INDUCTEV INC.,
Petitioner,
v.
WITRICITY CORPORATION.,
Patent Owner

IPR2023-01182
Patent 8,461,719

Petitioner's Demonstratives

Nov. 19, 2024

The ’719 Patent

“network of capacitors” Should Have Its Plain Meaning

Cook ’554 Renders Claim 17 Obvious

Lee and Cook ’523 Render Claim 17 Obvious

Claim 16 Is Canceled

The ’719 Patent

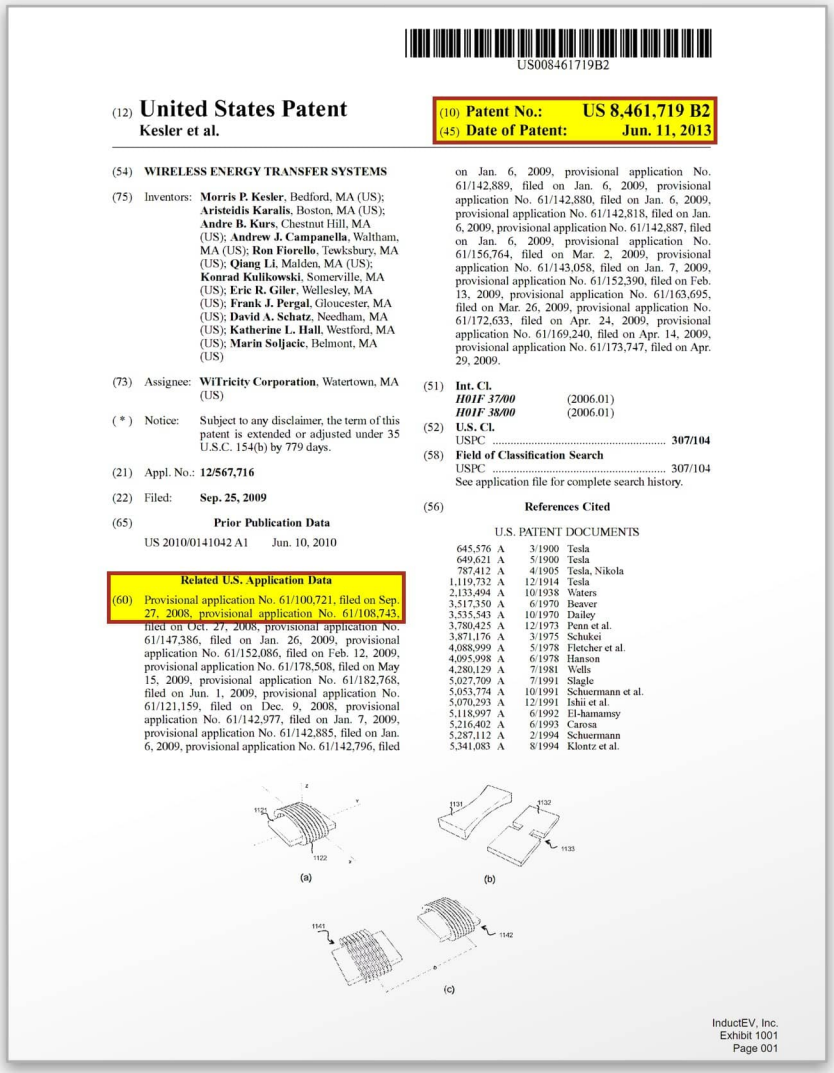
“network of capacitors” Should Have Its Plain Meaning

Cook ’554 Renders Claim 17 Obvious

Lee and Cook ’523 Render Claim 17 Obvious

Claim 16 Is Canceled

The '719 Patent (Ex. 1001)



US008461719B2

(12) **United States Patent**
Kesler et al.

(10) **Patent No.: US 8,461,719 B2**
(45) **Date of Patent: Jun. 11, 2013**

(54) **WIRELESS ENERGY TRANSFER SYSTEMS**

(75) Inventors: **Morris P. Kesler**, Bedford, MA (US); **Aristeidis Karalis**, Boston, MA (US); **Andre B. Kurs**, Chestnut Hill, MA (US); **Andrew J. Campanella**, Waltham, MA (US); **Ron Fiorello**, Tewksbury, MA (US); **Qiang Li**, Malden, MA (US); **Konrad Kulikowski**, Somerville, MA (US); **Eric R. Giler**, Wellesley, MA (US); **Frank J. Pergal**, Gloucester, MA (US); **David A. Schatz**, Needham, MA (US); **Katherine L. Hall**, Westford, MA (US); **Marin Soljacic**, Belmont, MA (US)

(73) Assignee: **WiTricity Corporation**, Watertown, MA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 779 days.

(21) Appl. No.: **12/567,716**

(22) Filed: **Sep. 25, 2009**

(65) **Prior Publication Data**

US 2010/0141042 A1 Jun. 10, 2010

Related U.S. Application Data

(60) Provisional application No. 61/100,721, filed on Sep. 27, 2008, provisional application No. 61/108,743, filed on Oct. 27, 2008, provisional application No. 61/147,386, filed on Jan. 26, 2009, provisional application No. 61/152,086, filed on Feb. 12, 2009, provisional application No. 61/178,508, filed on May 15, 2009, provisional application No. 61/182,768, filed on Jun. 1, 2009, provisional application No. 61/121,159, filed on Dec. 9, 2008, provisional application No. 61/142,977, filed on Jan. 7, 2009, provisional application No. 61/142,885, filed on Jan. 6, 2009, provisional application No. 61/142,796, filed on Jan. 6, 2009, provisional application No. 61/142,889, filed on Jan. 6, 2009, provisional application No. 61/142,880, filed on Jan. 6, 2009, provisional application No. 61/142,818, filed on Jan. 6, 2009, provisional application No. 61/142,887, filed on Jan. 6, 2009, provisional application No. 61/156,764, filed on Mar. 2, 2009, provisional application No. 61/143,058, filed on Jan. 7, 2009, provisional application No. 61/152,390, filed on Feb. 13, 2009, provisional application No. 61/163,695, filed on Mar. 26, 2009, provisional application No. 61/172,633, filed on Apr. 24, 2009, provisional application No. 61/169,240, filed on Apr. 14, 2009, provisional application No. 61/173,747, filed on Apr. 29, 2009.

(51) **Int. Cl.**
H01F 37/00 (2006.01)
H01F 38/00 (2006.01)

(52) **U.S. Cl.**
USPC **307/104**

(58) **Field of Classification Search**
USPC 307/104
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

645,576	A	3/1900	Tesla
649,621	A	5/1900	Tesla
787,412	A	4/1905	Tesla, Nikola
1,119,732	A	12/1914	Tesla
2,133,494	A	10/1938	Waters
3,517,350	A	6/1970	Beaver
3,535,543	A	10/1970	Dailey
3,780,425	A	12/1973	Penn et al.
3,871,176	A	3/1975	Schukei
4,088,999	A	5/1978	Fletcher et al.
4,095,998	A	6/1978	Hanson
4,280,129	A	7/1981	Wells
5,027,709	A	7/1991	Slagle
5,053,774	A	10/1991	Schuermann et al.
5,070,293	A	12/1991	Ishii et al.
5,118,997	A	6/1992	El-hamamsy
5,216,402	A	6/1993	Carosa
5,287,112	A	2/1994	Schuermann
5,341,083	A	8/1994	Klontz et al.

InductEV, Inc.
Exhibit 1001
Page 001

(10) **Patent No.: US 8,461,719 B2**
(45) **Date of Patent: Jun. 11, 2013**

Related U.S. Application Data

(60) Provisional application No. 61/100,721, filed on Sep. 27, 2008, provisional application No. 61/108,743,

(57) **ABSTRACT**

Described herein are improved capabilities for a source resonator having a Q-factor $Q_1>100$ and a characteristic size x_1 coupled to an energy source, and a second resonator having a Q-factor $Q_2>100$ and a characteristic size x_2 coupled to an energy drain located a distance D from the source resonator, where the source resonator and the second resonator are coupled to exchange energy wirelessly among the source resonator and the second resonator.

The '719 Patent – Independent Claim 17

17. A system, comprising:

a source resonator having a Q-factor Q_1 and a characteristic size x_1, and a second resonator having a Q-factor Q_2 and a characteristic size x_2, and located a distance D from the source resonator;

wherein the source resonator and the second resonator are coupled to exchange energy wirelessly among the source resonator and the second resonator, and wherein $\sqrt{Q_1 Q_2}$ is greater than 100; and

wherein at least one of the resonators includes a coil of a plurality of turns of a conducting material connected to a network of capacitors, wherein the plurality of turns are in a common plane, and wherein a characteristic thickness of the at least one of the resonators is much less than a characteristic size of the at least one of the resonators.

Ex. 1001 ('719 Patent) at Claim 17

The ’719 Patent

“network of capacitors” Should Have Its Plain Meaning

Cook ’554 Renders Claim 17 Obvious

Lee and Cook ’523 Render Claim 17 Obvious

Claim 16 Is Canceled

Claim Construction

Claim Term	Patent Owner's Construction	Petitioner's Construction
"network of capacitors"	"a circuit topology of passive components including one or more capacitors that provides two or more degrees of freedom"	Plain meaning, which is "any circuit topology including one or more capacitors"

Claim Language

17. A system, comprising:

a source resonator having a Q-factor Q_1 and a characteristic size x_1, and a second resonator having a Q-factor Q_2 and a characteristic size x_2, and located a distance D from the source resonator;

wherein the source resonator and the second resonator are coupled to exchange energy wirelessly among the source resonator and the second resonator, and wherein $\sqrt{Q_1 Q_2}$ is greater than 100; and

wherein at least one of the resonators includes a coil of a plurality of turns of a conducting material connected to a network of capacitors, wherein the plurality of turns are in a common plane, and wherein a characteristic thickness of the at least one of the resonators is much less than a characteristic size of the at least one of the resonators.

Ex. 1001 ('719 Patent) at Claim 17

The '719 Patent Defines "network of capacitors"

in FIG. 28(*d*). It will be appreciated that a network of capacitors, as used herein, may in general refer to any circuit topology including one or more capacitors, including without limitation any of the circuits specifically disclosed herein using capacitors, or any other equivalent or different circuit structure(s), unless another meaning is explicitly provided or otherwise clear from the context.

Ex. 1001 ('719 Patent) at 52:32-38

Parkervision, Inc. v. Vidal

"The patentee's use of the phrases 'as used herein' and 'refer to' conveys an intent for sentence 5 to be definitional."

Parkervision, Inc. v. Vidal, 88 F.4th 969, 976 (Fed. Cir. 2023)

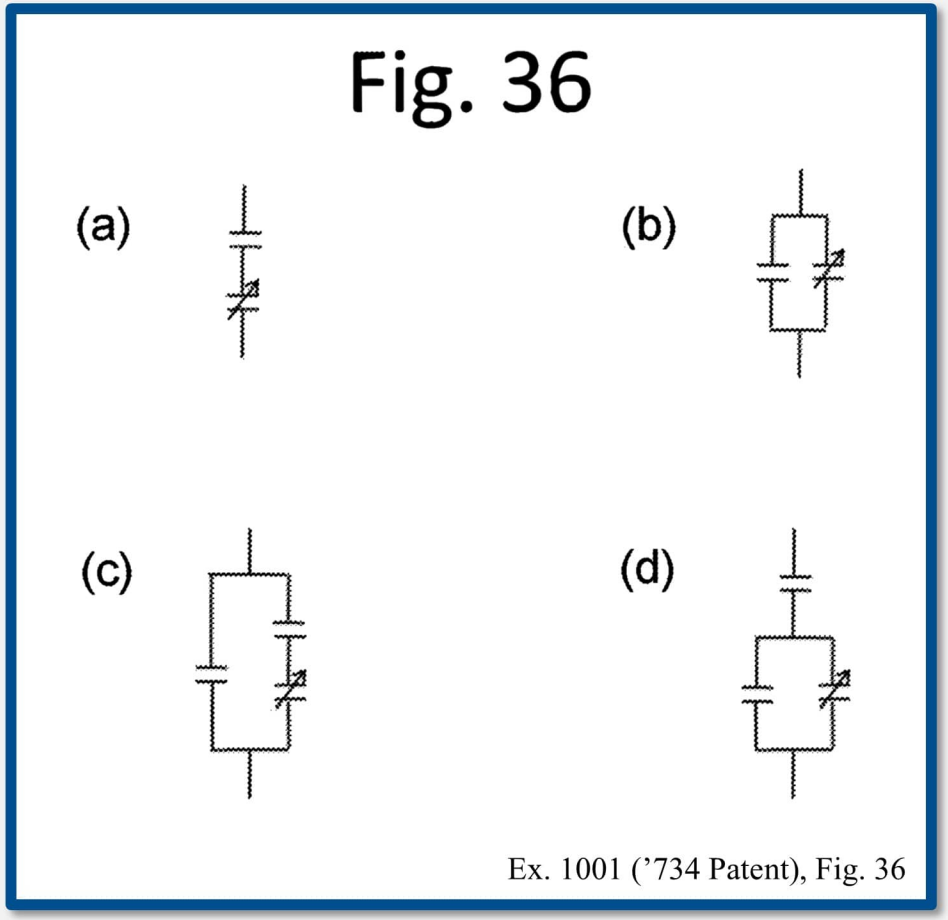
PO's Expert Agrees Specification Provides "Intended Definition"

Patent Owner's Expert

A. Well, I would suggest that passage that we looked at before, that I cite in paragraph 39, column 52, lines 32 to 38 of the '719, stands as the intended definition of "network of capacitors."

Ex. 1035 (Horenstein Dep. Tr.) at 100:8-11

A Network Of Capacitors Is One Or More Capacitors



Ex. 1001 ('734 Patent), Fig. 36

in FIG. **28**(*d*). It will be appreciated that a network of capacitors, as used herein, may in general refer to any circuit topology including one or more capacitors, including without limitation any of the circuits specifically disclosed herein using capacitors, or any other equivalent or different circuit structure(s), unless another meaning is explicitly provided or otherwise clear from the context.

Ex. 1001 ('719 Patent) at 52:32-38

FIGS. **36**(*a*),(*b*),(*c*),(*d*) depict four topologies of networks of fixed and variable capacitors designed to produce an overall variable capacitance with finer tuning resolution and some with reduced voltage on the variable capacitor.

Ex. 1001 ('734 Patent) at 10:11-14

POR Agrees With Petitioner's Construction

Patent Owner's Response

Horenstein Decl. ¶ 37. In the '719 patent, a network of capacitors is generally referred to as "a circuit topology including one or more capacitors." '719 patent 52:32-38; Horenstein Decl. ¶¶ 38-40.

POR at 5

PO's Construction Is Wrong

17. A system, comprising:

a source resonator having a Q-factor Q_1 and a characteristic size x_1, and a second resonator having a Q-factor Q_2 and a characteristic size x_2, and located a distance D from the source resonator;

wherein the source resonator and the second resonator are coupled to exchange energy wirelessly among the source resonator and the second resonator, and wherein $\sqrt{Q_1 Q_2}$ is greater than 100; and

wherein at least one of the resonators includes a coil of a plurality of turns of a conducting material connected to a network of capacitors, wherein the plurality of turns are in a common plane, and wherein a characteristic thickness of the at least one of the resonators is much less than a characteristic size of the at least one of the resonators.

