

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

INDUCTEV, INC.,
Petitioner,

v.

WITRICITY CORPORATION,
Patent Owner.

IPR2024-00140
Patent 8,466,654 B2

Before JAMESON LEE, CHRISTOPHER L. OGDEN, and
SCOTT RAEVSKY, *Administrative Patent Judges*.

OGDEN, *Administrative Patent Judge*.

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

Petitioner InductEV, Inc. (“InductEV”) filed a Petition (Paper 2, “Pet.”) under 35 U.S.C. §§ 311–319 requesting *inter partes* review (“IPR”) of claims 1, 4–10, 12–16, 18, and 19 of U.S. Patent No. 8,466,654 B2 (Ex. 1001, “the ’654 patent”). Patent Owner WiTricity Corporation (“WiTricity”) filed a Preliminary Response (Paper 6, “Prelim. Resp.”). With our authorization, InductEV also filed a Preliminary Reply (Paper 8, “Prelim. Reply”) and WiTricity filed a Preliminary Sur-reply (Paper 11, “Prelim. Sur-reply”).

Under the authority delegated to us by the Director of the USPTO under 37 C.F.R. § 42.4(a), we may institute an *inter partes* review when “the information presented in the petition . . . and any response . . . shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” 35 U.S.C. § 314(a); *see also* 37 C.F.R. § 42.108(c). Applying that standard, we institute an *inter partes* review of all the challenged claims of the ’654 patent for the reasons explained below. This is a preliminary decision, and we will base our final written decision on the full trial record.

II. BACKGROUND

A. THE ’654 PATENT (EX. 1001)

The ’654 patent describes a wireless “battery-charging system for a vehicle.” Ex. 1001, code (57). It involves the transfer of power that “couples energy from a primary structure (a transmitter) to a distal positioned

secondary structure (a receiver) via a magnetic field.” *Id.* at 1:18–20. An example of this is shown in Figure 1, reproduced below:

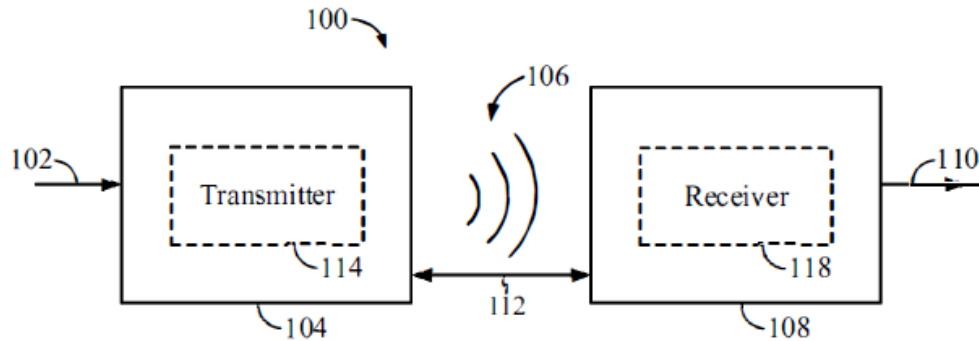


FIG. 1

Figure 1 depicts wireless charging system 1001 in which input power 102 is provided to transmitter 104, which generates radiated field 106. Ex. 1001, 2:11–15. Receiver 108 couples to radiated field 106 and generates output power 110. *Id.* at 2:15–18. Transmitter 104 and receiver 108 are separated by distance 112. *Id.* at 2:18–19. They each contain antennas 114 and 118, respectively, which preferably transfer power “by coupling a large portion of the energy in the near-field of the transmitting antenna to a receiving antenna rather than propagating most of the energy in the electromagnetic wave to the far field.” *Id.* at 2:31–36. The ’654 patent refers to the “area around . . . antennas 114 and 118 where this near-field coupling may occur” as “a coupling-mode region.” *Id.* at 2:38–40.

According to the ’654 patent, antennas (such as transmitting antenna 114 and receiving antenna 118) may be loop antennas, and may “include an air core or a physical core such as a ferrite core.” Ex. 1001, 2:62–63. In addition, “[f]errites may be used as magnetic shield[s] to prevent fields [from] generating eddy currents in metallic parts of the antenna surrounding.” *Id.* at 3:1–3.

Figure 5, reproduced below, depicts the wireless transfer structures as part of a vehicle charging system.

