

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

EVE ENERGY CO., LTD.,
Petitioner,

v.

VARTA MICROBATTERY GMBH,
Patent Owner.

IPR2021-00474
Patent 9,496,581 B2

Before CHRISTOPHER L. CRUMBLEY, JO-ANNE M. KOKOSKI, and
AVELYN M. ROSS, *Administrative Patent Judges*.

CRUMBLEY, *Administrative Patent Judge*.

JUDGMENT

Final Written Decision
Determining No Challenged Claim Unpatentable
Dismissing Patent Owner's Motion to Amend
35 U.S.C. § 318(a)

I. INTRODUCTION

Eve Energy Co., Ltd. filed a Petition (Paper 2, “Pet.”) requesting the Board institute an *inter partes* review of claims 1–13 of U.S. Patent No. 9,496,581 B2 (Ex. 1001, “the ’581 patent”). Varta Microbattery GmbH, the owner of the ’581 Patent, filed a Preliminary Response (Paper 7, “Prelim. Resp.”). Each party identified itself as the sole real party-in-interest to this proceeding. Pet. 1; Paper 4, 2.

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 ’581 patent. Paper 10 (“Decision on Institution” or “DI”). Pursuant to the Supreme Court’s decision in *SAS Institute Inc. v. Iancu*, 138 S. Ct. 1348, 1355 (2018), and USPTO Guidance,¹ we instituted review of all challenged claims on all asserted grounds. *Id.*

Following institution of trial, Patent Owner filed a Patent Owner Response (Paper 16, “PO Resp.”), Petitioner filed a Reply (Paper 20, “Pet. Reply”), and Patent Owner filed a Sur-reply (Paper 23, “Sur-reply”).

After institution, Patent Owner filed a Contingent Motion to Amend (Paper 17, “Motion to Amend” or “MTA”), proposing substitute claims 26–38 for original claims 1–13, contingent on those original claims being found unpatentable. Petitioner filed an Opposition (Paper 21, “MTA Opp.”), Patent

¹ In accordance with USPTO Guidance, “[i]f 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”).

Owner filed a Reply in Support of its Motion (Paper 24, “MTA Reply”), and Petitioner filed a Sur-reply (Paper 27, “MTA Sur-reply”).

In support of their respective positions, Petitioner relies on the testimony of Mr. Marc Juzkow (Ex. 1011, “Juzkow Declaration”; Ex. 1017, “Juzkow Supplemental Declaration”; Ex. 2006, “Juzkow Deposition”) and Mr. Jonathan Merz (Ex. 1013, 22, “Merz Translation Declaration”; Ex. 2011, “Merz Deposition”). Patent Owner relies on the testimony of Dr. Martin C. Peckerar (Ex. 2004, “Peckerar Declaration”; Ex. 2025, “Peckerar Supplemental Declaration”), Mr. Philipp Miehlich (Ex. 2008), and Dr. Hans Jurgen Lindner (Ex. 2009).

An oral hearing was held on May 24, 2022, and a transcript of the hearing is included in the record (Paper 29, “Tr.”).

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 not shown by a preponderance of the evidence that claim 13 of the ’581 patent is unpatentable. Petitioner’s challenges to claims 1–12 are moot in view of the Office’s subsequent cancellation of these claims. We dismiss as moot Patent Owner’s Revised Contingent Motion to Amend as to proposed substitute claims 26–38.

A. Related Proceedings

The parties indicate that the ’581 patent is the subject of multiple district court actions: *VARTA Microbattery GmbH v. Samsung Electronics America, Inc.*, No. 2:20-cv-00029-JRG (E.D. Tex.); *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. PEAG, LLC d/b/a JLab Audio*, 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.); *VARTA Microbattery GmbH v. Guandong Mic-Power New Energy Co., Ltd.*, No. 2:21-cv-00036-JRG (E.D. Tex.); *VARTA Microbattery GmbH v. Audio Partnership LLC, et al.*, No. 2:21-cv-00037-JRG (E.D. Tex.); *VARTA Microbattery GmbH v. PEAG, LLC d/b/a JLab Audio*, 2:21-cv-00038-JRG (E.D. Tex.); and *VARTA Microbattery GmbH v. GN Audio A/S et al.*, 2:21-cv-0134-JRG (D. Del.). Pet. 2–3; Paper 4, 2–3.

The '581 patent was also the subject of an *inter partes* review filed by another petitioner. See IPR2020-01211, Paper 1. In that proceeding, we held in our Final Written Decision that claims 1–12 of the '581 patent were unpatentable, but granted Patent Owner's Motion to Amend as to substitute claims 14–25. See *id.*, Paper 48. The Office issued a Trial Certificate finally canceling claims 1–12 and entering claims 14–25 on April 11, 2022.

B. The '581 Patent (Ex. 1001)

The '581 patent is titled “Button Cells and Method for Producing Same” and issued November 15, 2016, with claims 1–13. Ex. 1001, codes (54), (45), 12:15–13:12. The '581 patent describes a button cell that includes a housing cup and a top separated by a seal that forms a housing with parallel flat bottom and top areas, and an electrode-separator assembly including a flat positive and negative electrode, wherein the electrodes are aligned essentially at right angles to the flat bottom and top areas, and the assembly is a spiral winding having end faces defining side surfaces of the

winding facing in an axial direction relative to the flat bottom and top areas. *Id.* at code (57), 9:34–39, 11:11–24. The '581 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 3:22–30.

