

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD. AND SAMSUNG ELECTRONICS
AMERICA, INC.,

Petitioners,

v.

AQ CORPORATION,

Patent Owner.

CASE: IPR2026-00234

U.S. PATENT NO. 11,728,564

PATENT OWNER'S PRELIMINARY RESPONSE

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TABLE OF PATENT OWNER EXHIBITS

Exhibit No.	Description
2001	AQ Email to Samsung dated Nov. 8, 2021 (Original and Certified Translation)
2002	AQ Email dated Dec. 2, 2021 (Original and Certified Translation)
2003	Preliminary Amendment dated Nov. 5, 2021
2004	Samsung Electronics' 2025 Interim Business Report
2005	Samsung C&T Corp., 2024 Corporate Governance Report
2006	LexMachina Analysis – Judge Gilstrap
2007	<i>AQ Corp. v. Samsung Elecs. Co., Ltd. et al.</i> , Case No. 2:25-cv-01012-JRG, Dkt. No. 23 (E.D. Tex. Feb. 4, 2026) (Docket Control Order)
2008	Notice of References Cited dated January 30, 2023
2009	U.S. Patent App. No. 2010/0309081 to Kobayashi et al. (“ <i>Kobayashi</i> ”)
2010	U.S. Patent App. No. 2014/0339915 to Kanno et al. (“ <i>Kanno</i> ”)
2011	Statutory Disclaimer of U.S. Patent No. 11,728,564
2012	Declaration of Dr. David S. Ricketts
2013	<i>Curriculum Vitae</i> of Dr. David S. Ricketts

Patent Owner AQ Corporation (“AQ”), submits this Patent Owner Preliminary Response (“Response”) pursuant to 37 C.F.R. § 42.107(a) to the *Inter Partes* Review Petition (“Petition”) filed by Samsung Electronics Co., Ltd. (“Samsung Electronics”) and Samsung Electronics America, Inc. (“Samsung Electronics America”) (collectively, “Samsung” or “Petitioner”) for Claims 1-22 of U.S. Patent No. 11,728,564 (the “’564 Patent”) (Ex. 1001).

Although Petitioner challenges Claims 1-22 of the ’564 Patent (*see* Paper 5), only Claims 8 and 16 (the “Challenged Claims”) are relevant to the Board’s consideration of the Petition because Patent Owner statutorily disclaimed Claims 1-7, 9-15, and 17-22. Ex. 2011. “The patent owner may file a statutory disclaimer” and “[n]o inter partes review will be instituted based on disclaimed claims.” 37 CFR § 42.107.

I. INTRODUCTION

The ’564 Patent claims a smartphone antenna module having a substrate with two surfaces or sides. On one side, the “first major surface”; on the other side, the “second major surface.” Ex. 1001, Cl. 1. These two surfaces have different antenna patterns on each. *Id.*; Ex. 2012, ¶ 53. On the second major surface, there are multiple antenna patterns including an NFC functional antenna pattern portion, while on the first major surface, “a first antenna pattern...comprising an inner coil formed on [a] first inner ring portion and an outer coil on [a] first outer ring portion.” This first

antenna pattern integrates the inner and outer coils into a single same-surface, same-function antenna pattern, uniquely electrically connecting the two portions in parallel. Ex. 2012, ¶ 53. In challenging the '564 Patent, the Petition does not identify a single reference that includes this parallel electrical connection between the inner and outer coils recited in Claims 8 and 16. Ex. 2012, ¶¶ 74-75. Rather, the Petition relies on expert testimony to allege obviousness of the claimed structure, even when no prior art teachings disclose, suggest, or render obvious the claimed structure.

In all three petitioned grounds, the proposed combinations fail for several reasons. **First**, none of the proposed combinations—*Seong, Kang*, and *Cho* (Ground 1), *Ahn* and *721Lee* (Ground 2), and *005Lee, Seong*, and *Cho* (Ground 3) (the “Petition’s Combinations”)—teach or suggest Claims 8 or 16, including the requirement that “the inner coil and the outer coil are electrically connected in parallel.”

Second, the Petition fails to establish any motivation to combine the various references of the Petition’s Combinations in the manner required by the Challenged Claims, but instead relies on hindsight and conclusory assertions that the claimed architecture would have been a “simple design choice.” Notably, this allegedly “simple design choice” is not present in *any* prior art, undermining the Petition’s conclusory analysis. The specifically claimed electrical connection between the inner and outer coil is not only not present, but the Petition proposes no actual

rational basis to make the claimed connection, underscoring the Petition's shortcomings of the proposed Combinations. The Petition would have a POSA either split a single coil into two and electrically connect the two segments in parallel (without a teaching or reason to do so) or electrically connect two coils that serve entirely different purposes and are electrically isolated in the art (again, without a teaching or reason to do so).

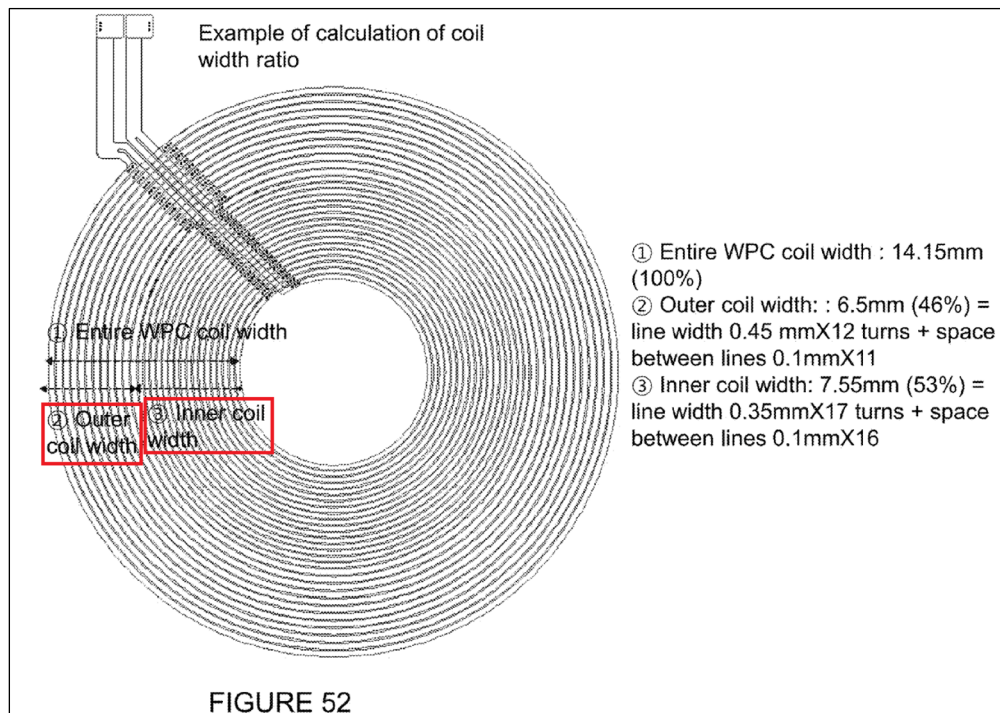
Third, while the state of the art at the time of the claimed invention addressed similar problems and design constraints as the '564 Patent, it did not contemplate the claimed parallel electrical connection of the inner and the outer coils. Ex. 2012, ¶¶ 47-52, 55. Instead, the state of the art exclusively wired any alleged first and second coil portions in series (or, said otherwise, a single coil, as wiring two portions of a coil in series is simply a longer coil), or fails to disclose they are connected at all, belying any conclusion that the Challenged Claims' election of a parallel connection would have been obvious.

II. SUMMARY OF THE '564 PATENT

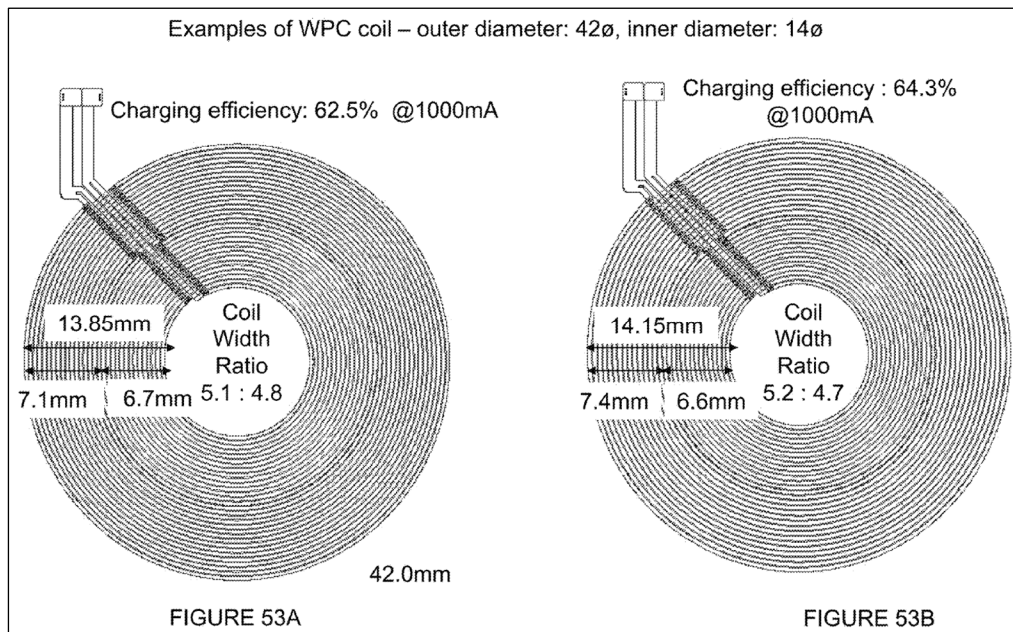
The '564 Patent is directed to a smartphone antenna module having a specific structural antenna architecture for smartphones. The '564 Patent addresses the competing constraints of charging efficiency of Wireless Power Consortium

