

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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MOMENTUM DYNAMICS CORPORATION,  
Petitioner,

v.

AUCKLAND UNISERVICES LIMITED,  
Patent Owner.

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IPR2021-01116  
Patent 9,767,955 B2

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Before JAMESON LEE, JO-ANNE M. KOKOSKI, and SCOTT  
RAEVSKY, *Administrative Patent Judges*.

RAEVSKY, *Administrative Patent Judge*.

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

## I. INTRODUCTION

Momentum Dynamics Corporation (“Petitioner”) filed a Petition for *inter partes* review of claims 1–13 of U.S. Patent No. 9,767,955 B2 (Ex. 1001, “the ’955 patent”). Paper 2 (“Pet.”). Auckland UniServices Limited (“Patent Owner”) filed a Preliminary Response. Paper 6 (“Prelim. Resp.”). Based on these submissions, we instituted an *inter partes* review of claims 1–13 (Paper 7, “Decision” or “Dec.”). Subsequent filings include a Patent Owner Response (Paper 12, “PO Resp.”) and a Petitioner Reply (Paper 21, “Reply”). The parties elected to forego an oral hearing. Paper 30.

We have jurisdiction over this proceeding under 35 U.S.C. § 6(b). After considering the evidence and arguments of the parties, we determine that Petitioner has proven by a preponderance of the evidence that claims 1–13 of the ’955 patent are unpatentable. *See* 35 U.S.C. § 316(e).

## II. BACKGROUND

### A. *The ’955 Patent*

The ’955 patent describes an inductive power transfer (“IPT”) pad for charging a battery without a cable. Ex. 1001, 1:17–25, 2:23–24. The ’955 patent aims to improve the wireless charging of electric batteries, including those used in electric vehicles. *See id.* at 2:12–24.

In one embodiment, the IPT pad includes a coil; one or more ferromagnetic slabs; and a shield member arranged around both the coil and the ferromagnetic slabs for channeling electromagnetic flux when in use. *Id.* at 2:39–44. The IPT pad preferably includes a backplate, where the backplate and shield member serve to direct flux upwards from the plane of

the backplate with less splay of flux in and parallel to the plane of the backplate. *Id.* at 3:10–11, 3:35, 3:53–56. The '955 patent explains that by directing flux upward, the IPT pad improves inductive coupling and controls induced field leakage thereby preventing damage of surrounding objects. *Id.* at 3:56–62.

Figure 4 is illustrative and is reproduced below.

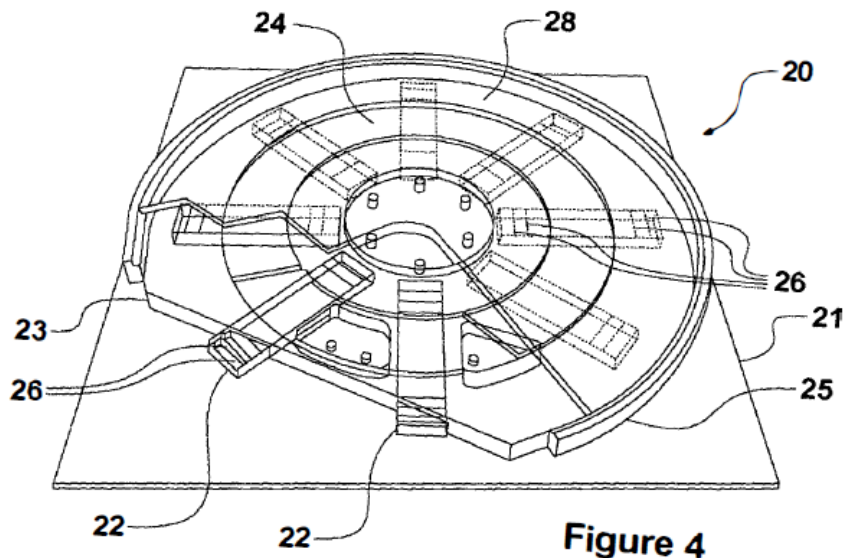


Figure 4 shows a perspective view of IPT pad 20, with a ghost outline to show internal detail. *Id.* at 7:54–60. IPT pad 20, from bottom to top, includes square backplate 20, on top of which are eight rectangular ferrite bars 22, displaced radially at 45 degrees with respect to each other. *Id.* at 8:62–67. A circular ring region 24 spans the top of ferrite bars 22 and holds coil 27 (shown in Figure 5). *Id.* at 8:67–9:5, Fig. 5. Coil 27 winds round the generally circular body of the pad approximately half way along the lengths of bars 22. *Id.* Rubbery molding 23 fills the gaps between ferrite bars 23 and forms a circular outline raised from square backplate 21. *See id.* at 8:66–67, Fig. 4. Raised strip 25 circumferentially surrounds circular rubbery molding 23 and extends vertically from backplate 21. *Id.* at 9:5–7. Cover

28 covers the main circular body of the pad including molding 23, coil 27, and ferrite bars 22. *See id.* at 9:8–14.

The '955 patent discloses that “strip 25 is coupled or formed integral to backplate 21 to assist in controlling the pattern of the flux generated.” *Id.* at 9:5–7. The '955 patent further explains that “backplate 21 and strip 25 are appropriately coupled to work together to direct flux generated by the charging pad through cover 28 in a generally perpendicular direction to backplate 21.” *Id.* at 9:15–18.

### *B. Challenged Claims*

Petitioner challenges claims 1–13 of the '955 patent. Claim 1 is representative:

1. An inductive power transfer pad to receive power from a transmitting pad, the inductive power transfer pad comprising:
  - one or more permeable magnetic material members in a first layer;
  - a coil having at least one turn of a conductor, the coil being arranged in a second layer substantially parallel to that of said permeable magnetic material members; and
  - a shield member comprising a backplate defining a third layer, said backplate arranged to control electromagnetic flux generated by said transmitting pad.

Ex. 1001, 14:37–48.

*C. Asserted Grounds of Unpatentability*

Petitioner asserts that claims 1–13 are unpatentable on the following grounds (Pet. 2), supported by the declaration of Dr. Mark Allen (Ex. 1003)<sup>1</sup>:

| <b>Claim(s) Challenged</b> | <b>35 U.S.C. §</b>  | <b>Reference(s)</b>         |
|----------------------------|---------------------|-----------------------------|
| 1, 4–6, 8–13               | 102(b) <sup>2</sup> | Hui-910 <sup>3</sup>        |
| 1, 4–13                    | 103(a)              | Hui-910, Beart <sup>4</sup> |
| 1–13                       | 103(a)              | Nakao <sup>5</sup> , Beart  |

III. ANALYSIS

*A. Principles of Law*

To establish anticipation, each and every element in a claim, arranged as recited in the claim, must be found in a single prior art reference. *See Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1369 (Fed. Cir. 2008); *Karsten Mfg. Corp. v. Cleveland Golf Co.*, 242 F.3d 1376, 1383 (Fed. Cir. 2001). Although the elements must be arranged or combined in the same way as in the claim, “the reference need not satisfy an *ipsissimis verbis*

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<sup>1</sup> Patent Owner did not submit an expert declaration in support of its Patent Owner Response.

<sup>2</sup> The Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) (“AIA”), amended 35 U.S.C. §§ 102 and 103. The ’955 patent claims priority as a division of application No. 12/451,436 filed on May 9, 2008. Ex. 1001, code (62). Accordingly, the effective filing date appears to be May 9, 2008. Because the May 9, 2008 effective filing date is before the effective date of the applicable AIA amendments, we refer to the pre-AIA versions of 35 U.S.C. §§ 102 and 103. The parties do not dispute that the pre-AIA statutes apply.

