

Suzhou Mojawa Ltd v. Shenzhen Shokz, Ltd.

IPR2025-00842 (US 11,197,084 B2)

IPR2025-00843 (US 11,310,582 B2)

Patent Owner Shenzhen Shokz | Demonstratives

Oral Hearing
August 25, 2026

Grounds of Invalidity

084 Patent - Claims 1-10, 12-20

Ground	Claims	Stat. Basis	Prior Art
1	1	35 U.S.C. § 103	Li and Fujita
2	12-15	35 U.S.C. § 103	Li, Fujita, and Fukuda
3	2-6	35 U.S.C. § 103	Li, Fujita, and Asaka
4	7-10	35 U.S.C. § 103	Li, Fujita, and Numata
5	16-20	35 U.S.C. § 103	Li, Fujita, Wang, Xu, and Nielsen

582 Patent - Claims 1-12, 14, 16-20

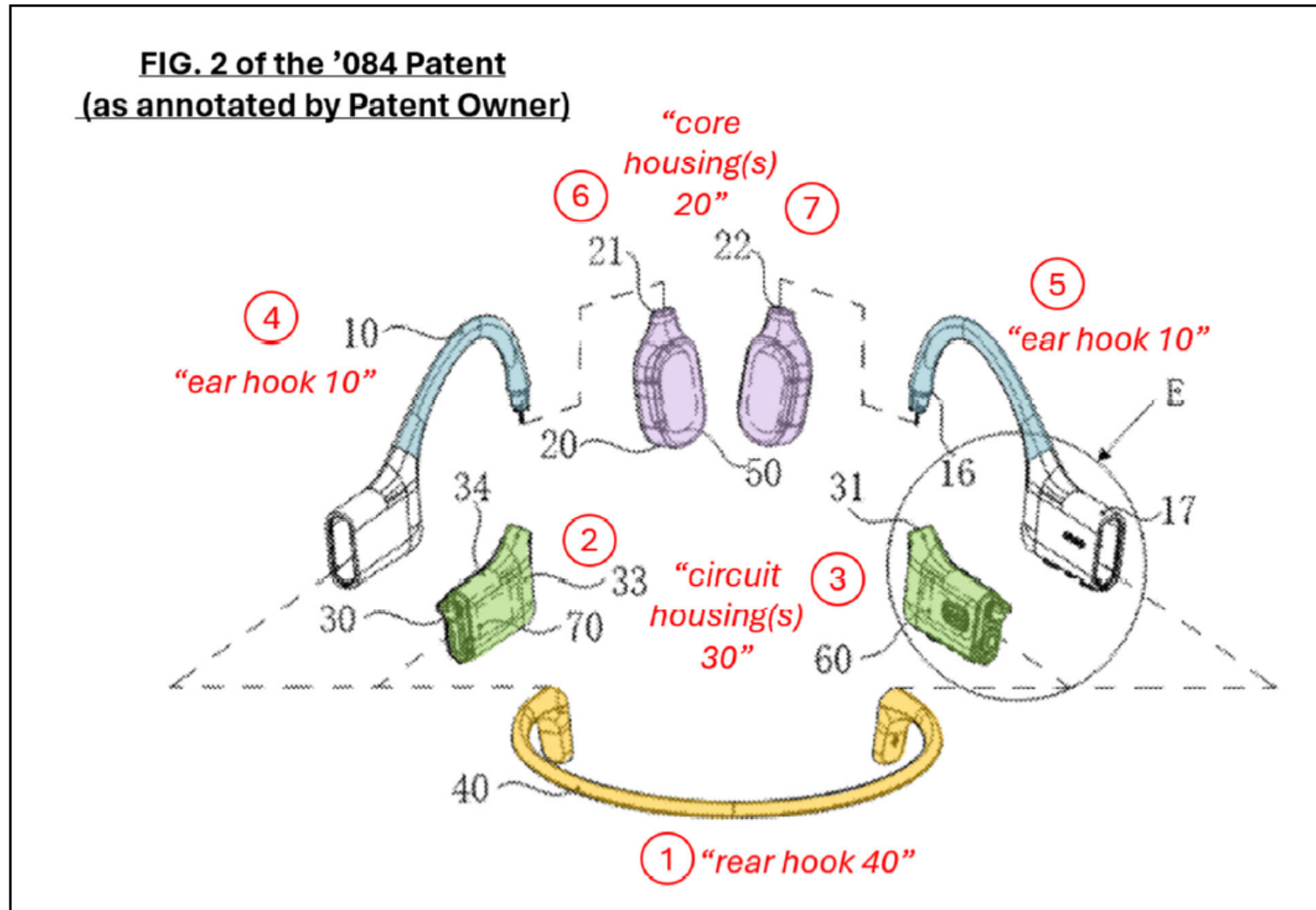
Ground	Claims	Stat. Basis	Prior Art
1	1, 14	35 U.S.C. § 103	Li and Liao
2	2-6	35 U.S.C. § 103	Li, Liao, Asaka
3	7-12	35 U.S.C. § 103	Li, Liao, Numata
4	16-20	35 U.S.C. § 103	Li, Liao, Wang, Xu, Nielsen

Overview

1. Background

- 2. Claim construction – “elastically abutted against”
- 3. The Li-Fujita Combination Fails
- 4. Li-Fujita-Fukuda Combination Fails
- 5. Li-Fujita-Numata Combination Fails
- 6. '582 Patent Specific Issues

Background - The '084/'582 Patents



Unless otherwise specified, all citations are to IPR2025-00842 (084 patent) documents.

Background - The '084/'582 Patent Improvements

These loudspeaker devices improve upon several aspects of prior bone conduction devices based on (1) a reduction in mold sizes needed for manufacturing due to segmentation and separation of an ear hook component from a core housing component, (2) waterproofing achieved by a protective sleeve “elastically abut[ting] against the core housing,” and (3) sound quality improvement by adjusting the angle between the normal line of the earphone’s panel and the driving force generated by driving device. *Id.*, 36:13-36.

Background – The '084/'582 Patent Improvements

Each improvement is reflected in the claims of the '084 Patent:¹

(1) improved manufacturability is reflected in at least elements [1a] and [1c]

which recite the segmentation/separation of the ear hook and the core housing;

(2) improvements in waterproofing function are reflected in at least elements

[1b] and [1c], and particularly with [1c]'s elastic abutment of the protective sleeve and the core housing; and

(3) sound quality improvements are reflected in at least element [1d]'s

housing panel and the driving force generated by the earphone vibration that is not parallel to a normal line of the housing panel.

Background – Claim 1

084 Patent

[1pre] A loudspeaker apparatus, comprising:

→ [1a] an ear hook including a first plug end and a second plug end,

[1b] the ear hook being surrounded by a protective sleeve, the protective sleeve being made of an elastic waterproof material;

→ [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

→ [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.

582 Patent

[1pre] A loudspeaker apparatus, comprising:

→ [1a] an ear hook including a first plug end and a second plug end,

[1b] the ear hook being surrounded by a protective sleeve, the protective sleeve being made of an elastic waterproof material;

→ [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,
wherein

[1d] the core housing including a housing panel facing human body and a housing back panel opposite to the housing panel, and

→ [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

→ [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.

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Claim Construction – POSITA

C. Level of Skill in the Art

Petitioner asserts that a POSITA would have had “a Bachelor’s degree in electrical or computer engineering, or a comparable field of study, plus approximately two to three years of professional experience with acoustic technology. Additional graduate education could substitute for professional experience, and significant experience in the field could substitute for formal education.” Petition, 5. For the purpose of this IPR, Patent Owner adopts the definition proposed by Petitioner.

Claim Construction – “elastically abutted against”

Patent Owner:

- A POSITA ... would have understood that “the core housing being ... elastically abutted against the protective sleeve” describes an end surface of the core housing being in contact with the protective sleeve under an elastic force.”

POR, 13-14.

Petitioner:

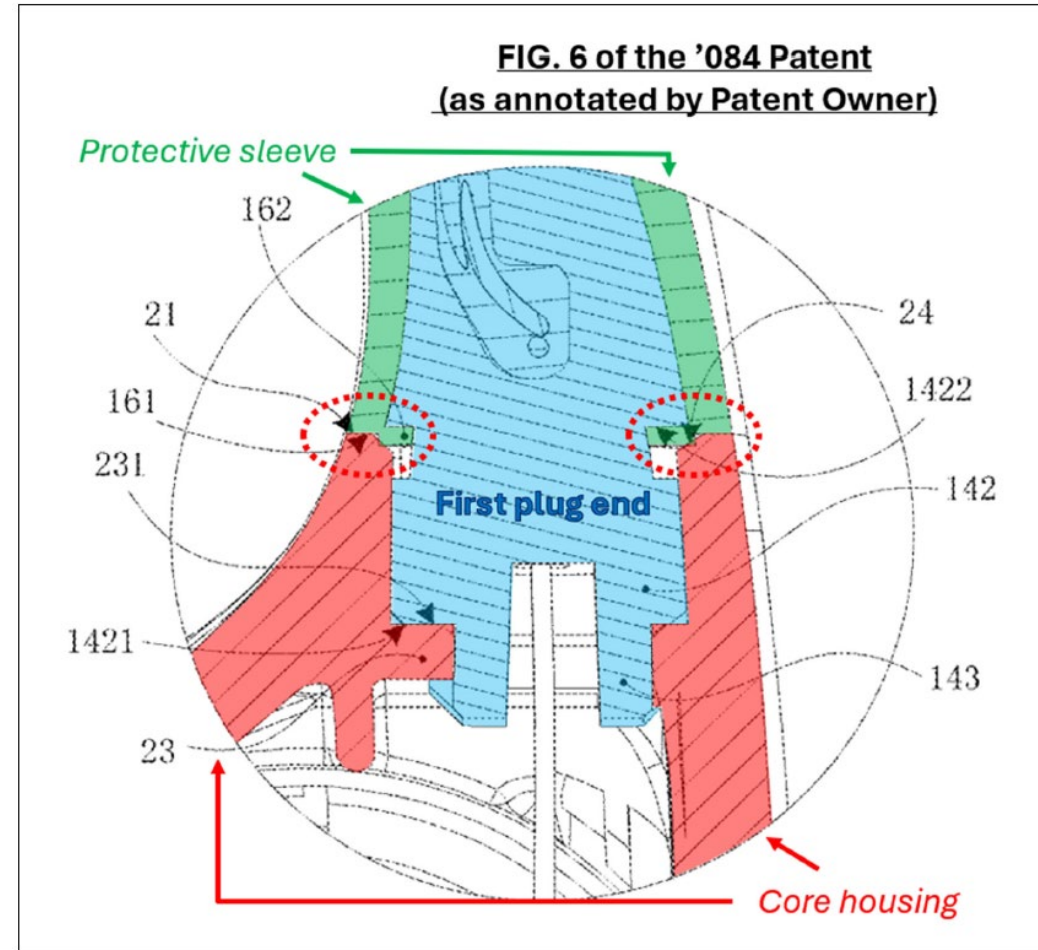
- “Any claim terms not listed below should be construed according to their plain and ordinary meaning to a POSITA at the time of the '084 Patent.” Pet., 6.
- “No construction of this phrase is warranted.” Reply, 2.

Claim Construction – “elastically abutted against”

Elastically Abutted Against

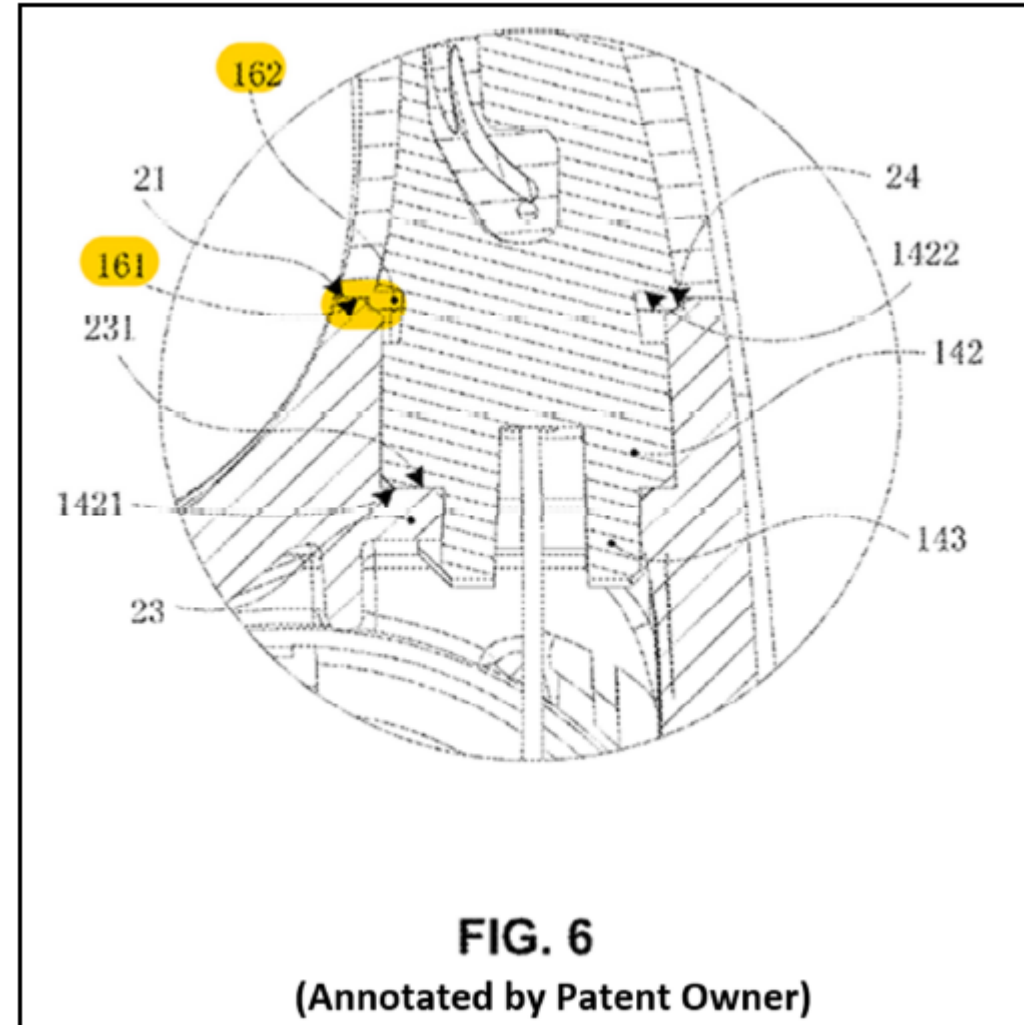
[1c] a core housing for accommodating an earphone core, the core housing being fixed to the first plug end and elastically abutted against the protective sleeve;

- “Critically, it is improper to ignore the adverb “elastically” when interpreting “elastically abutting;” it is equally improper to ignore “abutting” by, for example, interpreting this term as “covering” a portion of an outside surface.”



Claim Construction – “elastically abutted against”

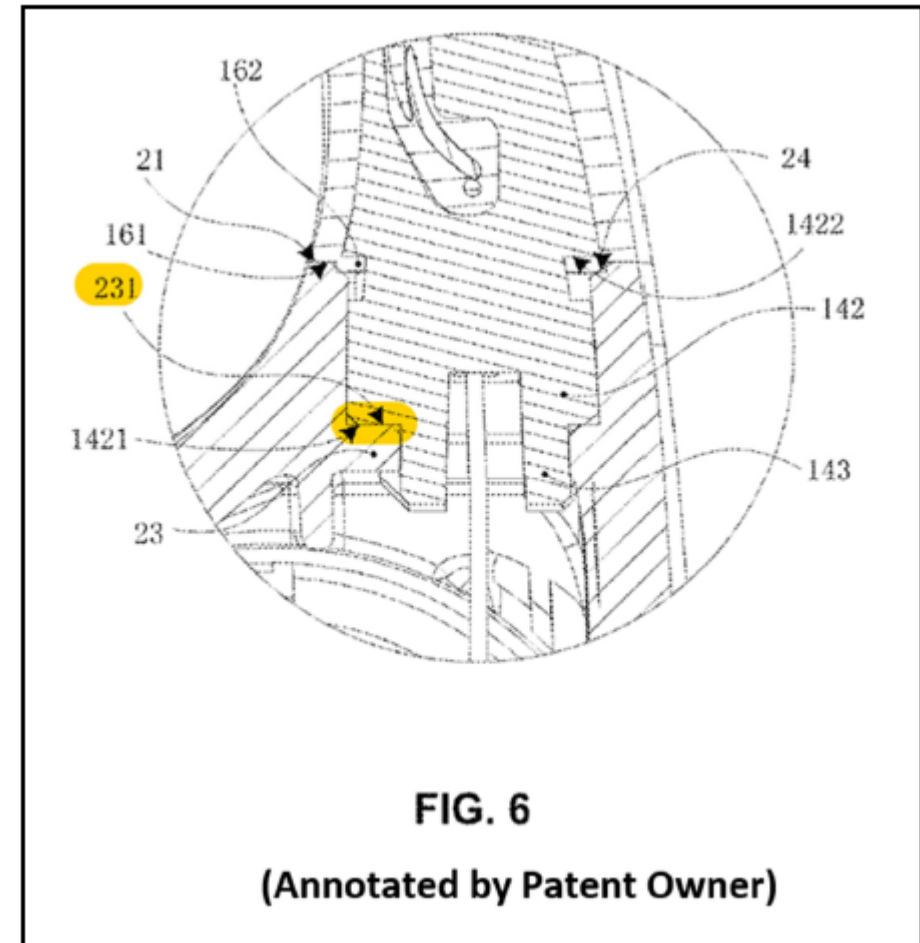
- Petitioner contends the '084 patent, at 13:54-58, shows abutting with locations other than an end surface. (Reply, 1-2)
- **Patent Owner:** Petitioner is wrong; “This section [of 084 patent] refutes Petitioner’s assertion because it states the elastic sleeve must be abutted against “the outer **end surface**” of the core housing.”



Claim Construction – “elastically abutted against”

- Petitioner also contends the '084 patent, at 12:29-34, shows abutting with locations other than an end surface. (Rep., 2)
- **Patent Owner:** Petitioner is wrong; “Figure 6 illustrates (annotated below), outer side surface 231 is **at the edge of the stopping block 23.**”

Fourth, Petitioner further points to the '084 patent, at 12:29-34 (Rep., 2) that explains: “...the inserting portion 142 may be at least partially inserted into the socket 22 and abut against the outer side surface 231 of a stopping block 23.” EX1001, 12:39-34. But, as Figure 6 illustrates (annotated below), outer side surface 231 is **at the edge of the stopping block 23.** See *id.*, 12:35-36 (“The outer



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Li-Fujita Combination Fails - Mandates a Gap

- “Because the vibrating cushion (16) [of Fujita] needs to vibrate to transmit sound, it cannot be connected to the surrounding casing (2). See, e.g., Fujita, FIG. 3.”
- “The vibration motion of cushion (16) is hinge-like and includes both a vertical component and a horizontal component. Fujita, ¶¶27, 41, FIG. 2.”
- “... a gap between cushion (16) and casing (2) is needed to allow and accommodate the vibration motion of the cushion.”

