

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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INDUCTEV, INC.,  
Petitioner,

v.

WITRICITY CORPORATION,  
Patent Owner.

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IPR2023-01182  
Patent 8,461,719 B2

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Before JAMESON LEE, ROBERT J. WEINSCHENK, and  
SCOTT RAEVSKY, *Administrative Patent Judges*.

WEINSCHENK, *Administrative Patent Judge*.

JUDGMENT  
Final Written Decision  
Determining Some Challenged Claims Unpatentable  
Granting Patent Owner's Motion to Amend  
*35 U.S.C. § 318(a)*

## I. INTRODUCTION

### A. *Background and Summary*

InductEV, Inc. (“Petitioner”) filed a Petition (Paper 2, “Pet.”) requesting an *inter partes* review of claims 16 and 17 (“the challenged claims”) of U.S. Patent No. 8,461,719 B2 (Ex. 1001, “the ’719 patent”). WiTricity Corporation (“Patent Owner”) filed a Preliminary Response (Paper 6, “Prelim. Resp.”) to the Petition. We instituted an *inter partes* review of the challenged claims on February 20, 2024. Paper 9 (“Dec. on Inst.”), 16. After institution, Patent Owner filed a Response (Paper 22, “PO Resp.”) to the Petition, Petitioner filed a Reply (Paper 30, “Pet. Reply”) to the Response, and Patent Owner filed a Sur-reply (Paper 34, “PO Sur-reply”) to the Reply. Patent Owner also filed a non-contingent Motion to Amend requesting cancellation of claim 16. Paper 36 (“Mot. Amend”), 1. We held an oral hearing on November 19, 2024, and a transcript of the hearing is included in the record. Paper 37 (“Tr.”).

For the reasons set forth below, we grant Patent Owner’s request to cancel claim 16, and we determine that Petitioner has shown by a preponderance of the evidence that claim 17 is unpatentable.

### B. *Real Parties in Interest*

The parties identify themselves as the only real parties in interest. Pet. 82; Paper 3, 1.

### C. *Related Matters*

The parties indicate that the ’719 patent is the subject of the following district court case: *WiTricity Corporation v. InductEV, Inc.*, No. 2:23-cv-01099 (E.D. Pa.) (“District Court Litigation”). Pet. 82; Paper 3, 1. The parties also indicate that another patent asserted in the District Court

Litigation, U.S. Patent No. 8,912,687 B2, is the subject of a petition for *inter partes* review in IPR2023-01208. Pet. 82; Paper 3, 1. Petitioner indicates that a patent related to the '719 patent was the subject of a petition for *inter partes* review in IPR2021-01166. Pet. 82.

*D. The '719 Patent*

The '719 patent relates to “wireless energy transfer.” Ex. 1001, 1:30–31. The '719 patent states that “[a] known non-radiative, or near-field, wireless energy transfer scheme, often referred to as either induction or traditional induction, . . . uses an oscillating current passing through a primary coil, to generate an oscillating magnetic near-field that induces currents in a near-by receiving or secondary coil.” *Id.* at 1:57–62.

According to the '719 patent, “[t]raditional induction schemes have demonstrated the transmission of modest to large amounts of power, however only over very short distances, and with very small offset tolerances between the primary power supply unit and the secondary receiver unit.” *Id.* at 1:63–67. To address that problem, the '719 patent describes “systems and methods” that “provide for near-field wireless energy transfer via strongly coupled [high quality factor (‘Q-factor’)] resonators . . . with the potential to transfer power . . . over distances much larger than have been achieved using traditional induction techniques.” *Id.* at 3:25–30.

*E. Illustrative Claim*

Both challenged claims, claims 16 and 17, are independent. Claim 17 is reproduced below.

17. A system, comprising:  
a source resonator having a Q-factor  $Q_1$  and a characteristic size  $x_1$ , and a second resonator having a Q-factor

$Q_2$  and a characteristic size  $x_2$ , and located a distance  $D$  from the source resonator;

wherein the source resonator and the second resonator are coupled to exchange energy wirelessly among the source resonator and the second resonator, and wherein  $\sqrt{Q_1 Q_2}$  is greater than 100; and

wherein at least one of the resonators includes a coil of a plurality of turns of a conducting material connected to a network of capacitors, wherein the plurality of turns are in a common plane, and wherein a characteristic thickness of the at least one of the resonators is much less than a characteristic size of the at least one of the resonators.

Ex. 1001, 99:4–19.

*F. Evidence*

Petitioner submits the following evidence:

<b>Evidence</b>	<b>Exhibit No.</b>
Declaration of Mark Allen (“Allen Declaration”)	1003
Cook, US 8,855,554 B2, issued Oct. 7, 2014 (“Cook ’554”)	1005
Cook, US 8,378,523 B2, issued Feb. 19, 2013 (“Cook ’523”)	1007
Lee, US 2007/0145830 A1, published June 28, 2007 (“Lee”)	1008
Pohjonen, WO 2007/101902 A1, published Sept. 13, 2007 (“Pohjonen”)	1009
Declaration of Mark Allen in Support of Petitioner’s Reply (“Allen Reply Declaration”)	1036

Patent Owner submits the Declaration of Mark N. Horenstein.

Ex. 2011 (“Horenstein Declaration”).