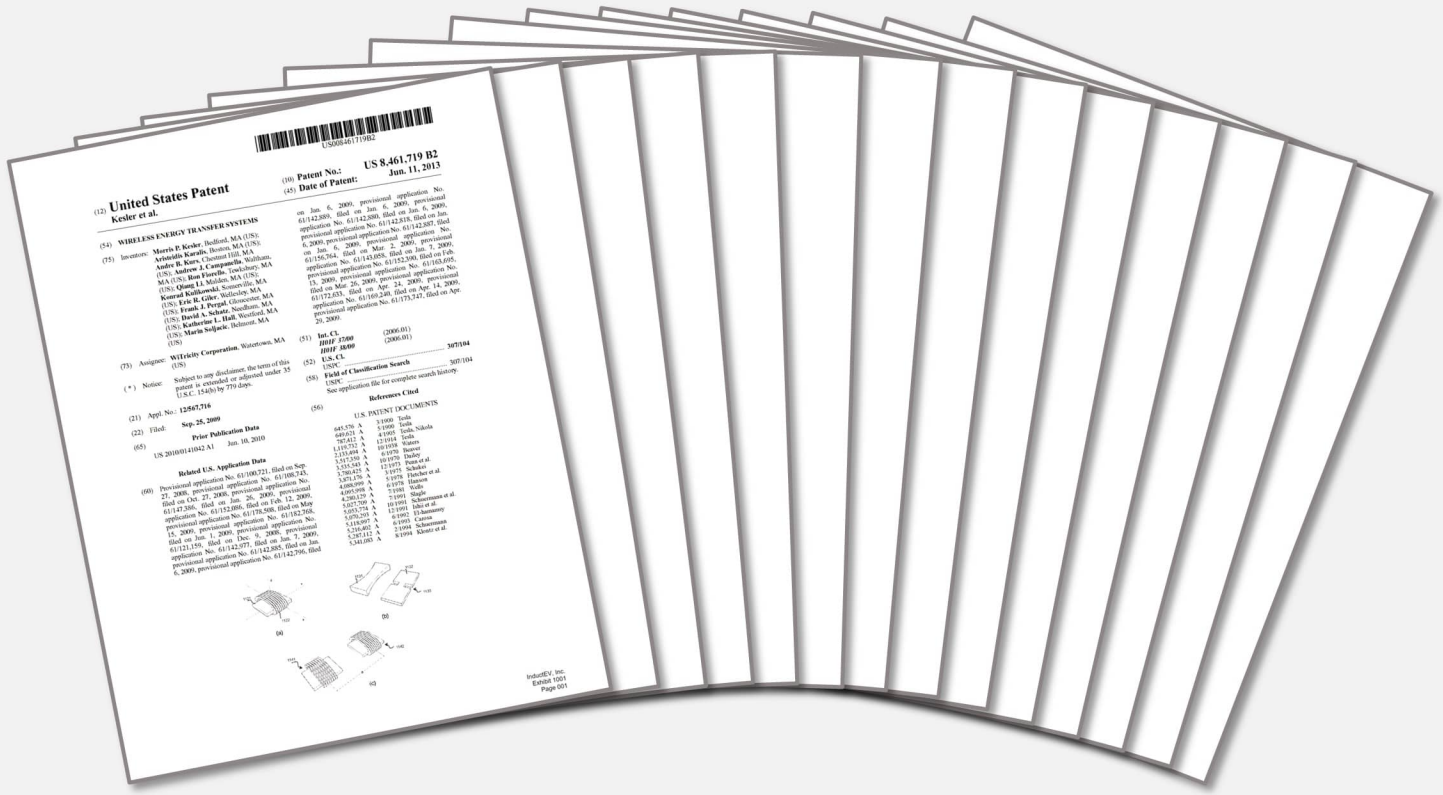
Ex. 1001 ('719 Patent) at Claim 17

Patent Owner's Response

The Board should therefore construe the term "network of capacitors" as "a circuit topology of passive components including one or more capacitors that provides two or more degrees of freedom."

POR at 14

PO's Construction Is Not Supported By Intrinsic Evidence



Degrees of freedom 0

PO Improperly Reads In Functional Requirements

Patent Owner's Response

complex impedance. Horenstein Decl. ¶ 41. The capacitance realized by the network may control the complex impedance, which requires that the network includes two or more degrees of freedom to control or regulate both the real and imaginary components of the complex impedance. '719 patent 44:3-6, 42-46, 45:58-61, 69:56-60, Horenstein Decl. ¶¶ 41-42.

POR at 12

Schwing GmbH v. Putzmeister AG

"Where a claim uses clear structural language, it is generally improper to interpret it as having functional requirements."

Schwing GmbH v. Putzmeister AG, 305 F.3d 1318, 1324 (Fed. Cir. 2002)

Matching Networks Are Not Claimed

Patent Owner's Response

variable capacitors. '719 patent 45:64-66, 46:6-13; Horenstein Decl. ¶ 40. The '719 patent also provides several examples of impedance-matching networks that include reactive elements, namely inductors and capacitors, connected to an inductive element to create a magnetic resonator. '719 patent FIGS. 30-35, 51:45 – 57:33; Horenstein Decl. ¶¶ 41-49.

POR at 13

FIGS. **30**(*a*),(*b*),(*c*),(*d*),(*e*),(*f*) depict six topologies of matching circuits directly coupled to a high-Q inductive ele-

Ex. 1001 ('734 Patent) at 9:21-22

FIGS. **31**(*a*),(*b*),(*c*) depict three topologies of matching circuits directly coupled to a high-Q inductive element and

Ex. 1001 ('734 Patent) at 9:32-33

FIGS. **32**(*a*),(*b*),(*c*) depict three topologies of matching circuits directly coupled to a high-Q inductive element and

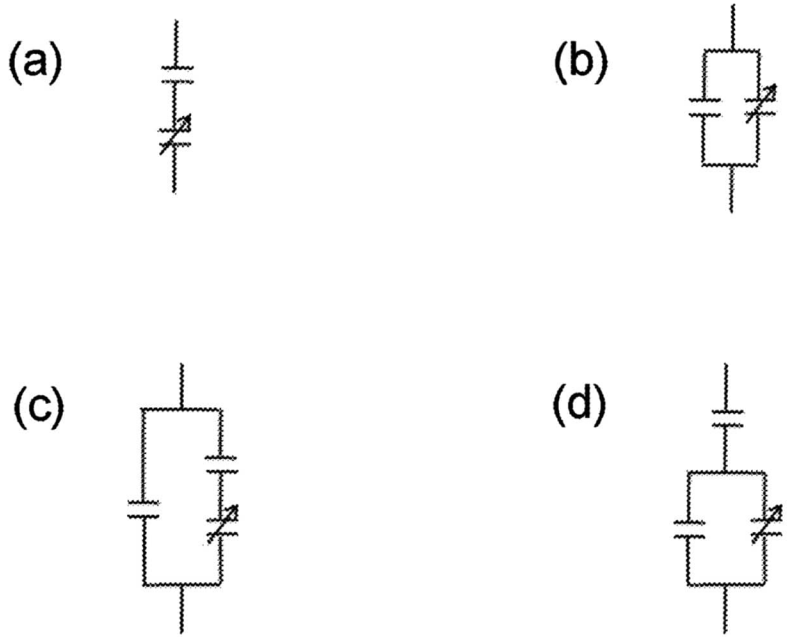
Ex. 1001 ('734 Patent) at 9:41-42

FIGS. **33**(*a*),(*b*),(*c*),(*d*),(*e*),(*f*) depict six topologies of matching circuits directly coupled to a high-Q inductive ele-

Ex. 1001 ('734 Patent) at 9:50-51

PO's Construction Excludes Embodiments

Fig. 36



Ex. 1001 ('734 Patent), Fig. 36

Patent Owner's Expert

Q. And it's your testimony that the topologies in Figure 36 don't satisfy that definition of "network of capacitors"; is that right?

A. That's right. . . .

Ex. 1035 (Horenstein Dep. Tr.) at 92:18-21

FIGS. **36**(*a*),(*b*),(*c*),(*d*) depict four topologies of networks of fixed and variable capacitors designed to produce an overall variable capacitance with finer tuning resolution and some with reduced voltage on the variable capacitor.

Ex. 1001 ('734 Patent) at 10:11-14

PO's Construction Excludes Embodiments

Patent Owner's Sur-Reply

(emphasis in original). Petitioner simply misses the point of the capacitor circuits in Figs. 36(a) – (d). These capacitor combinations function as two-terminal circuit elements only (one top terminal and one bottom terminal). Petitioner is incorrect in asserting that the diagrams in Fig. 36 are additional preferred embodiments. The

POSR at 3

in FIG. 28(*d*). It will be appreciated that a network of capacitors, as used herein, may in general refer to any circuit topology including one or more capacitors, including without limitation any of the circuits specifically disclosed herein using capacitors, or any other equivalent or different circuit structure(s), unless another meaning is explicitly provided or otherwise clear from the context.

Ex. 1001 ('719 Patent) at 52:32-38

PO's Extrinsic Evidence Supports Petitioner's Construction

Radio Engineer's Handbook

18. Network Definitions.—A network is made up of resistances, inductances, capacities, and mutual inductances connected together in some manner. The resist-

Ex. 2013 at 197

The ’719 Patent

“network of capacitors” Should Have Its Plain Meaning

Cook ’554 Renders Claim 17 Obvious

Lee and Cook ’523 Render Claim 17 Obvious

Claim 16 Is Canceled

The ’719 Patent

“network of capacitors” Should Have Its Plain Meaning

Cook ’554 Renders Claim 17 Obvious

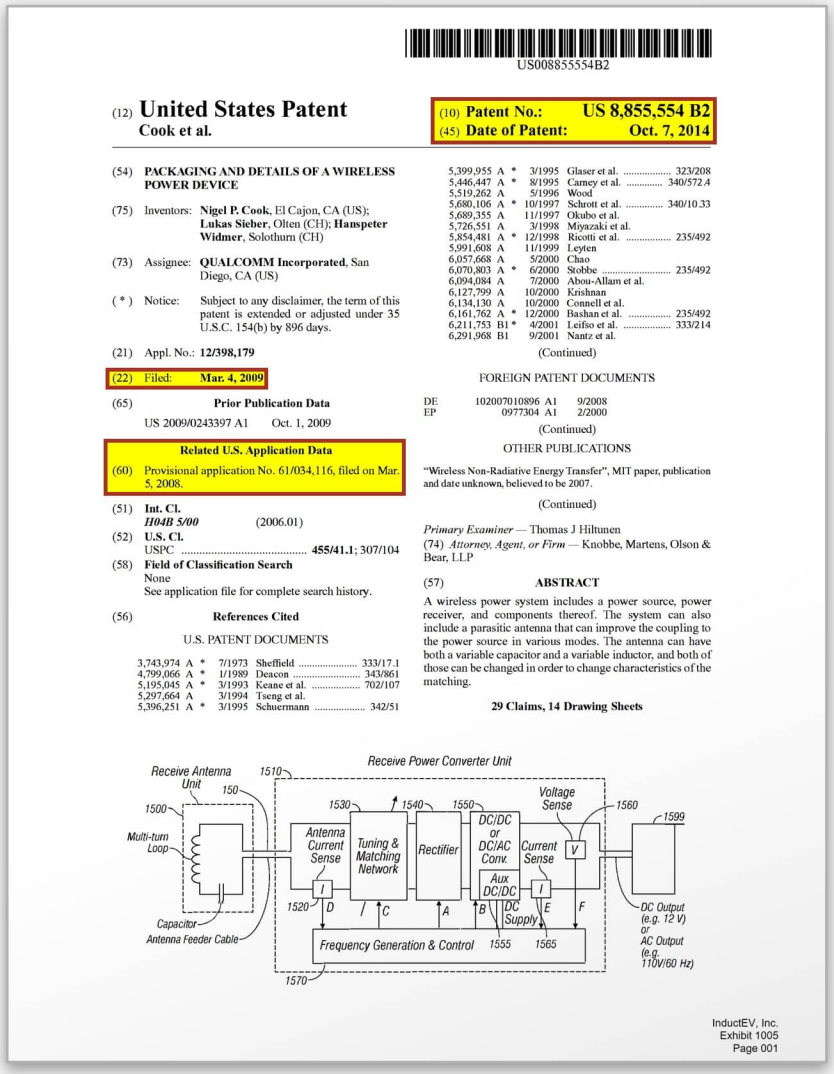
Cook ’554 Is Prior Art

Cook ’554 Discloses a Network of Capacitors

Lee and Cook ’523 Render Claim 17 Obvious

Claim 16 Is Canceled

Cook-554 (Ex. 1005)



US008855554B2

(12) **United States Patent**
Cook et al.

(10) **Patent No.: US 8,855,554 B2**
(45) **Date of Patent: Oct. 7, 2014**

(54) **PACKAGING AND DETAILS OF A WIRELESS POWER DEVICE**

(75) Inventors: **Nigel P. Cook**, El Cajon, CA (US); **Lukas Sieber**, Olten (CH); **Hanspeter Widmer**, Solothurn (CH)

(73) Assignee: **QUALCOMM Incorporated**, San Diego, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 896 days.

(21) Appl. No.: **12/398,179**

(22) Filed: **Mar. 4, 2009**

(65) **Prior Publication Data**

US 2009/0243397 A1 Oct. 1, 2009

Related U.S. Application Data

(60) Provisional application No. 61/034,116, filed on Mar. 5, 2008.

(51) **Int. Cl.**
H04B 5/00 (2006.01)

(52) **U.S. Cl.**
USPC **455/41.1**; 307/104

(58) **Field of Classification Search**
None
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,743,974	A *	7/1973	Sheffield	333/17.1
4,799,066	A *	1/1989	Deacon	343/861
5,195,045	A *	3/1993	Keane et al.	702/107
5,297,664	A	3/1994	Tseng et al.	
5,396,251	A *	3/1995	Schuermann	342/51
5,399,955	A *	3/1995	Glaser et al.	323/208
5,446,447	A *	8/1995	Carney et al.	340/572.4
5,519,262	A	5/1996	Wood	
5,680,106	A *	10/1997	Schrott et al.	340/10.33
5,689,355	A	11/1997	Okubo et al.	
5,726,551	A	3/1998	Miyazaki et al.	
5,854,481	A *	12/1998	Ricotti et al.	235/492
5,991,608	A	11/1999	Leyten	
6,057,668	A	5/2000	Chao	
6,070,803	A *	6/2000	Stobbe	235/492
6,094,084	A	7/2000	Abou-Allam et al.	
6,127,799	A	10/2000	Krishnan	
6,134,130	A	10/2000	Connell et al.	
6,161,762	A *	12/2000	Bashan et al.	235/492
6,211,753	B1 *	4/2001	Leifso et al.	333/214
6,291,968	B1	9/2001	Nantz et al.	

(Continued)

FOREIGN PATENT DOCUMENTS

DE	102007010896	A1	9/2008
EP	0977304	A1	2/2000

(Continued)

OTHER PUBLICATIONS

"Wireless Non-Radiative Energy Transfer", MIT paper, publication and date unknown, believed to be 2007.

(Continued)

Primary Examiner — Thomas J Hiltunen
(74) *Attorney, Agent, or Firm* — Knobbe, Martens, Olson & Bear, LLP

(57) **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. The antenna 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.

29 Claims, 14 Drawing Sheets

InductEV, Inc.
Exhibit 1005
Page 001

(10) **Patent No.: US 8,855,554 B2**
(45) **Date of Patent: Oct. 7, 2014**

(22) Filed: **Mar. 4, 2009**

Related U.S. Application Data

(60) Provisional application No. 61/034,116, filed on Mar. 5, 2008.

Demonstrative Exhibit – Not Evidence

Cook-554 Is Prior Art

Cook Provisional satisfies both prongs of *Dynamic Drinkware*

- **Provides sufficient support for claim 17 of Cook-554**
- **Provides sufficient support for cited subject matter**

No Dispute: Cook Provisional Supports Claim 17 Preamble

Cook-554

17. A method comprising:
receiving power via a resonant circuit from a non-modulated wireless magnetic field at an operating frequency and at a receive power level;
converting the received power, so as to charge a battery, with a power converting circuit having an impedance value that is variable; and
varying the impedance value of the power converting circuit to tune the resonant frequency of the resonant circuit based on the received power level.

Ex. 1005 (Cook-554) at Claim 17

Cook Provisional

At LF, the antenna coil may provide taps for matching or tuning purposes. At HF the use of a special coupling loop/coil (acting as an up-transformer) is an adequate method to match to the impedance of the antenna. This method however is limited in its adaptability to the various conditions that may occur in practice.

Ex. 1006 (Cook Provisional) at 29

No Dispute: Cook Provisional Supports Claim 17's First Step

Cook-554

17. A method comprising:

receiving power via a resonant circuit from a non-modulated wireless magnetic field at an operating frequency and at a receive power level;

converting the received power, so as to charge a battery, with a power converting circuit having an impedance value that is variable; and

varying the impedance value of the power converting circuit to tune the resonant frequency of the resonant circuit based on the received power level.