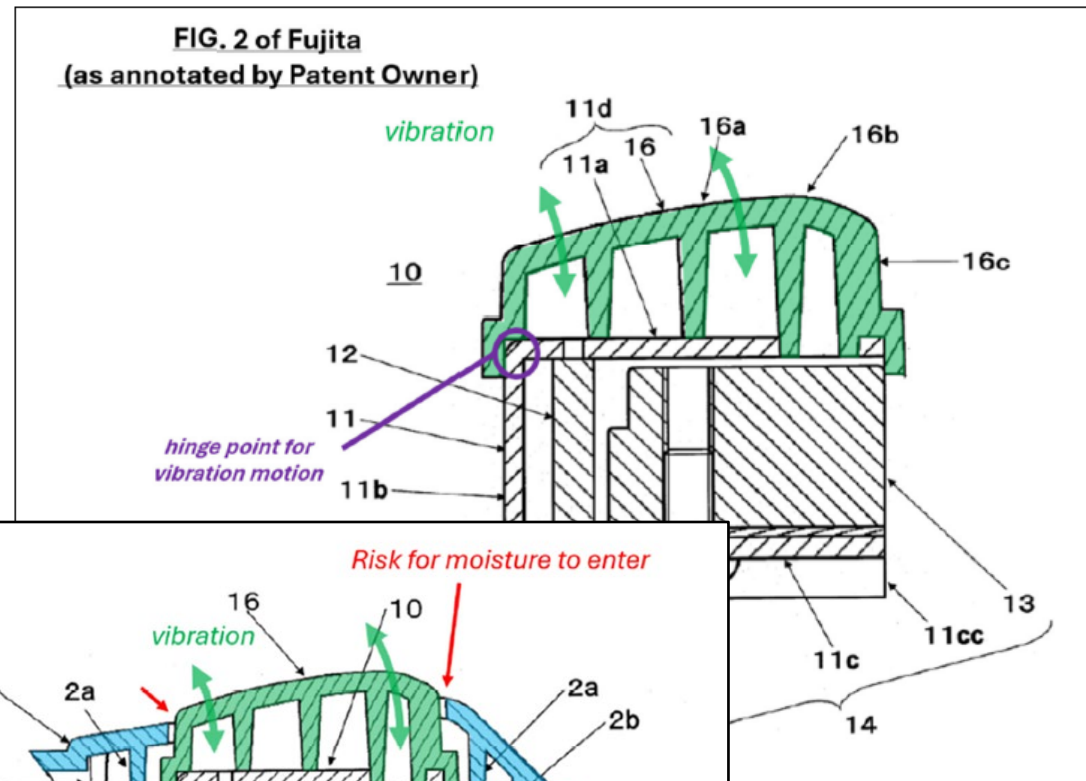
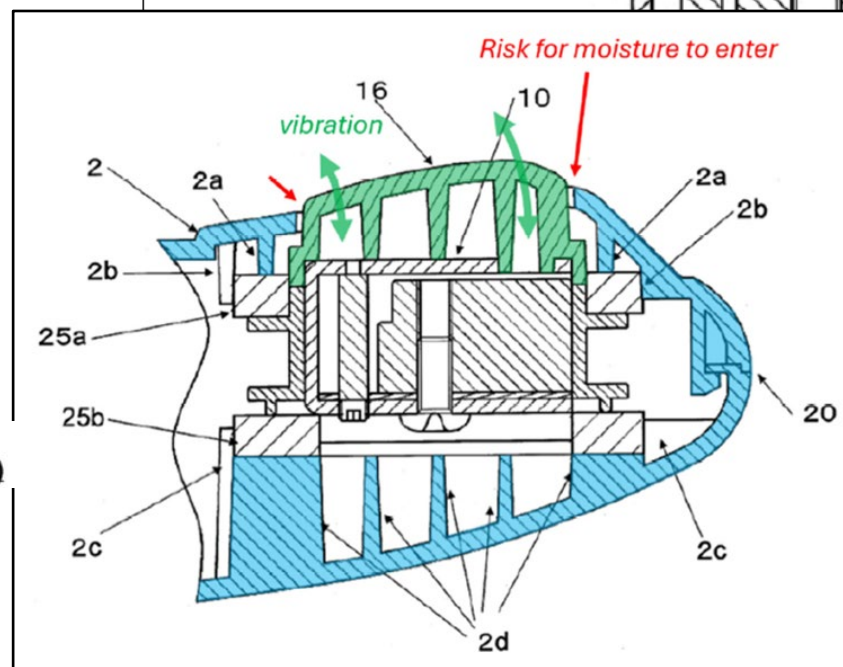


FIG. 3 of Fujita
(as annotated by Patent Owner)



Li-Fujita Combination Fails - Mandates a Gap

- **Petitioner**: Fujita does not use the term “gap.” (Rep., 6)
- **Patent Owner**: “Figure 3 clearly shows a gap (see red arrow annotations below) and never teaches filling the gap with any material.”
 - “Figure 3’s gap is depicted without hashmark (compared to other areas having hashmarks), further confirming the absence of filler material in the gap.”

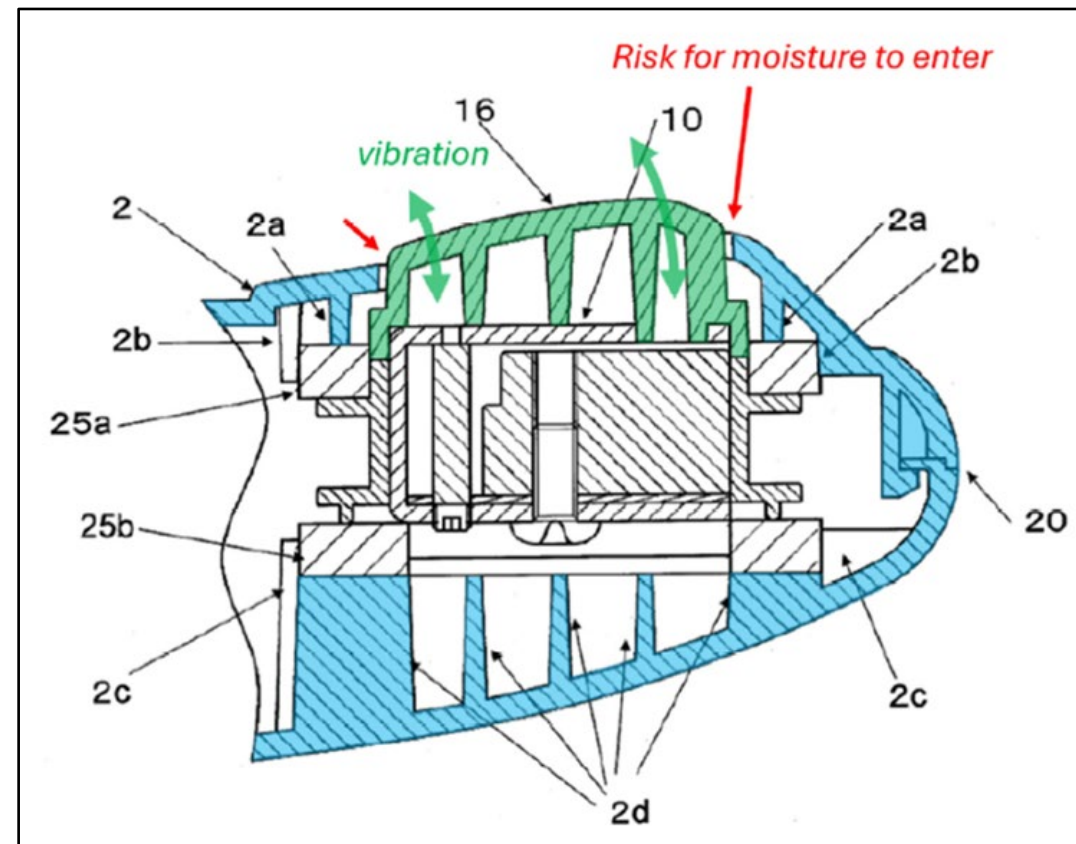
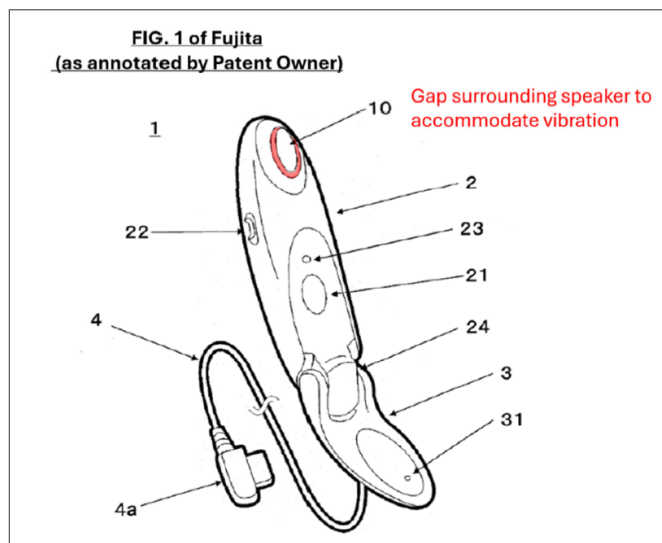
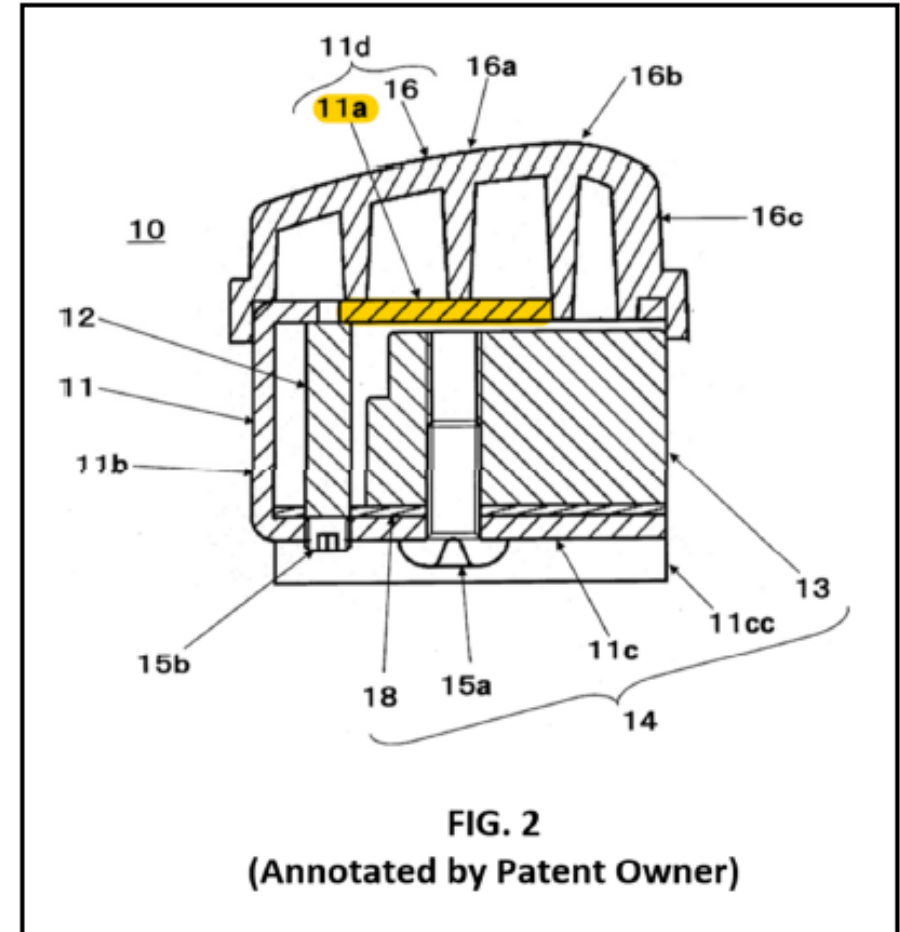


FIG. 3 of Fujita
(as annotated by Patent Owner)

POR, 20; Sur-Reply, 6.

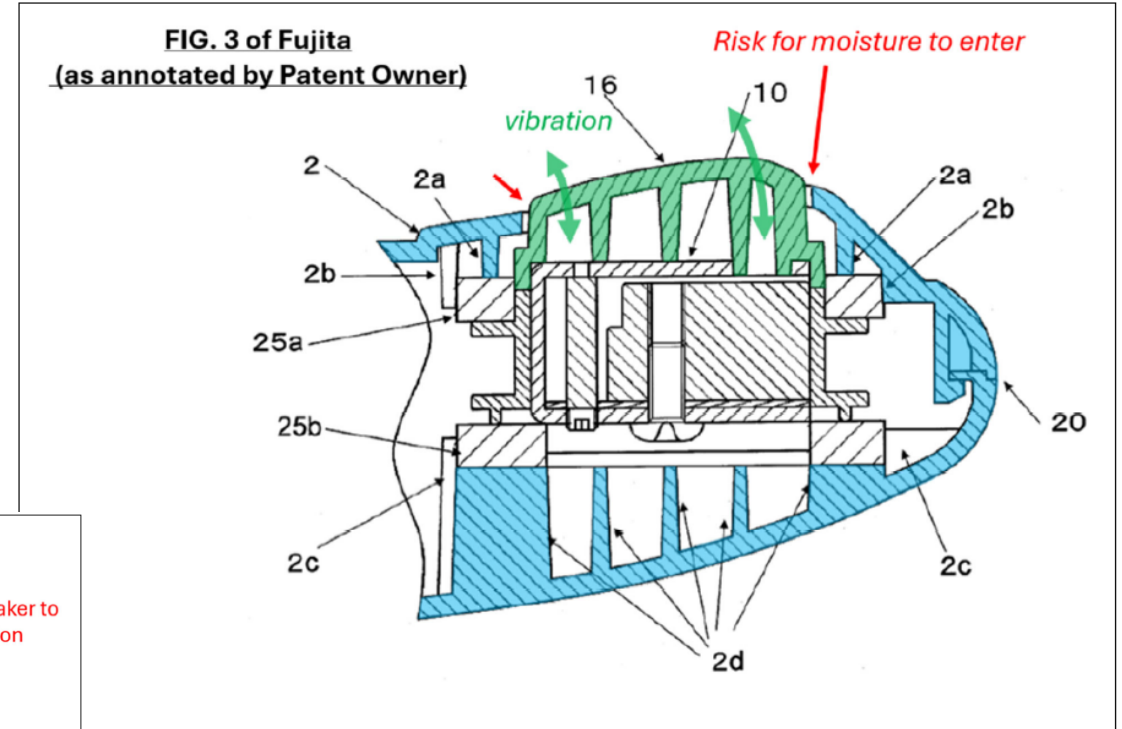
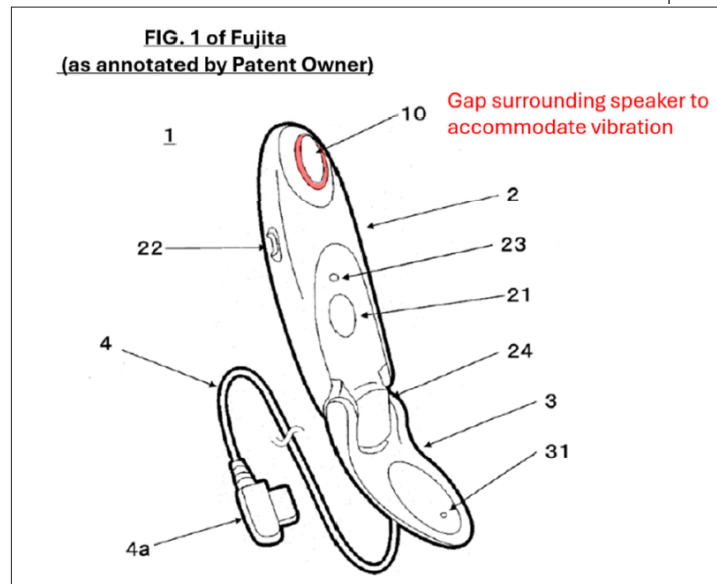
Li-Fujita Combination Fails – Significant Waterproofing Issues

- **Petitioner:** Fujita “contemplates a fixed and rigid fit of the cushion 16 between the positioning hole and boss to reduce secondary vibration.” (Rep., 6) – *new argument raised only in Petitioner’s Reply*
- **Patent Owner:** “Fujita never uses the term “rigid fit,” and Fujita’s section cited by Petitioner [Fujita, ¶28] explains that cushion 16 is fixed to vibration output part 11a.”
 - “The cushion’s attachment to element 11a is unrelated to the gap that surrounds the cushion, and in no way implies that the gap can be filled with any material.”



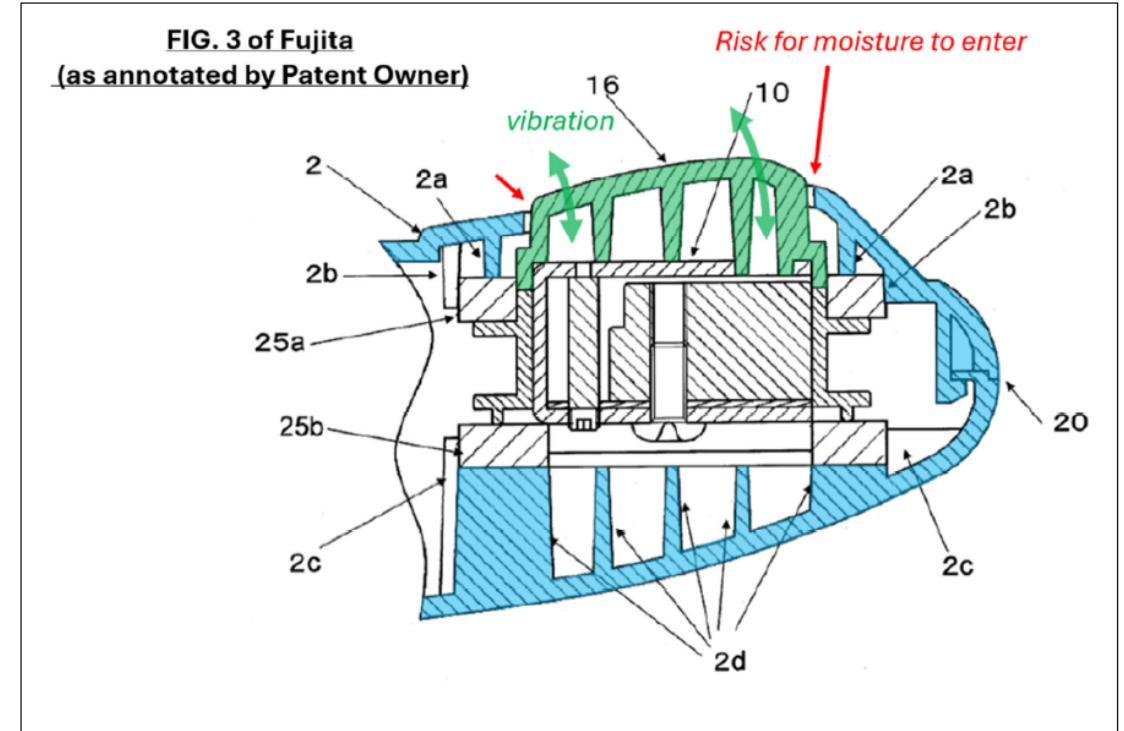
Li-Fujita Combination Fails – Significant Waterproofing Issues

- Fujita's older handheld phone not concerned with waterproofing.
- "... a POSITA would not have found Fujita's speaker design concept as appropriate for Li's device whatsoever, as it would have devolved Li's device from a waterproof one to a non-waterproof one, rendering it unsuitable for its intended applications."



