

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ANKER INNOVATIONS LTD.,
Petitioner,

v.

POWERMAT TECHNOLOGIES LTD.,
Patent Owner.

IPR2024-00994
Patent 9,048,696 B2

Before KEN B. BARRETT, KARA L. SZPONDOWSKI, and
RYAN H. FLAX, *Administrative Patent Judges*.

BARRETT, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
35 U.S.C. § 318(a)

I. INTRODUCTION

A. *Background and Summary*

Anker Innovations Ltd. (“Petitioner”)¹ filed a Petition requesting *inter partes* review of U.S. Patent No. 9,048,696 B2 (“the ’696 patent,” Ex. 1001). Paper 2 (“Pet.”). The Petition challenges the patentability of claims 1–7 and 9–14 of the ’696 patent. We instituted an *inter partes* review of all challenged claims on all proposed grounds of unpatentability. Paper 7. Powermat Technologies Ltd. (“Patent Owner”)² filed a Response to the Petition. Paper 11 (“PO Resp.”). Petitioner filed a Reply (Paper 14, “Pet. Reply”) and Patent Owner filed a Sur-reply (Paper 15, “PO Sur-reply”).

An oral hearing was held on September 16, 2025, and a transcript of the hearing is included in the record. Paper 24 (“Tr.”).

This Final Written Decision is entered pursuant to 35 U.S.C. § 318(a). For the reasons discussed below, we determine that Petitioner has shown by a preponderance of the evidence that claims 1–7 and 9–14 of the ’696 patent are unpatentable.

B. *Related Proceedings*

Both parties identify, as matters involving or related to the ’696 patent: *Powermat Technologies Ltd. v. Anker Innovations Ltd.*, No. 5:23-cv-00052 (E.D. Tex.); *Powermat Technologies Ltd. v. Shenzhen DAK Technology Co., Ltd. d/b/a Choetech*, No. 6:21-cv-00723 (W.D. Tex.); *Powermat Technologies Ltd. v. Shenzhen Huashuntong Logistics Co., Ltd.*

¹ Petitioner identifies Anker Innovations Ltd. as the real party in interest. Pet. 83.

² Patent Owner identifies Powermat Technologies Ltd. as the real party in interest. Paper 4, 1.

d/b/a Nanami, No. 6:21-cv-00724 (W.D. Tex.); and *Powermat Technologies Ltd. v. Shenzhen Kaixinghui Technology Co., Ltd. d/b/a Yootech*, No. 6:21-cv-00725 (W.D. Tex.). Pet. 84; Paper 4, 1.

C. The '696 Patent

The '696 patent pertains to inductive electrical power transfer. Ex. 1001, 1:19–20. “Inductive power coupling, as known in the art, allows energy to be transferred from a power supply to an electric load without connecting wires.” *Id.* at 1:27–29. “A power supply is wired to a primary coil and an oscillating electric potential is applied across the primary coil, thereby inducing an oscillating magnetic field,” which induces an oscillating current in a secondary coil. *Id.* at 1:29–35. “When electrical energy is transferred from a primary coil to a secondary coil the coil pair are said to be inductively coupled.” *Id.* at 1:37–39.

Figure 6b is reproduced below.

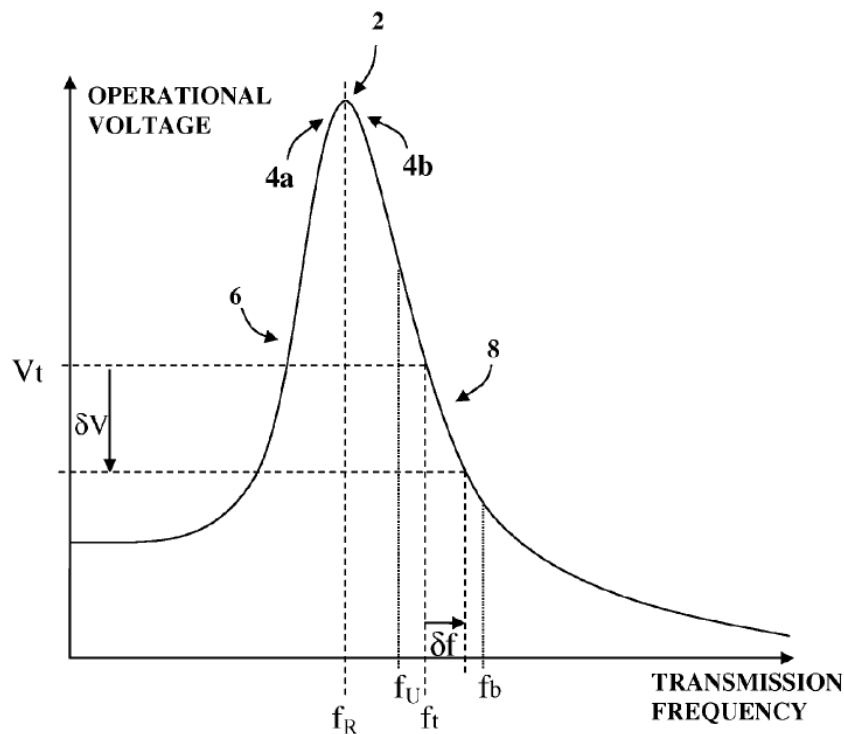


Fig. 6b

Figure 6b is “a graph showing how the amplitude of the operational voltage varies according to the transmission frequency.” *Id.* at 21:1–3. The induced voltage can be increased or decreased by a corresponding change in transmission frequency. *See id.* at 21:61–65 (describing the depicted example where an increase in transmission frequency of δf produces a decrease in induced voltage of δV). As shown in the figure, the voltage is at its highest when the transmission frequency is equal to the resonant frequency f_R of the system, at resonance peak 2. *Id.* at 21:3–6. According to the ’696 patent, “the slope of the graph is steepest in the regions 4a, 4b to either side of the resonance peak 2,” and “a small variation in frequency results in a large change in induced voltage.” *Id.* at 21:6–12. “For this reason prior art inductive transfer systems are typically very sensitive to small fluctuations in environmental conditions or variations in alignment between the induction coils.” *Id.* at 21:12–15; *see also id.* at 21:34–36 (“As a result of the changing alignment, the combined inductance of the coil pair changes which in turn changes the resonant frequency of the system.”).

The ’696 patent states,

It is a particular feature of embodiments of the current invention that the driver . . . is configured and operable to transmit a driving voltage which oscillates at a transmission frequency which is substantially different from the resonant frequency of the inductive couple. Preferably the transmission frequency is selected to lie within one of the near-linear regions 6, 8 where the slope of the frequency-amplitude graph is less steep.

Id. at 21:16–23; *see also id.* at 21:56–59 (“Referring back to FIG. 6b, the frequency of transmission is selected to be in the approximately linear region 8 of the curve between a lower frequency value of f_L , and an upper frequency value of f_U .”).

The Specification further states,

If the inductive power outlet . . . transmits power at the resonant frequency of the system, even a small lateral movement would reduce significantly the amplitude of the induced voltage. In contradistinction, according to embodiments of the present invention, the inductive power outlet . . . transmits power at a frequency in one of the regions 6, 8 to either side of the resonance peak 2 (FIG. 6*b*) where the slope of the resonance graph is much shallower. Consequently, the system has a much larger tolerance of variations such as lateral movement.

Id. at 21:37–46.

According to the '696 patent,

Another advantage of non-resonant transmission is that the transmission frequency may be used to regulate power transfer. In known inductive power transfer systems, power is typically regulated by altering the duty cycle of the transmission voltage provided by the driver. Thus, it will be appreciated that when the transmission frequency is not equal to the resonance frequency of the system, the driver . . . may be configured to adjust the transmission frequency in order to regulate the power transfer.

Id. at 21:47–55.

D. Illustrative Claim

Of the challenged claims of the '696 patent, claim 1 is the sole independent claim. The remaining challenged claims depend directly or indirectly from claim 1. Claim 1, reproduced below with bracketed annotations³ inserted, is illustrative.

³ We utilize Petitioner's annotations for claim 1 but have retained the paragraph formatting from the issued patent.

1. [1P] An inductive power outlet operable to transfer power to an inductive power receiver, said inductive power outlet comprising:
 - [1.1] a platform for supporting said inductive power receiver;
 - [1.2] at least one primary inductive coil embedded in said platform;
 - [1.3] an alignment mechanism configured to facilitate alignment between said primary inductive outlet and said inductive power receiver [1.4] such that an inductive couple is formed between said primary inductive coil and a secondary inductive coil of said inductive power receiver, said inductive couple having a characteristic resonant frequency; and
 - [1.5] a driving circuit wired to said primary inductive coil,
 - [1.6] said driving circuit comprising a switching unit configured and operable to provide an oscillating driving voltage across said primary inductive coil such that a secondary voltage is induced in the secondary inductive coil;
 - [1.7] wherein said driving circuit is configured and operable to produce said oscillating driving voltage at a transmission frequency substantially different from said characteristic resonant frequency of said inductive couple.

Ex. 1001, 28:25–46.

E. Evidence

Petitioner relies on the following references:

Name	Reference	Exhibit No.
Onishi	US 2008/0197804 A1, published Aug. 21, 2008	1004
Flowerdew	US 7,211,986 B1, filed July 1, 2004, issued May 1, 2007	1005
Partovi	US 2007/0279002 A1, published Dec. 6, 2007	1007
Baarman392	US 2008/0079392 A1, published Apr. 3, 2008	1008

Name	Reference	Exhibit No.
Tocci	RONALD J. TOCCI ET AL., DIGITAL SYSTEMS: PRINCIPLES AND APPLICATIONS (10th ed. 2007)	1009

Petitioner also relies on the declarations of Dr. Gary L. Woods (Exs. 1003, 1101) in support of its arguments, and Patent Owner relies on the declarations of Dr. Patrick Mercier (Exs. 2001, 2006) in support of its arguments. The parties also rely on other exhibits as discussed below.

F. Asserted Grounds of Unpatentability

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

Claim(s) Challenged	35 U.S.C. § ⁴	Reference(s)/Basis
1–7, 9, 10, 13, 14	103(a)	Onishi, Flowerdew
11–13	103(a)	Onishi, Flowerdew, Partovi
1, 3–5, 7, 9–14	103(a)	Baarman392, Partovi
2, 6	103(a)	Baarman392, Partovi, Tocci

II. ANALYSIS

A. Principles of Law

Petitioner bears the burden of persuasion to prove the unpatentability of the claims challenged in the Petition, and that burden never shifts to Patent Owner. *Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015). To prevail, Petitioner must establish by a

⁴ For purposes of this Decision, we understand the challenged claims have an effective filing date prior to March 16, 2013, the effective date of the relevant aspects of the Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) (“AIA”), and we apply the pre-AIA version of 35 U.S.C. § 103. *Cf.* Pet. 2 (Petitioner treating 2008 as the year of the priority date for purposes of this proceeding); PO Resp. 7 n.2 (same).

preponderance of the evidence that the challenged claims are unpatentable.
35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d).⁵

A patent claim is unpatentable under 35 U.S.C. § 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). 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 skill in the art; and (4) if present, any objective evidence of obviousness or non-obviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

B. The Level of Ordinary Skill in the Art

In determining the level of ordinary skill in the art, various factors may be considered, including the “type of problems encountered in the art; prior art solutions to those problems; rapidity with which innovations are made; sophistication of the technology; and educational level of active workers in the field.” *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995) (quoting *Custom Accessories, Inc. v. Jeffrey–Allan Indus., Inc.*, 807 F.2d 955, 962 (Fed. Cir. 1986)).

Petitioner contends that:

[A] person of ordinary skill in the art at the time of the alleged invention (“POSITA”) would have had a bachelor’s degree or

⁵ Although we refer to certain Patent Owner arguments as unpersuasive, this is in the context of the record as a whole in view of Petitioner’s arguments. We do not shift the ultimate burden of proof from Petitioner.

higher in electrical engineering, at least 3 years of experience designing or researching electronic circuits, and familiarity with power electronics and inductive power transfer circuits.

Pet. 6 (citing Ex. 1003 ¶ 20).

Patent Owner disagrees with Petitioner’s proposal “based on the lack of specific experience related to the field of wireless or inductive charging device design.” PO Resp. 23. Patent Owner contends that:

[A] POSITA would have a working knowledge of wireless charging and inductive charging. Ex. 2006 at ¶ 40. The person would have gained this knowledge through an undergraduate Bachelor of Science degree in electrical engineering, computer engineering, computer science, or a related field, with at least two years of experience working in the field of wireless or inductive charging device design, or testing of such wireless or inductive charging device testing, or an equivalent combination of academic study and work experience. *Id.* More education (e.g., a Master’s degree) or work experience any relevant field may compensate for a deficit in one or more relevant qualifications stated above. *Id.*

Id.

Patent Owner’s proposed experience of two years in the field of wireless/inductive charging is a bit more specific than Petitioner’s proposal of three years of experience with circuits and “familiarity with power electronics and inductive power transfer circuits.” We, however, discern little material difference between the parties’ proposed definitions. Petitioner’s definition is consistent with the level of ordinary skill reflected in the prior art references of record. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001) (recognizing that the prior art itself may reflect an appropriate level of skill in the art). For purposes of this decision, we apply Petitioner’s definition of the person of ordinary skill in the art. We

note, however, that were we to adopt Patent Owner's assessment, the outcome of this Decision would be the same.

