

Petitioner Mojawa's Demonstrative Exhibit for Oral Argument

Suzhou Mojawa Intelligent Electronic Co., Ltd. v. Shenzhen Shokz Co., Ltd.

IPR2025-00842 (U.S. Pat. No. 11,197,084 B2)

IPR2025-00843 (U.S. Pat. No. 11,310,582 B2)

August 25, 2026

Instituted Grounds

IPR2025-00843 U.S. Pat. No. 11,310,582 ('582 Pat.)			IPR2025-00842 U.S. Pat. No. 11,197,084 ('084 Pat.)		
Ground	Claim(s)	References		Ground	Claim(s)
1	1, 14	Li + Liao	Li + Fujita	1	1
		Li + Liao/Fujita + Fukuda		2	12-15
2*	2-6	Li + Liao/Fujita + Asaka		3*	2-6
3	7-12	Li + Liao/Fujita + Numata		4	7-10
4	16-20	Li + Liao/Fujita + Wang, Xu, and Nielsen		5	16-20

*PO Did Not Dispute

('582 and '084 Pats.)

No Pending Motions

- No motions to amend claims.
- No motions to exclude or strike evidence.

(**'582 and '084 Pats.**)

Commonality of Claim 1 Elements

'582 Pat. [1a]-[1d], [1f]

1. A loudspeaker apparatus, comprising:

an ear hook including a first plug end and a second plug end, the ear hook being surrounded by a protective sleeve, the protective sleeve being made of an elastic waterproof material;

a core housing for accommodating an earphone core, the core housing being fixed to the first plug end and elastically abutted against the protective sleeve, wherein

the core housing including a housing panel facing human body and a housing back panel opposite to the housing panel, and

the vibration of the earphone core drives the housing panel and the housing back panel to vibrate, the vibration of the housing panel having a first phase, the vibration of the housing back panel having a second phase, wherein when the vibration frequencies of the housing panel and the housing back panel is within a range of 2000 Hz to 3000 Hz, an absolute value of a difference between the first phase and the second phase is less than 60 degrees; and

a circuit housing for accommodating a control circuit or a battery, the circuit housing being fixed to the second plug end, the control circuit or the battery driving the earphone core to vibrate to generate a sound.

'084 Pat. [1a]-[1d]

1. A loudspeaker apparatus, comprising:

an ear hook including a first plug end and a second plug end, the ear hook being surrounded by a protective sleeve, the protective sleeve being made of an elastic waterproof material;

a core housing for accommodating an earphone core, the core housing being fixed to the first plug end and elastically abutted against the protective sleeve; and

a circuit housing for accommodating a control circuit or a battery, the circuit housing being fixed to the second plug end, the control circuit or the battery driving the earphone core to vibrate, the vibration of the earphone core generating a driving force to drive a housing panel of the core housing to vibrate, the driving force being not parallel to a normal line of the housing panel.

('582 and '084 Pats.)

[illegible]

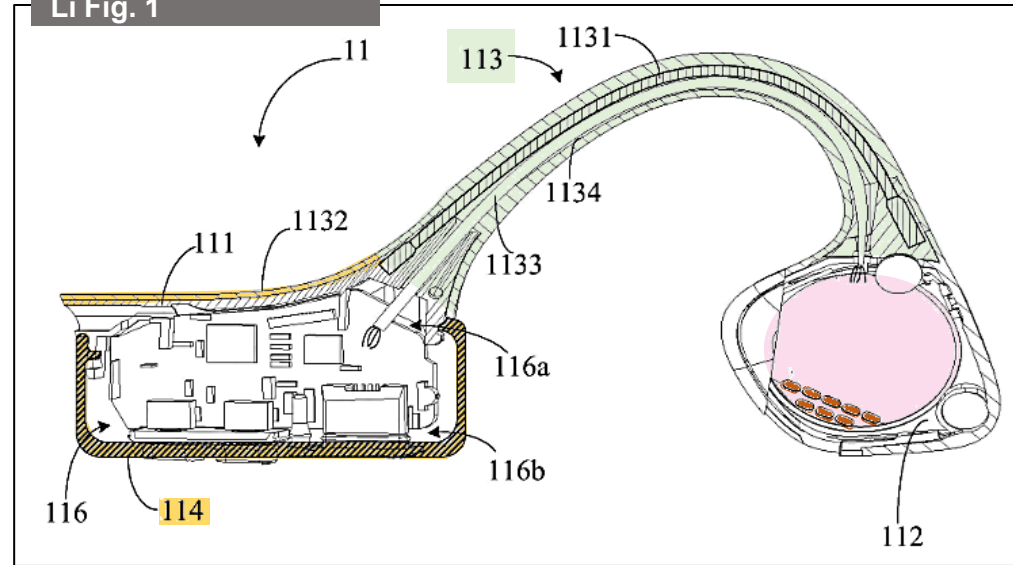
- ('582 and '084 Pats.)**

Ground 1: Li Discloses All Basic Elements of an Audio Headset

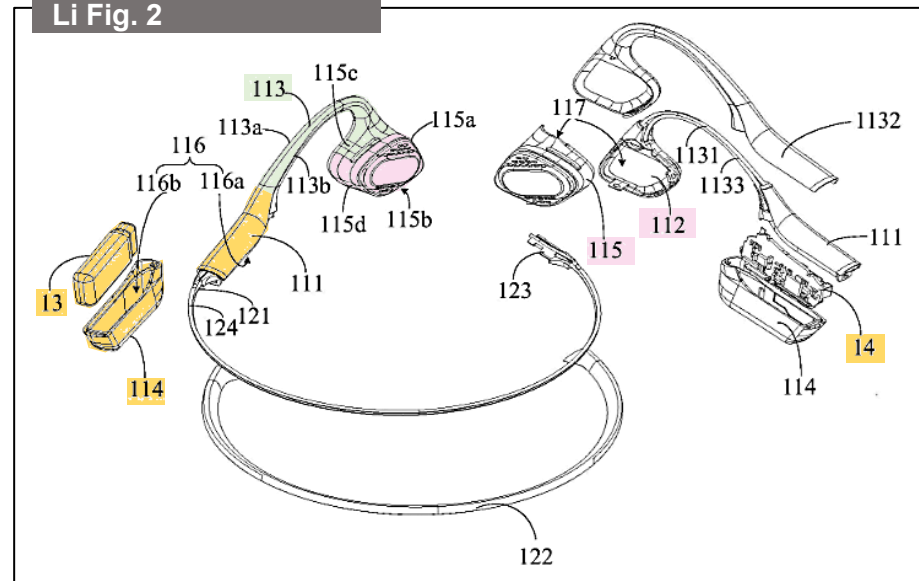
Li discloses:

- Ear Hook 113
- Core Housing 112, 115
- Earphone Core
- Circuit Housing 111, 114
- Control Circuit 14
- Battery 13

Li Fig. 1



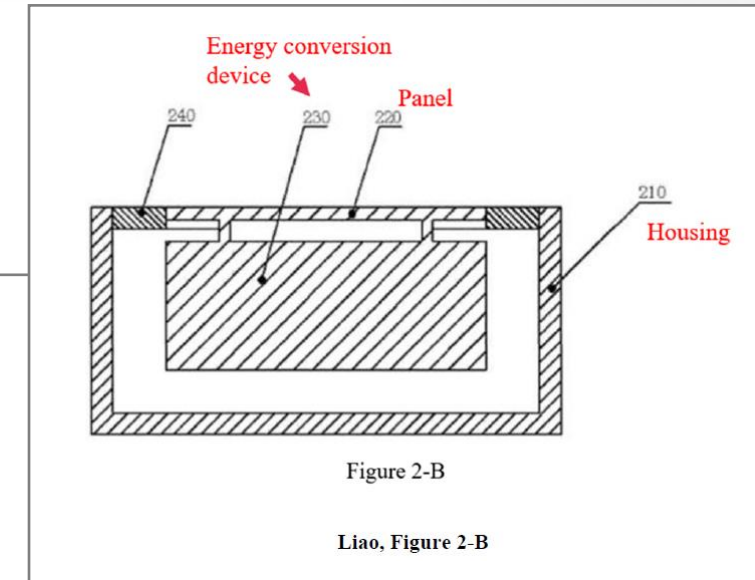
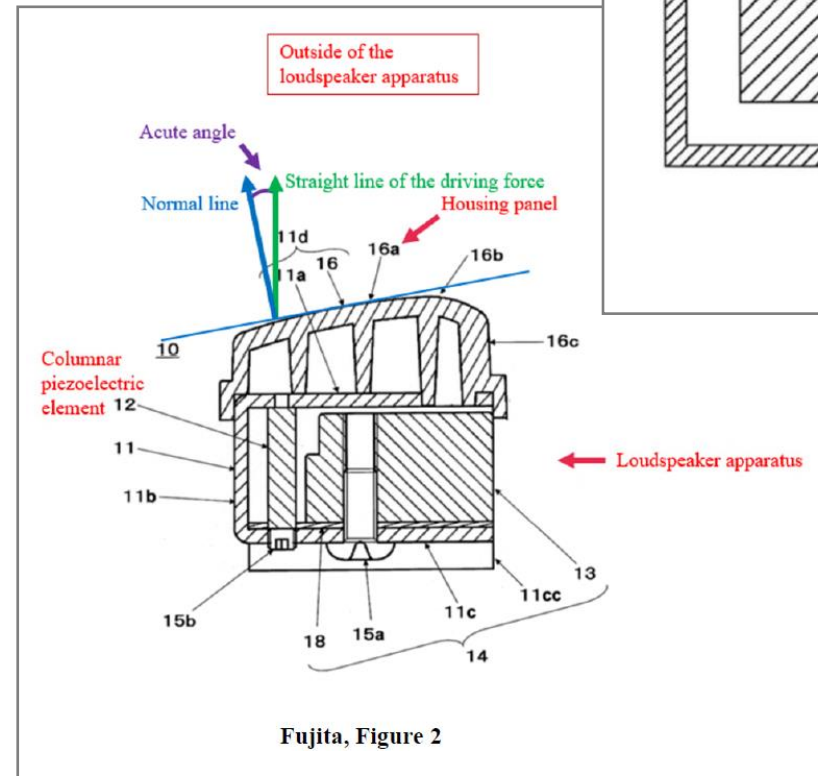
Li Fig. 2



('582 and '084 Pats.)

Ground 1: Li Combinations Render Claim 1 of Each Patent Obvious

- **Liao** teaches earphone core vibration drives housing panel 220 and back panel 210 with in phase vibration frequency in claimed 2000-3000 Hz range.
- **Fujita** teaches earphone core vibration drives housing panel with non-parallel driving force.
- Li + Liao ('582 Pat.) and Li + Fujita ('084 Pat.) combinations constitute routine engineering.



'582 Pat.: Liao, ¶¶ 55-58, 63, 75, 78, Figs. 2-B; Pet. 34-36; EX1003, ¶¶ 134-144; Reply 1, 17-19; EX1041, ¶¶ 14-18; Institution Decision 60-61.
'084 Pat.: Li, ¶¶ 3-5, 24, 25, 28, 46, 50, 51, 58, 71, Figs. 1, 2, 14; Fujita, Abs., ¶¶ 7, 8, 27, 28, 30, 32-34, 37, Fig. 2; Pet. 35-42; Reply 1, 5-8;
EX1003, ¶¶ 135-143; EX1041, ¶¶ 5, 8-12.

('582 and '084 Pats.)

Ground 1: Li + Routine Engineering

'582 Pat. [1a], [1b]

1. A loudspeaker apparatus, comprising:
an ear hook including a first plug end and a second plug end, the ear hook being surrounded by a protective sleeve, the protective sleeve being made of an elastic waterproof material;

[1a]: Li, ¶¶ 23, 25, 26, 29, 35, 44, 45, 58-69, Figs. 1, 2, 9, 12; Pet. 21-28; EX1003, ¶¶ 57, 114-122; Reply 1, 7-13; EX1041, ¶¶ 5-9; Institution Decision at 45-50.

