

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO. LTD.

Petitioner,

v.

WIPQTUS, INC.

Patent Owner

**SECOND SUPPLEMENTAL EXPERT DECLARATION OF
JOSHUA PHINNEY, IN SUPPORT OF PETITIONER'S OPPOSITION TO
REVISED MOTION TO AMEND U.S. PATENT NO. 10,038,339**

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I, Joshua Phinney, hereby declare as follows:

I. INTRODUCTION AND QUALIFICATIONS

1. I have previously provided a declaration filed as Ex. 1002 (“Declaration”) in support of Paper No. 1, Petition for *Inter Partes* Review of U.S. Patent No. 10,038,339 (“Petition”), and my testimony from that first Declaration remains the same.

2. I have also previously provided a Supplemental Declaration in Support of Petitioner’s Opposition to Patent Owner’s Motion to Amend (“Supplemental Declaration”) filed as Ex. 1015. My testimony from that Supplemental Declaration also remains the same.

3. I have been asked to provide a further declaration on the substitute claims 21 and 22 of Patent Owner’s Revised Motion to Amend for the ’339 patent (the “Motion”). This declaration (“Second Supplemental Declaration”) sets forth my opinion on the above aspects of the substitute claims.

II. UNDERSTANDING OF THE GOVERNING LAW

A. Enablement

4. I understand that the patent specification must support the full scope of the claim and must describe the invention in sufficient detail so that a POSA can practice the invention without excessive undue experimentation.

B. Indefiniteness

5. I understand that a claim is indefinite if, when read in light of the patent specification and its prosecution history, it fails to inform those skilled in the art about the scope of the invention with reasonable certainty. In particular, I have been informed that a claim is indefinite if a POSA could not clearly understand what is covered by the claim in order to avoid infringement.

C. Obviousness

6. I have set forth my understanding of the governing law on obviousness in my Declaration. Declaration, §II.A.

D. Interpreting Claims Before the Patent Office

7. I have set forth my understanding of the governing law on interpreting claims before the Patent Office in my Declaration. Declaration, §II.B.

E. Analogous Art

8. I have set forth my understanding of the governing law on analogous art in my Declaration. Declaration, §II.C.

F. Materials Relied on in Forming My Opinions

9. In forming my opinions expressed in this declaration, I have relied on my own knowledge, experience, and expertise, as well as the knowledge of a POSA in the relevant timeframe. In addition, I have reviewed all the materials filed through the date of this Supplemental Declaration in this proceeding, and any other materials cited in this Supplemental Declaration.

III. The Person of Ordinary Skill in the Art

10. I have set forth my opinion regarding the level of ordinary skill in the art for the '339 patent in my Declaration which remains the same. Declaration, §V.A.

IV. CLAIM CONSTRUCTION

11. I understand that in *inter partes* review, claims are “construed using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. 282(b).” 37 C.F.R. § 42.100(b). I understand that claims must be given their ordinary and customary meaning as understood by a POSA at the time of the invention in light of the specification and the prosecution history. *Id.*; *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312-13 (Fed. Cir. 2015) (en banc); 83 Fed. Reg. 51340, Vol. 83, No. 197 (Oct. 11, 2018). I understand that terms not specifically construed have their plain and ordinary meaning as understood by a POSA.

12. For purposes of this Second Supplemental Declaration, unless otherwise noted herein such as when the claim does not have a clear meaning and is indefinite, I apply the ordinary and customary meaning of the claim language as it would have been understood by a POSA as of August 12, 2012 based on the '339 patent and the prosecution history.

A. “topology”

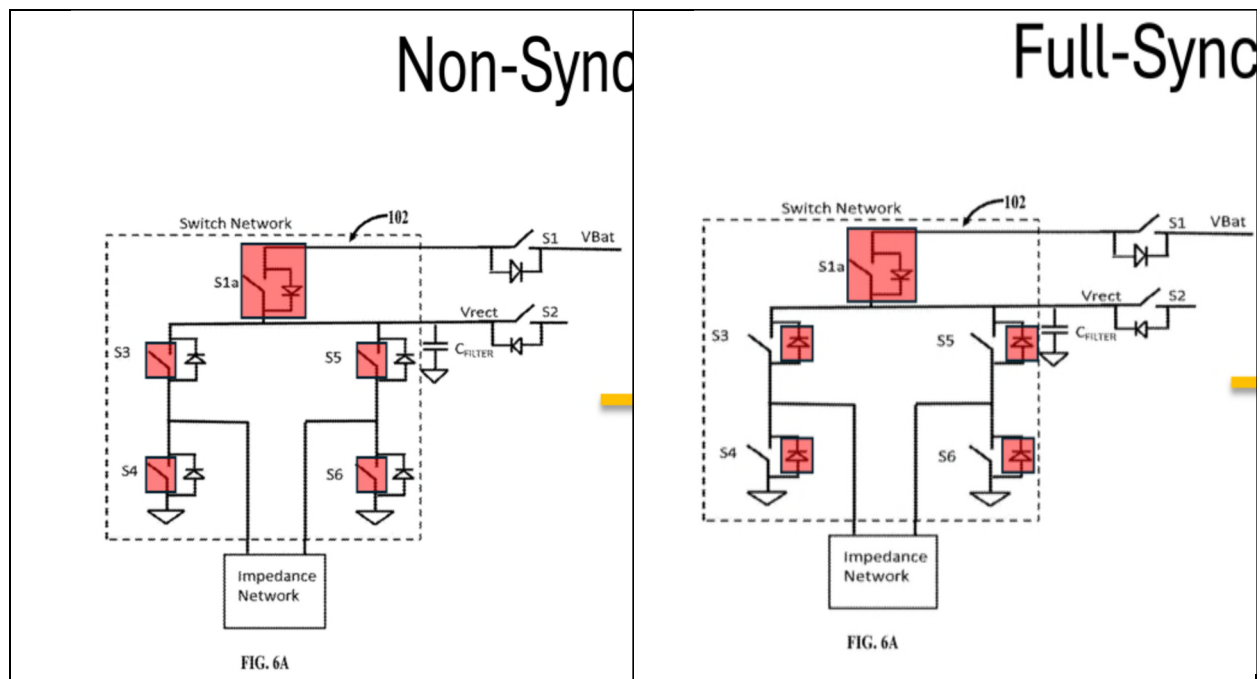
13. Patent Owner proposes that the claim term “topology” should be construed as “a collection of circuit components that perform a type of rectification or a type of power inversion.” Motion, 19. Furthermore, Patent Owner proposes that

the claim phrase “change topology ... of said switch network” should be construed as “configured to change the topology in a way that changes the type of rectifier or the type of inverter or a rectifier to an inverter or an inverter to a rectifier of the switch network circuit.” *Id.*, 19-20. I disagree with these proposed constructions.

14. In support of its proposed claim constructions, Patent Owner points to disclosures in the '339 patent that “[t]he dual mode wireless power receiver also adjusts the topology of the switch network, for example from the default non-synchronous rectifier to fully-synchronous rectifier.” Motion, 20. However, I have reviewed '312 Provisional Application (Ex. 2004) to which Patent Owner claims priority for the '339 patent, and this example of changing from non-synchronous rectifier to fully-synchronous rectifier is not disclosed in the '312 Provisional Application.

15. It is my opinion that changing the connected/disconnected states of switches by a rectifier, such as a fully-synchronous rectifier, should satisfy the claimed change of topology of the switch network. This is supported by Patent Owner’s infringement contentions that argued that “the switch network is constantly changing its topology while operating in ... rectification mode” because “the MOSFET switches of the “switch network” ... **change their configuration at a rapid rate**” such that “in one instance **two of the MOSFETS are on while the other two are off** and at another instant the **MOSFETs that were on turn off and**

the ones that were off turn on.” EX1016, 34-35, 37. This is also supported by Dr. Direen’s annotations to Fig. 6A of the ’339 patent below showing the configuration of the switches determining the topology of the switch network as well as his testimony. *See also* Deposition Transcript of Dr. Randell Direen of Nov. 14, 2024 (EX1020, “Direen-Depo-2”), 70:7-13 (“Q. Dr. Direen, does the configuration of the switches of a switch network determine the topology for a switch network? A. **I would say that the way that the switches are being used in the switch network determines how they -- the -- the topology of the switch network.**”); 72:21-73:3 (“... in the fully-synchronous version none of the -- the -- those four switches stay stationery during the operation, they all synchronously turn on and off with the incoming signals”).



