UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD.
Petitioner

v.

LYNK LABS, INC.
Patent Owner

Patent No. 10,966,298

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 10,966,298

TABLE OF CONTENTS

LIST OF EXHIBITS

Ex. 1001	U.S. Patent No. 10,966,298
Ex. 1002	Declaration of R. Jacob Baker, Ph.D., P.E.
Ex. 1003	Curriculum Vitae of R. Jacob Baker, Ph.D., P.E.
Ex. 1004	Prosecution History of U.S. Patent No. 10,966,298
Ex. 1005	Australian Patent Application Publication No. AU2003100206 ("*Birrell*")
Ex. 1006	GB Patent Application Publication No. 2202414 ("*Logan*")
Ex. 1007	U.S. Patent No. 5,028,859 ("*Johnson*")
Ex. 1008	U.S. Patent Application Publication No. 2002/0060530 ("*Sembhi*")
Ex. 1009	U.S. Patent Application Publication No. 2002/0030194 ("*Camras*")
Ex. 1010	U.S. Patent Application Publication No. 2002/0175870 ("*Gleener*")
Ex. 1011	U.S. Patent No. 6,882,128 ("*Rahmel*")
Ex. 1012	U.S. Patent No. 4,654,880 to Sontag ("*Sontag*")
Ex. 1013	S. Gibilisco, *Handbook of Radio & Wireless Technology*
Ex. 1014	U.S. Patent No. 5,657,054 ("*Files*")
Ex. 1015	RESERVED
Ex. 1016	U.S. Patent No. 6,362,789 ("*Trumbull*")
Ex. 1017	U.S. Patent No. 4,691,341 ("*Knoble*")
Ex. 1018	U.S. Patent No. 7,271,568 ("*Purdy*")
Ex. 1019	U.S. Patent No. 4,563,592 ("*Yuhasz*")
Ex. 1020	U.S. Patent Application Publication No. 2002/0149572 ("*Schulz*")

Ex. 1021	U.S. Patent No. 5,790,106 ("*Hirano*")
Ex. 1022	U.S. Patent Application Publication No. 2002/0021573 ("*Zhang*")
Ex. 1023	U.S. Patent No. 5,529,263 ("*Santana*")
Ex. 1024	U.S. Patent No. 6,879,497 ("*Hua*")
Ex. 1025	U.S. Patent No. 6,300,748 ("*Miller*")
Ex. 1026	Watson, J., Mastering Electronics, Third Ed., McGraw-Hill, Inc. (1990)
Ex. 1027	Sedra, A., *et al.*, Microelectronic Circuits, Fourth Ed., Oxford University Press (1998)
Ex. 1028	U.S. Patent Application Publication No. 2002/0158590 ("*Saito-590*")
Ex. 1029	U.S. Patent No. 4,816,698 ("*Hook*")
Ex. 1030	U.S. Patent Application Publication No. 2003/0137258 ("*Piepgras*")
Ex. 1031	U.S. Patent No. RE 33,285 ("*Kunen*")
Exs. 1032-1039	RESERVED
Ex. 1040	U.S. Patent No. 10,687,400
Ex. 1041	U.S. Patent No. 10,750,583
Ex. 1042	U.S. Patent No. 10,575,376
Ex. 1043	U.S. Patent No. 10,492,252
Ex. 1044	U.S. Patent No. 10,492,251
Ex. 1045	U.S. Patent No. 10,091,842
Ex. 1046	U.S. Patent No. 9,615,420
Ex. 1047	U.S. Patent No. 9,198,237

Ex. 1048	WO2011143510 (Application No. PCT/US2011/036359)
Ex. 1049	WO2011082168 (Application No. PCT/US2010/062235)
Ex. 1050	U.S. Patent No. 8,179,055
Ex. 1051	U.S. Patent No. 8,148,905
Ex. 1052	U.S. Patent No. 7,489,086
Ex. 1053	WO2010138211 (Application No. PCT/US2010/001597)
Ex. 1054	WO2010126601 (Application No. PCT/US2010/001269)
Ex. 1055	U.S. Provisional Application No. 61/333,963
Ex. 1056	U.S. Provisional Application No. 61/284,927
Ex. 1057	U.S. Provisional Application No. 61/335,069
Ex. 1058	U.S. Provisional Application No. 60/997,771
Ex. 1059	U.S. Provisional Application No. 60/547,653
Ex. 1060	U.S. Provisional Application No. 60/559,867
Ex. 1061	U.S. Provisional Application No. 61/217,215
Ex. 1062	U.S. Provisional Application No. 61/215,144
Exs. 1063-1079	RESERVED
Ex. 1080	U.S. Patent No. 6,879,319 ("*Cok*")
Ex. 1081	U.S. Patent No. 7,226,442 ("*Sheppard*")
Ex. 1082	U.S. Patent No. 6,936,936 ("*Fischer*")
Ex. 1083	U.S. Patent No. 6,078,148 ("*Hochstein*")
Ex. 1084	U.S. Patent Application Publication No. 2002/0081982 ("*Schwartz*")

Ex. 1085	U.S. Patent No. 4,350,973 ("*Petryk*")
Ex. 1086	U.S. Patent No. 4,797,651 ("*Havel*")
Ex. 1087	U.S. Patent No. 5,324,316 ("*Schulman*")
Ex. 1088	RESERVED
Ex. 1089	U.S. Patent Application Publication No. 2004/0207484 ("*Forrester*")
Ex. 1090	RESERVED
Ex. 1091	U.S. Patent Application Publication No. 2003/0122502 ("*Clauberg*")
Ex. 1092	U.S. Patent Application Publication No. 2005/0128751 ("*Roberge*")
Ex. 1093	U.S. Patent Application Publication No. 2002/0195968 ("*Sanford*")
Ex. 1094	WO 03/009535 A1 (Application No. PCT/JP020/07198) (Japanese original and English translation, including translator's certification) ("*Oba*")[1]
Ex. 1095	Universal Serial Bus Specification Revision 2.0, April 27, 2000
Ex. 1096	U.S. Patent No. 5,293,494 ("*Saito*")
Ex. 1097	U.S. Patent No. 6,814,642 ("*Siwinski*")
Ex. 1098	U.S. Patent Application Publication No. 2003/0076306 ("*Zadesky*")
Ex. 1099	U.S. Patent Application Publication No. 2003/0231168 ("*Bell*")
Ex. 1100	U.S. Patent No. 6,907,089 ("*Jensen*")
Ex. 1101	U.S. Patent No. 5,532,641 ("*Balasubramanian*")
Ex. 1102	U.S. Patent Application Publication No. 2003/0146897 ("*Hunter*")
Ex. 1103	U.S. Patent No. 6,439,731 ("*Johnson-731*")

[1] References to Ex. 1094 are to English translation document page:line numbers.

Ex. 1104	U.S. Patent No. 7,348,957 ("*Cui*")
Ex. 1105	U.S. Patent No. 4,573,766 ("*Bournay*")
Ex. 1106	U.S. Patent Application Publication No. 2002/0191029 ("*Gillespie*")
Ex. 1107	Case docket in *Samsung Elecs. Co., Ltd., v. Lynk Labs, Inc.* No. 1:21-cv-2665 (N.D. Ill.) (accessed Sept. 2, 2021)
Ex. 1108	Estimated Patent Case Schedule for Northern District of Illinois (available at https://www.ilnd.uscourts.gov/_assets/_documents/_forms/_judges/Pacold/Estimated%20Patent%20Schedule.pdf)
Ex. 1109	Lynk Labs, Inc.'s Preliminary Infringement Contentions in *Samsung Elecs. Co., Ltd. v. Lynk Labs, Inc.*, No. 1:21-cv-2665 (N.D. Ill.) (served July 21, 2021)
Ex. 1110	Lynk Labs, Inc.'s Exemplary Infringement Charts for U.S. Patent No. 10,966,298 (Apps. A-6, B-6, D-6, E-4, G-5, H-4, I-4) accompanying Lynk Labs, Inc.'s Preliminary Infringement Contentions in *Samsung Elecs. Co., Ltd. v. Lynk Labs, Inc.*, No. 1:21-cv-2665 (N.D. Ill.) (served July 21, 2021)
Ex. 1111	Lynk Labs, Inc.'s First Amended Complaint (Dkt. #11) in *Lynk Labs, Inc. v. Samsung Electronics, Co., Ltd.*, 6:21-cv-00526-ADA (June 9, 2021)
Ex. 1112	U.S. Patent No. 8,055,310 ("*Beart*")
Ex. 1113	Lynk Labs, Inc.'s Amended Preliminary Infringement Contentions in *Samsung Elecs. Co., Ltd. v. Lynk Labs, Inc.*, No. 1:21-cv-2665 (N.D. Ill.) (served Aug. 31, 2021)
Ex. 1114	Lynk Labs, Inc.'s Exemplary Infringement Charts for U.S. Patent No. 10,966,298 (Apps. A-6, B-6, D-6, E-4, G-5, H-4, I-4) accompanying Lynk Labs, Inc.'s Amended Preliminary Infringement Contentions in *Samsung Elecs. Co., Ltd. v. Lynk Labs, Inc.*, No. 1:21-cv-2665 (N.D. Ill.) (served Aug. 31, 2021)

Ex. 1115	Notification of Docket Entry (Dkt. #50) in *Samsung Elecs. Co., Ltd.*, *v. Lynk Labs, Inc.*, No. 1:21-cv-2665 (N.D. Ill. July 27, 2021)
Ex. 1116	Order (Dkt. #57) in *Samsung Elecs. Co., Ltd.*, *v. Lynk Labs, Inc.*, No. 1:21-cv-2665 (N.D. Ill. Aug. 19, 2021)

I. INTRODUCTION

Samsung Electronics Co., Ltd. ("Petitioner" or "Samsung") requests *inter partes* review of claims 1-25 ("challenged claims") of U.S. Patent No. 10,966,298 ("the '298 patent") (Ex. 1001) assigned to Lynk Labs, Inc. ("PO"). For the reasons below, the challenged claims should be found unpatentable and canceled.

II. MANDATORY NOTICES

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

Related Matter: The '298 patent is at issue in the following matter(s):

- *Samsung Electronics Co., Ltd. v. Lynk Labs, Inc.*, No. 1-21-cv-02665 (N.D. Ill.) (seeking declaratory judgment of non-infringement as to the '674 patent and also U.S Patent Nos. 10,492,252, 10,499,466, 10,966,298, 11,019,697, 10,492,251, 10,750,583, 10,687,400, and 10,517,149) ("Illinois Litigation").

The '298 patent claims priority to two provisional applications (U.S. Provisional Application Nos. 60/574,653 filed February 25, 2004 and 60/559,867 filed April 6, 2004) to which U.S. Patent No. 8,531,118, which was at issue in IPR2016-01133, also claims priority.

<u>Counsel and Service Information</u>: Lead counsel: Naveen Modi (Reg. No. 46,224), and Backup counsel are (1) Joseph E. Palys (Reg. No. 46,508), (2) Arvind Jairam (Reg. No. 62,759), (3) Howard Herr (*pro hac vice* admission to be requested). Service information is Paul Hastings LLP, 2050 M St., Washington, D.C., 20036, Tel.: 202.551.1700, Fax: 202.551.1705, email: PH-Samsung-LynkLabs-IPR@paulhastings.com. Petitioner consents to electronic service.

III. PAYMENT OF FEES

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

IV. GROUNDS FOR STANDING

Petitioner certifies that the '298 patent is available for review and Petitioner is not barred or estopped from requesting review on the grounds identified herein.

V. PRECISE RELIEF REQUESTED AND GROUNDS

Claims 1-25 should be canceled as unpatentable based on the following grounds:

<u>Ground 1</u>: Claims 1, 3, 4, 10-15, 17-21, and 23 are unpatentable under pre-AIA 35 U.S.C. § 103(a) as being obvious over *Birrell* and *Logan*;

<u>Ground 2</u>: Claim 2 is unpatentable under § 103(a) as being obvious over *Birrell*, *Logan*, and *Johnson*;

<u>Ground 3</u>: Claims 3, 10-12, and 21 are unpatentable under § 103(a) as being obvious over *Birrell*, *Logan*, and *Zhang*;

<u>Ground 4</u>: Claim 5 is unpatentable under pre-AIA 35 U.S.C. § 103(a) as being obvious over *Birrell*, *Logan*, and *Sembhi*;

<u>Ground 5</u>: Claims 6, 18, and 24 are unpatentable under pre-AIA 35 U.S.C. § 102 as being anticipated by *Birrell*;

<u>Ground 6</u>: Claims 7, 8, and 25 are unpatentable under pre-AIA 35 U.S.C. § 103(a) as being obvious over *Birrell*, *Logan*, and *Camras*;

<u>Ground 7</u>: Claim 9 is unpatentable under pre-AIA 35 U.S.C. § 103(a) as being obvious over *Birrell*, *Logan*, and *Gleener*;

<u>Ground 8</u>: Claim 16 is unpatentable under § 103(a) as being obvious over *Birrell*, *Logan*, and *Rahmel*; and

<u>Ground 9</u>: Claim 22 is unpatentable under § 103(a) as being obvious over *Birrell*, *Logan*, and *Sontag*.

The ’298 patent issued from an application filed May 4, 2020, and claims priority via a chain of applications dating back to February 25, 2004. For purposes of this proceeding, and without conceding the ’298 patent is entitled to such a date, Petitioner assumes the critical date for the ’298 patent is February 25, 2004.

Birrell published July 17, 2003, *Logan* published September 21, 1988, *Johnson* published July 2, 1991, *Sembhi* published May 23, 2002, *Camras* published

March 14, 2002, *Gleener* published November 28, 2002, *Sontag* published March 31, 1987, *Zhang* published February 21, 2002, and thus each qualifies as prior art at least under pre-AIA 35 U.S.C. § 102(b). *Rahmel* filed September 27, 2000 and issued April 19, 2005, and thus it qualifies as prior art at least under pre-AIA 35 U.S.C. § 102(e). None of these references were considered during prosecution. (*See generally* Ex. 1004.)

VI. LEVEL OF ORDINARY SKILL

A person of ordinary skill in the art as of the claimed priority date of the '298 patent ("POSITA") would have had at least a bachelor's degree in electrical engineering, computer engineering, computer science, physics, or the equivalent, and two or more years of experience with LED devices and/or related circuit design, or a related field. (Ex. 1002, ¶¶20-21.)[2] More education can supplement practical experience and vice versa. (*Id.*)

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[2] Petitioner submits the declaration of R. Jacob Baker, Ph.D., P.E. (Ex. 1002), an expert in the field of the '298 patent. (Ex. 1002, ¶¶1-14, 20-55 (citing, *inter alia*, Exs. 1027-1031, 1080-1087, 1089, 1091, 1093-1106); Ex. 1003.)

VII. OVERVIEW OF THE '298 PATENT

A. The '298 patent

While the '298 patent purports to identify an invention directed to an LED device/system having various features (*e.g.,* Ex. 1001, 4:30-11:3, 13:36-61), the claims are broadly directed to generic apparatuses and methods that include compilations of familiar one-off components/features that provide no novel functionality (e.g., LEDs, data receiver, transmission conductor, inductor, three-way switch, AC mains, and capacitive touch detection).[3] As explained below, the collection of such generically claimed features were known and obvious. *See In re Gorman*, 933 F.2d 982, 986 (Fed. Cir. 1991) ("The criterion ... is not the number of references, but what they would have meant to a person of ordinary skill in the field of the invention."). (*Infra* Section IX; Ex. 1002, ¶¶14-19, 22-57; Exs. 1040-1062.)

VIII. CLAIM CONSTRUCTION

The Board only construes the claims when necessary to resolve the underlying controversy. *Toyota Motor Corp. v. Cellport Systems, Inc.*, IPR2015-00633, Paper No. 11 at 16 (Aug. 14, 2015) (citing *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200

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[3] PO's infringement contentions in the Illinois Litigation fail likewise fail to provide much detail regarding the claimed features. (*E.g.*, Ex. 1110, 1-38; Ex. 1109; Ex. 1113; Ex. 1114, 1-34.)

F.3d 795, 803 (Fed. Cir. 1999)). For purposes of this proceeding, Petitioner believes that no special constructions are necessary to assess whether the challenged claims are unpatentable over the asserted prior art.[4] (Ex. 1002, ¶58.)

IX. DETAILED EXPLANATION OF GROUNDS[5]

As discussed below, claims 1-25 are unpatentable in view of the prior art. (Ex. 1002, ¶¶14-208.)

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[4] Petitioner reserves all rights to raise claim construction and other arguments, including challenges under 35 U.S.C. §§ 101 or 112, in district court as relevant to those proceedings. *See, e.g.*, *Target Corp. v. Proxicom Wireless, LLC*, IPR2020-00904, Paper 11 at 11–13 (Nov. 10, 2020). A comparison of the claims to any accused products in litigation may raise controversies that are not presented here given the similarities between the references and the patent.

[5] Section IX references exhibits other than the identified prior art for each ground. Such exhibits reflect the state of the art known to a POSITA at the time of the alleged invention consistent with the testimony of Dr. Baker.

A. Ground 1: Claims 1, 3, 4, 10-15, 17-21, and 23 Are Obvious Over *Birrell* and *Logan*

1. Claim 1

a) An apparatus comprising:

To the extent limiting, *Birrell* discloses this limitation.[6] (Ex. 1002, ¶¶67-70.) For example, *Birrell* discloses "a system for connecting an electrical device to a power source," where "the device may be coupled to the power source without requiring any direct connection," e.g., a wireless lighting system ("apparatus"). (Ex. 1005, 2:36-3:16, 3:17-27; Ex. 1002, ¶¶67-68; *see also* Ex. 1005, Abstract, 2:3-5, 16:37-18:13, FIGS. 1-3 and 8.)