Li-Fujita Combination Fails – Significant Waterproofing Issues

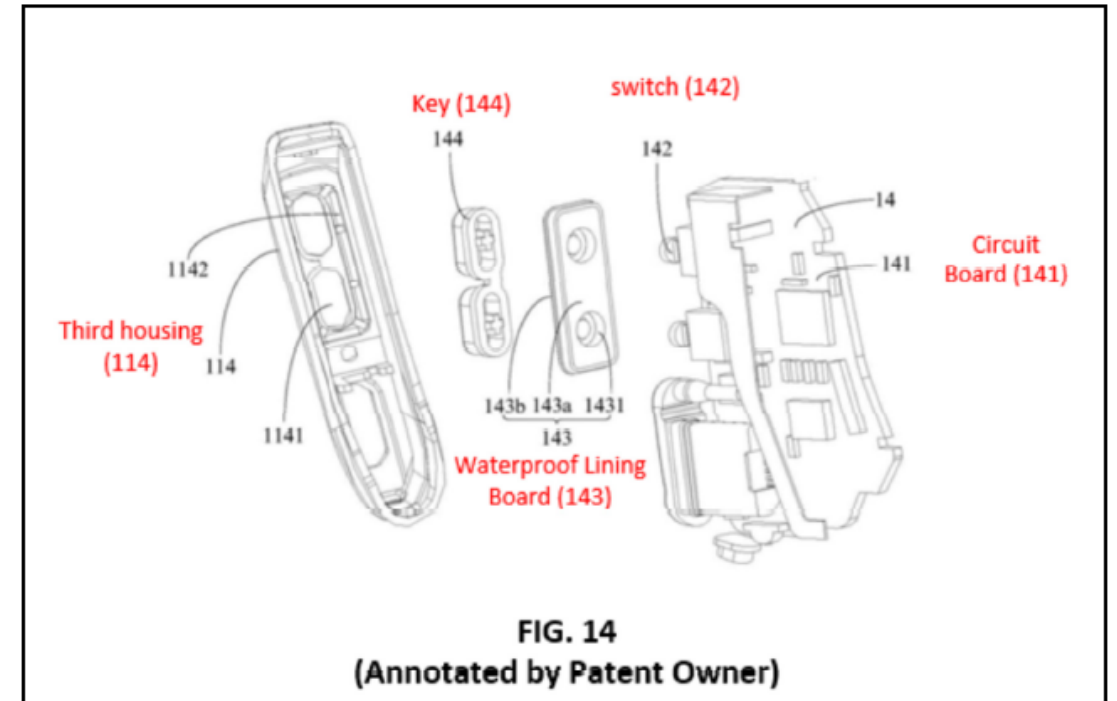
- **Petitioner:** a POSITA would fill the gap “with a rubber gasket or stopper...[that] would be watertight.” (Rep., 6) – *new argument raised only in Petitioner’s Reply*
- **Patent Owner:** filling the gap “*would have hindered the cushion’s movements*, prevented the cushion’s full vibration range, and would have contradicted Fujita’s very principles of operation.”
 - “Figure 3’s gap is depicted without hashmarks (compared to other areas having hashmarks), further confirming the absence of filler material in the gap.”



Li-Fujita Combination Fails – Significant Waterproofing Issues

- **Petitioner:** Li describes ““a waterproof lining board” that shows internal redundancy demonstrating that “a Fujita-style speaker would not “deter” a POSITA in managing internal moisture protection.” (Rep., 7) – new argument that relies on a new section of Li raised only in Petitioner’s Reply
- **Patent Owner:** “Li’s waterproof lining board is a flat, elongated element located deep inside the housing between two flat surfaces,” and “would not have been effective in preventing moisture infiltration into the Li-Fujita speaker.”
- “... even if implemented, such a lining still would not have avoided ***infiltration of moisture into and beneath the cushion*** through the gap in the Li- Fujita combination.”

Sur-Reply, 10-11.



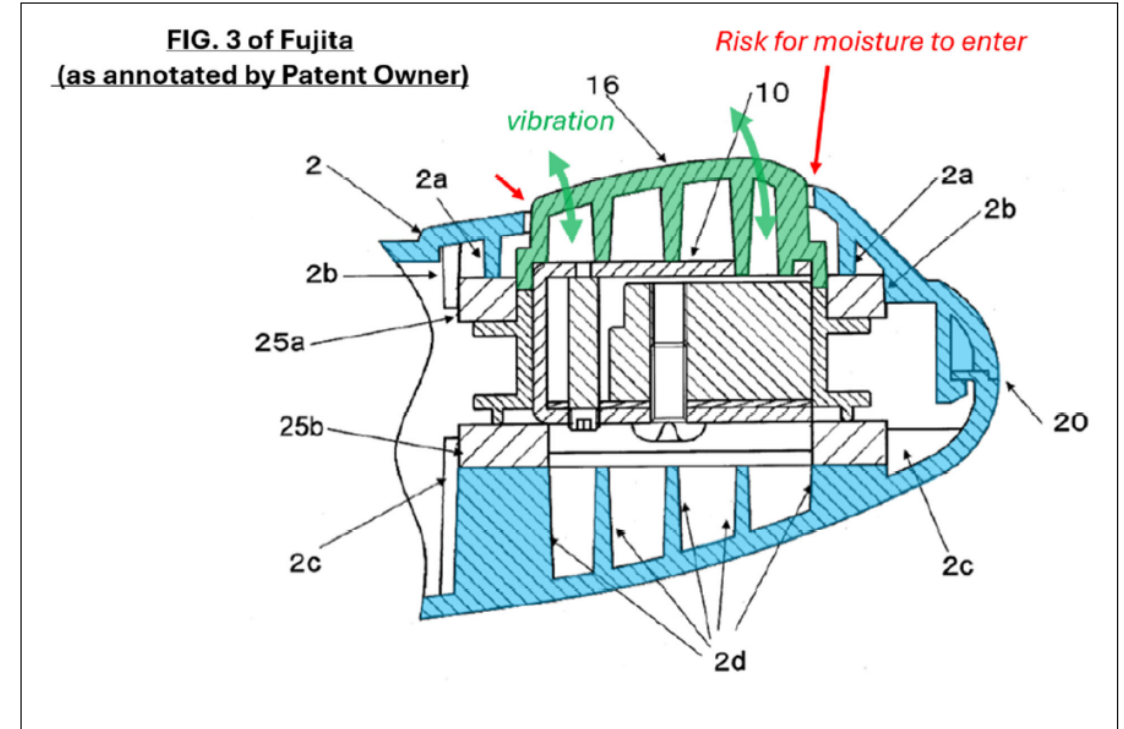
Fujita combination. As the POR and Dr. Scordilis explained, “...water infiltrating Li’s housing and Fujita’s speaker would degrade the operation of the complex and intricate moving parts, by affecting driving precision, reducing piezoelectric conversion efficiency, dampening vibration, and distorting the audio output.”

POR, 32, citing to Scordilis, ¶80.

Excerpt from Dr. Scordilis Declaration

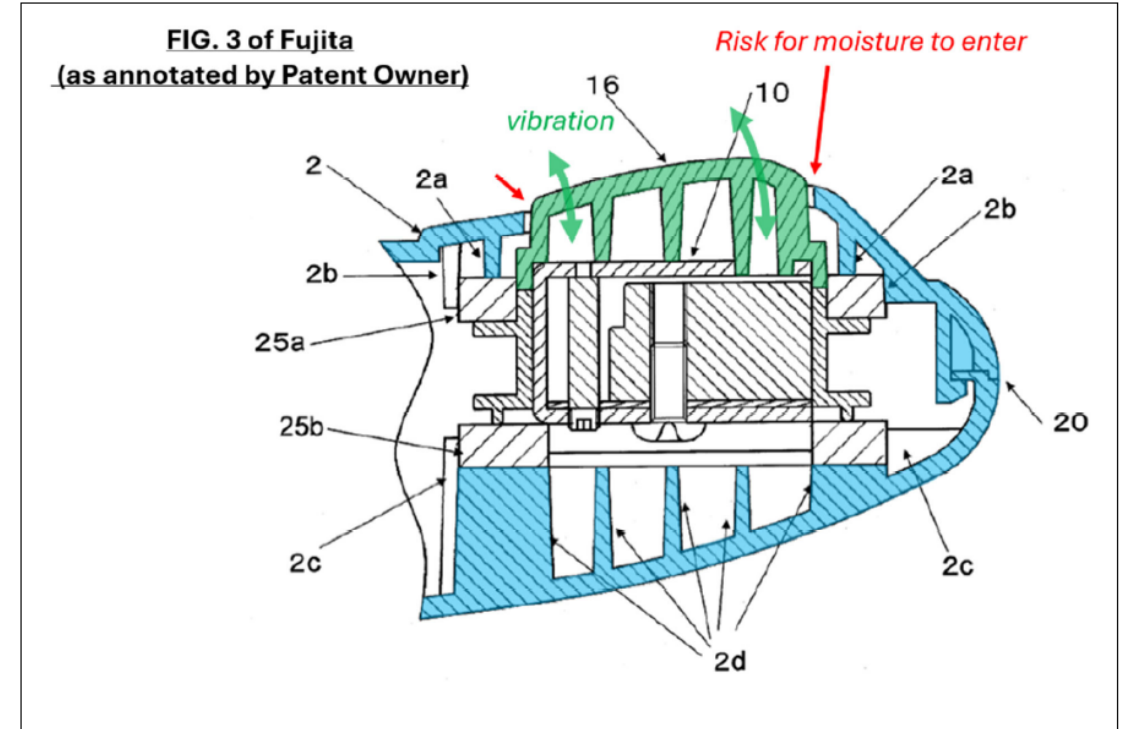
Li-Fujita Combination Fails – Significant Waterproofing Issues

- **Petitioner:** Use an elastic silicone layer that “would be extended over the interface between the housing and the vibrating speaker, to maintain a “watertight” seal while allowing Fujita’s speaker to vibrate freely.” (Rep., 7) – *new argument raised only in Petitioner’s Reply*
- **Patent Owner:** “such a purported sealing proposal is not described in any of the references (or the original Petition) and it would not have been obvious.”
- “It would have severely interfered with the rotational, in-and-out movements of the cushion.”



Li-Fujita Combination Fails – Complex Sound Leakage Issues

- The “combination would have required a gap between the housing and cushion (16) to allow it to move in-and-out as it vibrated.”
- “The inclusion of such annular and elliptical gap between the housing and the vibrating surface that moved up-and-down would have produced **complicated acoustic effects that a POSITA having a bachelor’s degree and 2-3 years of experience with acoustic technology would not have been able to mitigate.** Scordilis, ¶¶87-88.”



Li-Fujita Combination Fails – Complex Sound Leakage Issues

- **Petitioner**: sound leakage issues of combination would be mitigated by Li's strip-shaped holes (Rep., 8) – *new argument raised only in Petitioner's Reply*
- **Patent Owner**: "it is naïve and incorrect to assert that sound leakage issues associated with ***myriad Petitioner-proposed modifications [including adding a seal to cover the gap]*** to Li's speaker would be somehow mitigated by Li's strip-shaped holes, even in the presence of pivoting movements of the cushion."

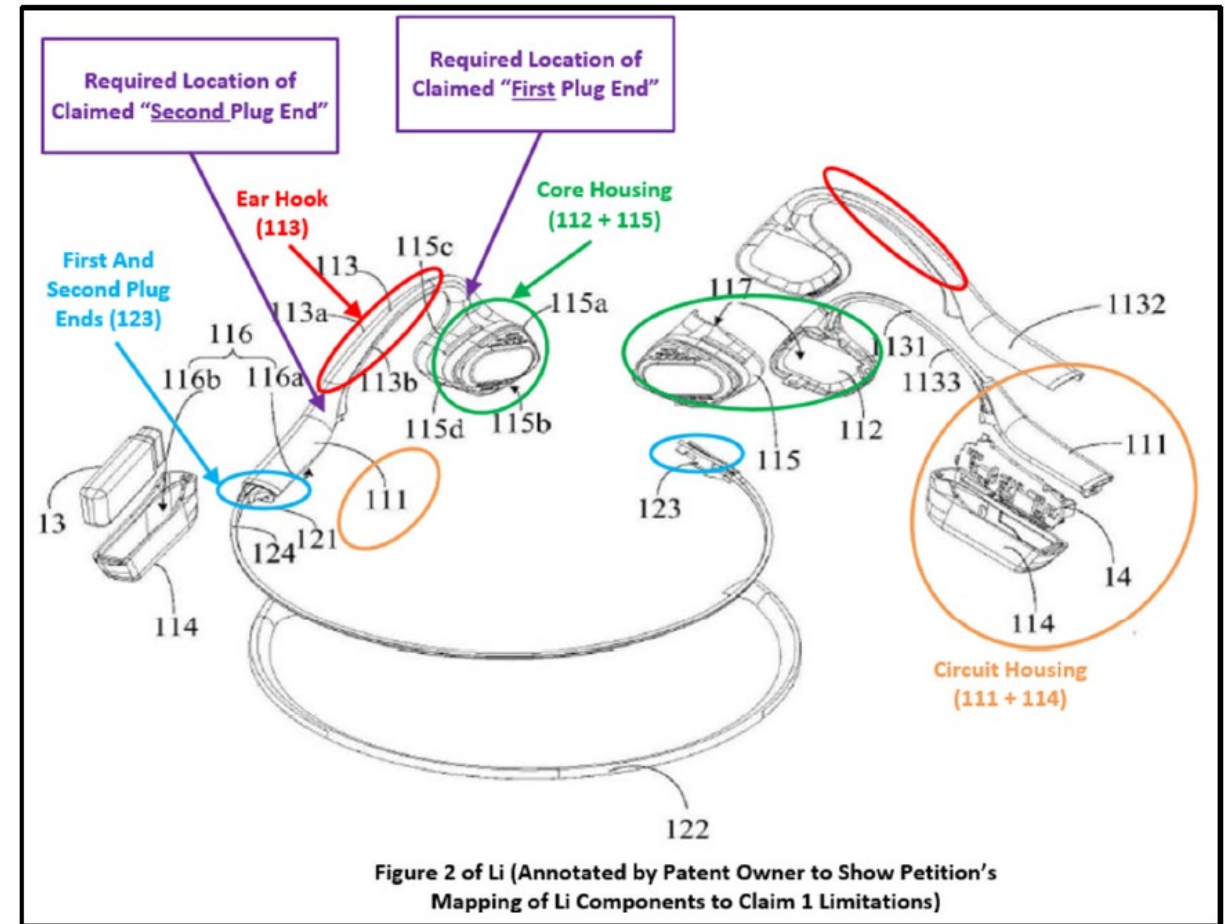
POSITA would have found it beyond their ordinary skill and knowledge to manage the sound leakage acoustic effects from Fujita's open gap, which is annular, elliptical and surrounds the moving cushion. The inclusion of such annular and elliptical gap between the housing and the vibrating surface that moved up-and-down would have produced complicated acoustic effects that a POSITA having a bachelor's degree and 2-3 years of experience with acoustic technology would not have been able to mitigate. POR, 23; Scordilis, ¶¶80, 87-88.

Excerpt from Dr. Scordilis Declaration

Li-Fujita Combination Fails – Missed Mapping of Plug Ends

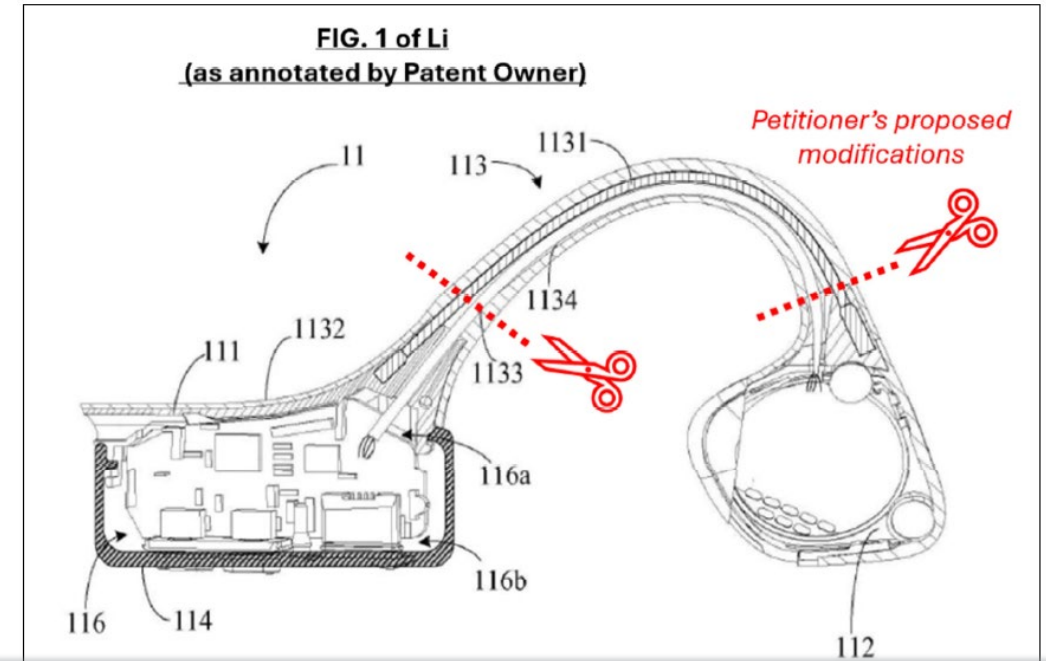
CHART OF CLAIMS
[1pre] A loudspeaker apparatus, comprising:
[1a] an ear hook including a first plug end and a second plug end,
[1b] the ear hook being surrounded by a protective sleeve, the protective sleeve being made of an elastic waterproof material;
[1c] a core housing for accommodating an earphone core, the core housing being fixed to the first plug end and elastically abutted against the protective sleeve; and
[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.

- Claim 1 recites specific locations for first and second plug ends.
- The Petition appears to acknowledge Li's lack of explicit description of plug ends at recited locations, but argues obviousness.



Li-Fujita Combination Fails – Arbitrary Addition of Plug Ends

- “... arbitrary segmentation would have been in direct contradiction to what Li described.”
- “...improving structural stability of the bone conduction earphone was a major theme in Li’s description, which would have cautioned a POSITA against attempting to modify Li’s unitary structure. Scordilis, ¶¶98-102”
- “... why a POSITA would act in contradiction to Li’s preference for a unitary ear hook structure by segmenting each ear hook into three pieces while risking mechanical issues such as relative displacement, shaking, or parasitic noise.”



attempting to modify Li’s unitary structure. Scordilis, ¶¶98-102; see also Li, ¶26 (“...effectively enhance the bending performance and *structural stability* of the bone conduction earphone...”), ¶29 (“...makes the connection ... more stable, and enhances *the sense of unity* and texture of the bone conduction earphone...”), ¶35 (“making the first elastic metal wire 1131 and the first housing 111 and the second housing 112 *more stably* fixed to each other”), ¶62 (“...enhancing the *structural stability* of the bone conduction earphone”) (emphasis added).

