UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD.
Petitioner

v.

SCRAMOGE TECHNOLOGY LTD.
Patent Owner

U.S. Patent No. 10,153,666

PETITION FOR *INTER PARTES* REVIEW
OF U.S. PATENT NO. 10,153,666

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I. INTRODUCTION

Samsung Electronics Co., Ltd. ("Petitioner") requests *inter partes* review ("IPR") of claims 1-28 of U.S. Patent No. 10,153,666 ("the '666 patent") (Ex. 1001), which, according to PTO records, is assigned to Scramoge Technology Ltd. ("PO"). For the reasons set forth below, the challenged claims should be found unpatentable and canceled.

II. MANDATORY NOTICES

Real Parties-in-Interest: Petitioner identifies the following as the real parties-in-interest: Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc.

Related Matters: PO has asserted the '666 patent against Petitioner in *Scramoge Technology Ltd. v. Samsung Electronics Co. Ltd.*, No. 2:22-cv-00015-JRG-RSP (E.D. Tex. Jan. 10, 2022).

Counsel and Service Information: Lead counsel is Naveen Modi (Reg. No. 46,224), and Backup counsel are (1) Joseph E. Palys (Reg. No. 46,508), (2) Phillip Citroën (Reg. No. 66,541), (3) Paul M. Anderson (Reg. No. 39,896), and (4) David Valente (Reg. No. 76,287), Paul Hastings LLP, 2050 M St., N.W. Washington, DC 20036 (Telephone: (202) 551-1990; Fax: (202) 551-1705; Email: PH-Samsung-Scramoge-IPR@paulhastings.com). Petitioner consents to electronic service.

III. PAYMENT OF FEES

The PTO is authorized to charge all fees due to Deposit Account No. 50-2613.

IV. GROUNDS FOR STANDING

Petitioner certifies that the '666 patent is available for IPR and Petitioner is not barred or estopped from requesting IPR on the identified grounds.

V. PRECISE RELIEF REQUESTED AND GROUNDS RAISED

A. Challenged Claims

Petitioner respectfully requests review and cancellation of claims 1-28 ("challenged claims") of the '666 patent.

B. Grounds

Claims 1-28 should be canceled as unpatentable based on the following grounds:

Ground 1: Claims 1-19 and 26-28 are obvious under 35 U.S.C. § 103(a) based on U.S. Patent No. 9,461,364 ("Lee-364") (Ex. 1010) in view of U.S. Patent Publication No. 2017/0237149 ("Lee-149") (Ex. 1011);

Ground 2: Claims 20-25 are obvious under § 103(a) based on Lee-364, Lee-149, and U.S. Patent Publication No. 2008/0164840 ("Kato") (Ex. 1005); and

Ground 3: Claims 1-18, and 20-27 are obvious under § 103(a) based on U.S. Patent Publication No. 2008/0164840 ("Kato") (Ex. 1005) in view of U.S. Patent No. 8,624,546 ("Jung") (Ex. 1006).

The ’666 patent issued December 11, 2018, from U.S. App. No. 15/673,763 (“the ’763 application”), filed August 10, 2017. While the ’666 patent purports to claim priority to earlier filed applications, as demonstrated in Sections VII.B-E, the earliest effective filing date for the ’666 patent is the August 10, 2017, filing date of the ’763 application.

Kato published July 10, 2008. Jung issued January 7, 2014, from U.S. Patent Application No. 12/741,679, which is a national-stage application filed May 6, 2010, corresponding to PCT/KR2009/007431. Therefore, even if the ’666 is entitled to its earliest possible priority date of November 4, 2011, Kato is prior art under at least pre-AIA 35 U.S.C. § 102(b) and Jung is prior art under at least pre-AIA 35 U.S.C. § 102(e).

Lee-364 issued October 4, 2016, and Lee-149 was filed February 13, 2017. Therefore, based on the August 10, 2017, earliest effective filing date for the ’666 patent, Kato, Jung, and Lee-364 are prior art under at least 35 U.S.C. § 102(a)(1), and Lee-149 is prior art under at least 35 U.S.C. § 102(a)(2). Jung was cited in an IDS submitted during prosecution of the ’763 application, but was never applied by the Examiner, much less in combination with Kato. None of the other references were considered as prior art by the Examiner during prosecution.

VI. LEVEL OF ORDINARY SKILL IN THE ART

A person of ordinary skill in the art as of the claimed priority date of the '666 patent ("POSITA") would have had a bachelor's degree in electrical engineering, computer engineering, applied physics, or a related field, and at least one year of experience in the research, design, development, and/or testing of wireless charging systems, or the equivalent. (Ex. 1002, ¶¶20.)[1] More education can supplement practical experience and vice versa. (*Id.*)

VII. OVERVIEW OF THE '666 PATENT

A. The '666 Patent

The '666 patent is titled "Wireless Power Receiver and Control Method Thereof" (Ex. 1001, Cover), and describes "a wireless power receiver with a minimized thickness by suitably arranging a receiving coil, a short-range communication antenna and a printed circuit board" (*id.*, 1:61-64). Specifically, the '666 patent describes forming the receiver using a printed circuit board with a "reception space" (hole) within which the power receiving coil is disposed, whereas the communication antenna is on or in the printed circuit board. (*Id*., 1:65-67, 2:7-15.)

B. AIA Applicability

[1] Petitioner submits the declaration of R. Jacob Baker, Ph.D., P.E., (Ex. 1002), an expert in the field of the '476 patent. (Ex. 1002, ¶¶5-15; Ex. 1003.)

The ’666 patent issued from the ’763 application, which was filed August 10, 2017. The ’666 patent claims priority to U.S. Patent Application Nos. 15/195,390 (“the ’390 application) (Ex. 1013) and 13/658,116 (“the ’116 application”) (Ex. 1012), which were filed June 28, 2016, and October 23, 2012, respectively. Because the ’666 patent claims priority to the ’116 application, which was filed prior to March 16, 2013, the ’763 application was examined as a pre-AIA application. However, as demonstrated below, all of the claims of the ’666 patent include subject matter that lacks written description support in the ’116 application, and therefore none of the claims are entitled to a pre-March 16, 2013, earliest effective filing date. *PowerOasis, Inc.*, 522 F.3d at 1306; *In re Gosteli*, 872 F.2d 1008, 1010–11 (1989). (Ex. 1002, ¶¶32-51.) As a result, the ’666 patent is subject to the AIA. *Grunenthal GmbH v. Antecip Bioventures II LLC*, PGR2018-00001, Paper 17 at 9-10 (May 1, 2018).

C. The ’116 and ’390 Applications Do Not Support the Claimed “Wireless Receiving Coil Disposed in the Board” and “Between the Plurality of Layers”

Claim 1 of the ’666 patent recites “a board comprising a plurality of layers,” “a wireless receiving coil disposed in the board,” and “wherein the wireless receiving coil…[is] disposed between the plurality of layers.” (Ex. 1001, 10:47-60.) As explained below, the ’116 or ’390 applications do not disclose a “wireless receiving coil” “disposed in the board” and “between the plurality of layers” of the

board. The disclosure of the '390 application is essentially the same disclosure as the '116 application, and therefore, while the discussion below focuses on the '116 application, the same reasoning applies to the '390 application.[2]

The '116 application discloses both a short-range communication antenna 340 (the claimed "short-range communication coil") and a receiving coil 310 (the claimed "wireless receiving coil") (Ex. 1012, 6:1-3, FIGs. 4-8), but the '116 application discloses that only the short-range communication antenna 340 is disposed "on" or "in" the printed circuit board 301 (*id.*, 6:29-7:4, 8:6-7). In comparison, the '116 application consistently and exclusively discloses that the receiving coil 310 is disposed in a reception space (i.e., a hole or vacant space) in the printed circuit board, as demonstrated by the following excerpts:

- "[T]he receiving coil may be disposed in a reception space of a printed circuit board 301." (*Id.*, 6:11-12.)[3]

[2] While claim 1 of the '390 application recites "a receiving coil disposed on the printed circuit board" (Ex. 1013, 15), there is no supporting disclosure or description of such an embodiment. Moreover, there is nothing in the '390 application regarding a receiving coil "in" or between layers of a printed circuit board.

[3] To the extent PO contends that the word "may" suggests other possible implementations, such an understanding conflicts with the next paragraph in the '116

- "In the embodiment, the receiving coil 310 may be disposed in the reception space inside the printed circuit board 301, and the short-range communication antenna 340 may be disposed to surround the receiving coil 310 on the printed circuit." (*Id*., 6:20-22.)
- "[R]eferring to FIG. 6(a), it may be identified that the receiving coil 310 is disposed in the reception space A of the printed circuit board 301 and the short-range communication antenna 340 is disposed on the printed circuit board 301. That is, the receiving coil 310 may be disposed in the reception space A provided inside the printed circuit board 301, and the short-range communication antenna 340 may be disposed at an upper side of the printed circuit board 301 while surrounding the reception space A." (*Id.*, 6:29-7:4.)
- "[T]he short-range communication antenna 340 may be disposed at an outer periphery on the printed circuit board 301 while surrounding the receiving coil 310 placed in the reception space A." (*Id.*, 7:9-11.)

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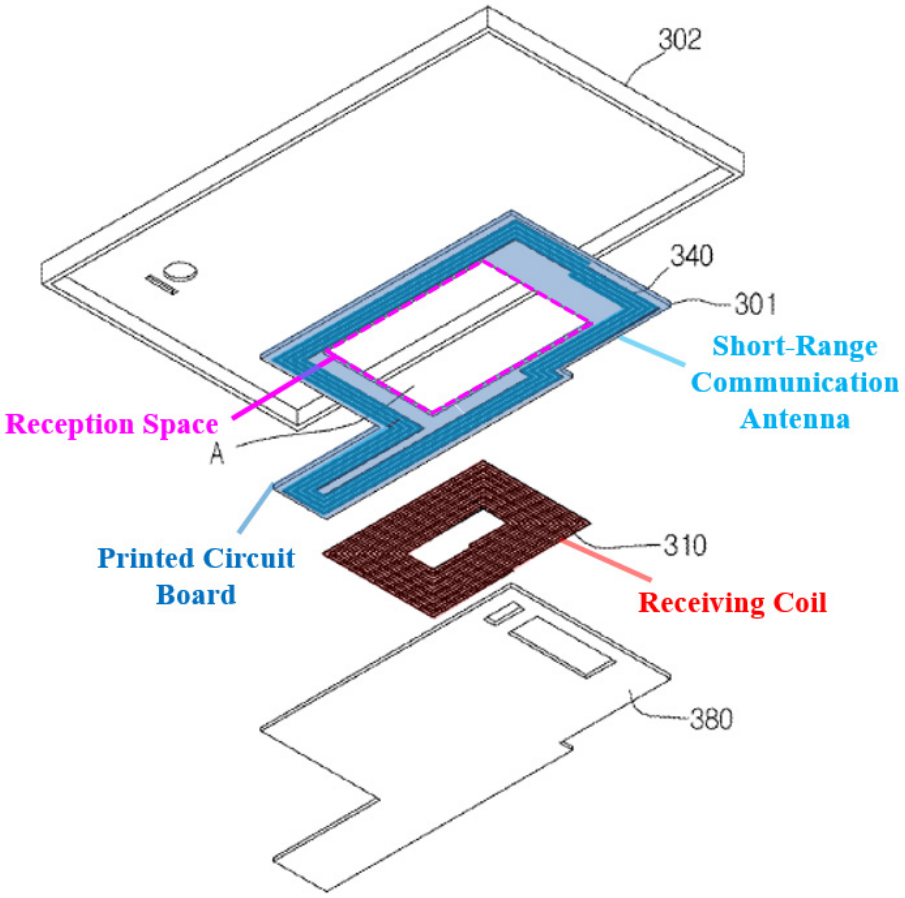
application, which states that, "[i]n the embodiment, the receiving coil 310 ***may*** have a spiral shape**,** ***but the embodiment is not limited thereto***." (Ex. 1012, 6:13-15 (emphasis added).)

- "The receiving coil 310 is disposed in the reception space A of the printed circuit board 301…." (*Id.*, 7:20-21.)
- "The short-range communication antenna 340 may be included in the printed circuit board 301 and may be configured to surround the receiving coil 310. In the embodiment, the short-range communication antenna 340 may be embedded in the printed circuit board 301…." (*Id.*, 8:6-9.)
- "The printed circuit board 301 has a reception space A in the central area, and the receiving coil 310 having a rectangular shape is disposed in the reception space A. The short-range communication antenna 340 is embedded in the printed circuit board 301." (*Id.*, 9:8-11.)
- *See also id.,* claims 1, 8, Abstract.

Moreover, each of figures 6(a), 7, and 8(a) show the receiving coil 310 disposed in a reception space A extending all the way through the printed circuit board 301. Because the reception space is a hole through the printed circuit board, there are no layers of the board that the receiving coil is "between."



(*Id*., FIG. 6(a) (annotated); Ex. 1002, ¶36.)

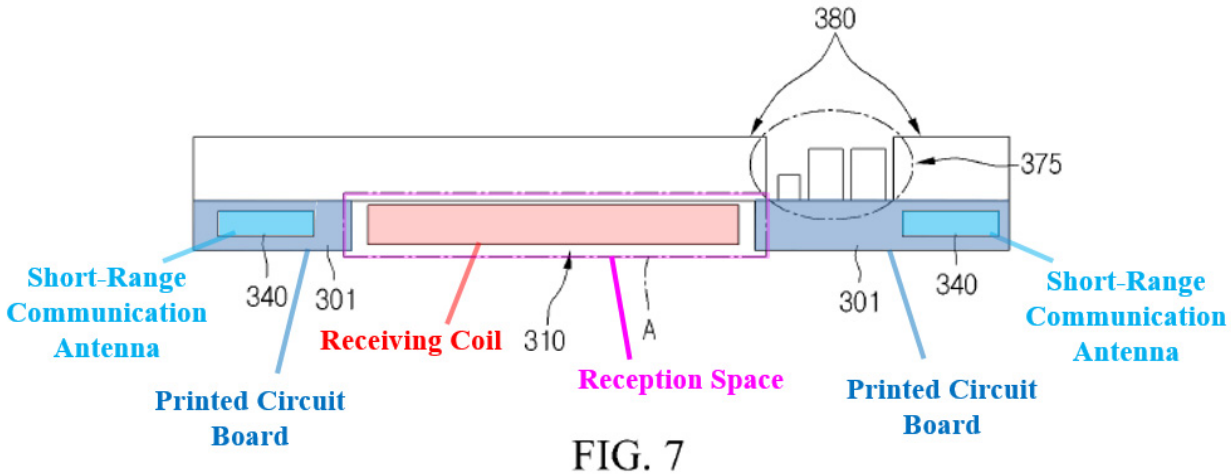
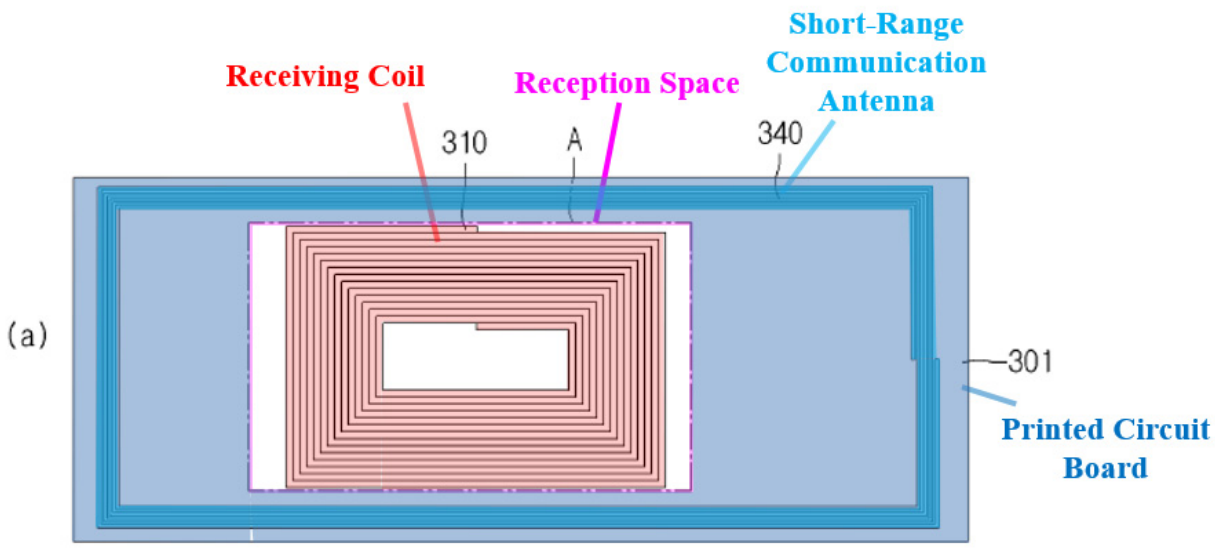


FIG. 7

(*Id*., FIG. 7 (annotated); Ex. 1002, ¶36.)



(*Id*., FIG. 8(a) (annotated); Ex. 1002, ¶36.)

Indeed, none of the figures of the '116 application depict the receiving coil 310 "in" a board, let alone "between the plurality of layers" in such a board. Thus, the '116 application does not disclose, either explicitly or inherently, "a wireless receiving coil disposed in the board," where "the wireless receiving coil…[is] disposed between the plurality of layers," as recited in claim 1. (Ex. 1002, ¶37.)

Thus, the '116 and '390 applications do not convey to a POSITA that the named inventor had possession of the features claimed at the relevant time. Indeed, as discussed below in Section VII.D, the first appearance of any language suggesting that the receiving coil is "in" the printed circuit board was in the specification filed with the '763 application on August 10, 2017. (Ex. 1004, 311, ¶[0084].) Therefore, claim 1 is not entitled to an effective filing date earlier than the August 10, 2017,

filing date of the '763 application. (Ex. 1002, ¶¶38.) *See, e.g.*, *Allergan, Inc. v. Sandoz Inc*., 796 F.3d 1293, 1308-09 (Fed. Cir. 2015); *LizardTech, Inc. v. Earth Resource Mapping, Inc.*, 424 F.3d 1336, 1345 (Fed Cir. 2005); *Lockwood v. American Airlines, Inc.*, 107 F.3d 1565, 1572 (Fed. Cir. 1997).

D. The Applicant Added New Matter to the '763 Application

The Applicant filed the '763 application as a "continuation" application, and represented to the Office that it has the ***same disclosure*** as the priority applications. However, apparently without informing the Office, the Applicant added new matter to the as-filed specification of the '763 application.

After the '763 application was filed, the Examiner initially rejected all of the pending claims under Section 112 as adding new matter not supported by the disclosure of the '116 application. (Ex. 1004, 183.) The Examiner suggested that, while the '763 application had been filed as a "continuation" application, the new matter added in the claims concerning the wireless receiving coil disposed "in" the board and "between the plurality of layers" was the basis of a "continuation in part" (CIP) application. (*Id*.)

Thus, the Examiner rejected claims 1-29 for failing to comply with the written description requirement. (*Id*., 184-188.) For example, "[r]egarding the new matter rejection of claims 1-29," the examiner stated that he "carefully considered the claims and reviewed the disclosure multiple times and simply is at a loss to find

where the claimed configuration can be found." (*Id*., 185-186.) The Examiner further explained that the terms "layer" and "separation" do not appear anywhere in the specification. (*Id*., 186.) Moreover the Examiner found that the specification, including the description of figures 9 and 10, lacked any supporting disclosure. (*Id*., 186.)

In response to the rejection, Applicant submitted a proposed amendment to the specification that was discussed during an Examiner interview. (*Id*., 64-69.) After the interview, Applicant amended the specification as proposed. (*Id*., 35-40.) That amendment, however, in order to support the claims, added significant additional text to paragraphs [0083] and [0084] of the specification:

Please amend paragraph [0083] as follows:

First, referring to FIG. 9, after the short-range communication antenna 340 has been disposed ~~on~~ in the printed circuit board 301, the shielding unit 380 may be attached to one side of the printed circuit board 301 with an adhesive. The printed circuit board 301 comprises a plurality of layers wherein each layer of the plurality of layers is spaced apart from adjacent layers. The shielding unit 380 is disposed under the short-range communication antenna 340 or the receiving coil 310 (not shown in the Fig. 9).

Please amend paragraph [0084] as follows:

Referring to FIG. 10, the printed circuit board 301 comprises a plurality of layers wherein each layer of the plurality of layers is spaced apart from adjacent layers, the short-range communication antenna 340 or the receiving coil 310 (not shown in the Fig. 10) is disposed in the printed circuit board 301. Moreover, the shielding unit 380 is disposed in the printed circuit board 301. The shielding unit 380 is disposed under the receiving coil 310 or the short-range communication antenna 340. The receiving coil 310 (not shown in the Fig. 10), the short-range communication antenna 340, and the shielding unit 380 are disposed between the plurality of layers of the printed circuit board 301. ~~while~~

(*Id*., 36-37.)

Applicant represented that the added sentences "are only to clarify and describe features that were already shown in Figures 9 and 10 and/or inherent based on the full disclosure of the subject application, ***which is the same as that of the parent applications***." (*Id*., 39 (emphasis added).) Based on these representations by the Applicant, the Examiner allowed the amendments to the specification and

withdrew the rejections to the claims, including the rejection for lack of written description support. (*Id*., 26.)

But, as demonstrated in Section VII.C above, the '116 application only discloses the receiving coil being disposed in the reception space. It does not disclose the receiving coil being "in" a board or between multiple layers of a board. Instead, the supporting disclosure for such features, if any, was new matter added to the specification of the '763 application upon filing.

Specifically, while the '763 application was filed as a "continuation" application of the '390 application, the description of figure 10 in paragraph [0084] of the as-filed specification of the '763 application was altered to suggest that either the short-range communication coil 340 ***or*** the receiving coil 310 is formed "in" the board 301. The alteration is shown below, with underlining indicating added matter and strikethrough indicating deleted matter in comparison to the same paragraph in the '390 and '116 applications:

> Referring to FIG. 10, while the procedure of disposing the short-range communication antenna 340 or receiving coil(310)(not shown in the Fig. 10) in ~~on~~ the printed circuit board 301 is being performed, the shielding unit 380 may be inserted into the printed circuit board 301.

(*Compare* Ex. 1012, 12:4-6 *and* Ex. 1013, 11:21-23 *with* Ex. 1004, 311, ¶[0084].)

When the Examiner initially rejected the claims submitted with the '763 application as including new matter, the Examiner clearly considered the specification submitted with the filing of the '763 application, which included the added "or receiving coil(310)(not shown in the Fig. 10) in ~~on~~ the printed circuit board" language that is not present in the '390 and '116 applications. (Ex. 1004, 186 ("discussion of Figure 10 [0084] spans 8 lines and describes how the short range communication antenna (340) ***or receiving coil (310-not shown in Figure 10) is disposed in*** the printed circuit board (301)") (emphasis added); *id.* ("It is also to be noted with extreme importance that 'or' was used when it comes to ***disposing the short range communication antenna (340) 'or' receiving coil (310-not shown in Fig. 10)*** does not provide support for a configuration with both (340) and (310) present between different 'layers.'") (emphasis added).)

Applicant never informed the Examiner or otherwise acknowledged that the "or receiving coil(310)(not shown in the Fig. 10) in ~~on~~ the printed circuit board" language was added to the '763 specification and is not present in the specifications of the '390 and '116 applications. Indeed, Applicant went so far as to assert that the "the full disclosure of the subject application ... ***is the same as that of the parent applications***" and that "the subject application is a ***continuation application, not a continuation-in-part application***, of U.S. Serial No. 15/195,390, which is a continuation of U.S. Serial No. 13/658,116." (*Id*., 39 (emphasis added).) But, as

demonstrated above in Section VII.C, there is no support, inherent or otherwise, in the ’116 specification for the receiving coil 310 being included “in” and between layers of a multilayer board.

E. The ’116 and ’390 Applications Does Not Support Other Claims of the ’666 Patent

Several dependent claims of the ’666 patent also lack support in the ’116 and ’390 Applications.

Claim 15 requires that the wireless receiving coil include a plurality of layers (claim 12), is disposed between specific layers of the board (claim 13), and has at least one layer that has a greater thickness than a separation distance between the layers that the coil is disposed between. There is no disclosure in the ’116 Application of receiving coil 310 being a multi-layer coil, and the receiving coil is never described, nor depicted in any figure, in a manner that could even arguably provide support for these features.

Similarly, claim 22 requires that the wireless receiver coil includes a first wireless receiving coil and a second wireless receiving coil (claim 20), and further requires the thickness of the first wireless receiving coil to be thinner than the shielding unit (claim 21) and thicker than one of the layers of the board (claim 22). There is no disclosure in the ’116 application of receiving coil 310 including multiple coils, and the receiving coil is never described, nor depicted in any figure, in a manner supporting these features.

VIII. CLAIM CONSTRUCTION

During IPR, claims are construed according to the "*Phillips* standard," as set forth in *Phillips v. AWH Corp*., 415 F.3d 1303 (Fed. Cir. 2005) (en banc). *See* 83 Fed. Reg. 51341 (Oct. 11, 2018). The Board only construes the claims when necessary to resolve the underlying controversy. *Toyota Motor Corp. v. Cellport Systems, Inc.*, IPR2015-00633, Paper No. 11 at 16 (Aug. 14, 2015). Petitioner believes that no express constructions of the claims are necessary to assess whether the prior art reads on the challenged claims. (Ex. 1002, ¶52.)

IX. DETAILED EXPLANATION OF GROUNDS

The challenged claims are unpatentable based on Grounds 1-3. (Ex. 1002, ¶¶65-205.)

A. Ground 1: Claims 1-19 and 26-28 Are Obvious over Lee-364 and Lee-149

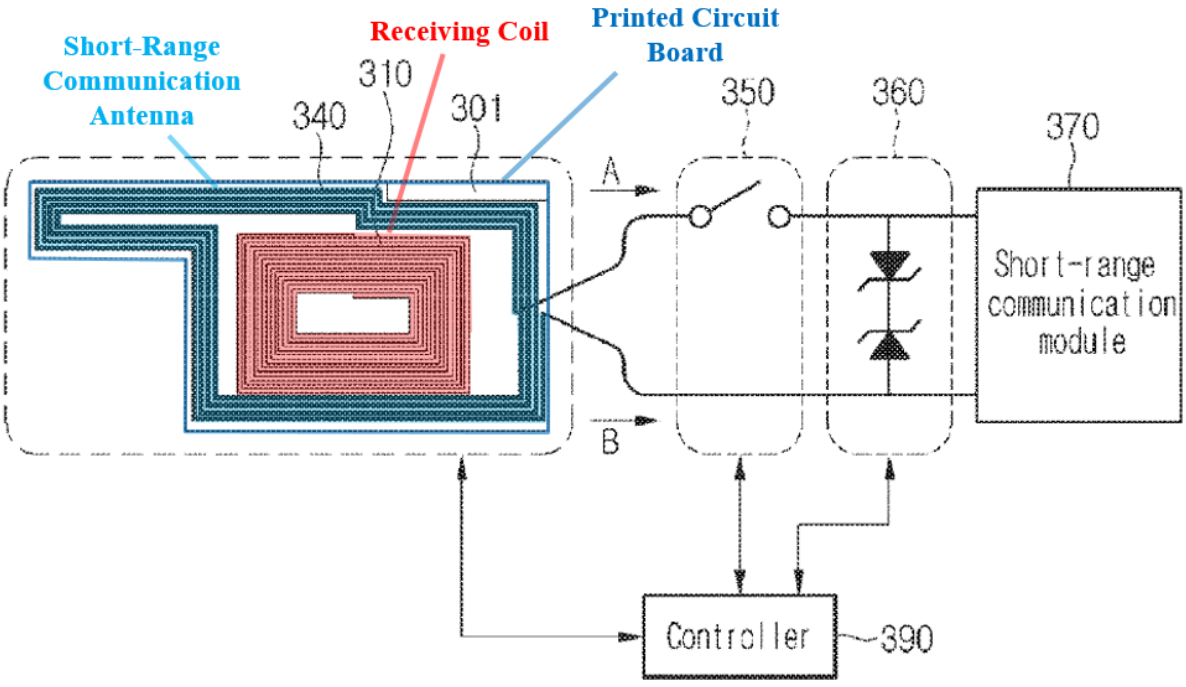
Because the earliest effective filing date of the '666 patent is the August 10, 2017, filing date of the '763 application, the grandparent patent of the '666 patent, Lee-364, qualifies as prior art to the '666 patent. Lee-364's specification is nearly identical to the specification of the '666 patent, and therefore explicitly discloses many of the limitations of the challenged claims. The remaining limitations would have been obvious based on the combination of Lee-364 and Lee-149.

1. Claim 1

a) A wireless power receiver that wirelessly receives power from a wireless power transmitter, the wireless power receiver comprising:

To the extent the preamble is limiting, Lee-364 discloses this feature. (Ex. 1002, ¶¶66-68.) For instance, Lee-364 discloses "[a] wireless power receiver according to an embodiment wirelessly receives power from a wireless power transmitter." (Ex. 1005, Abstract, Title.) With reference to figure 5, Lee-364 discloses a wireless power receiver that includes a receiving coil 310, a short-range communication antenna 340, and a printed circuit board 301. (Ex. 1010, 2:51-52, 3:64-66, 4:11-15, 4:28-29; Ex. 1002, ¶66.)