<sup>3</sup> U.S. Pat. Appl. Pub. No. US 2005/0189910 A1, published Sep. 1, 2005 (Ex. 1005, “Hui-910”).

<sup>4</sup> PCT Pub. No. WO 2005/024865 A2, published Mar. 17, 2005 (Ex. 1006, “Beart”).

<sup>5</sup> U.S. Pat. Appl. Pub. No. US 2004/0119576 A1, published June 24, 2004 (Ex. 1007, “Nakao”).

test,” i.e., identity of terminology is not required. *In re Gleave*, 560 F.3d 1331, 1334 (Fed. Cir. 2009); *accord In re Bond*, 910 F.2d 831, 832 (Fed. Cir. 1990).

A 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 of the invention to a person having ordinary skill in the art. *KSR Int’l Co. v. Teleflex, Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations including (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) when in evidence, objective evidence of nonobviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

*B. Level of Ordinary Skill in the Art*

Relying on the testimony of Dr. Mark G. Allen, Petitioner offers an assessment as to the level of ordinary skill in the art and the general knowledge of a person of ordinary skill (“POSA”) at the time of the ’955 patent. Pet. 6 (citing Ex. 1003 ¶¶ 31–34). For example, Dr. Allen states that a person having ordinary skill in the art “would have had at least a bachelor’s degree in electrical engineering (or equivalent) and at least two years’ industry experience or equivalent research” and that relevant additional education could be substituted for experience, “e.g., an advanced degree in electrical engineering (or equivalent) with at least one year of industry experience.” Ex. 1003 ¶ 33. Patent Owner neither disputes Petitioner’s assessment nor proposes an alternate assessment. We adopt Petitioner’s definition of the level of skill, except that we delete the phrase “at least” to avoid including ambiguity in the definition of the level of skill.

*C. Claim Construction*

In *inter partes* review, we construe claims using the same claim construction standard that would be used to construe the claims in a civil action under 35 U.S.C. § 282(b), including construing the claim in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent. 37 C.F.R. § 42.100(b) (2020).

1. *“shield member comprising a backplate”*

Claim 1 recites “a shield member comprising a backplate defining a third layer, said backplate arranged to control electromagnetic flux generated by said transmitting pad.” Ex. 1001, 14:46–48 (emphasis added).

Independent claim 13 includes a similar limitation. *Id.* at 16:14–16.

Petitioner argues that although “the claimed shield member **may** include more components than a backplate (such as added sidewalls), no other components are **required**. In particular, the claimed shield member does not require adding a strip or sidewalls to the backplate.” Pet. 8 (citing Ex. 1003 ¶¶ 60–68). Patent Owner disagrees with Petitioner’s proposed construction and argues that “a shield member comprising a backplate” “requires both a shield member and a backplate.” PO Resp. 13.

In our Institution Decision, we preliminarily determined that “a shield member comprising a backplate” “may include additional components other than the claimed backplate, but additional components are not required.” Dec. 13. Based on the full trial record, however, we need not construe this term because the parties only dispute whether Hui-910 discloses the “shield member comprising a backplate.” PO Resp. 14–15; Reply 11. And we do not reach the Hui-910-based grounds because, for reasons explained below,

the ground based on Nakao and Beart is dispositive of all the challenged claims. Thus, we do not construe this term.

2. “slabs”

Claim 7 depends directly from claim 1 and recites “wherein the backplate extends beyond coil and slabs.” Ex. 1001, 15:4–5. At the Petition stage, Petitioner argued that “the recited ‘slabs’ is a drafting error, and a POSA would understand it to be referring to the ‘one or more permeable magnetic material members’ in claim 1.” Pet. 47, 75–76 (citing Ex. 1003 ¶ 232). At the institution stage, we disagreed with Petitioner. Dec. 13–14. Now, Petitioner contends in the Reply that even under our preliminary construction, Nakao and Beart still would have rendered claim 7 obvious. Reply 25–26. Patent Owner does not dispute this. As there is no dispute, we find it unnecessary to construe “slabs” in this decision. We address Petitioner’s merits arguments in our analysis below.

We determine that no other terms require construction. *See Realtime Data, LLC v. Iancu*, 912 F.3d 1368 (Fed. Cir. 2019) (“The Board is required to construe ‘only those terms . . . that are in controversy, and only to the extent necessary to resolve the controversy.’” (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

*D. Asserted Obviousness of Claims 1–13 over Nakao and Beart*

Petitioner contends that claims 1–13 would have been obvious over Nakao and Beart. Pet. 49–77. For the reasons that follow, we determine that Petitioner has proven by a preponderance of the evidence that claims 1–13 would have been obvious over Nakao and Beart.

Because this ground is dispositive of all the claims, we do not reach Petitioner’s remaining grounds. *See Boston Sci. Scimed, Inc. v. Cook Grp. Inc.*, 809 F. App’x 984, 990 (Fed. Cir. Apr. 30, 2020) (non-precedential)

(recognizing that the “Board need not address issues that are not necessary to the resolution of the proceeding” and, thus, agreeing that the Board has “discretion to decline to decide additional instituted grounds once the petitioner has prevailed on all its challenged claims”).

*1. Nakao*

Nakao describes a noncontact coupler using a magnetic coupling technique for transferring power. Ex. 1007 ¶¶ 1, 2. Nakao describes known systems including opposite magnetic cores forming an annular closed magnetic path to allow primary and second coils located on the cores to transmit AC power to each other. *Id.* ¶¶ 4, 5.

Nakao describes an embodiment of a noncontact coupler including a pair of magnetic cores each having a U-shaped open magnetic path, with a primary coil and secondary coil being wound around each core, respectively. *Id.* ¶ 21. Each primary and secondary magnetic core is formed with annular outer circumferential core members, disc-shaped inner circumferential core members, and a number of intermediate core members arranged radially to form a circle connecting both core members. *Id.* The magnetic cores can be made of ferrite magnetic material. *Id.* ¶ 30.

Figure 7B is reproduced below.

FIG. 7B

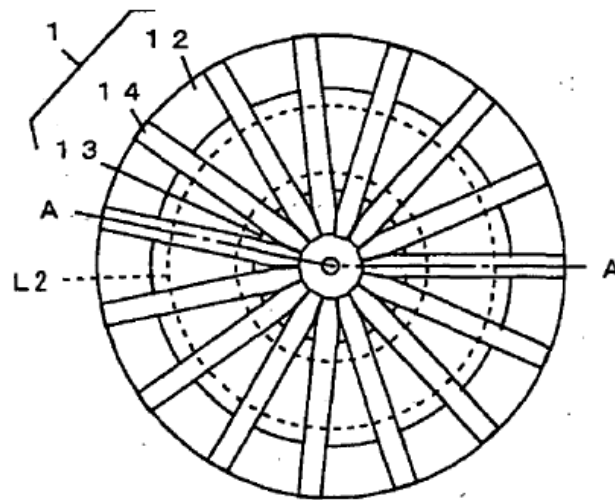


Figure 7B shows a plan view of Nakao's third embodiment of a noncontact coupler. *Id.* ¶ 37. The noncontact coupler is illustrated as a circle having three different magnetic cores 12, 13, and 14. *Id.* ¶ 68. Outer circumferential core member 12 is shown as a circumferential ring that extends from the outer edge of the circle to about a third of the radial direction to the center of the circle. *See id.* at Fig. 7, ¶ 68. Disc-shaped inner circumferential core member 13 is shown as a disc in the innermost third of the circle. *See id.* Intermediate core members 14 are shown as long rectangular spokes "arranged radially to form a circle connecting both of the core members 12, 13." *Id.* Secondary coil L2 is illustrated by circumferential dotted lines forming a ring in the middle third of the circle. *See id.* at Fig. 7, ¶ 51.

