

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

INDUCTEV, INC.
Petitioner,

v.

WITRICITY CORPORATION,
Patent Owner.

Case IPR2024-00140
Patent 8,466,654

PATENT OWNER'S SUR-REPLY

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Cases

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<i>Polaris Indus., Inc. v. Arctic Cat, Inc.</i> , 882 F.3d 1056 (Fed. Cir. 2018)	20

EXHIBIT LIST

Ex. 2001 – Declaration of Dr. Mark N. Horenstein

Ex. 2002 – CV of Dr. Mark N. Horenstein

Ex. 2003 – Wiley Electrical and Electronics Engineering Dictionary Excerpts (P.1)

Ex. 2004 – McGraw-Hill Dictionary of Scientific and Technical Terms Excerpts

Ex. 2010 – Supplemental Declaration of Dr. Mark N. Horenstein

Ex. 2011 – Transcript of Deposition of Dr. Mark Allen

Ex. 2012 – Wiley Electrical and Electronics Engineering Dictionary Excerpts (P.2)

I. INTRODUCTION

Petitioner's Reply ("Rep.") again fundamentally misunderstands the difference between the traditional transformer structure of Odachi (Ex. 1005) and the claimed "antennas." Petitioner relies on various extrinsic references that purportedly support Petitioner, but these references actually confirm that the couplers of Odachi, which include coils wrapped around a core that constrains the magnetic field lines, constitute a transformer, not antennas. Odachi also fails to move its transmitting coupler to a second alignment position based on the degree of coupling at a first alignment position. Petitioner vaguely argues that Odachi considers the degree of coupling at every position, but then alternatively relies on what Odachi "could" have disclosed.

Petitioner also ignores the express teachings of Odachi that the two couplers are in contact when charging occurs, to manufacture a reason to combine the compensating capacitors of Wang. Because Wang explains that compensating capacitors are beneficial in inductive coupling systems where the primary and secondary devices are *not* in contact, there is no reason to combine Odachi and Wang.

Petitioner also improperly conflates the teachings of separate embodiments in Ross in an attempt to read on the challenged claims. One embodiment of Ross relates to parking a car at a designed stop location for charging, while the other

embodiment relates to charging while driving down the road. Regardless of Petitioner's improper combination, neither embodiment discloses detecting a degree of coupling between a receiving antenna and a transmitting antenna at a first alignment position, and then moving the receiving antenna or transmitting antenna to a second alignment position to improve the degree of coupling in response to the degree of coupling detected at the first alignment position, as recited in claims 8 and 13. Therefore, for these reasons Petitioner's challenge should be rejected.

II. PO'S CONSTRUCTION OF "ANTENNA" IS CORRECT

Petitioner argues that "receiving antenna" and "transmitting antenna" should be construed as "an antenna which [emits/picks up] electromagnetic radiation," and mischaracterizes PO's construction as improperly limiting an "antenna" to a coil that produces/receives only a near-field component of flux. Rep. 2. PO's construction for "antenna" refers to a coil that produces/receives "a near-field component of flux in free space" to effect resonant inductive coupling (POR 8), but does not limit the definition of "antenna" to devices that only generate a near-field component, as Petitioner suggests. PO explicitly noted the '654 Patent's teaching that the transmitting antenna generates energy in both the near and far fields, but in localized power transfer systems most of the energy in the near field is coupled to the receiving antenna rather than propagated to the far field. POR 9-10 (citing Ex. 1001 at 2:32-35, 3:19-23, 3:43-48). That is, an "antenna" must be able to radiate energy in the

near and far fields, but in the power transfer context of the '654 Patent, the near field component effects the inductive coupling, as PO's construction states. *See* Horenstein Decl. (Ex. 2001) ¶ 25; Horenstein Supp. (Ex. 2010) ¶¶ 37-39.

