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. 9,601,269

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 9,601,269

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I. INTRODUCTION

Samsung Electronics Co., Ltd. ("Petitioner") requests *inter partes* review ("IPR") of claims 1, 2, 4-8, and 10 ("challenged claims") of U.S. Patent No. 9,601,269 ("the '269 patent," Ex. 1001). According to PTO records, the '269 patent 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 UNDER 37 C.F.R. § 42.8

A. Real Party-in-Interest

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

B. Related Matters

The '269 patent is at issue in the following district court proceedings:

- *Scramoge Technology Ltd. v. Samsung Electronics Co. Ltd. et al.*, Case No. 2:22-cv-00015-JRG-RSP (E.D. Tex.)

C. Counsel and Service Information

Lead Counsel: Naveen Modi (Reg. No. 46,224). Backup Counsel: (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) Mark Consilvio (Reg. No. 72,065). Service Information: Paul Hastings LLP, 2050 M Street, N.W., Washington, DC 20036. Tel: (202) 551-1700. Fax: (202) 551-1705. E-mail: PH-Samsung-Scramoge-IPR@paulhastings.com. Petitioner consents to electronic service.

III. PAYMENT OF FEES

The PTO is authorized to charge any fees due during this proceeding to Deposit Account No. 50-2613.

IV. GROUNDS FOR STANDING

Petitioner certifies that the ’269 patent is available for IPR, and that Petitioner is not barred or estopped from requesting IPR on the grounds identified below.

V. PRECISE RELIEF REQUESTED

Claims 1, 2, 4-8, and 10 of the ’269 patent should be cancelled as unpatentable based on the following grounds:

Ground 1: Claims 1, 4-8, and 10 are anticipated by U.S. Patent No. 7,295,096 (“Tamata”) (Ex. 1005);

Ground 2: Claim 2 is obvious based on Tamata;

Ground 3: Claims 1, 2, 4-8, and 10 are obvious based on Tamata in view of U.S. Patent Application Publication No. 2009/0096413 (“Partovi”) (Ex. 1010);

Ground 4: Claims 1, 2, 4-8, and 10 are obvious based on U.S. Pub No. 2007/0126544 (“Wotherspoon”) (Ex. 1009) in view of U.S. Patent Application Publication No. 2009/0015075 (“Cook”) (Ex. 1011); and

Ground 5 Claims 1, 2, 4-8, and 10 are obvious based on U.S. Patent No. 7,403,090 (“Kita”) (Ex. 1007) in view of Partovi.

The ’269 patent issued from U.S. Patent Application No. 14/124,997, filed on

April 24, 2012, and claims priority to Korean Application 10-2011-0055290, filed June 8, 2011.[1]

Tamata issued on November 13, 2007, Partovi published on April 16, 2009, Wotherspoon published on June 7, 2007, Cook published on January 15, 2009, and Kita issued on July 22, 2008. Therefore, all of these references qualify as prior art under at least pre-AIA 35 U.S.C. § 102(b). None of these references were considered during prosecution. (*See generally* Ex. 1004.)

VI. LEVEL OF ORDINARY SKILL IN THE ART

A person of ordinary skill in the art as of the claimed priority date of the '269 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.)[2] More education can supplement practical experience and vice versa. (*Id.*)

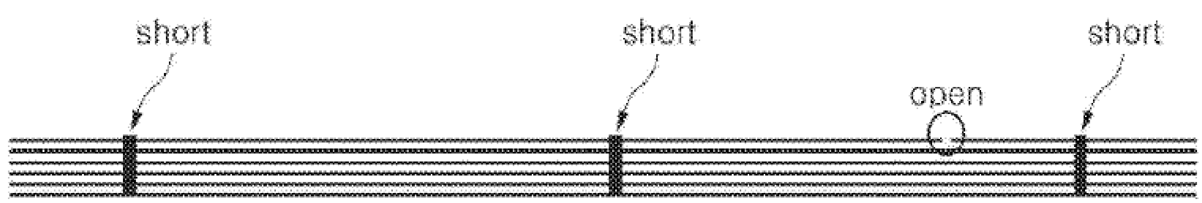
[1] Petitioner does not concede that the '269 patent is entitled to its claimed priority date.

[2] Petitioner submits the testimony of Dr. R. Jacob Baker (Ex-1002), an expert in the field of the '269 patent. (*Id.*, ¶¶5-15; Ex-1003.)

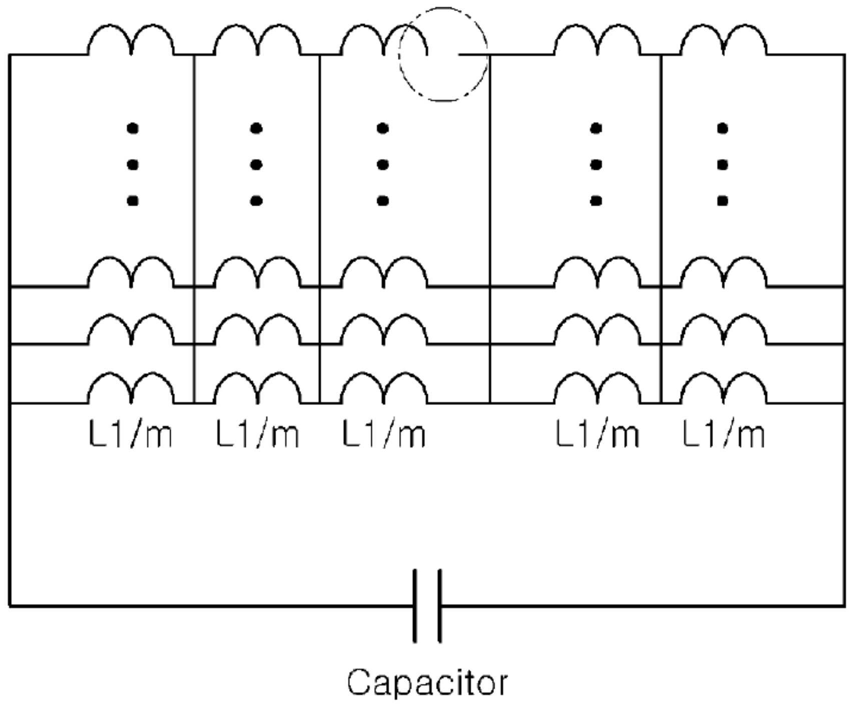
VII. OVERVIEW OF THE '269 PATENT

The '269 patent relates to "wireless power transmission." (Ex. 1001, 1:18-31.) According to the '269 patent, "litz coils are mainly used for the wireless power transmission." (*Id*. at 1:43-44.) Litz coils consist of a plurality of wires insulated from each other, where a spark may occur due to potential difference between the wires if one of the wires is open. (*Id*. at 1:44-46, 3:61-62, 4:13-16, 4:46-49, FIGs. 5, 6, 7(a), 7(b).) Therefore, the '269 patent teaches that the litz wires are shorted at predetermined intervals in order to reduce the chance of such a spark. (*Id*., 1:18-25, 1:52-55, 1:59-63, 4:20-25, 4:50-54, FIGs. 6, 7(c).)

FIG. 6



(*Id*., FIG. 6.)



(c) wire is shorted at predetermined interval (embodiment)

(*Id*., FIG. 7(c).)

According to the ’269 patent, the purported novel feature distinguishing the “related art” is the inclusion of “shorts” at “predetermined intervals.” (*Id*., 1:18-25, 1:52-55, 1:59-63, 4:20-25, 4:50-54, FIGs. 6, 7(c).) But, as illustrated by the prior art presented here, providing conductors (“shorts”) connecting wires of a coil at predetermined intervals was well known in the art. (*See* Section IX.A.4.)

VIII. CONSTRUCTION

For IPR proceedings, the Board applies the claim construction standard according to *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). *See* 83 Fed. Reg. 51,340-59 (Oct. 11, 2018). Under *Phillips*, claim terms are typically given their ordinary and customary meanings, as would have been understood by a POSITA at the time of the invention. *Phillips*, 415 F.3d at 1313; *see also id.,* 1312-16. The Board, however, 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) (citing *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

IX. DETAILED EXPLANATION OF UNPATENTABILITY

A. Ground 1 – Tamata Anticipates Claims 1, 4-8, and 10[3]

1. Claim 1

a) "A coil for wirelessly transmitting or receiving power, the coil comprising:"

The preamble is not limiting. In general, there is a "presumption against reading a statement of purpose in the preamble as a claim limitation." *Marrin v. Griffin*, 599 F.3d 1290, 1294–95 (Fed. Cir. 2010); *Allen Eng'g Corp. v. Bartell Indus.*, 299 F.3d 1336, 1346 (Fed. Cir. 2002). Here, the preamble is not limiting, because, for example, it (i) merely states a purpose or intended use of the invention; (ii) does not impose any structural requirements beyond those explicitly provided in

[3] The mapping of the claim features to the disclosure of Tamata is consistent with Patent Owner's infringement allegations in the district court proceedings. (*See* Ex. 1015, generally.)

the claim body; (iii) is not relied upon for antecedent basis in the claim body; and (iv) was not relied upon during prosecution to distinguish from the prior art. *Arctic Cat Inc. v. GEP Power Prods.*, 919 F.3d 1320, 1329-30 (Fed. Cir. 2019); *Shoes by Firebug LLC v. Stride Rite Children's Grp., LLC*, 962 F.3d 1362, 1367-68 (Fed. Cir. 2020).

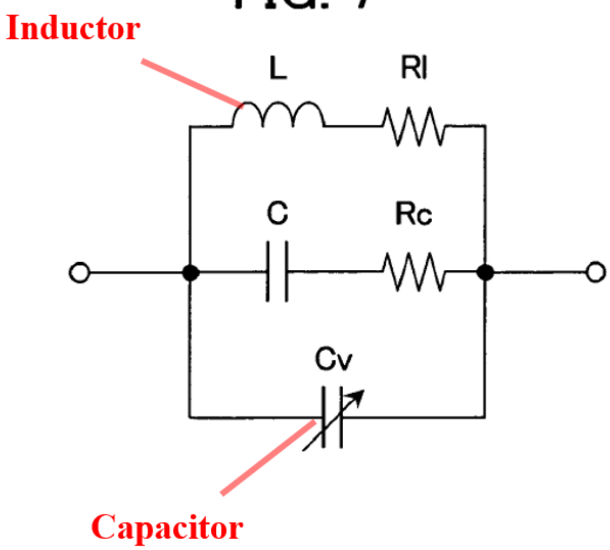
First, the preamble recites a "coil *for wirelessly transmitting or receiving power*," which merely states a purpose or intended use of the alleged invention. *Marrin*, 599 F.3d at 1294–95. Indeed, "[a]pparatus claims cover what a device is, not what a device does." *Hewlett-Packard Co. v. Bausch & Lomb Inc.*, 909 F.2d 1464, 1468 (Fed. Cir. 1990). The inductance capability of a coil to wireless transmit or receive power by converting an oscillating electromagnetic field to electric current or vice versa is inherent to conductive coils and therefore does not limit the claimed structure. (Ex. 1002, ¶44.) *Kropa v. Robie*, 187 F.2d 150, 152 (C.C.P.A. 1951).

Second, the preamble does not impose any structural requirements on the claim because the claim body provides a complete structure. (Ex-1001, 5:2-12 (body of claim 1 reciting all elements of a structure).) *Arctic Cat Inc.*, 919 F.3d at 1329–30; *Shoes by Firebug LLC*, 962 F.3d at 1367–68. Indeed, the preamble recites a "coil," which, according to the remaining claim elements, includes a "coil unit" and a "capacitor." It is unclear how a "coil" includes both a coil unit and a capacitor.

Moreover, the preamble does not provide antecedent basis for terms in the claim body. (*Id.*) The preamble was also not relied upon during prosecution to distinguish over the prior art. (*See generally* Ex-1004.) *Arctic Cat Inc.*, 919 F.3d at 1329.

Nevertheless, to the extent the preamble is limiting, Tamata discloses "a coil for wirelessly transmitting or receiving power." (Ex. 1002, ¶¶45-49.) For example, Tamata discloses a resonant circuit used in an apparatus that performs wireless transmission and/or reception, where the apparatus constitutes a "coil" as that term is used in claim 1. (Ex. 1005 at 1:13-19; *see also id.*, 11:42-46 (resonant circuit), 11:65-67 (voltage controlled oscillator); 12:1-10 (radio frequency transmitter-receiver, such as a tuner for satellite broadcasts, a wireless LAN apparatus, or mobile communication devices); Ex. 1002, ¶45.) Tamata's resonant circuit is shown in annotated figure 7 below, where the inductor shown in figure 7 has a structure like that shown in figure 1 of Tamata. (Ex. 1005, 5:59-61 ("FIG. 7 illustrates a structure in which the inductor illustrated in FIG. 6 is connected to a variable capacitance device Cv in parallel so that a resonant circuit is constructed."), 1:13-19, 3:9-25, 5:19-23 ("[T]he inductor 10 illustrated in FIG. 4 has the same structure as the inductor 1 illustrated in FIG. 1, with regard to the positions and connections of the insulating layers, the metal wires, and the via holes. The inductor 10 has advantages described below."), 5:24-61; Ex. 1002, ¶45.)

FIG. 7



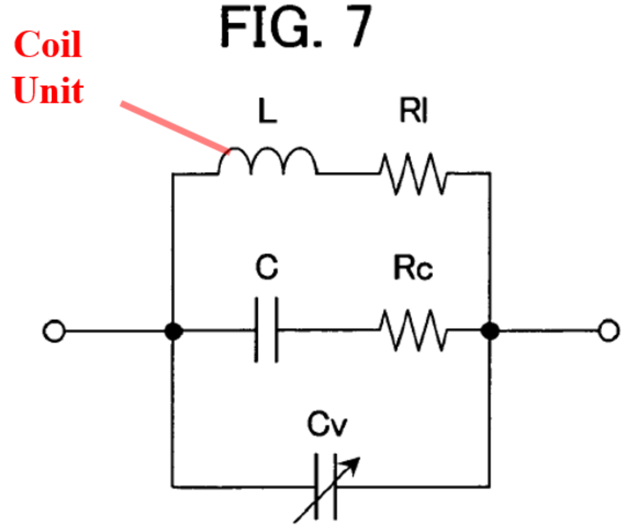
(Ex. 1005, FIG. 7 (annotated); Ex. 1002, ¶45.)

The understanding that such resonant circuits are used for wireless power transfer is consistent with the disclosure of the ’269 patent (Ex. 1001, 2:7-11, 3:21-23) and supported by numerous contemporaneous references. (Ex. 1019, ¶¶[0005]-[0008], [0024], [0108]-[0119]; Ex. 1029, 2:46-64, FIGs. 2A-2C; Ex. 1030, ¶¶[0013], [0036], [0048], FIG. 2; Ex. 1010, ¶¶[0013], [0017], [0115]-[0119], [0167]-[0174], [0212], [0249]; Ex. 1029, 2:48-62, FIGs. 2A-2C; Ex. 1002, ¶¶46-48; *see also* Ex. 1032, ¶¶[0003], [0005]; *infra* Section IX.D.1(c).) A POSITA would have understood that a wireless transmitting and receiving apparatus that includes the resonant circuit shown in figure 7 of Tamata constitutes “a coil for wirelessly transmitting or receiving power” as recited in claim 1. (Ex. 1002, ¶49; *see also* Sections IX.A.1(b)-(d).)

b) "a coil unit comprising a plurality of wires, the plurality of wires insulated from each other; and"

Tamata discloses this claim feature to the extent it can be understood. (Ex. 1002, ¶¶50-56.) For example, as discussed above in Section IX.A.1(a), Tamata discloses a resonant circuit that is used in an apparatus ("coil") for transmitting or receiving power. As shown in annotated figure 7 below, the resonant circuit includes an inductor ("coil unit"), which has characteristics corresponding to the inductor 1 shown and described in conjunction with figures 1 and 2 of Tamata. (Ex. 1005, 1:13-19, 3:9-25, 5:19-23, 5:24-61; Ex. 1002, ¶50.)