(“WPC”)¹ coils, limited form factor, and coexistence with other antennas that existed in the art. Ex. 2012, ¶ 53. To address these problems, the ’564 Patent provides an antenna formed on a flexible printed circuit board in which an inner coil and an outer coil are implemented on a single major surface of the substrate, but more specifically requires that these two coils are electrically connected in parallel. Ex. 1001, 42:13-32, Cls. 8, 16, Figs. 51-55; Ex. 2012, ¶ 53. Importantly, the inner coil and the outer coil are not electrically distinct coils or routed on different layers or surfaces; instead, as shown below in Figure 52, they are two portions of the same functional antenna pattern (e.g., WPC). Ex. 1001, Cls. 8, 16, Fig. 52; Ex. 2012, ¶ 53.

¹ “WPC” refers to the Wireless Power Consortium; however, in the Petition and this Patent Owner Preliminary Response, “WPC” is also used as shorthand for the wireless transfer of power.



Ex. 1001, Fig. 52 (annotated); Ex. 2012, ¶ 53.



Ex. 1001, Figs. 53A-53B; Ex. 2012, ¶ 53.

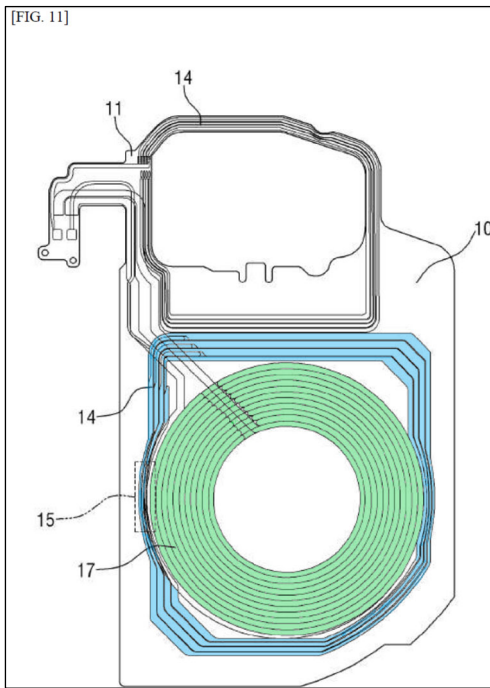
Importantly, the '564 Patent emphasizes that performance efficiencies arise

from specific physical architecture of the claimed antenna module, not merely from choosing “parallel” as an alleged “design choice.” As disclosed in the ’564 Patent, the inner and outer coils are each the same type of antenna pattern as the other, and are integrated and form a wireless power charging antenna on a single same-surface with tailored geometry to function as parallel current paths. Ex. 2012, ¶¶ 54-55. As such, the ’564 Patent discloses and claims a novel, structure-driven solution to wireless charging that departs from prior approaches. Ex. 2012, ¶ 55.

III. SUMMARY OF THE ART CITED

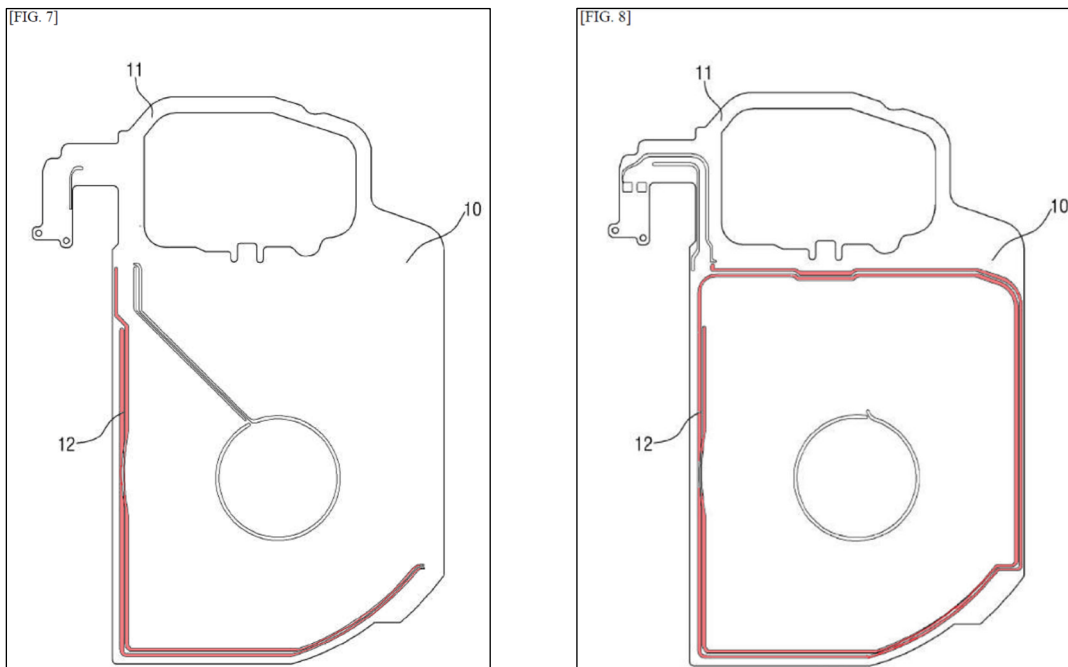
A. Overview of *Seong*

Seong describes a composite antenna structure that includes “NFC pattern, an MST pattern, and a WPC pattern are all formed at once on a single substrate.” Ex. 1006, ¶ 1; Ex. 2012, ¶ 56. A stated objective of *Seong* is to efficiently arrange multiple antennas on one substrate while minimizing mutual interference between the distinct antennas and reducing thickness. Ex. 1006, ¶¶ 25-27; Ex. 2012, ¶ 57. As shown in Figure 11 below, an MST pattern (blue) and a WPC pattern (green) are “formed on the top surface of the substrate.” Ex. 1006, ¶ 40, Fig. 11.



Ex. 1006, Fig. 11; Ex. 2012, ¶ 56.

While *Seong* does not specify the type of electrical connections between antenna patterns (or that they even could be connected), *Seong* consistently describes antennas of the same antenna pattern formed on opposite sides of a substrate. Ex. 2012, ¶ 57. For example, Figs. 7 and 8 (reproduced below) illustrate the “NFC pattern 12 formed on the top surface of the substrate 10” (Figure 7) and “the NFC pattern 12 formed on the bottom surface” (Figure 8). Ex. 1006, ¶ 64, Figs. 7-8; Ex. 2012, ¶ 57.



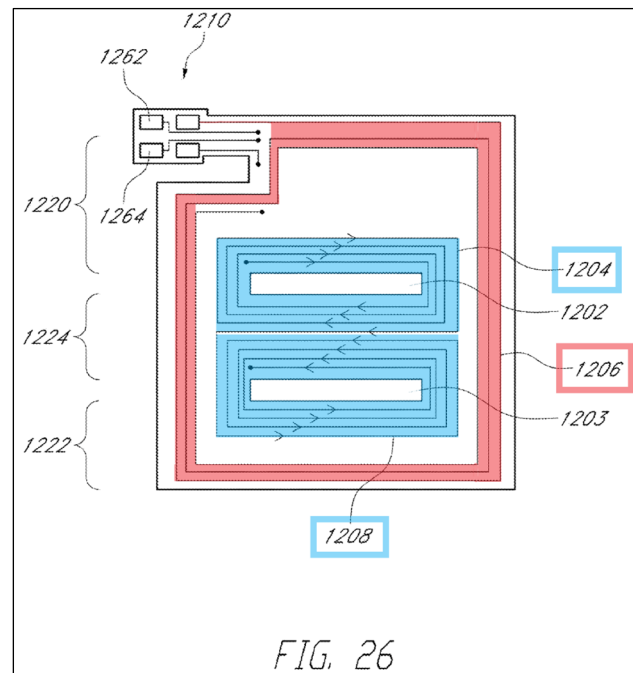
Ex. 1006, Fig. 7 (left, NFC pattern formed on top surface of substrate shown in red), Fig. 8 (right, NFC pattern formed on bottom surface of substrate shown in red); *see also* Ex. 1006, ¶ 68, Figs. 9-10 (illustrating “the MST pattern 14 formed on the top surface of the substrate 10, and FIG. 10 is a drawing showing the MST pattern 14 formed on the bottom surface”); Ex. 2012, ¶ 57.