Birrell's system includes a lighting tile 50 having LEDs 59. (Ex. 1005, 14:26-15:33, FIG. 1 (annotated below).) Metalized strips 55 and 56 "act as electrical coupling elements for the tile 50 to enable it to be capacitively coupled to a power source," facilitating wireless power transfer. (*Id.*; *see also id.*, 16:37-18:13, 17:21-28; Ex. 1002, ¶69.)

[6] PO asserts a mobile phone "when used with a wireless charger" collectively "is an apparatus." (Ex. 1110, 2, 40; Ex. 1114, 2, 36.)

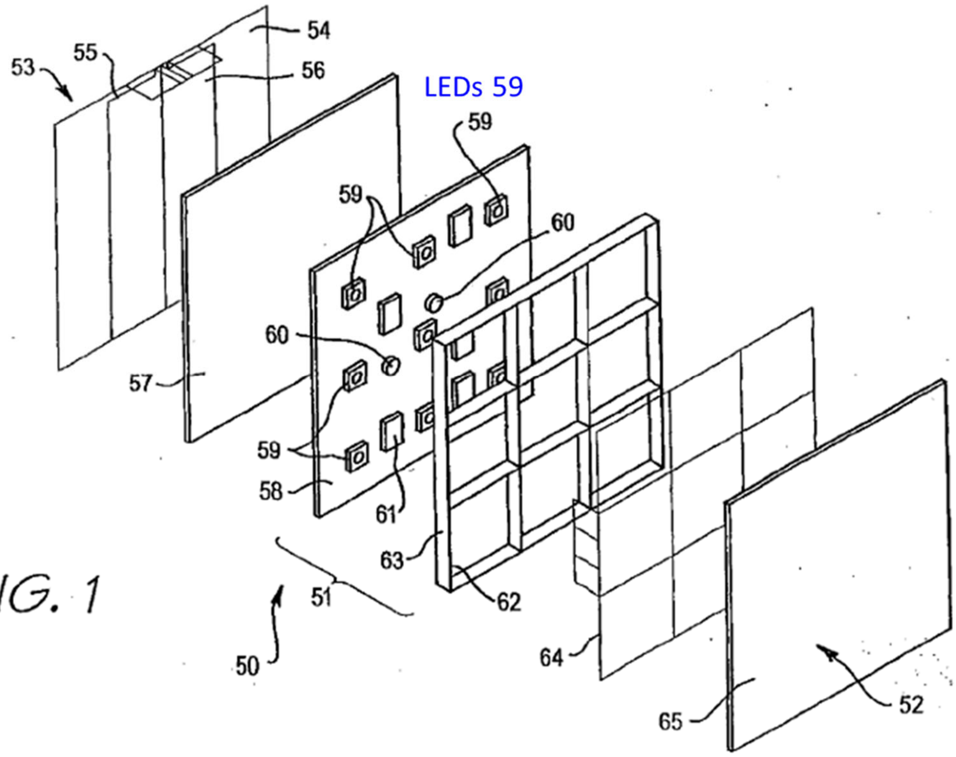


FIG. 1

Figure 8 shows a circuit diagram of the "apparatus" that includes "LEDs…capacitively coupled to an AC power supply" via capacitors C_A and C_B. (Ex. 1005, FIG. 8 (below), 20:26-31; *see also id.*, 14:8-13, 21:34, 23:2-11; Ex. 1002, ¶70; *infra* Sections IX.A.1(b)-(c).)

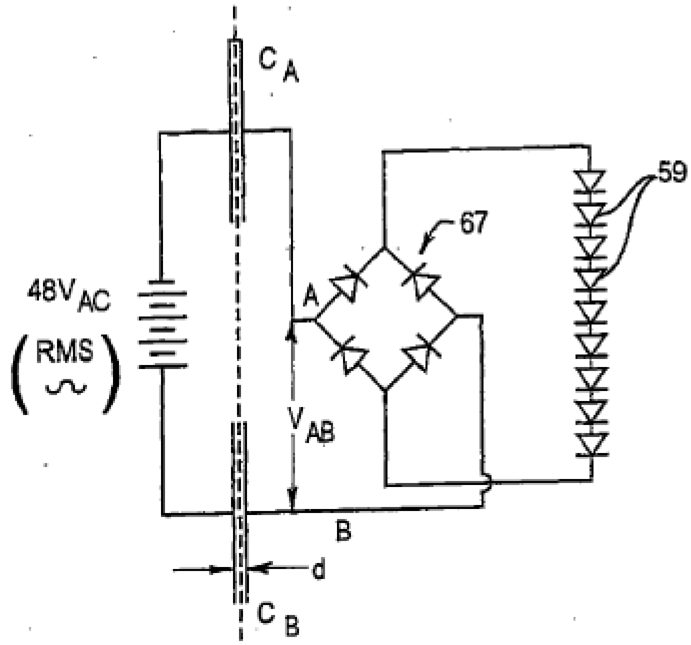


FIG 8

b) a first device including a first circuit having a first transmission conductor and a first inductor, wherein said first circuit is configured to use at least the first inductor to transmit power from the first device wirelessly; and

Birrell in view of *Logan* discloses and/or suggests this limitation. (Ex. 1002, ¶¶71-80.) *Birrell*'s lighting system includes a first device that includes a circuit comprising a conductive wire that connects to an AC power supply and to capacitors, which transmits wireless power to lighting tile 50's LEDs 59 through circuit 67. (Ex. 1005, FIG. 8 (below), 3:17-27, 20:26-31; 21:34, 22:29-30, 23:2-11; Ex. 1002, ¶71.)

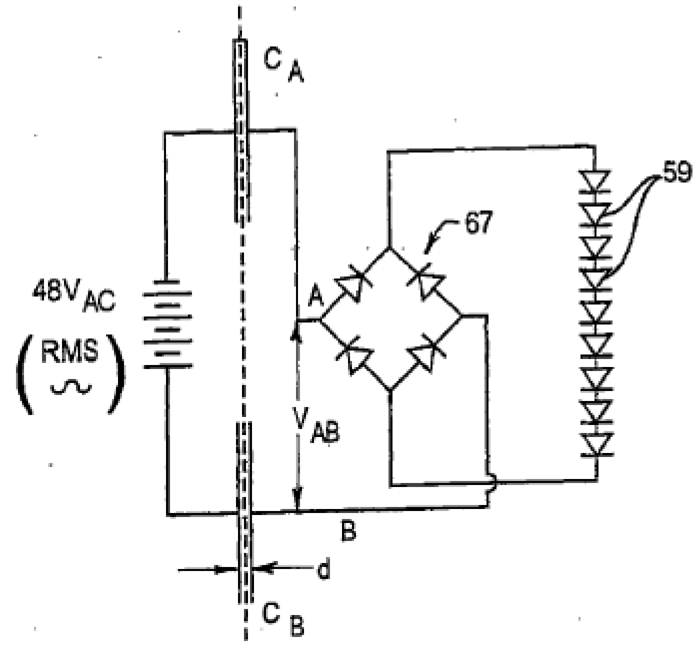


FIG 8

As shown in Figures 3, 8, a conductor connects the AC power supply to capacitor C_A and another conductor connects to capacitor C_B in order to transmit the AC power that is wirelessly sent to tile 50 having LEDs 59. (Ex. 1002, ¶71; Ex. 1005, FIGS. 3 (below), 8, 17:25-28.)

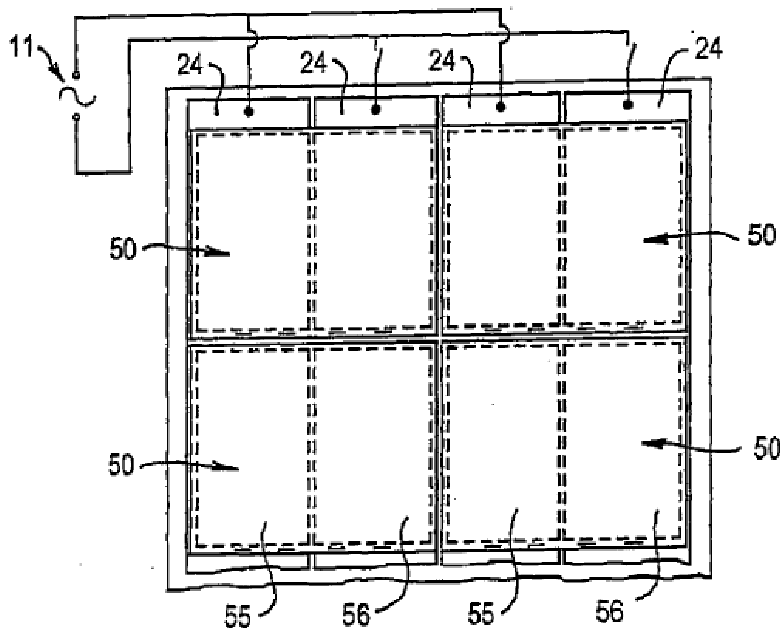
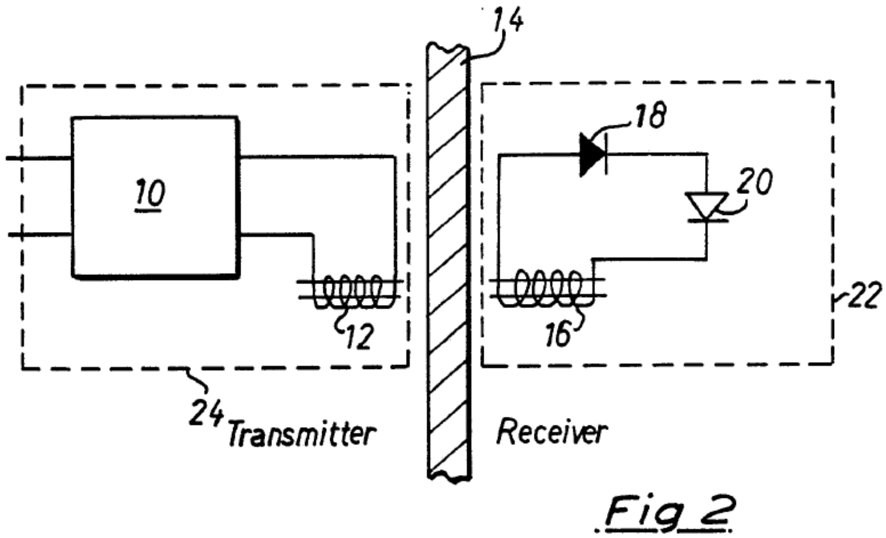


FIG 3

Tile 50's "metallised strips" 55 and 56 of are capacitively coupled to "metallised strips" 24 that are connected to the power supply via the conductors on the other circuit (left side of FIG. 8's dashed line), where strips 55/56 and strips 24 are separated by an insulator. (Ex. 1005, Abstract, FIGS. 2-3, 17:4-17:36 ("metallised strips act as electrical coupling elements" with "[i]nsulating layers"), 17:37-18:12; Ex. 1002, ¶72.) Thus, an insulator (dotted line in Figure 8) separates strips 55/56 of tile 50 from strips 24, which are part of the other circuit connected to the 48V AC power supply, where each of capacitors C_A and C_B are formed by a combination of strips 55/56, the insulator, and strips 24. (Ex. 1002, ¶72; Ex. 1005, 18:6-12; 20:26-31, 21:34, 22:29-30, 23:2-11.) The conductors connecting the power supply to capacitors C_A and C_B (and strips forming a part of the capacitors) constitutes a circuit because electric current flows through these components consistent with the operations of *Birrell*'s system. (Ex. 1002, ¶72.) Accordingly, *Birrell* discloses a "first device including a [first] circuit" having "a first transmission conductor" and that "the [first] circuit" is configured to wirelessly transmit power from the [first] device. (Ex. 1002, ¶72.)

While *Birrell* does not describe a first inductor used to wirelessly transmit power from the above described first device, a POSITA would have found it obvious to modify *Birrell* in view of *Logan* to implement such features. (Ex. 1002, ¶73.) Like *Birrell*, *Logan* discloses providing wireless power to an LED, including "across a panel/bulkhead" or a "wall." (Ex. 1006, Abstract, 1:3-2:6, 3:19-5:4, FIGS. 1-2.) Thus, a POSITA would have had reason to consider *Logan* when contemplating/implementing the system of *Birrell*. (Ex. 1002, ¶73.)

Logan's wireless power transfer is based on inductive coupling. (Ex. 1006, Abstract, 2:18-26, 7:21-26.) *Logan* discloses transmitting and receiving wireless power using coil 12 ("first inductor") and coil 16, where an oscillator 10 energizes coil 12 to create an "alternating electromagnetic flux," which induces an electromotive force in coil 16 for powering an LED 20. (*Id*., Abstract, 3:19-5:4; FIGS. 1-2.) Thus, *Logan* discloses a device including an "inductor" to transmit power from the device wirelessly to another device through, e.g., a partition/insulator, which is similar to *Birrell*'s arrangements. (Ex. 1002, ¶74.)



(Ex. 1006, FIG. 2.)

Based on *Birrell* and *Logan*, a POSITA would have been motivated to modify *Birrell*'s system to utilize inductive coupling to provide wireless power. (Ex. 1002, ¶75.) *Logan* describes the benefits of using inductive coupling to transmit wireless power in an LED lighting system. (Ex. 1006, 6:3-11 (given the "concentrated and localised nature" of the inductively-generated field, LED lightings "can be densely packed without interference problems"), 1:6-24 (interference issues with transmissions made in "closely adjacent positions"), 3:19-23.) Thus, a POSITA would have been motivated to implement *Logan*'s teachings/suggestions when contemplating *Birrell*, especially when *Birrell* discloses closely packing multiple light tiles. (Ex. 1005, FIG. 3, 13:37-14:2, 23:30-24:2; Ex. 1002, ¶75.)

Additionally, a POSITA would have appreciated that using inductive coupling to provide wireless power in *Birrell* would allow for voltage magnitude adjustments by adjusting the windings of the coils, thus providing flexibility when implementing wirelessly powering devices of different voltage requirements. (Ex. 1002, ¶76.) Indeed, a POSITA would have known that a transmitting coil with more windings than the receiving coil reduces the magnitude of the transmitted voltage and vice versa. (*Id.*; Ex. 1013, 161-162.) Furthermore, *Logan* explains that its system "can operate with a wide variety of panel/bulkhead materials" (Ex. 1006, 4:1-5) and a POSITA would have appreciated that an inductively-coupled system/apparatus has improved transfer characteristics when properly configured (*see e.g.,* Ex. 1012, 2:12-19, 2:31-43, 4:50-5:48, FIGS. 1, 4-5; *infra* Section IX.I.1(d)). Thus, a POSITA would have appreciated that providing similar features in *Birrell*'s apparatus would have improved the flexibility in its design/implementation to accommodate different applications. (Ex. 1002, ¶76.)

Moreover, there were only a handful of known techniques for transmitting power wirelessly, including inductive coupling, capacitive coupling, magnetic resonance coupling, microwave, and laser. (Ex. 1002, ¶77.) Thus, using inductive coupling (e.g., as in *Logan*) with *Birrell* would have been obvious because it would have been one of a "finite number of identified, predictable solutions." *Perfect Web Techs., Inc. v. InfoUSA, Inc.*, 587 F.3d 1324, 1331 (Fed. Cir. 2009).

A POSITA would have had the capability and a reasonable expectation of success in implementing inductive coupling in a system like *Birrell*, given the skills/knowledge of such a person at the time and the disclosures of *Logan* and *Birrell* (describing known ways for wirelessly powering LED devices). (Ex. 1002, ¶78; *see also* Ex. 1013, 161-162, 165-166, FIG. 5-4(c).) Indeed, implementing the above modification would have involved applying known technologies (e.g., wireless power (*Logan* and *Birrell*) with inductive coupling (*Logan*)) according to known methods (e.g., inductors to transmit/receive wireless power) to yield the predictable result of providing wireless power to LED lighting device(s) with reduced interference and with the flexibility to adjust the transmitted voltage for particular applications.[7] (Ex. 1002, ¶78.) *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 416 (2007).

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[7] PO relies on use of "a wireless charger" for this limitation in the Illinois Litigation (Ex. 1110, 2, 40, 75; Ex. 1114, 2, 36, 69) and that "wireless charging **necessarily requires**…a transmission conductor and an **inductor**" (Ex. 1110, 13-14; Ex. 1114, 12).

For example, in one non-limiting way (others would have been contemplated), the modification would have involved implementations of known configurations, such as an example from a 1998 textbook, (Ex. 1002, ¶79; Ex. 1013, FIG. 5-4(c)), where the capacitive coupling features (formed by capacitors C_A and C_B as shown in Figure 8 of *Birrell*) were modified with inductive coupling features (formed by inductors (and related circuitry) similar to Figure 2 of *Logan*).[8] (Ex. 1002, ¶79.) The modification would have predictably resulted in use of an inductor to wirelessly transmit power (provided by *Birrell*'s AC power supply) to another inductor in lighting tile 50 to eventually power the LEDs 59 (generally exemplified below). (Ex. 1002, ¶79.)