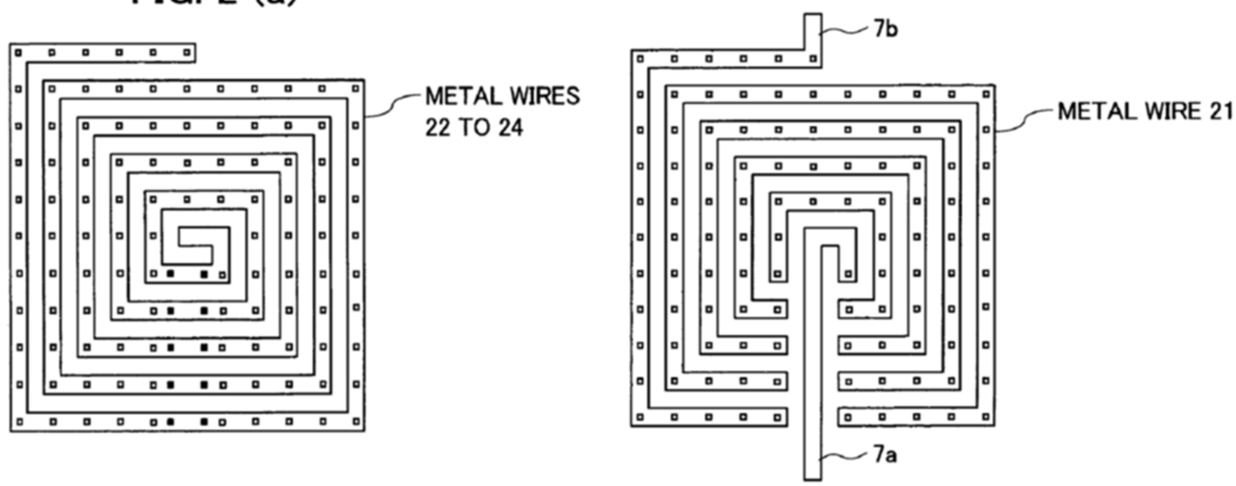
FIG. 7



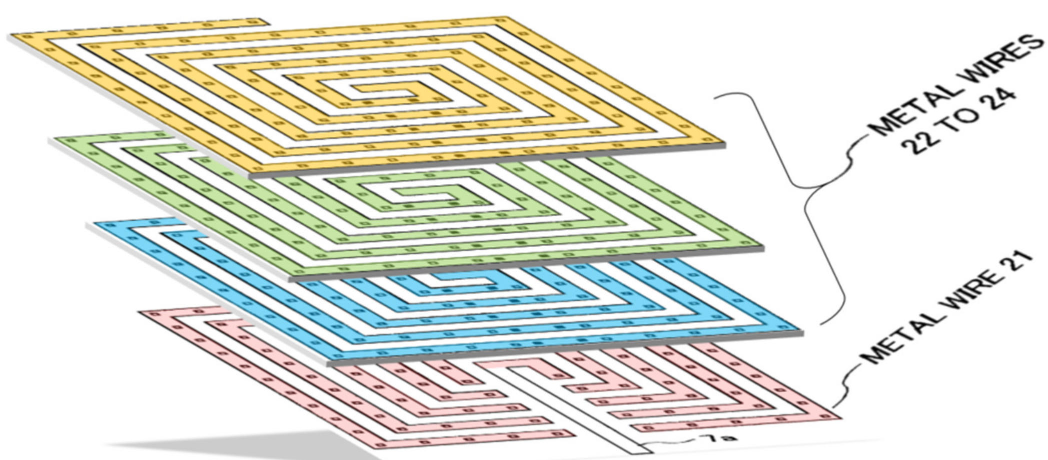
(Ex. 1005, FIG. 7; Ex. 1002, ¶50_.)

Tamata's inductor is made up of a plurality of stacked insulating layers, where coil patterns on the insulating layers are interconnected to form the inductor. (Ex. 1005, 2:25-31.) In the embodiment disclosed in figure 1 of Tamata, four insulating layers 11-14 with corresponding metal wires 21-24 are electrically interconnected using via holes 31-33. (Ex. 1005, 4:1-4.) As illustrated in figure 2 below, each of the metal wires 21-24 is formed as a spiral wiring pattern, where FIG. 2(a) illustrates a plan view of the metal wires for top three layers and FIG. 2(b) illustrates a plan view of the metal wire on the bottom layer. (Ex. 1005, 4:21-34; Ex. 1002, ¶51_.)

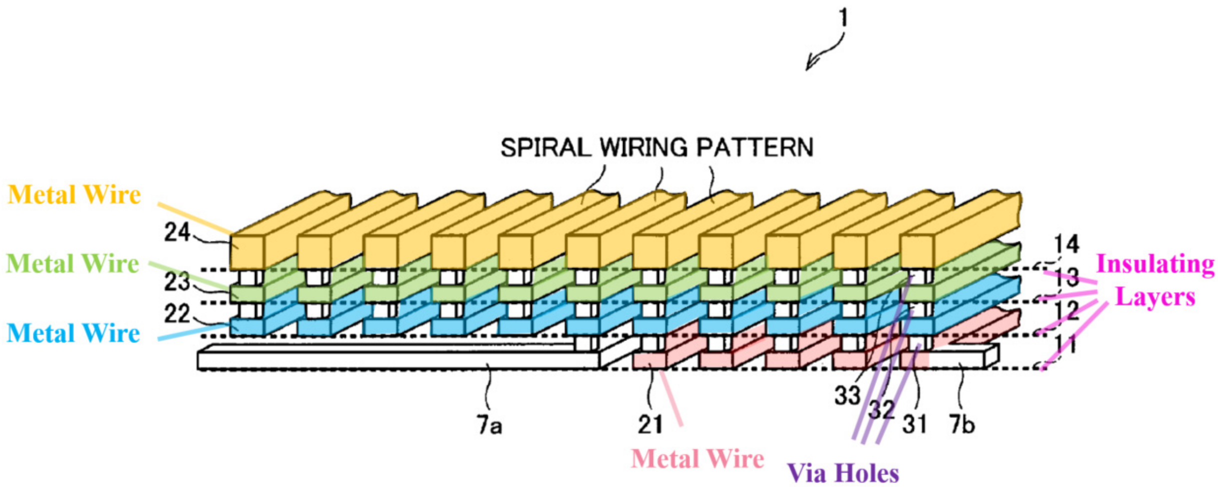
FIG. 2 (a) FIG. 2 (b)



(Ex. 1005, FIGS. 2(a), 2(b).) The non-limiting demonstrative below provides a perspective view of the stacked structure of Tamata's inductor.

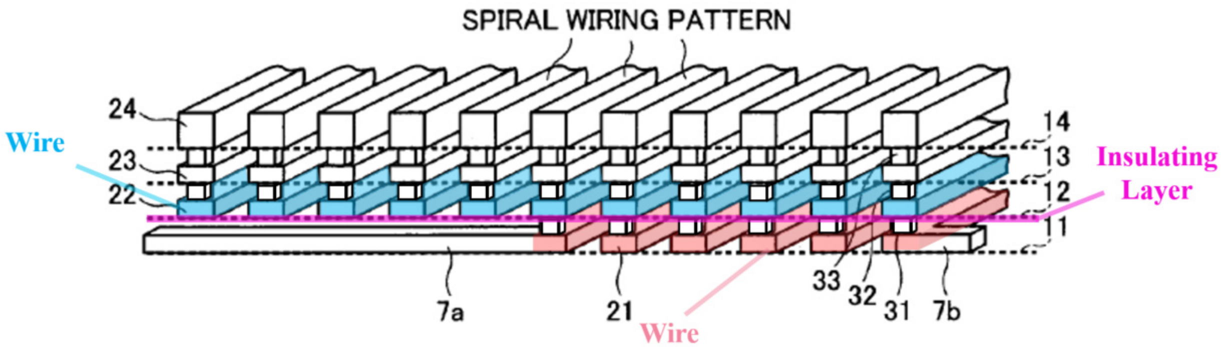


(Ex. 1002, ¶52.) Annotated figure 1 below is a cross-sectional view of Tamata's inductor 1 that includes insulating layers 11-14, metal wires 21-24, and via holes 31-33. (Ex. 1005, 3:9-10, 4:1-4; Ex. 1002, ¶53.)



(Ex. 1005, FIG. 1 (annotated); Ex. 1002, ¶53.) As shown in annotated figure 1 above, each metal wire is provided on a respective insulating layer, and the wires are electrically connected by sets of via holes connecting neighboring metal wires. (Ex. 1005, 4:5-20; Ex. 1002, ¶53.)

The metal wires 21 and 22 constitute a "plurality of wires" as recited in claim 1. Tamata discloses that the metal wires 21 and 22 ("a plurality of wires") are "insulated from each other" by insulating layer 12. For example, as illustrated in annotated FIG. 1 below, Tamata discloses an insulating layer 12 between the metal wire 22 and the metal wire 21 ("plurality of wires"). (Ex. 1005, 4:7-11 ("The first metal wire 21 is formed on an upper surface of the first insulating layer 11...and the second metal wire 22 is formed on an upper surface of the second insulating layer 12."); Ex. 1002, ¶54.)



(Ex. 1005, FIG. 1 (annotated); Ex. 1002, ¶54.)

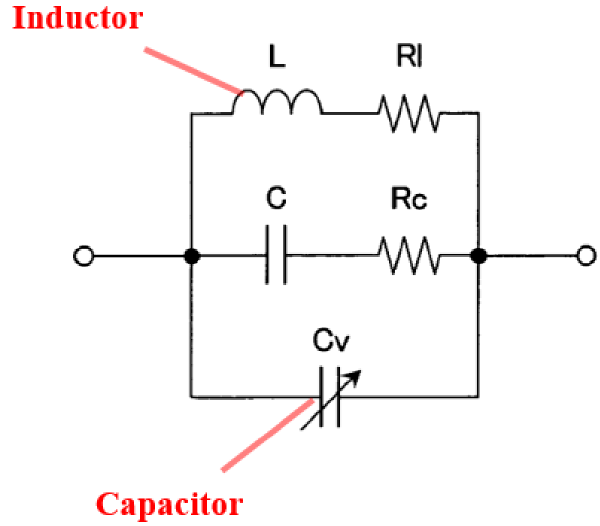
A POSITA would have understood that the via holes 31 are holes in the insulating layer 12 that include conductive material in order to provide the electrical connections between those coils. (Ex. 1005, 4:14-16 ("Through the via holes 31, the first metal wire 21 and the second metal wire 22 are electrically connected."); Ex. 1002, ¶55.)

Tamata's description of via holes that electrically connect the wires does not detract from the reference disclosing that the plurality of wires are "insulated from each other," as read in the context of the '269 patent. (Ex. 1002, ¶56.) Despite claim 1's recitation that "the plurality of wires ***insulated from each other***," the claim also requires that "the wires of the coil unit are ***shorted*** at predetermined intervals throughout the entirety of the wires." (Ex. 1001, 5:5-12; *see also id*., 1:59-63, 2:4-6, 2:16-18.) The '269 patent explains that "the short of the litz coil can be achieved by removing an insulating material from each wire at a predetermined interval and then connecting the wires with each other using a conductor." (Ex. 1001, 4:22-25; *see also id*., 3:60-65.) Hence, despite the presence of an insulating material between the wires in the '269 patent, the wires are described as electrically connected by conductors. Tamata discloses wires separated by insulating material and hence (in the same way as the embodiment of the '269 patent) "insulated from each other," as claimed, as well as being electrically connected to each other through via holes 31 (and thus "shorted") (*see* Section IX.A.1(d)). (Ex. 1002, ¶56.)

c) "a capacitor connected to the coil unit,"

Tamata discloses this feature. (Ex. 1002, ¶57.) For example, as shown in annotated figure 7 below, Tamata discloses a variable capacitor Cv connected to the inductor L ("the coil unit"). (Ex. 1005, 5:59-64 ("FIG. 7 illustrates a structure in which the inductor illustrated in FIG. 6 is connected to a variable capacitance device Cv in parallel so that a resonant circuit is constructed. That is, the series-connected coil L and resistor R1, the series-connected capacitor C and resistor Rc, and the variable capacitance device Cv are connected in parallel."); Ex. 1002, ¶57.)

FIG. 7



(Ex. 1005, FIG. 7 (annotated); Ex. 1002, ¶57.)

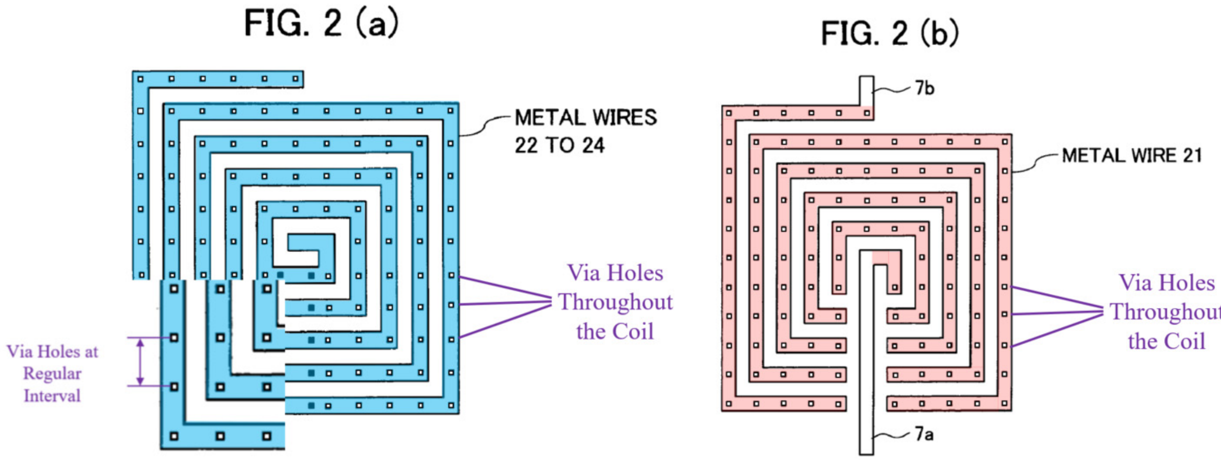
d) "wherein the wires of the coil unit are shorted at predetermined intervals throughout the entirety of the wires."

Tamata discloses this feature. (Ex. 1002, ¶¶58-62.) For example, the via holes 31 are holes in the insulating layer 12 filled with conductive material in order to provide the electrical connections between the wire 21 and the wire 22 ("plurality of wires"). (Ex. 1005, 4:14-16 ("Through the via holes 31, the first metal wire 21 and the second metal wire 22 are electrically connected."); Ex. 1002, ¶58.) As understood by a POSITA, Tamata's conductive via holes function as electrical short-circuits and thus metal wires 21 and 22 ("wires of the coil unit") are "shorted" at each location corresponding to such a via hole. (Ex. 1001, 4:22-25 ("The short of the litz coil can be achieved by removing an insulating material from each wire at a predetermined interval and then connecting the wires with each other using a conductor."); *see also id.*, 3:60-65; Ex. 1025, 1152 (describing a "short circuit" as "a low-resistance connection between two points in an electric circuit through which current flows instead of along the intended path"); Ex. 1002, ¶¶58, 61-62.)

As shown in annotated figures 2(a) and 2(b) below, Tamata includes conductive via holes (white squares), which constitute "shorts," positioned at regular intervals ("predetermined intervals") throughout an entirety of the metal wires 21 and 22:

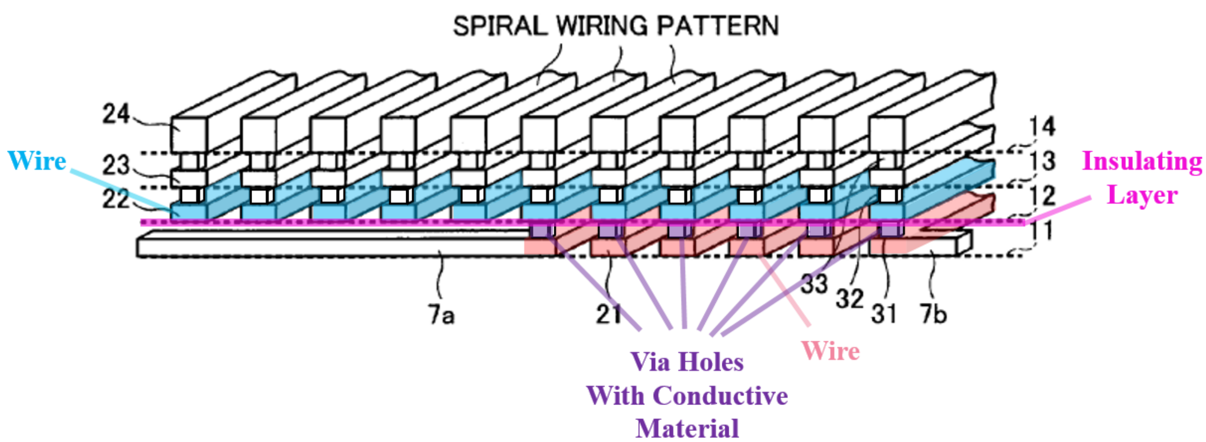
> The metal wires 21 through 24 are connected to each other through the via holes 31 to 33, which are provided on the respective wires. Each of the via holes 31 to 33 is provided in plurality. For example, **the via holes 31 are formed at regular intervals on the first metal wire 21 (bottom layer) arranged in a spiral pattern**.

(Ex. 1005, 4:35-44 (emphasis added); *see also id.*, 4:52-56 (via holes are "represented by white squares in the figure"), 4:57-61, FIGs. 1, 2(a), 2(b); Ex. 1002, ¶59.)



(Ex. 1005, FIGs. 2(a), (b) (annotated); Ex. 1002, ¶59.)

The via holes that include conductive material that electrically connect the metal wires 21 and 22 ("plurality of wires") are also show in annotated figure 1 below.

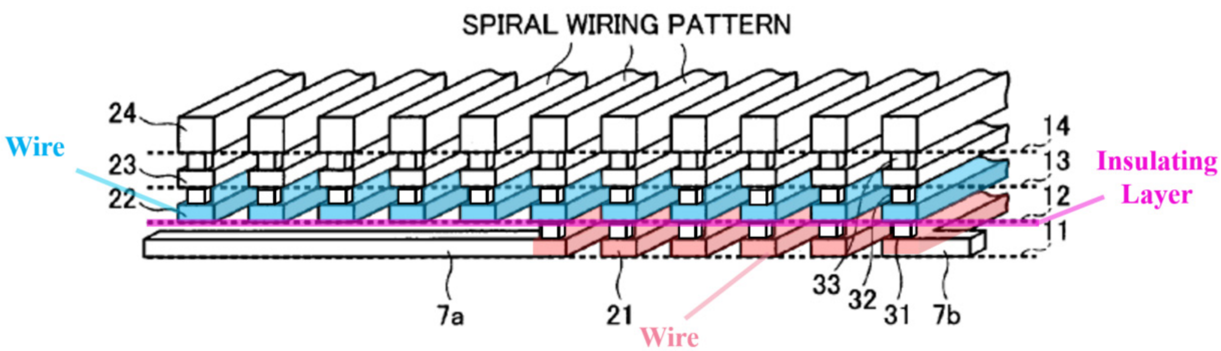


(Ex. 1005, FIG. 1 (annotated); Ex. 1002, ¶60.)

