

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

PEAG LLC (d/b/a JLab Audio), AUDIO PARTNERSHIP LLC and AUDIO
PARTNERSHIP PLC (d/b/a Cambridge Audio)
Petitioner,

v.

VARTA MICROBATTERY GMBH,
Patent Owner.

IPR2020-01213
Patent 9,799,858 B2

Before CHRISTOPHER L. CRUMBLEY, JO-ANNE M. KOKOSKI, and
JON B. TORNQUIST, *Administrative Patent Judges*.

CRUMBLEY, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
Granting in Part and Denying in Part Patent Owner's Motion to Amend
35 U.S.C. § 318(a)

ORDER
Dismissing in Part and Denying in Part Patent Owner's
Motion to Exclude Evidence
37 C.F.R. §42.64(c)

I. INTRODUCTION

PEAG LLC (d/b/a JLab Audio), Audio Partnership LLC and Audio Partnership PLC (d/b/a Cambridge Audio) (collectively, “Petitioner”) filed a Petition (Paper 1, “Pet.”) requesting the Board institute an *inter partes* review of claims 1–8 of U.S. Patent No. 9,799,858 B2 (Ex. 1001, “the ’858 patent”). Varta Microbattery GmbH (“Patent Owner” or “VARTA”) filed a Preliminary Response (Paper 8, “Prelim. Resp.”).¹

Upon consideration of the Petition, Preliminary Response, and the parties’ evidence, we determined that Petitioner had demonstrated a reasonable likelihood that it would prevail with respect to at least one claim of the ’858 patent. Paper 9 (“Decision on Institution” or “DI”). Thus, pursuant to the Supreme Court’s decision in *SAS Institute Inc. v. Iancu*, 138 S. Ct. 1348, 1355 (2018), and USPTO Guidance,² we instituted review of all challenged claims on all asserted grounds. *Id.*

Following institution of trial, Patent Owner filed a Patent Owner Response (Paper 15, “PO Resp.”), Petitioner filed a Reply (Paper 24, “Pet. Reply”), and Patent Owner filed a Sur-reply (Paper 29, “Sur-reply”). In support of their respective positions, Petitioner relies on the testimony of Mr. William H. Gardner (Ex. 1003, “Gardner Declaration”; Ex. 1041,

¹ Petitioner identifies PEAG LLC (d/b/a JLab Audio), Audio Partnership LLC, Audio Partnership PLC (d/b/a Cambridge Audio), and Guangdong Mic-Power New Energy Co. Ltd., as the real parties-in-interest. Pet. 1. Patent Owner identifies VARTA Microbattery GmbH, as the real party-in-interest. Paper 5, 2.

² In accordance with USPTO Guidance, “if the PTAB institutes a trial, the PTAB will institute on all challenges raised in the petition.” *See* USPTO, Guidance on the Impact of SAS on AIA Trial Proceedings (April 26, 2018) (available at <https://www.uspto.gov/patents-application-process/patent-trial-and-appeal-board/trials/guidance-impact-sas-aia-trial>) (“USPTO Guidance”).

“Gardner Supplemental Declaration”; Ex. 1032, “Gardner Deposition I”; Ex. 1033, “Gardner Deposition II”), and Patent Owner relies on the testimony of Dr. Martin C. Peckerar (Ex. 2043, “Peckerar Declaration”; Ex. 2050, “Peckerar Supplemental Declaration”; Ex. 2060, “Peckerar Second Supplemental Declaration”; Ex. 1034, “Peckerar Deposition I”; Ex. 1035, “Peckerar Deposition II”; Ex. 1042, “Peckerar Deposition III”). The parties also rely on the declaration testimony of Mr. Philipp Miehlich (Ex. 2045) and Dr. Hans Jurgen Lindner (Ex. 2046), and their respective deposition testimony (Exs. 1036, 1037).

An oral hearing was held on November 2, 2021, and a transcript of the hearing is included in the record (Paper 47, “Tr.”).

After institution, Patent Owner filed a contingent motion to amend and Petitioner filed an opposition. Paper 16; Paper 23. We provided Preliminary Guidance on that motion. Paper 26. Thereafter, Patent Owner filed a revised contingent Motion to Amend, proposing substitute claims 10–17 for original claims 1–8, contingent on those original claims being found unpatentable. Paper 28 (“Motion to Amend” or “MTA”). Subsequently, Petitioner filed an Opposition to Patent Owner’s Motion (Paper 35, “MTA Opp.”), Patent Owner filed a Reply in Support of its Motion (Paper 37, “MTA Reply”), and Petitioner filed a Sur-reply (Paper 42, “MTA Sur-reply”).

Patent Owner also filed a Motion to Exclude certain testimony contained in Mr. Gardner’s Supplemental Declaration (Ex. 1041). Paper 38 (“MTE”). Thereafter, Petitioner filed an Opposition to Patent Owner’s Motion to Exclude (Paper 41, “MTE Opp.”) and Patent Owner filed a Reply in Support of its Motion to Exclude (Paper 43, “MTE Reply”).

We have jurisdiction under 35 U.S.C. § 6. This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons discussed below, we determine that Petitioner has shown by a preponderance of the evidence that claims 1–8 of the '858 patent are unpatentable. We grant Patent Owner's revised contingent Motion to Amend as to proposed substitute claims 10–14, 16, and 17.

A. Related Proceedings

The parties indicate that the '858 patent is the subject of the following pending consolidated district court actions: *VARTA Microbattery GmbH v. Costco Wholesale Corporation*, No. 2:20-cv-0051-JRG (E.D. Tex.); *VARTA Microbattery GmbH v. Amazon.com, Inc.*, No. 2:20-cv-0052-JRG (E.D. Tex.); *VARTA Microbattery GmbH v. Best Buy Co., Inc.*, No. 2:20-cv-0054-JRG (E.D. Tex.); *VARTA Microbattery GmbH v. PEAG, LLC*, No. 2:20-cv-0071-JRG (E.D. Tex.); *VARTA Microbattery GmbH v. Audio Partnership LLC, et al.*, No. 2:20-cv-00138-JRG (E.D. Tex.); and *VARTA Microbattery GmbH v. Samsung Electronics America, Inc.*, No. 2:20-cv-00029-JRG (E.D. Tex.) (collectively, "the District Court Action"). Pet. 1; Paper 5, 2–3; Ex. 2002. Petitioner also filed petitions challenging claims of other patents asserted in the District Court Action in IPR2020-01211, IPR2020-01212, and IPR2020-01214. Pet. 2; Paper 5, 3.

B. The '858 Patent (Ex. 1001)

The '858 patent is titled "Button Cell Having Winding Electrode and Method for the Production Thereof" and issued October 24, 2017, with claims 1–9. Ex. 1001, codes (54), (45), 8:34–9:27. The '858 patent describes a button cell that includes two metal housing halves and a spiral winding electrode separator assembly connected to the housing halves by

metal conductors, where at least one of the conductors is connected to the housing by welding. *Id.* at code (57). The '858 patent further describes that the positive and negative electrodes are each in the form of flat electrode layers and connected to one another via a flat separator, and the electrodes are preferably laminated or adhesively bonded onto this separator. *Id.* at 3:15–19.

Figure 1A of the '858 patent, reproduced below, illustrates a button cell according to an embodiment of the claimed invention.

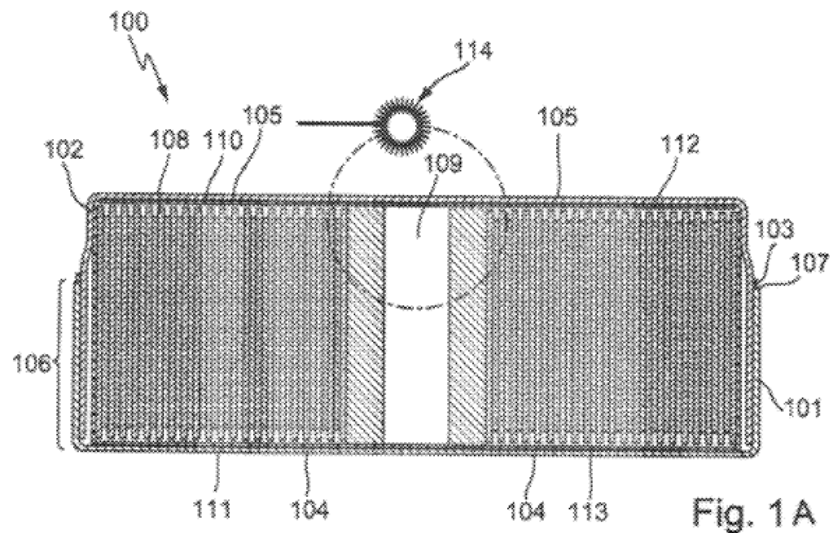


Figure 1A of the '858 patent, above, shows button cell 100 comprising two metal housing halves, metal cup part 101 and metal top part 102, that form plane bottom region 104 and plane top region 105; electrode assembly 108 wound on winding core 109; metal foil output conductors 110 and 111; and insulating elements 112 and 113. *Id.* at 6:52–7:18, Fig. 1A.

The '858 patent discloses that metal foils 110 and 111 are welded to the respective housing halves by laser 114, which creates a weld bead that passes fully through the housing and connects the conductors to the housing. *Id.* at 7:19–30, Fig. 1B. The '858 patent further discloses that insulating

elements 112 and 113, which may be insulating tape such as KAPTON or polypropylene, are arranged to prevent direct electrical contact between the conductors and the end sides of the electrode winding. *Id.* at 7:45–52.

C. Illustrative Claim

Petitioner challenges claims 1–8 of the '858 patent.³ Pet. 7. Of the challenged claims, claim 1 is the only independent claim. Claim 1, reproduced below, is illustrative of the subject matter of the challenged claims:

1. A button cell comprising:

two metal housing halves separated from one another by an electrically insulating seal forming a housing having a plane bottom region and a plane top region parallel thereto;

an electrode separator assembly comprising at least one positive electrode and at least one negative electrode inside the housing, the assembly provided in the form of a winding, lateral end sides of which face in a direction of the plane bottom region and the plane top region such that layers of the winding are oriented essentially orthogonally to the plane bottom region and plane top region; and

metal conductors electrically connected to the at least one positive electrode and the at least one negative electrode, and respectively, to one of the housing halves,

wherein the button cell has a height-to-diameter ratio less than one, at least one of the conductors is a metal foil and connects to the respective housing half with weld beads and/or weld spots passing through the housing, the weld beads and/or weld spots originate from an

³ Claim 9 is the only claim of the '858 patent Petitioner has not challenged in this Petition.

outer side, the metal foil connecting to the respective housing half bears flat on one of lateral end sides of the electrode separator assembly winding, and the metal foils are shielded from lateral end sides of the winding by insulating elements.

Ex. 1001, 8:34–59.

D. Prior Art and Asserted Grounds of Unpatentability

Petitioner contends that claims 1–8 are unpatentable based on the following grounds:

Claims Challenged	35 U.S.C. § ⁴	References/Basis
1–8	103	Kobayashi, ⁵ Kwon ⁶
1–8	103	Kaun, ⁷ Kobayashi, Kwon
1–8	103	Kobayashi, Kwon

Pet. 7, 18–23.

II. MOTION TO EXCLUDE

Patent Owner filed a Motion to Exclude Sections III–IV of Mr. Gardner’s Supplemental Declaration, because Patent Owner alleges the

⁴ The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284, 287–88 (2011), amended 35 U.S.C. § 103, effective March 16, 2013. Because the application from which the ’858 patent issued was filed before this date, the pre-AIA version of § 103 applies.

⁵ Japanese Unexamined Patent Application Publication No. JP 2007-294111 to Kobayashi, published November 8, 2007 (Ex. 1006). Exhibit 1006 contains both the original Japanese-language version (*id.* at 16–28) and a certified English translation (*id.* at 2–14).

⁶ Korean Laid-Open Patent Application KR 10-2003-0087316A to Kwon et al., published November 14, 2003 (Ex. 1008). Exhibit 1008 contains both the original Korean-language version (*id.* at 13–21) and a certified English translation (*id.* at 3–12).

⁷ U.S. Patent Application No. 2005/0233212 A1 to Kaun, published October 20, 2005 (Ex. 1005).

identified sections do not advance proper “reply” arguments and, instead, amount to new opinions “to fill the gaps in Petitioner’s obviousness grounds set forth in the Petition.” MTE 1. Specifically, Patent Owner states that Mr. Gardner “provides new opinions and theories that a [person of ordinary skill in the art] would have been motivated to combine Kaun (Ex. 1005) and Kobayashi (Ex. 1006) and would have expected success in making the combination.” *Id.*

Patent Owner first alleges that Mr. Gardner offers new opinions regarding (1) the motivation to modify Kaun with Kobayashi based on dendrite formation (*id.* at 2–4), (2) additional motivations to modify Kaun with Kobayashi (*id.* at 4–6), (3) a reasonable expectation of success relating to replacing Kaun’s electrode assembly with that of Kobayashi in light of Kaun’s central fastener and Kobayashi’s electrode assembly (*id.* at 6–9), and (4) a reasonable expectation of success regarding modifications to Kobayashi’s electrode assembly, to replace its conductor plates with metal foils (*id.* at 9–10). Because we do not reach Petitioner’s challenge, as discussed below, based on the combination of Kaun and Kobayashi, we similarly need not reach Patent Owner’s Motion to Exclude Mr. Gardner’s opinions as they relate to the Kaun/Kobayashi combination. Accordingly, we dismiss Patent Owner’s Motion to Exclude these purportedly new opinions as moot. We address Patent Owner’s remaining concern, relating to Mr. Gardner’s allegedly new testimony regarding Kobayashi’s modified electrode assembly, below.