Figure 7C is reproduced below.

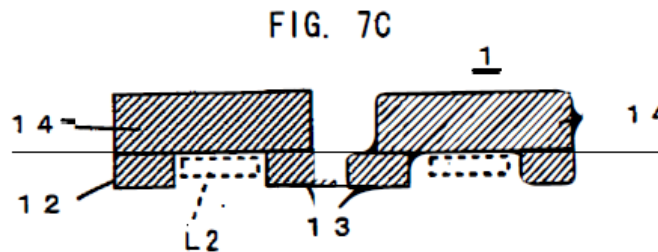


Figure 7C shows a cross-sectional view of the noncontact coupler depicted in Figure 7B. *Id.* ¶ 37. Intermediate core members 14 are shown as two rectangles, each connecting a rectangular outer circumferential core member 12 and an inner circumferential core member 13, located below core member 14. *See id.* at Fig. 7, ¶ 68. Secondary coil L2 is illustrated as a rectangular dotted line located below intermediate core members 14, between outer core members 12 and inner core members 13. *Id.*

## 2. Beart

Beart describes inductive power transfer units having flux shields. Ex. 1006, 1:3. The inductive power transfer unit is in the form of a flat bed or platform. *See id.* at 7:12–14. Electromagnetic field lines from the inductive power transfer unit couple with an electrical conductor in a secondary device placed in proximity to a power transfer area of the inductive power transfer unit. *See id.* at 7:15–20.

Figure 7 is illustrative and reproduced below.

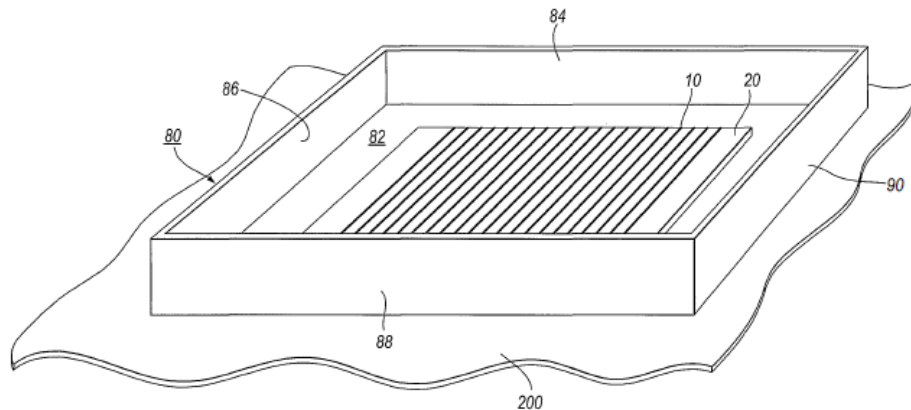


*Fig.7*

Figure 7 shows flux shield 80 located on top of support surface 200. *Id.* at 10:6–16. Flux shield 80 includes base 82 and side walls 84, 86, 88, and 90, forming a square extending upward from support surface 200. *Id.* Beart describes the height of the side walls as exaggerated for clarity. *Id.* Figure 7 also shows flux generating unit 50 in the shape of a square located in the middle of flux shield 80 on base 82. *See id.* at 9:1–12, Fig. 5. Flux generating unit 50 includes coil 10 wound around former 20. *Id.* Former 20 may be a thin sheet of magnetic material. *Id.* at 9:9–12. “The base 82 of the flux shield 80 extends between the lower surface of the flux generating unit 50 and the support surface 200. Because the flux shield 80 has side walls in this embodiment, the base 82 need not extend out beyond . . . 4 mm.” *Id.* at 10:8–13.

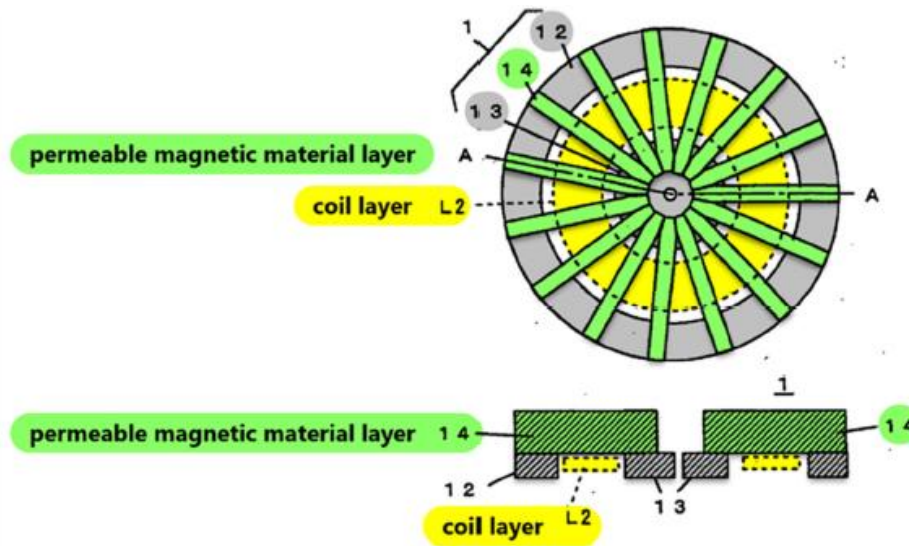
### *3. Independent Claim 1*

#### *a. Undisputed Limitations*

Petitioner contends that Nakao discloses the preamble of claim 1, “[a]n inductive power transfer pad to receiver power from a transmitting pad, the inductive power transfer pad comprising.” Pet. 60–63. Petitioner further contends that Nakao teaches the claimed “one or more permeable

magnetic material members in a first layer” and “a coil having at least one turn of a conductor, the coil being arranged in a second layer substantially parallel to that of said permeable magnetic material members.” *Id.* at 63–66.

For example, Petitioner refers to Nakao’s inductive power transfer system including a receiver pad and a transfer pad. *Id.* at 60–61 (citing Ex. 1007, Fig. 12D, ¶¶ 5, 7, 51–52, 78, 95). Petitioner also relies on Figure 7<sup>6</sup> of Nakao, annotating Figures 7B and 7C as follows:



*Id.* at 62 (citing Ex. 1003 ¶ 202; Ex. 1007 ¶ 68). Figures 7B (top) and 7C (bottom) include Petitioner’s annotations labelling intermediate magnetic core members 14 as a “permeable magnetic material layer” (colored green). *Id.* Figure 7 also labels dotted rectangle L2 as a “coil layer” (colored yellow), which Petitioner contends is substantially parallel to the intermediate magnetic core members 14 that form the claimed “permeable magnetic material members.” *Id.* at 62, 65.