2. Claim 4

"The coil of claim 1, wherein the coil unit further comprises: an insulator layer between the plurality of wires."

Tamata discloses this feature. (Ex. 1002, ¶63.) For example, as illustrated in annotated figure 1 below, Tamata discloses an insulating layer 12 ("an insulator layer") between the metal wire 22 and the metal wire 21 ("plurality of wires"). (Ex. 1005, 4:7-11 ("The first metal wire 21 is formed on an upper surface of the first insulating layer 11...and the second metal wire 22 is formed on an upper surface of the **second insulating layer 12**.") (emphasis added); FIG. 1, Ex. 1002, ¶63.)

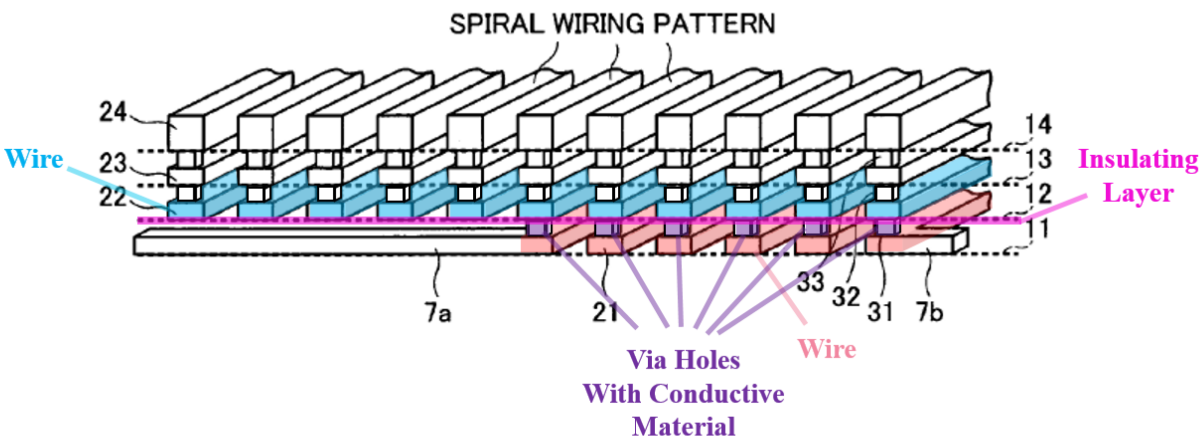


(Ex. 1005, FIG. 1 (annotated); Ex. 1002, ¶63.)

3. Claim 5

"The coil of claim 4, wherein the coil unit further comprises: a conductor electrically connected to at least portions of the plurality of wires."

Tamata discloses this feature. (Ex. 1002, ¶¶64-65.) For example, Tamata discloses a via hole that includes conductive material ("a conductor") electrically connected to at least portions of the plurality of metal wires 21 and 22. (Ex. 1005, 4:14-16 ("Through the via holes 31, the first metal wire 21 and the second metal wire 22 are electrically connected."), 4:35-41, 4:57-61 ("via holes (connecting via holes) 31 to 33"), FIGs. 1-3.)



(Ex. 1005, FIG. 1 (annotated); Ex. 1002, ¶64.) A POSITA would have understood Tamata's connecting via holes to include conductive material because the via holes electrically connect the metal wires. (Ex. 1002, ¶65; Ex. 1005, 4:14-20.)

4. Claim 6

"The coil of claim 5, wherein the conductor is configured to electrically connect the adjacent wires to each other through the insulator."

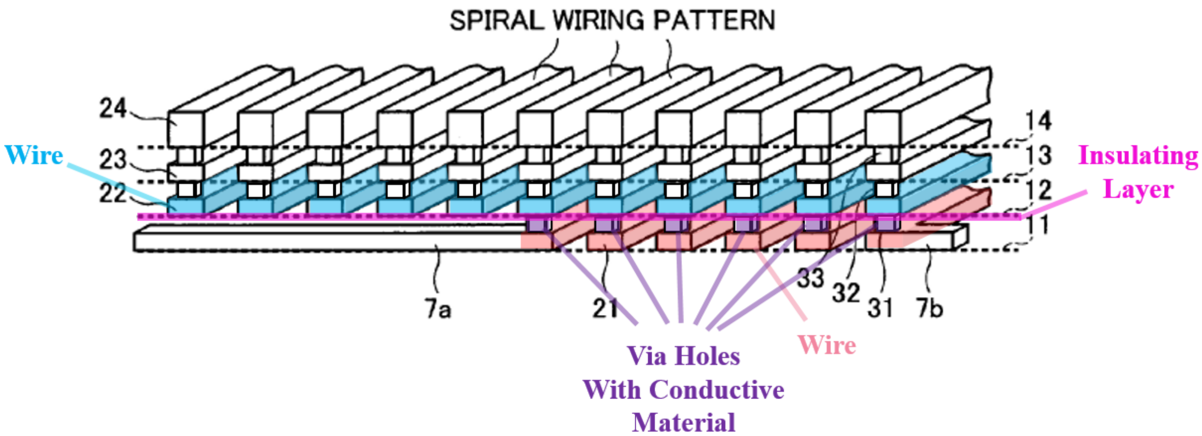
Tamata discloses this feature to the extent it can be understood.[4] (Ex. 1002, ¶¶66-67.) For example, as discussed above for claim 5, Tamata discloses a via hole

[4] There is no antecedent basis for "the adjacent wires" or "the insulator." For purposes of this proceeding, Petitioner treats the "adjacent wires" as referring to the

that includes conductive material ("a conductor") that electrically connects wires 21 and 22 ("adjacent wires") to each other through the insulating layer 12. (Ex. 1005, 4:14-16, 4:35-41, 4:57-61, FIGs. 1-3.)

As shown in annotated figure 1 below, Tamata discloses that the second insulating layer 12 separates the metal wires 21 and 22. (Ex. 1005, 4:5-11.) A POSITA would have understood that the via holes 31 are holes in the insulating layer 12 that include conductive material in order to provide the electrical connections between those coils. (Ex. 1005, 4:14-16 ("Through the via holes 31, the first metal wire 21 and the second metal wire 22 are electrically connected."); Ex. 1002, ¶67.) Therefore, Tamata discloses that the conductive material in the via holes 31, including the "conductor" identified above in Section IX.A.5, passes through the insulating layer 12 ("insulator"). (Ex. 1002, ¶67.)

"plurality of wires" and "the insulator" as referring to "the insulating layer." Petitioner does not concede that claim 6 is not indefinite.



(Ex. 1005, FIG. 1 (annotated); Ex. 1002, ¶67).)

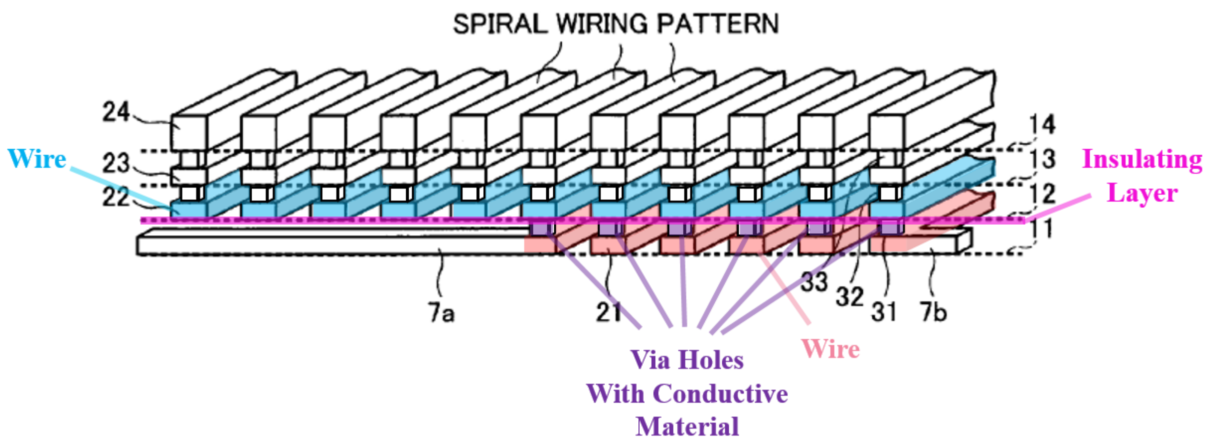
5. Claim 7

"The coil of claim 5, wherein the insulator has holes at a predetermined interval, the conductor being in the holes."

Tamata discloses this feature to the extent it can be understood.[5] (Ex. 1002, ¶¶68-69.) For example, Tamata discloses insulating layer 12 ("insulator") has via holes 31 ("holes") that include conductive material ("the conductor being in the holes") configured to electrically connect wires 21 and 22. (Ex. 1005, 4:5-20, 4:51-5:5, FIGs. 1-3; Ex. 1002, ¶68; Section IX.A.1(d), IX.A.3, IX.A.4.) The conductive material in one of those holes ("the conductor") is included in and passes through

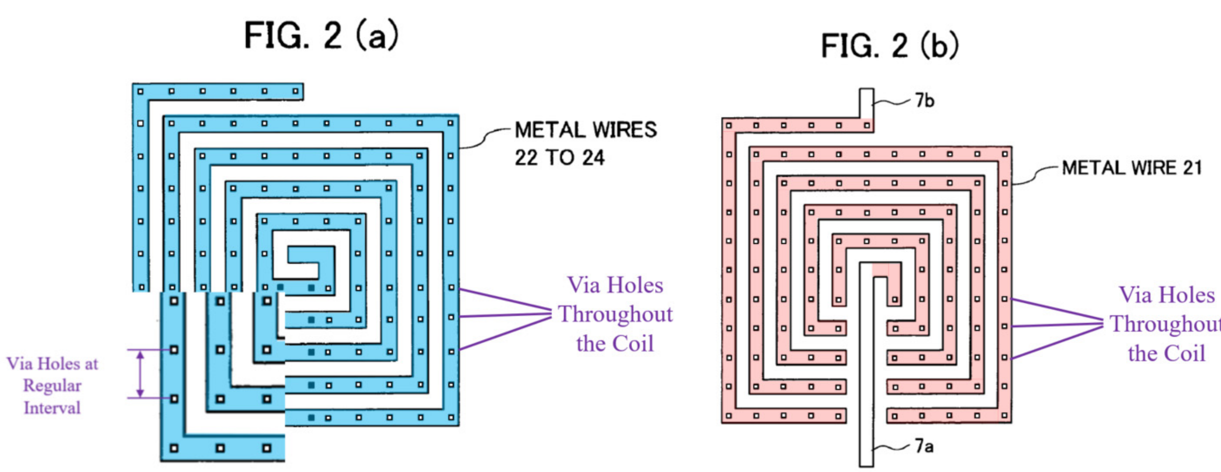
[5] There is no antecedent basis for "the insulator." For purposes of this proceeding, Petitioner treats "the insulator" as referring to "the insulator layer." Petitioner does not concede that claim 7 is not indefinite.

the via holes in order to provide the electrical connections between the wires 21 and 22. (Ex. 1002, ¶68.)



(Ex. 1005, FIG. 1 (annotated); Ex. 1002, ¶68).)

As discussed above in Section IX.A.1(d) and shown in figures 2(a) and 2(b), Tamata discloses conductive via holes (white squares) positioned at regular intervals ("holes at a predetermined interval") throughout an entirety of the metal wires 21 and 22. (Ex. 1005, 4:35-44, 4:57-61, FIGs. 1, 2(a), 2(b); Ex. 1002, ¶69; Section IX.A.1(d).)



(Ex. 1005, FIGS. 2(a), (b) (annotated); Ex. 1002, ¶69.)

6. Claim 8

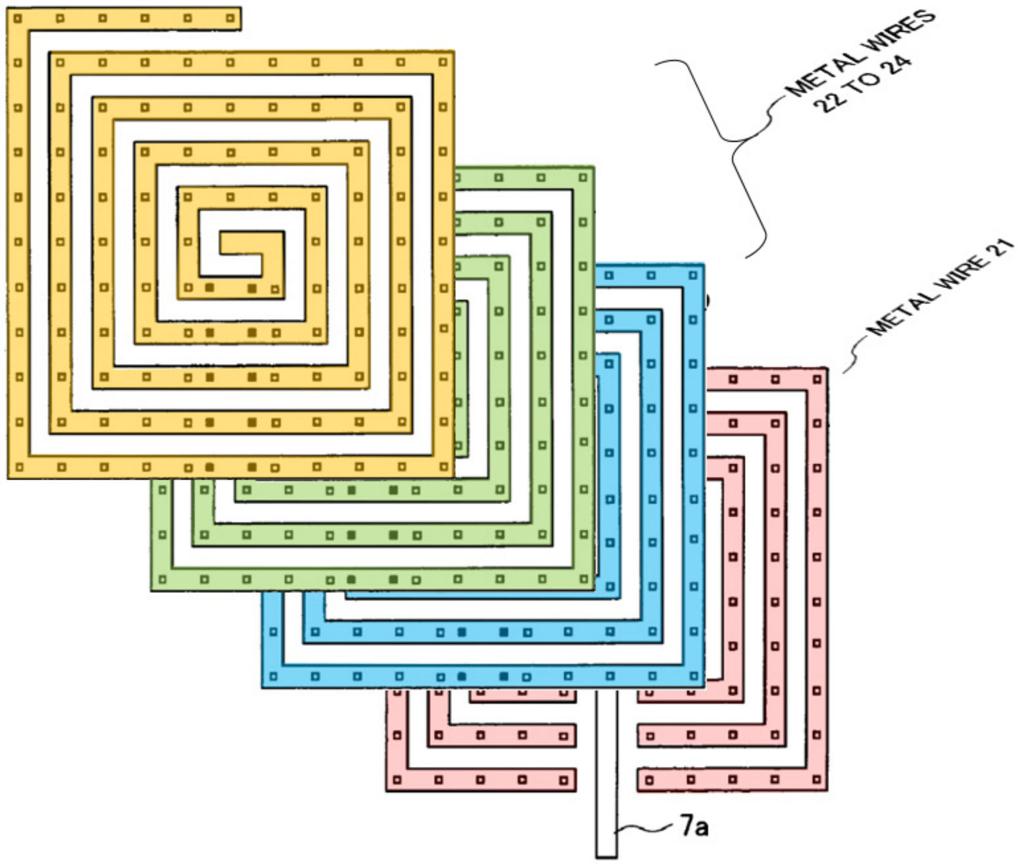
"The coil of claim 5, wherein the conductor contacts at least portions of the plurality of wires."

Tamata discloses this feature. (Ex. 1002, ¶70.) For example, as discussed above for claim 5, Tamata discloses a conductor that is "electrically connected to at least portions of the plurality of wires." (Section IX.A.3.) A POSITA would have understood that the conductive material in the via holes contacts the portions of the plurality of wires that it electrically connects in order to provide that electrical connection. (Ex. 1002, ¶70; Ex. 1005, 4:14-16 ("Through the via holes 31, the first metal wire 21 and the second metal wire 22 are electrically connected."), 4:35-41, 4:57-61, FIGs. 1-3.)

7. Claim 10

"The coil of claim 1, wherein the coil unit is a spiral type coil unit."

Tamata discloses this feature. (Ex. 1002, ¶71.) For example, Tamata discloses the inductor ("coil unit") includes metal wires 21-24 that are formed in a "spiral pattern." (Ex. 1005, 4:21-44, 4:57-61, FIGs. 1, 2(a), and 2(b).) The demonstrative below, which is a composite image of figures 2(a) and 2(b), illustrates the inductor ("coil unit") constitutes a "spiral type coil unit" as recited in claim 10. (Ex. 1002, ¶71.)



(*Id.*)

B. Ground 2 – Tamata Renders Obvious Claim 2

1. Claim 2

"The coil of claim 1, wherein the interval is in a range of about 0.01 m to about 100 m."

Tamata, in view of the knowledge of a POSITA, discloses or suggests this feature. (Ex. 1002, ¶¶72-77.) As an initial matter, the claimed range spans over five orders of magnitude—0.1 m (1cm) to about 100 m (0.1km)—where the upper end of the range would require "predetermined intervals" between shorts of 100 meters. Not only is such a coil impractically massive, but it is unclear how such 100-meter spacing would somehow eliminate sparks between wires. (Ex. 1002, ¶72_.) Indeed, the range is so vast that it is virtually meaningless, especially since it is unrelated to any other aspects of the coil, such as the coil dimensions, wire thickness, insulation thickness, etc. (*Id.*) Moreover the '269 patent attributes no criticality on this range and expressly states that "the above range of about 0.01 m to about 100 m is illustrative purpose only." (*Id.*; Ex. 1001, 4:36-37.)