[8] A POSITA would have further considered necessary design adjustments, e.g., operating voltage, frequency, power,…etc., to the circuitry to ensure the modification properly provided power consistent with *Birrell*'s operations. (Ex. 1002, ¶79.)

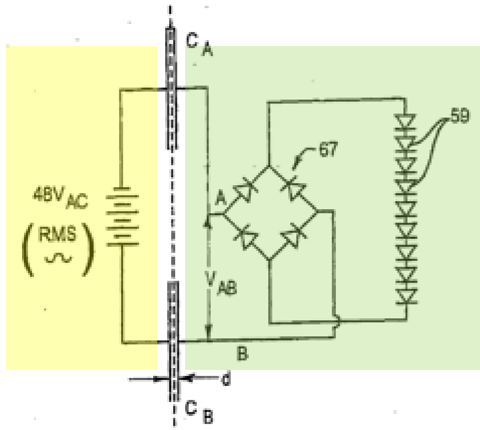


FIG 8

Birrell

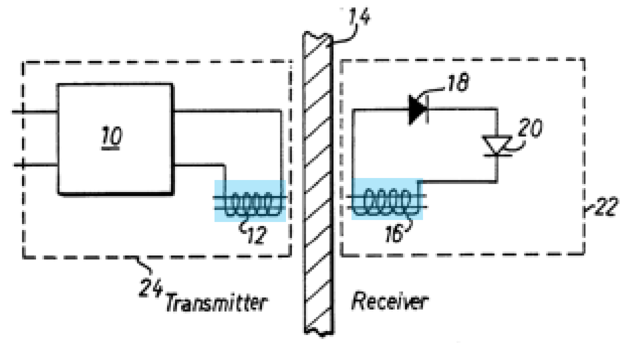
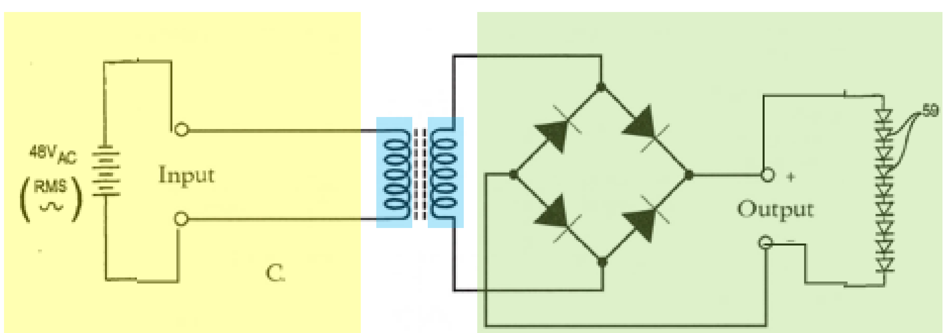


Fig 2

Logan



Demonstrative A

(Ex. 1002, ¶79.)[9]

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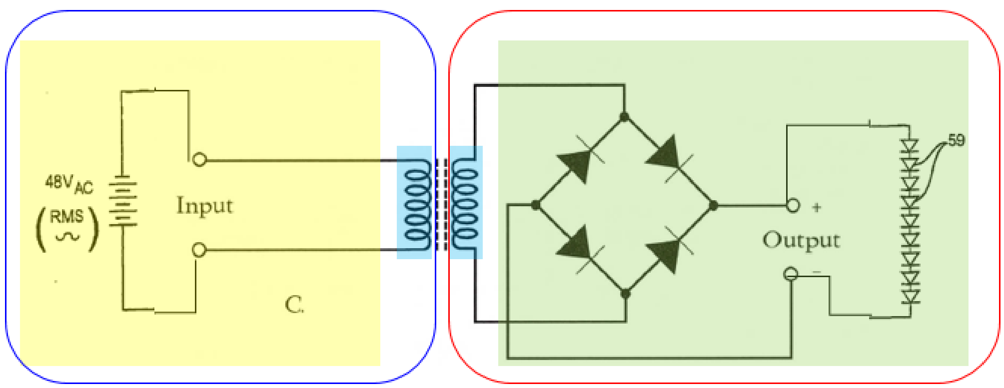
[9] The exemplary modified arrangement (the demonstratives here and below) is/are a high-level exemplary and non-limiting illustration(s), and does/do not necessarily

Thus, the *Birrell-Logan* combination discloses the claimed "first device" (e.g., exemplified below in blue box of Demonstrative F, including a "first circuit" comprising the conductor extending from the power supply ("first transmission conductor") and a "first inductor" (transmitting coil) used to transmit power from the "first device" wirelessly to the modified tile 50. (*Id.*, ¶80.)



Demonstrative F

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depict(s) an exact schematic(s) of the details included and the only arrangement(s) resulting from the modification. Other designs/configurations including components and paths not shown may have been contemplated by a POSITA when designing/implementing such a modified apparatus. (Ex. 1002, ¶¶79-80.)

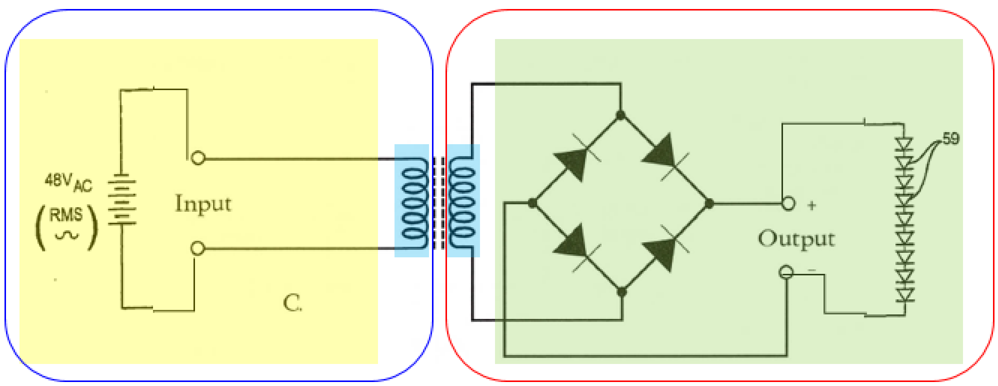
c) a second device including

(1) (a) at least one LED,

(2) (b) a second circuit configured to detect contact with a conductive substance via capacitive sensing for controlling the at least one LED, and

The above *Birrell-Logan* combination discloses/suggests the claimed "second device." (Ex. 1002, ¶¶81-84.) *Birrell* discloses that lighting tile 50 includes "at least one LED" 59. (Ex. 1005, 14:26-15:33, FIG. 8; Ex. 1002, ¶81.) Tile 50 also includes a capacitive touch sensor that detects human touch. (Ex. 1002, ¶82; Ex. 1005, 16:18-26 (touch sensor "acts as a high impedance capacitive pick up for human touch sensing."); 15:21-33 (touch sensors 60 disposed on "circuit board 58" of tile 50.) The disclosed touch sensor necessarily includes a "[second] circuit" as claimed because without circuitry (e.g., conductive paths and components known to part of such known touch sensors), it would not operate as a touch sensor as described in *Birrell* (e.g., the touch sensor "enable[s] the lighting tile 50 to be controlled" and requires power). (Ex. 1002, ¶82; Ex. 1005, 16:18-26.)

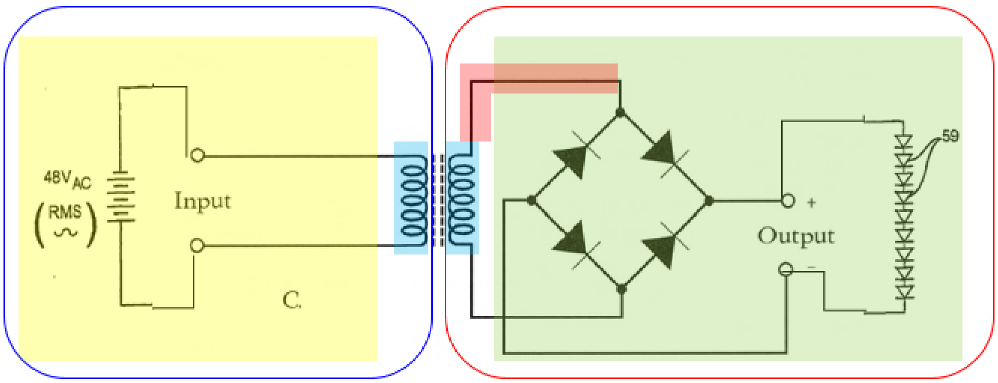
A POSITA would have understood that a person making contact includes a "conductive substance." (Ex. 1002, ¶83; Ex. 1001, 20:30-36 ("a conductive substance such as a person…").) *Birrell*'s touch sensor also includes a metallised polymer film 64 that "enable[s] the lighting tile 50 to be controlled," which a POSITA would have understood included the LEDs. (Ex. 1005, 16:18-26, 8:4-7 (tile 50 includes electronic manually controlled touch switches or light level controls); Ex. 1002, ¶¶83-84.) Thus, *Birrell*'s "second device" (e.g., red box below) includes "a second circuit" configured to detect contact with a human (conductive substance) or using a conductive substance ("metallised polymer film 64" (also a "conductive substance") for controlling the LED(s) in lighting tile 50. (Ex. 1005, 16:18-26; Ex. 1002, ¶¶83-84.)



Demonstrative F

(3) (c) a third circuit having a second transmission conductor and a second inductor, wherein said second device is configured to use at least the second inductor to receive power wirelessly from said first device for powering the apparatus.

The *Birrell-Logan* combination discussed above discloses and/or suggests this limitation. (Ex. 1002, ¶85; Sections IX.A.1(b), IX.A.1(c)(2).) As explained, the modified tile 50 ("second device") of the *Birrell-Logan* combination would have been inductively coupled to the "first device" via a receiving coil ("second inductor") to wirelessly receive power from the "first device" (limitation 1(b)). (Section IX.A.1(b).) Thus, for similar reasons, the modification would have resulted in tile 50 having a "third circuit" including a conductor ("second transmission conductor") extending from the receiving coil ("second inductor") that receives power wirelessly from the "first device" used for powering LEDs 59. (Ex. 1002, ¶85; Ex. 1005, 20:26-31 ("LEDs [are]…coupled to an AC power supply" and that the power supply "illuminate[s] the LEDs"); *id.*, 8:31-9:10 (system provides "data and power through the electrical coupling"), 22:29-30.) Thus, in the *Birrell-Logan* combination, the transmitting coil ("first inductor" (left blue coil below)) in the "first device" (blue box) would wirelessly transmit power to the receiving coil ("second inductor" (right blue coil) of the modified tile 50 ("second device" (red box)) for powering LEDs 59 via an electrical connection ("second transmission conductor" (e.g., red path, which may also extend to LEDs 59)). (Section IX.A.1(b); Ex. 1005, FIG. 8; Ex. 1002, ¶85.)



Demonstrative B

2. Claim 3

a) The apparatus of claim 1, wherein said second device is adapted to receive power from a power supply connected to an AC mains.

The *Birrell-Logan* combination discloses and/or suggests this limitation.[10] (Ex. 1002, ¶¶86-87.) As discussed, *Birrell* discloses a "second device" (modified tile 50) that wirelessly receives power from a 48V AC power supply. (Ex. 1005, 8:31-9:10, 20:26-31, 22:29-30; Section IX.A.1(b).)[11] While *Birrell* does not

[10] PO asserts wired charging to an AC mains or a wireless charger connected to AC mains meets this limitation. (Ex. 1110, 7, 44-45; Ex. 1114, 6, 40.)

[11] PO asserts that "DC voltage" or "rectified AC voltage" may be provided to LEDs. (*Compare* Ex. 1111, ¶46, *with id.*, ¶58.)

expressly disclose that the power supply is "connected to an AC mains," it would have been obvious to implement such features in the *Birrell-Logan* modified apparatus. (Ex. 1002, ¶86.)

A POSITA would have understood that 110/120V AC power from the electrical grid is a commonly used and convenient way of providing power to lighting fixtures and other electronics. (Ex. 1002, ¶87; Ex. 1013, 157 (120V AC used to power lighting fixtures); Ex. 1024, 1:9-28, 1:35-48, FIG. 1; Ex. 1025, 1:10-25, FIG. 1 (AC-DC converter); Ex. 1002, ¶87.) A POSITA would have also understood that such AC voltage can be adjusted by using a transformer to a voltage suitable for the device to be powered. (Ex. 1002, ¶87; Ex. 1013, 161-162, 165-166.) Accordingly, a POSITA contemplating the above modified *Birrell-Logan* apparatus would have been motivated to, e.g., connect an AC mains to the 48V AC source providing power via the "first device" to provide a constant source of power, which would have been adjusted to an appropriate voltage for the apparatus (e.g., 120 V to 48 V) using known components, such as transformer or the like. (Ex. 1002, ¶87.) A POSITA would have found such a configuration beneficial because it would provide a known predictable source of power typically used in the types of applications contemplated by *Birrell* and *Logan*. (*Id.*; Ex. 1005, 4:24-38; Ex. 1006, 1:3-5, 2:1-6, 4:1-22.) A POSITA would have had a reasonable expectation of success implementing this feature given that use of 120V AC from the electrical grid and use of a transformer to convert the AC power to a different/appropriate voltage were well known. (Ex. 1013, 161-162, 165-166; Ex. 1002, ¶87.) Indeed, the above modification would have been a mere combination of known components and technologies, according to known methods, to produce predictable results of providing power to the modified light system of *Birrell*. (Ex. 1002, ¶87; Ex. 1022, FIG. 2.1, ¶¶[0082]-[0084] (state of art).) *See KSR*, 550 U.S. at 416. Thus, the above-modified *Birrell-Logan* combination would have predictably resulted in the second device adapted to receive power from a power supply connected to an AC mains because the modified tile 50 receives power from the 48V AC power supply that is connected to the AC mains as modified above. (Ex. 1002, ¶87.)

3. Claim 4

a) The apparatus of claim 1, wherein said first device is configured to transmit power and data.

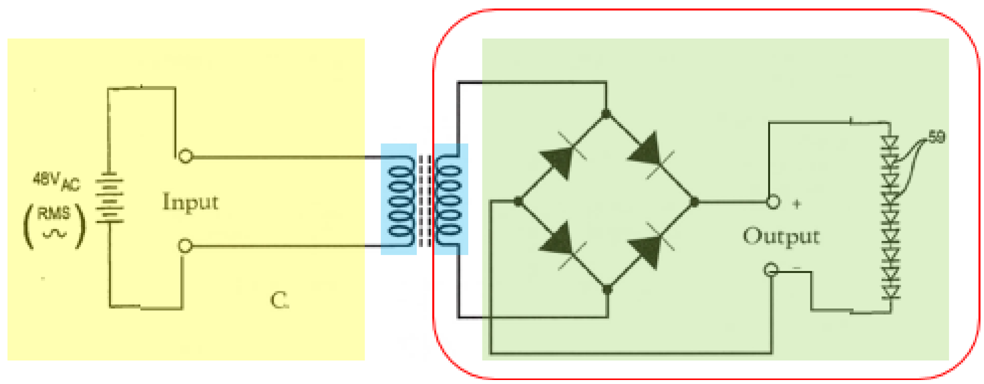
The *Birrell-Logan* combination discloses and/or suggests this feature. (Ex. 1002, ¶88.) The "first device" in the modified *Birrell-Logan* apparatus (Section IX.A.1(b)) transmits both data and power wirelessly because *Birrell* explains that its arrangement is "able to **provide both data and power through the electrical coupling** …." (Ex. 1005, 8:31-9:10; *id.*, 9:11-29, 13:15-23, 23:15-21 ("all data is transferred by the same electrical path that is used for the electrical power transfer").) *Logan* also discloses transmitting both power and data wirelessly through its inductive coupling. (Ex. 1006, 3:24-28, 5:18-6:2 ("**data can be superimposed on**

a carrier and transmitted through a panel" and "[t]wo-way transmission is possible"); Ex. 1002, ¶88.) Thus, a POSITA would have had the same skills, motivation, and expectation of success explained for claim 1 to configure the *Birrell-Logan* combination such that the first device providing power to the modified tile 50 ("second device") is also configured to transmit data consistent with the functionalities contemplated by *Birrell* and *Logan*. (Ex. 1002, ¶88; Sections IX.A.1(b)-(c).)

4. Claim 10

a) An apparatus comprising:

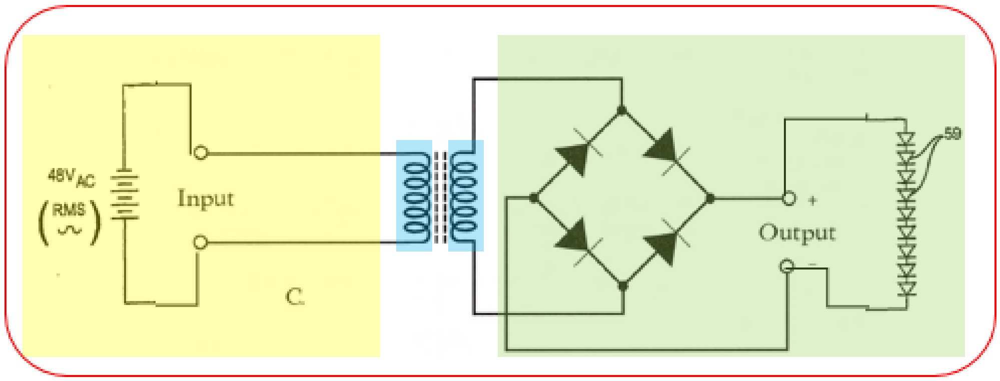
To the extent limiting, *Birrell*'s lighting tile 50 is an "apparatus." (Ex. 1005, 14:26-15:33; *supra* Section IX.A.1(a); *infra* Sections IX.A.4(b)-(e); Ex. 1002, ¶89.) Further, the *Birrell-Logan* combination (discussed below for limitation 10(e)) discloses the claimed apparatus in ***two ways***. (Sections IX.A.4(e), IX.A.1(b)) (modifying *Birrell*'s apparatus to include inductive coupling).) ***First***, as exemplified by the red box below, the modified lighting tile 50 in the discussed *Birrell-Logan* combination is an "apparatus" as claimed because it includes the features recited in limitations 10(b)-(e). (*Id.*; Sections IX.A.4(b)-(e); Ex. 1002, ¶89.)