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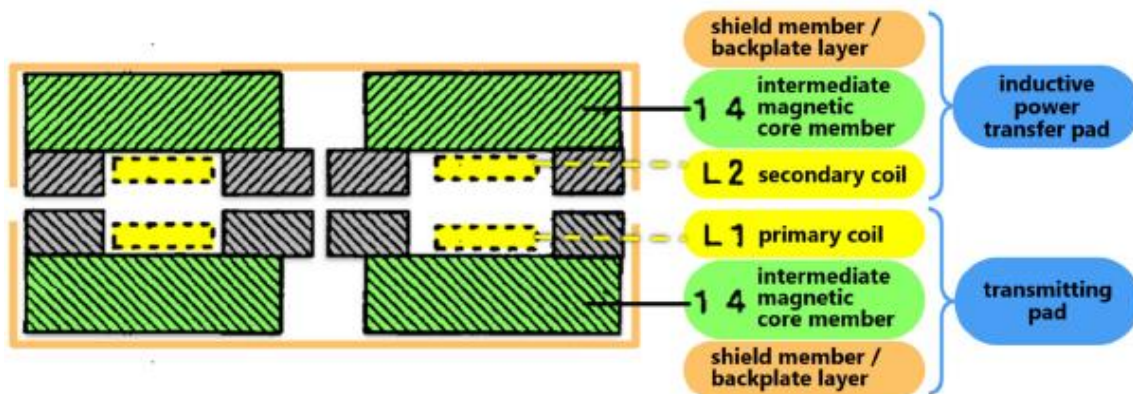
<sup>6</sup> Nakao Figure 7 is comprised of Figures 7A–7C, each of which presents a different view of the same embodiment. Ex. 1007 ¶ 37.

Patent Owner does not dispute that Nakao discloses these limitations. Based on our review of the entire record, we agree with Petitioner that Nakao does, in fact, disclose them.

- b. a shield member comprising a backplate defining a third layer, said backplate arranged to control electromagnetic flux generated by said transmitting pad.*

As to the claimed “shield member comprising a backplate,” Petitioner argues that “a POSA would have been motivated to add Beart’s flux shield to Nakao’s transmitting and receiving pads . . . where the ‘base’ of the flux shield is arranged between the magnetic core and the support surface that the pad is mounted on.” Pet. 67. Petitioner contends that “[t]he ‘base’ of Beart’s flux shield arranged [in this manner] would form the claimed ‘third layer’ to Nakao’s permeable magnetic material members—intermediate magnetic core members 14—in a first layer, and primary and secondary coils L1 and L2 arranged in a second layer.” *Id.* at 68.

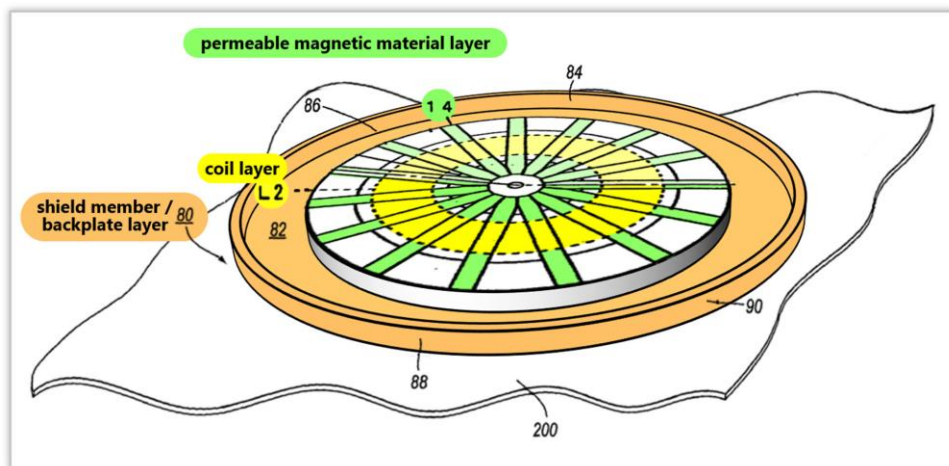
Petitioner illustrates this configuration in the following modified and annotated version of Nakao Figure 7C, reproduced below.



*Id.* at 69 (citing Ex. 1003 ¶ 216; Ex. 1007 ¶¶ 21, 68–69, cl. 7, Figs. 7B–7C; Ex. 1006, Figs. 7–9, 8:24–31, 10:6–11:11). The above figure is a

representation by Dr. Allen of an embodiment described in Nakao's Figure 7C, modified to show the transmitting pad and shield member of Beart (orange). *Id.* (citing Ex. 1003 ¶ 216). The figure illustrates two of Nakao's noncontact couplers shown in Figure 7C, with coils L1 and L2 (colored yellow) facing each other, and intermediate magnetic core members 14 (colored green) facing away from each other. *Id.* The figure further illustrates each noncontact coupler being surrounded on three sides—excluding the coil facing sides—with Beart's shield member/backplate drawn in orange. *Id.*

Petitioner also relies on the following figure from Dr. Allen's declaration, depicting the combination of Nakao Figure 7B and Beart Figure 7:



*Id.* at 57–58, 68; Ex. 1003 ¶¶ 196, 214. The above figure shows Beart's shield member and backplate layer (orange) underneath Nakao's permeable magnetic material layer (green) and coil layer (yellow). *Id.* at 67–68.

Patent Owner contends that neither Nakao nor Beart “disclose[s] a shield member and backplate on a wireless power receiver.” PO Resp. 15. Instead, Patent Owner contends, Petitioner and Dr. Allen “conclusorily assume” that the same motivations for adding Beart's sidewalls to a

backplate hold true on the receiver side. *Id.* (citing Pet. 43; Ex. 1003 ¶ 154). Here, Patent Owner argues grounds 2 and 3 together. Although Patent Owner appears to argue that this limitation is not taught by Nakao and Beart, Patent Owner’s argument refers primarily to Petitioner’s “motivations” for adding Beart’s sidewalls, and therefore appears to be directed primarily at Petitioner’s rationale to combine. *See id.* We accordingly address the remainder of this argument in the next section.

To the extent that Patent Owner disputes that the combination discloses this limitation, we find Patent Owner’s argument to be conclusory because it amounts to a single sentence, without reference to any evidence of record, that “none of . . . Nakao[] or Beart disclose[s] a shield member and backplate on a wireless power receiver.” *See id.* And we agree with Petitioner that the combination of Nakao with Beart discloses this limitation. *See* Pet. 66–70; Reply 12. For instance, we find persuasive Dr. Allen’s figure reproduced above and associated testimony that the combination of Nakao and Beart discloses the claimed “shield member comprising a backplate defining a third layer, said backplate arranged to control electromagnetic flux generated by said transmitting pad.” Ex. 1003 ¶¶ 196, 214; Pet. 57–58, 66–70.

*c. Rationale to Combine*

Petitioner argues that a person of ordinary skill in the art would have been motivated to add Beart’s flux shield to Nakao’s wireless system to (1) increase coupling between the transmitting pad and the receiving pad, and (2) to protect surrounding components, objects, and people from stray magnetic flux. Pet. 53–59 (citing, e.g., Ex. 1003 ¶¶ 188–199). Petitioner further argues that a “POSA also would have had a reasonable expectation of success modifying Nakao to include Beart’s flux shields because Beart

teaches how its flux shield could be implemented in pads such as Nakao's Figure 7 embodiment." *Id.* at 54 (citing Ex. 1003 ¶¶ 194–196).

As to Petitioner's first reason why a POSA would have modified Nakao with Beart, Petitioner argues that adding Beart's flux shields would improve coupling by directing the flux between the two pads instead of through other nearby objects. *Id.* Petitioner argues that Nakao teaches charging an electric vehicle, during which nearby objects, including in the parking location or the vehicle itself, could cause reduced efficiency with the wireless power transfer system. *See id.* at 54–55 (citing Ex. 1003 ¶ 189; Ex. 1017, 139, 80–81; Ex. 1006, 2:11–27, 4:11–20). Petitioner argues that Beart teaches using a flux shield to concentrate flux in a useful direction and prevent flux from flowing into other extraneous objects. *Id.* at 55 (citing, e.g., Ex. 1006, Figs. 7–9, 2:29–3:10, 4:11–14, 8:24–25, 10:6–15, 13:13–31; Ex. 1003 ¶¶ 190–92).