Ex. 1005 (Cook-554) at Claim 17

Cook Provisional

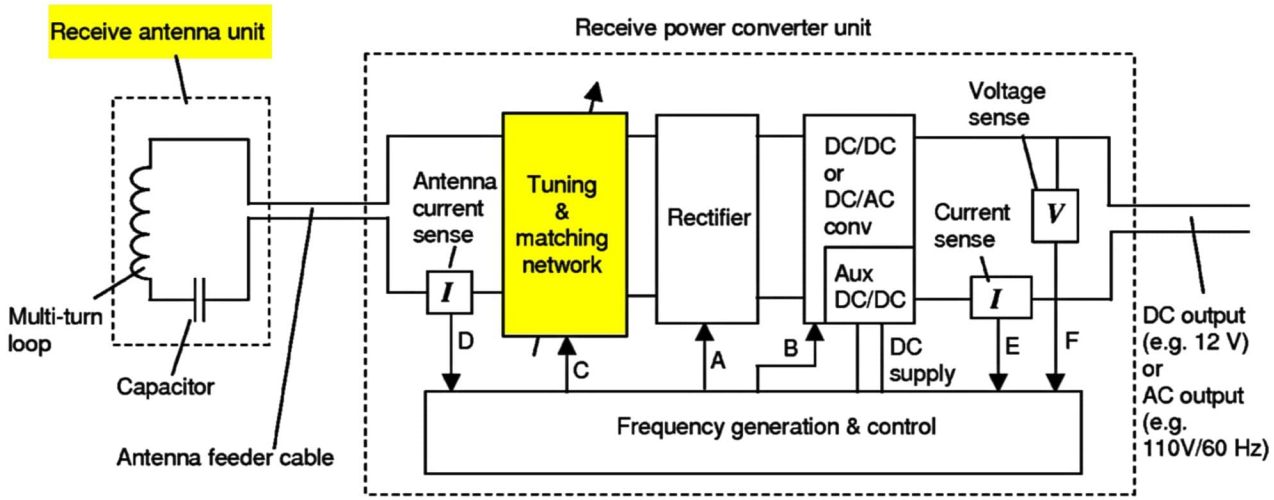


Figure 4-12: Receive subsystem

Ex. 1006 (Cook Provisional) at 47

No Dispute: Cook Provisional Supports Claim 17's Second Step

Cook-554

17. A method comprising:

receiving power via a resonant circuit from a non-modulated wireless magnetic field at an operating frequency and at a receive power level;

converting the received power, so as to charge a battery, with a power converting circuit having an impedance value that is variable; and

varying the impedance value of the power converting circuit to tune the resonant frequency of the resonant circuit based on the received power level.

Ex. 1005 (Cook-554) at Claim 17

Cook Provisional

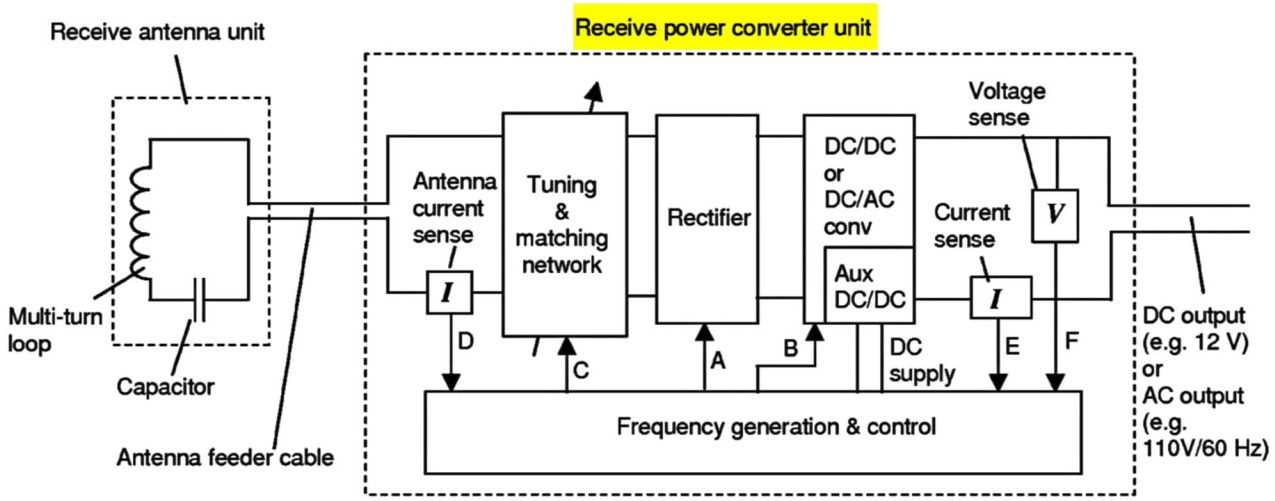


Figure 4-12: Receive subsystem

* * *

3.2.2.6 Load

The load includes

- the target load that consumes the transferred energy (e.g. battery of a device, device circuitry)

Ex. 1006 (Cook Provisional) at 47, 30

Demonstrative Exhibit – Not Evidence

No Dispute: Cook Provisional Supports Claim 17's Second Step

Cook-554

17. A method comprising:

receiving power via a resonant circuit from a non-modulated wireless magnetic field at an operating frequency and at a receive power level;

converting the received power, so as to charge a battery, with a power converting circuit having an impedance value that is variable; and

varying the impedance value of the power converting circuit to tune the resonant frequency of the resonant circuit based on the received power level.

Ex. 1005 (Cook-554) at Claim 17

Cook Provisional

e.g. in conjunction with a capacitor bank for coarse tuning. This purely electronic method avoids any tuneable reactance components. Instead, it uses switched-mode power conversion techniques to create antenna load impedance that can be varied in terms of both resistive (real) part and reactive (imaginary) part. The reactive part adds reactance into the series tank circuit

Ex. 1006 (Cook Provisional) at 30

Cook Provisional Supports Varying Impedance to Tune Resonance Frequency

Cook-554

17. A method comprising:

receiving power via a resonant circuit from a non-modulated wireless magnetic field at an operating frequency and at a receive power level;

converting the received power, so as to charge a battery, with a power converting circuit having an impedance value that is variable; and

varying the impedance value of the power converting circuit to tune the resonant frequency of the resonant circuit based on the received power level.

Ex. 1005 (Cook-554) at Claim 17

Cook Provisional

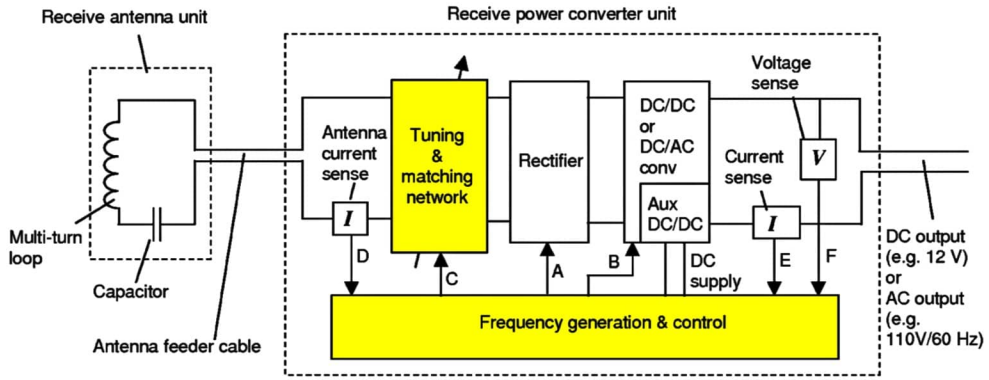


Figure 4-12: Receive subsystem

Therefore in practical high-Q designs readjusting (tuning) of the resonance frequency is often compulsory.

* * *

The tuning and matching network is generally needed to ensure that the receive antenna is operated at resonance and that the rectifiers input impedance is optimally matched to the receive antenna. This is particularly true for all applications requiring maximum transmission range and efficiency.

* * *

The frequency generation and control subunit automatically controls all relevant functions and parameters of the receive subsystem to satisfy voltage and current requirements of the external load and to maximise energy transfer efficiency. If needed, it generates the standard AC mains

Ex. 1006 (Cook Provisional) at 44, 47, 51, 55

Demonstrative Exhibit – Not Evidence

Cook Provisional Supports Claim 17's Final Step

Cook-554

17. A method comprising:

receiving power via a resonant circuit from a non-modulated wireless magnetic field at an operating frequency and at a receive power level;

converting the received power, so as to charge a battery, with a power converting circuit having an impedance value that is variable; and

varying the impedance value of the power converting circuit to tune the resonant frequency of the resonant circuit based on the received power level.

Ex. 1005 (Cook-554) at Claim 17

Cook Provisional

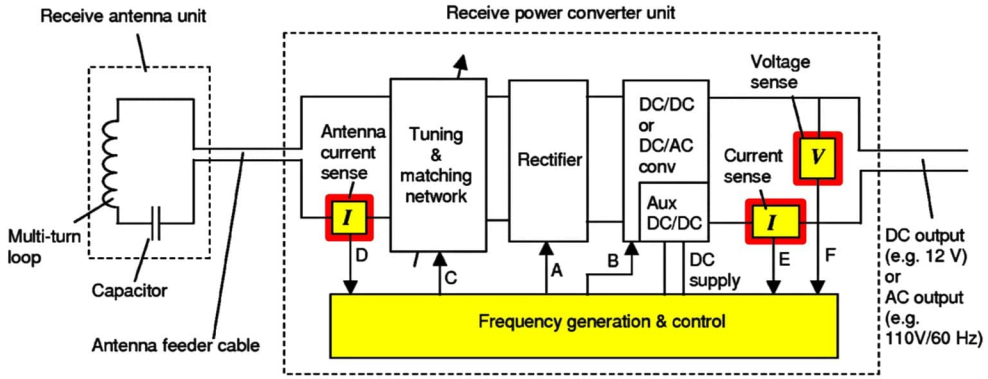


Figure 4-12: Receive subsystem

* * *

Additionally, it measures the antenna current by means of the antenna current sense, the DC or AC output voltage and current by means of the voltage and current sense, respectively. Based on these measurements, it computes and adjusts relevant operational parameters and configurations of the receive power converter unit in order to satisfy power demand by the receiver (within specified limits) and to maximise energy transfer efficiency.

* * *

as well as the receiver circuit. The receivers control system may determine the model parameters using specific measurements (e.g. antenna current and voltage, input power, etc.) and calibration routines. Based on this local model the receivers parameters may be optimised

Ex. 1006 (Cook Provisional) at 47, 44-45, 31

The ’719 Patent

“network of capacitors” Should Have Its Plain Meaning

Cook ’554 Renders Claim 17 Obvious

Cook ’554 Is Prior Art

Cook ’554 Discloses a Network of Capacitors

Lee and Cook ’523 Render Claim 17 Obvious

Claim 16 Is Canceled

Ground 2: Claim 17 Is Obvious Over Cook-554

17. A system, comprising:

a source resonator having a Q-factor Q_1 and a characteristic size x_1, and a second resonator having a Q-factor Q_2 and a characteristic size x_2, and located a distance D from the source resonator;

wherein the source resonator and the second resonator are coupled to exchange energy wirelessly among the source resonator and the second resonator, and wherein $\sqrt{Q_1 Q_2}$ is greater than 100; and

wherein at least one of the resonators includes a coil of a plurality of turns of a conducting material connected to a network of capacitors, wherein the plurality of turns are in a common plane, and wherein a characteristic thickness of the at least one of the resonators is much less than a characteristic size of the at least one of the resonators.

Ex. 1001 ('719 Patent) at Claim 17

Only disputed limitation

No Dispute: Cook-554 Teaches Preamble

17. A system, comprising:

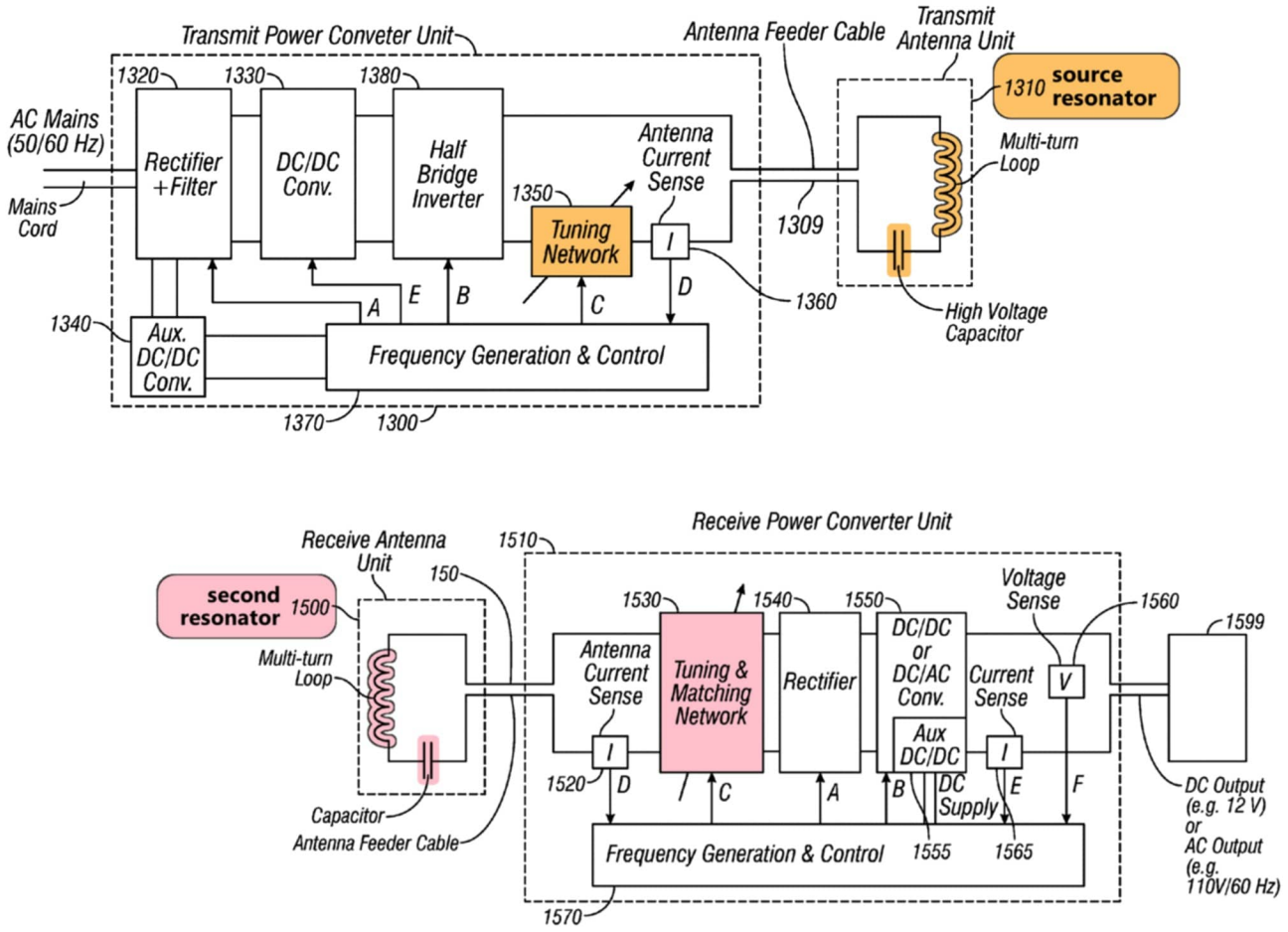
a source resonator having a Q-factor Q_1 and a characteristic size x_1, and a second resonator having a Q-factor Q_2 and a characteristic size x_2, and located a distance D from the source resonator;

wherein the source resonator and the second resonator are coupled to exchange energy wirelessly among the source resonator and the second resonator, and wherein $\sqrt{Q_1 Q_2}$ is greater than 100; and

wherein at least one of the resonators includes a coil of a plurality of turns of a conducting material connected to a network of capacitors, wherein the plurality of turns are in a common plane, and wherein a characteristic thickness of the at least one of the resonators is much less than a characteristic size of the at least one of the resonators.