*G. Asserted Grounds*

Petitioner asserts that the challenged claims are unpatentable on the following grounds:

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
16	103(a) <sup>1</sup>	Cook '554
16	103(a)	Cook '554, Pohjonen
17	103(a)	Cook '554
16	103(a)	Cook '523, Pohjonen
17	103(a)	Lee, Cook '523

## II. ANALYSIS

### A. Legal Standards

A claim is unpatentable as obvious 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 the invention was made to a person having ordinary skill in the art to which the subject matter pertains. *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) any objective indicia of non-obviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

### B. Level of Ordinary Skill in the Art

Petitioner argues that a person of ordinary skill in the art would have had “at least a bachelor’s degree in electrical engineering (or equivalent) and at least two to three years of industry or equivalent research experience in the field of wireless energy transfer.” Pet. 7–8 (citing Ex. 1003 ¶¶ 37–41). Petitioner’s description of the level of ordinary skill in the art is supported

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<sup>1</sup> The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284, 287–88 (2011), amended 35 U.S.C. § 103. Based on the effective filing date of the ’719 patent, we apply the pre-AIA version of § 103.

by the testimony of Petitioner’s declarant, Dr. Mark Allen. Ex. 1003 ¶¶ 37–41. Patent Owner does not dispute Petitioner’s description. PO Resp. 14. We adopt Petitioner’s description for purposes of this Decision.

*C. Claim Construction*

In an *inter partes* review proceeding, a patent claim is construed using the same standard used in a civil action under 35 U.S.C. § 282(b), including construing the claim in accordance with the ordinary and customary meaning of the 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).

*1. Network of capacitors*

Petitioner proposes construing the phrase “a network of capacitors” in claim 17 to mean “any circuit topology including one or more capacitors.” Pet. Reply 1. Petitioner argues that its proposed construction is “the lexicographic definition provided by the patentee.” *Id.* at 1–2 (citing Ex. 1001, 52:32–38). In contrast, Patent Owner proposes construing the phrase “a network of capacitors” to mean “a circuit topology of passive components including one or more capacitors that provides two or more degrees of freedom.” PO Resp. 14. Patent Owner argues that its proposed construction is supported by the written description of the ’719 patent. *Id.* at 12–13 (citing Ex. 1001, 5:38–43, 20:12–17, 37:65–38:1, 43:65–44:6, 44:42–46, 44:51–55, 45:54–46:13, 46:37–44, 51:45–57:33, 69:56–60, Figs. 30–35); PO Sur-reply 2–4 (citing Ex. 1001, 10:11–14, 57:34–40, Figs. 30–36).

The intrinsic evidence supports Petitioner’s proposed construction. Claim 17 recites “a source resonator . . . and a second resonator . . . wherein at least one of the resonators includes a coil of a plurality of turns of a

conducting material connected to *a network of capacitors.*” Ex. 1001, 99:5–15 (emphasis added). The ’719 patent states that

[i]t will be appreciated that *a network of capacitors, as used herein, may in general refer to any circuit topology including one or more capacitors*, including without limitation any of the circuits specifically disclosed herein using capacitors, or any other equivalent or different circuit structure(s), unless another meaning is explicitly provided or otherwise clear from the context.

*Id.* at 52:32–38 (emphasis added). Thus, the ’719 patent expressly defines the phrase “a network of capacitors” as any circuit topology including one or more capacitors. *Id.*

Patent Owner argues that “a network of capacitors” also must provide two or more degrees of freedom. PO Resp. 14. Specifically, Patent Owner contends that the ’719 patent describes an impedance matching circuit for matching a resonator to an external circuit. *Id.* at 13 (citing Ex. 1001, 5:38–43, 37:65–38:1, 44:51–55, 45:64–66, 46:6–13, 51:45–57:33, Figs. 30–35). According to Patent Owner, the impedance matching circuit controls both the real and imaginary parts of the impedance using two or more variable elements. *Id.* at 12–13 (citing Ex. 1001, 44:3–6, 44:42–46, 45:54–46:13, 46:37–44, 51:45–57:33, 69:56–60, Figs. 30–35; Ex. 2011 ¶¶ 41–49); PO Sur-reply 2–4; Tr. 25:22–26:12. Patent Owner points out that the impedance matching circuits in Figures 30–35 of the ’719 patent each include two or more elements with an arrow through them, which indicates that two or more elements are variable. PO Resp. 13 (citing Ex. 1001, 51:45–57:33, Figs. 30–35); Tr. 29:1–30:5.

The intrinsic evidence does not support Patent Owner’s proposed construction. The portions of the ’719 patent relied on by Patent Owner

describe an impedance matching circuit. *See* Ex. 1001, 45:54–66, 51:47–49. But the '719 patent indicates that an impedance matching circuit is not the same as a network of capacitors. *See, e.g., id.* at 5:35–40 (“wherein the first network of capacitors and the second network of capacitors form an impedance matching network”). Specifically, Figures 30–35 depict impedance matching circuits, and, as Patent Owner points out, those circuits include two or more variable elements. *Id.* at 52:16–20, 53:1–5, 53:52–56, 54:30–34, 55:10–14, 55:59–61, Figs. 30–35. In contrast, Figure 36 shows “networks of fixed and variable capacitors.” *Id.* at 10:11–14, 57:34–37, Fig. 36. But the networks of capacitors in Figure 36 do not include two or more variable elements. *Id.* at Fig. 36; *see id.* at 5:25–27 (“The first network of capacitors may include at least one tunable capacitor.”); Tr. 56:15–57:13. Thus, the intrinsic evidence shows that a network of capacitors by itself does not have to provide two or more degrees of freedom.