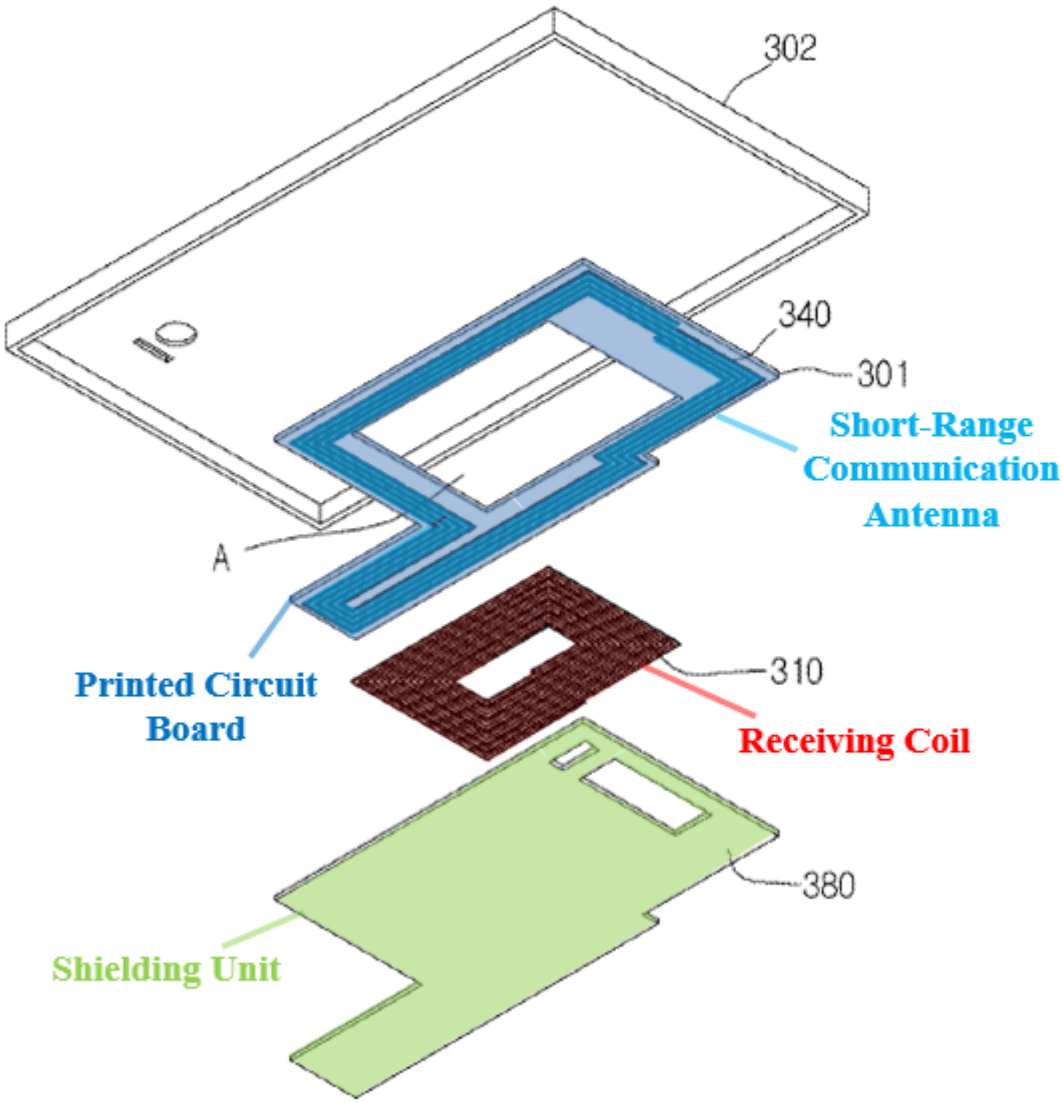
FIG.5



(Ex. 1010, FIG. 5 (annotated); Ex. 1002, ¶66.)

As shown in annotated figure 6(a) below, Lee-364 further discloses a "shielding unit 380 for shielding a magnetic field generated by the receiving coil 310," where "the shielding unit 380 may be disposed on the receiving coil 310 and the short-range communication antenna 340 such that the shielding unit 380 may include the area occupied by the receiving coil 310 and the short-range communication antenna 340." (Ex. 1010, 5:58-67; Ex. 1002, ¶67.)

FIG.6

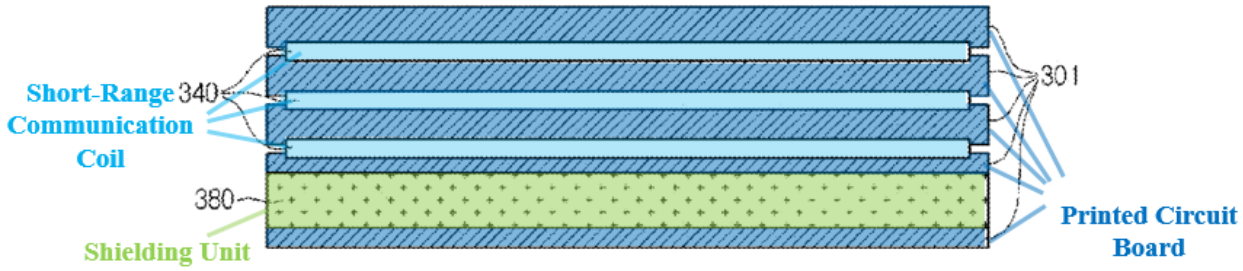


(Ex. 1010, FIG 6(a) (annotated); Ex. 1002, ¶67.)

Annotated figure 10 of Lee-364 "is a view illustrating one example of inserting the shielding unit into the wireless power receiver according to the embodiment" such that "the procedure of disposing the shielding unit 380 may be

included in the procedure of disposing the short-range communication antenna 340 without performing the procedure of disposing the shielding unit 380 at one side of the printed circuit board 301." (Ex. 1010, 2:65-67, 8:23-32.)

FIG.10

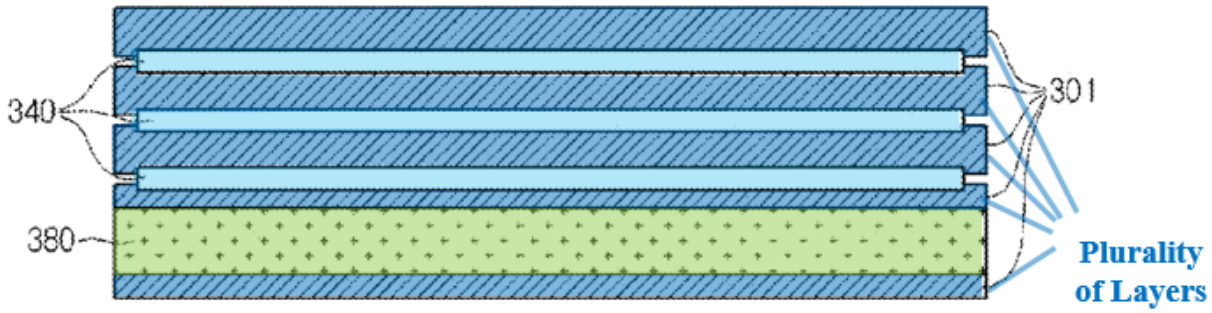


(Ex. 1010, FIG. 10 (annotated); Ex. 1002, ¶68.)

b) a board comprising a plurality of layers;

Lee-364 discloses this feature. (Ex. 1002, ¶69.) For example, figure 10 of Lee-364 (discussed in Section IX.A.1(a)) shows that the printed circuit board 301 ("board") includes a plurality of layers. (Ex. 1010, FIG. 10; Ex. 1002, ¶69.)

FIG.10



(Ex. 1010, FIG. 10 (annotated); Ex. 1002, ¶69.)

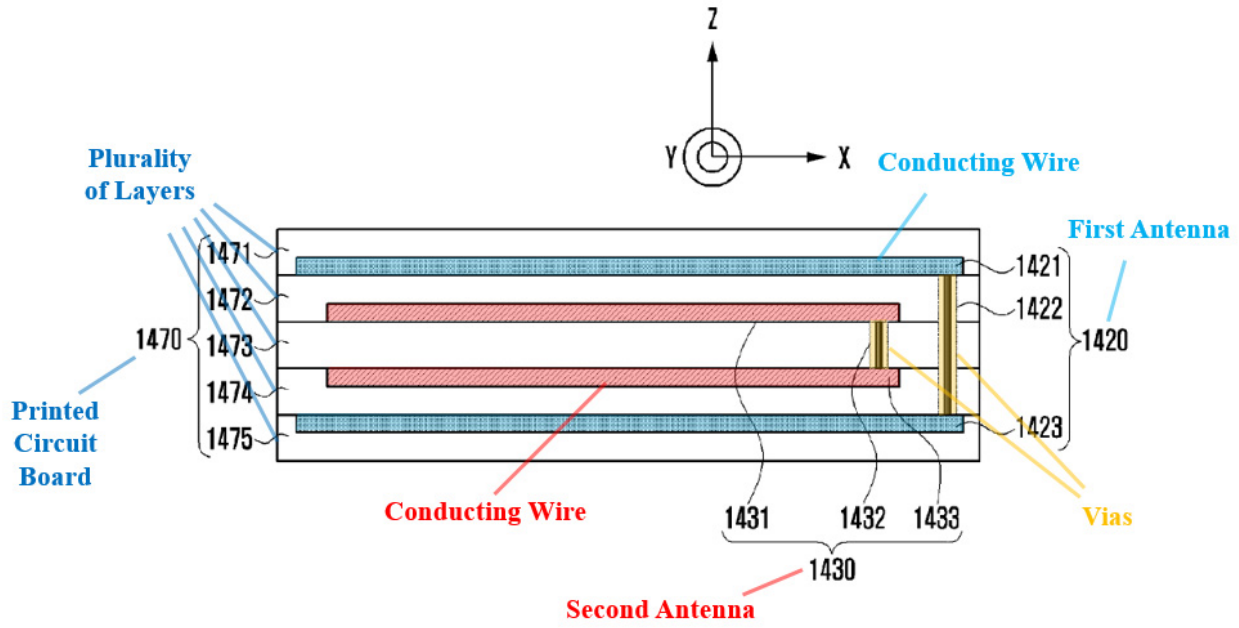
c) a wireless receiving coil disposed in the board;

Lee-364 and Lee-149 disclose or suggest this feature. (Ex. 1002, ¶¶70-81.) As discussed in Section IX.A.1(a), Lee-364 discloses a wireless power receiver that includes both a receiving coil 310 ("wireless receiving coil") and a short-range communication antenna 340. Moreover, Lee-364 discloses an embodiment where "[t]he short-range communication antenna 340 is embedded in the printed circuit board 301." (Ex. 1010, 6:30-32.) Lee-364 does not, however, disclose that the receiving coil 310 is disposed "in" the board, at least not consistent with claim element 1[g], which requires that the receiving coil is "disposed between the plurality of layers" of the board. Nevertheless, Lee-149 discloses this feature, and, in view of Lee-149, a POSITA would have found it obvious to implement a wireless

power receiver like that disclosed by Lee-364 such that it is "disposed in the board." (Ex. 1002, ¶70.)

Lee-149, like Lee-364, is in the field of portable electronic devices like mobile phones having a first antenna and a second antenna implemented in a printed circuit board (FPCB). (Ex. 1011, ¶¶[0071], [0164]-[0165]; Ex. 1002, ¶71.) As shown in annotated figure 14B below, the first loop antenna 1420 and second loop antenna 1430 are formed in the board 1470 that includes a plurality of layers 1471-1475. (Ex. 1011, ¶[0167].) Via 1422 connects conducting wires on layers 1471 and 1475, whereas via 1432 connects conducting wires on layers 1472 and 1474. (*Id*.)

FIG. 14B



(Ex. 1011, FIG. 14B (annotated); Ex. 1002, ¶72.)

A POSITA would have looked to Lee-149 when implementing a multi-layer coil structure like that disclosed in Lee-364, particularly because Lee-149 and Lee-364 are in the same field, and Lee-364 provides minimal detail regarding the multilayer coil structure shown in figure 10. (Ex.1002, ¶73.) Indeed, while figure 10 of Lee-364 shows multiple layers corresponding to the short-range communication antenna 340, Lee-364 does not provide any indication as to how those layers are interconnected. (*Id.*) A POSITA would therefore have considered

Lee-149, which provides disclosure as to how to interconnect multiple conducting layers of an antenna, when implementing the reception coil 310 and the short-range communication coil 340 disclosed by Lee-364. (Ex. 1002, ¶73.)

A POSITA would have combined the teachings of Lee-364 and Lee-149, as described above, to implement a wireless power receiver that includes both a wireless receiving coil and a short-range wireless communication antenna in the same printed circuit board. (Ex.1002, ¶74.) For example, Lee-364 discloses that by including the shielding unit in the manufacture of the printed circuit board, "a separate procedure of attaching the shielding unit 380 is not necessary, so the manufacturing process may be simplified." (Ex.1010, 8:34-39.) Consistent with Lee-364's goal of simplifying the manufacturing process, and based on Lee-149's disclosure of forming both antennas in the same board, a POSITA would have found it beneficial to also include the wireless receiving coil in the manufacture of the printed circuit board disclosed in Lee-362. Doing so would have avoided the separate procedures of manufacturing the wireless receiving coil and inserting that coil in a reception unit within the coil. Thus, in the combination, both coils and the shielding unit would have been formed during the same process, thereby further simplifying manufacturing. (Ex.1002, ¶74.)

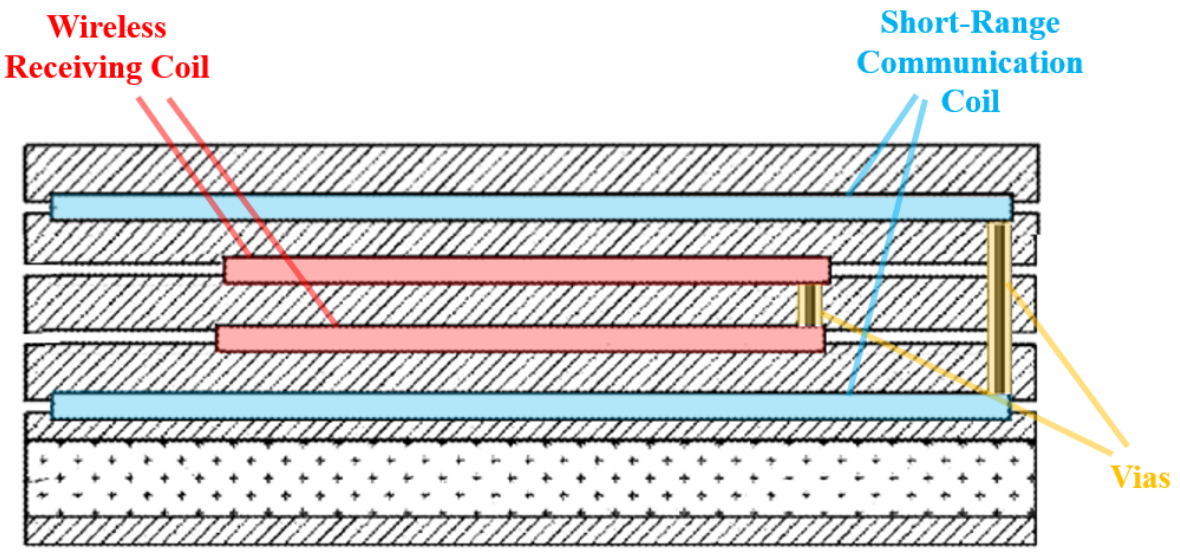
Indeed, Lee-149 discloses a multi-layer printed circuit board that includes two coils and further discloses how to interconnect the conductive material for those coils,

thereby demonstrating that including both coils in the same printed circuit board was a viable option. (*Id*.) Notably, additional references predating the earliest effective filing date of the '666 patent confirm that it was known to include coils for wireless power transfer and short-range wireless communication on the same printed circuit board. (*See*, *e.g*., Ex. 1008, 11:65-12:14, 12:30-44, FIGs. 4-7; Ex. 1009, Title, Abstract, ¶¶[0001], [0009]-[0010], FIGs. 6-7, 9-12; Ex. 1002, ¶¶74-77.)

Moreover, a POSITA would have found it obvious to form the wireless receiving coil in the Lee-364-Lee-149 combination in a manner consistent with the disclosure of both references. (Ex. 1002, ¶78.) For example, such a POSITA would have recognized based on the disclosure of Lee-149 that one coil could be formed in one set of layers, whereas the other coil could be formed in a different set of layers. (*Id.*) While forming the coils in separate layers may add layers to the board it doesn't necessarily add thickness, and using multiple layers for each coil would not be inconsistent with the teachings of Lee-364 discloses a multi-layer board where the short-range communication antenna includes multiple layers instead of only a single layer. (*Id.*) Moreover, a prior art combination need not retain all of the advantages disclosed by each of the prior art references. *See Medichem, S.A. v. Rolabo, S.L.*, 437 F.3d 1157, 1165 (Fed. Cir. 2006) ("a given course of action often has simultaneous advantages and disadvantages, and this does not necessarily obviate motivation to combine"). Furthermore, a POSITA would have understood that there

are tradeoffs in designing a wireless receiver, and, in some instances, the additional thickness from additional board layers results in other benefits (e.g., manufacturing efficiency, increased fault tolerance, coil performance, reduced resistance, smaller coil footprint). (Ex. 1002, ¶78.)

As noted above, Lee-364 does not provide any disclosure as to how the conductive portions in multiple layers of the short-range communication antenna are interconnected in the circuit board. (*Id.*, ¶79.) As such, a POSITA would have understood that the configuration illustrated in figure 14B of Lee-149 would provide a viable, known configuration where two coils are implemented in the same printed circuit board with the appropriate interconnect. (*Id.*) Indeed, the use of vias to provide connections between different layers in a multi-layer printed circuit board was a well-known and widely-used technique for providing such connections. (Ex. 1011, ¶[0167]; Ex. 1005, ¶[0071], FIGs. 7, 10; Ex. 1002, ¶79.) The non-limiting demonstrative below shows a wireless power receiver according to the Lee-364-Lee-149 combination. (Ex. 1002, ¶79.)



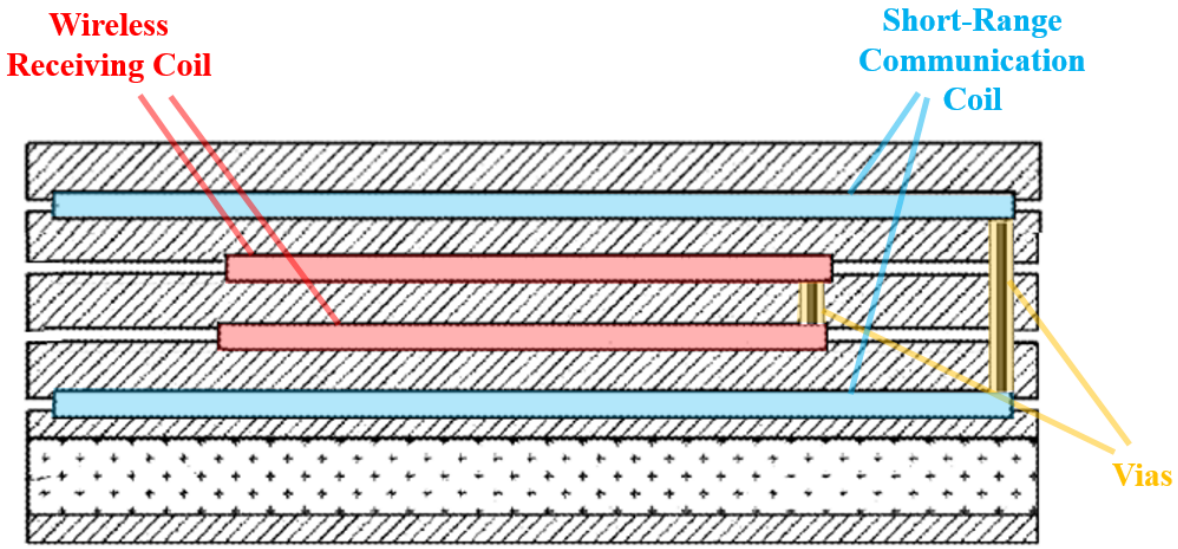
(Ex. 1002, ¶79.)

Including both a wireless receiving coil and a short-range wireless communication coil in the multi-layer circuit board of the Lee-364-Lee-149 combination would have been straightforward for a POSITA to implement, because Lee-149 discloses how to implement two coils in such a multi-layer circuit board, and Lee-364 discloses using two coils in a portable device like a mobile phone as disclosed by both Lee-364 and Lee-149. (Ex. 1002, ¶80.) The resulting coil module would have been a predictable combination of known components according to known methods, and would have been consistent with the inclusion of multiple coils for different functions in mobile phones as disclosed by both Lee-364 and Lee-149. (*Id.*) *See KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 416 ("*KSR*").

Therefore, the Lee-364-Lee-149 combination discloses or suggests "wireless receiving coil disposed in the board," as recited in claim element 1[c].

d) a short-range communication coil disposed in the board; and

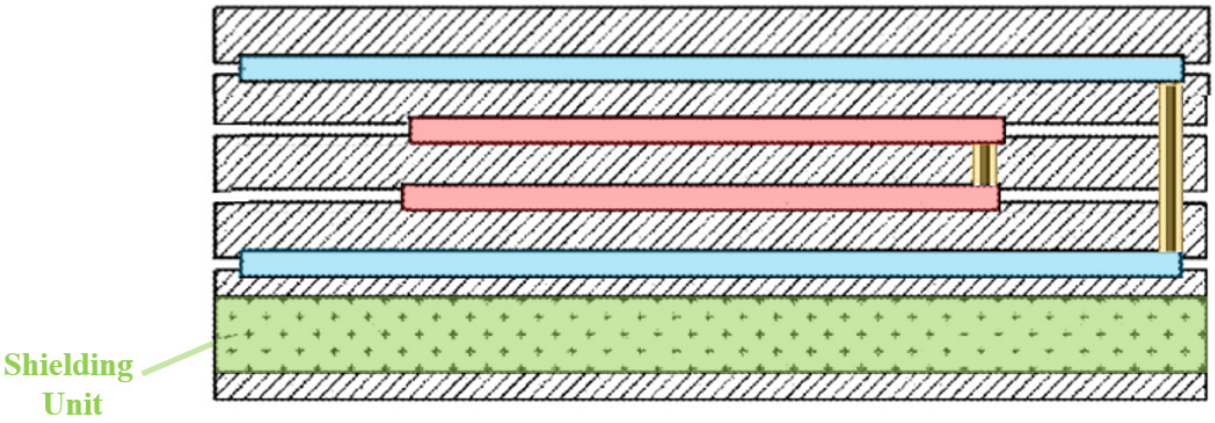
The Lee-364-Lee-149 combination discloses or suggests this feature. (Ex. 1002, ¶82.) As discussed above for claim element 1[c], Lee-364 discloses a short-range communication antenna ("short-range communication coil") disposed in a multi-layer printed circuit board. (Section IX.A.1(c); Ex. 1010, FIG. 10.) Such a short-range communication coil is shown in the demonstrative below corresponding to the Lee-364-Lee-149 combination, where, based on the disclosure of Lee-149, a via is included to connect the different layers of the short-range communication coil. (Section IX.A.1(c); Ex. 1002, ¶82.)



(Ex. 1002, ¶82.)

e) a shielding unit disposed in the board;

The Lee-364-Lee-149 combination discloses or suggests this feature. (Ex. 1002, ¶¶83-86.) For example, Lee-364 discloses a shielding unit 380 in the multi-layer board shown in figure 10. (Ex. 1010, 8:23-39; Ex. 1002, ¶83.) The non-limiting demonstrative below illustrates the shielding unit disposed in the board of the combination in the same manner as is disclosed by figure 10 of Lee-364. (Ex. 1002, ¶¶84-86.)



(Ex. 1005, FIG. 6 (annotated); Ex. 1002, ¶84.)

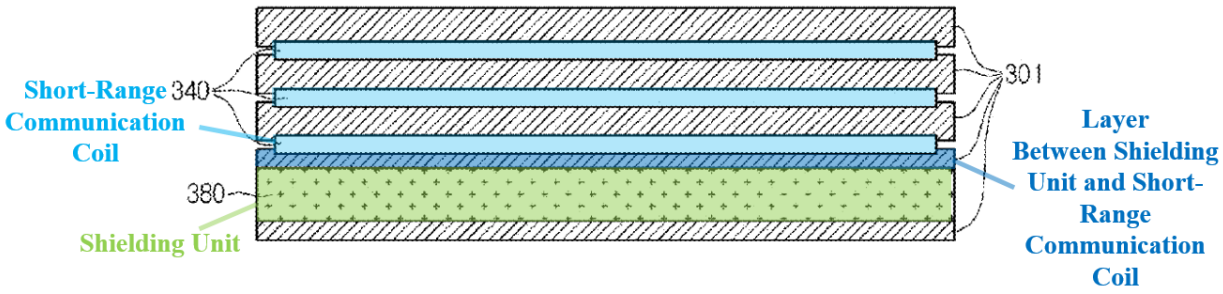
f) wherein the shielding unit is disposed on the wireless receiving coil and the short range communication coil, and

The Lee-364-Lee-149 combination discloses or suggests this feature. (Ex. 1002, ¶87.) While, in Lee-364, the wireless receiving coil is not disclosed as being "disposed in" the board, the shielding unit 380 is disclosed as being formed on both

the wireless receiving coil 310 and the short-range communication antenna 340. (Ex. 1010, 5:58-67.) The demonstrative in Section IX.A.1(e) above is consistent with this disclosure, as the shielding unit provides shielding for both coils. (Ex. 1002, ¶87.)

Additionally, as is clear from the disclosure and claims of the '666 patent, "disposed on" does not require the shielding unit to be "disposed directly on and in contact with" the coils as there is an intervening layer between the shielding unit and the short-range communication coil. (Ex. 1001, FIG. 10, claims 3, 4.)

FIG.10

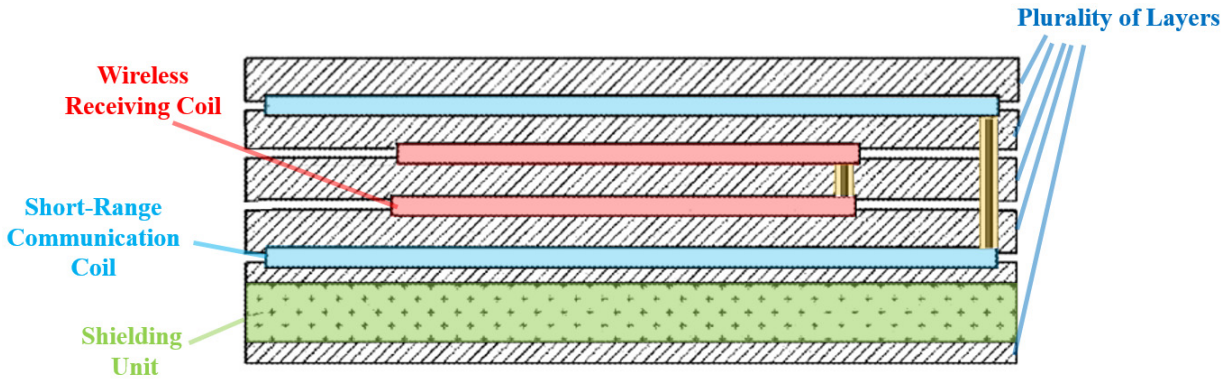


(Ex. 1001, FIG. 10 (annotated); Ex. 1002, ¶87.)

g) wherein the wireless receiving coil, the short-range communication coil, and the shielding unit are disposed between the plurality of layers.

The Lee-364-Lee-149 combination discloses or suggests this feature.[4] (Ex. 1002, ¶¶88-89.) As discussed above in Sections IX.A.1(c)-(e), in the Lee-364-Lee-149 combination, the wireless receiving coil, short-range communication coil, and shielding unit are "disposed in" the board. (Sections IX.A.1(c)-(e).)

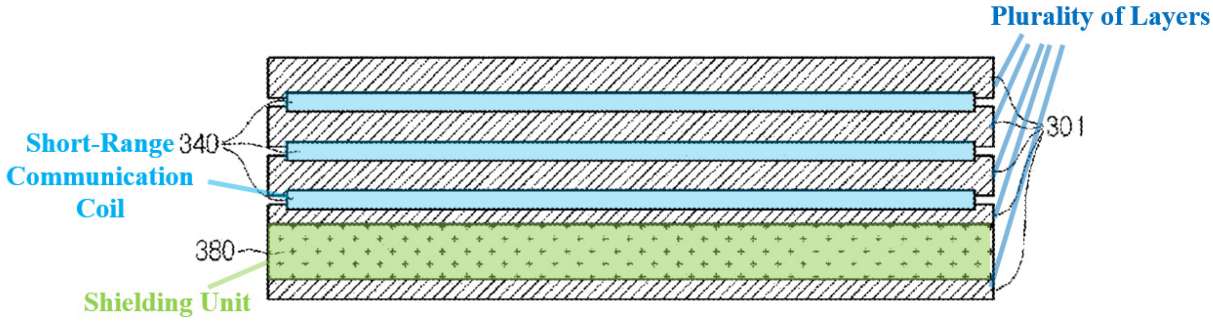
As shown in the non-limiting demonstrative below, the wireless receiving coil, short-range communication coil, and shielding unit are "disposed between the plurality of layers" in a manner consistent with the disclosure of figure 10 of the '666 patent. (Ex. 1002, 89; Ex. 1001, FIG. 10.)