B. Overview of *Kang*

Kang is directed to smartphone antenna modules formed on flexible printed circuit boards that integrate multiple different functional antenna patterns with distinct functions, such as NFC, MST, and wireless charging. Ex. 1012, ¶¶ [0002], [0198]-[0203]; Ex. 2012, ¶ 58. These different functional antenna patterns are arranged within a compact, layered structure. Ex. 1012, ¶¶ [0002], [0198]-[0203]; Ex. 2012, ¶ 58. *Kang* focuses primarily on mechanical layout, magnetic sheet

integration, and routing techniques to enable coexistence of multiple antennas within the constrained interior of a smartphone. Ex. 1012, ¶¶ [0198]-[0203]; Ex. 2012, ¶ 58.

Kang describes antenna modules that include multiple distinct coils, often arranged around through-holes or across multiple PCB sections, with magnetic sheets (e.g., ferrite or nanocrystal layers) positioned to guide magnetic flux and reduce interference. Ex. 1012, ¶¶ [0210]-[0211]; Ex. 2012, ¶¶ 58-59. The coils described in *Kang* are frequently associated with different antenna functions (e.g., NFC, MST, or wireless charging), and the reference emphasizes spatial arrangement and current-flow direction as design considerations. Ex. 1012, ¶ [0003], [0019]; Ex. 2012, ¶¶ 58-60. For example, as shown in Figure 26, the patterns described in *Kang* are associated with different antenna functions (e.g., NFC (red, coil B 1206), MST (blue, coil A 1204; blue, coil C 1208), or wireless charging (not shown below)). Ex. 1012, ¶¶ [0003], [0019]; Ex. 2012, ¶ 60.



Ex. 1012, Fig. 26 (annotated); Ex. 2012, ¶ 60. *Kang* briefly states that the adjacent coils, coil A and coil C, may be “connected to each other and can be used as an MST antenna.” Ex. 1012, ¶ [0217]. As shown by the directional arrows in Figure 26, “the current of coil A 1204 flows in the clockwise direction while the current of coil C 1208 flows in the counterclockwise direction[.]” Ex. 1012, ¶ [0224], Fig. 26. These opposing fields give rise to constructive or destructive field interactions depending on the relative geometry and phase of the independently driven coils. Ex. 2012, ¶¶ 47-52. Thus, *Kang*’s disclosed coil arrangements generate electromagnetic fields that interact with each other in a predefined manner. Ex. 2012, ¶¶ 58-60.

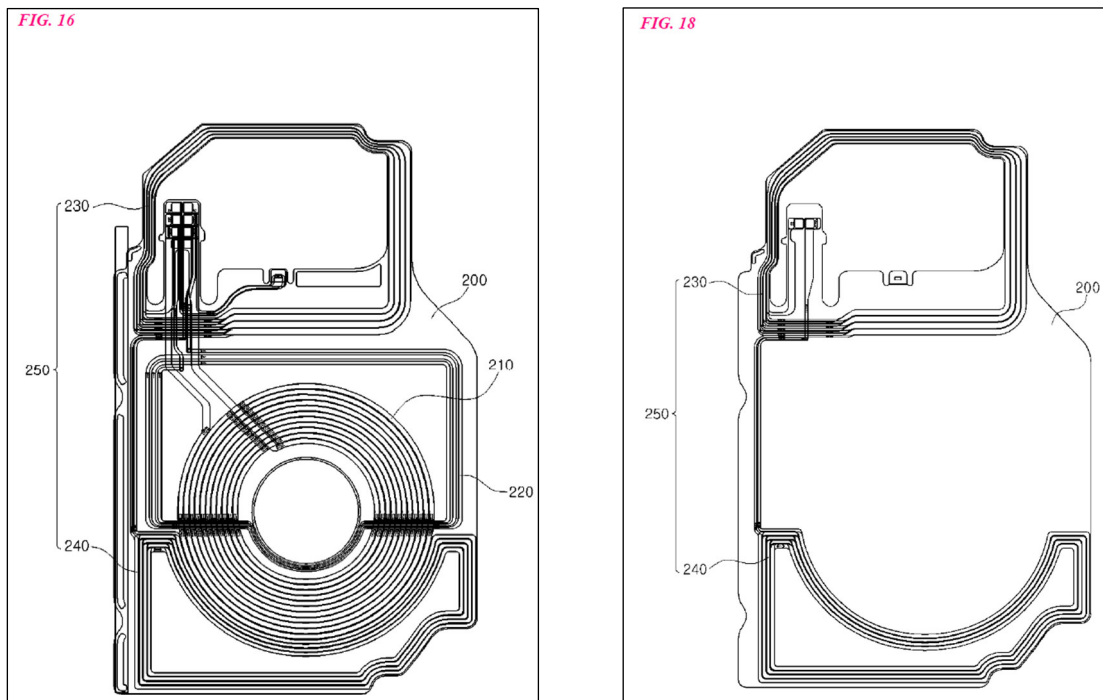
C. Overview of *Cho*

Cho is directed to antenna structures for mobile devices, with an emphasis on arranging multiple antennas on a shared substrate while managing electromagnetic

interference and space constraints. Ex. 1010, ¶¶ [0002]-[0003]. *Cho* focuses on antenna placement, pattern geometry, and magnetic materials to improve antenna performance in compact devices such as smartphones. Ex. 1010, ¶¶ [0004]-[0005]; Ex. 2012, ¶ 60.

In *Cho*, different antenna types (e.g., NFC or WPC) are implemented as distinct functional antenna patterns, each designed to serve a particular function and use a specific frequency band. Ex. 1010, ¶¶ [0056]-[0057]; Ex. 2012, ¶ 62. *Cho* emphasizes physical layout strategies, such as spacing, orientation, and the use of shielding or magnetic materials, rather than electrical integration of coil segments within a single antenna pattern. *see, e.g.*, Ex. 1010, Fig. 4; Ex. 2012, ¶ 62. Although *Cho* may describe coils with multiple turns or complex geometries, it does not describe an architecture in which inner and outer coils of a single antenna pattern are intentionally electrically connected in parallel to function as parallel current paths. Ex. 2012, ¶ 62. Instead, *Cho* reflects a design approach in which antenna functionality is preserved through electrical separation and layout control, rather than through electrical coupling of coil portions. Ex. 2012, ¶ 62.

As shown below in Figure 16, the wireless communication device depicted in *Cho* includes multiple wireless communication coils, including a “second wireless communication coil,” and Figure 18 depicts that second wireless communication coil. Ex. 1010, Fig. 16; Ex. 2012, ¶ 63.

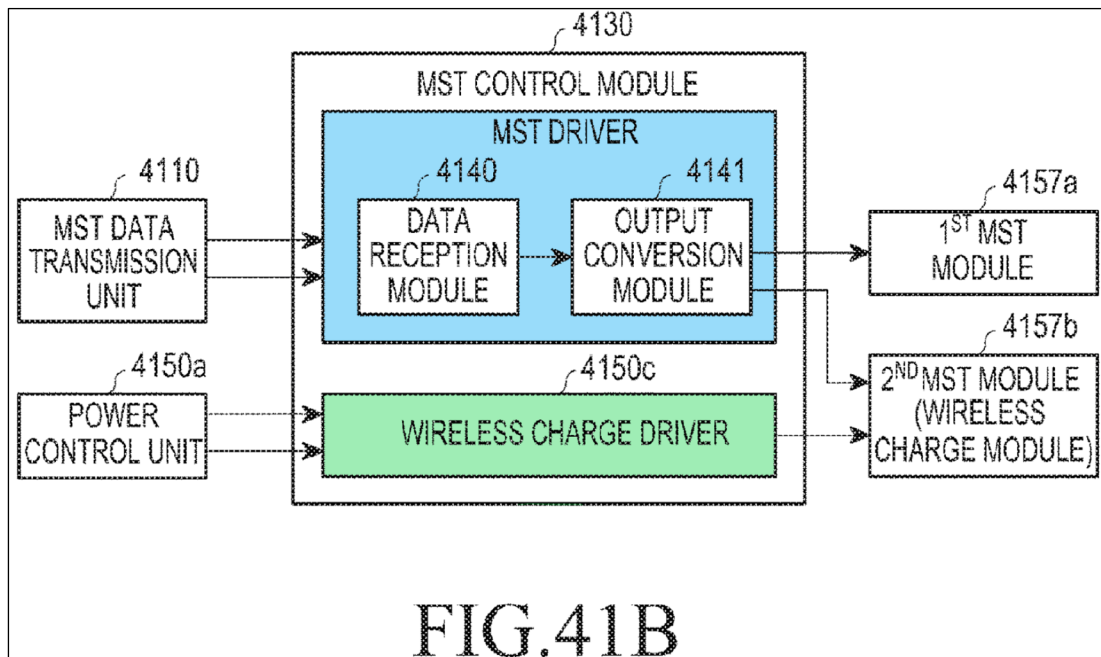


Ex. 1010, ¶¶ 89-90, Figs. 16, 18; Ex. 2012, ¶ 63.

