A.1.h.

Alternatively, if Chen's electrodes 261-263 are substituted with Wagman's connector 500 (§IX.D.1.a), Wagman's **contact 530** is a central charging contact and its **contact 525** is an annular ring charging contact, as illustrated in the cross-sectional view in Wagman's Fig. 5A:

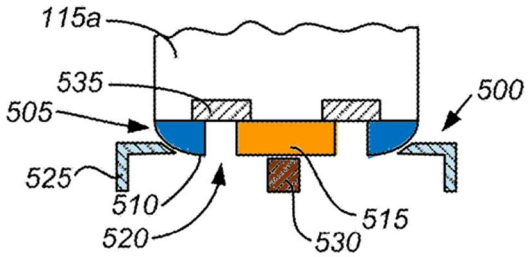
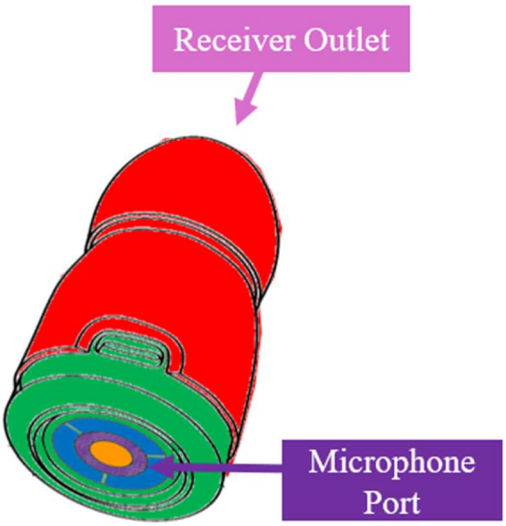


FIG. 5A

Ex1009, Fig. 5A, 25:9-27; Ex1002, ¶176. Similarly, when Wagman's **contact 525** is divided into three segments (§IX.D.1.a), they are a plurality of charging contacts (Wagman's modified **contacts 525**) that surround Wagman's **contact 515** and **contact 530** when the earphones are docked, as illustrated above. Ex1002, ¶176.

3. **[2]/[3]/[15]**

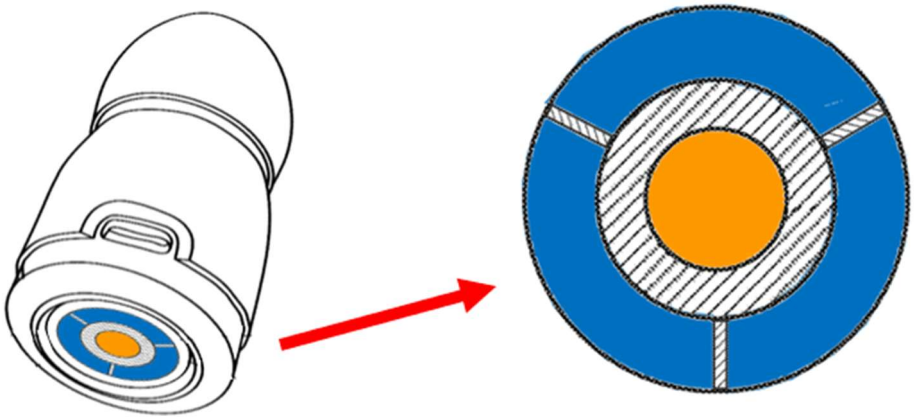
Chen combined with Wagman renders obvious claims 1 and 14 (§IX.D.2), and the limitations of these claims. Ex1002, ¶¶177-178. Chen combined with Wagman discloses a microphone port (port for "**microphone 140**") disposed in the outer surface of Chen's **faceplate** and a receiver outlet (outlet for "**speaker 145**") disposed in Chen's **shell**:



Ex1005, Fig. 7A(modified), [0025]; §§IX.D.1.b; IX.A.1.c-d.

4. **[4]/[16]**

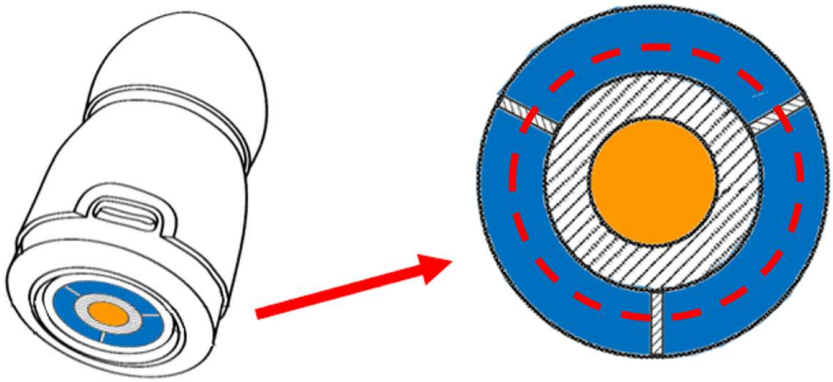
Chen combined with Wagman renders obvious claims 1 and 14 (§IX.D.2), and the limitations of these claims. Ex1002, ¶179. Wagman teaches the electrode arrangement comprises the plurality of contacts (Wagman's **contacts 510'**), as does its combination with Chen:



Ex1005, Fig. 7A(modified); Ex1009, Fig. 5B(modified); §IX.D.1.a; Ex1009, 24:63-65, 25:46-49, 20:49-55.

5. **[5]/[17]/[6]/[18]/[7]**

Chen combined with Wagman renders obvious claims 4 and 16 (§IX.D.4) and the limitations of these claims. Ex1002, ¶¶180-181. Wagman (and its combination with Chen) teaches **(1)** that each of the plurality of contacts (Wagman's **contacts 510'**) is arranged the same distance from the central contact (Wagman's **contact 515**) as each other contact of the plurality of contacts; **(2)** the plurality of contacts (Wagman's **contacts 510'**) defines a circle; and **(3)** each of the plurality of contacts comprises a curvilinear, annular, oval, elliptical, or polygonal shape:

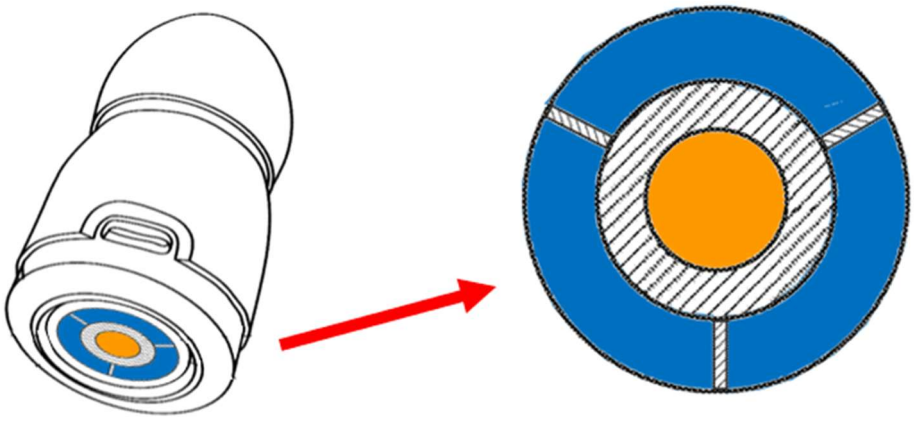


Ex1005, Fig. 7A(modified); Ex1009, Fig. 5B(modified). As illustrated above, the **contacts 510'** define a circle, and each **contact 510'** is curvilinear in shape and the same distance to **contact 515** as every other **contact 510'**. §IX.D.2.d; Ex1002, ¶181; Ex1009, 25:9-49.

6. **[8]/[19]**

Chen combined with Wagman renders obvious claims 4 and 16 (§IX.D.4) and the limitations of these claims. Ex1002, ¶¶182-183. Wagman teaches the plurality

of contacts comprises three arcuate contacts (Wagman's **contacts 510'**) each arranged at substantially the same distance from the central contact (Wagman's **contact 515**), as does its combination with Chen:



Ex1005, Fig. 7A(modified); Ex1009, Fig. 5B(modified). Wagman teaches that **contact 515** is "circular" and **contact 510** (undivided) is "ring shaped". Ex1009, Fig. 5B, 25:13-21; §IX.D.5. Wagman further teaches its contacts have "an arcuate peripheral contact surface," which "enable[s] a wiping motion each time the earbuds are inserted…creating a reliable interconnect." Ex1009, Cls. 2&4, 26:9-13, 28:37-40, 29:1-4. Each outer **contact 510'** is also arcuate because it is a 120-degree arc. Ex1002, ¶183.

7. **[9]**

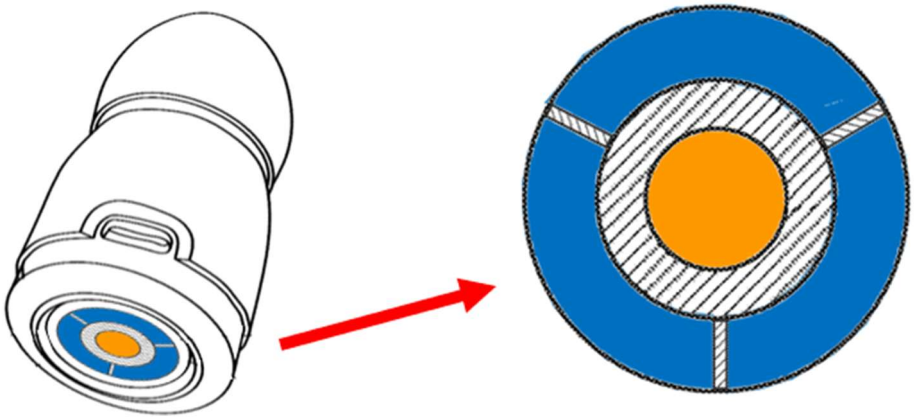
Chen combined with Wagman renders obvious claim 4 (§IX.D.4) and the limitations of claim 9. Ex1002, ¶¶184-185. Chen combined with Wagman teaches the central contact (Wagman's "**contact 515**") defines a cathode contact and the at

least one contact of the plurality of contacts (Wagman's "**contacts 510'**") define an anode contact.

As explained in §IX.B.7, Chen teaches an embodiment in which central "**first charging electrode 251**" is a cathode and surrounding "**second charging electrode 252**" is an anode and POSAs would be motivated to maintain that arrangement in the combination with Wagman. Ex1002, ¶185. And at a minimum, it would have been obvious to try because it was one of a finite number of arrangements of cathode and anode contacts. Ex1002, ¶185.

8. **[10]/[20]**

Chen combined with Wagman renders obvious claims 1 and 14 (§IX.D.2), and the limitations of these claims. Ex1002, ¶186. Wagman (and its combination with Chen) teaches the electrode arrangement comprises the annular ring contact (Wagman's **contacts 510'**) surrounding the central contact (Wagman's **contact 515**), at least to the extent that this claim encompasses a plurality of arcuate contacts which collectively form an annular ring:



Ex1005, Fig. 7A(modified); Ex1009, Fig. 5B(modified); §IX.D.1.a. Wagman describes its divided ring contacts as partially "annular." Ex1009, Fig. 6B, 9:28-49, 25:41-49, Cl. 8. Alternatively, Wagman's "ring **contact 510**" (undivided) is an annular ring contact because it is "ring shaped." Ex1009, 25:41-49, Fig. 5B.

9. **[11]**

Chen combined with Wagman renders obvious claim 1 (§IX.D.2) and the limitations of claim 11. Ex1002, ¶187. Chen combined with Wagman has charging circuitry (Chen's "rechargeable battery 130," "charge controller 120," and associated wiring) that is coupled to the electrode arrangement (Wagman's **contacts 510'** and **contact 515**). *See* §§IX.D.1.a, IX.D.2.c, IX.D.7. POSAs would understand that Chen's "rechargeable battery 130," "charge controller 120," and associated wiring comprise charging circuitry. §IX.A.3; Ex1002, ¶187.

10. **[12]**

Chen combined with Wagman renders obvious claim 1 (§IX.D.2) and the limitations of claim 12. Ex1002, ¶¶188-189. Chen combined with Wagman teaches the electrode arrangement (Wagman's **contacts 510'** and **contact 515**) is configured to communicate power and one or more information signals. As discussed in §IX.D.9, when modified, Wagman's **contacts 510'** and **contact 515** are coupled to Chen's charging controller 120 and configured to communicate power to "rechargeable battery 130." Ex1005, [0027]-[0028]; Ex1002, ¶188.

Further, when combined with Chen, at least one of Wagman's **contacts 510'** function as "[an] antenna electrode to provide communication functions," including via "BLUETOOTH and WI-FI." Ex1005, [0031], [0011]-[0012]; Ex1002, ¶189; §IX.A.4. Chen teaches a "switching module" that can selectively "make the antenna electrode work as a charging electrode or as an antenna." Ex1005, [0017], [0012], [0020]; §IX.D.2. Further, Wagman's **contacts 510'** can "carry[] both power and data signals." Ex1009, 20:49-55, 24:40-42.

11. **[13]**

Chen combined with Wagman renders obvious claim 1 (§IX.D.2) and the limitations of claim 13. Ex1002, ¶190. Chen combined with Wagman renders obvious the central contact (Wagman's **contact 515**) comprises a central contact surface and the annular ring contact or the plurality of contacts (Wagman's **contacts 510'**) comprises a contact surface, wherein one of the central contact surface and the contact surface of the annular ring contact or the plurality of contacts is recessed relative to the other. Wagman teaches "preloading one of [the] contacts" of the earbud or charging case "at a different height than the other (e.g., sequential contacts)." Ex1009, 26:41-44, 28:42-43. Wagman teaches this arrangement "can be useful...to make a ground connection to the earbud first before making an active electrical connection with it." *Id.* 26:44-47, 28:43-45. The '031 Patent describes the same motivation for this design. Ex1001, 9:35-38 ("connecting the cathodes of the

hearing devices and charger fixture prior to connecting the anodes can serve to establish a ground.") POSAs would have been motivated to recess Wagman's **contact 515** and **contacts 510'** relative to one another to make a ground connection between Chen's earphone and case before making an active electrical connection, as taught by Wagman. And POSAs would have had a reasonable expectation of success because Wagman already demonstrated the feasibility of contacts arranged at different relative depths and implementing this design in Chen would merely involve improving a similar device in the same way. Ex1002, ¶190.

12. **[21]**

Chen combined with Wagman renders obvious claim 14 (§IX.D.2) and the limitations of claim 21. Ex1002, ¶¶191-195.

a. **[21a]**

Chen combined with Wagman teaches a first charging interface (Wagman's **contacts 510'** and **contact 515**) comprising the electrode arrangement, wherein the circuitry (Chen's "rechargeable battery 130," "charge controller 120," and associated wiring) of the hearing device comprises charging circuitry coupled to the electrode arrangement. §§IX.D.2.c, IX.B.9; Ex1005, Figs. 5&6B&7A, [0027-28]; *id.* Cls. 1, 12; Ex1002, ¶192. Wagman's **contacts 510'** and **contact 515** are a "first charging interface" because they interface with Chen's "second charging module

260" and are coupled to the charging circuit used to charge Chen's "rechargeable battery 130." *Id.*; §IX.D.1.a; Ex1002, ¶192.

b. **[21b]**

Chen combined with Wagman teaches the charging interface of the charging module (Chen's electrodes **261**-263 or Wagman's **contact 530** and contact(s) 525) defines a second charging interface configured to detachably couple with the first charging interface (Wagman's **contacts 510'** and **contact 515**) of the hearing device. Ex1002, ¶193. Chen's electrodes **261**-263 are a second charging interface and Wagman's **contact 530** and contact(s) 525 are a second charging interface because either is configured to detachably couple with Wagman's **contacts 510'** and **contact 515**. Ex1005, Fig. 5&6B&7A, [0027]-[0028], [0030]-[0031]; Cls. 1, 6, 12, 15-16; Ex1009, Fig. 2, 19:22-27, 25:18-23; §IX.D.1.a.

c. **[21c]**

Chen combined with Wagman teaches the charging module (Chen's "second charging module 260") further comprises charging circuitry (Chen's "battery charger 270") coupled to the second charging interface (Chen's electrodes **261**-263 or Wagman's **contact 530** and contact(s) 525). Ex1002, ¶194. POSAs would understand that the "battery charger 270" comprises charging circuitry. §IX.A.5.c. In the combination, Chen's electrodes **261**-263 or Wagman's **contact 530** and

contact(s) 525 are coupled to Chen's "battery charger 270". §IX.D.1.a, Ex1005, Figs. 5&6B&7A; [0027-28].