Li-Fujita Combination Fails – Arbitrary Addition of Plug Ends

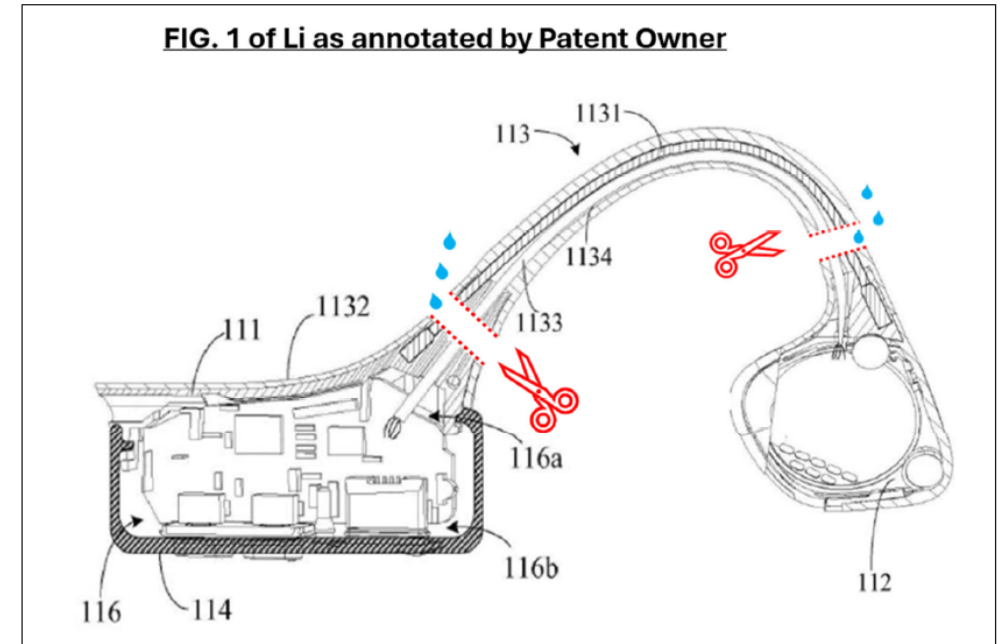
- “... a POSITA would have needed to make, not just one, but **two cuts** in Li’s ear hook assembly ...There is no explanation in the Petition as to why a POSITA would be motivated to modify Li’s ear hook assembly **multiple times at multiple locations.**” (POR., 38-39)
- “Li’s strong preference for a unitary structure is inconsistent with the interchangeable modularity represented by Petitioner’s seven-reference motley.” (POR., 33)
- “... **not one of the seven-reference motley teaches the actual claimed configuration of plugs being located at two ends of an ear hook component.**” (POR., 35)
- “In *ActiveVideo*, the Federal Circuit rejected obviousness arguments based upon a similar modularity argument by the patent challenger for being “conclusory and factually unsupported,” as well as “fraught with hindsight bias.” (POR., 40)
- “**Petitioner improperly relies on POSITA’s knowledge to backfill missing descriptions in the prior art.**” – violation of 37 C.F.R. § 42.104(b)(4), Federal Circuit law, and Director’s memo. (POR., 41)

Li-Fujita Combination Fails – Arbitrary Addition of Plug Ends

- **Petitioner**: “[a] POSITA would have understood there to be finite places to locate modular connections” and “the core housing (containing the speaker) and the circuit housing (containing the battery or control circuit)...are the natural points for modular separation because they are where the ear hook interfaces with the functional modules in a loudspeaker apparatus.” (Rep., 11-12) – *new argument raised only in Petitioner’s Reply*
- **Patent Owner**: “[Petitioner’s] argument ... squarely relies on the knowledge of a POSITA to improperly fill-in for the prior art’s missing description—***a practice that violates Rule 42.***”
 - ***“Neither Li nor any other prior art in the vast array of Petition’s references describes segmenting the ear hook at the claimed locations,*** thus strongly undermining Petitioner’s assertion that these locations were “natural points.”
 - *Petitioner’s position is based on impermissible hindsight.*

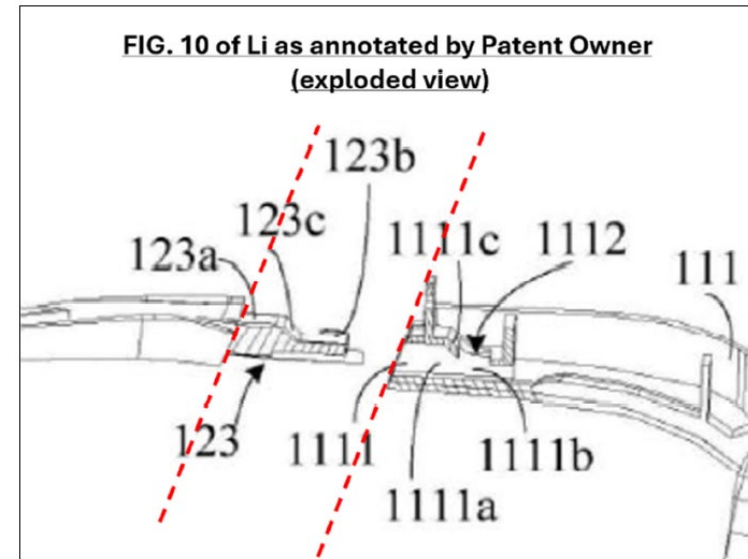
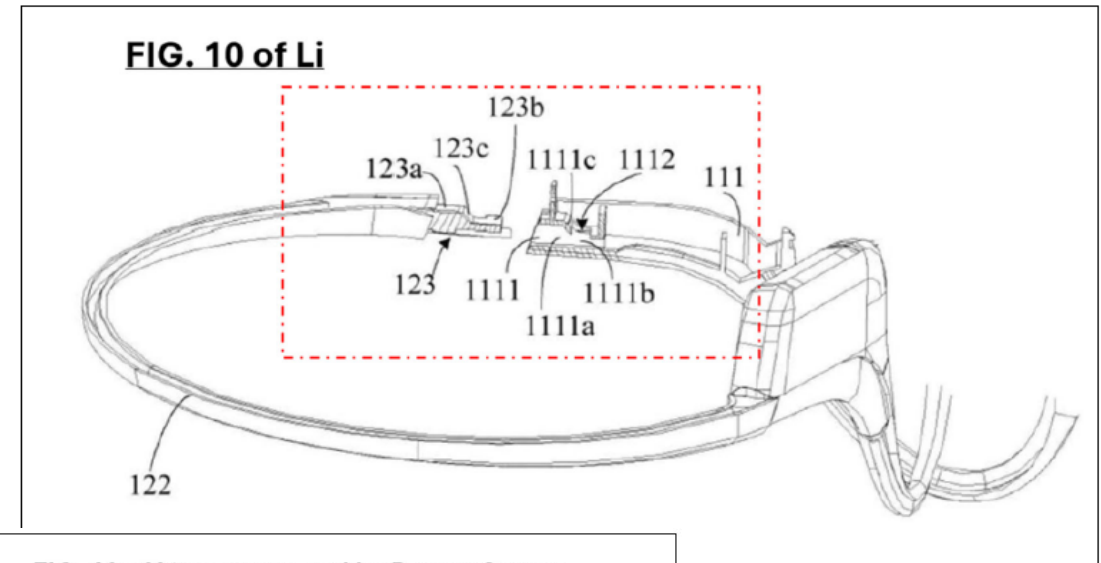
Li-Fujita Combination – Waterproofing Concerns of Additional Segments

- “The seams in Li’s elastic protective layer 1132 necessitated by Petitioner’s proposed modifications would have been yet another point of failure.”
- “...water entering into Li’s housing 112 would have interfered with the conduction of signals for the piezoelectric element driving Fujita’s speaker, for instance, with short circuiting and electric field interference. Scordilis, ¶80.”
- “Beyond electrical problems, water infiltrating Li’s housing and Fujita’s speaker would degrade the operation of the complex and intricate moving parts, by affecting driving precision, reducing piezoelectric conversion efficiency, dampening vibration, and distorting the audio output.”



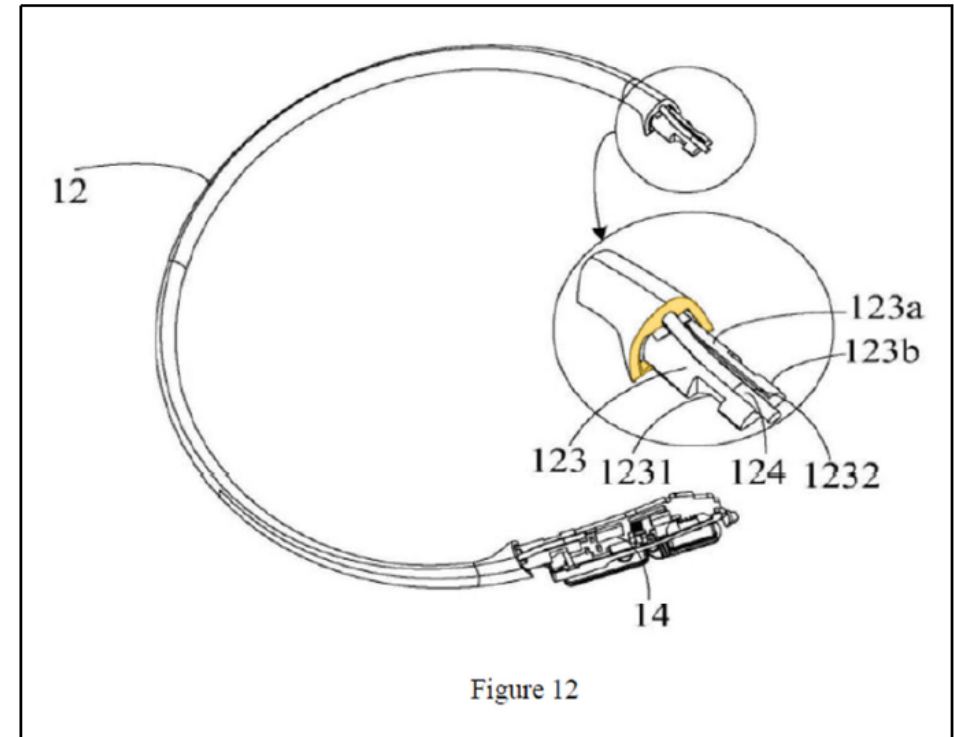
Li-Fujita Combination – Li Fails to Teach Elastic Abutting

- “The rear hook assembly [of Li] has an elastic coating layer 122 up to the plug-in portions 123, which remain uncovered.”
- “...there is nothing in Li to suggest that Li’s elastic coating layer 122 is elastically abutted (e.g., compressed) against the housing 111 (“**elastically abut**”). Scordilis, ¶¶119-125.”
- “Given the matching profiles, ... a POSITA would have expected that, at best, the ends of the elastic coating layer 122 on both sides of the gap would contact each other when the plug was fully inserted into the housing. **But this is far from the claimed “elastically abut,”** which requires contact under an elastic force.”



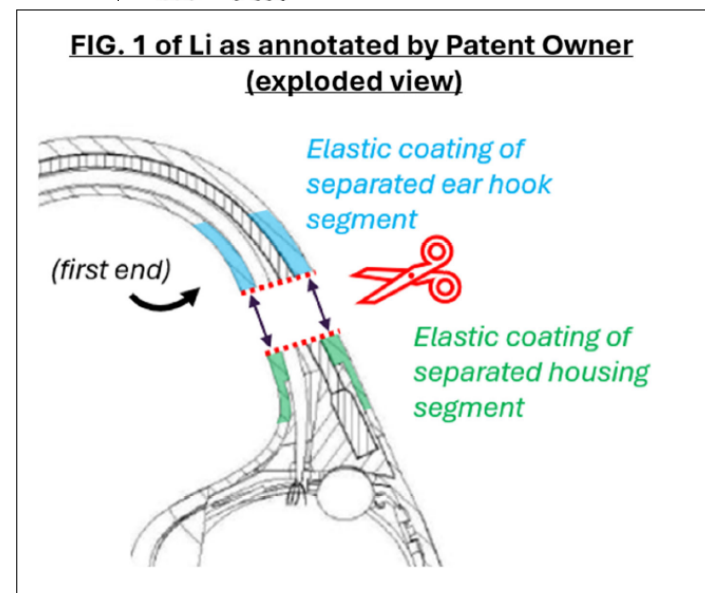
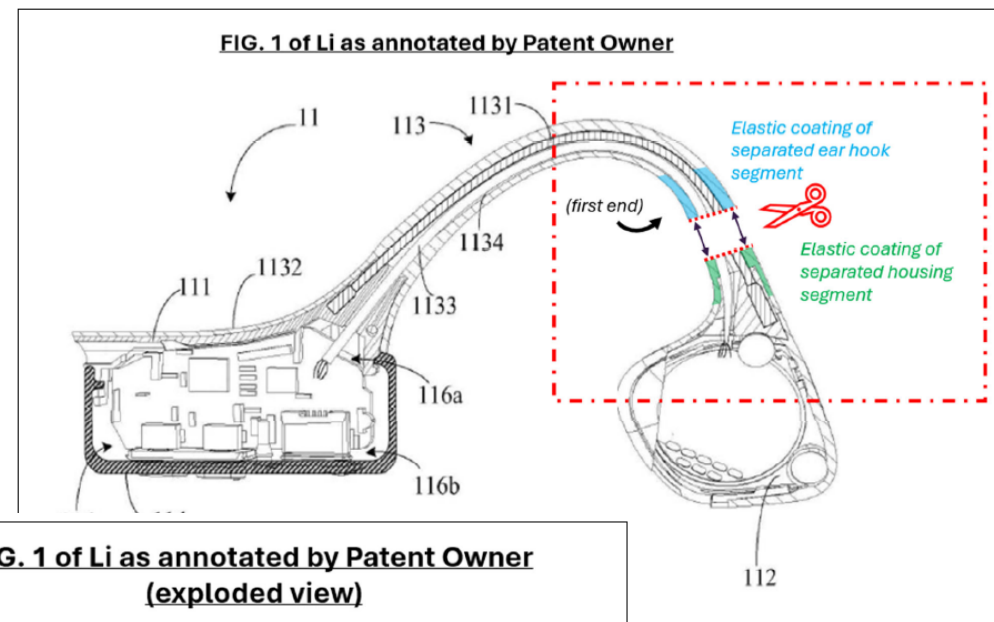
Li-Fujita Combination – Li Fails to Teach Elastic Abutting

- “FIG. 12 actually shows an end surface of the elastic coating layer 122 being approximately flat and not protruding past the base of the plug-in portion. See Li, FIG. 12 (annotated below to show a flat end surface of the elastic coating layer). Critically, Li’s specification does not describe that the elastic coating layer extends over or extends past the plug-in portions.”



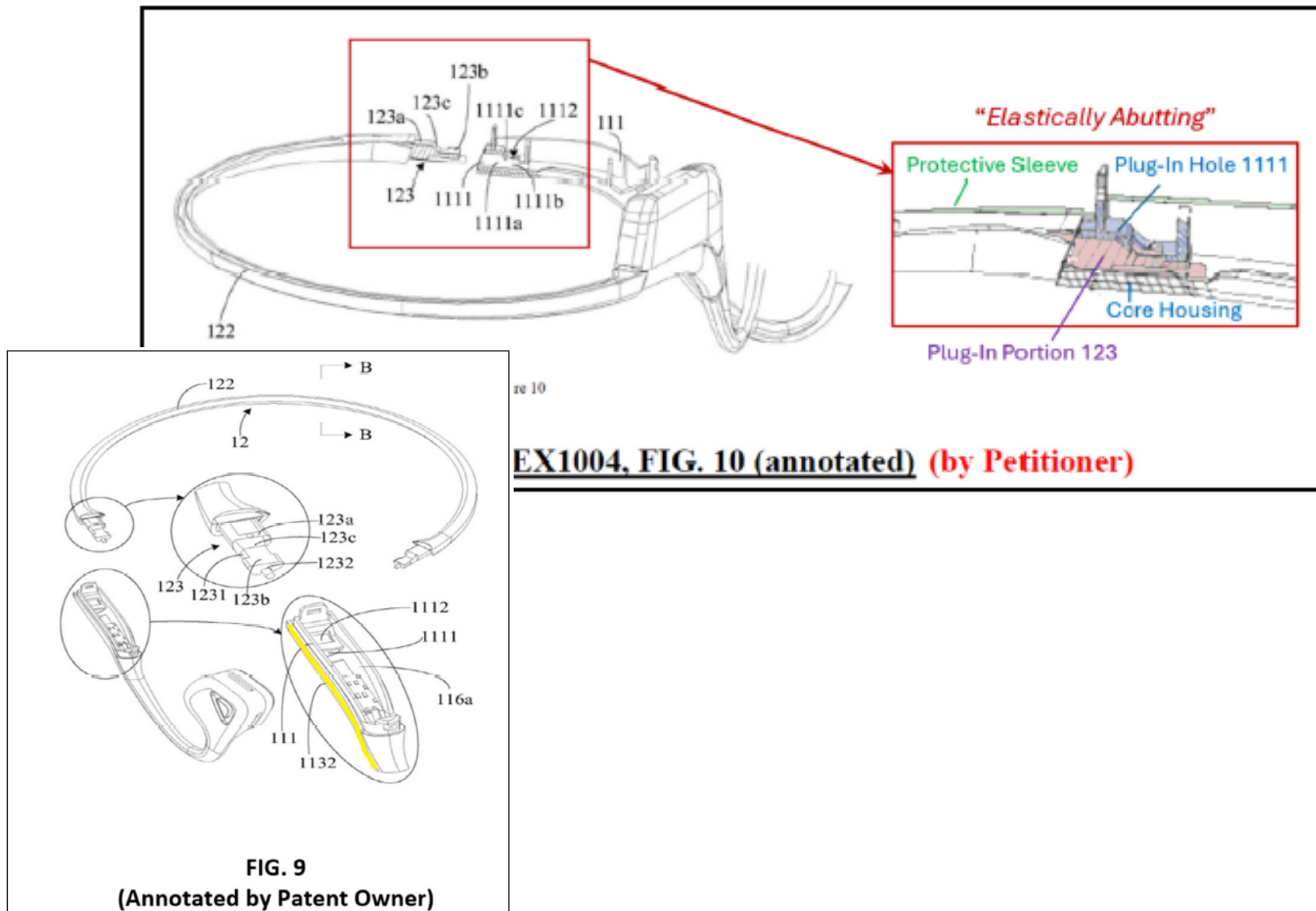
Li-Fujita Combination – Li Fails to Teach “abutting” of Correct Elements

- “Such a protective sleeve in Petitioner’s invalidity ground would be the blue-annotated protective sleeve in the [annotated] figure, which does not abut against the core housing located across the gap.”
- “... at best, the blue-annotated elastic sleeve would make contact against the green-annotated elastic sleeve. This is a sleeve-to-sleeve connection and not abutment (let alone elastic abutment) against the core housing.”
- ***The Petition itself admits sleeve-to-sleeve abutment:*** “the second elastic coating layer 122 abuts the first elastic coating layer 1132 at the plug-in portion 123” (Pet., 100), which is not sleeve-against-core-housing.



Li-Fujita Combination – Li Fails to Teach “abutting” of Correct Elements

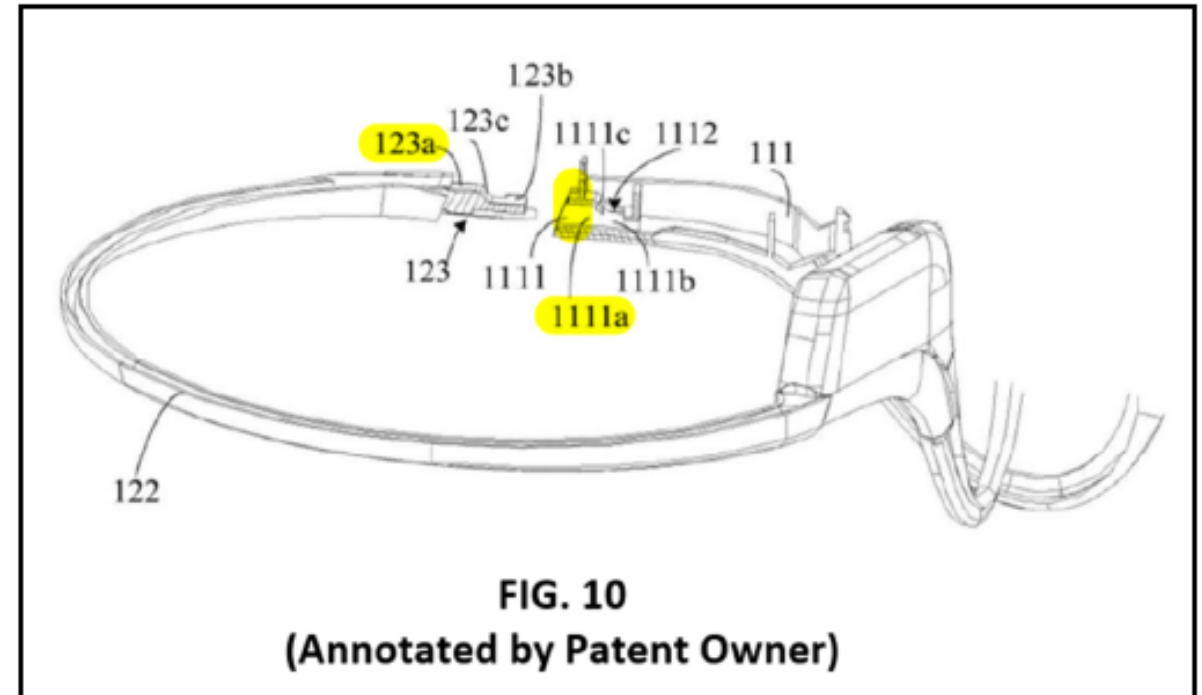
- **Petitioner:** Mislabels “core housing” in Figure 10 of Li in attempt to show elastically abutting. (Rep., 13-15)
- **Patent Owner:** “The cross-hatched area Petitioner erroneously labels “Core Housing” is in fact elastic coating layer 1132, which is more clearly depicted in Figure 9 (annotated below).”