Demonstrative A (annotated)

Second, as further exemplified in the red box below, the modified tile 50 with coils and the power supply device providing power (and interconnected circuitry and components) in the *Birrell-Logan* combination is an "apparatus."[12] (Ex. 1002, ¶89.)

[12] PO asserts a mobile phone "when used with a wireless charger" collectively "is an apparatus." (Ex. 1110, 2, 40; Ex. 1114, 2, 36.)



Demonstrative A (annotated)

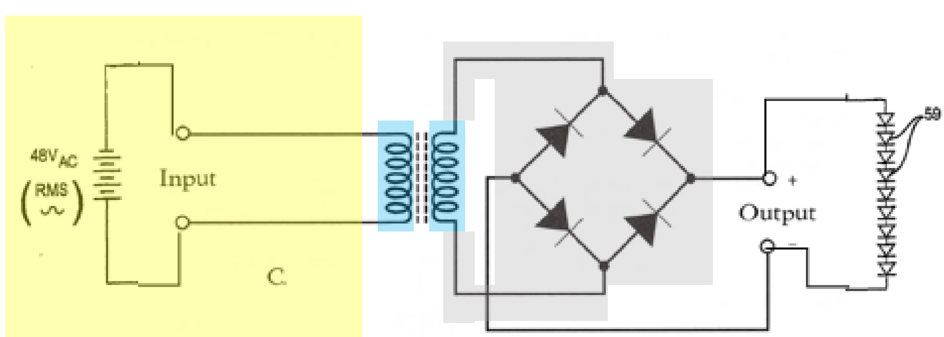
b) an LED circuit comprising at least one LED;

Birrell's tile 50 includes at least one LED 59. (Ex. 1005, 14:26-15:33; Ex. 1002, ¶90.) A POSITA would have understood that LEDs 59 in combination with other circuit components, e.g., the conductive wires connecting the LEDs and connections to receiver power (and thus current), is an "LED circuit," included in each of the above-identified "apparatus[es]. (Ex. 1002, ¶90; Section IX.A.4(a).)

c) a power supply, wherein said power supply is configured to provide power to the apparatus and is configured to receive power wirelessly from a power source;

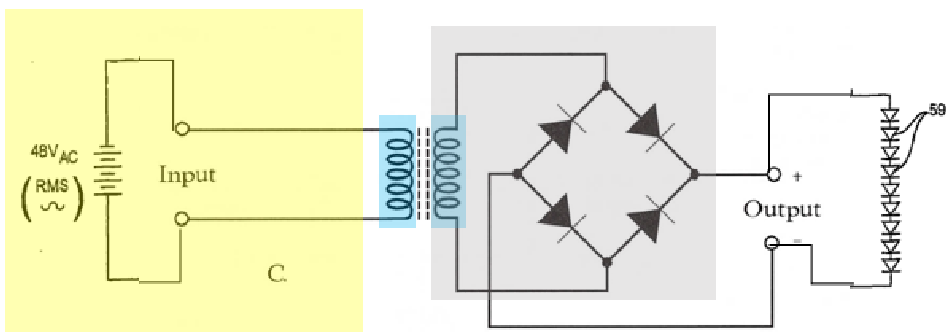
The *Birrell-Logan* combination discloses and/or suggests this limitation in two ways. (Ex. 1002, ¶¶91-93.)

First, it would have been obvious to modify *Birrell* in view of *Logan* to provide inductive coupling for the reasons explained for limitations 1(b)-1(c) and limitation 10(e) (Sections IX.A.1(b)-(c); IX.A.4(e); Ex. 1002, ¶92). In such a *Birrell-Logan* combination, the rectifier (diodes 67) and conductors connecting the receiving coil (e.g., grey below) discloses claim 10's "power supply" because it provides power to power LEDs 59 in the "apparatus." (Section IX.A.1(b); Ex. 1005, FIG. 8, 19:1-7 (diodes 67 form a bridge rectifier "ensur[ing] that light is emitted from the LEDs during both the positive and negative cycles of the AC power supply coupled via capacitors connections 66"); Ex. 1013, 163, 164-167 (bridge rectifier known to include a capacitor filter); Ex. 1001, 4:23, 9:57-65; Ex. 1002, ¶92.) In this way, each identified *Birrell-Logan* apparatus (limitation 10(a)) includes a "power supply" as claimed as it is configured to wirelessly receive power from a power source via its connection to the receiving coil that wirelessly receives power from the transmitting coil in the *Birrell-Logan* combination (*e.g.,* Ex. 1005, FIGS. 8, 10 (power supply 11)). (Ex. 1002, ¶92.)



Demonstrative D

Second, the rectifier (diodes 67), the receiving coil, and the conductors connecting the receiving coil in the modified tile 50 disclose the claimed "power supply" (e.g., grey below) because it provides power to LEDs 59 in the identified "apparatus" (limitation 10(a)) and is configured to receive power wirelessly (via receiving coil and conductors in the modified tile 50) from a power source (e.g., FIG. 8 (48V AC power source)) via the transmitting coil. (Ex. 1002, ¶93.)



Demonstrative E

d) a circuit configured to detect contact with a conductive substance for controlling at least the LED circuit; and

Birrell discloses this limitation for the same reasons above for claim limitations 1(c)(2) and 10(b) (describing that LEDs 59 in combination with other circuit components is a "LED circuit"). (*Supra* Sections IX.A.1(c)(2) and IX.A.4(b); Ex. 1002, ¶94.)

e) a data receiver, wherein said data receiver is configured to receive data from an antenna.

The *Birrell-Logan* combination discloses and/or suggests this limitation. (Ex. 1002, ¶¶95-96.) *Birrell* discloses that tile 50's circuitry is "structured so that all data is transferred by the same electrical path that is used for the electrical power transfer" (Ex. 1005, 23:15-21), where data are transmitted using a data modulator 80 and **received using a data demodulator 81** ("data receiver") (*id.*, 16:4-8, 23:22-29; FIG. 9 (below)). (Ex. 1002, ¶95.)

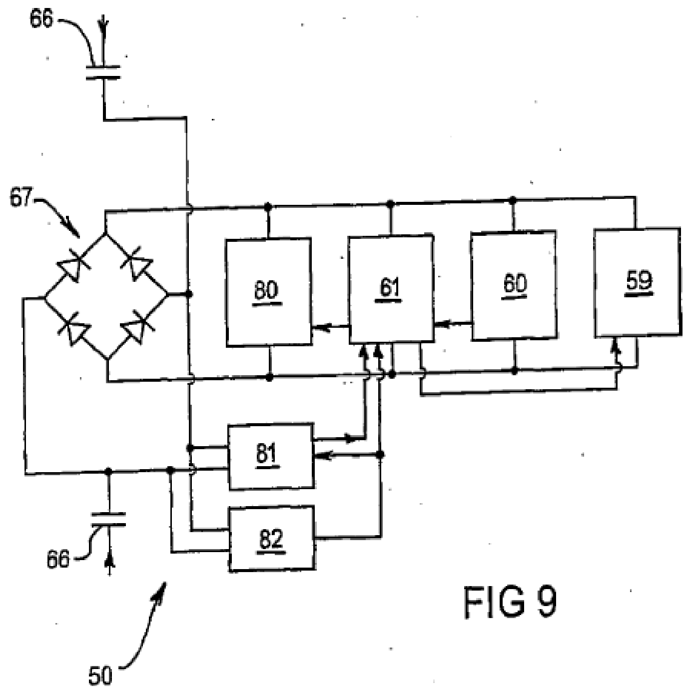


FIG 9

In the above *Birrell-Logan* combination, power and data are received using an inductive/receiving coil at the modified tile 50 in the form of an alternating electromagnetic field which is converted into an alternating current. (Ex. 1002, ¶96;

Ex. 1006, Abstract, 3:19-5:4; FIGS. 1-2; Ex. 1013, 161-166 (alternating current is generated through inductive coupling); Sections IX.A.1(b)-(c), IX.A.3, IX.A.4(a), IX.A.4(c).)) Thus, a POSITA would have understood that the receiving coil is an "antenna." (Ex. 1013, 110 ("[a] receiving antenna converts an electromagnetic (EM) field to an alternating current (AC)").) Given that data (and power) are received using the receiving coil ("antenna") in the modified tile 50, and the received data are demodulated using data demodulator 81 ("data receiver"), the *Birrell-Logan* combination discloses "a data receiver, wherein said data receiver is configured to receive data from an antenna." (Ex. 1002, ¶96.)

5. Claim 11

a) The apparatus of claim 10, wherein said circuit is configured to detect contact with the conductive substance via capacitive sensing.

The *Birrell-Logan* combination discloses/suggests this limitation for the reasons above for limitation 1(c)(2). (Section IX.A.1(c)(2); Ex. 1002, ¶97.)

6. Claim 12

a) The apparatus of claim 10, wherein said apparatus is configured to receive power from an AC mains power supply.

The *Birrell-Logan* combination discloses/suggests this limitation for the reasons above for claim 3. (Section IX.A.2; Ex. 1002, ¶98.)

7. Claim 13

a) An apparatus comprising:

To the extent limiting, *Birrell* alone or in combination with *Logan* discloses an "apparatus" for the reasons above for limitations 10(a) and 13(b)-(d). (Sections IX.A.4(a), IX.A.7(b)-(d); Ex. 1002, ¶99.)

b) a flat planar substrate upon which is mounted a plurality of LEDs;

Birrell discloses this limitation. (Ex. 1002, ¶100.) *Birrell* discloses that "mounted on the circuit board 58 includes nine LEDs 59." (Ex. 1005, FIG. 1, 15:18-21.) Given that *Birrell* discloses that the "preferred form of the present invention" is "a thin and generally **planar** lighting element" (*id.*, 13:15-17) and that *Birrell* describes that the lighting device is a "tile" (*e.g.*, *id.*, Abstract), a POSITA would have understood that *Birrell* discloses "a flat planar substrate upon which is mounted a plurality of LEDs," consistent with that shown in Figure 1 (LEDs 59 mounted on circuit board 58 (flat planar substrate). (*Id.*, FIG. 1; Ex. 1002, ¶100.) Such features would have been included in the modified tile 50 of the above the *Birrell-Logan* combination (Section IX.A.7(a).)

c) a data receiver, wherein the data receiver is configured to receive data from an antenna; and

The *Birrell-Logan* combination discloses/suggests this limitation for the reasons for limitations 10(a), 10(c), and 10(e). (Sections IX.A.4(a), IX.A.4(c), IX.A.4(e); Ex. 1002, ¶101.)

d) a circuit configured to detect contact with a conductive substance for controlling the plurality of LEDs.

The analysis for limitation 1(c)(2) explains how *Birrell* discloses the claimed "circuit," which would have been incorporated in the *Birrell-Logan* combination discussed above. (Sections IX.A.1(c)(2), IX.A.7(a)-(c); Ex. 1005, FIG. 1, 15:18-21 (lighting tile 50 including "nine LEDs 59"); Ex. 1002, ¶102.) For those reasons, the *Birrell-Logan* combination discloses limitation 13(d).

8. Claim 14

a) The apparatus of claim 13, wherein power is provided to said plurality of LEDs after said circuit detects the contact with the conductive substance.

Birrell alone or in combination with *Logan* discloses this limitation for the reasons discussed for limitation 1(c)(2) and those below. (Section IX.A.1(c)(2); Ex. 1002, ¶103.) *Birrell's* touch sensor "enable[s] the lighting tile 50 to be controlled" (Ex. 1005, 16:18-26) and that the lighting tile "includes integrally embedded electronic manual controls such as **touch switches or light level controls**" (*id.*, 8:4-7). A POSITA would have understood that switching on, or changing light levels of, an LED involves providing power to the LED.[13] (Ex. 1002, ¶103.) *Birrell* discloses that the "LEDs [are]…coupled to an AC power supply" and the power supply "illuminate[s] the LEDs." (Ex. 1005, 20:26-31; *id.*, 8:31-9:10 (data/power provided "through the electrical coupling"), 22:29-30 (48 Volt AC power supply illuminates the LEDs).) Thus, *Birrell* discloses that "power is provided to said plurality of LEDs after said circuit detects the contact with the conductive substance." (Section IX.A.1(c)(2); Ex. 1005, FIG. 1, 15:21-33, 16:18-26; Ex. 1002, ¶103.) A POSITA would have found it obvious to implement such features in the *Birrell-Logan* combined apparatus for the reasons discussed above and because it would have maintained the functionalities disclosed by *Birrell*. (Sections IX.A.1(c)(2), IX.A.7(d); Ex. 1002, ¶103.)

9. Claim 15

a) The apparatus of claim 13, wherein said LEDs are organic LEDs.

Birrell discloses this limitation as it discloses using "organic polymer LED materials" as light sources, which would have been implemented in the *Birrell-Logan* combination discussed above in claim 13 for the same reasons. (Ex. 1005, 11:35-12:3; Section IX.A.7; Ex. 1002, ¶104.)

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[13] PO alleges that "turn[ing] on" LEDs corresponds to the claimed "power is provided to said plurality of LEDs." (Ex. 1110, 25; Ex. 1114, 23.)

10. Claim 17

a) An apparatus comprising:

To the extent limiting, *Birrell* discloses this preamble for the reasons discussed for limitation 10(a). (Section IX.A.4(a); *infra* Sections IX.A.10(b)-(e); Ex. 1002, ¶105.)

b) an LED circuit comprising at least one LED;

Birrell discloses this limitation for the reasons discussed for limitation 10(b). (Section IX.A.4(b); Ex. 1002, ¶106.)

c) a circuit configured to detect contact with a conductive substance for at least controlling the LED circuit; and

Birrell discloses this limitation for the reasons discussed for limitations 1(c)(2) and 10(d). (*Supra* Sections IX.A.1(c)(2), IX.A.4(d); Ex. 1002, ¶107.)

d) a data receiver, wherein said data receiver is configured to receive data from an antenna,

The *Birrell-Logan* combination discloses/suggest this limitation for the reasons above for limitations 10(a), 10(c), and 10(e). (Sections IX.A.4(a), IX.A.4(c), IX.A.4(e); Ex. 1002, ¶108.)

e) wherein said apparatus is portable.

The *Birrell-Logan* combination discloses/suggests that the "apparatus" is portable. (Ex. 1002, ¶109.) *Birrell* discloses that tile 50 may be conveniently "removed from a supporting structure." (Ex. 1005, 15:8-14; *id.*, 2:14-35 (*Birrell* solves problems associated with fixed lighting devices).) *Birrell* also discloses that the lighting tile may be implemented on an "advertising display, or a piece of furniture such as a table surface [for reading purposes]." (Ex. 1005, 4:24-32.)[14] Thus, the combined *Birrell-Logan* apparatus would likewise have been "portable." (Ex. 1002, ¶109.)

11. Claim 18

a) An apparatus comprising:

To the extent limiting, *Birrell* discloses an "apparatus" for the reasons discussed for limitation 10(a). (Section IX.A.4(a); Ex. 1005, 14:26-15:33; *infra* Sections IX.A.11(b)-(d); Ex. 1002, ¶110.)

b) a flat planar substrate upon which is mounted a plurality of LEDs;

Birrell discloses this limitation for the reasons discussed for limitation 13(b). (Section IX.A.7(b); Ex. 1002, ¶111.)

c) a transmission conductor configured to provide data and power to said apparatus; and

Birrell discloses this limitation. (Ex. 1002, ¶¶112-113.) As explained and exemplified below, lighting tile 50 ("apparatus") includes a "transmission

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[14] PO alleges that large appliances, e.g., refrigerators, are "portable." (Ex. 1110, 116; Ex. 1114, 104.)

conductor," which receives wireless power from the power supply and provides power to the LEDs. (Section IX.A.1(c)(3); Ex. 1005, FIG. 8 (annotated below); Ex. 1002, ¶112.)