This is further consistent with the Board's Preliminary Guidance: "the claim language '*change ... topology of said switch network*' appears to encompass **changing the connected/disconnected states of the switches** and changing from an inverter to a rectifier (or the opposite)." Guidance, 17.

V. SUBSTITUTE CLAIMS 21 and 22 ARE INVALID FOR INDEFINITENESS AND LACK OF ENABLEMENT

16. It is my opinion that claims 21 and 22 lack enablement and are indefinite.

A. Lack of Enablement

17. Patent Owner proposes the underlined amendment to claim [21.e]: "said first circuitry, based on an input from said control logic circuit, configured to change, while configured to receive said power, the impedance of said impedance network and topology of said switch network to obtain a modified form of said received power, and apply said modified form of said power to said load device."

18. Patent Owner suggests that the amended claim [21.e] "requires at least additional control logic that is able to monitor that power delivered to a 'load device' such as the battery in order to manage the 'change in topology of the switch network to obtain a modified form of' received power" and argues that the asserted prior art is deficient for failing to teach such "control logic." Motion, 24-25; Declaration of Dr. Direen in Support of Patent Owner's Revised Motion to Amend (EX2008, "Direen-Decl-2"), ¶¶ 73-77.

19. While I disagree that monitoring power delivered to a battery is required by proposed substitute claim 21, it is my opinion that the '339 patent does not sufficiently enable monitoring the power delivered to a battery to manage the change in topology of the switch network to obtain a modified form of received power.

20. The '339 Patent does not teach this solution. Instead, it generally describes the control logic as “a state machine, a microcontroller.” EX1001, 19:2. A POSA reading the disclosures in the '339 patent would not have been provided with a solution to monitor the power delivered to a battery in order to manage the change in topology of the switch network to obtain a different form of received power because there are other ways to manage it, such as by monitoring local circuit conditions such as diode conduction.

B. Indefiniteness

21. The proposed amendments to claim 21 also fail under § 112 as they are indefinite under Patent Owner’s proposed construction of “*topology*.”

22. As discussed above, Patent Owner argues that “*topology*” means “a group of circuit components that perform a *type* of rectification of a *type* of power inversion”; and “*change ... topology of said switch network*” means “configured to change topology in a way that changes the *type* of rectifier or the *type* of inverter or a rectifier to an inverter or an inverter to a rectifier of the switch network circuit.”

23. But Patent Owner’s proposed construction renders the claim indefinite because it would be unclear to a POSA what constitutes a “type” of rectifier or inverter. For example, the ’339 patent describes various categories of inverters such as “a class D half bridge inverter, class E half bridge inverter, class D full bridge inverter,” EX1001, 4:20-21, but it is unclear whether these are “types” of inverters under Patent Owner’s construction of the term “topology.” Therefore, it is unclear, for example, whether changing from a “class D half bridge inverter” to a “class E half bridge inverter” would meet the claim limitation “*change ... topology of said switch network.*” Therefore, the claim fails to inform a POSA the reasonable scope of the claim and is indefinite.

VI. SUBSTITUTE CLAIMS 21 and 22 ARE INVALID UNDER 35 U.S.C. 103

24. It is my opinion that substitute claims 21 and 22 are each obvious in view of prior art cited in the grounds below.

Ground No.	Obviousness Grounds
1	Substitute claims 21 and 22 are obvious based on U.S. Patent Publication No. 2011/0018356 by Chatterjee et al. (Ex. 1003 - “Chatterjee”) in view of U.S. Patent Publication No. 2010/0083012 by Corbridge et al. (Ex. 1004 - “Corbridge”), U.S. Patent Publication 2009/0243397 (Ex. 1017 - “Cook”), and the knowledge of a person of ordinary skill in the art (“POSA”).
2	Under Patent Owner’s proposed construction of “topology,” substitute claims 21 and 22 are obvious based on U.S. Patent Publication No. 2011/0018356 by Chatterjee et al. (Ex. 1003 - “Chatterjee”) in view of U.S. Patent Publication No. 2010/0083012 by Corbridge et al. (Ex. 1004 - “Corbridge”), U.S. Patent

Ground No.	Obviousness Grounds
	Publication 2009/0243397 (Ex. 1017 – “Cook”), and the knowledge of a person of ordinary skill in the art (“POSA”).

A. GROUND 1: Chatterjee in view of Corbridge, Cook, and the Knowledge of a POSA

25. Assuming the Board does not adopt the improper construction of “*topology*” proposed by Patent Owner, substitute claims 21 and 22 should be found obvious over Chatterjee in view of Corbridge, Cook and the knowledge of a POSA. The only difference between the substitute claim 21 proposed in Patent Owner’s previous Motion to Amend Claims (hereinafter “first substitute claim 21”) and the revised substitute claim 21 here (hereinafter “revised substitute claim 21” or “substitute claim 21”) is Patent Owner’s modification of the amendment to the claimed “*impedance network*” comprises components “one of which must be a passive component and one of which must be either an active component or switch.” Such an “*impedance network*” is obvious in view of the proposed combination of cited prior art. *See* Guidance, 18-22.

1. Overview of Cook

26. Cook is a United States Patent Application Publication with Publication No. 2009/0243397. Cook was filed on March 4, 2009 and published on October 1, 2009.

27. Entitled “Packaging and Details of a Wireless Power device,” Cook is directed to “[a] wireless power system includes a power source, power receiver, and components thereof.” Cook(EX1017), Abstract. In particular, Cook’s system can include an antenna that “can have both a variable capacitor and a variable inductor, and both of those can be changed in order to change characteristics of the matching” so as to “improve the coupling to the power source in various modes.” Cook(EX1017), Abstract.

28. Figure 2 of Cook discloses a wireless power receiver that includes a resonant antenna 210, tuning 220, matching 240, rectifier 250, load 260, control system 270, and wireless interface 230..” Cook(EX1017), ¶91. The antenna 210 is “generally a multi-turn loop of wire.” Cook(EX1017), ¶92.

29. Cook further teaches that “[a]ssuming a fixed operating frequency defined by the energy transmitter, tuning of the antenna’s resonance frequency may compensate for detuning effects caused by extraneous objects (metallic objects at LF and metallic and dielectric objects at HF); detuned power receivers in close proximity; variation of load impedance.” Cook(EX1017), ¶¶96-99. “Tuning may also compensate for component tolerances, aging, etc.” Cook(EX1017), ¶100.

30. Cook further teaches that “[t]uning can be automatically executed by the receiver’s control system according to a defined procedure. A fractional tuning range in the order of $\pm 10\%$ may be desirable and also sufficient in most scenarios.”

Cook(EX1017), ¶¶101, 102. Specifically, Cook teaches that “[t]he resonant antenna can be changed by varying by anti-reactance (capacitance), or reactance of the inductive part of the antenna system. Capacitive tuning may be accomplished by mechanically tuneable capacitors (driven by mini-motor/actuator); electrically tuneable capacitors (dielectric permittivity tuning) or by capacitor bank (library) and electronic or mechanical switches (RF relays).” Cook(EX1017), ¶¶103-107.

31. It is my opinion that Cook is analogous art to the ’339 patent. The reference is from the same field of endeavor —wireless power charging—and at least reasonably pertinent to a problem addressed by the ’339 patent—wirelessly receive power. ’339 patent, 1:60-2:20 (“there is a need for a dual mode wireless charging receiver with security features built into the hardware of the mobile device that in one mode, **receives wireless power** to charge, for example, a mobile device . . .”); Cook(EX1017), Abstract, (“A wireless power system includes a power source, **power receiver**, and components thereof. The system can also include a parasitic antenna that can **improve the coupling to the power source** in various modes.”).

2. Motivation to Combine

32. Chatterjee teaches an inductive signal interface that selectively operates in a power transmit mode and a power receive mode. Declaration, §V.B. Corbridge similarly teaches an inductive signal transfer system, and in particular, teaches establishing a communication protocol for wireless power transmission.

Declaration, §V.C. A POSA would have found it obvious to improve Chatterjee's inductive signal interface such that, in the power transmit mode, it implements the sequence of signaling disclosed in Corbridge. Declaration, ¶¶160-170. However, neither Chatterjee nor Corbridge expressly disclose changing impedance of the impedance network comprising at least one passive component and at least one active component or switch while the inductive signal interface is configured to receive power.

33. Cook teaches “[a] wireless power system includ[ing] a power source, power receiver, and components thereof.” Cook(EX1017), Abstract. In particular, Cook teaches a wireless antenna that “can have both a variable capacitor and a variable inductor, and both of those can be changed in order to change characteristic of the matching,” thus “improv[ing] the coupling to the power source in various modes.” Cook(EX1017), Abstract. Cook further teaches that the variable capacitor can comprise a “capacitor bank” which comprises at least one capacitor connected in series with at least one switch. Cook(EX1017), ¶¶104-107, 239, Fig. 16.