According to the '581 patent, it was known in the art to have button cells with electrode-separator assemblies contained within the housing, but the prior art button cells always contained these assemblies inserted flat such that the electrode layers are aligned essentially parallel to the flat bottom and top areas of the housing. Ex. 1001, 1:44–45, 3:36–39. The '581 patent states that various problems occur in button cells that contain such electrode-separator assemblies, including increased scrap rates due to faults that can occur when the assemblies make contact with one another, as well as the potential that the assemblies will leak. *Id.* at 1:58–60, 1:66–2:4.

The '581 patent states it was also known in the art to close button cells in a liquid-tight manner by beading the edge of the cell cup over the cell top and that button cells without beading cannot be loaded as heavily in the axial direction as compared to button cells with a beaded-over cup edge, especially with respect to axial mechanical loads caused in the interior of the button cell. *Id.* at 2:5–7, 2:18–23. The '581 patent explains that the axial forces, which may occur, for example, as a result of volume changes during charging and discharging processes, can lead to leaks more readily in button cells without beading than in button cells with beading. *Id.* at 2:23–29. Thus, the '581 patent indicates there was a need in the art for a button cell

that is resistant to mechanical loads in the axial direction and is manufactured without a beaded-over cup edge. *Id.* at 2:32–36.

Figure 4 of the '581 patent, reproduced below, illustrates a button cell according to an embodiment of the claimed invention.

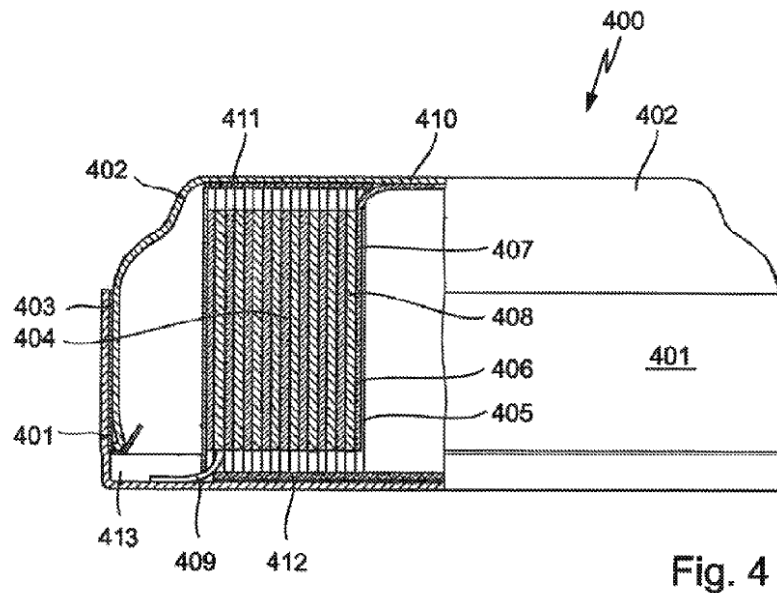


Figure 4 of the '581 patent, above, shows button cell 400 including a housing comprising cup part 401 and top part 402, with seal 403 arranged therebetween, and an assembly of electrodes 407 and 408 and separators 405 and 406, contained as spiral winding 404 within the housing. *Id.* at 11:11–21, Fig. 3. Top part 402 is inserted into cup part 401 such that the casing areas of top part 402 and cup part 401 overlap and the edge of cup part 401 is not beaded over the edge of top part 402.

The '581 patent discloses that electrode 407 is connected via output conductor 410 to top part 402, and electrode 408 is connected via output conductor 409 to cup part 401. *Id.* at 11:21–24. The '581 patent further discloses that insulating means 411 and 412 are arranged between the end faces of the winding and cup part 401 and top part 402. *Id.* at 11:28–31.

Figure 5 of the '581 patent, reproduced below, illustrates another embodiment of a button cell according to the claimed invention.

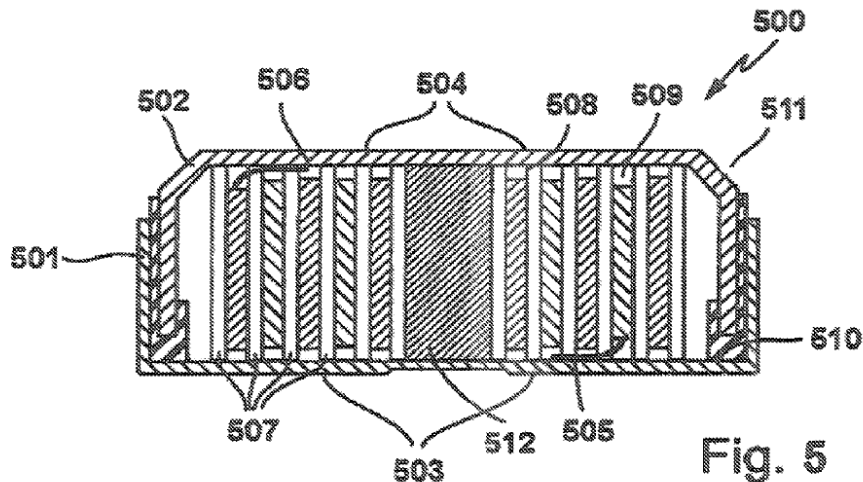


Figure 5 of the '581 patent, above, shows button cell 500 comprising cup part (cell cup) 501 and top part (cell top) 502 connected to one another, sealed by seal 510, which together form a housing with flat bottom area 503 and flat top area 504 parallel to it. *Id.* at 11:35–41. The '581 patent discloses that cell top 502 is inserted into cell cup 501 such that the casing areas of the cell top and the cell cup overlap and the edge of cell cup 501 is not beaded over edge 511 of cell top 502. *Id.* at 3:1–3, 11:44–51.