In sum, *Cho* reflects a design approach in which antenna functionality is preserved through electrical separation and layout control, rather than through electrical coupling of coil portions. Ex. 2012, ¶¶ 62-63.

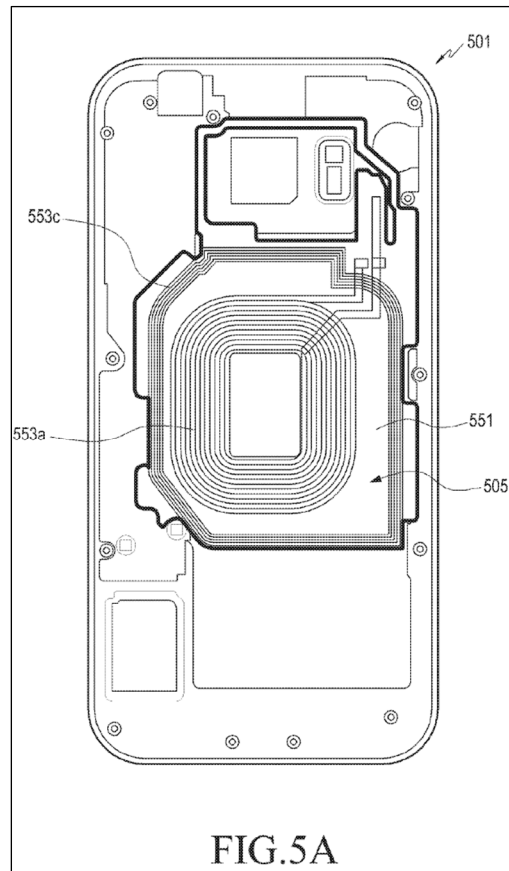
D. Overview of 721Lee

721Lee describes electronic devices that include multi-surface coil structures designed to increase inductance and magnetic field strength for magnetic secure transmission (i.e., MST) and, in some embodiments, wireless charging and NFC. Ex. 1011, ¶¶ [0005]-[0011]; Ex. 2012, ¶ 64. *721Lee* focuses on a “spiral type coil” architecture in which multiple coils disposed on different surfaces (e.g., first and second surface, or first through third surfaces) are electrically connected in series



Ex. 1008, Fig. 41B (annotated to indicate MST driver in blue and wireless charge driver in green); Ex. 2012, ¶ 66.

As shown in Figure 5A below, *005Lee* depicts multiple different conductive coil patterns of differing size and geometry arranged on a substrate. Ex. 1008, 16:60-17:23, 17:29-31, Fig. 5A. But *005Lee* does not describe any electrical connection between these coil patterns.

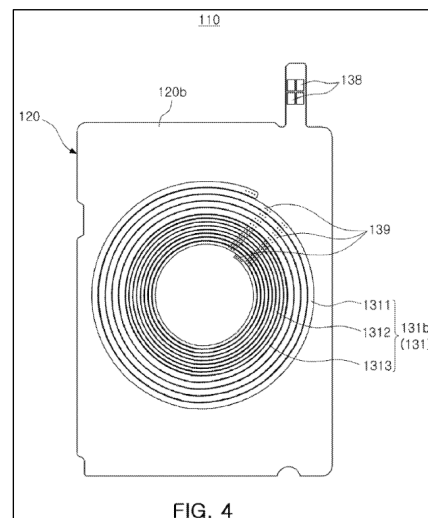
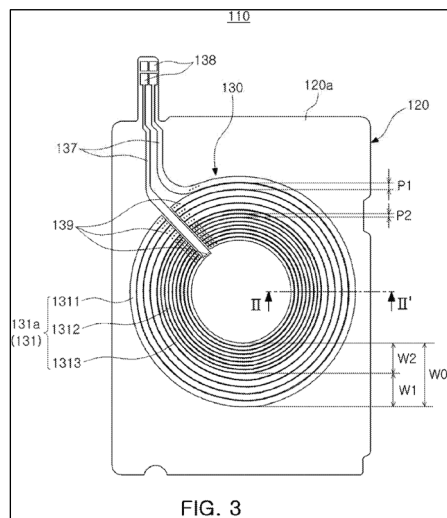


Ex. 1008, Figs. 5A-5B; Ex. 2012, ¶ 67.

F. Overview of *Ahn*

Ahn describes antenna structures formed on substrates, including spiral coil antennas used in wireless communication and wireless power applications. Ex. 1007, ¶¶ [0016], [0121]-[0126]; Ex. 2012, ¶ 68. *Ahn* focuses on coil geometry, trace width variation, and surface arrangement to improve performance characteristics such as efficiency and signal quality. Ex. 1007, Abstract, ¶¶ [0004], [0099]-[0100]; Ex. 2012, ¶ 68.

Ahn discloses embodiments in which multiple spiral wirings are disposed on different surfaces or layers of a substrate, and it discusses that such wirings may be electrically connected in series or in parallel. Ex. 1007, ¶¶ [0008]-[0011]; Ex. 2012, ¶¶ 69-70. “The substrate 120, [] is an insulating substrate having circuit wirings formed on opposite surfaces thereof[.]” Ex. 1007, ¶ [0065]; Ex. 2012, ¶ 70. These disclosures are directed to layer-to-layer or surface-to-surface configurations, where coils on opposite sides of a substrate are connected through interlayer conductors or vias. Ex. 2012, ¶ 71. For example, as shown in Figures 3 and 4 below, “the first spiral wiring 131a and the second spiral wiring 131b are electrically connected to each other through interlayer connection conductors 139.... Therefore, the first spiral wiring 131a and the second spiral wiring 131b may be disposed in parallel with each other on the opposite surfaces of the substrate 120, respectively.” Ex. 1007, ¶ [0074], Figs. 3-4.



Ex. 1007, Fig. 3 (left, front surface), Fig. 4 (right, back surface).

In describing spiral wirings with inner and outer portions, *Ahn* focuses on geometric characteristics (e.g., varying line widths or turn density) and on routing strategies across *different* layers. Ex. 2012, ¶¶ 70-72. *Ahn* does not describe a configuration in which inner and outer portions of a same-surface single antenna pattern are electrically connected in parallel as distinct coil elements. Ex. 2012, ¶ 72. Accordingly, *Ahn* reflects an approach to antenna design that relies on multi-surface implementations and interlayer connections, rather than on parallel electrical connections between inner and outer coils of the same antenna pattern formed on the same surface. Ex. 2012, ¶¶ 72-73.

IV. THE PETITION FAILS TO ESTABLISH A REASONABLE LIKELIHOOD OF UNPATENTABILITY OF ANY CHALLENGED CLAIM

A. Ground 1 Fails to Render Obvious the Challenged Claims

- i. The Non-Obvious Combination of *Seong*, *Kang*, and *Cho* Fails to Render Obvious Claims 8 and 16

Seong, *Kang* and *Cho*, independently and in combination, fail to render obvious Claims 8 and 16, because none of the references disclose that “the inner coil and the outer coil are electrically connected in parallel.” *Seong* and *Kang* are both silent with regard to any inner coil and outer coil being electrically connected in parallel (*Cho* is not cited by the Petition for this element) and the Petition fails to

establish a motivation to combine *Seong*, *Cho*, and *Kang* to arrive at the claimed coil configuration.