34. It is my opinion that a POSA would have been motivated to improve Chatterjee's inductive signal interface such that, in power receive mode, its impedance network—i.e. the capacitors connected to the coil—can be tuned while receiving power to improve performance, as taught by Cook. Specifically, a POSA would have understood that tuning the impedance network during receive mode can

“compensate for detuning effects caused by extraneous objects (metallic objects at LF and metallic and dielectric objects at HF),” “detuned power receivers in close proximity,” and “variation of load impedance,” as well as “component tolerances, aging, etc.” Cook(EX1017), ¶¶96-100. Such a modification would have required applying Cook’s known capacitive tuning technique in Chatterjee’s inductive signal interface in the same way as it functions in Cook.

35. It is my opinion that a combination would have involved “the mere application of a known technique”—Cook’s teachings regarding capacitive tuning using a capacitor bank and switches—“to a piece of prior art”—Chatterjee’s inductive signal interface 410—that is “ready for the improvement.” Cook(EX1017), ¶¶104-107. Chatterjee’s inductive signal interface is similar to Cook’s receiver because the wireless power receivers taught in Chatterjee and Cook both comprise an antenna comprising a coil and a capacitor, a rectifier, a load, and control system, to similarly function to wirelessly receive AC power via the coil, convert AC power to DC using a rectifier under the control of a control system, and transmitting the converted DC power to a load for, e.g., use or storage. Chatterjee(EX1003), ¶¶41-46, Fig. 4; Cook(EX1017), ¶¶91-127, Fig. 2. And such a combination would have resulted in simply applying Cook’s teaching about capacitive tuning in Chatterjee’s inductive signal interface in the same way as it functions in Cook.

36. It is my opinion that a POSA would also have been motivated to make such a combination because Chatterjee and Cook are both directed to the same field of endeavor, i.e., wireless power charging. Declaration, §V.B; *supra* §VIII.A.1. Chatterjee states that its invention “is not limited to those precise embodiments” described in the specification, and “many modifications and variations will be apparent to practitioners skilled in this art.” Chatterjee(EX1003), ¶97. Cook teaches that in wireless power transmission, the “transmit and receiving antennas are preferably resonant antennas, which are substantially resonant, e.g., within 10% of resonance” Cook(EX1017), ¶16. During operation, various factors may cause “detuning effects,” i.e., when the antenna’s resonance frequency shift away from its desired frequency such that the transmit antenna and receive antenna are no longer in resonance, such as “extraneous objects,” “detuned power receivers in close proximity,” or “variation of load impedance.” Cook(EX1017), ¶¶96-99. Tuning may compensate for such detuning effects, as well as component tolerances, aging, etc. Cook(EX1017), ¶¶96-100. In other words, tuning of an antenna, such as by changing its capacitance or inductance, changes its resonant frequency, and can bring the antenna back to resonance. Cook thus teaches a wireless receiver with a control system that performs “antenna tuning control” to improve antenna resonance matching and “maximize receiver efficiency.” Cook(EX1017), ¶¶119-124.

37. It is my opinion that a POSA would have had a reasonable expectation of success in applying Cook's capacitive tuning technique in Chatterjee's inductive signal interface. A POSA would have understood that such a combination could be implemented as adding Cook's capacitor bank to be connected in series with Chatterjee's capacitor C6 as shown in Cook's Figure 16. Cook(EX1017), ¶240 ("a tuning capacitor bank 1600 . . . in series to the principal capacitor 1610"), Fig. 16. Chatterjee's inductive signal interface already includes a processor 413 that can control the operation of switches of its power bridge circuit. Chatterjee(EX1003), ¶¶55, 73. A POSA would have been familiar with how to use that processor 413 to also control the switches for capacitive tuning pursuant to Cook's teaching. For example, Cook describes that its processor 413 implements a tuning algorithm so that the transmit antenna and receive antenna are "substantially resonant, e.g., within 10% of resonance," Cook(EX1017), ¶16; it takes measurements of the receiver antenna such as "antenna current, voltage, power, and calibration routines," Cook(EX1017), ¶¶82, 125, 163, 181, 182, 210, and based on the measurements, performs capacitive tuning, e.g., using "fractional tuning . . . in the order of +/- 10%." Cook(EX1017), ¶¶101-103, 107, Fig. 16.

3. Claim 21

38. Claim 21 is a proposed substitute claim of claim 1. The majority of the limitations set forth in substitute claim 21 are the same as in original claim 1 and the

first substitute claim 21 proposed in Patent Owner's previous Motion to Amend Claims, and my opinions regarding obviousness of those limitations are set forth in my first Declaration (EX1002) and Supplemental Declaration (EX1015) and remain the same.

- a. [21.p] A dual mode wireless power receiver configured to selectively apply a received power to a load device and utilize at least a part of the stored power to power-up a secondary wireless power receiver and communicate with said secondary wireless power receiver to cause an action or transaction or charge said secondary wireless power receiver's load device, said dual mode wireless power receiver comprising:**

39. This claim limitation is unchanged from the original claim; thus, I rely on my testimony in my first Declaration. Declaration, §VIII.A.1 (claim [1.p]).

- b. [21.a] one of coil and capacitor electrodes;**

40. This claim limitation is unchanged from the original claim; thus, I rely on my testimony in my first Declaration. Declaration, §VIII.A.1 (claim [1.a]).

- c. [21.b] a first circuitry comprising: [21.b-i] an impedance network comprising a collection of two or more electrical components, one of which must be a passive component and one of which must be either an active component or switch; [21.b-ii] a switch network; [21.b-iii] a filter capacitor;**

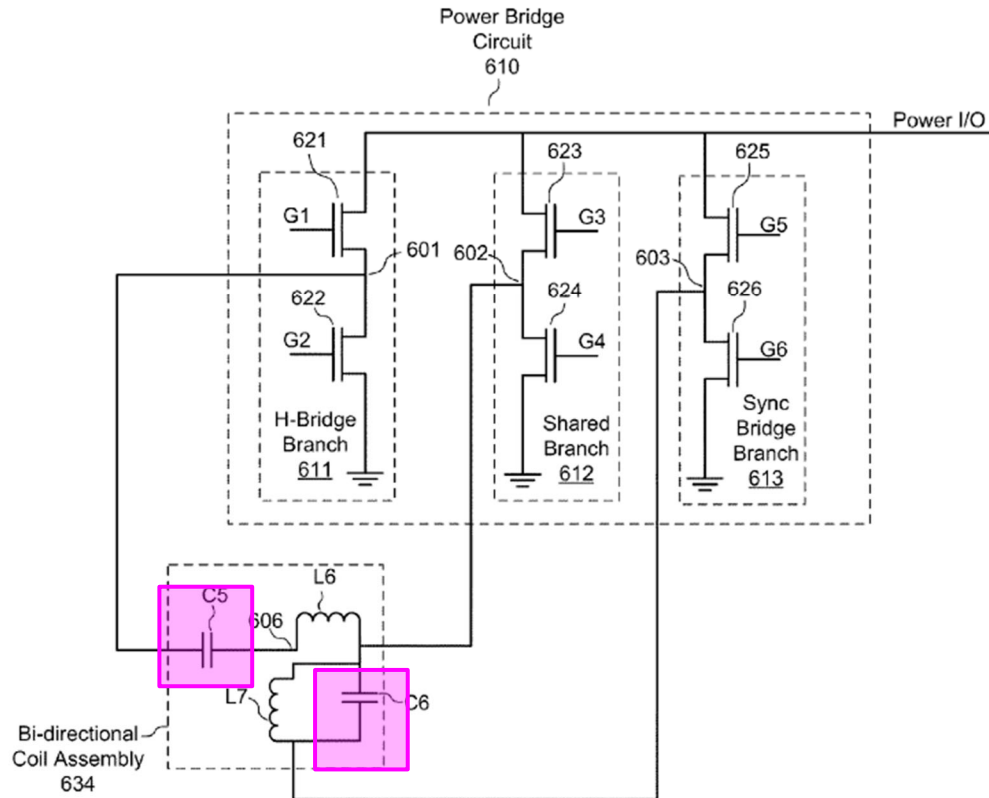
41. Chatterjee in view of Corbridge, Cook, and the knowledge of POSA renders the limitation obvious. Specifically, Chatterjee's bi-directional coil assembly discloses the claimed "impedance network"; its power bridge circuit

discloses the claimed “switch network”; and its power circuit discloses the claimed “filter capacitor.” Declaration(EX1002), §VIII.A.1 (claim [1.b]).