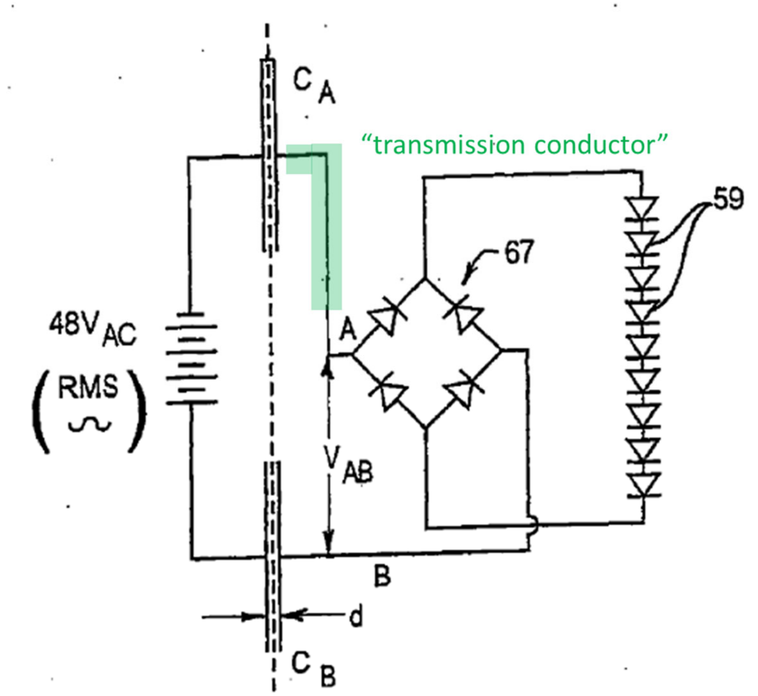


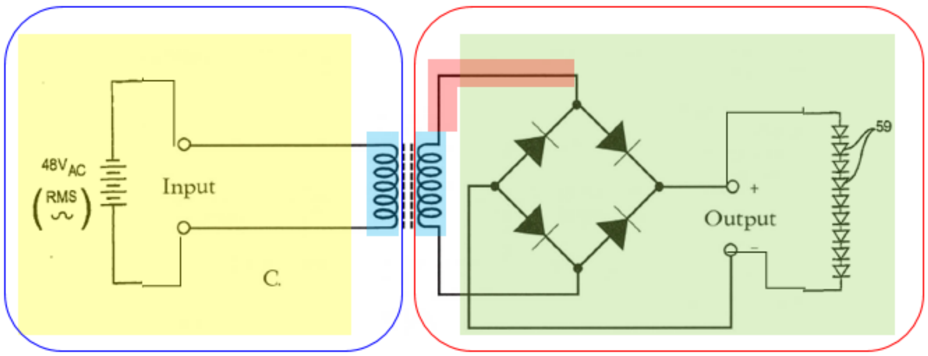
FIG 8

Birrell discloses that "all data is transferred by the same electrical path that is used for the electrical power transfer" (Ex. 1005, 23:15-21) and that this configuration is "able to provide both data and power through the electrical coupling" (*id.*, 8:31-9:10). (Section IX.A.3.) Thus, the "transmission conductor" provides power and data to tile 50 ("apparatus" (including as modified below with *Logan*)). (Ex. 1002, ¶113; Section IX.A.11(a).)

d) a data receiver, wherein the data receiver is configured to receive the data from the transmission conductor or an antenna and the power from the transmission conductor.

The *Birrell-Logan* combination discloses or suggests the data receiver receives the data from an antenna and power from the above "transmission conductor." (Ex. 1002, ¶¶114-115.) The analysis for limitations 1(b)-1(c) explains how/why a POSITA would have found it obvious in view of *Logan* to configure *Birrell* to utilize inductive coupling to transmit power to tile 50 ("apparatus"). (Sections IX.A.1(b)-(c).) Furthermore, the analysis for limitation 10(e) explains how the modified tile 50 in the *Birrell-Logan* combination includes data demodulator 81 ("data receiver") configured to receive data and power from the receiving coil, which is an "antenna." (Section IX.A.4(e).) Thus, the *Birrell-Logan* combination discloses/suggests limitation 18(d) where the data receiver is configured to receive the data from an "antenna" (receiving coil). (Ex. 1002, ¶114.)

Moreover, the "transmission conductor" (limitation 18(c)) would likewise provide the power to the "data receiver" in the *Birrell-Logan* combination for similar reasons. Indeed, as explained (Section IX.A.1(c)(3)), the transmission conductor in the modified tile 50 would be connected to the receiving coil and thus would receive data and power, which would have been provided to tile 50's components, including demodulator 81 ("data receiver"), as exemplified below ("apparatus" (red box) including demodulator 81 (above), antenna (right blue coil)), transmission conductor (red line)). (Section IX.A.11(c); Ex. 1005, 23:15-29, FIG. 9; Ex. 1002, ¶115.)



Demonstrative B

12. Claim 19

a) The apparatus of claim 18, wherein the LEDs are Organic LEDs.

Birrell discloses this limitation for the reasons discussed for claim 15. (Section IX.A.9; Ex. 1002, ¶116.)

13. Claim 20

a) The apparatus of claim 18, wherein said apparatus further comprises a MODEM.

Birrell discloses this limitation. (Ex. 1002, ¶117.) *Birrell* discloses that "the light tile circuitry is structured so that all data is transferred by the same electrical path…used for…power transfer," where data are transmitted using **a data modulator 80** and received using **a data demodulator 81** (collectively the claimed "MODEM") (Ex. 1005, 23:15-29). (Ex. 1002, ¶117; Ex. 1017, 2:19 ("**modem** or

modulator-**dem**odulator"); Ex. 1001, 23:53-60 (data signal receiver 2078 can be a modem).)

14. Claim 21

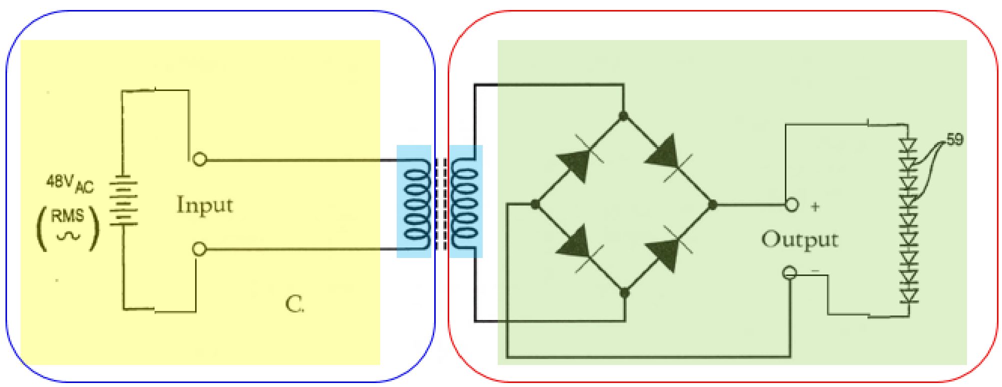
a) A system comprising:

To the extent limiting, *Birrell* (as modified below) discloses a "system" for the similar reasons discussed for limitation 1(a) and below. (Section IX.A.1(a).) *Birrell* discloses a lighting system ("system") that includes lighting tile 50 ("first device" (below for limitation 21(b)) and a device ("second device" below for limitation 21(c)) having an AC power supply to provide power to tile 50 in context of the combination of *Birrell-Logan*. (*Infra* Sections IX.A.14(b)-(c); Ex. 1002, ¶118.)

b) a first device, wherein the first device includes (a) at least one LED, (b) at least one antenna, (c) at least one data communications circuit, and (d) at least one battery, and wherein the first device is configured to detect contact with a conductive substance via capacitive sensing for controlling at least the at least one LED; and

Birrell in view of *Logan* discloses/suggests this limitation. (Ex. 1002, ¶¶119-120.) A POSITA would have found it obvious to configure *Birrell's* lighting system and thus tile 50 to include inductive coupling to wirelessly receive power and data signals in light of *Logan* for reasons discussed for limitations 1(b)-(c) and claims 10, 13, 17-18 (Sections IX.A.1(b), IX.A.1(c), IX.A.4, IX.A.7, IX.A.10-11; Ex. 1002,

¶119.) The modified tile 50 ("first device" (e.g., red box below)) in the *Birrell-Logan* combination would have included "at least one antenna" (e.g., receiving coil) and "at least one data communications circuit" (e.g., demodulator 81)[15] as claimed for the reasons explained for limitations 10(e), 13(c), 17(d), and/or 18(d). (Sections IX.A.4(e), IX.A.7(c), IX.A.10(d), IX.A.11(d); Ex. 1002, ¶119.)



Demonstrative F

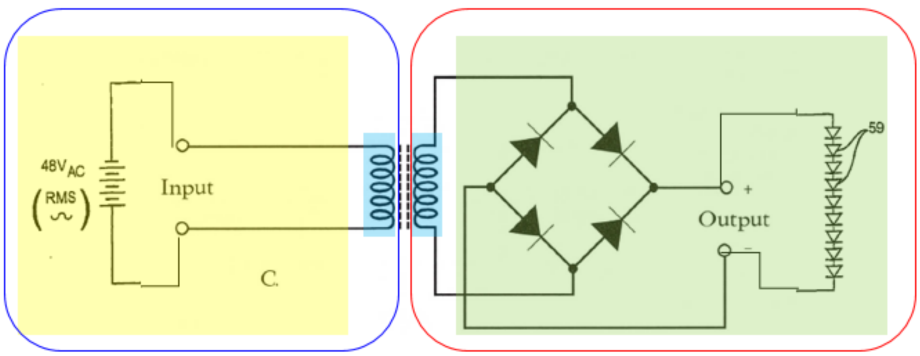
Modified tile 50 ("first device") includes at least one LED (LEDs 59) and is configured to detect contact with a conductive substance via capacitive sensing for controlling at least the at least one LED for the reasons discussed for claim limitations 1(c)(1)-1(c)(2). (Sections IX.A.1(c)(1)-(2).) Furthermore, the modified

[15] Modulator 80 alone or collectively with demodulator 81 is also a "data communication circuit." (Ex. 1002, ¶¶119-120; Ex. 1005, 16:4-8, 23:22-29; FIG. 9.)

"first device" would have also included "at least one battery" given *Birrell* explains that lighting tile 50 includes "energy storage components," which a POSITA would have understood is a battery and would have been incorporated in the *Birrell-Logan* combination. (Ex. 1005, 15:34-16:10; Ex. 1002, ¶120.) And even if such components were not considered a battery, *Birrell*'s disclosures would have motivated a POSITA to configure the modified tile 50 to include a battery to achieve the benefit of providing portable power source for the tile. (Ex. 1002, ¶120; *infra* Section IX.G.1(e) (regarding reasons/motivations to configure the "energy storage components" with a rechargeable battery to provide power, incorporated/applicable here).) Thus, it would have been obvious to implement such a battery in tile 50 as such a modification would have been within the skills of a POSITA who would have recognized the benefits of such a configuration and had a reasonable expectation of success in such an implementation (especially in light of *Birrell*'s "energy storage components" disclosures). (Ex. 1002, ¶120.)

c) a second device, wherein the second device is configured to transmit power and signals wirelessly to the first device.

The *Birrell-Logan* combination discloses/suggests this limitation for reasons discussed for claim 4. (Section IX.A.3 (where claim 4's mapped "first device" is the same as claim 21(c)'s "second device" in the *Birrell-Logan* combination); Ex. 1002, ¶121.) As explained, the second device in the *Birrell-Logan* combination (e.g., blue box below) would have been configured to transmit power and data through inductive coupling ("transmit power and signals wirelessly") to the modified lighting tile 50 (red box ("first device")) in the combination. (Section IX.A.3; Ex. 1002, ¶121; Section IX.A.1.)



Demonstrative F

15. Claim 23

a) The apparatus of claim 1, wherein the conductive substance includes a metallic material.

Birrell discloses this limitation in two ways. (Ex. 1002, ¶¶122-124.) **First**, as discussed above for limitation 1(c)(2), *Birrell* discloses that lighting tile 50 includes a "**metallised polymer film 64**" ("conductive substance") which "acts as a touch sensor." (Ex. 1005, 16:18-26; Section IX.A.1(c)(2).) A POSITA would have understood that the "metallised" film includes "a metallic material," and thus the touch sensor circuit in *Birrell* detects contact with a conductive metallic material substance.[16] (Ex. 1002, ¶122.) Such features would have been implemented in the *Birrell-Logan* combination for the same reasons explained for claim 1. (*Id.*; Section IX.A.1.)

Second, to the extent that the claim refers to a metallic material conductive substance making contact with the second circuit, it would have been obvious to configure the *Birrell-Logan* "apparatus" (claim 1) to allow the touch sensor components of *Birrell* to detect contact from a stylus or similar device having metallic material. (Ex. 1002, ¶123.) A POSITA would have been motivated to make such a modification given *Birrell* discloses that its capacitive touch sensor is capable of detecting touch. (Ex. 1005, 16:18-26; Ex. 1002, ¶123; Ex. 1001, 20:30-36.) A POSITA would have appreciated the many ways capacitive touch sensing can be facilitated (e.g., other types of conductive substances for making contact with a sensor) and that *Birrell*'s sensor was likewise capable of detecting contacts with other conductive substance(s), such as metal-containing input devices. Indeed, *Birrell* recognizes that metal wires or the like were a common conductive material(s), which may form elements of capacitive coupling. (Ex. 1005, 14:33-37.) It was also known in the state of art that metal-containing styluses/pointing devices

[16] PO has alleged touch screen features for this limitation. (Ex. 1110, 4, 38, 42, 73, 76, 101.)

were used in capacitive contact sensing applications. (Ex. 1002, ¶123; Ex. 1014, FIGS. 1, 4-6, 8:18-19 (tip 62 of stylus 30 is made of a metal), 7:66-8:11, Ex. 1020, ¶¶[0018] ("conductive stylus"), [0006], [0038], [0046], [0065]; Ex. 1021, 4:65-5:6 (disclosing that a stylus, e.g., an input pen includes a "conductive pen tip" and "[a] metallic shield member").) Accordingly, a POSITA would have been aware of such known features and thus been motivated, with a reasonable expectation of success, to configure the *Birrell-Logan* "apparatus" such that the "second circuit" was configured to also detect contact (for controlling the LED(s)) with a metallic material containing stylus or similar device, to expand the versatility of the modified system. (Section IX.A.1(c)(2); Ex. 1002, ¶123.)

Such a modification would have been a predictable implementation of known technologies and techniques (capacitive touch sensor technologies) that would have resulted in a foreseeable circuit that allowed the touch circuit to accommodate different applications and uses by users of the lighting device. (Ex. 1002, ¶124.) For example, a POSITA would have appreciate the benefits in expanding the functionality of the *Birrell-Logan* device to accommodate applications where a user may need/desire to use an extension/pointer or similar device to make contact with tile 50 for controlling the LEDs, which may be helpful where tile 50 is positioned in locations difficult for a user to reach with their outreached hands, and/or where a user wishes to avoid making personal contact with tile 50 (e.g., that is also operated by others) for personal hygiene reasons. (*Id*.) Configuring the touch circuitry in the combined apparatus to detect contact from a stylus/pointer that contains a metallic material (e.g., at the tip, etc.) would have been an obvious design configuration from which a POSITA would have been able to select from given the known ways to implement capacitive touch sensing systems/devices/components. (*Id.*)

B. Ground 2: Claim 2 Is Obvious Over *Birrell*, *Logan*, and *Johnson*

1. Claim 2

a) The apparatus of claim 1, wherein said first device[17] comprises at least one colored LED.

Birrell in view of *Logan* and *Johnson* discloses and/or suggests this limitation. (Ex. 1002, ¶¶125-129.) While *Birrell* (as modified) does not expressly disclose that the "**first device** comprises at least one colored LED," a POSITA would have nonetheless found it obvious to implement such features in view of *Johnson*. (Ex. 1002, ¶126.)

[17] PO has alleged that its mapped "second device" (not the "first device"), including the claimed LEDs, meets this limitation. (*E.g.*, Ex. 1110, 3, 6.) To the extent claim 2 is interpreted such that the second device's LEDs comprises a colored LED, the modified tile 50 in the *Birrell-Logan* apparatus ("second device") includes LEDs 59 that have different colors. (Ex. 1005, 12:4-21, 14:26-15:33, FIG. 8).)

Like *Birrell*, *Johnson* discloses a power delivery device, i.e., a battery charger. (Ex. 1007, 1:58-2:2.) As such, a POSITA implementing the system of *Birrell* would have had reason to consider the teachings of *Johnson*. (Ex. 1002, ¶127.) *Johnson* discloses that the power delivery device includes "[t]wo bicolor light emitting diodes (LEDs) 109 and 111" as indicators for signifying status and/or rate of power delivery (*id.*, 2:11-22) connectivity status to a battery for charging (*id.*, 6:55-60). (Ex. 1002, ¶127.)

A POSITA would have been motivated to implement at least one colored LED, similar to as disclosed in *Johnson*, in the "first device" in the *Birrell-Logan* combination to provide status indications of operation associated with the AC power supply. (Ex. 1002, ¶128.) A POSITA would have appreciated that a colored LED indicator would have allowed a user to quickly and efficiently determine the status of the power being delivered to tile 50 (e.g., indicate whether the AC power supply is operational or properly receiving/providing power). (Ex. 1002, ¶128.) Such implementation would have been beneficial as *Birrell* discloses that the lighting system is not limited to those mounted on the wall or ceilings, but may also be used in other settings where a user would have access to the AC power supply and first device to determine such status. (Ex. 1005, 4:20-32; *id.*, 2:8-13; Ex. 1002, ¶128.)

A POSITA would have had the capability, and a reasonable expectation of success in implementing, *Johnson*'s teachings/suggestions in a system like the

Birrell-Logan combination because, e.g., colored LEDs were commercially available and the circuitry to implement such LEDs were well-known. (Ex. 1002, ¶129; Ex. 1007, 6:51-60; Ex. 1013, 165-166; Ex. 1005, FIG. 8; Ex. 1006, FIG. 2.) Furthermore, the use of LED indicators for a power delivery device was also well-known. (Ex. 1018, 3:41-51; Ex. 1022, ¶[0087].) The above-described implementation would have involved the use of known technologies and techniques (e.g., use of colored LED status indicators) to yield the predictable result of the modified first device providing operational and/or power delivery status indications for ease of use. (Ex. 1002, ¶129.) *See KSR*, 550 U.S. at 416.