- a. Ground 1 fails to render obvious “the inner coil and the outer coil are electrically connected in parallel” (Claims 8 and 16)
 1. *Seong* does not disclose the claimed parallel inner and outer coil structure

The Petition incorrectly identifies two distinct coil patterns of *Seong* as the claimed inner and outer coils: the MST and WPC patterns. Ex. 2012, ¶¶ 80-81. Petitioner then concedes that *Seong* “does not, however, expressly state how the MST and WPC patterns are electrically connected.” Petition, 55. This statement misses the fact that *Seong* also does not even teach that the MST and WPC patterns are connected at all. Ex. 2012, ¶ 82. Consistent with the Petition’s admission, *Seong* indeed does not disclose an inner coil and an outer coil that are electrically connected in parallel as required by Claim 8 and 16, let alone such coils formed as part of a single antenna pattern on the same “first major surface” of a substrate as required by Claim 8. See Ex. 1001, Cl. 8, 16; Ex. 2012, ¶¶ 79-83. Instead, *Seong* describes multiple functionally and electrically distinct antenna patterns, including MST and WPC patterns, that are designed to coexist within a device. Ex. 2012, ¶ 82. *Seong* also does not explain any connection between the MST and WPC patterns. *Seong* further does not identify an inner coil and an outer coil of the same antenna pattern,

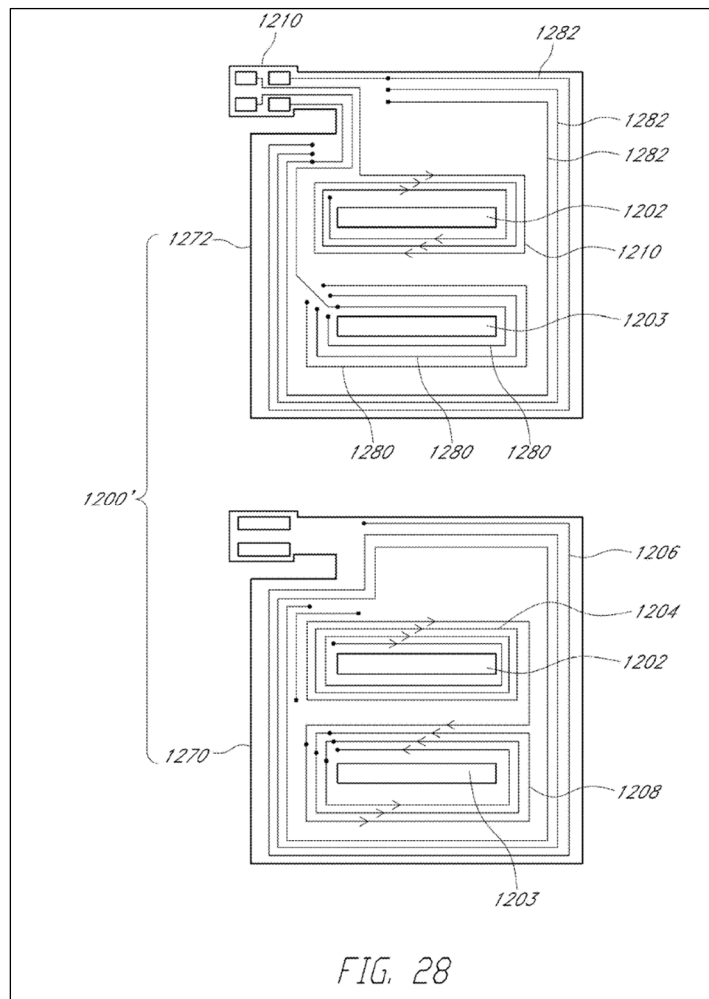
nor does it disclose any parallel electrical connection between such coils as part of a single antenna pattern. Ex. 2012, ¶¶ 83-84.

2. *Kang* does not remedy the deficiencies of *Seong*

Because, as Petitioner concedes, *Seong* does not disclose the claimed inner coil and outer coil that are electrically connected in parallel (or that the identified inner and outer coils are even connected at all), the Petition turns to *Kang* for the purported teaching of “electrically connecting inner and outer coils in parallel,” and concludes that “[i]t would have been obvious to electrically connect *Seong*’s WPC and MST patterns in parallel in view of *Kang*.” Petition, 55. Petitioner’s reliance on *Kang* is misplaced. Ex. 2012, ¶¶ 85-86.

Kang does not teach, nor is it relied upon for, inner and outer coils of an antenna pattern connected in any way. Ex. 2012, ¶ 87. Instead, *Kang* describes different functional antenna patterns that, while located on a same surface and including one coil surrounding the other coils, are not electrically connected in parallel, or at all. *See* Ex. 1012, Fig. 26; *see also id.*, ¶ [0218]; Ex. 2012, ¶ 88.

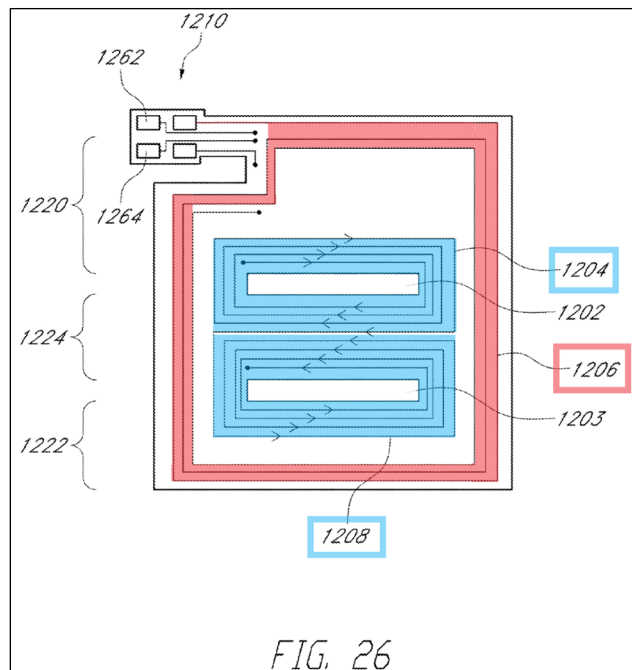
Kang further describes how “[i]n embodiments shown in FIGS. 28 and 21, coil A 1204, coil C 1208 and coil D 1210 are electrically connected to each other in series.” *Id.* ¶ [0231], Fig. 28 (below); Ex. 2012, ¶ 89. These embodiments are adjacent coils electrically connected to each other, not inner and outer coils electrically connected to each other.



Ex. 1012, Fig. 28 (depicting coil A (1204), coil B (1206), and coil C (1208) on the bottom layer (1270), and coil D (1210) on the top layer (1272)).

While *Kang* continues by saying “to provide a proper length of antennas, the connections may be modified to parallel connections,” (*id.* ¶ [0236]), this is referring to the connections between coils A and D or coils B and E, respectively. *See id.* ¶ [0237] (“***Coil A*** and ***coil D*** may be connected to each other in parallel. Similarly, ***coil B*** and ***coil E*** may be connected to each other in parallel. ***Coil B*** and ***coil F*** may be connected to each other in parallel.”); Ex. 2012, ¶ 89.

Critically, these parallel connections are *not* between any inner and outer coil of the same antenna pattern. Ex. 2012, ¶ 89. Although *Kang* has a single sentence stating that “coil A and coil C are connected to each other and can be used as an MST antenna,” *Kang* is clear that coil A 1204 and coil C 1208 are adjacent to one another, but these two coils (A and C) are not arranged in an inner coil and outer coil configuration. Ex. 1012, Fig. 26 (below); Ex. 2012, ¶¶ 88-90.



Ex. 1012, Fig. 26 (depicting coil A (1204) and coil C (1208) in blue, and coil B (1206) in red); Ex. 2012, ¶ 88.

The Petition relies, indiscriminately, on the word “parallel” in *Kang* and, without *any* analysis, merely concludes that it would be obvious to modify *Seong* in view of these specific teachings of *Kang* (which are inapplicable to the claimed

structure). Had the Petitioner actually analyzed the teachings of *Kang*, it would realize that *Kang*'s teachings of parallel are limited to different types of antennas that are not of the same antenna pattern arranged in an inner- and outer-coil configuration. Ex. 2012, ¶¶ 90-91. As a result, *Kang* cannot supply the missing teaching of electrically connecting in parallel an inner and outer coil of a single antenna pattern, because it simply does not have that teaching. Ex. 2012, ¶ 91.

Setting aside the deficiency of *Kang*, it cannot provide the motivation to modify *Seong*, which not only does not disclose how the WPC and MST patterns are connected, but in fact fails to disclose that those two antenna structures can be connected at all. Ex. 2012, ¶ 91.

The '564 Patent makes clear that the claimed "inner coil" and "outer coil" refer to an inner and outer portion of the same type of functional antenna pattern formed (i.e., inner WPC coil and outer WPC coil) on the same surface. Ex. 1001, Fig. 52; Ex. 2012, ¶ 82. Indeed, the '564 Patent consistently describes the inner coil and outer coil as two components of a WPC antenna pattern that are electrically connected in parallel. *See, e.g.*, Ex. 1001, Figs. 51, 52, 53A-53C; Ex. 2012, ¶¶ 92-93. And nothing in the Petition suggests that the MST and WPC coils of *Seong* would, or even could, be electrically connected to form the same functional antenna pattern. Ex. 2012, ¶¶ 94-96.

Kang does not supply this missing structure, and Petitioner does not contend otherwise. *Kang*'s references to coils that may be connected in series or parallel are generic and untethered to the particular claimed coil geometry, let alone the specific geometry. Ex. 2012, ¶ 94. *Kang* does not disclose an inner coil and an outer coil that make up the same antenna pattern formed on the same surface of a substrate, let alone that the inner and outer coil are electrically connected in parallel. Ex. 2012, ¶ 94. Critically, *Kang* does not disclose or suggest electrically connecting an inner coil and an outer coil in parallel, as required by Claims 8 and 16. Ex. 2012, ¶ 95.