- i. [21.b-i] an **impedance network** comprising a collection of two or more electrical components, one of which must be a passive component and one of which must be either an active component or switch

42. Chatterjee in view of Corbridge, Cook, and the knowledge of a POSA teaches this limitation.

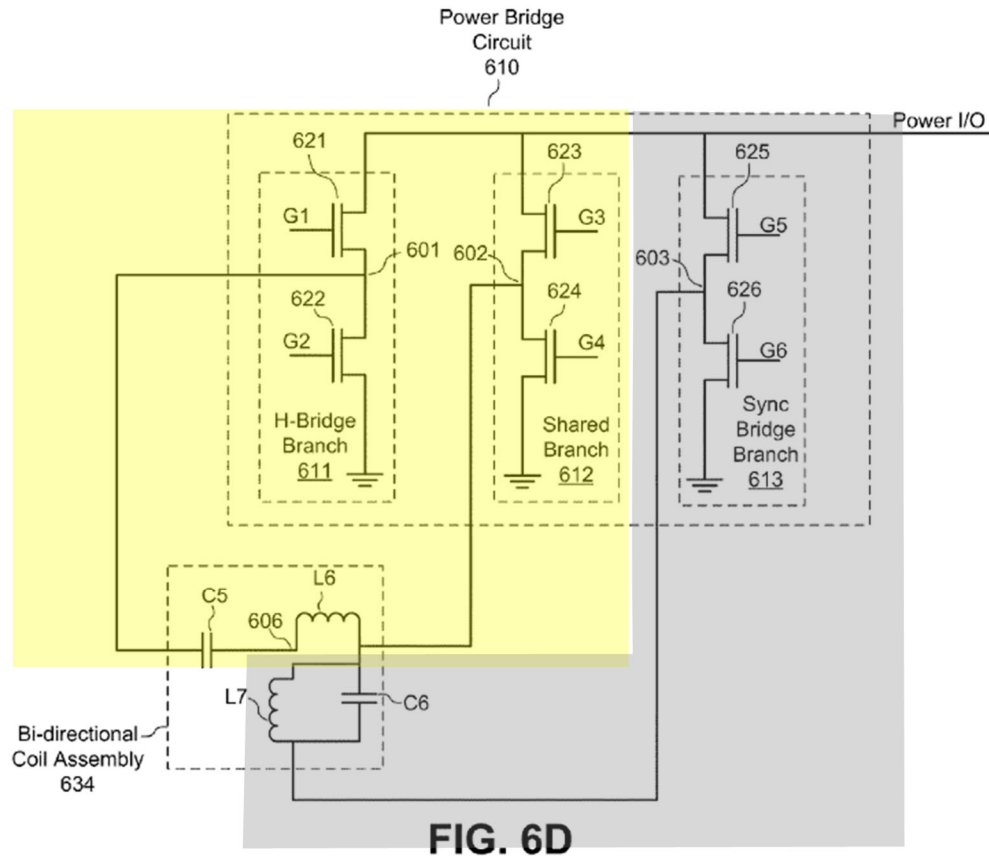
43. As shown in Figure 6D of Chatterjee, the coil assembly 634 comprises **capacitors C5 and C6** that are connected between the coil inductor L6 and L7 and the switch network (Power Bridge Circuit 610). EX1003, Fig. 6D, 7E, 7F. This is further shown in Figures 7E and 7F, which show the same circuitry of the bi-directional coil assembly 634 as in Figure 6D.

**FIG. 6D**

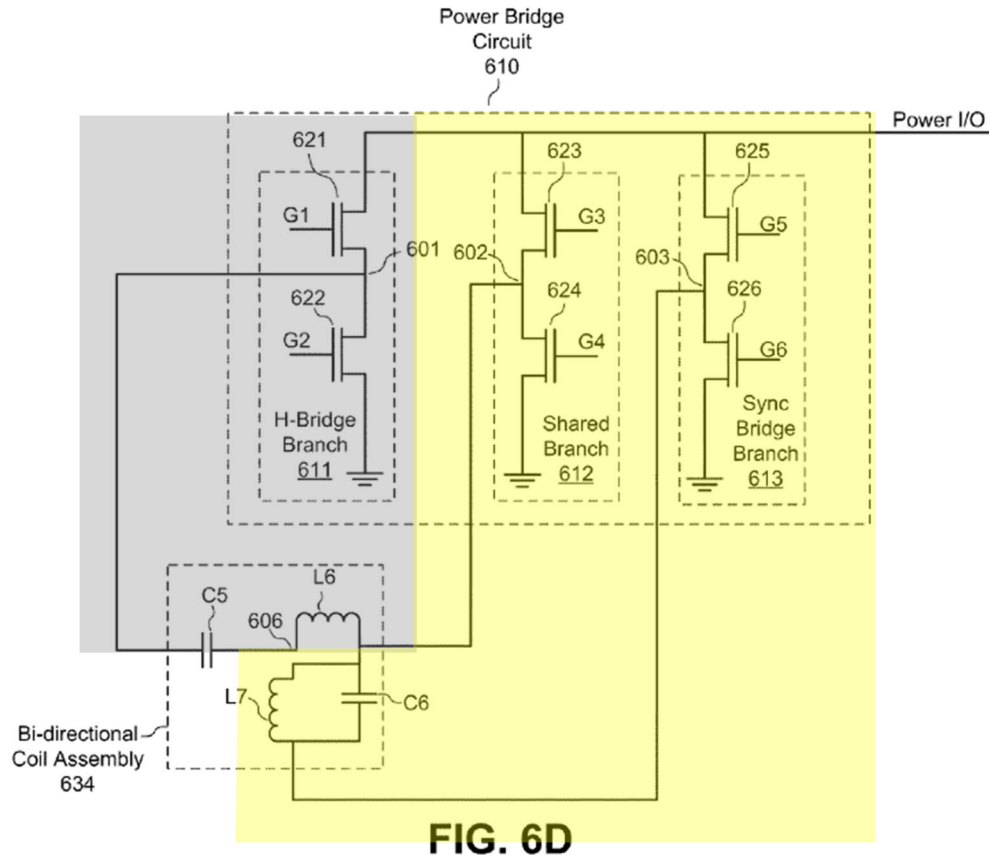
It is my opinion that Chatterjee's capacitors C5 and C6 disclose the passive component required by an "an impedance network comprising a collection of two or more electrical components, one of which must be a passive component and one of which must be either an active component or switch," as set forth in the substitute claim 21.

44. "In the power transmit mode, the sync bridge branch 613 is turned off and the current path through the bi-directional coil assembly 634 is the series combination of the capacitor C5 and the inductive coil L6. In the power receive mode, the H-bridge branch 611 is turned off and the current path through the bi-directional coil assembly 634 is parallel combination of the inductive coil L7 and

the capacitor C6.” Chatterjee(EX1003), ¶73. The annotated Figures below showing the active part of the circuitry of Figure 6D in yellow highlighting (and the inactive part in gray) under different modes. *Id.* Fig. 6D.

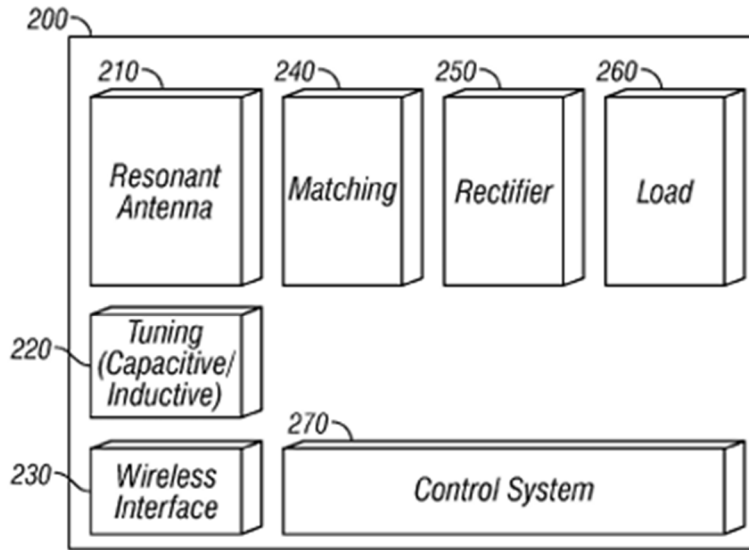


(Power Transmit Mode)