For the foregoing reasons, we construe the phrase “a network of capacitors” consistent with Petitioner’s proposed construction to mean “any circuit topology including one or more capacitors.” Nonetheless, as discussed below, even if we apply Patent Owner’s proposed construction of the phrase “a network of capacitors,” the asserted prior art still teaches the disputed claim limitation. *See* Section II.F.2.

#### *D. Motion to Amend*

Patent Owner’s non-contingent Motion to Amend requests that we cancel claim 16. Mot. Amend 1. Petitioner does not oppose Patent Owner’s request. *Id.* We grant Patent Owner’s unopposed request to cancel claim 16, and, as a result, we do not reach the asserted grounds for claim 16.



*E. Cook '554 as Prior Art*

Petitioner argues that Cook '554 is prior art to the '719 patent under 35 U.S.C. § 102(e). Pet. 10. To show that Cook '554 is prior art, Petitioner relies on the March 5, 2008 filing date of U.S. Provisional Patent Application No. 61/034,116 (Ex. 1006, "Cook Provisional"), which Petitioner notes is before "the earliest claimed priority date of the '719 patent." Pet. 10; *see* Ex. 1001, code (60) (earliest provisional application filed September 27, 2008). For the reasons discussed below, the Cook Provisional provides support for claim 17 of Cook '554, and provides support for the portions of Cook '554 relied on by Petitioner in the asserted ground of unpatentability. Thus, Petitioner has shown by a preponderance of the evidence that Cook '554 is entitled to the filing date of the Cook Provisional for purposes of this Decision.

*1. Support for Claim 17 of Cook '554*

Claim 17 of Cook '554 recites "receiving power via a resonant circuit from a non-modulated wireless magnetic field at an operating frequency and at a receive power level." Ex. 1005, 30:2–4. The Cook Provisional discloses "magnetic-field (inductive) coupling between a resonant transmit antenna and a resonant receive antenna and uses a[] non-modulated carrier frequency." Ex. 1006, 40, Figs. 4-11, 4-12, 4-13; Pet. 14. Patent Owner does not dispute that the Cook Provisional discloses this limitation of claim 17 of Cook '554. Petitioner shows sufficiently that the Cook Provisional discloses this limitation of claim 17 of Cook '554.

Claim 17 of Cook '554 recites "converting the received power, so as to charge a battery, with a power converting circuit having an impedance value that is variable." Ex. 1005, 30:5–7. The Cook Provisional discloses a

“receive power converter unit” with a variable impedance. Ex. 1006, 30, 40, 43–45, 55–57, Figs. 4-12, 5-5, 5-6, 5-7; Pet. 14. Patent Owner does not dispute that the Cook Provisional discloses this limitation of claim 17 of Cook ’554. Petitioner shows sufficiently that the Cook Provisional discloses this limitation of claim 17 of Cook ’554.

Claim 17 of Cook ’554 recites “varying the impedance value of the power converting circuit to tune the resonant frequency of the resonant circuit based on the received power level.” Ex. 1005, 30:8–10. The Cook Provisional discloses varying the impedance of the receive power converter unit to tune the resonance frequency based on the received power level. Ex. 1006, 31, 44–45, 51, 55, 57, Fig. 4-12; Pet. 15; Pet. Reply 4–6.

Patent Owner argues that Petitioner does not show sufficiently that the Cook Provisional discloses varying the impedance value of the power converting circuit to tune the resonant frequency based on the received power level. PO Resp. 31–35; PO Sur-reply 5–6. Patent Owner contends that “the voltage sense V and current sense I (elements E and F) in Fig. 4-12” of the Cook Provisional represent “the power being delivered to the load . . . not the power being received by the resonator.” PO Sur-reply 5–6 (citing Ex. 1006, 43, Fig. 4-12; Ex. 1035, 32:18–33:7). According to Patent Owner, “losses occur in the Receive Power Converter Unit,” and “[t]hus, the power delivered to the load, as measured by V and I, will be less than the power received by the resonator.” *Id.* at 6 (citing Ex. 1006, 60).

Patent Owner’s argument is unavailing. Even if Patent Owner is correct that elements E and F in Figure 4-12 of the Cook Provisional only represent the delivered power level (not the received power level), other portions of the Cook Provisional disclose tuning the resonant frequency of

the resonant circuit based on the received power level. *See* Pet. Reply 5–6. In particular, the Cook Provisional states that “[t]he control system of the receiver is in charge of . . . antenna tuning control.” Ex. 1006, 31. The Cook Provisional also states that “[t]he receiver[’]s control system may determine the model parameters using specific measurements (e.g. antenna current and voltage, *input power*, etc.) and calibration routines.” *Id.* (emphasis added). Thus, the Cook Provisional discloses tuning the resonant frequency based on input power. *Id.*

2. *Support for Portions of Cook ’554 Relied on in Asserted Ground of Unpatentability*

As indicated below in our analysis of the asserted ground of unpatentability based on Cook ’554, the Cook Provisional provides support for the portions of Cook ’554 relied on by Petitioner. *See* Section II.F.2. Specifically, for each limitation of the challenged claim, our analysis includes citations to the relevant portions of Cook ’554, as well as the corresponding portions of the Cook Provisional. *See id.* Patent Owner does not dispute that the Cook Provisional provides support for these cited portions of Cook ’554. *See* PO Resp. 31–35; PO Sur-reply 5–6.

3. *Summary*

For the foregoing reasons, Petitioner has shown by a preponderance of the evidence that Cook ’554 is entitled to the filing date of the Cook Provisional for purposes of this Decision and thus Cook ’554 is prior art to the ’719 patent under 35 U.S.C. § 102(e).