C. Claim Construction

We apply the same claim construction standard used in district court actions under 35 U.S.C. § 282(b), namely that articulated in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). *See* 37 C.F.R. § 42.100(b). In applying that standard, claim terms generally are given their ordinary and customary meaning as would have been understood by a person of ordinary skill in the art at the time of the invention and in the context of the entire patent disclosure. *Phillips*, 415 F.3d at 1312–13. “In determining the meaning of the disputed claim limitation, we look principally to the intrinsic evidence of record, examining the claim language itself, the written description, and the prosecution history, if in evidence.” *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 469 F.3d 1005, 1014 (Fed. Cir. 2006) (citing *Phillips*, 415 F.3d at 1312–17). “[W]hile extrinsic evidence can shed useful light on the relevant art, . . . it is less significant than the intrinsic record in determining the legally operative meaning of claim language.” *Phillips*, 415 F.3d at 1317 (internal quotation marks omitted).

The parties agree that “most claim elements do not require a formal construction for purposes of resolving controversies in this proceeding.” Pet. 6; *see* Paper 6, 22 (Patent Owner's Preliminary Response indicating this is undisputed). Both parties address the meaning of the recited “substantially different” transmission frequency. *See, e.g.*, Pet. 7–9; PO Resp. 23–29.

Substantially Different

Independent apparatus claim 1 recites that the “driving circuit is configured and operable to produce said oscillating driving voltage at a transmission frequency *substantially different* from said characteristic resonant frequency of said inductive couple.” Ex. 1001, 28:43–46 (emphasis added).

The parties do not direct our attention to any language in independent claim 1 that further indicates the meaning or scope of “substantially different.” *But see* PO Resp. 28–29 (Patent Owner’s argument, addressed below, that dependent claim 2 indicates that “the ’696 Patent is directed to a linear control technique for predictably regulating power transfer,” and that this informs the construction of “substantially different.”).

The Specification, discussing Figure 6b (reproduced above), states that the slope of the frequency-amplitude graph is steepest in the regions 4a, 4b to either side of the resonance peak, and “[t]hus in inductive transfer systems, which operate at or around resonance, a small variation in frequency results in a large change in induced voltage.” Ex. 1001, 21:6–10. The Specification further states, “[f]or this reason prior art inductive transfer systems are typically very sensitive to small fluctuations in environmental conditions or variations in alignment between the induction coils.” *Id.* at 21:12–15. According to the ’696 patent, “[i]t is a particular feature of embodiments of the current invention that the driver . . . is configured and operable to transmit a driving voltage which oscillates at a transmission frequency which is substantially different from the resonant frequency of the inductive couple.” Ex. 1001, 21:16–20. The Specification then states the following: “Preferably the transmission frequency is selected to lie within

one of the near-linear regions 6, 8 [of Figure 6b] where the slope of the frequency-amplitude graph is less steep.” *Id.* at 21:20–23; *see also id.* at 21:56–59 (“Referring back to FIG. 6b, the frequency of transmission is selected to be in the approximately linear region 8 of the curve between a lower frequency value of f_L and an upper frequency value of f_U .”); Pet. 7–8 (citing the same). Although there are inconsistencies between some of the frequency labels in Figure 6b and the Specification’s description of that figure,⁶ the parties agree that the near-linear region 8 of the curve in Figure 6b is the range from f_U to f_b . *See* PO Resp. 27–28; Pet. Reply 8–9; *see also id.* at 12 (Petitioner referring to f_b as the boundary).

Both parties note that the meaning of “substantially different” was discussed in the prosecution history. *See* Pet. 8; PO Resp. 8–10. During prosecution, the Examiner maintained in the Final Rejection that independent claim 1, along with others, would have been obvious over a prior art reference called “Malpas.” Ex. 1002, 89. An interview between the

⁶ For example, the Specification, in describing Figure 6b, explains that the approximately linear region 8 is between “a lower frequency value of f_L and an upper frequency value of f_U .” *See* Ex. 1001, 21:56–59. However, f_L is not shown in that figure. On the other hand, frequency f_b is depicted in the Figure 6b but is not described in the Specification, and is depicted as a value greater than upper frequency f_U , suggesting that it is not a typographical error and should be lower frequency f_L . *But see* Ex. 2006 ¶ 100 (Dr. Mercier characterizing upper frequency value f_U as “the lower bound frequency” and characterizing f_b as “the upper bound frequency . . . which also corresponds to the frequency that yields the lower bound of the operational voltage,” and opining that “a POSITA would understand that [lower frequency value] f_L and f_b may be regarded as referring to the same thing and may be used interchangeably.”). Additionally, the Specification’s statement that the near-linear regions 6 and 8 are where the slope is less steep than the “steepest” regions 4a and 4b is questionable. *See id.* at 21:6–8, 21:20–23.

applicant (Patent Owner) and the Examiner was conducted after this Final Rejection, and “[a]greement was reached that remarks directed to the claim language, Malpas, Figure 6B, and [0160+] would overcome the rejection of record.” *Id.* at 77 (second brackets in original).

In a response to the Final Office Action, the applicant quoted paragraph 161 of the application (corresponding to column 21, lines 16–23 in the issued patent), and argued:

The claims must be interpreted in light of the specification as they would be understood by one of ordinary skill in the art. As such, one having ordinary skill in the art would appreciate that the term “*substantially different from said characteristic resonant frequency*” recited in claims 1 and 17, in view of at least Fig. 6b, ***should be interpreted to mean*** that the frequency of the driving voltage is selected so as to ***lie within one of the near-linear regions of a frequency-amplitude graph associated with the inductive couple.***

Ex. 1002, 70 (emphasis added). The applicant continued, arguing that the claims are distinguishable over Malpas.

A person having ordinary skill in the art, upon reading Malpas, would have understood that in order to transmit power to a remote pick-up, it would be necessary to use a transmission frequency ***at or near to the resonant frequency of the pick-up*** (as opposed to the invention recited in instant claims 1 and 17, as currently presented, wherein the transmission frequency is selected to be ***different*** from the characteristic frequency of the inductive couple formed between the primary and secondary coils).

Id. at 71; *see also id.* at 70 (“By contrast, Malpas describes systems at which the transmission frequency is selected to be as close as possible to the resonant natural frequency of the pick-up.”).

Petitioner contends that, “regardless of the outermost boundaries of the scope of a transmission frequency ‘substantially different’ from a

characteristic resonant frequency as claimed, the specification plainly establishes that it must at least encompass the frequencies within one of the near-linear regions of the frequency-amplitude graph.” Pet. 8–9 (citing Ex. 1003 ¶¶ 36–41).

Patent Owner agrees with Petitioner that the claim phrase “substantially different” encompasses frequencies that lie within one of the near-linear regions of a frequency-amplitude graph. PO Sur-reply 1; *see also* PO Resp. 23–24 (quoting arguments made in the Patent Owner Preliminary Response).⁷

Patent Owner, however, requests that we go further. Specifically, Patent Owner argues that “a POSITA would define the ‘transmission frequency [that is] substantially different from the characteristic resonant frequency,’ as recited in claim 1, to further allow for some incremental change (increase or decrease) in frequency while remaining in one of the near-linear regions of the frequency-amplitude graph.” PO Resp. 29 (citing Ex. 2006 ¶ 112) (alteration in original).

Patent Owner concedes that the ’696 Patent does not use the phrase “linear regulation,” but asserts that “a POSITA would understand linear regulation/control as being a central aim of the ’696 Patent.” *Id.* at 25 (citing Ex. 2006 ¶ 111). Patent Owner presents extensive argument as to why we should interpret the Specification as disclosing “that the selection of

⁷ Patent Owner, in discussing Petitioner’s Baarman392-Partovi unpatentability ground, cites dictionaries for the meaning of “substantial” and as further support for the agreed upon portion of the construction. *See* PO Resp. 57 & 57 n.4; *see id.* at 57 (contending that “a POSITA would interpret the transmission frequency of claim 1 to lie within the near-linear region of a frequency-amplitude graph.”).

a transmission frequency within the near-linear regions of a frequency-amplitude graph (i.e., selection of a transmission frequency that is substantially different from the characteristic resonant frequency) will enable a linear control technique for predictably regulating power transfer.” *Id.* at 25–29 (citing Ex. 2006 ¶ 112); *see id.* at 26 (quoting a portion of the Specification that uses the terms “Preferably” and “Optionally”); PO Sur-reply 2–4.

Even if the Specification identified “linear regulation/control as being a central aim” of the ’696 patent, Patent Owner has offered no persuasive reason why a linear-control-related limitation should be read into independent claim 1, and we decline to do so. *Hill-Rom Servs., Inc. v. Stryker Corp.*, 755 F.3d 1367, 1371 (Fed. Cir. 2014) (“While we read claims in view of the specification, of which they are a part, we do not read limitations from the embodiments in the specification into the claims.” (citing *Liebel–Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 904 (Fed. Cir. 2004))); *cf.* Ex. 1105, 40 (the District Court, in the parallel litigation, excluding a witness’s testimony that the “substantially different” term requires “allow[ance] for some incremental change (increase or decrease) in frequency while remaining in the near-linear/linear regions” because, *inter alia*, Powermat “fails to offer any particularized arguments explaining why the ‘allow[ance]’ construction is proper.” (alterations in original)).

Patent Owner also relies on dependent claim 2, which depends from independent claim 1. PO Resp. 28–29. Dependent claim 2 adds to claim 1 the requirement that the driver be configured to increase and decrease the transmission frequency when a particular signal is received. *See* Ex. 1001, 28:47–54. Patent Owner asserts that this means that the driver is configured

to increase/decrease the “substantially different” frequency, namely a frequency that lies within the near-linear region of a frequency-amplitude graph, and argues that, “[i]n reading claim 2 as a whole, a POSITA would understand that the ’696 Patent is directed to a linear control technique for predictably regulating power transfer.” PO Resp. 28–29 (citing Ex. 2006 ¶ 101).

Even if dependent claim 2 called for linear control as Patent Owner appears to assert, we would not read such a limitation into the underlying independent claim. *See Karlin Tech., Inc. v. Surgical Dynamics, Inc.*, 177 F.3d 968, 971–72 (Fed. Cir. 1999) (“The doctrine of claim differentiation . . . normally means that limitations stated in dependent claims are not to be read into the independent claim from which they depend.”); *but see* PO Sur-reply 4 (arguing for a narrower interpretation of independent claim 1 because it must be read in the context of the entire patent, which includes dependent claim 2).

In light of the parties’ agreement and the Specification’s description of the transmission frequency that is “[p]referably . . . selected” and the applicant’s explicit statement defining the relevant claim language during prosecution, we construe “a transmission frequency substantially different from said characteristic resonant frequency of said inductive couple” as encompassing *frequencies that lie within one of the near-linear regions of a frequency-amplitude graph associated with the inductive couple*.

D. The Asserted Obviousness of Claims 1–7, 9, 10, 13, and 14 over Onishi and Flowerdew (Ground 1A)

Petitioner asserts that claims 1–7, 9, 10, 13, and 14 of the ’696 patent would have been obvious over Onishi and Flowerdew. *See* Pet. 14–28 (addressing the proposed combination and independent claim 1). Petitioner

contends that Onishi discloses all or much of the claimed subject matter, and relies on Flowerdew for teaching an alignment mechanism as recited in limitation 1.3. *See id.* at 14–15, 20–21.

Patent Owner argues that Onishi fails to disclose the recited “inductive couple having a characteristic resonant frequency” of limitation 1.4 and the recited “substantially different” frequency in limitation 1.7. *See* PO Resp. 31–49. Patent Owner also argues that a person of ordinary skill in the art would not have had a motivation to combine the references’ teachings regarding the “alignment mechanism” of limitation 1.3. *See id.* at 51–52. Patent Owner additionally argues that the proposed combination fails to satisfy the limitations of dependent claim 2 regarding increasing and decreasing the transmission frequency when a signal is detected. *See id.* at 49–51.

1. Onishi (Ex. 1004)

Onishi pertains to “a power transmission control device provided in a power transmission device of a non-contact power transmission system.” Ex. 1004 ¶ 10. “[T]he non-contact power transmission system transmit[s] power from the power transmission device to a power reception device by electromagnetically coupling a primary coil and a secondary coil to transmit the power to a load of the power reception device.” *Id.*

[W]hen the power transmission device has detected that a battery included in the load has been fully charged, the power-transmission-side control circuit stop[s] normal power transmission to the power reception device and perform[s] power-saving power transmission that transmits a small amount of power as compared with the normal power transmission. *Id.* ¶ 12. “The transmission frequency during power-saving power transmission is set at a frequency apart from the resonance frequency

(resonance peak) as compared with the frequency during normal power transmission, for example.” *Id.* ¶ 53.

Onishi’s Figure 4 is reproduced below.