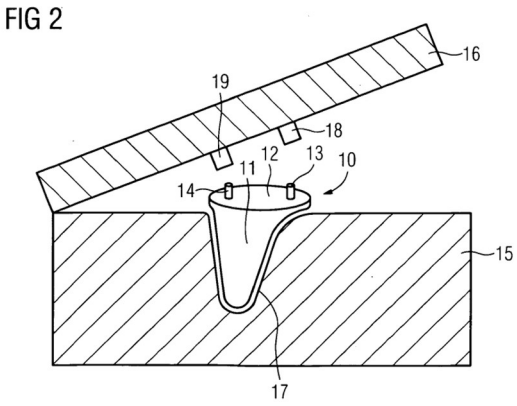
d. **[21d]**

Chen combined with Wagman teaches the charging module (Chen's "second charging module 260") is configured to charge a rechargeable power source (Chen's "rechargeable battery 130") of the hearing device that is coupled to the first charging interface (Wagman's **contacts 510'** and **contact 515**). Ex1002, ¶195. When Chen and Wagman are combined, Wagman's **contacts 510'** and **contact 515** are coupled to Chen's "rechargeable battery 130," which is charged by "battery charger 270." Ex1005, Figs. 5&6B&7A; *id.* [0027-28]; §§IX.D.9-10, IX.D.2.d, IX.D.1.a.

E. Ground 5: Dannemann Combined With Thiers Renders Obvious Claims 1, 4-12, 14, 16-21

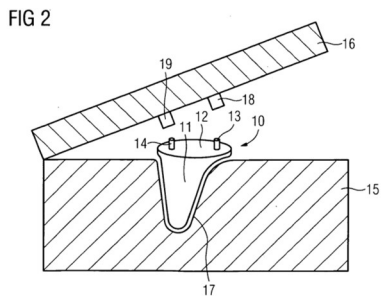
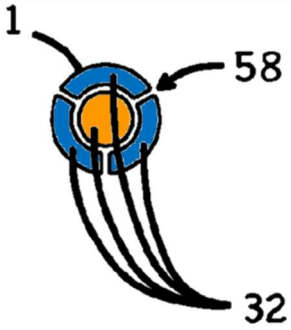
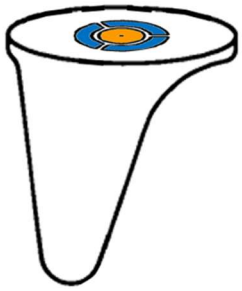
1. Motivation to Combine

POSAs would have been motivated to combine Dannemann and Thiers. Ex1002, ¶¶196-202. Dannemann discloses an ITE hearing device with two charging contacts 13, 14 arranged on the faceplate 12, which are connected to an integrated accumulator (battery) for recharging. Ex1006, [0027].



Ex1006, Fig. 2.

POSAs would have been motivated to substitute Dannemann's charging interface with Thiers' charging interface:

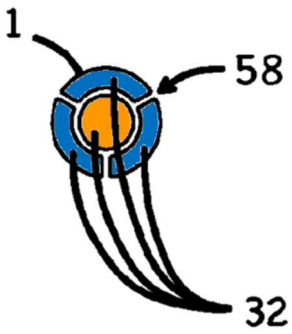
Dannemann	Thiers	Dannemann+Thiers
		

Ex1006, Fig. 2; Ex1008, Fig. 3(excerpted); Ex1006, Fig. 2(modified); Ex1002, ¶¶196-197.

POSAs would have been motivated to make this modification given the known advantages of increasing the number of contacts in power and data transmission. §§IX.B.1, V; Ex1002, ¶¶198, 55-62. Dannemann itself acknowledges these advantages, expressly contemplating that its charging device "may however

also be equipped with more than two positioning units 20, 21, in order to produce additional contacts to the hearing device for signal transmissions for instance." Ex1006, [0033]. POSAs reading Dannemann would therefore have understood that there was a recognized need for additional electrical contacts at the hearing-device-to-charger interface, and would have been motivated to look to the prior art for a space-efficient multi-contact solution suitable for the constrained form factor of an ITE hearing device faceplate. Ex1002, ¶198.

Thiers provides that solution. Thiers teaches that there was a "need in the art for a connecting system for an electronic device that allows a conductor dense connection…" but which "provides the same speed of charging and data transmission." Ex1008, [0013]. Thiers teaches that dense, multi-contact connectors were also desirable because the "consumer electronic industry is moving toward fewer connector ports on devices by combining the functions of what previously took multiple connectors into one," including "data and power" transmission. *Id.* [0002], [0006]. POSAs would have understood that a charging interface with Thiers' four contacts (central "**trace 32**" and outer "**traces 32**") had known advantages over a two-contact interface, like the one disclosed by Dannemann. Ex1008, [0043], [0048]; Ex1002, ¶¶199, 55-62.



Ex1008, Fig. 3(excerpted).

POSAs would have been motivated to substitute Dannemann's two-contact charging interface (charging contacts 13, 14) with Thiers' four-trace concentric configuration and to couple Thiers' electrode arrangement to Dannemann's internal accumulator circuitry. Ex1002, ¶200. This modification would have been prompted by several converging design incentives recognized by POSAs. First, because Dannemann's faceplate presents a circular geometry, a concentric trace arrangement of the type taught by Thiers is a geometrically natural solution: it exploits the rotational symmetry of the circular faceplate surface, ensuring reliable contact with the charging device regardless of the angular orientation of the hearing device when it is inserted into the charging cradle. Ex1002, ¶200. Second, expanding Dannemann's two-contact interface to Thiers's four-trace arrangement would have provided additional electrical paths for power delivery and signal transmission—an advantage that Dannemann itself contemplated. Ex1006, [0033]; Ex1002, ¶200. Third, Thiers's concentric configuration achieves this increase in electrical paths

within the same limited surface area, making it particularly well-suited for the constrained form factor of a hearing-device faceplate where space is at a premium. Ex1008, [0044]; Ex1002, ¶200.

POSAs would have been motivated to substitute the charging interface on Dannemann's "charging device" with four charging "contacts 50" from Thiers' "dock interface assembly 40" and couple them to the charging circuitry of the "charging device" for the same reasons. Ex1002, ¶201. Thiers' "dock interface assembly 40" provides a compatible charger-side electrode configuration for use with the device-side electrode arrangement described above. Ex1008, [0037-38], [0043-44], Fig. 2. For example, POSAs would be motivated to align four "contacts 50" from Thiers' "dock interface assembly 40" with the four "traces 32" from "connector 1" to provide four distinct "electrical path[s]…from each respective contact 50 to each corresponding trace 32" for the reasons stated above. Ex1002, ¶201; Ex1008, [0043-45].

POSAs would have had a reasonable expectation of success in making this combination. Ex1002, ¶202. Thiers states its charging system applies "generally to electronic devices," which includes electronic hearing devices like those disclosed by Dannemann. Ex1008, [0001]. And both Dannemann and Thiers employ the same fundamental contact architecture—electrodes arranged around a central axis for delivering electrical power through a detachable interface. Ex1002, ¶202.

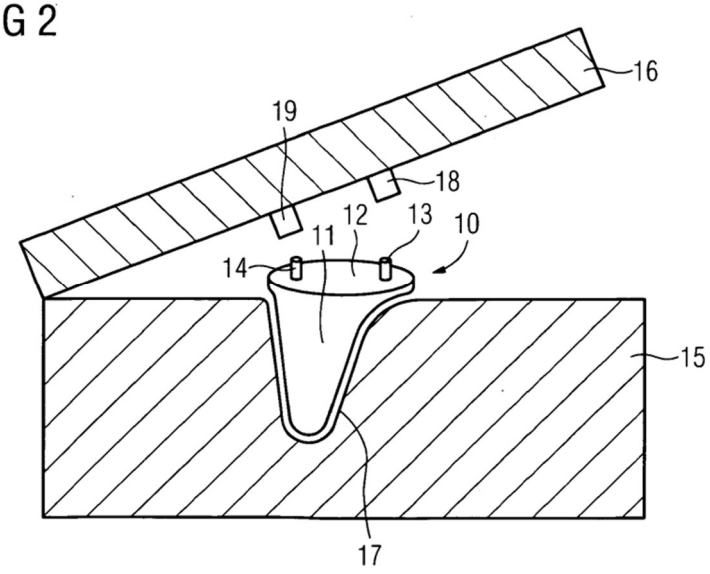
Dannemann's existing two contacts 13, 14 are already arranged on the circular faceplate surface in a manner compatible with a concentric geometry; incorporating additional concentric traces and nonconductive separating spaces from Thiers into that same faceplate surface would have amounted to no more than using a known technique to improve a similar technology in the same way. Ex1002, ¶202. POSAs would be motivated to rely on Dannemann's existing accumulator and internal wiring architecture to route the additional electrical paths provided by Thiers' configuration because Dannemann already teaches that electricity is routed from the contact surfaces through the charging contacts to the integrated accumulator. Ex1006, [0031]; Ex1002, ¶202. No undue experimentation or inventive ingenuity beyond ordinary skill would have been required; the combination merely applies well-known concentric electrode geometry—widely used across the electronic-device charging art—to a hearing device that already uses electrode-based charging at its faceplate. Ex1002, ¶202.

2. **[1]/[14]**

a. **[1pre]/[14a]**

Dannemann teaches these limitations and Dannemann combined with Thiers teaches these limitations. Ex1002, ¶¶203-204. Dannemann teaches a hearing device ("ITE hearing device 10"):

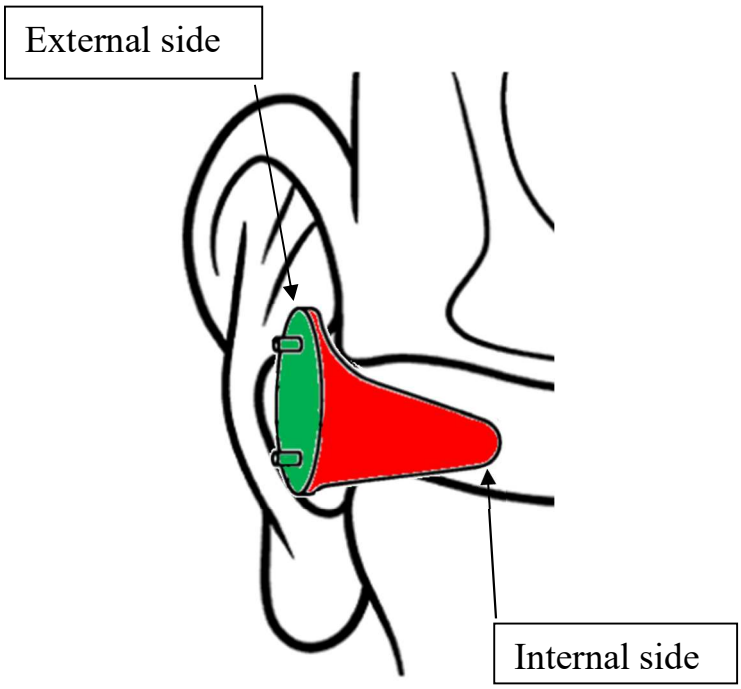
FIG 2



Ex1006, Fig. 2; [0003]-[0004], [0027]. Dannemann teaches that "[h]earing devices are wearable hearing apparatuses which are used to assist the hard-of-hearing." Ex1006, [0003]-[0004].

b. **[1a]/[14b]**

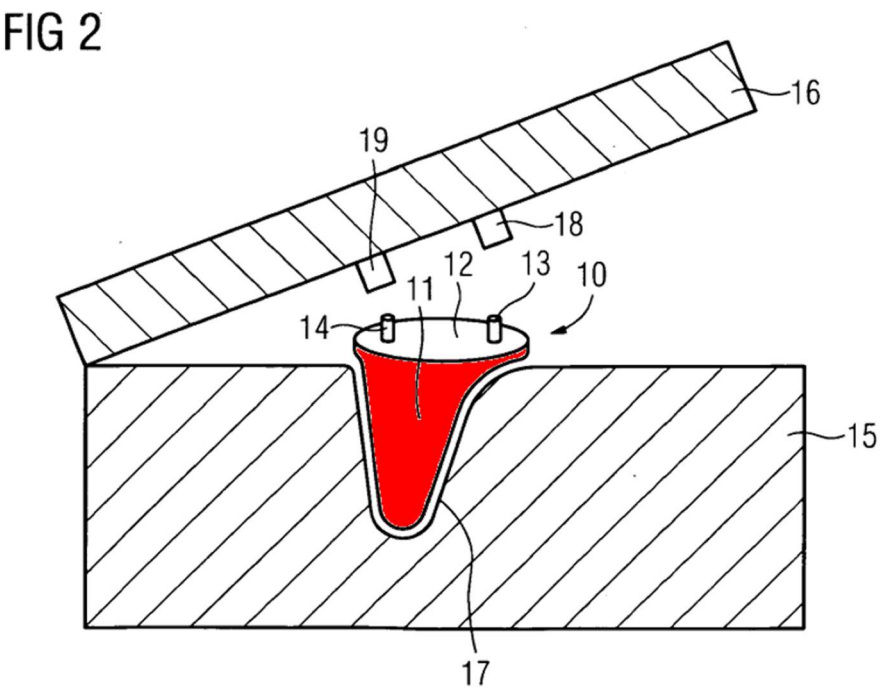
Dannemann teaches these limitations and Dannemann combined with Thiers teaches these limitations. Ex1002, ¶205. Dannemann teaches a housing ("**ITE shell 11**" and "**faceplate 12**") that encloses an internal volume (space within "**ITE shell 11**" and "**faceplate 12**") and extends from an internal side (ear-facing surface) to an external side (outward-facing surface):



Ex1006, Fig. 2, [0027]; Ex1002, ¶205.

c. **[1b]/[14c]**

Dannemann teaches these limitations and Dannemann combined with Thiers teaches these limitations. Ex1002, ¶¶206-207. Dannemann teaches a shell ("**ITE shell 11**") arranged at the internal side (ear-facing surface), and the internal side (ear-facing surface) is configured to be inserted in the wearer's ear canal:



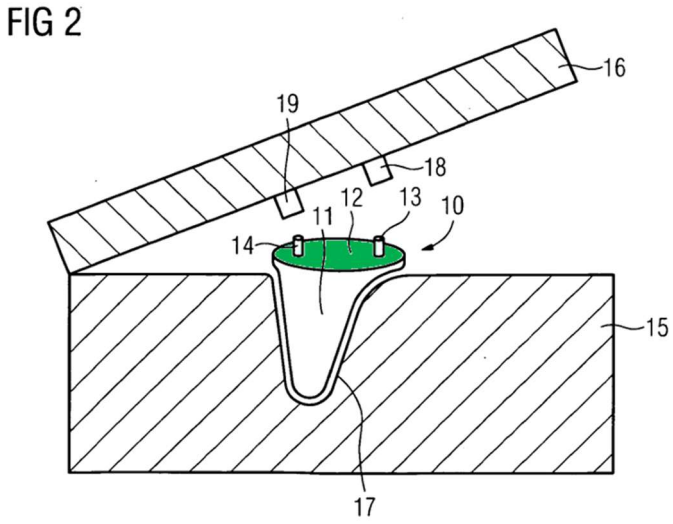
Ex1006, Fig. 2, [0027].