In the Institution Decision (ID), the Board noted that efficient energy transfer occurs by coupling a large portion of the near-field energy of the transmitting antenna to the receiving antenna rather than propagating most of the energy to the far field, but such near-field coupling is “not a defining characteristic of either the transmitting or receiving antenna.” ID 10-11 (citing Ex. 1001, 2:31-38). But the portion of the '654 Patent cited by the Board confirms PO's point—an “antenna” is able to radiate energy in *both* the near and far fields, but uses the near field component to effect efficient resonant inductive coupling. Petitioner alleges that PO is improperly limiting “antennas” “to the near-field” (Rep. 2), but also relies on the Wiley Electrical Dictionary (Ex. 2003), which describes an antenna as “emit[ting] [or picking up] electromagnetic *radiation*.” Rep. 2 (emphasis added). But this confirms that the antenna must *radiate* electromagnetic energy into free space, *i.e.*, the near field. *See* Horenstein Supp. ¶¶ 37-39. This is consistent with the definition preliminarily adopted by the Board of “a device that radiates and/or receives radio waves.” ID 8. Dr. Horenstein explains that a transmit antenna generates, or “radiates” radio waves into free space, which includes near-field flux that stays close to the coil, and far-field flux that propagates long distances from the coil. *See*

Horenstein Decl. at ¶¶ 22-24. That is, Petitioner’s position that an antenna emits electromagnetic radiation, but not necessarily in the near-field, is nonsensical because emitting electromagnetic radiation necessarily includes a near-field component. *See id.*

Petitioner also mischaracterizes the ’654 Patent as allegedly distinguishing between wireless energy transfer and propagating energy “into free space.” Rep. 4. The portion cited by Petitioner explains that energy transfer occurs by coupling energy from the near-field to a receiving antenna located in the near-field, rather than propagating energy “into free space.” Ex. 1001 3:19-23. But this reference to “free space” is really distinguishing between the near field and the far field. For example, the same concept is described earlier in the specification as “coupling a large portion of the energy in the near-field...rather than propagating most of the energy in an electromagnetic wave *to the far field.*” *Id.* 2:31-35 (emphasis added). Radiating energy in the near and far fields necessarily radiates energy “into free space” (i.e., into the air), rather than containing flux within a core, which is consistent with PO’s construction. Petitioner’s cherry picking of the term “into free space” distorts the meaning of the specification, and does not mean that the energy in the near-field is not “into free space.” Therefore, PO’s construction should be adopted.

III. THE PETITION FAILS TO DEMONSTRATE THAT ANY CLAIM OF THE '654 PATENT IS UNPATENTABLE

A. Ground 1a: Odachi Does Not Disclose a “Transmitting Antenna” or “Receiving Antenna”

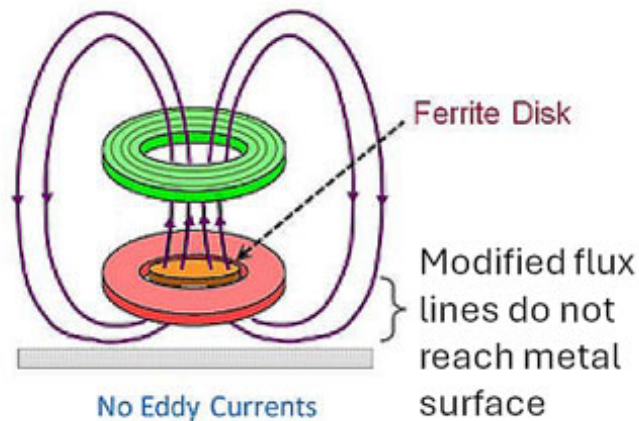
Odachi fails to disclose an “antenna” under the Board’s preliminary construction of this term, or PO’s proposed construction (Petitioner did not construe “antenna”).