F. *Obviousness of Claim 17 over Cook ’554*

Petitioner argues that claim 17 would have been obvious over Cook ’554. Pet. 38–53. For the reasons discussed below, Petitioner has shown by

a preponderance of the evidence that claim 17 would have been obvious over Cook '554.

*1. Overview of Cook '554*

Cook '554 describes “[a] wireless power system.” Ex. 1005, code (57). Cook '554's wireless power system includes a transmit subsystem comprising a transmit antenna unit, a power converter unit, and a tuning network. *Id.* at 11:20–35, Fig. 13. The tuning network “maintain[s] precise resonance maximizing antenna current.” *Id.* at 11:31–33. Cook '554's wireless power system also includes a receive subsystem comprising a receive antenna unit, a receive power converter unit, and a tuning and matching network. *Id.* at 13:46–63, Fig. 15. The tuning and matching network “maintain[s] precise resonance of the receive antenna by maximizing antenna current and . . . match[es] the rectifier to the receive antenna.” *Id.* at 13:58–63. Both the transmit subsystem's tuning network and the receive subsystem's tuning and matching network may include a capacitor bank. *Id.* at 17:41–45.

*2. Claim 17*

Claim 17 recites “a source resonator having a Q-factor  $Q_1$  and a characteristic size  $x_1$ , and a second resonator having a Q-factor  $Q_2$  and a characteristic size  $x_2$ , and located a distance  $D$  from the source resonator.” Ex. 1001, 99:5–8. Cook '554 teaches a transmit resonator (i.e., a source resonator) having a Q-factor and a characteristic size. Ex. 1003 ¶¶ 159–164; Ex. 1005, 10:25–44, 11:20–35, 12:19–38, 13:12–20, Figs. 13, 14; Ex. 1006,

23, 25–28, 34, 36, 40–43, 45, 49, 51–52, Figs. 4-3, 4-11; Pet. 38–40.<sup>2</sup>

Cook '554 also teaches a receive resonator (i.e., a second resonator) having a Q-factor and a characteristic size that is located a distance from the transmit resonator. Ex. 1003 ¶¶ 165–169; Ex. 1005, 6:14–19, 6:40–62, 10:25–11:19, 13:46–54, 15:23–26, Figs. 11–12, 15; Ex. 1006, 28–30, 37, 39–40, 43, 50, Fig. 4-8, 4-12; Pet. 41–42. Patent Owner does not dispute that Cook '554 teaches these limitations of claim 17. Petitioner shows sufficiently that Cook '554 teaches these limitations of claim 17.

Claim 17 recites “wherein the source resonator and the second resonator are coupled to exchange energy wirelessly among the source resonator and the second resonator.” Ex. 1001, 99:9–11. Cook '554 teaches exchanging energy wirelessly between the transmit resonator and the receive resonator. Ex. 1005, 10:32–60, 19:51–64; Ex. 1006, 39–40, 59; Pet. 42–43. Patent Owner does not dispute that Cook '554 teaches this limitation of claim 17. Petitioner shows sufficiently that Cook '554 teaches this limitation of claim 17.

Claim 17 recites “wherein  $\sqrt{Q_1 Q_2}$  is greater than 100.” Ex. 1001, 99:11–12. Cook '554 teaches that the transmit resonator “would have Q factors ‘up to 300’ at low frequency (LF) and ‘up to 600 in the [high frequency (HF)] range,’” and Cook '554’s receive resonator “will have ‘Q-factors up to 150 . . . at LF and up to 200 in the HF.’” Ex. 1005, 4:35–38, 6:20–35, 8:26–32, 10:32–45; Ex. 1006, 26, 29, 32, 40; Pet. 31–32, 43. The evidence of record indicates that the above Q-factors “result[] in the claimed

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<sup>2</sup> As explained above, for each limitation, we include citations to Exhibit 1006 that identify the portions of the Cook Provisional that provide support for the portions of Cook '554 relied on by Petitioner.

square-root value easily exceeding the required ‘greater than 100.’”

Ex. 1003 ¶¶ 146–147, 172–173; Pet. 32, 43. Patent Owner does not dispute that Cook ’554 teaches this limitation of claim 17. Petitioner shows sufficiently that Cook ’554 teaches this limitation of claim 17.

Claim 17 recites “wherein at least one of the resonators includes a coil of a plurality of turns of a conducting material connected to a network of capacitors, wherein the plurality of turns are in a common plane.” Ex. 1001, 99:13–16. Cook ’554 teaches that the transmit resonator and receive resonator each have a copper wire coil with multiple turns in the same plane that connects to a capacitor bank.<sup>3</sup> Ex. 1003 ¶¶ 174–178; Ex. 1005, 6:56–62, 10:61–65, 13:12–17, 13:31–54, 17:41–51, Figs. 13–15; Ex. 1006, 26–27, 30, 40, 42–43, 51–52, 55, Figs. 4-11, 4-12, 4-13; Pet. 43–47. For example, Cook ’554’s Figure 13 is reproduced below.