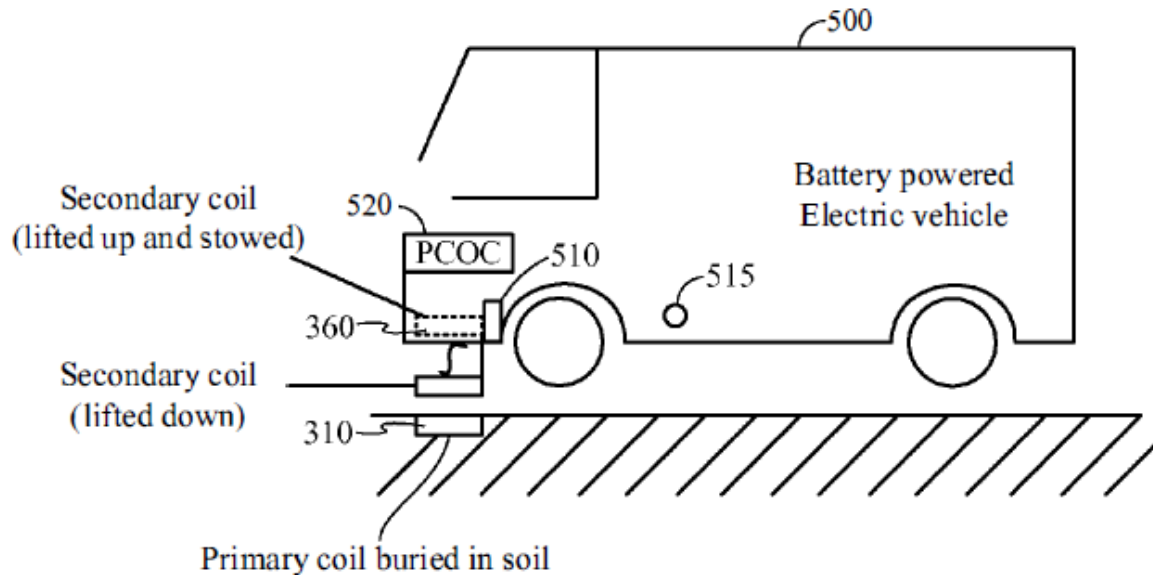


FIG. 5

Figure 5 depicts “primary” (transmitting) coil 310, which “delivers the charging power to the vehicle [500]” and is “buried into the soil of a parking lot at a position corresponding to where the secondary [receiving] coil 360 is likely to be on [vehicle 500].” Ex. 1001, 5:46–49. Secondary coil 360 can be lowered from vehicle 500 to be closer to primary coil 310 via lifting mechanism 510 as guided by processor 520. *Id.* at 5:54–61.

The charging system may also include a guidance system for coarse positioning of the vehicle so that it arrives at the proper location in which the coils are nearly aligned, relying for alignment on “a degree of coupling between the primary . . . and secondary [coils]” based on, for example, the power received from the primary coil. *Id.* at 6:5:13. The system can also include “fine positioning control” in the X and Y axes, which provides fine

movement of either the primary or secondary coils for better alignment. *See id.* at 5:66–67, 6:15–24.

B. CHALLENGED CLAIMS AND GROUNDS

Representative independent claim 13 is as follows:

- 13[pre] 13. A method, comprising:
- 13[a] guiding a receiving antenna of a vehicle to a first alignment position relative to a transmitting antenna;
- 13[b] responsive to detecting a degree of coupling in the first alignment position between the receiving antenna and the transmitting antenna that is measured at the receiving antenna, moving one of the receiving antenna and the transmitting antenna from the first alignment position to a second alignment position to improve alignment of the receiving antenna with the transmitting antenna and improve the degree of coupling.

Ex. 1001, 9:23–10:5 (InductEV’s reference numbers added).

InductEV argues four grounds for *inter partes* review, as summarized in the following table (*see* Pet. 2, 7):

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
13, 15	102(a), (b), (e) ¹	Odachi, ²
1, 7, 18	103(a)	Odachi, Wang ³
4–6	103(a)	Odachi, Wang, Partovi ⁴
8–10, 12–14, 16, 19	103(a)	Ross, ⁵ Wang

C. DECLARATORY TESTIMONY

InductEV submits a declaration by Dr. Mark Allen. Ex. 1003.
WiTricity submits two declarations by Dr. Mark N. Horenstein. Exs. 2001, 2005.

D. RELATED PROCEEDINGS

As a related matter, the parties identify *WiTricity Corp. v. InductEV, Inc.*, No. 23-cv-01099 (E.D. Penn. filed Mar. 21, 2023); *transferred*, No. 24-cv-00406 (D. Del. Apr. 1, 2024). Pet. 76–77; Paper 4, 1.

¹ 35 U.S.C. §§ 102, 103 (2006), *amended by* Leahy–Smith America Invents Act (“AIA”), Pub. L. No. 112-29 §§ 102, 103, sec. (n)(1), 125 Stat. 284, 287, 293 (2011) (effective Mar. 16, 2013). InductEV applies the pre-AIA version of §§ 102 and 103. *See* Pet. 7, 20, 39, 47.

² Odachi et al., US 5,617,003, issued Apr. 1, 1997 (Ex. 1005).

³ Chwei-Sen Wang, Design Considerations for Inductively Coupled Power Transfer Systems (2004) (Ph.D. thesis, University of Auckland) (Ex. 1008).

⁴ Partovi et al., US 7,952,322 B2, issued May 31, 2011 (Ex. 1006).

⁵ Ross, US 5,669,470, issued Sept. 23, 1997 (Ex. 1007).

III. GROUNDS OF THE PETITION

For the reasons below, we determine that InductEV has demonstrated a reasonable likelihood that it would prevail in showing that at least one of the challenged claims of the '654 patent is unpatentable under a ground of the Petition.

A. LEVEL OF ORDINARY SKILL IN THE ART

The level of ordinary skill in the pertinent art at the time of the invention is a factor in how we construe patent claims. *See Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–13 (Fed. Cir. 2005) (en banc). It is also one of the factors we consider when determining whether a patent claim is obvious over the prior art. *See Graham v. John Deere Co. of Kan. City*, 383 U.S. 1, 17–18 (1966).

To assess the level of ordinary skill, we construct a hypothetical “person of ordinary skill in the art,” from whose vantage point we assess obviousness and claim interpretation. *See In re Rouffet*, 149 F.3d 1350, 1357 (Fed. Cir. 1998). This legal construct “presumes that all prior art references in the field of the invention are available to this hypothetical skilled artisan.” *Id.* (citing *In re Carlson*, 983 F.2d 1032, 1038 (Fed. Cir. 1993)).

InductEV argues that a person of ordinary skill in the art “would have had . . . a bachelor’s degree in electrical engineering, microelectronics, or equivalent and . . . two to three years of industry or research experience in the field of wireless energy transfer,” and that “a higher level of education or skill might make up for less experience, and vice-versa.” Pet. 6 (citing Ex. 1003 ¶¶ 39–44). WiTricity does not presently contest this. *See Prelim. Resp.*

InductEV’s proposed articulation is supported by testimonial evidence, and appears to be consistent with the types of problems and solutions in the ’654 patent. *See* Ex. 1001, 1:15–28. Thus, we adopt it for this decision.