Dannemann's "**ITE shell 11**" is "individually manufactured" and "individually molded" to fit into a wearer's ear canal. Ex1006, Fig. 2; [0019], [0027]-[0028]. Dannemann teaches that "in-the-ear (ITE) hearing devices," like "**ITE shell 11**," are "worn…in the auditory canal" and thus "have an individually shaped hearing device shell" that is "individually produced for the hearing device wearer." Ex1006, [0003], [0005], [0006].

d. **[1c]/[14d]**

Dannemann teaches these limitations and Dannemann combined with Thiers teaches these limitations. Ex1002, ¶¶208-209. Dannemann teaches a faceplate

("**faceplate 12**") arranged at the external side (outward-facing surface), and the external side (outward-facing surface) is configured to face away from the wearer:



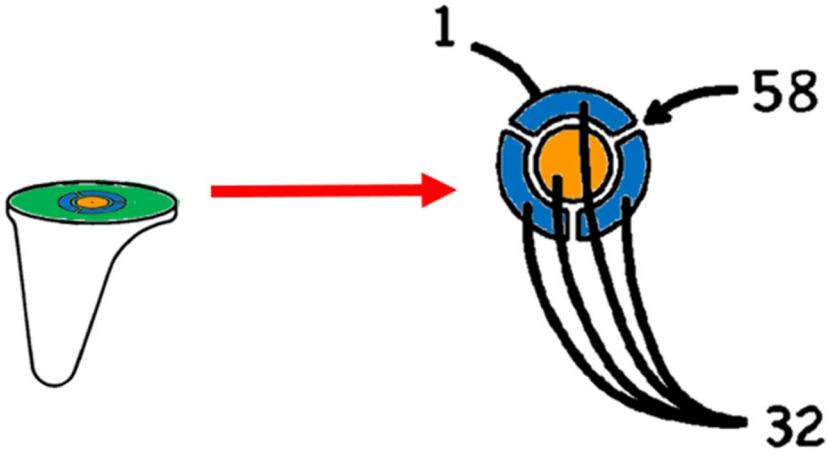
Ex1006, Fig. 2, [0027].

Because the "outward-facing surface" is opposite of the end that is configured to be inserted into a wearer's ear canal, the "outward-facing surface" is configured to face away from the wearer. Ex1006, Fig. 2, [0027]-[0028]; Ex1002, ¶209.

e. **[1d]/[14e]**

Dannemann combined with Thiers teaches these limitations. Ex1002, ¶¶210-211. Dannemann combined with Thiers has an electrode arrangement (Thiers' "connector 1") disposed in an outer surface of the faceplate (Dannemann's "**faceplate 12**"), the electrode arrangement comprising a central contact (Thiers' central "**trace 32**") and an annular ring contact surrounding the central contact or a plurality of contacts (Thiers' outer "**traces 32**") surrounding the central contact,

wherein the central contact and the annular ring contact or the plurality of contacts form at least a portion of an exterior surface of the hearing device:



Ex1006, Fig. 2(modified); Ex1008, Fig. 3(excerpted); Ex1002, ¶¶210-211; §§IX.E.1. Thiers teaches that "[c]onnector 1 includes four traces: one in the center with the surface in the form of a circle, and three traces that form a ring around the circle and axis of rotation." Ex1008, [0045], Fig. 3. Thiers further states "[t]he conductive traces 32…may be directly built into the case housing 24 of the [] electronic device 14b." *Id.* [0042], Fig. 1.

f. **[1e]/[14f]**

Dannemann combined with Thiers teaches these limitations. Ex1002, ¶212. Dannemann combined with Thiers has circuitry ("accumulator" and associated wiring) disposed in the internal volume (space within Dannemann's "ITE shell 11" and "faceplate 12") and coupled to the electrode arrangement (Thiers' "connector 1"). Ex1006, [0027]-[0028], [0031], Cls. 10&19&23; §IX.E.1.

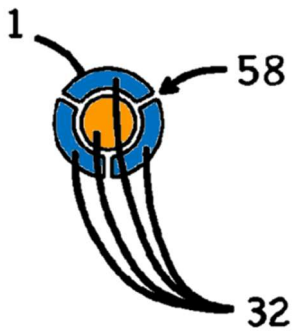
g. **[14pre]**

To the extent claim 14's preamble is limiting, Dannemann teaches it and Dannemann combined with Thiers teaches it. Ex1002, ¶213. Dannemann teaches a system including a "charging device for a hearing apparatus and a hearing device system," both of which are in the combination with Thiers. Ex1006, [0009].

h. **[14g]**

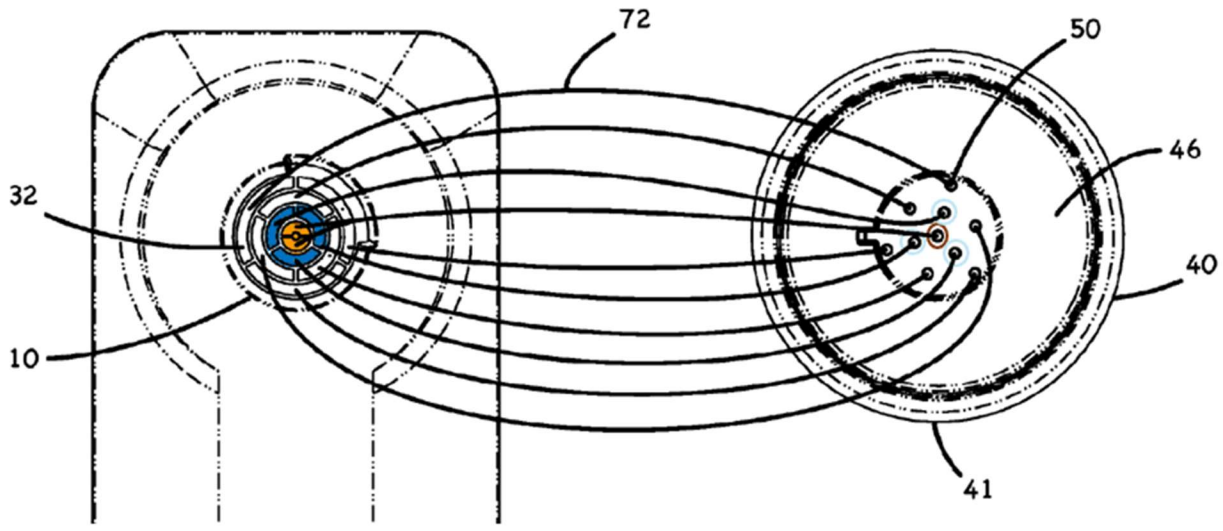
Dannemann combined with Thiers teaches these limitations. Ex1002, ¶¶214-218. Dannemann combined with Thiers has a charging module (Dannemann's "charging device") comprising a charging interface (Thiers' "contacts 50") that comprises a central charging contact (Thiers' middle "**contact 50**") and a plurality of charging contacts (Thiers' three outer "**contacts 50**") surrounding the central contact (Thiers' central "**trace 32**"). §IX.E.1; Ex1008, Fig. 2, [0043]-[0045].

Thiers' Fig. 3 shows outer "**traces 32**" surround central "**trace 32**" and Thiers teaches "contacts 50" of the "dock interface assembly 4" "may be arranged in such a manner that each one of the contacts 50 is aligned with a conductive trace 32." Ex1008, [0037]-[0039], [0043]-[0045].



Ex1008, Fig. 3(excerpted). Thus, Thiers teaches that three outer "contacts 50" surround (1) a middle "contact 50" and (2) central "trace 32" when docked so that each trace 32 aligns with a contact 50. Ex1002, ¶¶215-216.

This is confirmed by Thiers' Fig. 1, which depicts an embodiment with more than four traces 32 and contacts 50, and shows the three outer "**contacts 50**" surround middle "**contact 50**" and central "**trace 32**" when the interfaces are docked.



Ex1008, Fig. 2. To the extent PO argues Thiers does not teach this limitation, it also would have been obvious to configure Thiers such that three outer "**contacts 50**" surround **(1)** middle "**contact 50**" or **(2)** central "**trace 32**" when docked so that each trace 32 aligns with a contact 50 to create four "electrical path[s]" for charging and data transmission, as taught by Thiers. Ex1002, ¶¶217-218; Ex1008, Fig. 2, [0043-45]; §IX.E.1.

3. **[4]/[16]**

Dannemann combined with Thiers renders obvious claims 1 and 14. §IX.E.2. For the reasons set forth in Ground 2 (§IX.B.4), Thiers teaches the limitations of claims 4 and 16, as does its combination with Dannemann, Ex1002, ¶219.

4. **[5]/[17]/[6]/[18]/[7]**

Dannemann combined with Thiers renders obvious claims 4 and 16. §IX.E.3. For the reasons stated in Ground 2 (§IX.B.5), Thiers teaches the limitations of claims 5-7 and 17-18, as does its combination with Dannemann. Ex1002, ¶220.

5. **[8]/[19]**

Dannemann combined with Thiers renders obvious claims 4 and 16. §IX.E.3. For the reasons stated in Ground 2 (§IX.B.6), Thiers teaches the limitations of claims 8 and 19, as does its combination with Dannemann. Ex1002, ¶221.

6. **[9]**

Dannemann combined with Thiers renders obvious claim 4 (§IX.E.2) and the limitations of claim 9. Ex1002, ¶¶222-223. Dannemann combined with Thiers renders obvious a central contact (Thiers' central "**trace 32**") that defines a cathode contact and the at least one contact of the plurality of contacts (Thiers' outer "**traces 32**") defines an anode contact. Ex1002, ¶222. Dannemann teaches that its "charging contacts 13, 14...are used to charge [the] accumulator" (battery). Ex1006, [0027]. Because the electrode arrangement is used for charging, POSAs would understand

at least one of its contacts must be a cathode and at least one must be an anode in order to complete the charging circuit. Ex1002, ¶222.

In the combination with Thiers, POSAs would have been motivated to make the central contact a cathode and a surrounding contact an anode because there were a limited number of ways to arrange the anode and cathode in a four-contact arrangement, and all of them would have been obvious to try. Ex1002, ¶223. And POSAs would have had a reasonable expectation of success because Chen had already demonstrated the feasibility of having a central cathode contact and an outer anode contact. *Id.*; §IX.B.7.

7. **[10]/[20]**

Dannemann combined with Thiers renders obvious claims 1 and 14. §IX.E.2. For the reasons stated in Ground 2 (§IX.B.8), Thiers teaches the limitations of claims 10 and 20, as does its combination with Dannemann. Ex1002, ¶224.

8. **[11]**

Dannemann combined with Thiers renders obvious claim 1 (§IX.E.2) and the limitations of claim 11. Ex1002, ¶¶225-226. Dannemann combined with Thiers has charging circuitry (Dannemann's "accumulator" and associated wiring) that is coupled to the electrode arrangement (Thiers' "connector 1"). §§IX.E.1, IX.E.2.f, IX.E.6.

POSAs would understand that Dannemann's "accumulator" includes charging circuitry because Dannemann teaches that the "device charging contacts 13, 14 ... are used to charge [the] accumulator." Ex1006, [0027], [0008]; Ex1002, ¶226.

9. **[12]**

Dannemann combined with Thiers renders obvious claim 1 (§IX.E.2) and the limitations of claim 12. Ex1002, ¶227. Dannemann combined with Thiers has an electrode arrangement (Thiers' "connector 1") configured to communicate power and one or more information signals. When combined, Thiers' central "**trace 32**" and outer "**traces 32**" are coupled to Dannemann's accumulator and configured to communicate power to the "accumulator." §IX.E.8; Ex1006, [0008], [0027]; Ex1002, ¶227. Dannemann teaches using the contacts between "ITE hearing device 10" and "charging device" "for signal transmissions" and Thiers teaches each of the traces in "connector 1" can "transmit data and power." Ex1006, [0033]; Ex1008, Fig. 8, [0031], [0040]-[0043], [0055].

10. **[21]**

Dannemann combined with Thiers renders obvious claim 14 (§IX.E.2) and the limitations of claim 21. Ex1002, ¶¶228-232.

a. **[21a]**

Dannemann combined with Thiers teaches a first charging interface (Thiers' "traces 32" of "connector 1") comprising the electrode arrangement, wherein the

circuitry (Dannemann's "accumulator" and associated wiring) of the hearing device comprises charging circuitry coupled to the electrode arrangement. Ex1002, ¶229. Thiers' "traces 32" are a "first charging interface" because, in the combination with Dannemann, they interface with Dannemann's "charging device" and are part of a charging circuit used for charging Dannemann's "accumulator." Ex1008, [0043-0045]; §§IX.E.2.f, IX.E.6-8.

b. **[21b]**

Dannemann combined with Thiers teaches the charging interface of the charging module (Thiers' "contacts 50") defines a second charging interface configured to detachably couple with the first charging interface (Thiers' "traces 32") of the hearing device. Ex1002, ¶230. Thiers' "contacts 50" are a second charging interface because they are configured to detachably couple with Thiers' "traces 32," through which Dannemann's "accumulator" is recharged. *Id.* §IX.E.1; Ex1008, Fig. 3, [0037-38], [0043-45]; Ex1006, Fig. 2, [0027-29] ("When closing the cover 16, the charging contacts [] of the charging device then reliably contact the hearing device contacts….").

c. **[21c]**

Dannemann combined with Thiers teaches the charging module (Dannemann's "charging device") further comprises charging circuitry (circuitry within Dannemann's "charging device") coupled to the second charging interface

(Thiers' "contacts 50"). Ex1002, ¶231. POSAs would understand that Dannemann's "charging device" includes charging circuitry because Dannemann teaches that "[d]uring the charging process, electricity [] introduced into the contact surface 28 for instance, is routed from there through the charging contact 18 to the hearing device contact 13 and is finally routed to the integrated accumulator in the ITE hearing device 10." Ex1006, [0031]; Ex1002, ¶231. In the combination, Thiers' contacts 50 are coupled to the charging circuitry within Dannemann's "charging device." §IX.E.1.

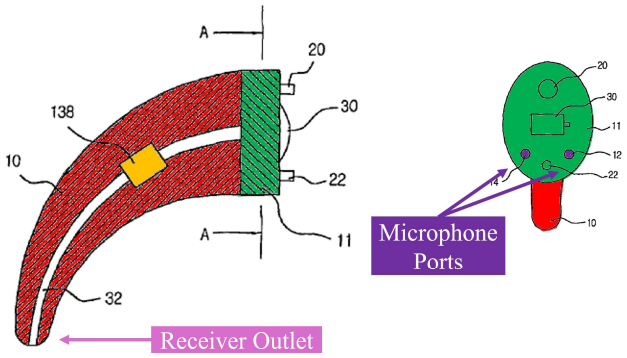
d. **[21d]**

Dannemann combined with Thiers teaches the charging module (Dannemann's "charging device") is configured to charge a rechargeable power source (Dannemann's "accumulator") of the hearing device that is coupled to the first charging interface (Thiers' "traces 32"). Ex1002, ¶232. When Dannemann and Thiers are combined, Dannemann's "accumulator" is coupled to Thiers' "traces 32," and is charged by Dannemann's "charging device." §§IX.E.8, IX.E.2.h, IX.E.1. Ex1002, ¶232.

F. Ground 6: Dannemann Combined With Thiers and Kwon Renders Obvious Claims 2-3, 15

Dannemann teaches an "ITE hearing device 10" with a "microphone" and a "miniature loudspeaker," but does not expressly teach the location of their ports in the earphone housing. Ex1006, [0003-04], [0027]. Kwon teaches one or more

microphone ports ("**microphones 12, 14**" ports) disposed in the outer surface of the faceplate ("**faceplate 11**") and a receiver outlet (**outlet** for "**receiver 138**") disposed in the shell ("**shell 10**"):

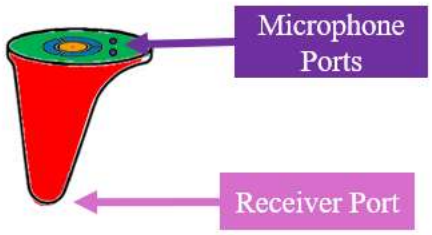


Ex1007, Figs. 2&3(excerpted), 3:56-59, 4:11-13.

POSAs would have been motivated to use Kwon's teachings to further modify the Dannemann-Thiers combination so that 1) Dannemann's microphone port forms an opening in the faceplate and 2) Dannemann's "loudspeaker" outlet is on the shell, which is inserted into a wearer's ear. POSAs would have been motivated to position the microphone port on Dannemann's faceplate such that it faces outward, or away from the user's ear canal, to best capture environmental sound or the user's voice. Ex1002, ¶234. Further, POSAs would have been motivated to include a receiver outlet on Dannemann's shell, which is inserted into a wearer's ear, so that the wearer can clearly hear sound from the speaker. POSAs would have had a reasonable expectation of success incorporating these features into Dannemann because Kwon demonstrates the feasibility of placing a microphone port on the faceplate and a

receiver outlet in the shell. Ex1002, ¶234. Implementing these features in Dannemann would have merely required applying a known arrangement to improve a similar device in the same way. Ex1002, ¶234.