The '581 patent further discloses that button cell 500 contains an assembly within the housing comprising electrodes 508 and 509 and separators 507 in the form of a winding, whose end faces in the direction of flat bottom area 503 and flat top area 504 which is parallel to it. *Id.* at 11:52–59. The '581 patent also discloses that the assembly is wound up on winding core 512 in the center of the button cell, and winding core 512 and the electrodes and separators wound around it are aligned at right angles to flat bottom and flat top areas 503 and 504. *Id.* at 11:59–63.

The '581 patent explains that if the volume of the electrodes increases or decreases during a charging or discharging process, the mechanical forces that result act predominantly radially, and can be absorbed by the casing area of the button cell. *Id.* at 11:63–67. According to the '581 patent, because of the right-angled alignment of the electrodes, radial forces can be absorbed much better than axial forces by the housing of the button cell, which results in the button cell having improved sealing characteristics. *Id.* at 3:52–56.

C. Illustrative Claims

Petitioner challenged claims 1–13 of the '581 patent. Pet. 9. As noted above, the Office subsequently canceled claims 1–12 of the patent pursuant to the Final Written Decision in IPR2020-01211, leaving claim 13 as the sole remaining challenged claim. Nevertheless, because claim 13 depends from canceled claims 1, 10, and 11, we reproduce these claims below:

1. A button cell comprising:

a housing cup and a housing top separated from one another by an electrically insulating seal and which form a housing with a flat bottom area and a flat top area parallel to it, and

an electrode-separator assembly within the housing comprising at least one positive and at least one negative electrode in the form of flat layers and connected to one another by at least one flat separator,

wherein

the electrode layers are aligned essentially at right angles to the flat bottom area and the flat top area and the electrode-separator assembly is a spiral winding having end faces defining side surfaces of the spiral winding facing in an axial direction relative to the flat bottom area and the flat top area, and

one of the electrodes connects to the flat bottom area or the flat top area via an output conductor comprising a

foil resting flat between an end face of the spiral winding and the flat top or the flat bottom area to which it is connected.

10. A method of producing a button cell according to claim 1, comprising inserting an electrode-separator assembly with flat layer electrodes into the housing such that the flat layers of the electrode are aligned essentially at right angles to the flat bottom and top areas, wherein the housing comprises a metallic cup part and a metallic top part.

11. The method as claimed in claim 10, wherein the electrode-separator assembly is inserted as a winding.

Ex. 1001, 12:16–36, 12:64–13:4.

Claim 13 reads as follows:

13. The method as claimed in claim 11, wherein the winding is heat-treated on its end faces before being installed, and subjected to a temperature at which the separator is thermoplastically deformable.

D. Prior Art and Asserted Grounds of Unpatentability

Petitioner contends that claims 1–13 are unpatentable based on the following grounds:

Claims Challenged	35 U.S.C. § ²	Reference(s)/Basis
1–12	103	Brown, ³ Arai, ⁴ Okochi, ⁵ Higuchi ⁶
13	103	Brown, Arai, Okochi, Higuchi, Kageyama ⁷
1, 2, 4, 5, 8–11	102(b)	Kano ⁸

Pet. 9. Petitioner contends that Brown, Arai, Okochi, Kageyama, and Kano are prior art to the '581 patent under 35 U.S.C. § 102(b), while Higuchi is prior art under § 102(a). *Id.* at 9–10. Patent Owner did not contest the prior art status of any reference, and we find that the references are prior art to the '581 patent.

² 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 to which the '581 patent claims priority was filed before this date, the pre-AIA version of § 103 applies.

³ U.S. Patent No. 3,748,182 to Brown, issued July 24, 1973 (Ex. 1002).

⁴ U.S. Patent Application No. 2006/0124973 A1 to Arai et al., published June 15, 2006 (Ex. 1004).

⁵ European Patent EP 0829105 B1 to Okochi et al., published March 18, 1998 (Ex. 1009).

⁶ Chinese Patent Application Publication CN 101286572A to Higuchi et al., published October 15, 2008 (Ex. 1008). Petitioner submitted a certified English translation of Higuchi as Exhibit 1003.

⁷ Japanese Unexamined Patent Application Publication No. H07-153488 to Kageyama, published June 16, 1995 (Ex. 1012). Petitioner submitted a certified English translation of Kageyama as Exhibit 1006.

⁸ Japanese Unexamined Patent Application Publication No. JP 2003-31266 to Kano et al., published January 31, 2003 (Ex. 1014). Petitioner submitted a certified English translation of Kano as Exhibit 1013.

II. 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 ’581 patent

is a person holding a bachelor’s degree in engineering (mechanical, electrical or chemical), general science, materials science or the equivalent and 3-4 years of work experience with electrochemical cell packaging systems.

DI 8 (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. 5 (stating that

“[t]he claims are patentable regardless of which definition is used.”); *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))).

Petitioner contends that the terms of the challenged claims should be given their ordinary and customary meaning, but does not state with specificity what the ordinary and customary meaning of any term may be. Pet. 17. In our Decision on Institution, we interpreted Petitioner’s position to be that no claim term of the ’581 patent requires express construction, and Petitioner did not disagree with this understanding during trial. Patent Owner agreed that no claim term required construction beyond its plain and ordinary meaning. PO Resp. 6.