B. CLAIM CONSTRUCTION

In an *inter partes* review, we construe a patent claim “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).” 37 C.F.R. § 42.100(b). This generally includes “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.” *Id.* The ordinary and customary meaning of a claim term “is its meaning to the ordinary artisan after reading the entire patent,” and “as of the effective filing date of the patent application.” *Phillips*, 415 F.3d at 1313, 1321.

In its Petition, InductEV argues that the challenged claims are unpatentable “under any reasonable construction [of the claim terms], including their plain meaning,” and does not propose any explicit claim constructions. Pet. 6–7 (citing Ex. 1003 ¶¶ 58–59).

WiTricity argues that we should construe the terms *transmitting antenna* and *receiving antenna*. Prelim. Resp. 8. According to WiTricity, the word *antenna*, itself, is well-known in the art and means, according to an IEEE technical dictionary, “a device that radiates and/or receives radio waves.” *Id.* at 8 (quoting Ex. 2001 ¶ 25 (citing Ex. 2003, 29)). WiTricity contends that *transmitting antenna* means “a primary coil that produces a near-field component of flux into free space that is intercepted by a

secondary coil to effect resonant inductive coupling,” and that *receiving antenna* means “a secondary coil that intercepts and receives a near-field component of flux in free space that is generated by a primary coil to effect resonant inductive coupling.” *Id.* at 10 (quoting Ex. 2001 ¶ 26). According to WiTricity, the “near-field” component of flux consists of the magnetic flux lines “which stay close to the primary coil,” as opposed to “‘far-field’ radio waves that propagate long distances from the primary coil.” *Id.* at 9–10 (citing Ex. 1001, 2:31–35, 3:19–23, 3:43–48; Ex. 2001 ¶¶ 23–24).

WiTricity also argues that the term *antenna*, as used in the ’654 patent, would not include a “transformer” in which “two or more coils of wire [are] separately wrapped around a magnetic core.” Prelim. Resp. 12 & n.6 (citing Ex. 2001 ¶ 27; Ex. 2003, 798). According to WiTricity, this would apply even if the magnetic core had two sections separated by an air gap through which nearly all the magnetic flux lines pass with only a small amount of leakage flux. *Id.* at 13–14 (citing Ex. 2001 ¶¶ 27–28).

In its Preliminary Reply, InductEV counters that we should construe *transmitting antenna* and *receiving antenna* according to their plain meanings, which are “an antenna that transmits energy, and an antenna that receives energy,” respectively. Prelim. Reply 1 (citing Ex. 1003 ¶¶ 58–59, 103–105). According to InductEV, WiTricity’s proposed constructions “are not rooted in either the specification or the prosecution history of the ’654 patent.” *Id.* at 2.

InductEV also notes that the ’654 patent explicitly contemplates that an “antenna” may have “a ferrite core,” thus, “nothing in the ’654 patent, or even in [WiTricity]’s construction, prevents two inductively coupled coils

comprising magnetic cores from serving as transmitting and receiving antennas.” Prelim. Reply 3–4.

In its Preliminary Sur-reply, WiTricity contends that “[s]imply because an antenna may have a ferrite core does not make it equivalent to a transformer.” Prelim. Sur-reply 3. According to WiTricity, “[a]dding a ferrite core to the center of the transmitting and receiving coils prevents the magnetic field from generating eddy currents in metal near the antenna . . . , but the primary coil still produces a near-field component of flux into free space that is intercepted by the secondary coil.” *Id.* (citing Ex. 1001, 2:62–3:3).

First, although InductEV disagrees that the word *antenna* would exclude coils found within a transformer-like structure, InductEV does not appear to dispute WiTricity’s proposed IEEE definition of *antenna* as “a device that radiates and/or receives radio waves.” *See* Prelim. Reply 2–3. We preliminary adopt that construction. But we agree with InductEV that nothing in this construction would exclude a coil found within a transformer-like structure, so long as it either transmits or receives radio waves. We also note that, although WiTricity relies on the generation of near-field flux lines into free space as a way to distinguish an antenna from a transformer, WiTricity does not point to any testimonial or other evidence that a transformer coil does not generate near-field flux lines into free space. *See, e.g.*, Prelim. Resp. 8–16; Ex. 2001, 20–37.

Second, we agree with InductEV that the preliminary evidence does not suggest (and WiTricity does not explicitly argue) that the terms *transmitting antenna* or *receiving antenna* depart from the ordinary and customary meanings of those terms. Pet. 2. The ’654 patent does refer to a

“coupling-mode region” consisting of the area around antennas 114 and 118 of Figure 1 in which “near-field coupling may occur.” Ex. 1001, 2:38–40; *see supra* Section II.A. But this is the region in which “efficient energy transfer occurs by coupling a large portion of the energy in the near-field of the transmitting antenna to a receiving antenna rather than propagating most of the energy in an electromagnetic wave to the far field”—not a defining characteristic of either the transmitting or receiving antenna. *See* Ex. 1001, 2:31–38.

Thus, for this decision, we preliminarily adopt InductEV’s proposed construction of *transmitting antenna* as “an antenna that transmits energy” and the proposed construction of *receiving antenna* as “an antenna that receives energy.” Prelim. Reply 1. This appears to be consistent with the ordinary and customary meaning of the terms and their usage in the ’654 patent. *See, e.g.*, Ex. 1001, 2:26–40. As this is a preliminary construction solely for this decision, the parties may continue to offer evidence and arguments as to these or other claim terms at trial. We do not need to construe any of the other terms explicitly for this decision. *See Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) (“The Board is required to construe ‘only those terms . . . that are in controversy, and only to the extent necessary to resolve the controversy.’” (quoting *Vivid Techs., Inc. v. Am. Sci & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

C. ANTICIPATION GROUND BASED ON ODACHI

InductEV argues that claims 13 and 15 are unpatentable under §§ 102(a), (b), and (e) as anticipated by Odachi. Pet. 2, 7.