Therefore, Dannemann combined with Thiers renders obvious claims 1 and 14 (§IX.E.2), and Dannemann combined with Thiers and Kwon teach a **microphone port** disposed in the outer surface of Dannemann's **faceplate** and a **receiver outlet** disposed in Dannemann's **shell**:



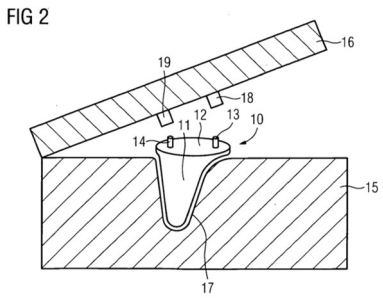
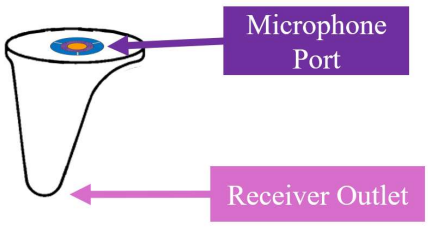
Ex1006, Fig. 2(modified); Ex1002, ¶235.

G. Ground 7: Dannemann Combined With Wagman Renders Obvious Claims 1-21

1. Motivation to Combine

POSAs would have been motivated to modify the electrical interface between Dannemann's ITE hearing device 10 and charging cover 16 with a central contact surrounded by three contacts on each device, as taught by Wagman. Ex1002, ¶¶236-248. Further, Wagman teaches a **microphone port** (*e.g.*, 535, 635) arranged between the **central** and **outer contacts**, as well as a **receiver outlet** 3020 on the end of the hearing device inserted into a wearer's ear. Ex1009, Cls. 7&12, 25:23-26, 40:65-67,

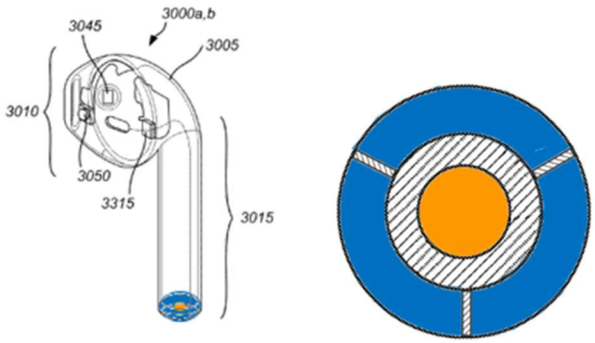
Figs. 5-5B&30. POSAs would have been motivated to combine these features with Dannemann, as shown below:

Dannemann	Wagman	Dannemann+Wagman
		

Ex1006, Fig. 2; Ex1009, 5B(modified); Ex1006, Fig. 2(modified); Ex1002, ¶236.

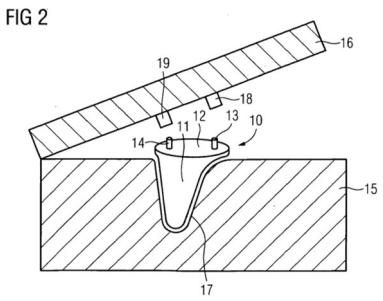
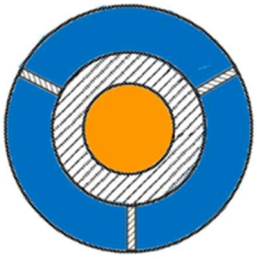
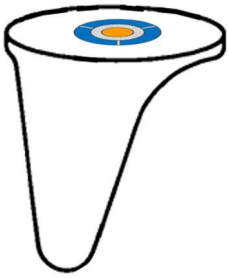
a. **Charging Interface**

As explained in Ground 4 (§IX.D.1.a), Wagman teaches or suggests an earbud electrode arrangement with central **contact 515** and three outer **contacts 510'** and a complementary charger, as shown below.



Ex1009, Figs. 33, 5B(modified).

POSAs would have been motivated to substitute Dannemann's charging interface with Wagman's charging interface:[6]

Dannemann	Wagman	Dannemann+Wagman
		

Ex1006, Fig. 2; Ex1009, 5B(modified); Ex1006, Fig. 2(modified)

POSAs would have been motivated to make this modification for the known advantages of increasing the number of contacts in power and data transmission. §IX.B.1; Ex1002, ¶¶237-246, 55-62. Dannemann itself acknowledges these advantages, expressly contemplating that its charging device "may however also be equipped with more than two positioning units 20, 21, in order to produce additional contacts to the hearing device for signal transmissions for instance." Ex1006, [0033]. POSAs reading Dannemann would therefore have understood that there was a recognized need for additional electrical contacts at the hearing-device-to-charger interface, and would have been motivated to look to the prior art ear-worn devices

[6] Throughout Ground 7, the numeral "**510'**" references the contacts created by dividing Wagman's earbud contact 510 into three contacts.

like Wagman's earbuds for a space-efficient multi-contact solution suitable for the constrained form factor of an ITE hearing device faceplate. Ex1002, ¶¶238-239.

POSAs would have been motivated to substitute Dannemann's two-contact charging interface (charging contacts 13, 14) with Wagman's four-trace concentric configuration and to couple Wagman's electrode arrangement to Dannemann's internal accumulator circuitry. Ex1002, ¶¶240-246. This modification would have been prompted by several converging design incentives recognized by POSAs. First, because Dannemann's faceplate presents a circular geometry, a concentric trace arrangement of the type taught by Wagman is a geometrically natural solution: it exploits the rotational symmetry of the circular faceplate surface, ensuring reliable contact with the charging device regardless of the angular orientation of the hearing device when it is inserted into the charging cradle. Ex1002, ¶241. Second, expanding Dannemann's two-contact interface to Wagman's four-trace arrangement would have provided additional electrical paths for power delivery and signal transmission—an advantage that Dannemann itself contemplated. Ex1006, [0033]; Ex1002, ¶242. Third, Wagman's concentric configuration achieves this increase in electrical paths within the same limited surface area, making it particularly well-suited for the constrained form factor of a hearing-device faceplate where space is at a premium. Ex1009, 20:49-55; Ex1002, ¶243.

POSAs would have been motivated to substitute the charging interface on Dannemann's "charging device" with "**contact 525**" and "**contact 530**" from Wagman's "connector 500" and couple them to the charging circuitry of the "charging device" for the same reasons. Ex1002, ¶244. Wagman's "**contact 525**" and "**contact 530**" are a compatible charger-side electrode configuration for use with the device-side electrode arrangement described above:

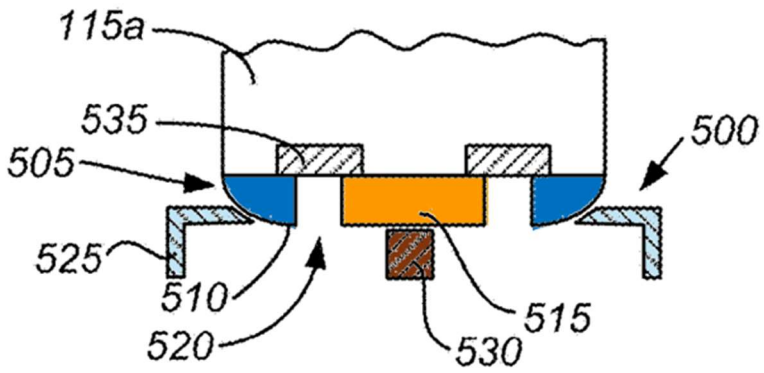


FIG. 5A

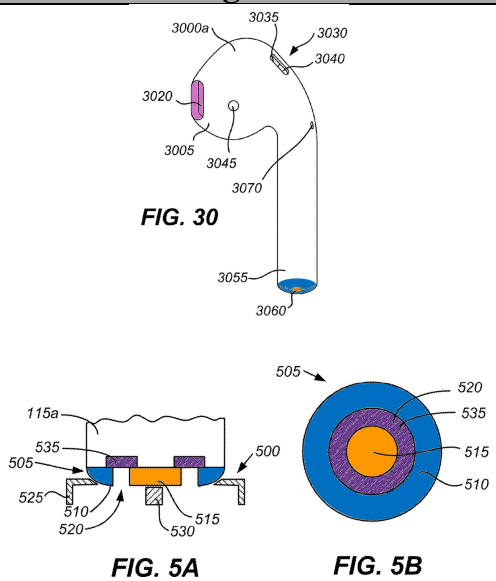
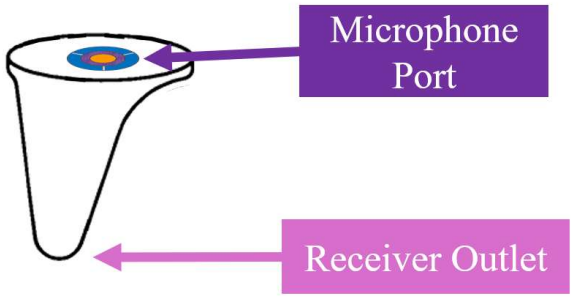
Ex1009, Fig. 5A, 25:9-27. Alternatively, POSAs also would have been motivated to divide Wagman's **contact 525** into three segments so that they correspond and align with the three arcuate contacts formed by dividing Wagman's **contact 515**, as described above. Ex1002, ¶245. For example, Thiers teaches this is beneficial so that there are distinct "electrical path[s]…from each respective contact [on the charger] to each corresponding trace" on the device. Ex1008, [0043-45]. POSAs would have recognized these were alternative design choices and POSAs would have been

motivated to use either depending upon the application (*e.g.*, how many independent data/power lines are desired). Ex1002, ¶245; §IX.D.1.a.

POSAs would have had a reasonable expectation of success in making this combination. Ex1002, ¶246. Both Dannemann and Wagman employ the same fundamental contact architecture—electrodes arranged around a central axis for delivering electrical power through a detachable interface. Ex1002, ¶246. Dannemann's existing two contacts 13, 14 are already arranged on the circular faceplate surface in a manner compatible with a concentric geometry; incorporating additional concentric traces and nonconductive separating spaces from Wagman into that same faceplate surface would have amounted to no more than using a known technique to improve a similar technology in the same way. Ex1002, ¶246. POSAs would be motivated to rely on Dannemann's existing accumulator and internal wiring architecture to route the additional electrical paths provided by Wagman's configuration because Dannemann already teaches that electricity is routed from the contact surfaces through the charging contacts to the integrated accumulator. Ex1006, [0031]; Ex1002, ¶246. No undue experimentation or inventive ingenuity beyond ordinary skill would have been required; the combination merely applies well-known concentric electrode geometry—widely used across the electronic-device charging art—to a hearing device that already uses electrode-based charging at its faceplate. Ex1002, ¶246.

b. **Microphone and Receiver**

Dannemann teaches a "microphone" and "miniature loudspeaker," but does not expressly teach the location of their ports in the earphone housing. §IX.F. POSAs would have been motivated to modify Dannemann so that 1) its microphone's **port** forms an opening in the faceplate between Wagman's **outer contacts** and **central contact** and 2) its "miniature loudspeaker" **outlet** is on Dannemann's shell, as taught by Wagman:

Wagman	Dannemann + Wagman
 FIG. 30 FIG. 5A FIG. 5B	

Ex1009, Figs. 5A-5B, 30; Ex1006, Fig. 2(modified). POSAs would have been motivated to combine these features of Wagman with Dannemann for the same reasons they would have been motivated to combine them with Chen. §IX.D.1.b; Ex1002, ¶¶247-248.

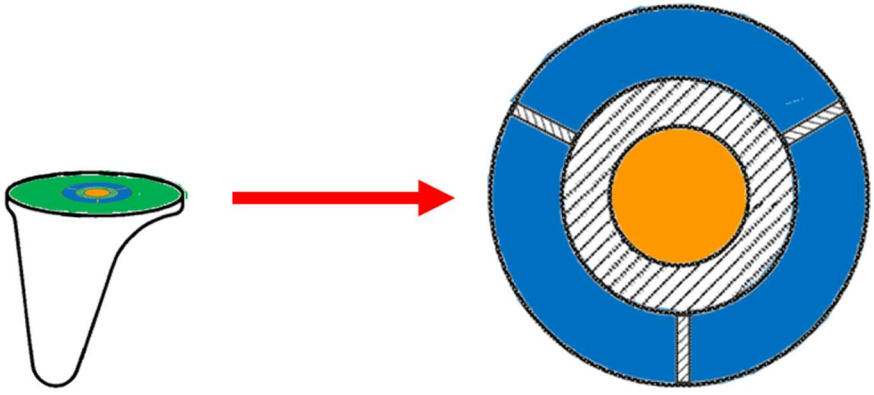
2. **[1]/[14]**

a. **[1pre]/[14a]/[1a]/[14b]/[1b]/[14c]/[1c]/[14d]/[14pre]**

Dannemann teaches these limitations and Dannemann combined with Wagman teaches these limitations. §§IX.E.2.a-d, IX.E.2.g; Ex1002, ¶249.

b. **[1d]/[14e]**

Dannemann combined with Wagman teaches these limitations. Ex1002, ¶¶250-251. Dannemann combined with Wagman teaches or renders obvious an electrode arrangement (Wagman's **contacts 510'** and **contact 515**) disposed in an outer surface of the faceplate (Dannemann's "**faceplate 12**"), the electrode arrangement comprising a central **contact 515** and an annular ring contact surrounding the central contact or a plurality of contacts (**contacts 510'**) surrounding the central contact, wherein the central contact and the annular ring contact or the plurality of contacts form at least a portion of an exterior surface of the hearing device:



Ex1006, Fig. 2(modified); Ex1009, Fig. 5B(modified); Ex1002, ¶250; §IX.G.1.a. Wagman teaches or suggests an electrode configuration with three arcuate **contacts 510'** surrounding a central **contact 515**. Ex1009, Fig. 5B(modified); §IX.D.1.a. Alternatively, Wagman's "ring **contact 510**" (undivided) is an annular ring contact because it is "ring shaped." Ex1009, 25:41-49, Fig. 5B. Wagman further teaches its contacts are "flush with an exterior surface" of the housing. Ex1009, Cls. 2&4, 26:9-13, 28:37-40, 29:1-4.

c. **[1e]/[14f]**

Dannemann combined with Wagman teaches these limitations. Ex1002, ¶252. Dannemann combined with Wagman has circuitry (Dannemann's "accumulator" and associated wiring) disposed in the internal volume (space within Dannemann's "ITE shell 11" and "faceplate 12") and coupled to the electrode arrangement (Wagman's **contacts 510'** and **contact 515**). Ex1006, [0027]-[0028], [0031], Cls. 10&19&23; §IX.G.1.a.

d. **[14g]**

Dannemann combined with Wagman teaches these limitations. Ex1002, ¶¶253-255. Dannemann combined with Wagman has a charging module (Dannemann's "charging device") comprising a charging interface (Wagman's **contact 530** and **contact(s) 525**) that comprises a central charging contact and an

annular ring charging contact or a plurality of charging contacts surrounding the central contact. Ex1009, Fig. 2&3&5A, 19:4-30, 20:44-21:11.