As a result, *Kang* does not remedy the deficiencies of *Seong*, which discusses multiple coils, often associated with different functions or formed on different surfaces, without identifying which coils are connected, how they are geometrically related, or under what structural conditions a parallel electrical connection would be implemented. Petition, 55 (“*Seong* does not, however, teach *how* the MST and WPC patterns are electrically connected.”); Ex. 2012, ¶¶ 93-94. Petitioner’s assertion that it would have been obvious to connect *Seong*’s MST and WPC coils in parallel “in view of *Kang*” merely substitutes abstract statements of *Kang* that it is possible to create electrical connections in various known ways, statements that are entirely divorced from the actual connection of the claimed coil configuration. Such a cobbling together is not enough. *Virtek Vision Int’l ULC v. Assembly Guidance Sys., Inc.*, 97 F.4th 882, 888 (Fed. Cir. 2024) (“[T]his case involves nothing other than an

assertion that because two coordinate systems were disclosed in a prior art reference and were therefore “known,” that satisfies the motivation to combine analysis. That is an error as a matter of law. It does not suffice to simply be known. A reason for combining must exist.”).

Cho is not cited for this element and does not cure the above deficiencies of *Seong* and *Kang*.

For the reasons discussed above, Petitioner fails to establish that the combination of *Seong*, *Kang*, and *Cho* render obvious Claims 8 and 16.

b. The Petition Fails to Establish a Motivation to Combine
Seong, *Kang*, and *Cho*

Ground 1 independently fails because the Petition does not articulate a reasoned motivation for a POSA to combine *Seong*, *Cho*, and *Kang* to arrive at the particular coil architecture required by Claims 8 and 16.

1. The Petition fails to articulate why a POSA would
select and combine the cited teachings to arrive at the
claimed architecture

The Petition’s motivation to combine discussion focuses on the general proposition that *Seong*, *Kang*, and *Cho* each relate to antenna modules in smartphones and the general goal of space efficiency. Petition, 20-23; Ex. 2012, ¶¶ 97-103. But Claims 8 and 16 do not merely recite “space-efficient antenna arrangements.” Both Claims 8 and 16 require a specific, claimed architecture,

including the “inner coil and the outer coil are electrically connected in parallel.” Ex. 1001, Cls. 8, 16; Ex. 2012, ¶ 104. Claim 8, which depends from independent Claim 1, further requires “a first antenna pattern formed on the first major surface and comprising an inner coil and an outer coil surrounding the inner coil” (Claim 8, based on dependency from Claim 1), and Claim 16 further requires the “inner coil and the outer coil are configured for wireless battery charging” (Claim 16, based on dependency from Claim 13). Ex. 1001, Cls. 1, 8, 16.

The Petition never explains *why* a POSA would modify *Seong*’s disclosure of electrically separate functional antenna patterns (i.e., WPC and MST patterns) into the claimed structure of a single antenna pattern on the same surface comprising inner and outer coils electrically connected in parallel. *See* Petition, 22-23. Instead, the Petition reasons “a POSA would have been motivated to electrically connect *Seong*’s WPC and MST patterns in parallel” because “[a] POSA would have understood parallel connections may be more secure, and thus preferable for high-security, close-distance transactions, such as NFC payment transactions.” *Id.* This fails to explain a reason to provide a connection between two otherwise not connected antenna patterns, and the Petition never addresses why a POSA would connect these otherwise disconnected antenna patterns.

Petitioner’s statements are not an articulated motivation to arrive at the claimed architecture; it is an assumption that a POSA would pick an abstract

electrical option (“parallel”) and then apply it to different antenna patterns, without addressing (i) that these two antenna patterns are not connected at all in the prior art, (ii) the claim requirement that the coils are inner/outer portions be of the same antenna pattern, and (ii) the ’564 Patent’s disclosure that “inner coil” and “outer coil” refer to an inner and outer portion of the same antenna pattern. *See, e.g.*, Ex. 1001, Cls. 8, 16, Fig. 52; Ex. 2012, ¶¶ 98-99.

Rather, they are exactly the type of generic and conclusory motivations that the Federal Circuit rejects. *See ActiveVideo Networks, Inc. v. Verizon Commc'ns, Inc.*, 694 F.3d 1312, 1320 (Fed. Cir. 2012) (expert testimony that is “generic and bears no relation to any specific combination of prior art elements” is “insufficient ... to support a determination of obviousness”).

Nor does the Petition provide any explanation as to why a POSA would be motivated to restructure *Seong*’s arrangement of WPC and MST antennas in that manner, as opposed to adopting any of the many alternative coil arrangements disclosed in the cited art. *See, e.g.*, Ex. 1006, Figs. 1-17; Ex. 1012, Figs. 1-50; Ex. 2012, ¶¶ 100-104.

In other words, the Petition supplies no “reasoned explanation” for selecting from the cited references and combining them in the specific manner demanded by Claims 8 and 16, rather than in some other way that preserves the functional and electrical separation of *Seong*’s distinct antenna patterns. *See In re Nuvasive, Inc.*,

842 F.3d 1376, 1383 (Fed. Cir. 2016) (citing *In re Lee*, 277 F.3d 1338, 1343 (Fed. Cir. 2002)).

2. Petitioner’s “simple design choice” theory relies on hindsight reconstruction

The Petition attempts to bridge the gap in its proof by characterizing the claimed parallel connection as a “simple design choice” that “would have been obvious to try.” Petition, 23. But that framing collapses the claim into an abstract circuit principle and ignores that Claims 8 and 16 require a particular architecture.

At base, the Petition treats the Claims 8 and 16 as though they are satisfied by choosing “parallel” over “series” in the abstract to connect to otherwise electrically isolated coils (or by coupling distinct functional patterns like MST and WPC). The ’564 Patent’s disclosure makes clear that the “inner coil” and “outer coil” are portions of the *same* antenna pattern, and Claim 16, in fact, specifies the particular antenna pattern, “inner coil and the outer coil are configured for wireless battery charging.”. *See, e.g.*, Ex. 1001, Cls. 8, 16, Fig. 52. The Petition’s “simple design choice” rationale depends on starting from the claimed invention and working backward to retrofit generic statements in the prior art onto a structure the art does not actually disclose. Ex. 2012, ¶¶ 47-52, 100-104. That is classic hindsight reconstruction and cannot satisfy Petitioner’s burden at institution.

Moreover, this connection is not simply a matter of design choice. Connecting an inner and outer coil of the same pattern in series would just create one coil. Ex. 2012, ¶¶ 51-52, 99-101. The requirements and implications of creating this parallel connection is far from a simple design choice. Ex. 2012, ¶¶ 51-52, 99-101.

Even if the Petition addressed the type of parallel connection that Claims 8 and 16 are directed to (it does not), the Petitioner's challenge amounts to nothing more than an argument that "different technology was independently known." This fails. *See Virtek Vision Int'l ULC*, 97 F.4th at 888 (explaining arguments "grounded in the fact that the claim elements are known in the prior art" without more "does not show a motivation to combine" (citing *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007) ("[A] patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art."))).

3. The cited art's figures undermine Petitioner's obviousness theory

The figures in the cited references underscore why Petitioner's "simple design choice" story is not grounded in the prior art. None of the prior art discloses that the claimed inner and outer coils are connected, let alone connected in parallel.

The Petition relies on *Kang* and *Seong*, which include numerous figures and embodiments illustrating a wide range of antenna layouts, coil geometries, and

interconnection schemes. *See, e.g.*, Ex. 1006, Figs. 1-17; Ex. 1012, Figs. 1-50. Despite the breadth of illustrated implementations, Petitioner does not identify (and the references do not illustrate or disclose) the specific claimed configuration: a single antenna pattern formed on the same major surface that includes inner and outer coils electrically connected in parallel. Ex. 1001, Cls. 8, 16; Ex. 2012, ¶ 104.

This absence is significant because it highlights the gap between (i) Petitioner’s abstract reconstruction and (ii) what the prior art actually discloses as workable designs. The cited art repeatedly illustrates alternative coil arrangements, which are often layered, function-segregated, or otherwise architecturally distinct, without ever depicting the claimed inner coil and outer coil parallel structure. That consistent absence throughout the illustrated embodiments corroborates that Petitioner’s proposed modification is not a straightforward, routine “design choice” reflected in contemporaneous design practice, but rather a hindsight-driven reconstruction guided by the ’564 Patent’s disclosure.

B. Ground 2 Fails to Render Obvious the Challenged Claims

i. The Non-Obvious Combination of *Ahn* and *721Lee* Fails to Render Obvious Claims 8 and 16

The non-obvious combination of *Ahn* and *721Lee* fails to render obvious Claims 8 and 16 because neither of the references disclose “the inner coil and the outer coil are electrically connected in parallel.” *First*, both *Ahn* and *721Lee* are

silent with regard to the claimed inner coil and outer coil being electrically connected in parallel. **Second**, the Petition does not establish a motivation to combine *Ahn* and *721Lee*.