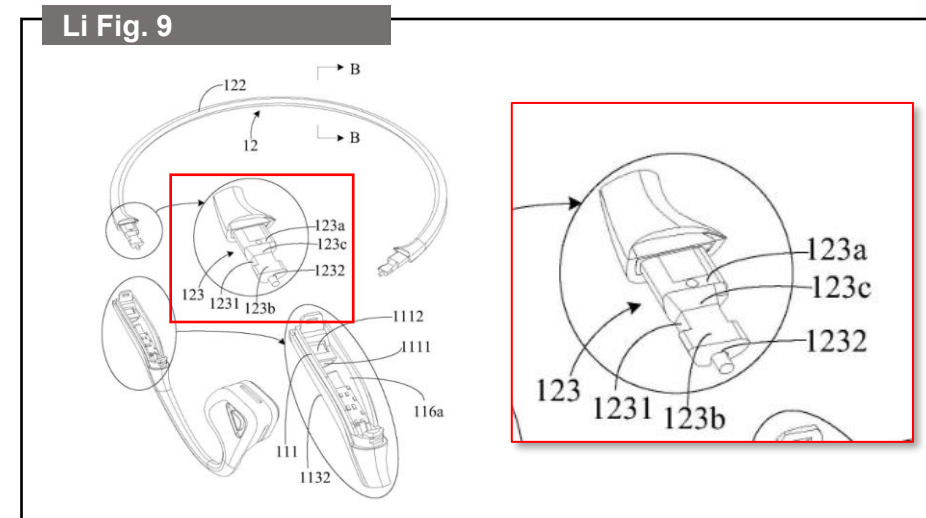
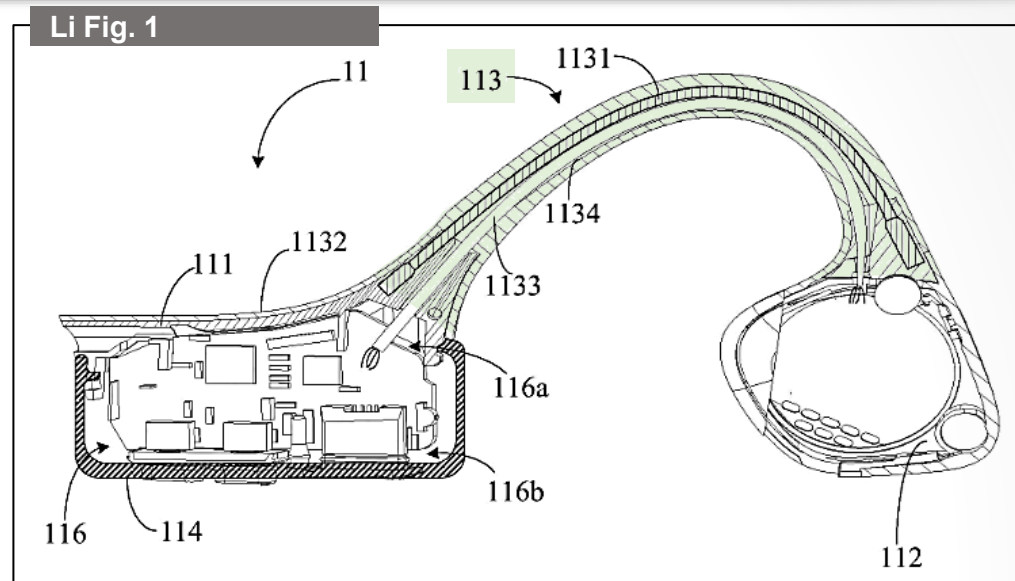
[1b]: Li ¶¶ 26, 30, 71, 73, Figs. 1, 3; Pet. 28-30; EX1003, ¶¶ 123-125, Reply 1.

'084 Pat. [1a], [1b]

1. A loudspeaker apparatus, comprising:
an ear hook including a first plug end and a second plug end, the ear hook being surrounded by a protective sleeve, the protective sleeve being made of an elastic waterproof material;

[1a]: Li, ¶¶ 23, 25, 26, 29, 35, 44, 45, 58-69, Figs. 1, 2, 9, 12; Pet. 24-30; EX1003, ¶¶ 57, 116-124; Reply 1, 8-13; EX1041, ¶¶ 14-18; Institution Decision at 47-48, 51.

[1b]: Li ¶¶26, 30, 71, 73, Figs. 1, 3; Pet. 30-32; EX1003, ¶¶125-127; Reply 1.



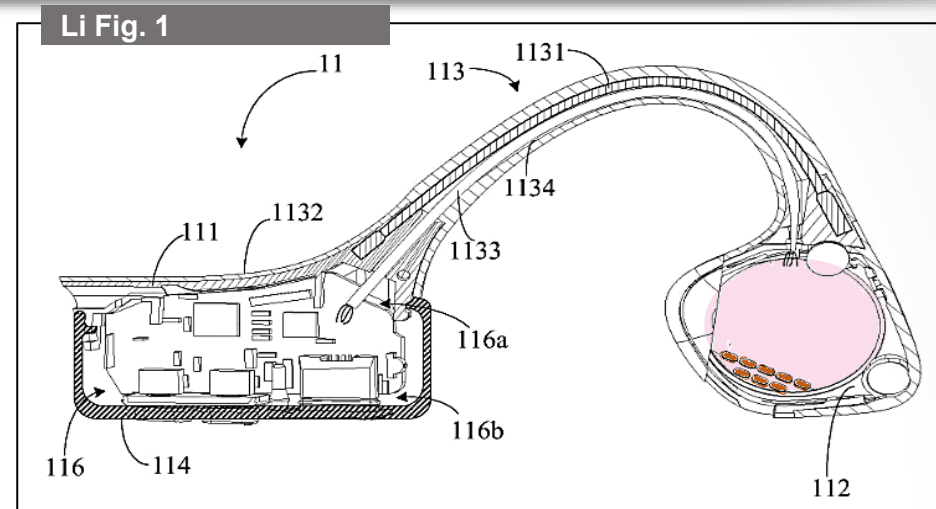
('582 and '084 Pats.)

Ground 1: Li + Routine Engineering

'582 Pat. [1c]

a core housing for accommodating an earphone core, the core housing being fixed to the first plug end and elastically abutted against the protective sleeve,

Li, ¶¶ 36, 43, 58, 59, 63, 64, Figs. 1, 2, 3, 5, 9, 10; Pet. 30-33; EX1003, ¶¶ 126-132; Reply 1, 13-16; EX1041, ¶¶ 10-13; Institution Decision at 54-56.



'084 Pat. [1c]

a core housing for accommodating an earphone core, the core housing being fixed to the first plug end and elastically abutted against the protective sleeve; and

Li, ¶¶ 36, 43, 58, 59, 63, 64, Figs. 1, 2, 3, 5, 9, 10; Pet. 32-35; EX1003, ¶¶ 128-134; Reply 1, 13-16; EX1041, ¶¶ 21-22; Institution Decision at 58-60, 62.

Li Fig. 10 (annotated)

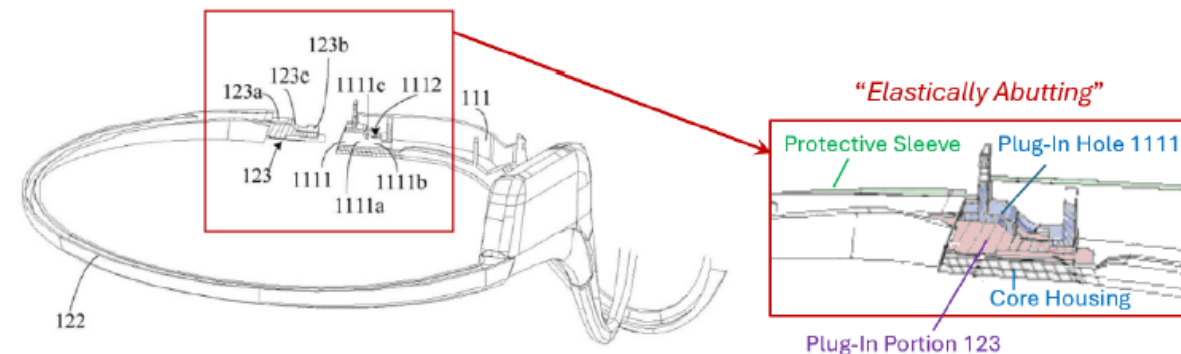


Figure 10

('582 and '084 Pats.)

Ground 1: Li + Routine Engineering

'582 Pat. [1f]

a circuit housing for accommodating a control circuit or a battery, the circuit housing being fixed to the second plug end, the control circuit or the battery driving the earphone core to vibrate to generate a sound.

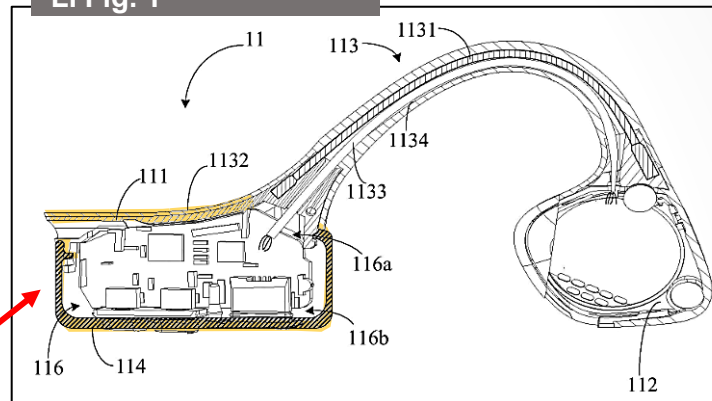
Li, ¶¶ 24, 46, 58, Figs. 1, 2; Pet. 36-40; EX1003, ¶¶ 145-149; Reply 1; see also [1a].

'084 Pat. [1d]

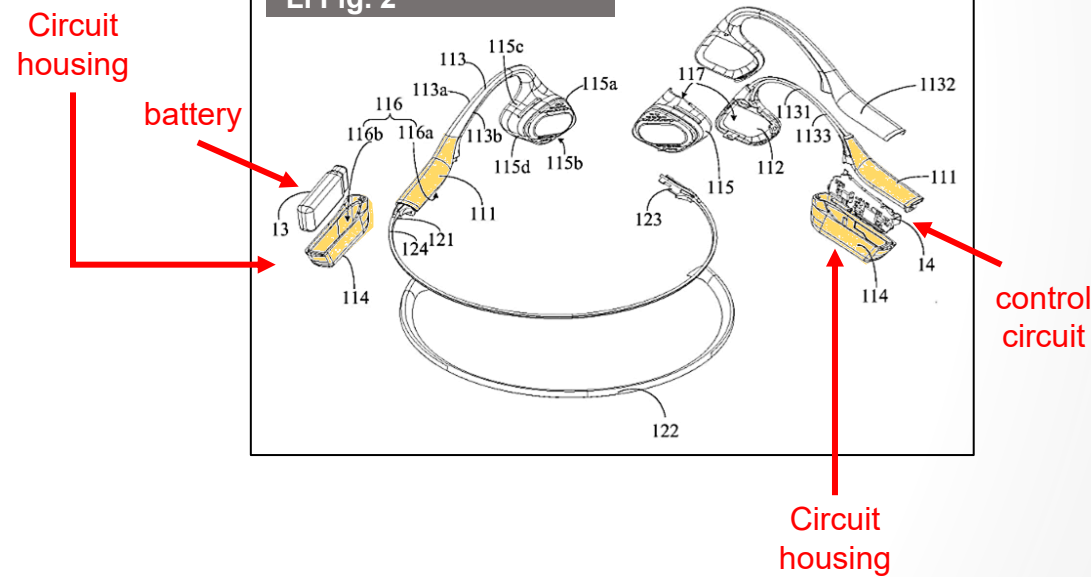
a circuit housing for accommodating a control circuit or a battery, the circuit housing being fixed to the second plug end, the control circuit or the battery driving the earphone core to vibrate, the vibration of the earphone

Li, ¶¶ 24, 46, 58, Figs. 1, 2; Pet. 35-39; EX1003, ¶¶ 135-139; Reply 1; see also [1a].