Sur-Reply, 17-18.

Li-Fujita Combination – Li Fails to Teach “abutting” of Correct Elements

- **Petitioner:** In Li’s paragraphs [0063]-[0064], “the plug-in portion 123 and the plug-in hole 1111 are configured for a “tight fit” between them so that “the rear hook can be effectively connected to the ear hook.” (Rep., 14)
- **Patent Owner:** Petitioner mischaracterizes Li because it “omits elements 123a and 1111a—the elements engaging with each other in a tight fit.”
 - “...there is no explanation in this section about elastic abutting **of the sleeve** with the core housing.”



engaging with each other in a tight fit. Li’s full citation reads: “...the second plug-in section 123b of the plug-in portion 123 passes through the first hole section 1111a and the second hole section 1111b in sequence, so that the first plug-in section 123a fits tightly with the first hole section 1111a.” Li, ¶63; Fig. 10

Relevant section of ¶63 of Li

Overview

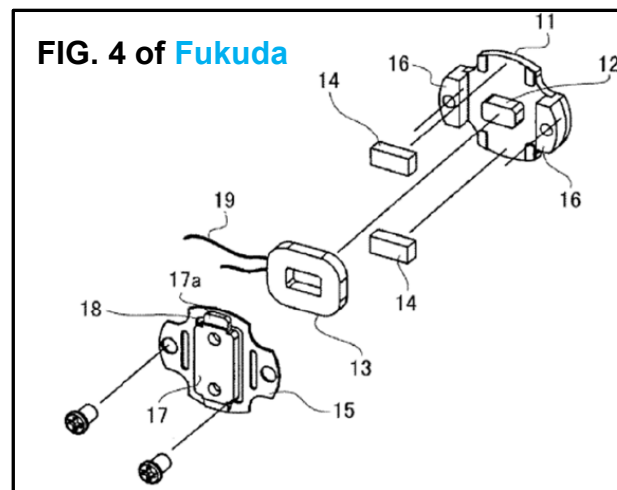
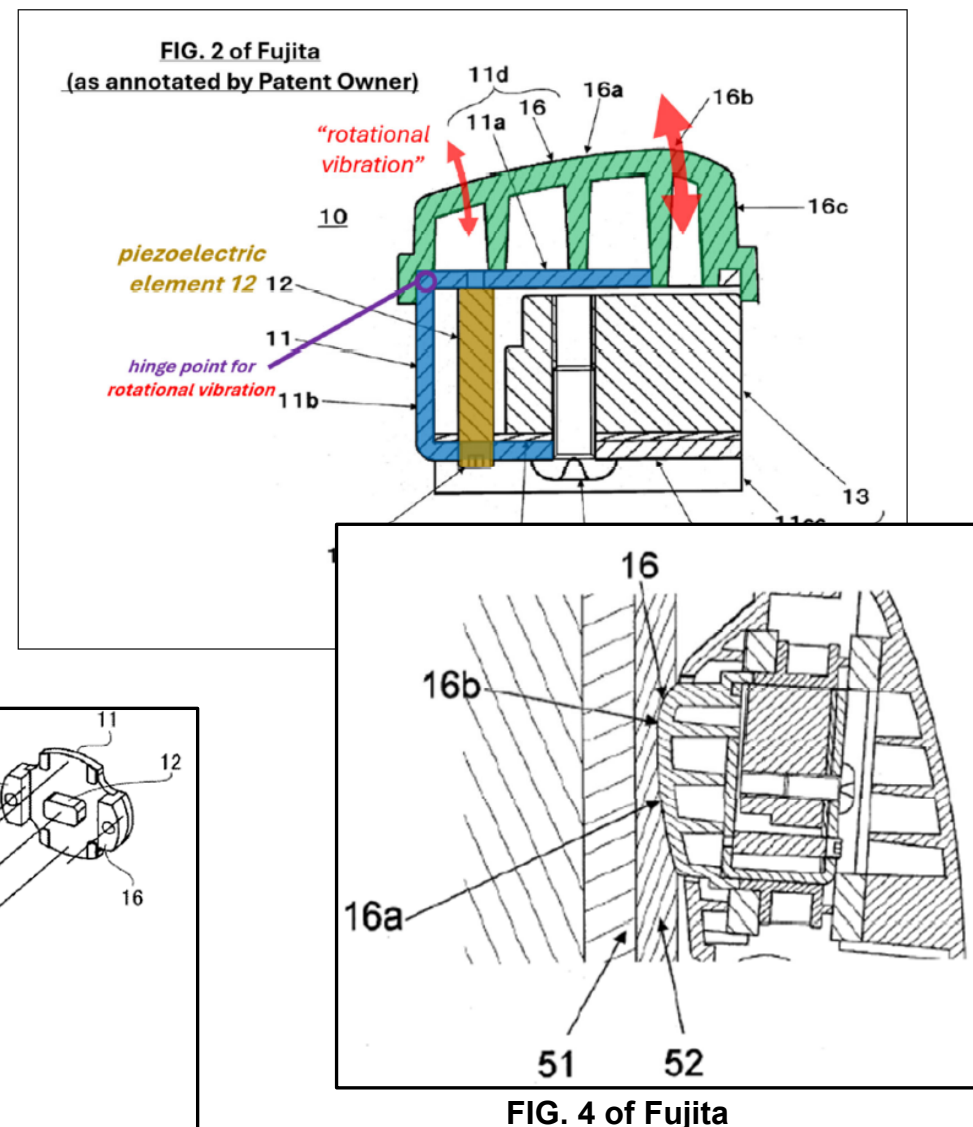
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Li-Fujita-Fukuda Combo Fails (Claims 12-15) – Fukuda Destroys Fujita’s Intended Purpose

[14pre] The loudspeaker apparatus of claim 12, wherein
[14a] the earphone core includes a coil and a magnetic circuit system, and
[14b] 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’s magnetically driven speaker destroys Fujita’s key benefit which requires rotational or hinged vibration.”
- “...*the entire reason why Fujita discloses a convex speaker cushion is inextricably tied to the rotational motion*, which causes the peak of the cushion to displace more than the non-peak portions for optimized transmission of sound signals. Fujita, ¶¶36-37; Scordilis, ¶¶135-138.”
- “... a POSITA would recognize that **Fukuda’s** magnetic speaker driver (i) only provides linear displacement, and (ii) would only be useful for linear outputs. Scordilis, ¶¶139-144.”

POR, 55-56; 58-60.

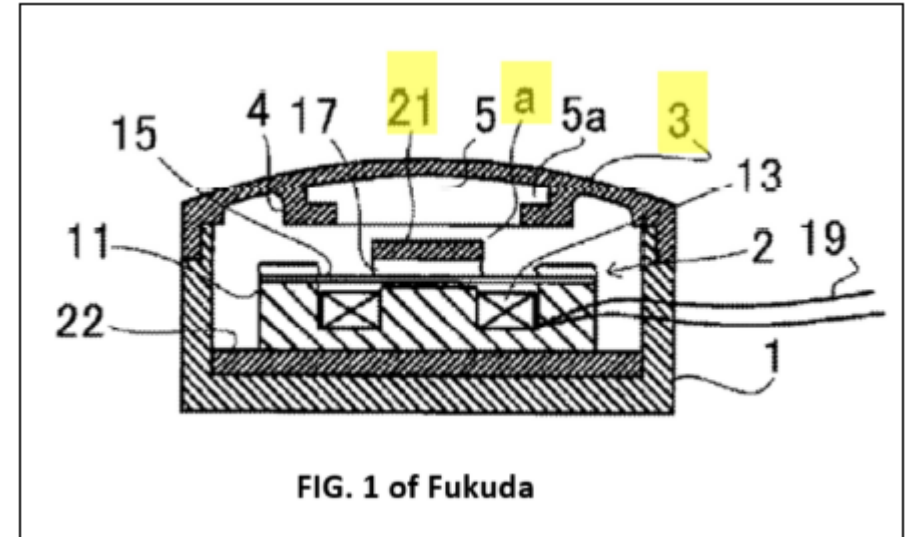


Li-Fujita-Fukuda Combo Fails (Claims 12-15) – No Motivation to Combine

Petitioner (Pet. 42-43)	Patent Owner
Magnetic circuits in bone conduction speakers were known to provide high-quality sound	Liao Reference that Petitioner relies upon does not compare piezo-based systems to magnet-based systems; <i>alleged improvement is over prior magnet-based systems</i> (POR, 63-64)
Magnet-based systems improved electromechanical conversion efficiency	References that Petitioner relies upon do not compare piezo-based systems to magnet-based systems; <i>alleged improvement is over prior magnet-based systems</i> (POR, 64-65)
Fukuda provides improvements (“efficient, high-quality sound, and simple construction”)	“Fukuda’s improvements are attributable to Fukuda’s <i>entire</i> system, and not to Fukuda’s magnetic mechanism for replacing a piezoelectric system” (POR, 66)
“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 <i>elastic contact structures</i> .” Kyriakakis Rebuttal Decl., Ex. 1041, ¶29	“Fujita’s cushion, required in Petitioner’s combination with Fukuda, is not an elastic contact structure but is a “ <i>highly rigid structure</i> ” and has “ <i>high rigidity</i> .” (Sur-Reply 26-27)

Li-Fujita-Fukuda Combo Fails (Claims 12-15) – Incompatible Technologies

Importantly, Fukuda's "benefits" that Petitioner relies on—"independent unit," "simple in construction" (Rep., 17), "as it is" incorporation (EX1041, ¶¶29, 31)⁴—are associated with Fukuda's "bone conduction speaker" as a unit, and cannot be attributed to Petitioner's select, hand-picked elements (e.g., elements 11 to 14) which are then combined with at least the asymmetric convex cushion of Fujita.



Fifth, Fukuda's magnetic system is specifically designed to operate with an "elastic cover 3 [] formed of a rubber material," and elastic plate 21. Fukuda, 4:25-33. Importantly, Fukuda relies on elasticity and deformability of its symmetric cover 3 and elastic plate 21 to cause variations in gap "a" to transmit vibrations. *See id.*, 4:25-56.

Li-Fujita-Fukuda Combo Fails (Claims 12-15) – Incompatible Technologies

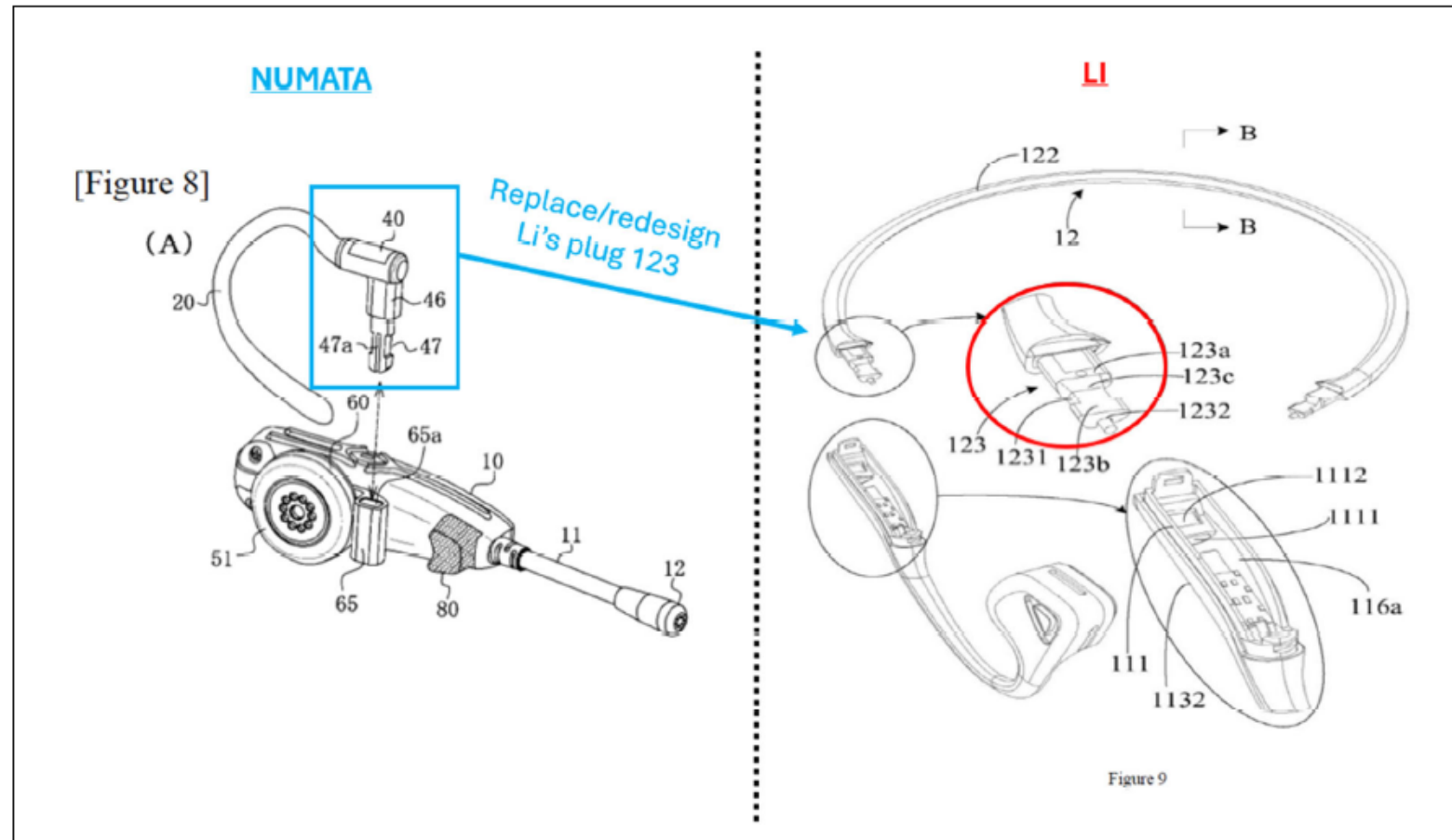
from the operating principles of Fukuda's system. Notably, Petitioner proposes combining differing components from incompatible systems (Fukuda's elastic membrane technology that operated based on a linear magnetic drive and a symmetric elastic cover *versus* Fujita's pivoting piezoelectric system with a rigid and asymmetric cushion). Such an endeavor—even if possible—would have required complex sound engineering and mechanical design considerations not described in the Petition, not within the skillset of this POSITA, and not achievable with a reasonable expectation of success.

Overview

1. Background
2. Claim construction – “elastically abutted against”
3. The Li-Fujita Combination Fails
4. Li-Fujita-Fukuda Combination Fails
- 5. Li-Fujita-Numata Combination Fails**
6. '582 Patent Specific Issues

Li-Fujita-Numata Combo Fails (Claims 7-10) – Numata’s Connector Renders Li’s Headset Useless

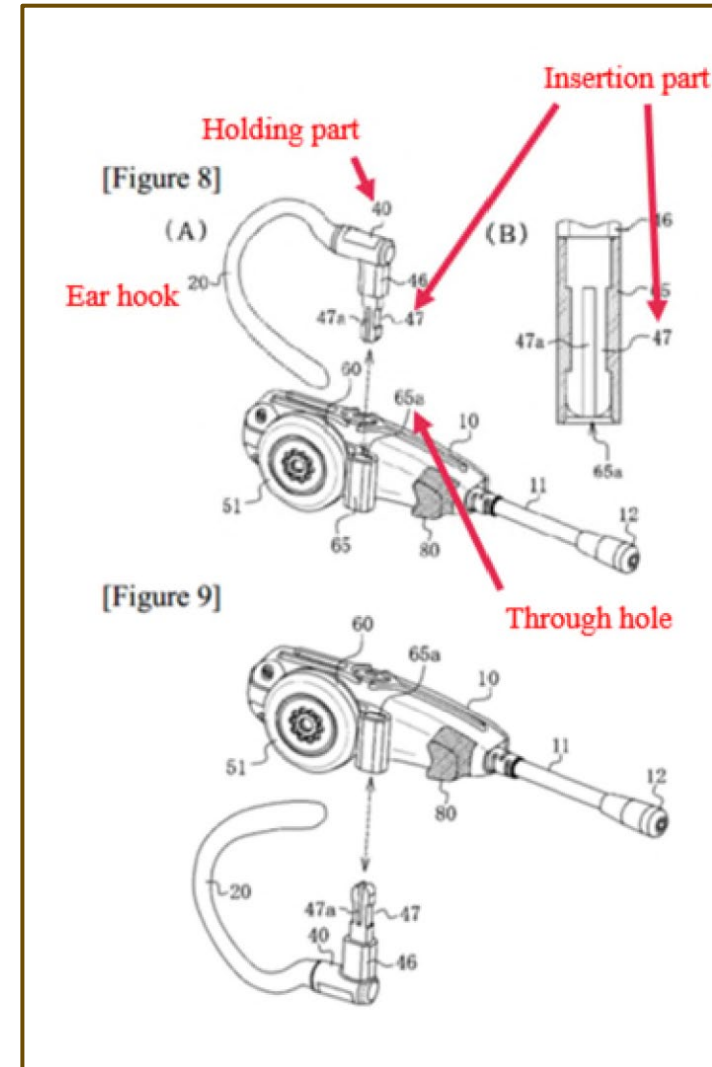
[7pre]	The loudspeaker apparatus of claim 1, wherein
[7a]	the core housing is arranged with a first socket connecting with an outer end surface of the core housing.
[7b]	a stopping block is arranged on an inner sidewall of the first socket, and
[7c]	the first socket is connected to the first plug end.



Pet., 81-84; POR, 67.