(Ex. 1002, ¶89.)

[4] Petitioner does not concede that the claims have written description support or are not indefinite.

FIG.10

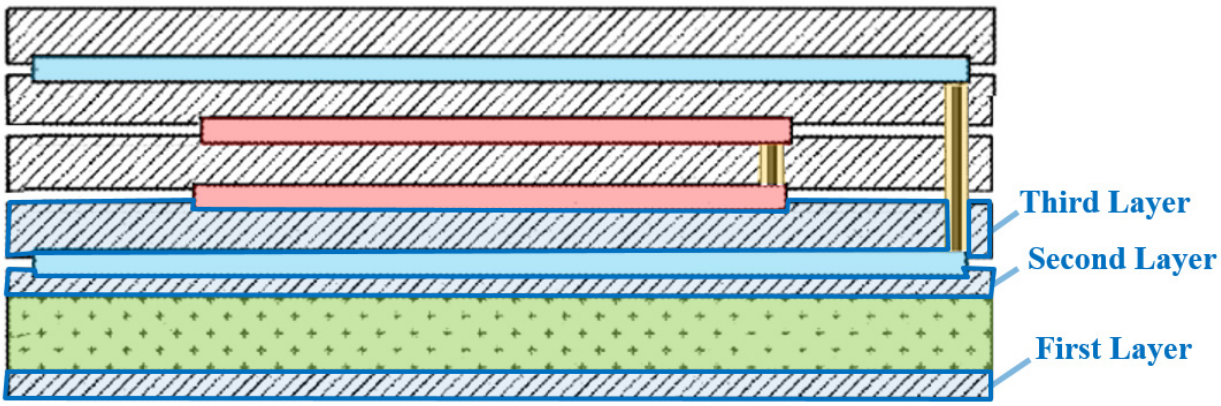


(Ex. 1001, FIG. 10 (annotated).)

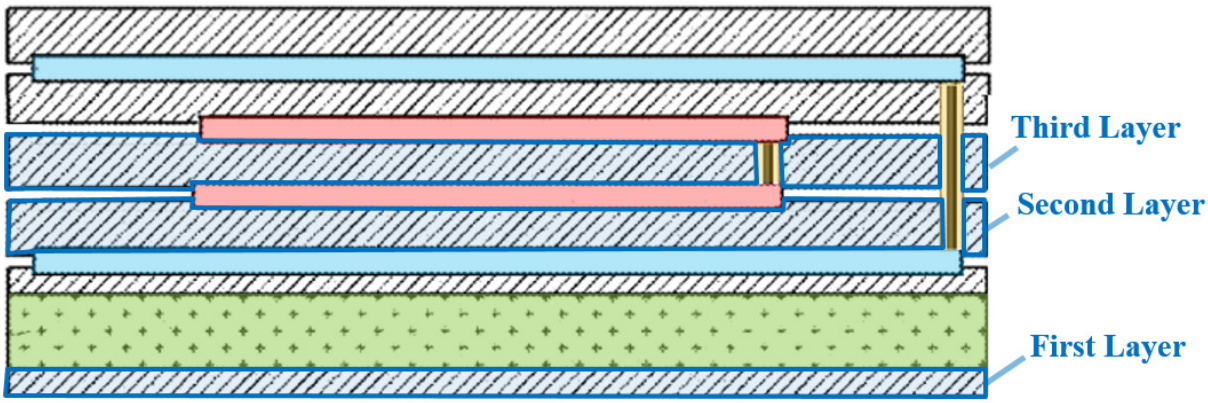
2. Claim 2

a) A wireless power receiver of claim 1, wherein the plurality of [layers] comprises a first layer, a second layer under the first layer, and a third layer under the second layer.

The Lee-364-Lee-149 combination discloses or suggests this feature. (Ex. 1002, ¶90.) As shown below, the plurality of layers includes a first layer, a second layer, and a third layer in at least two ways, as shown in the two demonstratives below. (*Id.*) Based on the only possible support for this feature being figure 10 of the '666 patent, a POSITA would have understood that "under" allows for the layers to be depicted in a vertically-reversed format in terms of ordering. (Ex. 1001, FIG. 10, claims 2-4; Ex. 1002, ¶90.) Therefore, consistent with the disclosure of the '666 patent, in both ways, the second layer is "under" the first layer, and the third layer is "under" the second layer. (Ex. 1001, FIG. 10, claims 2-4; Ex. 1002, ¶90.)



(Ex. 1002, ¶90.)

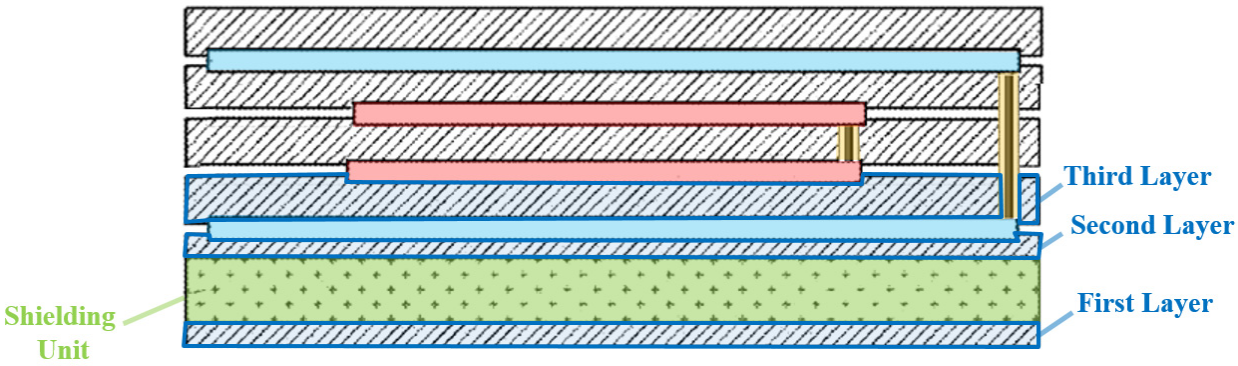


(*Id.*)

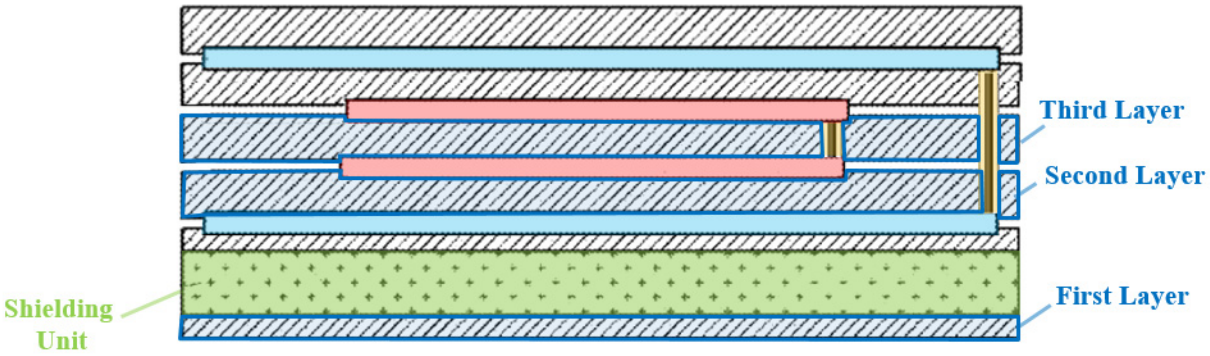
3. Claim 3

a) A wireless power receiver of claim 2, wherein the shielding unit is disposed between the first layer and the second layer.

The Lee-364-Lee-149 combination discloses or suggests this feature. (Ex. 1002, ¶91.) As shown below, the shielding unit is disposed between the first and second layers. (*Id.*)



(*Id.*)

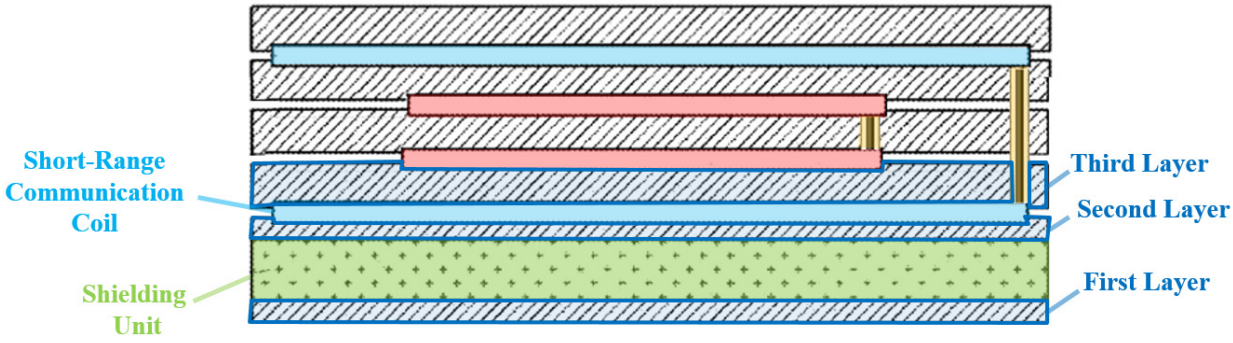


(*Id.*)

4. Claim 4

a) A wireless power receiver of claim 3, wherein the short-range communication coil is disposed between the second layer and the third layer.

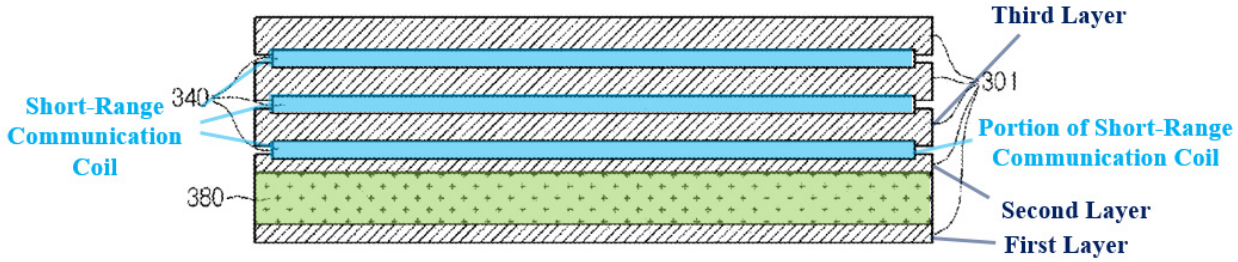
The Lee-364-Lee-149 combination discloses or suggests this feature. (Ex. 1002, ¶92.) As shown below, the short-range communication coil is disposed between the second and third layers. (*Id.*)



(*Id.*)

The understanding that a portion of the short-range communication coil between the second and third layers discloses or suggests claim 4 is supported by claims 5 and 6, which require a separation distance between the second and third layers to be smaller than the thickness of the short-range communication coil. The only arguable disclosure of those features in the '666 patent is in figure 10, annotated below, where only a portion of the short-range communication coil is between the second and third layers, which are necessarily neighboring layers in order to even arguably support claim 6. (Ex. 1002, ¶92.)

FIG.10

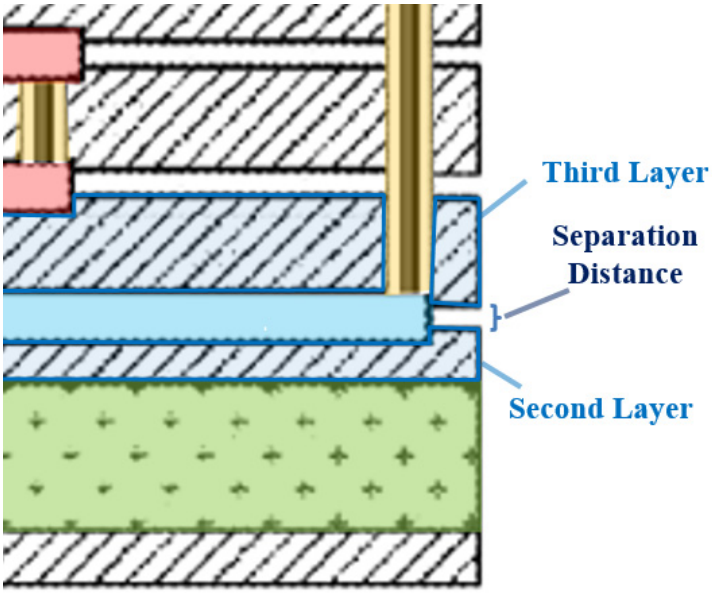


(Ex. 1001, FIG. 10 (annotated); *Id.*)

5. Claim 5

a) A wireless power receiver of claim 4, further comprising a separation distance between the second layer and the third layer.

The Lee-364-Lee-149 combination discloses or suggests this feature in a manner consistent with the '666 patent. (Ex. 1002, ¶94.) As shown below, there is a separation distance between the second and third layers. (*Id.*)

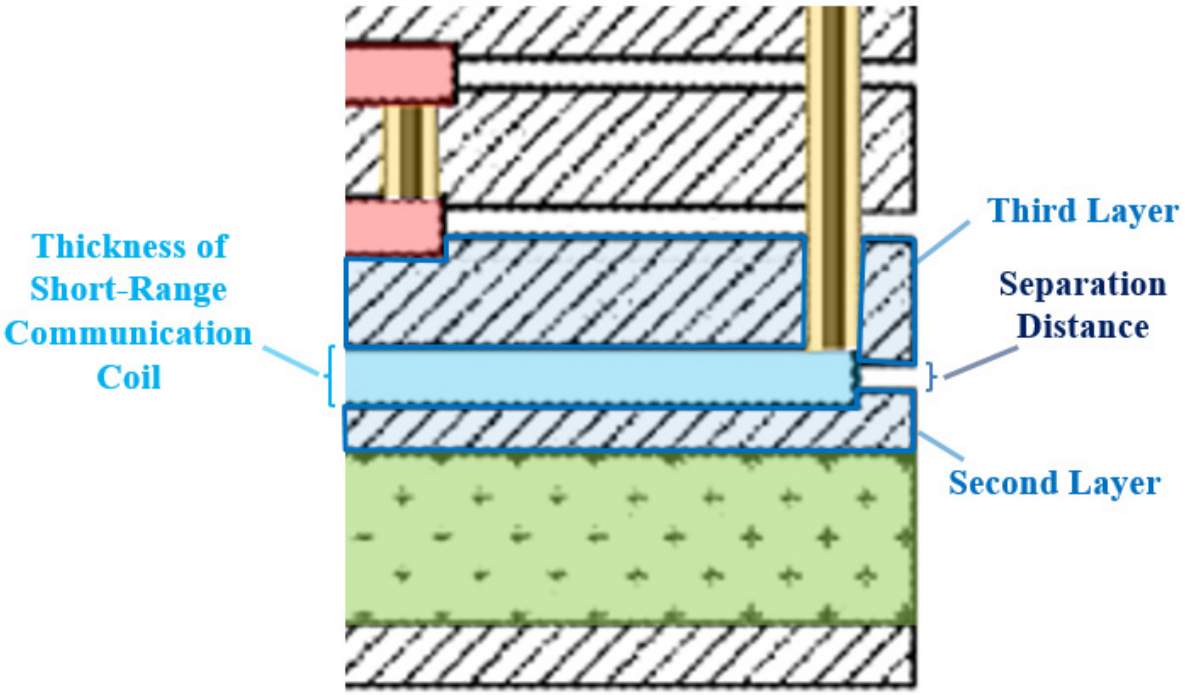


(*Id.*)

6. Claim 6

a) A wireless power receiver of claim 4, wherein the separation distance is smaller than a thickness of the short-range communication coil.

The Lee-364-Lee-149 combination discloses or suggests this feature in a manner consistent with the '666 patent. (Ex. 1002, ¶95.) As shown below, the separation distance is smaller than a thickness of the short-range communication coil. (*Id.*)



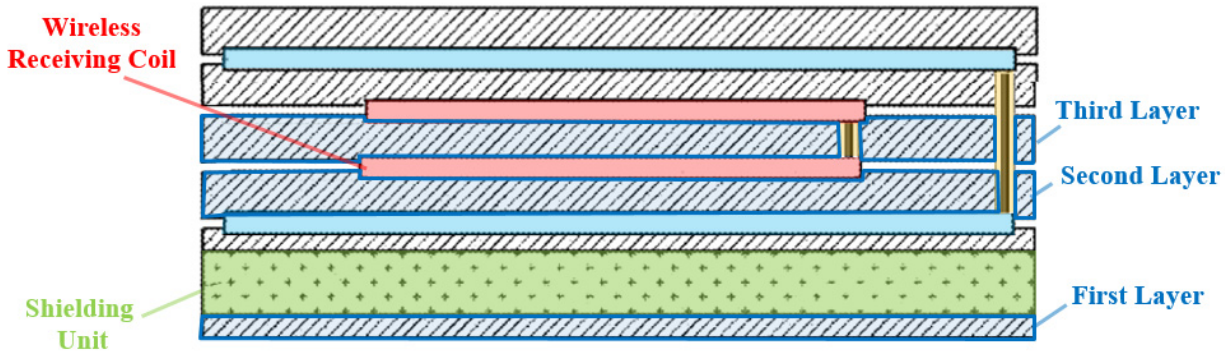
(Ex. 1005, FIG. 10 (annotated); Ex. 1002, ¶95.)

7. Claim 7

a) A wireless power receiver of claim 3, wherein the wireless receiving coil is disposed between the second layer and the third layer.

The Lee-364-Lee-149 combination discloses or suggests this feature. (Ex. 1002, ¶¶96-97.) As shown below, the wireless receiving coil is disposed between the second and third layers.[5] (Ex. 1002, ¶96.)

[5] For reasons similar to those discussed in Section IX.A.4, the understanding that a portion of the wireless receiving coil between the second and third layers discloses or suggests claim 7 is supported by claims 8 and 9. (Ex. 1002, ¶97.)

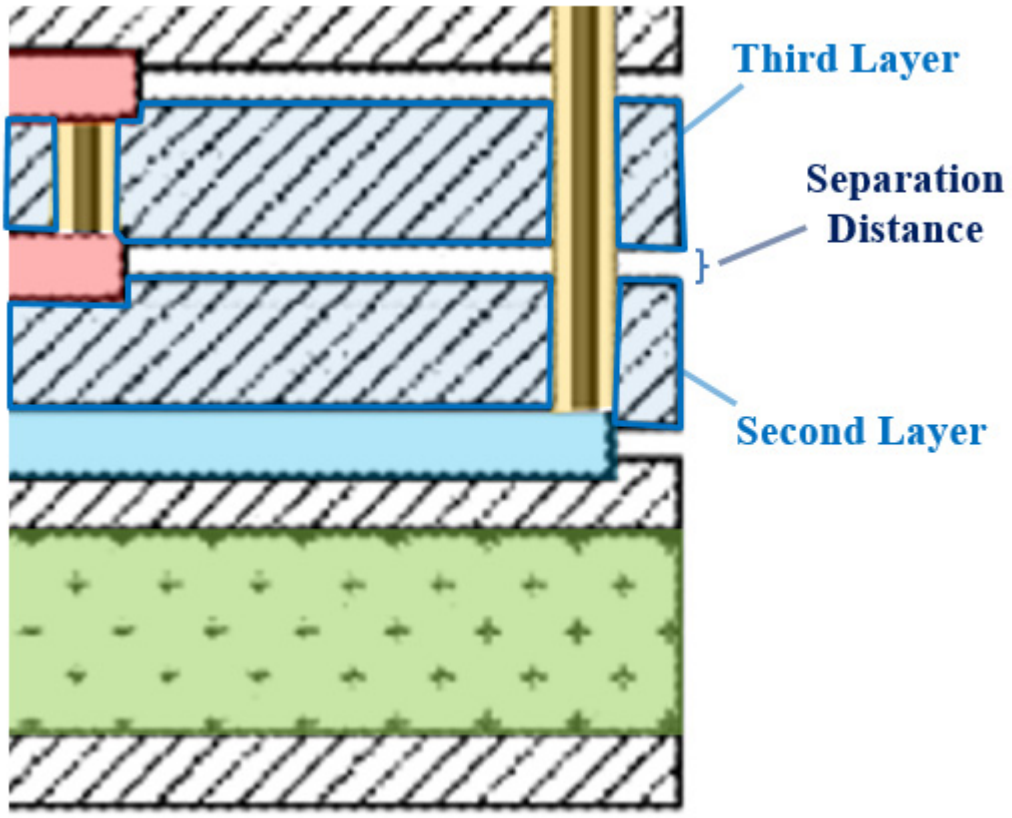


(Ex. 1002, ¶96.)

8. Claim 8

a) A wireless power receiver of claim 7, further comprising a separation distance between the second layer and the third layer.

The Lee-364-Lee-149 combination discloses or suggests this feature. (Ex. 1002, ¶98.) As shown below, there is a separation distance between the second and third layers. (Ex. 1002, ¶98.)

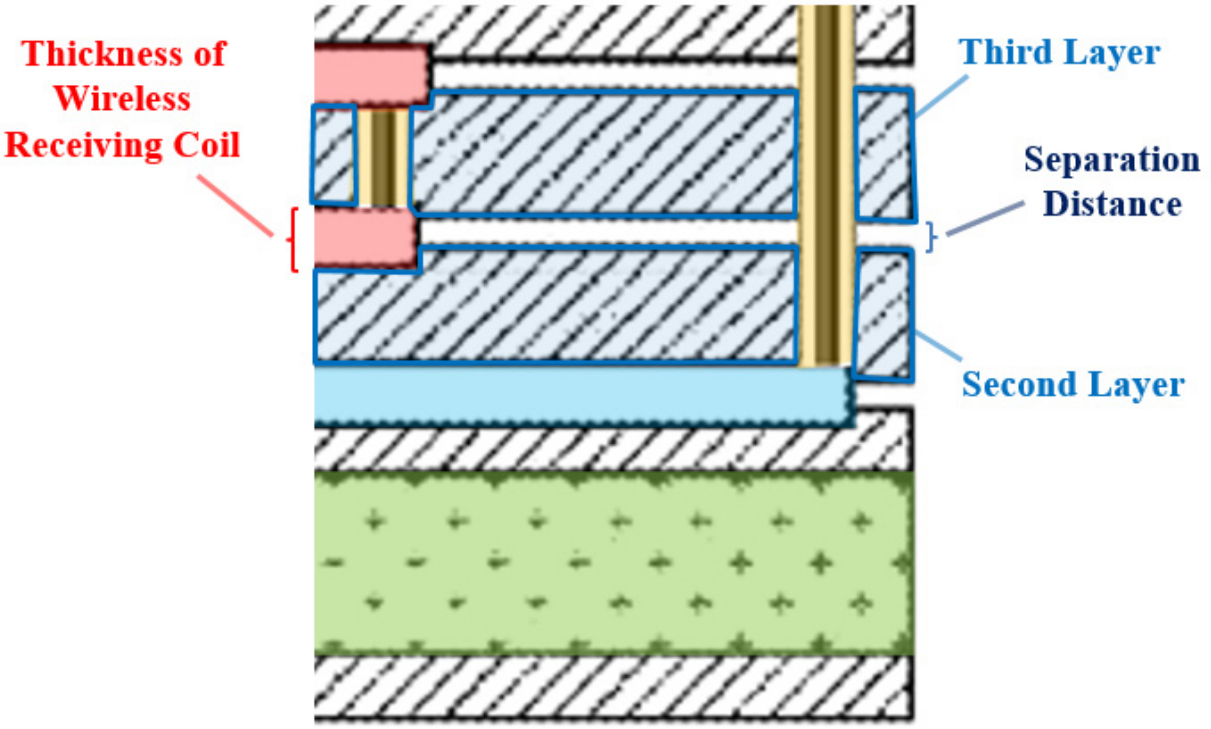


(*Id.*)

9. Claim 9

a) A wireless power receiver of claim 8, wherein the separation distance is smaller than a thickness of the wireless receiving coil.

The Lee-364-Lee-149 combination discloses or suggests this feature. (Ex. 1002, ¶99.) As shown below, the separation distance is smaller than a thickness of the wireless receiving coil. (*Id.*)

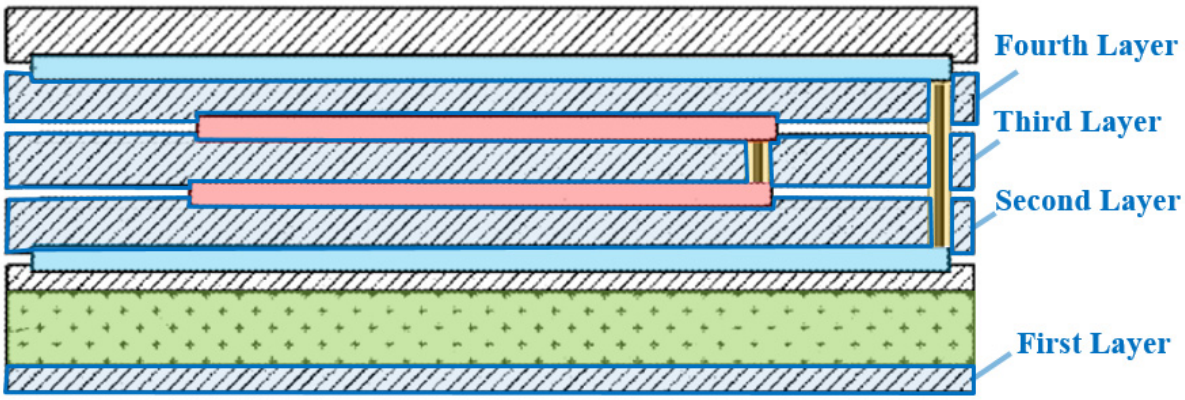


(*Id.*)

10. Claim 10

a) A wireless power receiver of claim 1, wherein the plurality of layers comprises a first layer, a second layer under the first layer, a third layer under the second layer, and a fourth layer under the third layer.

The Lee-364-Lee-149 combination discloses or suggests this feature. (Ex. 1002, ¶100.) As shown below, the plurality of layers includes a first layer, a second layer, a third layer, and a fourth layer. Consistent with the disclosure and claims of the '666 patent, the second layer is "under" the first layer, the third layer is "under" the second layer, and fourth layer is "under" the third layer. (Ex. 1001, FIG. 10, claims 2-4; Ex. 1002, ¶100.)

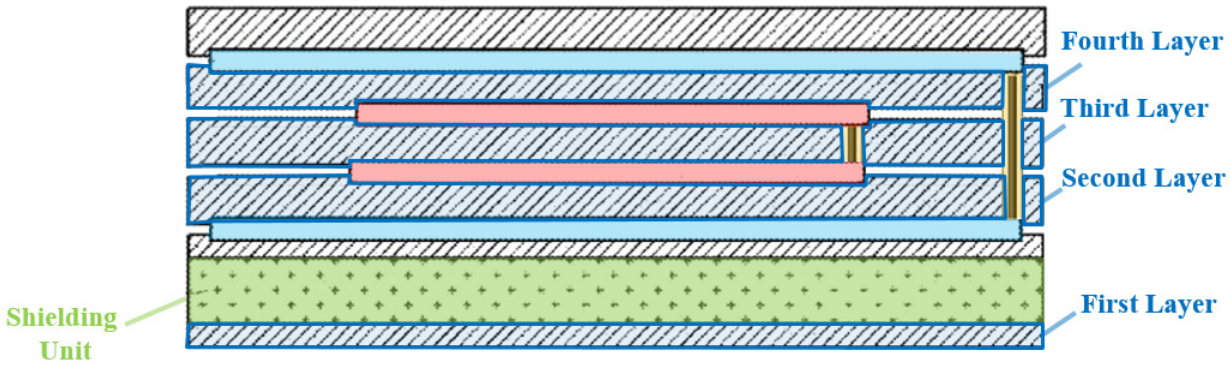


(Ex. 1002, ¶100.)

11. Claim 11

a) A wireless power receiver of claim 10, wherein the shielding unit is disposed between the first layer and the second layer.