As to Petitioner's second reason, Petitioner argues that "a POSA would have been motivated to combine Nakao with Beart to protect surrounding components and objects from undesirable and possibly damaging eddy currents," which can potentially heat and damage other objects. *Id.* at 55–56 (citing Ex. 1006, 2:11–27; Ex. 1017, 21, 67; Ex. 1003 ¶ 193). Petitioner also argues that a person of ordinary skill would have been motivated to add Beart's shielding to Nakao because "Nakao is a high-power system for electric vehicle charging and generates a correspondingly high-strength field" that can pose a safety hazard to people. *Id.* at 56 (citing Ex. 1003 ¶¶ 193–194; Ex. 1022, 514–15; Ex. 1026 ¶¶ 9–12; Ex. 1017, 23–24, 27).

After considering Patent Owner's arguments, which we address below, we agree with Petitioner that one of ordinary skill in the art would

have combined Beart with Nakao in the manner proposed. For instance, we find Petitioner’s arguments compelling that adding Beart’s flux shield to Nakao’s wireless system would have increased coupling between the transmitting pad and the receiving pad, and protected surrounding components, objects, and people from stray magnetic flux. *Id.* at 53–57 (citing, e.g., Ex. 1003 ¶¶ 188–193). We find that one of ordinary skill in the art would have made this modification because, according to Dr. Allen’s un rebutted testimony, increasing transmit-receive coupling would have reduced the problem of nearby metal (such as from a vehicle chassis) reducing power transfer efficiency due to “the ferrous materials provid[ing] a low reluctance path that ‘suck[s]’ flux away from the power transfer system.” Ex. 1003 ¶¶ 189–90. And we further find that one of ordinary skill in the art would have made this modification because Dr. Allen persuasively testifies that “coupling between the transmitting and receiving pads would be improved, and less drive current would be necessary to generate the same amount of power at the receiving pad.” *Id.* ¶ 192.

Moreover, we also find that Dr. Allen persuasively testifies that “when flux interacts with nearby metal components, . . . there are ‘core losses, for example via hysteresis and/or eddy current loss’ in those objects, and those eddy currents may heat up and potentially damage those objects.” *Id.* ¶ 193 (quoting Ex. 1006, 2:11–27; citing Ex. 1017, 21). We also find compelling his testimony that “stray flux could also interfere with medical devices like pacemakers in a passenger of the vehicle being charged, detonation of electro-explosive devices, and fires caused by sparks from induced fields.” *Id.* (citing Ex. 1022, 514–15). As such, we also agree with Dr. Allen’s testimony that “a POSA would [have] understood that stray

magnetic fields can pose a safety hazard to people as well.” *Id.* ¶ 194 (citing Ex. 1017, 23–24, 27, 155–60).

Accordingly, we find that Petitioner’s arguments for the combination are well-supported by unrebutted record evidence. Thus, even in light of Patent Owner’s arguments, which we address below, we determine that Petitioner has persuasively shown that one of ordinary skill in the art would have combined Beart with Nakao as proposed.

*(1) Irrelevant to receivers argument*

Patent Owner raises three arguments against the combination. The first of these is that Petitioner’s alleged motivation for adding shield sidewalls to Nakao is irrelevant to inductive power receivers. PO Resp. 15–19. We address Patent Owner’s other arguments in separate sections below.

Patent Owner points to claim 1’s preamble recitation of “[a]n inductive power transfer pad to *receive* power from a transmitting pad,” arguing that “Petitioner and Dr. Allen conclusorily assume that ‘[t]he same motivations [for combining] hold true on the receiver side.” *Id.* at 15 (citing Ex. 1003 ¶ 154).<sup>7</sup> Patent Owner contends that Beart shields the transmitter, not the receiver. *Id.* at 17 (citing Ex. 1006, Figs. 3 and 9, 2:6–9, 10:23–29). In Patent Owner’s view, Beart does not suggest placing sidewall shielding on a passive receiver. *Id.* at 18. “The receiver is not generating magnetic fields but receiving them,” Patent Owner argues, “so any motivation for doing so is lacking.” *Id.* Contrary to Dr. Allen’s testimony that Beart “can

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<sup>7</sup> In the original text, Patent Owner refers to “Hui-910” in this passage but applies this argument equally to the Nakao-Beart combination. PO Resp. 15 (“Petitioner’s alleged motivation for adding shield sidewalls *to Hui-910 and Nakano* is irrelevant to inductive power receivers.” (emphasis and capitalization changed)).

concentrate flux ‘in directions in which it is useful’” and “solve[] the problem of splay,”<sup>8</sup> Patent Owner argues, “there would have been no motivation to add such shielding to a receiver” because “the transmitter shield already ‘focuses the field in the area between the transmitting and receiving pad.’” *Id.* at 18–19.

Relatedly, Patent Owner also attacks Petitioner’s reliance on the Dobbs reference, which Petitioner uses to corroborate its motivation to combine argument. *Id.* at 15–17 (citing Pet. 58; Ex. 1026 ¶ 6). Patent Owner views Dobbs as teaching inferior shielding that—in the combination—would be disposed in the center of Nakao’s coils and magnetic core, “thereby reducing the effectiveness of magnetic coupling.” *Id.* at 15–16. Patent Owner asserts, “[p]articularly, in Nakao a shield such as Dobbs’ would further exacerbate the magnetic coupling problems due to slight misalignments between transmitter and receiver which Nakao seeks to avoid.” *Id.* at 16.

In the Reply, Petitioner contends that Dr. Allen’s testimony, corroborated by Dobbs, “established that a POSA would have added sidewalls to the transmitter and the receiver pads of [Nakao] because the ‘same principles [that apply to the transmitting pad as taught by Beart] would apply to the receiving pad as well.’” Reply 12 (citing Ex. 1003 ¶¶ 154–62, 193–98). And Petitioner disputes that it was unknown to add sidewalls to a receiver because “Dr. Allen testified, and Dobbs explained,”

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<sup>8</sup> The ’955 patent describes “splay” in the following context: “the backplate and the shield member serve to direct flux upwards from the plane of the backplate with less splay of flux in and parallel to the plane of the backplate.” Ex. 1001, 3:53–56. Dr. Allen testifies that “Beart’s improved flux shield . . . reduces the amount of flux splaying out the sides and parallel to the flux-generating surface[.]” Ex. 1003 ¶ 153.

that “it ‘is often desired’ to shield transmitting **and receiving** pads because there may be ‘undesirable RF emission, increased leakage inductance, and/or reduced power transfer efficiency.’” *Id.* (citing Ex. 1003 ¶ 162 (quoting Ex. 1026 ¶ 8)). As Petitioner relies on Dobbs solely for corroborating the motivation to combine Beart and Nakao, Petitioner contends, “[i]t is of no moment that Dobbs focused on a different geometry . . . when illustrating well-known shielding principles.” *Id.* at 13–14 (citing, e.g., Ex. 1026 ¶¶ 8, 42; Ex. 1003 ¶¶ 154–59, 187–99).

Petitioner also disagrees with Patent Owner’s contention that a POSA would have added sidewalls only to the transmitter side shielding because that completely “solves the problem of splay.” *Id.* at 14. In Petitioner’s view, Patent Owner provides no evidence to support this argument, whereas Dr. Allen testifies that sidewalls on the receiver side can also reduce splay. *Id.* (citing Ex. 1003 ¶¶ 148–53, 193–98). To the contrary, Petitioner contends, a POSA would have added sidewall shielding to the transmitter **and** receiver pads, “further protecting components” and “people in the vicinity.” *Id.* (citing Ex. 1003 ¶¶ 154–59, 193–98). And Petitioner points out that “[t]he shielding on the receiver side is for protection from fields generated by the transmitter side.” *Id.* at 15 (citing Ex. 1003 ¶¶ 154–56, 192–95).