Ex. 1001 ('719 Patent) at Claim 17

Cook-554



Ex. 1005 (Cook-554) at Fig. 13, Fig. 15

No Dispute: Cook-554 Teaches 17[a]

17. A system, comprising:

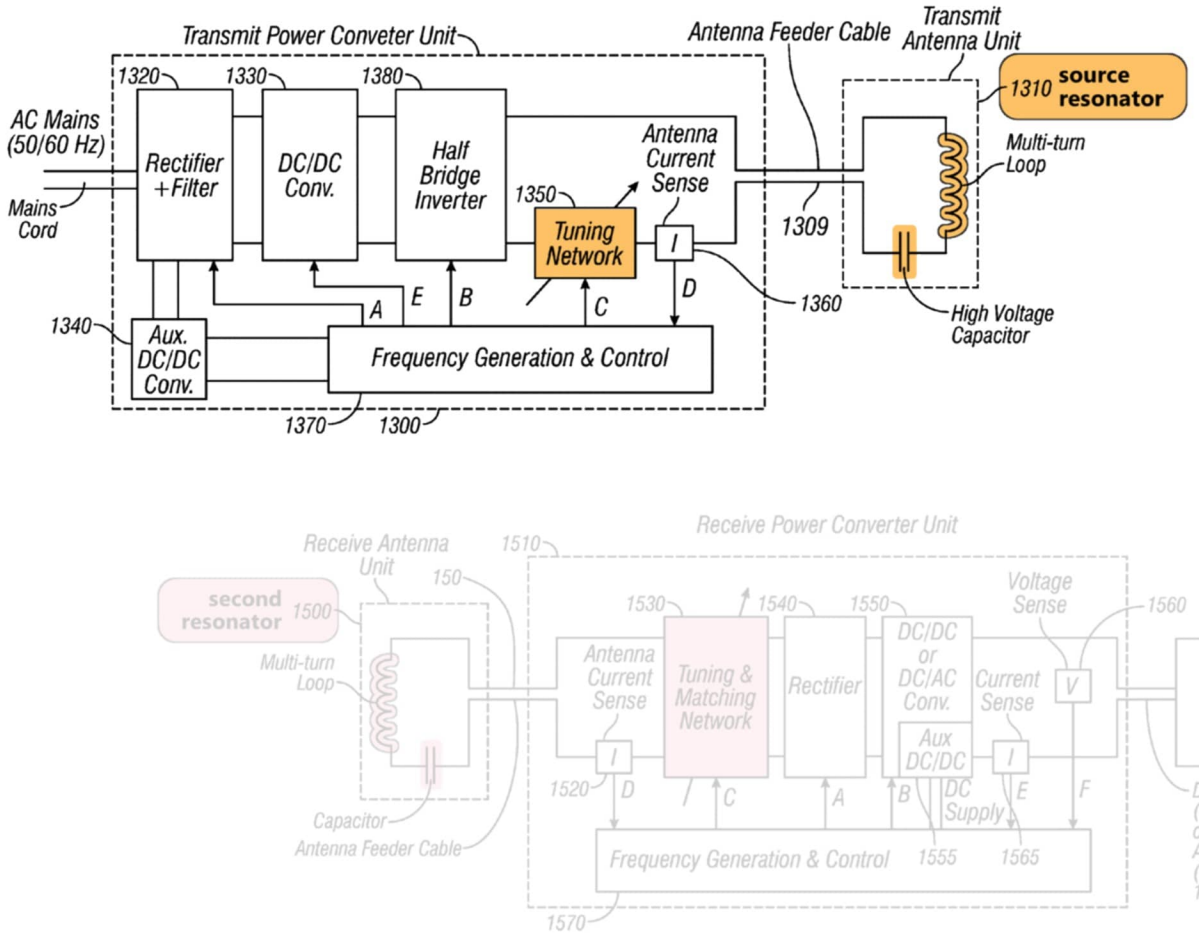
a source resonator having a Q-factor Q_1 and a characteristic size x_1, and a second resonator having a Q-factor Q_2 and a characteristic size x_2, and located a distance D from the source resonator;

wherein the source resonator and the second resonator are coupled to exchange energy wirelessly among the source resonator and the second resonator, and wherein $\sqrt{Q_1 Q_2}$ is greater than 100; and

wherein at least one of the resonators includes a coil of a plurality of turns of a conducting material connected to a network of capacitors, wherein the plurality of turns are in a common plane, and wherein a characteristic thickness of the at least one of the resonators is much less than a characteristic size of the at least one of the resonators.

Ex. 1001 ('719 Patent) at Claim 17

Cook-554



Ex. 1005 (Cook-554) at Fig. 13, Fig. 15

No Dispute: Cook-554 Teaches 17[b]

17. A system, comprising:

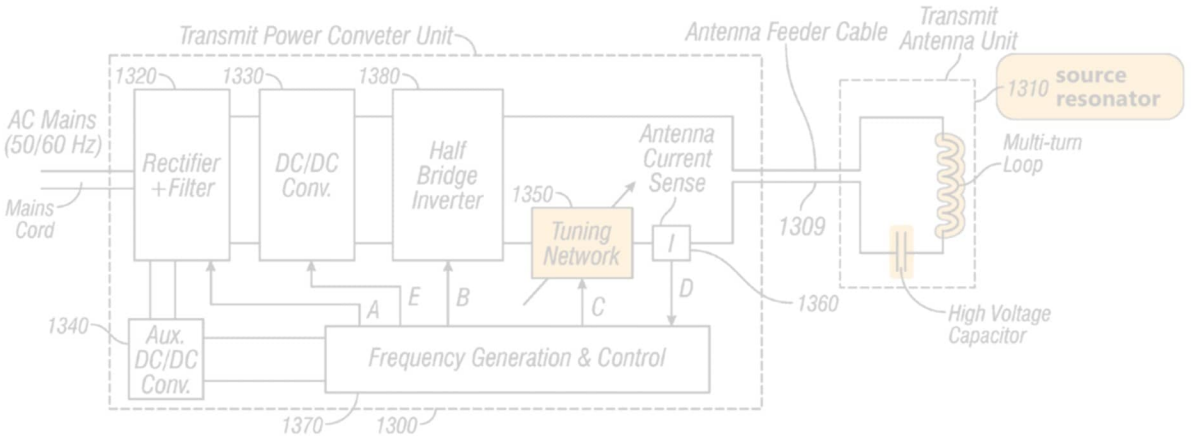
a source resonator having a Q-factor Q_1 and a characteristic size x_1, and a second resonator having a Q-factor Q_2 and a characteristic size x_2, and located a distance D from the source resonator;

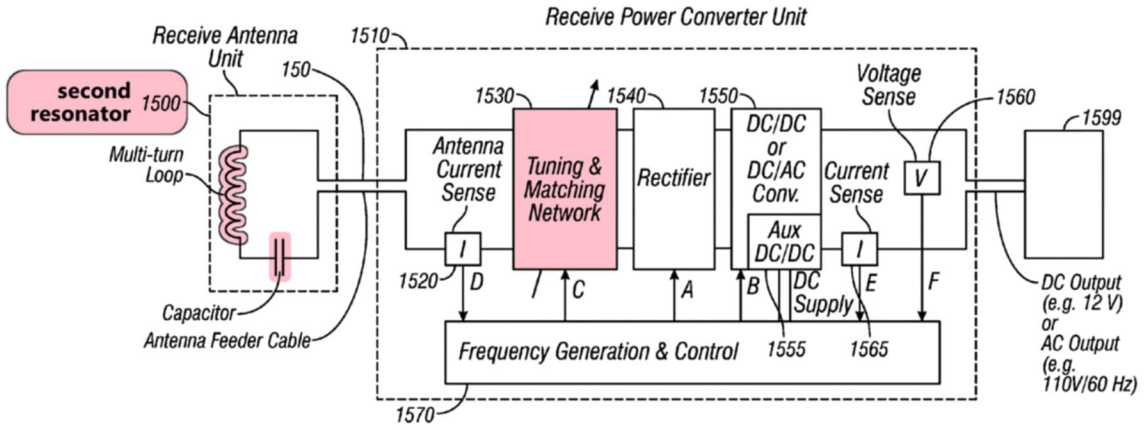
wherein the source resonator and the second resonator are coupled to exchange energy wirelessly among the source resonator and the second resonator, and wherein $\sqrt{Q_1 Q_2}$ is greater than 100; and

wherein at least one of the resonators includes a coil of a plurality of turns of a conducting material connected to a network of capacitors, wherein the plurality of turns are in a common plane, and wherein a characteristic thickness of the at least one of the resonators is much less than a characteristic size of the at least one of the resonators.

Ex. 1001 ('719 Patent) at Claim 17

Cook-554





Ex. 1005 (Cook-554) at Fig. 13, Fig. 15

No Dispute: Cook-554 Teaches 17[c]

17. A system, comprising:

a source resonator having a Q-factor Q_1 and a characteristic size x_1, and a second resonator having a Q-factor Q_2 and a characteristic size x_2, and located a distance D from the source resonator;

wherein the source resonator and the second resonator are coupled to exchange energy wirelessly among the source resonator and the second resonator, and wherein $\sqrt{Q_1 Q_2}$ is greater than 100; and

wherein at least one of the resonators includes a coil of a plurality of turns of a conducting material connected to a network of capacitors, wherein the plurality of turns are in a common plane, and wherein a characteristic thickness of the at least one of the resonators is much less than a characteristic size of the at least one of the resonators.

Ex. 1001 ('719 Patent) at Claim 17

Cook-554

The Wireless Power Bridge is based on magnetic-field inductive coupling between a resonant transmit antenna and a resonant receive antenna. This uses a non-modulated carrier frequency, of, for example, 50 Hz, that is appropriate for wireless transmission through a wall or window. The preferred frequency is in the range from 20 kHz to 135 kHz (VLF, LF). Another embodiment directly uses the AC power frequency, typically 60 Hz, for wireless energy transfer. One embodiment efficiently transfers power through a non-metallic wall of thickness in the range of a few mm up to 40 centimeters also depending on the size of the antenna. This is accomplished through use of two resonant antennas applying coupled resonance with a high Q-factor (typically >200).

Ex. 1005 (Cook-554) at 10:32-44

No Dispute: Cook-554 Teaches 17[d]

17. A system, comprising:

a source resonator having a Q-factor Q_1 and a characteristic size x_1, and a second resonator having a Q-factor Q_2 and a characteristic size x_2, and located a distance D from the source resonator;

wherein the source resonator and the second resonator are coupled to exchange energy wirelessly among the source resonator and the second resonator, and wherein $\sqrt{Q_1 Q_2}$ is greater than 100; and

wherein at least one of the resonators includes a coil of a plurality of turns of a conducting material connected to a network of capacitors, wherein the plurality of turns are in a common plane, and wherein a characteristic thickness of the at least one of the resonators is much less than a characteristic size of the at least one of the resonators.

Ex. 1001 ('719 Patent) at Claim 17

Cook-554

The Wireless Power Bridge is based on magnetic-field inductive coupling between a resonant transmit antenna and a resonant receive antenna. This uses a non-modulated carrier frequency, of, for example, 50 Hz, that is appropriate for wireless transmission through a wall or window. The preferred frequency is in the range from 20 kHz to 135 kHz (VLF, LF). Another embodiment directly uses the AC power frequency, typically 60 Hz, for wireless energy transfer. One embodiment efficiently transfers power through a non-metallic wall of thickness in the range of a few mm up to 40 centimeters also depending on the size of the antenna. This is accomplished through use of two resonant antennas applying coupled resonance with a high Q-factor (typically >200).

Ex. 1005 (Cook-554) at 10:32-44

Cook-554 Teaches 17[e]

17. A system, comprising:

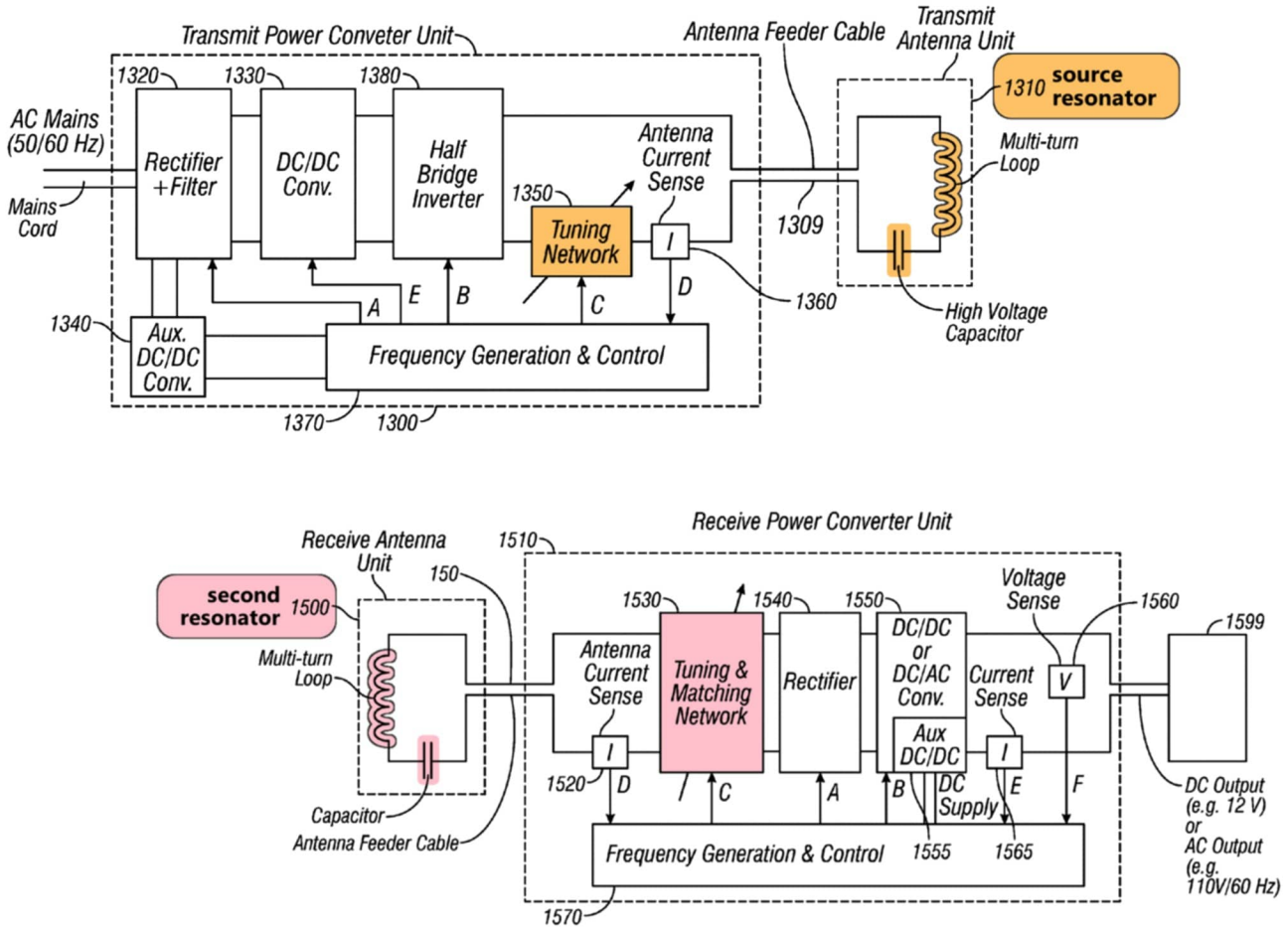
a source resonator having a Q-factor Q_1 and a characteristic size x_1, and a second resonator having a Q-factor Q_2 and a characteristic size x_2, and located a distance D from the source resonator;

wherein the source resonator and the second resonator are coupled to exchange energy wirelessly among the source resonator and the second resonator, and wherein $\sqrt{Q_1 Q_2}$ is greater than 100; and

wherein at least one of the resonators includes a coil of a plurality of turns of a conducting material connected to a network of capacitors, wherein the plurality of turns are in a common plane, and wherein a characteristic thickness of the at least one of the resonators is much less than a characteristic size of the at least one of the resonators.

Ex. 1001 ('719 Patent) at Claim 17

Cook-554



Ex. 1005 (Cook-554) at Fig. 13, Fig. 15

No Dispute: Cook-554 Teaches 17[e] Under Petitioner's Construction

Petitioner's Construction

Plain meaning, which is "any circuit topology including one or more capacitors"

Cook-554

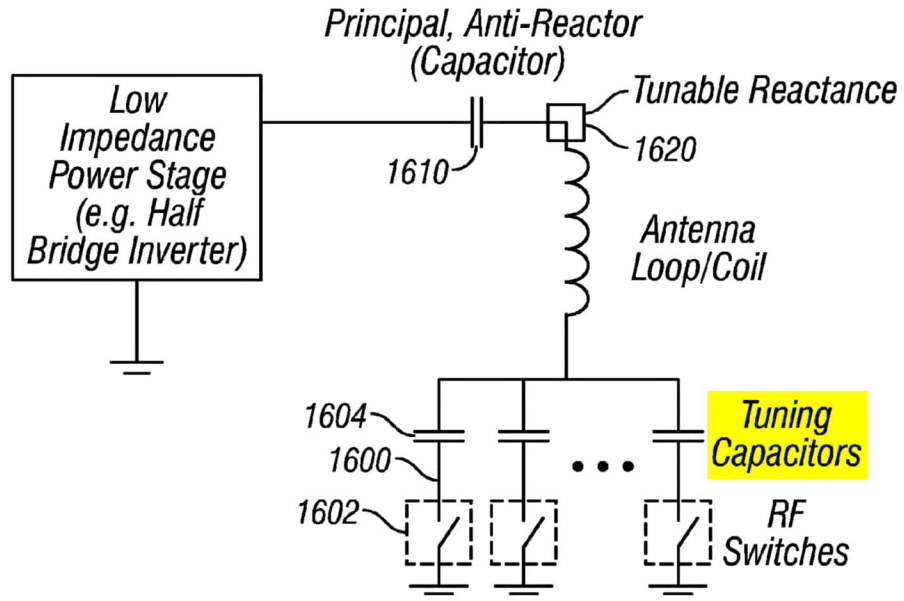


FIG. 16

Ex. 1005 (Cook-554) at Fig. 16

Patent Owner's Sur-Reply

The "Tuning Capacitors" component in series is comprised of multiple capacitors 1604 that can be added to yield a single total capacitance having one top terminal and one bottom terminal. Horenstein Decl. 52. These capacitors are connected, respectively, to the bottom of the Antenna Loop/Coil and ground.[6]

POSR at 6

Claim 17 Is Satisfied By Direct Or Indirect Connections

17. A system, comprising:

a source resonator having a Q-factor Q_1 and a characteristic size x_1, and a second resonator having a Q-factor Q_2 and a characteristic size x_2, and located a distance D from the source resonator;

wherein the source resonator and the second resonator are coupled to exchange energy wirelessly among the source resonator and the second resonator, and wherein $\sqrt{Q_1 Q_2}$ is greater than 100; and

wherein at least one of the resonators includes a coil of a plurality of turns of a conducting material connected to a network of capacitors, wherein the plurality of turns are in a common plane, and wherein a characteristic thickness of the at least one of the resonators is much less than a characteristic size of the at least one of the resonators.