(Power Receive Mode)

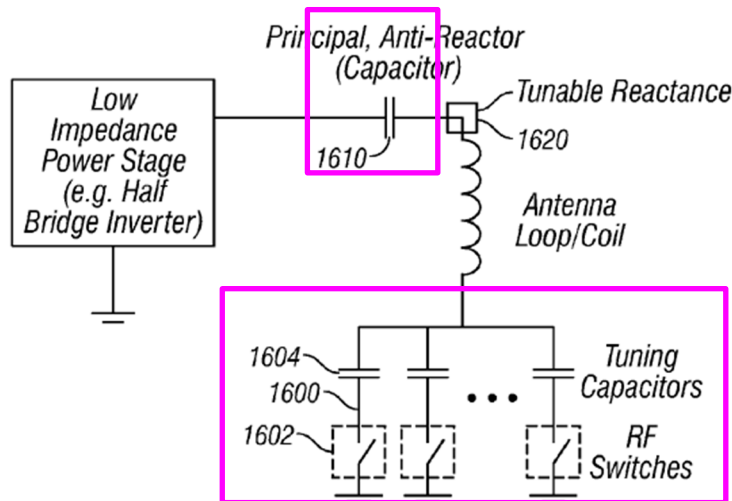
45. Furthermore, as explained in Section VI.A.2, a POSA would have been motivated to revise Chatterjee's inductive signal interface to further include Cook's capacitive tuning mechanism. Specifically, Figure 2 of Cook teaches a wireless receiver that includes "a resonant antenna 210, tuning 220, matching 240, rectifier 250, load 260, control system 270." Cook(EX1017), ¶91; Fig. 2.

**FIG. 2**

46. Cook’s resonant antenna comprises a “multi-turn loop of wire,” i.e., a coil. Cook(EX1017), ¶¶92, 130. A POSA would have understood that Cook’s resonant antenna 210 further comprises a **capacitor** because Cook discloses that “resonant antenna can be changed by varying by anti-reactance (**capacitance**), or reactance of the inductive part of the antenna system.” Cook(EX1017), ¶103; *see also* Cook(EX1017), ¶130 (“In a magnetically/inductively coupled system, the antenna 310 is generally a multi-turn loop (coil) in series with a **capacitor**.”); Figs. 13, 15.

47. Cook further teaches tuning the resonant frequency of the receiver antenna by capacitive tuning, such as using a “[c]apacitor bank (library) and **electronic or mechanical switches** (RF relays),” an example of which is shown in Fig. 16 below. Cook(EX1017), ¶¶104-107, 239, Fig. 16. The antenna capacitor, including a capacitor bank and switches, teaches the “impedance network” of claim

[21.b-i] because it comprises “a collection of two or more electrical components, one of which must be a passive component and one of which must be either an active component or switch.”



Cook(EX1017), Fig. 16.

48. A POSA would have found it obvious to modify Chatterjee to add Cook’s “capacitor bank ... with switches” to be connected in series with capacitor C6 as to be able to change impedance of the wireless power receiver in the charging mode, as explained above in Section VI.A.2. The combination of “capacitor bank . . . with switches” along with Chatterjee’s capacitors C5 and C6 meets the “impedance network” requirement.

ii. [21.b-ii] a switch network

49. This claim limitation is unchanged from the original claim; thus, I rely on my testimony in my first Declaration. Declaration(EX1002), §VIII.A.1 (claim

[1.b]). Specifically, Chatterjee's power bridge circuit teaches the claimed "switch network." Declaration(EX1002), §VIII.A.1 (claim [1.b]).

iii. [21.b-iii] filter capacitor

50. This claim limitation is unchanged from the original claim; thus, I rely on my testimony in my first Declaration. Declaration(EX1002), §VIII.A.1 (claim [1.b]).

d. [21.c] a second circuitry comprising: a control logic circuit; and a modulator/demodulator circuit;

51. This claim limitation is unchanged from the original claim; thus, I rely on my testimony in my first Declaration. Declaration(EX1002), §VIII.A.1 (claim [1.c]).

e. [21.d] said first circuitry configured to receive said power from a wireless power transmitter;

52. This claim limitation is unchanged from the original claim; thus, I rely on my testimony in my first Declaration. Declaration(EX1002), §VIII.A.1 (claim [1.d]).

- f. [21.e] said first circuitry, based on an input from said **control logic circuit**, configured to change, while configured to receive said power, the impedance of said impedance network and topology of said **switch network** to obtain a modified form of said received power, and apply said modified form of said power to said load device

53. As explained, it is my opinion that “*change ... topology of said switch network*” covers changing the connect/disconnect state of switches of the switch network. *Supra*, §IV.

54. It is further my opinion that that Chatterjee in view of Corbridge, Cook, and the knowledge of POSA teaches this limitation.

55. Figure 6D of Chatterjee teaches a first circuitry comprising at least the “impedance network” (**C5 and C6**) and the “switch network” (**power bridge circuit 610**). Chatterjee(EX1003), Fig. 6D, ¶72. The **processor 413** provides control signals G1-G6 to control the operation of the **power bridge circuit**. Chatterjee(EX1003), Fig. 6D, ¶63. In particular, in the power receive mode, **processor 413** sends signals G3-G6 to operate the shared branch 612 and sync bridge branch 613 so that the **switches 623-626** operate synchronously as a rectifier—i.e., each switch alternates between the connected and disconnected states to change the topology of the **power bridge circuit**. Chatterjee(EX1003), ¶65, 4, Fig. 2. Chatterjee therefore discloses “*said first circuitry, based on an input from said control logic circuit, configured to change . . . topology of said switch network.*”

56. It is my opinion that a POSA would also have understood that changing topology takes place “*while [the first circuitry is] configured to receive said power*” because **switches 623-626** continually switch on and off while in the power receive mode Chatterjee(EX1003), ¶4, Fig. 2. This is because in power receive mode, switches 623-626 operate synchronously as a rectifier to convert the received AC power to DC power, which requires the switches to switch on and off in synchronization with the AC signal.

57. It is my opinion that a POSA would further have understood that Chatterjee’s first circuitry is configured to change topology of said switch network “*to obtain a modified form of said received power, and apply said modified form of said power to said load device*” because **switches 623-626 operating as a rectifier** turns the received AC power into DC power, thus obtaining a “*modified form*” of the received power, and provides that modified form of said power to a load device such as a rechargeable battery. Chatterjee(EX1003), ¶37; *see also* Declaration, ¶145.

58. However, Chatterjee does not explicitly disclose “said first circuitry, based on an input from said control logic circuit, configured to change, **while configured to receive said power**, the impedance of said impedance network.” Cook teaches this limitation. Specifically, Figure 2 of Cook teaches a wireless receiver includes “a resonant antenna 210, tuning 220, matching 240, rectifier 250, load 260, control system 270.” Cook(EX1017), ¶91; Fig. 2.

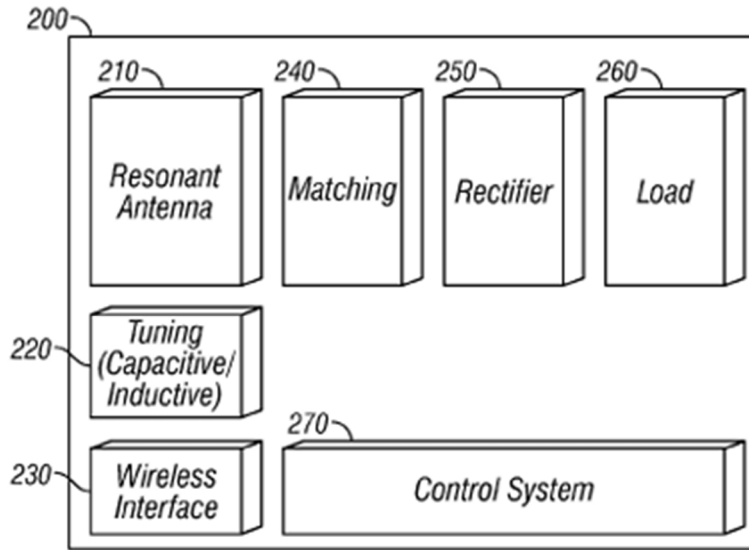
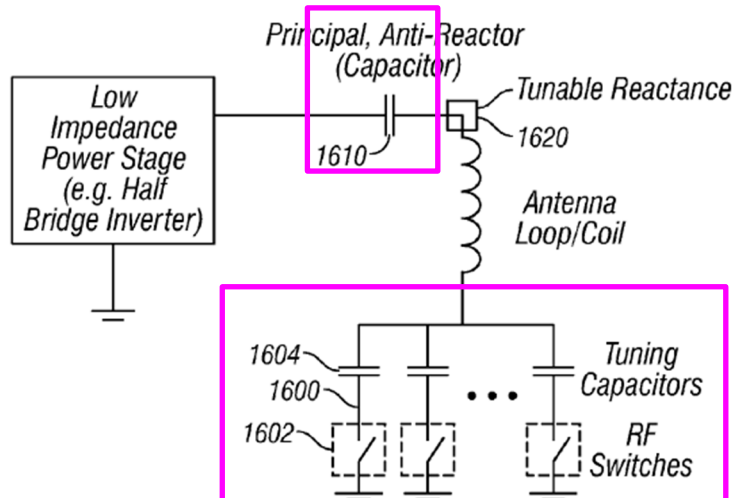