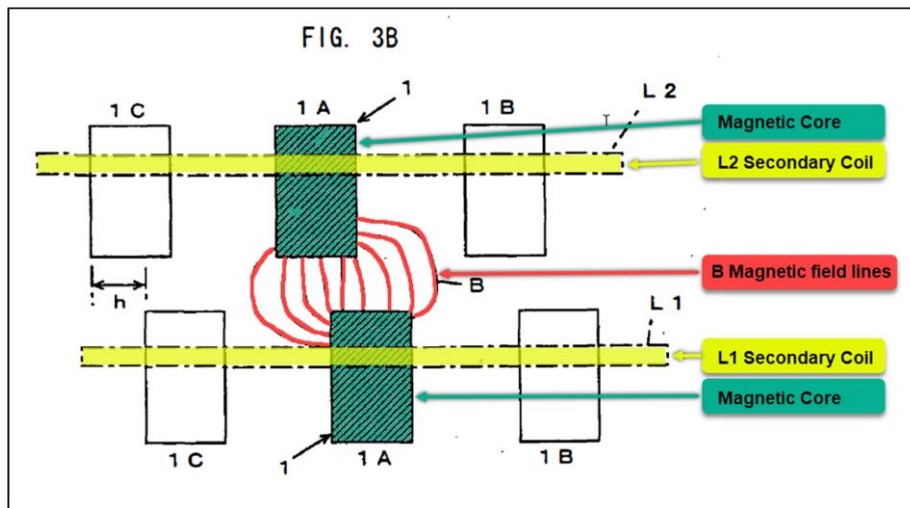
We determine that Petitioner has the better argument, supported by expert testimony and cited evidence. We find persuasive Petitioner’s argument that a POSA would have added sidewalls to shielding not just in a transmitter, but also in a receiver. *Id.* at 13–15. Dr. Allen’s unrebutted testimony that sidewalls on the receiver side can reduce splay, protect components, and protect people in the vicinity are compelling. *See* Ex. 1003 ¶¶ 148–59, 193–98. In contrast, Patent Owner presents only attorney

argument. Further, its contentions against Dobbs are also not compelling because Patent Owner’s arguments are directed to a bodily incorporation of Dobbs’ shield in Nakao’s non-contact coupler. PO Resp. 16. Petitioner, however, relies on Dobbs only to corroborate Dr. Allen’s testimony that one of ordinary skill in the art would have combined Beart’s shield—not Dobbs’—with Nakao. *Id.* at 13–14 (citing, e.g., Ex. 1026 ¶¶ 8, 42; Ex. 1003 ¶¶ 154–59, 187–99).

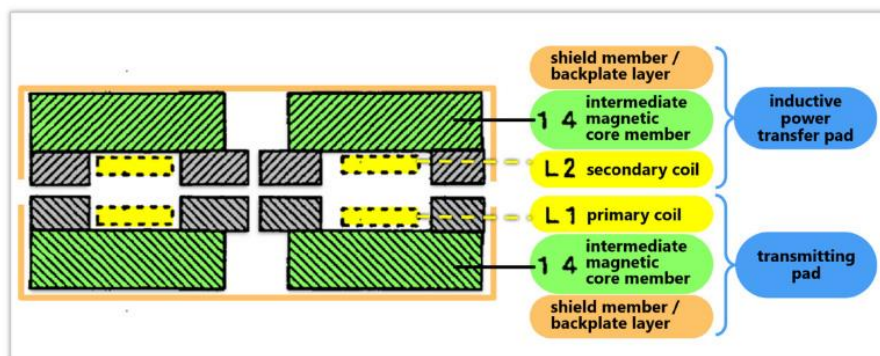
*(2) Inoperability argument*

Patent Owner next argues that Petitioner’s proposed modification of Nakao with Beart “impermissibly alters Nakao’s principle of operation and frustrates its intended purpose.” PO Resp. 41; *see also id.* at 31–42. Patent Owner argues that Nakao’s invention seeks to improve the usability of a noncontact coupler for an electric vehicle by broadening magnetic coupling over a wide range. *Id.* at 35–37 (citing, e.g., Ex. 1007 ¶¶ 13, 17, 57–58, Figs. 2, 3B). Accordingly, Patent Owner argues that Nakao teaches “extending the magnetic coupling to both the core tip surfaces and the side surfaces” to broaden the misalignment tolerance between primary and secondary coils. *Id.* at 35–36.

Patent Owner supplies the following annotated and modified Figure 3B of Nakao:



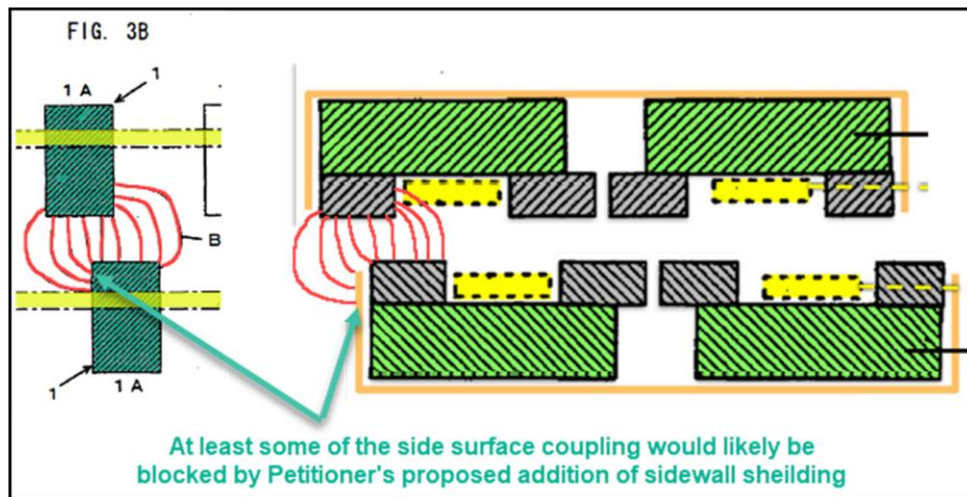
PO Resp. 36. In the above Figure 3B, Patent Owner labels magnetic cores 1A (green) and secondary coils L1 and L2 (yellow), and magnetic field lines B (red), some of which extend from the sides of magnetic cores 1A. *Id.* Patent Owner then contrasts Figure 3B with the following version of Nakao Figure 7C, annotated by Petitioner to show sidewalls (in orange) around magnetic core members (green), and to identify the inductive power transfer pad and the transmitting pad (blue):



*Id.* at 38 (citing Pet. 58). Relying on the above annotated Figure 7C, Patent Owner asserts that Petitioner proposes extending Beart's flux shield "along the side surfaces of Nakao's magnetic core, but fails to explain why or how

this would not reduce the magnetic coupling along these side surfaces, which is critical to reducing coupling degradation due to lateral misalignment between the primary and secondary coils.” *Id.* at 39 (citing Pet. 50–59, 66–69; Ex. 1007 ¶¶ 11, 13, 17, 58–60, Figs. 3A, 3B, 4A, 4B).