Li Fig. 1



Li Fig. 2



('582 and '084 Pats.)

Ground 1 ('582 patent): Li + Liao

'582 Pat. [1e]

the vibration of the earphone core drives the housing panel and the housing back panel to vibrate, the vibration of the housing panel having a first phase, the vibration of the housing back panel having a second phase, wherein when the vibration frequencies of the housing panel and the housing back panel is within a range of 2000 Hz to 3000 Hz, an absolute value of a difference between the first phase and the second phase is less than 60 degrees; and

Liao, ¶¶ 55-58, 63, 75, 78, Figs. 2-B; Pet. 34-36; EX1003, ¶¶ 134-144; EX1041, ¶¶ 14-18; Institution Decision 60-61.

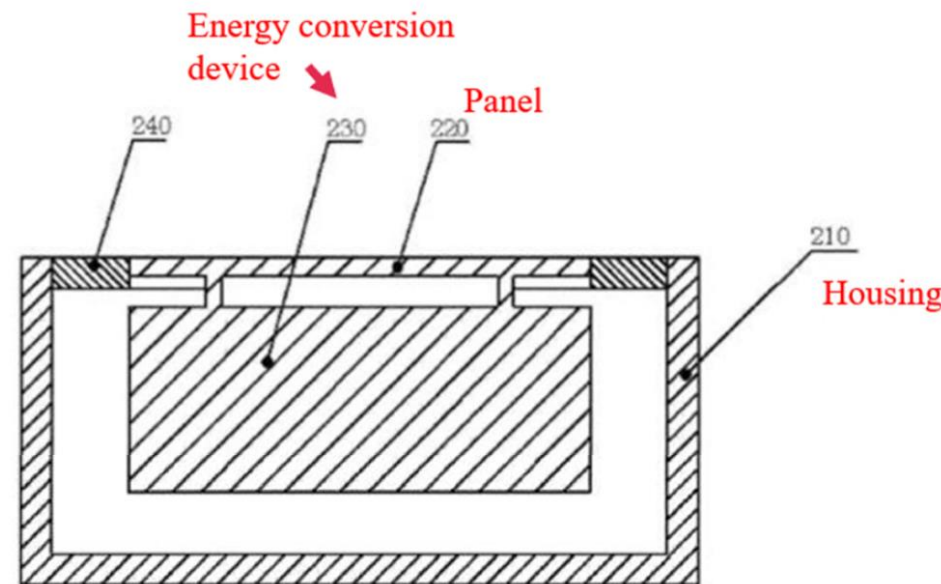


Figure 2-B

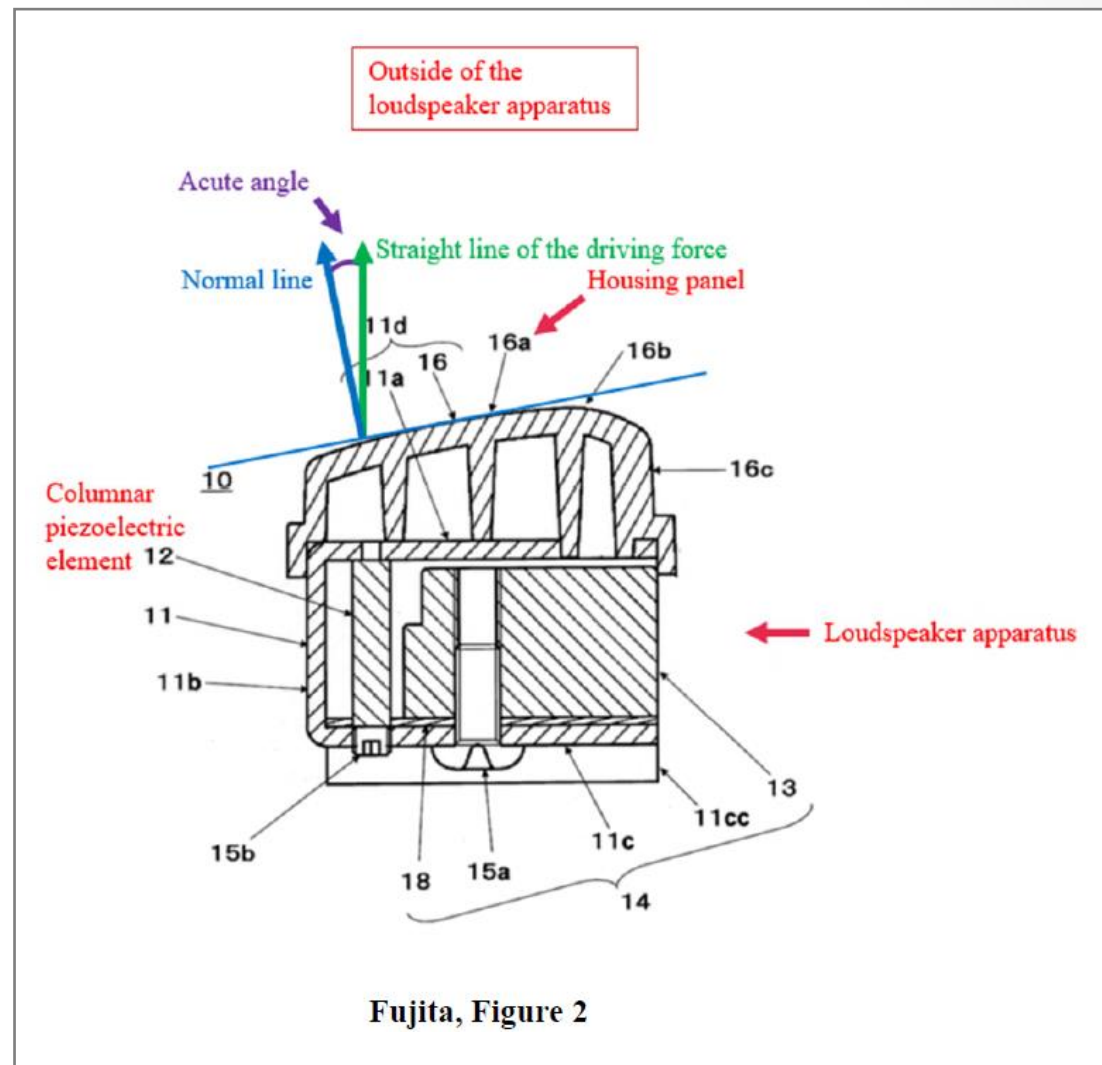
('582 Pat.)

Ground 1 ('084 patent): Li + Fujita

'084 Pat. [1d]

a circuit housing for accommodating a control circuit or a battery, the circuit housing being fixed to the second plug end, the control circuit or the battery driving the earphone core to vibrate, the vibration of the earphone core generating a driving force to drive a housing panel of the core housing to vibrate, the driving force being not parallel to a normal line of the housing panel.

Li, ¶¶ 3-5, 24, 25, 28, 46, 50, 51, 58, 71, Figs. 1, 2, 14; *Fujita*, Abs., ¶¶ 7, 8, 27, 28, 30, 32-34, 37, Fig. 2; *Pet.* 35-42; *EX1003*, ¶¶ 135-143; *Reply* 5-8; *EX1041*, ¶¶ 5, 8-12.



('084 Pat.)

Li-Liao and Li-Fujita Ground 1 of '582 and '084 Patents

Common Li Issues

Ground 1 ('582 and '084): Disputed Li Issues Common to Both Patents

- Whether claimed first and second plug ends are obvious features.
- Whether the core housing being elastically abutted against the protective sleeve is obvious.
- Whether Petitioner applied consistent construction of “the control circuit or the battery driving the earphone core to vibrate.”

(’582 and ’084 Pats.)

Ground 1 ('582 and '084): First and Second Plug Ends Are Obvious

- Li teaches end plug connections.
 - Li discloses “a variety of ways to connect components in a bone conduction earphone.”
 - Natural locations for modular connections are the two ear-hook interfaces.
 - Li does not “criticize, discredit, or otherwise discourage” using a plug to connect a housing to connecting component 113.
- “A patent challenger may rely on an ordinarily skilled artisan’s knowledge to establish obviousness.”
 - Institution Decision ('582) 47 (citing *Koninklijke Philips N.V. v. Google LLC*, 948 F.3d 1330, 1337–38 (Fed. Cir. 2020); *Ariosa Diagnostics v. Verinata Health, Inc.*, 805 F.3d 1359, 1365 (Fed. Cir. 2015)); ID ('084) 49 (same).

'582 Pat.: Li, ¶¶ 23, 25, 26, 29, 35, 44, 45, 58-69, Figs. 1, 2, 9, 12; Pet. 24-30; EX1003, ¶¶ 57, 114-122; Reply 8-13; EX1041, ¶¶ 5-9; Institution Decision at 45-50.

'084 Pat.: Li, ¶¶ 23, 25, 26, 29, 35, 44, 45, 58-69, Figs. 1, 2, 9, 12; Pet. 24-30; EX1003, ¶¶ 57, 116-124; Reply 8-13; EX1041, ¶¶ 14-18; Institution Decision at 47-48, 51

Ground 1 ('582 and '084): First and Second Plug Ends Are Obvious



Randall Manufacturing v. Rea,
733 F.3d 1355, 1362 (Fed. Cir. 2013)

An ordinarily skilled artisan's knowledge is “part of the store of public knowledge that must be consulted when considering whether a claimed invention would have been obvious.”

Ground 1 ('582 and '084): First and Second Plug Ends Are Obvious

- **Motivation**

- Plug ends provide modularity for simplified manufacturing, later wiring, component replacement, and cost reduction.
- Modular prior art supports motivation.
- Modular connections at ear hook ends among finite number of places to best achieve modularity benefits.
- Waterproofing was desired and various techniques widely available.

'582 Pat.: Li, ¶¶ 23, 25, 26, 29, 35, 44, 45, 58-69, Figs. 1, 2, 9, 12; Pet. 24-30; EX1003, ¶¶ 57, 114-122; Reply 8-13; EX1041, ¶¶ 5-9; Institution Decision at 45-50.

'084 Pat.: Li, ¶¶ 23, 25, 26, 29, 35, 44, 45, 58-69, Figs. 1, 2, 9, 12; Pet. 24-30; EX1003, ¶¶ 57, 116-124; Reply 8-13; EX1041, ¶¶ 14-18; Institution Decision at 47-48, 51

('582 and '084 Pats.)

