IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re *Ex Parte* Reexamination of:	)	
	)	
U. S. Patent No. 11,462,942 B2	)	Control No.: *To be assigned*
	)	
Issue Date: October 4, 2022	)	Group Art Unit: *To be assigned*
	)	
Inventors: Afshin Partovi, *et al.*	)	Examiner: *To be assigned*
	)	
Appl. No. 17/728,502	)	Confirmation No.: *To be assigned*
	)	
Filing Date: April 25, 2022	)	
	)	
For: EFFICIENCIES AND METHOD FLEXIBILITIES IN INDUCTIVE (WIRELESS) CHARGING	))	

Mail Stop *Ex Parte* Reexam
Attn: Central Reexamination Unit
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Commissioner:

REQUEST FOR *EX PARTE* REEXAMINATION OF U.S. PATENT NO. 11,462,942

Reexamination is requested under 35 U.S.C. § 302 and 37 C.F.R. § 1.510 for claims 1, 5, 12, and 21 of U.S. Patent No. 11,462,942 B2 ("the '942 patent"), which issued on October 4, 2022 to assignee Mojo Mobility, Inc.

The *ex parte* reexamination fee of $12,600 is paid herewith by deposit account authorization. The Commissioner is hereby authorized to charge any additional fees which may be required regarding this request, or credit any overpayment, to Deposit Account No. 50-2613. Should no proper payment be enclosed herewith, as by a check being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing or a credit card payment form being unsigned, providing incorrect information resulting in a rejected credit card transaction, or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 50-2613.

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Ex. PA-3	U.S. Patent Application Publication No. 2005/0127868 to Calhoon *et al.* ("*Calhoon*")
Ex. PA-4	Watson, J., Mastering Electronics, Third Ed., McGraw-Hill, Inc. (1990) ("*Watson*")
Ex. PA-5	GB Patent Application Publication No. 2202414 ("*Logan*")
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Ex. PA-11	U.S. Patent No. 4,942,352 ("*Sano*")
Ex. PA-12	International Patent Application Publication No. WO1996040367 ("*WangII*")
Ex. PA-13	Fundamentals of Electric Circuits, 2d., Charles Alexander et al., McGraw-Hill, 2004 ("*Alexander*")
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I. Introduction

An *ex parte* reexamination is requested on claims 1, 5, 12, and 21 of U.S. Patent No. 11,462,942 B2, which issued on October 4, 2022 to Partovi ("the '942 patent," Ex. PAT-A), for which the U.S. Patent and Trademark Office ("Office") files identify Mojo Mobility Inc. ("Mojo" or "Patent Owner") as the assignee. In accordance with 37 C.F.R. § 1.510(b)(6), Requester Samsung Electronics Co., Ltd. ("Requester") hereby certifies that the statutory estoppel provisions of 35 U.S.C. § 315(e)(1) and 35 U.S.C. § 325(e)(1) do not prohibit it from filing this *ex parte* reexamination request.

This request raises substantial new questions of patentability based on prior art that the Office did not have before it and/or did not fully consider during the prosecution of the '942 patent, and which discloses or suggests the features recited in the challenged claims. Requester respectfully urges that this Request be granted and that reexamination be conducted with "special dispatch" pursuant to 35 U.S.C. § 305.

The substantial new question of patentability set forth in this request is based on a patent publication in the priority chain of the '942 patent. Specifically, this request establishes that claims 1, 5, 12, and 21 of the '942 patent are not entitled to the filing date of an earlier application (U.S. Patent Application No. 12/116,876 (filed on May 7, 2008, now Pat. No. 8,169,185) in its priority chain, and as a result a publication of the '876 application is prior art against the '942 patent.

In accordance with 37 C.F.R. § 1.20(c), the fee for *ex parte* reexamination (non-streamlined) is submitted herewith. If this fee is missing or defective, please charge the fee as well as any additional fees that may be required to Deposit Account No. 50-2613.

II. Related Proceedings

On October 7, 2022, Patent Owner filed suit against Requester asserting, *inter alia*, infringement of the '942 patent in *Mojo Mobility Inc. v. Samsung Electronics Co., Ltd.*, No 2-22-CV-00292 (E.D. Tex.).

Requester filed *inter partes* review petitions against the '942 patent on June 30, 2023. IPR2023-01098, Paper 1; IPR2023-01099, Paper 1; IPR2023-01100, Paper 1. The Patent Trial and Appeal Board ("the PTAB") denied *inter partes* review.

This request, however, does not raise "the same or substantially the same prior art or arguments" previously presented, including in IPR2023-01098, IPR2023-01099, and IPR2023-1100. 35 U.S.C. § 325(d). This request is based on prior art that the Office did not have before it or did not fully consider during the prosecution of the ’942 patent, and that the PTAB did not have before it in IPR2023-01098, IPR2023-01099, and IPR2023-1100, and which discloses or suggests the features recited in the challenged claims, especially under the broadest reasonable interpretation standard applicable to this request. And the references used in this request are substantially different than those used in the aforementioned *inter partes* reviews.

III. Identification of Claims and Citation of Prior Art Presented

Requester respectfully requests reexamination of claims 1, 5, 12, and 21 of the ’942 Patent in view of the following prior art references, which are also listed on the attached PTO Form SB/08 (Ex. PA-SB08).

Ex. PA-1	U.S. Patent Application Publication No. 2009/0096413 to Partovi *et al.* (“*Partovi*”)
Ex. PA-2	U.S. Patent No. 5,713,939 to Nedungadi *et al.* (“*Nedungadi*”)
Ex. PA-3	U.S. Patent Application Publication No. 2005/0127868 to Calhoon *et al.* (“*Calhoon*”)

A copy of each of the above-listed references is attached to this request pursuant to 37 C.F.R. § 1.510(b)(3). A copy of the ’942 patent is also attached to this request as Exhibit PAT-A pursuant to 37 C.F.R. § 1.510(b)(4).

IV. Overview of the ’942 Patent

A. Specification and Drawings of the ’942 Patent

The ’942 patent is titled “Efficiencies and method flexibilities in inductive (wireless) charging.” (Ex. PAT-A, Cover.) The named inventors are Afshin Partovi and Michael Sears. (*Id.*) It issued from United States Patent Application No. 17/728,502, which was filed on April 25, 2022. (*Id.*) The ’942 patent is a continuation of U.S. patent application No. 17/507,323, filed on Oct. 21, 2021, now U.S. Patent No. 11,316,371, which is a continuation of U.S. patent application No. 16/055,109, filed on Aug. 5 , 2018 , now U.S. Patent No. 11,201,500, which is a continuation of U.S. patent application No. 15/463,252, filed on March 20, 2017, now U.S. Patent No. 10,044,229, which is a continuation of U.S. patent application No. 15/056,689, filed on February 29, 2016, now U.S. Patent No. 9,601,943, which is a continuation of U.S. patent application No. 14/608,052, filed on January 28, 2015, now U.S. Patent No. 9,276,437, which is a continuation of U.S. patent application No. 13/708,548, filed on December 7, 2012, now U.S. Patent No. 8,947,047, which is a continuation of U.S. patent application No. 13/442,698, filed on April 9, 2012, now U.S. Patent No. 8,629,654, which is a continuation of U.S. patent application No. 12/116,876, filed on May 7, 2008, now U.S. Patent No. 8,169,185, which is a continuation-in-part of U.S. patent application No. 11/669,113, filed on January 30, 2007, now U.S. Patent No. 7,952,322. The ’942 patent claims priority to provisional application Nos. 60/763,816 (“’816 Provisional”), filed on January 31, 2006, 60/810,262 (“’262 provisional”), filed on June 1, 2006, 60/810,298 (“’298 provisional”), filed on June 1, 2006, and 60/868,674 (“’674 provisional”), filed on December 5, 2006, 60/916,748 (“’748 Provisional”), filed on May 8, 2007, 60/952,835 (“’835 Provisional”), filed July 30, 2007, 61/012,922 (“’922 provisional”), filed on December 12, 2007, 61/012,924 (“’924 Provisional”), filed on Dec. 12, 2007, 61/015,606 (“’606 Provisional”), filed on December 20, 2007, and 61/043,027 (“’027 Provisional”), filed on April 7, 2008. (*Id.*) Mojo asserts that claims 1 and 21 of the ’942 patent have a July 30, 2007 priority date and claims 5 and 12 of the ’942 patent have a priority date of December 12, 2007. (Ex. LIT-1, 7.)

The ’942 patent is directed to “[a] system for providing power inductively to a portable device.” (Ex. PAT-A, Abstract.) Figure 1, excerpted below, shows a diagram of an embodiment of the alleged invention of the ’942 patent.

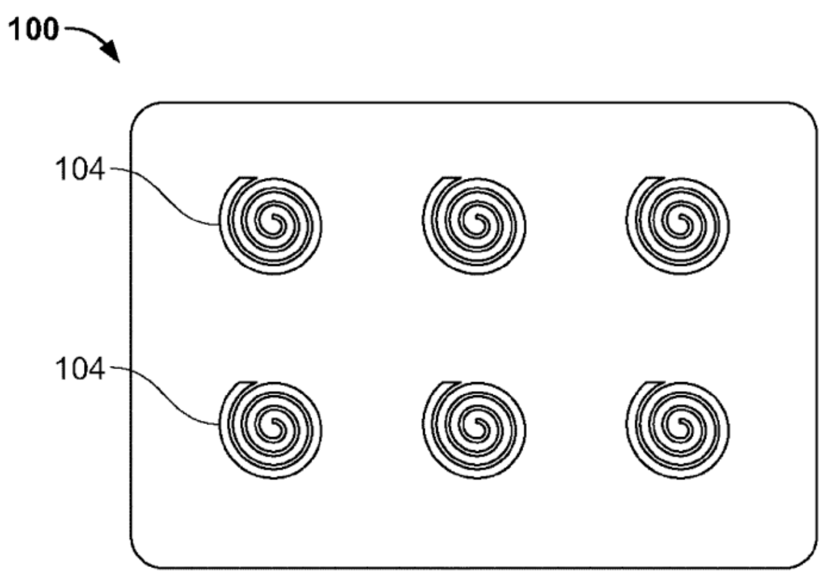


FIG. 1

(*Id.*, Figure 1.)