Patent Owner argues that “[t]he Petition failed to explain why a [person of ordinary skill in the art] would have been motivated to replace Kobayashi’s conductor plates 4a, 5a with metal foils” and “lacked

explanation for how a [person of ordinary skill in the art] would have combined metal foil conductors with other components of Kobayashi to yield an operable assembly.” *Id.* at 9. Patent Owner alleges that “Mr. Gardner’s Supplemental Declaration attempts to fill these gaps with new opinions addressing the following defects in the proposed combination: (1) metal foils lack rigidity to permit the electrodes to be wound around the winding axis (¶¶ 71, 81); and (2) metal foils would be entirely embedded in the insulating plate grooves 8a, 9a (¶¶ 53, 70, 86–87).” *Id.* According to Patent Owner, these new opinions are untimely and should be excluded. *Id.*

Petitioner explains that “the opinions are directly responsive to arguments made by Patent Owner in its Response” and, therefore, are not new. MTE Opp. 8. In particular, Petitioner explains that in its Patent Owner Response, Patent Owner argues that replacing Kobayashi’s metal plates with metal foils would not have been successful because “the metal foils lack sufficient rigidity to facilitate winding of the electrodes around the winding axis and that the metal foils ‘would be entirely embedded in the grooves [of the insulating plates], preventing the foils from making any connection whatsoever’ with the cell housing.” *Id.* at 9. Petitioner explains that Mr. Gardner’s opinions at paragraphs 71, 81, 88, and 89 address the structural stability issues and paragraphs 53, 70, and 84–87 address the depth of the grooves of Kobayashi’s insulating plates. *Id.*

We are not persuaded that the identified portions of Mr. Gardner’s Supplemental Declaration are improper. In the Petition, Petitioner alleged that a person of ordinary skill in the art would have had reason to substitute known metal foils for the metal conductor plates of Kobayashi in order to reduce the size of inactive materials and improve performance. Pet. 69–70

(citing Ex. 1003 ¶ 323). In its Response, Patent Owner argued, among other things, that the metal foil lacks the requisite rigidity to support the remaining components of the winding axis core (PO Resp. 26–27, 31) and that because metal connecting plates 4a and 5b are positioned within recesses of insulating plates 8 and 9, replacing the metal connecting plates with metal foils would result in an unreliable connection because the metal foil would become embedded within the grooves of the insulating plates (*id.* at 28–29, 30). Mr. Gardner’s supplemental testimony specifically addresses Dr. Peckerar’s and Patent Owner’s concerns that metal foils would be unsuitable in Kobayashi due to their flexibility and thickness as compared to the insulating plates. Ex. 1041 ¶¶ 53 (“the depth of the grooves can be altered in order to better accommodate metal foil output conductors”), 70, 71 (explaining that it is the winding core that provides structure not the output conductor plates), 81, 86 (explaining that the person of ordinary skill in the art could either adjust the size of the output conductors or the depth of the cavities themselves), 87. Therefore, Mr. Gardner’s testimony that the ordinarily skilled artisan would have understood how to account for the technical challenges Patent Owner identified properly responds to arguments raised by Patent Owner in its Patent Owner response. Accordingly, we deny Patent Owner’s Motion to Exclude as to Mr. Gardner’s testimony on this issue.

III. ANALYSIS

A. Legal Standards

To prevail in its challenge, Petitioner must demonstrate by a preponderance of the evidence that the claims are unpatentable. 35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d) (2019). A claim is unpatentable under

35 U.S.C. § 103 if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time of the invention to a person having ordinary skill in the art. *KSR Int’l Co. v. Teleflex, Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations including (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) objective evidence of nonobviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

To show obviousness, it is not enough to merely show that the prior art includes separate references covering each separate limitation in a challenged claim. *Unigene Labs., Inc. v. Apotex, Inc.*, 655 F.3d 1352, 1360 (Fed. Cir. 2011). “This is so because inventions in most, if not all, instances rely upon building blocks long since uncovered, and claimed discoveries almost of necessity will be combinations of what, in some sense, is already known.” *KSR*, 550 U.S. at 418–419.

On the other hand, an obviousness analysis “need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.” *Id.* at 418; *accord In re Translogic Tech., Inc.*, 504 F.3d 1249, 1259 (Fed. Cir. 2007). However, Petitioner cannot satisfy its burden of proving obviousness by employing “mere conclusory statements.” *In re Magnum Oil Tools Int’l, Ltd.*, 829 F.3d 1364, 1380 (Fed. Cir. 2016). Instead, Petitioner must articulate a reason why a person of ordinary skill in the art would have combined or modified the prior art references. *In re NuVasive, Inc.*, 842 F.3d 1376, 1382 (Fed. Cir. 2016);

see also Metalcraft of Mayville, Inc. v. The Toro Co., 848 F.3d 1358, 1366 (Fed. Cir. 2017) (“In determining whether there would have been a motivation to combine prior art references to arrive at the claimed invention, it is insufficient to simply conclude the combination would have been obvious without identifying any reason why a person of skill in the art would have made the combination.”); *Belden Inc. v. Berk-Tek LLC*, 805 F.3d 1064, 1073 (Fed. Cir. 2015) (“[O]bviousness concerns whether a skilled artisan not only *could have made* but *would have been motivated to make* the combinations or modifications of prior art to arrive at the claimed invention.”) (citing *InTouch Techs., Inc. v. VGO Commc’ns, Inc.*, 751 F.3d 1327, 1352 (Fed. Cir. 2014)).

B. Level of Ordinary Skill in the Art

In the Decision on Institution, we determined that a person of ordinary skill in the art at the time of the invention of the ’858 patent

would have had at least a bachelor’s degree in mechanical engineering, or a similar field, such as materials engineering, chemical engineering, or physics with at least five years of experience in the field of battery design and manufacturing. A person with a master’s degree in one of the above fields could have less practical experience of approximately three years. A person with a PhD could have less practical experience, about two years. A person with less education but more relevant practical experience may also meet this standard.

DI 20 (adopting Petitioner’s proposed definition). For purposes of this Final Written Decision, we maintain our determination from the Decision on Institution because neither party disputes that determination and because the level of skill is consistent with the record. *See* PO Resp. 7 (person of ordinary skill “would possess a Bachelor’s degree in electrical, mechanical or chemical engineering or equivalent [and] would also have two to three

years of experience working in a related technology.”); *see generally* Pet. Reply.

C. Claim Construction

In an *inter partes* review filed on or after November 13, 2018, we construe claims “using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. 282(b), including construing the claim in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.” 37 C.F.R. § 42.100(b); *see Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). Furthermore, we expressly construe the claims only to the extent necessary to resolve the parties’ dispute. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co. Ltd.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (“[W]e need only construe terms ‘that are in controversy, and only to the extent necessary to resolve the controversy.’” (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

Prior to institution, the parties agreed that no claim term of the ’858 patent required construction. Pet. 18; Prelim. Resp. 9. In their post-institution briefing, however, the parties dispute the meaning of “button cell.” *See* PO Resp. 7–9; Pet. Reply 1–3.

We discern no material difference between the parties’ respective constructions. Additionally, Patent Owner, during the hearing, expressed a general view that claim construction was unlikely to affect the parties’ positions. In particular, Patent Owner states that “[o]ur position is that really nothing turns on claim construction. You don’t have to engage in claim construction in this case.” Tr. 56:18–20, 56:20–22 (explaining that

limitations were submitted for construction “to gain some benefit in the co-pending litigations.”). Only terms that are in controversy need to be construed, and then only to the extent necessary to resolve the controversy. *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (applying *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999) in the context of an *inter partes* review). Because the outcome of our decision does not depend on either parties’ claim construction position, we determine that none of the identified claim terms require construction to resolve the issues in dispute in this proceeding.

D. Alleged Obviousness over Kobayashi and Kwon

Petitioner contends claims 1–8 would have been obvious over the combined disclosures of Kobayashi and Kwon. Pet. 8, 31–59, 69–79.⁸ Petitioner directs us to portions of Kobayashi and Kwon that purportedly disclose each of the limitations in the challenged claims. *Id.* at 33–59. Petitioner also relies on the declaration testimony of Mr. Gardner to support its arguments. *See id.*

⁸ As we noted in the Institution Decision, Petitioner advances two nearly identical grounds based on these references: the first based on a combination of Kobayashi and Kwon, and the second based on a combination of those two references and the knowledge of a person of ordinary skill in the art. “Because evaluation of obviousness necessarily incorporates the knowledge of a skilled artisan, we consider these two grounds together as one.” DI 28–29. The primary difference between the two grounds appears to be that one relies on Kwon to supply the metal foil conductor (Pet. 38–39), whereas the other relies on the knowledge of a skilled artisan that the electrode plates of Kobayashi could be reduced in thickness (*id.* at 71–72). We address both alternative modifications together under one ground.

1. *Kobayashi (Ex. 1006)*

Kobayashi is a Japanese Patent Application titled “Small Battery,” and published November 8, 2007. Ex. 1006, codes (43), (54).⁹ Kobayashi relates to a small battery capable of improving heavy load characteristics without impairing productivity. *Id.* at code (57). The small battery of Kobayashi may be a button cell or a coin cell comprising a container and a spirally wound flat electrode group stored in the container, including a positive electrode and a negative electrode connected via a separator and in the form of a spiral winding. *Id.* at code (57), ¶¶ 1, 9, 12, 14, 17, 32.

Figure 1 of Kobayashi, reproduced below, illustrates an embodiment of a battery according to Kobayashi’s disclosure.

FIG. 1

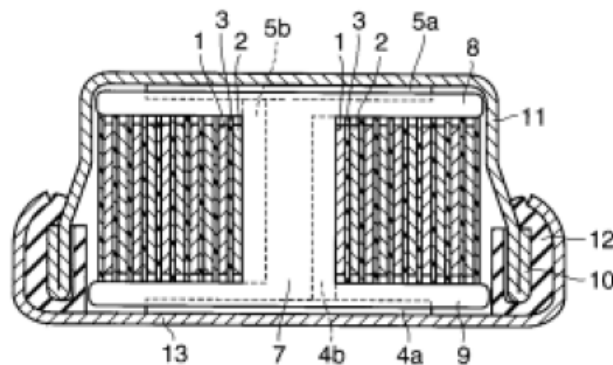


Figure 1 of Kobayashi, above, shows a battery including the container (housing) formed by top case 11 and bottom case 13, sealed by gasket 12 therebetween, and an electrode group comprising positive electrode 1 and negative electrode 2, connected via separator 3, in the form of a spiral winding, and housed within the container. *Id.* ¶¶ 9, 12, 32, 47. Kobayashi

⁹ Petitioner provides a certified English translation of Kobayashi in the record. Ex. 1006, 1. All citations to Kobayashi are to the certified translation rather than the Japanese language original.

discloses that electrode layers 1 and 2 of the wound electrode group are arranged within the container at right angles to top case 11 and bottom case 13, and insulating members 8 and 9 are disposed on the top and bottom surfaces of the wound electrode group. *Id.* ¶¶ 10, 19, 32, Fig. 1.

Figure 1 of Kobayashi also depicts the container formed by top case 11 and bottom case 13 having a flat bottom area and a flat top area and top case 11 inserted into bottom case 13 such that the edge of bottom case 13 is crimped radially inward towards the edge of top case 11. *Id.* ¶¶ 9, 33, 34, 47.

2. *Kwon (Ex. 1008)*

Kwon is a Korean Patent Application titled “Coin-Type Electric Double Layer Capacitor and Its Manufacturing Method,” and published November 14, 2003. Ex. 1008, codes (43), (54). Kwon relates to a coin-type double layer capacitor wherein the metal cases and polarized electrodes are laser welded together, to “afford[] stable coupling physically as well as electrically.” *Id.* at code (57). For example, Kwon discloses positioning the anode polarized electrode on the inner surface of the anode metal case so their centers are aligned, and then using a laser beam to heat the outside of the anode metal case such that the inner surface of the case and the electrode are welded together. *Id.* at 7, Fig. 5a. Between the inner surface of the case and the electrode is a metal current collector, which Kwon describes as being “in the form of aluminum foil.” *Id.* at 5, 7, Fig. 5a. Kwon states that laser welding, because it does not generate electric shock and generates a narrow thermal effect, has advantages over conventional spot welding and allows sturdy coupling of the metal case and polarized electrode without damage to the electrode. *Id.* at 7.

3. *Analysis of Claim 1*

Petitioner contends that the combined disclosures of Kobayashi and Kwon suggests the limitations of claim 1 and that a person of ordinary skill in the art would have been motivated to combine the teachings of the references in a manner that would result in the claimed battery. Pet. 31–41. Petitioner here relies on Kobayashi as disclosing nearly all of the limitations except “at least one of the conductors is a metal foil and connects to the respective housing half with weld beads and/or weld spots passing through the housing, the weld beads and/or weld spots originate from an outer side,” which Petitioner contends was either well-known in the prior art and commonly used in batteries at the time of the invention, or disclosed expressly in Kwon. *Id.* at 38–40 (citing Ex. 1003 ¶¶ 385–387, 395; Ex. 1006 ¶¶ 18, 28; Ex. 1008, 4–5, 7, Fig. 5B); 71–73 (citing Ex. 1003 ¶¶ 432–433; Ex. 1006 ¶¶ 7, 18, 21, 28; Ex. 1008, 3, 7, Fig. 5B).

Petitioner alleges that Kobayashi suggests a button cell where it discloses “a button-type battery or a coin-type battery,” as claimed in the preamble. *Id.* at 33 (citing Ex. 1006 ¶ 1); *see also* Ex. 1006 ¶ 12. Further, according to Petitioner, Kobayashi teaches metal container 11 and aluminum container 13 (i.e., the claimed “two metal housing halves”) and insulating gasket 12 (i.e., the claimed “electrically insulating seal”), where metal container 11 and aluminum container 13 have a flat top and flat bottom area, respectively. *Id.* at 33–34 (citing Ex. 1006 ¶¶ 4, 33, 34, claim 2, Fig. 1; Ex. 1003 ¶¶ 151–152).

Petitioner further contends that Kobayashi discloses an electrode group within a housing including positive electrode 1 and negative electrode 2, in the form of flat layers spirally wound with a separator 3 located

between electrode layers 1 and 2. *Id.* at 34–36 (citing Ex. 1006 ¶ 32, Figs. 1, 9). Petitioner contends that Kobayashi further discloses that the positive and the negative electrodes are oriented orthogonally to the plane bottom and top regions of containers 11, 13, and the lateral ends of the layers face the plane top area of container 11. *Id.* at 35 (citing Ex. 1006 ¶¶ 33, Fig. 9; Ex. 1003 ¶¶ 153–154). According to Petitioner, Kobayashi also discloses “disc-shaped positive electrode terminal plate 4a” and “disc-shaped negative electrode terminal plate 5a,” which provide electrical connection of the electrode group to the container. *Id.* at 36–37 (citing Ex. 1006 ¶ 28, FIG. 6; Ex. 1003 ¶ 381).