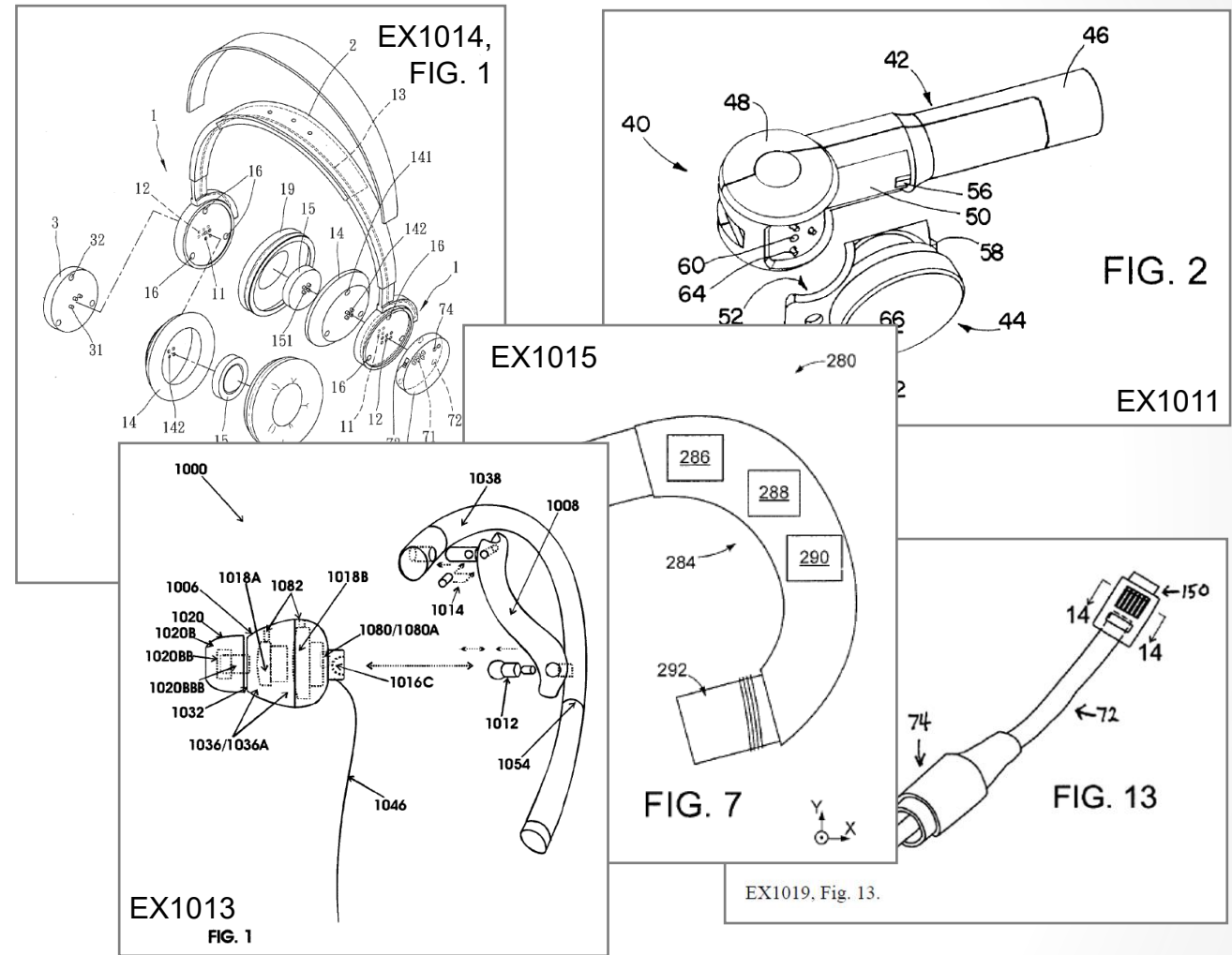
Ground 1 ('582 and '084): First and Second Plug Ends Are Obvious

- “The relevant inquiry is whether a skilled artisan would have been motivated to combine Li’s teachings with the skilled artisan’s knowledge about the benefits of modular component design.”
– ID ('582) 49; ID ('084) 51.
- “[T]he Federal Circuit stated in *Randall* that ‘well-documented knowledge’ could ‘easily explain why an ordinarily skilled artisan would have been motivated to combine or modify the cited references to arrive at the claimed inventions.’”
– ID ('582) 48; ID ('084) 50.

Ground 1 ('582 and '084): Component Modularity Well-Known in the Art

Modular Portions and Electrical Connections Were Well-Known in the Art

- Hupkes (EX1011): user comfort
- Dryer (EX1012): reduced mfg. costs
- Mei (EX1013): wearing stability
- Chen (EX1014): reduced mfg. costs
- Lott (EX1015): modular headset portions
- Bellas (EX1016): headphones with removable or separable components
- Eggebraaten (EX1019): modular connections “inexpensive to manufacture”



Both Pats.: Ex. 1011 ¶¶ 6–7, 30–37, Fig. 2; Ex. 1012, 2:4–15, 3:13–35, Fig. 2; Ex. 1013, 10:62–11:8, 22:23–23:2, 23:64–24:8, Figs. 1, 17, 19; Ex. 1014 ¶¶ 4–5, 14–17, Figs. 1, 3; Ex. 1015, 2:6–17, 4:2–5, 5:19–6:17, 6:65–7:42, Figs. 3, 5, 7; Ex. 1016 ¶¶ 56, 79, 85, 96; Ex. 1019 ¶¶ 9–15, 31, 35, 45, Figs. 1–15).

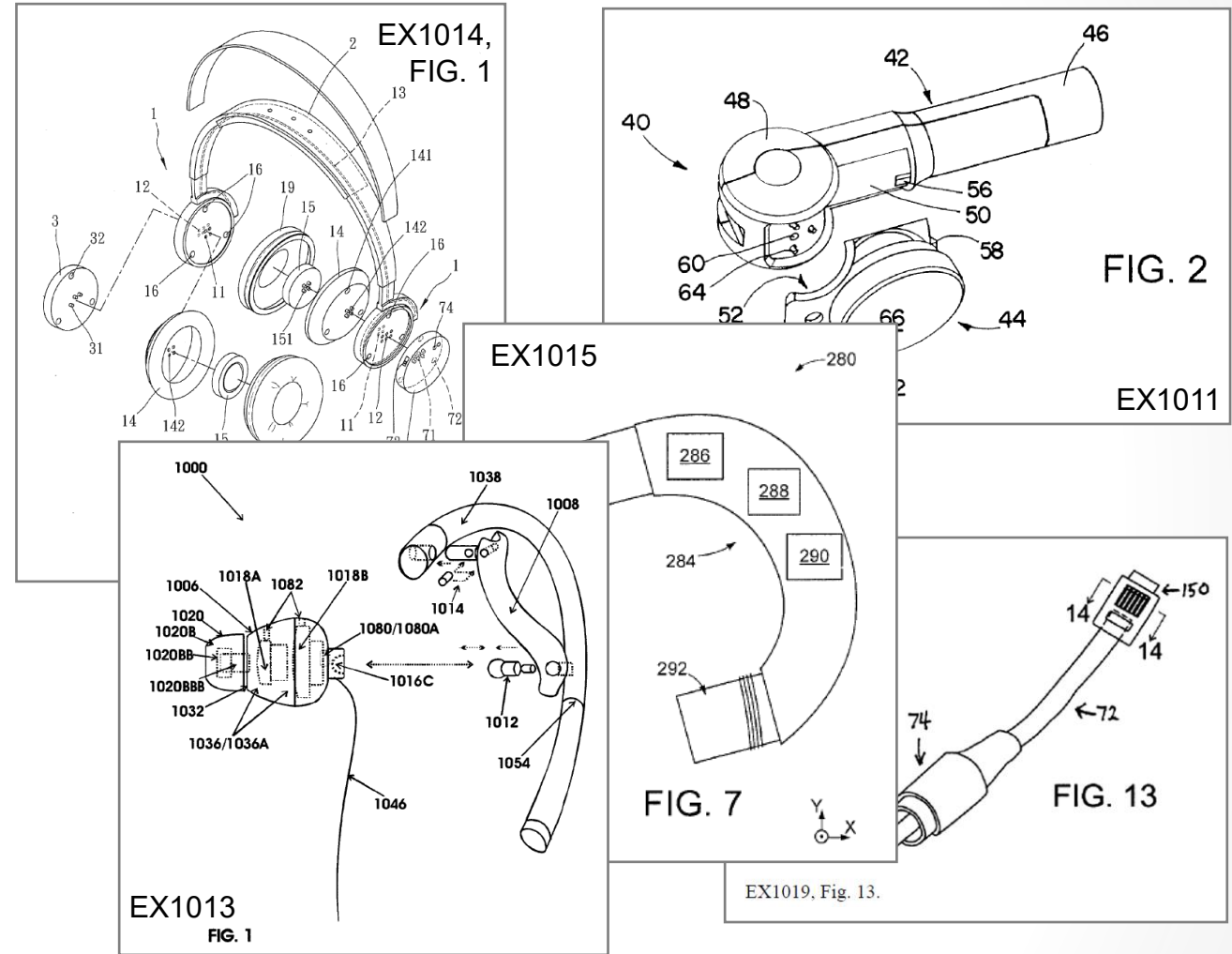
'084 Pat.: Pet. 19–20, 24–30; EX1003, ¶¶ 116–124; Reply 9–13; EX1041, ¶¶ 14–18; Institution Decision 49–52.

'582 Pat.: Pet 17–18, 23–28; EX1003, ¶¶ 114–122; Reply 8–13; EX1041, ¶¶ 6–9; Institution Decision 47–50.

('582 and '084 Pats.)

Ground 1 ('582 and '084): Component Modularity Well-Known in the Art

- Reliance on “Modularity” Prior Art is Proper.
 - Board already determined compliance with 37 C.F.R. § 42.104(b)(4).
 - Prior modular patents fall outside definition of “general knowledge” in July 31, 2025 Director Memo.
 - Prior modular patents demonstrate knowledge of POSITA and support motivation to combine.



'084 Pat.: Institution Decision 20-24, 49-52; Reply 12-13.

'582 Pat.: Institution Decision 63-64, 47-50; Reply 12-13.

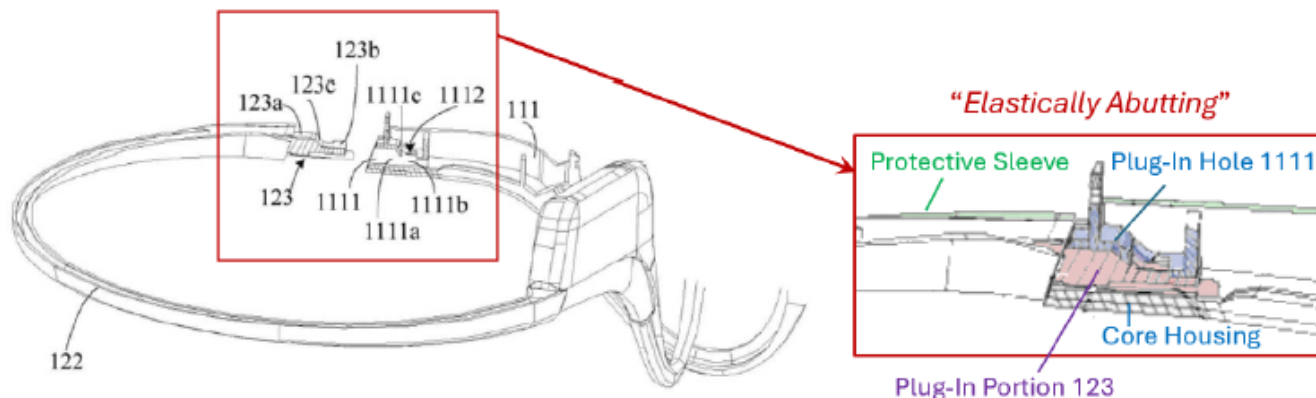
('582 and '084 Pats.)

Ground 1: Elastically Abutted Claim 1 of '582 and '084 Patents

Ground 1 ('582 and '084): Elastic Abutment Is Obvious

'582 Pat. [1b]; '084 Pat. [1c];

a core housing for accommodating an earphone core, the core housing being fixed to the first plug end and elastically abutted against the protective sleeve; and



- Li teaches the core housing elastically abutted against the protective sleeve.
- “Li’s figures collectively show [the elastically abutted] feature.”

ID ('582) 55-56 (citing Figs. 2, 5, 9-10); ID ('084) 59-60 (same).

'582 Pat.: Li, ¶¶ 36, 43, 58, 59, 63, 64, Figs. 1, 2, 3, 5, 9, 10; Pet. 30-33; EX1003, ¶¶ 126-132;

Reply 13-16; EX1041, ¶¶ 10-13; Institution Decision at 54-56 at 55-56 (citing Figs. 2, 5, 9-10).