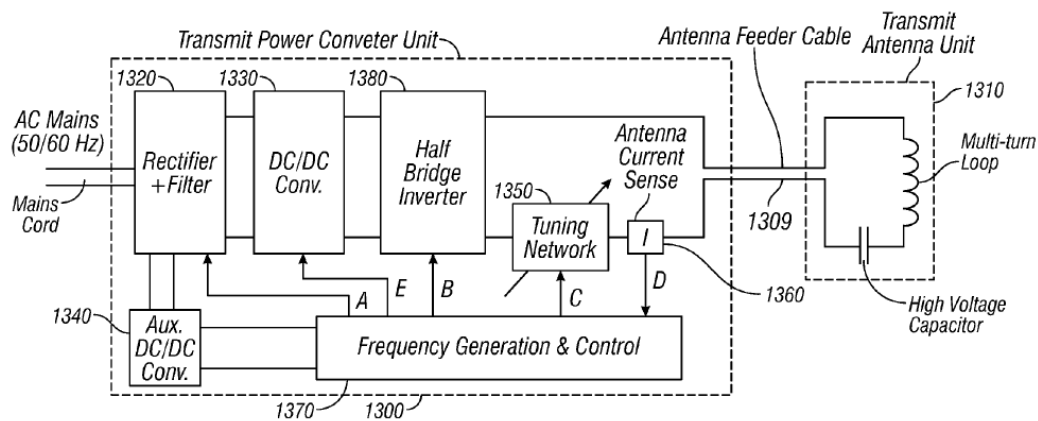


FIG. 13

<sup>3</sup> Cook '554's Figures 13 and 15 show a coil connected to a tuning network (i.e., a capacitor bank). Pet. 44–45; Ex. 1005, Figs. 13, 15. But, to the extent claim 17 requires a coil directly connected to a network of capacitors, Cook '554's Figure 16 shows a coil directly connected to a capacitor bank. Pet. Reply 22–23; Ex. 1005, Fig. 16; Ex. 1036 ¶ 58.

Ex. 1005, Fig. 13. Cook '554's Figure 13 shows that the transmit resonator includes transmit antenna unit 1310 that has a "multi-turn loop (coil)" and tuning network 1350 that has a capacitor bank. *Id.* at 11:20–24, 11:31–33, 13:12–14, 17:41–44, Fig. 13.

Patent Owner alleges two reasons why Petitioner does not show sufficiently that Cook '554 teaches a resonator including a coil of a plurality of turns of a conducting material connected to a network of capacitors. PO Resp. 49–54; PO Sur-reply 6–12. First, Patent Owner argues that claim 17 requires that "the coil and the network of capacitors are component parts of the resonator(s)." PO Resp. 52. Patent Owner contends that "Petitioner asserts that [Cook '554's] transmit antenna unit corresponds to the source resonator, and that [Cook '554's] receive antenna unit corresponds to the second resonator." *Id.* at 50–51 (citing Pet. 44–45). But, according to Patent Owner, Cook '554's capacitor bank "is not a component part of the transmit antenna unit (alleged source resonator)" or "the receive antenna unit (alleged second resonator)." *Id.* at 52 (citing Ex. 2011 ¶¶ 121–122).

Patent Owner's argument is unavailing. Petitioner does not assert that Cook '554's transmit antenna unit alone is the claimed source resonator or that Cook '554's receive antenna unit alone is the claimed second resonator. *See* Pet. 38–39, 41. Rather, Petitioner asserts that Cook '554 teaches "a source resonator *including* a 'transmit antenna unit' *and* associated 'tuning network.'" *Id.* at 38–39, 44 (citing Ex. 1003 ¶¶ 159–160) (emphasis added). And Petitioner asserts that Cook '554 teaches "a 'receive antenna unit' *and* 'tuning and matching network' corresponding to the claimed 'second resonator.'" *Id.* at 41, 45 (citing Ex. 1003 ¶¶ 165–166) (emphasis added). In other words, Petitioner asserts that Cook '554's tuning network is part of

the source resonator and Cook '554's tuning and matching network is part of the second resonator. *Id.* at 38–39, 41, 44–45. Petitioner's assertion that the tuning networks are part of the resonators is consistent with Cook '554's teaching that the tuning networks “maintain precise resonance.” Ex. 1005, 11:31–33, 13:58–63, 17:34–45; *see* Pet. 38–39, 41, 44–45; PO Resp. 53 (“the tuning network . . . tunes the resonant frequency of the transmit antenna unit, and the tuning and matching network . . . tunes the resonant frequency of the receive antenna unit”); Ex. 1003 ¶¶ 175–176.

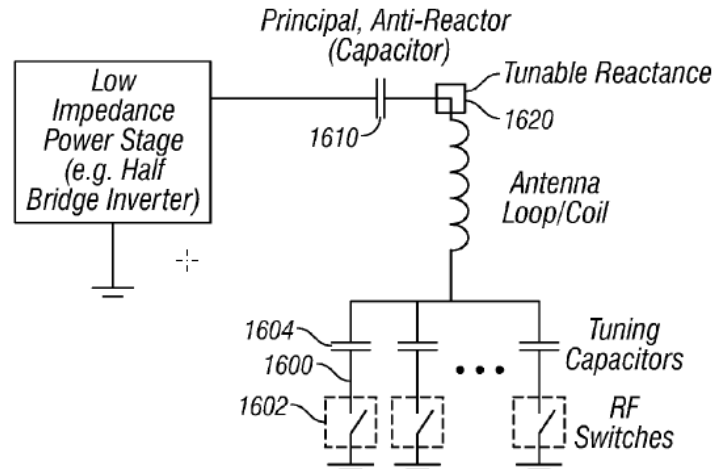
Second, Patent Owner argues that Petitioner does not show sufficiently that Cook '554's capacitor bank provides two or more degrees of freedom. PO Resp. 53–54; PO Sur-reply 6–7. Patent Owner contends that Cook '554's “switched capacitor bank is essentially a single variable capacitor” with capacitors that “are simply switched into or out of the circuit to achieve different capacitance values.” PO Resp. 54 (citing Ex. 2011 ¶¶ 50–59, 119–120). Thus, according to Patent Owner, Cook '554's capacitor bank “provides only a single degree of freedom.” *Id.*

Patent Owner's argument is unavailing. As discussed above, we decline to adopt Patent Owner's proposed construction of the phrase “a network of capacitors.” *See* Section II.C.1. Instead, we construe the phrase “a network of capacitors” to mean “any circuit topology including one or more capacitors.” *See id.* Patent Owner does not dispute that Cook '554's capacitor bank is a circuit topology including one or more capacitors. *See* PO Resp. 49–54; PO Sur-reply 6–12.