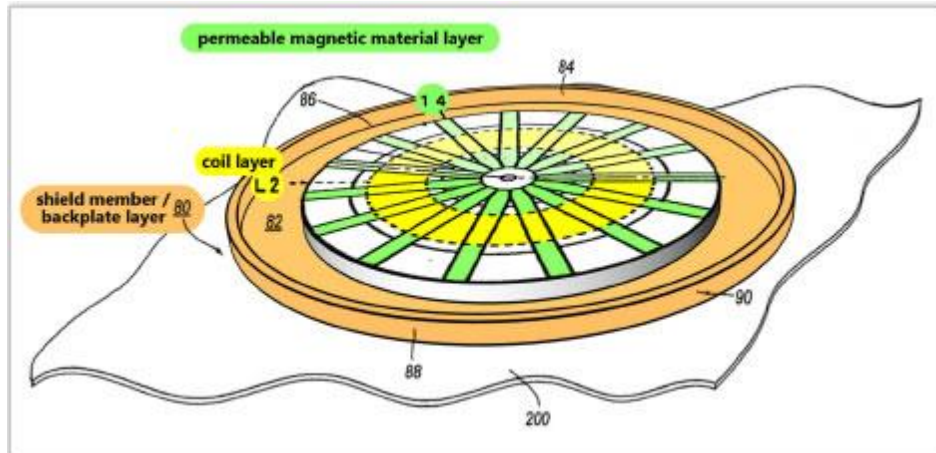
Patent Owner next provides the following annotated Nakao Figure 3B (on the left) and 7C (on the right), modified to depict this lateral misalignment:



*Id.* at 41. The above Figure illustrates misaligned primary and secondary coils (in green) combined with the addition of Beart’s shielding (in orange, from Petitioner’s annotated Figure 7C), which Patent Owner argues would likely block at least some of the side surface coupling. *Id.*; see also *id.* at 39. Thus, Patent Owner concludes, “Petitioner’s proposed modification impermissibly alters Nakao’s principle of operation and frustrates its intended purpose.” *Id.* at 41.

In the Reply, Petitioner contends that Patent Owner is wrong about Beart’s shields frustrating Nakao’s principle of operation for three reasons. Reply 22. First, Petitioner contends, Patent Owner’s conclusory attorney argument does not rebut the record evidence demonstrating that adding Beart’s shielding to Nakao’s non-contact coupler would improve coupling

and efficiency. *Id.* Second, Petitioner argues that Patent Owner mistakenly assumes that a POSA would place Beart’s side walls directly adjacent to Nakao’s pads, but Petitioner proposes spacing Beart’s sidewalls away from Nakao’s pads, as shown in the following Figure:



*Id.* at 22–23 (citing Pet. 57, 68; Ex. 1003 ¶¶ 196, 214; Ex. 1006, Figs. 7–9, 5:14–16, 10:6–29). The above Figure, created by Dr. Allen, shows Beart’s sidewall shield spaced apart from Nakao’s pad. See Pet. 57–58 (citing, e.g., Ex. 1003 ¶ 196). Third and finally, Petitioner contends that even if Beart’s shield might block “*some* of the side surface coupling” in Nakao, reducing “some” coupling would at worst make Nakao’s solution less efficient, not “inoperable.” *Id.* at 23–24 (citing PO Resp. 40; *In re Mouttet*, 686 F.3d 1322, 1334 (Fed. Cir. 2012) (finding claims obvious even if the proposed combination “may be inferior for certain purposes” rather than “unlikely to work”)).

Petitioner persuades us that one of ordinary skill in the art would have combined Beart with Nakao in the manner proposed. Petitioner’s arguments have a rational basis in the evidence of record, supported by the unrebutted testimony of Dr. Allen. In particular, as we explained above, we are persuaded by Dr. Allen’s unrebutted testimony that sidewalls on the receiver

side can reduce splay, protect components, and protect people in the vicinity. See Ex. 1003 ¶¶ 148–59, 193–98; Reply 21–23. Patent Owner’s attorney argument, in contrast, does not undermine Petitioner’s showing. Patent Owner’s argument assumes that Beart’s shield sidewalls would be immediately near Nakao’s noncontact coupler. PO Resp. 36–41. But Patent Owner overlooks that the proposed combination relies on sidewalls spaced some distance away from Nakao’s pads, as shown in the figure above. See Reply 22–23.

We also agree with Petitioner that even if some of Nakao’s side surface coupling would be blocked by the combination’s proposed sidewall shielding, the advantages of combining would have outweighed the reduction of “**some** of the side surface coupling.” Reply 23–24; PO Resp. 40. “A given course of action often has simultaneous advantages and disadvantages, and this does not necessarily obviate motivation to combine.” *Allied Erecting and Dismantling Co. v. Genesis Attachments, LLC*, 825 F.3d 1373, 1381 (Fed. Cir. 2016) (citation omitted). We find that Dr. Allen’s un rebutted testimony regarding the improved coupling and safety advantages, discussed above, outweighs Patent Owner’s speculative disadvantage of reducing “some” side surface coupling. See Ex. 1003 ¶¶ 196, 214; PO Resp. 40.

### *(3) Magnetic field orientation argument*

Patent Owner’s final argument is that the different orientations of the magnetic fields in Nakao and Beart would have discouraged combining the references. PO Resp. 41. Specifically, Patent Owner argues that “Petitioner does not acknowledge or discuss how Beart’s tray-shaped shield and backplate would function differently with a vertically oriented magnetic field produced by a planar coil (as disclosed in . . . Nakao) compared with

the horizontally oriented magnetic field produced by Beart’s horizontal coil.” *Id.*

This argument also does not undermine Petitioner’s persuasive showing. As explained in detail above, Petitioner provides sufficient supporting evidence to show that a person having ordinary skill in the art would have been motivated to include Beart’s shield with Nakao’s noncontact coupler. *E.g.*, Pet. 55–56 (citing Ex. 1006, 2:11–27; Ex. 1017, 21, 67; Ex. 1003 ¶ 193–94; Ex. 1022, 514–15; Ex. 1026 ¶¶ 9–12). Patent Owner does not direct us to evidence that supports its assertion that “Beart’s tray-shaped shield and backplate would *function differently* with a vertically oriented magnetic field produced by a planar coil.” PO Resp. 41 (emphasis added). Patent Owner also fails to explain what it means when it states that the tray-shaped shield and backplate would “function differently.” To the extent that Patent Owner means that the tray-shaped shield and backplate added to Nakao’s device would not shield surrounding objects from undesirable and possibly damaging eddy currents and a high-strength field, Patent Owner does not direct us to evidence to support that contention.

*d. Summary as to Claim 1*

Accordingly, we determine that Petitioner has shown by a preponderance of the evidence that claim 1 would have been obvious<sup>9</sup> over Nakao in view of Beart.

*4. Independent Claim 13*

The parties argue similar claim 13 together with claim 1. Pet. 60–70; PO Resp. 31–43. For the reasons discussed above, we determine that

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<sup>9</sup> Patent Owner did not introduce any evidence of objective indicia of nonobviousness in this proceeding.

Petitioner has shown by a preponderance of the evidence that claim 13 would have been obvious over Nakao in view of Beart.

### 5. *Dependent Claims*

Petitioner contends that dependent claims 2–12 would have been obvious over Nakao in view of Beart. Pet. 70–77. Petitioner provides a detailed analysis explaining where Nakao and Beart disclose the limitations in dependent claims 2–6 and 8–12. *Id.* Patent Owner does not raise separate arguments for these claims. Based on our review of the record, we determine that Petitioner has shown by a preponderance of the evidence that claims 2–6 and 8–12 would have been obvious over Nakao and Beart.