FIG. 2

59. Cook’s resonant antenna comprises a “multi-turn loop of wire,” i.e., a coil. Cook(EX1017), ¶¶92, 130. A POSA would have understood that Cook’s antenna 210 further comprises a capacitor because Cook discloses that “resonant antenna can be changed by varying by anti-reactance (*capacitance*), or reactance of the inductive part of the antenna system.” Cook(EX1017), ¶103; *see also* Cook(EX1017), ¶130 (“In a magnetically/inductively coupled system, the antenna 310 is generally a multi-turn loop (coil) in series with a capacitor.”); Figs. 13, 15.

60. Cook further teaches tuning the resonant frequency of the receiver antenna by capacitive tuning, such as using a “[c]apacitor bank (library) and electronic or mechanical switches (RF relays),” an example of which is shown in Fig. 16 below. Cook(EX1017), ¶¶104-107, 239, Fig. 16. The antenna capacitor, including a capacitor bank and switches, teaches the “impedance network” of claim

[21.b-i] because it comprises “two or more electrical components from the list of (i) one or more passive components; ... and (iii) switches.”



Cook(EX1017), Fig. 16.

61. Cook further teaches “tuning the antenna’s resonance frequency” to compensate for “variation of load impedance,” Cook(EX1017), ¶¶96, 99, such as by capacitive tuning. Cook explains that “[c]apacitive tuning can use a set of capacitors, e.g., a capacitor bank, in a series or parallel arrangement with RF switches that may be opened or closed to adjust the effective capacitance.” Cook further teaches that the wireless receiver further comprises a control system 350 that “handles . . . antenna tuning control” and “power and efficiency control.” Cook(EX1017), ¶¶119-121, 133.

62. It is my opinion that a POSA would have understood that the controlling of capacitive tuning takes place “while configured to receive power” because Cook teaches that tuning is “automatically executed by the receiver’s

control system.” Cook(EX1017), ¶101. Cook describes that its **processor 413** implements a tuning algorithm so that the transmit antenna and receive antenna are “substantially resonant, e.g., within 10% of resonance,” Cook(EX1017), ¶16; it takes measurements of the receiver antenna such as “antenna current, voltage, power, and calibration routines,” Cook(EX1017), ¶¶82, 125, 163, 181, 182, 210, and based on the measurements, performs **capacitive** tuning, e.g., using “fractional tuning . . . in the order of +/- 10%.” Cook(EX1017), ¶¶101-103, 107, Fig. 16. Cook further explains that tuning is for compensating detuning effects, such as “extraneous metallic objects,” “detuned power receivers in close proximity” or “variations of load impedances” that may take place during the power transmission process. Cook(EX1017), ¶¶96-99. A POSA would have understood that the Cook’s receiver control system performs capacitive tuning while the receiver is in operation, i.e., receiving power, based on measurements of the receiver, so as to compensate for detuning effects during operation that cause the antenna to shift out resonance. Therefore, Chatterjee in view of Corbridge, Cook, and the knowledge of a POSA teaches “*based on an input from said **control logic circuit**, configured to change, while configured to receive said power, the impedance of said **impedance network**.*”

63. A POSA would have found it obvious to modify Chatterjee to add Cook’s “capacitor bank ... with switches” to be connected in series with capacitor

C6 as to be able to change impedance of the wireless power receiver in the charging mode, as explained above in Sections VI.A.2 and VI.A.3.c.i.

- g. [21.f] said first circuitry, based on an input from said control logic circuit, configured to change said topology of said switch network and said impedance of said impedance network to transmit at least part of said stored power to said secondary wireless power receiver to power-up said secondary wireless power receiver;**

64. This claim limitation is unchanged from the original claim; thus, I rely on my testimony in my first Declaration. Declaration(EX1002), §VIII.A.1 (claim [1.f]).

- h. [21.g] said second circuitry, on power-up of said secondary wireless power receiver, configured to identify a type of said secondary wireless power receiver and identify a wireless power protocol of said secondary wireless power receiver;**

65. This claim limitation is unchanged from the original claim; thus, I rely on my testimony in my first Declaration. Declaration(EX1002), §VIII.A.1 (claim [1.g]).

- i. [21.h] said second circuitry, configured to receive and interpret data from said secondary wireless power receiver in said identified wireless power protocol;**

66. This claim limitation is unchanged from the original claim; thus, I rely on my testimony in my first Declaration. Declaration(EX1002), §VIII.A.1 (claim [1.h]).

- j. [21.i] said second circuitry, based on said interpretation, configured to perform a function associated with said transmitted power in conjunction with said first circuitry.

67. This claim limitation is unchanged from the original claim; thus, I rely on my testimony in my first Declaration. Declaration(EX1002), §VIII.A.1 (claim [1.i]).

4. Claim 22 wherein said switch network of said first circuitry is configured as one of an inverter and a rectifier.

68. This claim limitation is unchanged from the original claim; thus, I rely on my testimony in my first Declaration. Declaration(EX1002), §VIII.A.2.

B. GROUND 2: Chatterjee in view of Corbridge, Cook, and the Knowledge of a POSA

69. Even if the Board chooses to adopt the Patent Owner's proposed construction of "*change topology ... of switch network*," the amended claims are still obvious over Chatterjee in view of Corbridge, Cook, and the knowledge of a POSA because Corbridge teaches the aspect of changing rectification type while receiving power, and, as established below, it would have been obvious to modify Chatterjee's Fig. 6D in view of Corbridge to change rectification type while receiving power.

1. Motivation to Combine

70. If the Board construes "*change ... topology of said switch network*" to require changing the "type" of rectification between non-synchronous and synchronous while configured to receive power, substitute claim 21 is obvious as

Corbridge teaches this limitation, and it would have been obvious to combine this teaching with Chatterjee.

71. Corbridge teaches that the switches of full bridge rectifier comprise transistor-diode pairs, and further teaches a driver circuitry that drives the switches such that certain switches first operate as diodes, before activating transistors that can being actively turned on and off to provide synchronous rectification. Corbridge(EX1004), ¶¶85, 80.

72. A POSA would have found it obvious to implement the transistor diode pairs disclosed in Corbridge to improve the Chatterjee's power bridge circuit to provide both non-synchronous and synchronous rectification. Such a combination would have involved "the mere application of a known technique"—Corbridge's teaching regarding using transistor diode pairs to provide different types of rectifiers—"to a piece of prior art"—Chatterjee's power bridge circuit—that is "ready for the improvement." Corbridge(EX1004), ¶¶85, 80.

73. A POSA would have understood Chatterjee's Fig. 6D to be a high level circuit diagram, and a POSA reviewing the diagram in Figure 6D would have appreciated that the switches 623-626 could have been implemented in several known ways, including as the transistor diode pairs disclosed in Corbridge. Corbridge is in the same field of wireless power transmission as Chatterjee and is in

fact “incorporated by reference in its entirety for all purposes” in Chatterjee such that a POSA would have consulted the reference. Chatterjee(EX1003), ¶48.

74. A POSA would have had a reasonable expectation of success in the implementing Chatterjee’s switches 623 to 626 as transistor diode pair and applying Corbridge’s control circuit to drive Chatterjee’s switches 624 and 626.

75. First, Corbridge discloses the same kind of full bridge rectifier as Chatterjee and the driver circuitry would function the same way in Chatterjee as in Corbridge.