Indeed, a POSITA would have understood that the spacing between shorts ("interval") would be nothing more than a design choice, where features such as the coil dimensions, wire thickness, insulation thickness, are considered when determining the spacing between shorts. (Ex. 1002, ¶73.) Therefore, such a POSITA would have understood that although Tamata does not expressly disclose the specific distance of the predetermined interval, a distance that falls within the claimed range would have been an obvious design choice for a coil having dimensions where such spacing provides the desired degree of interconnection between the spiral wiring patterns in Tamata. (*Id.*) A POSITA would have been aware of the general size of such spiral wiring patterns ("coils") when used to support wireless power transfer in a resonant circuit like that disclosed by Tamata. (*Id.*) A POSITA would have understood that, in that context, spacing of the connectors (shorts) between the wiring patterns at 1 cm or more would have been obvious. (*Id.*)

Moreover, the interval between connectors recited in claim 2 is a result-effective variable where, absent any disclosure of criticality or unexpected results, specific values in the claimed range would be obvious to a POSITA. Claim 2 recites that "the interval is in a range of about 0.01 m to about 100 m," which simply refers to the relative spacing of the conductors without any reference to other coil variables. (Ex.1002, ¶¶74-76.) As explained below, the spacing of the conductors (i.e., the interval between each "short" between the wires of the coil) is a result-effective variable and finding an optimum value of a result effective variable in such a known coil structure was obvious. *In re Applied Materials, Inc.*, 692 F.3d 1289, 1295 (Fed. Cir. 2012) (noting that claimed process "variables were result-effective, rendering their optimization within the grasp of one of ordinary skill in the art"); *In re Boesch*, 617 F.2d 272, 276 (C.C.P.A. 1980); *In re Aller*, 220 F.2d 454, 456 (CCPA 1955). This is especially true given that the '269 patent provides no evidence that the claimed interval produces a new or unexpected result and thus the claimed range cannot form the basis of patentability given the claimed interval is a result-effective variable. (Ex. 1002, ¶¶74-76.) *In re Boesch*, 617 F.2d at 276; *In re Woodruff*, 919 F.2d 1575, 1578 (Fed. Cir. 1990). Indeed, as noted above, the range spans five orders of magnitude and is for illustrative purposes, thereby demonstrating the clear lack of any criticality.

Tamata discloses including conductors that connect the wires 21 and 22. (Section IX.A.1(d).) While Tamata's inductor includes regularly spaced conductors, the exact spacing of Tamata's conductors is not explicitly disclosed. (Ex. 1002, ¶74.) However, Tamata recognizes that, in the spiral wire, a series resistance (wiring resistance) occurs that leads to reduction in quality factor Q of the inductor. (Ex. 1005, 1:65-2:3.) To address this, "the coil patterns are electrically connected [through via holes] and stacked in multiple levels [allowing] resistances (wiring resistance) applied in series to the coil patterns to be applied in a parallel manner [and] enabling reduction in the total series resistance of the inductor." (Ex. 1005, 2:34-38; *see also id*., 5:1-10.) Tamata also recognizes that this arrangement of electrical connections reduces parasitic capacitance and increases quality (Q) factor (hence counteracting the skin effect). (Ex. 1002, ¶74; Ex. 1005, 2:21-3:5, 5:1-10, 6:4-9:21, FIGs. 9-12.) At the time of the alleged invention, it was desirable to have an inductor with a large Q factor in order to provide for more efficient wireless power transfer. (Ex. 1002, ¶74.)

Indeed, it was known at the time to arrange the conducting interconnections at "predetermined intervals" like in Tamata in order to obtain desirable coil characteristics. (Ex. 1002, ¶75; *see also* Ex. 1012, 3:6-13 (describing stacked metal traces "connected by a plurality of vias 110 each positioned at a predetermined distance"), 4:29-31, 4:38-41, 4:51-58 (teachings applicable to spiral inductors), 5:14-17, FIGS. 5, 6, 11; Ex. 1013, 3:21-37, 5:28-40, 7:5-45 (describing "via-hole conductors disposed at predetermined intervals"), 11:61-12:9; Ex. 1014, cl. 3, 9 (requiring contact holes formed on a first conductive pattern "at predetermined intervals"); Ex. 1002, ¶75.) It was also known that "[t]he use of...shorting bridges can enable [a Radio Frequency (RF)] coil designer to create an RF coil that has an impedance that is already matched to a transmission line." (Ex. 1008, ¶[0009]; Ex. 1002, ¶75.)

A POSITA would have understood that providing such connections at an interval greater than 1 cm (and less than 100 m) would have been beneficial in a coil having dimensions where the interval provides the desired interconnectivity between wires in the coil without unnecessarily adding complexity and cost to the coil structure by having more conductors (hence with a smaller interval) than is required to obtain the desired performance. (Ex. 1002, ¶76.) This is evidenced by the lack of specificity of the interval in the prior art references as well as the massive range for such an interval provided by the '269 patent itself. The lack of specificity demonstrates that the interval is nothing more than a variable that can be optimized in order to provide desired electrical characteristics for the coil while not adding unnecessary complexity and cost. (*Id.*)

In view of the above, a POSITA would have recognized that the spacing between the conductors connecting two wires forming a coil is a result-effective variable given that the spacing affects the electrical characteristics of the coil and that this variable determines whether a sufficient parallel connection is established between the wires. (*Id.*, ¶¶74-76.) Therefore, to increase the level of parallel connectivity, a skilled artisan would have looked to optimize the interval between connectors in Tamata. (*Id.*, ¶76) Indeed, when designing a coil that includes parallel-connected wires like that disclosed by Tamata, a POSITA would have been motivated to experiment with the spacing of the connectors that interconnect the wires such that the desired coil characteristics are achieved without undue complexity and cost. (*Id.*, 77)

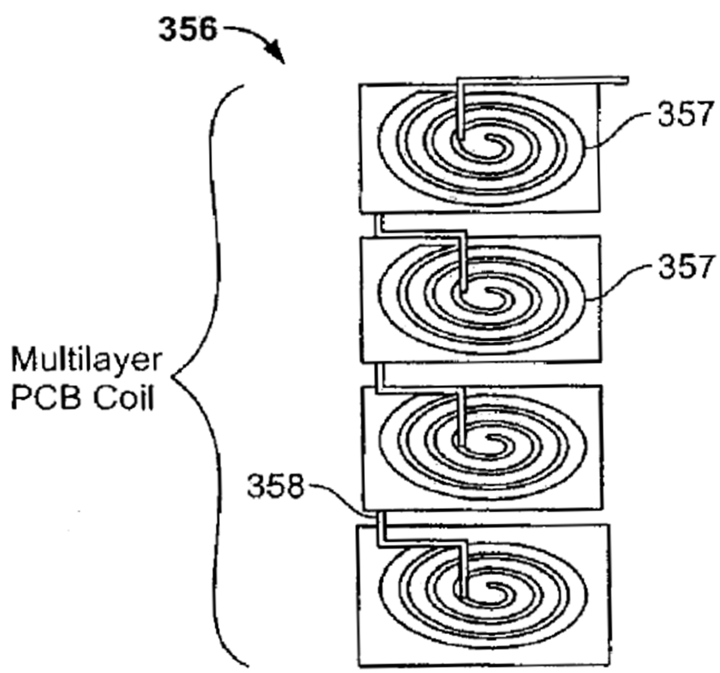
Therefore, Tamata renders obvious the claimed feature of "the interval is in a range of about 0.01 m to about 100 m" because the parameter recited in the claim (*i.e.*, the interval between conductors) was understood by a POSITA to be a result-effective variable. Indeed, the '269 patent provides no evidence that the claimed intervals of 1 meter, 10 meters, 50 meters, or 100 meters, which are all included in the range, produce a new or unexpected result. (Ex. 1002, ¶72.) In fact, the '269 patent states the range is merely for "illustrative purpose only." (Ex. 1001, 4:36-37.) Thus, the claimed interval range cannot form the basis of patentability given the teachings of Tamata and the knowledge of a POSITA. *In re Woodruff*, 919 F.2d 1575, 1578 (Fed. Cir. 1990) ("The law is replete with cases in which the difference between the claimed invention and the prior art is some range or other variable within the claims. These cases have consistently held that in such a situation, the applicant must show that the particular range is *critical*, generally by showing that the claimed range achieves unexpected results relative to the prior art range.") (citations omitted).

Further, the courts have long recognized that "where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." *E.I. DuPont de Nemours & Co. v. Synvina C.V.*, 904 F.3d 996, 1006 (Fed. Cir. 2018) (quoting *In re Aller*, 220 F.2d at 456). "A more specific application of this general principle is that '[a] prima facie case of obviousness typically exists when the ranges of a claimed composition overlap the ranges disclosed in the prior art.'" *Id.* (quoting *In re Peterson*, 315 F.3d 1325, 1329 (Fed. Cir. 2003). "[S]uch overlap creates a presumption of obviousness." *Id.* This same scheme controls in IPR proceedings. *Id*. at 1008. Thus, "where there is a range disclosed in the prior art, and the claimed invention falls within that range, the burden of production falls upon the patentee to come forward with evidence of teaching away, unexpected results or criticality, or other pertinent objective indicia indicating that the overlapping range would not have been obvious in light of that prior art." *Id.*

C. Ground 3 – Tamata and Partovi Render Obvious Claims 1, 2, 4-8, and 10

As discussed above in Section IX.A, the preamble of claim 1 is not limiting. To the extent the preamble is limiting and Tamata does not disclose the features therein, Partovi discloses using an inductor like that disclosed by Tamata for wireless power transfer, and in view of Partovi, a POSITA would have found it obvious to include a Tamata-like inductor in a coil unit or wireless power transfer apparatus for wirelessly transmitting or receiving power. (Ex. 1002, ¶¶78-85.)

Partovi, like Tamata, discloses multi-layer inductors where a plurality of coil patterns are stacked to form the inductor. (Ex. 1010, ¶[2012].)



(*Id.*, FIG. 18.)

As shown in figure 18 above, "a multi-layer PCB coil 356 is created in separate PCB layers 357, which are then connected 358, and manufactured together via common techniques used in PCB fabrication, for example by use of a via or contacts." (*Id.*, ¶[0224].) This arrangement is structurally and functionally similar to Tamata's stacked metal wire coils connected with vias. (Ex. 1002, ¶80.) Hence, a POSITA would have had reason to consider the teachings of Partovi and Tamata together.

Partovi is directed to "a system and method for inductive charging of portable devices" (Ex. 1010, ¶[0003]) where such portable devices include, for example, cellular telephones (*id.*, [0004].) To avoid the drawbacks of special connectors to charge the portable devices, Partovi discloses "[a] portable inductive power source, power device, or unit, for use in powering or charging electrical, electronic, battery-operated, mobile, and other devices or rechargeable batteries." (Ex. 1010, ¶[0013].) Partovi discloses a system that includes a "base unit that contains a primary, which creates an alternating magnetic field by means of applying an alternating current to a winding, coil, or any type of current carrying wire" and "a receiver that comprises a means for receiving the energy from the alternating magnetic field from the pad and transferring it to a mobile or other device or rechargeable battery" using "coils, windings, or any wire that can sense a changing magnetic field, and rectify it to produce a direct current (DC) voltage, which is then used to charge or power the device." (*Id.*) For example, Partovi states "[a] mobile device can be enabled to receive power inductively by providing a receiver (such as a coil, etc.)." (Ex. 1010, ¶[0460].)

Partovi discloses that using a coil, like that depicted in figure 18 of Partovi, in such a wireless power transfer application provides for an efficient power transfer using a compact arrangement that achieves "higher flux densities." (Ex. 1010, ¶¶[0212], [0224], FIG. 18.) Partovi further discloses that such stacked coils can provide low resistance, which is desirable. (*Id.*, ¶[0224] ("The resulting overall stack is a thin multi-layer PCB that contains many turns of the coil. In this way, wide coils (low resistance) can be used, while the overall width of the coil is not increased."); *see also id.*, ¶¶[0167] ("[I]n order for the power efficiency to be maximized and to minimize losses in the coil, the coils should be manufactured to have as low a resistance as possible."), [0473] ("To design a high efficiency inductive power transfer coil, the resistivity of the coil must be minimized while the resulting induction is kept at desired levels."), [0224] ("wide coils (low resistance) can be used").)

In view of Partovi, a POSITA would have found it obvious to use Tamata's inductor that includes stacked coils in wireless power transfer systems like those disclosed by Partovi. (Ex. 1002, ¶¶81-83.) A POSITA would have had good reason to combine the teachings of Tamata and Partovi, as described above, to implement a wireless power transfer apparatus ("coil" as recited in claim 1) that includes an inductor like that shown in figure 1 of Tamata and discussed above in Section IX.A. (Ex.1002, ¶83.) Partovi discloses that inductors made of stacked coils, like that shown in figure 1 of Tamata, provide advantages such as high flux density and low resistance, which results in more efficient power transfer. (Ex. 1010, ¶¶[0212], [0224].) Indeed, Tamata recognizes that having the coil patterns stacked and connected together "allows resistances (wiring resistance) applied to series to the coil patterns to be applied in a parallel manner, enabling reduction in the total resistance of the inductor." (Ex. 1005, 2:34-38.) Therefore, a POSITA would have understood that a Tamata-like inductor would have been appropriate for use in wireless power transfer systems like those disclosed by Partovi because the inductor has the characteristics Partovi teaches are advantageous in such systems, such as lower resistance. (Ex.1002, ¶83.)

Including a Tamata-like inductor in a wireless power transfer system as disclosed by Partovi would have been straightforward for a POSITA to implement, because Partovi discloses how to implement such a wireless power transfer system that includes a multi-layer inductor as disclosed by both Tamata and Partovi. (Ex. 1002, ¶84.) The wireless power transfer apparatus ("coil") would have been a predictable combination of known components according to known methods (*e.g.*, applying the teachings of Partovi regarding using multi-layer inductors in wireless power transfer systems to Tamata's multi-layer inductor), and would have been produced the predictable result of an wireless power transfer apparatus with numerous advantages described by Partovi. (Ex. 1002, ¶84.) *See KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 416 (2017).

Therefore, the Tamata-Partovi combination discloses or suggests the preamble of claim 1, whereas the remaining features of claims 1, 4-8, and 10 are disclosed by Tamata for the reasons presented above in Section IX.A. (Ex. 1002, ¶85.) Similarly, the features of claim 2 are disclosed or suggested by Tamata for the reasons presented above in Section IX.B. (*Id.*)

D. Ground 4 –Wotherspoon and Cook Render Obvious Claims 1, 2, 4-8, and 10[6]

1. Claim 1

a) A coil for wirelessly transmitting or receiving power, the coil comprising:

As discussed above in Section IX.A.1(a), the preamble of independent claim 1 is not limiting. However, to the extent the preamble is limiting, Wotherspoon discloses or suggests a coil for wirelessly transmitting or receiving power. (Ex.

[6] The mapping of the claim features to the disclosure of Wotherspoon is consistent with Patent Owner's infringement allegations in the district court proceedings. (*See* Ex. 1015, generally.)

1002, ¶¶86-94.) For example, Wotherspoon discloses an apparatus ("coil") that includes an inductive component like that illustrated in figure 3 below. (Ex. 1009, [0031] ("For example, FIG. 3 illustrates an inductor with the turns 2 and 6 shorted together not only at their ends but also at an intermediate point illustrated at 10.")

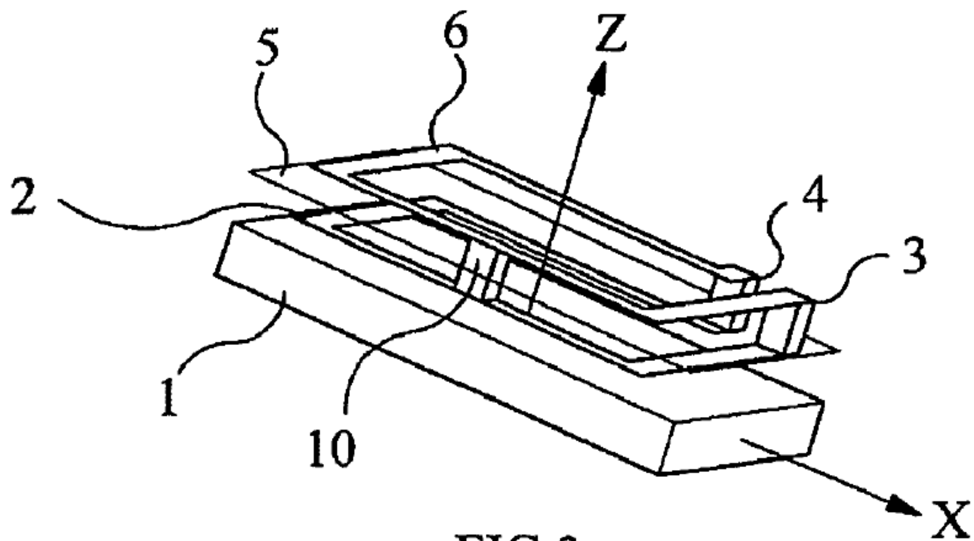


FIG 3

(Ex. 1006, FIG. 3.)

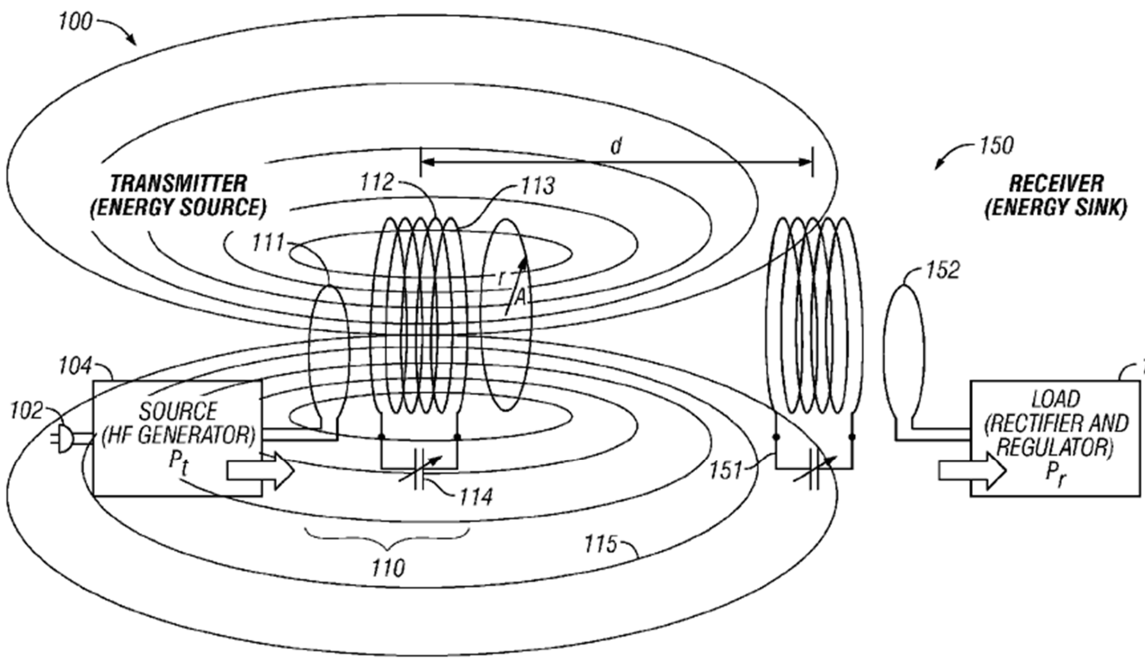
Wotherspoon further discloses that such an inductive component, as well as those depicted in the other figures, can function as a loop antenna, chip inductor, or inductive coupling—*i.e.*, devices capable of wirelessly transmitting or receiving power—that have many possible uses, such as in a near field coupling device or radio frequency identification device. (Ex. 1009, ¶¶[0001] ("loop antenna or choke or in near field coupling devices or tuned circuits"), [0009], [0019] ("loop antenna, an inductive coupling, a choke, a tuned circuit and a filter"), [0037]; Ex. 1002, ¶¶86-87.)