We agree that no claim terms require express construction for purposes of resolving the dispute between the parties. *See Nidec Motor*, 868

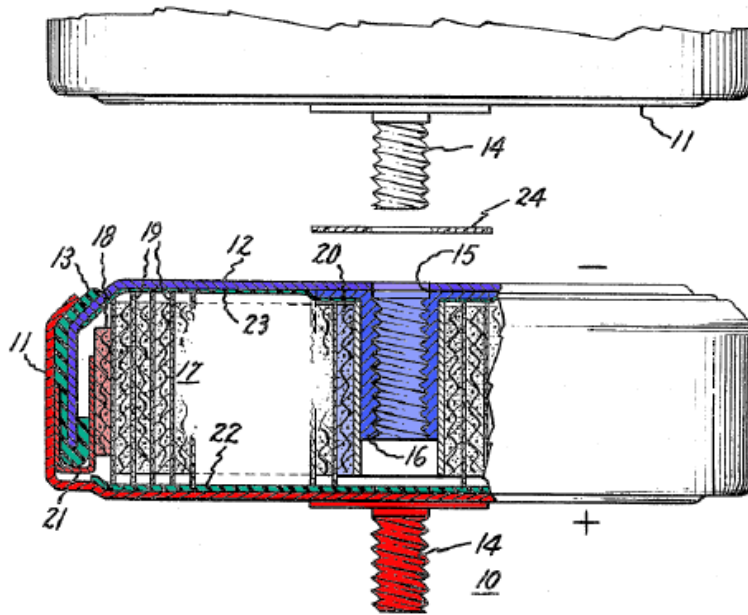
F.3d at 1017; *Vivid Techs.*, 200 F.3d at 803 (“[O]nly those terms need be construed that are in controversy, and only to the extent necessary to resolve the controversy.”).

D. Alleged Obviousness over Brown, Arai, Okochi, Higuchi, and Kageyama

The sole ground of unpatentability asserted by Petitioner as to remaining original claim 13 is based on obviousness over the combined disclosures of Brown, Arai, Okochi, Higuchi, and Kageyama. Pet. 72–77. Petitioner contends that claim 13 is unpatentable because its subject matter would have been obvious over the combined disclosures of these references in view of the knowledge of a person of ordinary skill in the art. *Id.* In evaluating this ground of unpatentability, we also must review Petitioner’s ground challenging claims 1, 10, and 11 as obvious over the combined disclosures of Brown, Arai, Okochi, and Higuchi, as claim 13 depends from these claims and Petitioner incorporates its analysis of that ground in discussing the unpatentability of claim 13. *Id.* at 72 (citing *id.* at 31–33). Petitioner also relies on the declaration testimony of Mr. Juzkow to support its arguments. *See id.*

1. Brown (Ex. 1002)

Brown is a U.S. Patent entitled “Button Type Cell Casing and Sealed Button Type Battery,” issued July 24, 1973. Ex. 1002, 1. Brown discloses a battery, which may be a rechargeable button cell battery, that has a cover casing and a spirally wound electrode assembly. *Id.* at 1:11–30, 52–59. The structure of Brown’s battery is shown in its Figure:



Brown's Figure, with color annotations added by Patent Owner, depicts positive components cathode 18, case 11, and threaded metal stud 14 shaded in red, while negative components anode 20, cover 12, and threaded socket 16 are shaded in blue. PO Resp. 4. Between the oppositely-charged components of case 11 and cover 12 is electrically insulating gasket 13, shown with green cross-hatching. *Id.*; Ex. 1002, 2:2–5. Metallic conducting strip 21 connects cathode 18 and case 11. Ex. 1002, 2:15–16.

2. *Arai (Ex. 1004)*

Arai is a U.S. Patent Application entitled “Energy Storage Device, Module Thereof and Electric Vehicle Using the Same,” published June 15, 2006. Ex. 1004, codes (43), (54). Arai describes a rechargeable battery cell having a battery can, battery lid, and a gasket in between that serves as an electrically insulating seal. *Id.* ¶¶ 82–83. Within the battery is a spiral wound electrode assembly having positive and negative electrodes. *Id.* The electrodes each have metal foil electrode tabs welded to them, which are then connected to the battery can or battery lid, providing an electrical

connection between the electrode and the housing. *Id.* ¶ 83. Figure 1 of Arai illustrates the arrangement of these elements:

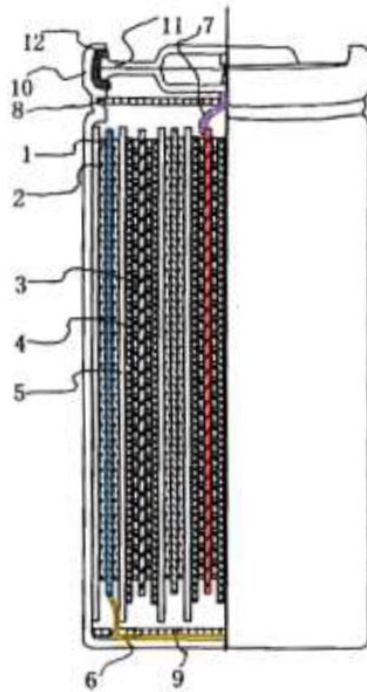


Figure 1 of Arai, with color annotations added by Petitioner, shows negative electrode tab 6 (yellow) connecting negative electrode layer 4 (blue) with battery can 10, and positive electrode tab 7 (purple) connecting positive electrode layer 2 (red) with battery lid 11. Ex. 1004 ¶¶ 43–54, 83; Pet. 24.