76. Second, a synchronous full-bridge rectifier was well known and widely used at the time of the invention. *See* Chatterjee, ¶4. A POSA would have known that various wireless power receiver chips available at the time included the same kind of full bridge full synchronous rectifiers that initially operate in diode mode, and transition into half synchronous mode or full synchronous mode when exceeding a certain power input. For example, in 2011 Texas Instruments provided the bq51013 chip, referred as a “Integrated Wireless Power Supply Receiver, Qi Compliant,” which provided a “full synchronous rectifier.” Integrated Wireless Power Supply Receiver, Qi (Wireless Power Consortium) Compliant (EX1022, “bq51013”), April 2011. I verified the public availability of the bq51013 datasheet at least as of Jan. 31, 2012 via the Wayback Machine. EX1025, (<https://web.archive.org/web/20120131194013/http://www.ti.com:80/lit/ds/symlink>

[/bq51013.pdf](#)), visited Nov. 19, 2024. The bq51013 datasheet explains the same kind

of change of rectification type based on input power:

The bq51013 provides an integrated, self-driven synchronous rectifier that enables high-efficiency AC to DC power conversion. The rectifier consists of an all NMOS H-Bridge driver where the backgates of the diodes are configured to be the rectifier when the synchronous rectifier is disabled. ***During the initial startup of the WPC system the synchronous rectifier is not enabled. At this operating point the DC rectifier voltage is provided by the diode rectifier. Once VRECT is greater than UVLO, half synchronous mode will be enabled until the load current surpasses 250mA. Above 250mA the synchronous rectifier will stay enabled*** until the load current drops back below 250mA where half synchronous mode will be enabled instead.

A POSA would have appreciated VRECT means the rectifier's output voltage. *See* Bq51013(EX1022) at 7. During the initial startup of the WPC wireless transfer protocol, VRECT is lower than UVLO (undervoltage lock-out), and thus the transistors would not cycle, but rather function as a "diode rectifier," i.e., a nonsynchronous rectifier. And only when the out voltage VRECT is above UVLO would the transistors start switching on and off. As additional examples, Texas Instrument's UCC28950 and Integrated Device Technologies' IDT P9020 chip datasheets available at the time also describe similar wireless power receiver chip or rectification controller chip with the similar feature of transitioning between a non-synchronous mode and a half or full synchronous mode. *See* EX1023 and EX1024.

77. Therefore, a POSA would have had a reasonable expectation of success to improve Chatterjee's power bridge circuit with Corbridge's transistor diode pairs.

78. Because Ground 2 is the same as Ground 1 except for the limitation of "change ... topology" which was addressed above, I incorporate my opinions about the motivation to combine in Ground 1 as if fully stated here.

2. Claim 21

a. **[21.p] A dual mode wireless power receiver configured to selectively apply a received power to a load device and utilize at least a part of the stored power to power-up a secondary wireless power receiver and communicate with said secondary wireless power receiver to cause an action or transaction or charge said secondary wireless power receiver's load device, said dual mode wireless power receiver comprising:**

79. I rely on my testimony in Ground 1. *Supra*, §VI.A.3.a (claim [1.p]).

b. **[21.a] one of coil and capacitor electrodes;**

80. I rely on my testimony in Ground 1. *Supra*, §VI.A.3.b (claim [1.a]).

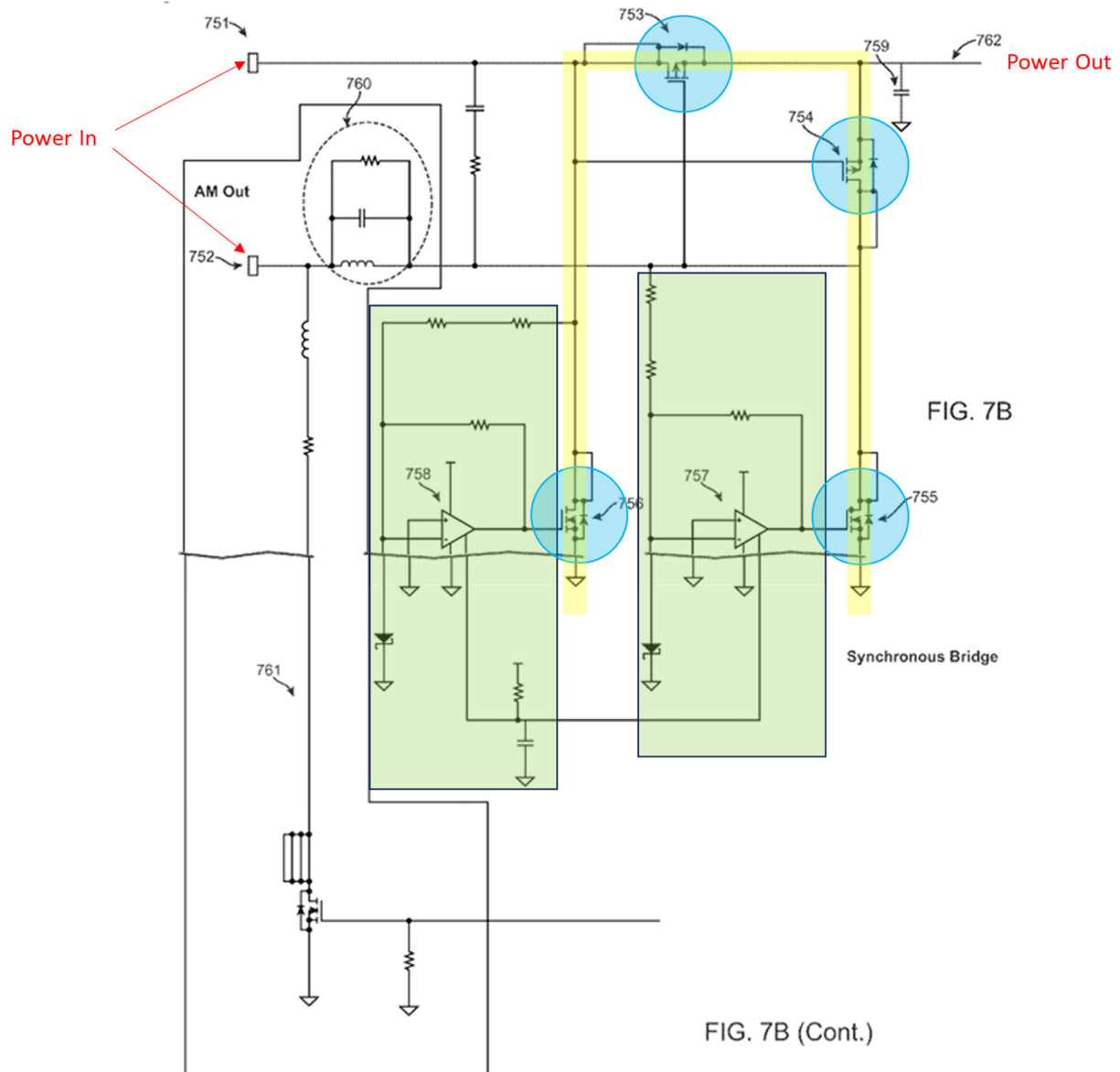
c. **[21.b] a first circuitry comprising: [21.b-i] an impedance network comprising a collection of two or more electrical components, one of which must be a passive component and one of which must be either an active component or switch; [21.b-ii] a switch network; [21.b-iii] a filter capacitor;**

81. I rely on my testimony in Ground 1. *Supra*, §VI.A.3.c (claim [1.c]).

d. [21.c] a second circuitry comprising: a **control logic circuit; and a **modulator/demodulator circuit**;**

82. Chatterjee in view of Corbridge, Cook, the knowledge of POSA renders obvious this limitation even under Patent Owner's construction of "*topology*." Chatterjee's **processor 413** teaches a "*control logic circuit*"; and its communication circuit 415 comprises **a modulator 416 and demodulator 417** that teach the "*modulator/demodulator circuit*." Declaration (EX1002), §VIII.A.1 (claim [1.c]).