The '942 patent states concerning Figure 1:

> the mobile device or battery charger or power supply preferably has a substantially flat configuration, such as the configuration of a pad 100, and comprises multiple coils or sets of wires 104. These coils or wires can be the same size as or larger than the coils or wires in the mobile devices, or battery and can have similar or different shapes, including for example a spiral shape. For example, for a mobile device charger or power supply designed to charge or provide power to up to four mobile devices of similar power (up to 10 W each) such as mobile phones, MP3 players, batteries, etc., four or more of the coils or wires will ideally be present in the mobile device or battery charger.

(*Id.*,13:11-22.)

Figure 10 of the '942 patent, excerpted below, shows a more detailed view of the charger:

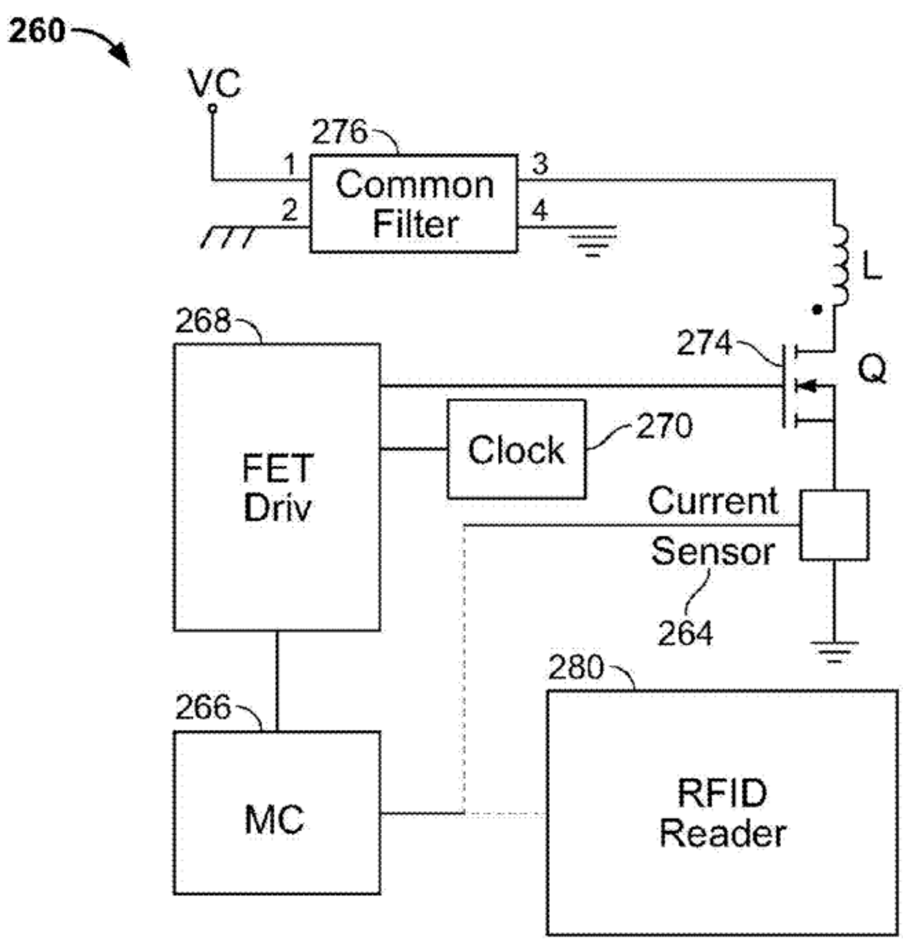


FIG. 10

(*Id.*, Figure 10.)

The '942 patent describes Figure 10 as follows:

> As shown in FIG. 10, in accordance with one embodiment, the pad circuit 260 incorporates a micro control unit (MCU1) 266 that can enable or disable the FET driver 268. The MCU1 receives input from another sensor mechanism that will provide information that it can then use to decide whether a device is nearby, what voltage the device requires, and/or to authenticate the device to be charged or powered.

(*Id.*, 26:21-27.)

Figure 11 of the '942 patent excerpted below shows a receiver capable of charging by the wireless charge:

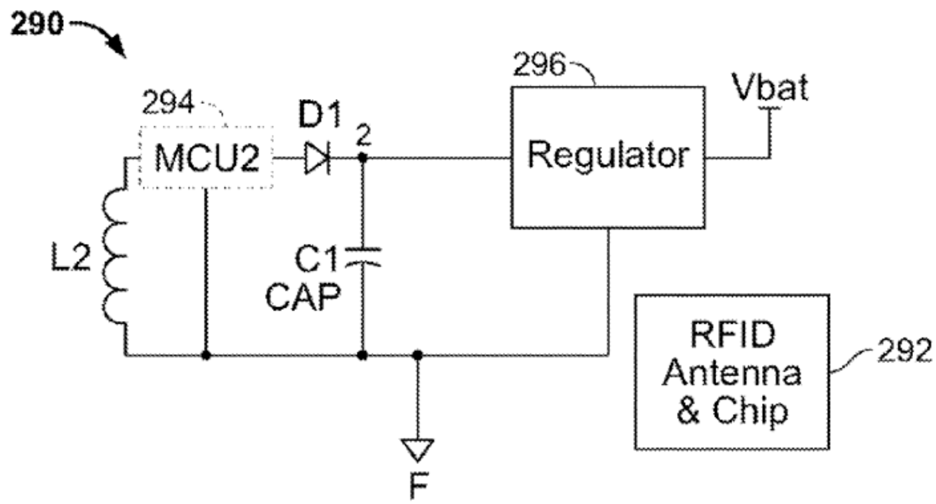


FIG. 11

(*Id.*, Figure 11.)

The '942 patent describes Figure 11 as follows:

> FIG. 11 shows a figure of a circuit diagram 290 in accordance with an embodiment. In accordance with an embodiment, the MCU1 can periodically start the FET driver. If there is a receiver nearby, it can power the circuit. The regulator 296, or another memory chip in the circuit can be programmed so that on power-up, it draws current in a pre-programmed manner. An example is the integration of an RFID transponder chip in the path, such as ATMEL e5530 or another inexpensive microcontroller (shown here as MCU2 294), that upon power-up modulates the current in the receiver that can then be detected as current modulation in the primary. As with the

> previous example, other sensors, such as an RFID antenna 292 can also be used to provide positional and other information.

(*Id.*, 27:5-18.)

The inventors of the '942 patent were involved with problems related to efficiency of a wireless charger capable of wirelessly charging many devices. (*Id.*, 3:13-28.) The '942 patent and the provisionals that the application of the '942 patent claims the benefit of admit that numerous claimed features of the alleged invention were known in the prior art prior to the alleged invention of the '942 patent. For example, the '262 provisional acknowledges that a person of ordinary skill in the art would recognize wireless charging from the principles of a transformer:

> Realizing that a power supply contains a transformer for voltage conversion, **one can envision breaking up the transformer into 2 parts**. One part would contain the first winding and the electronics to drive this winding at the appropriate operating frequency. The other part consists of a winding where power is received and then rectified to obtain DC voltage. If the 2 parts are brought into physical proximity to each other, p**ower is transformed from one part to the other inductively** without any connection.

(Ex. PAT-G, at 2.) (emphasis added)

The '262 provisional further acknowledges that wireless charging and wireless power transfer were known prior to the priority date of the application of the '942 patent: "An early patent in '89 for use of an **inductive charger** for powering batteries in a watch is US patent 4,873,677 by K. Sakamoto et al." (*Id.*, 2.) "Patent 5,959,433 [] describes an **inductively rechargeable battery system**. Patent 6,208,115 [] describes a battery with a coil in the package for receiving power from a **primary charger**." (*Id.*, 3.) "**[I]nductive charging** would be particularly advantageous to [shavers and toothbrushes] []. B Choi. Et al. (Proc. IEEE ICCE '01 June 2001, PP. 58-59) have shown use of such **a charger for a mobile phone application**." (*Id.*) "Patents 5,600,225, 5,963,012, and 6,183,651 describe **charging systems** where ... **power transfer** ... **between the secondary and primary** is established." (*Id.*, 4.)

The '262 provisional further acknowledges that these prior wireless charging systems included a "charging pad":

> More recently, K. Hatanaka, et al., IEEE Trans. On Magnetics, 38, 3329 (2002) have investigated the possibility of developing **a surface with multiple coils** imbedded in it (a desk in this case) where **any device placed on the surface can be charged**. ... S. Hui

> et al., Transactions of 35th IEEE Power Electronics Specialists Conference, Aachen, Germany, pp. 638-644, 2004, describe a method for obtaining uniform power on the surface of **a charging pad**. By having **multiple coils** on 3 pcb layers and activating all the coils simultaneously, they have shown that they can obtain uniform magnetic fields on the surface.

(*Id.*, 3-4.)

The ’262 provisional further acknowledges that wireless charging systems in the prior art wirelessly communicated, using the same set of coils, “information about the power requirements of the battery and its status during the charging”:

> Patents 5,600,225, 5,963,012, and 6,183,651 describe charging systems where in addition to the power transfer, **a communication link between the secondary and primary** is established that transfers **information about the power requirements of the battery and its status** during the charging to the primary. This information is used to establish methods and **parameters for charging (voltage, current, duration, etc.)** and to identify **end of charge** point.

(*Id.*, 4.)