To show anticipation under § 102, a petitioner must locate each and every element in a claim, arranged as recited in the claim, in a single prior art reference. *See Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1369 (Fed. Cir. 2008). The limitations may be present in the reference “either explicitly or inherently.” *In re Schreiber*, 128 F.3d 1473, 1477 (Fed. Cir. 1997). In making this determination, we consider the reference “together with the knowledge of one of ordinary skill in the pertinent art.” *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994) (citing *In re Samour*, 571 F.2d 559, 562 (CCPA 1978)).

For the reasons below, InductEV has sufficiently shown that Odachi anticipates claims 13 and 15.

1. Overview of Odachi

Odachi describes a method of “charging a battery of an electric vehicle through inductive coupling between a primary inductive device” on a moveable arm of a ground charger, and “a secondary inductive device” mounted on the bottom of the vehicle. Ex. 1005, code (57). Elements involved in the method are depicted in Figure 6, reproduced below:

Fig. 6

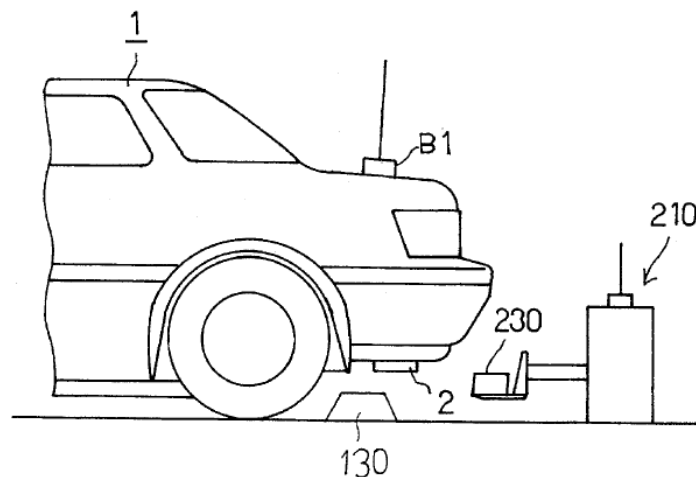


Figure 6 depicts electric vehicle 1, with secondary inductive device 2 on the bottom of its rear end, and wheels parked adjacent to wheel stops 130 in a garage. Ex. 1001, 8:1–15. Depicted behind wheel stops 130 is ground battery charger 210, which includes primary inductive device 230 on a moveable support arm. *Id.* at 8:16–22.

Figure 12, reproduced below, depicts primary inductive coupler 230 and secondary inductive coupler 2 in more detail:

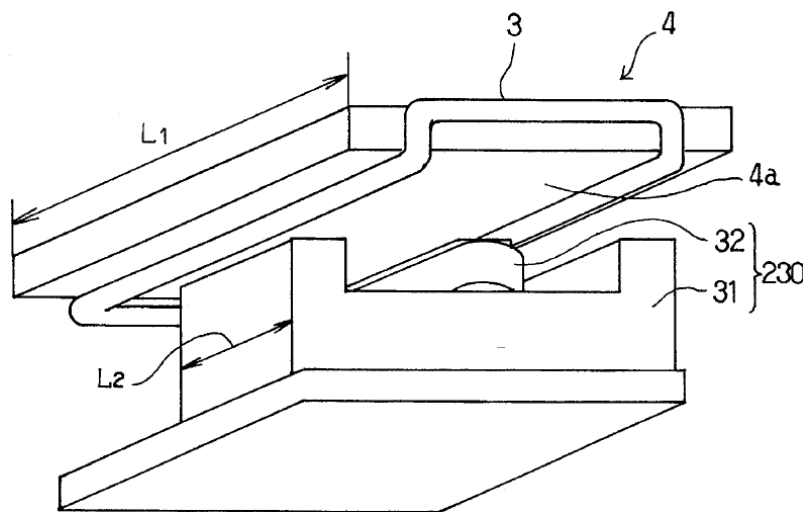


Figure 12 depicts primary inductive coupler 230 at the bottom, which includes E-shaped core 31 and primary coil 32 which is wound around the middle projection of core 31. Ex. 1005, 8:40–43. Secondary inductive coupler 2 is depicted above that, and includes core 3, which is a flat plate fixed at its top end to the bottom of the vehicle and fixed at its bottom end to secondary coil 4, which is connected to the vehicle’s battery. *Id.* at 8:3–11. The interior of secondary coil 4 forms oval-shaped cavity 4a, into which primary coil 32 can fit when the primary and secondary inductive couplers are magnetically coupled for charging. *Id.* at 8:9–10, 8:43–54.

Odachi discloses that “[t]he position where the primary inductive device should be placed with respect to the secondary inductive device just

before coupling thereof is determined on the basis of the change of the check current which is monitored while moving the primary inductive device relative to the secondary inductive device.” Ex. 1005, code (57)

2. *Preamble*

The preamble of claim 13 recites “[a] method.” Ex. 1001, 9:23. InductEV argues that, to the extent the preamble is limiting, Odachi discloses a method as recited. Pet. 11 (citing Ex. 1005, code (57); Ex. 1001 ¶¶ 100–101). WiTricity does not contest this. *See* Prelim. Resp.

Without deciding whether the preamble is limiting, we find InductEV’s arguments sufficiently persuasive that Odachi discloses the preamble of claim 13.