FIG. 4

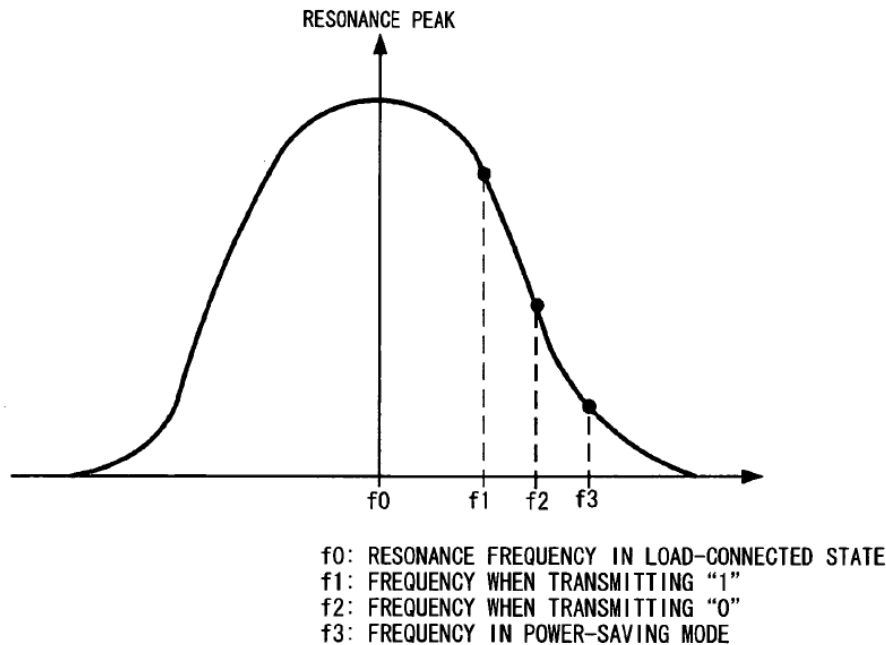


Figure 4 depicts the resonance characteristics of induction coil(s)⁸ and applications of frequencies where “the horizontal axis indicates the frequency, and the vertical axis indicates the resonance peak value.” *Id.* ¶ 180. “The resonance characteristics of the primary coil L1 and the secondary coil L2 when the portable telephone . . . is placed on the charger . . . (i.e., when load exists with respect to the power transmission device 10) . . . have a symmetrical and broad mountain shape, as shown in

⁸ We address below Patent Owner’s argument that Onishi’s Figure 4 depicts the characteristics of individual coil(s) and not the inductive couple of two coils. *See* PO Resp. 48–49.

FIG. 4, for example.” *Id.* “[T]he frequency f1 is a frequency used when transmitting ‘1’ during normal power transmission” and “is a basic frequency during power transmission.” *Id.* ¶ 181. “The frequency f2 is a frequency used when transmitting ‘0’ (see FIGS. 3A and 3B),” and “[a] frequency f3 is a frequency used in the power-saving mode.” *Id.*

2. *Flowerdew (Ex. 1005)*

Flowerdew pertains to inductive battery chargers. Ex. 1005, 1:5–7. According to Flowerdew, “[t]o make the efficiency of power transfer as high as possible it is necessary to contain the magnetic field so that all, or most, of the field in the first coil is linked to the second.” *Id.* at 2:61–64. Flowerdew states, “[t]he present invention provides a contactless charging system utilizing induction which does not require a housing with a compartment or recess that must be mechanically matched to the item being charged.” *Id.* at 4:42–45. “In an embodiment of the invention, the charger takes the form of a shallow concave (herein also referred to as ‘dished’ or a ‘dish’) or similarly shaped upper charging surface.” *Id.* at 4:49–52.

Flowerdew, referring to Figure 5 (not shown here), discloses

Charging surface 357 may include a plurality of dished recesses to permit the secure and defined location of a plurality of items placed on the surface. The dished recesses may be optimized for the alignment of some subset of items that are placed on the surface to receive power from charger 302. In a further embodiment of the invention, charging surface 357 possesses one or more markers indicating a preferred alignment and/or orientation for items that may placed on that part of the surface to receive power from charger 302.

Id. at 7:52–61.

3. *The Asserted Obviousness of Independent Claim 1 over Onishi and Flowerdew*

- a. *[1P] An inductive power outlet operable to transfer power to an inductive power receiver, said inductive power outlet comprising:*

Petitioner contends that, “[t]o the extent the preamble is a limitation, Onishi discloses ‘a charger 500 (cradle) (i.e., electronic instrument)’ (**inductive power outlet**) that includes a power transmission device 10 and a ‘portable telephone 510 (i.e., electronic instrument)’ (**inductive power receiver**) that includes a power reception device 40.” Pet. 17 (citing Ex. 1004 ¶¶ 31, 124–131; Ex. 1003 ¶ 56).

Patent Owner does not raise any arguments regarding these contentions.⁹ See PO Resp. 31–52; PO Sur-reply 5–21.

- b. *[1.1] a platform for supporting said inductive power receiver;*

Petitioner contends that “Onishi discloses that the charger/cradle (**inductive power outlet**) includes an exterior housing (**platform**) for supporting the portable telephone or other electronic instrument (**inductive power receiver**).” Pet. 18–19 (citing Ex. 1004 ¶¶ 39, 124–126, 137, 174, 180, Fig. 1A; Ex. 1003 ¶ 58).

Patent Owner does not raise any arguments regarding these contentions. See PO Resp. 31–52; PO Sur-reply 5–21.

- c. *[1.2] at least one primary inductive coil embedded in said platform;*

Petitioner contends that “Onishi discloses that the charger/cradle’s power transmission device 10 includes ‘a primary coil L1 (power-

⁹ Neither party presents arguments as to whether the preamble is limiting.

transmission-side coil)’ (*at least one primary inductive coil*).” Pet. 20 (citing Ex. 1004 ¶ 128, Fig. 2; Ex. 1003 ¶ 59). Petitioner further contends that, “a[s] depicted in FIG. 1A . . . , power transmission device 10 including primary coil L1 is embedded within the exterior housing (*platform*) of the charger/cradle (*inductive power outlet*).” *Id.* (citing Ex. 1004 ¶¶ 125, 128, 131, 137, 174, 180, Figs. 1A–2; Ex. 1003 ¶ 59).

Patent Owner does not raise any arguments regarding these contentions. *See* PO Resp. 31–52; PO Sur-reply 5–21.

d. [1.3] an alignment mechanism configured to facilitate alignment between said primary inductive outlet and said inductive power receiver

Limitation 1.3 calls for an alignment mechanism to help with the alignment of the power receiver to the inductive power outlet. *See* Ex. 1001, 28:31–33. Petitioner contends that “Onishi’s charger includes a ‘cradle’ to support the power reception device, which at least suggests the use of a mechanical alignment mechanism.” Pet. 14 (citing Ex. 1004 ¶¶ 39, 120, 124–131, 161, 174, Fig. 1A; Ex. 1003 ¶ 49). Petitioner further contends that, “[t]o the extent Onishi does not expressly describe the use of a conventional ‘alignment mechanism,’ such a feature was commonly implemented in similar wireless charging systems to achieve several known benefits,” and that “Flowerdew plainly suggests using alignment mechanisms such as shaped surface features and directional logos/markers to promote alignment of the coils of the charger and device.” *Id.* at 14–15 (citing Ex. 1005, 2:59–3:14, 7:52–61, 11:25–44; Ex. 1003 ¶ 50).

Petitioner offers several reasons why a person of ordinary skill in the art would have been motivated to make the proposed combination. *See* Pet. 15–17, 20–21. For example, Petitioner contends that a person of

ordinary skill in the art “would have been motivated to implement Onishi in a manner that includes an alignment mechanism as suggested by Flowerdew (e.g., a dished recess or other shaped surface feature, a directional logo/marker, or both) so that the primary and secondary coils would be more readily ‘optimized’ for alignment and the inductive ‘coupling is maximized.’” *Id.* at 15 (citing Ex. 1005, 2:59–3:14, 7:52–61, 11:25–44; Ex. 1003 ¶ 52). Petitioner also contends that one would be motivated to make the combination “to advantageously improve user convenience when placing the rechargeable device on the charger platform . . . [which] would have benefited the user both in terms of automatically guiding the rechargeable device toward a more optimized and stable position for charging and conveniently confirming a visual indication of a preferred orientation (without requiring tedious adjustments each time).” *Id.* at 15–16 (citing Ex. 1003 ¶ 53; Ex. 1005, 7:52–61, 11:25–44).

Petitioner also contends that “Flowerdew expressly suggests a known technique to address a conventional problem—namely, aligning the primary and secondary coils in a wireless charger system in a rapid and error-free manner.” *Id.* at 16 (citing Ex 1003 ¶ 54). According to Petitioner, Onishi discloses a system that inductively couples two coils, but does not expressly detail how to align those coils, and that “Flowerdew suggests a known technique to do so.” *Id.* (citing, *inter alia*, Ex. 1005, 2:59–3:14, 7:52–61, 11:25–44); *see also id.* at 16 (citing *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.”))).

Patent Owner argues that a person of ordinary skill in the art “would not be motivated to place the charging device of Onishi in the housing disclosed in reference to Figure 2 and/or Figure 5 of Flowerdew (*see* Ex. 1005 at 7:52–61) or Figure 10 (*see* Ex. 1005 at 11:25–44) of Flowerdew because there is no expectation of success.” PO Resp. 51 (citing Ex. 2006 ¶ 144). Patent Owner asserts that each of Flowerdew’s housings shown in those figures “requires a specific geometry” of multiple coils oriented at certain angles to generate a nearly horizontal magnetic field, and that Onishi has only one coil that would not allow for the horizontal couple of Flowerdew. *See id.* at 51–52. Patent Owner further asserts that “attempting to modify Onishi using the teachings of Flowerdew would render the combination inoperable because the principle of operation of Flowerdew is contrary to Onishi’s which requires a vertical coupling between” the primary and secondary coils. *Id.* at 51–52 (citing Ex. 2006 ¶ 144). Patent Owner also argues that “Flowerdew’s housing shape for the charging device is specifically designed to facilitate coupling with a secondary coil shaped as a long solenoidal coil,” and that “Petitioner has not explained why Onishi’s arrangement would be used with a long solenoidal coil as a secondary coil.” *Id.* at 52 (citing, *inter alia*, Ex. 2006 ¶ 145); *see also* PO Sur-reply 20 (arguing that “Petitioner . . . continues to ignore that Flowerdew’s ‘conventional alignment mechanism’ is specifically designed to facilitate inductive coupling with a secondary coil shaped as a long solenoidal coil.”).

We do not find Patent Owner’s arguments persuasive. We agree with Petitioner that Patent Owner’s arguments are incorrectly premised on a hypothetical combination involving the bodily incorporation of the two references’ specific structures. *See* Pet. Reply 17. “The test for obviousness

is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art.” *In re Keller*, 642 F.2d 413, 425 (CCPA 1981); *see also In re Sneed*, 710 F.2d 1544, 1550 (Fed. Cir. 1983) (“[I]t is not necessary that the inventions of the references be physically combinable to render obvious the invention under review.”); *In re Nievelt*, 482 F.2d 965, 968 (CCPA 1973) (“Combining the *teachings* of references does not involve an ability to combine their specific structures.”). Rather, “if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill.” *KSR Int’l Co.*, 550 U.S. at 417.

Petitioner’s proposed combination is the application, to Onishi’s charging system, of Flowerdew’s general teaching of the technique of using an alignment mechanism in order to optimize the alignment of the inductive coils and to maximize the inductive coupling. *See, e.g.*, Pet. 15 (“[A] POSITA would have been motivated to implement Onishi in a manner that includes an alignment mechanism as suggested by Flowerdew (e.g., a dished recess or other shaped surface feature, a directional logo/marker, or both) so that the primary and secondary coils would be more readily ‘optimized’ for alignment and the inductive ‘coupling is maximized.’”). Flowerdew teaches, for example, that, with the use of a dished charging surface, the secondary unit “tends to align in one axis” and “[t]his alignment is such that the coupling between a solenoid receive coil in secondary unit 304 and the charging coils of charger 302 is maximized.” Ex. 1005, 11:25–52.

Petitioner, with the supporting testimony of Dr. Woods, contends, and we agree, that a person of ordinary skill in the art “would have been sufficiently skilled to implement [the proposed] combination given the predictable techniques disclosed in each reference and the relatively advanced state of the art at the time.” *Id.* at 17 (citing Ex. 1003 ¶ 55).

We determine that Petitioner has shown that the proposed combination teaches or suggests the subject matter of limitation 1.3 and that Petitioner has set forth adequate and persuasive reasons with rational underpinning as to why a person of ordinary skill in the art would have modified Onishi’s system to utilize an alignment mechanism. We also determine, for the reasons stated by Petitioner, that a person of ordinary skill in the art would have had a reasonable expectation of success in making the proposed combination. *See* Pet. 16–17; Ex. 1003 ¶ 55.

- e. [1.4] such that an inductive couple is formed between said primary inductive coil and a secondary inductive coil of said inductive power receiver, said inductive couple having a characteristic resonant frequency; and*

Petitioner contends that Onishi’s coils L1 and L2 (mapped to the primary inductive coil and secondary inductive coil, respectively) form an inductive couple and that “the predictable [Onishi-Flowerdew] combination would further improve/enhance Onishi’s inductive coupling of coils L1 and L2 having a characteristic resonant frequency (e.g., frequency f_0) by more consistently and reliably aligning the coils for power transmission.” Pet. 21–22 (citing Ex. 1004 ¶¶ 3, 125, 128–133, 137, 180–181, Figs. 2, 4, 5; Ex. 1003 ¶ 61).