Ex. 1001 ('719 Patent) at Claim 17

The power supplies and the power consumers may be connected to magnetic resonators directly or indirectly or inductively. Electrical signals may be supplied to, or taken from,

Ex. 1001 ('734 Patent) at 58:48-49

Douglas Dynamics, LLC

"The ordinary meaning of 'connected to' encompasses indirect linkages."

Douglas Dynamics, LLC v. Buyers Prods. Co., 717 F.3d 1336, 1342 (Fed. Cir. 2013)

Cook-554 Discloses Two Degrees of Freedom

Patent Owner's Construction

"a circuit topology of passive components including one or more capacitors that provides two or more degrees of freedom"

Cook-554

the resonance frequency may help keep a high Q. A resonant antenna system that is automatically tunable can use tunable capacitor(s) and/or tunable inductances, e.g., electrically tuneable reactors. Both must be capable of withstand either

Ex. 1005 (Cook-554) at 17:35-38

Patent Owner's Expert

Q. So the capacitors don't have to provide both degrees of freedom in a network of capacitors; is that right?

A. Well, the variable inductor performs the equivalent function of a variable capacitor. So when I say "network of capacitors includes one or more capacitors or their equivalent", I believe a person of skill would understand that to include the circuits of 30H through -M that also have variable inductors.

Ex. 1035 at 96:2-11

Cook-554 Discloses Two Degrees of Freedom

Cook-554

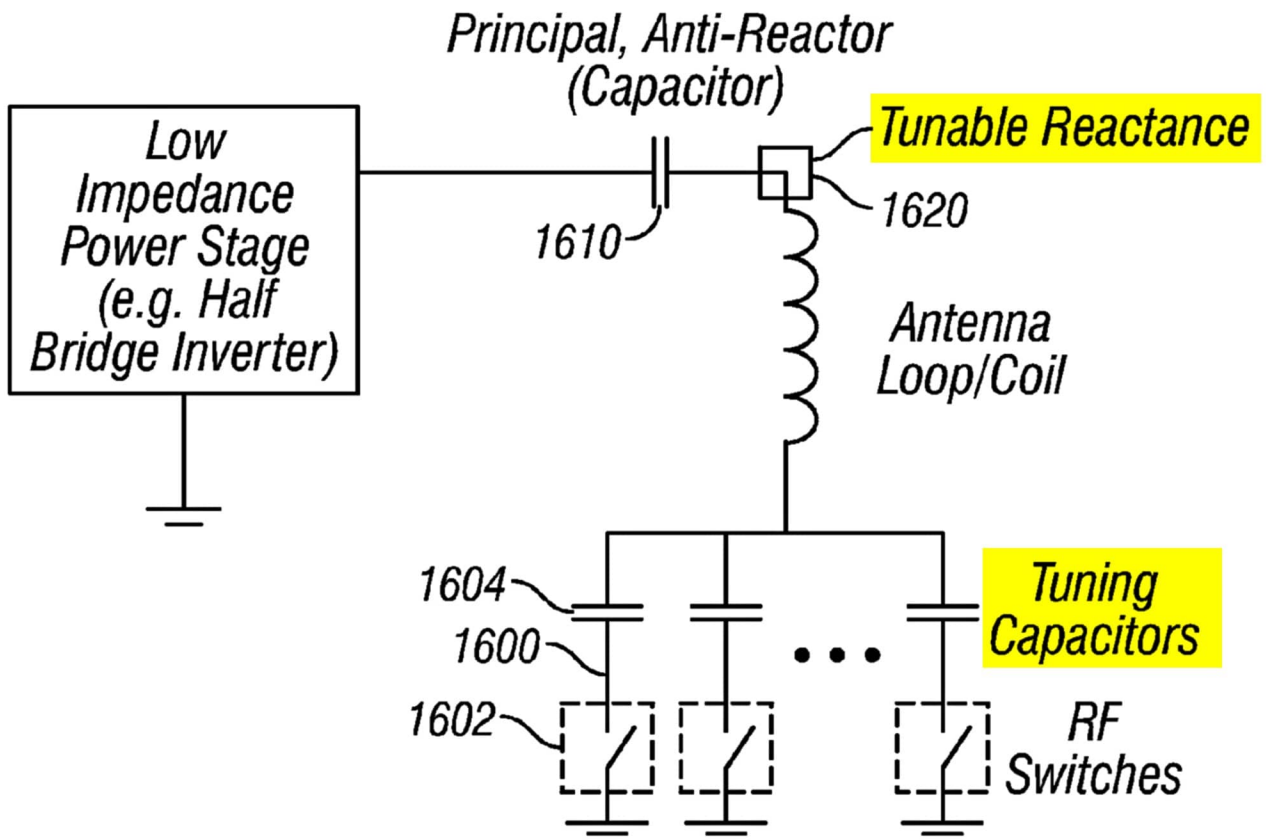
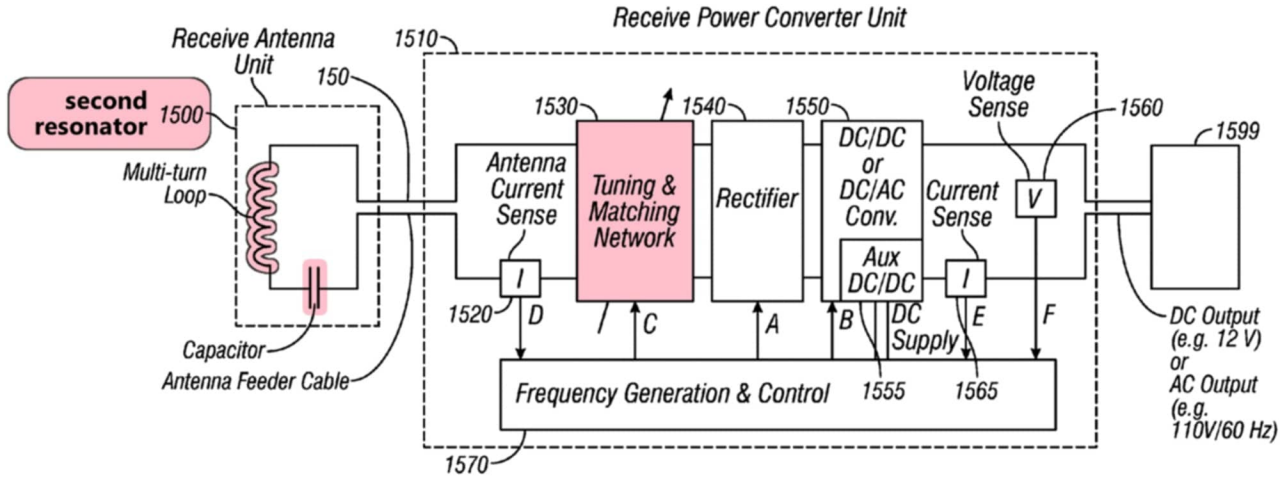


FIG. 16

Ex. 1005 (Cook-554) at Fig. 16

Cook-554 Discloses Impedance Matching

Cook-554



Ex. 1005 (Cook-554) at Fig. 15

The tuning and matching network is generally used to ensure that the receive antenna is operated at resonance and that the rectifier's input impedance is optimally matched to the receive antenna. This is particularly true for all applica-

Ex. 1005 (Cook-554) at 14:26-29

Patent Owner Moves The Goalposts

17. A system, comprising:

a source resonator having a Q-factor Q_1 and a characteristic size x_1, and a second resonator having a Q-factor Q_2 and a characteristic size x_2, and located a distance D from the source resonator;

wherein the source resonator and the second resonator are coupled to exchange energy wirelessly among the source resonator and the second resonator, and wherein $\sqrt{Q_1 Q_2}$ is greater than 100; and

wherein at least one of the resonators includes a coil of a plurality of turns of a conducting material connected to a network of capacitors, wherein the plurality of turns are in a common plane, and wherein a characteristic thickness of the at least one of the resonators is much less than a characteristic size of the at least one of the resonators.

Ex. 1001 ('719 Patent) at Claim 17

Patent Owner's Construction

"a circuit topology of passive components including one or more capacitors that provides two or more degrees of freedom"

Patent Owner's Sur-Reply

Bridge Inverter by a simple series connection. The four series elements all pass the same current from the Power-Stage Bridge Inverter and allow only adjustment of the resonant frequency in Cook's circuit without adjusting the load resistance presented to the power stage to a matching value. Horenstein Decl. at 40, 45.

POSR at 7

No Dispute: Cook-554 Teaches Planar Coils (17[e])

17. A system, comprising:

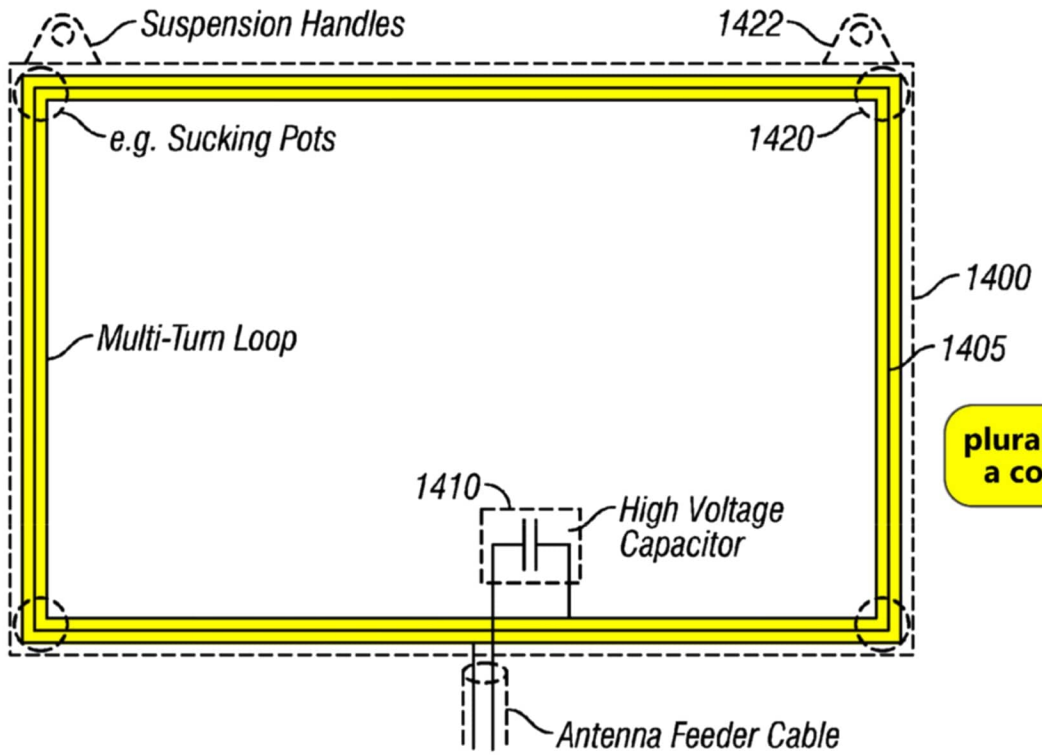
a source resonator having a Q-factor Q_1 and a characteristic size x_1, and a second resonator having a Q-factor Q_2 and a characteristic size x_2, and located a distance D from the source resonator;

wherein the source resonator and the second resonator are coupled to exchange energy wirelessly among the source resonator and the second resonator, and wherein $\sqrt{Q_1 Q_2}$ is greater than 100; and

wherein at least one of the resonators includes a coil of a plurality of turns of a conducting material connected to a network of capacitors, wherein the plurality of turns are in a common plane, and wherein a characteristic thickness of the at least one of the resonators is much less than a characteristic size of the at least one of the resonators.

Ex. 1001 ('719 Patent) at Claim 17

Cook-554



Ex. 1005 (Cook-554) at Fig. 14

Demonstrative Exhibit – Not Evidence

No Dispute: Cook-554 Teaches Limitation 17[f]

17. A system, comprising:

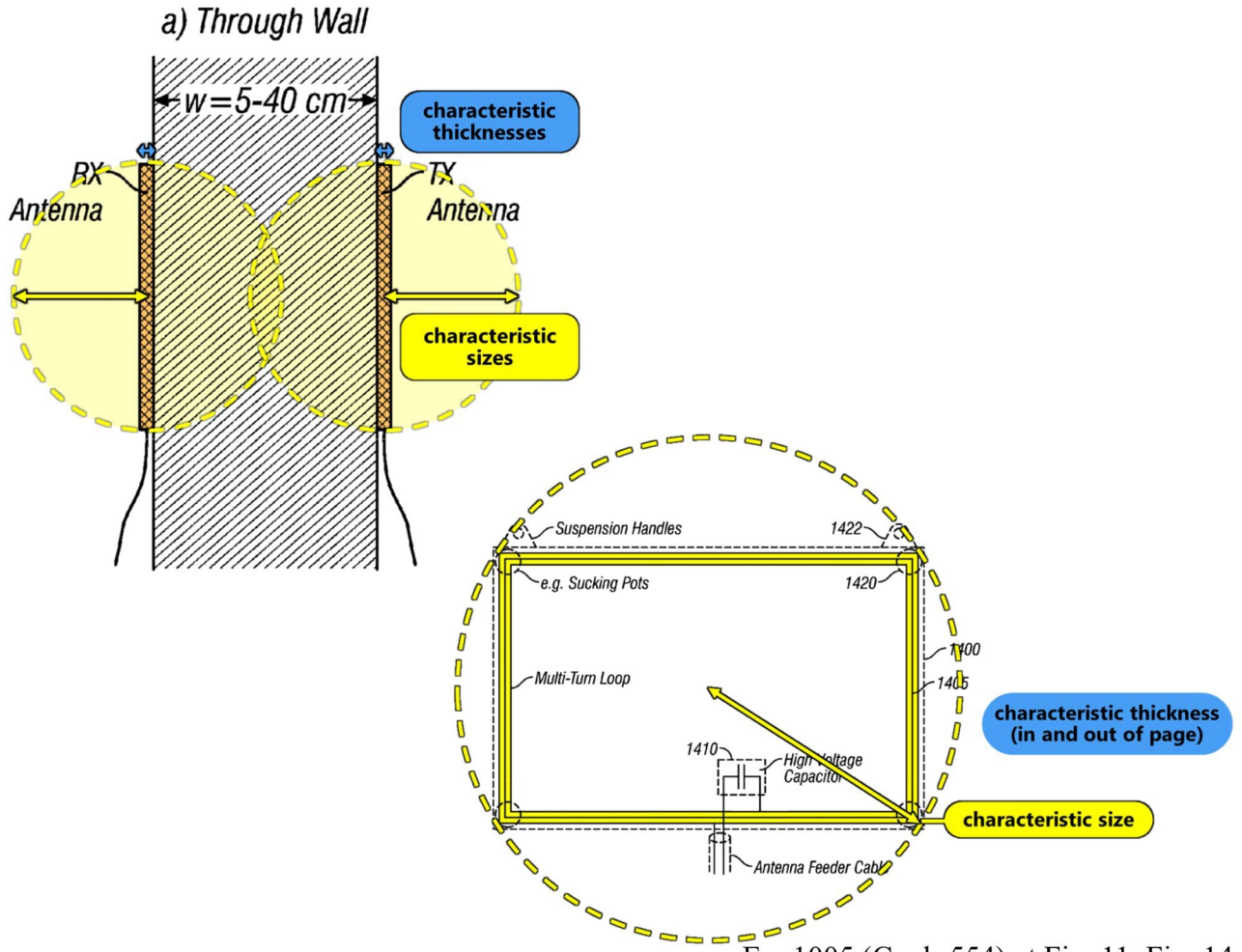
a source resonator having a Q-factor Q_1 and a characteristic size x_1, and a second resonator having a Q-factor Q_2 and a characteristic size x_2, and located a distance D from the source resonator;

wherein the source resonator and the second resonator are coupled to exchange energy wirelessly among the source resonator and the second resonator, and wherein $\sqrt{Q_1 Q_2}$ is greater than 100; and

wherein at least one of the resonators includes a coil of a plurality of turns of a conducting material connected to a network of capacitors, wherein the plurality of turns are in a common plane, and wherein a characteristic thickness of the at least one of the resonators is much less than a characteristic size of the at least one of the resonators.