Regarding the claim 1 requirement that the button cell has a height-to-diameter ratio of less than one, Petitioner contends that Kobayashi discloses that its electrode structure has a “height in the winding axis direction of the electrode group [that] is smaller than the size in the direction perpendicular to the winding axis,” which would be understood to mean that the height to diameter ratio of its button cell was less than 1. Pet. 37–38 (citing Ex. 1006 ¶ 10, Fig. 1; Ex. 1003 ¶ 384). Petitioner also contends that Kobayashi discloses that its terminal plates 4a and 5a bear flat on the housing halves of containers 11, 13, and that insulator plates 8 and 9 are placed between the spiral wound electrode assembly and the terminal plates, shielding them from the lateral ends of the winding. *Id.* at 40–41 (citing Ex. 1006 ¶¶ 7, 19, 32, Fig. 1; Ex. 1003 ¶ 388).

With respect to the claimed “at least one of the conductors is a metal foil,” Petitioner acknowledges that “Kobayashi discloses the use of metal terminal plates 4a, 5a (i.e., conductors) to connect the positive and/or negative electrodes to the housing.” *Id.* at 71 (citing Ex. 1006 ¶ 18, 28;

Ex. 1003 ¶¶ 432–433. Though Kobayashi does not describe its output conductor as a foil, Petitioner explains that foils were known in the prior art and commonly used by persons of ordinary skill in the art to reduce the thickness of various conductor components. *Id.* (citing Ex. 1003 ¶ 432; Ex. 1009, 879, 1294; Ex. 1008, 4). Petitioner notes that Kobayashi itself discloses the use of foils as part of its electrode assembly. *Id.* (citing Ex. 1006 ¶¶ 7, 21). Alternatively, Petitioner observes that Kwon expressly discloses the use of metal foil current collectors. *Id.* at 38 (citing Ex. 1008, 4; Fig. 5B).

Relying on the testimony of Mr. Gardner, Petitioner reasons that a person of ordinary skill in the art would have been motivated to modify Kobayashi’s cell to substitute metal electrode terminal plates 4a and 5a with metal foil to reduce the thickness of the metal plates to improve certain properties of the cell, including “improv[ing] the energy density of the plates, reduc[ing] resistance of the other components of the electrode assembly, and improv[ing] the ratio of active to inactive components of the cell battery.” Pet. 69–70 (citing Ex. 1003 ¶¶ 209, 323; Ex. 1009, 35, 879, 1294); *see also* Ex. 1003 ¶ 249 (explaining that “[o]ne known form of output conductors that is well known to a [person of skill in the art] generally, are foils which . . . achieve the goals of decreasing the weight of the cell, while also providing increased volume within the cell, without compromising any other functions of the cell.”).

Claim 1 also requires that the metal foil connects to the housing “with weld beads and/or weld spots passing through the housing, the weld beads and/or weld spots originate from an outer side.” Petitioner indicates that Kwon discloses laser welding, and a person of ordinary skill in the art would

have had reason to modify Kobayashi's cell using Kwon's laser welding. Pet. 38 (citing Ex. 1004, 4–5; Ex. 1006 ¶¶ 7, 18, 21, 28; Ex. 1003 ¶¶ 374–374, 385, 395, 398). Such welding would form a weld spot or bead between the housing and the conductor, and the weld spot would originate from outside the housing. *Id.* at 39 (citing Ex. 1008, 7; Ex. 1003 ¶¶ 386).

Patent Owner does not challenge many of Petitioner's allegations regarding the teachings of Kobayashi and Kwon. *See generally* PO Resp. We have reviewed the evidence and argument of record and determine that Petitioner establishes, by a preponderance of the evidence, that each uncontested limitation of claim 1 of the '858 patent is present in the combined disclosures of Kobayashi and Kwon.

Patent Owner, however, does argue that Petitioner has not demonstrated Kobayashi or Kwon teaches that “at least one of the conductors is a metal foil” that “bears flat on one of the lateral end sides of the electrode separator winding while shielded from the spiral winding by an insulating element” (PO Resp. 21–23, 51–52), or provided a reason one of ordinary skill in the art would have modified Kobayashi to include a foil conductor (*id.* at 23–31, 53–58) or had a reasonable expectation of success in doing so (*id.* at 31–32, 58–59). We address these contested issues below.

- a) *Whether Petitioner has shown that Kobayashi or Kwon describes “an output conductor comprising a foil resting flat between an end face of the spiral winding and the flat top or flat bottom area”*

First, Patent Owner argues that Petitioner has failed to show that metal conductor plates 4a and 5a of Kobayashi can be foils. While acknowledging that Kwon discloses foil current collectors, Patent Owner distinguishes Kwon's “current collector layer [which] is an integral component of the

active device—it forms the electrode” from the ’858 patent’s output conductor that “routes current from one of the electrodes to the appropriate contact point to the external world.” PO Resp. 22. As a result, Patent Owner argues, “[t]he interfacial electrode layer in Kwon is not a metal foil output conductor of the claims.” *Id.* Nor does Patent Owner believe that, even without Kwon’s disclosure, a person of skill in the art would have decreased the thickness of Kobayashi’s metal plates to arrive at a foil. *Id.* at 51–52. Patent Owner argues that Mr. Gardner’s testimony is based on inapplicable teachings directed “to conventional battery design, not to button cell design,” and “considerations relating to thickness of the electrodes, not of output conductors.” *Id.*

Petitioner contends that, in view of Kwon’s foil output conductors, “it would have been obvious to a [person of ordinary skill in the art] to use metal foils as the metal plates 4a, 5a disclosed in Kobayashi.” Pet. 38 (citing Ex. 1003 ¶¶ 385, 395). Noting that Kobayashi “already discloses the use of metal foils as part of its electrode assembly,” Petitioner contends that substituting Kwon’s metal foils for the metal plates would have been a “simple substitution of one known element for another.” *Id.* at 38–39 (quoting *KSR*, 550 U.S. 400). Mr. Gardner testifies that because “the output conductor in both Kwon and Kobayashi are of similar form (i.e. a conductor which is disposed between the cell housing and the corresponding electrode below),” a person of ordinary skill in the art would have understood that Kwon “could be easily applied to a spiral wound electrode assembly, as disclosed in Kobayashi.” Ex. 1003 ¶ 372.

In the alternative, Petitioner alleges that even without Kwon’s disclosure “a [person of ordinary skill in the art] would have been motivated

to use metal foils as the metal plates . . . at least because Kobayashi already discloses the use of metal foils within the electrode assembly.” Pet. Reply 4, 20. Petitioner explains that “a [person of ordinary skill in the art] would find it obvious to apply the advantages of conventional battery design to button cells” and that any necessary modifications or adjustments would be well within the skill set of one of ordinary skill in the art. *Id.* at 20. Petitioner, relying on the testimony of Mr. Gardner, states that a person of ordinary skill in the art “would understand the ‘terminal plates’ of Kobayashi could also be foils, because a [person of ordinary skill in the art] would understand that the designation as ‘plates’ was merely a convention, and whether such ‘plates’ could also be considered metal foils was merely a question of thickness.” *Id.* at 8 (citing Ex. 1041 ¶ 84). According to Mr. Gardner, Kobayashi’s electrode terminal plates could be modified to reduce its thickness. Ex. 1041 ¶ 84.

Upon review of Petitioner’s arguments and supporting evidence, we find that Petitioner adequately shows that a person of ordinary skill in the art would have modified Kobayashi to include metal foils in place of its terminal electrode plates, or applied the teachings of Kwon to use foils as the output conductor of Kobayashi. Petitioner explains that one of ordinary skill in the art would have known that metal foil may be used in batteries because the use of metal foil as a conductor is common in the art, and is explicitly disclosed in Kwon. Pet. 38–39 (citing Ex. 1003 ¶¶ 385–386, 395), 69–70 (citing Ex. 1003 ¶¶ 209, 323). Petitioner also directs our attention to Kobayashi, which details use of metal foil for conducting elements. *Id.* at 71; *see also* Ex. 1006 ¶¶ 7, 21, 26, 27 (describing metal foil electrodes). Furthermore, Mr. Gardner testifies that “reducing the thickness of the output

conductors has the effect of reducing the ratio of inactive to active components within the cell, which improves energy density . . . [and is] a well-known goal in the art.” Ex. 1003 ¶ 323. Mr. Gardner further opines that a person of ordinary skill in the art “would be motivated to reduce the thickness of the output conductors of Kobayashi in order to increase energy density within the cell” and “to use metal foils as the output conductors, as this furthers the well-known goal in the art of reducing the size of internal battery components.” *Id.* We acknowledge Patent Owner’s argument that Mr. Gardner relies on teachings related to conventional battery design—not button cell batteries—and that he discusses “considerations relating to thickness of the electrodes, not of output conductors.” PO Resp. 51–52. But, Mr. Gardner’s testimony similarly relies on passages directed to “basic concepts” of battery operations and, as a whole, focuses on the concept that reducing the thickness of the terminal electrode plates would “maximize the space available inside the cell for active components,” thereby increasing electrode density and improving battery performance. Ex. 1003 ¶ 323 (citing Ex. 1009, 35). According to Mr. Gardner, “these adjustments . . . would be well within the skill of a [person of ordinary skill in the art].” Ex. 1041 ¶¶ 104. We credit Mr. Gardner’s testimony. “Moreover, if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond that person’s skill.” *KSR*, 550 U.S. at 401.

Second, Patent Owner asserts that “Mr. Gardner . . . does not explain how, without modification to the cavities formed in Kobayashi’s insulating members, the metal foils would bear flat on a lateral end side of the

winding” while also being connected to one of the housing halves with weld beads. PO Resp. 23; Sur-reply 6–7. According to Patent Owner, the conventional battery teachings relied upon by Mr. Gardner “cannot simply be applied to small button cell design” and “numerous factors in evaluating the suitability of modifying a button cell to include any particular component” must be (and were not) considered by Mr. Gardner. PO Resp. 52; Sur-reply 6–7. Patent Owner directs our attention to various references to show that “[c]onventional battery designs are ‘difficult to apply’ to coin or button cells, particularly for secondary or rechargeable batteries.” PO Resp. 52.

Petitioner asserts that “[a] [person of ordinary skill in the art] would have understood the output conductors rest flat on the housing halves, on both lateral ends of the winding” and that the cavity depth in the housing could be adjusted to accommodate a metal foil. Pet. Reply 8 (citing Ex. 1003 ¶ 388).

On this issue, we agree with Petitioner. Mr. Gardner explains that the skilled artisan “would further recognize that the output conductor can be comprised of various materials . . . which could be metal or any various materials [and] the shape of the output conductor is not particularly limited.” Ex. 1003 ¶ 322. Mr. Gardner further testifies that a person of ordinary skill in the art “would recognize, not only that metal foil conductors could be inserted into these grooves without difficulty, but also that the depth of the grooves can be altered in order to better accommodate metal foil output conductors.” Ex. 1041 ¶¶ 53, 70. We recognize Patent Owner’s argument that numerous factors must be considered and that conventional battery design does not necessarily translate to button cell designs (PO Resp. 20–

21), but as Mr. Gardner testifies, “this may be true in some cases, [but] the lessons and advantages of using techniques from conventional battery design and applying it to button cell would be obvious to a [person of ordinary skill in the art].” Ex. 1041 ¶ 103. He continues to explain that “[n]aturally, such transposition of techniques would require some modification and adjustments. . . . [and that] each of these adjustments, . . . would be well within the skill of a [person of ordinary skill in the art].” *Id.* ¶ 104 (describing, for example, “reducing the thickness of the conductor plates of Kobayashi”). We credit Mr. Gardner’s testimony. Moreover, Patent Owner does not allege that any proposed modification would be beyond the skill of a person of ordinary skill in the art or explain how any of the “difficulties in manufacturing a button cell” (PO Resp. 52) are relevant to the proposed substitution of a metal foil for a metal terminal electrode plate. *See generally id.*; Sur-reply.

Thus, based on the evidence and argument of record, we determine that the combination of Kobayashi and Kwon, and the general knowledge of those skilled in the art, would suggest the use of foil in place of Kobayashi’s terminal electrode plates, and that the foil would bear flat on one of the lateral ends of the electrode separator assembly.