Patent Owner argues that “Onishi does not disclose an inductive couple having a characteristic resonant frequency.” PO Resp. 31. According to Patent Owner, Onishi’s discussion of a characteristic resonant

frequency is only in the context of one coil (an induction coil), not in a pair of coils, and that Onishi's Figure 4 depicts resonance characteristics of a single coil. *See id.* at 31–32 (citing Ex. 1004 ¶ 180), *id.* at 35; *see also id.* at 33 (“Although Onishi states that ‘[t]he resonance characteristics of the primary coil L1 and the secondary coil L2 . . . have a symmetrical and broad mountain shape, as shown in FIG. 4’ (Ex. 1004 at [0180]), a POSITA would understand that this discussion relates to two independent inductive coils as opposed to an inductive couple formed therebetween.” (alterations in original) (emphasis omitted)).

This limitation merely recites the results of facilitating the alignment of the two coils (as recited in the immediately preceding “alignment mechanism” limitation discussed above), namely that an inductive couple is formed between the two coils and that the couple has a characteristic resonant frequency. *See* Ex. 1001, 28:33–37 (“such that an inductive couple is formed between said primary inductive coil and a secondary inductive coil of said inductive power receiver, said inductive couple having a characteristic resonant frequency”). This recitation of “a characteristic resonant frequency” provides antecedent basis for the claim's later use of that frequency as a reference point. *See id.* at 28:44–46 (limitation 1.7 reciting, “a transmission frequency substantially different from said characteristic resonant frequency of said inductive couple”).

Onishi discloses an inductively coupled system. *See* Ex. 1004 ¶ 137 (“The primary coil L1 (power-transmission-side coil) is electromagnetically coupled with the secondary coil L2 (power-receiving-side coil) to form a power transmission transformer.”). Dr. Woods credibly testifies that a person of ordinary skill in the art “would have understood that an inductive

couple between a primary and secondary coil used for transmitting power would have ‘a characteristic resonant frequency’ because this is an inherent physical property of an efficient inductive couple used for transmitting power in an inductively coupled system like Onishi.” Ex. 1101 ¶ 21; *cf.* Ex. 1102, 30:20–22¹⁰ (Dr. Mercier testifying: “If you have a parabolic-shaped curve, . . . then yes, I would say there is a characteristic resonant frequency in all cases.”). At oral argument, Patent Owner’s counsel argued that Petitioner had not proven that Onishi’s Figure 4 depicts a characteristic frequency for an inductive couple of two coils, but conceded that “[e]very couple has a characteristic resonant frequency.” Tr. 32:6–17.

Accordingly, we find that Onishi’s two-coil inductive couple has a characteristic resonant frequency, even if Onishi’s Figure 4 does not depict the characteristics of such a two-coil couple (an issue we further discuss below in the context of limitation 1.7). We determine that Petitioner has shown that the Onishi-Flowerdew combination teaches or suggest suggests the subject matter of limitation 1.4.

f. [1.5] a driving circuit wired to said primary inductive coil,

Petitioner contends that “Onishi discloses a power transmission section 12 which, in connection with at least voltage detection circuit 14, provides the claimed ‘**driving circuit**’ wired to primary coil L1 (**primary inductive coil**).” Pet. 23 (citing Ex. 1004 ¶¶ 132–139, 197–200, Figs. 2, 5; Ex. 1003 ¶ 63); *see also id.* at 23–25.

Patent Owner does not raise any arguments regarding this contention. *See* PO Resp. 31–52; PO Sur-reply 5–21.

¹⁰ For this exhibit, we cite to the page numbers of the underlying document, those on the right side of the footer.

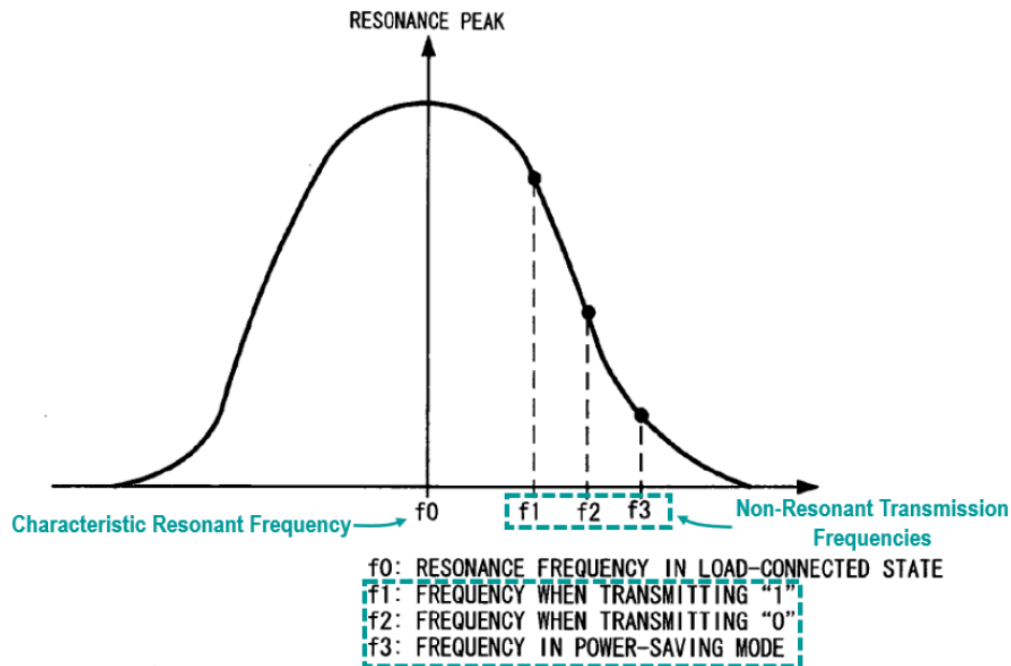
- g. *[1.6] said driving circuit comprising a switching unit configured and operable to provide an oscillating driving voltage across said primary inductive coil such that a secondary voltage is induced in the secondary inductive coil;*

Petitioner contends that “Onishi’s ‘power transmission section 12’ provides a ‘**switching unit**’ of the claimed ‘**driving circuit**’ configured and operable to provide an oscillating driving voltage across primary coil L1 such that a secondary voltage is induced in secondary coil L2.” Pet. 25; *see also id.* at 25–26 (citing Ex. 1004 ¶¶ 132–137, Figs. 2, 4, 5).

Patent Owner does not raise any arguments regarding these contentions. *See* PO Resp. 31–52; PO Sur-reply 5–21.

- h. *[1.7] wherein said driving circuit is configured and operable to produce said oscillating driving voltage at a transmission frequency substantially different from said characteristic resonant frequency of said inductive couple.*

Petitioner contends that “Onishi discloses that the power transmission section 12 (component of the claimed ‘**driving circuit**’) is configured and operable to supply an oscillating driving voltage to primary coil L1 (**primary inductive coil**) that oscillates at a non-resonant transmission frequency (e.g., frequencies f_1 , f_2 , or f_3) that is substantially different from the characteristic resonant frequency (e.g., frequency f_0) of the inductive couple.” Pet. 27 (citing Ex. 1003 ¶ 67). Petitioner provides an annotated version of Onishi’s Figure 4, which we reproduce below.



Id. at 27. Above is Onishi's Figure 4, depicting the resonance characteristics of induction coil(s) and application of frequencies, with Petitioner's annotations indicating Petitioner's contentions that the figure depicts non-resonant transmission frequencies and the characteristic resonant frequency. *See* Ex. 1004 ¶ 180. Petitioner asserts that Onishi describes operating at the three transmission frequencies. Pet. 27–28 (citing Ex. 1004 ¶¶ 53, 171, 181, Fig. 3A, Ex. 1003 ¶ 68). Petitioner contends that “each of frequencies f_1 , f_2 , and f_3 lie in a near-linear region of the frequency-response curve and thus, as noted during prosecution . . . fall within the scope of being ‘substantially different’ from the characteristic resonant frequency f_0 .” *Id.* at 28 (citing the claim construction section of the Petition (Section IV) and Ex. 1003 ¶ 62). According to Petitioner, “the substantially similar positions of Onishi's frequencies f_1 , f_2 , and f_3 in the frequency-response curve as the transmission frequency (e.g., f_t in FIG. 6B) identified as ‘substantially different’ in the '696 specification confirms that Onishi discloses and renders obvious a transmission frequency that is ‘substantially

different’ from the characteristic resonant frequency regardless of the outermost scope of this claim term.” *Id.* (citing Ex. 1001, 21:16–23, 21:56–65, Fig. 6b; Ex. 1003 ¶ 68).

Patent Owner argues that “none of f_1 , f_2 , and f_3 are described, shown, or otherwise disclosed as occurring within the near-linear regions of a frequency-amplitude graph associated with the inductive couple, as required by claim 1,” and that “they [are not] otherwise disclosed as substantially different from the characteristic resonant frequency of the inductive couple.” PO Resp. 37–38.

Patent Owner asserts that “Onishi’s discussion of resonance characteristics, including its description of Figure 4, is limited to the context of the individual coil(s),” and therefore “Petitioner has failed to demonstrate that Onishi discloses a transmission frequency substantially different from the characteristic resonant frequency *of the inductive couple* [between two coils], as required by limitation [1.7].” PO Resp. 48 (citing Ex. 2006 ¶ 139).

Patent Owner’s argument that Onishi is limited to a discussion of the resonance characteristics of the single primary coil L1 is based on the first sentence of Onishi’s paragraph 180. *See id.* at 31–32 (“Onishi’s discussion of this frequency is only in the context of ‘the resonance characteristics of the induction coil’ (i.e., a single primary coil L1).”). That sentence, using the singular term “coil,” states, “FIG. 4 is a view showing the resonance characteristics of the induction coil and applications of frequencies.” Ex. 1004 ¶ 180. However, the remainder of the paragraph clearly discusses two coils in describing Figure 4, stating:

The resonance characteristics of the primary coil L1 and the secondary coil L2 when the portable telephone 510 is placed on the charger 500 (cradle) (i.e., when load exists with respect to

the power transmission device 10) (see FIG. 1A) have a symmetrical and broad mountain shape, as shown in FIG. 4, for example. In FIG. 4, the horizontal axis indicates the frequency, and the vertical axis indicates the resonance peak value.

Id. We do not find persuasive Dr. Mercier's opinion that, "[a]lthough Onishi states that '[t]he resonance characteristics of the primary coil L1 and the secondary coil L2 . . . have a symmetrical and broad mountain shape, as shown in FIG. 4' (Ex. 1004 at [0180]), a POSITA would understand that this discussion relates to two independent inductive coils as opposed to an inductive couple formed therebetween." Ex. 2006 ¶ 115 (alterations in original) (citing at PO Resp. 33). The basis of Dr. Mercier's opinion is the preceding sentence in paragraph 180 referring, in the singular, to "the induction coil." *See id.* Dr. Mercier, however, does not offer any persuasive *technical* explanation as to why Onishi would focus on the resonance characteristics of individual coils when those coils are coupled and under load or why Onishi would plot power transmission frequencies on a curve for only one coil rather than the inductive couple. *See id.* Additionally, Dr. Mercier's opinion that the single curve of Figure 4 is a depiction for two separate coils—i.e., that the independent coils of Onishi have the same resonant frequency—is at odds with Dr. Mercier's opinion that the primary coil and secondary coil have different characteristic resonant frequencies. *See id.* ¶ 118 (Dr. Mercier stating that "Dr. Woods acknowledged that primary coil L1 and the secondary coil L2 have different characteristic resonant frequencies I agree with Dr. Woods here. That is, each coil-capacitor pair (e.g., L1 and C1, or L2 and C2) has its own characteristic resonant frequency.").

The more plausible explanation is that the Onishi contains a typographical error that would be recognized as such by a person of ordinary

skill in the art. *But see, e.g.*, PO Resp. 36 (Patent Owner arguing that “[a]t most, Onishi is unclear as to whether Figure 4 depicts the resonance characteristics of the inductive couple, but such an ambiguous disclosure is insufficient for establishing unpatentability of a claim.”); PO Sur-reply 5 (Patent Owner referring to “inconsistencies in Onishi that render it ambiguous and unacceptably vague.”).

Dr. Woods testifies that Onishi’s “Paragraph [0180] is unambiguous that FIG. 4 does not illustrate the frequency-response of a single coil in isolation, but instead illustrates the ‘resonance characteristics of the primary coil L1 **and** the secondary coil L2’ when the coils are brought in electromagnetic proximity of each other for charging—i.e., in an **inductively coupled** state.” Ex. 1101 ¶ 18. Dr. Woods, in support of his opinion, notes that Onishi’s legend for Figure 4 describes f_0 as the “RESONANCE FREQUENCY IN LOAD-CONNECTED STATE.” *Id.* We find Dr. Woods’s testimony more credible than Dr. Mercier’s. We disagree with Patent Owner’s argument (PO Resp. 35) that Petitioner’s reliance on Onishi’s Figure 4 is misplaced, and we find that Figure 4 discloses a resonant frequency of the inductive couple between the primary and secondary coils, as recited in limitations 1.4 and 1.7.