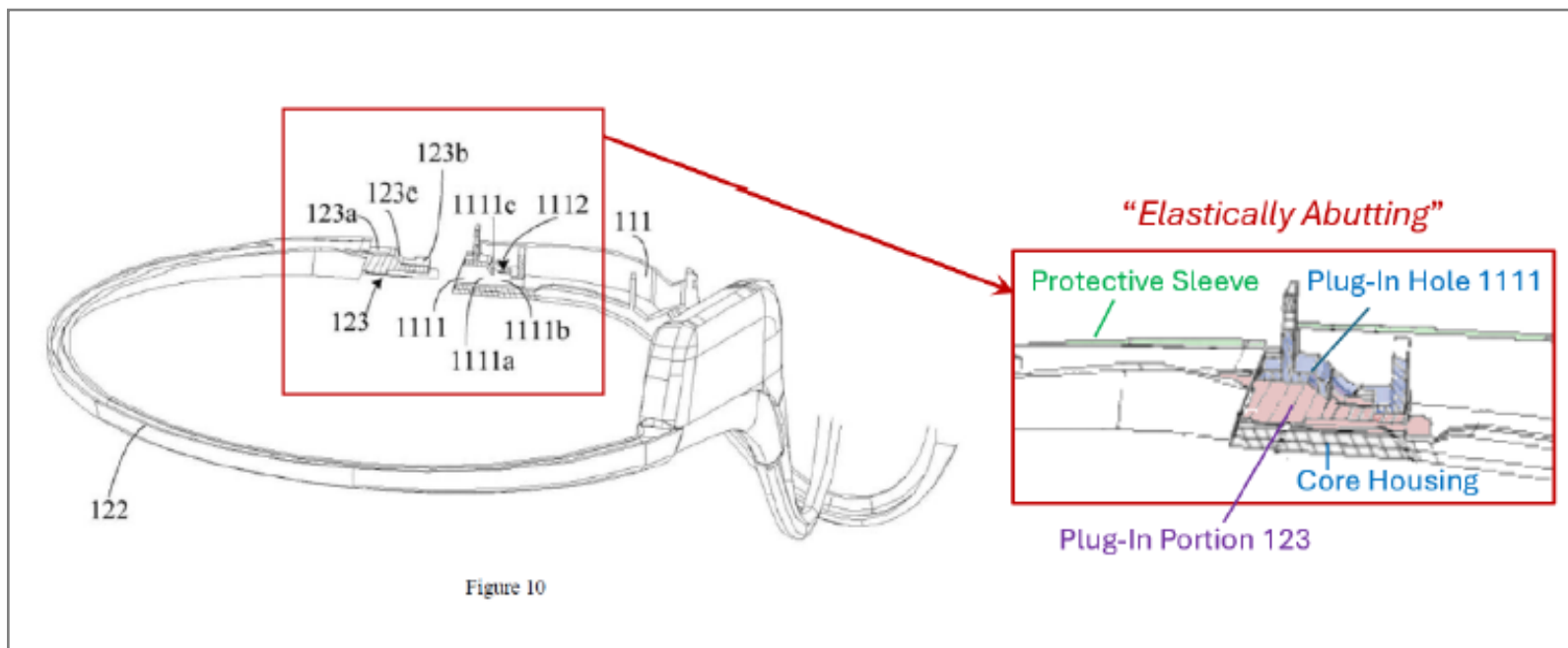
'084 Pat.: Li, ¶¶ 36, 43, 58, 59, 63, 64, Figs. 1, 2, 3, 5, 9, 10; Pet. 32-35; EX1003, ¶¶ 128-134; Reply 13-16;

EX1041, ¶¶ 21-22; Institution Decision at 58-60, 62, at 59-60 (citing Figs. 2, 5, 9-10).

('582 and '084 Pats.)

Ground 1 ('582 and '084): Elastic Abutment Is Obvious

- “Li’s figures show that second elastic coating layer 122 abuts a housing when ‘plug-in portions 123 are respectively connected and fixed to the first housings 111 of the two ear hook assemblies 11.”
 - ID ('582) 55 (citing EX1004, ¶58, Figs. 2, 3, 5, 9, 10); ID ('084) 59 (citing same).



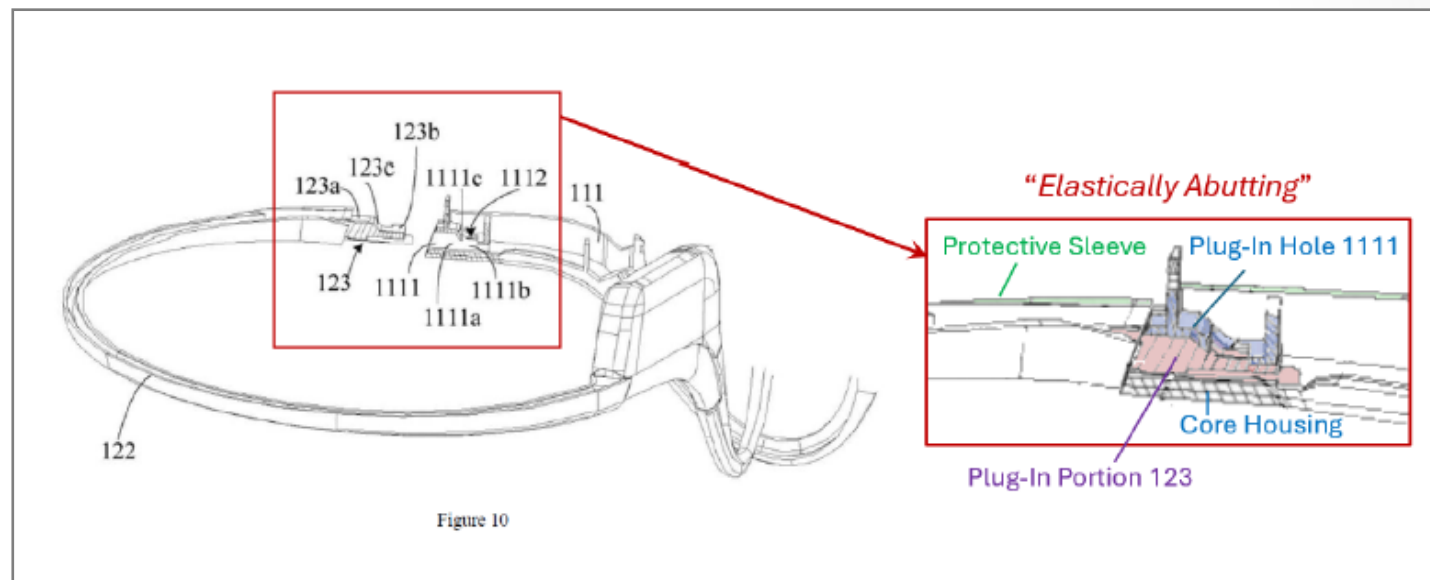
'582 Pat.: Institution Decision 55 (citing EX1004, ¶58, Figs. 2, 3, 5, 9, 10).

'084 Pat.: Institution Decision 59 (citing EX1004, ¶58, Figs. 2, 3, 5, 9, 10).

('582 and '084 Pats.)

Ground 1 ('582 and '084): Elastic Abutment Is Obvious

- A POSITA would have understood second elastic coating layer 122 compresses against end of the plug-in hole 1111 of the housing 111.
 - Li's plug-in portions tightly fit into the housing openings.
 - Li's second elastic coating layer is silicone, rubber, latex, or a composite material.



Ground 1 ('582 and '084): No Construction of “Elastically Abutted” Is Necessary



***Realtime Data LLC v. Iancu*,
912 F.3d 1368, 1375 (Fed. Cir. 2019)**

“The Board is required to construe only those terms that are in controversy, and only to the extent necessary to resolve the controversy.”

(Internal citations omitted)

Ground 1 ('582 and '084): No Construction of “Elastically Abutted” Is Necessary

Patent Owner’s “plain and ordinary” construction is incorrect:

Improperly imports limitations from the specification

- “end surface of the core housing”
 - specification discloses other abutment locations
- does not require a waterproof relationship
 - confirmed by claim differentiation (see claim 10 of each patent)

'084 Pat. [1c]: EX1001, 13:42-58; 12:29-34, Fig. 6; 37:61-67; Pet. 6-7; Reply 1-2.

'582 Pat. [1c]: EX1001, 13:34-50; 12:16-26, Fig. 6; 37:40-46; Pet. 6-7; Reply 1-3.

Ground 1: Control Circuit or Battery Driving Earphone Core Claim 1 of '582 and '084 Patents

Ground 1 ('582 and '084): Control Circuit or Battery Driving Earphone Core

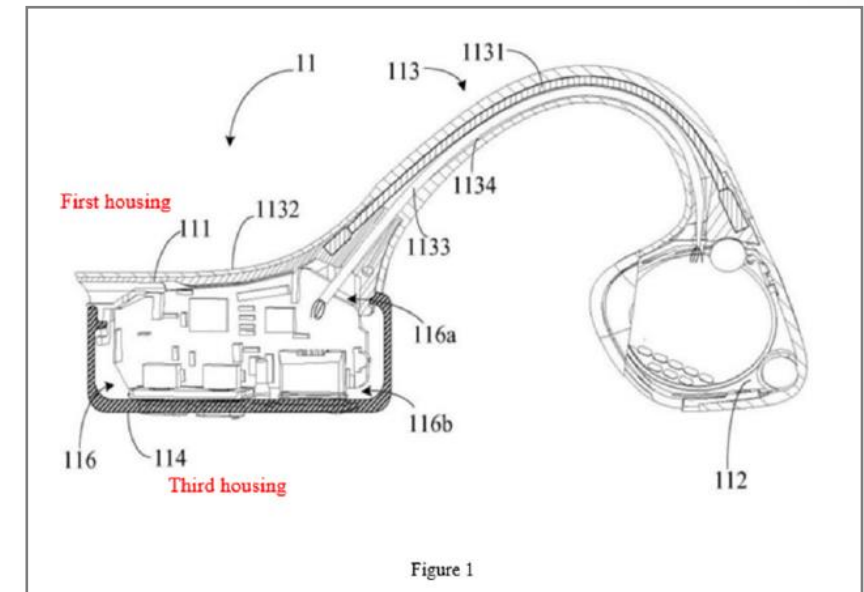
'582 Pat. [1f]

a circuit housing for accommodating a control circuit or a battery, the circuit housing being fixed to the second plug end, the control circuit or the battery driving the earphone core to vibrate to generate a sound.

'084 Pat. [1d]

a circuit housing for accommodating a control circuit or a battery, the circuit housing being fixed to the second plug end, the control circuit or the battery driving the earphone core to vibrate, the vibration of the earphone core generating a driving force to drive a housing panel of the core housing to vibrate, the driving force being not parallel to a normal line of the housing panel.

PO does not dispute Li teaches “the control circuit or battery [drives] the earphone core”



'582 Pat.: See POR 78-80; Sur-Reply 4.

'084 Pat.: See POR 82-84; Sur-Reply 5.

Ground 1 ('582 and '084): Petitioner applied Consistent Claim Construction

- PO's argument of contradictory claim constructions is factually incorrect.
 - Petitioner applied plain and ordinary meaning in IPR and district court.
 - Dr. Kyriakakis testified Li discloses the control circuit drives the earphone core.
- Inconsistent claim construction should have been raised during discretionary denial briefing.

'084 Pat. [1d]: Pet. 6-7, 35-37, EX1003, ¶136; Reply 3-5; EX2021, 65:3-71:14, 66:3-19, 67:4-10, 69:14-70:7, 70:9-71:14, 68:22-69:6; EX2023, 17-20.

'582 Pat. [1f]: Pet. 6-7, 36-38, EX1003, ¶146; Reply 4-7; EX2021, 65:3-71:14, 66:3-19, 67:4-10, 69:14-70:7, 70:9-71:14, 68:22-69:6; EX2023, 17-20.