Ex. 1001 ('719 Patent) at Claim 17

Cook-554



Ex. 1005 (Cook-554) at Fig. 11, Fig. 14

No Dispute: Cook-554 Teaches Limitation 17[f]

17. A system, comprising:

a source resonator having a Q-factor Q_1 and a characteristic size x_1, and a second resonator having a Q-factor Q_2 and a characteristic size x_2, and located a distance D from the source resonator;

wherein the source resonator and the second resonator are coupled to exchange energy wirelessly among the source resonator and the second resonator, and wherein $\sqrt{Q_1 Q_2}$ is greater than 100; and

wherein at least one of the resonators includes a coil of a plurality of turns of a conducting material connected to a network of capacitors, wherein the plurality of turns are in a common plane, and wherein a characteristic thickness of the at least one of the resonators is much less than a characteristic size of the at least one of the resonators.

Ex. 1001 ('719 Patent) at Claim 17

Cook-554

A typical layout of a flat panel transmit antenna unit is shown in FIG. **14**. The antenna **1400** is formed of a coil part **1405** and a high voltage capacitor **1410**. The high voltage capacitor **1410** is mounted in the interior of the loop to save space and to provide a maximum loop size for a given outer contour form factor. Since the HV capacitor is integrated into

Ex. 1005 (Cook-554) at 13:30-35

The ’719 Patent

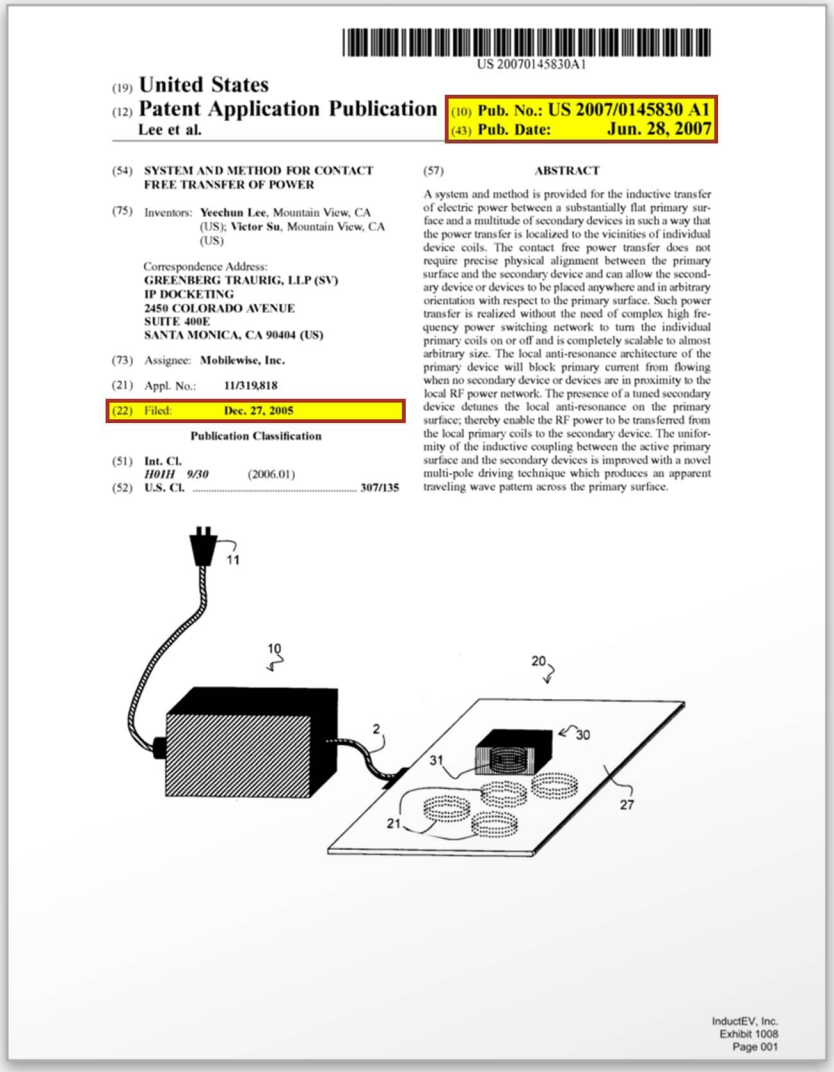
“network of capacitors” Should Have Its Plain Meaning

Cook ’554 Renders Claim 17 Obvious

Lee and Cook ’523 Render Claim 17 Obvious

Claim 16 Is Canceled

Lee (Ex. 1008)



US 20070145830A1

(19) **United States**

(12) **Patent Application Publication**
Lee et al.

(10) **Pub. No.: US 2007/0145830 A1**
(43) **Pub. Date: Jun. 28, 2007**

(54) **SYSTEM AND METHOD FOR CONTACT FREE TRANSFER OF POWER**

(75) Inventors: **Yeechun Lee**, Mountain View, CA (US); **Victor Su**, Mountain View, CA (US)

Correspondence Address:
GREENBERG TRAURIG, LLP (SV)
IP DOCKETING
2450 COLORADO AVENUE
SUITE 400E
SANTA MONICA, CA 90404 (US)

(73) Assignee: **Mobilewise, Inc.**

(21) Appl. No.: **11/319,818**

(22) Filed: **Dec. 27, 2005**

Publication Classification

(51) **Int. Cl.**
H01H 9/30 (2006.01)

(52) **U.S. Cl.** **307/135**

(57) **ABSTRACT**

A system and method is provided for the inductive transfer of electric power between a substantially flat primary surface and a multitude of secondary devices in such a way that the power transfer is localized to the vicinities of individual device coils. The contact free power transfer does not require precise physical alignment between the primary surface and the secondary device and can allow the secondary device or devices to be placed anywhere and in arbitrary orientation with respect to the primary surface. Such power transfer is realized without the need of complex high frequency power switching network to turn the individual primary coils on or off and is completely scalable to almost arbitrary size. The local anti-resonance architecture of the primary device will block primary current from flowing when no secondary device or devices are in proximity to the local RF power network. The presence of a tuned secondary device detunes the local anti-resonance on the primary surface; thereby enable the RF power to be transferred from the local primary coils to the secondary device. The uniformity of the inductive coupling between the active primary surface and the secondary devices is improved with a novel multi-pole driving technique which produces an apparent traveling wave pattern across the primary surface.

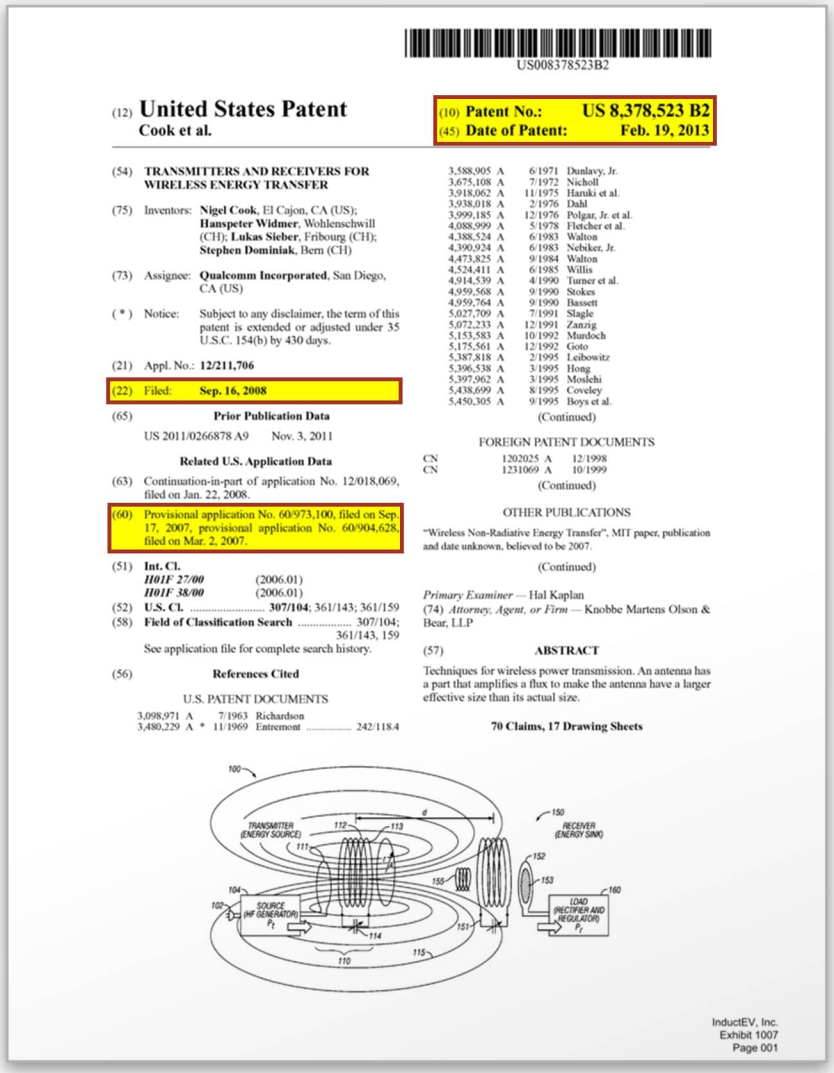
InductEV, Inc.
Exhibit 1008
Page 001

(10) **Pub. No.: US 2007/0145830 A1**

(43) **Pub. Date: Jun. 28, 2007**

(22) Filed: **Dec. 27, 2005**

Cook-523 (Ex. 1007)



US008378523B2

(12) **United States Patent**
Cook et al.

(10) **Patent No.: US 8,378,523 B2**
(45) **Date of Patent: Feb. 19, 2013**

(54) **TRANSMITTERS AND RECEIVERS FOR WIRELESS ENERGY TRANSFER**

(75) Inventors: **Nigel Cook**, El Cajon, CA (US); **Hanspeter Widmer**, Wohlenschwill (CH); **Lukas Sieber**, Fribourg (CH); **Stephen Dominiak**, Bern (CH)

(73) Assignee: **Qualcomm Incorporated**, San Diego, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 430 days.

(21) Appl. No.: **12/211,706**

(22) Filed: **Sep. 16, 2008**

(65) **Prior Publication Data**

US 2011/0266878 A9 Nov. 3, 2011

Related U.S. Application Data

(63) Continuation-in-part of application No. 12/018,069, filed on Jan. 22, 2008.

(60) Provisional application No. 60/973,100, filed on Sep. 17, 2007, provisional application No. 60/904,628, filed on Mar. 2, 2007.

(51) **Int. Cl.**
H01F 27/00 (2006.01)
H01F 38/00 (2006.01)

(52) **U.S. Cl.** **307/104**; 361/143; 361/159

(58) **Field of Classification Search** 307/104; 361/143, 159

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,098,971	A	7/1963	Richardson	
3,480,229	A *	11/1969	Entremont	242/118.4
3,588,905	A	6/1971	Dunlavy, Jr.	
3,675,108	A	7/1972	Nicholl	
3,918,062	A	11/1975	Haruki et al.	
3,938,018	A	2/1976	Dahl	
3,999,185	A	12/1976	Polgar, Jr. et al.	
4,088,999	A	5/1978	Fletcher et al.	
4,388,524	A	6/1983	Walton	
4,390,924	A	6/1983	Nebiker, Jr.	
4,473,825	A	9/1984	Walton	
4,524,411	A	6/1985	Willis	
4,914,539	A	4/1990	Turner et al.	
4,959,568	A	9/1990	Stokes	
4,959,764	A	9/1990	Bassett	
5,027,709	A	7/1991	Slagle	
5,072,233	A	12/1991	Zanzig	
5,153,583	A	10/1992	Murdoch	
5,175,561	A	12/1992	Goto	
5,387,818	A	2/1995	Leibowitz	
5,396,538	A	3/1995	Hong	
5,397,962	A	3/1995	Moslehi	
5,438,699	A	8/1995	Coveley	
5,450,305	A	9/1995	Boys et al.	

(Continued)

FOREIGN PATENT DOCUMENTS

CN	1202025	A	12/1998
CN	1231069	A	10/1999

(Continued)

OTHER PUBLICATIONS

"Wireless Non-Radiative Energy Transfer", MIT paper, publication and date unknown, believed to be 2007.

(Continued)

Primary Examiner — Hal Kaplan
(74) *Attorney, Agent, or Firm* — Knobbe Martens Olson & Bear, LLP

(57) **ABSTRACT**

Techniques for wireless power transmission. An antenna has a part that amplifies a flux to make the antenna have a larger effective size than its actual size.

70 Claims, 17 Drawing Sheets

InductEV, Inc.
Exhibit 1007
Page 001

(10) **Patent No.: US 8,378,523 B2**
(45) **Date of Patent: Feb. 19, 2013**

(22) Filed: **Sep. 16, 2008**

(60) Provisional application No. 60/973,100, filed on **Sep. 17, 2007,** provisional application No. 60/904,628, filed on Mar. 2, 2007.

No Dispute: A POSA Would Have Combined Lee And Cook-523

Petition

A POSA reading Lee would have understood "nearly infinite" means Q as high as practical, which would also improve transfer efficiency. Lee ¶ 12 (acknowledging Q cannot be "infinity" in practice); Allen Decl. 232; Story of Q (Ex. 1010) 592 ("[i]n a majority of situations the desired value of Q is the highest one economically attainable."). *InductEV Inc. v. Witricity Corp.*, IPR2021-01165, Paper 41 at 47-50 (March 6, 2023) (Ex. 1022) (finding prior art taught "increased energy transfer efficiency resulting from higher Qs"). To determine what Q values were practical and attainable, a POSA would have looked to the Q values in other known high Q resonant wireless power transfer systems, which would have led them to Cook-523. Cook-523, like Lee, taught source and device resonators comprising a

Petition at 68-69

No Dispute: Combination Teaches The Preamble Of Claim 17

17. A system, comprising:

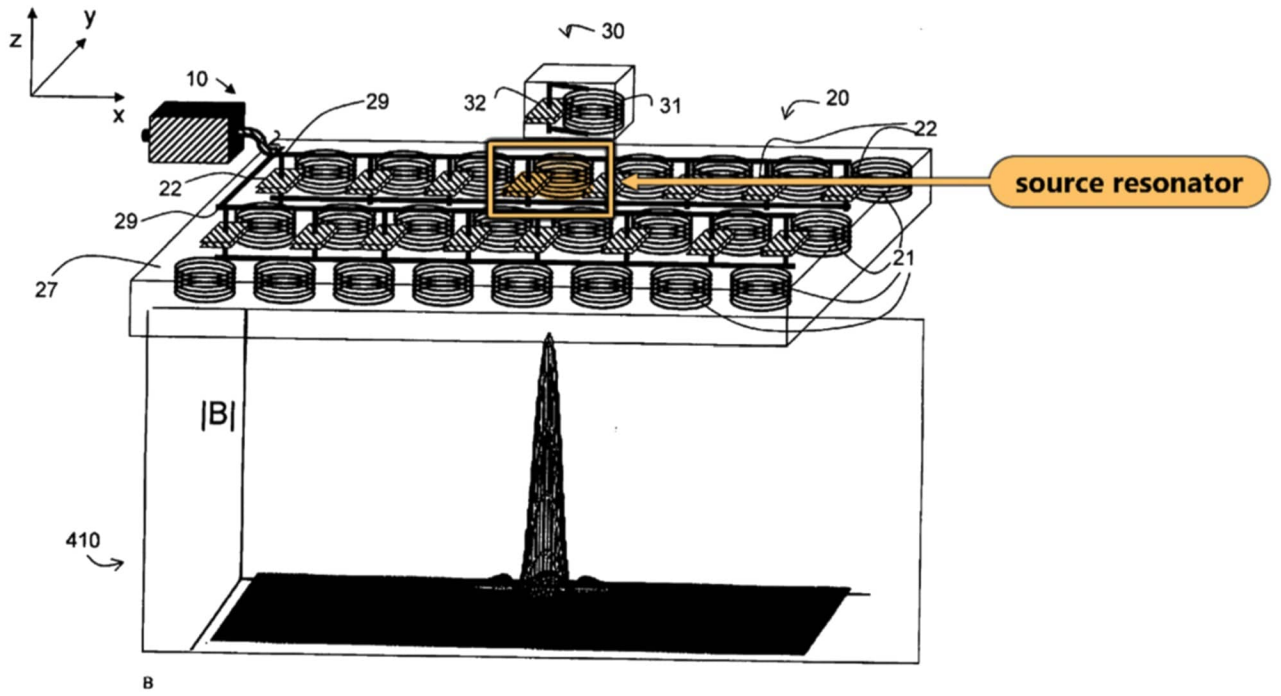
a source resonator having a Q-factor Q_1 and a characteristic size x_1, and a second resonator having a Q-factor Q_2 and a characteristic size x_2, and located a distance D from the source resonator;

wherein the source resonator and the second resonator are coupled to exchange energy wirelessly among the source resonator and the second resonator, and wherein $\sqrt{Q_1 Q_2}$ is greater than 100; and

wherein at least one of the resonators includes a coil of a plurality of turns of a conducting material connected to a network of capacitors, wherein the plurality of turns are in a common plane, and wherein a characteristic thickness of the at least one of the resonators is much less than a characteristic size of the at least one of the resonators.