Based on Wotherspoon's disclosure of inductor coil structure and intended use (*e.g.*, as in near field inductive coupling device or switched mode power supply), a POSITA would have understood Wotherspoon discloses or suggests the use of the inductor shown in figure 3 above in an apparatus ("coil") for wirelessly transmitting or receiving power. (Ex. 1002, ¶88; *see*, *e.g.*, Ex. 1018, ¶¶9, 14, 16, 55, 70, 91; Ex. 1019, ¶¶[0005]-[0008], [0093]-[0094], [0108]-[0119]; Ex. 1010, ¶¶[0003]-[0012]; Ex. 1026, 1:12-64; Ex. 1027, ¶¶[0005]-[0008]; Ex. 1028, 1:8-59, 2:5-10.)

Further, to the extent the preamble is limiting and Wotherspoon does not disclose or suggest the features therein, Cook discloses using an inductor like that disclosed by Wotherspoon in an apparatus for wireless power transfer, and in view of Cook, a POSITA would have found it obvious to include Wotherspoon's inductor in a system ("coil") used "for wirelessly transmitting or receiving power." (Ex. 1002, ¶89.)

Cook discloses wireless energy transfer from a power source to a destination via electromagnetic near field/inductive coupling that uses transmitting and receiving antennas. (Ex. 1011, ¶¶[0001] ("It is desirable to transfer electrical energy from a source to a destination without the use of wires to guide the electromagnetic fields."), [0002], [0003]-[0010], [0011] ("The present application describes transfer of energy from a power source to a power destination via electromagnetic field coupling. Embodiments describe techniques for new coupling structures, e.g., transmitting and receiving antennas.), [0012]-[0015], [0016], [0026], [0027], [0052], [0064]; Ex. 1002, ¶90.)

For example, Cook discloses a power transmitter assembly 100 illustrated in figure 1 below, including a resonant antenna 110 having an inductive loop 111, which is inductively coupled to a high Q resonant antenna part 112. (Ex. 1011, ¶[0016].)



(Ex. 1011, FIG. 1.)

The resonant antenna 112 includes a number of coil loops 113. (*Id.*, ¶[0016].) A variable capacitor 114, is connected in series with the coil 113, forming a resonant loop. (*Id*.) Cook further discloses that energy (power) can be transferred to a receiver 150 including a receiving antenna 155. (*Id*., ¶¶[0020]-[0021].) The receiving antenna 155 is similarly a high Q resonant coil antenna 151 having a coil part and capacitor, coupled to an inductive coupling loop 152. (*Id*., ¶[0020].)

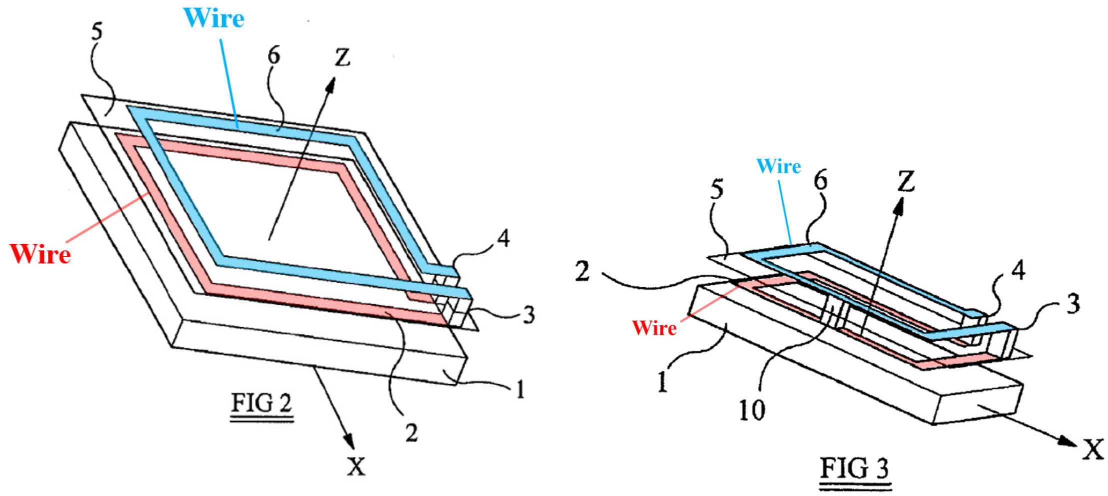
In view of Cook, a POSITA would have found it obvious to use a Wotherspoon-like inductor that includes coils in wireless power transfer systems like those disclosed by Cook. (Ex. 1002, ¶92.) A POSITA would have had good reason to combine the teachings of Wotherspoon and Cook, as described above, to implement a wireless power transfer system ("coil" as recited in claim 1) that includes an inductor like that shown in, for example, figure 3 of Wotherspoon and discussed below in Sections IX.D.1(b)-IX.D.1(d) (Ex.1002, ¶93.) Cook discloses that using inductive loops in near field coupling devices, like those disclosed in Wotherspoon, results in more efficient power transfer. (Ex. 1011, ¶¶[0001], [0011]-[0014].) In this regard, Cook recognizes that it was "desirable to increase the Q as much as possible," where "the Q" refers to the quality factor of the coil. (*Id*., ¶[0040]; Ex. 1002, ¶93.) And Wotherspoon discloses a way to increase Q in a given inductive coil/loop antenna for a near field coupling device, thereby improving performance. (Ex. 1009, ¶¶[0001], [0003], [0019], [0020] ("It is thus possible to provide an inductive component of improved performance. Such a component is relatively easy and inexpensive to manufacture, for example having the advantages of known planar arrangements. The resistance of the component may be made relatively low and the results of the skin[] effect may be reduced to as to provide an inductive component of improved Q, particularly at relatively high frequencies where the skin effect becomes significant."), [0037].) Therefore, a POSITA would have understood that Wotherspoon's inductor would be appropriate for use in wireless power transfer systems like those disclosed by Cook, as the inductor has the characteristics Cook teaches are advantageous (*e.g.*, high Q) in such systems. (Ex.1002, ¶93.)

Including an inductor as disclosed by Wotherspoon in a wireless power transfer system as disclosed by Cook would have been straightforward for a POSITA to implement, because Cook discloses how to implement such a wireless power transfer system that includes a high-Q inductor like that disclosed by Wotherspoon. (*Id.*, ¶94; Ex. 1009, ¶0020 (describing the inductive component as "relatively easy and inexpensive to manufacture").) The wireless power transfer apparatus ("coil") would have been a predictable combination of known components according to known methods (e.g., applying the teachings of Cook regarding using inductive coils in wireless power transfer systems to Wotherspoon's inductor), and would have been produced the predictable result of an wireless power transfer apparatus with numerous advantages described by Cook and Wotherspoon. (Ex. 1002, ¶94.) *See KSR*, 550 U.S. at 416.

b) a coil unit comprising a plurality of wires, the plurality of wires insulated from each other; and

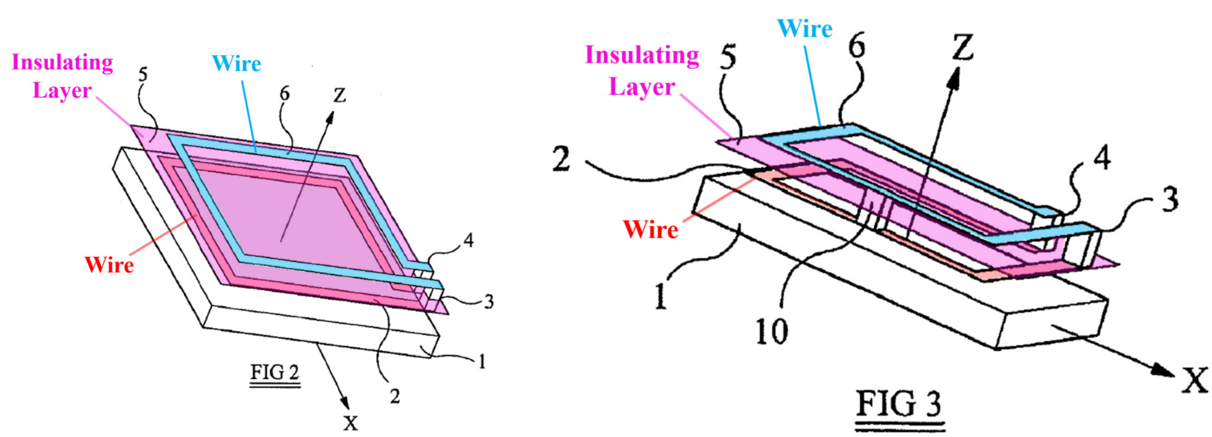
The Wotherspoon-Cook combination discloses or suggests this feature (Ex. 1002, ¶¶95-97.) For example, as shown in annotated figures 2 and 3[7] below, Wotherspoon discloses an inductor ("a coil unit") that includes a square turn 2 and a square turn 6 ("a plurality of wires") that are insulated from each other by insulating layer 5. (Ex. 1009, ¶¶[0028] ("inductor [of figures 1-3] comprises what is effectively a single turn coil of square shape"), [0029] ("square turn 2 is formed by silk screen printing a conductive ink"), [0030] ("A second square turn 6 is formed on top of the insulating layer 5, for example using the same technique as was used to form the turn 2."); Ex. 1002, ¶95 (explaining how a POSITA would have understood coil turns formed from conductive ink to be "wire" according to that term's ordinary meaning in the art); Ex. 1023, 5:8-40 (describing wires of a loop antenna coil made from conductive ink); Ex. 1024, ¶¶[0086]-[0087] (describing electrical wires formed from conductive ink).)

[7] Wotherspoon's description of the inductor in figures 1 and 2 also applies to like elements the other figures, including figure 3. (Ex. 1009, ¶0027 ("Like reference numerals refer to like parts throughout the drawings.")



(Ex. 1009, FIGs. 2, 3 (annotated); Ex. 1002, ¶95.)

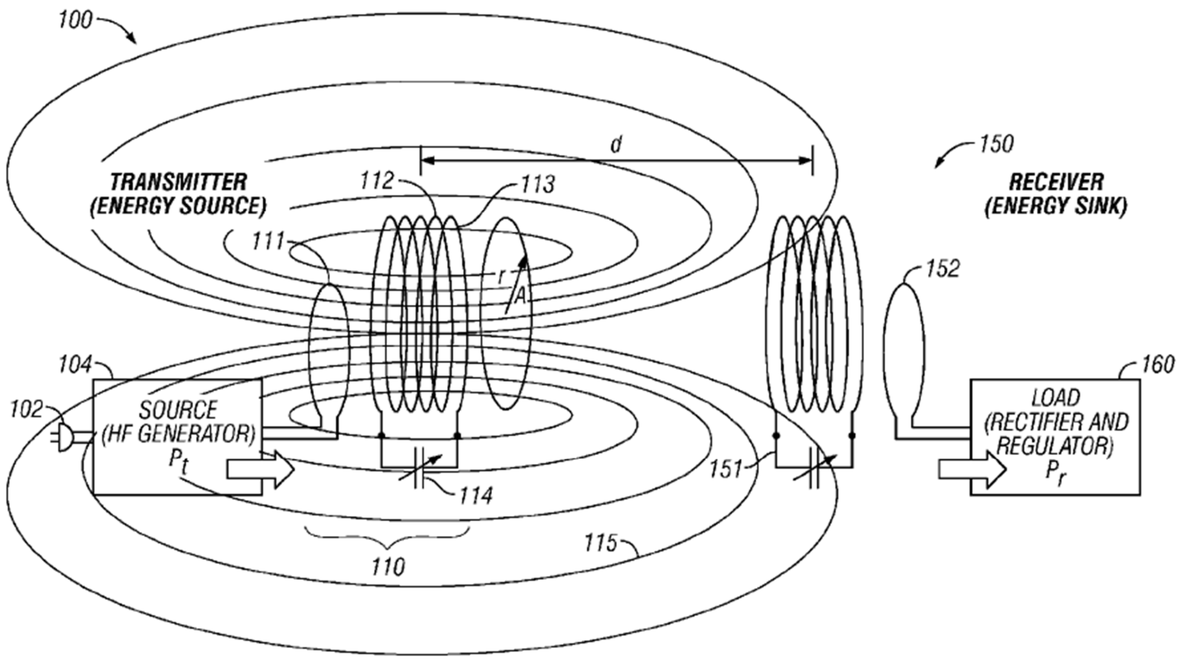
Wotherspoon discloses that the "inductive component" includes a "plurality of planar inductive elements" that are "separated by an insulator," but "connected in parallel" at least at "one…point" in each turn. (Ex. 1009, ¶[0009].) Annotated figures 2 and 3 below show the insulating layer that separates the turns 2 and 6 ("wires"). (Ex. 1009, ¶¶[0009], [0030] ("The turn 6 has the same shape and size as the turn 2 and directly overlays it so as to be superimposed directly above the turn 2 but separated electrically therefrom by the insulating layer 5."), FIGs. 2, 3.)



(Ex. 1009, FIGs. 2, 3 (annotated); Ex. 1002, ¶97.)

c) a capacitor connected to the coil unit,

The Wotherspoon-Cook combination discloses or suggests this feature (Ex. 1002, ¶¶98-100.) As discussed above in Section IX.D.1(a), a POSITA would have found it obvious to use an inductor like that disclosed by Wotherspoon in a wireless power transfer application like that disclosed by Cook. (Section IX.D.1(a).) As shown in figure 1 of Cook below and as was well-known in the art, such wireless power transfer systems often utilize resonant circuits to facilitate wireless power transfer, where an inductor (*e.g.*, coil 113) coupled with a capacitor (*e.g.*, variable capacitor 114) forms the resonant circuit. (Ex. 1002, ¶98; Ex. 1029, 2:48-62, FIGs. 2A-2C; Ex. 1030, ¶[0013], FIG. 2; Ex. 1031, ¶[0469]; Ex. 1006, ¶13 (describing conventional use of capacitor with an inductor coil for power transfer); Ex. 1008, ¶¶0042, 0049; Ex. 1018, ¶¶9, 14, 16, 55, 70, 91; Ex. 1019, ¶¶[0108]-[0116] (describing an RFID reader/writer with an LC resonator circuit), [0143]-[0144]; *see also supra* Section IX.A.1(a).)



(Ex. 1011, FIG. 1 (annotated); Ex. 1002, ¶98.)

Therefore, Cook discloses a variable capacitor 114 connected to coil 113, forming an LC resonant circuit in a power transmitter. (Ex. 1011, abstract, ¶¶0016, 0022, 0024, FIG. 1; *see also* ¶¶0025-0027, FIG. 2; Ex. 1002, ¶99.) Cook also discloses a similar high Q resonant antenna 151 having a capacitor connected to a coil forming an LC resonant circuit in a power receiver 150. (Ex. 1011, ¶0012; Ex. 1002, ¶99.)

Therefore, for at least the reasons discussed above in Section IX.D.1(a), it would have been obvious to a POSITA to implement an inductor coil like that of Wotherspoon in a power transmission apparatus like that of Cook that includes a capacitor coupled to the inductor to form a resonant circuit. (Ex. 1002, ¶100.)

Indeed, Cook teaches that such resonant circuits were known to increase the efficiency of power transmission. (Ex. 1011, ¶0014-0015, 0028-0032; Ex. 1002, ¶100.) A POSITA would have had a reasonable expectation of success as Cook provides detailed disclosure of such resonant circuits, and any modifications to the teachings of Cook and Wotherspoon to facilitate the combination would have been apparent to and within the skillset of such a POSITA. (Ex. 1002, ¶100.) Therefore, the Wotherspoon-Cook combination discloses or suggests claim element 1[c].

d) wherein the wires of the coil unit are shorted at predetermined intervals throughout the entirety of the wires.

The Wotherspoon-Cook combination discloses or suggests this feature. (Ex. 1002, ¶¶101-103.) For example, Wotherspoon discloses the turns 2 and 6 ("wires of the coil unit") are shorted at their ends and are also shorted at an intermediate point of each turn or at sub-sections of substantially identical lengths ("predetermined intervals") throughout the entirety of the turns. (Ex. 1009, ¶¶[0009], [0011], [0012], ("Each at least one intermediate point may divide the respective at least one turn into a plurality of sections of substantially equal lengths."), [0013], [0031] ("For example, FIG. 3 illustrates an inductor with the **turns 2 and 6 shorted together** not only at their ends but also at an intermediate point illustrated at 10....The positions of the interconnections may, for example, be chosen so as to divide the turns into sub-sections of substantially identical lengths."), [0035] ("Intermediate interconnections 10a and 10b are formed at or near the mid points of the turns of each two-turn planar inductive element."), FIGs. 3, 6; Ex. 1002, ¶101.)