The ’262 provisional further acknowledges a “typical” sequence for selectively activating primary coils for charger operation:

> A **<u>typical</u>** sequence for operation may be as follows: The mobile device charger may be in a low power status normally thus minimizing power usage. However, **periodically, each of the coils** (or a separate data coil in another PCB layer) **is powered up in rotation with a short signal such as a short RF signal that can activate a signal receiver in the secondary** such as an RF ID tag. The mobile device charger then tries to **identify a return signal from any mobile device** (or any secondary) that may be nearby. Once a mobile device (or a secondary) is detected **the mobile device charger and the mobile device proceed to exchange information**. This information can include **a unique ID code** that can verify the authenticity and manufacturer of the charger and mobile device, the **voltage requirements of the battery** or the mobile device, **and the capacity of the battery**.

(*Id.*, 7.)

The ’262 provisional further acknowledges regulating the wireless power transfer by adjusting frequency: “Patent 6,301,128 [] includes a **variable frequency primary driver to optimize power transfer.**” (*Id.*, 3.)

The ’674 provisional further acknowledges a “typical” wireless charging system that combines some of the well-known teachings described above:

> Figure 1 shows the main components of a **typical inductive power transfer system**. This system is **used to illustrate the principle of inductive power transfer** and is not meant to be limiting to the present invention.
>
> The system for transferring power inductively, thus comprises 2 parts: One is **a pad** that contains the primary which creates an alternating magnetic field by means of **applying an alternating current to** a winding**, a coil**, or any type of current carrying wire. In addition, the pad can contain various signaling, and switching or communication circuitry and means of **identifying the presence of devices to be charged**. The pad can also contain **multiple coils** or sections to charge various devices or to allow charging of devices placed anywhere on the pad. The second part is **a receiver** that comprises a means for receiving the energy from the alternating magnetic field from the pad such as **coils**, windings, or any wire **that can sense a charging magnetic field, rectifying it** to produce a dc voltage, and possibly electronic components to set the voltage and current to the appropriate levels required by the device. In addition, the receiver can also contain circuitry to sense and determine the status of the electronic device to be charged, the battery inside, or a variety of f other parameters and to **communicate this information to the pad**.

(Ex. PAT-I, 7.)

Figure 1 of the ’674 provisional depicts the “typical” wireless charging system:

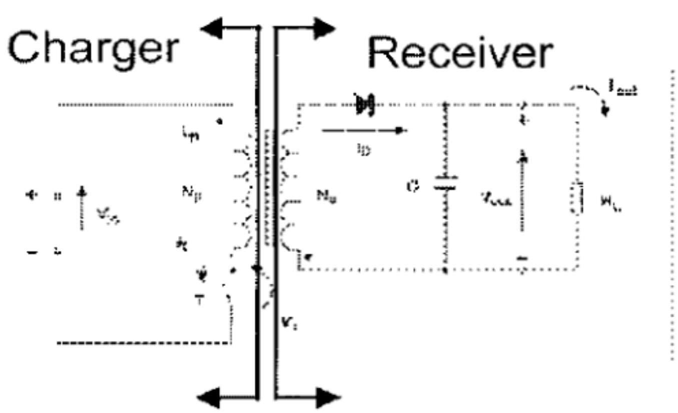


Figure 1 - Simplified picture of an inductive power transfer unit.

(*Id.*, Figure 1.)

The ’674 provisional further acknowledges that the “typical” wireless charging system of Figure 1 was known in prior art publications:

> Hui et al. (Trans. On IEEE Transactions on Power Electronics, Vol. 14, P. 506, 1999) describes the performance of coreless PCBs used as transformers. In operation, the coil demonstrates a resonance at a frequency determined by the parameters of the design of the coil (number of windings, coil thickness, width, etc.). Previous work (Hui, et al., Circuits & Systems, Vol. 11, No. 3, P.2, 2000 & Hui et all, Electronics Letters, Vol. 34, p. 1052, 1998) demonstrate the frequency dependency of the coreless PCB coil. **However, the circuits in these articles are driven by square waves with a MOSFET <u>as shown in Figure 1</u>**.

(*Id*., 9.)

The ’942 patent provides more detail on the “typical” wireless charging system:

> FIG. 2 shows the main components of a **<u>typical</u> inductive power transfer system 110**. The circuit illustrated is **used to illustrate the <u>principle of inductive power transfer</u>** and is not meant to be limiting to an embodiment. In accordance with an embodiment, the charger 112 comprises **a power source 118**, and **a switch T 126 (which can be a MOSFET** or other switching mechanism) that is switched at an appropriate frequency to **generate an AC voltage across the primary coil Lp 116 and generate an AC magnetic field.** This field in turn **generates a voltage in the coil 120 in the receiver 114 that is rectified and then smoothed by a capacitor** to provide power 122 to a load RI 124. For ease of use, a receiver can be integrated with a mobile device, such as integrated inside the mobile device or attached to the surface of the mobile device during manufacture, to enable the device to receive power inductively from a mobile device charger or integrated into, or on its battery.
>
> ...
>
> The mobile device or its battery **<u>typically</u>** can include additional **rectifier(s) and capacitor(s)** to change the AC induced voltage to a DC voltage. This is then fed to **a regulator/charge management chip** which includes the appropriate information for the battery and/or the mobile device. The mobile device charger provides power and the regulation is provided by the mobile device. The mobile device or battery charger or power supply, after **exchanging information** with the mobile device or battery, **determines the appropriate charging/powering conditions to the mobile device**. It then proceeds to power the mobile device with the appropriate parameters required. For example, to set the mobile device voltage

> to the right value required, **the value of the voltage to the mobile device charger can be set. Alternatively, the duty cycle of the charger switching circuit or its frequency can be changed to modify the voltage in the mobile device or battery**. Alternatively, a combination of the above two approaches can be followed, wherein regulation is partially provided by the charger or power supply, and partially by the circuitry in the receiver.

(Ex. PAT-A, 15:21-16:15.)

Figure 2 of the '942 patent depicts the "typical" wireless charging system:

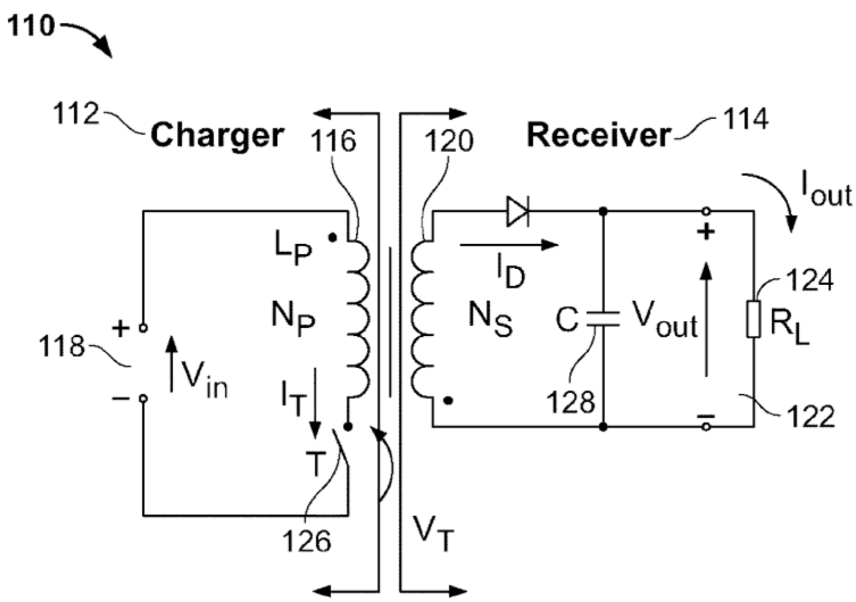


FIG. 2

(*Id.*, Figure 2.)

The '674 provisional further acknowledges that microcontrollers that modulate current were known in the art: "An example would be integration of an RFID transponder chip in the path such as ATMEL e5530 or another inexpensive microcontroller (shown as MCU2) that would upon power-up, modulate the current in the secondary that can be detected as current modulation in the primary (current sensor in Figure 3)." (Ex. PAT-I, 12-13.)

The '942 patent further acknowledges that "ferrite material (such as those provided by Ferrishield Inc.)" was known in the art and was known to be "used between the receiver and the battery to shield the battery or device from the EM fields." (Ex. PAT-A, 20:9-12.)

B. Prosecution History of the ’942 patent

During prosecution of the ’942 patent, the applicant sought claims almost identical to the allowed claims of the ’371 patent, filed a terminal disclaimer, and the application went straight to allowance. (Ex. PAT-B, 504, 562.)

In the notice of allowance, the examiner stated that the prior art failed to teach the combination of features that included “a communication and control circuit ... configured to: detect ... information in the first primary coil,” “operate the first drive circuit ... to power the receiver unit,” and “regulate in a closed feedback manner” the voltage at the rectifier output. (*Id.*, 569-571.) However, the features identified by the examiner were well-known in the art at the time of the invention.

C. Level of Ordinary Skill

A person of ordinary skill in the art (“POSITA”) around the time of the purported invention (whether in or around 2006 or in or around 2012) would have had at least a master’s degree in electrical engineering, or a similar discipline, and at least two years of experience in the relevant field, e.g., wireless power transfer. More education can supplement practical experience and vice versa. (Ex. PA-DEC, ¶¶20-21.)

V. Claim Construction

“During patent examination, the pending claims must be ‘given their broadest reasonable interpretation consistent with the specification.’” MPEP § 2111; *see also* MPEP § 2258. Limitations in the specification are not read into the claims. MPEP § 2258. The standard of claim interpretation in reexamination is different than that used by the courts in patent litigation.[1] Therefore, any claim interpretations submitted or implied herein for the purpose of this reexamination do not necessarily correspond to the appropriate construction under the legal standards mandated in litigation. MPEP § 2686.04.11; *see also In re Zletz*, 893 F.2d 319, 322, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989). For purposes of this request, Requester believes that no

1 Requester reserves all rights and defenses available including, without limitation, defenses as to invalidity, unenforceability, and non-infringement regarding the ’942 patent. Further, because the claim interpretation standard used by courts in patent litigation is different from the appropriate standard for this reexamination, any claim constructions submitted or implied herein for the purpose of this reexamination are not binding upon Requester in any litigation related to the ’942 patent. Specifically, any interpretation or construction of the claims presented herein or in Dr. Baker’s declaration for reexamination, either implicitly or explicitly, should not be viewed as constituting, in whole or in part, the Requester’s own interpretation or construction of such claims.

special constructions of the challenged claims, are needed over the asserted prior art. (Ex. PA-DEC, ¶¶86-87.)