Moreover, even if we apply Patent Owner's proposed construction of the phrase “a network of capacitors,” Cook '554 still teaches the disputed claim limitation. Specifically, Cook '554's Figure 16 teaches a resonant



circuit with two variable reactive elements, namely 1) tunable capacitor bank 1600; and 2) tunable reactance 1620.<sup>4</sup> Ex. 1005, 17:46–51, 17:62–63, Fig. 16; Ex. 1006, 51–57 (“Capacitor bank tuning may be combined with a continuously tuneable reactance for fine tuning.”); Pet. Reply 24–25. Cook ’554’s Figure 16 is reproduced below.



**FIG. 16**

Ex. 1005, Fig. 16. Cook ’554’s Figure 16 shows a resonant circuit with tunable capacitor bank 1600 and tunable reactance 1620. *Id.* at 17:46–51, 17:62–63, Fig. 16. The tunable capacitor bank provides a first degree of freedom and the tunable reactance provides a second degree of freedom. Ex. 1036 ¶ 58.

Patent Owner asserts that Cook ’554’s Figure 16 “does not show a circuit that has ‘two degrees of freedom’” because the tunable capacitor bank and the tunable reactance are “connected in series.” PO Sur-reply 6–7 (citing Ex. 2011 ¶¶ 40, 45, 50–53, 56). According to Patent Owner, “while

<sup>4</sup> Tunable reactance 1620 may be a tunable capacitor or a tunable inductor. PO Sur-reply 7 n.5; Ex. 2011 ¶ 42 (“adjustable reactive elements (i.e., adjustable capacitors and/or inductors”).

resonance can be achieved by adjusting the series-connected Tunable Reactance 1620 and/or the capacitor bank 1604, there is no way to change the remaining *resistance* connected to the Power-Stage Bridge Inverter.” *Id.* at 8–9 (citing Ex. 2011 ¶¶ 41, 44–49, 73, 120). The evidence of record does not support Patent Owner’s assertion. The evidence of record indicates that a circuit with two variable reactive elements satisfies Patent Owner’s proposed construction. For example, Patent Owner’s declarant, Dr. Mark Horenstein, states that “a person of skill would have known [that] a circuit having two tunable reactances, e.g., capacitors, can establish an impedance match.” Ex. 2011 ¶ 44; *see id.* ¶ 42 (“the network provide[s] two or more degrees of freedom in the form of adjustable reactive elements”). And, as discussed above, Cook ’554 teaches a resonant circuit with two variable reactive elements—a tunable capacitor bank and a tunable reactance. Ex. 1005, 17:46–51, 17:62–63, Fig. 16; Ex. 1036 ¶ 58.

Claim 17 recites “wherein a characteristic thickness of the at least one of the resonators is much less than a characteristic size of the at least one of the resonators.” Ex. 1001, 99:16–19. Cook ’554 teaches a flat resonator with thin coils and a large number of turns. Ex. 1005, 13:30–41, 15:38–54; Ex. 1006, 43, 49; Pet. 47–49. The evidence of record indicates that a person of ordinary skill in the art would have understood the terms “flat” and “thin” in this context to describe a resonator with a characteristic thickness much less than a characteristic size. Ex. 1003 ¶¶ 183–184; Pet. 47–49. Patent Owner does not dispute that Cook ’554 teaches this limitation of claim 17. Petitioner shows sufficiently that Cook ’554 teaches this limitation of claim 17.

### 3. *Summary*

For the foregoing reasons, Petitioner has shown by a preponderance of the evidence that claim 17 would have been obvious over Cook '554.

#### *G. Obviousness of Claim 17 over Lee and Cook '523*

Petitioner argues that claim 17 would have been obvious over Lee and Cook '523. Pet. 63–80. For the reasons discussed below, Petitioner has shown by a preponderance of the evidence that claim 17 would have been obvious over Lee and Cook '523.

##### *1. Overview of Lee and Cook '523*

Lee describes “a system . . . of wireless power transfer between a primary unit . . . and a secondary unit.” Ex. 1008 ¶ 54. Lee’s primary unit includes “a two-dimensional array of primary coils . . . and attendant matching capacitors.” *Id.* ¶ 56. Lee’s secondary unit includes a “receiving coil” and “a main capacitor . . . in parallel connection with the receiving coil.” *Id.* ¶ 75. The secondary unit also includes “a bank of switched capacitors . . . which are also in parallel with the main capacitor . . . to form a variable and electronically adjustable capacitance.” *Id.*

Cook '523 describes “[t]echniques for wireless power transmission.” Ex. 1007, code (57). Cook '523’s system uses “transmit and receiving antennas” with Q-factors “greater than 1000.” *Id.* at 1:31–34, 1:44–45.