- a. Ground 2 fails to render obvious “the inner coil and the outer coil are electrically connected in parallel” (Claims 8, 16)
 1. *Ahn* does not disclose the claimed parallel inner and outer coil structure

Ahn does not disclose an inner coil and an outer coil that are electrically connected in parallel as required by claims 8 and 16, let alone such coils formed as part of a single antenna pattern (required by Claims 8 and 16) on the same “first major surface” of a substrate (required by Claim 8). *See* Ex. 1001, Cls. 8, 16; Ex. 2012, ¶ 106. Instead, as Petitioner concedes, *Ahn* discloses “first and second spiral wirings disposed ***on opposite surfaces of the substrate*** in parallel.” Petition, 97 (emphasis added). Petitioner also argues that *Ahn* discloses that the first and second spiral wirings “may be connected to each other in series or in parallel,” (Petition, 97) but this still does not meet the claimed limitation. Ex. 2012, ¶¶ 106-107. In addition, *Ahn* explains that the spiral wirings include a first section forming an outer portion and a second section forming an inner portion, with different line widths, and then states: “the spiral wirings ... may include two wirings having different widths and connected to each other in ***series***.” Ex. 1007, ¶¶ [0076]-[0077]; Ex. 2012, ¶ 109. This series connection is the only disclosed connection mechanism in *Ahn*. That

disclosure is incompatible with Petitioner’s attempt to treat Claims 8 and 16 as satisfied by *Ahn*’s generic mention of “parallel.” Ex. 2012, ¶ 109.

Ahn’s “series” or “parallel” language concerns a different relationship entirely: *Ahn* describes first and second spiral wirings disposed on ***opposite surfaces of the substrate*** (Ex. 1007, ¶ [0071]) and electrically connected through interlayer conductors (Ex. 1007, ¶¶ [0071]-[0074]), noting that these opposing-surface spirals may be treated as disposed “in parallel with each other on the opposite surfaces of the substrate 120, respectively” (i.e., layered conductors). Ex. 1007, ¶¶ [0074]; Ex. 2012, ¶ 108.

Ahn does not disclose an inner coil and an outer coil of the same antenna pattern, nor does it disclose any parallel electrical connection between such inner and outer coils of a single antenna structure on a first surface of a substrate. Ex. 2012, ¶ 110.

2. *721Lee* does not remedy the deficiencies of *Ahn*

Because *Ahn* does not disclose the claimed inner coil and outer coil that are electrically connected in parallel, the Petition turns to *721Lee* to bolster its (incorrect) design choice theory² and to argue the general notion that two coils “may

² Yet again, the Petition does not articulate how a parallel connection of an inner and outer coil on the same surface would be made. While the series connection

be connected in parallel.” Petition, 98. Petitioner’s reliance on *721Lee* is misplaced and yet again this same conclusory statement is insufficient to carry the day for Petitioner, as its argument is untethered from the claimed requirements. Ex. 2012, ¶ 111.

First, *721Lee*’s “parallel” discussion is based on multi-layer coil structures, with multiple surfaces, connected through vias (i.e., connecting coils on different layers in parallel). Ex. 2012, ¶ 112. *721Lee* expressly describes a “parallel type coil” where a coil with turns on one layer is connected in parallel to a coil on another layer, and then explains a key technical drawback: where via-connected coils in parallel create very small resistance, “it may be construed equally as a short conducting wire,” and “the current may be applied to only one coil rather than to two coils ... which may act as a problem.” Ex. 1011, ¶ [0152]; Ex. 2012, ¶ 112. That is not a disclosure of a parallel inner/outer architecture; it is a warning that parallel-coupled coils can behave unpredictably (by shunting current), which undermines the Petition’s claim that the choice to connect coils in parallel would

is trivial, simply connecting the inner-most end of the outer coil with the outer-most end of the inner coil, a parallel connection of coils on the same surface requires significantly more complex orientation and modifications. Ex. 2012, ¶ 52.

have yielded predictable results with a reasonable expectation of success. Ex. 2012, ¶¶ 112-113.

Second, *721Lee* is directed to increasing inductance and strengthening magnetic fields for MST, NFC, and WPC coils in a limited area by using coils on ***multiple surfaces*** and “via set conductors.” *See, e.g.*, Ex. 1011, ¶¶ [0011]-[0014], [0143], [0154]-[0156]; Ex. 2012, ¶ 113. That is a fundamentally different design direction than the claimed requirement that the inner coil and outer coil are electrically connected in parallel within Claim 8’s and Claim 16’s first antenna pattern, and further on the same surface as required by Claim 8. Ex. 2012, ¶ 113. Where *721Lee* mentions parallel connections in other contexts (e.g., “sub coils” connected in parallel), those discussions again relate to sub-coils buried between layers and via connections, not the claimed inner/outer parallel configuration. Ex. 1011, ¶ [0134]; Ex. 2012, ¶ 113.

As such, *721Lee* does not supply the missing disclosure that *Ahn* lacks. At most, *721Lee* discloses parallel connections between coils on different layers (and even identifies why general parallel coupling can lead to current-shunting behavior). Ex. 2012, ¶ 113. But *721Lee* fails to disclose the claimed inner coil and outer coil on the same surface in parallel electrical connection. Ex. 2012, ¶ 114.

- b. The Petition Fails to Establish a Motivation to Combine *Ahn* and *721Lee*

Ground 2 independently fails because the Petition does not articulate a reasoned motivation for a POSA to combine *Ahn* and *721Lee* to arrive at the particular coil architecture required by Claims 8 and 16. Ex. 2012, ¶ 115.

1. The Petition fails to articulate why a POSA would select and combine the cited teachings to arrive at the claimed architecture

The Petition's motivation to combine discussion focuses on the general proposition that *Ahn* and *721Lee* each relate to antenna modules in smartphones and the general goal of space efficiency. Petition, 65-68. But Claims 8 and 16 do not merely recite "space-efficient antenna arrangements." Ex. 2012, ¶ 116. The claims require a specific, claimed architecture: "a first antenna pattern formed on the first major surface and comprising an inner coil and an outer coil surrounding the inner coil" (Claim 8, based on dependency from Claim 1) "wherein the inner coil and the outer coil are electrically connected in parallel" (Claims 8 and 16). Ex. 1001, Cls. 1, 8, 16; Ex. 2012, ¶ 117.

Aside from the missing disclosure, Ground 2 independently fails because the Petition does not articulate a reasoned motivation to modify *Ahn*'s disclosed coil architecture, where inner and outer sections are described as series-connected, to arrive at the claimed inner/outer parallel connection. At best, *Ahn*'s technical contribution is to optimize loss and efficiency by varying trace widths between inner and outer portions of a spiral and managing routing/lead wires through disconnected

regions, not by teaching that inner/outer portions should be paralleled. Ex. 1007, ¶¶ [0076]-[0083], [0093]-[0100], [0072]-[0074]; Ex. 2012, ¶ 118.

721Lee emphasizes multi-layer coil structures and via-set arrangements to increase inductance and field strength, not on an inner coil and outer coil of a single antenna pattern being electrically connected in parallel. Ex. 1011, ¶¶ [0011]-[0014], [0154]-[0156]; Ex. 2012, ¶ 118. The Petition fails to articulate anything, other than the existence of parallel connections, that would motivate the proposed modifications to *Ahn's* structure. And the mere existence of connections is insufficient to render obvious the claimed structure because the other structural limitations of Claims 8 and 16, necessary for the parallel connections of the claimed inner and outer coils on the same surface, are similarly lacking. Ex. 2012, ¶ 116.

The Petition also fails to provide any explanation as to why a POSA would be motivated to restructure *Ahn's* arrangement of first and second spiral wirings in that manner, as opposed to adopting any of the many alternative coil arrangements disclosed in the cited art. *See, e.g.*, Ex. 1006, Figs. 1-17; Ex. 1007, Figs. 3-10; Ex. 1011, Figs. 3-25; Ex. 1012, Figs. 1-50; Ex. 2012, ¶¶ 118-120. In other words, the Petition supplies no “reasoned explanation” for selecting from the cited references and combining them in the specific manner demanded by Claims 8 and 16, rather than in some other way that preserves the separation of *Ahn's* distinct antenna patterns. *See In re Nuvasive*, 842 F.3d at 1383 (citing *In re Lee*, 277 F.3d at 1343).

The Petition’s motivation to combine theory therefore amounts to hindsight reconstruction: it identifies the word “parallel” in general discussions and then asserts a POSA would have applied it to *Ahn*’s inner and outer structure, despite *Ahn*’s express series-connection description of those inner/outer sections. *See, e.g.*, Ex. 1007, ¶¶ [0076]-[0077].