1. Odachi Fails Under the Board’s Preliminary Construction

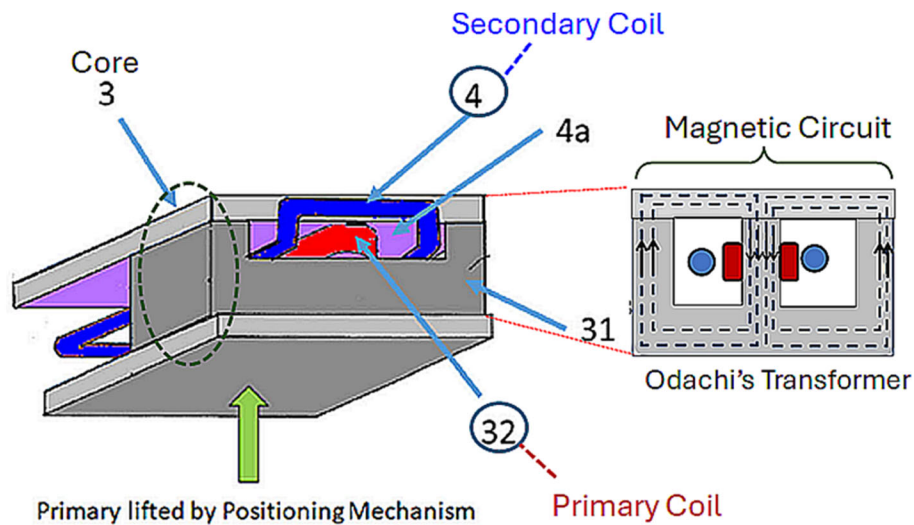
In the ID, the Board preliminarily adopted PO’s proposed IEEE definition of “antenna” as “a device that radiates and/or receives radio waves.” ID 10. Petitioner wrongly argues that the primary coil of Odachi transmits or receives energy wirelessly “through radiating electromagnetic fields, using radio waves.” Rep. 6. Petitioner cites the testimony of PO’s expert, Dr. Horenstein, out of context to allege that Odachi radiates electromagnetic waves. *See id.* Dr. Horenstein actually testified that the primary coil *of the '654 Patent*—not Odachi—radiates energy when an AC current flows through it. *See* Ex. 1033, 14:6-17:14.

Petitioner also wrongly argues that the “couplers” of Odachi have the “same structure as the loop antennas disclosed in the '654 Patent.” Rep. 5. But as Dr. Horenstein explained using the diagrams below, the primary coil of the '654 Patent (top image) may include a ferrite disk or “core” that prevents eddy currents in an adjacent metal surface, but does not confine the magnetic flux lines, which are

generated in the near-field. Horenstein Supp. ¶¶ 51-53. On the other hand, the “couplers” of Odachi (bottom image) include primary and secondary cores that come together to form a single core that confines the magnetic flux to the core, such that no near or far-field radiation is produced. *See id.* at ¶¶ 43, 53, 69.



'654 Patent Representation



Odachi Representation

Therefore, the coils of Odachi do not have the “same structure” as the loop antennas described in the '654 Patent.

Petitioner relies on multiple extrinsic references, but none of them supports Petitioners' position that a transformer "radiate[s] energy." Hui (Ex. 1041) states that "the use of the ferrite plates helps to confine the magnetic field generated from the transformer windings," but contrary to Petitioner's argument, says nothing about "radiat[ing] energy." Rep. 7; Ex. 1041, 3:28-29. If anything, Hui confirms PO's position that ferrite *in a transformer* confines the magnetic field. The cited portion of Terman (Ex. 1044) shows loop antennas that look very similar to the loop antenna shown in Fig. 3 of the '654 Patent, and not surprisingly explains that the field is radiated in a plane perpendicular to the plane of the loop, as the '654 Patent also explains. Ex. 1044 at 813. This portion of Terman does not mention any ferrite core, and in contrast to Hui, confirms that antennas (as in Terman) radiate fields into free space, but transformers (as in Hui) do not. *Id.*

To support its position that transformers radiate magnetic fields into free space, Petitioner selectively quotes from Hui that "the ferrite plate alone cannot completely guide the H-field" but omits the end of the sentence: "in the tangential direction." But the transformer in Hui (Fig. 3a) is a PCB transformer with pancake coils and ferrite plates on either side of the coils. *See* Ex. 1041, Fig. 3a, 2:22-24. The ferrite plates constrain the magnetic field in the direction perpendicular to the coils, just as the ferrite core in Odachi constrains the magnetic field in the perpendicular direction. *See id.*, 3:28-31. The difference is that Hui does not have

a ferrite core that constrains the magnetic field in all directions, like the core in Odachi, rendering it irrelevant.