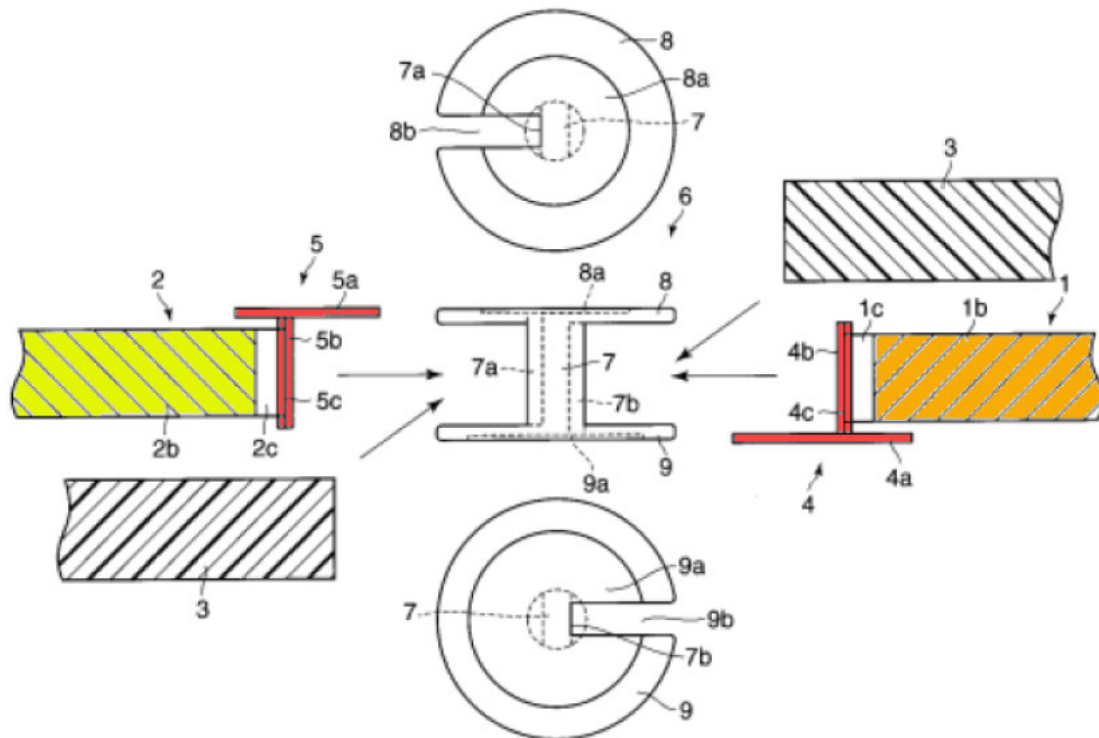
- b) Whether Petitioner has established a reason to modify Kobayashi to include a foil output conductor*
 - (1) does the modification “eliminate the primary goal” of Kobayashi or render it inoperable for its intended purpose*

Patent Owner argues that Petitioner’s proposed modification to replace Kobayashi’s metal plates 4a and 5a with a foil “would have destroyed the entire essence,” or alternatively the “basic objective of

Kobayashi, which is to provide an integrated assembly to wind the electrodes about a core.” PO Resp. 23–24, 53. Patent Owner asserts that Kobayashi’s winding core, including metal plates 4a and 5a, provide for a rigid connection system that is “necessary to enable winding of the electrode assembly and its functioning within a cell housing.” *Id.* at 24, 53. Patent Owner explains that “[a] [person of ordinary skill in the art] would have understood that, as the electrodes are wound, mechanical forces place the electrode assembly in tension in a direction generally perpendicular to the winding axis” and “[t]he electrode assembly could not be wound according to Kobayashi’s teachings in the absence of the rigid metal conducting plates to stabilize the assembly.” *Id.* at 26, 53. Patent Owner also contends that because Kobayashi requires a rigid connection system, it teaches away from Petitioner’s modification. *Id.* at 29, 57. Patent Owner similarly asserts that the proposed modification to replace Kobayashi’s terminal plates with a metal foil “would have rendered Kobayashi inoperable for its intended purpose” because metal foil would not provide the requisite stability to permit winding of the electrode ribbon and provide strength for the winding core within the housing. *Id.* at 30, 57.

Petitioner contends that “Kobayashi does not disclose any degree of ‘rigidity’ which must be maintained by the components, nor does [Patent Owner] cite to any portion of Kobayashi which allegedly discloses this feature.” Pet. Reply 5. According to Petitioner, it is the “insulating member[s] (elements 7, 8, and 9 of Fig. 1), [that] provide[] a primary source of stability and rigidity to the cell.” *Id.* Petitioner explains that any support terminal plates 4a and 5b provide would be cursory and minimal when compared with the central winding component. *Id.*

We are persuaded by Petitioner’s argument and supporting evidence. Kobayashi describes a button cell, or other small battery, with a central, integrated winding axis core to spiral wind the positive and negative electrodes fixed to the winding axis core. Ex. 1006 ¶¶ 9, 14–17. Patent Owner provides annotated Figure 8, reproduced below, to illustrate Kobayashi’s electrode assembly. PO Resp. 26.



Annotated Figure 8 shows positive electrode terminal 4 (right, red), including positive electrode terminal plate 4a, terminal connection part 4b, and slit 4c, and positive electrode 1 (orange) inserted into slit 4c. Ex. 1006 ¶¶ 28, 47. Also shown is negative electrode terminal 5 (left, red), including negative electrode terminal plate 5a, terminal connection part 5b, and slit 5c, and negative electrode 2 (yellow) inserted into slit 5c. *Id.* Winding member 6 comprises winding axis core 7—which includes notch part 7a and 7b to receive terminal connection part 4b and 5b respectively—and insulating

plates 8 and 9, each having a corresponding notch part 8b and 9b to communicate with notch parts 7a and 7b. *Id.* ¶¶ 30, 47. Insulating plates 8 and 9 include circular groove parts 8a and 9a to “accommodat[e]” positive terminal plate 4a and negative terminal plate 5a, respectively. *Id.*

Kobayashi explains that after positive electrode 1 is inserted into slit 4c, “the terminal connection part 4b of the positive electrode terminal 4 was inserted into notch part 7b of the winding axis core 7, and the positive electrode terminal plate 4a was disposed in the notch part 9a of the insulation plate.” *Id.* ¶ 31. Kobayashi describes the same treatment for negative electrode 2. *Id.* Kobayashi explains “[a]s a result of having inserted the terminal connection parts 4b and 5b into the notch parts 7a and 7b of the winding axis core, the shape of the winding axis core 7 becomes cylindrical. *Id.* Notably, Kobayashi does not describe any degree of rigidity required for any component, much less electrode terminal plates 4a and 5a. *See generally id.* Similarly, Kobayashi does not describe electrode terminal plates as providing any structural support for winding. *Id.* Instead, Kobayashi describes the function of terminal plates 4a and 5a as providing contact with electrode case 13 or 11. *Id.* ¶¶ 33–34. In discussing positive electrode 1, Kobayashi states that “the electrode group was inserted into this positive electrode case 13, so that the positive electrode terminal plate 4a thereof was in contact with the inner surface of the positive electrode case 13.” *Id.* ¶ 34; *see also id.* ¶ 33 (discussing the negative electrode group). Indeed, Kobayashi indicates that it is winding axis core 7 (and insulation plates 8 and 9) that provides structure to wind the electrode groups into a spiral form—not electrode terminal plates 4a and 5a. *Id.* ¶¶ 9, 15, 20, claim 1. Mr. Gardner’s testimony is consistent with this understanding. In

particular, he testifies that “structural[] integrity is provided by a ‘winding axis core 7’ located at the center of the electrode assembly [and] [t]he conductor plates do not provide any specific rigidity to the structure.”

Ex. 1041 ¶ 88. We note Patent Owner’s argument that mechanical forces place tension on the electrode assembly during winding and require rigid metal conducting plates for stabilization (PO Resp. 26), but neither Patent Owner nor Dr. Peckerar directs our attention to any portion of Kobayashi that describes this purported criticality to electrode terminal plates 4a and 5a. *See generally* PO Resp.; Ex. 2043 ¶ 333.

(2) *whether the proffered motivation to modify Kobayashi has merit*

Patent Owner further asserts that the motivation to modify Kobayashi offered by Mr. Gardner and Petitioner, i.e., “reducing the ratio of inactive to active components within the cell, which improves energy density,” is without merit. PO Resp. 55. Patent Owner argues that the “overall ratio of inactive to active components within Kobayashi’s cell is at most only slightly improved.” *Id.* Patent Owner also argues that “[o]nly a tiny portion of the plates is exposed” and “[a] [person of ordinary skill in the art] would have understood that the opposed grooves 8a, 9a are not suitable to receive metal foils” because “[t]he metal foils would be entirely embedded in the grooves, preventing the foils from making any connection whatsoever” with the housing. *Id.* at 28–29. And, according to Patent Owner, “a [person of ordinary skill in the art] would have understood that a rigid metal plate would be much easier to attach reliably to the connecting rods” because welding to metal plates, as opposed to metal foils, is easier. *Id.* at 29.

We disagree. As we explained above, Petitioner and Mr. Gardner explain, among other things, that a person of ordinary skill in the art would

be motivated to use foils in the Kobayashi electrode design instead of terminal electrode plates “in order to increase overall volume in the cell that is available for active components.” Ex. 1003 ¶¶ 250, 323; Pet. 69–70. Doing so “allows for increased size of the electrode layers within the electrode assembly which, beyond increasing the energy storage capacity of the cell, also decrease[s] the electrical resistance within the electrode layers.” Ex. 1003 ¶ 250. As Mr. Gardner testifies, reducing the thickness of the terminal electrode plates also reduces the ratio of inactive to active components, thereby increasing energy density within the cell—which “is a well-known goal in the art.” *Id.* ¶ 323 Dr. Peckerar acknowledges that the available overall volume would increase, though he qualifies it as only “very slightly improved.” Ex. 2043 ¶ 337; *see also* PO Resp. 28 (same).

Mr. Gardner also testifies that a person of ordinary skill in the art would understand that use of foil, in addition to increasing the volume within the cell, would reduce the weight of the output conductors thereby “reducing the overall weight . . . of the resultant button cell.” Ex. 1003 ¶¶ 248–249, 322. Mr. Gardner’s testimony that weight is also a concern is supported by the teachings of Kaun and Kwon. *See, e.g.* Ex. 1005 ¶ 18 (“Current collectors used in these cell arrangements add significant weight, and thus reduced specific cell energy and power outputs.”); Ex. 1008, 4 (“development of high end, small-size and light-weight electronic parts are being promoted”); *see also* PO Resp. 45; Ex. 2043 ¶ 327 (acknowledging that current collectors add significant weight). On balance, the preponderance of the evidence supports Petitioner’s contention that there is benefit—regardless of degree—to the function of the electrode by maximizing internal space for active

components as well as benefits in power output by reducing the overall weight of the button cell.

We also disagree with Patent Owner's position that Kobayashi's "insulation plates are not suitable to receive metal foil conductors" because the "metal foils would be entirely embedded in the grooves, preventing the foils from making any connection." PO Resp. 29, 56; Sur-reply 7. Petitioner, through the testimony of Mr. Gardner, explains that a person of ordinary skill in the art would understand that the terminal electrode plate could be "comprised of various materials" and "would recognize a number of shapes which would fit between the electrode assembly and the housing of Kobayashi, with a motivation to choose a relatively light weight material so as to prevent the bulk of the resulting button cell." Ex. 1003 ¶ 322. Mr. Gardner further testifies that a person of ordinary skill in the art would know how to adjust the groove depth such that the metal foil would contact the housing. Ex. 1033, 183:19–21; Ex. 1041 ¶¶ 53, 70; Pet. Reply 9. Patent Owner does not disagree that such a modification is within the skill level of the ordinarily skilled artisan. *See generally* PO Resp.; Sur-reply. Furthermore, we disagree with Patent Owner's argument that it would be difficult to attach a flexible metal foil to the terminal connection part 4b and 5b. PO Resp. 29. As Petitioner points out, Kobayashi "already discloses the use of metal foils within the electrode assembly" which are connected to terminal connection part 4b. Pet. Reply 4, 6; Ex. 1006 ¶¶ 21, 29. And Kwon discloses attaching a metal foil using welds, without the loss of structural integrity. Pet. Reply 4 (citing Ex. 1003 ¶ 408); Ex. 1008, 7. Furthermore, though there *may* be "difficulties" presented in welding a foil to the terminal connection part, "[t]he fact that the motivating benefit comes

at the expense of another benefit . . . should not nullify its use as a basis to modify the disclosure of one reference with the teachings of another.”

Winner Int’l Royalty Corp. v. Wang, 202 F.3d 1340, 1349 n.8 (Fed. Cir. 2000). One of ordinary skill in the art would have considered both the advantages and disadvantages and balanced the relative tradeoffs in making the proposed combination. *Id.*

(3) *does a reasonable expectation of success exist in
Petitioner’s proffered modification of Kobayashi*

Patent Owner further argues that a person of ordinary skill in the art would not have had a reasonable expectation of success in combining the identified disclosures to arrive at the subject matter of claim 1, because substantial redesign would need to occur. PO Resp. 31–32; Sur-reply 7. Specifically, Patent Owner alleges that “[b]ecause Kobayashi’s winding core assembly relies on the metal plates as an integral part of a positive locking system,” use of metal foils would require a redesign of the winding posts as “they would no longer be registered and held securely in place by the metal plates.” PO Resp. 31. According to Patent Owner, it is likely that “a [person of ordinary skill in the art] would have been required to abandon integrating the Kobayashi winding into its winding axis core, which is the primary objective of the Kobayashi reference.” *Id.* at 31–32.

Petitioner asserts that “metal foils would serve just as well as the terminal plates, if not better, to operate the button cell of Kobayashi.” Pet. Reply 10. Petitioner asserts that Dr. Peckerar’s testimony that metal foils lack sufficient rigidity is speculative. *Id.* at 7. Indeed, according to Petitioner, Kobayashi does not “necessitate a rigid connection system, but the insulating member provides a primary source of stability and rigidity.” *Id.* Relying on the testimony of Mr. Gardner, Petitioner argues that “a

[person of ordinary skill in the art] would understand that the metal foils would maintain electrical contact without impairment to manufacturability and service life of the battery.” *Id.* (citing Ex. 1041 ¶ 81).

In weighing the evidence before us, we disagree with Patent Owner that Petitioner failed to show a reasonable expectation of success and that substantial redesign would need to occur. As we explained above (*supra* Section III.D.3.b.1) Kobayashi does not describe electrode terminal plates 4a and 5a as a critical part of the locking assembly. And, contrary to Patent Owner’s allegations, Kobayashi does not describe the “winding posts”¹⁰ as “registered and held securely in place by the [electrode terminal] plates.” PO Resp. 31. Notably, neither Patent Owner nor Dr. Peckerar cites to any portion of Kobayashi to support these assertions. *See id.*; Ex. 2043 ¶¶ 466–468. Rather, Kobayashi merely states that the electrode terminal plates are “electrically connected” to the terminal connection part. Ex. 1006 ¶ 28. Kobayashi does indicate, however, that terminal connection parts 4b and 5b are secured to winding axis core 7. In particular, Kobayashi describes that winding member 6 contains a “winding axis core 7, and insulation plates 8 and 9 . . . integrated with the upper and lower end of the winding axis core” where winding axis core 7 includes “a notch part 7b into which the terminal connection part 4b of the positive electrode terminal 4 is fitted.” *Id.* ¶ 30.

c) Summary of Claim 1

For the foregoing reasons, we are persuaded by Petitioner’s arguments and evidence demonstrating that a person of ordinary skill in the art would

¹⁰ It is unclear what component Patent Owner refers to, as Kobayashi does not use the term “winding post.” *See generally* Ex. 1006. We assume Patent Owner refers to terminal connection parts 4b and 5b.

have had reason to combine the teachings of Kobayashi and Kwon, in view of the knowledge of the skilled artisan, and would have had a reasonable expectation of successfully doing so to arrive at the subject matter recited in claim 1. As noted above, we also agree with Petitioner's arguments and evidence that Kobayashi and Kwon in combination with the knowledge of the person of ordinary skill in the art teaches or suggests all of the limitations recited in claim 1.