3. *Okochi (Ex. 1009)*

Okochi is a European Patent entitled “Non-Aqueous Electrolyte Secondary Batteries,” published March 18, 1998. Ex. 1009, codes (43), (54). Okochi describes a rechargeable battery having a spirally wound electrode assembly. *Id.* ¶¶ 1, 21. The positive and negative electrodes of Okochi’s battery have metal foils which act as collectors, and which are spot welded to the electrode and the inner surface of the cell container. *Id.* ¶¶ 17, 25.

4. *Higuchi (Ex. 1003)*

Higuchi is a Chinese Patent Application entitled “Coin-shaped Non-Aqueous Electrolyte Secondary Battery,” published October 15, 2008.

Ex. 1003, codes (43), (54).⁹ Higuchi describes a coin-shaped rechargeable battery having a strip-shaped anode, strip-shaped cathode, and strip-shaped separator which are wound together to form a cylindrical wound body. *Id.* at 3–4,¹⁰ Fig. 5B.

5. *Kageyama (Ex. 1006)*

Kageyama is a Japanese Patent Application titled “Manufacturing Method of Cylindrical Non-Aqueous Electrolyte Battery,” and published June 16, 1995. Ex. 1006, codes (43), (54).¹¹ Kageyama relates to preparation of a wound electrode body wherein the electrode separator protrudes from the ends of the electrode, and after winding the separator is bent over the ends of the electrode by heat molding. *Id.* at code (57). While Kageyama does not limit the method for heat molding the separator, it specifically references hot air blowing and using a heating jig to apply heat and pressure from above and below the winding. *Id.* ¶ 22. Kageyama discloses that in traditional battery windings, slight displacements in the position of the electrodes and separators during manufacturing may lead to

⁹ Petitioner provides a certified English translation of Higuchi in the record. Ex. 1003, 1; *see id.* at 23 (translator’s declaration). All citations to Higuchi are to the certified translation rather than the Chinese language original.

¹⁰ We refer to the pagination added by Petitioner in the lower-right corner of the page.

¹¹ Petitioner provides a certified English translation of Kageyama in the record. Ex. 1006, 1; *see id.* at 12 (translator’s declaration). All citations to Kageyama are to the certified translation rather than the Japanese language original.

the electrodes coming into contact with one another. *Id.* ¶ 7. By extending the length of the separator, and then bending the separator over the ends of the electrodes, contact between the electrodes can be prevented without increasing the volume of the battery casing. *Id.* ¶¶ 9, 16.

6. *Petitioner's Proposed Combination*

Petitioner contends that, when considered together, Brown, Arai, Okochi, Higuchi, and Kageyama suggest the limitations of claim 13, and that a person of ordinary skill in the art would have been motivated to combine the disclosures of the references in a manner that would result in the claimed method of producing a button cell. Pet. 72–77. Petitioner begins its analysis with the cell of Brown, which Petitioner alleges discloses a housing cup and housing top separated by an electrically insulating seal (Pet. 34–35) and a spiral-wound electrode-separator assembly with flat layer electrodes connected by a separator (*id.* at 35–38). Brown's electrode layers are aligned at right angles to the flat top and bottom of the housing and formed into a spiral winding, and Petitioner argues that Higuchi also discloses this spiral winding arrangement of electrodes. *Id.* at 38–44.

With regard to the claim limitation that “one of the electrodes connects to the flat bottom area or the flat top area via an output conductor comprising a foil resting flat between an end face of the spiral winding and the flat top or the flat bottom area,” Petitioner contends that Brown discloses an output conductor comprising a metallic connecting strip, but concedes that strip does not rest flat between the end face of the spiral winding and the top or bottom area of the housing. Pet. 44–45. Petitioner directs us to Arai or Okochi for this aspect of the claimed battery. *Id.* at 45–47. For example, Arai is said to disclose an output conductor that is a foil, welded to the

electrodes and resting flat between an end face of the spiral winding and the flat top or bottom area of the housing. *Id.* at 45–46 (citing Ex. 1004 ¶¶ 18, 48–49, 79, 81, 83; Ex. 1011 ¶¶ 148–150). To illustrate this structure, Petitioner provides the following annotated version of Figure 1 of Arai, as prepared by Mr. Juzkow:

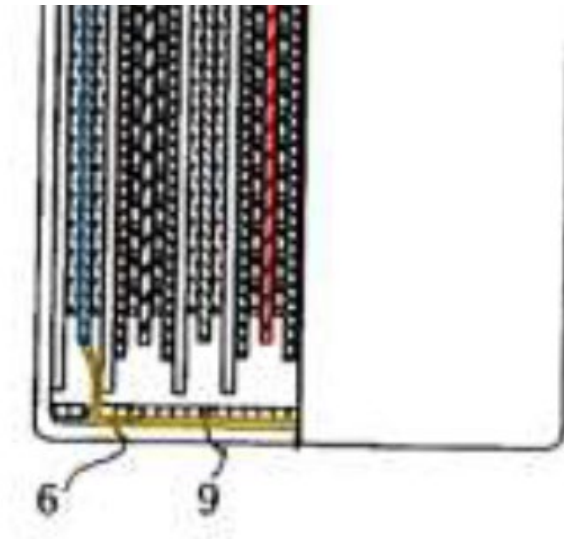
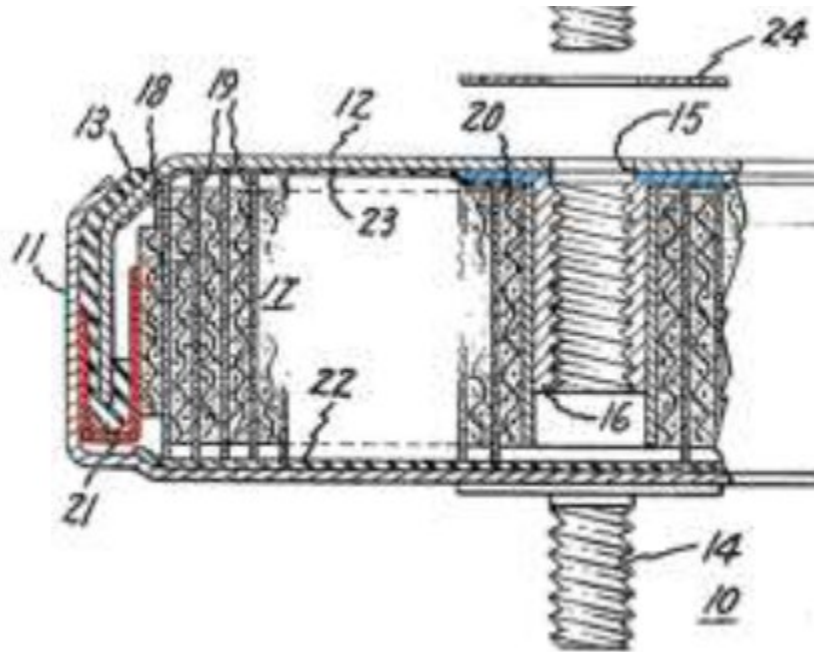


Figure 1 of Arai, reproduced above as annotated by Mr. Juzkow, shows wound electrodes shaded blue and red, with output conductor 6 shaded yellow resting flat between insulator 9 and the battery housing. Ex. 1011 ¶ 150.

Okochi is said to contain a similar disclosure, with a rechargeable battery with a spirally wound electrode having a metal foil collector welded to the negative electrode and the inner surface of the bottom of the cell. Pet. 47–48. In view of these disclosures, Petitioner contends that a person of ordinary skill in the art would have understood the metallic connecting strip 21 of Brown, shown below as annotated by Mr. Juzkow, “should be modified to rest flat between the end face of the spiral winding and the

metallic bottom, as disclosed by Arai and Okochi.” Pet. 48 (citing Ex. 1011 ¶ 153).



Brown’s Figure, reproduced above with annotations provided by Mr. Juzkow, shows output conductor 21 shaded in red positioned between the overlapping portions of casing halves 11 and 12, next to insulating gasket 13. Ex. 1002, 2:13–16, Figure; Ex. 1011 ¶ 146.

Petitioner contends that a person of ordinary skill in the art would have had a reasonable expectation of success in making this modification, because all three of Brown, Arai, and Okochi disclose cells that use spirally wound electrode assemblies. Pet. 48. And “[t]he motivation for doing so would be to preserve the compactness of the button cell.” *Id.* (citing Ex. 1011 ¶¶ 153–156).

Turning to claim 10, which is directed to a method of making the button cell of claim 1, and claim 11, which specifies that the electrode-separator assembly of claim 10 is a winding, Petitioner notes that Brown teaches that various methods of forming its button cell assembly are suitable,

and that Arai teaches a specific method for winding and assembling its electrode-separator assembly. Pet. 66–71.

Finally, with respect to claim 13, which adds to the method of claim 11 that the winding is heat-treated on its end faces before being installed, at a temperature at which the separator is thermoplastically deformable, Petitioner directs us to the teachings of Kageyama. Pet. 74–77. Kageyama is said to disclose heat treating an electrode winding to deform its separator, using either hot air or a heating jig. *Id.* at 73 (citing 1006 ¶ 22; Ex. 1011 ¶ 233). Mr. Juzkow testifies that it was well-known to heat treat the end faces of spirally wound electrodes to thermoform the separator layer, and that a person of ordinary skill in the art would have applied these heating techniques to cells such as those disclosed in Brown, Arai, or Higuchi “in order to cause the separator layers to either shrink or be softened so that they could be molded as desired for a particular type of battery.” Ex. 1011 ¶ 237.

Patent Owner does not challenge Petitioner’s characterization of the prior art’s disclosures, or its allegations regarding the teachings of Brown, Arai, Okochi, Higuchi, or Kageyama. *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 limitation of claim 13 of the ’581 patent is present in the five prior art references.

Patent Owner, however, does argue that Petitioner has not provided a persuasive reason why one of ordinary skill in the art would have modified the cell of Brown to include an output conductor that rests flat against the top or bottom casing of a button cell (*id.* at 23–31), and argues that a person of ordinary skill in the art would not have had a reasonable expectation of

success in doing so (*id.* at 31–37). With respect to claim 13 specifically, Patent Owner also contends that a person of ordinary skill in the art would not have had a reason to add the additional heat treatment step of Kageyama. *Id.* at 37–39. Patent Owner also asserts that objective indicia support the nonobviousness of the claim. *Id.* at 39–49. We address these contested issues below.