3. *Limitation 13[a]*

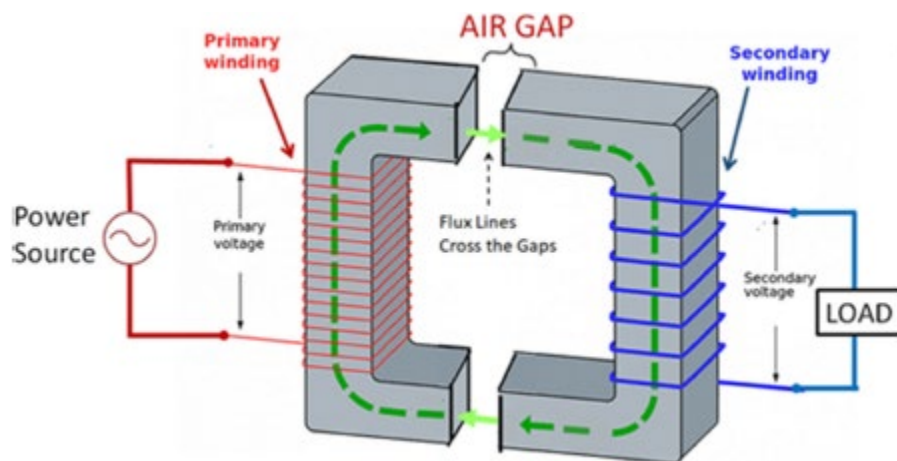
Limitation 13[a] recites “guiding a receiving antenna of a vehicle to a first alignment position relative to a transmitting antenna.” Ex. 1001, 9:24–25.

InductEV argues that the recited “receiving antenna” corresponds to Odachi’s secondary inductive coupler 2, the recited “transmitting antenna” corresponds to primary inductive coupler 230, and the recited “guiding” step corresponds to the driver parking the car adjacent to wheel stops 130 such that inductive couplers 2 and 230 are adjacent to each other. Pet. 11–13 (citing Ex. 1005, 4:6–15, 8:1–28, 8:40–54, 9:52–65, 10:36–11:17, 11:60–12:26, 12:43–52, Figs. 6, 7, 11, 14; Ex. 1003 ¶¶ 102–109).

In response, WiTricity argues that Odachi’s secondary inductive coupler 2 is not a “receiving antenna” and primary inductive coupler 230 is not a “transmitting antenna” according to WiTricity’s proposed construction

of those terms. Prelim. Resp. 14 (citing Ex. 1005 at 9:49–51, 11:60–12:7, 8:43–48; Ex. 2001 ¶¶ 29–33); Prelim. Sur-reply 2–3 (citing Ex. 1001, 2:62–3:3; Ex. 2001 ¶¶ 29–33).

According to WiTricity, when Odachi’s inductive couplers 2 and 230 are engaged, cores 31 and 3 are “brought into contact.” Prelim. Resp. 10–11 (quoting Ex. 1005, 9:49) (citing Ex. 1005, 1:7–13, 7:29–35, 8:16–19, 8:40–51, 11:60–12:19). Because of this contact, WiTricity characterizes the resulting combined couplers 2 and 230 as a “transformer” (“two or more coils of wire *separately wrapped around a magnetic core*”) rather than a pair of antennas. *Id.* at 12 & n.6 (citing Ex. 2001 ¶ 27; Ex. 2003, 798). WiTricity illustrates its contention in the following figure:



The above figure depicts two C-shaped cores facing each other, with an air gap separating the tips of each core. One core has a primary winding connected to a power source, and the other core has a secondary winding connected to a load. The figure depicts magnetic flux lines (indicated by a green dashed line) circulating around the shape formed by the two cores, and in the process crossing the two air gaps.

Analogizing the above figure to Odachi’s arrangement, WiTricity argues that, when cores 3 and 31 are engaged or nearly aligned, the effective

combined core “directs and contains the magnetic flux lines, thus ensuring that nearly all of them reach the secondary winding except for a small amount of leakage flux.” Prelim Resp. 12–13 (citing Ex. 2001 ¶ 27). To the extent that cores 3 and 31 are not in direct contact, WiTricity contends that the cores would still act as a single transformer, with flux lines bridging the air gap but otherwise remaining within the combined core. *Id.* at 13–14 (citing Ex. 2001 ¶ 28).

In its Preliminary Reply, InductEV argues that “Odachi teaches the claimed antennas even under [WiTricity]’s proposed constructions” because Odachi’s couplers define a space between primary coil 4 and secondary coil 32 on both sides. Prelim. Reply 3–4 (citing Ex. 1005, 8:1–54, 12:8–52; Ex. 1003 ¶¶ 103–109, 143–144). InductEV also points out that the ’654 patent expressly states that the antennas forming the claimed invention may include ferrite cores. *Id.* at 3–4 (citing Ex. 1001, 2:59–66).

WiTricity disagrees that in Odachi’s arrangement, flux lines would include a near-field component emitted into free space, and argues that an “antenna” can include a ferrite core without being equivalent to a transformer, and the function of such a ferrite core is to “prevent[] the magnetic field from generating eddy currents in metal near the antenna,” but such an antenna would “still produce[] a near-field component of flux into free space that is intercepted by the secondary coil.” Prelim. Sur-reply 3 (citing Ex. 1001, 2:62–3:3; Ex. 2001 ¶¶ 29–33).

First, we disagree with WiTricity that we should consider Odachi’s cores 3 and 31 to be in contact or nearly in contact for the purpose of our analysis. Although Odachi discloses that, at the conclusion of the alignment process, “primary core 31 is brought into contact with the secondary core 3”

(Ex. 1005, 9:49–50), this contact does not exist until the very end of the alignment process. During the alignment method of Odachi that would correspond to claim 13, which begins when a motor starts to move primary inductive coupler 230 into position (*id.* at 6:56–60, Fig. 1), “the spaced distance between the primary inductive coupler [230] and the secondary inductive receptacle 2 is reduced gradually and electromagnetic induction occurs between the coupler to the receptacle when the former coupler comes close to the latter receptacle” (*id.* at 6:1–6). Consequently, prior to any contact or precise alignment between the two cores, “an electromotive force is induced in the secondary coil 4 and this induced force is increased with the decrease in the spaced distance.” *Id.* at 6:6–8.

Second, as we discuss above, we disagree with WiTricity’s proposed constructions for *transmitting antenna* and *receiving antenna*. See *supra* Section III.B. Thus, we do not import into our construction of these terms any requirement, from the disclosed embodiments of the ’654 patent, that the antennas produce or intercept a near-field component of flux into free space. Consistent with our preliminary construction of these terms, InductEV has sufficiently shown, at this stage, that Odachi’s coil 32 transmits radio waves and coil 4 receives radio waves, and they are thus transmitting and receiving antennas, respectively.