Li-Fujita-Numata Combo Fails (Claims 7-10) – Numata’s Connector Renders Li’s Headset Useless

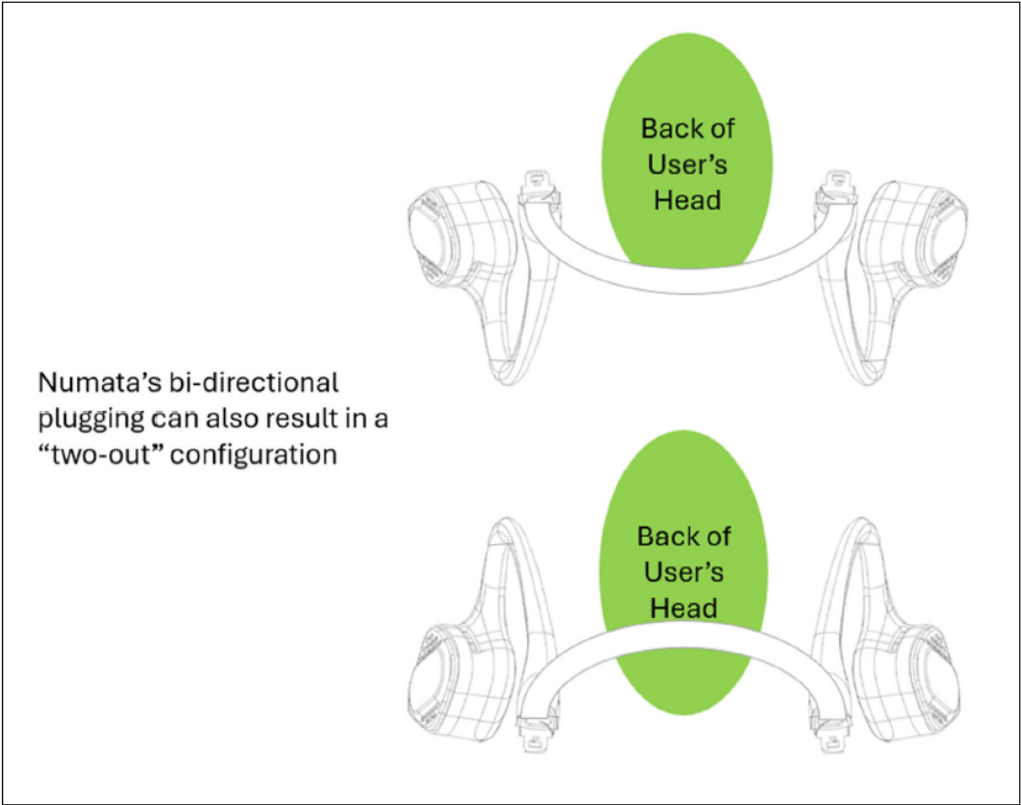
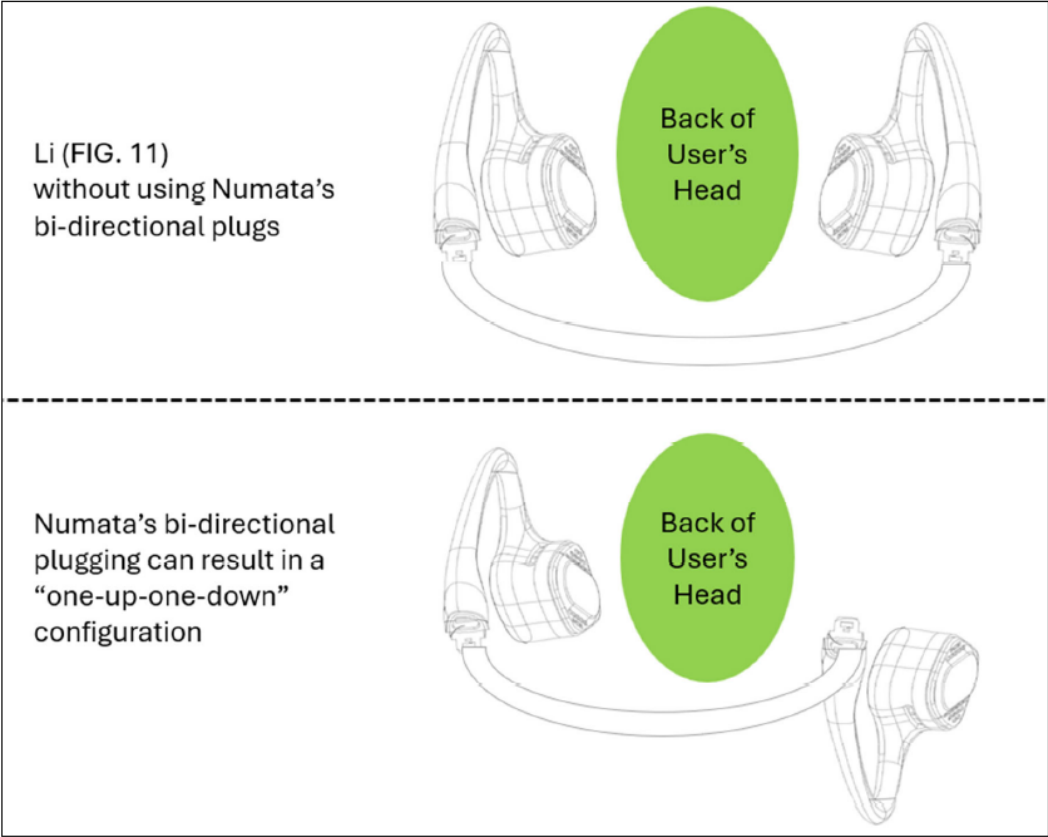
- “Numata is directed to a single-ear earpiece.”
- “Other than switching from a left-ear to a right-ear configuration ([Numata, ¶]10)—**a feature irrelevant to Li’s device**—Petitioner has failed to show a single scenario where Numata’s bidirectional connector improves the wearability of Li’s dual-ear device.”
- “...while this orientation flexibility is useful for single-ear devices, it is significantly problematic for dual-ear earphones, and especially for dual-ear bone conduction devices.”



Numata’s Figures 8 and 9
(annotated by Petitioner) (Pet., 14)

POR, 68-69; Sur-Reply, 29.

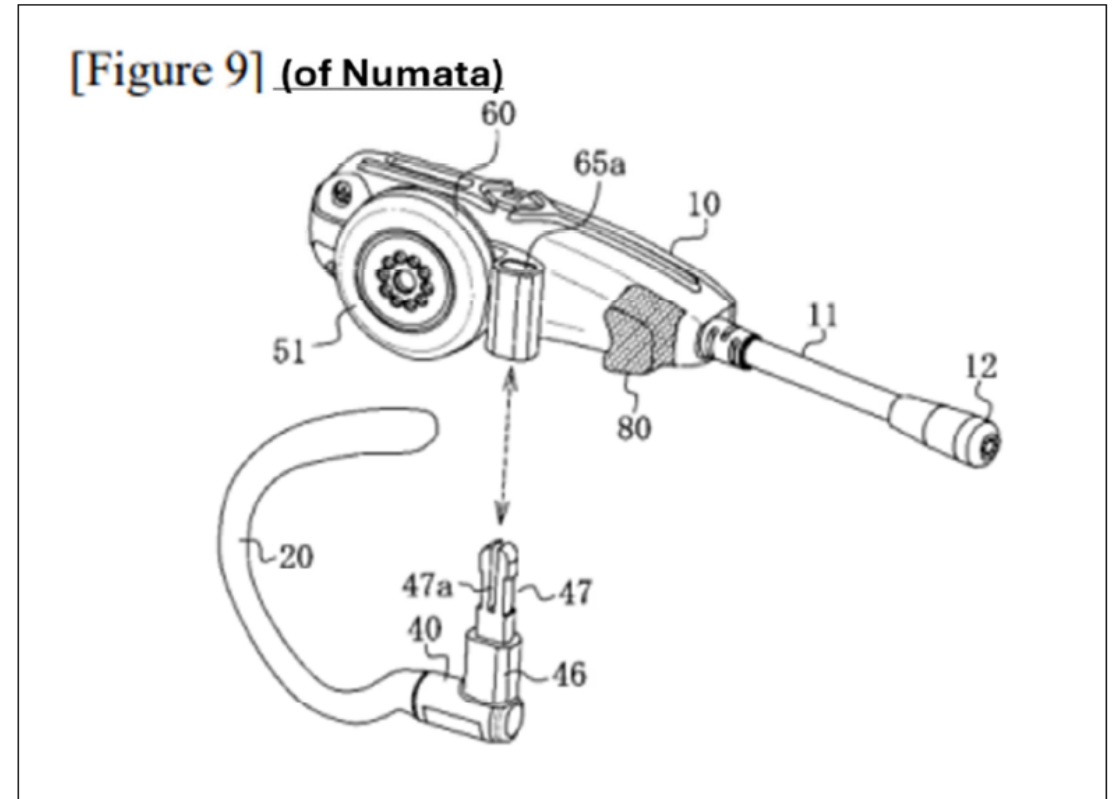
Li-Fujita-Numata Combo Fails (Claims 7-10) – Numata’s Connector Renders Headset Useless



POR, 70-71.

Li-Fujita-Numata Combo Fails (Claims 7-10) – No Mechanism to Unplug

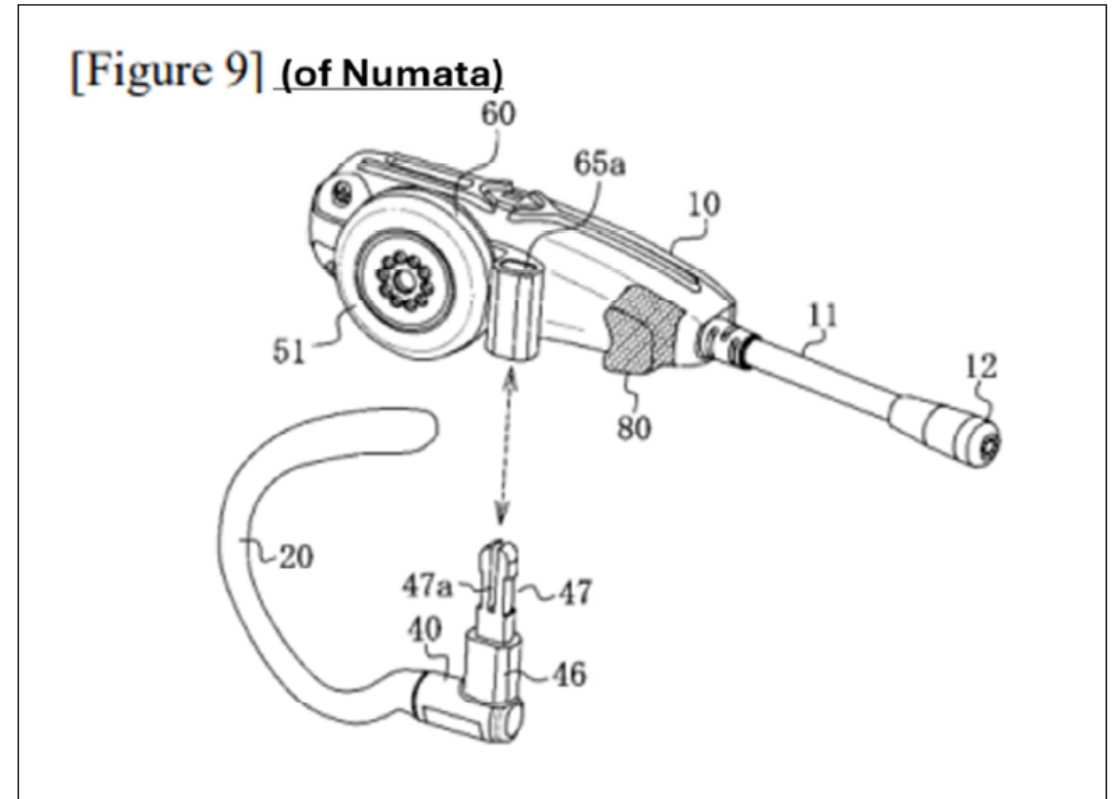
- “...an essential part of Numata’s plug was ***the accessible “through-hole” [65A] at the other end of the plug***, which allowed the release and detachment of the plug by inserting a tool into the hole.”
- “However, in Petitioner’s proposed combination, Numata’s plugs would be inserted ***into Li’s housings*** (i.e., an enclosed space) which did not (and could not) have such an accessible through-hole to allow the release of the plug.”
 - “...once Numata’s plugs were inserted into the core housing, ***it would not have been possible to remove them.***”



Notably, Numata discloses that the engagement of the insertion part “can be easily released ***by inserting a tool from the opening in the opposite direction of the relevant insertion part 47 of the through-hole 65A*** to reduce the slit 47A, so the above assembly is easy to attach and detach and change.” Numata, ¶34 (emphasis added).

Li-Fujita-Numata Combo Fails (Claims 7-10) – No Passageway for Electrical Wires

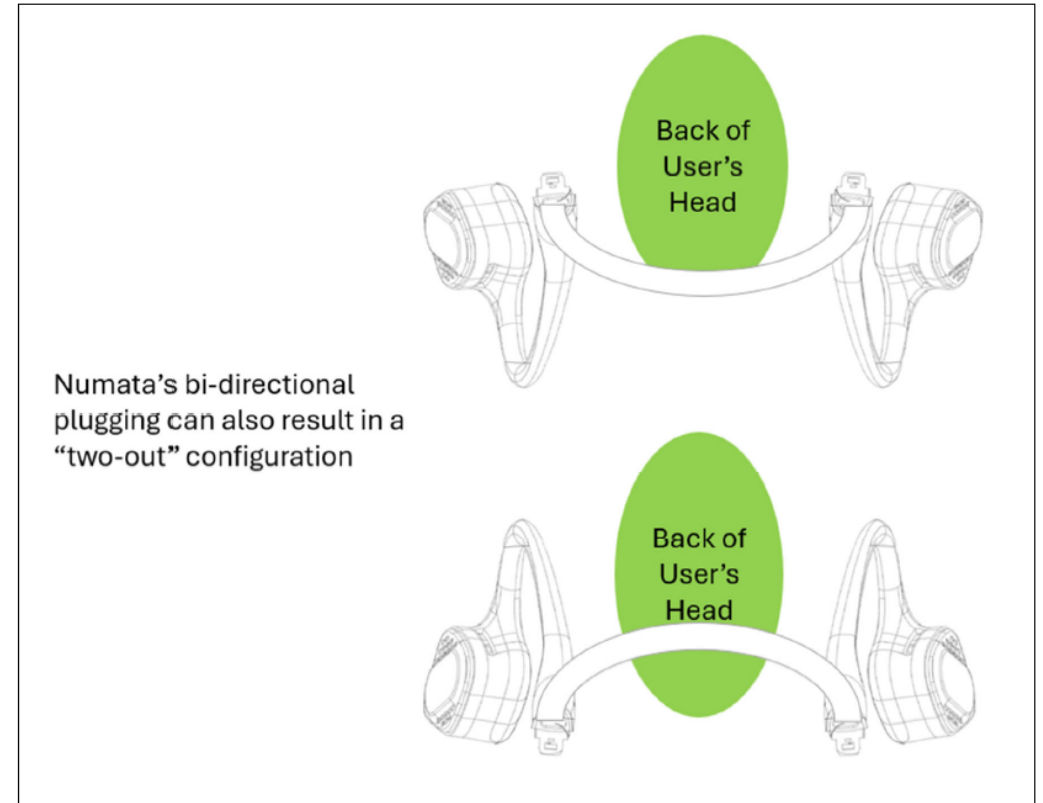
- “...the insertion part 47 [of Numata] **does not pass wiring and is not used whatsoever to establish electrical connectivity** across both sides of the structural connection.”
- “It would not have been obvious to a POSITA **how these moving and dynamic parts of Numata’s insertion part 47 would accommodate any necessary wiring.**”



Li-Fujita-Numata Combo Fails (Claims 7-10) – Numata’s Connector Provides No Improvement

Petitioner: Numata’s connector provides “secure fit and improved wear resistance.” (Rep., 23)

- **Patent Owner:** “Li already describes multiple mechanisms for providing a secure connection including plug-in holes to receive plug-in portions and even applying adhesives (see e.g., Li, ¶¶37, 60).”
 - “[I]mproved wear resistance[:.]” this term or variations thereof are not in Numata—at least not in the context used by Petitioner. Numata describes simplifying the process of “wearing” the headset by one hand. Numata, Abstract, ¶¶7, 12, 17.”



Li-Fujita-Numata Combo Fails (Claims 7-10) – Numata’s Connector Provides No Improvement

Numata’s Flaw Shown POR	Petitioner’s Reply	Shortcomings of Petitioner’s Position
Incorrect and upside-down insertion of earphones	POSITA would flip the connections back to the correct position Can Fix through routine engineering, e.g., keying or asymmetric geometries to prevent reverse insertion	Fails to explain why POSITA would be motivated to change the Li-Fujita combination to use a bidirectional connector knowing this deficiency Alternative connector configurations require significant modifications not explained in Numata and/or in original Petition, and not a routine engineering task for this POSITA
		No explanation why a POSITA would use a reversable connector, if it cannot be used as a reversible connector
Incorrectly connected/assembled	Not rebutted in Petitioner’s Reply.	¶36 of expert declaration is not cited in Petition

Numata’s Flaw Shown POR	Petitioner’s Reply	Shortcomings of Petitioner’s Position
earphone is permanently attached because Numata’s release mechanism requires a hole that cannot be implemented in the waterproof housing of the combination	Expert (EX1041, ¶36) admits this problem but purports that a POSITA would use alternate release mechanisms that do not require a through-hole, e.g., a resilient cantilever latch accessible from the exterior, a spring-loaded detent, or a flexible barb that compresses upon pulling	Petitioner’s original filings and all cited references fail to describe any such alternate structures Stated modifications are not trivial, and expert has no explanation about how those modifications would be even possible
	Not rebutted in Petitioner’s Reply Expert (EX1041, ¶38) opines these would have been “avoided by multiple known techniques for providing electrical connections via plug and socket portions.”	Petition and Reply have insufficient explanations and improperly incorporate-by-reference the expert declaration ¶38 of expert declaration is conclusory and merely points to elements 65/65A of Numata’s connector, and summarily declares
Numata’s connector has no electrical connectivity capability, and adding any electrical connections would obstruct plug’s insertion into its receptacle		

- New arguments – only in **Petitioner’s Reply or Rebuttal Decl.**
- Unavailing
- Improper incorporation by reference

Numata’s Flaw Shown POR	Petitioner’s Reply	Shortcomings of Petitioner’s Position
		providing electrical connections would have been routine

Sur-Reply, 30-32.

Li-Fujita-Numata Combo Fails (Claim 9) – “Spaced Apart”

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

FIG. 4 of the '084 Patent
(as annotated by Patent Owner)

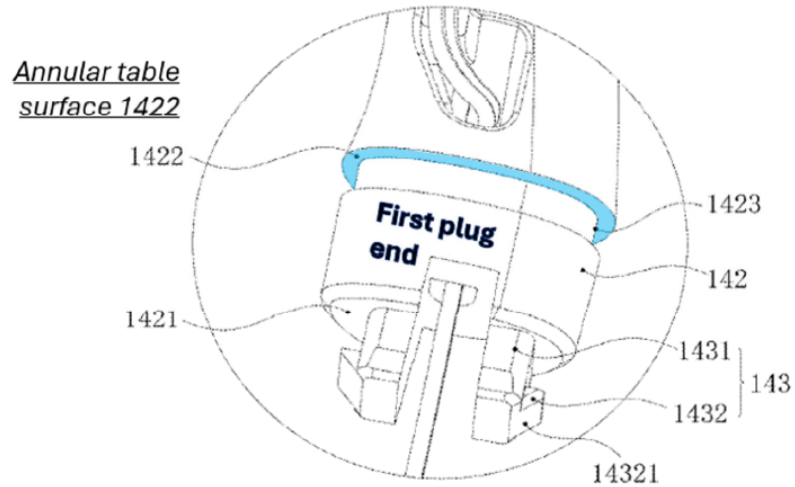


FIG. 6 of the '084 Patent
(as annotated by Patent Owner)