Wagman's **contact 530** is a central charging contact and its **contact 525** is an annular ring charging contact, as illustrated in the cross-sectional view in Wagman's Fig. 5A:

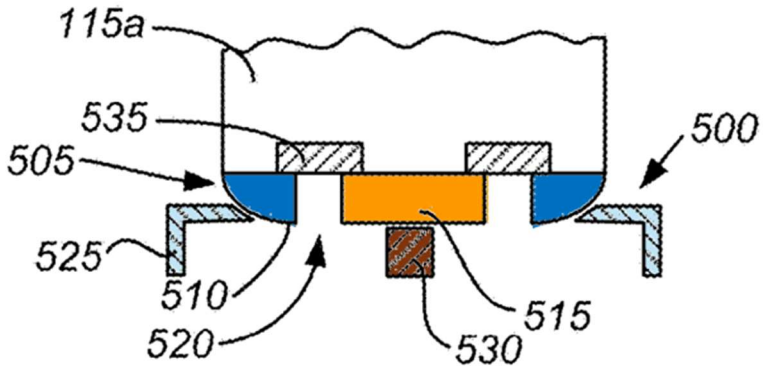


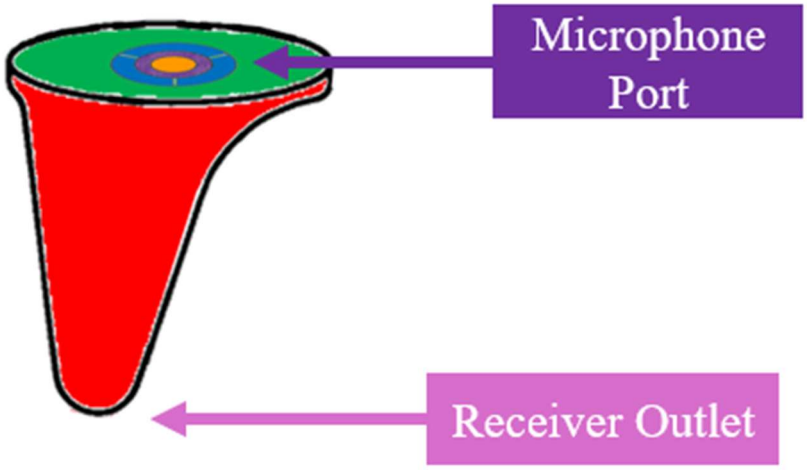
FIG. 5A

Ex1009, Fig. 5A, 25:9-27; Ex1002, ¶254. Similarly, when Wagman's **contact 525** is divided into three segments (§IX.G.1.a), they are a plurality of charging contacts surrounding Wagman's **contact 530** and **contact 515** when the earphones are docked, as illustrated above. Ex1002, ¶255.

3. **[2]/[3]/[15]**

Dannemann combined with Wagman renders obvious claims 1 and 14 (§IX.G.2), and the limitations of these claims. Ex1002, ¶256. Dannemann combined with Wagman teaches a **microphone port** (port for "microphone 2") disposed in the

outer surface of the Dannemann's "**faceplate 12**" and a **receiver outlet** (outlet for "loudspeaker or receiver 4") disposed in Dannemann's "**ITE shell 11**":



Ex1006, Fig. 2(modified); §IX.G.1.b.

4. **[4]/[16]**

Dannemann combined with Wagman renders obvious claims 1 and 14. §IX.G.2. For the reasons stated in Ground 4 (§IX.D.4), Wagman teaches the limitations of claims 4 and 16, as does its combination with Dannemann. Ex1002, ¶257.

5. **[5]/[17]/[6]/[18]/[7]**

Dannemann combined with Wagman renders obvious claims 4 and 16. §IX.G.4. For the reasons stated in Ground 4 (§IX.D.5), Wagman teaches the limitations of claims 5-7 and 17-18, as does its combination with Dannemann. Ex1002, ¶258.

6. **[8]/[19]**

Dannemann combined with Wagman renders obvious claims 4 and 16. §IX.G.4. For the reasons stated in Ground 4 (§IX.D.6), Wagman teaches the limitations of claims 8 and 19, as does its combination with Dannemann. Ex1002, ¶259.

7. **[9]**

Dannemann combined with Wagman renders obvious claim 4 (§IX.G.4) and the limitations of these claims. Ex1002, ¶¶260-261. Dannemann combined with Wagman renders obvious the central contact (Wagman's "**contact 515**") defines a cathode contact and the at least one contact of the plurality of contacts (Wagman's outer "**contacts 510'**") defines an anode contact. Dannemann teaches that its "device charging contacts 13, 14...are used to charge [the] accumulator" (battery). Ex1006, [0027]. Because the electrode arrangement is used for charging, POSAs would understand at least one of its contacts must be a cathode and at least one must be an anode in order to complete the charging circuit. Ex1002, ¶260. For the reasons stated in Ground 5, POSAs would have been motivated to make the central contact a cathode and a surrounding arcuate contact an anode. §IX.E.6; Ex1002, ¶261.

8. **[10]/[20]**

Dannemann combined with Wagman renders obvious claims 1 and 14. §IX.G.2. For the reasons stated in Ground 4 (§IX.D.8), Wagman teaches the

limitations of claims 10 and 20, as does its combination with Dannemann. Ex1002, ¶262.

9. **[11]**

Dannemann combined with Wagman renders obvious claim 1 (§IX.G.2) and the limitations of claim 11. Ex1002, ¶¶263-264. Dannemann combined with Wagman has charging circuitry (Dannemann's "accumulator" and associated wiring) that is coupled to the electrode arrangement (Wagman's **contacts 510'** and **contact 515**). *See* §§IX.G.1.a, IX.G.2.c, IX.G.7.

POSAs would understand that Dannemann's "accumulator" includes charging circuitry because Dannemann teaches that the "device charging contacts 13, 14 ... are used to charge [the] accumulator." Ex1006, [0027]; Ex1002, ¶264; *see* Ex1006, [0008].

10. **[12]**

Dannemann combined with Wagman renders obvious claim 1 (§IX.G.2) and the limitations of claim 12. Ex1002, ¶¶265-266. Dannemann combined with Wagman has an electrode arrangement (Wagman's **contacts 510'** and **contact 515**) that is configured to communicate power and one or more information signals. As discussed in §IX.G.7, when modified, Wagman's **contacts 510'** and **contact 515** are coupled to Dannemann's "accumulator" to provide power for recharging. Ex1006, [0008], [0027]; Ex1002, ¶265.

Further, Dannemann teaches using the contacts between "ITE hearing device 10" and "charging device" "for signal transmissions" and Wagman's **contacts 510'** and **contact 515** can "carry[] both power and data signals." Ex1006, [0033]; Ex1009, 20:49-55, 24:40-42.

11. **[13]**

Dannemann combined with Wagman renders obvious claim 1. (§IX.G.2). For the same reasons stated for Ground 4 (§IX.D.11), Wagman teaches the limitations of claim 13, as does its combination with Dannemann. Ex1002, ¶267.

12. **[21]**

Dannemann combined with Wagman renders obvious claim 14 (§IX.G.2) and the limitations of claim 21. Ex1002, ¶¶268-272.

a. **[21a]**

Dannemann combined with Wagman teaches a first charging interface (Wagman's **contacts 510'** and **contact 515**) comprising the electrode arrangement, wherein the circuitry (Dannemann's "accumulator" and associated wiring) of the hearing device comprises charging circuitry coupled to the electrode arrangement. §§IX.G.2.c, IX.G.9; Ex1002, ¶269. Wagman's **contacts 510'** and **contact 515** are a "first charging interface" because they interface with Dannemann's "charging device" and are coupled to the charging circuit used to charge Dannemann's "accumulator." *Id.*; §IX.G.1; Ex1009, Fig. 2, 19:22-27, 25:18-23; Ex1002, ¶269.

b. **[21b]**

Dannemann combined with Wagman teaches the charging interface of the charging module (Wagman's **contact 530** and **contact(s) 525**) defines a second charging interface configured to detachably couple with the first charging interface (Wagman's **contacts 510'** and **contact 515**) of the hearing device. Ex1002, ¶270. Wagman's **contact 530** and **contact(s) 525** are a second charging interface because they are configured to detachably couple with Wagman's **contacts 510'** and **contact 515** for delivering power to Dannemann's hearing device. §§IX.G.1.a, IX.G.2.b, IX.G.2.d; Ex1009, Fig. 2, 19:22-27, 25:18-23; Ex1006, Fig. 2, [0027]-[0029] ("When closing the cover 16, the charging contacts 18, 19 of the charging device then reliably contact the hearing device contacts….").

c. **[21c]**

Dannemann combined with Wagman teaches the charging module (Dannemann's "charging device") further comprises charging circuitry (circuitry within Dannemann's "charging device") coupled to the second charging interface (Wagman's **contact 530** and **contact(s) 525**). Ex1002, ¶271. POSAs would understand that Dannemann's "charging device" comprises charging circuitry. §IX.E.10.c. In the combination, Wagman's **contact 530** and **contact(s) 525** are coupled to Dannemann's charging circuitry to provide power to Dannemann's ITE hearing device. §IX.G.1.a; Ex1006, Fig. 2, [0027]-[0029].

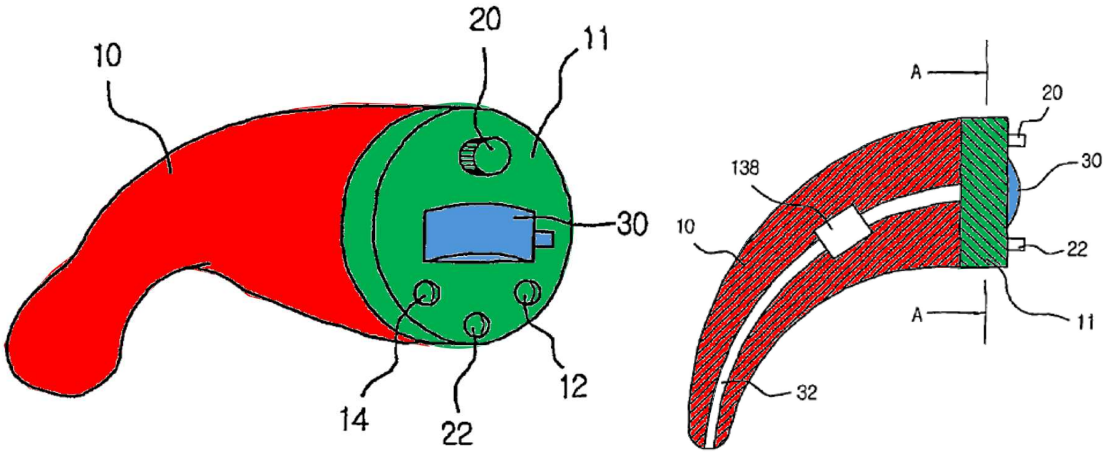
d. **[21d]**

Dannemann combined with Wagman teaches the charging module (Dannemann's "charging device") is configured to charge a rechargeable power source (Dannemann's "accumulator") of the hearing device that is coupled to the first charging interface (Wagman's **contacts 510'** and **contact 515**). Ex1002, ¶272. When Dannemann and Wagman are combined, Wagman's **contacts 510'** and **contact 515** are coupled to Dannemann's "accumulator," which is charged by Dannemann's "charging device." §§IX.G.7, IX.G.2.d, IX.G.1. Ex1002, ¶272.

H. Ground 8: Kwon Combined With Wagman and Thiers Renders Obvious Claims 1-21

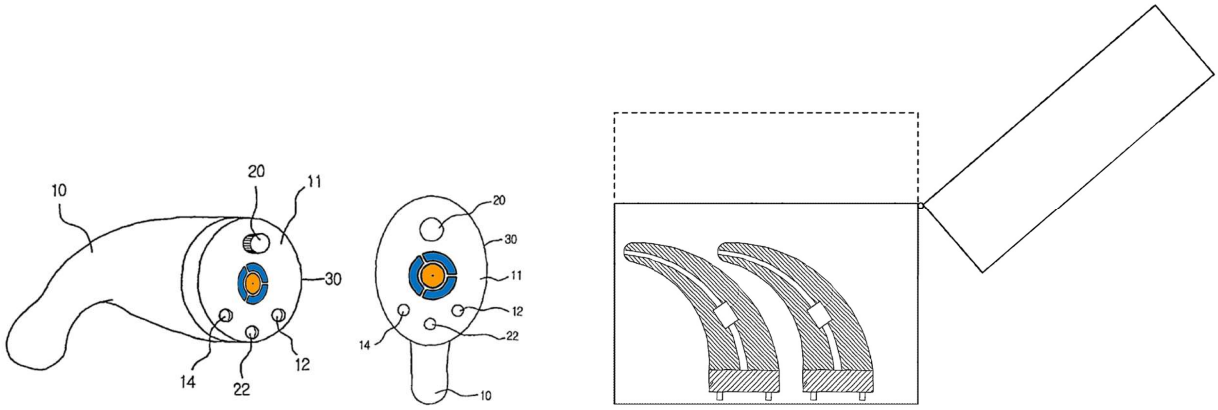
1. Motivation to Combine

POSAs would have been motivated to combine Kwon, Wagman, and Thiers. Ex1002, ¶¶273-280. Kwon teaches an in-the-ear (ITE) hearing aid with a **shell 10** and a **faceplate 11** having a **cover 30** (battery door) for accessing a replaceable battery 26. Ex1007, Fig. 1, 3:54-4:19.



Ex1007, Figs. 1&2.

POSAs would have been motivated to replace Kwon's replaceable battery and battery cover 30 with Wagman's "rechargeable battery," charging case 204, and associated circuitry, and to use Thiers' multi-contact connectors as the interface between the hearing aid and the charging case, as shown below. Ex1002, ¶274.



Ex1007, Figs. 1, 2, 3(modified); Ex1009, Fig. 1(modified).

a. **Wagman's Rechargeable Battery Architecture**

POSAs would have been motivated to convert Kwon into a rechargeable hearing aid using Wagman's rechargeable battery architecture. Ex1002, ¶¶274-277. Rechargeable hearing devices were well known in the art and offered known advantages over replaceable batteries. Ex1002, ¶275, §V. POSAs would have understood that rechargeable batteries avoid "time-consuming and costly replacement of the batteries" and enable the batteries to remain in the hearing device during charging. Ex1015, 1:22-24. The broad usage of rechargeable hearing devices in the prior art also demonstrated their feasibility and would have given POSAs a

reasonable expectation of success incorporating these features in Kwon. Ex1002, ¶275; §V.

The combination incorporates two elements taught by Wagman: ***First***, Wagman's rechargeable battery architecture—in which a battery with limited capacity is recharged via an external connection rather than replaced. In the combination, Kwon's replaceable battery 26 and battery door 30 are replaced with Wagman's "**rechargeable battery**," which is coupled via internal "circuitry" to a "**case interface 270**," through which "power and/or data" is exchanged with "**case 204**:"

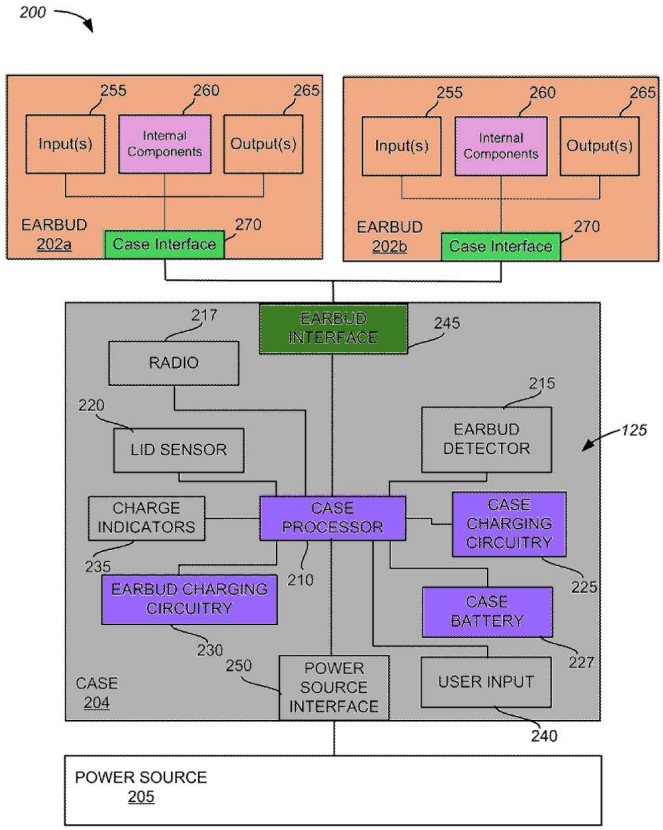


FIG. 2

Ex1009, Fig. 2, 18:28-36, 18:46-49, 19:4-15, 19:22-30.