Even if we were to adopt WiTricity’s proposed constructions, including its implied argument that the term *antenna* excludes coils found within a transformer-like structure, the preliminary evidence suggests that Odachi’s arrangement would still meet the claim limitations. In particular, we are unpersuaded that Odachi’s magnetic flux lines would operate in a transformer-like way as depicted in the above transformer illustration

created by WiTricity. That illustration is not similar to Odachi's arrangement, as Odachi's coil 4 does not appear to wrap around core 3 in the same way that the secondary coil wraps around the core in WiTricity's illustration. Rather, Odachi's core 3 is a flat plate and coil 4 is simply fixed to its bottom. *See* Ex. 1001, 8:5–11, Fig. 12 (reproduced *supra* Section III.C.1). Thus, the preliminary evidence does not suggest that the electromagnetic flux lines in Odachi's arrangement would be confined primarily to cores 3 and 31, even when those cores are in contact at the end of the alignment process. Rather, at this stage, we find sufficiently persuasive InductEV's explanation that the inductive coupling in Odachi's system takes place, at least in significant part, through near-field radio transmission from coil 32 to coil 4 within the open-air space of cavity 4a. *See* Prelim. Reply 3 (citing Ex. 1005, 8:15–48, 12:8–52; Ex. 1003 ¶¶ 103–109, 143–144).

InductEV is also sufficiently persuasive at this stage that the mere presence of ferrite cores in Odachi's arrangement does not negate the status of coils 32 and 4 as transmitting or receiving “loop antennas,” because the '654 patent states that “[l]oop antennas may be configured to include . . . a physical core such as a ferrite core.” Ex. 1001, 2:61–63; *see* Prelim. Reply 3–4.

For the above reasons, we find that InductEV has sufficiently shown, at this stage, that Odachi discloses limitation 13[a].

4. *Limitation 13[b]*

Limitation 13[b] recites

responsive to detecting a degree of coupling in the first alignment position between the receiving antenna and the transmitting

antenna that is measured at the receiving antenna, moving one of the receiving antenna and the transmitting antenna from the first alignment position to a second alignment position to improve alignment of the receiving antenna with the transmitting antenna and improve the degree of coupling.

Ex. 1001, 10:49.

InductEV argues that Odachi discloses this limitation because it moves the support arm for primary inductive coupler 230 from one position to another in response to measuring V_{RMS} , which is the induced voltage across secondary coil 4. Pet. 13–17 (citing Ex. 1005, 3:1–5, 4:1–2, 5:54–6:45, 9:66–10:12, 10:31–12:42, 13:39–64, Figs. 4, 5, 11, 14; Ex. 1003 ¶¶ 110–125); *id.* at 18 (citing Ex. 1005, 6:34–45, 11:43–12:26, 13:3–9, 13:53–64, 14:5–32, 14:56–58, 15:12–26; Ex. 1003 ¶¶ 121–125). InductEV contends that a person of ordinary skill in the art would have understood, in particular, that “monitoring V_{RMS} constitutes detecting the degree of coupling between the two coils, measured at the receiving antenna,” because “ V_{RMS} goes up when the coils are better coupled, and down when the coils are less-well coupled, and scales proportionally with the amount of power being transferred to the secondary coil.” *Id.* at 17 (citing Ex. 1005, 13:39–64, Fig. 5; Ex. 1003 ¶ 120)

WiTricity does not specifically contest InductEV’s arguments regarding limitation 13[b]. *See* Prelim. Resp. We find the arguments sufficiently persuasive at this stage.

5. *Conclusion as to claim 13*

For the above reasons, we determine that InductEV has sufficiently shown that Odachi identically discloses every limitation of claim 13. We

therefore determine that InductEV is reasonably likely to prevail in showing that claim 13 is unpatentable under § 102 as anticipated by Odachi.

6. *Claim 15*

Limitation 15 depends from claim 13 and further recites “wherein moving one of the receiving antenna and the transmitting antenna comprises moving the transmitting antenna laterally relative to the receiving antenna.” Ex. 1001, 10:11–14.

InductEV argues that Odachi discloses moving primary inductive coupler 230 laterally (i.e., moving in the X-axis or Y-axis direction) relative to secondary inductive coupler 2, and thus meets the additional limitation of claim 13. Pet. 19 (citing Ex. 1005, 11:6–59, 14:19–32; Ex. 1003 ¶¶ 126–128).

WiTricity does not specifically contest InductEV’s arguments regarding claim 15. *See* Prelim. Resp. We find the arguments sufficiently persuasive at this stage. Thus, we determine that InductEV is reasonably likely to prevail in showing that claim 15 is unpatentable under § 102 as anticipated by Odachi.

D. OBVIOUSNESS GROUNDS BASED ON ODACHI

InductEV argues that claims 1, 7, and 18 are unpatentable under § 103(a) as obvious over Odachi and Wang, and that claims 4–6 are unpatentable under § 103(a) as obvious over Odachi, Wang, and Partovi. Pet. 2, 19–47.

Apart from its arguments relating to the construction of *transmitting antenna*, *receiving antenna*, and *antenna*, which we address above, WiTricity does not specifically contest these grounds. *See* Prelim. Resp. 15–

16 (citing Ex. 2001 ¶¶ 29–33, 35–36) (arguing that the disclosures in Wang and Partovi fail to remedy the alleged deficiencies in Odachi).

Because InductEV has shown a reasonable likelihood of prevailing with respect to claims 13 and 15 under the anticipation ground based on Odachi as discussed above, we will institute on all grounds raised in the Petition. *See SAS Inst., Inc. v. Iancu*, 138 S. Ct. 1348, 1359–60 (2018). At this stage, we need not address the merits of InductEV’s obviousness grounds based on Odachi and Wang or Partovi.