83. Corbridge similarly discloses a **control logic circuit** that controls the switch network (i.e., the **switches 753 to 756** connected into an H-bridge as shown in yellow highlighting), including whether the **switches 755 and 756** of the switch network operate as transistors or as diodes while in rectification mode. Figure 7B of Corbridge, reproduced below, provides "a circuit-level diagram" of a part of a wireless power receiver including a rectifier comprising four switches, namely "**transistor diode pairs 753, 754, 755 and 756**":



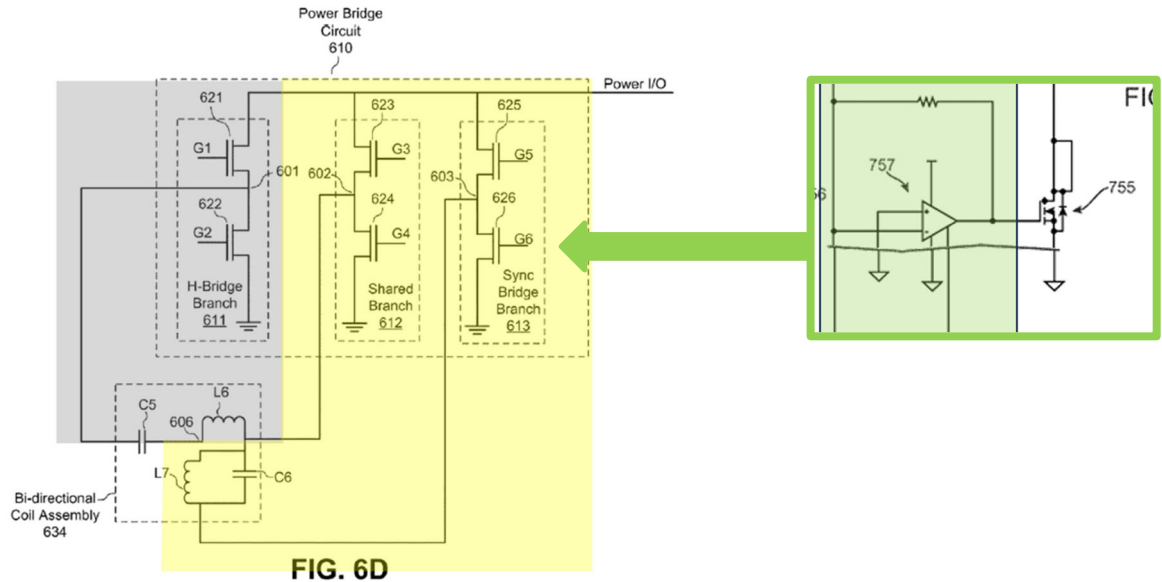
84. As shown in Fig. 7B above, each of the “**transistor diode pairs**” has both a transistor and a diode and Corbridge discloses that the “**transistor diode pairs 753, 754, 755 and 756**” can selectively operate as “a rectifier formed by diodes”, “a synchronous bridge”, or a “half-synchronous bridge.” Corbridge, ¶¶85, 80. A POSA would have appreciated that the “rectifier formed by diodes” refers to a nonsynchronous rectifier in which the transistors do not operate; the “synchronous

bridge” refers to a fully synchronous rectifier in which all four transistor operate as part of the rectifier; and the “half-synchronous bridge” refers to a rectifier in which two switches operate as transistors and two operate as diodes.

85. Specifically, Corbridge discloses that “Op Amp 757 is configured and coupled to output a voltage level to turn on the transistor of transistor diode pair 755 when the diode of transistor diode pair 755 becomes forward-biased,” and “Op Amp 758 is similarly configured to perform the same function on transistor diode pair 756.” Corbridge, ¶86. A POSA would have understood that the two switches 755 and 756 first operate with their switches as diodes rather than transistors because when the diode “becomes forward-biased,” that means the diodes are conducting current thus functioning as a rectifier. A POSA would have further understood that after the diodes becomes forward biased, the transistors get “turn[ed] on” by Op Amp 757 and 758 which means the Op Amp 757 and 758 outputs a voltage that is sufficient to drive the transistor to cycle at the frequency of the AC signal. Corbridge, ¶86. A POSA would also have understood that a transistor requires a certain amount of voltage to drive it to turn on and off, such as a gate-to-source voltage in a MOSFET. In other words, transistors 755 and 756 would only actively switch on and off when the incoming voltage is above a certain threshold, such that the rectifier operates as a synchronous rectifier; and before that, transistors 755 and 756 would operate as a diode. A POSA would have found these two types of rectification to be

well known given the disclosure in Corbridge and the many commercial power-receiver chips available at that time that provided synchronous rectifiers that initially operate in diode mode.

86. It would have been obvious to a POSA to improve the circuit illustrated in Chatterjee's Fig. 6D with teachings of Corbridge regarding controlling a transistor diode pair to switch between a non-synchronous diode based rectifier and a synchronous transistor based rectifier, as illustrated in the annotated figures below.



(Power Receive Mode)

Chatterjee(EX1003), Fig. 6D; Corbridge(EX1004), Fig. 7B (excerpt).

e. [21.d] said first circuitry configured to receive said power from a wireless power transmitter;

87. This claim limitation is unchanged from the original claim; thus, I rely on my testimony in my first Declaration. Declaration(EX1002), §VIII.A.1 (claim [1.d]).

- f. [21.e] said first circuitry, based on an input from said **control logic circuit**, configured to change, while configured to receive said power, the impedance of said impedance network and topology of said **switch network** to obtain a modified form of said received power, and apply said modified form of said power to said **load device**

88. If the Board construes “*changing . . . topology of the switch network*” to require changing the “type” of rectification between non-synchronous and synchronous, Chatterjee does not explicitly disclose it. However, as established above, Corbridge teaches transistor diode pairs that can be “used as a synchronous bridge or rectifier formed by diodes.” *Supra* §II.A.2.e; Corbridge(EX1004), ¶85. Accordingly, it would have been obvious to configure Chatterjee’s **power bridge circuit 610**, shown in Fig. 6D, such that **switches 623-626** provide transistor diode pairs, as taught in Corbridge Fig. 7B, to provide the ability to alternate between a non-synchronous diode-based rectifier and synchronous transistor-based rectifier while configured to receive power. *Supra* §VI.B.1. Because the proposed combination can change the type of rectifier when configured to receive power, the proposed combination teaches the claimed “*changing . . . topology of the switch network*” under Patent Owner’s claim construction because the Patent Owner’s position is that changing from a nonsynchronous rectifier to a synchronous rectifier meets the limitation of “*change ... topology of the switch network.*” Motion, 19-20; ’339 Patent (EX1001), 4:4-5.

89. Chatterjee does not explicitly disclose “*said first circuitry, based on an input from said **control logic circuit**, configured to change, **while configured to receive said power**, the impedance of said **impedance network**.*” As established above, Cook teaches this limitation and its combination with Chatterjee would have been obvious. *See Supra* §§VI.A.2, VI.A.3.c.1, VI.A.3.f.

g. [21.f] said first circuitry, based on an input from said control logic circuit, configured to change said topology of said switch network and said impedance of said impedance network to transmit at least part of said stored power to said secondary wireless power receiver to power-up said secondary wireless power receiver;

90. This claim limitation is unchanged from the original claim; thus, I rely on my testimony in my first Declaration. Declaration(EX1002), §VIII.A.1 (claim [1.f]).

h. [21.g] said second circuitry, on power-up of said secondary wireless power receiver, configured to identify a type of said secondary wireless power receiver and identify a wireless power protocol of said secondary wireless power receiver;

91. This claim limitation is unchanged from the original claim; thus, I rely on my testimony in my first Declaration. Declaration(EX1002), §VIII.A.1 (claim [1.g]).

- i. [21.h] said second circuitry, configured to receive and interpret data from said secondary wireless power receiver in said identified wireless power protocol;**

92. This claim limitation is unchanged from the original claim; thus, I rely on my testimony in my first Declaration. Declaration(EX1002), §VIII.A.1 (claim [1.h]).

- j. [21.i] said second circuitry, based on said interpretation, configured to perform a function associated with said transmitted power in conjunction with said first circuitry.**

93. This claim limitation is unchanged from the original claim; thus, I rely on my testimony in my first Declaration. Declaration(EX1002), §VIII.A.1 (claim [1.i]).

5. Claim 22 wherein said switch network of said first circuitry is configured as one of an inverter and a rectifier

94. This claim limitation is unchanged from the original claim; thus, I rely on my testimony in my first Declaration. Declaration(EX1002), §VIII.A.2.

VII. OBJECTIVE INDICIA OF NON-OBVIOUSNESS

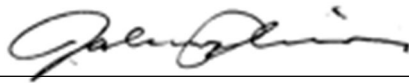
95. I am not aware of any objective indicia of non-obviousness that would make substitute claims 21 and 22 of the '339 patent non-obvious over the prior art considered herein. Patent Owner's Response does not identify any. In my opinion, any possible objective indicia of non-obviousness would not overcome the prior art that clearly demonstrates that the subject matter of claims 21 and 22 of the '339 patent would have been obvious to a POSA as of August 12, 2012.

96. I reserve the right to supplement my opinions as appropriate if WiPQTUS alleges or offers any purported evidence of any such objective indicia of non-obviousness.

97. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Executed this 20th day of November 2024.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Joshua Phinney", is written over a horizontal line.

Joshua Phinney, Ph.D.