Petitioner also selectively quotes Dobbs (Ex. 1038) as allegedly disclosing that power coupling devices “will radiate strongly to the surrounding space” through core airgaps. Rep. 9. But the ferromagnetic “half-cores” of Dobbs are used to “improv[e] mutual inductive coupling between the windings” by forcing the magnetic flux through the ferrite. Ex. 1038, ¶ 47. Dobbs expressly notes that the “cores” in Dobbs can be located anywhere relative to the coils, and are not limited to being “centrally located within the turn(s) of a winding as might be the case *in a conventional transformer.*” *Id.*, ¶ 49. That is, Dobbs confirms that a structure having a ferrite core located within the core to contain magnetic flux lines, like in Odachi, is a “conventional transformer,” not an antenna. The portions of Dobbs cited by Petitioner refer to a different core configuration (C-shaped cores above and below the coils, with airgaps between) than that of Odachi (E-shaped primary core that abuts secondary core). *See* Horenstein Supp. ¶¶ 43, 53, 69. Therefore, any radiation through airgaps in Dobbs is irrelevant to Odachi. None of the extrinsic references cited by Petitioner change the fact that Odachi does not radiate radio waves. *See* Horenstein Supp. ¶ 29.

2. Odachi Fails Under PO's Construction

Odachi does not disclose coils that produce or receive “a near-field component of flux into free space...to effect resonant inductive coupling,” as PO defines “transmitting/receiving antenna.” In an attempt to force fit Odachi into this definition, Petitioner misreads Odachi to argue that there is a “spaced distance” between the devices when charging. Rep. 10. The portion of Odachi cited by Petitioner (8:50-54) describes how the *coils* of the two couplers are not in contact, even when the two *cores* are in contact. See Ex. 1001, 8:50-54; Horenstein Supp. ¶ 29 (annotated figure showing space between coils). The space between the coils is irrelevant. The issue is whether Odachi couplers produce “a near-field component of flux into free space,” which they do not because of the common core that is formed when Odachi performs charging. See Horenstein Decl. ¶¶ 29-33, 44; Horenstein Supp. ¶ 43. Odachi repeatedly discloses that the two cores are “brought into contact” or in abutment, rather than the “spaced” configuration that Petitioner suggests. Ex. 1001, 4:34-44, 7:23-26, 9:48-51.

Petitioner also raises the belated argument that it would have been obvious to “implement Odachi wirelessly,” which Petitioner summarily concludes meets the “antenna” limitation. Rep. 11 (citing Pet. 23-25). The alternative obviousness argument that Petitioner raised regarding “wireless power” related to the preamble of claim 1, not the antenna limitations. Pet. 23-25. Petitioner never raised an

alternative argument that it would have been obvious to modify the transformer of Odachi to instead be an antenna. The only obviousness argument Petitioner raised regarding the antenna limitation [1a] was to combine the compensation capacitor of Wang with the coupler of Odachi—not to completely change the structure of the couplers. Petitioner cannot now borrow an argument from a completely different element to remedy the fatal flaw in its original argument. This argument is waived.

3. Petitioner’s Remaining Odachi Arguments Fail

Petitioner wrongly argues that Odachi’s couplers are “antennas” because they have separate cores. Rep. 11. First, Odachi is clear that the cores are in contact, forming a single core, during charging. Ex. 1001, 4:34-44, 7:23-26, 9:48-51. But regardless, the fact that the core is separated into two cores that can move with respect to each other is irrelevant because the two cores still function to confine the magnetic flux lines, rather than radiate them into free space. *See* Horenstein Supp. ¶ 69.