VI. Statement of Substantial New Questions of Patentability

The following combinations of prior art disclose or suggest all of the features of claims 1, 5, 12, and 21 of the ’942 patent.

SNQ1: *Partovi* and *Calhoon* raise a substantial new question of patentability (“SNQ1”) with respect to claims 1, 5, and 12 of the ’942 patent.

SNQ2: *Partovi* and *Nedungadi* raise a substantial new question of patentability (“SNQ2”) with respect to claim 21 of the ’942 patent.

The above combinations were not applied in a rejection by the Patent Office during prosecution. Nor were they presented in IPR2023-01098, IPR2023-01099, IPR2023-01100, which involved different prior art. For example, *Partovi* was not presented as a primary reference like in the instant request. Moreover, as explained in detail below, *Partovi* discloses the “planar coil” limitations that the Board found non-obvious in the particular prior art combination presented in the IPRs. Thus, “the request is not based on the same or substantially the same prior art or arguments presented in the prior petition.” Control No. 90/015,130, Order Granting Request for Ex Parte Reexamination (November 17, 2022) at 10-11., which involved different prior art.

For the reasons discussed below and in the accompanying declaration of Dr. Baker (Ex. PA-DEC), *Partovi*, *Calhoon*, and *Nedungadi* raise a substantial new question of patentability with respect to claims 1, 5, 12, and 21 of the ’942 patent.

A. SNQ1: *Partovi* in View of *Calhoon* Discloses or Suggests Claims 1, 5, and 12

1. Effective Filing Date of Claims 1, 5, 12, and 21 of the ’942 Patent

Mojo asserts that claims 1 and 21 of the ’942 patent are entitled to at least an effective filing date of July 30, 2007 and claims 5 and 12 of the ’942 patent are entitled to at least an effective filing date of December 12, 2007. (Ex. LIT-1, 7.) Mojo’s assertions are incorrect. As explained below, the ’942 patent claims are not even entitled to the May 7, 2008 filing date of U.S. Patent Application No. 12/116,876 (filed on May 7, 2008, now Pat. No. 8,169,185) (the “’876 Application”), which is an application in the priority chain of the ’942 patent. This is relevant because the failure to claim priority back to the ’876 application results in the publication of the ’876 application becoming prior art to the ’942 patent claims. (*See infra* Section VI.A.1.a.1-3.)

The ’942 patent is a continuation of U.S. patent application No. 17/507,323 (filed on Oct. 21, 2021, now U.S. Patent No. 11,316,371) (the “’323 Application”), which is a continuation of U.S. patent application No. 16/055,109 (filed on Aug. 5, 2018, now U.S. Patent No. 11,201,500) (the “’109 Application”), which is a continuation of U.S. patent application No. 15/463,252 (filed on March 20, 2017, now U.S. Patent No. 10,044,229) (the “’252 Application”), which is a continuation of U.S. patent application No. 15/056,689 (filed on February 29, 2016, now U.S. Patent No. 9,601,943) (the “’689 Application”), which is a continuation of U.S. patent application No. 14/608,052 (filed on January 28, 2015, now U.S. Patent No. 9,276,437) (the “’052 Application”), which is a continuation of U.S. patent application No. 13/708,548 (filed on December 7, 2012, now U.S. Patent No. 8,947,047) (the “’548 Application”), which is a continuation of U.S. patent application No. 13/442,698 (filed on April 9, 2012, now U.S. Patent No. 8,629,654) (the “’698 Application”), which is a continuation of U.S. patent application No. 12/116,876 (filed on May 7, 2008, now U.S. Patent No. 8,169,185) (the “’876 Application”), U.S. Patent Application No. 11/669,113 (filed on Jan. 30, 2007, now Pat. No. 7,952,322) (the “’113 Application”), Provisional Application No. 60/763,816 (filed on Jan. 31, 2006) (the “’816 Application”), Provisional Application No. 60/810,262 (filed on Jun. 1, 2006) (the “’262 Application”), Provisional Application No. 60/810,298 (filed on Jun. 1, 2006) (the “’298 Application”), Provisional Application No. 60/916,748) filed on May 8, 2007) (the “’748 provisional”), Provisional Application No. 60/952,835 (filed on July 30, 2007) (the “’835 provisional”), Provisional Application No. 61/043,027 (filed on April 7, 2008) (the “’027 provisional”), Provisional Application No. 61/015,606 (filed on December 20, 2007) (the “’606 provisional”), Provisional Application No. 61/012,924 (filed on Dec. 12, 2007) (the “’924 provisional”), Provisional Application No. 61/012,922 (filed on December 12, 2007) (the “’922 provisional”), and Provisional Application No. 60/868,674 (filed on Dec. 5, 2006) (the “’674 Application”). (Ex. PAT-A, Cover.)

Claims 1, 5, 12, and 21 of the’942 Patent are, however, not entitled to the May 7, 2008 filing date of the ’876 Application because the ’876 Application (and the prior applications it incorporates by reference) does not provide written description support for each limitation in claims 1, 5, 12, and 21.

“It is elementary patent law that a patent application is entitled to the benefit of the filing date of an earlier filed application only if the disclosure of the earlier application provides support for the claims of the later application, as required by 35 U.S.C. § 112." *PowerOasis, Inc. v. T-Mobile USA, Inc*., 522 F.3d 1299, 1306 (Fed. Cir. 2008) (citations omitted*); see also Research Corps. Techs. v. Microsoft Corp*., 627 F.3d 859, 871-72 (Fed. Cir. 2010) (holding that a later-filed application, with claims that were not limited to a "blue noise mask," was not entitled to the priority filing date of the parent application, which was "limited to a blue noise mask"). This requirement prevents an inventor from "overreaching" in a later-filed application as to the scope of what was invented at the time of the earlier-filed application by requiring that the invention be described in "such detail that . . . future claims can be determined to be encompassed within the . . . original creation." *Vas-Cath Inc. v. Mahurkar*, 935 F.2d 1555, 1561 (Fed. Cir. 1991). To satisfy the written description requirement, the disclosure of the earlier-filed application must "reasonably convey[]" to one of ordinary skill in the art that, as of the filing date sought, "the inventor had possession" of the subject matter now claimed. *Ariad Pharm., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351–52 (Fed. Cir. 2010); *Vas-Cath*, 935 F.2d at 1563-64. The test for written description, therefore, requires "an objective inquiry into the four corners of the specification from the perspective of a person of ordinary skill in the art" to determine whether the specification "show[s] that the inventor [had] actually invented," or possessed, each feature now included as a claim limitation. *Ariad Pharm*., 598 F.3d at 1351; *see also New Railhead Mfg*., 298 F.3d at 1295. While "the disclosure as originally filed does not have to provide in *haec verba* support for the claimed subject matter at issue…one skilled in the art, reading the original disclosure***, must immediately discern the limitation at issue in the claims***." *Purdue Pharma L.P. v. Faulding Inc.*, 230 F.3d 1320, 1323 (Fed. Cir. 2000) (emphasis added).

Here, none of the aforementioned applications disclose limitation [1.l] which requires the "**communication and control circuit**" <u>in the charger</u> to "**monitor for <u>continued presence</u> of the portable device**" and "**if the portable device is no longer present . . . stop operation of the first drive circuit for the provision of power inductively to the portable device**." (Ex. PAT-A, 75:5-13.[2]) (emphasis added); Ex. PA-DEC, ¶¶102-130.)

Furthermore, none of the aforementioned applications disclose limitation [21.l] which requires the "**receiver circuit**" to "**<u>periodically</u> communicate to the inductive charging system additional information corresponding to a presently induced output voltage or current of the**

[2] [1.l] refers to Requester's numbering of the claim limitations. *See infra* Section VI.A.4.l

receiver rectifier circuit to enable the inductive charging system to regulate in a closed loop feed-back manner the output voltage or current of the receiver rectifier circuit during the charging of the portable device." (Ex. PAT-A, 79:63-80:3) (emphasis added); Ex. PA-DEC, ¶¶131-147.)

a. Claims 1, 5, 12 of the '942 Patent Require the Communication and Control Circuit to Monitor for the Continued Presence of the Portable Device, And If the Portable device Is No Longer Present . . . Stop Operation of the First Drive Circuit

Claim 1 of the '942 Patent requires the communication and control circuit in the charger to "**detect, through the first sense circuit, a received communication of information in the first primary coil.**" (Ex. PAT-A, 74:31-35.) Claim 1 further requires the communication and control circuit to "**monitor for continued presence of the portable device and completion of the charging of the battery detected by the communication and control circuit through the first sense circuit**" and "**if the portable device is no longer present . . . stop operation of the first drive circuit for the provision of power inductively to the portable device**." (*Id.*, 75:5-13.) "[**M]onitor for <u>continued presence</u> of the portable device**," however, is different from detecting the presence of the portable device <u>initially</u>. This is evident from the claim itself because the claim initially recites that the communication and control circuit "detect [] a received communication of information in the first primary coil" from the receiver, and then later recites monitoring for a "**continued**" presence of the portable device. (*Compare id.*, 74:34-35, *with, id.*, 75:5-9.) In other words, "**monitor for continued presence**" requires **<u>the communication and control circuit</u>** to check for the presence of the portable device <u>after</u> the initial detection of the receiver to unit. It is not sufficient for the communication and control circuit to detect the **initial** presence of the portable device. (Ex. PA-DEC, ¶104.) Claim 1 <u>additionally</u> requires that "if the portable device is no longer present . . . stop operation of the first drive circuit for the provision of power inductively to the portable device." (*Id.*, 75:10-13.)