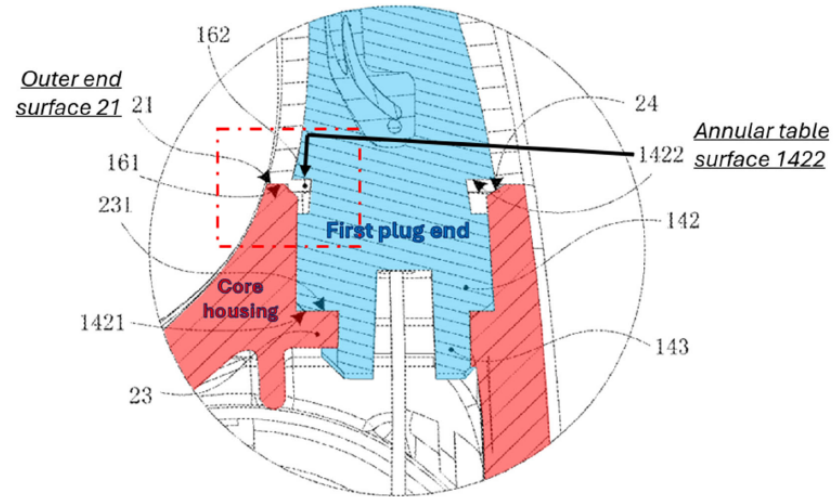
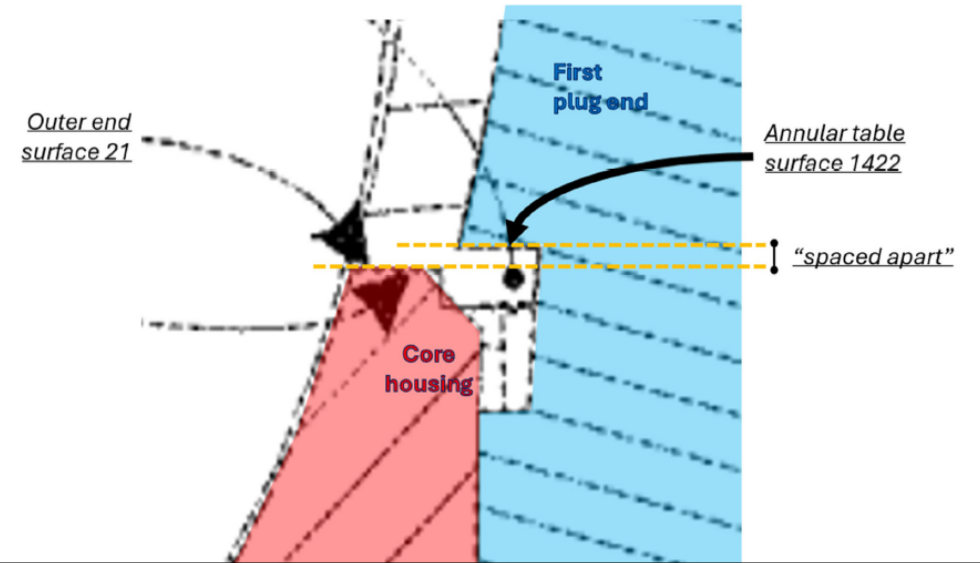
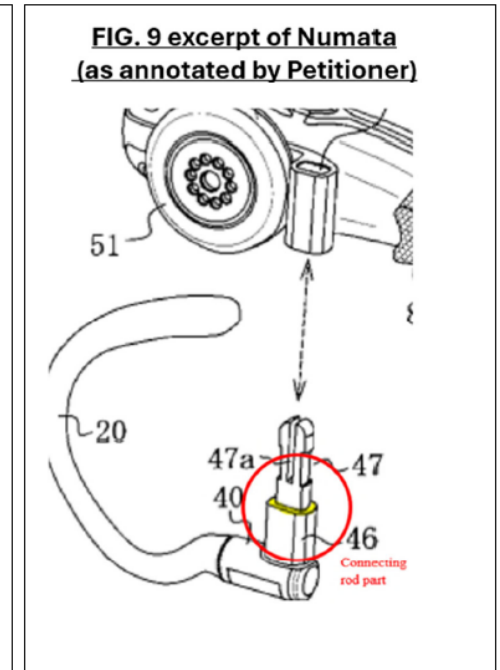
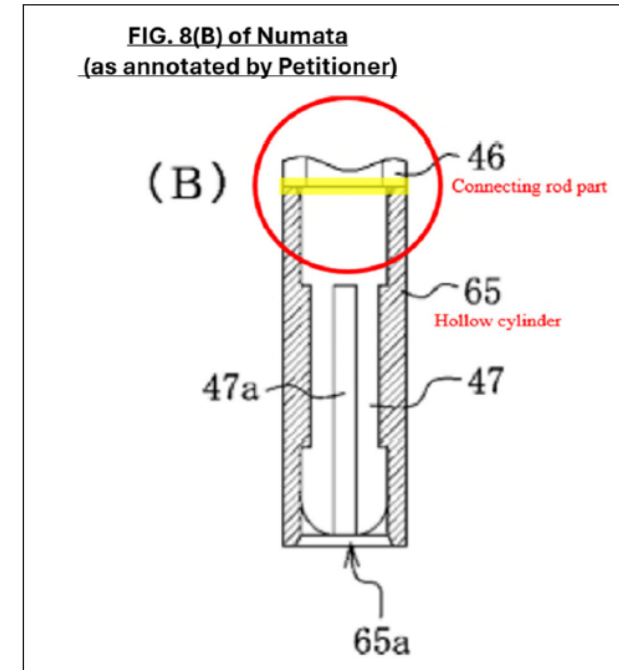


FIG. 6 of the '084 Patent
(magnified view)



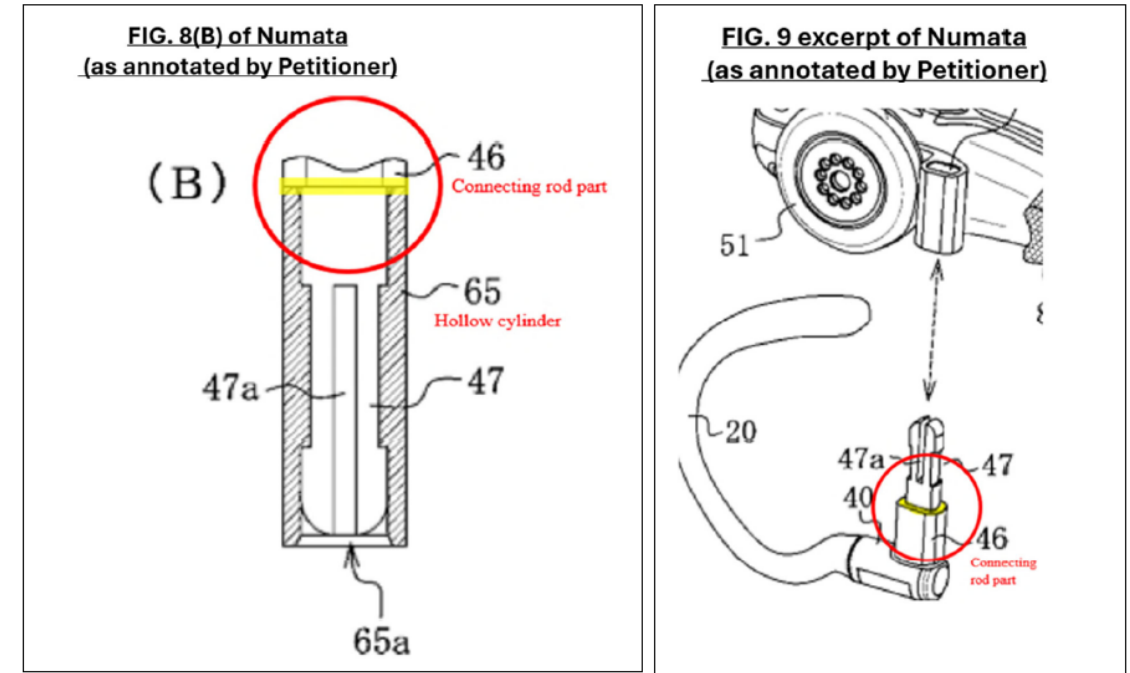
Li-Fujita-Numata Combo Fails (Claim 9) – Numata’s Connector Not “spaced apart”

- “Numata teaches the opposite: the inserting surface being ***flush against*** the socket.”
- **Petitioner:** misconstrues claim 9 as requiring a temporal condition: (“When the Numata plug is partially inserted into a socket...”) (Rep., 24)
- **Patent Owner:** Petitioner is incorrect:
 - “... claim 9 does not have a temporal condition; it is an apparatus claim describing the spatial configuration of “the insertion portion” within the socket.”
 - “...claim 9 describes positioning of the inserting portion when the first plug end is connected to the first socket. See base claim 7 (“the first socket is connected to the first plug end.”).”



Li-Fujita-Numata Combo Fails (Claim 9) – “Manufacturing Tolerances” Argument Unavailing

- **Petitioner:** “[e]ven when the Numata plug is fixed to the socket,” the space-apart condition is satisfied “to accommodate typical **manufacturing tolerances** and permit reliable installation.” (Rep., 24) - *new argument raised only in Petitioner’s Reply*
- **Patent Owner:** Petitioner is incorrect:
 - “Petitioner and its expert fail to provide any evidence of relevant manufacturing tolerances that would create such a “spaced apart” configuration.”
 - Or “how or why the surfaces (i.e., annular table “surface” and outer end “surface” of the core housing) would be spaced apart in the presence of small manufacturing tolerances in parts of those surfaces.”



Overview

1. Background
2. Claim construction – “elastically abutted against”
3. The Li-Fujita Combination Fails
4. Li-Fujita-Fukuda Combination Fails
5. Li-Fujita-Numata Combination Fails
- 6. '582 Patent Specific Issues**

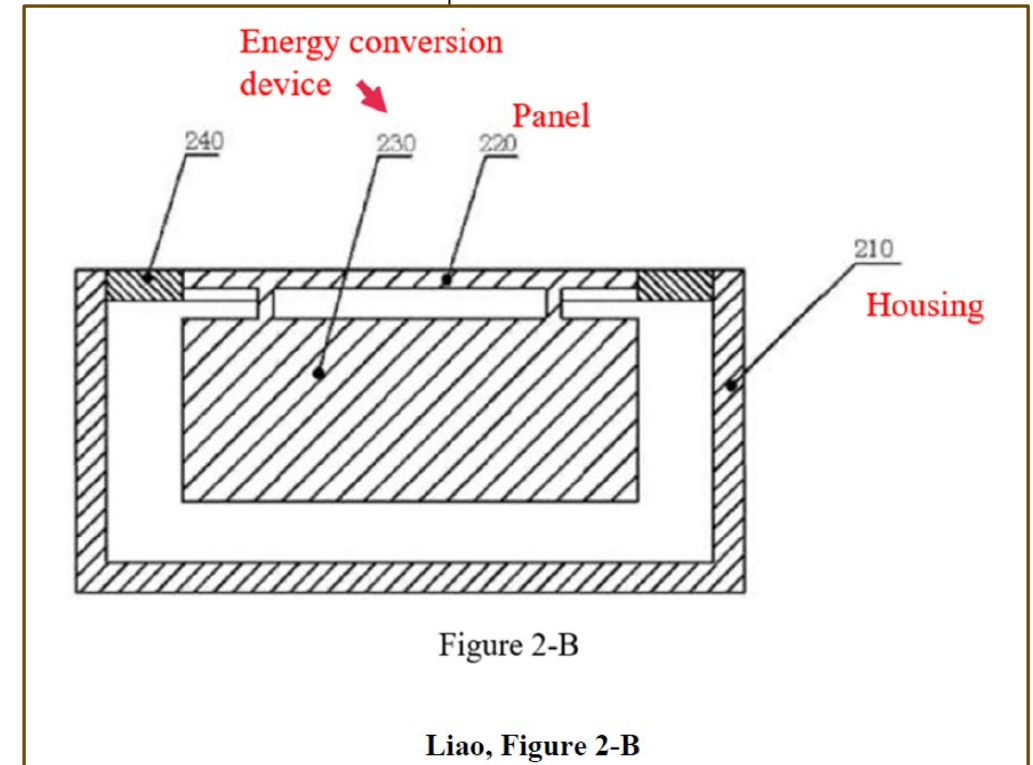
'582 Patent – Claim 1

CHART OF CLAIMS	
	[1pre] A loudspeaker apparatus, comprising:
	[1a] an ear hook including a first plug end and a second plug end,
	[1b] the ear hook being surrounded by a protective sleeve, the protective sleeve being made of an elastic waterproof material;
	[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, wherein
	[1d] the core housing including a housing panel facing human body and a housing back panel opposite to the housing panel, and
→	[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
	[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-Liao Combination Fails – Petitioner’s Inherency Position Fails

[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

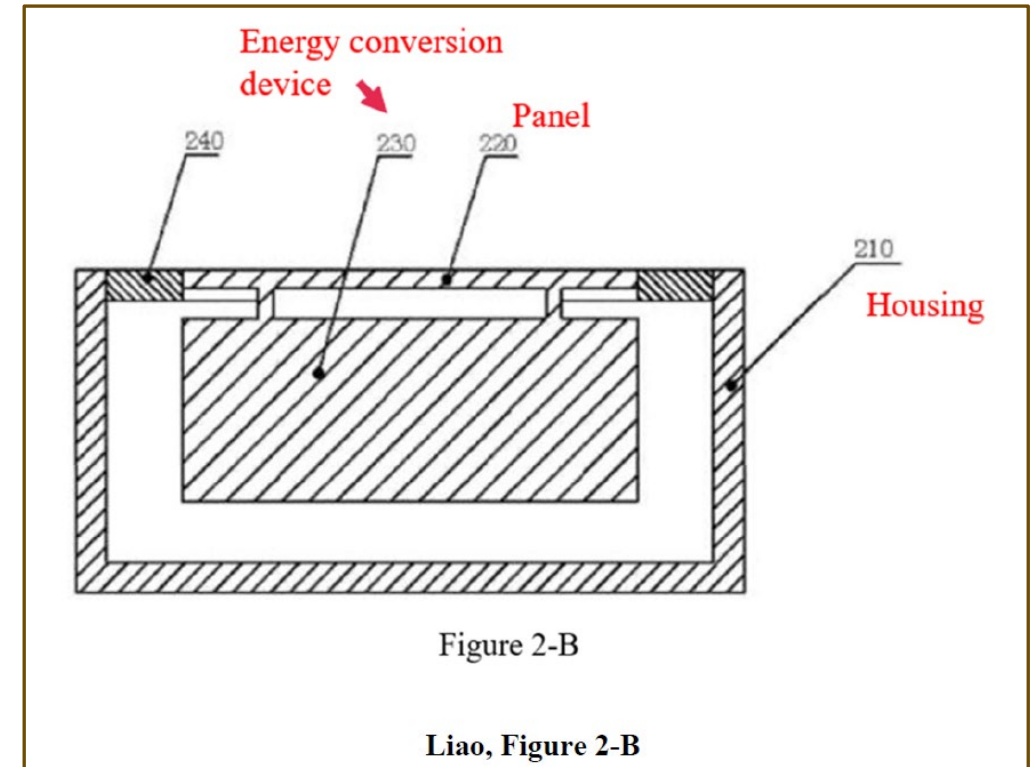
- **Petitioner:** “[a] *POSITA would understand* that if panel 220 is vibrating, housing 210 is also vibrating in phase (*the absolute value of the phase difference is nearly zero*) because panel 220 and the housing 210 are rigidly connected without connection members 240, as taught by Liao.” (Pet. 35)



(annotated by Petitioner) (Pet., 35)

Li-Liao Combination Fails – Petitioner’s Inherency Position Fails

- **Patent Owner:** Petitioner’s reasoning that having a “rigid” housing necessarily yields “nearly zero” phase difference collapses:
 - “Rigid connections are only one factor and far from being sufficient.”
 - “Ordinary design features—such as **differences in panel thickness or material** (e.g., thin, compliant plastic), **how the panels are supported and braced** (e.g., different adhesive strengths or fastener materials), and **how the front panel is loaded by the driver compared to the back panel**—can cause the front and back panels to move out of phase even if the housing is rigidly constructed.”



(annotated by Petitioner) (Pet., 35)

Li-Liao Combination Fails – Treatment of Claim 14 Contradicts Petitioner’s Claim 1 Position

[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.

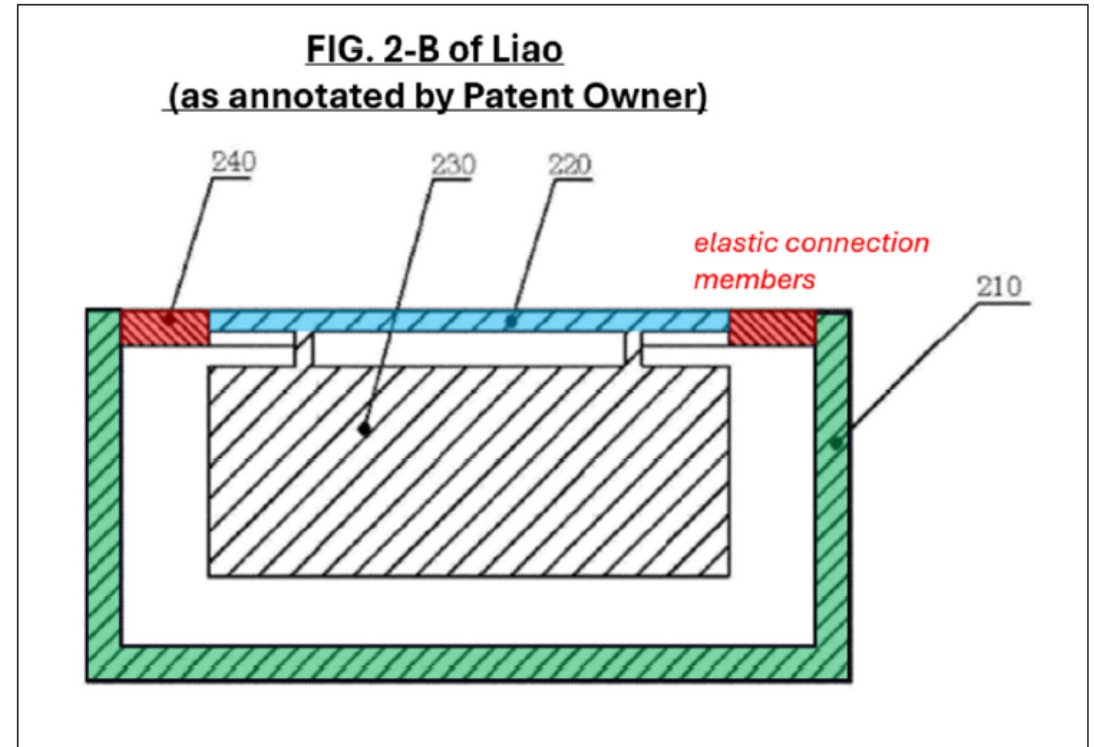
	Guaranteeing “nearly in <i>phase</i> ” vibrations (element [1e])	Guaranteeing “nearly the same” vibration <i>amplitudes</i> (dependent claim 14)
1) Rigid panel connections	Asserted as necessary	Asserted as necessary
2) Same panel material	Not asserted as relevant	Asserted as necessary
3) Same panel thickness	Not asserted as relevant	Asserted as necessary
4) Same vibration source	Not asserted as relevant	Asserted as necessary

- Petitioner lists four requirements for the housing panel and back panel to meet claim 14’s vibration amplitude ratio requirement to be “within a range of 0.5 to 1.5. (Pet., 41-42)
- “Petitioner’s attempt to cabin the effects of panel material and panel thickness to vibration amplitude dynamics—but not vibration phase dynamics—is technically unsound and renders its original inherency position against claim 1 even less credible.”

POR (582), 47-48.

Li-Liao Combination Fails – Reliance on a Fringe Teaching of Liao is Improper

- “Petitioner’s assertion that Liao teaches “rigidly connected” panels rests on a single, one-off statement that the vibrating speaker panel (220) can be “directly attached” to the housing (210). See Petition, 35, 41 (citing Liao, ¶¶57–58).”
- “...only the first sentence of paragraph 58 states direct attachment, with paragraph 57 merely implying it is a possibility.”
- Remaining sections of Liao describe “**elastic connection members (240)** coupling the panel and housing (not a direct or rigid connection), explaining multiple benefits of those members and illustrating them in the figures.”



“Obviousness cannot be based on the *hindsight combination of components selectively culled from the prior art* to fit the parameters of the patented invention.” *Cheese Sys, Inc. v. Tetra Pak Cheese and Powder Sys, Inc.*, 725 F.3d 1341, 1352 (Fed. Cir. 2013)

Cheese Sys., Inc. v. Tetra Pak Cheese and Powder Sys. Inc. (POR, 49)

POR (582), 50-51.

Li-Liao Combination Fails (Claim 14) – Petitioner’s Four Requirements Not Sufficient

[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.