Petitioner cites several extrinsic references that allegedly equate “transformers” and “antennas,” but even a cursory review reveals this is false. Cook-765 (Ex. 1036) describes power transfer that occurs between two antennas “by storing energy in the near field,” which is very similar to PO’s definition of “antenna.” Ex. 1036, 1:37-40. Cook-765 says that two high-Q antennas may “react similarly to a loosely coupled transformer,” but the fact that Cook-765 uses the both

“transformer” and “antenna,” and describes them as acting “similarly” confirms that the two are not equivalent. Likewise, the citations to Ross (Ex. 1007) and Partovi Appl. (Ex. 1016) separately reference transformers and antennas (or coils), and describe them as using the same general type of coupling, but just because two different components may share some functional similarity does not make them equivalent.

Petitioner next argues that Dr. Horenstein’s opinion that a small gap between the Odachi couplers would not radiate near field component flux into free space, is “unexplained” and “conclusory.” Rep. 14. On the contrary, Dr. Horenstein explains how the cores in Odachi contain the magnetic flux both when the cores are in contact, and even if there is a small gap. Ex. 2010 ¶¶ 29, 42-44, 68-70. It is Petitioner that fails to explain how a small gap between the Odachi cores somehow converts the Odachi “couplers” to “antennas.” Petitioner again selectively quotes from Elliot (Ex. 1039) as allegedly stating that ferrite directs magnetic flux but does not negate “radiated fields.” Rep. 14. Elliot actually says that “in a transformer design, magnetic material, such as ferrite, is used to direct the magnetic flux and improve the coupling.” Ex. 1039-002. The only reference to “radiated fields” is in an entirely different column, and says nothing about ferrite. *Id.*

Lastly, Petitioner distorts Dr. Horenstein’s testimony to allege that there is no difference between the “induction field” and “near field” of an antenna, such that the

inductive field used by Odachi constitutes an “antenna” under PO’s definition. While Dr. Horenstein created the diagram in par. 37 of his supplemental declaration (Ex. 2010) himself, he explains that the induction, near, and far fields shown therein are based on the same Wiley IEEE dictionary definitions that Petitioner cites. Ex. 2010 ¶¶ 37-38, Ex. 2006, 275, 498. The Wiley dictionary provides separate definitions for “induction field” and “near field,” and Dr. Horenstein explains in detail how an induction field behaves “as if permanently associated with” the antenna, whereas the near-field is a radiation field that is propagated outward from the antenna. Ex. 2010 ¶¶ 38-41. Petitioner next notes that Dr. Horenstein could not artistically depict a boundary between an induction field and a near field (Rep. 16), but Dr. Horenstein explained that his diagram was just a rendering of the concepts of induction, near, and far fields. Ex. 1033, 59:13-62:12. Petitioner also cites to Dr. Horenstein’s testimony regarding how the ’654 Patent, *not Odachi*, operates relative to the various field regions. *Id.* 14:11-15:13. Despite Petitioner’s effort to twist his deposition testimony, Dr. Horenstein made clear that transformers, such as the transformer of Odachi, produces only the induction-field component, but no near or far field component. Ex. 2010 ¶¶ 37-44. Accordingly, Odachi fails to disclose the recited “transmitting antenna” and “receiving antenna” under any interpretation.

B. Ground 1A: Odachi Does Not Move the Receiving Antenna or Transmitting Antenna From the First Alignment Position to a

Second Alignment Position “Responsive to Detecting a Degree of Coupling in the First Alignment Position”

The parties largely agree on how Odachi calculates the position of maximum coupling: Odachi calculates the positions X_1 and X_2 where the V_{RMS} voltage (or I_{RMS} current) crosses a threshold, and then calculates the midpoint between X_1 and X_2 as the position of maximum coupling. *See* Rep. 17-18. But Petitioner wrongly argues that all of the measured coupling values, including the degree of coupling at the starting position, are used to determine X_1 and X_2 . As shown in Fig. 4 of Odachi, X_1 denotes the x -position of the carriage when the current I_{RMS} crosses from above the reference value I_0 to below the reference value I_0 , and X_2 denotes the x -position of the carriage when the current I_{RMS} crosses from below the reference value I_0 to above the reference value I_0 . Ex. 1005, Fig. 4. The I_{RMS} value is constant from the start position until it begins to decrease just prior to position X_1 . *Id.* But even if the I_{RMS} value at the start position was doubled, and decreased until it crossed threshold I_0 at position X_1 , the different I_{RMS} start value would not change the position of X_1 . *See id.*, 6:34-36 (describing X_1 as position where I_{RMS} crosses threshold).