The Lee-364-Lee-149 combination discloses or suggests this feature. (Ex. 1002, ¶101.) As shown below, the shielding unit is disposed between the first and second layers. (*Id.*)

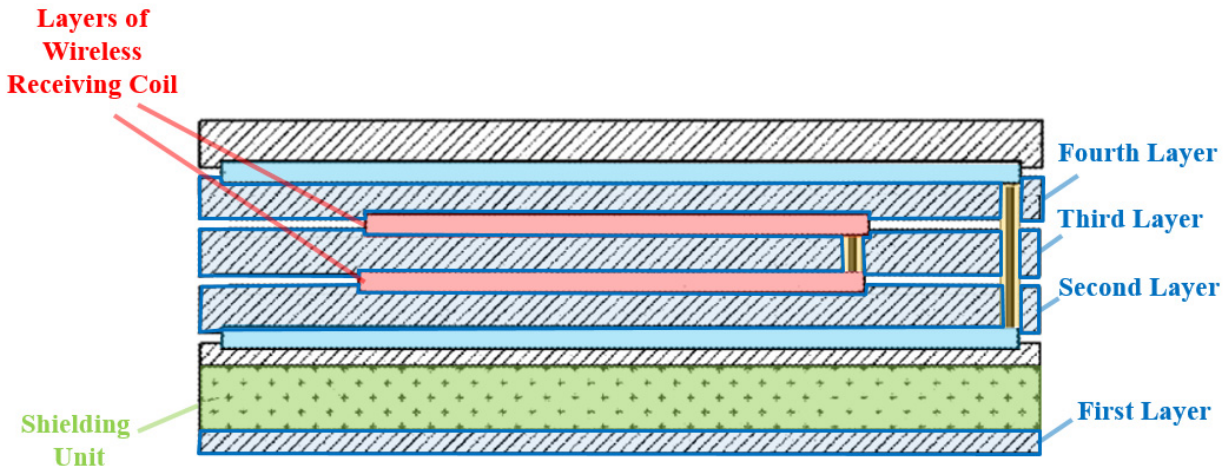


(*Id.*)

12. Claim 12

a) A wireless power receiver of claim 11, wherein the wireless receiving coil comprises a plurality of layers.

The Lee-364-Lee-149 combination discloses or suggests this feature.[6] (Ex. 1002, ¶102.) As shown below, the wireless receiving coil includes a plurality of layers. (*Id.*)



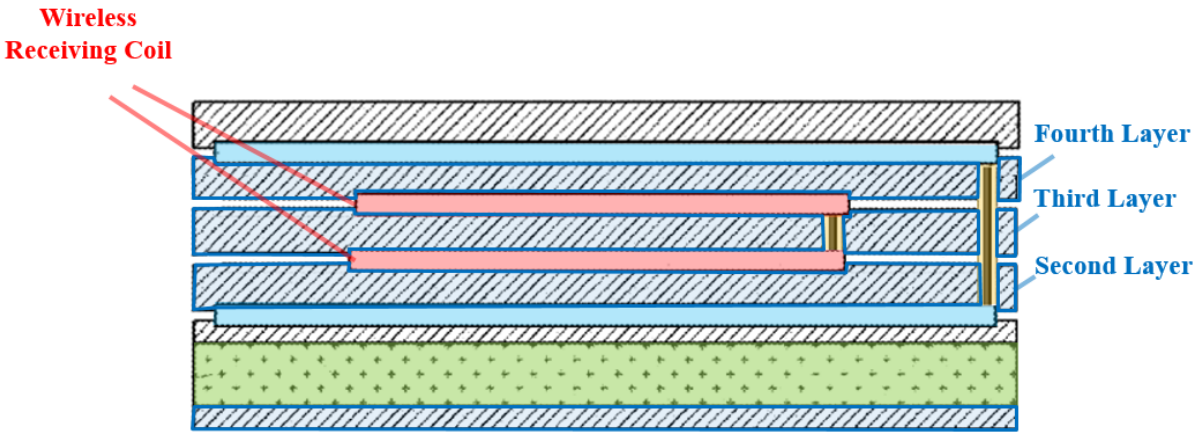
(*Id.*)

[6] There is no support in the '666 patent for a multi-layer wireless receiving coil. (Ex. 1002, ¶102.)

13. Claim 13

a) A wireless power receiver of claim 11, wherein the wireless receiving coil is disposed between the second layer and the third layer and between the third layer and the fourth layer.

The Lee-364-Lee-149 combination discloses or suggests this feature. (Ex. 1002, ¶103.) As shown below, the wireless receiving coil is disposed between the second and third layers and between the third and fourth layers. (*Id.*)

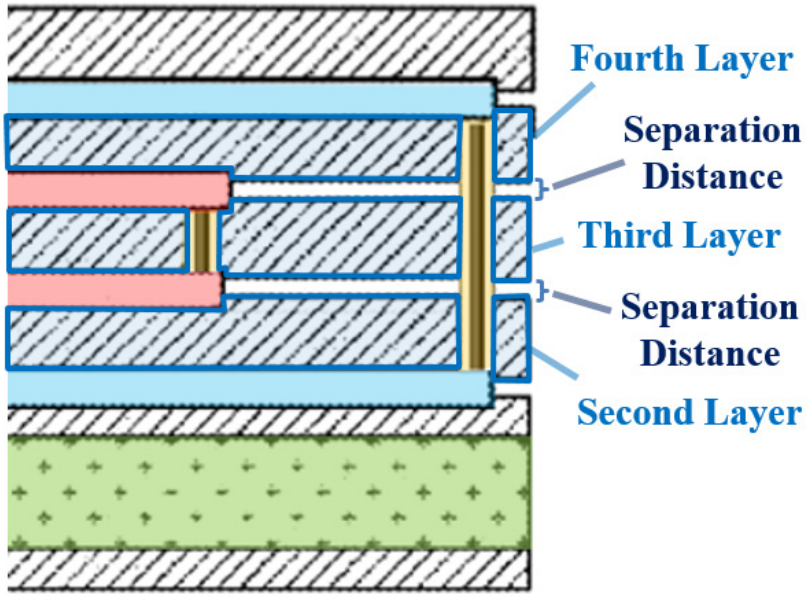


(*Id.*)

14. Claim 14

a) A wireless power receiver of claim 13, further comprising a separation distance between the second layer and the third layer and between the third layer and the fourth layer.

The Lee-364-Lee-149 combination discloses or suggests this feature. (Ex. 1002, ¶104.) As shown below, there is a separation distance between the second and third layers and between the third and fourth layers. (*Id.*)

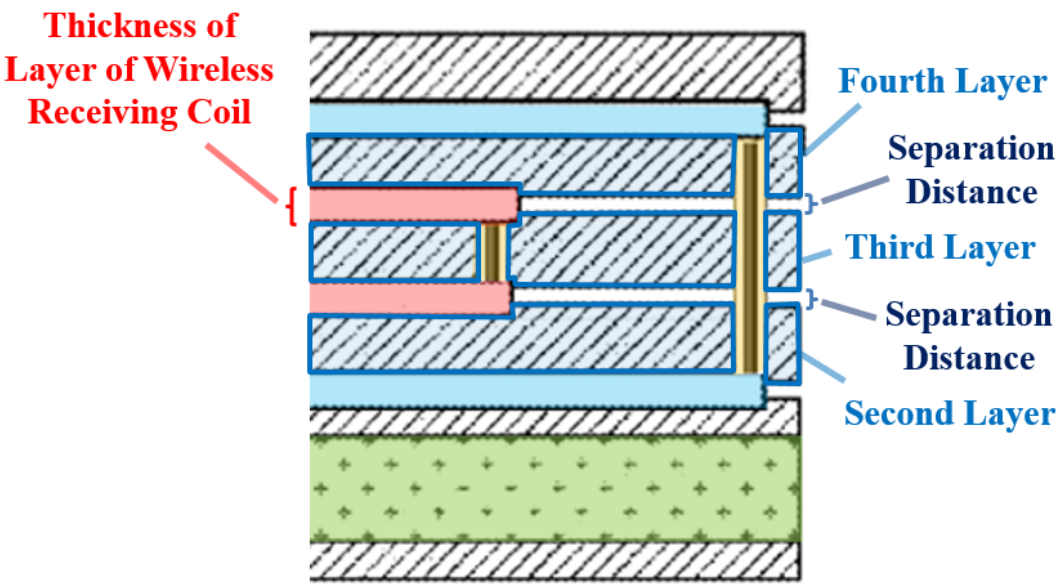


(*Id.*)

15. Claim 15

a) A wireless power receiver of claim 14, wherein the separation distance is smaller than a thickness of at least one of the plurality of layers of the wireless receiving coil.

The Lee-364-Lee-149 combination discloses or suggests this feature. (Ex. 1002, ¶105.) As shown below, the separation distance is smaller than a thickness of a layer of the wireless receiving coil. (*Id.*)

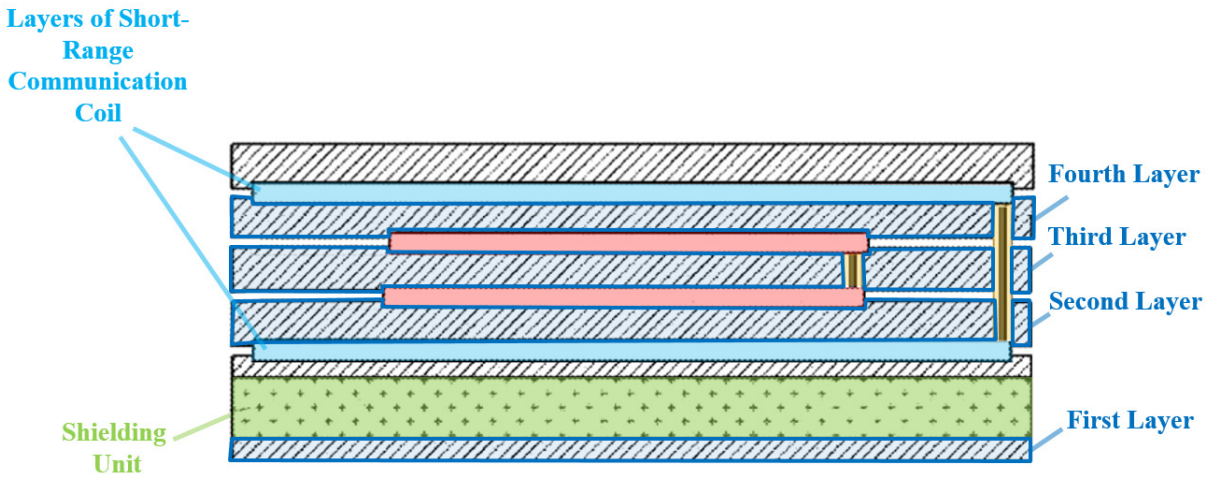


(*Id.*)

16. Claim 16

a) A wireless power receiver of claim 11, wherein the short-range communication coil comprises a plurality of layers.

The Lee-364-Lee-149 combination discloses or suggests this feature. (Ex. 1002, ¶106.) As shown below, the short-range communication coil includes a plurality of layers. (*Id.*)



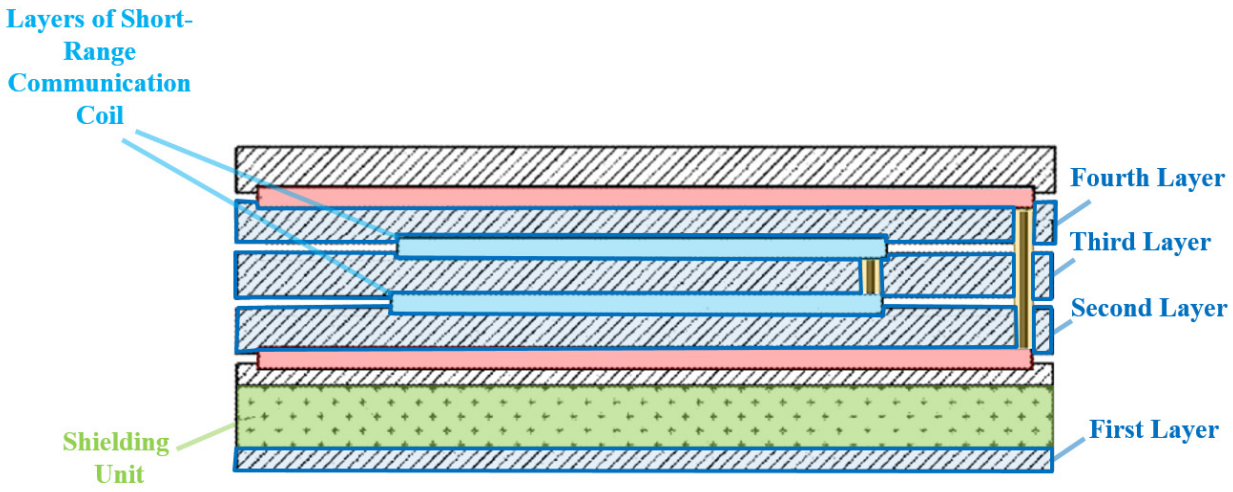
(*Id.*)

17. Claim 17

a) A wireless power receiver of claim 16, wherein the short-range communication coil is disposed between the second layer and the third layer and between the third layer and the fourth layer.

The Lee-364-Lee-149 combination discloses or suggests this feature. (Ex. 1002, ¶107.) The '666 patent does not provide any disclosure regarding relative positioning of the short-range communication coil and the wireless receiver coil in the multi-layer board. Such lack of disclosure of any positional relationship or criticality of the positioning of the two coils supports the understanding that the positioning of the coils in the board is nothing more than a design choice. (*Id.*) For example, as shown in the demonstrative below, the relative positioning of the coils in the multi-layer board is swapped in comparison to the demonstrative shown for claim 16 above. Indeed, a POSITA would have found it obvious to orient the layers

of the two coils in a variety of arrangements, as such positioning is nothing more than a design choice. (*Id.*) Therefore, as shown in the demonstrative below, the Lee-364-Lee-149 combination discloses or suggests that the short-range communication coil is disposed between the second and third layers and between the third and fourth layers. (*Id.*)



(*Id.*)

18. Claim 18

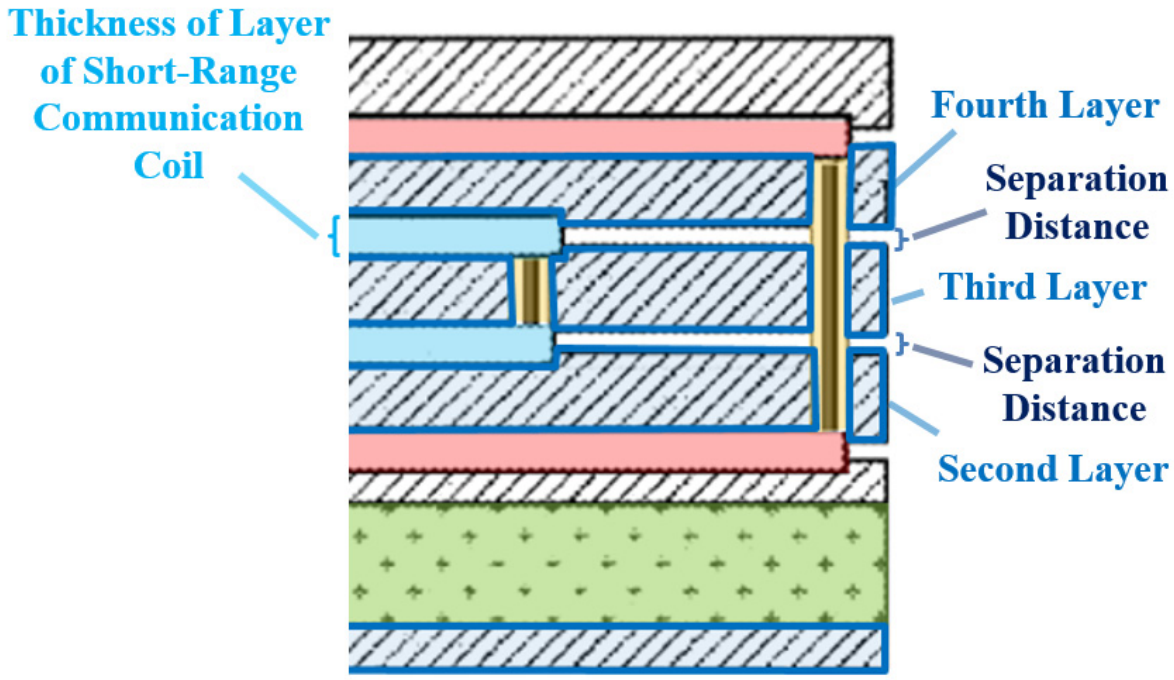
a) A wireless power receiver of claim 17, further comprising a separation distance between the second layer and the third layer and between the third layer and the fourth layer.

The Lee-364-Lee-149 combination discloses or suggests this feature for the same reasons discussed above for claim 14. (Section IX.A.14; Ex. 1002, ¶108.)

19. Claim 19

a) A wireless power receiver of claim 18, wherein the separation distance is smaller than a thickness of the one of the layers of the short-range communication coil.

The Lee-364-Lee-149 combination discloses or suggests this feature. (Ex. 1002, ¶109.) For example, as shown below, the separation distance is smaller than a thickness of a short-range communication coil layer. (*Id.*)



(*Id.*)

20. Claim 26

a) A wireless power receiver of claim 1, wherein the wireless receiving coil is surrounded by the short-range communication coil.

The Lee-364-Lee-149 combination discloses or suggests this feature. (Ex. 1002, ¶110.) For example, Lee-364 discloses that "the short-range communication antenna 340 may be disposed at an outer periphery on the printed circuit board 301 while surrounding the receiving coil 310." (Ex. 1010, 5:4-7, *see also id*., 5:44-52; Ex. 1002, ¶110.)

21. Claim 27

a) A wireless power receiver of claim 1, wherein the shielding unit is arranged to correspond to an area occupied by the wireless power receiving coil and the short-range communication coil.

The Lee-364-Lee-149 combination discloses or suggests this feature. (Ex. 1002, ¶111.) As discussed above for claim elements 1[e] and [f], the shielding unit is arranged to correspond to an area occupied by both coils. (Sections IX.A.1(e) and (f); Ex. 1010, 5:62-67.)

22. Claim 28

a) A wireless power receiver of claim 1, wherein the shielding unit comprises a ferrite.

The Lee-364-Lee-149 combination discloses or suggests this feature. (Ex. 1002, ¶112.) Lee-364 discloses that "[t]he shielding unit 380 may include ferrite." (Ex. 1010, 8:12.)

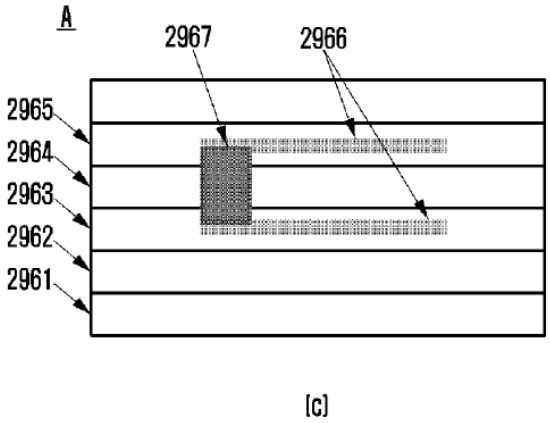
B. Ground 2: Claims 20-25 Are Obvious over Lee-364, Lee-149, and Kato

1. Claim 20

a) A wireless power receiver of claim 1, wherein the wireless receiving coil comprises a first wireless receiving coil and a second wireless receiving coil, wherein at least one of the plurality of layers is disposed between the first wireless receiving coil and the second wireless receiving coil.

Lee-364, Lee-149, and Kato disclose or suggest these features to the extent they can be understood. (Ex. 1002, ¶¶113-124.) As an initial matter, the '666 patent does not disclose or describe a wireless receiving coil that includes a first coil and a second coil. (*Id.*, ¶113.) For purposes of this proceeding, it is assumed that a multilayer coil that includes a first coil pattern on one layer and a second coil pattern on another layer, where the first and second coil patterns are connected together, discloses or suggests this feature.

Lee-364 does not disclose a wireless receiving coil that includes a first coil and a second coil. Lee-149 discloses forming an antenna that includes two or more coils, as illustrated in figure 29(c) below. (Ex. 1011, ¶[0283].)

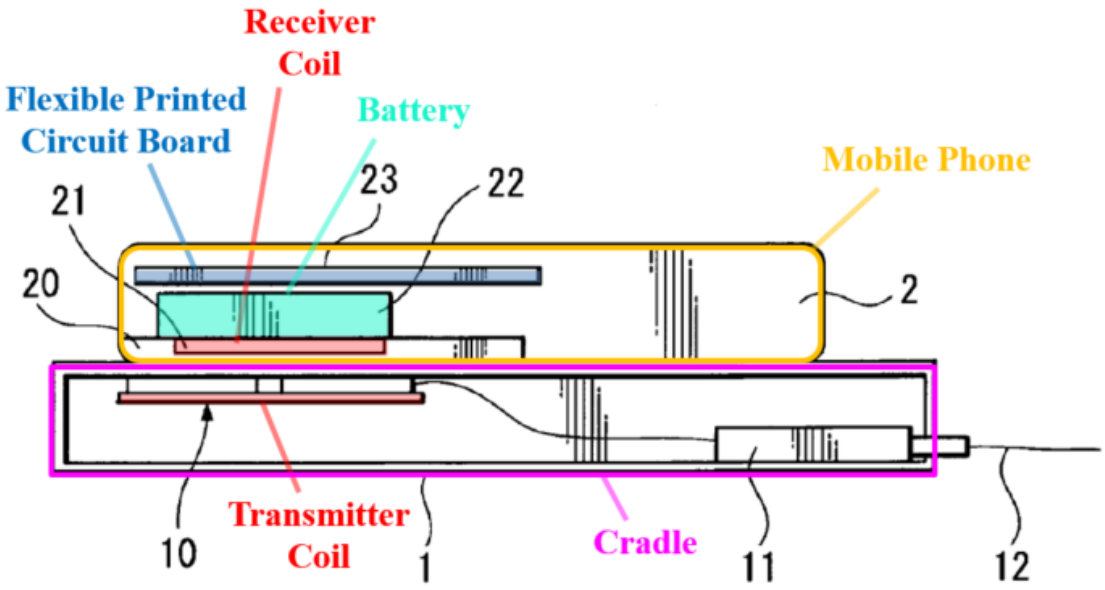


(*Id*., FIG. 29(c).)

To the extent that the Lee-364-Lee-149 combination does not disclose or suggest the wireless receiving coil includes a first and second wireless receiving coil, Kato discloses multi-layer coil structures that include multiple coils, and a POSITA would have found it obvious to implement the coils in the Lee-364-Lee-149 combination to include first and second coils as disclosed by Kato. (Ex. 1002, ¶115.)

Kato, like Lee-364 and Lee-149, discloses coils used for wireless charging of mobile devices. (Ex. 1005, Title, ¶[0003].) With reference to figure 3, Kato discloses a cradle 1 that includes a primary power-transmission coil 10 for transmitting power to a secondary power-transmission coil 21 for receiving power included in a mobile phone unit 2. (Ex. 1005, ¶[0049], FIG. 3; Ex. 1002, ¶116.)

FIG. 3



(Ex. 1005, FIG. 3 (annotated); Ex. 1002, ¶116.)

Kato discloses that the secondary power transmission coil 21 receives power from the transmitter coil 10. (Ex. 1005, ¶[0049]; Ex. 1002, ¶117.) Figures 7-10 of Kato show one embodiment of a multi-layer power transmission coil 21PS. (Ex. 1005, ¶¶[0062], [0069], FIGs. 7-10.)

The multi-layer coil structure in figures 7-10 includes a plurality of substrates 64a-d, where, on each substrate, "a spirally-wound conductor line pattern 60 is formed." (Ex. 1005, ¶[0070].) The spirally-wound conductor line patterns 60 ("coils") are shown in annotated figures 7 and 8 below.

FIG. 7

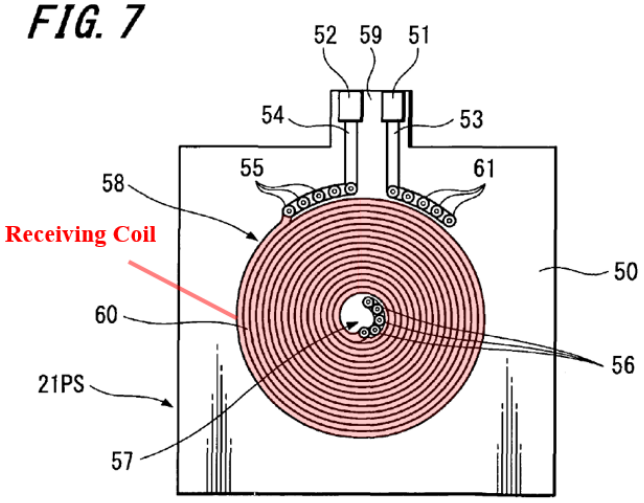
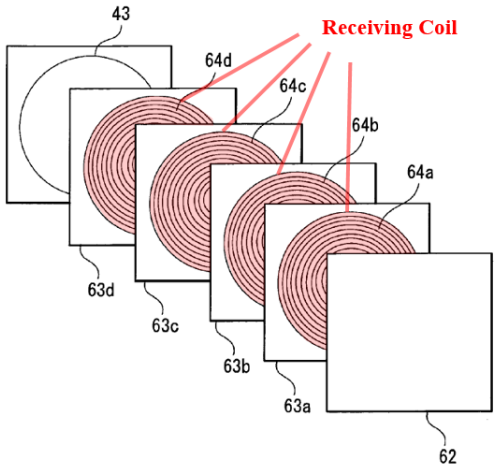
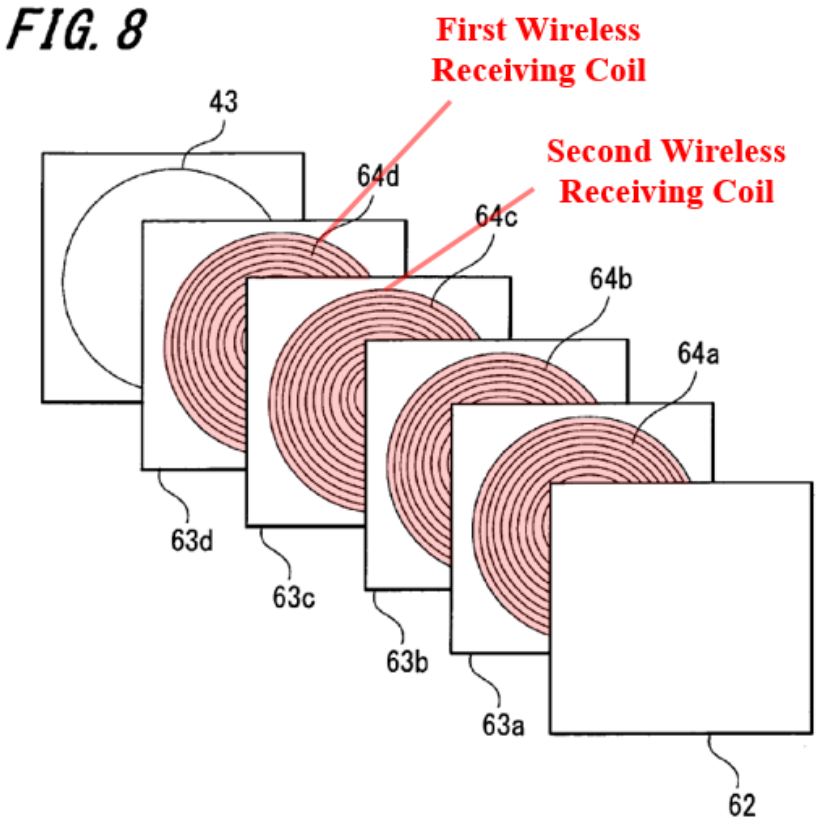


FIG. 8



(Ex. 1005, FIGs. 7, 8 (annotated); Ex. 1002, ¶118.)

Kato discloses that that the coil patterns 60 are electrically connected to each other such that they function together as a coil. (Ex. 1005, ¶[0071]; Ex. 1002, ¶119.) Therefore, as shown in annotated figure 8 below, Kato discloses a wireless receiving coil that includes first and second wireless receiving coils. (Ex. 1002, ¶119.)



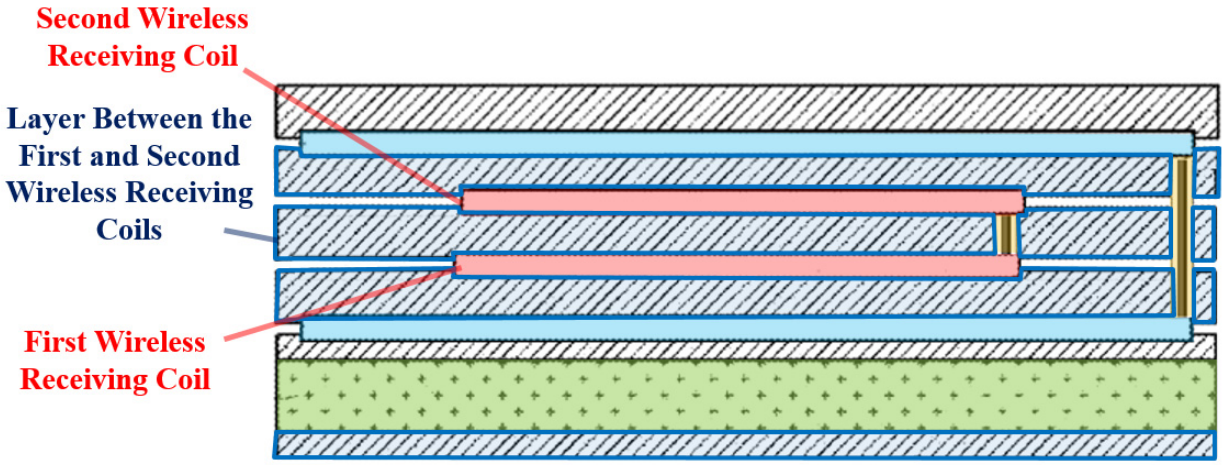
(Ex. 1005, FIG. 8 (annotated); Ex. 1002, ¶119.)