Second, the combination incorporates Wagman's charging "**case 204**" as the external charging station for Kwon's converted rechargeable hearing aid. The charging case includes a "**case battery 227**", "**case charging circuitry 225**", and "**earbud charging circuitry 230**" for exchanging "power and/or data" through "**earbud interface 245**." *Id.* Ex1002, ¶¶276-277.

b. **Thiers' Charging Interface**

POSAs would have been motivated to use Thiers' concentric multi-contact interface in the combination with Kwon and Wagman for the same reasons provided in Grounds 2 and 5. Ex1002, ¶¶278-280; §§IX.B.1, IX.E.1. Specifically, in the combination, POSAs would have been motivated to use **(1)** Thiers' four "traces 32" from "connector 1" as the "**case interface 270**" and **(2)** four corresponding "contacts 50" from Thiers' "dock interface assembly 40" as the "**earbud interface 245**" between **case 204** and Kwon's **hearing aid**:

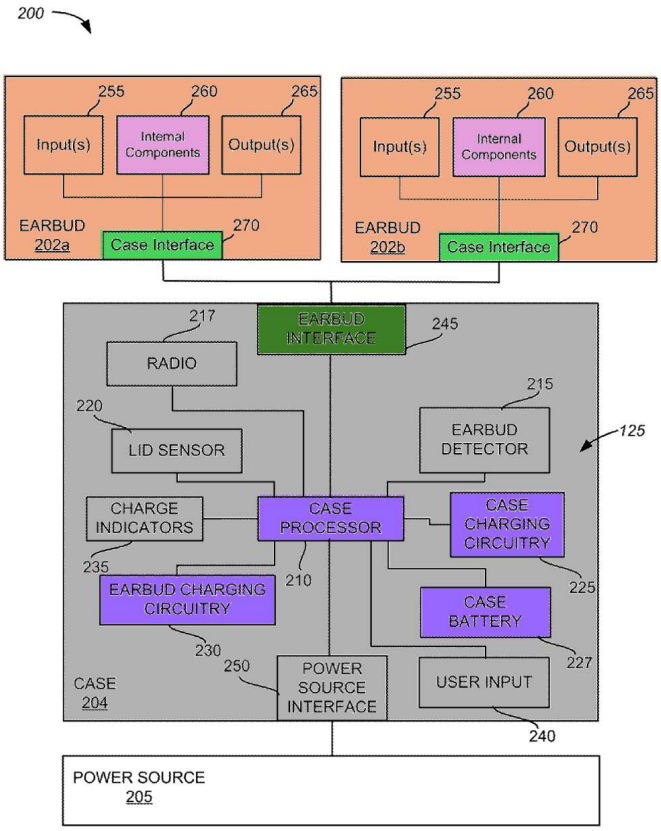
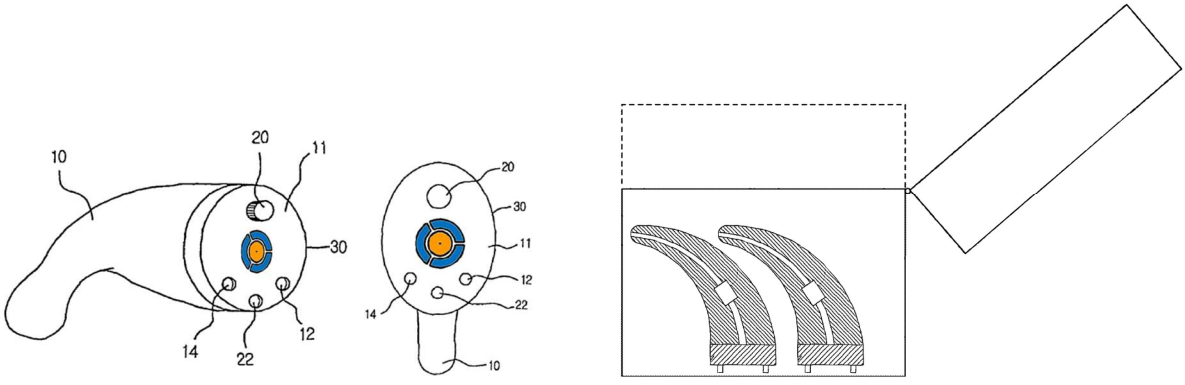


FIG. 2

Ex1009, Fig. 2.

POSAs would have been motivated to adopt Thiers's multi-contact concentric trace configuration for the rechargeable implementation because it increases the number of electrical paths for power delivery and data transmission between devices in a compact, space-efficient arrangement—critical for the constrained form factor of an ITE hearing aid. §§IX.B.1, IX.E.1; Ex1002, ¶279. Further, as discussed above, Wagman teaches or at least suggests an electrode configuration with three arcuate contacts surrounding a central contact that would have further encouraged POSAs to incorporate this design choice from Thiers. §§IX.D.1, IX.G.1.

POSAs also would have had a reasonable expectation of success in making this combination because Wagman already teaches "**case interface 270**" and "**earbud interface 245**" and Thiers merely provides a specific electrode interface through which Wagman's data and power transmissions can occur. Ex1002, ¶280. In the combination, Kwon's battery accommodation space 28 and battery door 30 would be replaced with Wagman's rechargeable battery and internal circuitry. Ex1002, ¶280. Thiers' concentric conductive traces 32 would be disposed in the outer surface of Kwon's faceplate (the externally accessible surface of the ITE hearing aid) and Thiers' corresponding contacts 50 would be in Wagman's case 204 to facilitate data and power transmission. *Id.* This modification merely required applying known techniques—a rechargeable battery, an electrode arrangement with concentric contacts, internal wiring, and a charging case with contacts—to a hearing device already designed with compact electronics and battery electrodes integrated into its faceplate structure:

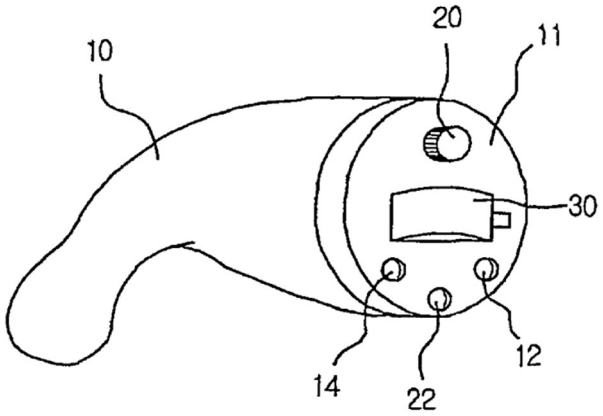


Ex1002, ¶280; Ex1007, Figs. 1, 2, 3 (modified); Ex1009, Fig. 1(modified).

2. **[1]/[14]**

a. **[1pre]/[14a]**

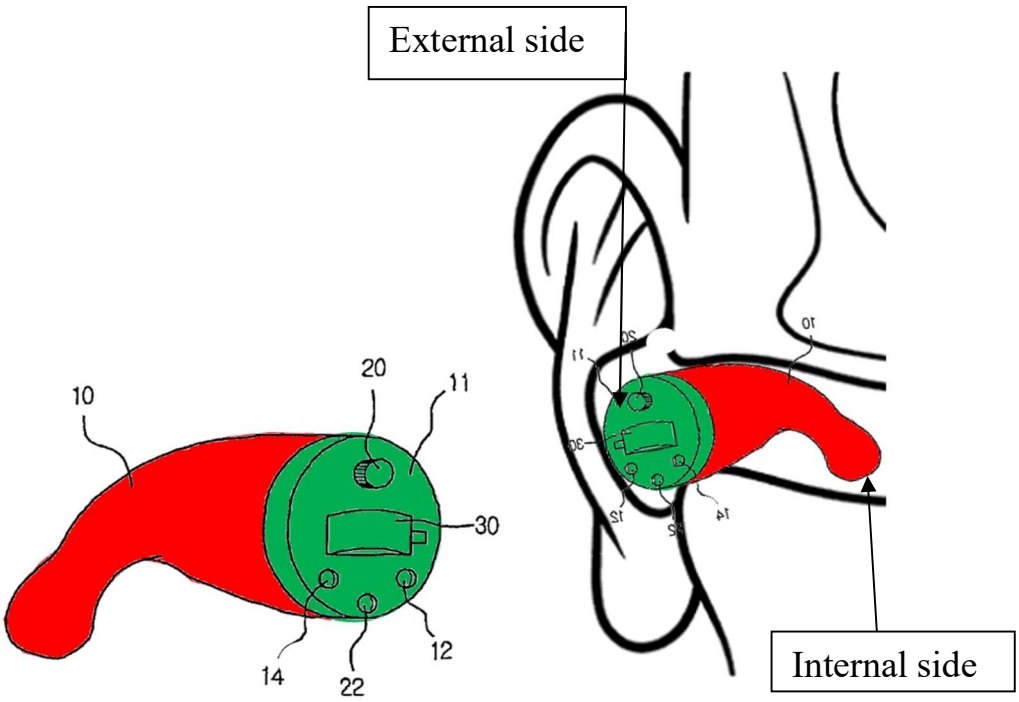
To the extent that the preamble is limiting, Kwon teaches a hearing device, as does its combination with Wagman and Thiers. Ex1002, ¶281. Kwon is directed to (ITE) hearing aids, including a "faceplate for an In-The-Ear (ITE) hearing aid." Ex1007, Figs. 1&2, Title, Abstract, 1:7-15; 1:41-51; 3:7-18.



Ex1007, Fig. 1, 2:38-55.

b. **[1a]/[14b]**

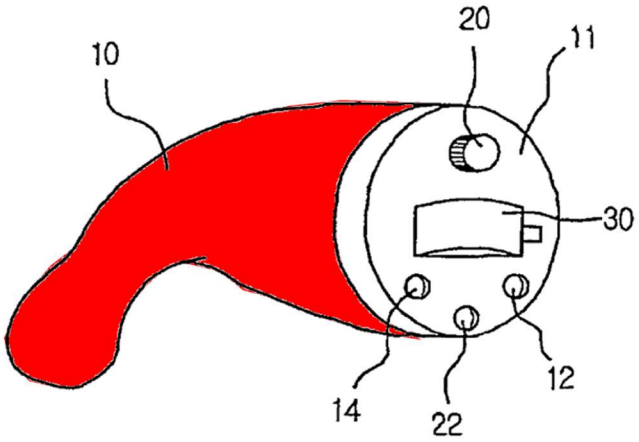
Kwon teaches this limitation, as does its combination with Wagman and Thiers. Ex1002, ¶282. Kwon teaches a housing ("**shell 10**" and "**faceplate 11**") that encloses an internal volume (space within the "**shell 10**" and "**faceplate 11**") and extends from an internal side (ear-facing surface) to an external side (outward-facing surface), as shown below.



Ex1007, Fig. 1. Kwon teaches that the "**shell 10** [is] formed in a snail shape." Ex1007, 3:54-57. When the hearing aid is worn by a user, as depicted above, its internal side is positioned inside a user's ear canal, while its external side faces away from the user. Ex1002, ¶282.

c. **[1b]/[14c]**

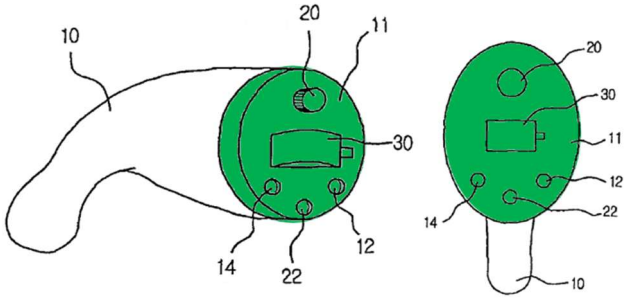
Kwon teaches this limitation, as does its combination with Wagman and Thiers. Ex1002, ¶283. Kwon teaches a **shell 10** arranged at the internal side (ear-facing surface), and the internal side (ear-facing surface) is configured to be inserted in the wearer's ear canal:



Ex1007, Fig. 1. For example, Kwon teaches that the "ITE hearing aid is inserted into the external auditory canal of an ear" and that the "**shell 10** [is] formed in a snail shape." Ex1007, Fig. 1, 1:19-22, 3:54-57, 7:20-22, 8:11-12, 8:17-18. Thus, the ear-facing surface of the hearing aid is configured to be inserted in a wearer's ear canal to ensure the earphone does not fall out when being used by a user. *Id.*; Ex1002, ¶283.

d. **[1c]/[14d]**

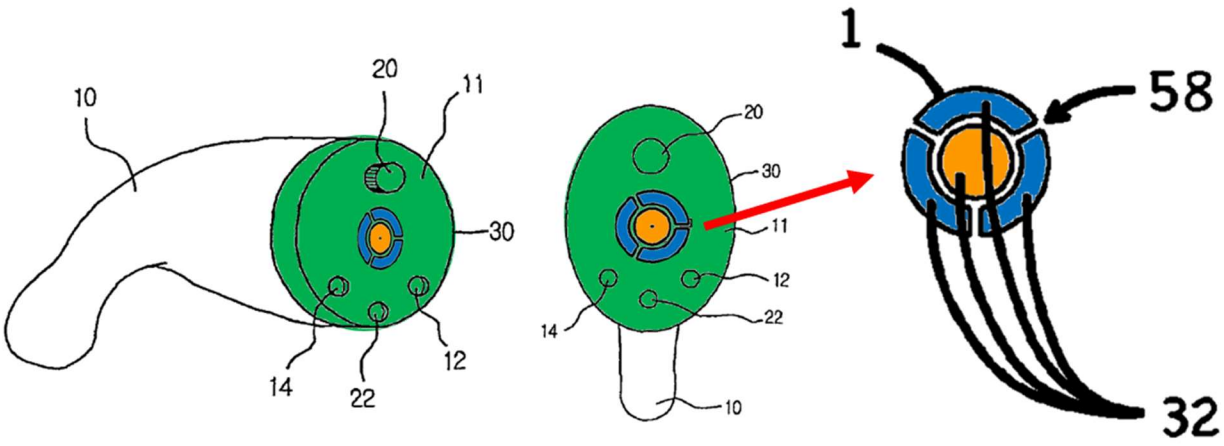
Kwon teaches this limitation, as does its combination with Wagman and Thiers. Ex1002, ¶284. Kwon teaches a "**faceplate 11**" arranged at the external side (outward-facing surface), and the external side (outward-facing surface) is configured to face away from the wearer:



Ex1007, Fig. 1&3. Kwon teaches that the "**faceplate 11**...is installed at the input side of the shell 10" and that "front and rear microphones 12 and 14 [] are installed on the **faceplate 11** to receive an acoustic sound." Ex1007, 3:54-59. Because the outward-facing side of the hearing aid is opposite of the end that is configured to be inserted into a wearer's ear canal, the outward-facing side is configured to face away from the wearer. *Id.*; Ex1002, ¶284.

e. **[1d]/[14e]**

Kwon combined with Wagman and Thiers teaches these limitations. Ex1002, ¶¶285-286. Kwon combined with Thiers has an electrode arrangement (Thiers' "connector 1") disposed in an outer surface of the faceplate (Kwon's "**faceplate 11**"), the electrode arrangement comprising a central contact (Thiers' central "**trace 32**") and an annular ring contact surrounding the central contact or a plurality of contacts (Thiers' outer "**traces 32**") surrounding the central contact, wherein the central contact and the annular ring contact or the plurality of contacts form at least a portion of an exterior surface of the hearing device:



Ex1007, Figs. 1&3(modified); Ex1008, Fig. 3; §§IX.H.1.b. Thiers teaches that "[c]onnector 1 includes four traces: one in the center with the surface in the form of a circle, and three traces that form a ring around the circle and axis of rotation." Ex1008, [0045]. Thiers further states "[t]he conductive traces 32…may be directly built into the case housing 24 of the [] electronic device 14b." *Id.* [0042], Fig. 1. And Wagman teaches its contacts are "flush with an exterior surface" of the housing. Ex1009, Cls. 2&4, 26:9-13, 28:37-40, 29:1-4.

f. **[1e]/[14f]**

Kwon combined with Wagman and Thiers teaches these limitations. Ex1002, ¶287. Kwon combined with Wagman and Thiers has circuitry (Wagman's "**internal components 260**" and associated "circuitry") disposed in the internal volume and coupled to the electrode arrangement (Thiers' "connector 1"). §IX.H.1.