Petitioner cites col. 11:43-59 of Odachi, but this portion merely explains that Odachi counts the number of clock pulses as the carriage moves laterally, so the system knows how many clock pulses it takes to get from one end of the carriage range to the point of maximum coupling X_A . *Id.*, 11:33-59. But counting clock pulses

has nothing to do with the degree of coupling at the starting position. Odachi simply does not disclose moving the transmitting antenna from a first alignment position to a second alignment position “responsive to detecting a degree of coupling in the first alignment position.”

Petitioner’s last argument for this limitation fares no better. Petitioner conjures a hypothetical scenario in which the vehicle in Odachi is parked off-center, such that the first measurement taken “could be” at position X1. Rep. 18-19. Petitioner cannot manufacture prior art to fill gaps in Odachi. What Odachi “could” disclose is irrelevant, and in fact confirms that Odachi does *not* actually this feature. Therefore, this argument also fails.

C. Ground 1b: A POSA Would Not Have Combined the Capacitor of Wang With the Transformer of Odachi.

Petitioner’s motivation to combine argument again depends on a mischaracterization of Odachi that power transfer occurs across a “spaced distance” between the primary and secondary couplers. Rep. 19. Odachi repeatedly explains that the positioning system is used to locate the primary coil and place it “in abutment” with the secondary coil before charging begins. Odachi, 4:34-41; *see also* 7:19-26 (“...the primary coupler 6 is brought into contact with the secondary receptacle”); 9:47-51 (“elevator 42 d is moved upward until the primary 31 is brought into contact with the secondary core 3...”); 11:60-12:1 (“...where the

primary inductive coupler 230 is engaged with the secondary receptacle 2...”). Importantly, Odachi discloses that after the two couplers are “brought into contact” (7:23-24), “the driver then...sets the controller 21 in a battery charging mode,” which causes “power circuit 23 to supply a charging AC current to the primary coil 14.” *Id.*, 7:27-32. That is, Odachi clearly discloses that charging only occurs after the couplers are contacting each other, which undermines Petitioner’s entire rationale for combining Odachi and Wang.

Petitioner argues that a POSA would have been motivated to add a capacitor of Wang to Odachi because Wang teaches that adding capacitors increases power transfer efficiency. Rep. 20. But Petitioner must show that this alleged benefit provided by the capacitor in Wang would actually make sense when combined with Odachi. Petitioner has failed to show that adding a capacitor to Odachi would enable “more efficient[]” power transfer, or the use of “higher voltage or current gain.” Ex. 1003, ¶ 153. Petitioner cites pages 4-5 of Wang for allegedly describing “high power applications,” but this portion of Wang merely describes the goals of greater power and efficiency while simultaneously “*increasing air gaps*” between the primary and secondary windings. Ex. 1008, 4. Wang explains that in such systems, the coupling strength is normally weak and the amount of required power cannot be delivered. *Id.* 38. Therefore, adding a capacitor may allow for greater efficiency and higher power *as compared to air gap systems without capacitance*, but Petitioner cites no

evidence that the same benefit would result in Odachi, where there is no air gap between the couplers during charging. *See* Horenstein Supp. ¶¶ 74-75. Petitioner’s argument therefore lacks the “articulated reasoning with some rational underpinning” that is required to establish obviousness. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007).

D. Ground 1b: Odachi and Wang Do Not Disclose Adjusting an X-Y Alignment of the Transmitting Antenna Based on a Degree of the Coupling in the First Alignment Position

For the same reasons discussed above in connection with Odachi, the combination of Odachi and Wang also fail to disclose adjusting an x-y alignment of the transmitting antenna based on a degree of coupling in the first alignment position. More specifically, the transmitting coupler of Odachi is adjusted based on the I_{RMS} current or V_{RMS} voltage crossing a threshold voltage, which is independent of the degree of coupling in the first alignment position. *See supra* III.(B). Therefore, Petitioner has failed to show that Odachi and Wang disclose this feature.