As claims 5 and 12 depend from claim 1, they also require these limitations.

(1) The ’876 Application Does Not Disclose the “Communication and Control Circuit” “Monitor[ing] for [the] Continued Presence of the Portable Device” And “If the Portable device Is No Longer Present . . . Stop Operation of the First Drive Circuit”

The ’876 Application does not disclose the communication and control circuit “**monitor[ing] for [the] continued presence of the portable device**” and “**if the portable device is no longer present . . . , stop operation of the first drive circuit for the provision of power inductively to the portable device**.” (Ex. PAT-A, 75:5-13.) Therefore, the ’942 Patent cannot claim the benefit of the ’876 Application as there is no written description support in the ’876 Application for claim limitation [1.l] of the ’942 Patent.

For example, the ’876 Application’s disclosures related to the presence of the portable device concern either the base unit unilaterally detecting the presence of the portable device or the portable device communicating with the base unit to indicate its <u>initial</u> (as opposed to “continued”) presence near the base unit.

Ex. PAT-J, ¶[0090], (“In some embodiments the pad can also contain various signaling, and switching or communication circuitry, or means of identifying the presence of devices or batteries to be charged or powered.”);

Ex. PAT-J, ¶[0100], (“In one embodiment a chip connected to an antenna (for example, the receiver coil or separate data antenna) or another means of transfer of information can be used to provide information about, for example, the presence of the mobile device or battery, its authenticity (for example its manufacturer code) and the devices' charging/power requirements (such as its required voltage, battery capacity, and charge algorithm profile).”);

Ex. PAT-J, ¶[0103], (“In other embodiments the mobile device or battery can be sensed by means of a number of proximity sensors such as capacitance, weight, magnetic, optical, or other sensors that determine the presence of a mobile device or battery near a coil in the mobile device or battery charger or power supply.”);

Ex. PAT-J, ¶[0153], (“A Hall sensor or a Reed switch can sense a magnetic field. If a small magnet is placed inside the receiver unit of the system, a Hall sensor or Reed switch can be used to sense presence of the magnet and can be used as a signal to start the FET.”);

Ex. PAT-J, ¶[0153], ("Other capacitance, optical, magnetic, or weight, etc. sensors can be incorporated to sense the presence of a secondary or receiver and to begin the energy transfer process.");

Ex. PAT-J, ¶[0164], ("In another embodiment, the pad will include a method for detecting the presence of the mobile device, battery/receiver and taking appropriate action to turn on the coil and/or to drive the coil with the appropriate pattern to generate the required voltage in the receiver. This can be achieved through incorporation of RFID, proximity sensor, current sensor, etc.");

Ex. PAT-J, ¶[0229], ("The current through the FET is monitored through a current sensing method. The inductance of L1 is highly dependent on the presence of objects nearby that affect its magnetic field. These objects include metallic objects or another nearby coil such as L2. Switching L1 at high frequency (100 kHz to several MHz) through a Field Effect Transistor (FET) such as Q1, the value of current being drawn is highly dependent on the L1 Value. This property can be used to sense the presence of nearby devices or batteries capable of drawing power and also to enable bi-directional communication if desired.");

Ex. PAT-J, ¶[0240], ("Figure 36 shows an embodiment in which a coil mosaic is used to cover the surface area of the pad. The circuitry can include means of sensing the presence of a receiver coil to start the appropriate driver to provide power.");

Ex. PAT-J, ¶[0241], ("A sensing mechanism senses the presence of a receiver coil on top or close to a charger or power supply coil and starts the drive circuit to power the appropriate coil. The sensing mechanism can be a current sense mechanism.");

Ex. PAT-J, ¶[0365], ("Alternatively, the case and/or coils can turn on when a device is placed in it by sensing the presence of a device through a magnetic, mechanical, or other form of switch.")

The aforementioned disclosures cannot provide written description support for limitation [1.l] of the '876 Patent because they concern <u>initial</u> detection (as opposed to "continued" presence) of the receiver or portable device.

The '876 Application also discloses "[t]he pad also uses monitoring to find out when and if the first mobile device is removed from the pad, or when the end of charge is reached." (Ex. PAT-J, ¶[0164].) But even this statement does not support claim [1.l]. (Ex. PA-Dec, ¶119.) The statement does not explain ***how*** the pad performs monitoring or ***what happens if the pad finds outs that the mobile device has been removed***. For example, the sentence does not discloses that the communication and control circuit in the charger monitors the continued presence of the portable device as required by the claim – "monitor[ing] for [the] continued presence of the portable device and completion of the charging of the battery detected by the communication and control circuit through the first sense circuit." (Ex. PAT-A, 75:5-9.) Nor is there any disclosure of the communication and control circuit stopping "**operation of the first drive circuit for the provision of power inductively to the portable device**" if the mobile device is no longer present. The single disclosure of the base unit using monitoring to find out when and if the first mobile device is removed from the pad (Ex. PAT-J, ¶[0164]) cannot provide written description support for limitation [1.l] because it fails to disclose the specifics of the claim (e.g., stopping of operation of the drive circuit if the mobile device is found to be absent).

(2) As discussed below, neither the '113 Application or the Provisional Applications, which are incorporated by reference in the '876 Application, remedy this deficiency in the '876 Application. The '113 Application Also Does Not Disclose the "Communication and Control Circuit" "Monitor[ing] for [the] Continued Presence of the Portable Device" and "if the portable device is no longer present . . . , stop operation of the first drive circuit for the provision of power inductively to the portable device."

The '113 Application does not disclose the communication and control circuit "monitor[ing] for [the] continued presence of the portable device and completion of the charging of the battery detected by the communication and control circuit through the first sense circuit" and "if the portable device is no longer present . . . stop operation of the first drive circuit for the provision of power inductively to the portable device." (Ex. PAT-A, 75:5-13.) Therefore, the '942 Patent cannot claim the benefit of the '113 Application as there is no written description support in the '113 Application for claim limitation [1.l] of the '942 Patent.

For example, the '113 Application's disclosures related to the presence of the portable device concern either the base unit unilaterally detecting the presence of the portable device or the portable device communicating with the base unit to indicate its initial (as opposed to "continued") presence near the base unit.

Ex. PAT-E, ¶[0036] ("In some embodiments the pad can also contain various signaling, and switching or communication circuitry, or means of identifying the presence of devices to be charged.");

Ex. PAT-E, ¶[0046] ("In one embodiment a chip connected to an antenna (for example, the secondary coil or separate data antenna) or another means of transfer of information can be used to provide information about, for example, the presence of the mobile device, its authenticity (for example its manufacturer code) and the devices [] charging requirements (such as its required voltage, battery capacity, and charge algorithm profile).");

Ex. PAT-E, ¶[0049] ("In other embodiments the mobile device can be sensed by means of a number of proximity sensors such as capacitance, weight, magnetic, optical, or other sensors that determine the presence of a mobile device near a coil in the mobile device charger. Once a mobile device is sensed near a primary coil or section of the mobile device charger, the mobile device charger can then activate that primary coil or section to provide power to the secondary coil in the mobile device's battery, shell, receiver module, or the device itself.");

Ex. PAT-E, ¶¶[0098]-[0101] ("In addition to high efficiency, one method that is required for minimizing EMI and maintaining high overall efficiency is the ability to recognize the presence of a secondary nearby, and then turning on the pad only when appropriate. Two methods for this are shown in Figures 10 and 11 . . . The MCU1 receives input from another sensor mechanism that will provide information that it can then use to decide whether a device is nearby, what voltage the device requires, and/ or to authenticate the device to be charged . . . One of the sensor mechanisms for this information are through the use of an RFID reader 280 that can detect an RFID tag of circuit and antenna in the secondary (i.e. device to be charged) . . . Once a device containing the tag is nearby the pad, the RFID reader can be activated, read the information on the tag memory and compare with a table to determine authenticity / voltage required or other info . . . Other capacitance, optical, magnetic, or weight, etc. sensors can be incorporated to sense the presence of a secondary or receiver and to begin the energy transfer process.");

Ex. PAT-E, ¶[0110] ("In another embodiment, the pad will include a method for detecting the presence of the mobile device/ receiver and taking appropriate action to turn on the coil and/ or to drive the coil with the appropriate pattern to generate the required voltage in the receiver. This can be achieved through incorporation of RFID, proximity sensor, current sensor, etc. . . . The coils in the pad are normally off and periodically powered up sequentially to sense whether the secondary is nearby by measuring the current through the primary coil. Alternatively, proximity sensors under each section can sense the presence of a magnet or change in capacitance or other parameter to know where a device is placed. RFID techniques with localized antennas under each section or such can also be used.")

Ex. PAT-E, ¶[0110], ("The pad [may] also use the monitoring to find out when and if the first mobile device is removed from the pad or end of charge is reached.")

For the reasons articulated in Section VI.A.1.a.1, the aforementioned disclosures cannot provide written description support for limitation [1.l] of the '942 Patent because, while they generally concern identifying the presence of the receiver or portable device, limitation [1.l] requires the communication and control circuit in the charger to monitor **<u>the continued presence of the portable device</u>**. Therefore, the '113 Application's disclosures related to the presence of the receiver are unrelated to the receiver communicating to the first sense circuit of its continued presence near the base unit. Furthermore, there is no disclosure of **<u>stopping of operation of the drive circuit if the mobile device is found to be absent</u>**. For example, the '113 Application's disclosure that "[t]he pad [may] also use the monitoring to find out when and if the first mobile device is removed from the pad or end of charge is reached," does not disclose **stopping of operation of the drive circuit if the mobile device is found to be absent.** As discussed below, the Provisional Applications, which are incorporated by reference in the '113 Application, cannot remedy this deficiency in the '113 Application.