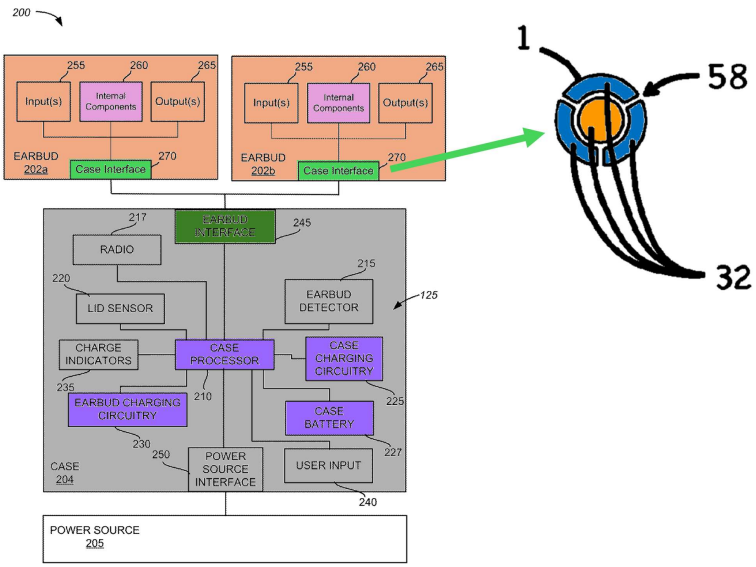


FIG. 2

Ex1009, Fig. 2, 18:28-36, 18:46-49, 19:4-15, 19:22-30; Ex1008, Fig. 3. Wagman's "**internal components 260**" include "a speaker, a microphone, a rechargeable battery, a processor, and/or other circuitry and components." Ex1009, 18:46-49.

g. **[14pre]**

Kwon in combination with Wagman and Thiers teaches a system, to the extent the preamble is limiting. Ex1002, ¶288. As modified, Kwon's "In-The-Ear (ITE) hearing aid" and Wagman's charging case 204 are a system. *See* §IX.H.1; Ex1002, ¶288.

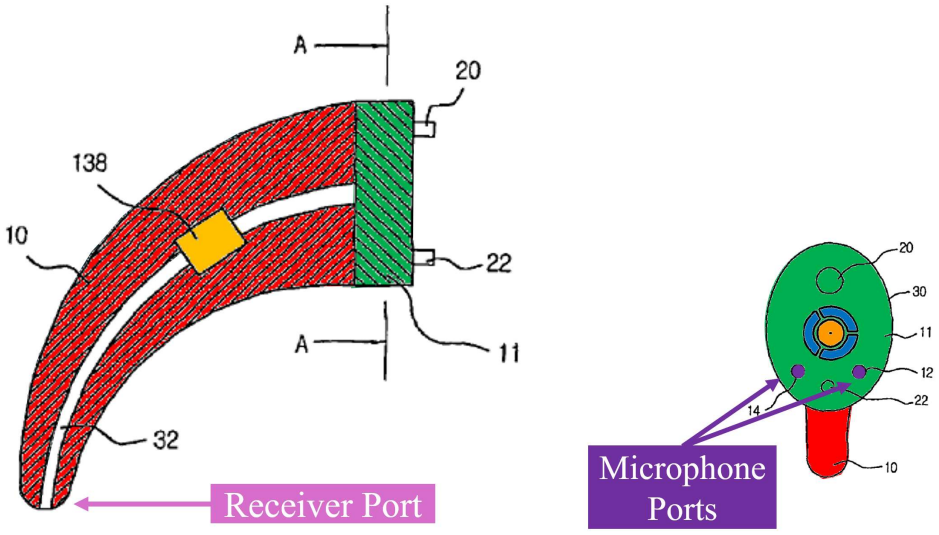
h. **[14g]**

Kwon combined with Wagman and Thiers teaches these limitations. Ex1002, ¶289. Kwon combined with Wagman and Thiers has a charging module (Wagman's "**case 204**") comprising a charging interface (Wagman's "earbud interface 245", which in the combination uses Thiers' "contacts 50") that comprises a central

charging contact and a plurality of charging contacts surrounding the central contact. Ex1008, Fig. 2, [0044]-[0045], 18:28-36, 18:46-49, 19:4-15, 19:22-30; Ex1002, ¶289. For the reasons stated in Grounds 2 and 5 (§§IX.B.2.d, IX.E.2.h), Thiers teaches or at least renders obvious that three outer "contacts 50" surround (1) a middle "contact 50" and (2) central "trace 32" when docked so that each trace 32 aligns with a contact 50, satisfying this limitation under any interpretation of "the central contact."

3. **[2]/[3]/[15]**

Kwon combined with Wagman and Thiers renders obvious claims 1 and 14 (§IX.H.2), and the limitations of these claims. Ex1002, ¶¶290-291. Kwon teaches one or more microphone ports ("**microphones 12, 14**" ports) disposed in the outer surface of the faceplate ("**faceplate 11**") and a receiver outlet (**outlet** for "**receiver 138**") disposed in the shell ("**shell 10**"):



Ex1007, Figs. 2-3 (modified).

Kwon describes "**microphones 12 and 14** [] are installed on the **faceplate 11**." Ex.1007, 3:56-59. Further, Kwon teaches "the **receiver 138** is disposed in the middle of the tube 32 in order to output the acoustic signal to an eardrum." Ex1007, Figs. 2&3, 3:56-59, 4:11-13.

4. **[4]/[16]**

Kwon combined with Wagman and Thiers renders obvious claims 1 and 14. §IX.H.2. For the reasons stated in Ground 2 (§IX.B.4), Thiers teaches the limitations of claims 4 and 16, as does its combination with Kwon and Wagman. Ex1002, ¶292.

5. **[5]/[17]/[6]/[18]/[7]**

Kwon combined with Wagman and Thiers renders obvious claims 4 and 16. (§IX.H.4). For the reasons stated in Ground 2 (§IX.B.5), Thiers teaches the limitations of claims 5-7 and 17-18, as does its combination with Kwon and Wagman. Ex1002, ¶293.

6. **[8]/[19]**

Kwon combined with Wagman and Thiers renders obvious claim 1. (§IX.H.2). For the reasons stated in Ground 2 (§IX.B.6), Thiers teaches the limitations of claims 8 and 19, as does its combination with Kwon and Wagman. Ex1002, ¶294.

7. **[9]**

Kwon combined with Wagman and Thiers renders obvious claim 4 (§IX.H.4) and the limitations of these claims. Ex1002, ¶¶295-297. Kwon combined with

Wagman and Thiers renders obvious a central contact (Thiers' central "**trace 32**") that defines a cathode contact and the at least one contact of the plurality of contacts (Thiers' outer "**traces 32**") defines an anode contact. Ex1002, ¶295. Wagman teaches that "**[e]arbud interface 245** can transfer power and/or data between **case 204** and the earbuds via **case transfer interface 270** in each earbud" and thereby "charge **earbuds 202a, 202b**." Ex1009, 19:7-9, 19:22-27.

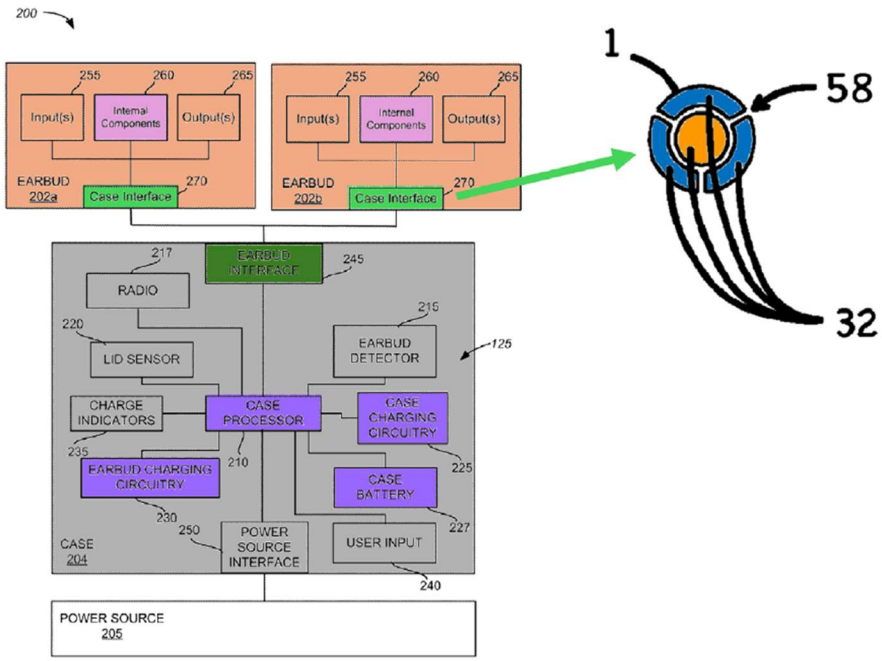


FIG. 2

Ex1008, Fig. 3; Ex1009 Fig. 2; 18:28-36, 18:46-49, 19:4-15, 19:22-30. Because the electrode arrangement is used for charging, POSAs would understand at least one of its contacts must be a cathode and at least one must be an anode in order to complete the charging circuit. Ex1002, ¶296. For the reasons stated in Ground 5, POSAs

would have been motivated to make Thiers' central "**trace 32**" a cathode and one of outer "**traces 32**" an anode. §IX.E.6; Ex1002, ¶297.

8. **[10]/[20]**

Kwon combined with Wagman and Thiers renders obvious claims 1 and 14. §IX.H.2. For the reasons stated in Ground 2 (§IX.B.8), Thiers teaches the limitations of claims 10 and 20, as does its combination with Kwon and Wagman. Ex1002, ¶298.

9. **[11]**

Kwon combined with Wagman and Thiers renders obvious claim 1 (§IX.H.2) and the limitations of claim 11. Ex1002, ¶299. Kwon combined with Wagman and Thiers has charging circuitry (Wagman's "**rechargeable battery**" and associated "circuitry") that is coupled to the electrode arrangement (Thiers' "connector 1"). §§IX.H.1, IX.H.2.f, IX.H.7. POSAs would understand the "circuitry" in Wagman's earbuds includes charging circuitry because it is used to charge "**rechargeable battery**:"

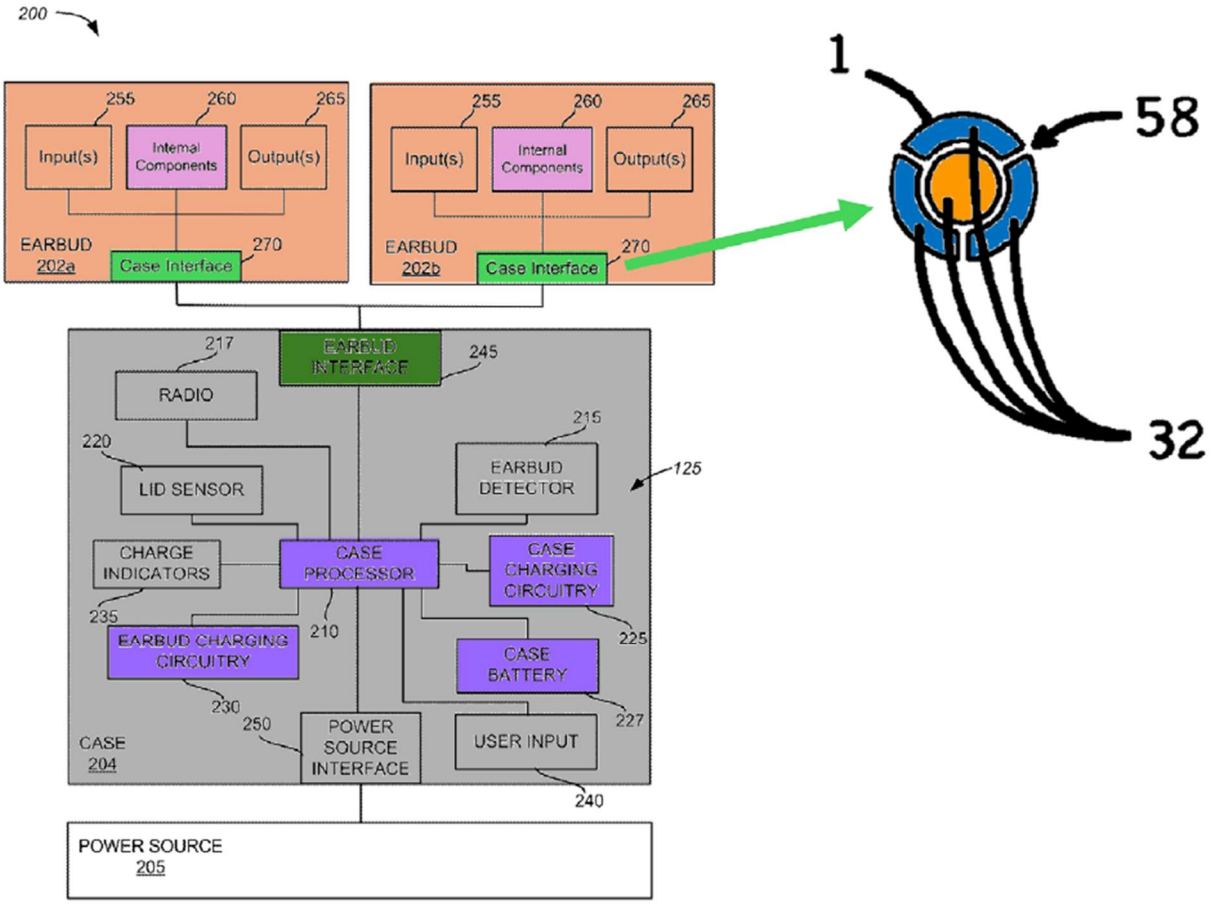


FIG. 2

Ex1008, Fig. 3; Ex1009, Fig. 2, 18:28-36, 18:46-49, 19:4-15, 19:22-30, Cls. 1&8&17, Ex1002, ¶299.

10. **[12]**

Kwon combined with Wagman and Thiers renders obvious claim 1 (§IX.H.2) and the limitations of claim 12. Ex1002, ¶¶300-301. Kwon combined with Wagman and Thiers has an electrode arrangement (Thiers' "connector 1") that is configured to communicate power and one or more information signals. As discussed in §IX.H.7, when modified, Thiers' central "**trace 32**" and outer "**traces 32**" are

coupled to Wagman's "rechargeable battery" and "circuitry" and configured to communicate power to the "rechargeable battery." Ex1009, Fig. 2, 18:28-36, 18:46-49, 19:4-15, 19:22-30, Cls. 1&8&17; Ex1002, ¶300.

Further, Wagman teaches "[d]ata communication between earbud interface 245 and pair of earbuds," including "transmit[ting] firmware updates to both case processor 210 and pair of earbuds 202a, 202b through the same contacts that are used to charge the devices." Ex1009, 20:44-21:2, 24:40-42. And Thiers teaches each of the traces in "connector 1" could be used to "transmit data and power." Ex1008, [0002]-[0005].

11. **[13]**

Kwon combined with Wagman and Thiers renders obvious claim 1. §IX.H.2. For the same reasons stated for Ground 4 (§IX.D.11), Wagman teaches the limitations of claim 13, as does its combination with Kwon and Thiers. Ex1002, ¶302.

12. **[21]**

Kwon combined with Wagman and Thiers renders obvious claim 14 (§IX.H.2) and the limitations of claim 21. Ex1002, ¶303.

a. **[21a]**

Kwon combined with Wagman and Thiers teaches a first charging interface (Wagman's "**case interface 270**," which in the combination includes "traces 32" of Thiers' "connector 1") comprising the electrode arrangement, wherein the circuitry

(Wagman's "**rechargeable battery**" and associated "circuitry") of the hearing device comprises charging circuitry coupled to the electrode arrangement. Ex1002, ¶304; §§IX.H.1, IX.H.2.f, IX.H.7, IX.H.9.