Patent Owner argues that Petitioner cannot rely on Onishi’s Figure 4 for other reasons, too. *See, e.g.*, PO Resp. 39–42. Patent Owner’s arguments are based on the assertion that “Figure 4 of Onishi and its related disclosure is inconsistent and lacks the specificity required by limitation [1.7].” PO Sur-reply 12 (section heading); *see also id.* at 15 (Patent Owner arguing that “the lack of dimensions, axis labels, quantitative values, or clear direction from the specification, renders any analysis of Figure 4 and any

alleged similarities with the '696 Patent as entirely speculative and driven by hindsight.”).¹¹ Patent Owner does not indicate clearly what specificity it deems the limitation to require, and we decline to read into claim 1 any level of specificity beyond that of our construction of a “substantially different” frequency (i.e., that the frequency lies within one of the near-linear regions of a frequency-amplitude graph associated with the inductive couple). Thus, Patent Owner’s arguments and Dr. Mercier’s opinions regarding Onishi’s purported lack of specificity are not commensurate with the language of claim 1 and, accordingly, are not persuasive. *See, e.g.*, Ex. 1102, 51:14–20 (Dr. Mercier testifying on cross-examination that “Onishi is very unclear about what it’s depicting in Figure 4. It’s really not clear to me what the vertical axis is and under what *exact operating conditions* it’s being represented.” (emphasis added)).

Patent Owner argues that Onishi does not state that Figure 4 is drawn to scale and, “[d]espite any similarities that may exist between, as Petitioner characterizes them, the ‘substantially similar positions of Onishi’s frequencies f_1 , f_2 , and f_3 in the frequency-response curve’ and the ‘696 Patent’s ‘transmission frequency (e.g., f_t in FIG. 6B)’ . . . , absent quantitative values any similarities are merely speculative.” PO Resp. 40 (quoting Pet. 28) (citing, *inter alia*, *Hockerson-Halberstadt, Inc. v. Avia Group Int’l Inc.*, 222 F.3d 951, 956 (Fed. Cir. 2000)). According to Patent

¹¹ Patent Owner argues that there is an inconsistency in that Onishi’s description refers to “the relationship ‘ $f_1 > f_2 > f_3$ ’” while “Figure 4 illustrates the opposite (i.e., $f_3 > f_2 > f_1$).” PO Sur-reply 14. A person of ordinary skill would understand the proper disclosure via the figure itself, and any inconsistency does not render Onishi’s Figure 4 “entirely unclear,” as Patent Owner argues. *Id.*; Ex. 1011 ¶ 45.

Owner, “without dimensions or vertical-axis labels a POSITA would not be able to draw any conclusions regarding any similarities between the two illustrations.” *Id.* at 41 (citing Ex. 2006 ¶ 128).

While patent drawings not designated as being drawn to scale cannot be relied upon to define precise proportions of elements if the specification is completely silent on the issue, *Hockerson-Halberstadt, Inc.*, 222 F.3d at 956, that does “not mean that things patent drawings show clearly are to be disregarded.” *In re Mraz*, 455 F.2d 1069, 1072 (CCPA 1972) (emphasis omitted). A drawing teaches all that it reasonably discloses and suggests to a person of ordinary skill in the art. *In re Aslanian*, 590 F.2d 911, 914 (CCPA 1979).

Dr. Woods credibly and persuasively testifies at length as to why Onishi’s Figure 4 provides an adequate disclosure to allow a person of ordinary skill to discern whether the subject frequencies are “substantially different” and lie within the near-linear region of a frequency-amplitude curve. *See* Ex. 1101 ¶¶ 41–45; *see, e.g., id.* ¶ 41 (“The ’696 Patent provides no dimensions or quantitative values to define its transmission frequency. . . . A POSITA would have been able to understand Onishi’s FIG. 4 to the same extent that a POSITA would have been able to understand FIG. 6b of the ’696 Patent.”). Dr. Woods testifies, and we agree, that:

[I]t would have been clear to a POSITA that FIG. 4 is a frequency-amplitude graph for an inductive couple. . . . A POSITA would have readily known that the y-axis relates to a measurement (e.g., voltage, current, or power) in the system indicative of power transferred via the inductive couple in view of Onishi’s disclosure. *See* EX1004, [0171] (the “power value of the resonant circuit becomes a maximum at the resonance peak, and decreases as the resonance frequency moves away

from the resonance peak”), ... This is sufficient for a POSITA to determine that the frequencies f_1 , f_2 , f_3 are in the near-linear region of a frequency-amplitude graph for an inductive couple. In particular, regardless of whether the Y-axis in FIG. 4 is power (i.e., watts), voltage (volts), or current (amps) the illustrated amplitude curve and positioning of frequencies f_1 , f_2 , f_3 , would demonstrate that the frequencies were selected to be substantially different from the characteristic resonant frequency when compared to the region from f_U to f_b shown in FIG. 6B of the '696 patent.

Id. ¶ 43. Accordingly, we disagree with and do not find persuasive Patent Owner’s contention that “Petitioner’s arguments that rely on Onishi’s illustration of Frequencies f_1 , f_2 , and f_3 in Figure 4 are improper and misguided, and do not meet Petitioner’s burden.” PO Resp. 41. We find that Onishi discloses a frequency-amplitude graph and that it is appropriate to use a comparison of Onishi’s figure to the figure of the '696 patent in order to assess whether a frequency is “substantially different” from the characteristic resonance frequency.

For frequencies f_1 and f_2 , Patent Owner (PO Resp. 42) quotes from Onishi’s paragraph 53, which states, “[t]he transmission frequency during power-saving power transmission is set at a frequency apart from the resonance frequency (resonance peak) as compared with the frequency during normal power transmission, for example.” Ex. 1004 ¶ 53. Based on this statement comparing the normal power frequencies f_1 and f_2 with the power-saving power frequency f_3 that is “set . . . apart” from the resonance peak, Patent Owner argues that “Onishi describes frequencies f_1 and f_2 as being at or near resonant frequency (f_0 in Onishi)—similar to the Malpas reference distinguished by Applicant during prosecution, and contrary to claim 1.” PO Resp. 42–43 (citing Ex. 2006 ¶¶ 62–67, 131).

We disagree with Patent Owner's argument. Onishi, consistent with Figure 4, is indicating that normal power transmission frequencies f_1 and f_2 are closer to the resonance peak than power saving frequency f_3 , which is set apart from that peak. *See* Ex. 1101 ¶ 31. Neither the subject sentence in Onishi nor Figure 4 is a disclosure that f_1 and f_2 are substantially the same (as opposed to the claimed "substantially different") as the resonant frequency, as Patent Owner argues.

We similarly disagree with Patent Owner's argument that "[t]he sparse disclosure in Onishi that possibly relates to the relative positions of frequencies f_1 , f_2 , and f_3 explains that the normal power transmission frequencies (i.e., frequencies f_1 and f_2) *are indistinguishable from the resonance frequency.*" PO Sur-reply 12–13 (citing Ex. 2006 ¶¶ 124, 131); *see also id.* at 18 (Patent Owner referring to alleged "teachings of Onishi that require frequencies f_1 and f_2 to be indistinguishable from the resonance"); *see also* PO Resp. 43 (quoting Ex. 2007, 17:7–23). Neither Patent Owner nor Dr. Mercier offer any persuasive evidence that Onishi describes frequencies f_1 and f_2 as being *indistinguishable* from the resonance frequency. *See id.*; Ex. 2006 ¶¶ 124, 131. Rather, this argument is premised on Patent Owner's counsel asking Dr. Woods on cross-examination to identify an antonym of "distinguishable." *See* PO Resp. 43; Ex. 2006 ¶ 131.

Patent Owner also appears to argue that the normal power frequencies are indistinguishable from the resonance frequency because Onishi characterizes the curve as having a broad mountain shape. *See* PO Resp. 43 ("This is in part because of the '**broad mountain shape**' of the resonance curve, which results in the normal power transmission frequencies being

outside the linear or near-linear region of the resonance curve.” (quoting Ex. 1004 ¶ 180; citing Ex. 2006 ¶ 131)). Dr. Mercier does not explain why the shape of the curve means that frequencies f_1 and f_2 must be indistinguishable from or “near the resonance frequency.” Ex. 1004 ¶ 180. Figure 4 clearly depicts the three frequencies at three different and distinguishable points on the x-axis, not all at the same point of the vertical line below the label “Resonance Peak.” See Ex. 1004, Fig. 4. Additionally, under Patent Owner’s theory, frequencies f_1 and f_2 would be indistinguishable from each other, which is contrary to Onishi’s teaching that those are different frequencies. See Ex. 1004 ¶ 181 (“In FIG. 4, the frequency f_1 is a frequency used when transmitting ‘1’ during normal power transmission. The frequency f_1 is a basic frequency during power transmission. The frequency f_2 is a frequency used when transmitting ‘0’.”). We find that a person of ordinary skill in the art would be able to distinguish between f_0 , f_1 , and f_2 , contrary to Patent Owner’s argument that Onishi indicates otherwise.

For power-saving mode frequency f_3 , Patent Owner argues that being described as “apart” from resonance frequency f_0 is not enough to qualify as being “significantly different.” PO Resp. 44. Patent Owner first argues that the purpose of the “substantially different” recitation in the claim is to “ensure[] that ‘there is some room for the incremental fluctuation of the transmission frequency (δf) without incurring large unpredictable fluctuations of induced voltage.’” *Id.* at 44–45 (quoting Ex. 2006 ¶ 102). Patent Owner’s argument ends there without explicitly alleging that Onishi’s frequency f_3 is located on the curve where there would be such large unpredictable fluctuations. We do not find Patent Owner’s argument

persuasive because it appears to be premised on the proposed claim construction that we rejected above. *See supra* Section II.C (rejecting Patent Owner’s request to read into the claim the requirement that a “substantially different” frequency “allow for some incremental change (increase or decrease) in frequency while remaining in one of the near-linear regions of the frequency-amplitude graph.”).

Patent Owner further argues that Onishi’s Figure 4 “is at best unclear as to whether frequency f3 lies within a near-linear or non-linear region of the resonance curve, the latter being in direct contravention of the stated location of the transmission frequency on a frequency-amplitude graph.” PO Resp. 45–46 (citing Ex. 1002 ¶ 70). According to Patent Owner, “operating in the non-linear region of the frequency-amplitude graph (even if not at or near resonance) would only undermine the predictability of the system, contrary to the stated intent of the ’696 Patent.” *Id.* at 46–47 (citing Ex. 2006 ¶¶ 53, 136). These arguments, apparently based on the assertion that frequency f3 is on a non-linear portion of the curve, are not commensurate with the as-construed scope of the claim, which is not limited to those points on the linear portion and encompasses frequencies that lie within one of the *near-linear* regions of a frequency-amplitude graph.

Patent Owner next argues that “Onishi describes power-saving mode frequency f3 as corresponding to the region in which little to no power is transmitted to the receiver,” and that this means that it is “within the range of frequencies that result in an operation voltage that is approaching zero non-linearly, where supplied power is lower, and thus the power-saving mode frequency is outside the linear and near-linear regions of the resonance curve.” PO Resp. 47 (citing, *inter alia*, Ex. 2006 ¶ 137); *see also* PO

Sur-reply 13–14 (Patent Owner arguing that “being apart from the resonance frequency at a point where only a small amount of power is transmitted means that frequency f_3 is located near the bottom of a frequency-amplitude graph in the *non-linear* region.” (emphasis added)). Although Patent Owner mentions the near-linear regions, the argument that the frequency is on the non-linear portion again appears to be incorrectly premised on the claim being limited to points only in the linear region. Neither Patent Owner nor Dr. Mercier explain why being in the low power region necessarily means frequency f_3 is outside the *near-linear* region. *See* Ex. 2006 ¶ 137 (Dr. Mercier repeating Patent Owner’s conclusory argument).

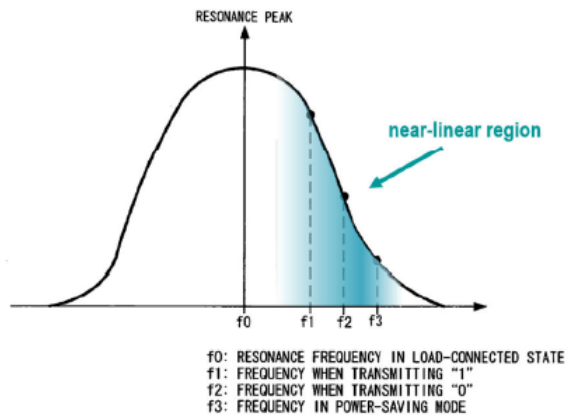
Dr. Woods credibly and persuasively testifies that:

[E]ach of frequencies f_1 , f_2 , and f_3 [of Onishi] lie in a near-linear region of the frequency-response curve and thus, as noted during prosecution . . . , fall within the scope of being “substantially different” from the characteristic resonant frequency f_0 Indeed, the strikingly similar positions of Onishi’s frequencies f_1 , f_2 , and f_3 in the frequency-response curve as the transmission frequency (e.g., f_t in FIG. 6B) identified as “substantially different” in the ’696 specification confirms that Onishi discloses and renders obvious a transmission frequency that is “substantially different” from the characteristic resonant frequency regardless of the outermost scope of this claim term.