2. Petitioner’s “simple design choice” theory relies on hindsight reconstruction

For the same reasons discussed above in Section IV.A.i.b.2 the Petition’s attempt to bridge the gap in its proof by characterizing the claimed parallel connection as a “simple design choice” that “would have been obvious to try” fails. Petition, 98. Additionally, the Petition’s “only two electrical connection possibilities” framing is not a substitute for evidence that a POSA would have selected the claimed configuration. Petition, 98. *Ahn* contains multiple coil wirings and multiple layout alternatives, including additional coils for NFC and MST functionality and different placement options. Ex. 1007, ¶¶ [0122]-[0126]. The Petition’s categorical “binary choice” argument ignores that the claimed limitation concerns a specific architecture (inner coils and outer coils electrically connected in parallel) that must be disclosed or suggested by the prior art, not simply the availability of the abstract concept of “parallel” connections in unrelated contexts. As discussed, while a series connection of an inner and outer coil may be trivial, it

is a significantly more complex process to connect an inner and outer coil on the same surface in parallel. *See supra* Section IV.B.a.

Because Claims 8 and 16 are not taught or suggested by *Ahn* or *721Lee*, Ground 2 fails to render Claims 8 and 16 obvious.

3. The cited art's figures undermine Petitioner's obviousness theory

The figures in the cited references underscore why Petitioner's "simple design choice" story is not grounded in the prior art. None of the prior art discloses that the claimed inner and outer coils on a same surface are connected, let alone connected in parallel.

The Petition relies on *Ahn* and *721Lee*, which include numerous figures and embodiments illustrating a wide range of antenna layouts, coil geometries, and interconnection schemes. *See, e.g.*, Ex. 1007, Figs. 3-10; Ex. 1011, Figs. 3-25. Despite the breadth of illustrated implementations, Petitioner does not identify (and the references do not illustrate or disclose) the specific claimed configuration: an antenna pattern formed on the same major surface that includes inner and outer coils of the same kind electrically connected in parallel. Ex. 2012, ¶ 120.

This absence is significant because it highlights the gap between (i) Petitioner's abstract reconstruction and (ii) what the prior art actually discloses as workable designs. The cited art repeatedly illustrates alternative coil arrangements,

which are often layered, function-segregated, or otherwise architecturally distinct, without ever depicting the claimed inner coil and outer coil parallel structure. That consistent absence throughout the illustrated embodiments corroborates that Petitioner’s proposed modification is not a straightforward, routine “design choice” reflected in contemporaneous design practice, but rather a hindsight-driven reconstruction guided by the ’564 Patent’s disclosure.

Additionally, as discussed above in Section IV.B.i.a.2, Petitioner’s own art confirms that electrically connecting coils in parallel was not viewed at the time as a straightforward or predictable design choice. *See* Section IV.B.i.a.2. For example, *721Lee*’s disclosure of “parallel type” coils arises in the context of multi-layer coil structures connected through vias, and expressly identifies technical drawbacks associated with such configurations, including very low resistance and unintended current shunting to a single coil. Ex. 1011, ¶ [0152]; Ex. 2012, ¶ 119. Far from treating parallel coil connections as interchangeable or routine, *721Lee* cautions that such arrangements can behave unpredictably and present engineering problems, further undercutting Petitioner’s contention that the claimed configuration would have been a “simple design choice.” Ex. 2012, ¶¶ 119-120.

C. Ground 3 Fails to Render Obvious the Challenged Claims

- i. The Non-Obvious Combination of *005Lee*, *Seong*, and *Cho* Fails to Render Obvious Claims 8 and 16

Ground 3 does not cure the deficiencies identified above with respect to Grounds 1 and 2. As explained in Sections IV.A, the Petition fails to establish that *Seong* discloses or suggests the required claim limitations, including “wherein the inner coil and the outer coil are electrically connected in parallel.” *See* Section IV.A. Those failures are dispositive, and the Petition’s reliance on *005Lee* does not alter the analysis. Moreover, the Petition fails to establish a reasoned motivation for a POSA to combine *005Lee*, *Seong*, and *Cho* to arrive at the particular coil architecture required by Claims 8 and 16.

a. Ground 3 fails to render obvious Claims 8 and 16

As discussed above in Section IV.A.i.a, *Seong* does not disclose that the inner coil and the outer coil are electrically connected in parallel as required by Claims 8 and 16, much less such coils formed as part of a single antenna pattern on the same “first major surface” of a substrate as required by Claim 8. *See* Section IV.A.i; Ex. 1001, Cls. 8, 16; Ex. 2012, ¶¶ 121-123. *Cho* and *005Lee* similarly fail to teach or suggest these claim elements. Ex. 2012, ¶ 124. Petitioner’s expert offers only conclusory assertions that these references could be combined to arrive at the claimed invention, without identifying any disclosure in either reference that addresses the specific claim requirements. These same deficiencies apply with respect to Ground 3.

The inclusion of *005Lee* in Ground 3 does not remedy these failures. *005Lee* does not disclose or suggest the inner coil and the outer coil electrically connected in parallel as claimed. The Petition asserts that “Cho teaches electrically connecting inner and outer coils in parallel.” Petition, 134. The Petition goes on to assert that “[i]t would have been obvious to incorporate Cho’s parallel-electrical connection teachings with the combined *005Lee-Seong* teachings to electrically connect *005Lee*’s *MST* and *wireless charge coils* (inner and outer coils) in parallel.” Petition, 134. An electrical connection, even if parallel, between an MST and WPC antenna is irrelevant to the specific antenna pattern required by Claims 8 and 16. Ex. 2012, ¶¶ 122-124. Petitioner does not assert, nor could it, that the identified MST antenna and WPC are of the same antenna pattern, or collectively form a single antenna structure. Ex. 2012, ¶¶ 123-124. Nor is there any indication that these two antenna types could, or would, be connected.

Petitioner improperly treats distinct antenna patterns (e.g., MST and WPC) as though they satisfy Claim 8’s and Claim 16’s requirement for an inner and outer coil of the same antenna pattern. Ex. 2012, ¶ 124. Simply labeling these distinct antennas as “inner” and “outer” coils does not supply the missing structure required by the claims. Ex. 2012, ¶ 124. Nor does the Petition explain how *005Lee* would modify or supplement *Seong* and *Cho* in a manner that would supply the missing claim elements. Ex. 2012, ¶ 124. Instead, Ground 3 merely repackages the same

theory advanced in Grounds 1 and 2, relying on the same flawed assumptions and the same conclusory expert testimony. As a result, Petitioner has failed to establish that the combination of *005Lee*, *Seong*, and *Cho* render obvious Claims 8 and 16. Ex. 2012, ¶ 125.

b. The Petition Fails to Establish a Motivation to Combine *005Lee*, *Seong*, and *Cho*

The Petition fails to articulate a motivation to combine *005Lee* with *Seong* and *Cho* that is grounded in the disclosures of the references themselves or is not otherwise hindsight-driven. As with Grounds 1 and 2, Petitioner relies on hindsight-driven reasoning and generic assertions that a POSA “would have been motivated” to combine the references, without explaining why a POSA would have looked to *005Lee* to address the specific deficiencies of *Seong* and *Cho* or how such a combination would have been implemented. Ex. 2012, ¶¶ 126-127.

Notably, Petitioner argues that “a POSA would have been motivated to implement 005Lee’s teachings of forming coils on *both substrate surfaces* with Seong’s Figure 6, which shows coils on a substrate’s bottom surface, opposite similar patterns on the top surface,” and concludes that “[t]his would have combined known elements according to known methods (forming known coil patterns on *both substrate sides*, as 005Lee and Seong teach).” Petition, 110 (emphases added). However, as discussed above, Claim 8 requires the inner and outer coils of one

antenna pattern to be on the “first major surface,” not one coil on a first top surface and the other coil on a second bottom surface. Ex. 2012, ¶ 128. In other words, Petitioner’s argument that “[f]orming coils on both substrate sides was common, and Seong’s disclosure provides details a POSA would have used to effectively implement 005Lee’s teachings” is inapposite to Claims 8 and 16. Ex. 2012, ¶¶ 128-129.

Petitioner’s arguments with respect to combining *005Lee* and *Cho* are similarly deficient. The Petition states that because “[t]here are only two electrical connection possibilities—in parallel or in series, as Cho teaches— [] it would have been obvious to try and a simple design choice to electrically connect 005Lee’s inner and outer conductive patterns in parallel[.]” Petition, 112. Petitioner’s reference to generic electrical connection disclosures in *Cho* still does not address why it would have been obvious to combine these references to arrive at a single antenna pattern having inner and outer coils electrically connected in parallel on the same surface as required by Claims 8 and 16. Ex. 2012, ¶ 129. This is because no such motivation existed.

Accordingly, Petitioner has failed to establish that the combination of *005Lee*, *Seong*, and *Cho* renders the challenged claims obvious. Ground 3 therefore fails.

V. CONCLUSION

As each of the Grounds fail on the merits (as well as for the discretionary reasons detailed in Patent Owner's Paper Supporting Discretionary Denial (Paper 9)), institution of the Petition should be denied.

Dated: April 29, 2026

Respectfully submitted,

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Certification of Word Count Under 37 C.F.R. § 42.24(d)

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CERTIFICATE OF SERVICE

I hereby certify that on April 29, 2026, I caused a true and correct copy of the foregoing to be served on the following counsel of record for Petitioner by electronic mail to the following addresses:

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