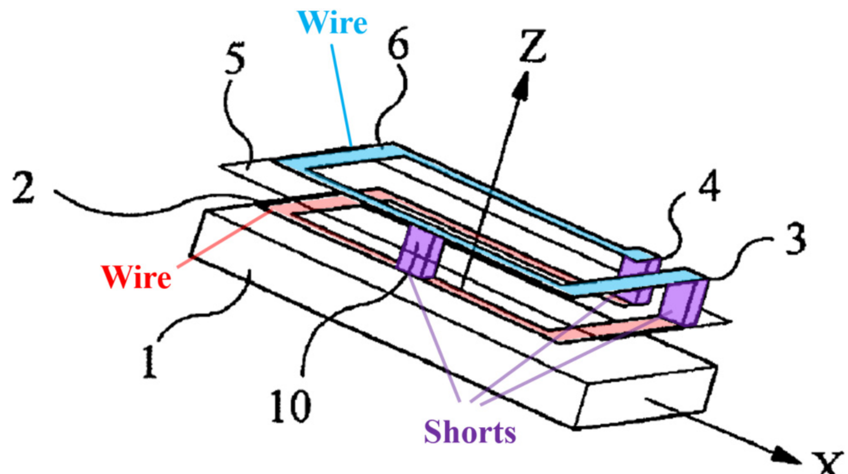


FIG 3

(Ex. 1009, FIG. 3 (annotated); Ex. 1002, ¶101.)

Wotherspoon's interconnections placed at the ends and at a midpoint of each turn, or at equally spaced intervals of the coil, constitutes shorts at "predetermined intervals throughout the entirety of the wires," as claimed. (Ex. 1001, 4:22-25 ("The short of the litz coil can be achieved by removing an insulating material from each wire at a predetermined interval and then connecting the wires with each other using a conductor."); *see also id.*, 3:60-65; Ex. 1025, 1152 (describing a "short circuit" as "a low-resistance connection between two points in an electric circuit through which current flows instead of along the intended path"); Ex. 1002, ¶¶102-103.) Such an understanding is consistent with PO's infringement contentions asserting that vias connecting two wires placed at the end of each turn satisfies this feature. (Ex. 1015, 9-10).

2. Claim 2

The coil of claim 1, wherein the interval is in a range of about 0.01 m to about 100 m.

The Wotherspoon-Cook combination discloses or suggests this feature. (Ex. 1002, ¶¶104-109.) As discussed above in Section IX.B, the 1 cm to 100 m range recited in claim 2 is incredibly expansive and divorced from any other quantitative dimensions of the claimed coil unit. (Section IX.B; Ex. 1002, ¶104.) A POSITA would have recognized that the selection of the appropriate interval for the shorts in the coils is nothing more than a design choice that depends on a number of factors. (Ex. 1002, ¶104.) Patentability should not be based on such an unsupported and technically meaningless range. For at least these reasons, claim 2 is obvious in view of the Wotherspoon-Cook combination.

Moreover, even if this range is given patentable weight, the Wotherspoon-Cook combination discloses or suggests an interval that falls within the claimed range. For example, Wotherspoon discloses an embodiment where the turns 2 and 6 ("wires") are shorted at a midpoint between the coils such that the "interval" between connections is approximately one half the circumference of the turn. (Ex. 1002, ¶105; Ex. 1009, ¶¶[0031] ("For example, FIG. 3 illustrates an inductor with the turns 2 and 6 shorted together not only at their ends but also at an intermediate point illustrated at 10....The positions of the interconnections may, for example, be chosen so as to divide the turns into sub-sections of substantially identical lengths."), [0035] ("Intermediate interconnections...are formed at or near the mid points of the turns of each two-turn planar inductive element."), FIGs. 3,6.)

Wotherspoon further discloses that, "[f]or example, the inductor illustrated in FIGS. 1 to 3 is formed on an alumina substrate 1 which, in this example, is of square shape with sides which are 10 mm in length and with a thickness of 1 mm." (Ex. 1009, ¶[0028].) Therefore, Wotherspoon discloses an embodiment diameter of the substrate on which the turns are formed is 40 mm (4 cm). (Ex. 1002, ¶106.)

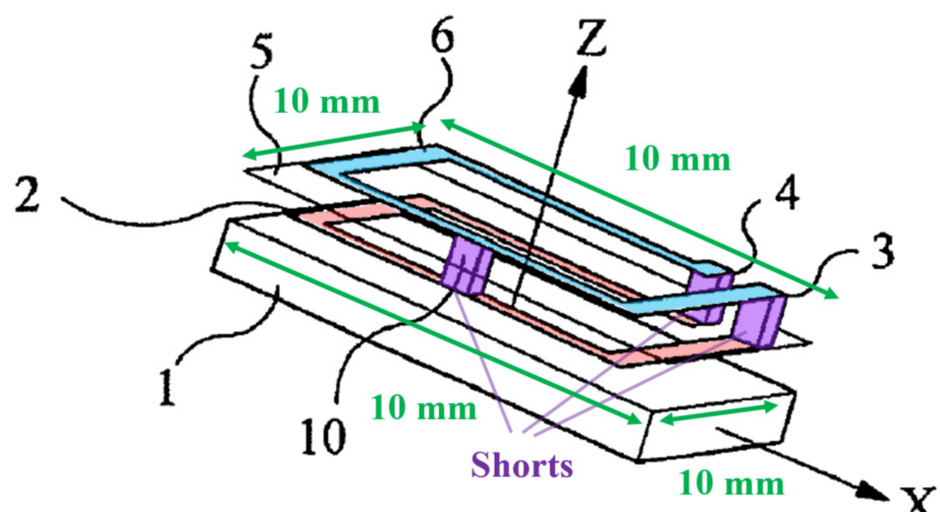


FIG 3

(Ex. 1009, FIG. 3 (annotated); Ex. 1002, ¶106.)

A POSITA would have understood that the coil dimensions would be approximately the same as the substrate on which the coil is formed such that the circumference of such a coil would be approximately 40 mm (10 mm + 10 mm + 10 mm + 10 mm = 40 mm or 4 cm), whereas, if a short is placed at the midpoint between the ends of the coil the interval is 40 ÷ 2 = 20 mm (2 cm), and clearly greater than 0.01 m (10 mm or 1 cm). (Ex. 1002, ¶107.) Moreover, for the coil shown in figure 3 above, there interval of approximately 1.5 cm from terminal 3 to intermediate connection 10 and 2.5 cm from intermediate connection 10 to terminal 4. (*Id.*; Ex. 1009, FIG. 3.) Therefore, Wotherspoon discloses coil dimensions that result in spacing intervals of the shorts that are within the claimed 0.01 m to 100 m range. (*Id.*)

Indeed, consistent with PO's infringement contentions (Ex. 1015), which allege that connections at the end of each turn of a coil correspond to shorts at predetermined intervals as recited in claim 1, and further allege that the interval for the spacing is the circumference of the coil, figure 2 of Wotherspoon also discloses this feature. Based on the substrate sizing disclosed by Wotherspoon, the spacing between shorts is approximately 40 mm, which is also within the 0.01 m to 100 m range. (Ex. 1002, ¶108.)

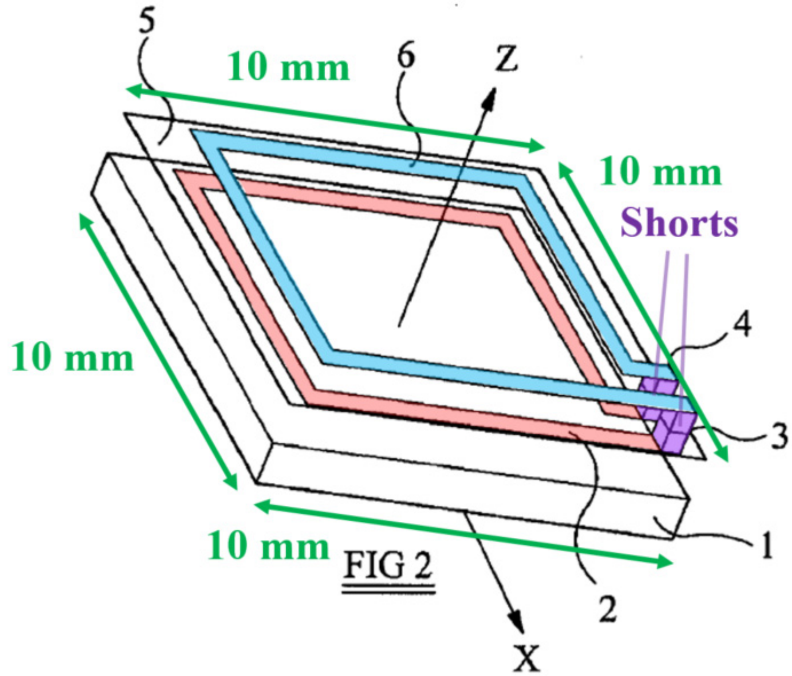


FIG 2

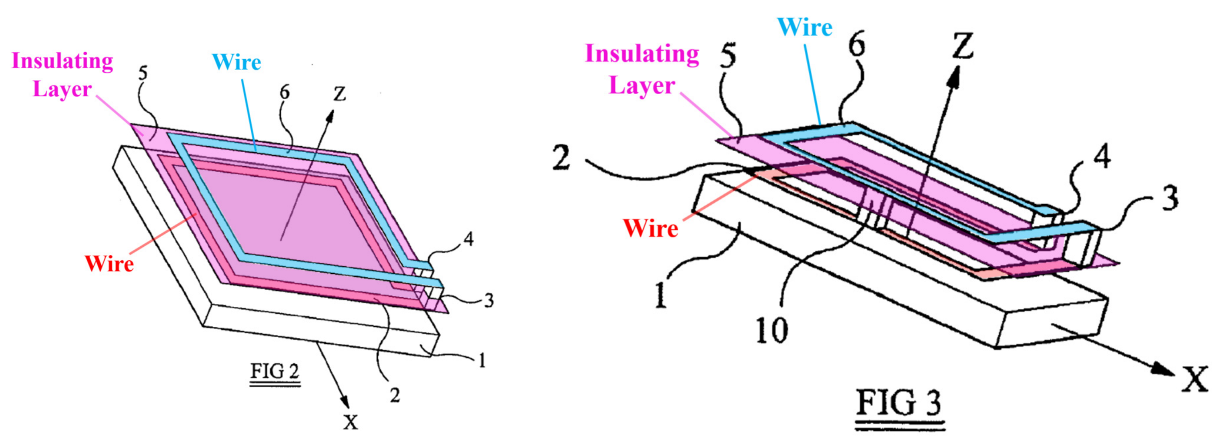
(Ex. 1009, FIG. 2 (annotated); Ex. 1002, ¶108.) *See Collabo Innovations, Inc. v. Sony Corp.*, 778 F. App'x 954, 960 (Fed. Cir. 2019); *Paice LLC v. Ford Motor Co.*, 722 F. App'x 1015, 1022 (Fed. Cir. 2018).

In addition, Cook gives examples of antennas having dimensions of 40x90 mm, 60x100 mm, 120x200 mm, and 240x310 mm. (Ex. 1011, ¶0063.) Therefore, if these coil dimensions are applied to the coils of the Wotherspoon-Cook combination where the turns are shorted at an intermediate point, the intervals between shorts also fall within the claimed range. (Ex. 1002, ¶109.) For at least these reasons, the Wotherspoon-Cook combination discloses or suggests claim 2.

3. Claim 4

The coil of claim 1, wherein the coil unit further comprises: an insulator layer between the plurality of wires."

The Wotherspoon-Cook combination discloses or suggests this feature. (Ex. 1002, ¶110.) For example, Wotherspoon discloses an insulator layer 5 between the plurality of wires. (Ex. 1009, ¶¶[0030] ("An electrically insulating layer 5 is formed on top of the turn 2 and the substrate 1 by any suitable technique.... A second square turn 6 is formed on top of the insulting layer 5...and directly overlays it so as to be superimposed directly above the turn 2 but separated electrically therefrom by the insulating layer 5.), [0027], FIGs. 1-6; Ex. 1002, ¶110.)

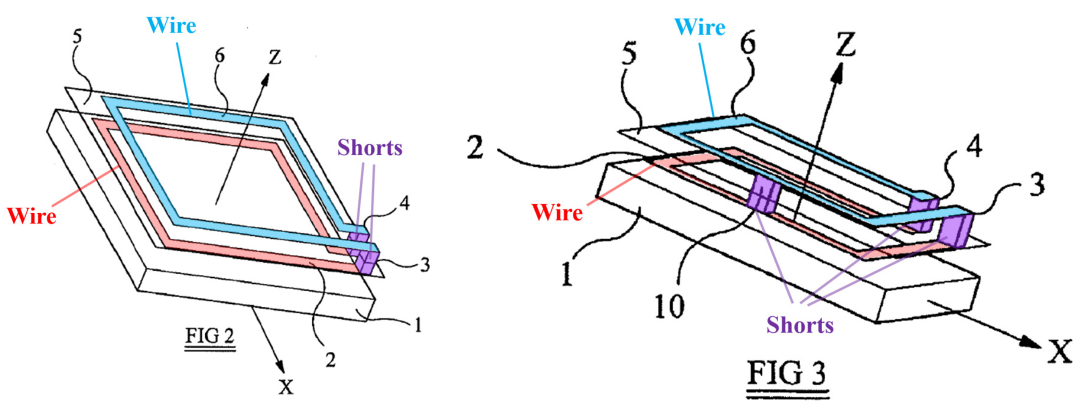


(Ex. 1009, FIGs. 2, 3 (annotated); Ex. 1002, ¶110.)

4. Claim 5

"The coil of claim 4, wherein the coil unit further comprises: a conductor electrically connected to at least portions of the plurality of wires."

The Wotherspoon-Cook combination discloses or suggests this feature. (Ex. 1002, ¶111.) For example, Wotherspoon discloses interconnections 10 ("a conductor") electrically connected to at least portions of turns 2 and 6 ("the plurality of wires"). (Ex. 1009, ¶¶[0031] ("In order to maintain the desired inductive value and reduce capacitive coupling between the turns 2 and 6, the turns are shorted together at one or more intermediate points. For example, FIG. 3 illustrates an inductor with the turns 2 and 6 shorted together not only at their ends but also at an intermediate point illustrated at 10. These interconnections are made by conductive paths extending perpendicularly to the planes of the turns 2 and 6 and passing through the insulating layer 5."), [0032], [0035]; Ex. 1002, ¶111.)

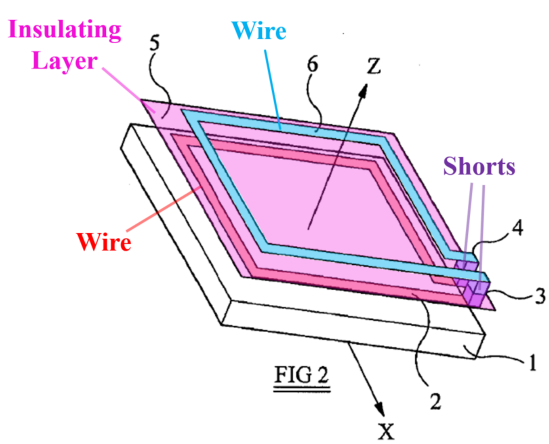


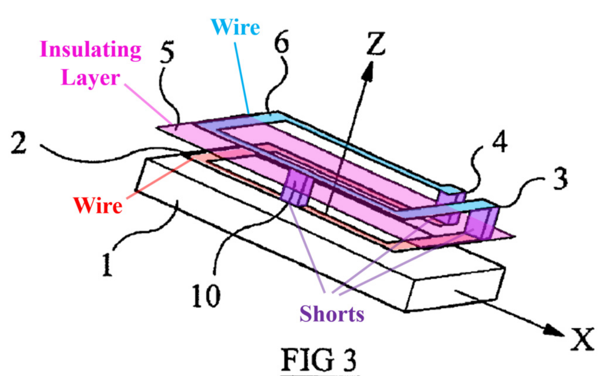
(Ex. 1009, FIGs. 2, 3 (annotated); Ex. 1002, ¶111.)

5. Claim 6

"The coil of claim 5, wherein the conductor is configured to electrically connect the adjacent wires to each other through the insulator."

The Wotherspoon-Cook combination discloses or suggests this feature. (Ex. 1002, ¶112.) For example, Wotherspoon discloses the interconnections 10 ("a conductor") configured to electrically connect the adjacent turns 2 and 6 ("wires") to each other through the insulating layer 5 ("insulator"). (Ex. 1009, ¶¶[0031] ("For example, FIG. 3 illustrates an inductor with the turns 2 and 6 shorted together not only at their ends but also at an intermediate point illustrated at 10. These interconnections are made by conductive paths extending perpendicularly to the planes of the turns 2 and 6 and passing through the insulating layer 5."), [0032], [0035], FIGs. 3, 6; Ex. 1002, ¶112.)





(Ex. 1009, FIG. 3 (annotated); Ex. 1002, ¶112.)