(3) The Provisional Applications Also Do Not Disclose the "Communication and Control Circuit" "Monitor[ing] for [the] Continued Presence of the Portable Device" and "if the portable device is no longer present . . . , stop operation of the first drive circuit for the provision of power inductively to the portable device."

The '262, '298, '922, '924, '606, '748, '835, and '674 Provisional Application's disclosures related to the presence of the portable device concern either the base unit unilaterally detecting the presence of the portable device or the receiver communicating to the base unit to indicate its **initial** presence near the base unit. *See e.g.*, (Ex. PAT-G, 6-7 ("[t]echniques employed in RF ID whereby a small chip connected to an antenna (secondary coil or separate data antenna) or other means of transfer of information can be used to provide information about, for example, the presence of the mobile device, its authenticity (manufacturer code) and the charging requirements (required voltage, battery capacity, charge algorithm profile, etc."); (Ex. PAT-G, 8, ("The mobile device charger can sense the mobile device by means of change in the conditions of a resonant circuit in the mobile device charger when the mobile device is brought nearby. In another geometry the mobile device can be sensed by means of a number of proximity sensors such as capacitance, weight, magnetic, optical, or other sensors that determine the presence of a mobile device near a coil in the mobile device charger.”)); (Ex. PAT-H, 5, (“In addition, the pad could contain various signaling, and switching or communication circuitry and means of identifying the presence of devices to be charged.”)); (Ex. PAT-H, 5, (“The receiver may contain circuitry to identify its presence and characteristics to the pad.”)); (Ex. PAT-I, 5, (“the pad can contain various signaling, and switching or communication circuitry and means of identifying the presence of devices to be charged.”)); (Ex. PAT-I, 11-13, (“In addition to high efficiency, one method that is required for minimizing EMI and maintaining high overall efficiency is implementation of a method to recognize the presence of a secondary nearby and turning on the pad only when appropriate. Two methods for this are shown in Figure 3 . . . The MCU1 receives input from another sensor mechanism that will provide information that it can use to decide whether a device is nearby, what voltage the device requires, and / or to authenticate the device to be charged . . An RFID reader that would detect an RFID tag of circuit and antenna in the secondary (i.e. device to be charged). The information on the tag can be detected to identify the voltage in the secondary required and to authenticate the circuit to be genuine or under license . . . Once a device containing the tag is nearby the pad, the RFID reader would be activated, read the information on the tag memory and compare with a table to determine authenticity/ voltage required or other info . . . In another method, the MCU1 periodically starts the FET driver. The current through the FET driver is monitored through a current sensing method . . . Other capacitance, optical, magnetic, or weight, etc. sensors can be incorporated to sense the presence of a secondary or receiver and to begin the energy transfer process . . . The MCU1 can periodically start the FET driver. If there is a receiver nearby, it would power the circuit in Figure 4 . . . An example would be integration of an RFID transponder chip in the path such as ATMEL e5530 or another inexpensive microcontroller (shown as MCU2) that would upon power-up, modulate the current in the secondary that can be detected as current modulation in the primary (current sensor in Figure 3).”)); (Ex. PAT-I, 35-36, (“In another embodiment, the pad will include a method for detecting the presence of the mobile device / receiver and taking appropriate action to turn on the coil and / or to drive the coil with the appropriate pattern to generate the required voltage in the receiver. This can be achieved through incorporation of RFID, proximity sensor, current sensor, etc. . . . The coils in the pad are normally off and periodically powered up sequentially to sense whether the secondary is nearby by measuring the current through the primary coil as shown in Figure 3. Alternatively, proximity sensors under each section can sense the presence of a magnet or change in capacitance or other parameter to know where a device is placed. RFID techniques with localized antennas under each section or such can also be used . . . The board will also use the monitoring to find out when and if the first mobile device is removed from the pad or end of charge is reached.”)); (Ex. PAT-M, 22 (“The charging continues in open or closed loop depending on the system architecture until end of charge is achieved. This is either indicated to the charger by the MCU2 or sensed in the charger sense circuit by a change in the amount of current being drawn.”)); (Ex. PAT-L, 14 (“An MCU in the charger, MCUI also monitors the process and can switch on an optional lower voltage input to the primary coil (through Q2 and Voltage Regulator) if necessary. It can also sense the end of charge or perform verification or other tasks.”)); (Ex. PAT-L, 11 (“At the end of the charge cycle, the Charge Management IC can signal end of charge cycle to MCU2 which sends a pre-determined code to MCU1 to shut down the charger, move to hibernation mode or take some other pre-determined step.”)); (Ex. PAT-K, 22 (“The charging continues in open or closed loop depending on the system architecture until end of charge is achieved. This is either indicated to the charger by the MCU2 or sensed in the charger sense circuit by a change in the amount of current being drawn.”)); (Ex. PAT-K, 10(“By monitoring the current and comparing it to a baseline measurement taken at power up, and periodically with no devices nearby, MCU1 can determine whether a device is near the coil and drawing power.”)); (Ex. PAT-P, 6 (“In accordance with some embodiments, the case can also include means of recognition of the device automatically by, for example, RFID, Felica, detection of coil from change in the case's coil's induction, or by verification using proprietary techniques, etc.”)); (Ex. PAT-O, 38 (“The pad also use the monitoring to find out when and if the first mobile device is removed from the pad or end of charge is reached.”)); (Ex. PAT-O, 39 (“In an alternate geometry, the total system current or individual coil current is monitored, and, if a sudden unexpected drawn current is noticed, measures to investigate further or to shut down the appropriate coil indefinitely or for a period of time or to indicate an alarm would be taken.”)) The ’816 and ’027 Provisional Application do not disclose detecting the presence of a portable device.

For the reasons articulated in Section VI.A.1.a.1, the aforementioned disclosures cannot provide written description support for limitation [1.l] of the ’942 Patent because, while they generally concern identifying the presence of the receiver or portable device, or that charging has ended, limitation [1.l] requires the **monitoring for the continued presence of the portable device** near the base unit by the communication and control circuit, which is not disclosed. Moreover, nothing in the above-identified provisionals discloses **stopping of operation of the drive circuit if the mobile device is found to be absent**, as claimed.

b. Claim 21 of the '942 Patent Requires the Charger to "Periodically" Receive Certain Information from the Receiver Circuit

Claim 21 recites a "**receiver circuit**" in the portable device. (Ex. PAT-A, 79:5-26.) Claim 21 recites that the receiver circuit is configured to "**periodically communicate to the inductive charging system additional information corresponding to a presently induced output voltage or current of the receiver rectifier circuit to enable the inductive charging system to regulate in a closed loop feed-back manner the output voltage or current of the receiver rectifier circuit during the charging of the portable device**." (*Id.*, 79:63-80:3 (emphasis added).) This limitation thus requires the receiver circuit to "**periodically**" communicate specific information to the charger, where the specific information is "**a presently induced output voltage or current of the receiver rectifier circuit**." *Id.*

Periodically carries a particular meaning to a person of ordinary skill in the art, which is that something occurs at regular intervals. (Ex. PA-DEC, ¶132.) This meaning is confirmed by the specification of the '942 Patent. (*See e.g.*, Ex. PAT-A. 26:44-45 ("In another embodiment the MCU1 relies on a clock 270 to periodically start the FET driver."), 28:56-59 ("The coils in the pad are normally off and periodically powered up sequentially to sense whether the receiver is nearby by measuring the current through the primary coil.").)

(1) The '876 Application Does Not Disclose the Charger "Periodically" Receiving the Claimed Information from the Receiver

The '876 Application does not disclose a "**receiver circuit**" that "**periodically communicate[s] to the inductive charging system additional information corresponding to a presently induced output voltage or current of the receiver rectifier circuit to enable the inductive charging system to regulate in a closed loop feed-back manner the output voltage or current of the receiver rectifier circuit during the charging of the portable device**." (Ex. PAT-A, 79:63-80:3) (emphasis added). Therefore, the '942 Patent cannot claim priority to the

'876 Application, as there is no written description support in the '876 Application for claim limitation [21.l] of the '942 Patent.

For example, the '876 Application's disclosures related to **periodic** activity concern detecting whether a portable device is nearby the charging pad. (Ex. PAT-J, ¶[00154], ("In accordance with an embodiment, the MCU1 can periodically start the FET driver. If there is a receiver nearby, it can power the circuit.")); *id.*, [00164] ("The coils in the pad are normally off and periodically powered up sequentially to sense whether the receiver is nearby by measuring the current through the primary coil."; *id.*, ¶[00229] ("By monitoring the current and comparing it to a baseline measurement taken at power up, and periodically with no devices nearby, MCU1 can determine whether a device or battery is near the coil and drawing power."); *id.*, ¶[00241] ("Each coil drive can periodically start driving the coil at an appropriate frequency and a current sense circuit can monitor the drawn current to sense when a receiver is nearby thereby affecting the inductance of the charger or power supply coil."); *id.*, ¶[00248] ("The switch periodically switches each of the coils in rotation to the coil drive and sense circuitry. Once an appropriate receiver coil in the vicinity of a charger or power supply coil is detected, that coil may be interrogated further to verify a chargeable device is nearby and then charging or powering of the device begins."; *id.*, ¶[00279] ("MCU1 gives a command to the FET driver periodically to begin switching the coil. The duty cycle may be set very low to generate a low voltage in any potential nearby receiver coil."); *id.*, at 105, claim 7 ("The system of claim 1, wherein one or more coils includes a switch component, and wherein the microcontroller unit periodically starts the switch components, monitors the current therein, and uses the current to sense the proximity of a receiver and device or battery to that coil, and activate charging in that coil, or a selection of coils in that region.").