4. Remaining Claims

Petitioner contends that the combination of Kobayashi, Kwon, and the knowledge of the person of ordinary skill in the art suggests the additional limitations of claims 2–8 and renders the claims obvious. Pet. 42–48, 75–76. Patent Owner does not present any arguments specific to challenged claims 2–5 or 7, but instead appears to rely on the arguments and reasons it raises above with respect to claim 1. PO Resp. 32. Therefore, Patent Owner has forfeited any arguments based on these uncontested claims. *Cf. NuVasive*, 842 F.3d at 1381 (explaining that the patent owner waives an argument presented in the preliminary response if it fails to renew that argument in the patent owner response during the instituted trial).

We have reviewed the evidence of record, including the testimony of Mr. Gardner and the analysis and evidence Petitioner presents above with respect to claim 1, we are persuaded that Petitioner shows sufficiently that the combination of Kobayashi, Kwon, and the general knowledge of the ordinarily skilled artisan suggests the limitations of claims 2–5 and 7, and provides sufficient reasoning with rational underpinning for modifying the Kobayashi's teachings as claimed. *See* Pet. 42–48, 75–76. Because a

preponderance of the evidence supports Petitioner's arguments as to claims 2–5 and 7, we adopt Petitioner's analysis as our own.

a) Claim 6

Patent Owner separately argues the patentability of claim 6, which depends from claim 1 and requires that the button cell further comprise “at least one separate insulator which prevents direct electrical contact between lateral end sides of the winding and the conductors.” Ex. 1001, 9:5–8. For this element, Petitioner relies on the disclosure of Kobayashi, specifically its teaching of insulating plates “disposed between the positive electrode case and the electrode group, between the negative electrode case and the electrode group, or both.” Pet. 45–46 (citing Ex. 1006 ¶ 19, Fig. 1). Petitioner contends that these plates prevent electrical contact between the spiral wound electrode layers and the terminal plates. *Id.*

Patent Owner opposes Petitioner's arguments, pointing out that Petitioner relies on Kobayashi's insulating plates 8 and 9 as the “insulating elements” of claim 1, and cannot also rely on those same insulating plates as the “separate insulator” of claim 6. PO Resp. 33. Dr. Peckerar testifies that the '858 patent describes two types of insulators: the first are insulating elements 112 and 113, which are described as “thin plastic films,” while the second are insulating tapes 207, 208, which are adhesively bonded to the conductors. Ex. 2043 ¶ 470 (citing Ex. 1001, 7:12–14, 45–52).

Petitioner and Mr. Gardner interpret claim 6 differently. Mr. Gardner points out that claim 1 requires at least one metal foil, “and that this at least one metal foil is then shielded from the winding.” Ex. 1041 ¶ 92. Claim 6 then requires a second, separate insulator. *Id.* Mr. Gardner testifies that Kobayashi's first conductor plate is shielded from the electrode assembly by

a first insulation plate 8, while the second conductor plate is shielded by a separate insulator, namely insulation plate 9. *Id.*

Upon review of the evidence and the parties' arguments, we consider Petitioner to have set forth a better interpretation of claim 6 and the '858 patent's disclosure. Claim 1 requires "at least one" of the button cell's electrodes be a metal foil, and that those foils are shielded by insulating elements. Thus, a battery with only one foil electrode, and one insulating element, could satisfy claim 1. As a result, a second electrode, and a second insulator, could satisfy claim 6. As set forth by Petitioner, Kobayashi as modified by Kwon teaches both a first and second electrode, and a first and second insulator.

We acknowledge Patent Owner's argument that the '858 patent describes insulators in connection with two different figures. The embodiment shown in Figures 1A and 1B has insulators 112 and 113, which are described as "thin plastic films." Ex. 1001, 7:12–14. Figures 2A to 2C, meanwhile, show "some important steps in the production of an electrode winding" for use in cells such as those in Figure 1, and depict insulating tape 207 and 208 adhered to the collector foils. *Id.* at 7:31–34, 7:45–52. Contrary to Patent Owner's interpretation of this disclosure as "two types of insulators," nowhere does the '858 patent show both the thin plastic film insulator (112, 113) and the insulating tape (207, 208) in use in the same battery. Indeed, it is more consistent with the disclosure of the '858 patent that the insulating tape (207, 208) shown during the formation of the electrode winding in Figure 2 may subsequently be the insulator (112, 113) of the formed cell of Figure 1. *See id.* at 7:31–34 ("FIG. 2A to FIG. 2C represent some important steps in the production of an electrode winding,

which is suitable in particular for button cells (for example, as represented in FIG. 1).”).

b) Claim 8

Patent Owner also argues separately the patentability of claim 8, which depends from claim 1 and further requires that the electrode winding comprise “at its center an essentially cylindrical axial cavity delimited laterally by the winding and on lateral end sides by a subregion of the bottom or top region, respectively,” and also that at least one of the conductors be welded to the housing in the subregion located at an end of the axial cavity. Ex. 1001, 9:12–17. As the ’858 patent explains, “in certain cases the intensity of the [welding] laser will be selected to be too strong and the laser will penetrate through the housing wall and the conductor.” *Id.* at 6:29–32. By welding in a region that is aligned with the center axial cavity of the winding, “[i]f a laser beam penetrates through the housing in this region, the winding cannot be damaged. Instead, the laser beam will be absorbed by the housing half lying opposite or by a winding core optionally arranged inside the cavity.” *Id.* at 6:35–39.

Petitioner contends that Kobayashi as combined with Kwon teaches or suggests these additional limitations of claim 8. Pet. 47–48. According to Petitioner, because Kobayashi discloses that its electrode layers are wound around a central winding core that is cylindrical in shape, a cylindrical axial cavity is formed in the winding. *Id.* (citing Ex. 1006 ¶¶ 29, 30, Fig. 8; Ex. 1003 ¶ 404). Mr. Gardner testifies that a person of ordinary skill in the art would have recognized that this structure of Kobayashi, when combined with the welding method of Kwon, would result in a battery where “at least

one of the conductors contains a weld with a corresponding housing half in the subregion” defined by the cavity. Ex. 1003 ¶ 406.

Patent Owner disagrees, arguing that “Kobayashi does not disclose an axial cavity or a cylindrical axial cavity delimited laterally by the winding.” PO Resp. 33. According to Patent Owner, “Kobayashi’s central winding axis core is solid; it is not a cavity.” *Id.* at 34. Patent Owner also contends that because the end of the wound electrode extends into the solid core, the cavity is not cylindrical. *Id.* Dr. Peckerar testifies that “[t]he shape of winding axis core becomes cylindrical only when terminal connection posts are located in the winding axis core.” Ex. 2043 ¶ 473. Regarding the location of the weld, Patent Owner argues that Kwon does not suggest the weld is located at any particular subregion relative to the spiral winding. PO Resp. 34–35.

In response, Petitioner acknowledges that Kobayashi’s cylindrical cavity is filled, at least in part, with its winding core, but that it “nevertheless discloses an essentially cylindrical cavity at the center of the spiral winding.” Pet. Reply 11. And Petitioner argues that it would have been obvious “in view of the laser welding of Kwon to create a weld with the corresponding housing half in the subregion.” *Id.* (citing Ex. 1041 ¶ 80). Mr. Gardner testifies that a person of ordinary skill in the art “would have known that applying a weld at this location would minimize risk of heat induced damage to the spiral wound electrode assembly.” Ex. 1041 ¶ 93.

We have reviewed the parties’ arguments and the cited evidence, and agree with Petitioner that Kobayashi’s wound electrode defines an essentially cylindrical axial cavity. Although Patent Owner correctly points out that this cavity contains a winding core, we note that the ’858 patent

similarly notes that its central cavity may contain a winding core. Ex. 1001, 6:35–39. The presence of a separate element within the electrode’s central cavity does not negate the existence of the cavity itself. Nor are we convinced by Patent Owner’s argument that Kobayashi’s cavity is not essentially cylindrical because a portion of the electrode extends into a slit in the winding core. Overall, Kobayashi’s central cavity is essentially cylindrical in shape.

In addition, we credit Mr. Gardner’s testimony that a person of ordinary skill in the art would have known to locate the weld as taught in Kwon in the central region of the housing, to avoid damaging the spiral wound electrode. Notably, Dr. Peckerar does not address this motivation, only testifying that Kwon does not teach locating its weld in any particular location. Ex. 2043 ¶ 472.

c) Conclusion on Remaining Claims

For these reasons, we find that Petitioner has proven by a preponderance of the evidence that the combined disclosures of Kobayashi and Kwon teach or suggest the additional elements of all dependent claims 2–8.

5. Objective Indicia of Nonobviousness

The fourth Graham factor instructs that we must consider—apart from what the prior art itself would have suggested—whether objective evidence of nonobviousness (i.e., secondary considerations) may lead to a conclusion that the challenged claims would not have been obvious. *See, e.g., Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1538–39 (Fed. Cir. 1983) (instructing that evidence of secondary considerations, when present, must always be considered in determining obviousness). Objective indicia of

nonobviousness may include evidence of commercial success, licensing, copying, praise by others, long felt but unresolved need, and failure or skepticism of others. *Graham*, 383 U.S. at 17–18. But, objective indicia are only a part of the “totality of the evidence”; its mere existence does not control the conclusion of obviousness. *See Richardson-Vicks Inc. v. Upjohn Co.*, 122 F.3d 1476, 1483 (Fed. Cir. 1997). Objective indicia of nonobviousness “may often be the most probative and cogent evidence in the record” and “may often establish that an invention appearing to have been obvious in light of the prior art was not.” *Transocean Offshore Deepwater Drilling, Inc. v. Maersk Drilling USA, Inc.*, 699 F.3d 1340, 1349 (Fed. Cir. 2012).

Objective indicia of nonobviousness “is only relevant to the obviousness inquiry ‘if there is a nexus between the claimed invention and the [objective indicia of nonobviousness].’” *In re Affinity Labs of Tex., LLC*, 856 F.3d 883, 901 (Fed. Cir. 2017) (quoting *Ormco Corp. v. Align Tech., Inc.*, 463 F.3d 1299, 1312 (2006)). A “nexus” is a legally and factually sufficient connection between the objective evidence and the claimed invention such that the objective evidence should be considered in the determination of obviousness. *Henny Penny Corp. v. Frymaster LLC*, 938 F.3d 1324, 1332 (Fed. Cir. 2019); *In re Paulsen*, 30 F.3d 1475, 1482 (Fed. Cir. 1994). A presumption of nexus arises where “the patentee shows that the asserted objective evidence is tied to a specific product and that product ‘embodies the claimed features, and is coextensive with them.’” *Fox Factory, Inc. v. SRAM, LLC*, 944 F.3d 1366, 1373 (Fed. Cir. 2019) (quoting *Polaris Indus., Inc. v. Arctic Cat, Inc.*, 882 F.3d 1056, 1072 (Fed. Cir. 2018) (quoting *Brown & Williamson Tobacco Corp. v. Philip Morris Inc.*, 229

F.3d 1120, 1130 (Fed. Cir. 2000)); *see also* *Teva Pharms. USA, Inc. v. Sandoz, Inc.*, 723 F.3d 1363, 1372 (Fed. Cir. 2013) (explaining that a “presumption of a nexus” exists where a product is “coextensive” with a patent claim). If, however, the patented invention is only a component of the commercial embodiment, the patentee is not entitled to a presumption of nexus. *Fox Factory*, 944 F.3d at 1374. In addition, “[a] patent claim is not coextensive with a product that includes a ‘critical’ unclaimed feature that is claimed by a different patent and that materially impacts the product’s functionality.” *Id.* at 1375. But, “[a] finding that a presumption of nexus is inappropriate does not end the inquiry into secondary considerations”; rather, “the patent owner is still afforded an opportunity to prove nexus by showing that the evidence of secondary considerations is the ‘direct result of the unique characteristics of the claimed invention.’” *Id.* at 1374 (quoting *In re Huang*, 100 F.3d 125, 140 (Fed. Cir. 1996)). Patent Owner bears the burden of establishing that a nexus exists between the objective indicia of nonobviousness and the patented invention. *Id.* at 1373.

a) nexus

Patent Owner argues that substantial evidence of nonobviousness exists in the form of unexpected results, commercial success enabling the development of new consumer products, industry praise, and copying. *See* PO Resp. 60–69. In particular, Patent Owner contends that its CoinPower[®] button cell batteries are covered by at least claim 1 of the ’858 patent. *Id.* at 60 (citing Ex. 2043 ¶¶ 615–621). Patent Owner attributes the improved performance of the CoinPower[®] button cell to its claimed combination of elements that “allows increased electrode material to be placed inside the housing.” *Id.* Specifically, Patent Owner alleges

[t]he claimed invention includes a jelly roll configuration that facilitates optimal use of limited space in the housing because it is perpendicular to flat top and bottom portions of the housing. The jelly roll is protected by an insulating layer to avoid short circuits, particularly during swelling and shrinking of the jelly roll during charging and discharging. In addition, a flat foil output conductor that connects one of the jelly roll electrodes to the housing consumes no space because it rests between the spiral winding and the housing, thereby making volume available for electrode material. This structure also provides greater stability of the button cell, representing a significant breakthrough in button cell design.

Id. at 60–61 (citing Ex. 2045 ¶ 16; Ex. 2043 ¶¶ 590–592); *see also id.* (identifying the combination of the jelly roll electrode and “the placement of the flat output conductor” as responsible for “vastly increased energy density” and “improved cycling”). Patent Owner alleges that “CoinPower[®] products are *substantially* coextensive with” the patented features. *Id.* (emphasis added) (citing Ex. 2045 ¶¶ 37, 46, 52; Ex. 2046 ¶¶ 42, 47, 52; Ex. 2043 ¶ 616).

Patent Owner identifies two claimed features—i.e., the jelly-roll configuration and the placement of the flat foil output conductor—as responsible for the improved performance of the VARTA CoinPower[®] button cell batteries.¹¹ *Id.* However, Patent Owner’s declarants explain that it is the combination of the two identified features with other features, such as a housing closed without being beaded over, that are responsible for improved performance. In particular, Mr. Miehlisch, employed in VARTA’s marketing and sales department, testifies that the new cell design, which

¹¹ Elsewhere, Patent Owner also credits “weld spots passing through the housing wall from the outside” as a claimed feature linked to commercial success. PO Resp. 65–66.