7. *Reason to Combine the References*

Patent Owner argues that Petitioner’s proposed modification to the cell of Brown, by moving the output conductor to lie flat against the bottom of the housing, lacks sufficient supporting motivation. PO Resp. 21–22. Patent Owner notes that Petitioner articulates a general motivation to “design button cell batteries that maximized the active volume of the battery housing” and “minimize the ability of the electrodes inside the housing to cause deformation.” Pet. 31 (citing Ex. 1011 ¶¶ 91, 93, 96–105). Patent Owner calls this motivation “nonsensical,” because moving the output conductor as Petitioner proposes would actually *decrease* the amount of active volume in the cell. PO Resp. 22, 24–25. Patent Owner directs us to the deposition testimony of Mr. Juzkow, Petitioner’s expert, who testified on cross-examination that placing the connector under the electrode assembly would leave less vertical space for active material, and agreed that reconfiguring Brown’s cell in the manner Petitioner suggests “would not improve the compactness of the cell.” Ex. 2006, 118:3–119:3.¹² Indeed,

¹² Mr. Juzkow went on to explain his belief that a person of ordinary skill in the art would have compensated for the loss in volume for active material due to the relocated conductor by replacing the hollow central member of Brown’s cell with a smaller cavity, thus resulting in an overall same volume of active material. Ex. 2006, 118:19–119:16. But Mr. Juzkow also admitted

Mr. Juzkow testified that the reconfiguration of the output conductor proposed by Petitioner would result in approximately a one percent reduction in active material. *Id.* at 119:22–120:10.

Elsewhere in the Petition, the motivation to modify the output conductor of Brown’s cell is articulated slightly differently: Petitioner argues that the motivation for creating a cell that has an output conductor resting flat between the end face of the spiral winding and the flat area of the housing would be “to preserve the compactness of the button cell.” Pet. 48 (citing Ex. 1011 ¶ 153). Although Petitioner relies on Mr. Juzkow’s testimony for this contention, that testimony does not explain how relocating the conductor would “preserve” compactness.

Patent Owner also relies on the declaration of its expert, Dr. Peckerar, who testifies that modifying Brown’s connecting strip would necessarily consume more space within the cell and therefore would not preserve compactness at all. PO Resp. 25 (citing Ex. 2004 ¶¶ 133–138). Dr. Peckerar also testifies that the modification to Brown’s cell would make the conductor’s connection less reliable, because it would be resting on the bottom of the housing cell instead of securely clamped between the insulating gasket 13 and the case 11 as disclosed in Brown. Ex. 2004 ¶ 144.

In response, Petitioner claims that Patent Owner is attempting to “complicate . . . the simple design consideration of where to connect the electrode assembly to the casing.” Reply 8. In Petitioner’s view, the prior art of record shows that there were four potential options for where to

that these other modifications that could have been made were not part of his direct testimony in his Declaration (*id.* at 119:7–16), and we are reluctant consider other modifications raised for the first time on cross-examination (and not supported in the Petition) as the basis for our conclusions here.

connect the output conductor: to the top face of the cell; indirectly to the top face via central post; to an outer (circumferential) face of the cell; or to the bottom face of the cell. *Id.* Citing *KSR*, Petitioner argues that a person of ordinary skill in the art would have chosen between this “finite number of known, predictable solutions” and that this “is not evidence of innovation, but rather ordinary skill and common sense.” *Id.* at 9. Petitioner also notes that Brown does not explicitly require its output conductor to be located in the place shown in its Figure, so the location of the conductor shown is “exemplary, not mandatory” and Petitioner need not justify relocating Brown’s conductor. *Id.*

We acknowledge Petitioner’s view that the decision of where to locate the output conductor of a battery cell appears “simple” and that the proposed modification to Brown may be one of a small set of possible options. But that does not remove Petitioner’s obligation to explain why a person of ordinary skill in the art would have had some reason to make the modification to the prior art that has been proposed. Requiring a petitioner to articulate a reason to modify the prior art guards against hindsight evaluation of a modification which may only appear obvious after the fact. For this reason, the Supreme Court has noted that “there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness,” and that “[t]o facilitate review, this analysis should be made explicit.” *See KSR*, 550 U.S. at 418 (quoting *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)). Here, after evaluating the entirety of the factual record adduced at trial, we cannot conclude that Petitioner has set forth a sufficiently supported reason why a person of ordinary skill in the art would have modified Brown.

First, we agree with Patent Owner that Petitioner's articulated goal of maximizing the volume of active material in the cell is undercut by the modification it proposes. As Petitioner's expert Mr. Juzkow admitted, relocating Brown's output conductor to the bottom of the cell would reduce the volume available for active material by approximately one percent. While we do not disregard Mr. Juzkow's subsequent testimony that other modifications to Brown's cell (such as removal of the central screw cavity) could compensate for this loss in volume, the fact remains that Petitioner did not propose these additional modifications in the Petition. It is incumbent on Petitioner to set forth all modifications to the prior art it plans to rely on, and justify why a person of ordinary skill in the art would have had reason to make them, so that we may fully evaluate whether it would have been obvious to do so. In any event, even if we were to accept Mr. Juzkow's late assertion of other modifications that could be used to compensate for the loss in volume of active material, the fact remains that it is *these other modifications* that would be serving the motivation proposed by Petitioner of maximizing the volume of active material; relocating the output conductor would have no positive effect towards this modification. Thus, we conclude that Petitioner's expressed motivation of maximizing active material volume has no rational relationship to the modification of Brown that is central to its Petition, of relocating the output conductor from the side of the casing to the bottom.

Nor do we find persuasive Petitioner's argument that relocating Brown's output conductor to the bottom of the cell would have been attempted "to preserve the compactness of the button cell." Petitioner does not explain why reconfiguration would be necessary to *preserve* the

compactness of the cell, as opposed to simply leaving the cell configuration unchanged. Certainly, one way to “preserve” the compactness of Brown’s cell is to not make any modification to Brown at all.