A POSITA would have looked to Kato for guidance regarding implementing a wireless power receiver like that of the Lee-364-Lee-149 combination, particularly because all of these references are in the same field. (Ex. 1002, ¶120.) Having looked to Kato, such a POSITA would have found it obvious to implement the multi-layer coils of the Lee-364-Lee-149 combination, including the wireless receiving coil, such that each layer of the coil includes a spirally-formed conductive pattern, like the multi-layer coil structure disclosed by Kato. (Ex. 1005, ¶¶[0069]-[0073]; Ex. 1002, ¶120.)

A POSITA would have had good reason to combine the teachings of Kato with the Lee-364-Lee-149 combination, as described above, to implement a wireless power receiver having spirally-formed conductive patterns ("first and second wireless receiving coils") making up the wireless receiving coil. A POSITA would have known that such a structure enables a multi-layer inductor to be realized by connecting multiple coils together in order to achieve the desired performance, while minimizing device thickness by using conductor patterns in a multi-layer printed circuit board rather than wires for the coils. (Ex. 1005, ¶[0073]; Ex. 1022, ¶¶[0212], [0224], FIG. 18; Ex.1002, ¶121.)

Implementing the multi-layer wireless receiving coil of the Lee-364-Lee-149-Kato combination in such a way would have been straightforward for a POSITA to implement, because Kato discloses how to implement such a coil in a multi-layer circuit board, and Lee-149 discloses including two coils in a printed circuit board like that disclosed by Kato and Lee-364. (Ex. 1002, ¶122.) For example, a POSITA would have found it obvious to implement the conductive patterns on different layers connected by a via in the Lee-364-Lee-149 combination as spirally-wound patterns that themselves constitute coils. (*Id.*) The resulting coil module would have been a predictable combination of known components according to known methods to yield the predictable result of a functional wireless receiving coil with reduced thickness compared to a wire coil. (*Id.*) *See KSR*, 550 U.S. at 416. Therefore, as shown in

the demonstrative below, which corresponds to the wireless power receiver of the Lee-364-Lee-149 combination discussed above in Section IX.A.1(e) and modified as discussed above based on Kato, the Lee-364-Lee-149-Kato combination discloses or suggests claim 20.

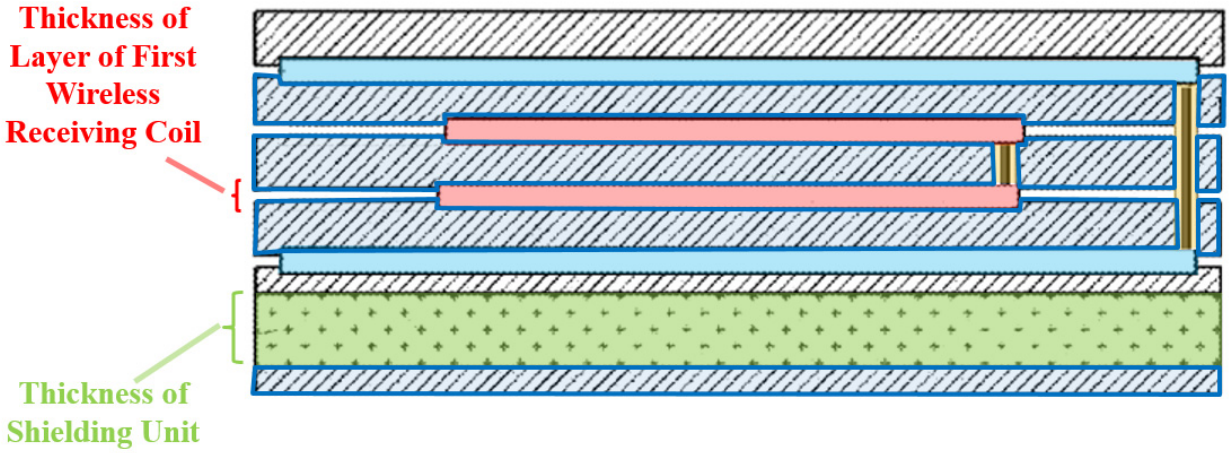


(Ex. 1002, ¶124.)

2. Claim 21

a) A wireless power receiver of claim 20, wherein a thickness of the first wireless receiving coil is thinner than a thickness of the shielding unit.

The Lee-364-Lee-149-Kato combination discloses or suggests this feature. (Ex. 1002, ¶125.) As shown below, the thickness of the first wireless receiving coil is thinner than the thickness of the shielding unit. (*Id.*)

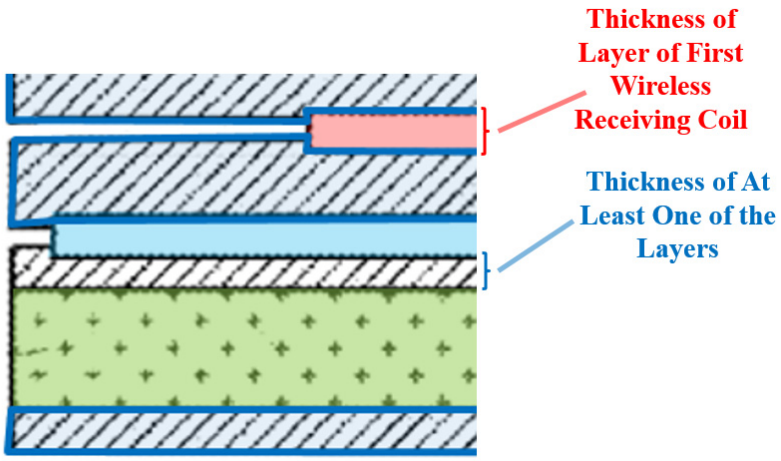


(*Id.*)

3. Claim 22

a) A wireless power receiver of claim 21, wherein a thickness of the first wireless receiving coil is thicker than a thickness of at least one of the plurality of layers.

The Lee-364-Lee-149-Kato combination discloses or suggests this feature. (Ex. 1002, ¶126.) As shown in the demonstrative below, the thickness of the first wireless receiving coil is thicker than a thickness of at least one of the plurality of layers. (*Id.*)



(*Id.*)

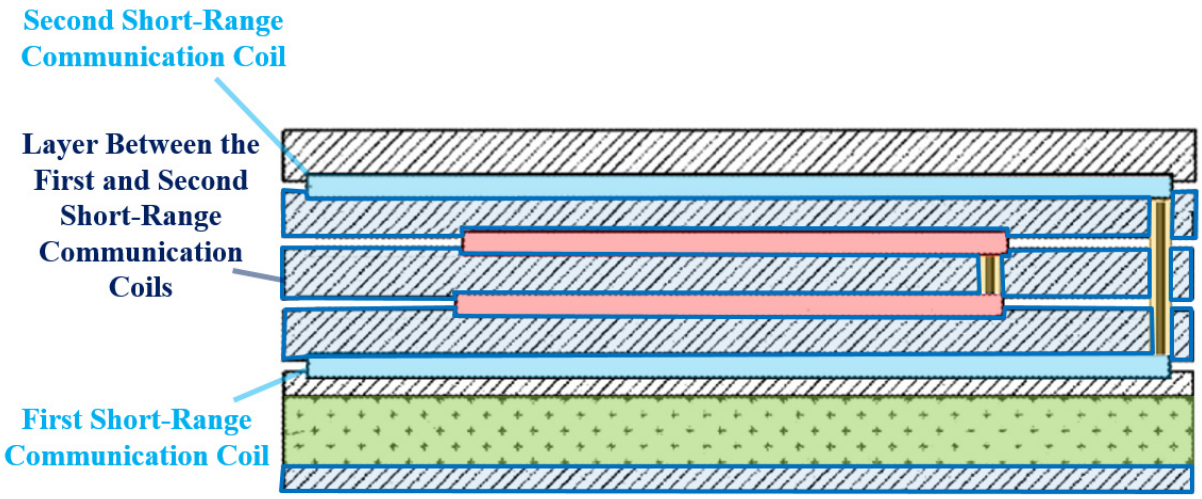
4. Claim 23

a) A wireless power receiver of claim 1, wherein the short-range communication coil comprises a first short-range communication coil and a second short-range communication coil, wherein at least one of the plurality of layers is disposed between the first short-range communication coil and the second short-range communication coil.

The Lee-364-Lee-149-Kato combination discloses or suggests this feature. (Ex. 1002, ¶¶127-128.) As discussed above for claim 20, a POSITA would have found it obvious to implement the multi-layer coils of the Lee-364-Lee-149 combination such that each layer of the coil includes a spirally-formed conductive pattern, like multi-layer coil structure disclosed by Kato. (Section IX.B.1; Ex. 1005, ¶¶[0069]-[0073]; Ex.1002, ¶127.) Therefore, for the same reasons discussed above for claim 20 with respect to the wireless receiving coil, a POSITA would have found it obvious to implement the multi-layer short-range communication coil of the Lee-

364-Lee-149-Kato combination such that it includes first and second short-range communications coils. (Ex. 1002, ¶¶127.)

Therefore, as shown below, the Lee-364-Lee-149-Kato combination discloses or suggests claim 23.

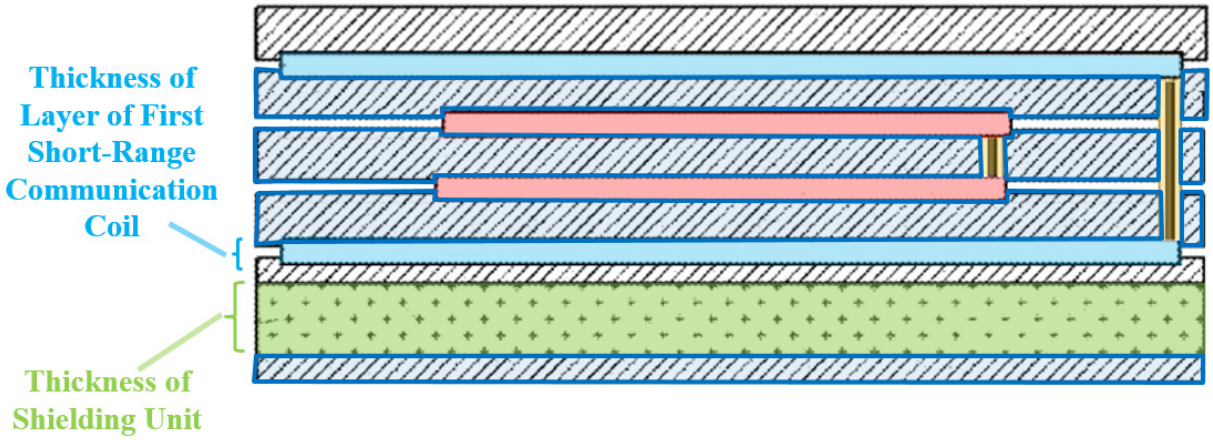


(Ex. 1002, ¶128.)

5. Claim 24

a) A wireless power receiver of claim 23, wherein a thickness of the first short-range communication coil is thinner than a thickness of the shielding unit.

The Lee-364-Lee-149-Kato combination discloses or suggests this feature. (Ex. 1002, ¶129.) As shown below, the thickness of the first short-range communication coil is thinner than the thickness of the shielding unit. (*Id.*)

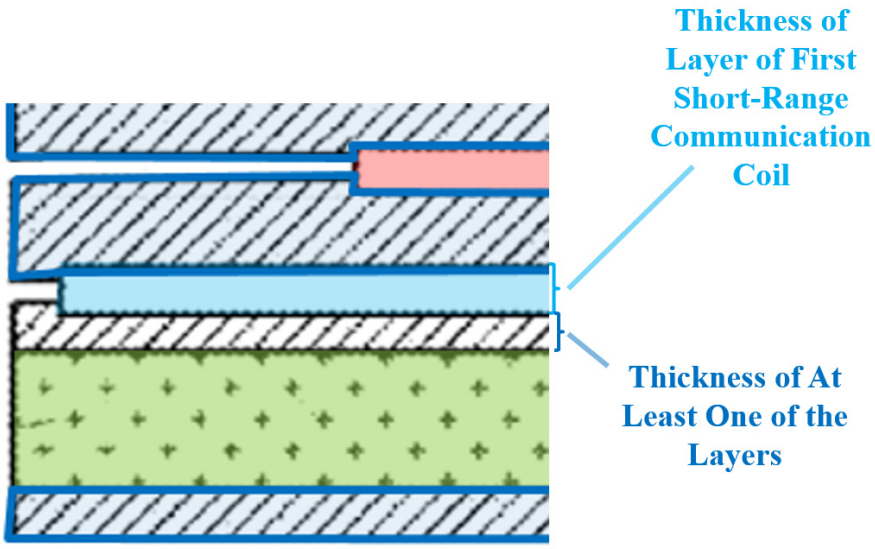


(*Id.*)

6. Claim 25

a) A wireless power receiver of claim 24, wherein a thickness of the first short-range communication coil is thicker than a thickness of at least one of the plurality of layers.

The Lee-364-Lee-149-Kato combination discloses or suggests this feature. (Ex. 1002, ¶130.) As shown below, the thickness of the first short-range communication coil is thicker than a thickness of at least one of the plurality of layers. (*Id.*)



(*Id.*)

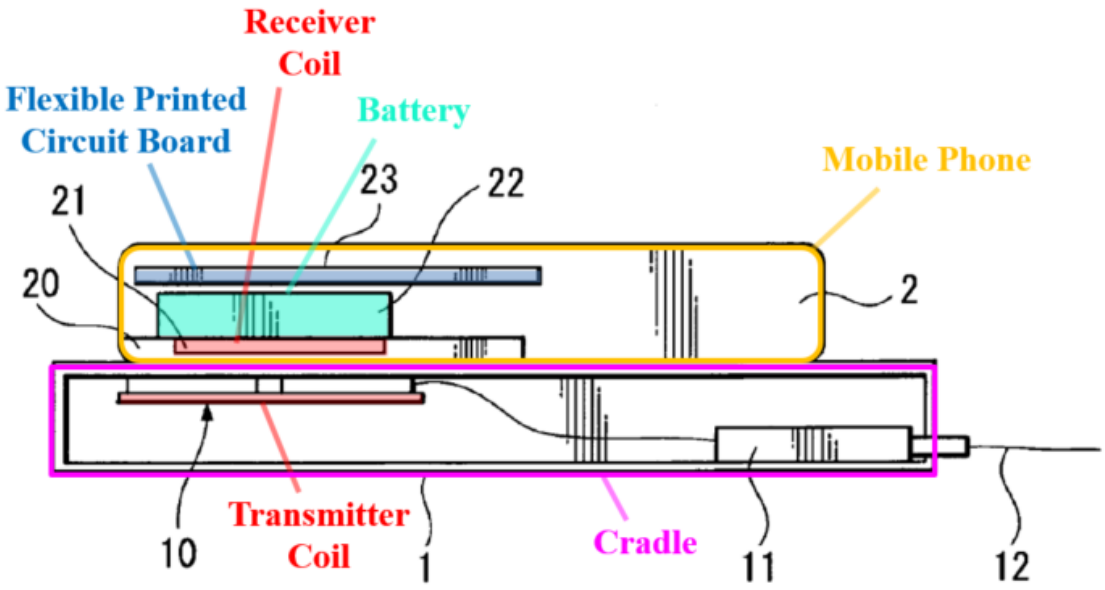
C. Ground 3: Claims 1-18, and 20-27 Are Obvious over Kato and Jung

1. Claim 1

a) A wireless power receiver that wirelessly receives power from a wireless power transmitter, the wireless power receiver comprising:

To the extent the preamble is limiting, Kato discloses this feature. (Ex. 1002, ¶131.) As discussed above in Section IX.B.1, Kato discloses a secondary power-transmission coil 21 ("wireless power receiver") that receives power from a primary power-transmission coil 10 ("wireless power transmitter"). (¶¶[0003], [0049], FIG. 3; Ex. 1002, ¶131.)

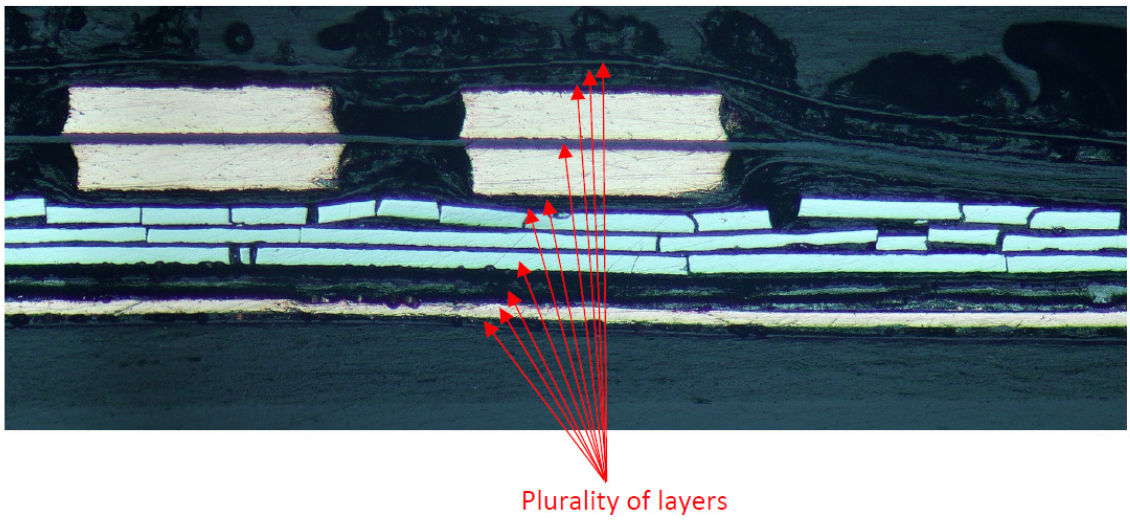
FIG. 3



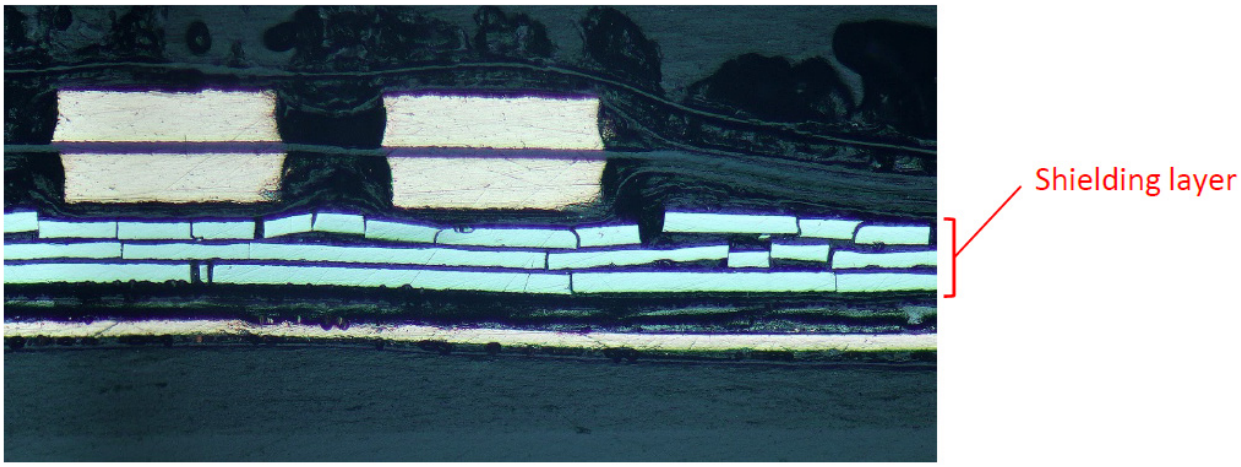
(Ex. 1005, FIG. 3 (annotated); Ex. 1002, ¶131.)

b) a board comprising a plurality of layers;

Kato discloses this feature in a manner consistent with PO's assertions in litigation. (Ex. 1002, ¶¶132-136.) In district court, PO identifies various "layers" (e.g. including the "shielding layer") as being included in the "plurality of layers" of the board. (Ex. 1015, 2, 6.)



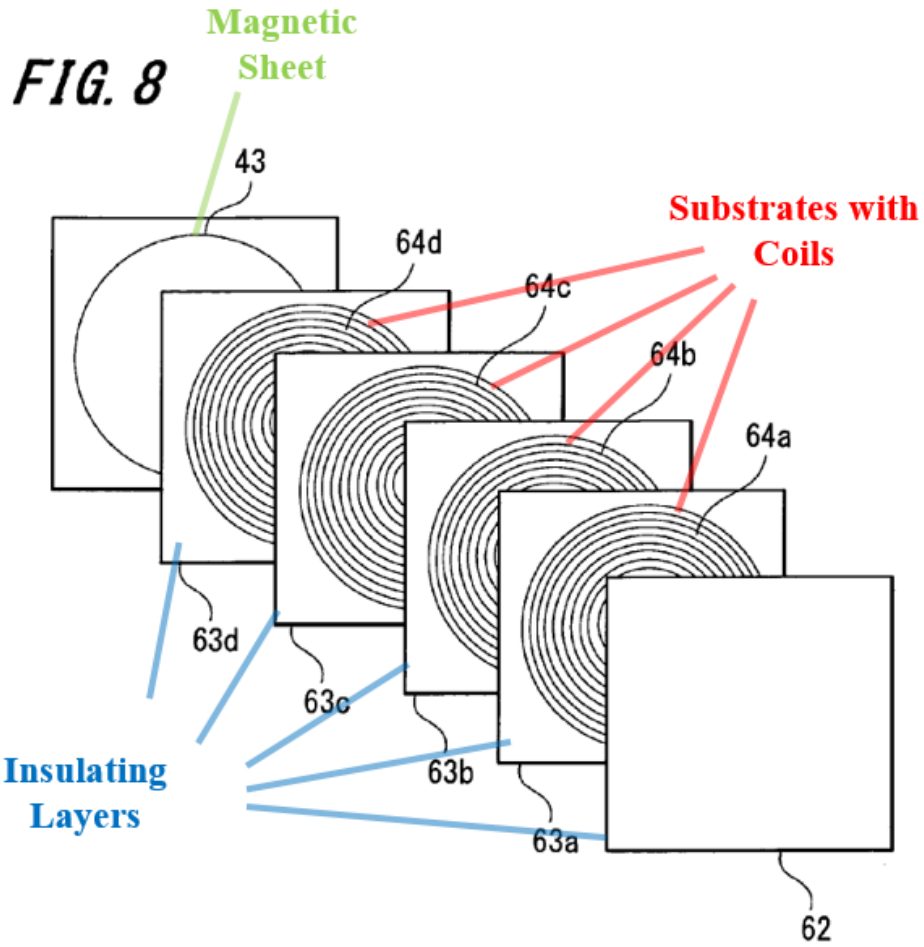
(Ex. 1015, 2.)



(*Id*., 6.)

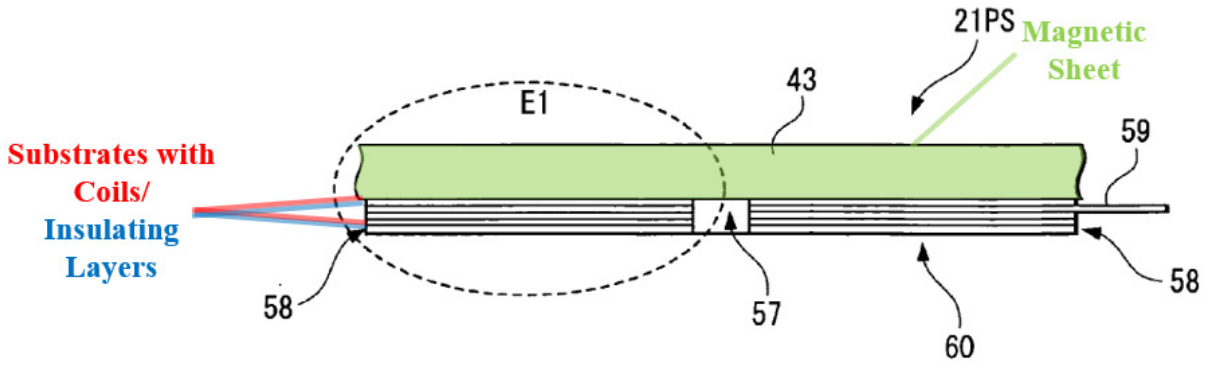
Without waiving any positions it may present in district court, under PO's broad interpretation, Kato discloses this feature. (Ex. 1002, ¶132.) *See 10X Genomics, Inc. v. Bio-Rad Labs., Inc.*, IPR2020-00086, Paper 8 at 21-22 (PTAB Apr. 27, 2020) (permitting petitioner to base its challenge "on claim constructions implied by Patent Owner's district court infringement contentions").

For example, the multi-layer board shown in figures 7-10 of Kato is a "board comprising a plurality of layers." (Ex. 1005, ¶¶[0069], FIGs. 7-10.) Figure 8 shows the board layers separated, whereas figure 9 provides a cross-sectional view of the multi-layer board. (Ex. 1005, ¶[0069]; Ex. 1002, ¶133.)



(Ex. 1005, FIG. 8 (annotated); Ex. 1002, ¶133.)

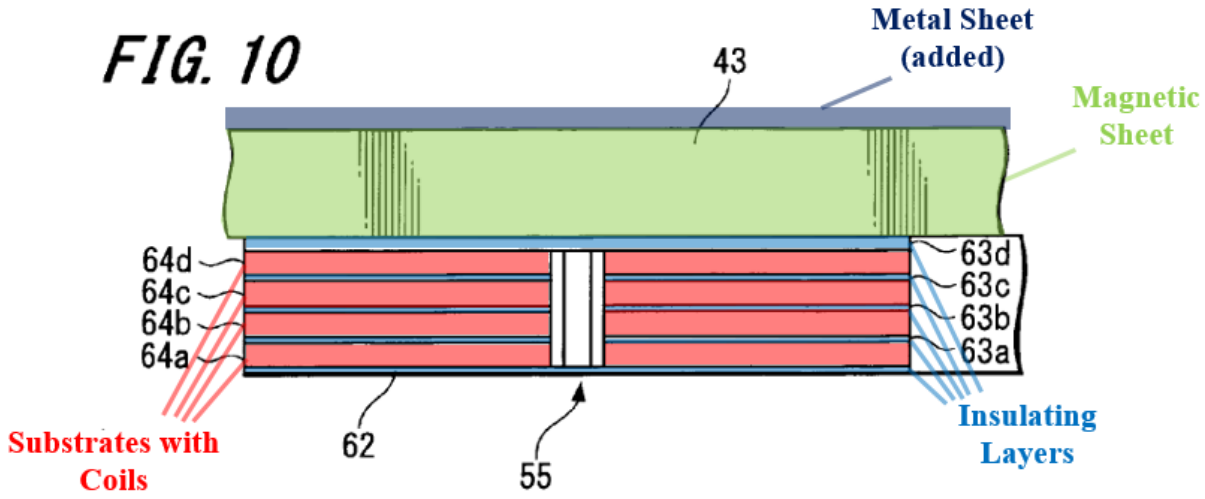
FIG. 9



(Ex. 1005, FIG. 9 (annotated); Ex. 1002, ¶134.)

Kato's coil assembly includes a plurality of stacked substrates separated by insulating layers, where a magnetic sheet is formed on the stacked substrate/insulating layers. (Ex. 1005, ¶[0070].) Kato further discloses that a metal sheet is attached to the outer side of the magnetic sheet 43 (*id.*, ¶[0071]), where figure 10 below has been modified to include the metal sheet.

FIG. 10



(Ex. 1005, FIG. 10 (annotated); Ex. 1002, ¶135.)

Kato's coil structure shown in annotated figure 10 above is a "board comprising a plurality of layers." (Ex. 1002, ¶136.) Consistent with PO's broad interpretation in litigation, the collection of layers ("plurality of layers"), including the substrates, insulating layers, magnetic sheet, and metal sheet, constitutes a "board" as recited in claim 1. (*Id.*)

c) a wireless receiving coil disposed in the board;

Kato discloses this feature. (Ex. 1002, ¶¶137-140.) As discussed above in Section IX.B.1, Kato discloses a multi-layer coil structure, where coil patterns 60 are electrically connected to each other to function together as a coil. (Section IX.B.1; Ex. 1005, ¶¶[0070]-[0071].)