The aforementioned disclosures cannot provide written description support for limitation [21.l] of the '942 Patent because, while they concern periodic activity, they relate to initial detection of a receiver or portable device. Claim limitation [21.l] requires a "receiver circuit" to "***periodically*** communicate to the inductive charging system ***additional information corresponding to a presently induced output voltage or current of the receiver rectifier circuit*** to enable the inductive charging system to regulate in a closed loop feed-back manner the output voltage or current of the receiver rectifier circuit during the charging of the portable device" which necessarily occurs ***during charging and after a receiver is initially detected***. Therefore, the '876

Application's disclosures related to "**periodically**" are unrelated to periodically communicating **the voltage or current information of the rectifier** via the receiver's coil.

The '876 Application's disclosures relating to the receiver conveying information about the current and voltage to the charger similarly fail to disclose claim [21.l] at least because the information transfer is **not periodic**. *See e.g.*, (Ex. PAT-J, ¶[00118], ("Furthermore, the induced voltage/current in the mobile device can be sensed and communicated to the charger to form a closed-loop, and the duty cycle, frequency, and/or voltage of the switch can be adjusted to achieve the desired voltage/current in the mobile device.")); *id.*, ¶[00180] ("The communicated feedback from the receiver to primary can be used by the primary to, for example, adjust the frequency, or to otherwise alter the output voltage to that receiver, using the frequency/output characteristics described above."); *id.*, ¶[00181] ("In a closed loop design, such as in a switching mode power supply, the device/receiver communicates information back to the primary, and then the primary determines how much power should be sent to the receiver."); *id.*, ¶[00204] ("In one implementation, the receiver sends a digital code corresponding to the output voltage and MCU1 compares this to the earlier output voltage value and makes a determination about which direction and by how many steps to move the frequency. The frequency is then changed accordingly. In another implementation, MCU2 sends one of 2 values corresponding to a voltage high or low condition. If the voltage is within range, MCU2 does not communicate with the primary. When a voltage high signal is received, MCU1, takes a predetermined step towards higher frequency to lower the output power and the process is repeated until output voltage is within required range."); *id.*, ¶[00279] ("The charging continues in open or closed loop depending on the system architecture until end of charge is achieved. This is either indicated to the charger or power supply by the MCU2 or sensed in the charger or power supply sense circuit by a change in the amount of current being drawn."); *id.*, ¶[00204] ("In one implementation, the receiver sends a digital code corresponding to the output voltage and MCU1 compares this to the earlier output voltage value and makes a determination about which direction and by how many steps to move the frequency. The frequency is then changed accordingly. In another implementation, MCU2 sends one of 2 values corresponding to a voltage high or low condition. If the voltage is within range, MCU2 does not communicate with the primary."); *id.*, claim 11 ("wherein the charger or the power supply, and the mobile device, communicate with each other to transfer data").

The aforementioned disclosures cannot provide written description support for limitation [21.l] of the '942 Patent because, while they may disclose a charger receiving information corresponding to the induced voltage or current of the receiver of the portable device, there is no disclosure of the receiver communicating the voltage or current information of the rectifier ***periodically*** (e.g., at a predetermined or regular interval). Furthermore, Applicant's use of the term "periodically" in other portions of the '876 Application confirms that Applicant's non-use of the term when describing communication between the receiver and the charger was deliberate. *See e.g.*, (Ex. PAT-J, ¶[00164], ("The coils in the pad are normally off and <u>periodically powered up sequentially to sense whether the receiver is nearby by measuring the current through the primary coil</u>.")) Moreover, there is no disclosure of communicating voltage or current information, at a regular interval, via a receiver coil.

The '876 Application's disclosures concerning communicating via a primary coil similarly fail to disclose periodically communicating information corresponding to the output voltage or circuit of the receiver rectifier. *See e.g.*, (Ex. PAT-J, ¶[00130], ("In accordance with another embodiment, the receiver in the battery or mobile device also includes a means for providing information regarding battery manufacturer, required voltage, capacity; current, charge status, serial number, temperature, etc. to the charger. In a simplified embodiment, only the manufacturer, required voltage, and/or serial number is transmitted . . . The communication link can also use the same coil or wires as antenna for data transfer or use a separate antenna.")); *id*., ¶[00200] ("The communication between the charger and the receiver 630 is achieved through the same coil as the power transfer."). These disclosures solely relate to conveying information via a coil and fail to disclose conveying such information ***periodically***.

For the forgoing reasons the '942 Patent cannot claim the benefit of the '876 Application as there is no written description support in the '876 Application for claim limitation [21.l] of the '942 Patent. As discussed below, neither the '113 Application or the Provisional Applications, which are incorporated by reference in the '876 Application, remedy this deficiency in the '876 Application.

(2) The '113 Application Also Does Not Disclose the Charger "Periodically" Receiving the Claimed Information from the Receiver

There is no disclosure of a "receiver circuit" that "<u>**periodically**</u> communicate[s] to the inductive charging system additional information corresponding to a presently induced output voltage or current of the receiver rectifier circuit to enable the inductive charging system to regulate in a closed loop feed-back manner the output voltage or current of the receiver rectifier circuit during the charging of the portable device" (Ex. PAT-A, 79:63-80:3) in the '113 Application.

For example, the '113 Application's disclosures related to "periodically" concern powering the primary coil to initially detect whether a portable device is nearby. *See e.g.*, (Ex. PAT-E, ¶[00102], ("In accordance with an embodiment, the MCU1 can periodically start the FET driver. If there is a receiver nearby, it can power the circuit.")); (Ex. PAT-E, ¶[00110], ("The coils in the pad are normally off and periodically powered up sequentially to sense whether the secondary is nearby by measuring the current through the primary coil.")); (Ex. PAT-E, claim 15, ("The system of claim 14 wherein the alternating switching is periodically started and stopped to automatically detect a presence of a mobile device placed close to or aligned with the primary coil of the base unit.")). For the reasons articulated in Section VI.A.1.b.1, the aforementioned disclosures cannot provide written description support for limitation [21.l] of the '942 Patent because, while they concern periodic activity, they relate to initial detection of a receiver or portable device.

The '113 Application's disclosures relating to conveying information about the current and voltage of the receiver similarly fail to disclose periodically communicating information corresponding to the output voltage or current of the receiver rectifier. *See e.g.*, (Ex. PAT-E, ¶[0037], ("In some embodiments, the receiver can also contain circuitry to sense and determine the status of the electronic device to be charged, the battery inside, or a variety of other parameters and to communicate this information to the pad.")); (Ex. PAT-E, ¶[0046], ("In accordance with an embodiment, the mobile device charger or pad, and the various mobile devices, can communicate with each other to transfer data. In one embodiment, the coils in the mobile device charger that are used for powering the mobile device, or another set of coils in the same PCB layer or in a separate layer, can be used for data transfer between the mobile device charger and the mobile device to be charged or the battery directly.")); (Ex. PAT-E, ¶[0063], ("Furthermore, the induced voltage/current in the mobile device can be sensed and communicated to the charger to form a closed-loop, and the duty cycle, frequency, and/or voltage of the switch can be adjusted to achieve the desired voltage/current in the mobile device.")). For the reasons articulated in Section VI.A.1.b.1 above, the aforementioned disclosures cannot provide written description support for limitation [21.l] of the '942 Patent because, while there is disclosure of the charger receiving information corresponding to the induced voltage or current of the portable device, there is no disclosure of the receiver communicating the voltage or current information of the rectifier periodically, or at a regular interval.

(3) The Provisional Applications Also Do Not Disclose the Charger "Periodically" Receiving the Claimed Information from the Receiver

There is no disclosure of a "receiver circuit" that "***periodically*** communicate[s] to the inductive charging system additional information corresponding to a presently induced output voltage or current of the receiver rectifier circuit to enable the inductive charging system to regulate in a closed loop feed-back manner the output voltage or current of the receiver rectifier circuit during the charging of the portable device" in the '262, '298, '922, '924, '606, '816, '027, '748, '835, and '674 Provisional Applications.

For example, the disclosures in these provisional applications related to "periodically," concern powering on the primary coil to initially detect whether a portable device is nearby, not the receiver periodically communicating to the charger the presently induced output voltage or current of the receiver rectifier circuit. *See e.g.*, (Ex. PAT-G, 7 ("However, periodically, each of the coils (or a separate data coil in another PCB layer) is powered up in rotation with a short signal such as a short RF signal that can activate a signal receiver in the secondary such as an RF ID tag.")); (Ex. PAT-I, 15 ("The coils in the pad are normally off and periodically powered up sequentially to sense whether the secondary is nearby by measuring the current through the primary coil as shown in Figure 3.")); (Ex. PAT-H, 18 ("Since batteries in these devices such as pace makers, cochlear implants, or other monitoring devices may need periodic charging, inductive power transfer can provide an ideal non-contact method for charging and testing the performance of the devices (i.e. check up) or downloading data that the devices have logged.")); (Ex. PAT-K, 10 ("By monitoring the current and comparing it to a baseline measurement taken at power up, and periodically with no devices nearby, MCUI can determine whether a device is near the coil and drawing power.")); (Ex. PAT-M, 10 ("By monitoring the current and comparing it to a baseline measurement taken at power up, and periodically with no devices nearby, MCUI can determine whether a device is near the coil and drawing power.")); (Ex. PAT-N, 14 ("As an example, a circular path around the main charger/ power supply PCB coil can be powered by a DC current periodically or when a user desires to charge or power a mobile device."); (Ex. PAT-P, 9 ("In accordance with an embodiment, this part can be a stand-alone charger or desktop charger that comprises a Field Effect Transistor (FET) that periodically turns the current through a coil on and off.”)); (Ex. PAT-O, 14 (“The mobile device charger can be in a low power status normally, thus minimizing power usage. However, periodically, each of the coils (or a separate data coil in another PCB layer) is powered up in rotation with a short signal such as a short radiofrequency (RF) signal that can activate a signal receiver in the secondary such as an RF ID tag.”)).