E. Ground 1b: Odachi and Wang Do Not Disclose a “Remote Receiving Antenna”

For the same reasons discussed above, the receiving coupler of Odachi is not an “antenna,” and is not “remote” because the couplers of Odachi are brought into contact before charging occurs. Petitioner again relies on a “spaced distance” between the *coils* of Odachi, but ignores the repeated descriptions of Odachi that the couplers, and more specifically the cores of the couplers, are in abutment before

charging. *See* Horenstein Supp. ¶¶ 43, 53, 69; Ex. 1001, 4:34-44, 7:23-26, 9:48-51. Petitioner’s reliance on the “spaced distance” of the coils is misplaced, and does not render the receiving coupler of Odachi “remote.”

F. Ground 1b: Odachi and Wang Do Not Disclose “the Coupling Test Comprises a Measurement of the Amount of Power That is Transferred to the Receiving Antenna,” as Recited in Claim 18

Petitioner argues that PO misunderstands claim 18, which requires the coupling to test to measure the amount of power that is transferred “during the coupling test.” Rep. 22. But it is Petitioner that misunderstands the difference between monitoring a “check current” and measuring the amount of power transferred. Odachi discloses only that, “the power circuit is activated to supply a check current I_{RMS} to the primary coil” which is then monitored until either a minimum or maximum is reached. Ex. 1005, 5:54-60. Petitioner summarily concludes that measuring the amount of power transferred “is accomplished by measuring I_{RMS} or V_{RMS} using the check current.” Rep. 22. As an initial matter, I_{RMS} *is* the “check current” (*Id.*), so measuring I_{RMS} “using the check current is nonsensical.” Moreover, Petitioner fails to explain how monitoring a check current is equivalent to measuring the amount of power transferred, and therefore fails to establish that Odachi and Wang disclose this feature.

G. Ground 1c: Claims 4-6 Are Not Unpatentable Over Odachi, Wang and Partovi.

Petitioner has failed to provide the required motivation for combining the multiple-coil array of Partovi with the Odachi transmitting coil. Petitioner does not dispute that Partovi is directed to charging multiple electronic devices (e.g., cell phones) on a single charging pad. Ex. 1006, Fig. 16; Rep. 22-23. But the additional charging capacity of Partovi is not relevant in Odachi. Petitioner contends that it would have been obvious to implement the multiple-coil array concept of Partovi using “coils sized like Odachi’s original coil” (Rep. 23), but there would be no reason for doing so. Petitioner argues that a multi-coil approach would expand the horizontal range of Odachi, but Odachi already moves the transmitting coupler horizontally to “provide a wider range of permissible distances within which the vehicle should be parked for coupling of the inductive core-coil devices.” Ex. 1006, col. 2:15-18. Contrary to Petitioner’s argument, there is nothing to suggest a need for Odachi to also be able to charge a vehicle parked in the neighboring space, and therefore no motivation to combine Partovi and Odachi. *See Arctic Cat Inc. v. Polaris Indus., Inc.*, 795 Fed. Appx. 827, 833 (Fed. Cir. 2019) (rejecting attempt to “create a problem with the prior art in hopes of creating a motivation to combine”).

H. Ground 2: Ross and Wang Do Move the Receiving/Transmitting Antenna from a First Alignment Position to a Second Alignment

Position Based on a Degree of Coupling Detected at the Receiving Antenna

1. Claims 8-10, 12, and 19

a. A POSA Would Not Have Combined The Capacitor of Wang With the System of Ross

Petitioner argues that the frequency ranges of Ross and Wang overlap such that it would have been obvious to combine the capacitors of Wang with Ross. Rep. 22-23. Petitioner's overly-literal reading of the references misses the point. Wang explains that in order to increase coupling strength, the operating frequency can be increased to between several kHz (on the low end), to many MHz, which is orders of magnitude higher. Wang, 38. This increase in operating frequency increases the reactance in the primary and secondary windings, which must be compensated by capacitors. *Id.* But just because the operating frequency of Ross (1-10 kHz) slightly overlaps with the very bottom of the increased frequency range disclosed by Wang, does not mean that Ross suffers from the increased reactance that requires compensation capacitors. Therefore, Petitioner has not established a need to add capacitors to Ross. *See* Horenstein Supp. ¶¶ 111-112