Claim 7 depends directly from claim 1 and recites, “wherein the backplate extends beyond coil and slabs.” In the Petition, Petitioner argues “the recited ‘slabs’ is a drafting error, and a POSA would understand it to be referring to the ‘one or more permeable magnetic material members’ in claim 1.” Pet. 75–76 (citing Ex. 1003 ¶ 232). Petitioner then asserts that this element is taught by Beart because Beart’s shield base extends “beyond each edge of the flux generating unit,” where the flux generating unit comprises the ferrite and coil. *Id.* at 76 (citing Ex. 1006, 10:12–12, 9:14–31, 5:9–18). Extending the shield beyond the flux generating unit “increase[es] the path length” and thereby improves inductive power transfer efficiency, Petitioner argues. *Id.* at 76 (citing Ex. 1006, 2:11–2:27, 4:4–20, Ex. 1003 ¶¶ 233–34). Petitioner further contends that “[a] POSA would have been motivated to install Beart’s flux shield to extend beyond the coil and intermediate core members 14 in Nakao for the same reason.” *Id.* (citing Ex. 1030 ¶¶ 233–34).

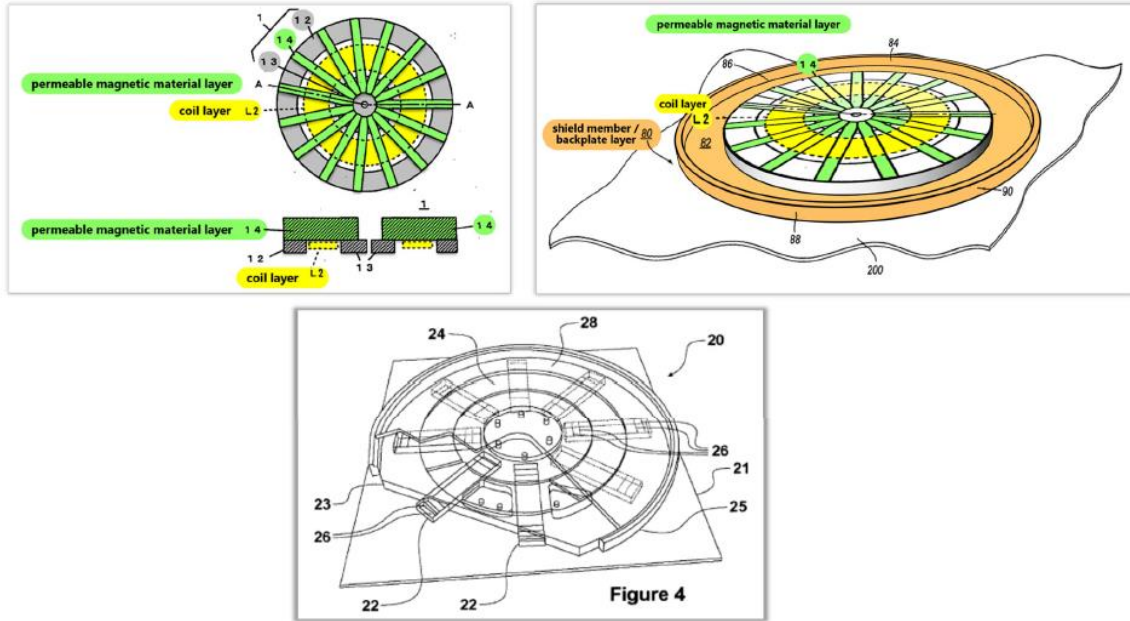
Our Institution Decision did not adopt Petitioner’s proposed construction of “slabs” because the preliminary record did not support

Petitioner’s assertion that “the recited ‘slabs’ is a drafting error.” Dec. 13–14. Accordingly, we preliminarily determined that Petitioner’s argument that the intermediate core members 14 in Nakao meet claim 7’s “slabs” limitation was in error. *Id.* at 38 (citing Pet. 63–65, 75–76).

Patent Owner does not address claim 7 or the construction of “slabs” in its Response. Regardless, the Reply argues that even under our Institution construction, claim 7 would have been obvious based on Nakao and Beart. Reply 25–26.<sup>10</sup> Petitioner contends that claim 7 is unpatentable even under our institution construction because Nakao’s intermediate core members are ferrite slabs that are “practically identical to the ’955 patent’s ferrite slabs,” as shown in the following comparison of Nakao’s annotated Figures 7B–C (top) and the ’955 patent’s Figure 4 (bottom):

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<sup>10</sup> Even though Patent Owner does not address claim 7, Petitioner permissibly responds to our Institution Decision’s analysis of claim 7 because “[a] reply may . . . respond to arguments raised in the . . . decision on institution.” 37 C.F.R. § 42.23(b); Consolidated Trial Practice Guide, 73 (“[I]n response to issues arising from the Supreme Court’s decision in *SAS* (138 S. Ct. at 1358), the Board will permit the petitioner, in its reply brief, to address issues discussed in the institution decision.”); Dec. 13–14, 38.



Reply 25–26 (citing Pet. 57–58, 62–65, 75–76; Ex. 1001, Fig. 4). Starting with the two figures at the top, on the left is shown annotated Nakao Figures 7B and 7C, depicting Nakao’s noncontact coupler or pad with intermediate core members 14. *Id.* On the right is shown Petitioner’s illustration of Nakao’s pad with Beart’s shield extending beyond intermediate core members 14. *Id.* Below these two figures is shown Figure 4 of the ’955 patent, illustrating a charging pad with backplate 21 and strip 25 extending beyond ferrite bars 22. *Id.*; Ex. 1001, 8:52–9:23.

We agree with Petitioner that Nakao’s intermediate core members 14 in Figures 7B and 7C teach “slabs” as claimed in claim 7. We find that one of ordinary skill in the art would have viewed Nakao’s intermediate core members 14, as shown in Figures 7B and 7C, to be shaped like the slabs of the ’955 patent. Patent Owner does not dispute this. Nor does Patent Owner dispute Petitioner’s contention that “[a] POSA would have been motivated to install Beart’s flux shield to extend beyond the coil and intermediate core members 14 in Nakao” to improve inductive power transfer efficiency. Pet. 76 (citing Ex. 1003 ¶¶ 233–34; Ex. 1006, 2:11–27, 4:4–20). Petitioner’s

arguments are supported by the evidence of record, including Dr. Allen's un rebutted testimony.

Accordingly, on the full record, we determine that Petitioner has shown by a preponderance of the evidence that claim 7 would have been obvious over the combination of Nakao and Beart.

#### IV. CONCLUSION<sup>11</sup>

In summary:

| Claims                 | 35 U.S.C. § | Reference(s)/ Basis   | Claims Shown Unpatentable | Claims Not shown Unpatentable |
|------------------------|-------------|-----------------------|---------------------------|-------------------------------|
| 1, 4–6, 8–13           | 102(b)      | Hui-910 <sup>12</sup> |                           |                               |
| 1, 4–13                | 103(a)      | Hui-910, Beart        |                           |                               |
| 1–13                   | 103(a)      | Nakao, Beart          | 1–13                      |                               |
| <b>Overall Outcome</b> |             |                       | 1–13                      |                               |

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<sup>11</sup> Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner's attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. See 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. See 37 C.F.R. § 42.8(a)(3), (b)(2).

<sup>12</sup> As discussed above, we do not reach Petitioner's grounds based on Hui-910 because the Nakao-Beart ground is dispositive of all the challenged claims.

V. ORDER

It is, therefore,

ORDERED that Petitioner has shown by a preponderance of the evidence that claims 1–13 of the '955 patent are 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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