FIG. 7

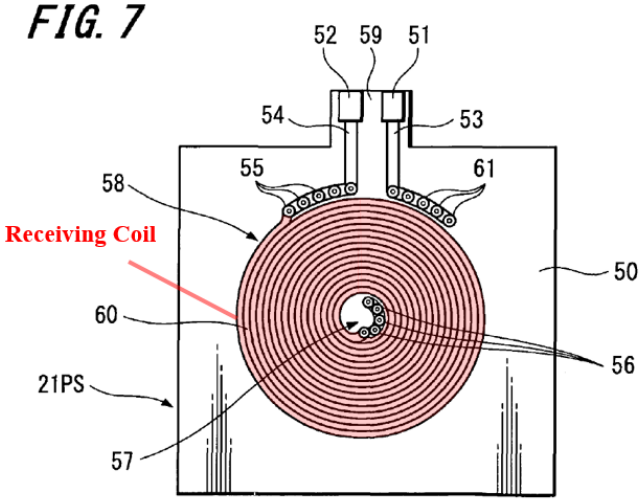
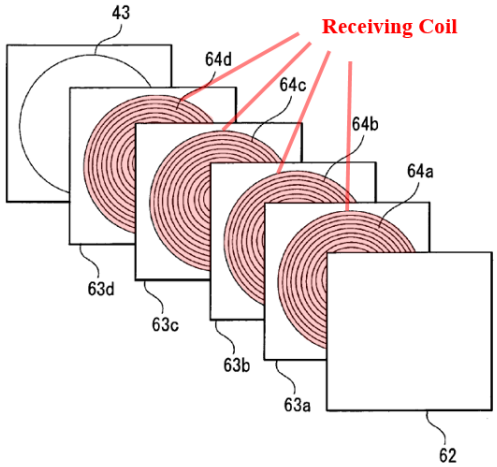


FIG. 8



(Ex. 1005, FIGs. 7, 8 (annotated); Ex. 1002, ¶137.)

The coil shown in figures 7 and 8 above is a "wireless receiving coil" that receives power. (Ex. 1005, ¶¶[0049], [0062], [0069].) A POSITA would have

understood that the coil that includes the conductive patterns 60 is "in" the board as it is disposed between layers of the board. (Ex. 1002, ¶138-140; Section IX.A.1(c).)

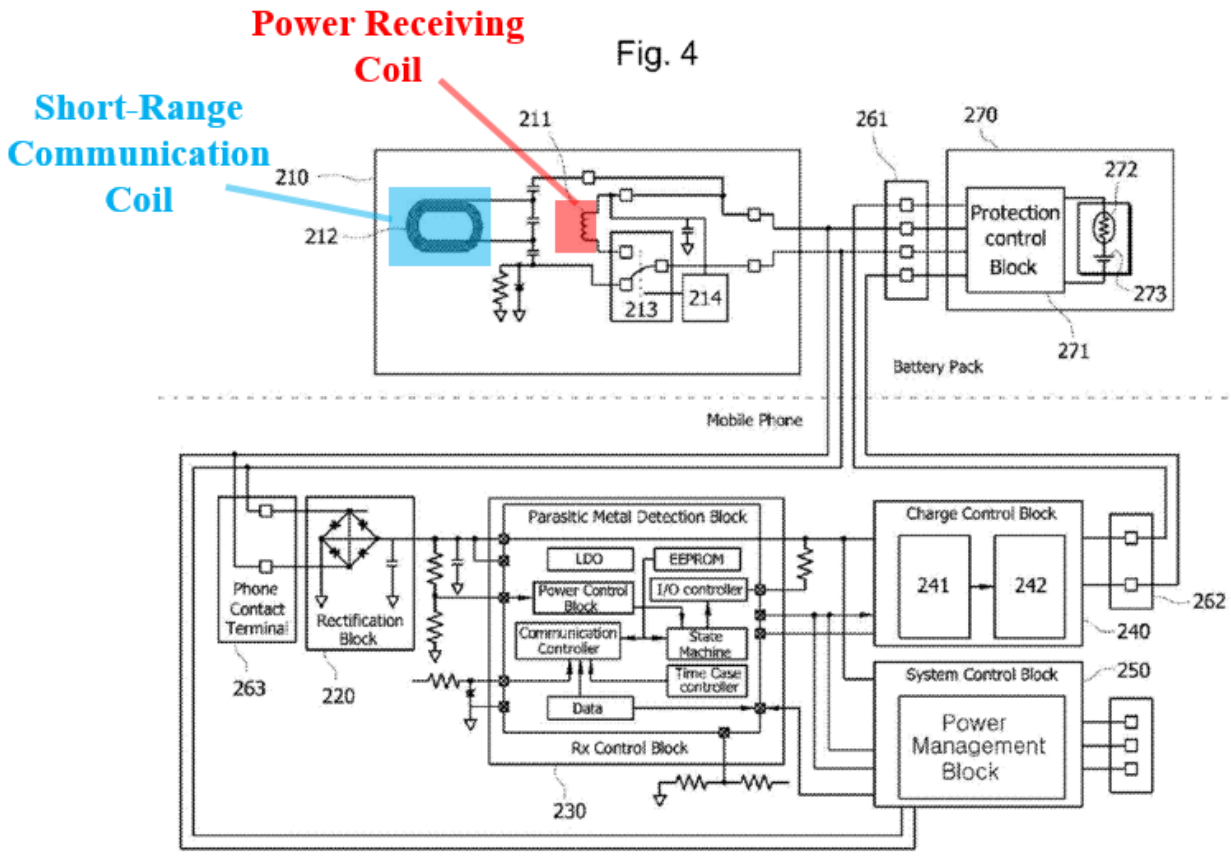
d) a short-range communication coil disposed in the board; and

Kato in combination with Jung discloses or suggests this feature. (Ex. 1002, ¶¶141-157.) As discussed above for claim elements 1[a]-1[c], Kato discloses a mobile phone with a power receiving coil in a circuit board. (Sections IX.C.1(a)-(c).)

Kato does not explicitly disclose a short-range communication coil in the board. Jung, however, discloses a mobile phone that includes both wireless power reception and short-range wireless data communication, where each of these wireless functions has a separate coil. In view of Jung, it would have been obvious for a POSITA to implement a mobile phone as disclosed by Kato that, in addition having the wireless charging coil, includes a short-range communication coil. (Ex. 1002, ¶142.)

Jung, like Kato, is in the field of portable terminals like mobile phones and discloses a phone that includes both a first coil 211 for wireless charging and a second coil 212 for wireless communication. (Ex. 1006, 1:8-16, 1:29-30, 1:66-2:4,

5:20-24.)[7] For example, annotated figure 4 of Jung below shows a mobile phone that includes a power receiving coil 211 and a short-range communication coil 212. (Ex. 1006, 9:18-19, 9:24-26, 9:66-10:1.)

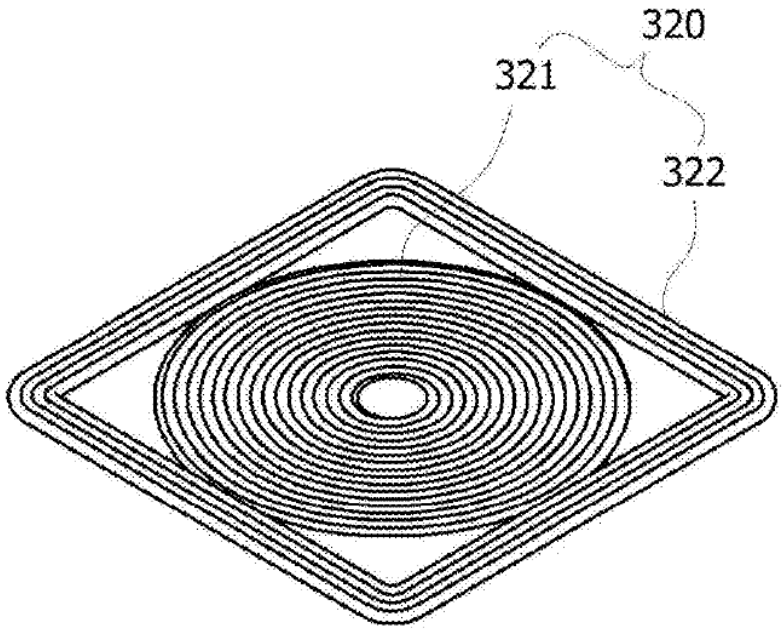


(Ex. 1006, FIG. 4 (annotated); Ex. 1002, ¶¶143-144.)

[7] A POSITA would have understood Jung's description of the "electronic settlement system" to be a short-range communication system where payments ("settlements") are facilitated by short-range communication. (Ex. 1006, 1:58-62; Ex. 1007, 1:21-33; Ex. 1002, ¶143.)

Jung further discloses the power reception coil 211 and data communication coil 212 are arranged in the same plane in order to minimize the thickness of the device. (Ex. 1006, 10:42-54; *see also* Ex. 1007, 2:10-15, 3:4-11, 4:16-18, 5:57-61, 5:65-6:1.) Figure 12 of Jung shows two such coils formed in the same plane.

Fig. 12



(Ex. 1006, FIG. 12.)

Jung discloses that "portable terminals that have recently proliferated include an electronic settlement system using a Local Area Network (LAN), so that settlement is carried out by bringing the portable terminals into proximity with electronic settlement devices and conducting a settlement process." (Ex. 1006, 1:58-62.) Moreover, Jung discloses that such wireless communication functionality is added to portable devices that have wireless charging functionality. (*Id*., 1:66-2:4.)

Therefore, a POSITA would have understood that Jung teaches that the utility of such portable devices, such as mobile phones, can be increased by including short-range wireless communication functionality in addition to the wireless charging functionality. (Ex. 1002, ¶¶146-148; Ex. 1007, 1:27-36, 1:44-58, 4:16-24.) Jung discloses including another coil on the portable device to support the wireless communication. (Ex. 1006, 1:66-2:4.)

A POSITA would have looked to Jung for guidance regarding implementing a mobile phone like that disclosed in Kato, particularly because Jung and Kato are in the same field. (Ex.1002, ¶149.) Having looked to Jung, such a POSITA would have been motivated to include a short-range communication coil, like that disclosed by Jung, in a printed circuit board that includes a wireless charging antenna, like that disclosed by Kato, to provide a coil module for a portable terminal (e.g. mobile phone) that supports both wireless charging and short-range wireless communication functionality. (*Id.*)

A POSITA would have had good reason to make such a combination. (*Id.*, ¶150.) As Jung discloses, inclusion of such additional functionality on a portable terminal was proliferating at the time and expands the capabilities of the portable terminal by, for example, allowing the phone to be used in an "electronic settlement system" (e.g., to make payments). (Ex. 1006, 1:58-62; Ex. 1014, ¶¶[0022]-[0024]; Ex.1002, ¶150.) Moreover, a POSITA would have understood that implementing

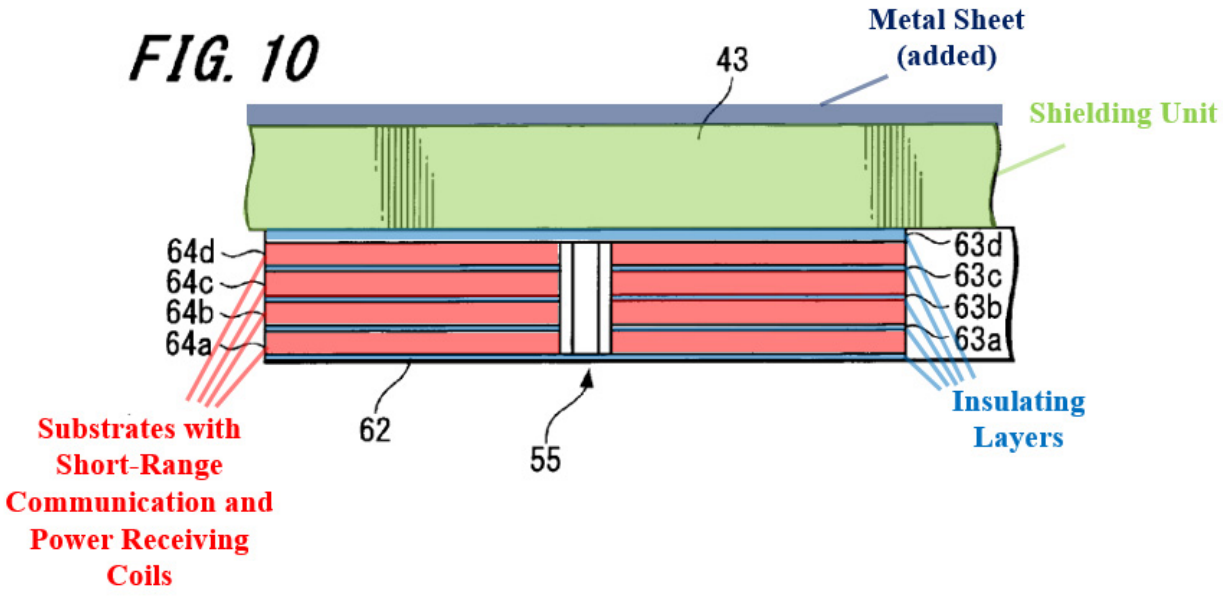
short-range communication functionality on a mobile phone like that disclosed by Kato would have been desirable based on the trend of increasing functionality on mobile devices prior to the time of the alleged invention. For example, short-range communication functionality in the form of Near Field Communication (NFC) functionality was being added to such mobile devices to facilitate such transactions, as confirmed by contemporaneous references. (Ex. 1002, ¶151.) For example, Chong discloses mobile phones that include both wireless charging and NFC functionality. (Ex. 1008, 1:28-35, 3:6-10, 3:25-33, 11:33-46, 12:43-44 ("Therefore, the ongoing trend is to give the NFC function to the mobile terminal.").) Similarly, Yu discloses that "[r]ecently, the introduction of wireless charging function and the usability of near field communication are increasing in prominence in mobile portable devices, specifically mobile phones, and near field communication and a coil for wireless power transmission for wireless charging need to be used at the same time." (Ex. 1009, ¶[0002].)

Moreover, a POSITA would have found it beneficial to include both antennas in the same printed circuit board, as opposed to separate boards, in order to reduce the number of components in the phone, reduce costs, and promote manufacturability, while still supporting Jung's teaching of implementing the coils in the same plane to avoid increased thickness. (Ex. 1006, 10:42-54; Ex. 1014, ¶[0024]; Ex. 1008, 11:65-12:14, 12:30-44, 13:27-30, 15:44-47, 15:51-54

("Moreover, the present invention forms a wireless charging coil and an NFC antenna at the same time to simplify a manufacturing process, thereby reducing a processing time and a manufacturing cost."), 15:55-16:2, FIGs. 4-7; Ex. 1009, ¶[0018] ("Even in terms of cost, it reduced the number of components and provided cost reduction by manufacturing a near field communication antenna and a power transmission coil on top of a single board."); Ex. 1002, ¶152.) Moreover, such a POSITA would have found it obvious to form the short-range communication coil in the Kato-Jung combination in a manner similar to the wireless charging coil in Kato. (Ex. 1002, ¶152.) For example, such a POSITA would have recognized that because there are multiple layers used for forming the wireless charging coil in Kato, those same layers can be used to form the short-range communication coil. (*Id.*, ¶153) A POSITA would have understood that using the same layers and same general multi-layer circuit board structure for both coils, in comparison to implementing the coils as separate components, would have provided advantages in reducing overall thickness, reducing the number of components, improving manufacturability, and reducing costs. (*Id.*)

A POSITA would also have understood that the configuration illustrated in figure 12 of Jung would be appropriate for each of the layers in the multi-layer board that includes the power receiving coil and the short-range communication coil in the Kato-Jung combination. (*Id.*, ¶154.) In other words, the short-range communication

coil would be disposed on the outside of the power receiving coil, where each coil would include conductive patterns on each of the substrate layers as is disclosed by Kato. (*Id.*; *see also* Ex. 1007, Abstract, 1:44-58, 2:30-31 ("the second coil surrounding the first coil on a same plane"), 3:63-64, FIG. 2.) A POSITA would have understood that such an arrangement minimizes the area required by the two antennas and allows for the communication coil to be wide in order to promote improved communication. (Ex. 1002, ¶155; Ex. 1008, 12:48-53, FIG. 5; Ex. 1017, ¶¶[0041], [0047]-[0048], FIGs. 1, 9; Ex. 1009, ¶¶[0009], [0010].)



(Ex. 1005, FIG. 10 (annotated); Ex. 1002, ¶155.)

Including both a wireless receiving coil and a short-range wireless communication coil in the multi-layer circuit board of the Kato-Jung combination would have been straightforward for a POSITA to implement, because Kato

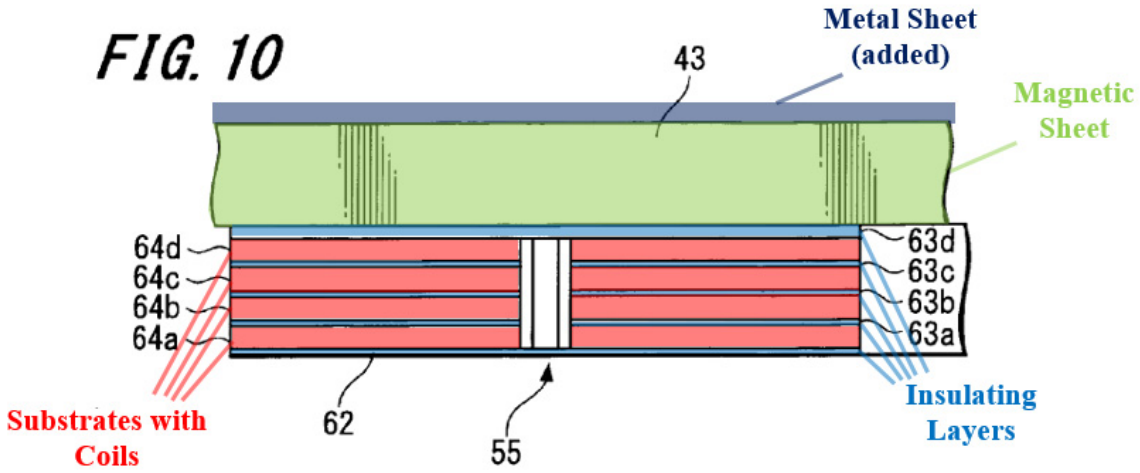
discloses how to implement a coil in a multi-layer circuit board, and Jung discloses using two coils in a mobile phone like that disclosed by Kato. (Ex. 1002, ¶156.) The resulting coil module would have been a predictable combination of known components according to known methods, and would have been consistent with the known features of mobile phones, as evidenced by Jung. (*Id.*) *See KSR*, 550 U.S. at 416.

Therefore, the Kato-Jung combination discloses or suggests "a short-range communication coil disposed in the board."

e) a shielding unit disposed in the board;

f) wherein the shielding unit is disposed on the wireless receiving coil and the short range communication coil, and

The Kato-Jung combination discloses or suggests these features. (Ex. 1002, ¶¶158-164.) For example, Kato discloses a magnetic sheet 43 on the wireless receiving coil in the multi-layer board. (Ex. 1005, ¶[0070].)



(Ex. 1005, FIG. 10 (annotated); Ex. 1002, ¶158.)

Kato further discloses that the magnetic sheet prevents undesired magnetic field radiation (Ex. 1005, ¶[0065]), and constitutes a "shielding unit." (Ex. 1002, ¶159.) Such an understanding is consistent with the '666 patent. (Ex. 1001, 5:64-66.)

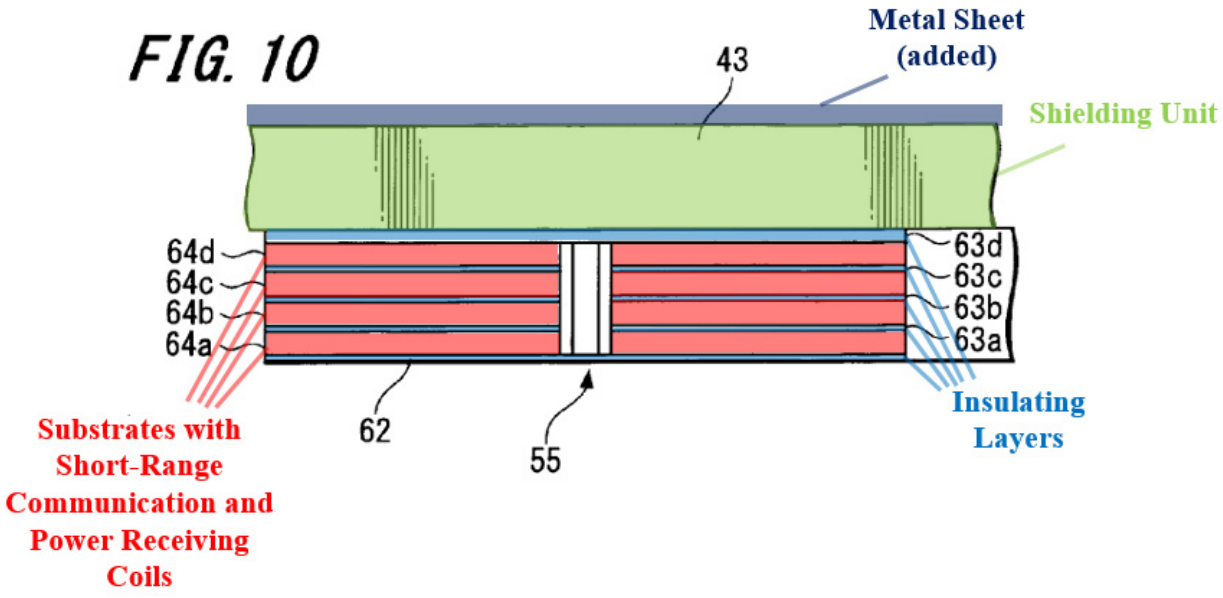
While Kato discloses a magnetic sheet on a wireless charging antenna, Kato does not explicitly disclose a magnetic sheet on both a power receiving coil and a short-range wireless communication coil. However, a POSITA would have found it obvious to form the magnetic sheet in the Kato-Jung combination such that it covers both coils in order to shield the other portions of the mobile device from the magnetic fields generated by those coils. (Ex. 1002, ¶160.) The shielding unit covers both coils and therefore is "disposed on" the coils in a manner consistent with the disclosure of the '666 patent. Indeed, Jung discloses having such shielding on both

types of coils. (Ex. 1006, 10:27-35, ("That is, the power reception coil 212 and the loop antenna 212 are provided on different pieces of shielding material on the same plane, thereby minimizing the thickness of the battery pack A."), 11:8-14, 11:38-40.) Indeed, it was well known at the time of the alleged invention to dispose a shielding unit on both a wireless receiving coil and short range communication coil and that such a configuration provided benefits. (Ex. 1002, ¶160; Ex. 1020, ¶¶70, 77, FIGs. 3-4; Ex. 1021, FIG. 4A, 2:35-42, 5:12-24; Ex. 1007, FIG. 3, 3:49-55, 4:7-15.)

Therefore, a POSITA would have found it obvious to include a shielding unit in the board of the Kato-Jung combination, where the shielding unit includes either a single magnetic sheet that covers both coils or separate magnetic shielding for the two coils. (Ex. 1002, ¶161.) In either case, such a POSITA would have recognized that positioning the shielding unit in the position shown for the magnetic sheet in Kato would provide the appropriate shielding in a manner consistent with the disclosure of both Kato and Jung. (*Id.*; *see also* Ex. 1007, 3:4-11, 3:45-55, 4:38-42, 4:52-53; Ex. 1008, 13:48-14:59, FIGs. 6-7.)

A POSITA would have found it straightforward to include a shielding unit covering both coils. (Ex. 1002, ¶¶162-163.) Such a POSITA would have understood that if a single magnetic sheet is used, a magnetic sheet like that disclosed by Kato can simply be enlarged, whereas Jung provides detailed disclosure of how to

implement such a shielding unit if separate shielding is employed. A POSITA would have understood that the shielding unit is "in" the board because, as discussed below with respect to claim element 1[g], the shielding unit is disposed between layers of the board. (Section IX.C.1(g).) As shown below, the Kato-Jung combination discloses or suggests "a shielding unit disposed in the board; wherein the shielding unit is disposed on the wireless receiving coil and the short range communication coil" as recited in claim 1.

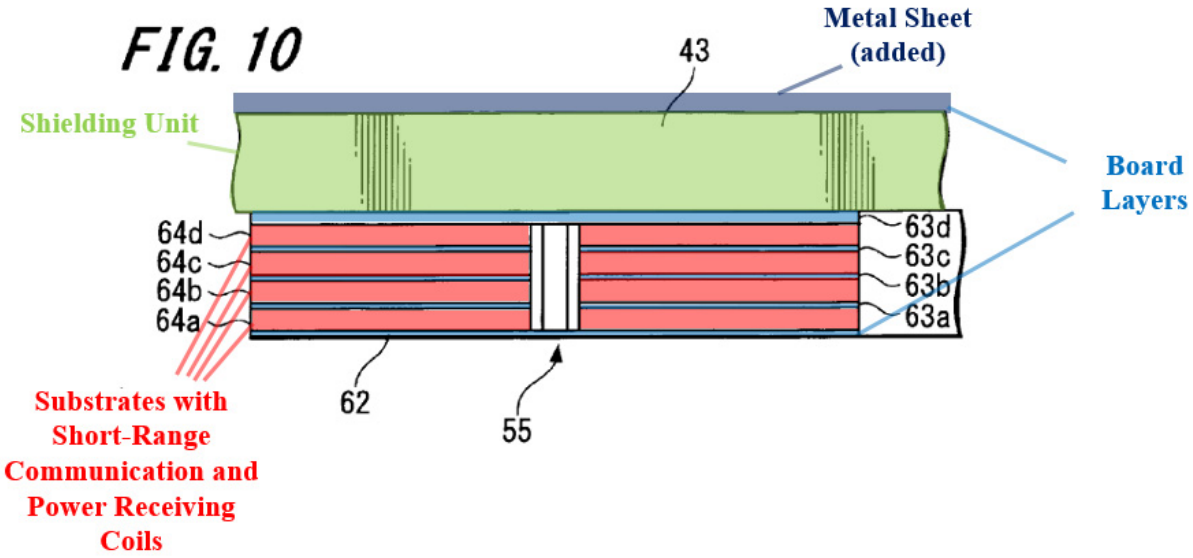


(Ex. 1002, ¶162.)

g) wherein the wireless receiving coil, the short-range communication coil, and the shielding unit are disposed between the plurality of layers.

The Kato-Jung combination discloses or suggests this feature. (Ex. 1002, ¶165.) As discussed above in Section IX.C.1(d), in the Kato-Jung combination, the

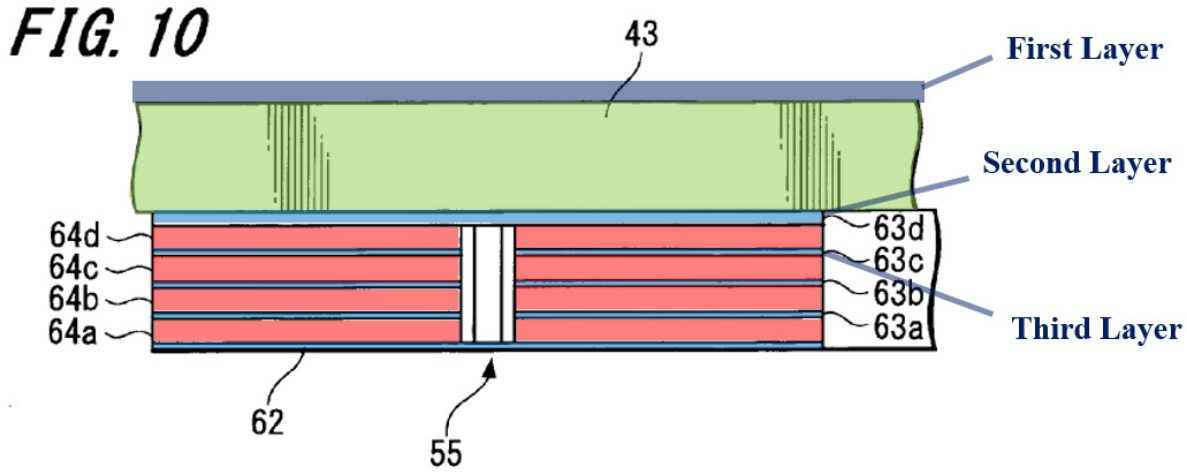
short-range communication coil is formed between the layers of the multi-layer board in the same manner as the wireless power receiving coil disclosed by Kato. (Section IX.C.1(d).) As noted above for claim element 1[b], consistent with PO's broad interpretation, each of the layers depicted in annotated figure 10 below constitutes a "layer" of the board, where, as shown, the shielding unit, as well as the substrates with the short-range communication and power coils, are between the metal sheet on the shielding unit and the surface insulating layer 62 ("disposed between the plurality of layers").



(Ex. 1005, FIG. 10 (annotated); Ex. 1002, ¶165.)

2. Claim 2[8]

The Kato-Jung combination discloses or suggests this feature. (Ex. 1002, ¶¶166-167.) As shown below, the plurality of layers includes a first layer, a second layer, and a third layer.