“provided unprecedented increases in performance, including in energy density, charge capacity, and cycling stability,”

consisted of a “jelly roll” electrode coil packed tightly into an uncrimped, button-like housing. The electrode coil was protected against short-circuiting by [an] insulating means, and was connected to the cell terminals by a flexible flat foil conductors resting flat between the electrode top and housing, and welded to the housing components from the outside. These features are all found in the claims of the VARTA patents here under review.

Ex. 2045 ¶¶ 15–16 (footnote omitted). And, Dr. Lindner, one of the named inventors of the ’858 patent, testifies that the

complex issues we faced were how to safely pack the required amount of electrode material into the very small “button”-sized housing and protect it against short circuits; how to connect the “jelly roll” electrode to the terminals in such a confined space without itself consuming much volume, and how to seal the top and bottom of the cell housing, all while accommodating the expansion and contraction of the electrode winding and the resulting mechanical forces.

Ex. 2046 ¶ 33. According to Dr. Linder, the jelly-roll configuration with an insulator, flexible foil output conductors, sealing the cell without crimping, and welding the foil conductors from outside the housing each contributed to the improved battery performance. *Id.* ¶¶ 34–43. Thus, it is the combination of five elements—not solely the ones claimed in the ’858 patent—that are purportedly responsible for the “vastly increased performance characteristics” of the CoinPower® products. *Id.* ¶ 43; *see also id.* ¶ 45 (noting that “*various aspects* of our invention are covered by 10 issued patents, including the four United States patents here under review” (emphasis added)); Tr. 84:24–85:10 (explaining that welding, for example, is “also part of the success”). Like the patent owner in *Fox Factory*, “[i]n

light of the patentee’s own assertions about the significance of the unclaimed features, no reasonable fact finder could conclude that these features are insignificant.” *Fox Factory*, 994 F.3d 1375. As a result, the patent claims are not coextensive with the CoinPower® products because those products include “‘critical’ unclaimed feature[s] that [are] claimed by a different patent and materially impacts the product’s functionality.” *Id.*

Therefore, for purposes of our analysis, we do not apply a presumption of nexus. Below, however, we consider the parties’ arguments and evidence regarding any purported unexpected results, industry praise, commercial success, and copying in light of any alleged nexus.

b) unexpected results

Patent Owner contends that “[t]he invention is a novel design for the button cell that resulted in a leap forward in performance over conventional cells.” PO Resp. 61 (citing Ex. 2045 ¶ 16; Ex. 2046 ¶¶ 13–14, 47); Sur-reply 22–23 (citing Ex. 2045 ¶¶ 15–16, 30, 36, 45–46, 51–52; Ex. 2046 ¶¶ 14, 47, 53–54). Patent Owner explains that “[u]nlike conventional batteries, Patent Owner sought to produce a button cell that could be used in a wearable device that may be located in the ear shell” and that “[b]atteries that were suitable for such consumer devices with required performance . . . did not exist.” *Id.* at 62 (citing Ex. 2045 ¶ 30). Patent Owner explains that conventional teachings favored a “fixed core structure,” such as Kobayashi, and that “[c]ontrary to this conventional belief . . . the flexibility of the combination of elements of the [’858 patented] invention allows the electrode assembly to ‘breathe’ from its charged to discharged states, while providing excellent stability over its lifetime, representing a striking

advancement in the field.” *Id.* at 62–63 (citing Ex. 2045 ¶¶ 35–37; Ex. 2046 ¶ 34).

Here, Patent Owner provides some evidence and supporting testimony that suggests that the combination of elements in the CoinPower® products resulted in a surprisingly stable connection and improved capability. Mr. Miehlisch testified that funding requests by the inventors “initially met with a great deal of reluctance” (Ex. 2045 ¶ 26), but that the “patented new cell produced energy densities, charge capacities and cycling stability that represented a performance leap forward, particularly a cell of such small size” (*id.* ¶ 36). According to Mr. Miehlisch, “[i]n all [his] years in this technology, [he] had never seen a performance leap of this magnitude – about 30% over then existing button cells.” *Id.* Patent Owner, however, ties its unexpected results to a combination *five* features, that allow for use of a maximum amount of internal space, and not to the specific *two* features of the ’858 patent. *Id.* ¶¶ 31–35 (identifying the jelly-roll configuration, the insulating means, the flexible foil output conductors, sealing the cell without crimping, and welding the foil conductors from outside the housing). As a result, we accord only moderate weight to Patent Owner’s evidence of unexpected results in the absence of a more substantial nexus to the claims.

c) commercial success

Patent Owner contends that its CoinPower® products have been very successful. PO Resp. 63–64. Patent Owner explains that the “technology claimed in the ’858 patent was a breakthrough in button cell design and [that its] commercial embodiment has been adopted as the gold standard for use in many devices including true wireless stereo earbuds.” *Id.* (citing Ex. 2045 ¶¶ 18–19). According to Patent Owner, the CoinPower® products “have

enjoyed widespread acceptance and explosive sales growth” and “sales of the patented button cells have more than doubled each year in the past six years, reaching almost 115 million units in 2020,” which “represents just over 60% of global market share in 2020.” *Id.* at 64 (citing Ex. 2045 ¶¶ 54–57). Mr. Miehllich testifies that the “sales [are] due solely to the performance characteristics of the patented CoinPower button cell, which is brought about by the unique utilization of a ‘jelly roll’-electrode with its supporting structures” and not to any “marketing or advertising efforts.” Ex. 2045 ¶¶ 58–59.

While we agree that some evidence shows the CoinPower[®] products are commercially successful and have resulted in significant sales, Patent Owner does little, if anything, to tie that commercial success to the patented features of the ’858 patent. The testimony of Mr. Miehllich clearly attributes VARTA’s sales to the overall combination of features in the CoinPower[®] products, including three features not claimed by the ’858 patent. In particular, Mr. Miehllich testifies that

[t]he performance enabling our sales to the interested device manufacturers were the direct result of the combination of a “jelly roll” oriented electrode essentially filling a housing, insulating means protecting the electrode and flexible foil conductors resting flat between the electrode and housing. The non-beaded-over housing contributed additional volume to be occupied by electrode, further enhancing performance, and the welding of the conductor foils to the cell terminals by weld spots passing from the outside through the housing was our preferred method of secure attachment as it readily facilitated manufacture of the cell on a large scale.

Ex. 2045 ¶ 46. Accordingly, we accord only moderate weight to Patent Owner’s evidence of commercial success in the absence of a more substantial nexus to the claims.

d) industry praise

Patent Owner contends that it “has received several industry awards for its CoinPower product covered by the claims of the ’858 patent.” PO Resp. 67 (citing Ex. 2045 ¶¶ 62–66). “Among the recognition are the 2011 Top Innovator award from TOP100, the 2012 Product of the Year award from *Elektronik* Publication, the Innovation Award 2015 from the *Selezione di Elettronica* publication, and the Deutsche Innovationspreis 2020, all citing the CoinPower cells.” *Id.*

Having considered the record evidence, we find some evidence of industry praise. For example, Mr. Miehlich testifies that in earning the above-referenced awards, the CoinPower® button cell was “cited.” Ex. 2045 ¶¶ 63–66. However, without more, it is difficult to assess the role the patented features of the ’858 patent played in VARTA receiving such recognition. On balance, we accord little weight to Patent Owner’s evidence of industry praise, as significant industry praise tied to the claimed features has not been shown.

e) long felt need

Patent Owner argues that “[t]he ’858 patent is considered a breakthrough in battery technology because it provided, for the first time, a solution to the problem of limited energy density available for small devices, such as those placed into a human ear.” PO Resp. 68 (citing Ex. 2045 ¶ 52). Patent Owner alleges that prior art “button cells could not supply the required energy density or cycling stability” for true wireless stereo (“TWS”) headphones. *Id.* But, “[t]he availability of Patent Owner’s high performance cells quickly led to the development not only of TWS

earphones, but a variety of other new-generation devices, including fitness trackers, medical patches, smart keys, and the like.” *Id.*

Petitioner asserts that “VARTA fails to show that any novel claim elements of the ’858 Patent solved any unmet need.” Pet. Reply 25. Petitioner argues that both Patent Owner and its declarants fail to identify any need in the art or introduce evidence that the combination of claim elements met that supposed need. *Id.*

In order to show a long-felt but unmet need for the claimed invention, the objective evidence must show that the need was a persistent one that was recognized by those of ordinary skill in the art. *In re Gershon*, 372 F.2d 535, 538 (CCPA 1967). “Evidence of a long felt but unresolved need tends to show non-obviousness because it is reasonable to infer that the need would have not persisted had the solution been obvious.” *WBIP LLC v. Kohler Co.*, 829 F.3d 1317, 1332 (Fed. Cir. 2016). Here, the record evidence shows some evidence of long felt need. For example, Mr. Miehlisch and Dr. Linder testify that “[b]atteries with sufficient capacity . . . miniaturized to . . . fit the human ear did not exist.” Sur-reply 25 (citing Ex. 2045 ¶¶ 16, 24–30, 39, 41, 46, 54–55; Ex. 2046 ¶¶ 12, 14, 20–23, 26–34, 37–43; Ex. 1036, 25:11–27:18). However, that testimony does not elaborate on the specific unmet yet unresolved need. Further, Patent Owner, attributes its ability to provide a solution to the problem of limited energy density for small devices to a combination *five* features, that allow for use of a maximum amount of internal space, and not to the specific *two* features of the ’858 patent. Ex. 2045 ¶¶ 14–16, 18, 54 (attributing the success generally to the combination of five features). As a result, we accord little weight to

Patent Owner's evidence of long felt need as significant need tied to the claimed features has not been shown.

f) copying

Patent Owner asserts that “[a]s small consumer electronics devices have become more popular, others began manufacturing high performance button cells that copy the features claimed in the ’858 patent.” PO Resp. 69 (citing Ex. 2045 ¶¶ 67–69). “Patent Owner believes that as many as three to five manufacturers of button cells, including sizeable companies such as interested party Mic-Power, now employ the electrode configuration and supporting structures exactly as set forth at least in claim 1 of the ’858 patent to manufacture button cells.” *Id.* (citing Ex. 2045 ¶ 68). Patent Owner asserts that the fact these companies adopted Patent Owner's button cell design indicates the validity of the ’858 patent. *Id.*

Petitioner asserts that just because a competing product may fall within the scope of the claims does not result in copying. Pet. Reply 25. By way of example, Petitioner directs our attention to an IEC standard that purports to dictate certain physical and electrical specifications for standard-compliant batteries. *Id.* (citing Ex. 1038; Ex. 1037, 60:9–61:21).

“Copying requires duplication of features of the patentee's work based on access to that work, lest all infringement be mistakenly treated as copying.” *Institut Pasteur & Universite Pierre Et Marie Curie v. Focarino*, 738 F.3d 1337, 1347–48 (Fed. Cir. 2013). Evidence of copying may take the form of “internal documents, direct evidence such as photos or patented features, or disassembly of products, or access and similarity to a patented product.” *Liqwd, Inc. v. L'Oreal USA, Inc.*, 941 F.3d 1133, 1137 (Fed. Cir. 2019). Here, the testimony of Mr. Michlich and Dr. Peckerar provide some

evidence of copying. For example, Mr. Miehllich testifies that “VARTA believes” that there may be as many as 5 manufacturers that have adopted the design set forth in “the VARTA patents here under review.” In addition, Dr. Peckerar testifies that the “VARTA CoinPower® button cells had been commercially available long before the EVE and Mic-Power button cells appeared in the marketplace” and that the “similarities are so pervasive that the EVE and Mic-Power batteries were constructed to be copies of the VARTA CoinPower® button cells.” Ex. 2043 ¶ 625. Dr. Peckerar compares the features of the Mic-Power M1254S2 and EVE ICR 1454 cells with the claim limitations of the ’858 patent and concludes that each limitation of claims 1, 4, and 6 is present. *Id.* ¶¶ 632–637. However, while the evidence of record suggests Petitioner and others *could* have accessed patent Owner’s work, there is no evidence to suggest that access and copying, in fact, occurred. As such, we assign little weight to Patent Owner’s evidence of copying.

6. *Conclusion as to Obviousness*

Having considered each of the *Graham* factors, we determine that the first two *Graham* factors—the scope and content of the prior art and differences between the prior art and the challenged claims—significantly outweigh the marginal evidence of unexpected results, commercial success, industry praise, long felt need, and copying. Accordingly, we conclude that Petitioner has demonstrated by a preponderance of the evidence that the subject matter of claims 1–8 would have been obvious over the combined teachings of Kobayashi and Kwon.

E. Remaining Grounds

Having determined that Petitioner establishes by a preponderance of the evidence that the combined teachings of Kobayashi and Kwon, renders the subject matter of claims 1–8 unpatentable, we need not address Petitioner’s additional grounds challenging claims 1–8. *See SAS*, 138 S. Ct. at 1359 (holding a petitioner “is entitled to a final written decision addressing all of the claims it has challenged”); *Boston Sci. Scimed, Inc. v. Cook Grp. Inc.*, 809 F. App’x 984, 990 (Fed. Cir. 2020) (nonprecedential) (“We agree that the Board need not address [alternative grounds] that are not necessary to the resolution of the proceeding.”).

IV. REVISED CONTINGENT MOTION TO AMEND

Patent Owner filed a Revised Contingent Motion to Amend original claims 1–8 and replace them with proposed substitute claims 10–17. MTA 3. We have determined that original claims 1–8 of the ’858 patent have been shown to be unpatentable by a preponderance of the evidence; therefore, we proceed to address Patent Owner’s Revised Contingent Motion to Amend.

Before considering the patentability of any substitute claims, we first must determine whether the motion to amend meets the statutory and regulatory requirements set forth in 35 U.S.C. § 316(d) and 37 C.F.R. § 42.121. Patent Owner bears the burden of persuasion to show, by a preponderance of the evidence, that: (1) the amendment responds to a ground of unpatentability involved in the trial; (2) the amendment does not seek to enlarge the scope of the claims of the patent or introduce new subject matter; (3) the amendment proposes a reasonable number of substitute claims; and (4) the proposed claims are supported in the original disclosure.