Ex. 1001 ('719 Patent) at Claim 17

Lee



Ex. 1008 (Lee) at Fig. 3

No Dispute: Combination Teaches 17[a]

17. A system, comprising:

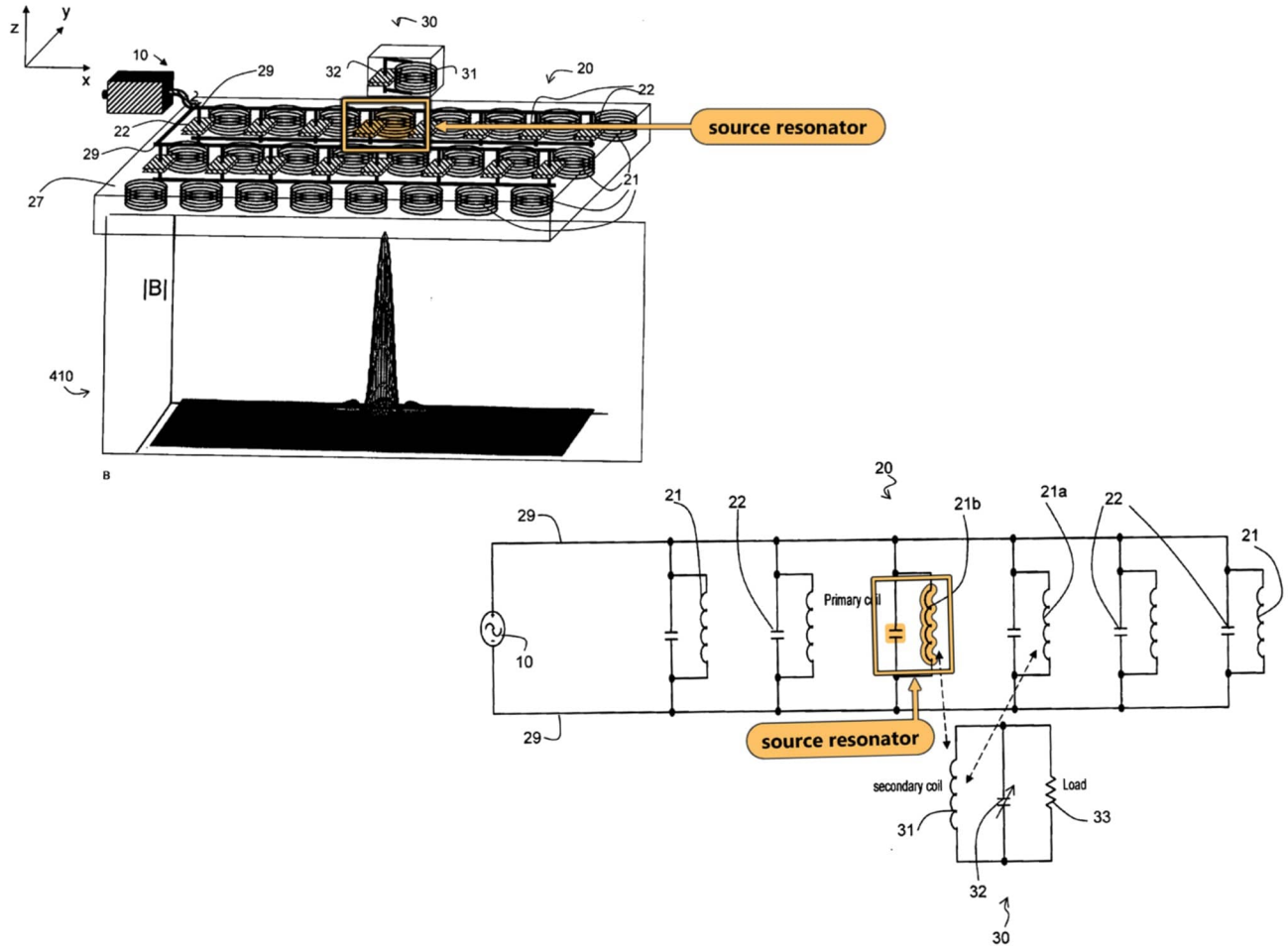
a source resonator having a Q-factor Q_1 and a characteristic size x_1, and a second resonator having a Q-factor Q_2 and a characteristic size x_2, and located a distance D from the source resonator;

wherein the source resonator and the second resonator are coupled to exchange energy wirelessly among the source resonator and the second resonator, and wherein $\sqrt{Q_1 Q_2}$ is greater than 100; and

wherein at least one of the resonators includes a coil of a plurality of turns of a conducting material connected to a network of capacitors, wherein the plurality of turns are in a common plane, and wherein a characteristic thickness of the at least one of the resonators is much less than a characteristic size of the at least one of the resonators.

Ex. 1001 ('719 Patent) at Claim 17

Lee



Ex. 1008 (Lee) at Fig. 3, Fig. 4

No Dispute: Combination Teaches 17[b]

17. A system, comprising:

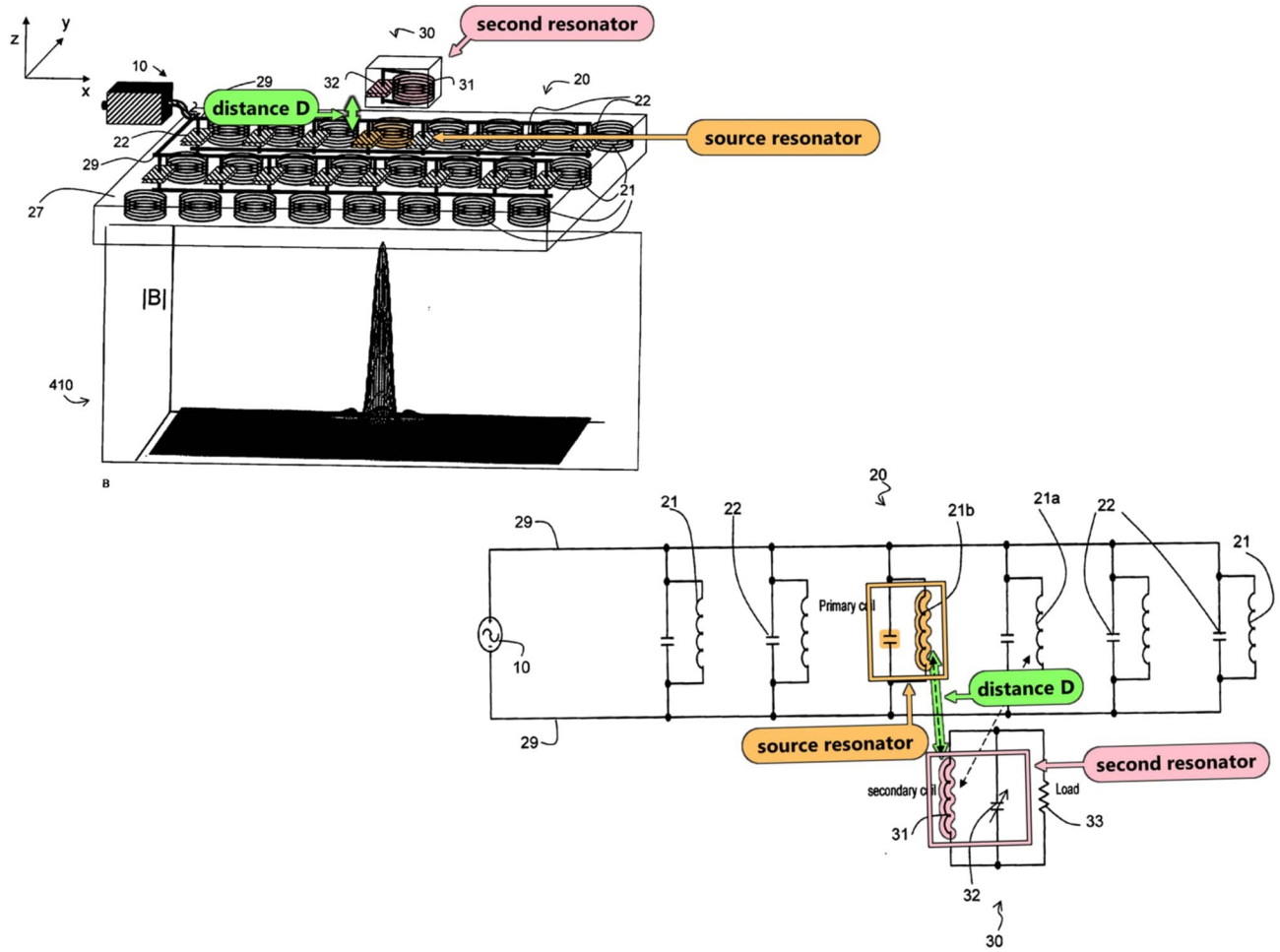
a source resonator having a Q-factor Q_1 and a characteristic size x_1, and a second resonator having a Q-factor Q_2 and a characteristic size x_2, and located a distance D from the source resonator;

wherein the source resonator and the second resonator are coupled to exchange energy wirelessly among the source resonator and the second resonator, and wherein $\sqrt{Q_1 Q_2}$ is greater than 100; and

wherein at least one of the resonators includes a coil of a plurality of turns of a conducting material connected to a network of capacitors, wherein the plurality of turns are in a common plane, and wherein a characteristic thickness of the at least one of the resonators is much less than a characteristic size of the at least one of the resonators.

Ex. 1001 ('719 Patent) at Claim 17

Lee



Ex. 1008 (Lee) at Fig. 3, Fig. 4

No Dispute: Combination Teaches 17[c]

17. A system, comprising:

a source resonator having a Q-factor Q_1 and a characteristic size x_1, and a second resonator having a Q-factor Q_2 and a characteristic size x_2, and located a distance D from the source resonator;

wherein the source resonator and the second resonator are coupled to exchange energy wirelessly among the source resonator and the second resonator, and wherein $\sqrt{Q_1 Q_2}$ is greater than 100; and

wherein at least one of the resonators includes a coil of a plurality of turns of a conducting material connected to a network of capacitors, wherein the plurality of turns are in a common plane, and wherein a characteristic thickness of the at least one of the resonators is much less than a characteristic size of the at least one of the resonators.

Ex. 1001 ('719 Patent) at Claim 17

Lee

[0023] In one embodiment, there is provided a primary unit for transferring power wirelessly, wherein the primary unit includes at least one bank of switched capacitors that is adapted to adjusting the source impedance of the RF drive to match the impedance of the effective load of one or more secondary units that are coupled to the primary unit for the purpose of minimizing the reflected RF power, and thereby minimizing the heat generation on the RF power supply side when there is a load impedance-source impedance mismatch. Alternatively, the switched capacitor bank can be replaced by any other means of adjusting the capacitance value of a high voltage network electronically, such as a MEMS capacitor which can vary its capacitance by electrostatically varying the air gap between adjacent metallic membranes under analog or digital control.

Ex. 1008 (Lee) at [0023]

No Dispute: Combination Teaches 17[d]

17. A system, comprising:

a source resonator having a Q-factor Q_1 and a characteristic size x_1, and a second resonator having a Q-factor Q_2 and a characteristic size x_2, and located a distance D from the source resonator;

wherein the source resonator and the second resonator are coupled to exchange energy wirelessly among the source resonator and the second resonator, and wherein $\sqrt{Q_1 Q_2}$ is greater than 100; and

wherein at least one of the resonators includes a coil of a plurality of turns of a conducting material connected to a network of capacitors, wherein the plurality of turns are in a common plane, and wherein a characteristic thickness of the at least one of the resonators is much less than a characteristic size of the at least one of the resonators.

Ex. 1001 ('719 Patent) at Claim 17

Cook-523

netic environment. Q factors of the described antennas, however, may vary between 1500-2600. A single turn transmit

Ex. 1007 (Cook-523) at 13:2-3

No Dispute: Combination Teaches 17[e] Under Petitioner's Construction

Petitioner's Construction

Plain meaning, which is "any circuit topology including one or more capacitors"

17. A system, comprising:

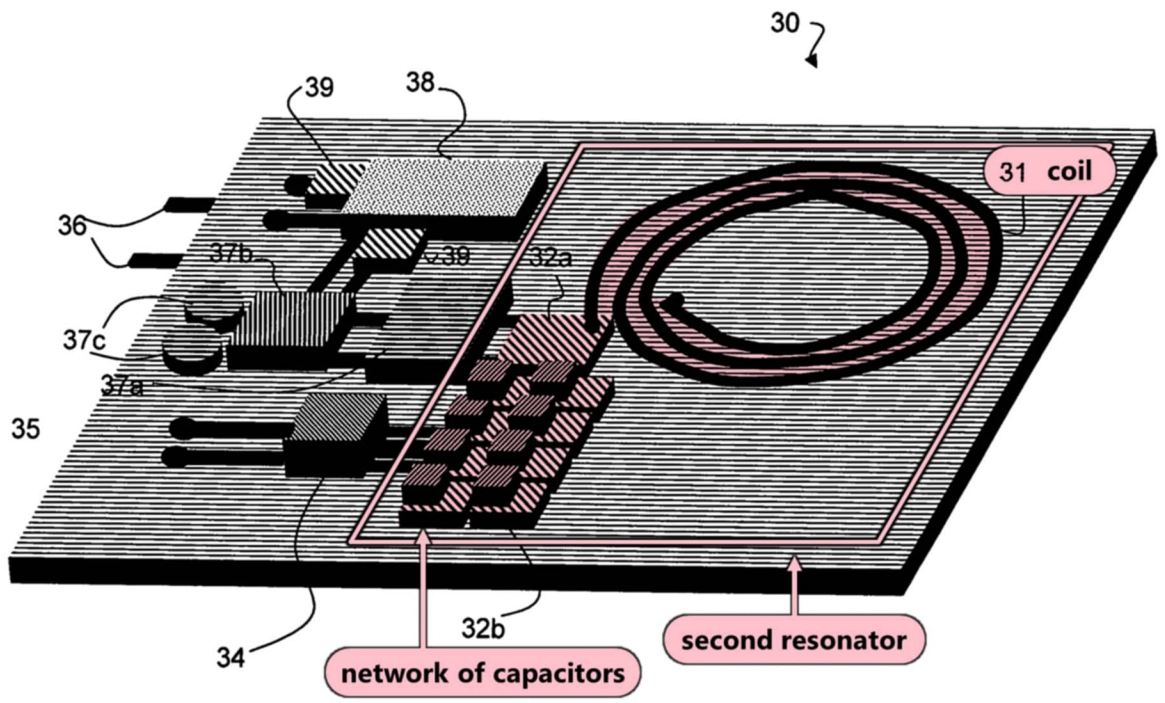
a source resonator having a Q-factor Q_1 and a characteristic size x_1, and a second resonator having a Q-factor Q_2 and a characteristic size x_2, and located a distance D from the source resonator;

wherein the source resonator and the second resonator are coupled to exchange energy wirelessly among the source resonator and the second resonator, and wherein $\sqrt{Q_1 Q_2}$ is greater than 100; and

wherein at least one of the resonators includes a coil of a plurality of turns of a conducting material connected to a network of capacitors, wherein the plurality of turns are in a common plane, and wherein a characteristic thickness of the at least one of the resonators is much less than a characteristic size of the at least one of the resonators.

Ex. 1001 ('719 Patent) at Claim 17

Lee



Ex. 1008 (Lee) at Fig. 12

Combination Teaches 17[e] Under Petitioner's Construction

Petitioner's Construction

Plain meaning, which is "any circuit topology including one or more capacitors"

17. A system, comprising:

a source resonator having a Q-factor Q_1 and a characteristic size x_1, and a second resonator having a Q-factor Q_2 and a characteristic size x_2, and located a distance D from the source resonator;

wherein the source resonator and the second resonator are coupled to exchange energy wirelessly among the source resonator and the second resonator, and wherein $\sqrt{Q_1 Q_2}$ is greater than 100; and

wherein at least one of the resonators includes a coil of a plurality of turns of a conducting material connected to a network of capacitors, wherein the plurality of turns are in a common plane, and wherein a characteristic thickness of the at least one of the resonators is much less than a characteristic size of the at least one of the resonators.