C. Ground 3: Claims 3, 10-12, and 21 Are Obvious Over *Birrell*, *Logan*, and *Zhang*

1. Claim 3

a) The apparatus of claim 1, wherein said second device is adapted to receive power from a power supply connected to an AC mains.

Section IX.A.2 explains how the *Birrell-Logan* combination discloses/suggests claim 3. (Section IX.A.2; Ex. 1002, ¶¶130-135.) However, to the extent that the *Birrell-Logan* combination does not itself support the obviousness of such a modification, *Zhang* further supports that a POSITA would have been motivated, and found obvious, to configure the *Birrell-Logan* apparatus to couple an AC mains to a power supply that provides power received by the modified tile 50 ("second device"). (Ex. 1002, ¶131.)

Zhang discloses a power supply providing power to LEDs. (Ex. 1022, ¶¶[0082]-[0084] (disclosing with reference to Figure 2.1 that a 9V AC power supply, through a rectifier 35, is used to power an array of LEDs 19), FIG. 2.1; Ex. 1002, ¶132.)

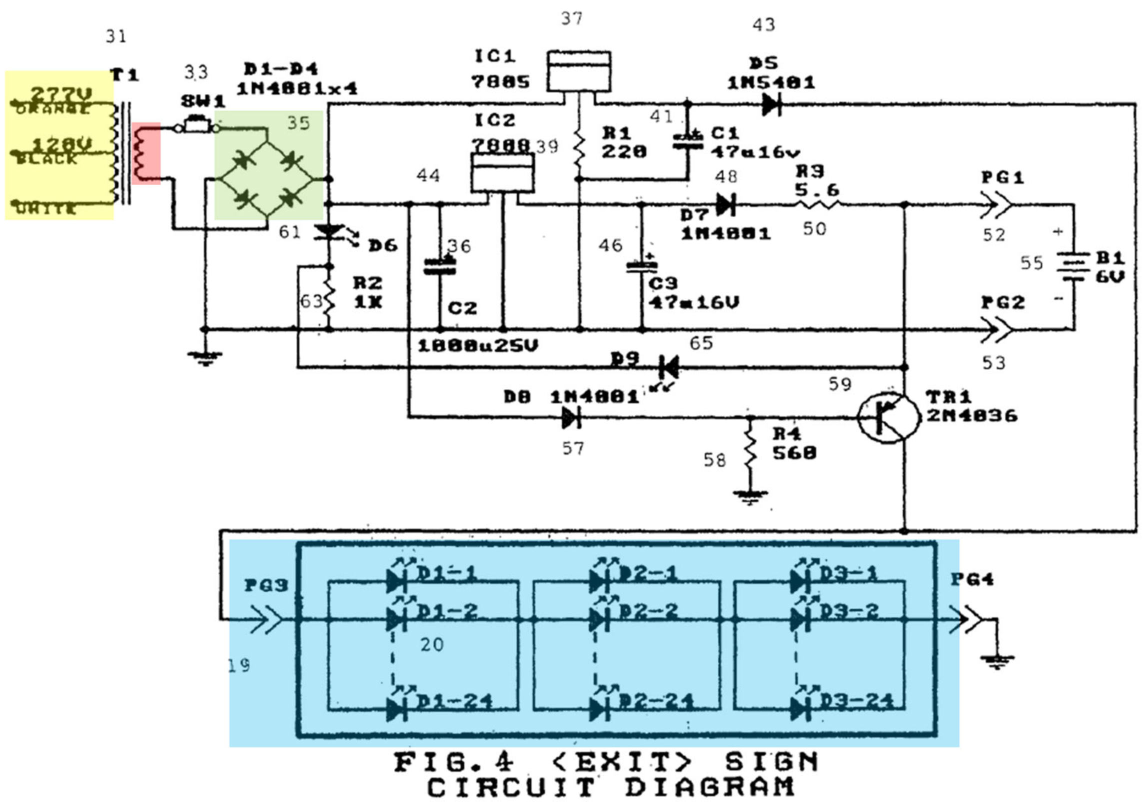


Fig. 2.1, Electronic Circuit Board for LED Exit Sign

(Ex. 1022, FIG. 2.1 (120V AC (yellow), 9V AC (red), rectifier 35 (green), and LEDs 19 (blue)); Ex. 1002, ¶132.) Thus, a POSITA would have had reason to consider the teachings of *Zhang* when implementing the system of *Birrell*. (Ex. 1002, ¶132.) *Zhang* discloses that the 9V AC is derived from the 120V AC, which is from the commercial line or electrical grid ("AC mains") by using a transformer 31. (Ex. 1022, ¶[0083]; Ex. 1002, ¶132.)

Based on the guidance by *Zhang*, a POSITA would have found it obvious to modify the *Birrell-Logan* combination to connect the 48V AC power supply (similar to as described in *Birrell*) to a 120V AC commercial line such that it draws power from the electrical grid. (Ex. 1002, ¶133.) Indeed, consistent with that demonstrated by *Zhang*, a POSITA would have understood that 120V AC power from the electrical grid is commonly used, conveniently providing power to lighting fixtures and other electronics. (Ex. 1013, 157 (120V AC powering lighting fixtures); Ex. 1024, 1:9-28, 1:35-48, FIG. 1; Ex. 1025, 1:10-25, FIG. 1; Ex. 1002, ¶133.) Furthermore, even if an electronic device does not use 120V AC directly, a POSITA would have understood that the AC voltage can be adjusted by using a transformer, similar to as disclosed in *Zhang*, to a voltage suitable for the electronic device to be powered. (Ex. 1022, ¶[0083]; Ex. 1013, 161-162, 165-166; Ex. 1002, ¶133.)

A POSITA thus would have been motivated, with a reasonable expectation of success, to configure the second device in the *Birrell-Logan* combination (claim 1) to be adapted to receive power from a power supply connected to an AC mains for reasons above and those discussed in Section IX.A.2. (Section IX.A.2; Ex. 1022, ¶[0083]; Ex. 1013, 161-162, 165-166; Ex. 1002, ¶134.) Indeed, the above configuration would have been a mere combination of known components and technologies, according to known methods, to produce predictable results. (*Id*.) *See KSR*, 550 U.S. at 416.

The *Birrell-Logan-Zhang* combination discloses this limitation in another way. (Ex. 1002, ¶135.) As discussed below for claim 21, a POSITA would have found it obvious to include a rechargeable battery ("power supply") in the modified lighting tile 50, where the battery is charged by AC mains power during normal operation, and when the AC mains power is interrupted, the battery powers the modified lighting tile 50. (*Infra* Section IX.C.2; Ex. 1002, ¶135.) Accordingly, for those reasons, the modified lighting tile 50 ("second device") in the *Birrell-Logan-Zhang* combination would have been adapted to receive power from a rechargeable battery (a "power supply") that is charged by an AC mains ("a power supply connected to an AC mains"). (*Id.*)

2. Claim 21

As explained in Ground 1, the *Birrell-Logan* combination discloses/suggests the limitations of claim 21. (Section IX.A.14; Ex. 1002, ¶¶136-140.) However, to the extent that the *Birrell-Logan* combination is found not to disclose that "the first device" includes "at least one battery" as explained for claim 21 (Ground 1), it would have been obvious to implement a battery in the modified tile 50 ("first device") in the *Birrell-Logan* combination in view of *Zhang*. (Ex. 1002, ¶¶136-137.)

Zhang discloses a power supply providing power to LEDs. (Ex. 1022, ¶¶[0082]-[0084].) *Zhang* additionally discloses "a battery 55," where the power supply derives from the 120V AC power to charge the battery during normal operations and when the AC power is interrupted, battery 55 provides power to the LEDs. (Ex. 1022, ¶¶[0082]-[0087], FIG. 2.1; *see also id.*, Abstract, ¶¶[0036], [0054], [0094], [0109]; Ex. 1002, ¶138.)

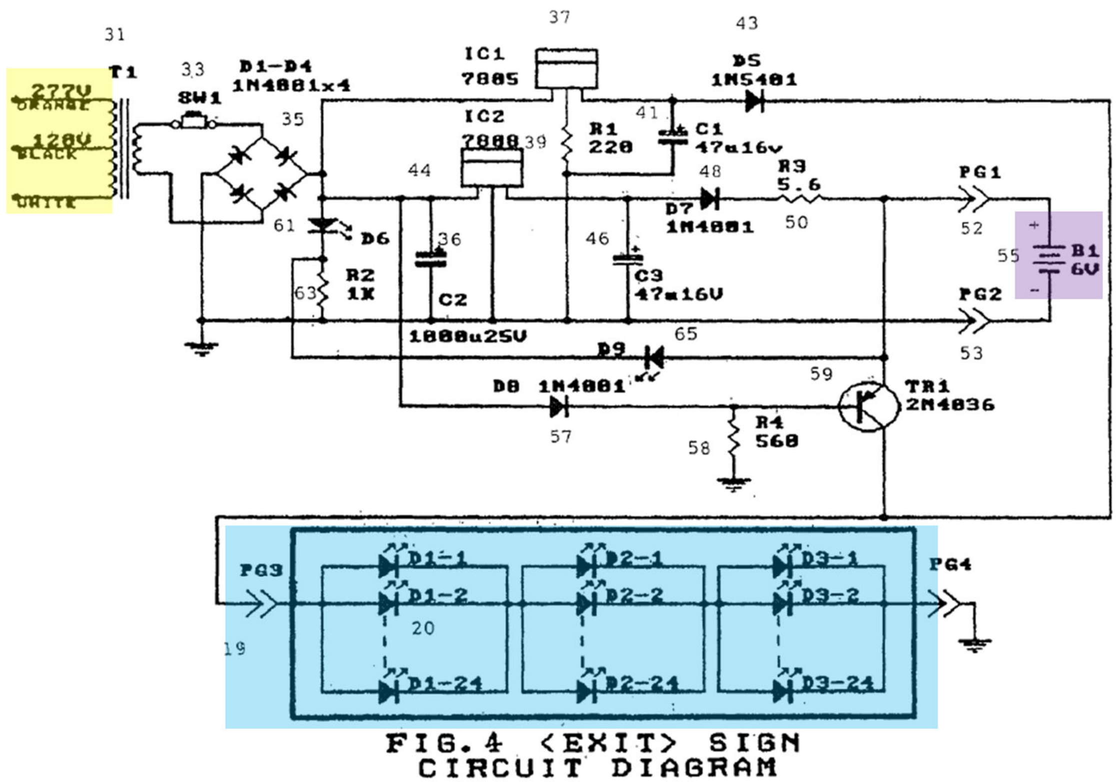


Fig. 2.1, Electronic Circuit Board for LED Exit Sign

(Ex. 1022, FIG. 2.1 (120V AC in yellow, LEDs 19 in blue, and battery 55 in purple); Ex. 1002, ¶138.)

A POSITA would have found it obvious and beneficial to include a rechargeable battery in the modified lighting tile 50 of the *Birrell-Logan* combination that would be charged using AC mains power (e.g., 120/220 VAC), during normal operation. (Ex. 1002, ¶139.) Indeed, consistent with that described in *Zhang*, a POSITA would have found it beneficial to include such a battery as it would have provided backup power to the apparatus, which ultimately ensures that the LEDs in lighting tile 50 would provide continuous illumination, particularly during emergency situations, e.g., fire and earthquake, when the AC mains power is unavailable. (Ex. 1002, ¶139; Ex. 1022, ¶¶[0082]-[0087]; *id.*, ¶[0036]; Section IX.C.1.) Furthermore, a POSITA would have been motivated to use a rechargeable battery as it would have allowed repeated uses and charges by use of the AC mains power when available. (Ex. 1002, ¶139; Ex. 1022, ¶[0036].)

A POSITA would have had the capability and motivation, with a reasonable expectation of success, to implement a rechargeable battery in the *Birrell-Logan* combination, given that it was known to use battery as portable and/or backup power. (Ex. 1011, FIG. 7; Ex. 1022, FIG. 2.1; Ex. 1002, ¶140.) Such implementation would have involved applying known technologies and techniques (e.g., use of a rechargeable battery in a lighting device) to yield the predictable result of implementing a rechargeable battery in the modified tile for use as a backup power when main power is interrupted. (Ex. 1002, ¶140.) *See KSR*, 550 U.S. at 416.

3. Claims 10-12

The *Birrell-Logan* combination modified in view of *Zhang* also discloses/suggests **claim 10**. (Ex. 1002, ¶¶141-145.)

Namely, while Section IX.A.4(c) explains how *Birrell* discloses a "power supply" as claimed, it would have been obvious to configure the modified tile 50 in the *Birrell-Logan* "apparatus" (Section IX.A.4) to include a rechargeable battery ("power supply") to provide power to the apparatus in view of *Zhang* as discussed in claim 21 above in Ground 3. (*Supra* Section IX.C.2; Ex. 1002, ¶142.) Further, for similar reasons and in light of the state of the art, it would have been obvious to configure such a rechargeable battery to also be recharged wirelessly to provide additional versatility and benefits known to be achieved through such features. (Ex. 1002, ¶142.) A POSITA would have appreciated that enabling the rechargeable battery in the modified tile 50 to be charged wirelessly (and via AC mains (*supra* Sections IX.C.1-2; Ex. 1022, ¶[0036])) would have provided a user friendly and efficient way of sustaining power to the rechargeable battery in the *Birrell-Logan-Zhang* modified tile 50 discussed above. (Ex. 1002, ¶142.) Indeed, it was known in the art that wirelessly recharging mechanisms/configurations for devices (including portable devices) provided benefits to existing devices (including portable ones) (*Id.*; Ex. 1112, 1:7-57, 7:5-8:10; Ex. 1092, ¶¶[0198]-[0200] ("[a] power facility 1800" of a lighting system "may include a battery" where "power facility 1800 can include an inductive charging facility" to "charge an onboard power source").) A POSITA would have thus found providing such features with the rechargeable battery in the *Birrell-Logan-Zhang* modified tile 50 beneficial as it would have provided alternate ways to maintain the battery life. A POSITA would have had the same capabilities and expectation of success to implement such features as described above for modifying tile 50 to include a rechargeable battery. (Section IX.C.2; Ex. 1002, ¶142.)

Claim 11 is disclosed/suggested by the *Birrell-Logan-Zhang* combination for the reasons explained in Section IX.A.5. (Ex. 1002, ¶143.)

As to **claim 12**, to the extent that *Birrell* is read not to disclose or suggests this limitation (Ground 1, Section IX.A.6), *Birrell* in view of *Logan* and *Zhang* discloses this limitation for the reasons discussed above for claims 3 and 21 above. (*Supra* Sections IX.C.1-2; Ex. 1002, ¶¶144-145.) Moreover, it would have been obvious to configure the modified tile 50 in the *Birrell-Logan-Zhang* combination discussed above to receive power from an AC mains power supply for reasons similar to those explained for claims 3, 10, and 21 above (Sections IX.C.1-3). (Ex. 1002, ¶¶144-145.) For similar reasons, a POSITA would have been motivated (with a similar expectation of success) to allow the rechargeable battery in the modified tile 50 to be wirelessly charged (e.g., from power provided via the AC mains) to ensure the rechargeable battery would be able to serve as a backup power supply for extended periods of AC main power interruptions. (*Id.*)

D. Ground 4: Claim 5 Is Obvious Over *Birrell*, *Logan*, and *Sembhi*

1. Claim 5

a) The apparatus of claim 1, wherein said second device comprises a three-way switch.

Birrell in view *Logan* and *Sembhi* discloses and/or suggests this limitation. (Ex. 1002, ¶¶146-150.) *Birrell* discloses that lighting tile 50 includes "integrally embedded electronic manual controls such as touch switches or light level controls, remote controls such as radio frequency or infra-red, automatic controls" (Ex. 1005, 8:4-30), but *Birrell* does not expressly disclose that lighting tile 50 includes a "three-way switch." Nevertheless, a POSITA would have found it obvious to implement such feature in the modified tile 50 of the *Birrell*-*Logan* combination in view of *Sembhi*. (Ex. 1002, ¶147.)

Like *Birrell*, *Sembhi* discloses a lighting device controller, e.g., a switch, for controlling the light intensity level. (Ex. 1008, Abstract.) Thus, a POSITA would have had reason to consider *Sembhi* when implementing the system of *Birrell*. (Ex. 1002, ¶148.) *Sembhi* discloses that it was known to implement three-way switches, which allows an additional light control "at another location." (Ex. 1008, ¶[0018].) *Sembhi* explains that such a three-way switch would also allow using radio frequency signals to control the lighting. (*Id.*; Ex. 1002, ¶148.)