##### *2. Claim 17*

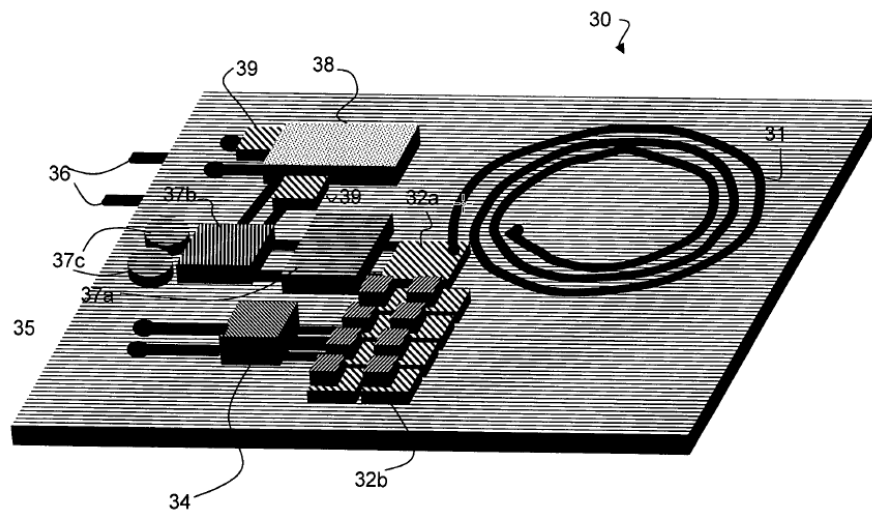
Claim 17 recites “a source resonator having a Q-factor  $Q_1$  and a characteristic size  $x_1$ , and a second resonator having a Q-factor  $Q_2$  and a characteristic size  $x_2$ , and located a distance  $D$  from the source resonator.” Ex. 1001, 99:5–8. Lee teaches a primary unit (i.e., a source resonator) having a Q-factor and a characteristic size. Ex. 1003 ¶¶ 238–246; Ex. 1008

¶¶ 54–58, 60, Fig. 3; Pet. 71–74. Lee also teaches a secondary unit (i.e., a second resonator) having a Q-factor and a characteristic size that is located a distance from the primary unit. Ex. 1003 ¶¶ 247–253; Ex. 1008 ¶¶ 54–55, 57–58, 60, 70, 75, Fig. 3; Pet. 74–76. Patent Owner does not dispute that the Lee and Cook ’523 combination teaches these limitations of claim 17. Petitioner shows sufficiently that the Lee and Cook ’523 combination teaches these limitations of claim 17.

Claim 17 recites “wherein the source resonator and the second resonator are coupled to exchange energy wirelessly among the source resonator and the second resonator.” Ex. 1001, 99:9–11. Lee teaches exchanging energy wirelessly between the primary unit and the secondary unit. Ex. 1008 ¶¶ 20, 23–25, 37, 55, 57, 60; Pet. 77. Patent Owner does not dispute that the Lee and Cook ’523 combination teaches this limitation of claim 17. Petitioner shows sufficiently that the Lee and Cook ’523 combination teaches this limitation of claim 17.

Claim 17 recites “wherein  $\sqrt{Q_1 Q_2}$  is greater than 100.” Ex. 1001, 99:11–12. Cook ’523 teaches a resonator with “‘Q factors’ that vary between 1500–2600.” Ex. 1007, 12:65–13:19; Pet. 77. The evidence of record indicates that it would have been obvious to implement Lee’s primary unit and secondary unit with Cook ’523’s Q-factors of 1500–2600, thereby resulting in  $\sqrt{Q_1 Q_2}$  being greater than 100. Ex. 1003 ¶¶ 235, 256–259; Pet. 66, 68–70, 77–78. Patent Owner does not dispute that the Lee and Cook ’523 combination teaches this limitation of claim 17. Petitioner shows sufficiently that the Lee and Cook ’523 combination teaches this limitation of claim 17.

Claim 17 recites “wherein at least one of the resonators includes a coil of a plurality of turns of a conducting material connected to a network of capacitors, wherein the plurality of turns are in a common plane.” Ex. 1001, 99:13–16. Lee teaches that the secondary unit has a trace coil with multiple turns in the same plane that connects to a capacitor bank. Ex. 1008 ¶¶ 26–27, 54–55, 57, 75, 78, 86, Fig. 12; Pet. 78–79. For example, Lee’s Figure 12 is reproduced below.



**FIGURE 12**

Ex. 1008, Fig. 12. Lee’s Figure 12 shows that the secondary unit includes spiral shaped coil 31, main capacitor 32a, and switched capacitor bank 32b. *Id.* ¶ 75, Fig. 12.

Patent Owner alleges two reasons why Petitioner does not show sufficiently that the Lee and Cook ’523 combination teaches a resonator including a coil of a plurality of turns of a conducting material connected to a network of capacitors. PO Resp. 59–64; PO Sur-reply 12–15. First, Patent Owner argues that Petitioner relies on the secondary unit’s “coil, main

capacitor and switched capacitor bank [as] correspond[ing] to the second resonator.” PO Resp. 60–61 (citing Pet. 78). But, according to Patent Owner, “the resonator in Lee does not in fact include the switched capacitor bank” because “Lee repeatedly refers to the LC network” (i.e., the coil and main capacitor) “as what provides the resonant frequency for the secondary unit.” *Id.* at 61–62 (citing Ex. 1008 ¶¶ 47, 56–60, 64–65, 75, 78, 83, Fig. 2; Ex. 2011 ¶ 133).