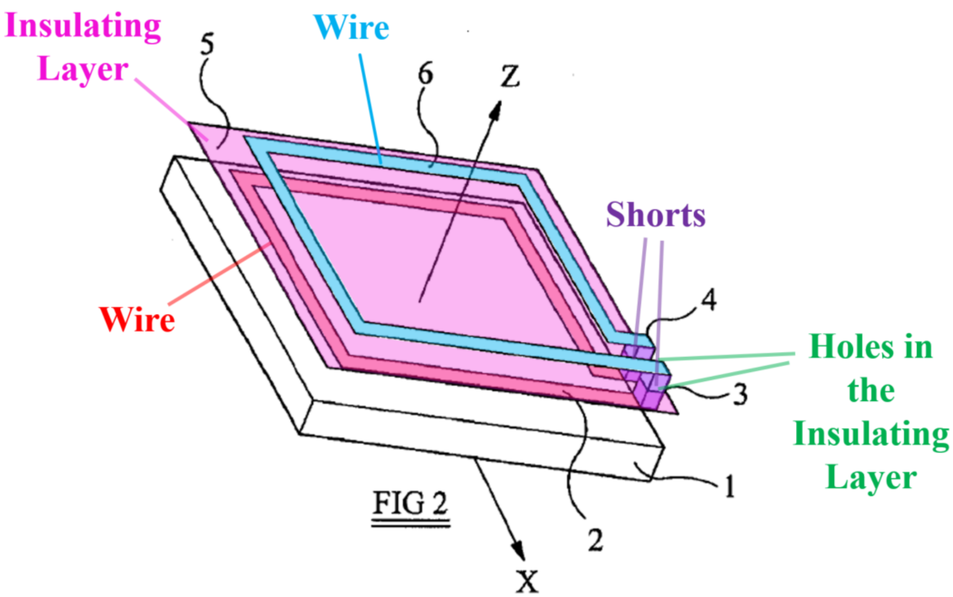
6. Claim 7

"The coil of claim 5, wherein the insulator has holes at a predetermined interval, the conductor being in the holes."

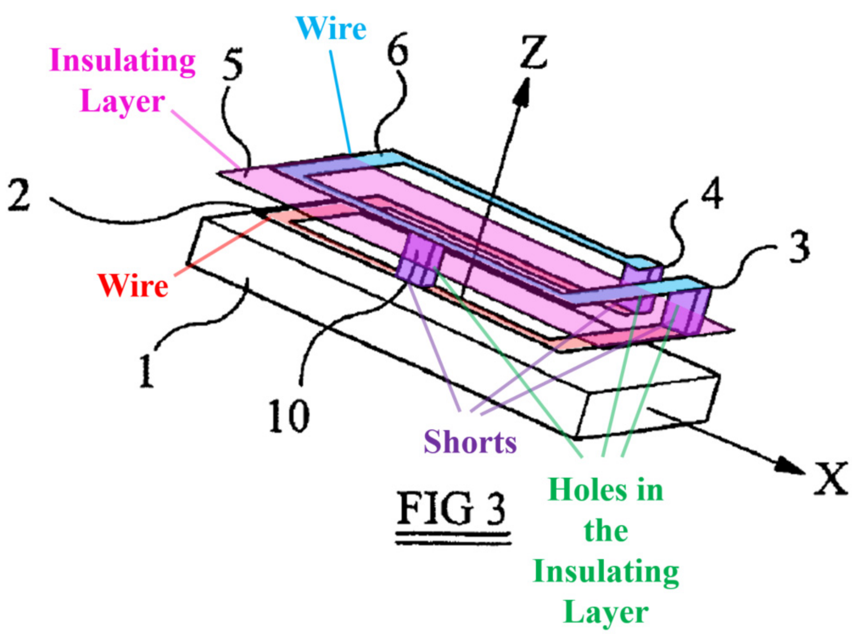
The Wotherspoon-Cook combination discloses or suggests this feature. (Ex. 1002, ¶113.) For example, Wotherspoon discloses that the insulating layer ("insulator") has holes corresponding to where the interconnections 10 pass through the insulator, where the holes are at predetermined intervals corresponding to the interconnections ("conductors"):

> FIG. 3 illustrates an inductor with the turns 2 and 6 shorted together not only at their ends but also at an intermediate point illustrated at 10. These interconnections are made by conductive paths extending perpendicularly to the planes of the turns 2 and 6 and passing through the insulating layer 5. Although a single connection 10 is illustrated in FIG. 3, any desired number of such connections may be provided. The positions of the interconnections may, for example, be chosen so as to divide the turns into sub-sections of substantially identical lengths.

(Ex. 1009, ¶[0031]; *see also id.*, ¶¶[0032], [0035], FIGs. 3, 6; Ex. 1002, ¶113.)



(Ex. 1009, FIG. 2 (annotated); Ex. 1002, ¶113.)



(Ex. 1009, FIG. 3 (annotated); Ex. 1002, ¶113.)

7. Claim 8

"The coil of claim 5, wherein the conductor contacts at least portions of the plurality of wires."

The Wotherspoon-Cook combination discloses or suggests this feature. (Ex. 1002, ¶114.) For example, as discussed above for claim 5, Wotherspoon discloses a conductor that is "electrically connected to at least portions of the plurality of wires." (Section IX.D.4.) A POSITA would have understood that the conductive material in the interconnections 10 contacts the portions of the plurality of wires that it electrically connects in order to provide that electrical connection. (Ex. 1002, ¶114; Ex. 1009, ¶¶[0031] ("For example, FIG. 3 illustrates an inductor with the turns 2 and 6 shorted together not only at their ends but also at an intermediate point illustrated at 10."), [0032], [0035], FIGs. 3, 6; Ex. 1002, ¶114.)

8. Claim 10

"The coil of claim 1, wherein the coil unit is a spiral type coil unit."

The Wotherspoon-Cook combination discloses or suggests this feature. (Ex. 1002, ¶115.) For example, Wotherspoon discloses the inductor ("the coil unit") is a spiral type coil unit. (Ex. 1009, ¶¶[0002], [0016] ("Each of the at least one turns may comprise a plurality of turns arranged as a spiral in the respective plane."), claim 8, FIG. 6; Ex. 1002, ¶115.)

E. Ground 5 – Kita in View of Partovi Renders Claims 1, 2, 4-8, and 10 Obvious

1. Claim 1

a) A coil for wirelessly transmitting or receiving power, the coil comprising:

As discussed above in Section IX.A.1(a), the preamble of claim 1 is non-limiting. (*See* Section IX.A.1(a).) Nevertheless, to the extent the preamble is limiting, Kita in combination with Partovi discloses or suggests the features therein. (Ex. 1002, ¶¶116-129.) For example, Kita discloses a variable inductor for use in various transfer circuits ("coil" as recited in claim 1):

> The variable inductor according to the present invention can be applied to a transfer circuit in radio communication such as in a GPS, mobile phone, and wireless LAN, and used, for example, in an amplifier and an oscillator. The present invention is particularly preferably for a radio communication transfer circuit for a high frequency area. AS the characteristic adjusted by the present invention, various characteristics such as the gain of the amplifier and the noise factor (NF) are included as well as the inductance and the Q value.

(Ex. 1007, 3:4-15.)

Further, Kita discloses, that, when used in a transfer circuit, a shift in the inductor's characteristics can cause "a decrease in receiver sensitivity." (*Id.*, 1:32-

35). A POSITA would have understood that when an inductor is exposed to changing magnetic flux, a current is induced in the inductor such that it operates as a "receiver." (Ex. 1002, ¶117.) Therefore, such current induction in a receiver circuit including the inductor is wireless power reception, as current is a component of power (*e.g.*, power (P) = current (I) * voltage (V), $P=I^2$ * resistance (R)). (*Id.*.)

Moreover, a POSITA would have understood that Kita's inductor is capable of transmitting and receiving power as it is an inherent characteristic of such an inductor. (*Id.* ¶118.) Therefore, a POSITA would have understood that such an inductor is appropriate for use in a system ("coil") "for wirelessly transmitting or receiving power." (*Id.*)

To the extent Kita does not disclose or suggest the features of the preamble, Partovi discloses using an inductor like that disclosed by Kita for wireless power transfer, and in view of Kita, a POSITA would have found it obvious to include a Kita-like inductor in a "coil for wirelessly transmitting or receiving power." (Ex. 1002, ¶119.)

As discussed above in Section IX.B, Partovi discloses multi-layer inductors where a plurality of coil patterns are stacked to form the inductor, where the coil patterns are interconnected by "a via or contacts." (Ex. 1010, ¶¶[2012], [0224]; Ex. 1002, ¶120.) This arrangement is structurally and functionally similar to Kita's stacked coils connected with through holes filled with conductive material. (Ex.

1002, ¶120.) Hence, a POSITA would have had reason to consider the teachings of Partovi and Kita together. (*Id.*)

As also discussed above in Section IX.B, Partovi is directed to "a system and method for inductive charging of portable devices." (Section IX.B, Ex. 1010, ¶¶[0003]-[0004], [0013]; Ex. 1002, ¶121.) Partovi discloses that using a multi-layer coil, like that depicted in figure 18 of Partovi, in wireless power transfer applications provides for efficient power transfer using a compact arrangement that achieves "higher flux densities." (Ex. 1010, ¶¶[0212], [0224], FIG. 18.) Partovi further discloses that such stacked coils can provide low resistance, which is desirable. (Ex. 1010, ¶[0224] ("In this way, wide coils (low resistance) can be used, while the overall width of the coil is not increased."); *see also id.*, ¶¶[0167] ("[I]n order for the power efficiency to be maximized and to minimize losses in the coil, the coils should be manufactured to have as low a resistance as possible."), [0473] ("To design a high efficiency inductive power transfer coil, the resistivity of the coil must be minimized while the resulting induction is kept at desired levels."), [0224] ("wide coils (low resistance) can be used").)

In view of Partovi, a POSITA would have found it obvious to use Kita's inductor that includes stacked coils in wireless power transfer systems like those disclosed by Partovi. (Ex. 1002, ¶122.) A POSITA would have had good reason to combine the teachings of Kita and Partovi, as described above, to implement a coil unit or wireless power apparatus that includes an inductor like that shown in figures 1 and 2 of Kita. (*Id.*) Partovi discloses that inductors made of stacked coils, like that shown in figures 1 and 2 of Kita, provide advantages such as high flux density and low resistance, which results in more efficient power transfer. (Ex. 1010, ¶¶[0212], [0224].) Indeed, a POSITA would have understood that by connecting the coils in parallel, the resistance of the inductor is reduced in comparison to a series connection of the coils. (Ex. 1002, ¶122.) Therefore, a POSITA would have understood that Kita's inductor would be appropriate for use in wireless power transfer systems like those disclosed by Partovi, as the inductor has the characteristics Partovi teaches are advantageous in such systems, such as lower resistance. (Ex.1002, ¶122.)

Moreover, Kita discloses that the inductance of its inductor can be adjusted by removing a portion of one of the coils in the designated "adjustment area." (Ex. 1007, 2:52-3:3, 4:13-27, 4:39-40, 4:48-55.) Kita further discloses that the ability to adjust the inductance of the inductor to arrive at the expected inductance value can be particularly valuable in high-frequency operations. (Ex. 1007, 1:42-52.) In particular, Kita notes that "as the operation frequency increases, the circuit become more complicated, and hence, narrow deviation is required for the parts used therein." (*Id.*, 1:42-45.) Kita further discloses that variable type parts that can be finely adjusted can help to ensure that the circuits that include those variable type parts function as expected. (*Id.*, 1:45-52.)

Partovi discloses wireless charging systems that operate at high frequencies, including the charging system depicted in figure 2 below. (Ex. 1010, ¶[0177] ("the circuit in FIG. 2 above, can be...tuned to operate at 1.3 MHz.")

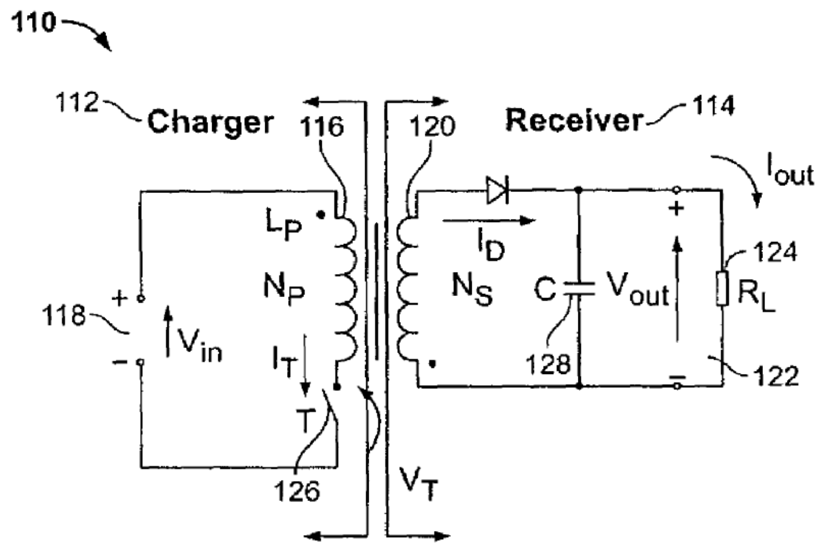


FIG. 2

(Ex. 1010, FIG. 2.)

With respect to operating the charging system shown above at 1.3 MHz, Partovi further discloses:

> With matching coils in the primary and secondary in the receiver, without capacitor C, total circuit efficiency of the circuit including the clock and FET driver circuit approaches 48%. Addition of a 1600 pF capacitor in parallel to the FET increases the total circuit efficiency to

> 75% (a better than 50% increase in efficiency), while simultaneously decreasing the voltage across the FET and also the harmonics in the circuit. The coil to coil transfer efficiency with the capacitor placed in parallel with the FET is estimated to be approximately 90%.

(Ex. 1010, ¶[0170].)

Therefore, a POSITA would have understood that the fine tuning of the inductors as disclosed by Kita would have been particularly useful in high-frequency application such as the wireless power transfer system shown in figure 2 of Partovi above, which operates and high frequencies (*e.g.*, 1.3 MHz) and uses "matched coils." (Ex. 1002, ¶126.) By allowing each of the inductors included in the system of figure 2 to be adjusted, better matching of their inductances can be achieved, where the matched inductance values can be set to correspond to the desired inductance for the coils, where, as disclosed by Kita, deviations from that desired inductance can have a greater impact a higher frequencies. (*Id.*) Therefore, in order to achieve these additional advantages, a POSITA would have had good reason to include the inductor as disclosed by Kita in a wireless power transfer system like that disclosed in figure 2 of Partovi. (*Id.*)

In the Kita-Partovi combination corresponding to an embodiment like that shown in figure 2 above, an inductor like that disclosed by Kita is included in each of the charger 112 and receiver 114 in order to promote inductance matching between the inductors. (Ex. 1010, ¶[0177] ("with matching coils in the primary and secondary in the receiver"); Ex. 1002, ¶127.)

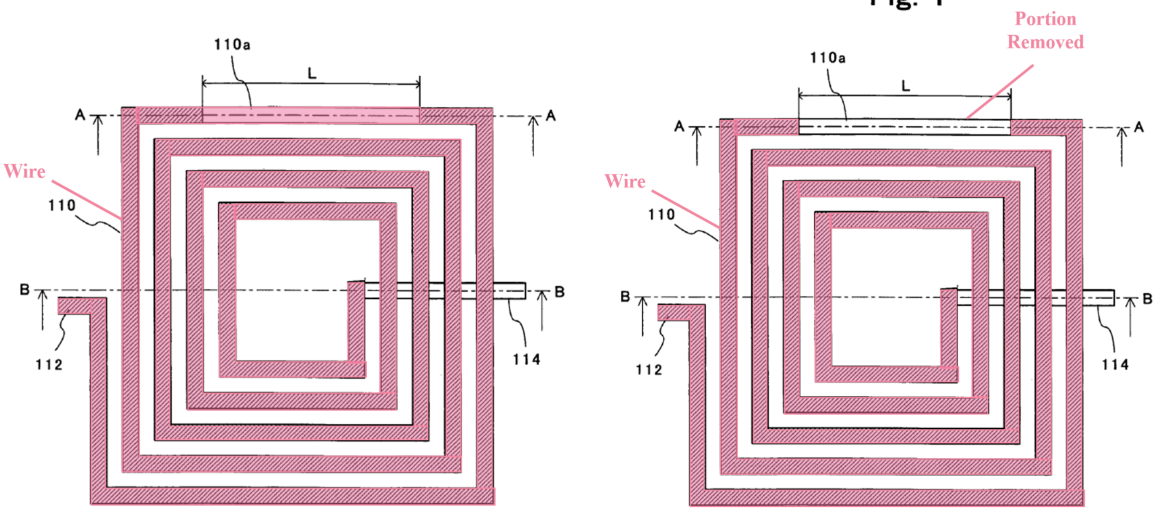
Including an inductor as disclosed by Kita in a wireless power transfer system as disclosed by Partovi would have been straightforward for a POSITA to implement, because Partovi discloses how to implement such a wireless power transfer system that includes a multi-layer inductor as disclosed by both Kita and Partovi. (Ex. 1002, ¶128.) Moreover, a POSITA would have understood how to select the appropriate dimensions, materials, and other inductor characteristics for the multi-layer inductor as described by Kita for use in a particular application according the Kita-Partovi combination. (*Id.*) The wireless power transfer apparatus/coil unit would have been a predictable combination of known components according to known methods (*e.g.*, applying the teachings of Partovi regarding using multi-layer inductors in wireless power transfer systems to Kita's multi-layer inductor), and would have been produced the predictable result of an wireless power transfer apparatus with numerous advantages described by Partovi and Kita. (*Id.*) *See KSR*, 550 U.S. at 416.