Finally, we are unpersuaded by Petitioner’s attempt to rely on a “simple substitution of known elements” rationale for modifying Brown. Brown does not simply disclose a button cell and leave it to the person of ordinary skill in the art to choose the location of the output conductor from among several art-recognized options. Brown specifies that its output conductor is located on the side of the cell, sandwiched between the bottom cell housing half and a sealing gasket. We credit Dr. Peckerar’s testimony that a person of ordinary skill in the art would have realized that locating the conductor as specified in Brown would have certain advantages, such as holding the conductor in place and maintaining contact with the cell housing. Ex. 2004 ¶ 144. While such advantages do not mean that a person of ordinary skill in the art would not have chosen other arrangements, they do mean that there should be some reason for the designer to forego such advantages by implementing another design, such as a tradeoff of one advantage for another. As discussed above, Petitioner gives us no such advantage here other than maximizing the volume for active material, which we find is not supported by the record.

Having evaluated the totality of the record, we find that Petitioner has not articulated a sufficient reason why a person of ordinary skill in the art would have made the proposed modifications to Brown’s cell in view of the teachings of Arai, Okochi, Higuchi, and Kageyama, to result in the method claimed in claim 13. For these reasons, we determine that Petitioner has failed to prove by a preponderance of the evidence that claim 13 would have

been unpatentable as obvious over the combined disclosures of Brown, Arai, Okochi, Higuchi, and Kageyama.¹³

E. Remaining Grounds

We have addressed above Petitioner’s second asserted ground of unpatentability, which is the sole ground in the Petition that challenges claim 13 of the ’581 patent. The remaining grounds of unpatentability were directed to claims 1–12, which as noted above have been canceled by trial certificate following our Final Written Decision in IPR2020-01211. These remaining grounds of the Petition, directed to claims that have been canceled, are therefore moot.

III. REVISED CONTINGENT MOTION TO AMEND

Patent Owner filed a Revised Contingent Motion to Amend, which propose substitute claims 26–38 in the event that we determined original claims 1–13 to be unpatentable. MTA 4. Original claims 1–12 are no longer at issue in this proceeding, having been canceled and replaced by substitute claims 14–25 via a granted Motion to Amend in IPR2020-01211. And we have found that Petitioner has not established by a preponderance of

¹³ Although not raised in briefing by either party, we have also evaluated whether estoppel under 37 C.F.R. § 42.73(d)(3)(i) would require a finding of unpatentability of claim 13 in light of our prior determination in IPR2020-01211 that claims 1–12 are unpatentable. *See* 37 C.F.R. § 42.73(d)(3)(i) (“A patent applicant or owner is precluded from . . . obtaining in any patent: A claim that is not patentably distinct from a finally refused or canceled claim.”). We conclude that it does not. The Board has previously held that defending the patentability of a previously-issued claim in an *inter partes* review does not qualify as “obtaining in a patent” that claim, and therefore patent owner estoppel does not apply in this situation. *See Apple Inc. v. ContentGuard Holdings, Inc.*, IPR2015-00458, Paper 9, 8 (PTAB July 15, 2015).

the evidence that claim 13 is unpatentable. The contingency on which Patent Owner's Motion to Amend is based, therefore, has not occurred. We dismiss the Motion to Amend as moot.

IV. CONCLUSION¹⁴

For the foregoing reasons, we conclude that Petitioner has not satisfied its burden of demonstrating, by a preponderance of the evidence, that the subject matter of claim 13 of the '581 patent is unpatentable as follows, and resolve the asserted grounds of unpatentability as follows:

Claim(s)	35 U.S.C. §	Reference(s)¹⁵	Claim(s) Shown Unpatentable	Claim(s) Not Shown Unpatentable
1–12	103	Brown, Arai, Okochi, Higuchi		
13	103	Brown, Arai, Okochi, Higuchi, Kageyama		13
1, 2, 4, 5, 8–11	102(b)	Kano		

¹⁴ 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).

¹⁵ In view of the cancellation of claims 1–12 following the Final Written Decision in IPR2020-01211, we do not reach the two grounds for which the last two columns of this table are blank. See Section II.E.

Claim(s)	35 U.S.C. §	Reference(s)¹⁵	Claim(s) Shown Unpatentable	Claim(s) Not Shown Unpatentable
Overall Outcome				13

Given the outcome summarized above, we dismiss the Contingent Motion to Amend as follows:

Motion to Amend Outcome	Claim(s)
Original Claims Cancelled by Amendment	
Substitute Claims Proposed in Amendment	
Substitute Claims: Motion to Amend Granted	
Substitute Claims: Motion to Amend Denied	
Substitute Claims: Not Reached	26–38

V. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that Petitioner has not established by a preponderance of the evidence that claim 13 of the '581 patent is unpatentable;

FURTHER ORDERED that Petitioner's challenges to claims 1–12 of the '581 patent are *dismissed* as moot;

FURTHER ORDERED that Patent Owner's Motion to Amend is *dismissed* as moot; 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.

IPR2021-00474
Patent 9,496,581 B2

FOR PETITIONER:

Timothy Maier
Siddhesh Pandit
Christopher Maier
MAIER & MAIER PLLC
tjm@maierandmaier.com
svp@maierandmaier.com
cjm@maierandmaier.co

FOR PATENT OWNER:

H. Hartmann
Wesley Mueller
Robert Wittmann
Paul J. Filbin
Brent Chatham
LEYDIG, VOIT & MAYER, LTD
mhartmann@leydig.com
wmueller@leydig.com
bwittmann@leydig.com
pfilbin@leydig.com
bchatham@leydig.com