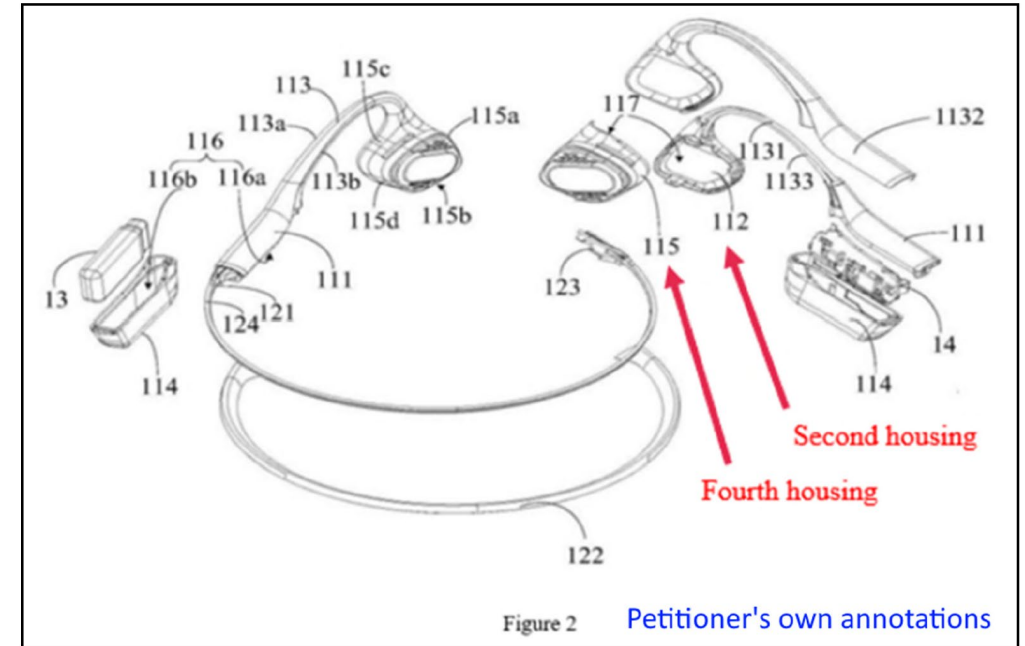
	Guaranteeing “nearly in <i>phase</i> ” vibrations (element [1e])	Guaranteeing “nearly the same” vibration <i>amplitudes</i> (dependent claim 14)
1) Rigid panel connections	Asserted as necessary	Asserted as necessary
2) Same panel material	Not asserted as relevant	Asserted as necessary
3) Same panel thickness	Not asserted as relevant	Asserted as necessary
4) Same vibration source	Not asserted as relevant	Asserted as necessary

- Petitioner is incorrect in assuming the four requirements it proffers are sufficient for producing the ratio of vibration amplitudes required by Claim 14.
- “For instance, Petitioner’s four conditions can be dominated by respective panel geometries, such as shape and curvature. **Panels constructed of the same thickness and material can produce different vibration characteristics if one panel’s surface is more curved than the other, if one panel has a greater surface area than the other, or if one panel has a different shape than the other.** Scordilis, ¶¶132-134.”

POR (582), 48, 54-55.

Li-Liao Combination Fails – Petitioner’s Claim 1 Counter Arguments Unavailing

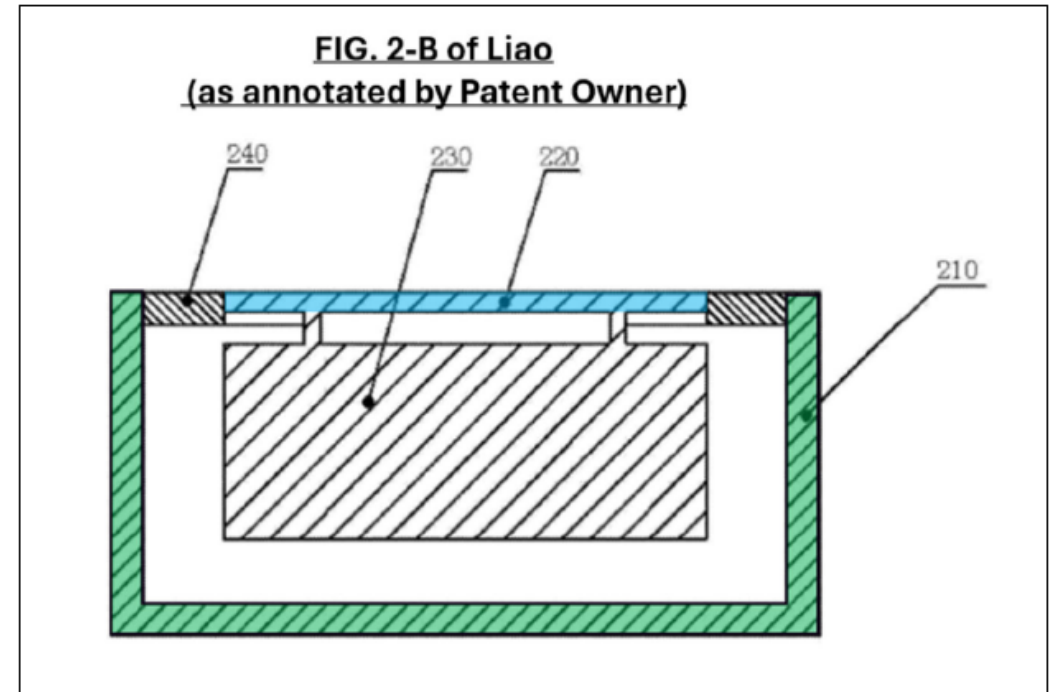
- **Petitioner:** “Liao’s direct attachment housing would “perform in the same way as the claimed housing,” including a sub-60-degree phase difference, because it allegedly has “a flat, planar front panel and a flat rear housing wall,” centrally driven, forming a “direct and symmetrical” path with “planar panels of uniform thickness.” Rep., 17-19 (citing EX1041, ¶¶14-18)” - *new argument based on new assumptions raised only in Petitioner’s Reply*
- **Patent Owner:** “Li’s housings are neither flat nor symmetric, and Petitioner never explains how Liao’s assumed geometry maps onto Li’s structures.”
 - “By his own physics, Li’s contoured, asymmetric housings have precisely the features Dr. Kyriakakis concedes: “could otherwise induce **significant phase divergence**.” EX1041, ¶16.”



Sur-Reply (582), 15-16.

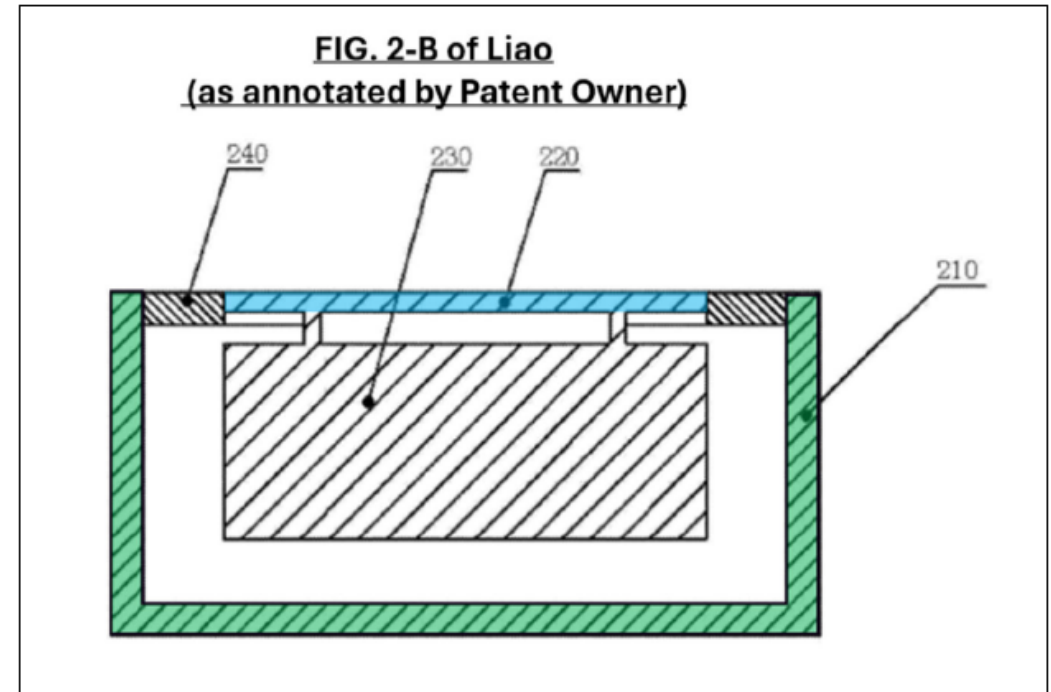
Li-Liao Combination Fails – Petitioner’s Claim 1 Counter Arguments Unavailing

- **Patent Owner:** “Liao does not disclose the alleged [*flat, equal thickness, centrally driven, symmetric*] geometry—it contradicts it.”
 - “Liao teaches “***more preferably***, the mass distribution of the panel around the vibration [center] is uneven (i.e., the ***vibration center deviates from the physical center of the panel***).” Liao, ¶74. Liao thus prefers an off-center vibration center, contrary to EX1041. As to “planar panels of uniform thickness” (Rep., 19)— absent from EX1041—Liao states that “***[p]referably, a panel with uneven thickness can be used.***” Liao, ¶78; POR 57. Liao thus prefers the very non-uniformities the Reply assumes away.”



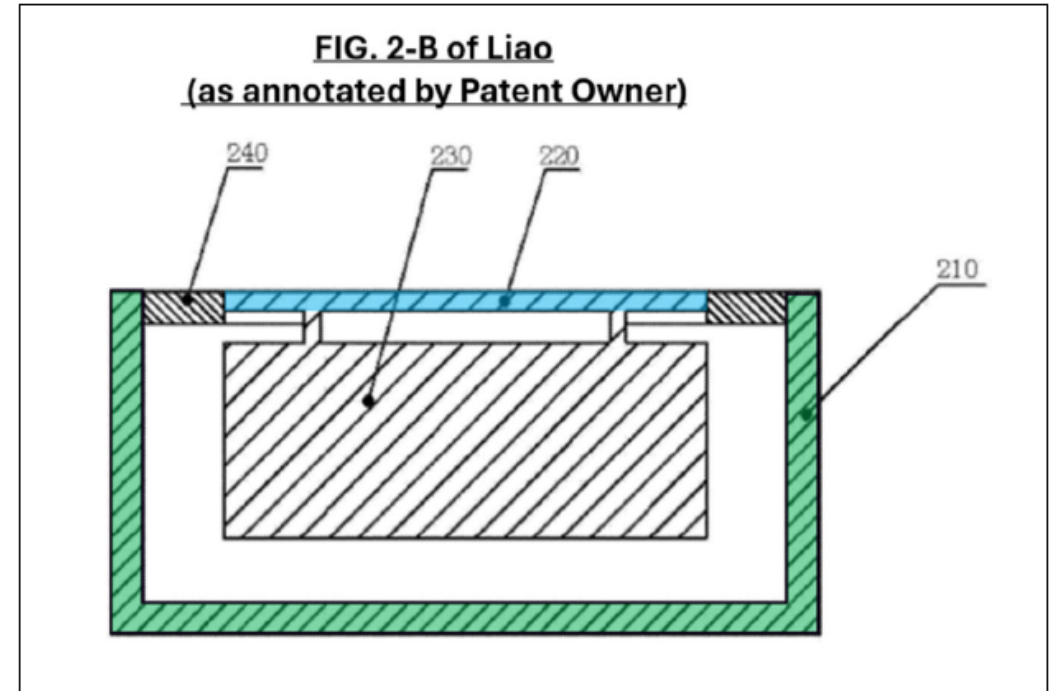
Li-Liao Combination Fails (Claim 14) – Petitioner’s Equal-Thickness Assertion Fails

- “Petitioner identifies equal panel thicknesses as one of the necessary aspects of a speaker housing to produce the vibration amplitude ratio (“within a range of 0.5 to 1.5”) recited in claim 14 (Petition, 41) and points to paragraphs [0057]- [0058] of Liao and paragraph 152 of the declaration testimony of its expert Dr. Kyriakakis. See Petition, 41.”
- **Patent Owner:** “There is no description in Liao that the thickness of the vibrating panel (220) is the same as the thickness of the speaker housing (210).”
 - “To the contrary, Liao describes and shows a preferred embodiment with a front panel having a variable-thickness configuration. See Liao, ¶78; Fig. 2B.”



Li-Liao Combination Fails (Claim 14) – Petitioner’s Counter Arguments Fail

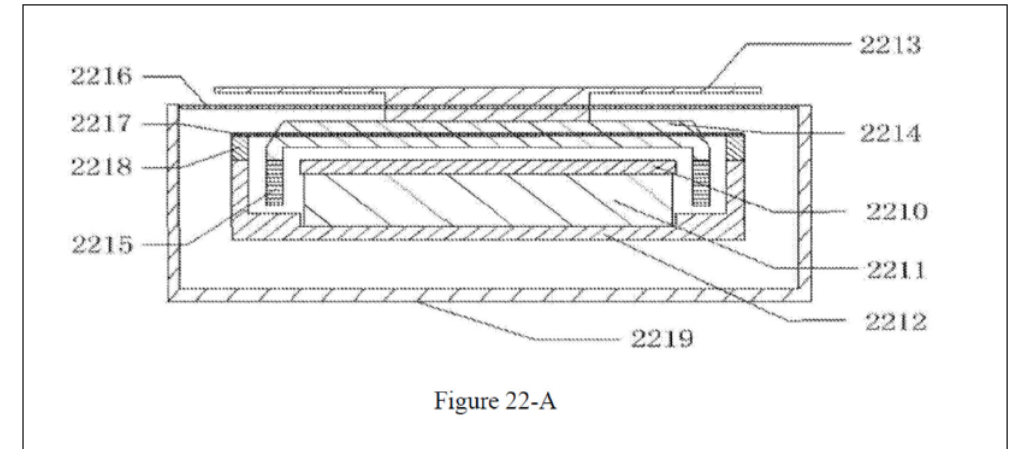
- **Petitioner:** “need not show that Liao’s housing construction necessarily always produces the claimed vibration amplitude ratio range.” Rep., 20.”
- **Patent Owner:** “The Petition derived the claimed ratio from Liao’s structure alone, based on four conditions (rigid connection, same material, same thickness, same source), concluding the panels “would also have nearly the same amplitudes.” Pet., 41-42; EX1003, ¶¶151-153.”
 - “A property derived from structure rather than disclosure is inherency subject to the “necessarily present” standard (*supra* §III.C.1; *PAR Pharm.*, 773 F.3d at 1195-96), and Liao nowhere discusses relative panel amplitudes. POR, 55; EX2020, ¶131.”



Sur-Reply (582), 21.

Ground 4 Combination Fails (Claim 16) – Petitioner Relies on Contradictory Positions

- In asserting obviousness of claim 16, “Petitioner’s use of FIG. 22-A of Liao, which centers around ***an elastically connected housing***, ***directly contradicts*** its obviousness position against element [1e] which relied upon a purported teaching of a “***rigidly connected***” housing by Liao.” (Pet., 95-96)
 - “...this “triple vibration system” disclosed by Liao implements ***an elastic connection*** between the vibrating front panel and the housing: “The first vibration transmitting plate 2216 ***elastically connects*** the energy conversion device to the housing 2219.” Liao, ¶172 (emphasis added).”
 - “As such, this “triple vibration system” [used by Petitioner for Claim 16] contradicts the Petition’s contentions regarding claim 1, and undermines its critical reliance on the front panel being rigidly connected to the housing. See Scordilis, ¶¶164-166.”

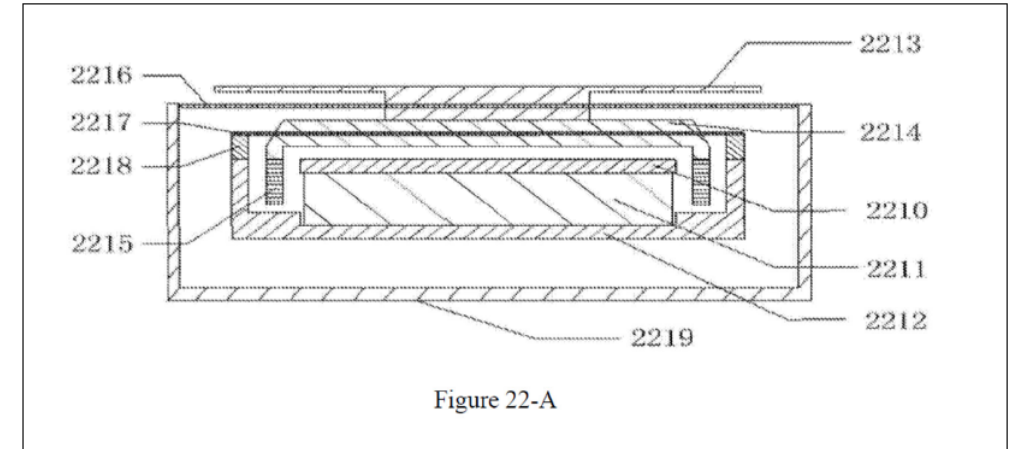


Liao’s “triple vibration system”

[16a] wherein the earphone core further includes a magnetic circuit component generating a first magnetic field
[16b] the magnetic circuit component including: a first magnetic unit configured to generate a second magnetic field;
[16c] a first magnetically conductive unit; and
[16d] 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.

Ground 4 Combination Fails (Claim 16) – Petitioner’s Counter Arguments Unavailing

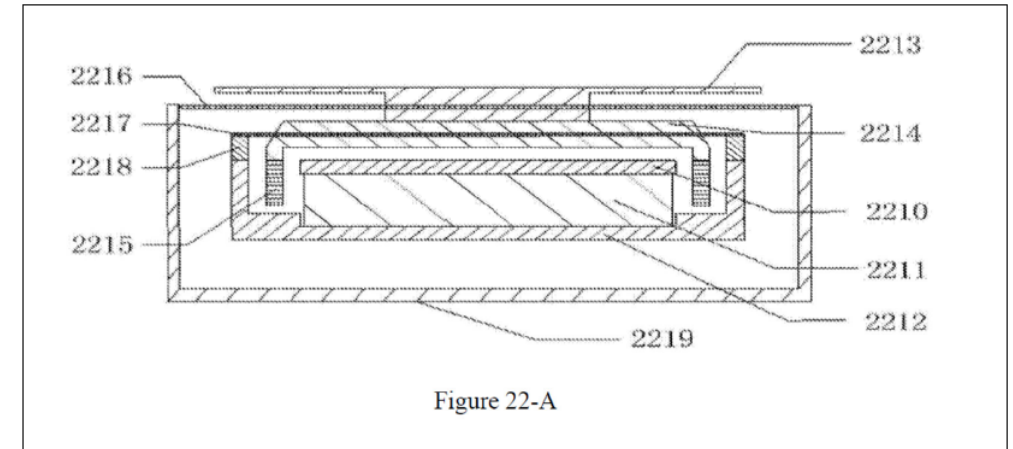
- **Petitioner’s expert:** Liao’s elastic and direct-attachment techniques are “not mutually exclusive or technically inconsistent” and that Liao’s magnetic circuit components are “compatible with different disclosed housing configurations, including Liao’s direct-attachment housing configuration.” EX1041, ¶¶30-31 - *new argument only in Petitioner’s Expert Rebuttal Declaration and improperly incorporated by reference*
- **Patent Owner:** Petitioner fails to explain “why a POSITA would separate Figure 22-A’s magnetic circuit from its defining elastic connection, or how the hybrid would satisfy [1e]’s phase requirement.”



Liao’s “triple vibration system”

Ground 4 Combination Fails (Claim 16) – Petitioner’s Counter Arguments Unavailing

- **Petitioner:** Petition identified “other portions of Liao” (Pet., 93) and relied on Wang and Xu for [16a]. Rep., 26-27; Pet., 95-96; EX1003, ¶¶268- 270.”
- **Patent Owner:** “longer list of references does not identify which combination Petitioner asserts—which Liao housing embodiment, paired with which magnetic circuit component, satisfies both [16a] and [1e].”
 - “The Petition’s [16a] mapping invoked Liao’s Figure 22-A “magnetic circuit system”—the elastic embodiment, the source of the contradiction. Pet., 95; EX1003, ¶268.”
 - “Neither the Petition nor the Reply explains how that elastic embodiment coexists with the rigid, no-connection member housing on which [1e] depends, or how the combination would work. POR 75-78.”



Liao’s “triple vibration system”