37 C.F.R. § 42.121(d)(1); *Lectrosonics, Inc. v. Zaxcom, Inc.*, IPR 2018-01129, Paper 15 (PTAB Feb. 25, 2019) (precedential).

Although Patent Owner must demonstrate that the statutory and regulatory requirements for a motion to amend are met, Petitioner “bears the burden of persuasion to show, by a preponderance of the evidence, that any proposed substitute claims are unpatentable.” 37 C.F.R. § 42.121(d)(2); *Lectrosonics*, Paper 15 at 4 (citing *Aqua Prods. Inc. v. Matal*, 872 F.3d 1290 (Fed. Cir. 2017); *Bosch Auto. Serv. Sols. LLC v. Iancu*, 878 F.3d 1027 (Fed. Cir. 2017)).

Patent Owner proposes substantive amendments to independent claim 1 by way of proposed substitute claim 10 to distinguish over the cited art. MTA 3, 6–8; *see also id.* at Appendix A (illustrating amendments to proposed claim language). The remaining proposed substitute dependent claims are amended to reflect proper dependency and other non-distinguishing language. *Id.* at 8; *see also id.* at Appendix A. The parties focus their discussion on the newly proposed limitations in the independent claims that purportedly distinguish over the prior art.

A. Requirements Under 35 U.S.C. § 316 (d) and 37 C.F.R. § 42.121

Patent Owner asserts that its motion to amend proposes a reasonable number of substitute claims, is not broadening, and is responsive to the grounds of unpatentability involved in the proceeding. MTA 4–8. Patent Owner proposes a single substitute claim for each challenged claim (i.e., one-for-one), and therefore, meets the requirement for a reasonable number of proposed substitute claims. *See* 37 C.F.R. § 42.121(a)(3); *see also Lectrosonics*, Paper 15 at 4 (“There is a rebuttable presumption that a reasonable number of substitute claims per challenged claim is one (1)

substitute claim.”). Patent Owner also proposes narrowing limitations in direct response to the grounds of unpatentability involved in this proceeding. *See* MTA 6–8. Petitioner does not dispute Patent Owner’s contentions. *See generally* MTA Opp. We determine that Patent Owner has met the above-identified statutory and regulatory requirements for a motion to amend.

Petitioner disputes whether Patent Owner has shown the proposed substitute claims are supported in the original disclosure. *Id.* at 2–4. Patent Owner argues that “each limitation of the substitute claims is disclosed in the specification and/or figures of” U.S. Patent Application No. 13/378,117, “as filed on December 14, 2011, and for which a Section 371(c) filing date was given on the same date.” MTA 9.¹² Patent Owner identifies corresponding support for each limitation in chart format. *Id.* at 9–12. Petitioner raises specific objections to proposed substitute claims 10 and 15. MTA Opp. 2–4.

We have reviewed the proposed substitute claims and Patent Owner’s identified portions of the originally-filed application that allegedly provide written description support. Other than the specific limitations Petitioner contests, which we discuss separately below, we determine that Patent Owner has shown sufficient written description support for the uncontested limitations of claims 10–17. *See* MTA 8–13.

¹² The ’858 patent issued from U.S. Patent Application No. 13/378,117 (“the ’117 application”), which claims priority to international patent application PCT/EP2010/058637, which in turn claims priority to two German patent applications filed June 18, 2009 and December 31, 2009. Ex. 1001, 1:7–11; MTA 10; Ex. 2035, “the ’117 application”). Patent Owner cites to the “Clean Copy” of the substitute Specification in the preliminary amendment filed with the original application. *See* MTA 9 n.2 (citing Exhibit 2035 starting at page 41).

1. Proposed Substitute Claim 10

Petitioner asserts that “[t]here is not sufficient written description for at least claim element 10[g],” i.e., the proposed substitute independent claim limitation requiring that the housing half to which the metal foil connects, the metal foil, and the insulating element “form a sequence of three flat layers in direct contact with one another in which the metal foil is interposed between the other two layers.” MTA Opp. 3–4. Petitioner argues that “if, as the claim requires, the metal foil is interposed between an insulator and a housing half, the metal foil can not additionally contact the electrode housing, as it would be blocked from doing so by an insulating element.” *Id.* at 3.

Patent Owner responds that the language of proposed substitute claim 10 “is not so restrictive,” and that the claim requires the metal foil to be in contact with a housing half and “connected to” an electrode. MTA Reply 1–2. “Consistent with the specification, claim 10 permits a portion of the metal foil conductor that is not interposed between the insulator and housing half to be electrically connected to an electrode of the electrode assembly.” *Id.* at 2. We agree. As proposed, substitute claim 10 requires only that the metal foil is “interposed” between the insulating element and the housing half. This requirement is met by a metal foil such as the one shown in Figures 2 and 3 of the ’858 patent, which show the metal foil connected to a current collector that extends past the insulator and onto the radial edge of the spiral wound electrode. We are not persuaded by Petitioner’s argument that an arrangement of layers as set forth in the substitute claim would be inoperable, or that it is insufficiently supported by the written description of the original application.

2. *Proposed Substitute Claim 15*

Separately, Petitioner argues that proposed substitute claim 15 is not supported by the '117 application, because it recites “at least one first additional separate insulator associated with the first metal conductor and at least one second separate insulator associated with the second metal conductor,” where these insulators “prevent[] direct electrical contact between the lateral end sides of the spiral winding and the first metal conductor and the second metal conductor.” MTA Opp. 3. Petitioner contends that proposed substitute claim 10 already recites two insulating elements, which shield the two metal conductors from the end of the spiral winding. *Id.* According to Petitioner, there is no support for proposed substitute claim 15’s requirement of *two* additional separate insulators associated with the metal conductors, which would require a cell with *four* insulators in total.¹³

Patent Owner contends that the original Specification “demonstrate[s] possession of multiple insulators between the end sides of the spiral winding and the metal conductors.” MTA Reply 3 (citing Ex. 2035 ¶¶ 11–13, 15, 33, 45, 46, 48, 50–52, 54, Figs. 1A, 1B, 2B, 2C, 3A, 3B, 5). In particular, Patent Owner directs us to the disclosure of insulating elements 112, 113 and insulating tape 207/305 and 208/306 in connection with Figures 1A and 3A–B, respectively. *Id.* Dr. Peckerar testifies that a person of ordinary skill in the art “would have understood . . . that the '117 Application describes two

¹³ In this respect, proposed substitute claim 15 differs from original claim 6, which recites “at least one separate insulator” in addition to claim 1’s insulating element on “at least one . . . metal foil” conductor. As discussed above in Section II.D.5.a., claim 6 requires at least *two* insulators.

separate insulating elements on each side of the electrode separator assembly.” Ex. 2050 ¶ 43.

As discussed above in connection with original claim 6, we disagree with Patent Owner’s interpretation of the written description on this point. The record does not support an interpretation of the ’858 patent as disclosing multiple insulators on each side of an electrode assembly. As Petitioner points out, the ’858 patent gives no reason to “includ[e] multiple pairs of insulators within a housing, which would add extra inactive materials to the battery, a feature that would not be desired by persons of ordinary skill in the art.” MTA Opp. 3–4 (citing Ex. 1003 ¶ 323).

Nor do we find Dr. Peckerar’s testimony on this issue to be persuasive. Dr. Peckerar provides an annotated version of Figures 3A and 3B of the ’858 patent, where portions of the outer ring of the spiral wound electrode are highlighted red, and testifies that this shows “disc-shaped insulating elements” (Ex. 2060 ¶ 5):

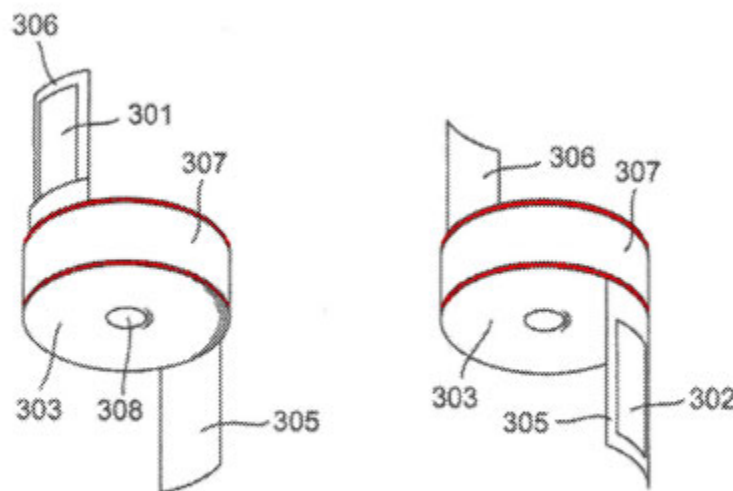


Fig. 3A

Annotated Figure 3A shows unlabeled rings on the outer edge of a spiral wound electrode highlighted in red. As Dr. Peckerar acknowledges,

however, these highlighted portions of the Figures are “not called out separately” in the ’858 patent (*id.*), and indeed, we find no support in the written description for a “disc-shaped insulating element.” To the contrary, Figure 3A shows an outer “insulating film 307” on the outer side of the winding.¹⁴ No figure of the ’858 patent shows multiple insulators associated with each metal conductor on the lateral ends of the spiral wound electrode. As we discussed above, it is more consistent with the disclosure of the ’858 patent that the insulating tape (207, 208) shown during the formation of the electrode winding in Figures 2 and 3 may subsequently be the insulator (112, 113) of the formed cell of Figure 1.

As a result, we conclude that the ’117 application lacks sufficient written description support for proposed substitute claim 15, specifically its requirement of four total insulators, two associated with each of the two metal conductors of the button cell. Patent Owner has not carried its burden with respect to this aspect of its Motion to Amend.

B. Challenges to the Proposed Substitute Claims under § 103

Patent Owner and Petitioner address the patentability of proposed substitute claims 10–17 on the following grounds:

Substitute Claims	35 U.S.C. §	References/Basis
10–17	103	Kaun, Kobayashi, Kwon

¹⁴ Being on the winding itself, insulating film 307 is not “associated with” the metal conductors, and cannot be one of the insulators of claim 15. Patent Owner does not argue otherwise.

Substitute Claims	35 U.S.C. §	References/Basis
10–17	103	Kannou, ¹⁵ Kaun, Kwon, Kawamura ¹⁶

C. Patentability of Proposed Substitute Claim 10

As a replacement for independent claim 1, Patent Owner proposes claim 10. MTA 3. Proposed substitute independent claim 10 is reproduced below with annotations showing amendments to original claim 1:

1- 10. A button cell comprising:

two metal housing halves, each including a generally round end surface joined to a lateral surface region, the lateral surface regions of the housing halves at least partially overlapping each other and being separated from one another by an electrically insulating seal, the lateral surface regions providing a force-fit connection therebetween to form ~~forming~~ a leak-tight, button cell housing having a plane bottom region and a plane top region parallel thereto;

~~an~~ a rechargeable lithium-ion electrode separator assembly comprising at least one positive electrode, ~~and~~ at least one negative electrode, and at least one separator and disposed inside the button cell housing, the assembly provided in the form of a spiral winding, lateral end sides of which face in a direction of the plane bottom region and the plane top region such that layers of the spiral winding are oriented essentially orthogonally to the plane bottom region and the plane top region; and,

a first metal conductor ~~conductors~~ electrically connected to the at least one positive electrode and a first of the housing halves and a second metal conductor electrically connected to the

¹⁵ Japanese Unexamined Patent Application Publication No. JP 2003-31266 to Kannou et al., published January 31, 2003 (Ex. 1039). Exhibit 1039 contains both the original Japanese-language version (*id.* at 10–16) and a certified English translation (*id.* at 2–8).

¹⁶ U.S. Patent Application No. 2007/0218356 A1 to Kawamura et al., published September 20, 2007 (Ex. 1040).

at least one negative electrode, ~~and respectively, to one and a second~~ of the housing halves,

wherein the button cell has a height-to-diameter ratio less than one,

wherein at least one of the first metal conductor and the second metal conductor ~~conductors~~ is a metal foil and the metal foil connects to the ~~respective housing half~~ first housing half or the second housing half with weld beads and/or weld spots passing through the button cell housing,

wherein the weld beads and/or weld spots originate from an outer side of the button cell housing,

wherein the metal foil ~~connecting to the respective housing half~~ bears flat on one of the lateral end sides of the ~~electrode separator assembly~~ spiral winding, and

wherein the first metal foils conductor and the second metal conductor are respectively shielded from the lateral end sides of the spiral winding by ~~insulating elements~~ a first insulating element and a second insulating element, and

wherein (i) the first housing half or the second housing half to which the metal foil connects, (ii) the metal foil, and (iii) one of the first insulating element or the second insulating element form a sequence of three flat layers in direct contact with one another in which the metal foil is interposed between the other two layers.

Id. at Appendix A, A-8–A-9. Relevant to the patentability over the prior art, proposed substitute independent claim 10 adds the following new features: (1) the lateral surface regions of the housing halves at least partially overlap each other and provide a force-fit connection to form a leak-tight housing; and (2) a sequence of three flat layers in direct contact with one another, formed by the housing half, the metal foil, and the insulating element. *Id.* at 16, 18–19; *see also id.* at Appendix A. Each proposed substitute claim 10–17 includes these identified new features, either through express recitation or by virtue of dependence.

3. *Challenges based on Kaun, Kobayashi, and Kwon*

The parties address whether the combined disclosures of Kaun, Kobayashi, and Kwon render proposed substitute claims 10–17 obvious. MTA 16–18, 19–23; MTA Opp. 6–15, 25. Petitioner directs us to portions of Kaun, Kobayashi, and Kwon that purportedly disclose each of the limitations in the challenged claims. MTA Opp. 6–15.

a) *Analysis of Claim 10*

Patent Owner does not challenge many of Petitioner’s allegations regarding the teachings of Kaun, Kobayashi, and Kwon. *See generally* MTA Reply. Instead, Patent Owner focuses its argument on the lack of record evidence and Petitioner’s purported failure to show that Kaun, Kobayashi and Kwon describe (1) a button cell where “the lateral surface regions providing a force-fit connection therebetween to form a leak-tight, button cell housing” (*id.* at 4–6), or (2) “a sequence of three flat layers in direct contact with one another,” formed by the housing half, the metal foil, and the insulating element (*id.* at 7–8).