Ex. 1003 ¶ 68.

Dr. Woods also credibly and persuasively testifies that “the position of f_3 in FIG. 4 in Onishi is in a region that is remarkably similar to the near-linear region of the preferred embodiment of the ’696 patent.” Ex. 1101 ¶ 38. Dr. Woods provides annotated versions of the pertinent figures, which we reproduce below.

EX1004 (Onishi), FIG. 4:



EX1001, (the '696 Patent), FIG 6b:

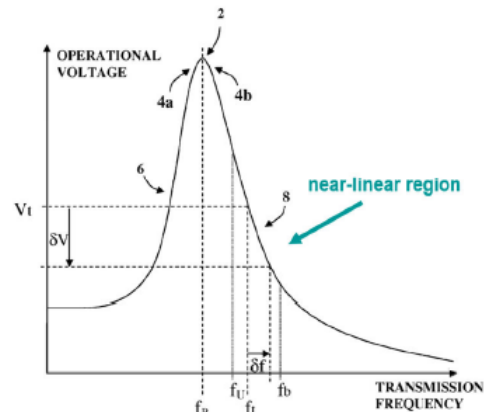


Fig. 6b

Id. Above, on the left, is Onishi's Figure 4 with annotations, including shading, to indicate Dr. Woods's opinion as to the near-linear region. Above, on the right, is Figure 6b of the challenged patent annotated to indicate the near-linear region 8, which the parties agree is between frequencies f_U and f_b . As can be seen in Figure 6b of the '696 patent, frequency f_b is on a portion of the curve that deviates from the more linear portion. We agree with Dr. Woods that Onishi's frequency f_3 is similarly situated. Ex. 1003 ¶ 68; Ex. 1101 ¶ 38.

We find that Petitioner has shown by a preponderance of the evidence that Onishi's frequencies f_1 , f_2 , and f_3 lie within a near-linear region of a frequency-amplitude graph associated with the inductive couple. We determine that Petitioner has shown that Onishi teaches or suggests the subject matter of limitation 1.7.

i. Conclusion as to Independent Claim 1

Having considered the parties' arguments and evidence, we determine that Petitioner has demonstrated by a preponderance of the evidence that the subject matter of independent claim 1 would have been obvious over Onishi and Flowerdew.

4. *The Asserted Obviousness of Dependent Claim 2 over Onishi and Flowerdew*

Dependent claim 2, in pertinent part, calls for “said driver” to increase the transmission frequency when a first signal is detected and decrease the frequency when a second signal is detected. Ex. 1001, 28:47–54.

Petitioner contends that Onishi discloses that power transmitting device 10 switches from normal power transmission (at frequency f1 or f2) to power-saving power transmission (at frequency f3) responsive to a first signal (“save command”), and that is done by “increas[ing] the transmission frequency from ‘f1’ or ‘f2’ to ‘f3,’ as shown in FIG. 4.” Pet. 35–36 (citing, *inter alia*, Ex. 1003 ¶ 77). Similarly, Petitioner contends that the opposite change (decreasing the transmission frequency from f3 to f1 or f2) occurs when the power transmitting device receives a second signal (“high-load state”). *Id.* at 36–37 (citing, *inter alia*, Ex. 1003 ¶ 78).

Patent Owner argues that any change between two of Onishi’s frequencies (f1, f2, and f3) “will require a non-linear increase/decrease in the transmission frequency,” and “[t]hus, Onishi fails to disclose a power control technique that maintains a substantially different transmission frequency, as required in claim 1.” PO Resp. 50 (citing Ex. 2006 ¶ 141; Ex. 2007, 24:24–25:2). Patent Owner impliedly argues that independent claim 1 requires a linear control technique and that the recited increase/decrease of dependent claim 2 must occur *linearly* between two frequencies that are “substantially different” from the resonant frequency. *See* PO Resp. 28–29 (“[A] POSITA would understand that the ’696 Patent is directed to a linear control technique for predictably regulating power transfer.”).

Patent Owner's arguments are not commensurate with language of either independent claim 1 or dependent claim 2, which do not recite linear control. *See supra* Section II.C (rejecting Patent Owner's proposed claim construction involving linear control). And, even if, for example, claim 2 requires the driver to change the frequency between two "substantially different" frequencies, that change could occur by non-linearly by moving along a *near-linear* portion of the curve and still satisfy the parties' agreed construction of "substantially different."

Having considered the parties' arguments and evidence, we determine that Petitioner has demonstrated by a preponderance of the evidence that the subject matter of dependent claim 2 would have been obvious over Onishi and Flowerdew.

5. The Asserted Obviousness of Dependent Claims 3–7, 9, 10, 13, and 14 over Onishi and Flowerdew

The remaining claims in this ground depend directly or indirectly from independent claim 1. Petitioner, with the support of the testimony of Dr. Woods, addresses the limitations of these claims. *See* Pet. 28–45. Patent Owner does not present arguments regarding Petitioner's contentions beyond those already addressed. *See, e.g.*, PO Resp. 31 (Patent Owner arguing that Petitioner has not met its burden for independent claim 1, and, "[a]s claims 2–6 and 9–14 each depend on claim 1, Petitioner cannot show that Onishi in view of Flowerdew renders obvious any of claims 1–7 and 9–14.").

Having considered the parties' arguments and evidence, we determine that Petitioner has demonstrated that claims 3–7, 9, 10, 13, and 14 would have been obvious over Onishi and Flowerdew.

*E. The Asserted Obviousness of Claims 11–13 over
Onishi, Flowerdew, and Partovi (Ground 1B)*

Petitioner asserts that claims 11–13 would have been obvious over Onishi, Flowerdew, and Partovi. *See* Pet. 45–49.

1. Partovi (Ex. 1007)

Partovi pertains to inductive charging systems. Ex. 1007 ¶ 4. Partovi discloses, “the receiver battery can include a mechanical, magnetic, or optical method of alignment of the coils or wires of the charger and mobile device for optimum power transfer.” *Id.* ¶ 82. For the magnet embodiment, “[w]hen the mobile device is placed on or adjacent to the charger, the magnets attract and pull the two parts into alignment with the centers of the two coils or wires aligned.” *Id.* “Alternatively, audible, or visual signs (LEDs that get brighter with the parts aligned), or mechanical means (dimples, protrusions, etc.) can be used for alignment.” *Id.*

2. Discussion

Dependent claims 11–13 pertain to the alignment mechanism and particularly to, respectively, magnetic, audible indication, visual indication, and tactile indication. Ex. 1001, 29:28–30:4. Petitioner relies on Partovi for teachings in this regard, and offers reasons why a person of ordinary skill in the art would have combined Partovi’s alignment mechanisms with the teachings of Onishi and Flowerdew. *See* Pet. 46–49 (citing, *inter alia*, Ex. 1007 ¶¶ 82–87, 90–91, 96, 135; Ex. 1003 ¶¶ 91–98). For example, Petitioner contends that:

[A] POSITA would have been motivated to implement the Onishi-Flowerdew combination to include an additional/confirmatory alignment mechanism using magnets, protrusions, audible, and/or visual indications (as suggested by Partovi) so as to advantageously provide built-in confirmation/feedback to the user that the receiver was properly

positioned on the charger. EX1003, ¶93; EX1007, [0096] (“to help guide the user to place the mobile device on a primary coil for maximum reception”).

Id. at 47.

Patent Owner argues that there is no motivation to make the combination and “[t]here is no expectation of success in attempting to combine the teachings of Partovi with Onishi to achieve a system that operates ‘at a transmission frequency substantially different from said characteristic resonant frequency of said inductive couple.’” PO Resp. 53 (citing Ex. 2006 ¶ 147). According to Patent Owner, “Partovi is specifically directed to the use of magnetic alignment to facilitate operation at resonance” and “[a] POSITA would not be motivated to use a magnetic alignment targeted for resonant power transmission in a system intended to provide non-resonant power transmission e.g., power transmission at a frequency substantially different from resonant frequency.” *Id.* at 53–54. Patent Owner argues that “the Onishi-Partovi system imagined by Petitioner would be incompatible with both Onishi (non-resonant operation) and Partovi (resonant operation) and Petitioner has failed to demonstrate by a preponderance of the evidence that the resulting system would function.” *Id.* at 54 (citing Ex. 2006 ¶ 148).

We do not agree with Patent Owner’s arguments. Dr. Woods, quoting from Partovi, persuasively testifies that Partovi’s teachings are not limited to operating at the resonance frequency (Ex. 1101 ¶¶ 51–54), and that “Partovi expressly contemplates driving a frequency that is ‘out-of’ resonance to create the appropriate voltage in the receiver, such as to operate at any of the frequencies f_1 , f_2 , f_3 , to induce the appropriate voltage in the secondary coil” (*id.* ¶ 52). *See also* Ex. 1007 ¶¶ 77–78 (Partovi explaining: “The

primary of the charger . . . then can be driven to create the appropriate voltage/current in the receiver. For example, the duty cycle of the switch in that circuit can be programmed with a microprocessor to be changed to provide the appropriate levels in the receiver. . . . [T]he frequency of the switch can be changed to move the circuit into, and out of, resonance to create the appropriate voltage in the receiver.”); Pet. Reply 18–19; *but see* PO Sur-reply 21 (arguing, without any citation in support from Dr. Mercier, that in discussing moving out of resonance, “Partovi describes changing the frequency of the switch in the mobile device charger to facilitate operation with the receiver at resonance as a coupled pair.”).

We determine that Petitioner has set forth adequate and persuasive reasons with rational underpinning as to why a person of ordinary skill in the art would have modified the Onishi-Flowerdew system to utilize the alignment mechanisms recited in dependent claims 11–13, and that a person of ordinary skill in the art would have had reasonable expectation of success in making the proposed combination. Petitioner has demonstrated that claims 11–13 would have been obvious over Onishi, Flowerdew, and Partovi.

F. The Asserted Obviousness of Claims 1, 3–5, 7, and 9–14 over Baarman392 and Partovi (Ground 2A)

Petitioner asserts that independent claim 1 and dependent claims 3–5, 7, and 9–14 would have been obvious over Baarman392¹² and Partovi. *See* Pet. 54–65 (addressing claim 1 and the proposed combination). Patent

¹² Petitioner cites to Exhibit 1006, which is a Purdy reference. We, like Patent Owner (PO Resp. 56 n.3), understand Petitioner and Dr. Woods to be referring to Baarman392, Exhibit 1008.

Owner argues, “Petitioner has failed to show with particularity how the combination of Baarman392 and Partovi would render obvious claim element [1.7],” and “a POSITA would not be motivated to combine Baarman392 and Partovi.” PO Resp. 55.

1. Baarman392 (Ex. 1008)

Baarman392 discloses “[a]n inductive charging system for recharging a battery,” with the system including a charger circuit and a secondary circuit. Ex. 1008, code (57) (Abstract).

Figure 2 of Baarman392 is reproduced below.

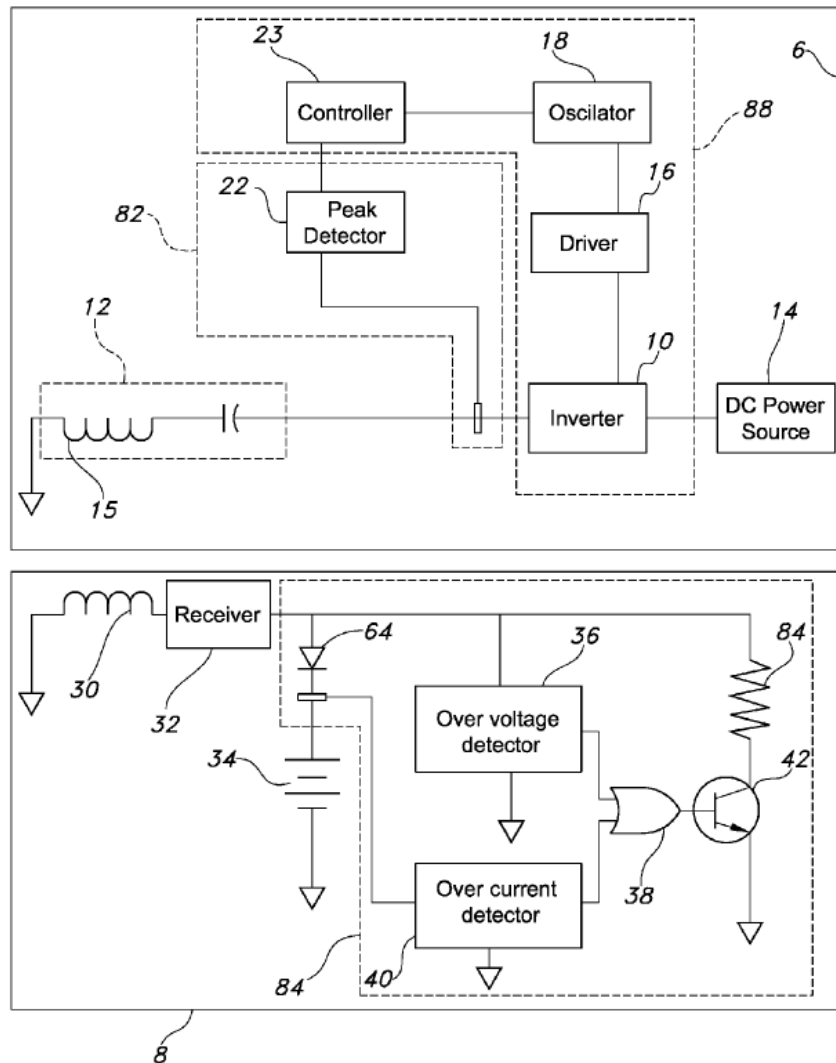


FIG. 2

Figure 2 depicts “a system for inductive charging of a battery.” *Id.* ¶ 26. The system includes charger circuit 6 and secondary circuit 8. *Id.* ¶ 32. “The charger circuit 6 generally includes a primary coil 15, a frequency controller 80 for applying power to the primary coil at a desired frequency and a feedback detector 82 for receiving feedback from the secondary circuit 8.” *Id.* “The secondary circuit 8 generally includes a secondary coil 30 for receiving inductive power from the charger circuit 6 and a feedback mechanism 84 for providing feedback to the charger circuit 6 indicative of the voltage or current in the secondary circuit 8.” *Id.* “The frequency controller 80 varies the frequency of the power applied to the primary coil 15 as a function of the feedback from the secondary circuit 8.” *Id.*

Figure 3 of Baarman392 is reproduced below.