E. OBVIOUSNESS GROUND BASED ON ROSS AND WANG

InductEV argues that claims 8–10, 12–14, 16, and 19 are unpatentable under § 103(a) as obvious over Ross in view of Wang. Pet. 9, 19–36.

A claim is unpatentable under § 103(a) 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 said subject matter pertains.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). When a ground in a petition is based on a combination of references, we consider “whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.” *Id.* at 418 (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)).

We base our obviousness inquiry on factual considerations 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 skill in the art, and (4) any objective indicia of obviousness or non-obviousness that may be in evidence. *See Graham*, 383 U.S. at 17–18.

Considering these factors,⁶ we determine that InductEV has shown a reasonable likelihood that at least claim 13 would have been obvious over Ross (with or without the teachings of Wang), for the reasons explained below.

1. Overview of Ross

Ross describes “[a] roadway-powered electric vehicle system,” in which “charging occurs through a network of power coupling elements, e.g., coils, embedded in the roadway,” which charges the vehicle through inductive coupling to the vehicle’s “corresponding onboard power coupling elements, e.g., coils.” Ex. 1007, code (57).

Ross describes inductive charging both while the vehicle is driving on an electrified roadway, and while the vehicle is parked, such as in a passenger loading/unloading zone. *See* Ex. 1007, 12:33–13:32. In the latter case, once the vehicle is stopped, a controller uses “conventional hydraulic and/or electronic positioning devices” to “further control[] the lateral position of the [onboard coil] so that it is more closely aligned” to the “optimum lateral position” relative to the corresponding coil on the roadway, as well as to control the “vertical (air gap)” alignment “to reduce the air gap to near zero.” *Id.* at 12:52–62.

⁶ Neither party argues at this stage that there are objective indicia of obviousness or non-obviousness, so this factor is not part of our analysis.

2. *Overview of Wang*

Wang is a Ph.D. thesis relating to inductively coupled power transfer systems. Ex. 1008, i. It teaches various compensation circuits for primary and secondary inductive coils, each of which include capacitors. *Id.* at 24.

Although InductEV relies on Wang with respect to other challenged claims that require the use of a capacitor in the transmitting or receiving antenna, InductEV does not specifically rely on Wang for its arguments challenging claim 13. *See* Pet. 50–56; *see, e.g.*, Pet. 59–60 (relying on Wang in the context of claim 8).

1. *Preamble*

The preamble of claim 13 recites “[a] method.” Ex. 1001, 9:23. InductEV argues that, to the extent the preamble is limiting, Ross discloses a method as recited. Pet. 50 (citing Ex. 1007, code (57), 20:29–41; Ex. 1001 ¶¶ 198–199). WiTricity does not contest this. *See* Prelim. Resp.

Without deciding whether the preamble is limiting, we find InductEV’s arguments sufficiently persuasive that Ross discloses the preamble of claim 13.

2. *Limitation 13[a]*

Limitation 13[a] recites “guiding a receiving antenna of a vehicle to a first alignment position relative to a transmitting antenna.” Ex. 1001, 9:24–25.

InductEV argues that Ross discloses a transmitting antenna in the form of a coil embedded in a roadway, and a receiving antenna in the form of a coil in a vehicle that receives power through inductive coupling.

Pet. 51–52 (citing Ex. 1007, 7:57–8:64, 9:11–43, Figs. 1, 2; Ex. 1003 ¶¶ 200–205).

InductEV also argues that Ross teaches that the receiving antenna “is guided into a first alignment position by being driven or parked over a roadway-embedded transmitting coil, which couples to the vehicle-mounted coil.” Pet. 53 (citing Ex. 1007, 7:11–13, 12:32–62, Figs. 1–2, 4, 7; Ex. 1003 ¶¶ 203–205). According to InductEV, this guidance may be either manual by a driver or an automatic process in which an auto-position control “effectively ‘takes over’ the driving of the vehicle for the final 10–15 feet.” *Id.* (quoting Ex. 1007, 43–44) (citing Ex. 1007, 6:12–24, 9:44–10:5, 12:30–47; Ex. 1003 ¶¶ 203–205).

WiTricity does not specifically contest InductEV’s arguments regarding limitation 13[a]. *See* Prelim. Resp. We find the arguments sufficiently persuasive at this stage.

3. *Limitation 13[b]*

Limitation 13[b] recites

responsive to detecting a degree of coupling in the first alignment position between the receiving antenna and the transmitting antenna that is measured at the receiving antenna, moving one of the receiving antenna and the transmitting antenna from the first alignment position to a second alignment position to improve alignment of the receiving antenna with the transmitting antenna and improve the degree of coupling.

Ex. 1001, 10:49.

InductEV argues that, “[a]fter Ross’s vehicle is parked within ‘rough tolerance’ relative to the embedded coil (the claimed first alignment position), the onboard coil is moved to a position that provides better coupling and alignment with the embedded road coil (the claimed second

alignment position).” Pet. 54 (citing Ex. 1007, 9:44–10:5, 12:10–62, 13:15–32; Ex. 1003 ¶¶ 207–209). According to InductEV, Ross’s vehicle coil is mounted on a movable assembly, and its horizontal and vertical positions are adjusted to maximize the coupling efficiency with the coil in the roadway. Pet. 54–55 (citing Ex. 1007, 9:44–10:5, 12:52–62; Ex. 1003 ¶¶ 208–209).

InductEV contends that a person of ordinary skill in the art “would have understood that when Ross’s system moves the coil assembly from a first ‘rough’ alignment position to a second ‘more closely aligned’ position, it does so by detecting the degree of coupling in the initial position and then moving the coil to the better-coupled position.” Pet. 55 (citing Ex. 1007, 6:25–39, 9:44–10:5, 12:52–62; Ex. 1003 ¶¶ 210–212). In particular, according to InductEV, Ross teaches that this optimal alignment for coupling is determined by “monitoring the change in the amplitude of the inductively received power signal as the [vehicle coil] is laterally moved in one direction or the other.” Pet. 56 (quoting Ex. 1007, 13:24–26) (citing Ex. 1007, 3:66–67, 9:15–46, 13:20–32; Ex. 1003 ¶¶ 211–212).