Patent Owner’s argument is unavailing. Petitioner asserts that Lee teaches “a ‘secondary unit’ for receiving wireless power includ[ing] a receiving coil and a *tunable capacitive element* that corresponds to the claimed ‘second resonator.’” Pet. 74 (citing Ex. 1003 ¶¶ 247–248; Ex. 1008 ¶¶ 57, 75) (emphasis added). In other words, Petitioner asserts that Lee’s tunable capacitive element (i.e., the capacitor bank) is part of the second resonator. *Id.* at 74, 78. Petitioner’s assertion that the capacitor bank is part of the second resonator is consistent with Lee’s teaching that the capacitor bank provides “capacitance correction” so “the resonance frequency . . . can stay matched with the RF driving frequency.” Ex. 1008 ¶ 78; *see* Pet. 78–79; Pet. Reply 29–30; PO Resp. 62–63 (“the switched capacitor bank tunes the resonant frequency of the LC network”); Ex. 1036 ¶ 67.

Second, Patent Owner argues that Petitioner does not show sufficiently that Lee’s capacitor bank provides two or more degrees of freedom. PO Resp. 62–64; PO Sur-reply 12–14. Patent Owner contends that Lee’s “switched capacitor bank is essentially a single variable capacitor” with capacitors that “are simply switched into or out of the circuit to achieve different capacitance values.” PO Resp. 63. Thus, according to

Patent Owner, Lee’s capacitor bank “provides only a single degree of freedom.” *Id.*; *see* PO Sur-reply 12.

Patent Owner’s argument is unavailing. As discussed above, we decline to adopt Patent Owner’s proposed construction of the phrase “a network of capacitors.” *See* Section II.C.1. Instead, we construe the phrase “a network of capacitors” to mean “any circuit topology including one or more capacitors.” *See id.* Patent Owner does not dispute that Lee’s capacitor bank is a circuit topology including one or more capacitors. *See* PO Resp. 59–64; PO Sur-reply 12–15.

Claim 17 recites “wherein a characteristic thickness of the at least one of the resonators is much less than a characteristic size of the at least one of the resonators.” Ex. 1001, 99:16–19. Lee teaches that the secondary unit’s coils are substantially flat. Ex. 1008 ¶¶ 26, 75, Fig. 12; Pet. 79–80. The evidence of record indicates that a person of ordinary skill in the art would have understood the phrase “substantially flat” in this context to describe a resonator with a characteristic thickness much less than a characteristic size. Ex. 1003 ¶¶ 263–264; Pet. 79–80. Patent Owner does not dispute that the Lee and Cook ’523 combination teaches this limitation of claim 17. Petitioner shows sufficiently that the Lee and Cook ’523 combination teaches this limitation of claim 17.

### 3. *Reason to Combine*

Petitioner asserts that a person of ordinary skill in the art would have had reason to combine the cited teachings of Lee and Cook ’523. Pet. 66–71 (citing Ex. 1003 ¶¶ 223–236). We agree with Petitioner’s rationale. Specifically, it would have been obvious to a person of ordinary skill in the art to combine Lee and Cook ’523 so that Lee’s primary unit and secondary

unit have Cook '523's Q-factor of 1500–2600. Ex. 1003 ¶¶ 256–259; Pet. 66, 77–78. Doing so would have been obvious because using Cook '523's high Q-factor would have improved the efficiency of Lee's resonant power transfer. Ex. 1003 ¶ 235; Pet. 68–70. In addition, a person of ordinary skill in the art would have had a reasonable expectation of success in using Cook '523's high Q-factor with Lee's primary unit and secondary unit because Cook '523's Q-factor was achievable using well-known formulas. Ex. 1003 ¶ 236; Pet. 70–71. Patent Owner does not dispute that it would have been obvious to combine the cited teachings of Lee and Cook '523. Petitioner shows sufficiently that it would have been obvious to combine the cited teachings of Lee and Cook '523.

#### 4. *Summary*

For the foregoing reasons, Petitioner has shown by a preponderance of the evidence that claim 17 would have been obvious over Lee and Cook '523.

### III. CONCLUSION<sup>5</sup>

We grant Patent Owner's request to cancel claim 16, and we determine that Petitioner has shown by a preponderance of the evidence that claim 17 is unpatentable.

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<sup>5</sup> 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).



In summary:

<b>Claim(s)</b>	<b>35 U.S.C. §</b>	<b>Reference(s)/Basis</b>	<b>Claim(s) Shown Unpatentable</b>	<b>Claim(s) Not Shown Unpatentable</b>
16 <sup>6</sup>	103	Cook '554		
16	103	Cook '554, Pohjonen		
17	103	Cook '554	17	
16	103	Cook '523, Pohjonen		
17	103	Lee, Cook '523	17	
<b>Overall Outcome</b>			17	

<b>Motion to Amend Outcome</b>	<b>Claim(s)</b>
Original Claims Cancelled by Amendment	16
Substitute Claims Proposed in the Amendment	
Substitute Claims: Motion to Amend Granted	
Substitute Claims: Motion to Amend Denied	
Substitute Claims: Not Reached	

#### IV. ORDER

It is hereby

ORDERED that Patent Owner's non-contingent Motion to Amend requesting cancellation of claim 16 is *granted*;

FURTHER ORDERED that claim 17 of the '719 patent is shown unpatentable; 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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<sup>6</sup> Claim 16 is cancelled and thus not designated as "Shown Unpatentable" or "Not Shown Unpatentable" in this table. *See* Section II.D.

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