Therefore, the Kita-Partovi combination discloses or suggests the preamble of claim 1.

b) "a coil unit comprising a plurality of wires, the plurality of wires insulated from each other; and"

The Kita-Partovi combination discloses or suggests this feature. (Ex. 1002, ¶¶130-136.) For example, Kita discloses a variable inductor ("coil unit") that is a multi-layer inductor that includes a plurality of coils ("plurality of wires") stacked vertically and interconnected. (Ex. 1007, 2:33-36 ("A first aspect of the present invention is applied to a characteristic adjustment method for an inductor formed by laminating a plurality of coils and electrically connecting these coils by a through hole."); Ex. 1002, ¶130.) For example, figure 1 of Kita shows a plan view of Kita's inductor, which includes spiral coil 110. (Ex. 1007, 3:50-52, 3:64, FIG. 1.)

Fig. 1 Fig. 1

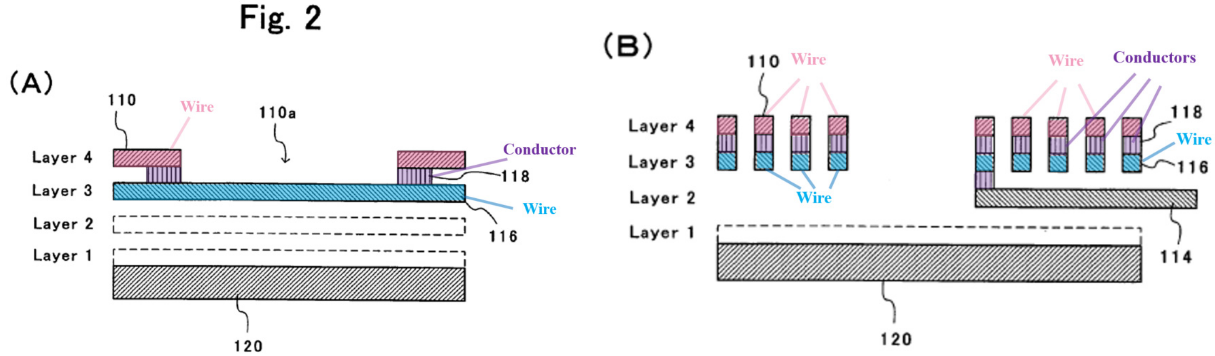


(Ex. 1007, FIG. 1; Ex. 1002, ¶130.)

Kita further discloses that the inductance of the multi-layer inductor can be adjusted by providing an adjustment area in the uppermost spiral coil 110, where a portion of the coil is removed (as shown in figure 1 on the right above) in order to adjust the inductance. (Ex. 1007, 4:13-24, 4:39-40 ("the adjustment area 110a of the spiral coil 110 is removed (cut down)").) Characteristics of the inductor may be adjusted by selecting an appropriate length and location of the adjustment area. (Ex. 1007, 2:52-3:3, 4:24-27, 4:48-55.)

Annotated figures 2(A) and 2(B) of Kita below provide cross sectional views of the inductor having the multiple layers, where the cross-sectional views are taken along the A-A and B-B lines in figure 1 above, respectively. The example inductor shown in figures 2(A) and 2(B) includes two coils 110 and 116 ("plurality of wires") connected by through holes 118. (Ex. 1007, 4:6-8.)

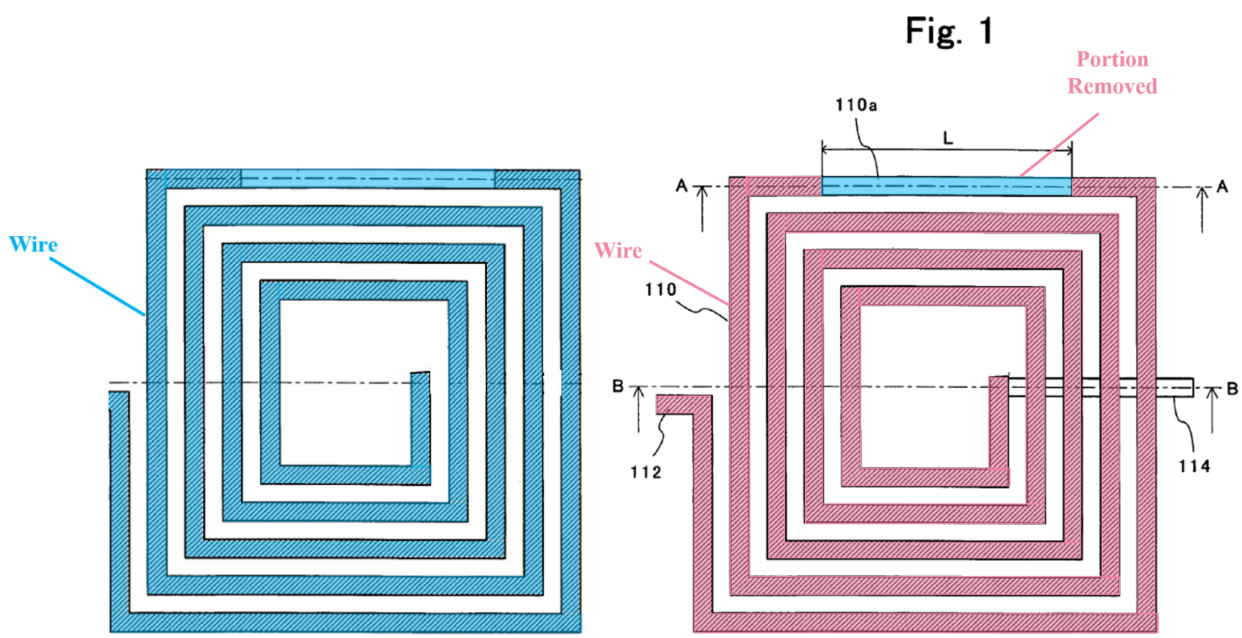
Fig. 2



(Ex. 1007, FIGs. 2(A) (left), 2(B) (right) (annotated); Ex. 1002, ¶132.)

Kita explains that while only two coils ("wires") are shown, the inductor can include more layers with more coils. (Ex. 1007, 3:57-67 ("The number of lamination of the coils is not limited to two layers, and one layer or three layers or more may be used").) Therefore, a POSITA would have understood that Kita discloses variable inductors with two or more coils ("plurality of wires") formed in a stack structure, where each of the coils in the stack is a spiral coil like that shown in figure 1 above. (Ex. 1002, ¶¶133-134.)

Figure 1 of Kita is modified and annotated on the left below to show the spiral coil 116 ("wire") on the third layer, whereas annoated figure 1 on the right shows the coil 110 ("wire") on the fourth layer, where a portion of the coil 116 is visible through the removed portion of the coil 110. (*Id.*, ¶135; Ex. 1007, 4:1-4 ("The two spiral coils 110 and 116 are respectively, a rectangular spiral coil made of aluminum, copper, or the like, and have **substantially the same shape**.") (emphasis added).)



(Ex. 1007, FIG. 1 (modified, annoated); Ex. 1002, ¶135.)

The spiral coils 110 and 116 constitute a "plurality of wires" as recited in claim 1. Kita discloses that the coils 110 and 116 ("a plurality of wires") are "insulated from each other" by an insulating layer. For example, Kita discloses "an insulating layer interposed between the first and the second coils." (Ex. 1007, 2:44-45; *see also id*. 3:56-61, 4:6-8 ("The spiral coils 116 and 110 formed in the third and fourth wiring layers are electrically connected by a through hole 118 formed in the insulating layer."), 6:10-11; Ex. 1002, ¶136.)

c) "a capacitor connected to the coil unit,"

The Kita-Partovi combination discloses or suggests this feature. (Ex. 1002, ¶¶137-138.) As discussed above in Section IX.A.1(a), a POSITA would have understood that inductors like that disclosed by Tamata and Kita, which is similar to Tamata, are often used in resonant circuits for wireless power transfer and other applications. (Section IX.A.1(a).) As also discussed above in Section IX.A.1(a), such resonant circuits typically include a capacitor coupled to the inductor to form the resonant circuit. (*Id*.)

Moreover, as discussed above in Section IX.E.1(a), a POSITA would have found it obvious to use an inductor as disclosed by Kita in a wireless power transfer system shown in figure 2 of Partovi. (Section IX.E.1(a).) For example, a POSITA would have recognized that the adjustability of the inductance of an inductor would have been particularly applicable for the inductance matching used in the figure 2 wireless power transfer system of Partovi. (*Id*.) As shown in annotated figure 2 of Partovi below, the inductor ("coil unit") included in the receiver is connected to a capacitor. (Ex. 1010, ¶[0177], FIG. 2; Ex. 1002, ¶138.) Therefore, the Kita-Partovi combination discloses or suggests claim element 1[c].

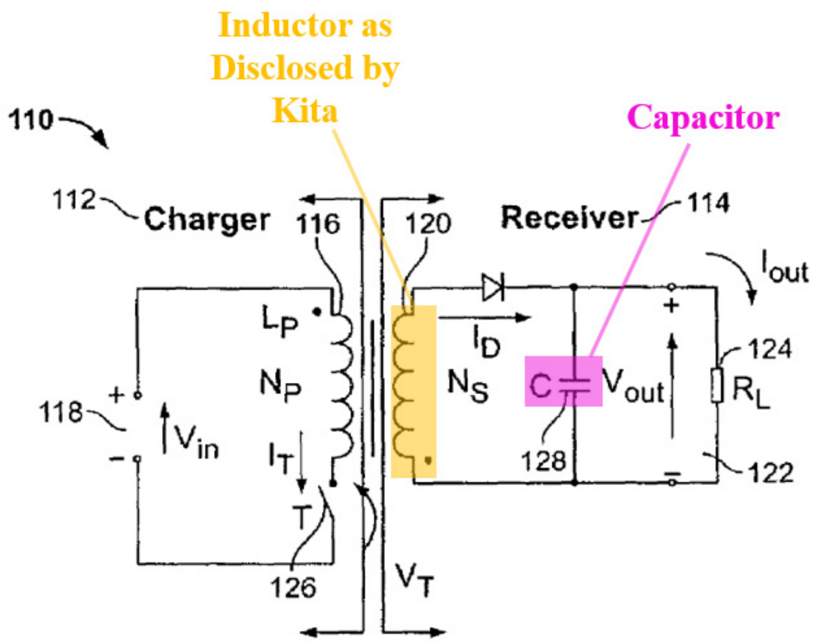


FIG. 2

(Ex. 1010, FIG. 2 (annotated); Ex. 1002, ¶138.)

d) "wherein the wires of the coil unit are shorted at predetermined intervals throughout the entirety of the wires."

The Kita-Partovi combination discloses or suggests this feature. (Ex. 1002, ¶139.) For example, Kita discloses that "the spiral coils 110 and 116 are electrically connected to each other by a conductive material...filled in the through hole" and "[a] plurality of through holes 118 is **formed over the entire coil at predetermined intervals**." (Ex. 1007, 4:8-12.) A POSITA would have understood that Kita's conductive through holes function as electrical short-circuits and thus the coils 110 and 116 ("wires of the coil unit") are "shorted" at each location corresponding to such a through hole, where the through holes are at predetermined intervals throughout the coils. (*Id*.; Ex. 1001, 4:22-25 ("The short of the litz coil can be achieved by removing an insulating material from each wire at a predetermined interval and then connecting the wires with each other using a conductor."); *see also id*., 3:60-65; Ex. 1025, 1152 (describing a "short circuit" as "a low-resistance connection between two points in an electric circuit through which current flows instead of along the intended path"); Ex. 1002, ¶139.)

2. Claim 2

The coil of claim 1, wherein the interval is in a range of about 0.01 m to about 100 m.

The Kita-Partovi combination discloses or suggests this feature. (Ex. 1002, ¶140.) As discussed above in Section IX.B, the 1 cm to 100 m range recited in claim 2 is incredibly expansive and divorced from any other quantitative dimensions of the claimed coil unit. (Section IX.B; Ex. 1002, ¶140.) A POSITA would have recognized that the selection of the appropriate interval for the shorts in the coils is nothing more than a design choice that depends on a number of factors. (Ex. 1002, ¶140.) Patentability should not be based on such an unsupported and technically meaningless range. For at least these reasons, claim 2 is obvious in view of the Kita-Partovi combination.

3. Claim 4

"The coil of claim 1, wherein the coil unit further comprises: an insulator layer between the plurality of wires."

The Kita-Partovi combination discloses or suggests this feature. (Ex. 1002, ¶141.) For example, Kita discloses "an insulating layer interposed between the first and the second coils." (Ex. 1007, 2:44-45; *see also id*. 3:56-61, 4:6-8 ("The spiral coils 116 and 110 formed in the third and fourth wiring layers are electrically connected by a through hole 118 formed in the insulating layer."), 6:10-11; Ex. 1002, ¶141.) The insulating layer is an "insulating layer" between the coils 110 and 116 ("plurality of wires").

4. Claim 5

"The coil of claim 4, wherein the coil unit further comprises: a conductor electrically connected to at least portions of the plurality of wires."

The Kita-Partovi combination discloses or suggests this feature. (Ex. 1002, ¶142.) For example, Kita discloses conductive through holes that include conductive material ("a conductor") electrically connected to at least portions of the coils 110 and 116 ("plurality of wires"). (Ex. 1007, 4:6-8 ("The spiral coils 116 and 110 formed in the third and the fourth wiring layers are **electrically connected** by a through hole 118 formed in the insulating layer."), 4:8-11 ("a conductive material...fill[s] in the through hole."); Ex. 1002, ¶142.)

5. Claim 6

"The coil of claim 5, wherein the conductor is configured to electrically connect the adjacent wires to each other through the insulator."

The Kita-Partovi combination discloses or suggests this feature. (Ex. 1002, ¶143.) For example, as discussed above for claim 5, Kita discloses a through hole that includes conductive material ("a conductor") that electrically connects coils 110 and 116 ("adjacent wires") to each other through the insulating layer. (Ex. 1007, 4:6-8 ("The spiral coils 116 and 110 formed in the third and the fourth wiring layers are **electrically connected by a through hole 118 formed in the insulating layer**."), 4:8-11 ("a conductive material...fill[s] in the through hole.").) A POSITA would have understood that, in order to electrically connect the coils on either side of the insulating layer, the through holes pass through the insulating layer ("insulator"). (Ex. 1002, ¶143.)

6. Claim 7

"The coil of claim 5, wherein the insulator has holes at a predetermined interval, the conductor being in the holes."

The Kita-Partovi combination discloses or suggests this feature. (Ex. 1002, ¶144.) For example, as discussed above in Sections IX.E.1(d) and IX.E.5, the insulating layer ("insulator") between the coils 110 and 116 includes through holes that are filled with conductive material in order to provide electrical connections between the coils, where the "plurality of through holes 118 is formed over the entire coil at predetermined intervals." (Ex. 1007, 4:8-12.)

7. Claim 8

"The coil of claim 5, wherein the conductor contacts at least portions of the plurality of wires."

The Kita-Partovi combination discloses or suggests this feature. (Ex. 1002, ¶145.) For example, as discussed above for claim 5, Kita discloses a conductor that is "electrically connected to at least portions of the plurality of wires." (Section IX.E.4.) A POSITA would have understood that the conductive material in the through holes contacts the portions of the plurality of wires that it electrically connects in order to provide that connection. (Ex. 1002, ¶145; Ex. 1007, 4:6-8 ("The spiral coils 116 and 110 formed in the third and the fourth wiring layers are electrically connected by a through hole 118 formed in the insulating layer."), 4:8-11 ("a conductive material...fill[s] in the through hole.").)

8. Claim 10

"The coil of claim 1, wherein the coil unit is a spiral type coil unit."

The Kita-Partovi combination discloses or suggests this feature. (Ex. 1002, ¶146.) For example, Kita discloses that the wires in the coil unit are spiral coils. (Ex. 1007, 4:6-8 ("The **spiral coils 116 and 110** formed in the third and the fourth wiring layers are electrically connected by a through hole 118 formed in the insulating layer.") (emphasis added); Ex. 1002, ¶146.)

X. DISCRETIONARY DENIAL IS NOT APPROPRIATE

As explained below, 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 Petitioner has not yet moved to stay the parallel district court case 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*, IPR2021-00298, Paper 11 at 10-11 (PTAB May 19, 2021).

The **second factor** (proximity of trial dates) 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 (Feb. 19, 2019) (recognizing that, even if a trial will come before a final decision, institution is appropriate to "give[] the district court the opportunity, at its discretion, to conserve judicial resources by staying the litigation until the review is complete," which helps "satisfy[] the AIA's objective"); *cf. Unilioc USA, Inc. v. RingCentral, Inc.*, No. 2-17-cv-00354-JRG (E.D. Tex. Feb. 12, 2018), at *1 (observing that staying the case pending IPR will "streamline the scope of th[e] case to an appreciable extent" regardless of the IPR outcome).

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 complaint in the Eastern District of Texas 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 only four months after PO's Complaint and shortly after receiving the infringement contentions weighs in favor of institution third *Fintiv* factor. *Facebook, Inc. v. USC IP P'ship*, *LP*, IPR2021-00033, Paper 13 at 13 (PTAB April 30, 2021) (finding it was reasonable for Petitioner to wait to file the Petition until shortly after receiving infringement contentions).

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 (Dec. 2, 2019) (where the district court has not issued a claim construction ruling, fact discovery and expert discovery are not closed, and dispositive motion briefing has not yet occurred, that weighs against finding that case is at "an advanced stage"); *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., LP, 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 '269 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 foregoing reasons, Petitioner requests IPR and cancellation of claims 1, 2, 4-8, and 10 of the '269 patent.

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(d), the undersigned certifies that the foregoing Petition for *Inter Partes* Review of U.S. Patent No. 9,601,269 contains, as measured by the word-processing system used to prepare this paper, 13,504 words. This word count does not include the items excluded by 37 C.F.R. § 42.24(a).

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. 9,601,269 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 supporting 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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