In response, WiTricity argues that while the vehicle in Ross is being driven into the loading/unloading zone, and during the fine alignment after it is parked, the vehicle coil assembly is not moved “responsive to detecting a degree of coupling,” but rather in response to signals from other sensors, such as optical sensors. Prelim. Resp. 17–19 (citing Ex. 1007, 12:52–62, 13:5–15; Ex. 2001 ¶ 39). WiTricity acknowledges Ross’s disclosure of alignment based on monitoring the change in the inductively received power signal, but contends this only applies to an embodiment describing alignment while the vehicle is being driven on a roadway, and not during parking or during the fine-alignment embodiment that occurs when the

vehicle is in the loading/unloading zone. *Id.* at 19–20 (citing Ex. 1007, 12:48–52, 13:20–32).

In its Preliminary Reply, InductEV disagrees that Ross’s alignment based on the degree of coupling applies only to the embodiment in which the vehicle is being driven on a roadway, because according to Ross, the lateral position is controlled based on the inductively received power signal “even when the vehicle is stopped” or parked. Prelim. Reply 4–5 (quoting Ex. 1007, 13:20–21) (citing Ex. 1007, 6:53–56, 12:32–13:32, Figs. 1, 2). InductEV also argues that the challenged claims do not require control based on the degree of inductive coupling during the “parking” phase after the vehicle leaves the electrified roadway and while the vehicle is moved into the recited “first alignment position.” *Id.* at 5.

WiTricity responds that Ross’s statement that coupling-based alignment occurs “even when the vehicle is stopped” would only occur while the vehicle “is temporarily stopped . . . , e.g., at a stop light,” but not during the finer alignment that occurs in the passenger loading/unloading zone. Prelim. Sur-reply 4–5 (citing Ex. 1007, 12:63–13:4).

Based on the preliminary record, we find sufficiently persuasive InductEV’s argument that Ross’s teaching about alignment based on the degree of coupling applies during the fine-alignment stage in a passenger loading/unloading zone. This teaching appears to be a generally applicable to any embodiment for aligning the vehicle coil that could otherwise be performed using optical or other sensors. *See* Ex. 1007, 13:15–31.

Alternatively, if WiTricity is correct that alignment based on the degree of coupling is not explicitly applicable to the “parked” embodiment, the preliminary evidence suggests that a person of ordinary skill in the art

would have had reason to substitute such alignment for alignment based on the output of the sensors that Ross discloses, such as optical sensors, and that this would have predictably led to aligning the two coils regardless of whether the vehicle is parked temporarily on a roadway or parked in a loading/unloading zone. *See* Ex. 1003 ¶¶ 246–248 (opining that a person of ordinary skill would have understood that one may obtain the “optimum lateral position” of the vehicle coil by sensing the degree of coupling “[i]nstead of” using sensors (quoting Ex. 1007, 13:21)); *KSR*, 550 U.S. at 416 (“[W]hen a patent claims a structure already known in the prior art that is altered by the mere substitution of one element for another known in the field, the combination must do more than yield a predictable result.”); *Intel Corp. v. PACT XPP Schweiz AG*, 61 F.4th 1373, 1380 (Fed. Cir. 2023) (“[I]f there’s a known technique to address a known problem using ‘prior art elements according to their established functions,’ then there is a motivation to combine.” (citing *Intel Corp. v. Qualcomm Inc.*, 21 F.4th 784, 799–800 (Fed. Cir. 2021))).

We also find persuasive, on the present record, InductEV’s argument that claim 13 does not require control based on the degree of inductive coupling while the receiving antenna is being guided into the recited “first alignment position.” *See* Prelim. Reply 5. Whereas limitation 13[b] requires such control after the receiving antenna is already in the “first alignment position” (e.g., during fine alignment while Ross’s vehicle is parked in the loading/unloading zone), there is no such requirement in limitation 13[a] while the receiving antenna is being moved to the “first alignment position” (e.g., while Ross’s vehicle leaves the electrified roadway and parks in the loading/unloading zone).

For the above reasons, we find that InductEV has sufficiently shown, at this stage, that Ross discloses or teaches limitation 13[b].

4. *Conclusion as to claim 13.*

For the above reasons, we determine that InductEV has shown, sufficiently at this stage, that Odachi identically discloses every limitation of claim 13. We therefore determine that InductEV is reasonably likely to prevail in showing that claim 13 is unpatentable under § 103(a) as obvious over Ross with or without the additional teachings of Wang.

5. *Other Claims*

For the grounds based on Ross and Wang, WiTricity makes the same arguments for independent claim 8, and does not otherwise address the specific limitations of the other challenged claims for this ground. *See* Prelim. Resp. 17–20.

Because InductEV has shown a reasonable likelihood of prevailing with respect to claim 13 as discussed above, we need not address InductEV's contentions regarding claims 8–10, 12, 14, 16, or 19. *See SAS*, 138 S. Ct. at 1359–60.

IV. CONCLUSION

For the reasons above, InductEV has shown that there is a reasonable likelihood it would prevail with respect to at least one of the claims challenged in the Petition, and we institute trial on all asserted grounds and all challenged claims. *See* 37 C.F.R. § 42.108(a).

V. ORDER

It is

ORDERED that, pursuant to 35 U.S.C. § 314(a), an *inter partes* review of claims 1, 4–10, 12–16, 18, and 19 of the '654 patent is instituted with respect to all the grounds set forth in the Petition; and

FURTHER ORDERED that pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, *inter partes* review of the '654 patent commences on the entry date of this Order, and the Board hereby gives notice of the institution of a trial.

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