Petitioner relies exclusively on Kaun to supply a housing that “is disposed around the electrode assembly 22 to isolate the positive and negative electrode 12p and 12 electrically from each other. . . . The housing 28 also serves to contain the electrode assembly 22 and *seal* the contents of the cell from the atmosphere.” MTA Opp. 6 (citing Ex. 100[5] ¶ 109). Because we agree with Patent Owner that Petitioner has failed to show that Kaun teaches or suggests that “the lateral surface regions provid[e] a force-fit connection therebetween to form a leak-tight, button cell housing,” a limitation present in all the proposed substitute claims, we limit our discussion below to addressing this argument.

Petitioner alleges that Kaun discloses the limitation “the lateral surface regions providing a force-fit connection therebetween to form a leak-tight, button cell housing.” *Id.* at 6–9. Petitioner directs us to Figure 7A of Kaun, and the accompanying disclosure that “the housing includes two cups 28p and 28n joined together, and electrically isolated from each other with a gasket 32 located around the periphery of the cups 28p and 28n. Preferably, the ‘U’ shaped gasket 32 is made of polyethylene.” *Id.* at 7 (citing Ex. 1005 ¶ 109, Fig. 7B).

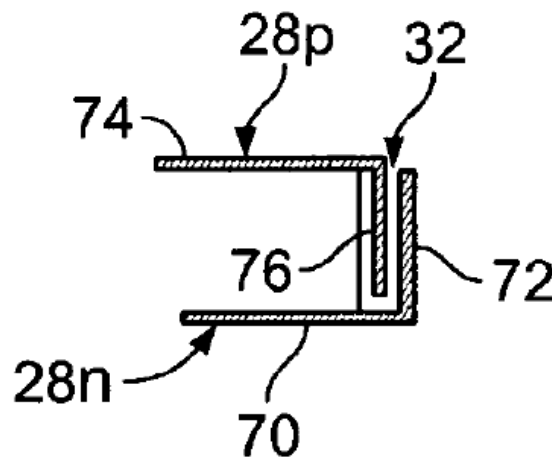


FIG. 7B

Petitioner also notes Kaun’s statement that “[t]he gasket 32, usually polyethylene, can also be an adhesive polymer, such as Dupont Surlyn, to seal the cell without pressure loading where *a pressure release seal is not required.*” *Id.* at 8 (citing Ex. 1005 ¶ 120).

Patent Owner disagrees, highlighting the fact that Kaun discloses that its cell housing is held together, at least in part, by a central fastener that connects the housing halves. MTA Reply 4. Patent Owner provides the following annotated version of Figure 11 of Kaun (*id.* at 5):

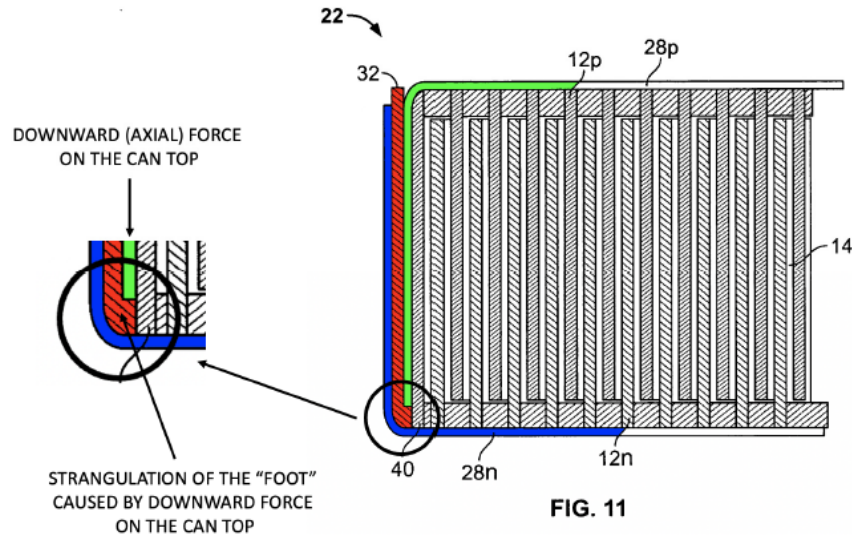
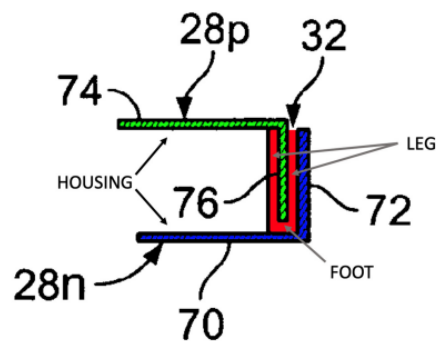


Figure 11 of Kaun, as annotated by Patent Owner, shows housing halves 28n, 28p highlighted in blue and green, with gasket 32 highlighted in red. According to Patent Owner, Kaun’s center fastener “appl[ies] closing forces in a downward axial direction to cause a ‘strangulation’ of the foot in Kaun’s gasket 32 underneath the cut edge of the cup 28p . . . to hold the housing halves together at a predetermined pressure by relative movement of the top and the bottom.” *Id.* at 5 (citing Ex. 1005 ¶¶ 91, 130, Figs. 7B, 11, 12B; Ex. 2060 ¶¶ 10–11). Dr. Peckerar testifies that “[t]he U-shaped gasket 32 shown in [Figure 7B] of Kaun operates in the same manner, as well.” Ex. 2060 ¶ 10. Figure 7B of Kaun, as annotated by Dr. Peckerar, is provided below:



Annotated Figure 7B of Kaun shows housing halves 28n (blue) and 28p (green), separated by U-shaped gasket 32 (red).

At the outset, we note that the parties dispute whether Kaun discloses a force-fit connection that holds the housing halves together. *See, e.g.*, MTA Opp. 8 (“the claim does not require that the housing halves be held together *exclusively* by a ‘force-fit’ connection”); MTA Reply 6 (“Dr. Peckerar explains that any force fit connection in Kaun is not sufficient to hold the housing halves together.”). This is beside the point; as Petitioner ultimately points out in the MTA Sur-Reply, “the claims have no such requirement that the cans be ‘held together’ by the force-fit connection of Kaun. Rather, the claim language is to ‘form . . . a button cell housing’ that is ‘leak-tight’ by use of a force-fit connection.” MTA Sur-reply 4 (alteration in original). Our analysis, therefore, focuses on whether Petitioner has proven that a force-fit connection between the housing halves of Kaun creates a leak-tight seal.

The parties also devoted substantial portions of their briefing and the hearing disputing whether Kaun’s housing is indeed leak-tight. Patent Owner highlights Kaun’s disclosure that its cells, at least in some embodiments, are intended to allow gas pressure to safely escape from the cell rather than building up and causing an explosion. MTA 17 (citing Ex. 1005 ¶ 23). According to Patent Owner, this requires a conclusion that the cells of Kaun are not “leak-tight,” although Patent Owner provides no explicit construction of that term or why it would rule out the release of gas.¹⁷ *Id.* Petitioner disagrees, arguing that “[t]he default state of the cell according to Kaun is leak-tight, releasing excess gas pressure as needed.”

¹⁷ We note, for example, that the ’858 patent also refers to the closure of button cells as “liquid-tight.” Ex. 1001, 1:33–39.

MTA Opp. 7. Ultimately, however, we need not undertake an explicit construction of “leak-tight” or determine whether it would encompass gas release from a cell, because as set forth below, Petitioner has not proven that in Kaun a force-fit connection is what causes the gasket to seal the cell.

Proposed substitute claim 10 requires “the lateral surface regions of the housing halves . . . at least partially overlapping each other and being separated from one another by an electrically insulating seal, the lateral surface regions providing a force-fit connection therebetween to form a leak-tight, button cell housing.” MTA Appendix A, A-8 (proposed substitute claim 10). Thus, proposed substitute claim 10 explains that the lateral ends of the housing halves at least partially overlap, are separated by a seal, and have a force-fit connection between their overlapping lateral ends that causes a leak-tight seal. *Id.* This is further described in the ’858 patent,¹⁸ which recites that “[b]utton cell 100 comprises two metal housing halves: a metal cup part 101 and a metal top part 102. With a seal 103 lying between them, the two parts are connected together in a leaktight fashion.” Ex. 1001, 6:52–7:13 (emphasis added). Thus, the patent makes clear that the force-fit between the lateral ends of the housing halves, with the seal between them, is what causes the leak-tight aspect of the battery housing.

As described above, Dr. Peckerar provides annotated figures from Kaun, and testifies that the center fastener of Kaun’s housing generates a downward force that causes a “strangulation” of the foot of the gasket. Ex. 2060 ¶¶ 10–11. We have reviewed Kaun’s disclosure and find

¹⁸ Patent Owner provides citations to the ’858 patent (Ex. 1001). *See generally* MTA Reply. For consistency, we do the same, but observe that the original disclosure, i.e., the ’117 application (Ex. 2035), contains the same description.

Dr. Peckerar's testimony well-supported and credible. Neither Petitioner nor Mr. Gardner directly contests Dr. Peckerar on the existence of this downward force. And given this testimony and our analysis of Kaun's disclosure, we find that to the extent Kaun's housing is leak-tight, it is the downward pressure on the foot of the gasket (or, in Figure 7, the horizontal connector of the U-shaped gasket) provided by the center fastener that causes the seal. Kaun's housing halves may also engage in some degree of a force-fit connection that causes a lateral force between the overlapping sides of the housing halves, but we cannot conclude on this record that this force-fit, as opposed to the downward force caused by the central fastener, is responsible for a leak-tight seal with the gasket.

For this reason, we find that Petitioner has not proven by a preponderance of the evidence that Kaun discloses a force-fit connection between the housing halves that forms a leak-tight button cell housing, as required by claim 10. Petitioner does not allege that any other prior art reference in this combination teaches or suggests this element of the claim.

b) Dependent Claims

The remaining proposed substitute claims, i.e., claims 11–14, 16, and 17,¹⁹ each require the additional feature of “the lateral surface regions providing a force-fit connection therebetween to form a leak-tight, button cell housing,” by virtue of dependence from independent claim 10. Petitioner relies on the same arguments and evidentiary support we

¹⁹ We have not considered the patentability of proposed substitute claim 15, as Patent Owner has not met its burden of showing adequate written description support for that claim.

determined did not establish obviousness with respect to claim 10 above.
MTA Opp. 25.

In view of the foregoing, we find Petitioner has failed to establish, by a preponderance of the evidence, that the combination of Kaun, Kobayashi, and Kwon render proposed substitute claims 11–14, 16, and 17 obvious.

4. *Challenges based on Kannou and Kaun, with either of Kwon or Kawamura*

The parties also address whether the combination of Kannou and Kaun, with either of Kwon or Kawamura, render proposed substitute claims 10–17 obvious. MTA 18, 24; MTA Opp. 15–24.

Patent Owner argues that (1) Kannou fails to teach a force-fit connection between lateral regions of button cell housing halves (MTA 18), (2) “Kawamura does not disclose a button cell housing of any sort” (*id.*), (3) Kannou does not disclose “a sequence of three flat layers in direct contact with one another” as outlined in proposed substitute claim 10 (*id.* at 24), and (4) one of ordinary skill in the art would not have had reason to combine Kannou’s “Comparative Example 1” with Kaun’s housing (MTA Reply 8–9).

Petitioner relies exclusively on Kaun describing a cup casing having a force-fit connection. MTA Opp. 16 (“Kannou [] discloses a button cell which is closed via crimping, and thus, has the same weaknesses as Kobayashi.”). Because we determined above that Petitioner failed to show that Kaun discloses or suggests “the lateral surface regions providing a force-fit connection therebetween to form a leak-tight, button cell housing,” we similarly find Petitioner has failed to make that showing here. Accordingly, we determine that the preponderance of the evidence fails to

show that proposed substitute claim 14 is unpatentable based on the combination of the combination of Kannou, Kaun, Kwon, and Kawamura.

The remaining proposed substitute claims, i.e., claims 11–14, 16, and 17, each require the additional feature of “the lateral surface regions providing a force-fit connection therebetween to form a leak-tight, button cell housing,” by virtue of dependence from independent claim 10. Petitioner relies on the same arguments and evidentiary support we determined did not establish that claim 10 would have been obvious. MTA Opp. 15–17.

In view of the foregoing, we find Petitioner and the record has failed to establish, by a preponderance of the evidence, that the combination of Kaun and Kannou with either of Kwon or Kawamura, renders proposed substitute claims 10–14, 16, and 17 obvious.

V. CONCLUSION²⁰

For the foregoing reasons, we conclude that Petitioner has satisfied its burden of demonstrating, by a preponderance of the evidence, that the subject matter of claims 1–8 of the ’858 patent is unpatentable as follows:

²⁰ Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner’s attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. See 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. See 37 C.F.R. § 42.8(a)(3), (b)(2).

Claims	35 U.S.C. §	Reference(s)/Basis²¹	Claim(s) Shown Unpatentable	Claim(s) Not Shown Unpatentable
1–8	103	Kobayashi, Kwon	1–8	
1–8	103	Kaun, Kobayashi, Kwon		
1–8	103	Kobayashi, Kwon	1–8	
Overall Outcome			1–8	

We further conclude that Patent Owner has satisfied its burdens on a motion to amend with respect to proposed substitute claims 10–14, 16, and 17, and Petitioner has *not* demonstrated by a preponderance of the evidence that these proposed substitute claims are unpatentable. Thus, we grant the revised contingent Motion to Amend as follows:

Motion to Amend Outcome	Claim(s)
Original Claims Cancelled by Amendment	
Substitute Claims Proposed in Amendment	10–17
Substitute Claims: Motion to Amend Granted	10–14, 16, 17
Substitute Claims: Motion to Amend Denied	15
Substitute Claims: Not Reached	

²¹ In view of our determination that claims 1–8 are rendered obvious in view of Kobayashi and Kwon, we do not reach grounds for which the last two columns of this table are blank. *See* Section III.E.

VI. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that Petitioner establishes by a preponderance of the evidence that claims 1–8 of the '858 patent are unpatentable; and

FURTHER ORDERED that Patent Owner's Motion to Exclude is *dismissed in part and denied in part*; and

FURTHER ORDERED that Patent Owner's Motion to Amend is *granted in part and denied in part*; and

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

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Patent 9,799,858 B2

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