Ex. 1001 ('719 Patent) at Claim 17

Lee

[0075] FIG. **12** is an isometric view of an exemplary embodiment of the secondary coil **31** and circuit elements in the device adapter. The secondary unit **30** comprises a spiral shaped PCB trace coil as the receiving coil **31**, a main capacitor **32***a* in parallel connection with the receiving coil **31**, and a bank of switched capacitors **32***b* which are also in parallel with the main capacitor **32***a* to form a variable and electronically adjustable capacitance, an impedance matching network **37***a*, a full bridge rectifier **37***b*, output capacitors **37***c* that smoothes out output voltage ripple, a feedback voltage controller **34** to regulate the DC output voltage even as the inductive coupling between the secondary unit **30** and the primary surface **27** is constantly changing. The output

Ex. 1008 (Lee) at [0075]

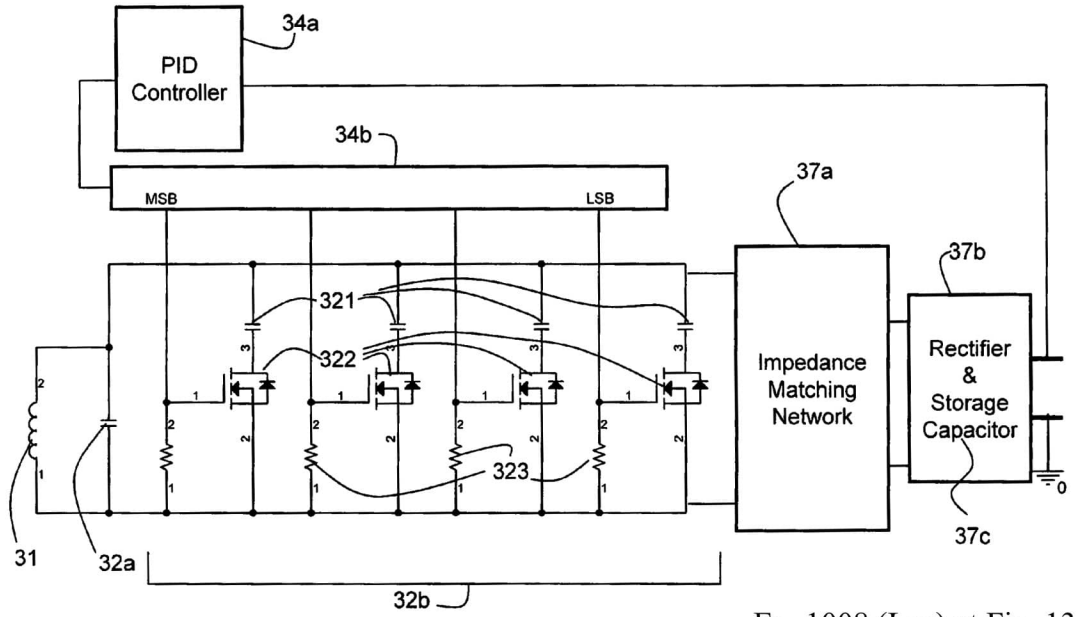
Combination Teaches 17[e] Under Petitioner's Construction

Patent Owner's Response

Contrary to the position taken by Petitioner, the resonator in Lee does not in fact include the switched capacitor bank. Horenstein Decl. ¶ 133. Again, as disclosed by Lee, the receiving coil and a main capacitor that form an LC network that has a resonant frequency. Lee ¶¶ 47, 75, 78. Lee repeatedly refers to the LC network as what provides the resonant frequency for the secondary unit. *Id.* ¶¶ 56-

POR at 61

Lee



Ex. 1008 (Lee) at Fig. 13

there needs to be additional parallel capacitance in order to restore the resonance to its original value so that it can stay matched with the RF driving frequency. This capacitance correction is provided by a bank of switched capacitors **32***b* shown in FIG. **13**. Only four switched capacitors 32*b* are

Ex. 1008 (Lee) at [0078]

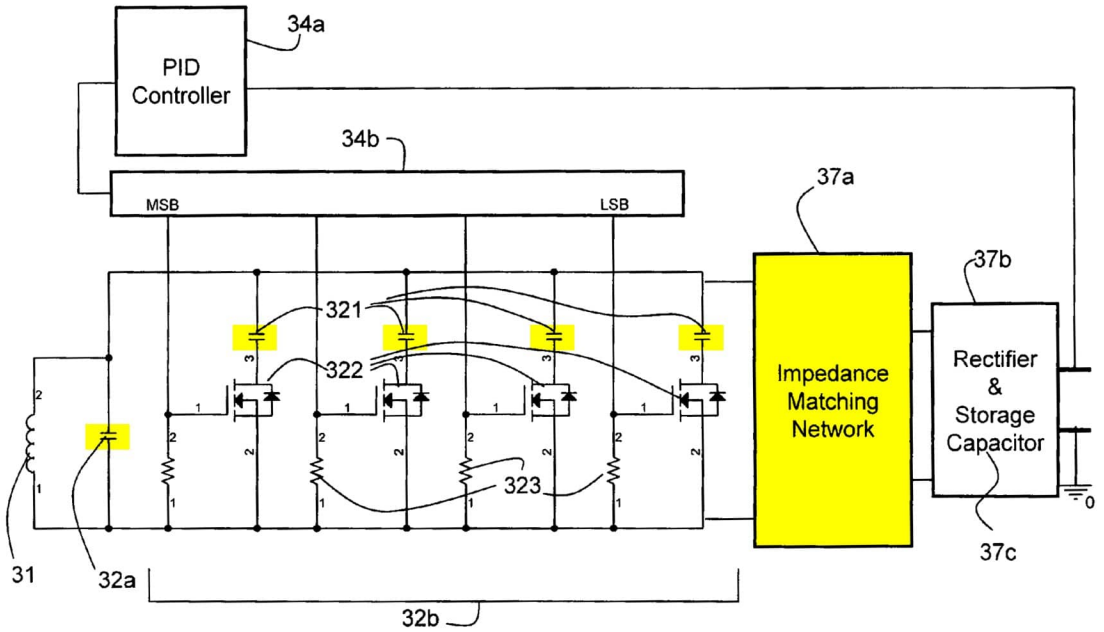
Combination Teaches 17[e] Under PO's Construction

Patent Owner's Construction

"a circuit topology of passive components including one or more capacitors that provides two or more degrees of freedom"

Lee

[0075] FIG. **12** is an isometric view of an exemplary embodiment of the secondary coil **31** and circuit elements in the device adapter. The secondary unit **30** comprises a spiral shaped PCB trace coil as the receiving coil **31**, a main capacitor **32***a* in parallel connection with the receiving coil **31**, and a bank of switched capacitors **32***b* which are also in parallel with the main capacitor **32***a* to form a variable and electronically adjustable capacitance, an impedance matching network **37***a*, a full bridge rectifier **37***b*, output capacitors **37***c* that smoothes out output voltage ripple, a feedback voltage controller **34** to regulate the DC output voltage even as the inductive coupling between the secondary unit **30** and the primary surface **27** is constantly changing. The output



Ex. 1008 (Lee) at [0075], Fig. 13

Combination Teaches 17[e] Under PO's Construction

Patent Owner's Construction

"a circuit topology of passive components including one or more capacitors that provides two or more degrees of freedom"

Patent Owner's Expert

of freedom to allow for independent control of the reactive components. The degrees of freedom in an impedance matching network are thus provided by two or more independent reactive elements.

Ex. 2011 (Horenstein Decl.) at ¶ 45

Patent Owner's Expert

Q. And I think we went over this earlier, but it's your expert opinion that impedance matching requires providing two degrees of freedom?

A. Generally it does. In the context of impedance matching, as it's discussed in the '719 patent, it does.

Ex. 1035 (Horenstein Dep. Tr.) at 49:19-24

No Dispute: Combination Teaches Planar Coils (17[e])

17. A system, comprising:

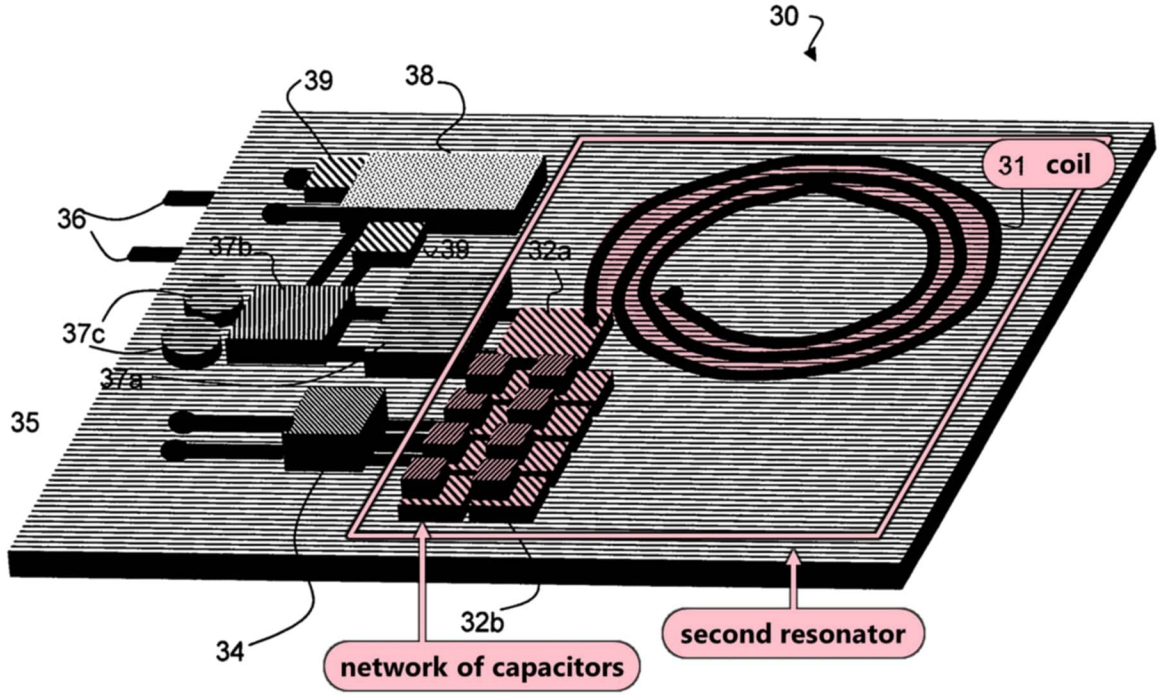
a source resonator having a Q-factor Q_1 and a characteristic size x_1, and a second resonator having a Q-factor Q_2 and a characteristic size x_2, and located a distance D from the source resonator;

wherein the source resonator and the second resonator are coupled to exchange energy wirelessly among the source resonator and the second resonator, and wherein $\sqrt{Q_1 Q_2}$ is greater than 100; and

wherein at least one of the resonators includes a coil of a plurality of turns of a conducting material connected to a network of capacitors, wherein the plurality of turns are in a common plane, and wherein a characteristic thickness of the at least one of the resonators is much less than a characteristic size of the at least one of the resonators.

Ex. 1001 ('719 Patent) at Claim 17

Lee



Ex. 1008 (Lee) at Fig. 12

No Dispute: Combination Teaches Limitation 17[f]

17. A system, comprising:

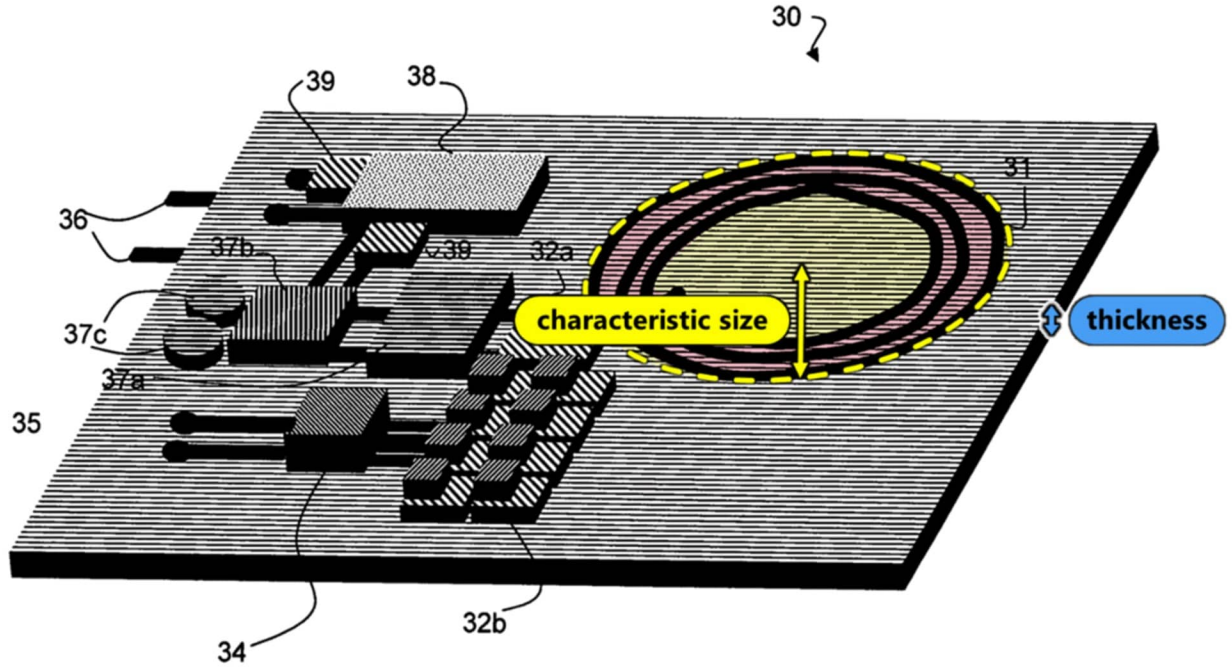
a source resonator having a Q-factor Q_1 and a characteristic size x_1, and a second resonator having a Q-factor Q_2 and a characteristic size x_2, and located a distance D from the source resonator;

wherein the source resonator and the second resonator are coupled to exchange energy wirelessly among the source resonator and the second resonator, and wherein $\sqrt{Q_1 Q_2}$ is greater than 100; and

wherein at least one of the resonators includes a coil of a plurality of turns of a conducting material connected to a network of capacitors, wherein the plurality of turns are in a common plane, and wherein a characteristic thickness of the at least one of the resonators is much less than a characteristic size of the at least one of the resonators.

Ex. 1001 ('719 Patent) at Claim 17

Lee



Ex. 1008 (Lee) at Fig. 12

No Dispute: Combination Teaches Limitation 17[f]

17. A system, comprising:

a source resonator having a Q-factor Q_1 and a characteristic size x_1, and a second resonator having a Q-factor Q_2 and a characteristic size x_2, and located a distance D from the source resonator;

wherein the source resonator and the second resonator are coupled to exchange energy wirelessly among the source resonator and the second resonator, and wherein $\sqrt{Q_1 Q_2}$ is greater than 100; and

wherein at least one of the resonators includes a coil of a plurality of turns of a conducting material connected to a network of capacitors, wherein the plurality of turns are in a common plane, and wherein a characteristic thickness of the at least one of the resonators is much less than a characteristic size of the at least one of the resonators.

Ex. 1001 ('719 Patent) at Claim 17

Lee

[0026] In one embodiment, there is provided a secondary unit for receiving power wirelessly, wherein the secondary unit includes a coil for coupling to the induction field of the primary unit. The coil is substantially flat and can comprise a single turn or multiple turns depending on the load resistance of the secondary unit, the voltage and/or current requirements.

Ex. 1005 (Cook-554) at 13:30-35

The ’719 Patent

“network of capacitors” Should Have Its Plain Meaning

Cook ’554 Renders Claim 17 Obvious

Lee and Cook ’523 Render Claim 17 Obvious

Claim 16 Is Canceled

PO Moved To Cancel Claim 16

16. A system, comprising:

a source resonator having a Q-factor Q_1 and a characteristic size x_1, and a second resonator having a Q-factor Q_2 and a characteristic size x_2, and located a distance D from the source resonator;

wherein the source resonator and the second resonator are coupled to exchange energy wirelessly among the source resonator and the second resonator; and

wherein $\sqrt{Q_1 Q_2}$ is greater than 100, and wherein at least one of the resonators is enclosed in a low loss tangent material.

Ex. 1001 ('719 Patent) at Claim 16

CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. § 42.6(e), I certify that on this 15th day of November, 2024, a true and correct copy of the foregoing **Petitioner's Demonstratives** was served by electronic mail on Patent Owner's lead and backup counsel at the following email addresses:

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