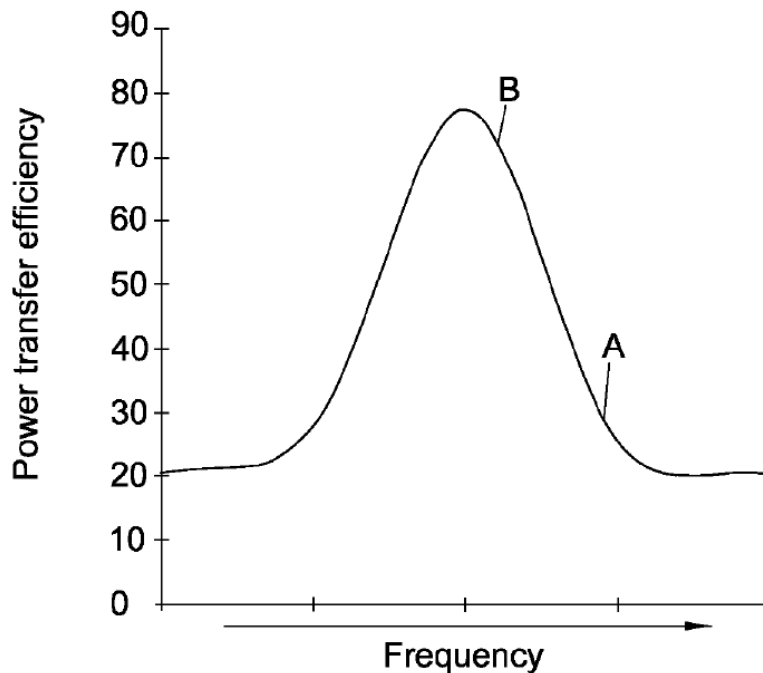


FIG. 3

Figure 3 depicts an exemplary power transfer curve for primary coil 15 and secondary coil 30. *Id.* ¶ 38.

Baarman392 states

In the illustrated embodiment, the primary coil 15 and the secondary coil 30 are loosely coupled. Because the two are loosely coupled in this embodiment, the slope of the power transfer curve about the resonant frequency is not as steep as if the coils 15, 30 were tightly coupled. An exemplary power transfer curve for the coils 15, 30 is shown in FIG. 3. In this embodiment, the power transfer is highest when the inverter 10 is operating at resonance. However, even if the inverter 10 is not operating at resonance, significant power transfer can occur when the inverter is operating off-resonance. Generally, the inverter 10 is operated between frequency A and frequency B. Frequency B is somewhat less than the resonant frequency. Between frequency A and frequency B, the power transfer curve can be piece-wise linearized by a software lookup table located in the controller 20. Thus, a decrease in the operating frequency of the inverter 10 will result in a generally predictable increase in the power transferred from the primary coil 15 to the secondary coil 30. As can be seen by the graph, it would be equally effective to use an operating frequency less than the resonant frequency. If so, then an increase in the operating frequency would lead to an increase in the power transfer, and vice-versa.

Id. ¶ 38.

2. Discussion

Petitioner contends that Baarman392 discloses and teaches much of the subject matter of independent claim 1. *See* Pet. 54–65; *see also, e.g., id.* at 56–57 (contending that Baarman392 discloses a platform or at least renders it obvious, and “Partovi confirms that inductive charging devices like those disclosed in Baarman392 conventionally included such platforms.”). Petitioner further contends, “Baarman392 does not expressly describe an ‘alignment mechanism,’ but such features were conventionally

used in similar wireless charger systems to achieve known benefits, as suggested by Partovi.” *Id.* at 54 (citing Ex. 1003 ¶ 105); *see also id.* at 58–59 (addressing the “alignment mechanism” limitation 1.3). Petitioner provides contentions as to several reasons why a person of ordinary skill in the art would have made the proposed combination. *See id.* at 54–56. Petitioner, for example, contends that a person of ordinary skill in the art “would have been motivated to implement an alignment mechanism (suggested by Partovi) in Baarman392’s system so as to advantageously facilitate alignment of the primary and secondary coils ‘for optimum power transfer.’” *Id.* at 54–55 (citing Ex. 1007 ¶¶ 82, 96, 135; Ex. 1003 ¶ 106). Dr. Woods testifies that, “the efficiency of the inductive couple between Baarman392’s primary and secondary coils would have been enhanced and repeatably consistent by using such conventional options.” Ex. 1003 ¶ 106; *see Pet. 55* (citing Ex. 1003 ¶ 106; *Intel Corp.*, 61 F.4th at 1380 (“[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.”)).

For the “substantially different” limitation 1.7, Petitioner provides an annotated version of Figure 3 of Baarman392, which we reproduce below.

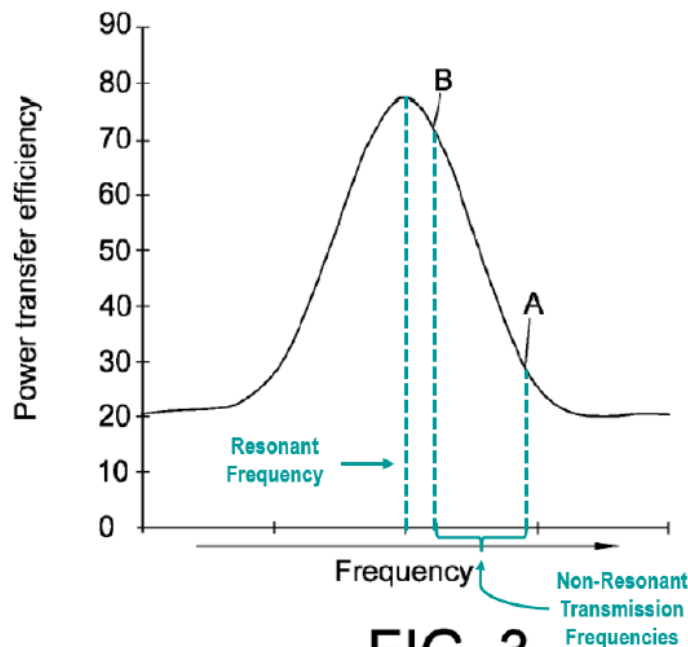


FIG. 3

Above is Figure 3 of Baarman392, depicting a power transfer curve (Ex. 1008 ¶ 38) with Petitioner’s annotations including labels indicating the resonant frequency and the range of non-resonant transmission frequencies in the range from point A to point B on the curve. Pet. 64. Petitioner asserts that Baarman392 teaches a driving circuit that “produces a driving voltage at a non-resonant transmission frequency within a near-linear region of the power transfer curve.” *Id.* (citing Ex. 1003 ¶ 120). Petitioner additionally asserts that “Baarman392’s transmission frequencies between A and B in the frequency-response curve” are “substantially similar” to “the transmission frequency (e.g., f_t in FIG. 6B)” that is identified as “substantially different” in the ’696 patent. *Id.* at 65.

As mentioned, Patent Owner’s arguments against this ground pertain to the “substantially different” limitation 1.7 and whether there would have been a motivation to make Petitioner’s proposed combination. PO Resp. 5. Patent Owner does not dispute Petitioner’s contentions that the proposed

combination teaches or suggests the subject matter of the preamble and of each of limitations 1.1 through 1.6. Having considered Petitioner’s arguments and evidence, we determine that Petitioner has shown that the proposed combination teaches or suggests the preamble and limitations 1.1 through 1.6. We now turn to Patent Owner’s arguments.

Patent Owner argues that Baarman392 does not disclose a transmission frequency substantially different from the characteristic resonant frequency, as recited in limitation 1.7. *See* PO Resp. 55. Patent Owner notes that Baarman392 states that frequency B on the curve is “somewhat less than the resonant frequency.” *Id.* at 55–56 (quoting Ex. 1008 ¶ 38) (emphasis omitted). Patent Owner argues that, “[h]owever, frequencies ‘*somewhat less than* the resonant frequency’ are—by definition—not *substantially different from* the resonant frequency, as claimed.” *Id.* at 56 (citing Ex. 2006 ¶ 151). Patent Owner further argues that “claim 1 ‘requires a transmission frequency that is meaningfully different from the characteristic resonant frequency in order to mitigate against large unintended fluctuations in induced voltage,’ and therefore requires the frequency to be in the near-linear region of a frequency-amplitude graph. *Id.* at 57 (quoting Ex. 2006 (Dr. Mercier’s Declaration) ¶ 153). Patent Owner then argues:

Baarman392 does not describe or conclusively show by a preponderance of evidence either of frequencies A or B as lying within such a region. If anything, Baarman392 suggests a system lacking in *the stability and predictability that the claims of the ’696 Patent attempt to achieve* due to the express inclusion of a near (or “somewhat less than”) resonant frequency within the operable transmission frequency range.

Ex. 2006 (Mercier Dec.) at ¶ 154. Accordingly, Baarman392 suggests operation at or near resonant frequency

Id. at 58 (emphasis added); *see also* PO Sur-reply 22 (Patent Owner, apparently referring to frequencies A and B, arguing that “Baarman392’s inclusion of frequencies that extend beyond the near-linear region of the curve would result in unpredictability and fluctuations in power, problems the ’696 Patent expressly sets out to address.”).

To the extent that Patent Owner argues that stability and predictability are required, we note that the claims do not expressly recite such language, and Patent Owner has not explained adequately why the claims should be so limited. *See also supra* Section II.C (rejecting Patent Owner’s request to read into a limitation regarding linear control). Additionally, Baarman392 teaches that, in the range between frequencies A and B, “a decrease in the operating frequency of the inverter 10 will result in *a generally predictable increase* in the power transferred from the primary coil 15 to the secondary coil 30.” Ex. 1008 ¶ 38. Dr. Woods credibly and persuasively testifies that “[a] POSITA would have understood that a change in operating frequency which results in a generally predictable change in power transfer would be an operating frequency that is analogous to a frequency chosen to lie in the near-linear region identified in FIG. 6b of the ’696 patent.” Ex. 1011 ¶ 56.

We are not persuaded by Patent Owner’s focus on words such as “somewhat less than” (coupled with the assertion that, “by definition,” this is not “substantially different”) rather than the overall disclosure of Baarman392, including Figure 3 depicting the power transfer curve and whether that figure shows a transmission frequency in the near-linear region. *See* PO Resp. 55–58 (Patent Owner’s arguments regarding “somewhat less than” and characterizing Dr. Woods’s deposition testimony regarding

frequency B as purportedly reading out of the claim the word “substantially”). Additionally, we note that Patent Owner’s argument is in terms of the discrete points A and B, whereas Baarman392 discloses that, “[g]enerally, the inverter 10 is operated between frequency A and frequency B,” i.e., a range from frequency A and frequency B. Ex. 1008 ¶ 38. Claim 1 recites only a single “substantially different” frequency, and the requirement is met by any frequency that is within a near-linear region of a frequency-amplitude graph associated with the inductive couple. See Ex. 1001, 28:43–46 (“said driving circuit is configured and operable to produce said oscillating driving voltage at *a transmission frequency substantially different* from said characteristic resonant frequency of said inductive couple”).