Li-Liao Ground 1 of '582 Patent

Liao Issues

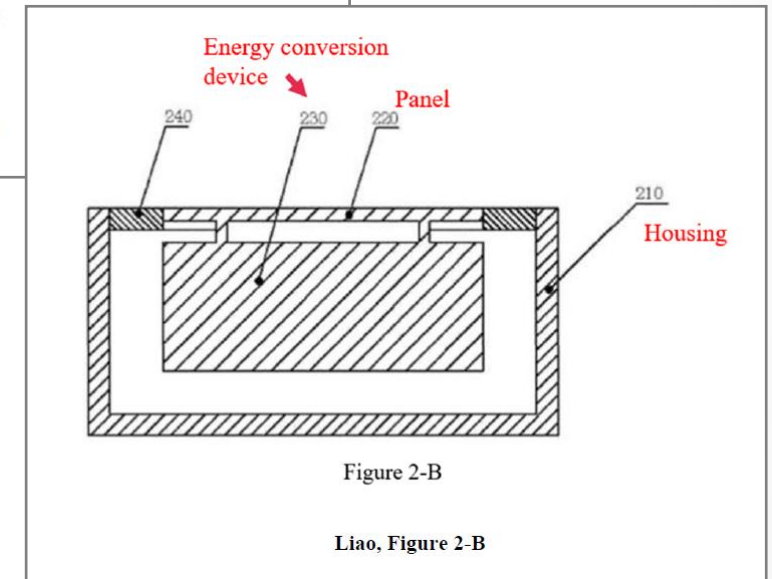
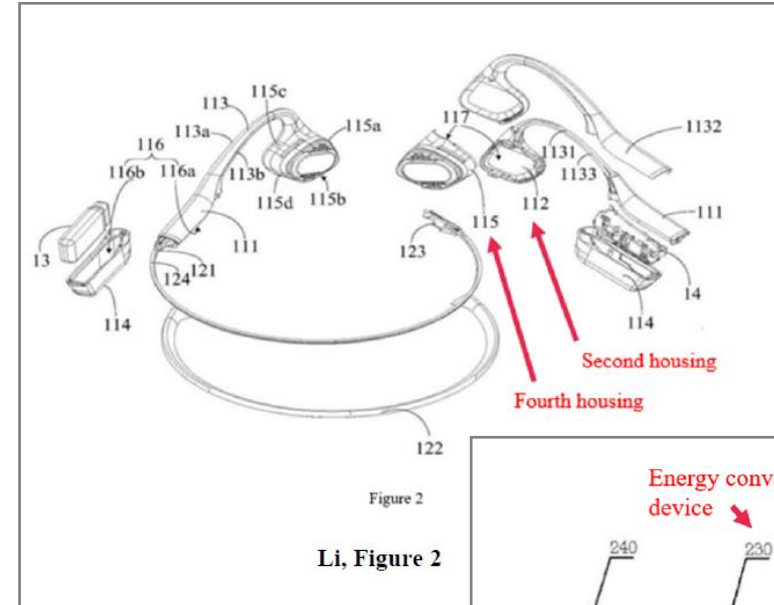
Ground 1 ('582 Pat.): Liao Renders Claimed Vibration Obvious

'582 Pat. [1e]

the core housing including a housing panel facing human body and a housing back panel opposite to the housing panel, and
the vibration of the earphone core drives the housing panel and the housing back panel to vibrate, the vibration of the housing panel having a first phase, the vibration of the housing back panel having a second phase, wherein when the vibration frequencies of the housing panel and the housing back panel is within a range of 2000 Hz to 3000 Hz, an absolute value of a difference between the first phase and the second phase is less than 60 degrees; and

[1d]: Li, ¶¶ 43, 49, Figs. 1, 2, 5, 8; Pet. 33-34; EX1003, ¶133.

[1e]: Liao, ¶¶ 55-58, 63, 75, 78, Figs. 2-B; Pet. 34-36; EX1003, ¶¶ 134-144; EX1041, ¶¶ 14-18; Institution Decision 60-61.



('582 Pat.)

Ground 1 ('582 Pat.): Liao Renders Claimed Vibration Obvious

- Liao discloses housing with flat front panel and rear housing wall of substantially similar shape, with the vibration source located centrally.
- Liao discloses direct attachment between housing panels.
- POSITA would have understood Liao's housing with such direct attachment to vibrate with nearly identical phase and amplitude within the claimed frequency range.
- Patent Owner's generalized concerns about specific geometry not applicable to Liao's disclosure, which lacks such geometry.

Ground 1 ('582 Pat.): Liao Renders Claimed Vibration Obvious

- Petitioner need not show Liao's housing construction *necessarily* always produces the claimed phase difference contrary to PO's assertions.
- All that is required is that it would have been obvious to a POSITA for Liao's housing to perform in the same way as the claimed housing.

Ground 1 ('582 Pat.): Inherency Not Required to Render Claims Obvious



***DexCom, Inc. v. Stewart*,
No. 2024-1291, 2025 WL 2399052, at *4 (Fed. Cir. Aug. 19, 2025)**

“[T]he Board focused its inquiry on what [the prior art reference] would teach or suggest to a person of ordinary skill in the art, rather than limiting itself to what [the reference] literally says or shows. To do otherwise would have been error.”

Ground 1 ('582 Pat.): Hindsight Argument Fails in Absence of Nexus

- PO offered no evidence that the claimed frequencies have any nexus to secondary considerations of nonobviousness.



In re GPAC Inc.,
57 F.3d 1573, 1580 (Fed. Cir. 1995)

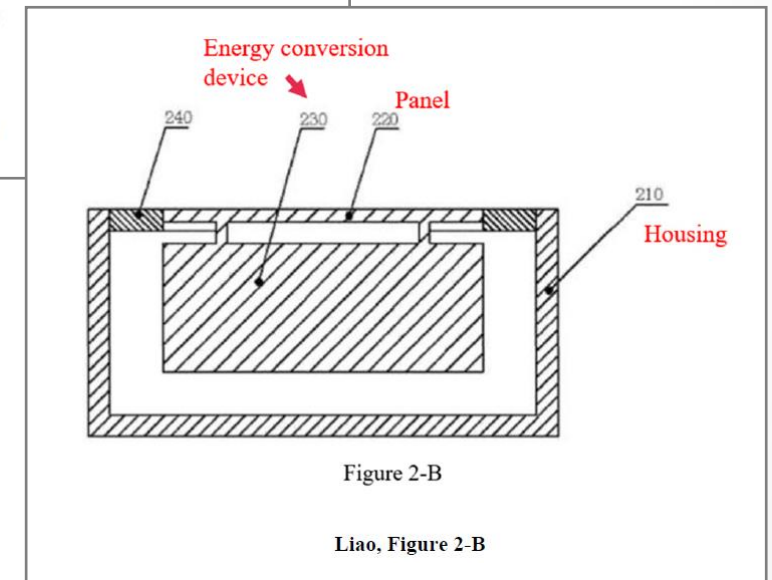
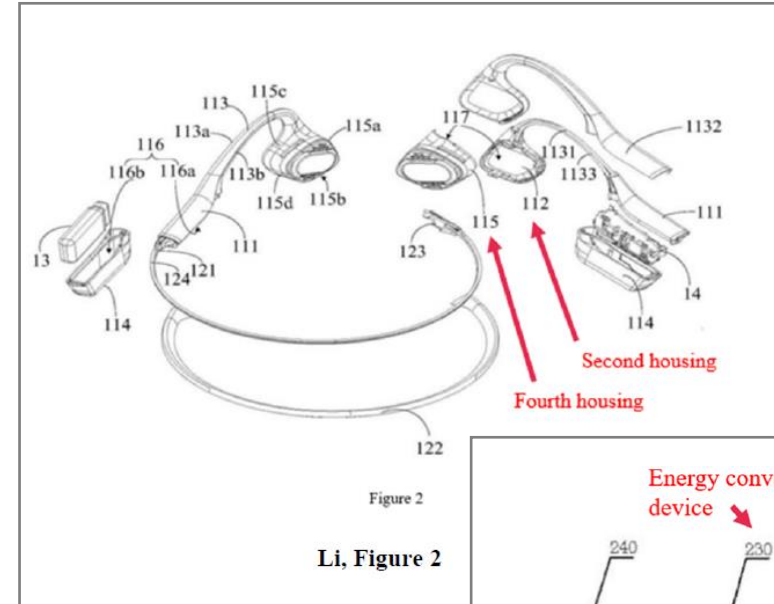
“For objective evidence to be accorded substantial weight, its proponent must establish a nexus between the evidence and the merits of the claimed invention.”

Ground 1, Claim 14 ('582 Pat.): Vibration Amplitude Ratio Range

'582 Pat. [14]

14. The loudspeaker apparatus of claim 1, wherein the vibration signal of the housing panel has a first amplitude, the vibration signal of the housing back panel has a second amplitude, and a ratio of the first amplitude to the second amplitude is within a range of 0.5 to 1.5.

Li, ¶¶ 29, 43, Liao, ¶¶ 47, 57, 58, 75, Fig. 2-B; Pet. 40-42; EX1003, ¶¶ 136, 150-153; Reply 20-21; EX1041, ¶ 19; see also [1e].



('582 Pat.)

Ground 1, Claim 14 ('582 Pat.): Vibration Amplitude Ratio Range Obvious

- Liao discloses a housing with direct attachment of planar housing panels.
- POSITA would have understood such a housing would have nearly the same amplitudes within a range of 0.5 to 1.5 due to the rigid construction of the core housing with rigid materials of the same thickness, and the amplitudes being driven from the same source.

Ground 1, Claim 14 ('582 Pat.): POSITA Motivated to Simplify and Reduce Costs

- Obvious to POSITA to construct housing 210 out of the same material as panel 220 in order to simplify the design and reduce costs.
- POSITA would have been motivated and found obvious to construct Liao's bone conduction speaker with panel and housing of same thickness to simplify the design and manufacture and to reduce costs.

Ground 1, Claim 14 ('582 Pat.): Hindsight Argument Fails in Absence of Nexus

- PO offered no evidence that the claimed amplitude ratio range has any nexus to secondary considerations of nonobviousness.



In re GPAC Inc.,
57 F.3d 1573, 1580 (Fed. Cir. 1995)

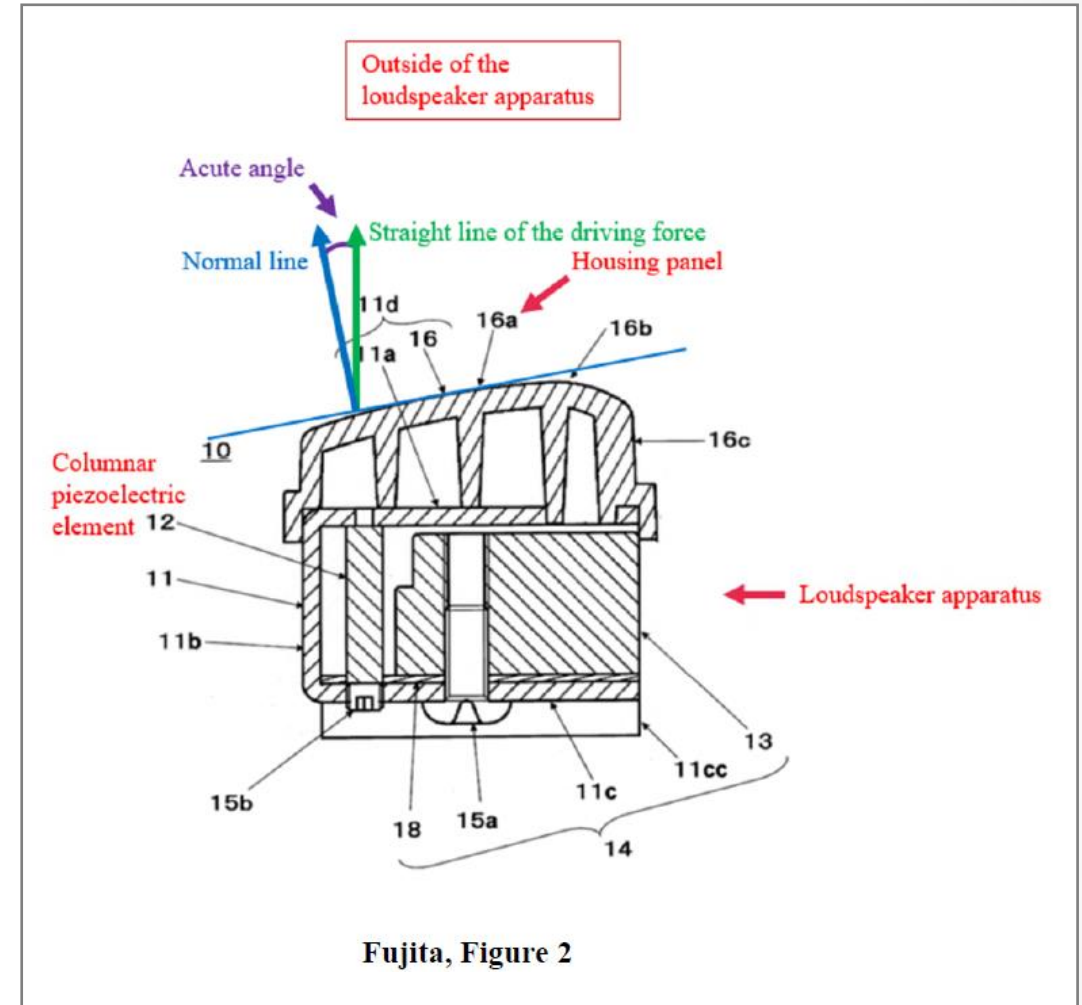
“For objective evidence to be accorded substantial weight, its proponent must establish a nexus between the evidence and the merits of the claimed invention.”