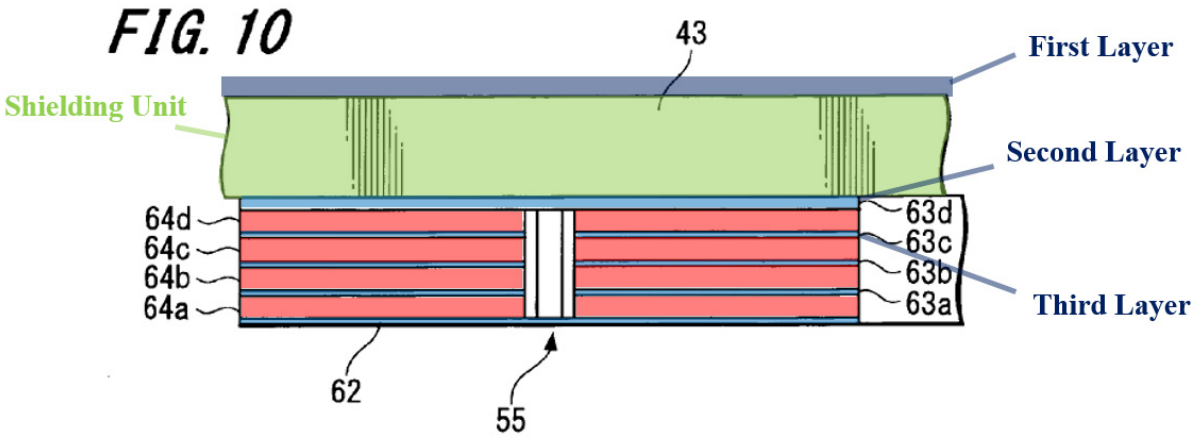
(Ex. 1005, FIG. 10 (annotated); Ex. 1002, ¶166.)

As shown above, the "first layer" is the metal sheet that Kato discloses is on the magnetic sheet, the "second layer" is the interlayer insulating layer 63d, and the "third layer" is the interlayer insulation layer 63c. Consistent with the claims and disclosure of the '666 patent, the second layer is "under" the first layer, and the third layer is "under" the second layer. (Ex. 1002, ¶167.)

[8] The claim language is not repeated.

3. Claim 3

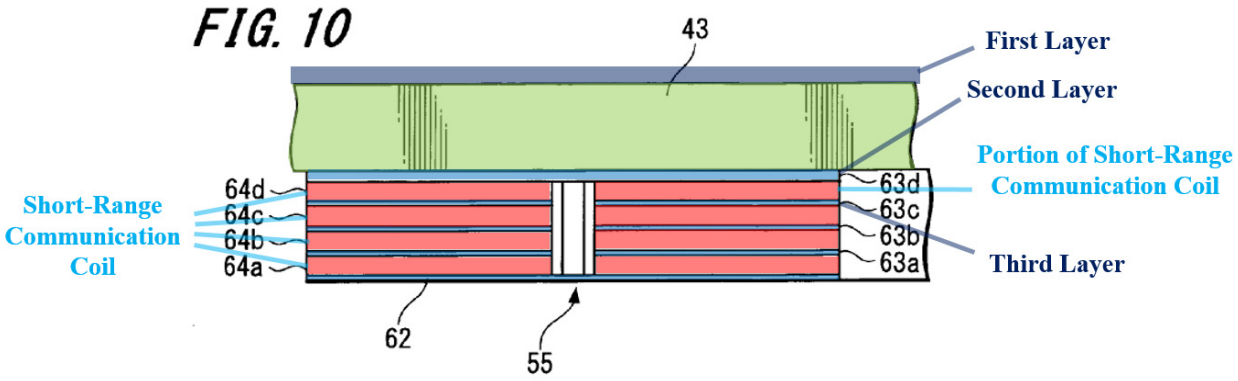
The Kato-Jung combination discloses or suggests this feature. (Ex. 1002, ¶168.) As shown below, the shielding unit is between the first and second layers. (*Id.*)



(Ex. 1005, FIG. 10 (annotated); Ex. 1002, ¶168.)

4. Claim 4

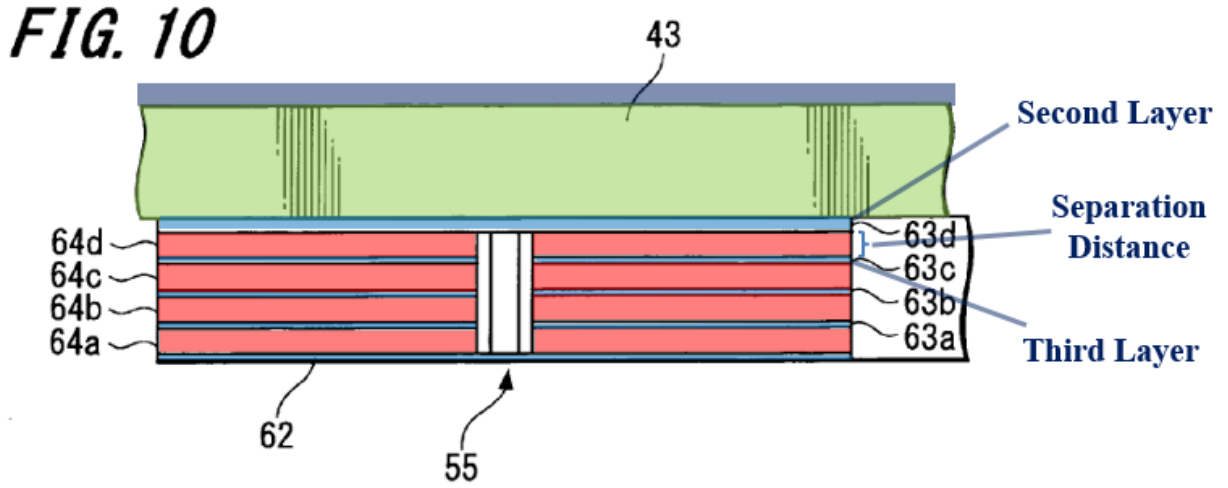
The Kato-Jung combination discloses or suggests this feature. (Ex. 1002, ¶¶169-170.) As shown below, the layer substrate 64d, which includes a portion of the short-range communication coil in the Kato-Jung combination, is between the second and third layers. (*Id.*, ¶169.)



(Ex. 1005, FIG. 10 (annotated); Ex. 1002, ¶169.)

5. Claim 5

The Kato-Jung combination discloses or suggests this feature. (Ex. 1002, ¶171.) As shown below, there is a separation distance between the second and third layers. (*Id.*)



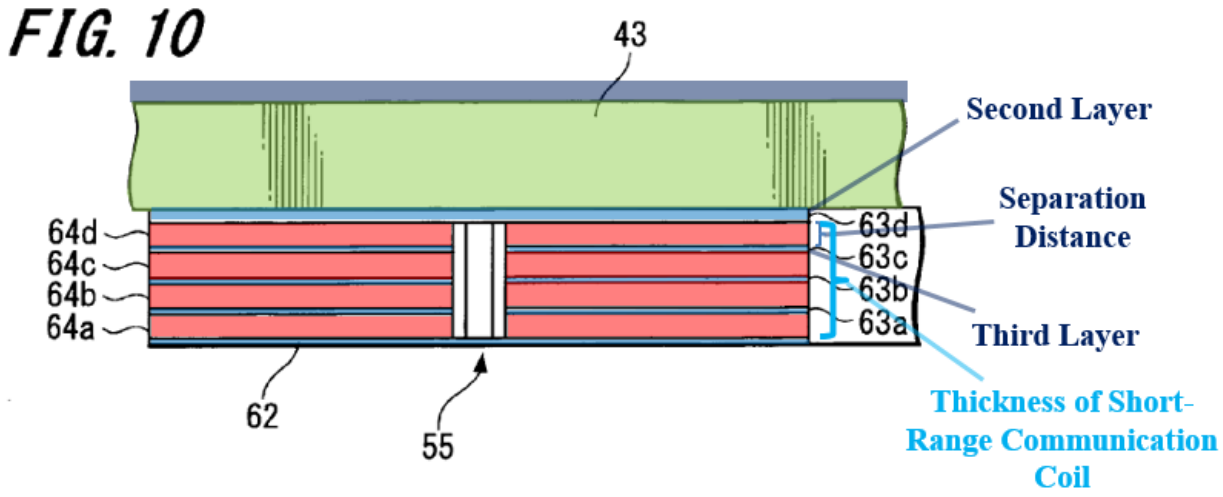
(Ex. 1005, FIG. 10 (annotated); Ex. 1002, ¶171.)

6. Claim 6

The Kato-Jung combination discloses or suggests this feature to the extent it can be understood. (Ex. 1002, ¶¶172-173.) As an initial matter, the specification of

the '666 patent does not mention a "separation distance" or any relative dimensions of the short-range communication coil with respect to any "separation distance." (*Id.*, ¶172.)

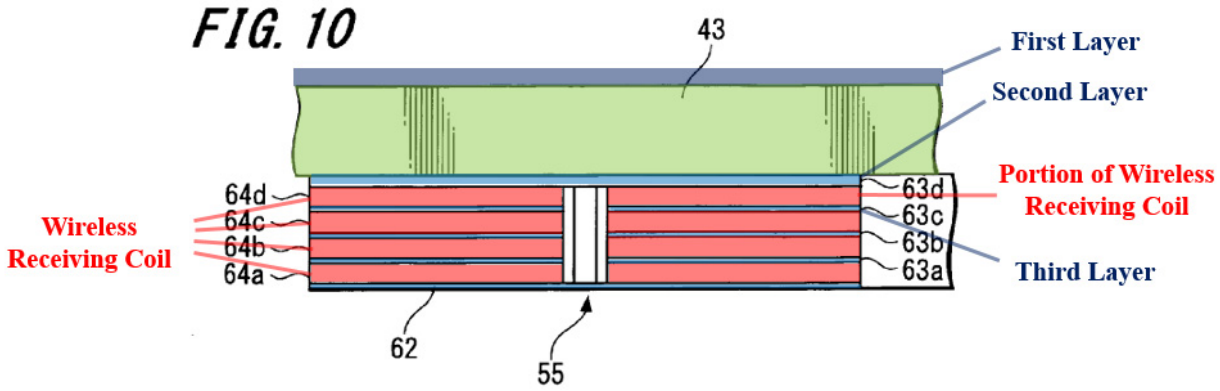
As shown below, the thickness of the short-range communication coil, which includes the separation distance between the second and third layers is necessarily greater than the separation distance. (*Id.*, ¶173.)



(Ex. 1005, FIG. 10 (annotated); Ex. 1002, ¶173.)

7. Claim 7

The Kato-Jung combination discloses or suggests this feature. (Ex. 1002, ¶174.) As shown below, the layer substrate 64d, which includes a portion of the wireless receiving coil, is between the second and third layers. (*Id.*)



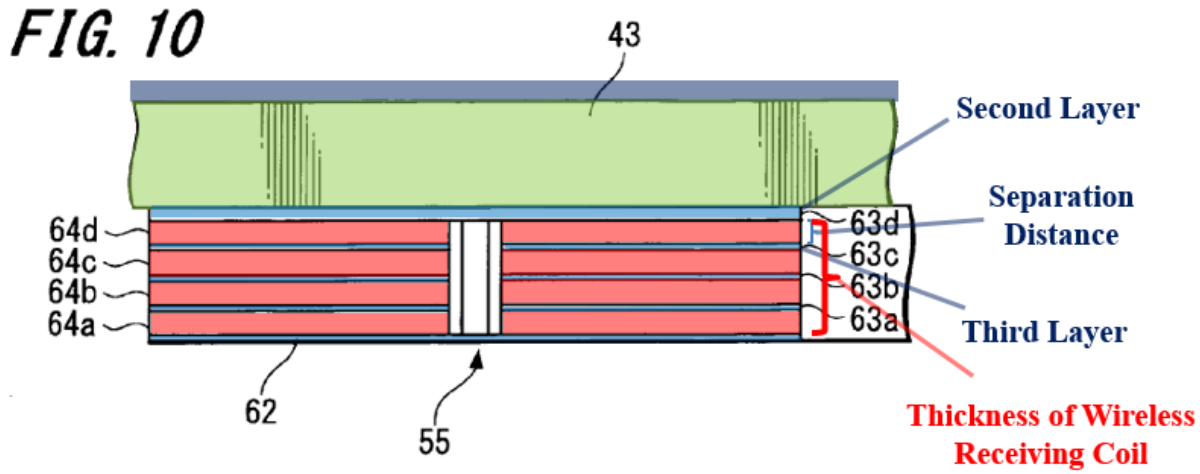
(Ex. 1005, FIG. 10 (annotated); Ex. 1002, ¶174.)

8. Claim 8

The Kato-Jung combination discloses or suggests this feature for the same reasons discussed above for claim 5. (Section IX.C.5; Ex. 1002, ¶175.)

9. Claim 9

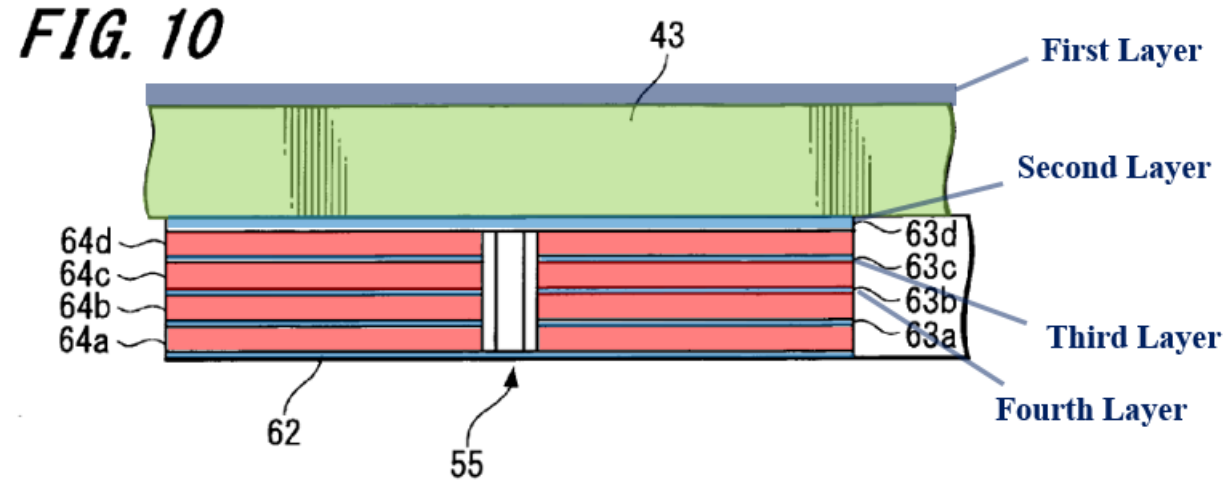
The Kato-Jung combination discloses or suggests this. (Ex. 1002, ¶176.) As shown below, the thickness of the wireless receiving coil, which includes the separation distance between the second and third layers is necessarily greater than the separation distance. (*Id.*)



(Ex. 1005, FIG. 10 (annotated); Ex. 1002, ¶176.)

10. Claim 10

The Kato-Jung combination discloses or suggests this feature. (Ex. 1002, ¶¶177-178.) As shown below, the plurality of layers includes a first layer, a second layer, a third layer, and a fourth layer.

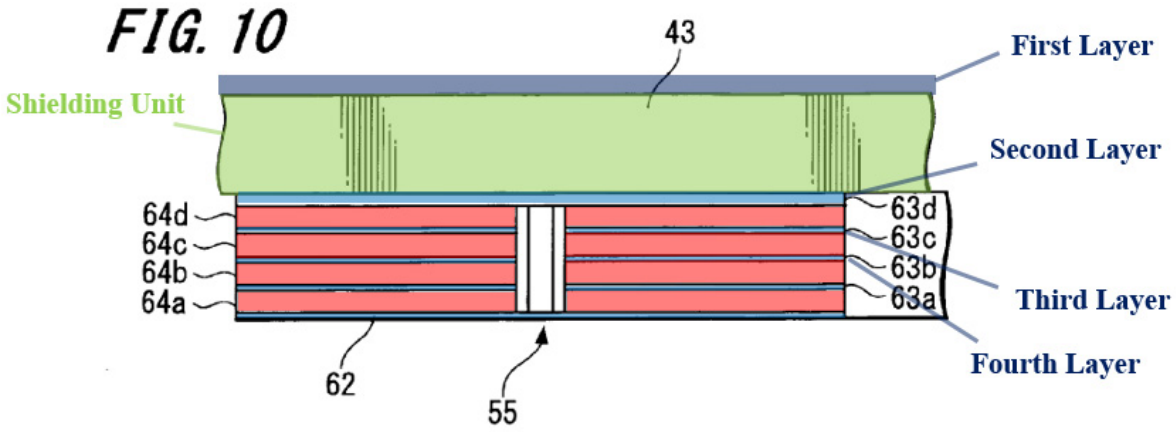


(Ex. 1005, FIG. 10 (annotated); Ex. 1002, ¶177.)

As shown above, the "first layer" is the metal sheet that Kato discloses is on the magnetic sheet, the second, third, and fourth layers are the interlayer insulating layers 63d, 63c, and 63b, respectively. Consistent with the disclosure and claims of the '666 patent, the second layer is "under" the first layer, the third layer is "under" the second layer, and the fourth layer is "under" the third layer. (Ex. 1002, ¶178.)

11. Claim 11

The Kato-Jung combination discloses or suggests this feature. (Ex. 1002, ¶179.) As shown below, the shielding unit is between the first and second layers. (*Id.*)

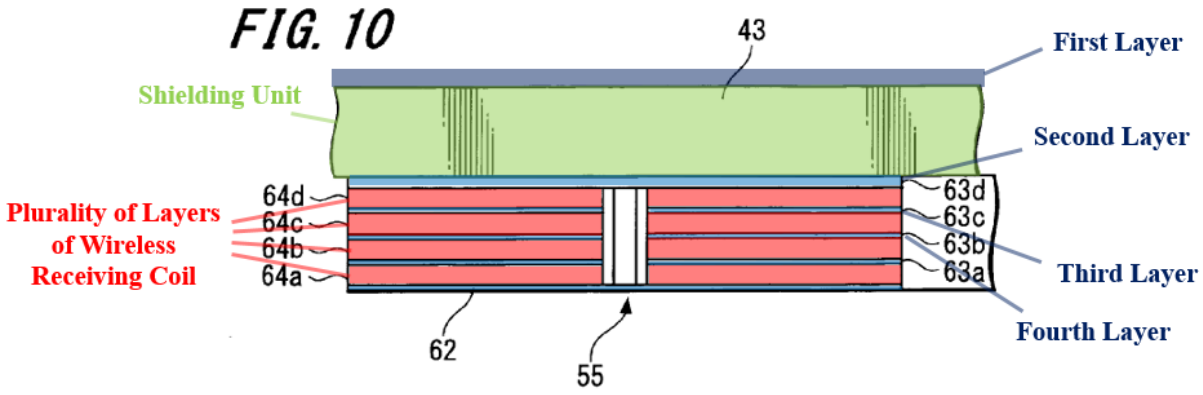


(Ex. 1005, FIG. 10 (annotated); Ex. 1002, ¶179.)

12. Claim 12

The Kato-Jung combination discloses or suggests this feature. (Ex. 1002, ¶180.) Kato discloses that each of the layer substrates 64a-64d includes a conductive

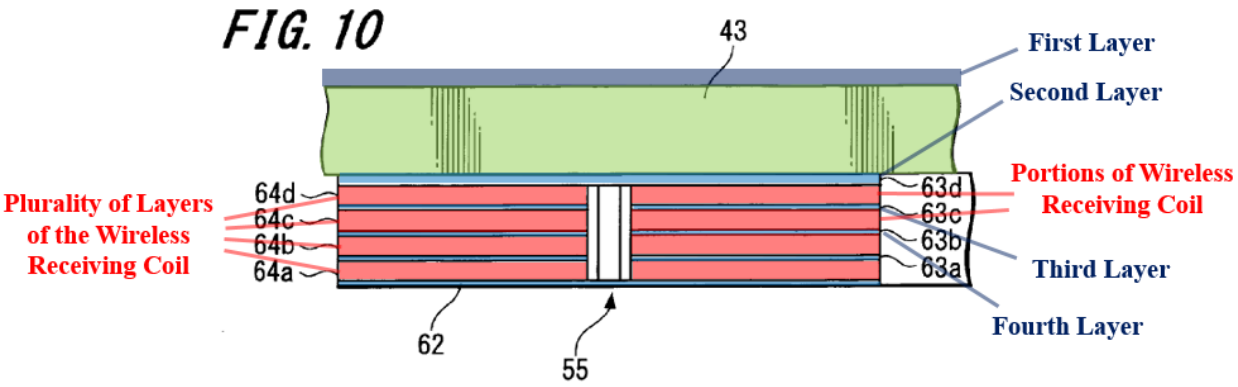
pattern corresponding to a portion of the wireless receiving coil (Section IX.C.1(c), where each conductive pattern is a "layer" of the coil. (*Id.*)



(Ex. 1005, FIG. 10 (annotated); Ex. 1002, ¶180.)

13. Claim 13

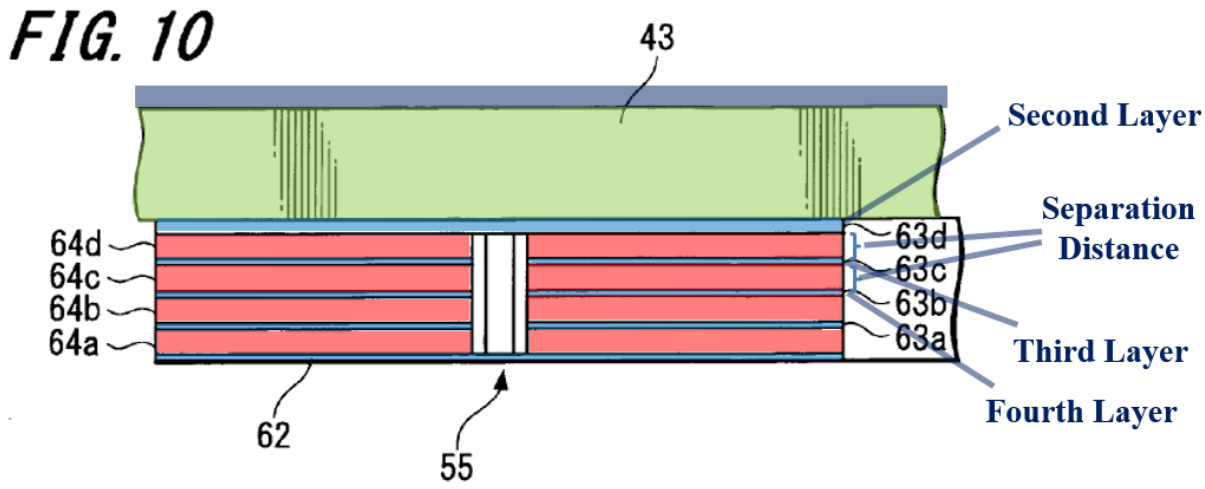
The Kato-Jung combination discloses or suggests this feature. (Ex. 1002, ¶181.) As shown below, the layer substrates 64c and 64d, each of which includes a portion of the wireless receiving coil, are between the second and third layers and between the third and fourth layers, respectively. (*Id.*)



(Ex. 1005, FIG. 10 (annotated); Ex. 1002, ¶181.)

14. Claim 14

The Kato-Jung combination discloses or suggests this feature. (Ex. 1002, ¶182.) As shown below, there is a separation distance between the second and third layers and between the third and fourth layers. (*Id.*)

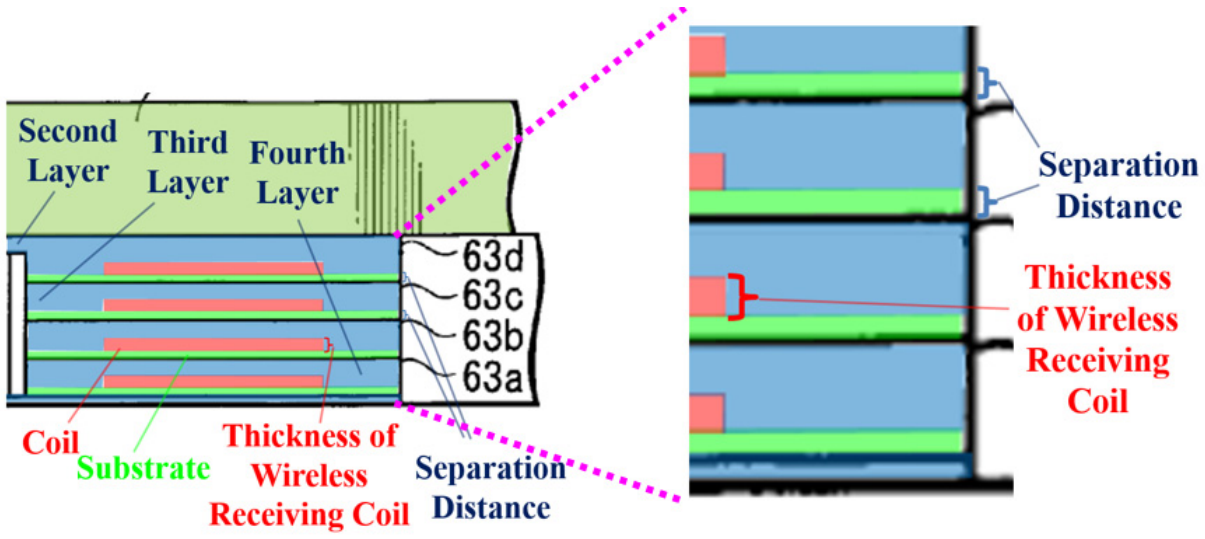


(Ex. 1005, FIG. 10 (annotated); Ex. 1002, ¶182.)

15. Claim 15

The Kato-Jung combination discloses or suggests this feature. (Ex. 1002, ¶¶183-184.) Kato discloses that the four-layered structure shown in figure 10 includes layer substrates 64a-64d, where each substrate includes a "substrate made of a polyamide resin or the like as a base material on which a spirally-wound line pattern 60 is formed," where "an adhesion layer and an interlayer insulating layer 63a" are formed between the substrates 64a-64d. (Ex. 1005, ¶[0070].) Kato does not depict all of these features in figure 10, nor does it disclose their relative dimensions. (Ex. 1002, ¶183.) The demonstrative below shows the spirally-wound

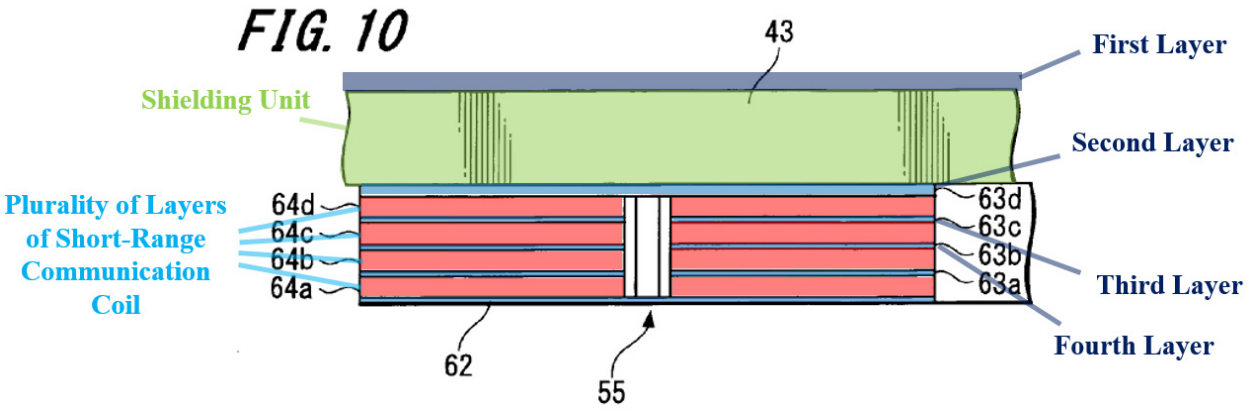
pattern ("coil") on a substrate as described by Kato, where the adhesive/insulating layers 63a-63d cover the sides of the coil and fill in the space between the substrates in a manner consistent with, for example, an adhesive resin. (*Id.*; Ex. 1005, ¶[0070]). A POSITA would have understood that the thickness of the coil and the substrate on which the coil is formed are nothing more than design choices selected to, for example, provide the desired inductor characteristics. (Ex. 1002, ¶183.) In the demonstrative below, which is a modified portion of figure 10, a thin substrate supports a thicker coil, which is consistent with other figures in Kato. (Ex. 1005, ¶¶[0066], [0082], FIGs. 6, 19, 20, 26.) Because the coil is thicker than the substrate, the separation distance between the layers 63b-63d, which corresponds to the thickness of the substrate, is smaller than the thickness of a layer of the wireless receiving coil. (Ex. 1002, ¶183.)



(*Id.*, ¶184.)