A POSITA would have been motivated to implement a three-way switch in the modified tile 50 to allow the device to provide or work with three-way switch designs that allow a user to control the lighting device from multiple locations. (Ex. 1002, ¶149.) Indeed, the use of three-way switches to allow users to control lighting devices from different locations was known to a POSITA at the time, and providing similar functionalities with the modified tile 50 of the *Birrell-Logan* apparatus would have been a straightforward and predictable application of such common technologies and features. (Ex. 1019, 1:11-18; Ex. 1023, 3:66-4:10 (disclosing use of two three-way switches to control a lighting device), 5:12-32 (same); FIG. 4; Ex. 1002, ¶149.) Given such knowledge, a POSITA would have been motivated to implement a three-way switch at the modified lighting tile 50 that would operate with another three-way switch at a location different from the lighting tile, to provide similar functionality (e.g., allow a user to turn on/off tile 50 from different locations). (Ex. 1002, ¶149.) A POSITA would have the capability and reasonable expectation of success in implementing a three-way switch in a system given that implementing three-way switches for lighting circuits was "well known." (Ex. 1019, 1:11-18; Ex. 1002, ¶¶149-150.) Indeed, *Birrell* itself discloses that the lighting device can be controlled remotely using radio frequency, similar to as disclosed in *Sembhi*. (Ex. 1005, 8:4-14; Ex. 1011, ¶[0018].) *See KSR*, 550 U.S. at 416.

E. Ground 5: Claims 6, 18, and 24 Are Anticipated by *Birrell*

1. Claim 6

a) A method of operating an apparatus, the method comprising:

To the extent limiting, *Birrell* discloses this preamble for reasons above for limitation 1(a), 10(a) (showing operation of tile 50 or the lighting system with tile 50 (each an "apparatus"). (Sections IX.A.1(a) and IX.A.4(a); Sections IX.E.1(b)-(e); Ex. 1002, ¶¶151-152.)

b) receiving power wirelessly in the apparatus;

Birrell discloses this limitation. (Ex. 1002, ¶153.) For example, *Birrell* discloses that lighting tile 50 receives power wirelessly through capacitive coupling. Figure 8 describes a device with an AC power supply that is capacitively coupled to tile 50 and transmits wireless power to tile 50 via capacitors C_A and C_B to ultimately power LEDs 59. (Ex. 1005, FIGS. 1 and 8, 2:36-3:16, 3:17-27 (device "coupled to the power source without requiring any direct connection"), 14:26-15:33, 20:26-31; 21:34, 22:29-30 ("a 48 Volt AC power supply…will satisfactorily illuminate the LED's of Figure 8"), 23:2-11).) Such functionality discloses limitation 6(b). (Ex. 1002, ¶153.)

c) transmitting or receiving data signals wirelessly;

Birrell discloses this limitation. (Ex. 1002, ¶154.) A device including the power supply transmits both data and power wirelessly and tile 50 receives the same.

(Ex. 1005, FIG. 8, 8:31-9:10 ("**provid[ing] both data and power through the electrical coupling**…."), 9:11-29, 13:15-23 ("lighting elements may be controlled by data transmitted with the power supply"), 23:15-21 ("all data is transferred by the same electrical path…used for the electrical power transfer," where "data is superpositioned on the primary power.").) Such functionality discloses limitation 6(c). (Ex. 1002, ¶154; *see also* Section IX.E.1(b).)

d) detecting contact with a conductive substance via capacitive sensing; and

Birrell discloses this limitation for the same reasons discussed above for claim limitation 1(c)(2), which describes the operations of detecting such contact like that claimed in limitation 6(d) in relation to the touch sensor component in tile 50. (Section IX.A.1(c)(2); Ex. 1002, ¶155.)

e) increasing a level of power to an LED circuit comprising at least one LED in the apparatus after detection of the contact.

Birrell discloses this limitation for the same reasons discussed above for claim limitation 10(b) ("an LED circuit comprising at least one LED") and claim 14 ("power is provided to said plurality of LEDs after said circuit detects the contact with the conductive substance"). (Sections IX.A.4(b), IX.A.8; Ex. 1002, ¶156.) As explained in those sections, providing power to the LED circuit (and LEDs) after contact detection results in increasing the level of power to the LED circuit to illuminate the LEDs in a manner consistent with *Birrell*'s disclosures and that recited in limitation 6(e). (*Id.*)

2. Claim 18

a) Claim Preamble 18(a)

To the extent limiting, *Birrell* discloses this preamble for the reasons above for limitation 10(a) (tile 50 being an "apparatus"). (Section IX.A.4; Section IX.A.11; *infra* Sections IX.E.2(b)-(d); Ex. 1002, ¶157.)

b) Claim limitation 18(b)

Birrell discloses this limitation for the reasons above for limitation 13(b), which explains how tile 50 ("apparatus") includes the claimed "flat planar substrate" as recited in limitation 18(b). (Section IX.A.7(b); Ex. 1002, ¶158.)

c) Claim limitation 18(c)

Birrell discloses this limitation for the reasons above for limitation 18(c) in Ground 1. (Section IX.A.11(c); Ex. 1002, ¶159.)

d) Claim limitation 18(d)

Birrell discloses this limitation. (Ex. 1002, ¶160.) As discussed in Section IX.A.11(d) (limitation 18(d), Ground 1), *Birrell* discloses a "data receiver" (data demodulator 81 of tile 50). (Section IX.A.11(d).) *Birrell* also discloses a "transmission conductor" in tile 50 providing both data and power to the "data receiver." (*Id.*; Ex. 1005, FIG. 9 (annotated below), 23:15-21 ("the light tile circuitry is structured so that all data is transferred by the same electrical path that is used for the electrical power transfer"), 23:22-29 (data transmitted via modulator 80 and data received by demodulator 81 ("data receiver") via the transmission conductor); Ex. 1002, ¶160.)

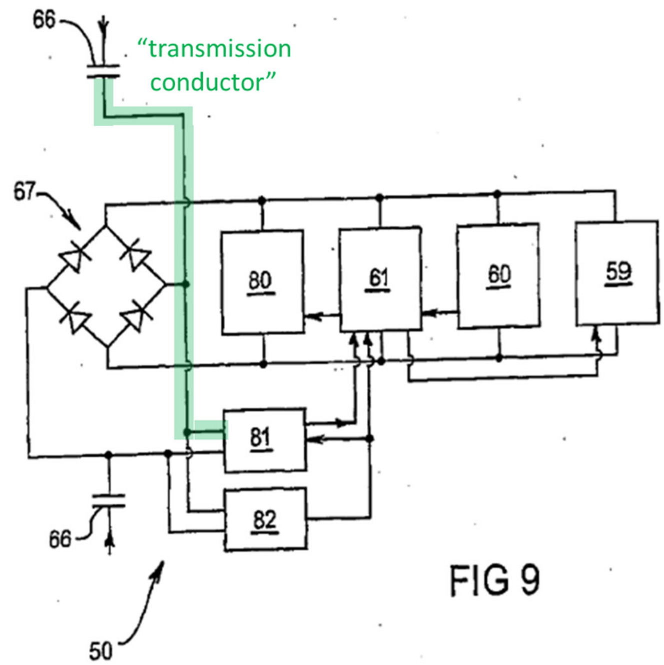


FIG 9

3. Claim 24

a) The method of claim 6, wherein the conductive substance includes a metallic material.

Birrell discloses this limitation for the reasons discussed above for claim 23 of Ground 1. (Section IX.A.15; Ex. 1002, ¶161.)

F. Ground 6: Claims 7, 8, and 25 Are Obvious Over *Birrell*, *Logan*, and *Camras*

1. Claim 7

a) An apparatus comprising:

To the extent limiting, *Birrell* discloses an "apparatus" for the reasons above for limitation 10(a) (tile 50 as "apparatus"). (Section IX.A.4(a); *infra* Sections IX.F.1(b)-(g); Ex. 1002, ¶¶162-163.)

b) an LED circuit including a plurality of LEDs;

Birrell discloses this limitation for the reasons above for limitation 10(b). (Section IX.A.4(b); Ex. 1002, ¶164.)

c) a data receiver, wherein the data receiver is configured to receive data from an antenna;

Birrell in view of *Logan* discloses/suggests this limitation for the reasons above for limitation 10(e). (Section IX.A.4(e); Ex. 1002, ¶165.)

d) a first circuit configured to detect contact with a conductive substance via capacitive sensing for at least controlling the LED circuit;

Birrell discloses this limitation for the reasons above for limitations 1(c)(2), 10(d). (*Supra* Sections IX.A.1(c)(2), IX.A.4(d); Ex. 1002, ¶166.)

e) a second circuit having a transmission conductor and an inductor, wherein the second circuit is configured to use at least the inductor to receive power wirelessly for powering the apparatus; and

Birrell in view of *Logan* discloses/suggests this limitation for the reasons above for limitations 1(b) and 1(c)(3) (modified tile 50 in *Birrell-Logan* combination includes a circuit having a transmission conductor and inductor like that in limitation 7(e).) (*Supra* Sections IX.A.1(b), IX.A.1(c)(3); Ex. 1002, ¶167.)

f) a lens doped with particles configured to transmit light,

The *Birrell-Logan* combination in view of *Camras* discloses/suggests this limitation. (Ex. 1002, ¶¶168-171.) *Birrell* discloses that a front cover of lighting tile 50 may be an optical lens (Ex. 1005, 16:27-36) and that certain coatings/layers may be applied to the LED to change its light color (*id.*, 12:4-21). While *Birrell* does not expressly disclose that the lens is "doped with particles configured to transmit light," a POSITA would have found it obvious to implement such features in view of *Camras*. (Ex. 1002, ¶168.)

Camras discloses an LED lighting device. (Ex. 1009, Abstract) and that "conventional phosphor particles" may be used to dope optical lenses of LEDs to "convert[]" light of wavelengths emitted…to other wavelengths." (Ex. 1009, ¶¶ [0054], [0059].) Indeed, *Camras* teaches doping the LED lens with particles (e.g., phosphor) to transmit lights of different colors, similar to as described in the '298 patent. (Ex. 1001, 14:13-19; Ex. 1002, ¶169.)

A POSITA when implementing *Birrell* (as modified above) would have been motivated to look to *Camras*, as both *Birrell* and *Camras* disclose applying phosphor particles to an LED to change its color. (Ex. 1005, 12:4-21 (phosphor coating/layer may be directly applied on to LED or disposed at or adjacent to the first major surface of the lighting element); Ex. 1009, ¶¶[0054] ("phosphor particles"), [0059].) In light of such disclosures/suggestions, a POSITA would have been motivated to configure the LED lighting components of the modified tile 50 to include a lens doped with particles (e.g., phosphor particles) to transmit light to allow the *Birrell-Logan* apparatus to provide LED illumination at different colors. (Ex. 1002, ¶170.) A POSITA would have understood that using a doped lens with the LED components in *Birrell* would have been one of several predictable configuration options, given that (consistent with that known by a POSITA) the light emitted from *Birrell*'s LEDs would need to travel through a lens before being observed. (Ex. 1005, 16:27-36 (lens may provide "an optical correction for emitting light" or "other applied optical techniques").)

Thus, a POSITA would have had the skills/motivation (with a reasonable expectation of success) to implement the above modification, especially since the use of phosphor particles for modifying LED light color was well-known and available. (Ex. 1092, ¶[0195]; Ex. 1002, ¶171.) Likewise because such implementation would have involved applying known technologies and techniques (e.g., known phosphor coating techniques for LEDs (*Birrell* and *Camras*)) to yield the predictable result of providing LEDs of different colors in the combined *Birrell-Logan* apparatus. (Ex. 1002, ¶171.) *See KSR*, 550 U.S. at 416.

g) wherein the apparatus is portable.

Birrell discloses this limitation for the reasons above for claim 17(e). (*Supra* Section IX.A.10(e); Ex. 1002, ¶172.)

2. Claim 8

a) The apparatus of claim 7, wherein said apparatus is configured to provide power to said LED circuit after detection of a touch.

Birrell discloses this limitation for the reasons above for claim limitations 10(b) and 14. (Sections IX.A.4(b) and IX.A.8; Ex. 1002, ¶173.)

3. Claim 25

a) The apparatus of claim 7, wherein the conductive substance includes a metallic material.

Birrell discloses this limitation for the reasons above for claim 23. (Section IX.A.15; Ex. 1002, ¶174.)

G. Ground 7: Claim 9 Is Obvious Over *Birrell*, *Logan*, and *Gleener*

1. Claim 9

a) An apparatus comprising:

To the extent limiting, *Birrell* discloses this preamble for the reasons above for limitation 10(a). (Section IX.A.4(a); *infra* Sections IX.G.1(b)-(f); Ex. 1002, ¶¶175-176.)

b) an LED circuit including at least one LED;

Birrell discloses this limitation for the reasons discussed above for limitation 10(b). (Section IX.A.4(b); Ex. 1002, ¶177.)

c) a data receiver, wherein the data receiver is configured to receive data from an antenna;

Birrell in view of *Logan* discloses this limitation for the reasons discussed for limitation 10(e). (Section IX.A.4(e); Ex. 1002, ¶178.)

d) a capacitor coupled to the antenna, wherein the capacitor is configured to tune the antenna; and

While the *Birrell*-*Logan* combination does not explicitly disclose a capacitor coupled to the disclosed antenna to tune the antenna (Section IX.A.4(e)), it would have been obvious to configure the *Birrell*-*Logan* combination to implement such features in view of *Gleener*. (Ex. 1002, ¶¶179-184.)

Birrell discloses that data communication between devices may be achieved using wireless techniques. (Ex. 1005, 8:4-30; *id.*, 8:31-9:10.) *Gleener* also discloses the use of antennas for wireless communication (Ex. 1010, Abstract, ¶[0002]), and thus a POSITA would have considered *Gleener* when implementing the *Birrell*-*Logan* combination. (Section IX.A.4(e); Ex. 1002, ¶180.)

Gleener discloses a known matching network 10 that includes a capacitor 18 coupled to an antenna 14 to "tune … the antenna" for transmitting wireless signals at a single prescribed frequency bandwidth. (Ex. 1010, ¶[0005].)

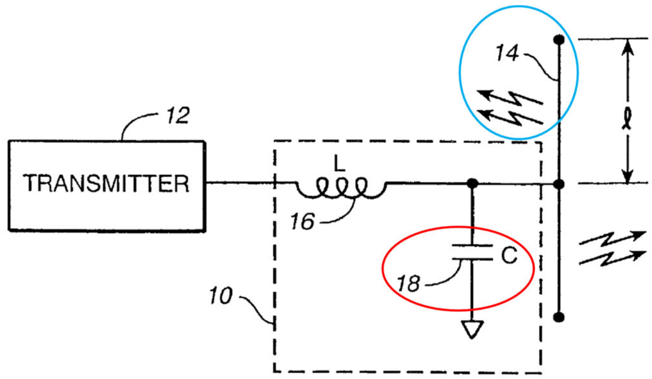


FIG._1
(PRIOR ART)

(Ex. 1010, FIG. 1 (annotated); Ex. 1002, ¶181.) *Gleener* also discloses a matching network 104 that includes a variable capacitor 108 coupled to antenna 106 "to tune the antenna system 100" for transmitting wireless signals at two separate frequency bandwidths. (*Id.*, ¶[0022]; *id.*, Abstract, ¶¶ [0013]-[0014], [0021], [0024]; Ex. 1002, ¶181.)

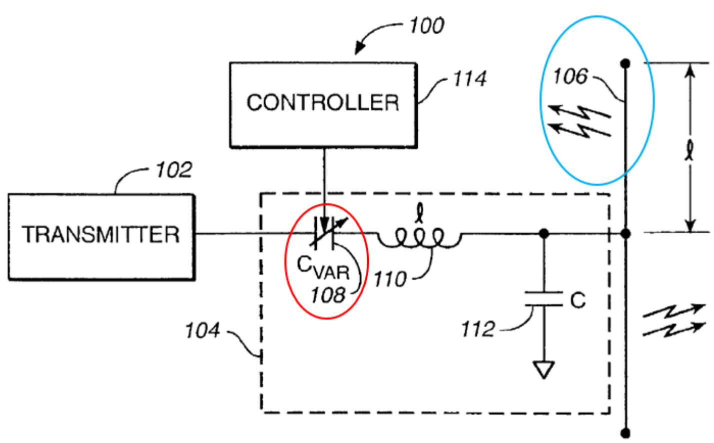


FIG._3

(*Id.*, FIG. 3 (annotated); *id.*, ¶¶[0021]-[0022]; Ex. 1002, ¶181.) A POSITA would have thus understood via *Gleener* that tuning an antenna by using a capacitor may apply to both transmitters and receivers. (Ex. 1010, ¶¶[0012], [0020], [0022], [0025]-[0026]; Ex. 1002, ¶181.)

Thus, POSITA would have been motivated and found it predictable to configure the *Birrell-Logan* combination to couple a capacitor to the combined apparatus's antenna for tuning. (Ex. 1002, ¶182.) Indeed, as disclosed in *Gleener*, "[i]n order to assure the **maximum transfer of energy** …, the **impedances** between the antenna and the transmitter for the frequency of transmission **should be matched**." (Ex. 1010, ¶[0002].) Thus, a POSITA would have found it beneficial to use a matching network that includes a tuning capacitor, similar to as disclosed in *Gleener*, for transmitting or receiving wireless signals at one or more frequency bandwidths. (Ex. 1010, ¶[0020] ("transceiver 100 may also be a receiver or a transmitter depending upon the specific application"); ¶¶[0005], [0020]-[0022], FIGS. 1 and 3; Ex. 1002, ¶182.)

Such a configuration would have enabled the antenna in the *Birrell-Logan* apparatus to be precisely tuned to a frequency at which wireless transmissions occur, and also allowed it to be tuned to one of multiple frequencies, thus increasing the versatility and efficiency of the combined apparatus. (Ex. 1010, ¶¶[0011] ("enables…efficiently transmit[ting] signals"), [0014]; Ex. 1002, ¶183.)