Li-Fujita Ground 1 of '084 Patent

Fujita Issues

Ground 1 ('084 Pat.): Non-Parallel Driving Force Is Obvious

- PO does not dispute Fujita teaches non-parallel driving force.
- POSITA would have understood Fujita's design enhanced sound transmission efficiency.
 - Pet. 21 (citing EX1003, ¶110); Reply 5-6 (citing Li, ¶ 25; EX1022, ¶¶ 32-34).



Fujita, Figure 2

Ground 1 ('084 Pat.): Waterproofing Concerns Do Not Defeat the Combination

- Fujita does not require an open, unsealed gap as PO claims.
 - Any “gap” would be filled with a gasket, such as a rubber gasket or stopper.
- POSITA would have followed Li's sealing techniques for waterproofing.
 - Li teaches silicone, rubber, elastic coating layers, and waterproof lining structures.
 - Li's elastic materials allow sealing while preserving vibration.

Ground 1 ('084 Pat.): Sound Leakage Concerns Are Addressed by Li

- PO presumes POSITA would engage in cut-and-paste exercise.
- Li addressed sound leakage via strip-shaped sound holes causing acoustic interference.
 - Li reduces leakage using phase interference cancellation techniques.
 - POSITA would have reduced leakage with Li's disclosed sound-hole teachings.

Li-Fujita-Fukuda Ground 2 of '084 Patent

Fukuda Issues

Ground 2, Claims 12 and 13 ('084 Pat.): Mapping

'084 Pat. [12], [13]

12. The loudspeaker apparatus of claim 1, wherein the housing panel and the earphone core are in a transmission connection, and all or part of the housing panel is used to contact or abut a user's body to conduct a sound generated by the vibration of the earphone core.

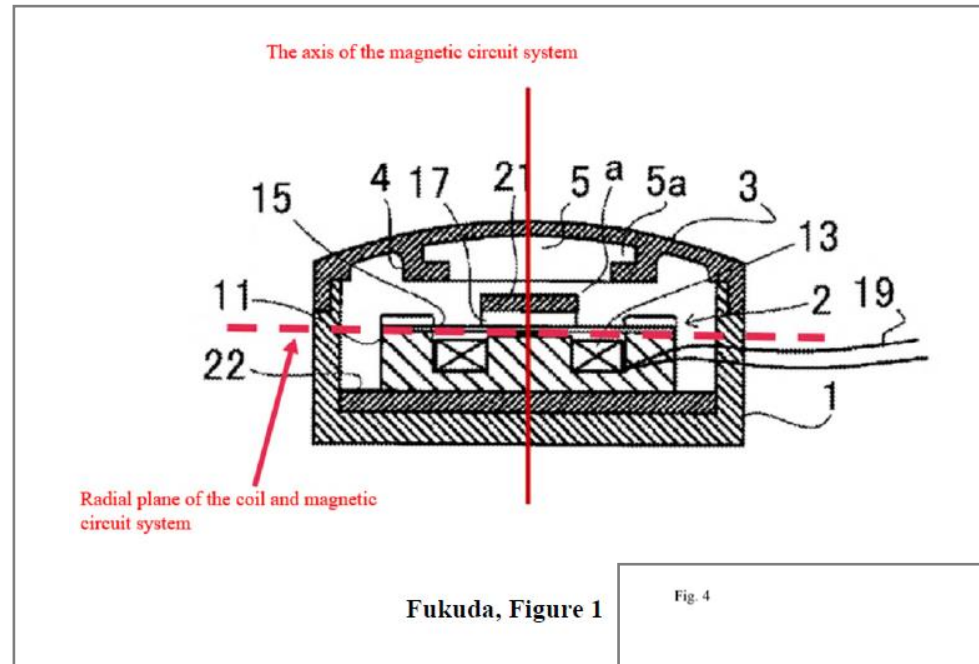
13. The loudspeaker apparatus of claim 12, wherein when a straight line of the driving force has a positive direction pointing to outside of the loudspeaker apparatus from the housing panel and the normal line has a positive direction pointing to the outside of the loudspeaker apparatus, an angle between the two lines in their positive direction is an acute angle.

- Both Li-Fujita-Fukuda and Li-Fujita combinations render claims 12-13 obvious.
- Li-Fujita earphones with Fukuda's vibration mechanism achieves an efficient, high-quality sound and simple construction.

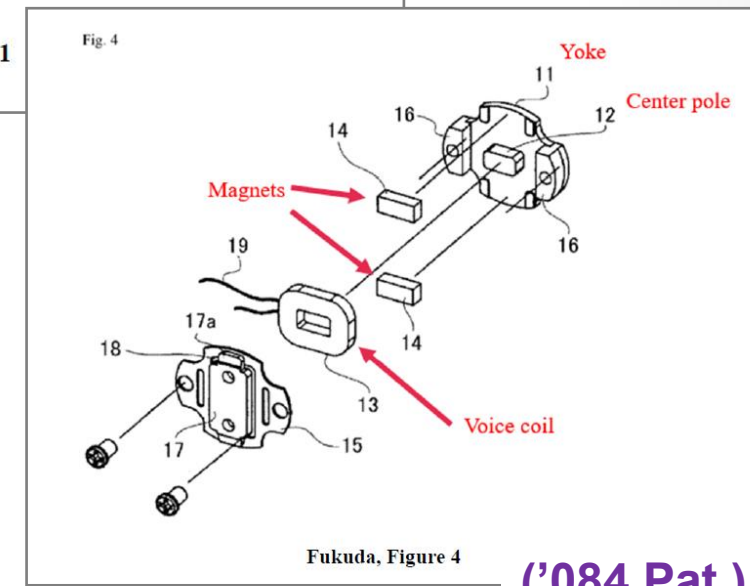
Ground 2, Claim 14 ('084 Pat.): Fukuda's Modular Magnetic Driver

'084 Pat. [14]

14. The loudspeaker apparatus of claim 12, wherein the earphone core includes a coil and a magnetic circuit system, and an axis of the coil or the magnetic circuit system is not parallel to the normal line, the axis being perpendicular to a radial plane of the coil or the magnetic circuit system.



Fukuda, Figure 1



Fukuda, Figure 4

('084 Pat.)

Fukuda teaches modular magnetic driver unit with simple construction.

Ground 3 ('084 Pat.): Fukuda's Modular Magnetic Driver

- **Motivation to Combine:** Fukuda driver offers efficient, high-quality sound and reduced manufacturing cost.
 - Liao teaches that high-density permanent magnets improve sound quality.
 - Xu, Nielsen, and Nakada show industry focus on sensitivity, efficiency, distortion reduction, and magnetic-force optimization.
 - Fukuda's modular driver is optimized for low manufacturing cost and “minimized sound leakage.”

Ground 2, Claim 14 ('084 Pat.): Fukuda's Modular Magnetic Driver

- Fujita's convex contact interface remains beneficial whether driven linearly or rotationally.
 - Fukuda's driver is a well-known alternative vibration generation mechanism in a more cost-effective and leakage-resistant method of driving that same surface.
 - Linear displacement of Fujita's convex contact surface by Fukuda's driver can provide more consistent amplitude control and lower distortion than rotational motion.

Ground 2, Claim 14 ('084 Pat.): Fukuda's Modular Magnetic Driver

- Adapting driver motion and mounting is routine engineering.
 - Fukuda's unitary driver can be readily incorporated into a bone conduction device.
 - A POSITA would have understood that different known vibration-generation mechanisms (including piezoelectric and magnetic drivers) could be integrated with known vibration-transmission interfaces and elastic contact structures.
 - Any frequency-response differences can be adjusted through conventional driver tuning (e.g., coil mass, magnet strength, or suspension stiffness).

Li-Liao/Fujita-Asaka
Ground 2 ('582) and Ground 3 ('084)

UNCHALLENGED

Li-Liao/Fujita-Numata Ground 3 ('582) and Ground 4 ('084)

Common Numata Issues

Grounds 3 ('582 Pat.) & 4 ('084 Pat.): Li+Liao/Fujita+Numata Claims 9 and 10

'582 Patent [9], [10]

8. The loudspeaker apparatus of claim 7, wherein the first plug end includes:

an inserting portion being at least partially inserted into the first socket and abutting against an outer side surface of the stopping block; and

two elastic hooks being arranged on a side of the inserting portion facing inside of the core housing, wherein:

the two elastic hooks are brought together under action of external thrust and the stopping block, and after passing through the stopping block, the two elastic hooks are elastically restored to be stuck on an inner surface of the stopping block to realize the fixation of the core housing and the first plug end.

9. The loudspeaker apparatus of claim 8, wherein the inserting portion is partially inserted into the first socket, and

an exposed part of the inserting portion is arranged in a stepped manner to form an annular table surface spaced apart from the outer end surface of the core housing.

10. The loudspeaker apparatus of claim 9, wherein the protective sleeve further extends to a side of the annular table surface facing the outer end surface of the core housing, and

when the core housing and the first plug end are fixed, the protective sleeve elastically abuts against the core housing to realize sealing.

'084 Patent [9], [10]

8. The loudspeaker apparatus of claim 7, wherein the first plug end includes:

an inserting portion being at least partially inserted into the first socket and abutting against an outer side surface of the stopping block; and

two elastic hooks being arranged on a side of the inserting portion facing inside of the core housing, wherein:

the two elastic hooks are brought together under action of external thrust and the stopping block, and after passing through the stopping block, the two elastic hooks are elastically restored to be stuck on an inner surface of the stopping block to realize the fixation of the core housing and the first plug end.

9. The loudspeaker apparatus of claim 8, wherein the inserting portion is partially inserted into the first socket, and

an exposed part of the inserting portion is arranged in a stepped manner to form an annular table surface spaced apart from the outer end surface of the core housing.

10. The loudspeaker apparatus of claim 9, wherein the protective sleeve further extends to a side of the annular table surface facing the outer end surface of the core housing, and

when the core housing and the first plug end are fixed, the protective sleeve elastically abuts against the core housing to realize sealing.

('582 and '084 Pats.)