16. Claim 16

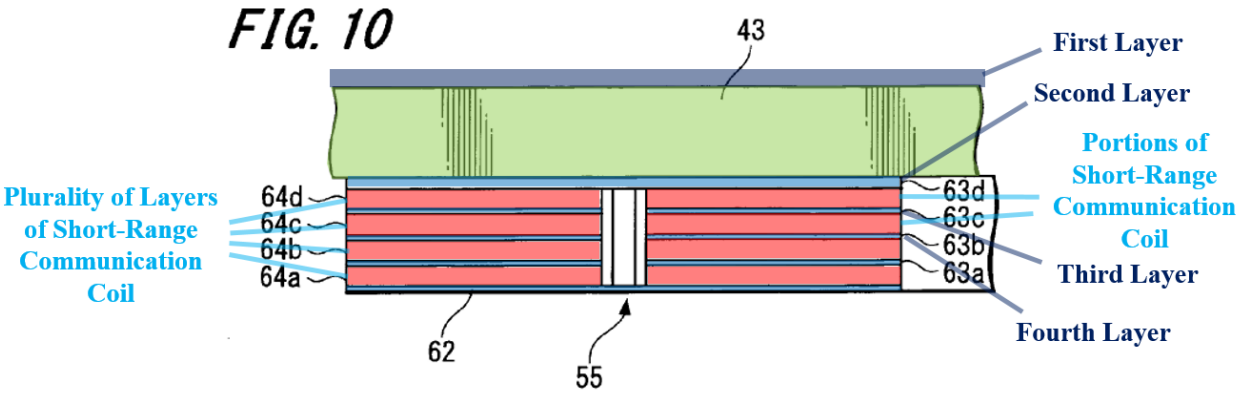
The Kato-Jung combination discloses or suggests this feature. (Ex. 1002, ¶¶185.) The Kato-Jung combination discloses or suggests a short-range communication coil that is disposed in the board in the same manner as the power receiving coil disclosed by Kato, where each of the layer substrates 64a-64d includes a conductive pattern corresponding to a layer of the short-range communication coil. (Section IX.C.1(d); Ex. 1002, ¶185.)



(Ex. 1005, FIG. 10 (annotated); Ex. 1002, ¶185.)

17. Claim 17

The Kato-Jung combination discloses or suggests this feature. (Ex. 1002, ¶¶186.) As shown below, the layer substrates 64c and 64d, each of which includes a portion of the short-range communication coil, are between the second and third layers and between the third and fourth layers, respectively. (*Id.*)



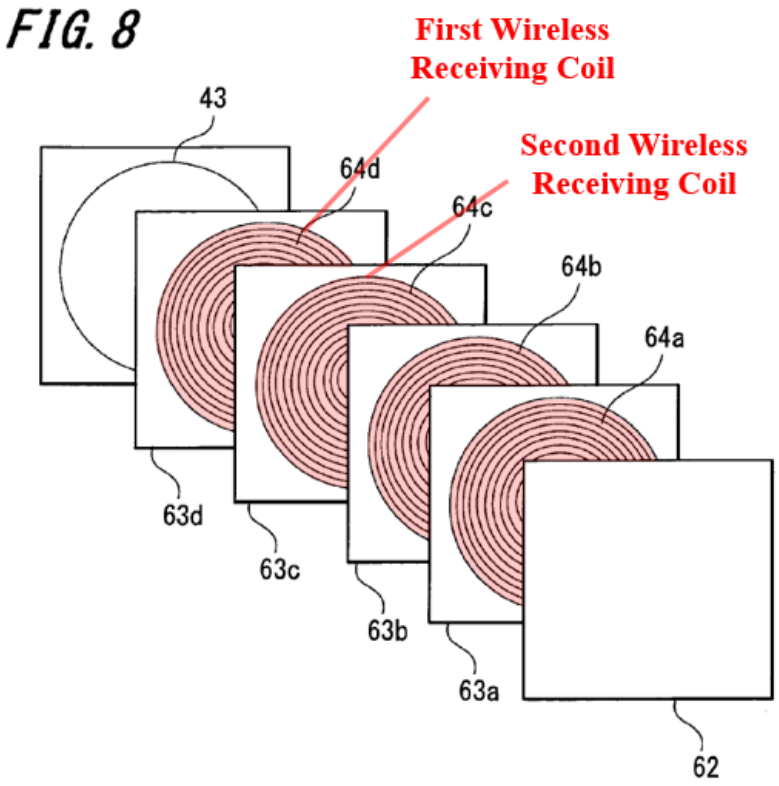
(Ex. 1005, FIG. 10 (annotated); Ex. 1002, ¶186.)

18. Claim 18

The Kato-Jung combination discloses or suggests this feature for the same reasons discussed above for claim 14. (Section IX.C.14; Ex. 1002, ¶187.)

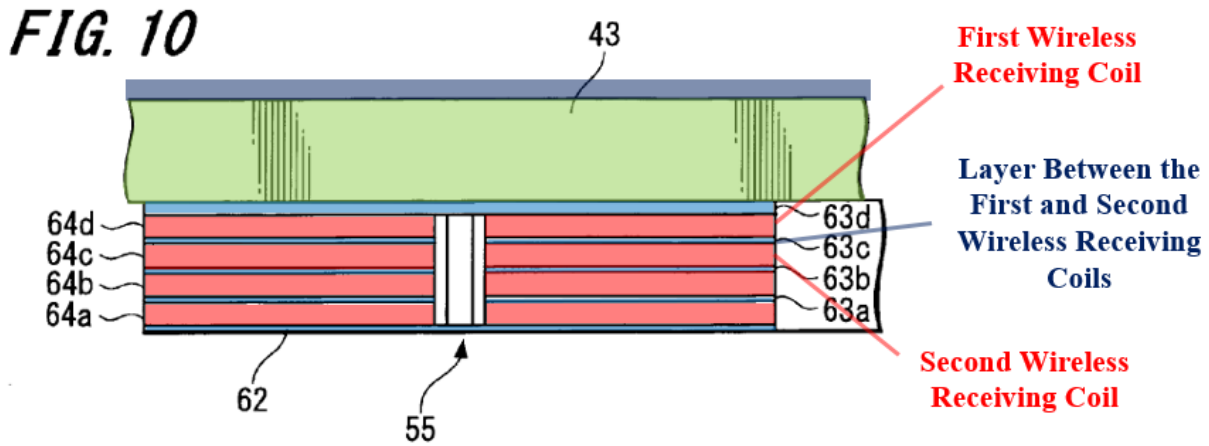
19. Claim 20

The Kato-Jung combination discloses or suggests this feature to the extent it can be understood. (Ex. 1002, ¶¶188-190.) As shown in annotated figure 8 of Kato below, the wireless receiving coil includes a spirally-wound conductive pattern on layer substrate 64d ("first wireless receiving coil") and a spirally-wound conductive pattern on layer substrate 64c ("second wireless receiving coil"). (Ex. 1005, ¶[0070]; Ex. 1002, ¶189.)



(Ex. 1005, FIG. 8 (annotated); Ex. 1002, ¶189.)

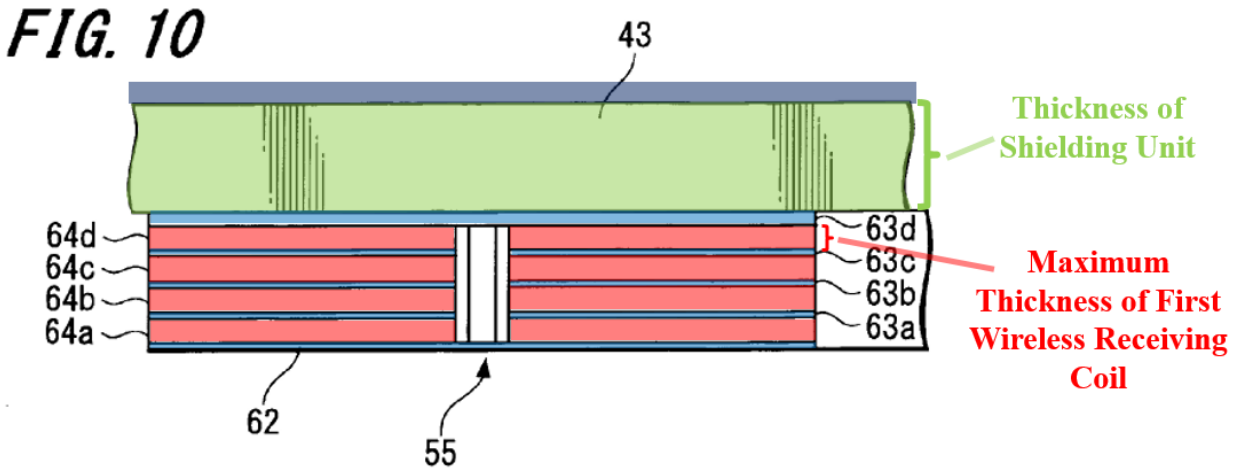
As shown below, interlayer insulating layer 63c ("at least one of the plurality of layers") is between the first and second coils. (Ex. 1002, ¶190.)



20. Claim 21

The Kato-Jung combination discloses or suggests this feature. (Ex. 1002, ¶¶191-192.) As shown below, the thickness of the magnetic sheet 43 of Kato is thicker than the fourth layer substrate 64d that includes the conductive pattern corresponding to the "first wireless receiving coil," and therefore is also thicker than that coil. (*Id.*, ¶191.)

Moreover, a POSITA would have understood that selecting the relative thicknesses of the shielding unit and first wireless receiving coil is nothing more than a design choice. (Ex. 1005, ¶[0065], Ex. 1002, ¶192.)

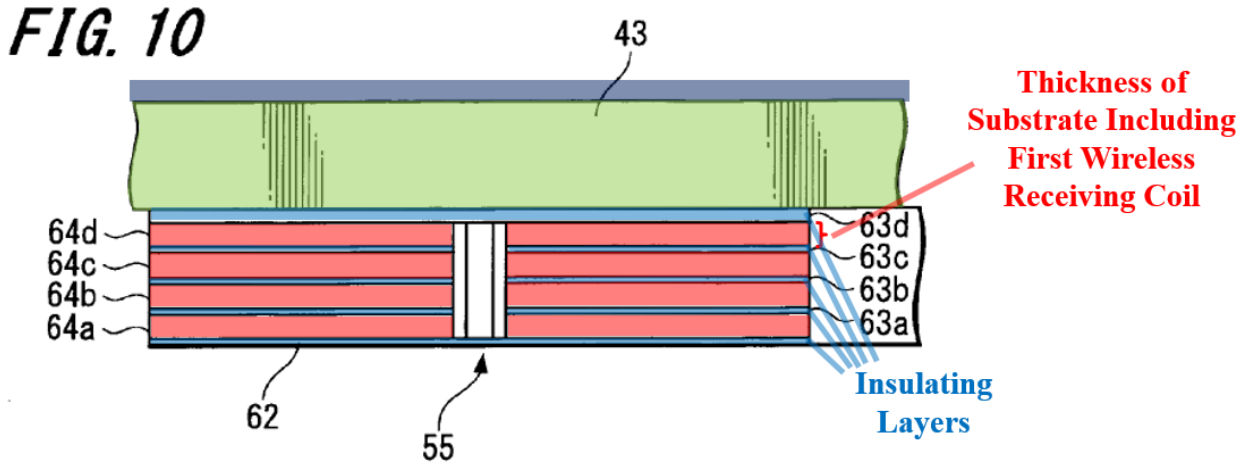


(Ex. 1005, FIG. 10 (annotated); Ex. 1002, ¶192.)

21. Claim 22

The Kato-Jung combination discloses or suggests this feature. (Ex. 1002, ¶¶193-194.) As shown below, the thickness of the fourth layer substrate 64d that includes the "first wireless receiving coil" is thicker than each interlayer insulating

layer 63a-63d. While Kato does not explicitly disclose the relative thickness of the conductive patterns 60 that form the multi-layer coil in comparison to the interlayer insulating layers 63a-63d, a POSITA would have understood that selecting the relative thicknesses of the first wireless receiving coil and the insulating layers is nothing more than an obvious design choice. (Ex. 1002, ¶¶193-194.)

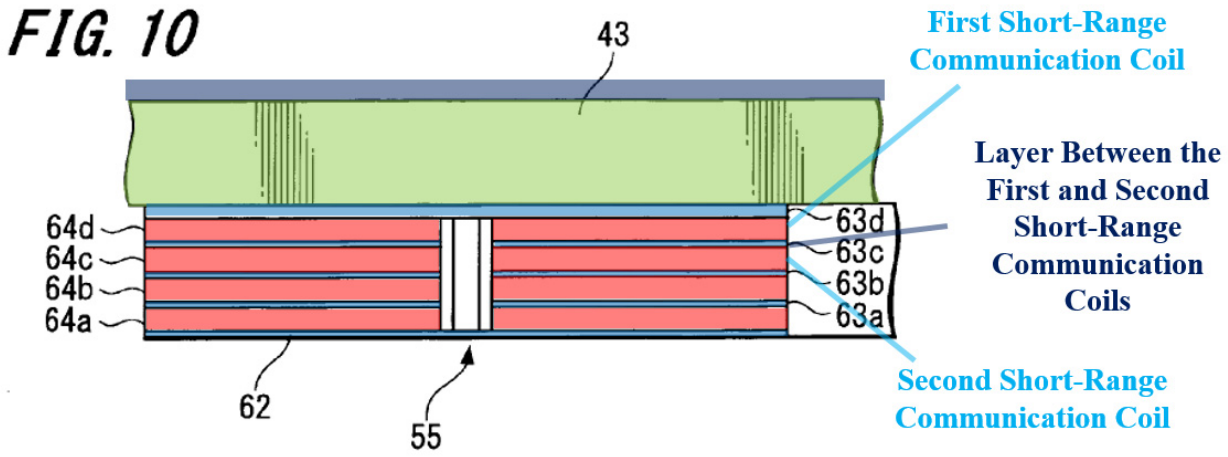


(Ex. 1005, FIG. 10 (annotated); Ex. 1002, ¶194.)

22. Claim 23

The Kato-Jung combination discloses or suggests this feature. (Ex. 1002, ¶¶195-196.) The Kato-Jung combination discloses or suggests a short-range communication coil that is disposed in the board in the same manner as the power receiving coil disclosed by Kato, where each of the layer substrates 64a-64d includes a spirally-wound conductive pattern corresponding to a portion of the short-range communication coil. (Section IX.C.1(d).) Therefore, layer substrates 64d and 64c

include a "first short-range communication coil" and a "second short-range communication coil," respectively. (Ex. 1002, ¶195.)

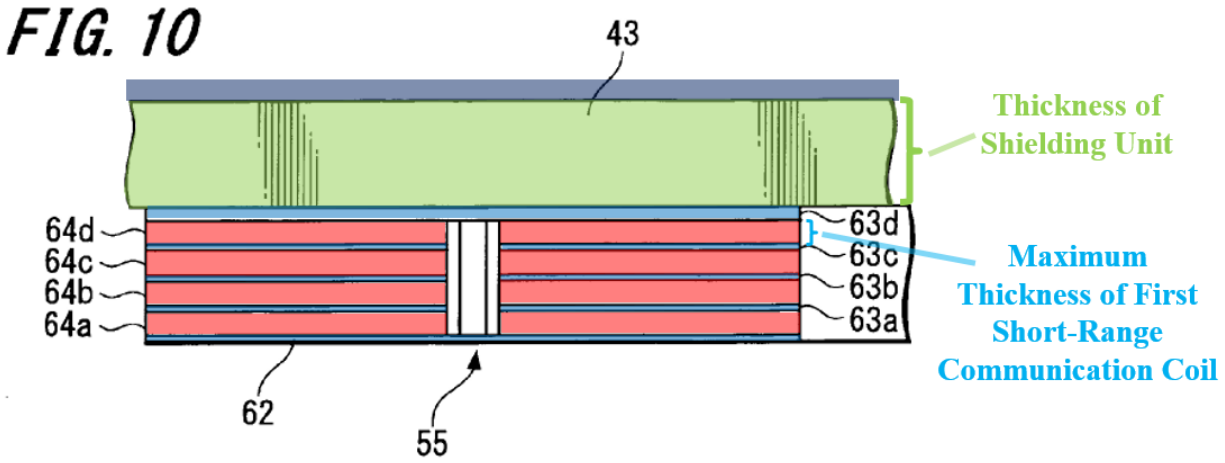


(Ex. 1005, FIG. 10 (annotated); Ex. 1002, ¶195.)

The interlayer insulating layer 63c ("at least one of the plurality of layers") is disposed between the first and second coils. (Ex. 1002, ¶196.)

23. Claim 24

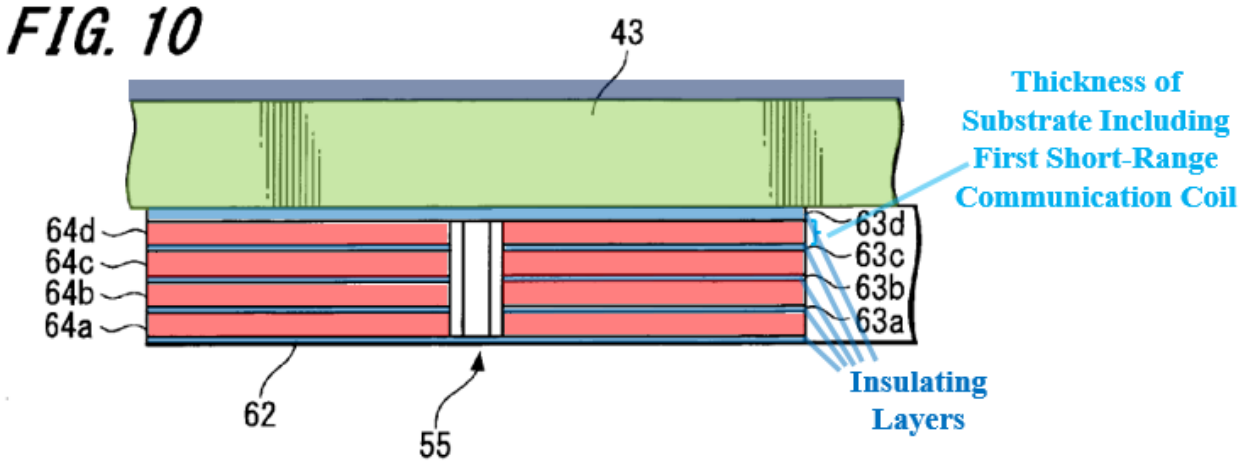
The Kato-Jung combination discloses or suggests this feature. (Ex. 1002, ¶¶197-198.) As shown below, the thickness of the magnetic sheet 43 of Kato is thicker than the fourth layer substrate 64d that includes the conductive pattern corresponding to the "first short-range communication coil," and therefore is also thicker than that coil. (*Id.*, ¶197.) Moreover, a POSITA would have understood that selecting the relative thicknesses of the shielding unit and first short-range communication coil is nothing more than a simple design choice. (Ex. 1005, ¶[0065], Ex. 1002, ¶198.)



(Ex. 1005, FIG. 10 (annotated); Ex. 1002, ¶198.)

24. Claim 25

The Kato-Jung combination discloses or suggests this feature. (Ex. 1002, ¶¶199-200.) As shown below, the thickness of the fourth layer substrate 64d that includes the "first short-range communication coil" is thicker than each of the interlayer insulating layers 63a-63d. While Kato does not explicitly disclose the relative thickness of the conductive patterns 60 that form the multi-layer coil in comparison to the interlayer insulating layers 63a-63d, a POSITA would have understood that selecting the relative thicknesses of the first short-range communication coil and the insulating layers is nothing more than an obvious design choice. (*Id.*)



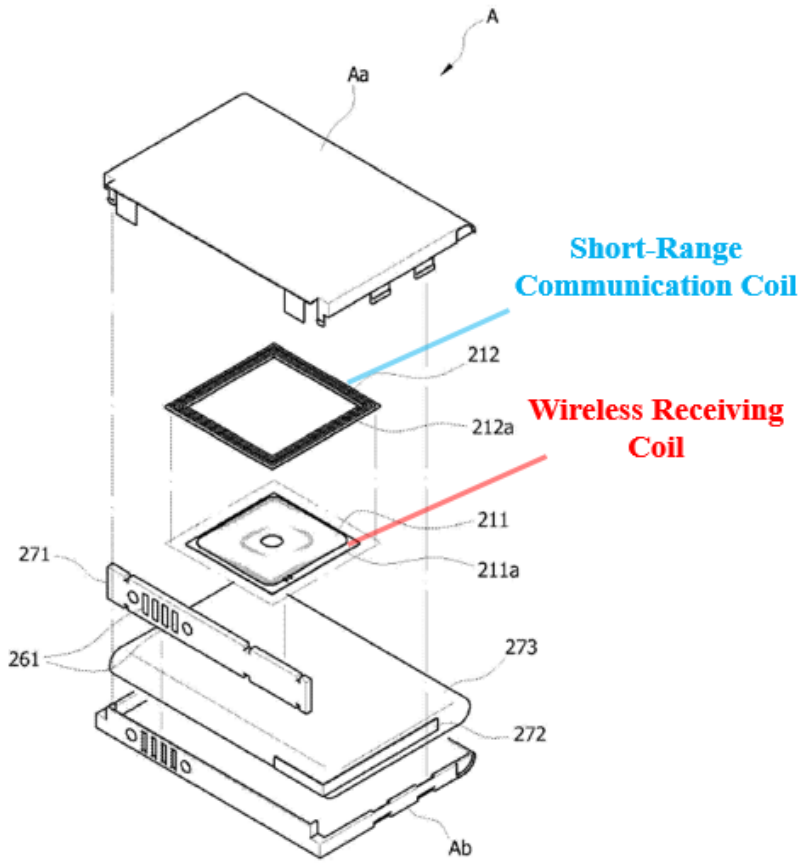
(Ex. 1005, FIG. 10 (annotated); Ex. 1002, ¶200.)

25. Claim 26

The Kato-Jung combination discloses or suggests this feature. (Ex. 1002, ¶¶201-204.) As discussed above in Section IX.C.1(d), a POSITA would have been motivated to implement the Kato-Jung combination in a manner where the short-range communication coil surrounds the wireless receiving coil. (Section IX.C.1(d); Ex. 1006, 6:17-19, 10:14-21, 10:36-41, FIGs. 6, 12; Ex. 1002, ¶¶201-204; *see also* Ex. 1008, 12:48-53, FIG. 5; Ex. 1017, ¶¶[0041], [0047]-[0048], FIGs. 1, 9; Ex. 1009, ¶¶[0009], [0010].)

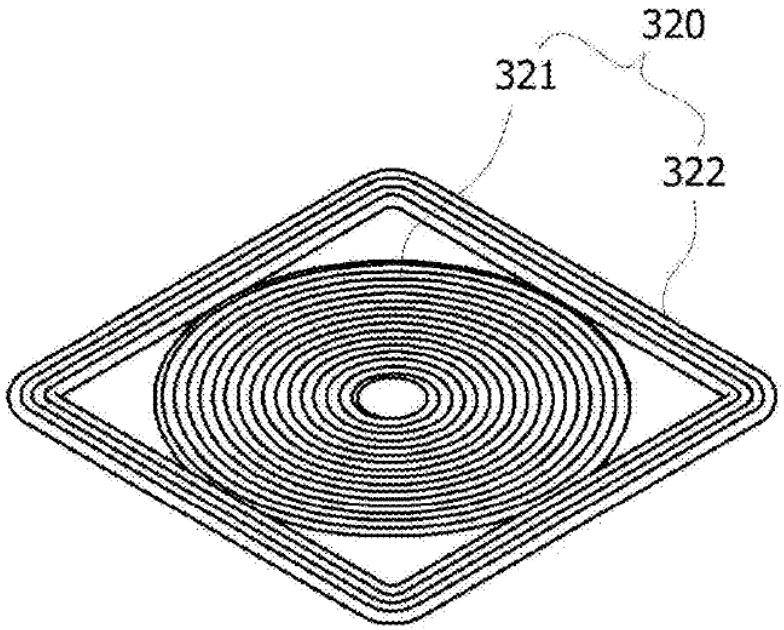
As shown in annotated figure 6 of Jung below, the power reception coil 211 is surrounded by the loop antenna 212 (i.e. short-range communication coil.) (Ex. 1006, 6:17-19, 10:14-21, 10:36-41, FIG. 6; Ex. 1002, ¶202.)

Fig. 6



(Ex. 1006, FIG. 6 (annotated); Ex. 1002, ¶202.) Figure 12 of Jung also shows two coils formed in the same plane where one coil surrounds the other coil.

Fig. 12



(Ex. 1006, FIG. 12.)

26. Claim 27

a) A wireless power receiver of claim 1, wherein the shielding unit is arranged to correspond to an area occupied by the wireless power receiving coil and the short-range communication coil.

The Kato-Jung combination discloses or suggests this feature. (Ex. 1002, ¶205.) For example, as discussed above for claim element 1[e], the shielding unit covers both the wireless power receiving coil and the short-range communication coil. (Section IX.C.1(e).)

X. DISCRETIONARY DENIAL IS NOT APPROPRIATE

The six factors set out in *Fintiv* do not justify denying institution. *See Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 (PTAB Mar. 20, 2020) (precedential).

The **first factor** (stay) is at best neutral because a stay has not been requested and the PTAB does not infer how the district court would rule should a stay be requested. *See, e.g., Hulu LLC v. SITO Mobile R&D IP, LLC et al.*, IPR2021-00298, Paper 11 at 10-11 (PTAB May 19, 2021).

The **second factor** (proximity of trial) is neutral. While jury selection is currently set for June 26, 2023, "an early trial date" is "non-dispositive" and simply means that "the decision whether to institute will likely implicate other factors," which, as explained, favor institution. *Fintiv*, IPR2020-00019, Paper 11 at 5, 9; *see also Intuitive Surgical, Inc. v. Ethicon LLC*, IPR2018-01703, Paper 7 at 12 (PTAB Feb. 19, 2019); *Unilioc USA, Inc. v. RingCentral, Inc.*, No. 2-17-cv-00354-JRG (E.D. Tex. Feb. 12, 2018), at *1.

The **third factor** (investment in parallel proceedings) weighs strongly in favor of institution. The district court case is in its infancy and the Parties' have made little investment to date. PO filed its district court complaint on January 10, 2022, Petitioner filed its answer just over a month ago on April 14, 2022, and PO served its infringement contentions on May 4, 2022. Petitioner's diligence in pursuing this petition shortly after receiving the infringement contentions weighs in favor of institution. *Facebook, Inc. v. USC IP P'ship*, *L.P.*, IPR2021-00033, Paper 13 at 13 (PTAB April 30, 2021).

Moreover, the most cost-intensive period in the case will occur after the Board's institution decision, including the January 25, 2023, *Markman* hearing, close of fact and expert discovery, and dispositive motions. *See Precision Planting, LLC. v. Deere & Co.*, IPR2019-01044, Paper 17 at 14-15 (PTAB Dec. 2, 2019); *Abbott Vascular, Inc. v. FlexStent, LLC*, IPR2019-00882, Paper 11 at 30 (Oct. 7, 2019) (same).

Because the investment in the trial has been minimal and Petitioner acted diligently, this factor favors institution. *See, e.g., Hulu*, Paper 11 at 13.

The **fourth factor** (overlap) also weighs in favor of institution, because Petitioner has not yet served its invalidity contentions in the parallel district court proceeding, and thus there is currently no overlap.

Regarding the **fifth factor**, the Board should give no weight to the fact that Petitioner and PO are the same parties as in district court. *See Weatherford U.S., L.P., v. Enventure Global Tech., Inc.*, Paper 16 at 11-13 (April 14, 2021).

The **sixth factor** (other circumstances) weighs heavily in favor of institution given the undeniable similarity between Petitioner's references and the '666 patent. *See Align Technology, Inc. v. 3Shape A/S*, IPR2020-01087, Paper 15 at 42-43 (PTAB Jan 20, 2021); *see also* Section IX. There is also a significant public interest against "leaving bad patents enforceable," and institution will further that interest. *Thryv, Inc v. Click-To-Call Techs., LP*, 140 S. Ct. 1367, 1374 (2020).

XI. CONCLUSION

For the reasons given above, Petitioner requests institution of IPR for claims 1-28 of the ’666 patent based on the grounds specified in this petition.

Respectfully submitted,

Dated: May 26, 2022 By: /Naveen Modi/
Naveen Modi (Reg. No. 46,224)
Counsel for Petitioner

CERTIFICATE OF COMPLIANCE

Pursuant to 37 C.F.R. § 42.24(b)(1), the undersigned certifies that the foregoing Petition for *Inter Partes* Review of U.S. Patent No. 10,153,666 contains, as measured by the word-processing system used to prepare this paper, 12,860 words. This word count excludes the Table of Contents, Table of Authorities, List of Exhibits, Certificate of Compliance, and Certificate of Service.

Respectfully submitted,

Dated: May 26, 2022

By: /Naveen Modi/
Naveen Modi (Reg. No. 46,224)
Counsel for Petitioner

CERTIFICATE OF SERVICE

I hereby certify that on May 26, 2022, I caused a true and correct copy of the foregoing Petition for *Inter Partes* Review of U.S. Patent No. 10,153,666 and supporting exhibits to be served via express mail on the Patent Owner at the following correspondence address of record as listed on PAIR:

Vorys, Sater, Seymour and Pease LLP
1909 K Street, NW, 9th Floor
Washington, DC 20006-1152

The Petition and exhibits were also served upon counsel of record for Patent Owner in the litigation pending before the U.S. District Court for the Eastern District of Texas entitled *Scramoge Technology Ltd. v. Samsung Electronics Co. Ltd. et al.*, Case No. 2:22-cv-00015-JRG-RSP (E.D. Tex.) by electronic mail at the following addresses:

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