A POSITA would have had a reasonable expectation of success implementing this feature, especially since such configurations were known in the art. (Ex. 1002,

¶184; Ex. 1016, 2:62-65 (tunable variable capacitor element), FIG. 5, 4:49-55 (capacitive tuning network 71 used with the antenna assembly 20); Abstract; Ex. 1026, 31-32 ("variable capacitor…for tuning a…receiver"); Ex. 1002, ¶184.) Indeed, *Gleener* discloses that the capacitor value in the matching network can be determined using "methods known in the art for impedance matching" (Ex. 1010, ¶[0025]) that may apply to "different type[s] of antenna structure" (*id.*, ¶[0027]). (Ex. 1002, ¶184.) Thus, the above configuration would have involved the use of known technologies/techniques (e.g., tuning capacitors for antennas) that would have led to the predictable result of providing tuning for the antenna in the *Birrell-Logan* apparatus. (Ex. 1002, ¶184.) *See KSR*, 550 U.S. at 416.

e) a transmission conductor configured to wirelessly receive an alternating electromagnetic field that is used to provide power to charge the apparatus,

Birrell in view of *Logan* discloses this limitation. (Ex. 1002, ¶¶185-186.) As discussed, an inductor and a conductive wire ("transmission conductor") in the *Birrell-Logan* apparatus receive the wirelessly transmitted power to power the LEDs. (Section IX.A.1(c)(3).) Such wireless power is transmitted/received in the form of an "alternating electromagnetic flux" ("alternating electromagnetic field"). (Ex. 1006, 3:19-5:4, 6:12-14 ("transmitted electromagnetic signal"), 7:20-26 ("electromagnetic field transmitted by the transmission coil"); FIGS. 1-2; Ex. 1002, ¶185.)[18]

Additionally, *Birrell* discloses that tile 50 includes "energy storage components." (Ex. 1005, 15:34-16:10.) To the extent the "energy storage components" are found not to be chargeable, it would have been obvious to configure the energy storage components to be a rechargeable battery that is charged via the wirelessly received alternating electromagnetic field. (Ex. 1002, ¶186.) A POSITA would have recognized that choosing between a rechargeable and non-rechargeable battery would have been a choice between a finite number of predictable options, and that rechargeable batteries were known to be configured to wirelessly receive power. (Ex. 1002, ¶186; Ex. 1011, 3:23-34 (wirelessly received power "for charging a power storage device, such as batteries, in wireless and other electrical devices"); Ex. 1022, ¶¶[0085]-[0087] (rechargeable battery to power LEDs); Ex. 1002, ¶186.) Thus, implementing a rechargeable battery capable of being charged via the wireless signals provided in the *Birrell-Logan-Gleener* apparatus would have been obvious because it would have been one of a "finite

[18] PO asserts wireless charging "necessarily includ[es] a transmission conductor configured to wirelessly receive an alternating electromagnetic field." (Ex. 1110, 17; Ex. 1114, 15.)

number of identified, predictable solutions" for providing power to the apparatus. *Perfect Web Techs., Inc. v. InfoUSA, Inc.*, 587 F.3d 1324, 1331 (Fed. Cir. 2009). Recognizing the known benefits of rechargeable batteries, and the advantages of providing wireless charging of such components, a POSITA would have been motivated to implement such features in the *Birrell-Logan-Gleener* apparatus, and done so with a reasonable expectation of success, especially given the teachings/suggestions of *Birrell-Logan-Gleener* and state of the art knowledge. (Ex. 1002, ¶186.)

f) wherein the apparatus is portable.

Birrell discloses this limitation for the reasons above for claim limitation 17(e). (*Supra* Section IX.A.10(e); Ex. 1002, ¶187.)

H. Ground 8: Claim 16 Is Obvious Over *Birrell*, *Logan*, and *Rahmel*

1. Claim 16

a) An apparatus comprising:

To the extent limiting, *Birrell* discloses this preamble for the reasons for limitation 10(a) (Ground 1). (*Supra* Section IX.A.4(a) ; *infra* Sections IX.H.1(b)-(f); Ex. 1002, ¶¶188-189.)

b) an LED circuit comprising at least one LED;

Birrell discloses this limitation for the reasons discussed above for limitation 10(b) (Ground 1). (*Supra* Section IX.A.4(b); Ex. 1002, ¶190.)

c) a data receiver, wherein the data receiver is configured to receive data from a first antenna;

Birrell in view of *Logan* discloses/suggests this limitation for the reasons above for limitation 10(e) (Ground 1). (*Supra* Section IX.A.4(e); Ex. 1002, ¶191.)

d) a second antenna configured to receive radio frequency noise, wherein said radio frequency noise is used to provide power to said apparatus; and

Birrell in view of *Logan* and *Rahmel* discloses this limitation. (Ex. 1002, ¶¶192-197.) While the *Birrell-Logan* combination discloses "a first antenna," it does not expressly disclose "a second antenna" configured as claimed. Nevertheless, a POSITA would have found it obvious to implement this feature in view of *Rahmel*. (Ex. 1002, ¶192.)

Rahmel discloses a wireless power system, and thus a POSITA would have had reason to consider the teachings of *Rahmel* when implementing the *Birrell-Logan* apparatus (Ex. 1011, 1:7-13; Ex. 1002, ¶193.) *Rahmel* discloses using an energy reclamation system (ERS) antenna to receive ambient RF noise and convert the same to power a device and/or to charge a battery therein. (Ex. 1011, 1:52-2:20, FIG. 7.) Such ERS antenna may be implemented in addition to an existing antenna. (*Id.*, 9:56-10:15, FIGS. 6 and 11; Ex. 1002, ¶193.)

Rahmel explains that the separate antennas (ERS antenna and original antenna) can be "designed with different dimensions to receive signals at their respectively desired frequency bands." (Ex. 1011, 10:1-4; *id.*, 6:59-64, 9:56-10:15.)

Rahmel discloses that a design using multiple antennas allows efficient energy transfer. (*Id.*, 6:41-48 ("each antenna…can be designed to have maximum efficiency").) Furthermore, a dedicated ERS antenna could be placed in a location where the noise signal is strong in order to maximize energy collection. (*Id.*, 6:64-7:4; Ex. 1002, ¶194.) *Rahmel* also explains that energy collected via an ERS antenna may be stored in an energy storage subsystem (ESS), such as a rechargeable battery, as backup power. (Ex. 1011, 3:14-42, 5:26-50, 9:48-11:8, FIGS. 7 and 11.) Thus, a POSITA would have found it beneficial to implement an ERS antenna ("second antenna") in the *Birrell-Logan* apparatus in light of such guidance. (Ex. 1002, ¶¶194-195.)

Such a modification would have allowed the *Birrell-Logan* apparatus to benefit from efficient wireless communications over various frequencies and dedicated functionalities to improve operations of the apparatus (e.g., use of antennas for receiving power/data over different frequencies, receiving power to charge/power certain components (e.g., energy storage components, other components), etc.). (Ex. 1002, ¶196.) A POSITA would have considered the design trade-offs of including multiple antennas in the apparatus with the advantages and improved efficiencies, as suggested by *Rahmel*. (Ex. 1002, ¶196.)

A POSITA would have the capability and reasonable expectation of success in implementing such a modification, given the guidance by *Rahmel*, which explains implementations of an ERS antenna can be flexible based on "any physical size limitations," and "the technology available." (Ex. 1011, 2:37-42; Ex. 1002, ¶197.) Thus, a POSITA would have had the capabilities and motivation (with reasonable expectation of success) to implement such a modification, especially given it would have involved applying known technologies/techniques (e.g., as described by *Birrell-Logan* and *Rahmel*) to yield the predictable result of providing multiple antennas in the combined apparatus, while achieving the benefits of receiving/providing efficient wireless power based on RF noise to power the apparatus and device components (e.g., battery, components, etc.). (Ex. 1002, ¶197.) *See KSR*, 550 U.S. at 416.

e) a circuit configured to detect contact with a user via capacitive sensing for at least controlling the LED circuit,

Birrell discloses this limitation for the reasons above for limitations 1(c)(2) and 10(d) and that its capacitive touch sensor is capable of "human touch sensing" ("detect contact with a user"). (*Supra* Sections IX.A.1(c)(2) and IX.A.4(d); Ex. 1005, 16:18-26; Ex. 1002, ¶198.)

f) wherein said apparatus is portable.

Birrell discloses this limitation for the reasons above for claim limitation 17(e) of Ground 1. (*Supra* Section IX.A.10(e); Ex. 1002, ¶199.)

I. Ground 9: Claim 22 Is Obvious Over *Birrell*, *Logan*, and *Sontag*

1. Claim 22

a) A system comprising:

To the extent limiting, *Birrell* discloses this preamble for reasons above for limitations 1(a) and claim 21. (*Supra* Sections IX.A.1(a), IX.A.14; *infra* Sections IX.I.1(b)-(d); Ex. 1002, ¶¶200-201.)

b) a transmit device, wherein the transmit device is configured to transmit power and signals; and

Birrell in view of *Logan* discloses this limitation for reasons above for limitations 1(b) and claim 4. For example, the *Birrell*-*Logan* combination discloses that a device (including, e.g., 48V AC supply and a transmitting coil) transmits both power and signals/data ("a transmit device"). (*Supra* Sections IX.A.1(b), IX.A.3; Ex. 1005, 8:31-9:10-29, 13:15-23, 23:15-21; Ex. 1002, ¶202.)

c) a data communications device, wherein the data communications device includes (a) at least one LED, (b) at least one antenna, and (c) at least one data communications circuit,

Birrell in view of *Logan* discloses this limitation. (Ex. 1002, ¶203.) The analysis for limitation 21(b) explains how the *Birrell*-*Logan* combination discloses a modified lighting tile 50 (a part of a lighting system and a "data communication device" of limitation 22(c)) that includes LEDs 59 ("at least one LED"), a receiving coil ("at least one antenna"), and a "data communications circuit," like that recited in limitation 22(c). (*Supra* Section IX.A.14(b); Ex. 1002, ¶203.)

d) wherein the transmit device is configured to transmit power and signals wirelessly to the data communications device using resonance and inductance.

Birrell in view of *Logan* and *Sontag* discloses this limitation. (Ex. 1002, ¶¶204-207.) As discussed for limitation 1(b) and claim 4, the device in the *Birrell-Logan* combination includes a power supply and transmits power and data ("transmit device" transmitting "power and signals") wirelessly to lighting tile 50 ("data communications device") based on inductive coupling via a transmitting coil ("using … inductance"). (*Supra* Sections IX.A.1(b) and IX.A.3; Ex. 1002, ¶204.) While the *Birrell-Logan* combination does not expressly disclose doing so using both "**resonance** and inductance," a POSITA would have found it obvious to implement such features in view of *Sontag*. (Ex. 1002, ¶204.)

Sontag discloses a wireless transmission system that may be used to transmit signal and electrical energy across a barrier, and thus a POSITA would have considered *Sontag*'s teachings/suggestions in light of *Birrell-Logan*. (Ex. 1012, 1:8-12, 1:29-33, 5:56-6:23; Ex. 1002, ¶205.) Indeed, *Sontag* discloses a system with a "transmitting antenna [that] consists of a **resonant LC circuit** involving **inductor** 22 and capacitor 24" and a "receiving antenna 20 also comprises an LC circuit consisting of inductor 26 and capacitor 28." (Ex. 1012, 3:2-13, FIGS. 1-3; *id.*, 3:14-4:21.) As such, *Sontag* discloses a wireless transmission system "using resonance and inductance" as claimed. (Ex. 1002, ¶205; Ex 1001, 24:57, 26:24-28.) Based on the teachings/suggestions of *Birrell*, *Logan*, *Sontag*, and a POSITA's knowledge, a POSITA would have been motivated to modify the above-discussed *Birrell-Logan* "transmit device" (limitation 22(b)) to transmit power and signals wirelessly to the data communications device "using resonance and inductance." (Ex. 1002, ¶205.)

A POSITA would have been motivated to implement such a modification because, as guided by *Sontag*, it would have allowed the *Birrell-Logan* "transmit device" to have improved transfer characteristics relating to the receiving antenna of tile 50. (Ex. 1012, 2:12-19 (transfer characteristic…relatively independent of the distance," "radial misalignment," and "resonant frequency mismatch"); 2:31-34 (signal level at the receiver being "virtually constant over a much wider range of distance variations between the transmitting antenna and the receiving antenna, both axially and laterally"), 2:35-43, 4:50-5:48, FIGS. 4-5; Ex. 1002, ¶206.) A POSITA would have thus sought to achieve similar benefits in the *Birrell-Logan* system to allow wireless transmissions over a broader range of operating distances and thus expanding the implementation/applications of the system. (Ex. 1002, ¶206; Ex. 1012, 1:34-47, 3:7-14 (applications of other combinations to form a resonant circuit), 3:24-28; Ex. 1002, ¶206.)

A POSITA would have had the capability and motivation (with a reasonable expectation of success) to implement the above modification in light of teachings/suggestions of *Sontag* and *Birrell-Logan*, and that use of inductance and resonance in electrical circuits were known in the art. (Ex. 1002, ¶207; Ex. 1013, 56 ("The most common LC [inductance-capacitance] circuits are resonant circuits"), 57-59.) Indeed, the modification would have involved applying known technologies and techniques (e.g., known wireless transmission features involving inductance and resonance (*Sontag*)) that would have led to the predictable result of a transmit device (as in the *Birrell-Logan* system) configured to wirelessly transmit power/signals using known resonance and inductance features, in a manner consistent with the operations of *Birrell*. (Ex. 1002, ¶207.) *See KSR*, 550 U.S. at 416.

X. DISCRETIONARY DENIAL IS NOT APPROPRIATE HERE

An evaluation of the factors under *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 (Mar. 20, 2020) (precedential), favors institution notwithstanding the concurrent Illinois Litigation (Section II).

The **first *Fintiv* factor** favors institution. Petitioner will seek a stay of the Illinois Litigation upon institution. At minimum, the Board should not speculate regarding the likelihood of stay, particularly because courts routinely issue stays after institution. *Western Digital Corp. et al v. Kuster*, IPR2020-01391, Paper 10 at 8-9 (PTAB Mar. 11, 2021; *Samsung Elec. Am., Inc. v. Snik LLC*, IPR2020-01427, Paper 10 at 10 (PTAB Mar. 9, 2021).

The **second and third *Fintiv* factors** also favor institution. The Illinois Litigation is at an early stage.[19] A trial date has not been set, and there has not been significant resource investment by the court and the parties, particularly compared to the resource expenditures leading up to a trial. (Exs. 1107, 1116.) Moreover, any trial (if it occurs) would likely only occur at least 102 weeks after the service of the complaint—and thus after a final written decision in this IPR. (Ex. 1108, 1-2 (document available at Northern District of Illinois website, estimating "Case Ready

[19] Although PO moved to transfer the Illinois Litigation to Texas, that motion was denied. (Ex. 1115.)

for Trial" 102 weeks after complaint served); Ex. 1107, 5 (Dkt. #16 showing summons returned May 19, 2021).)

The **fourth *Fintiv* factor** similarly favors institution. In the Illinois Litigation, PO has asserted claims 1, 3, 6–10, 12–19, and 21-22 of the '298 patent, while this Petition challenges all 25 claims, so the Illinois Litigation will not resolve all disputed validity issues. (Section IX; Ex. 1113, 2-5; Ex. 1114, 2-116.) Furthermore, Petitioner stipulates it will not pursue in the Illinois Litigation invalidity based on any instituted IPR grounds in this proceeding.

Finally, the **sixth *Fintiv* factor** favors institution. Petitioner diligently filed this Petition **within one week of PO's amended infringement contentions** in the Illinois Litigation (Ex. 1113), with strong unpatentability grounds. (Section IX.) Institution is consistent with the significant public interest against "leaving bad patents enforceable." *Thryv, Inc. v. Click-To-Call Techs., LP*, 140 S. Ct. 1367, 1374 (2020). Moreover, this Petition is the ***sole*** challenge to the '298 patent before the Board—a "crucial fact" favoring institution. *Google LLC v. Uniloc 2017 LLC*, IPR2020-00115, Paper 10 at 6 (May 12, 2020).

XI. CONCLUSION

Accordingly, Petitioner requests institution of IPR for the challenged claims based on the specified grounds.

Respectfully submitted,

Dated: September 7, 2021 By: /Joseph E. Palys/
Joseph E. Palys (Reg. No. 46,508)
Counsel for Petitioner

CERTIFICATE OF COMPLIANCE

Pursuant to 37 C.F.R. § 42.24(d), the undersigned certifies that the foregoing Petition for *Inter Partes* Review of U.S. Patent No. 10,966,298 contains, as measured by the word-processing system used to prepare this paper, 13,907 words. This word count does not include the items excluded by 37 C.F.R. § 42.24 as not counting towards the word limit.

Respectfully submitted,

Dated: September 7, 2021

By: /Joseph E. Palys/
Joseph E. Palys (Reg. No. 46,508)
Counsel for Petitioner

CERTIFICATE OF SERVICE

I hereby certify that on September 7, 2021, I caused a true and correct copy of the foregoing Petition for *Inter Partes* Review of U.S. Patent No. 10,966,298 and supporting exhibits to be served via express mail on the Patent Owner at the following correspondence address of record as listed on PAIR:

K&L Gates LLP- Chicago
P.O. Box 1135
Chicago IL 6090

By: /Joseph E. Palys/
Joseph E. Palys (Reg. No. 46,508)