Moreover, Petitioner ignores the express disclosure of Ross that teaches away from using the high frequencies that, according to Wang, necessitate compensating capacitors. Rep. 24. Ross states that an AC signal above 1-10 kHz may generate magnetic fields that penetrate into the vehicle and cause possible harmful effects.

Ross 5:53-60. Petitioner does not dispute this teaching of Ross, but instead cites to two generic statements of Wang that inductively coupled power transfer systems are generally safe. Wang, i, 1. But these generic statements do not address the specific safety concern of Ross related to the use of high frequencies that would necessitate the use of compensation capacitors. Petitioner cannot just ignore inconvenient portions of Ross that teach away from the proposed combination. *Polaris Indus., Inc. v. Arctic Cat, Inc.*, 882 F.3d 1056, 1069 (Fed. Cir. 2018) (“a reference ‘must [be] considered for all it taught, disclosures that diverged and taught away from the invention at hand as well as disclosures that pointed towards and taught the invention at hand’”).

b. Ross Does Move the Receiving Antenna From a First Alignment Position to a Second Alignment Position to Better Align the Receiving Antenna With the Transmitting Antenna

Petitioner improperly combines two separate teachings of Ross to argue that Ross discloses moving the receiving antenna from a first position to a second position with better alignment. The first portion of Ross discloses that as the operator of RPEV 12 approaches a “designed stopped location,” e.g., a passenger loading/unloading zone, an auto positioning control takes over the driving of the vehicle for the final 10-15 feet, and, based on the position of the vehicle determined by vehicle sensors 60, is steered to laterally position the vehicle with a “rough

tolerance, e.g., +/- 5-10 cm of an optimum lateral position when the vehicle comes to its designed stopped location.” Col. 12:37-52. Ross does not disclose that the degree of coupling is measured at the “rough tolerance” position before being moved to the optimum position. *See* Horenstein Supp. ¶ 119.

Petitioner argues that the second portion of Ross relates to when the vehicle is “being driven,” but also to “when the vehicle is stopped.” Rep. 26. But “when the vehicle is stopped” is still in the context of the vehicle “being driven,” such as temporarily stopping at a traffic light. Ross, 13:15-31. There is no disclosure in this section that there is a “designed stopped location” or that the steering is controlled by the vehicle as it approaches the designed stopped location. *Id.*, 12:48-52. Therefore, Petitioner cannot combine the separate embodiments of Ross to arrive at this claim element.

2. Ross Does Not Move the Receiving or Transmitting Antenna to a Second Alignment Position “Responsive to Detecting a Degree of Coupling in the First Alignment Position” (Claims 13, 14, 16)

For the same reasons discussed above, Ross does not disclose that the receiving antenna is moved from the “rough tolerance” position (i.e., first alignment position) to the more closely aligned position (i.e., the second alignment position) “responsive to detecting a degree of coupling in the [rough tolerance] position.”

IV. CONCLUSION

For the reasons explained above, Patent Owner respectfully submits that the Petition does not show that any claim of the '654 Patent is unpatentable. Thus, the Board should deny reject all grounds of the Petition.

Dated: February 13, 2025

Respectfully submitted,

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CERTIFICATION UNDER 37 CFR § 42.24

Under the provisions of 37 CFR § 42.24(d), the undersigned hereby certifies that the word count for the foregoing Patent Owner's Preliminary Response to Petition totals 13,981, which is less than the 5,600 allowed under 37 CFR § 42.24(b)(1).

Dated: February 13, 2025

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CERTIFICATE OF SERVICE

It is certified that a copy of the *Patent Owner's Sur-Reply* has been served on Petitioner as provided in 37 C.F.R. § 42.6(e) via electronic mail transmission addressed to the persons at the address of record as follows:

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