Patent Owner asserts that “Baarman392 describes its power transfer curve for this range [between frequency A and frequency B] as ‘piece-wise linearized by a software lookup table,’” and quotes Dr. Mercier’s opinion that linearization would only be used for a *non-linear* curve and would not be necessary for a *linear* curve. PO Resp. 58 (quoting Ex. 2006 ¶ 155) (emphasis added). This argument that the curve is not *linear* is not persuasive as it is not commensurate with the agreed construction of “substantially different” as pertaining to a *near-linear* range of a frequency-amplitude graph. And, even if Patent Owner’s interpretation of Baarman392 is correct, Patent Owner does not explain why the “non-linear curve” prior to being subjected to a piece-wise linear function is not indicative of a near-linear region of the curve, which would fall within the scope of “substantially different.” See PO Resp. 59 (Patent Owner’s conclusory argument that, “[a]ccordingly, the requirement for approximation by a piece-wise linear function demonstrates that the graph in Figure 3 of Baarman392

does not disclose ‘the near-linear regions of a frequency-amplitude graph associated with the inductive couple.’”); Ex. 2006 ¶ 155 (Dr. Mercier repeating this conclusory argument with the basis being that “a piecewise linear function is specifically used here to approximate a *non-linear* curve.” (emphasis added)); *but see* Ex. 1101 ¶ 58 (Dr. Woods testifying that “[a] ‘near-linear’ curve can still be piecewise linearized to achieve even tighter control and greater linearity, if desired.”).

Patent Owner next argues that, even if the range between frequency A and frequency B in Baarman392 includes a near-linear region, Baarman392 also discloses operation “non-linearly” whereas “a central aim of the ’696 Patent relates to the linear regulation/control for predictably regulating power transfer.” PO Resp. 59 (citing Ex. 2006 ¶ 156). This argument is based on the rejected claim construction that would require linear control. Also, to the extent that Patent Owner argues that there can be no “power regulation that occurs in the non-near-linear portions of a frequency-amplitude curve (i.e., portions that are not substantially different),” that argument is not commensurate with the open-ended language of independent claim 1, which recites being operable at a “substantially different” frequency, but does not exclude also being operable at other frequencies.

At oral argument, Patent Owner argued that the curve in Figure 3 of Baarman392 and that of Figure 6b of the ’696 patent are not comparable because they use different variables on the y-axis. *See* Tr. 37:15–38:12. We are unable to locate this argument in Patent Owner’s Response or Sur-reply, and Patent Owner did not, at oral argument, identify an opinion from Dr. Mercier that the curves are not comparable. *See id.*; *see also id.* at 46:12–47:6 (Patent Owner’s counsel, when asked whether this was a new

argument, reading into the record string cites in the footers of the demonstrative exhibits, including page 24 of Patent Owner’s Response, which concerns claim construction and does not mention Baarman392, and Dr. Mercier’s testimony on cross-examination at Exhibit 1102, page 17, line 19 through page 18, line 5, which only discusses Figure 6b of the ’696 patent). Thus, Patent Owner’s assertion regarding the figures being not comparable, is mere attorney-argument, not evidence. *See In re Pearson*, 494 F.2d 1399, 1405 (CCPA 1974) (“Attorney’s argument in a brief cannot take the place of evidence.”). We find persuasive Dr. Woods’s testimony about the similarities between Figure 6b of the ’696 patent and Figure 3 of Baarman392. Ex. 1003 ¶ 120.

The key issue is whether Baarman392 discloses or suggests the limitation under the parties’ agreed construction of “substantially different,” namely a transmission frequency that lies within a near-linear region of a frequency-amplitude graph associated with the inductive couple. Figure 6b of the ’696 patent is useful in that it gives some indication as to what constitutes a “near-linear” region and, by extension, what constitutes a “substantially different” frequency.

Baarman392’s Figure 3 is a graph of frequency and the amplitude of power transfer efficiency. *See* Ex. 1008, Fig. 3. We find that Figure 3 of Baarman392 is a frequency-amplitude graph associated with the inductive couple, and that at least one frequency in the range between frequency A and frequency B is within a near-linear region of that graph. *See, e.g.*, Ex. 1003 ¶¶ 114, 120; Ex. 1011 ¶¶ 57–58. We determine that Petitioner has shown by a preponderance of the evidence that the proposed combination teaches or suggests the subject matter of limitation 1.7

Patent Owner argues that there is no motivation to combine the references and that there is no expectation of achieving maximum power transfer efficiency. PO Resp. 60–62. Specifically, Patent Owner asserts that “Partovi’s magnetic alignment system is intended to be used for power transfer at resonant frequency” and “Partovi’s objective is to maximize power transfer efficiency.” *Id.* at 60 (citing Ex. 1007 ¶¶ 44, 118; Ex. 2006 ¶ 158). According to Patent Owner, “[t]here is no expectation that such maximum power transfer efficiency can be achieved when operating in accordance with the teachings of Baarman392.” *Id.* (citing Ex. 2006 ¶ 158). This argument is not persuasive. As the Federal Circuit has explained, “[t]he reasonable expectation of success requirement refers to the likelihood of success in combining references to meet the limitations of the *claimed invention*.” *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1367 (Fed. Cir. 2016) (emphasis added). It is incorrect to view the “reasonable expectation of success” inquiry as an analysis of “whether one would reasonably expect the prior art references to operate as those references intended once combined.” *Id.*

Patent Owner also argues that the proposed combination would be incompatible with both references because Partovi purportedly discloses only a tightly couple charging systems whereas Baarman392 purportedly “requires a loosely coupled system to ensure a less steep power transfer curve.” PO Resp. 60–62 (citing, *inter alia*, Ex. 1008 ¶ 38; Ex. 2006 ¶ 159). However, Patent Owner also alleges that Partovi’s tight coupling is maintained by the use of moveable primary coils. *Id.* at 61. And, Patent Owner implicitly concedes that Partovi achieves maximum power transfer efficiency not exclusively due to the alignment mechanism, but via the

manipulation of two different variables—magnetic alignment and operating at resonance. *Id.* at 60. Petitioner’s proposed combination merely applies Partovi’s teaching of an alignment mechanism, and does not involve the bodily incorporation of Partovi’s entire system or Partovi’s method of operation. *See* Pet. 54–56, 58–59. Also, even if Patent Owner’s characterizations of the references’ disclosures are correct, Dr. Woods credibly testifies that “a POSITA would readily recognize that the solution in Baarman392 would function even in a tightly coupled scenario,” and, “[i]n other words, Baarman392’s solution would operate even with a steep power transfer curve to achieve the desired behavior.” Ex. 1101 ¶ 64 (citing Ex. 1008 ¶ 38). Dr. Mercier’s testimony, on the other hand, is based on a purported express statement in Baarman392 that, in our reading of the cited paragraph, does not appear to exist. *See* Ex. 2006 ¶ 159 (Dr. Mercier testifying: “As expressly stated by Baarman392,” a tightly coupled charging system “would cause the slope of the power transfer curve to become too steep to achieve the behavior desired by Baarman392.” (citing Ex. 1008 ¶ 38)); Ex. 1008 ¶ 38 (Baarman392 discussing an “illustrated embodiment” where, “[b]ecause the two [coils] are loosely coupled in this embodiment, the slope of the power transfer curve about the resonant frequency is not as steep as if the coils 15, 30 were tightly coupled.”); *see also* Ex. 1101 ¶ 64 (Dr. Woods testifying that the purportedly expressly stated assertion “is not supported anywhere in Baarman392 let alone expressly.”).

Patent Owner argues that “Petitioner appears to mix embodiments of Baarman in its citation to [0015]–[0019] and [0055]–[0057] without explanation as to why POSITA would do so.” PO Resp. 63 (citing Pet 64) (brackets in original). Patent Owner does not explain the basis for this

argument, i.e., that these sections pertain to different embodiments or how there is a purported mixing of embodiments. Regarding the cited paragraphs, the Petition states, “Baarman392 further teaches that ‘[b]etween frequency A and frequency B, the power transfer curve can be piece-wise linearized by a software lookup table located in the controller 20’ such that ‘a decrease in the operating frequency of the inverter 10 will result in a generally predictable increase in the power transferred from the primary coil 15 to the secondary coil 30.’” Pet. 64 (quoting Ex. 1006 ¶ 38). As support for this proposition, Petitioner lists paragraphs 15 through 19 and 55 through 57 using a “*see also*” citation after the primary citation to paragraph 38. *Id.* Patent Owner does not explain adequately why the inclusion of those secondary citations is fatal to Petitioner’s case or indicate why these additional paragraphs, even if referring to different specific embodiments, fail to support Petitioner’s proposition without the need for a reason to combine them. *See* Pet. Reply 23–24.

We determine that Petitioner has set forth adequate and persuasive reasons with rational underpinning as to why a person of ordinary skill in the art would have modified the system of Baarman392 to utilize an alignment mechanism as suggested by Partovi. We also determine that a person of ordinary skill in the art would have had a reasonable expectation of success in making the proposed combination.

Having considered the parties’ arguments and evidence, we determine that Petitioner has demonstrated by a preponderance of the evidence that the subject matter of independent claim 1 would have been obvious over Baarman392 and Partovi.

3. The Asserted Obviousness of Dependent Claims 3–5, 7, and 9–14 over Baarman392 and Partovi

The remaining claims in this ground depend directly or indirectly from independent claim 1. Petitioner, with the support of the testimony of Dr. Woods, addresses the limitations of these claims. *See* Pet. 65–70. Patent Owner does not present arguments regarding Petitioner’s contentions beyond those already addressed. *See, e.g.*, PO Resp. 55 (arguing that Petitioner has not met its burden for independent claim 1, and that “[a]such, Ground 2A fails.”).

Having considered the parties’ arguments and evidence, we determine that Petitioner has demonstrated that dependent claims 3–5, 7, and 9–14 would have been obvious over Baarman392 and Partovi.

G. The Asserted Obviousness of Claims 2 and 6 over Baarman392, Partovi, and Tocci (Ground 2B)

Petitioner asserts that dependent claims 2 and 6 would have been obvious over Baarman392, Partovi, and Tocci. *See* Pet. 70–81. Patent Owner argues that Petitioner has not established that claim 2 would have been obvious. *See* PO Resp. 64–66.

1. Tocci (Ex. 1009)

Tocci is a textbook titled “Digital Systems: Principles and Applications.” Ex. 1009, 1. Tocci discusses, for example, Boolean algebra. *See id.* at 18 (page 57 of the underlying document).

2. Discussion

Dependent claim 2, in pertinent part, calls for “said driver” to increase the transmission frequency when a first signal is detected and decrease the frequency when a second signal is detected. Ex. 1001, 28:47–54.

Petitioner contends that Baarman392 teaches adjusting the transmission frequency in response to feedback, but that “Baarman392 does not expressly describe the underlying logic/form of such feedback.” Pet. 71 (citing, *inter alia*, Ex. 1003 ¶ 139). Petitioner further contends that a person of ordinary skill in the art would have found it obvious “to implement Baarman392-Partovi’s charging condition feedback using conventional Boolean variables as suggested by Tocci.” *Id.* at 72 (citing Ex. 1003 ¶¶ 141–146).

Patent Owner reiterates its unpersuasive argument that the frequencies in Baarman392 between frequency A and frequency B are not substantially different from the resonance frequency, as recited in limitation 1.7. PO Resp. 65–66. Patent Owner further argues that “any change in frequency between frequency A and frequency B will require a non-linear increase/decrease in the transmission frequency,” and, “[t]hus, Baarman392 fails to disclose a power control technique that maintains a substantially different transmission frequency, as required in claim 1.” *Id.* at 66 (citing Ex. 2006 ¶ 165). Patent Owner also argues that “Baarman392 relies on ‘piece-wise lineariza[tion] by a software lookup table’ . . . , which, as explained above, is only used if the curve being approximated is non-linear.” PO Sur-reply 24 (quoting Ex. 1008 ¶ 37) (citing Ex. 2006 ¶ 155) (first alteration in original).

For at least the same reasons discussed above for the similar arguments made in the context of the Onishi-Flowerdew challenge to dependent claim 2 and the arguments regarding piecewise linearization of Baarman392, we do not find Patent Owner’s arguments persuasive. *See supra* Sections II.D.4, II.F.2. Neither claim 1 nor claim 2 requires a linear

control technique. *See supra* Section II.C (rejecting Patent Owner’s proposed claim construction involving linear control). Further, the parties’ agreed construction is in terms of a “near-linear” region of a curve, and therefore Patent Owner’s arguments that piece-wise linearization means that the curve of Baarman392 is not linear are not commensurate with the claim term “substantially different.”

Patent Owner does not present separate arguments for claim 6, which depends from claim 2. *See* PO Resp. 64–66.

Having considered the parties’ arguments and evidence, we determine that Petitioner has demonstrated by a preponderance of the evidence that the subject matter of dependent claims 2 and 6 would have been obvious over Baarman392, Partovi, and Tocci.

III. CONCLUSION¹³

Petitioner has shown by a preponderance of the evidence that claims 1–7 and 9–14 of the ’696 patent are unpatentable.

¹³ 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:

Claim(s)	35 U.S.C. §	Reference(s)/Basis	Claim(s) Shown Unpatentable	Claim(s) Not Shown Unpatentable
1–7, 9, 10, 13, 14	103(a)	Onishi, Flowerdew	1–7, 9, 10, 13, 14	
11–13	103(a)	Onishi, Flowerdew, Partovi	11–13	
1, 3–5, 7, 9–14	103(a)	Baarman392, Partovi	1, 3–5, 7, 9– 14	
2, 6	103(a)	Baarman392, Partovi, Tocci	2, 6	
Overall Outcome			1–7, 9–14	

IV. ORDER

For the foregoing reasons, it is

ORDERED that claims 1–7 and 9–14 of the '696 patent have been proven to be 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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