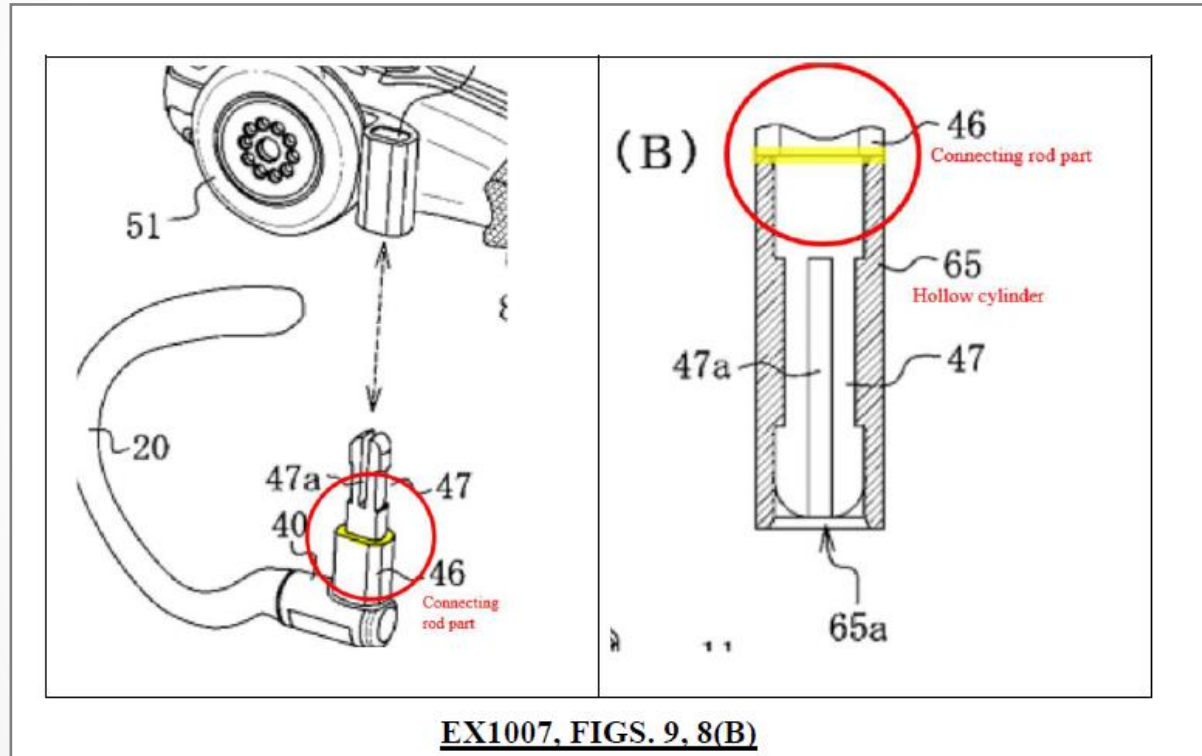
Grounds 3 ('582 Pat.) & 4 ('084 Pat.), Claim 9: Li+Liao/Fujita+Numata

'582 Pat. [9]

9. The loudspeaker apparatus of claim 8, wherein the inserting portion is partially inserted into the first socket, and
an exposed part of the inserting portion is arranged in a stepped manner to form an annular table surface spaced apart from the outer end surface of the core housing.

'084 Pat. [9]

9. The loudspeaker apparatus of claim 8, wherein the inserting portion is partially inserted into the first socket, and
an exposed part of the inserting portion is arranged in a stepped manner to form an annular table surface spaced apart from the outer end surface of the core housing.



- Numata plug end has “annular table surface spaced apart from the outer end surface” as in claim 9
 - Plain language: when inserting portion is “partially inserted” into the socket, exposed part has an annular surface “spaced apart” from the core housing’s outer end surface
 - If plug end is fully inserted, manufacturing tolerances would provide annular surface spaced apart from the outer end surface

Grounds 3 ('582 Pat.) & 4 ('084 Pat.), Claim 9: Li+Liao/Fujita+Numata

- **Motivation to combine:** Numata teaches advantages of secure fit and improved wear resistance.
- POSITA would use routine assembly techniques.
 - E.g., keying and asymmetric geometries would prevent reverse insertion.
 - POSITA would have recognized benefits of Numata outweigh any risk of mis-installation.

'582 Pat.: Pet. 62-67, EX1003, ¶¶ 199-208; Numata, [0031]-[0034], Figs. 1, 8, 9; Reply 22-25; EX1041, ¶¶ 20-28.

'084 Pat.: Pet. 81-84, EX1003, ¶¶ 217-223; Numata, [0031]-[0034], Figs. 1, 8, 9; Reply 22-25; EX1041, ¶¶ 35, 37, 38.

Grounds 3 ('582 Pat.) & 4 ('084 Pat.), Claim 9: Li+Liao/Fujita+Numata

- POSITA would have had an expectation of success.
 - Numata's plugs provide different types of electrical connectivity.
 - Numata discloses structure configured for detachable modular assembly.
 - Incorporating conventional conductive elements—such as conductive pins, spring contacts, conductive sleeves, or routed wires would have been routine to a POSITA.

'582 Pat.: Pet. 66-67; EX1003, ¶ 206; Reply 22-23; EX1041, ¶ 25; Numata, ¶¶ 31-34, Figs. 8, 9.
'084 Pat.: Pet. 84, EX1003, ¶ 221; Reply 23, EX1041, ¶ 38; Numata, ¶¶ 31-34, Figs. 8, 9.

Grounds 3 ('582 Pat.) & 4 ('084 Pat.), Claim 10: Li+Liao/Fujita+Numata

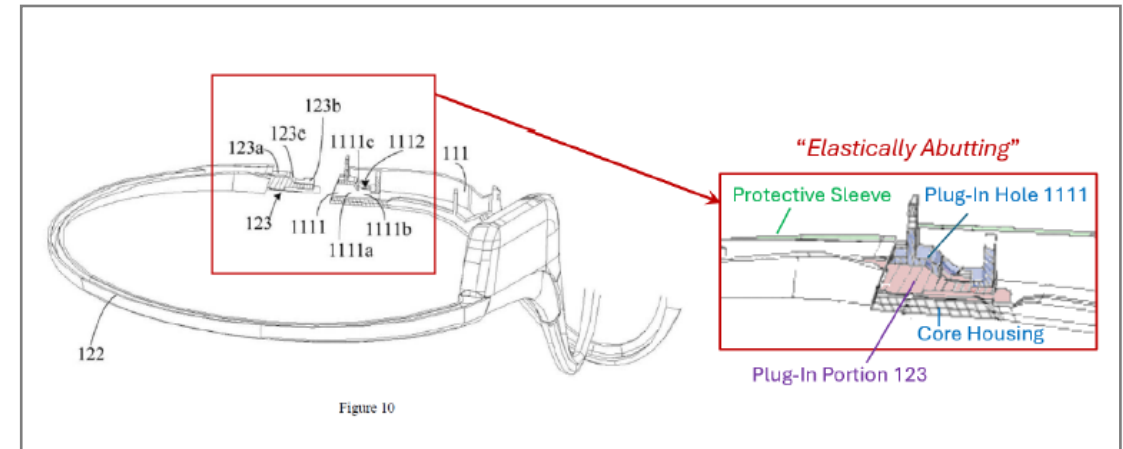
'582 Pat. [10b]

10. The loudspeaker apparatus of claim 9, wherein the protective sleeve further extends to a side of the annular table surface facing the outer end surface of the core housing, and when the core housing and the first plug end are fixed, the protective sleeve elastically abuts against the core housing to realize sealing.

- Li discloses Element 10[b]

'084 Pat. [10b]

10. The loudspeaker apparatus of claim 9, wherein the protective sleeve further extends to a side of the annular table surface facing the outer end surface of the core housing, and when the core housing and the first plug end are fixed, the protective sleeve elastically abuts against the core housing to realize sealing.



Grounds 3 ('582 Pat.) & 4 ('084 Pat.), Claim 10: Li+Liao/Fujita+Numata

- “Li’s figures collectively show [the elastically abutted] feature.”
- POSITA would have used Li’s teachings of a protective sleeve interacting with the elastic coating layer 1132 over the core housing to obtain additional sealing.

'582 Pat.: Institution Decision 55-56 (citing Li, Figs. 2, 5, 9-10); Reply 25; EX1041, ¶ 28; see discussion above regarding element 1[c].

'084 Pat.: Institution Decision 59-60 (citing Li, Figs. 2, 5, 9-10); Reply 25; EX1041, ¶ 42; see discussion above regarding element 1[c].

Li-Liao-Wang-Xu-Nielsen Ground 4 of '582 Patent

Liao Issues

Ground 4 ('582 Pat.): Liao Discloses Claimed Magnetic Circuit Component

'582 Pat. [16]

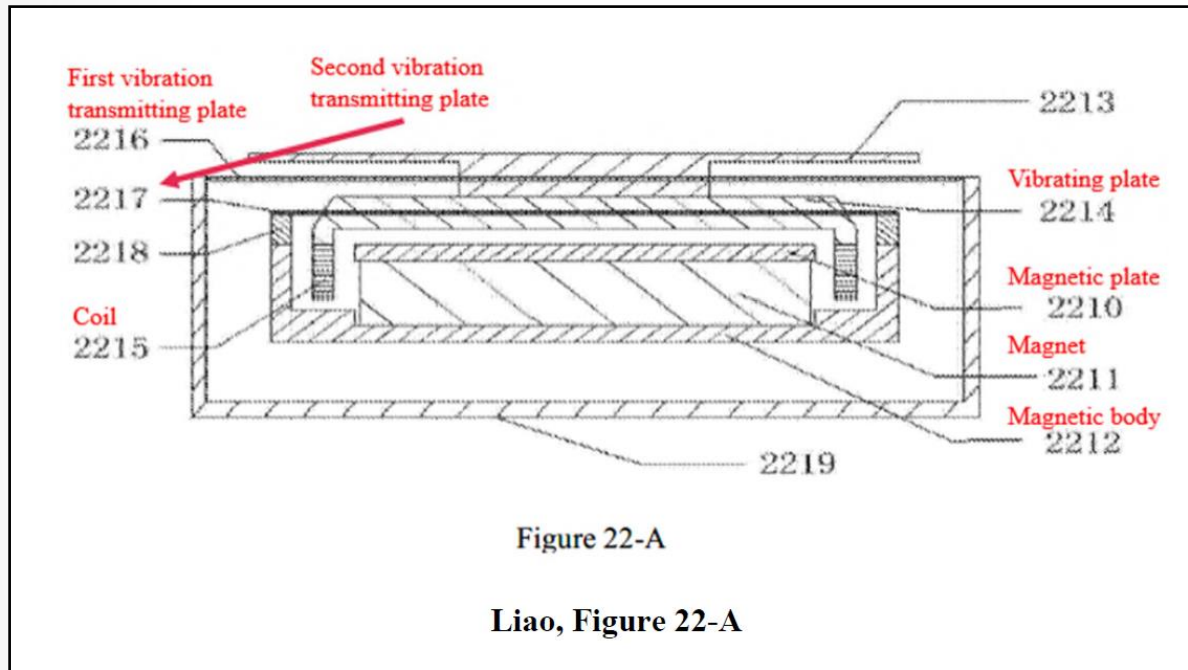
16. The loudspeaker apparatus of claim 1, wherein the earphone core further includes a magnetic circuit component generating a first magnetic field, the magnetic circuit component including:

- a first magnetic unit configured to generate a second magnetic field;
- a first magnetically conductive unit; and
- at least one second magnetic unit, the at least one second magnetic unit surrounding the first magnetic unit and forming a magnetic gap with the first magnetic unit, a magnetic field strength of the first magnetic field in the magnetic gap being greater than a magnetic field strength of the second magnetic field in the magnetic gap.

- Undisputed that Li+Liao+Wang+Xu+Nielsen disclose additional elements of claims 17-20.
- PO argues the Petition mis-cited Liao for claim element 16[a].

('582 Pat.)

Ground 4 ('582 Pat.): Liao Discloses Claimed Magnetic Circuit Component



- Liao discloses a magnetic circuit component generating a first magnetic field.
- POSITA would have understood Liao to disclose or suggest a suitable magnetic circuit component in a housing using a direct connection to achieve the frequency requirements of claim 1.
- Wang and Xu also each disclose Element 16[a].

Li-Liao/Fujita and Wang-Xu-Nielsen
Ground 4 ('582) and Ground 5 ('084)

Common Wang-Xu-Nielsen Issues

Ground 4 ('582 Pat.), Claims 16-20: Mapping Argument

- Petition provides a feature-by-feature obviousness analysis.
- POSITA would have looked to each of Wang, Xu, and Nielsen “to improve the Li-Liao earphone magnetic circuit system with a strong, efficient magnetic field.”
- Li-Liao-Wang-Xu-Nielsen combination applied in claim 20 is compatible with application of prior art in claims 16-19.

Ground 5 ('084 Pat.): Claims 16–20 Are Obvious

- PO does not dispute that the claim elements are present.
- Wang, Xu, and Nielsen improve Li-Fujita's magnetic circuit.
- Nielsen applied to Claim 20 is compatible with obviousness rationale for claims 16–19.

Petitioner's Reply