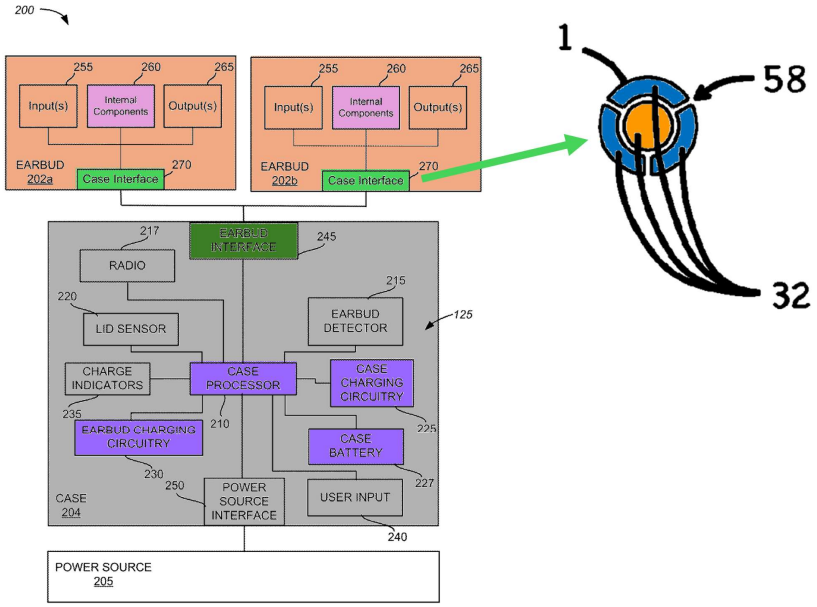


FIG. 2

Ex1008, Fig. 3(excerpted); Ex1009, Fig. 2, 18:28-36, 18:46-49, 19:4-15, 19:22-30, Cls. 1&8&17.

b. **[21b]**

Kwon combined with Wagman and Thiers teaches the charging interface of the charging module (Wagman's "**earbud interface 245**", which in the combination includes Thiers' "contacts 50") defines a second charging interface configured to detachably couple with the first charging interface (Wagman's "**case interface 270**") of the hearing device:

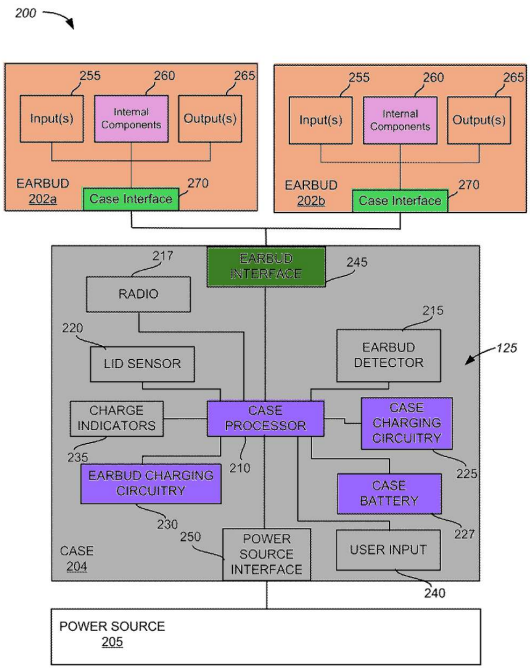
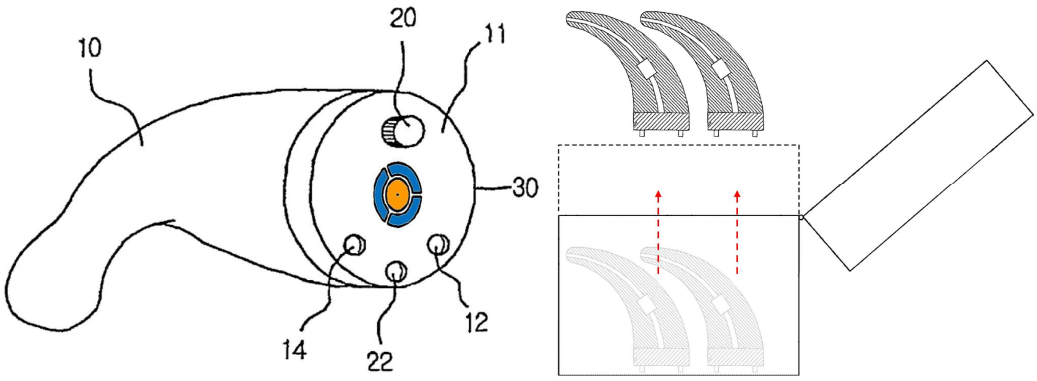


FIG. 2

Ex1009, Fig. 2, 18:28-36, 18:46-49, 19:4-15, 19:22-30; §IX.H.1. When combined with Kwon, these surfaces "detachably" couple because Kwon's hearing aids (which include Wagman's "**case interface 270**") are removed from Wagman's "**case 204**" (which includes Wagman's "**earbud interface 245**") when the hearing aid is worn by the user. Ex1002, ¶¶305-306.



Ex1007, Figs. 1&2(modified); Ex1009, Fig. 1(modified).

c. **[21c]**

Kwon combined with Wagman and Thiers teaches the charging module (Wagman's "**case 204**") further comprises charging circuitry (**case processor 210**, **earbud charging circuitry 230**, **case charging circuitry 225**, **case battery 227**, and associated wiring) coupled to the second charging interface (Wagman's "**earbud interface 245**"):

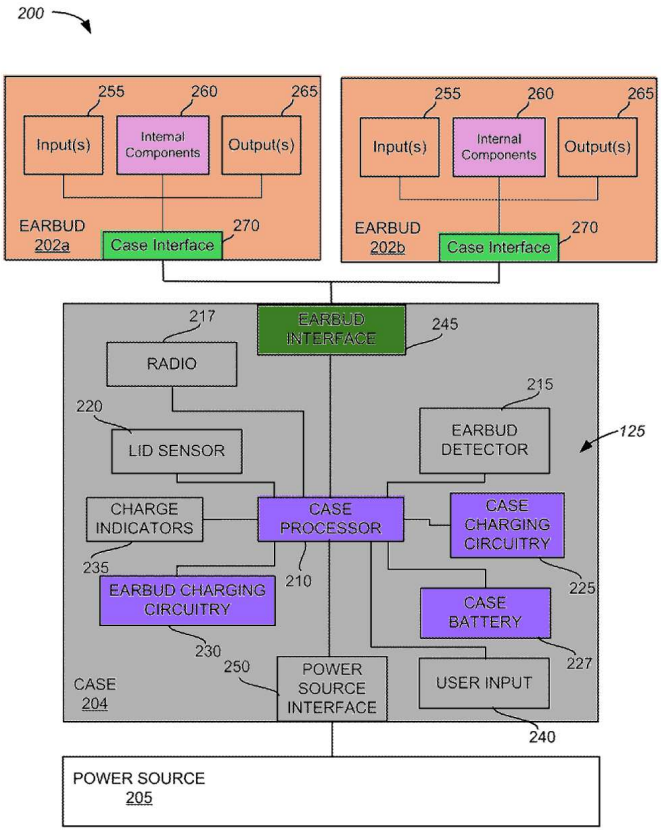


FIG. 2

Ex1009, Fig. 2; §IX.H.1; Ex1002, ¶¶307-308. Wagman teaches this circuitry works together to charge Wagman's "**rechargeable battery**" through "**earbud interface 245**." Ex1009, 19:4-15, 19:22-30, 21:43-22:53.

d. **[21d]**

Kwon combined with Wagman and Thiers teaches the charging module (Wagman's "case 204") is configured to charge a rechargeable power source (Wagman's "rechargeable battery") of the hearing device that is coupled to the first charging interface (Wagman's "case interface 270"):

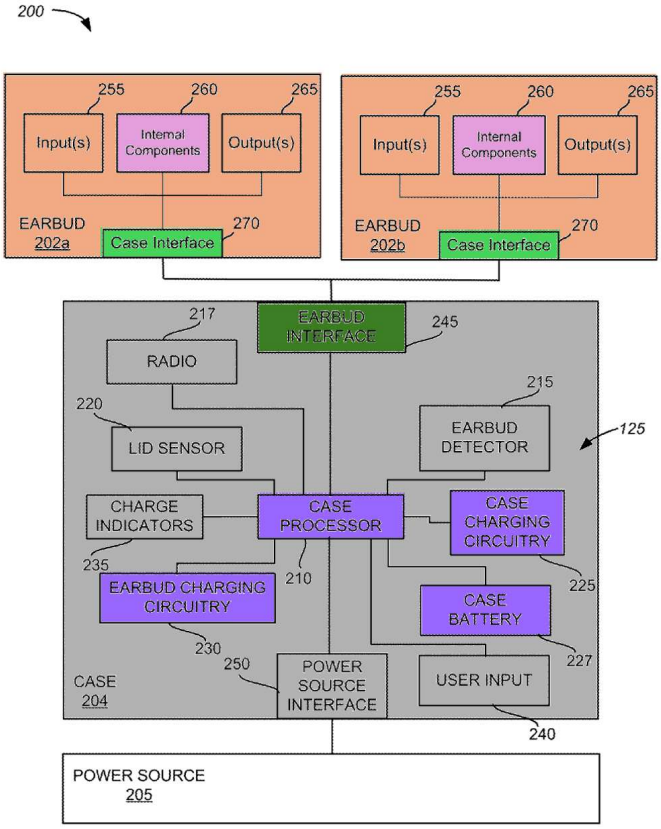


FIG. 2

Ex1009, Fig. 2, 18:28-36, 18:46-49, 19:4-15, 19:22-30, 21:43-22:53; §IX.H.1; Ex1002, ¶309.

I. Ground 9: Claims 1-8 and 10-21 Lack Written Description

Claims 1-8 and 10-21 are invalid for failing to comply with the written-description requirement of Section 112(a). All claims recite "a central contact; and

an annular ring contact surrounding the central contact or a plurality of contacts surrounding the central contact" and—other than claim 9—provide no information about the nature of these contacts or their role in charging the claimed device. In contrast, whenever a central charging contact is mentioned in the specification, it is ***always*** described as being a ***cathode*** contact. Underscoring the importance of this central cathode and its positioning, the patent emphasizes the advantages of "facilitat[ing] electrical contact between the first and second cathode contacts prior to electrical contact between the first and second anode contacts." Ex1001, 2:17-21. For the claimed charging architecture at issue—particularly claims directed to the central/surrounding contact geometry—the specification repeatedly identifies the central cathode and cathode-first engagement as the architecture that constitutes the disclosed charging invention and produces its identified advantages. The specification does not disclose possession of the materially broader genus created by eliminating that limitation, and thus the claims are invalid under Section 112(a).

The written-description requirement ensures that "the scope of the right to exclude, as set forth in the claims, does not overreach the scope of the inventor's contribution to the field of art as described in the patent specification." *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1353-54 (Fed. Cir. 2010) (en banc). "A broad claim is invalid when the entirety of the specification clearly indicates that the invention is of a much narrower scope." *Cordis Corp. v. Medtronic AVE, Inc.*,

339 F.3d 1352, 1365 (Fed. Cir. 2003). That principle applies with particular force where the specification repeatedly and uniformly describes the invention as including a particular feature, but the claims omit that feature. *See ICU Medical, Inc. v. Alaris Medical Systems, Inc.*, 558 F.3d 1368, 1374-78 (Fed. Cir. 2009) (holding claims invalid because the specification described only medical valves with spikes, while the claims contained no spike limitation, and thus the specification did not demonstrate possession of a spikeless valve).

Here, despite the claims generically claiming just "central contact" and "contact[(s)] surrounding the central contact", the specification requires that any central charging contact be a "***cathode*** contact," and that any contact(s) that "surround[s] the central contact" be the opposite type of electrical contact—an "***anode*** contact." *See, e.g.*, Ex1001, 15:40-57. When the central contact is used for charging, it is a "first ***cathode*** contact" in each and every disclosed embodiment, and correspondingly shows a non-central "first anode contact [] spaced apart from the first cathode contact." *See, e.g.*, Ex1001, 11:26-44 (discussing Fig. 3, which in turn shows central cathode contact 312 and "spaced apart" anode contacts 314); *id.* 12:54-13:4 (disclosing, with respect to Fig. 4, central "first cathode contact 412" and non-central "second anode contacts 414, 416"), 14:40-43 ("When implemented on a hearing device, for example, a region of the ***cathode*** contact 502 (e.g., ***central***

region) can be recessed ….”); *see also id.* 15:8-11, 16:11-16, 17:48-52, 19:18-30 (same disclosure for remaining embodiments).

While certain embodiments permit the outer contacts to be a “cathode or anode contacts,” not once does the specification disclose the claimed “central contact” being an “anode contact.” Ex1001, 16:35-38, 18:43-47. Because the specification “does not support” a central charging contact that is anything “***other than***” a cathode, and does not support a corresponding surrounding contact(s) that is anything “***other than***” including at least one anode, claims 1-8 and 10-21 fail to comply with the written description requirement. *Frymaster, LLC, et al. v. Sherwood Sensing Solutions LLC*, IPR2020-00752, Paper No. 41, at 21-23 (PTAB Aug. 23, 2021).

Not only does the scope of the claims impermissibly exceed the patent’s disclosure, this overbroad scope also runs contrary to “the stated purpose of the invention.” *Gentry Gallery, Inc. v. Berkline Corp.*, 134 F.3d 1473, 1479 (Fed. Cir. 1998) (cited by *Frymaster*, Paper No. 41, at 22). The patent purports to “significantly reduce[] or minimize[] spurious electrical spikes in the circuitry, by ensuring that the cathodes of the hearing devices and charger fixture are connected prior to connecting the anodes.” Ex1001, 9:17-27, 9:35-38. The patent does this by “displac[ing] at least a portion of the second cathode contact above the contact surface to facilitate electrical contact between the first and second cathode contacts

prior to electrical contact between the first and second anode contacts." *Id.* 12:36-42; *see also id.* 22:34-57 (describing "[a] biasing arrangement" for this purpose). And for every embodiment that includes "arcuate contact[s]" (as required by certain claims), the specification repeatedly describes the central "cathode contact" on either the "hearing device" or a complementary "charging module" that is "displaceable…and proud relative to a contact surface of the anode contact." *Id.* 14:39-42.

The patent discloses several benefits from first establishing a connection with the central cathode contact, including "consistent inrush current waveform," foreign-object detection, and minimization of "spurious electrical spikes"—all of which are defeated if the central contact were an anode. Ex1001, 9:17-27, 9:35-38; Ex1002, ¶¶310-313. The prosecution history confirms the inventors originally understood this arrangement as essential rather than optional: "consistent with this disclosure," the "broadest original claim" in the '031 Patent's parent application "was directed to" a hearing device that "facilitate[d] electrical contact between the first and second cathode contacts prior to electrical contact between the first and second anode contacts" (Ex1017, Cl. 1) and PO successfully distinguished the prior art cited in prosecution on that basis. §IV.B.

Because the patent *only* discloses a central charging contact that is a cathode and surrounding anode contacts—all in the context of an invention focused on a

"biasing arrangement" to facilitate cathode-first connection—the Challenged Claims that are significantly broader than that disclosure are invalid for failing to comply with the written description requirement.

X. SECONDARY CONSIDERATIONS

Petitioner is unaware of any evidence of alleged secondary indicia that would support non-obviousness of the '031 Patent. To the extent Patent Owner subsequently presents such evidence, Petitioner respectfully requests the right to respond.

XI. MANDATORY NOTICES UNDER 37 C.F.R. §42.8

A. Real Parties-in-Interest

Petitioner identifies Sonova USA Inc. and Sonova AG as the real parties-in-interest.

B. Related Matters

To the best of Petitioner's knowledge, the '031 Patent has not been involved in any litigation or *inter partes* or post-grant review prior to this proceeding. On September 21, 2026, Petitioner filed PGR2026-00076 seeking post-grant review of U.S. Patent No. 12,739,553, which issued from the child application of the '031 Patent.

C. Lead and Backup Counsel, Service, and Power of Attorney

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Petitioner concurrently submits a Power of Attorney, 37 C.F.R. §42.10(b), and consents to electronic service at SonovaPGR@kirkland.com.

XII. PAYMENT OF FEES UNDER 37 C.F.R. §42.203

Petitioner concurrently electronically submits the required fees for this Petition. The Board is authorized to charge Deposit Account No. 506092 for any fee deficiency.

Date: September 29, 2026

Respectfully submitted,

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Attorneys for Petitioner

CERTIFICATE OF COMPLIANCE

This Petition complies with the type-volume limitations as mandated in 37 C.F.R. §42.24, totaling 18,645 words. Counsel has relied upon the word count feature provided by Microsoft Word.

/s/ Marcus E. Sernel

CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. §§42.6(e)(4)(i) *et seq*. and 42.105(b), the undersigned certifies that a copy of the foregoing document with the accompanying Exhibits listed in Petitioner's Exhibit List was caused to be served by FedEx Priority Overnight, costs prepaid, to Patent Owner at the following address of record:

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c/o Mueting Raasch Group

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