The ’816 and ’924 Applications do not disclose periodic activity. For the reasons articulated in Section VI.A.1.b.1, the aforementioned disclosures cannot provide written description support for limitation [21.l] of the ’942 Patent because, while they may concern periodic activity, at most they relate to initial detection of a receiver or portable device.

The disclosures in the ’262, ’298, ’922, ’924, ’606, ’816, ’027, ’748, ’835, and ’674 Applications relating to conveying information about the current and voltage of the receiver similarly fail to disclose ***periodically*** communicating information ***corresponding to the output voltage or current of the receiver rectifier***. *See e.g.*, (Ex. PAT-G, 6-7 (“Preferably, the mobile device charger and the mobile devices can communicate with each other to transfer data. In a preferred embodiment, the coils in the mobile device charger used for powering the mobile device or another set of coils in the same PCB layer or in a separate layer can be used for data transfer between the mobile device charger and the mobile device to .be charged or the battery directly . . . other means of transfer of information can be used to provide information about, for example, the presence of the mobile device, its authenticity (manufacturer code) and the charging requirements (required voltage, battery capacity, charge algorithm profile, etc..”)); (Ex. PAT-K, 9 (“The MCUI and current sense chips in the charger and MCU2 can provide bi-directional communication between the charger and the receiver for optimum charging.”)); (Ex. PAT-L, 7 (“As shown in Figure 4, the output voltage to the load is monitored and with changes in the load condition, a chip or a Micro Controller Unit (MCU) varies the frequency or the duty cycle of the FET driver to achieve optimum operation and controlled output voltage with a changing load.”)); (Ex. PAT-M, 11 (“After the initial handshake and verification, the MCUI and current sense chips in the charger and MCU2 can provide bi-directional communication between the charger and the receiver for optimum charging during the charge cycle. The system can also regulate the power and voltage received at the Charge Control Circuit to insure overvoltage conditions do not occur.”)); (Ex. PAT-O, 55 (“In a closed loop design, such as in a switching mode power supply, the device/secondary communicates information back to the primary, and then the primary determines how much power should be sent to the secondary.”)); (Ex. PAT-G, 9 (“Alternatively, the duty cycle of the charger switching circuit or its frequency can be changed to modify the voltage in the mobile device. -- Alternatively, a combination of the above two approaches where regulation is partially provided by the charger and partially by the circuitry in the secondary can be used.”); (Ex. PAT-H, 7 (“In one embodiment, the receiver or the mobile device may, through an electrical (such as RF), mechanical, or optical method, inform the charger about the voltage/ current characteristics of the device. The primary of the charger in the circuit diagram above then can be driven to create the appropriate voltage/ current in the receiver. For example, the duty cycle of the switch in that circuit can be programmed with a microprocessor to be changed to provide the appropriate levels in the receiver.”)); (Ex. PAT-H, 8, (“Furthermore, the induced voltage/current in the mobile device can be sensed and communicated to the charger to form a closed-loop, and the duty cycle, frequency, and/or voltage of the switch can be adjusted to achieve the desired voltage/current in the mobile device.”)); (Ex. PAT-H, 11-12 (“The information exchange between the charger and the receiver may be through an RF link or an optical transmitter/ detector or some combination. RF ID techniques, Near-Field Communication (NFC), bluetooth or some method for information transfer can be used. Similarly, the receiver could send signals that can be used by the charger to determine the location of the receiver to determine which coil or section of the charger to activate. The communication link can also use the same coil or wires as antenna for data transfer or use a separate antenna or use the capabilities of the mobile device (i.e. built in blue tooth or NFC).”)); (Ex. PAT-G, 6 (“Preferably, the mobile device charger and the mobile devices can communicate with each other to transfer data. In a preferred embodiment, the coils in the mobile device charger used for powering the mobile device or another set of coils in the same PCB layer or in a separate layer can be used for data transfer between the mobile device charger and the mobile device to .be charged or the battery directly.”)); (Ex. PAT-G, 9 (“For example, to set the mobile device voltage to the right value required, the value of the voltage to the mobile device charger can be set. Alternatively, the duty cycle of the charger switching circuit or its frequency can be changed to modify the voltage in the mobile device.”)); (Ex. PAT-I, 5 (“In addition, the receiver can also contain circuitry to sense and determine the status of the electronic device to be charged, the battery inside, or a variety of other parameters and to communicate this information to the pad.”)); (Ex. PAT-I, 12-13 (“An example would be integration of an RFID transponder chip in the path such as ATMEL e5530 or another inexpensive microcontroller (shown as MCU2) that would upon power-up, modulate the current in the secondary that can be detected as current modulation in the primary (current sensor in Figure 3).")). The '027 and '748 Provisional Applications do not disclose conveying information about the current and voltage of the receiver to the charger.

For the reasons articulated in Section VI.A.1.b.1, the aforementioned disclosures cannot provide written description support for limitation [21.l] of the '942 Patent because, while there is disclosure of the charger receiving information corresponding to the induced voltage or current of the portable device, there is no disclosure of the receiver communicating the voltage or current information of the rectifier ***periodically***.

2. Overview of *Partovi*

Partovi was filed on January 30, 2007 and published on August 9, 2007 (Ex. PA-1, cover), and qualifies as prior art at least under pre-AIA 35 U.S.C. § 102(b) because the '942 patent claims are not entitled to the May 7, 2008 filing date of the '876 Application. Because the '942 patent claims are not entitled to the filing date of the '876 application, they cannot have a filing date earlier than April 9, 2012, which is the filing date of U.S. Application No. 13/442,698—the next application in the priority chain of the '942 patent. As such, *Partovi* is prior art at least under pre-AIA 35 U.S.C. § 102(b) because its publication date is more than one year before April 9, 2012.[3]

Partovi discloses a pad 100 that inductively transfers power to a mobile device. (Ex. PA-1, ¶¶[0104]-[0118], [0128], FIGS, 1, 2.)

[3] To be sure, the '942 patent claims are not even entitled to the April 9, 2012 filing date of U.S. Application No. 13/442,698 because even the '698 application lacks written description support for the '942 patent claims. But that does not matter for this request. Even assuming *arguendo* that the '942 patent claims could get the April 9, 2012 filing date, *Partovi* would still be prior art.

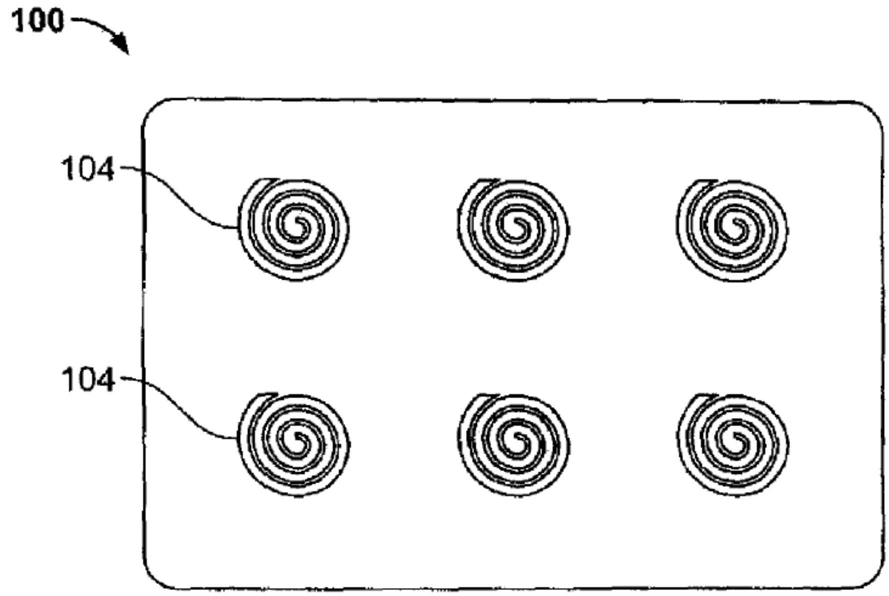
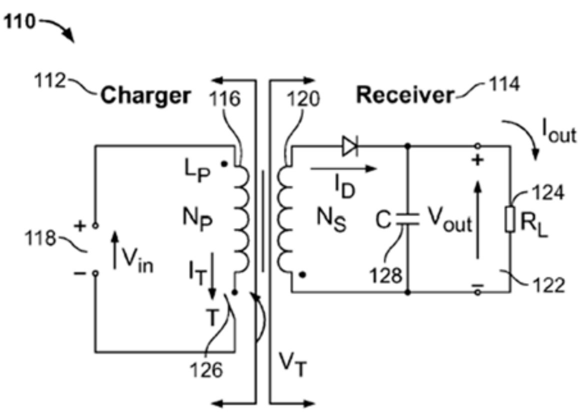


FIG. 1

(*Id.*, FIG. 1.)



(*Id.*, FIG. 2.)

3. Overview of *Calhoon*

Calhoon was filed on December 12, 2003 and published on June 16, 2005, and thus qualifies as prior art at least under pre-AIA 35 U.S.C. § 102(e). *Calhoon* is titled "Inductive Battery Charger." (Ex. PA-3, Cover.) *Calhoon* discloses "[a]n inductive charging system [that] transfers energy by inductively coupling a source coil on a power source to a receiver coil for a battery charger." (*Id.*, Abstract.) *Calhoon* discloses "a charging system 300" that includes "an inductive charging source 302 that wirelessly provides electrical power and/or data communications to an inductive battery charger assembly 304." (*Id.*, ¶[0029].) "The battery charger assembly 304 may be configured to receive electrical energy from inductive power source 302" through "a power pickup coil 324 that is operatively connected to a power supply 320." (*Id.*, ¶[0031].) "In one operation, the power supply 320 of battery charger assembly 304 provides electrical energy to a battery charger 322 that supplies energy to legacy battery pack 350." (*Id.*)

Figure 3, which illustrates the components of the inductive charger system, is reproduced below:

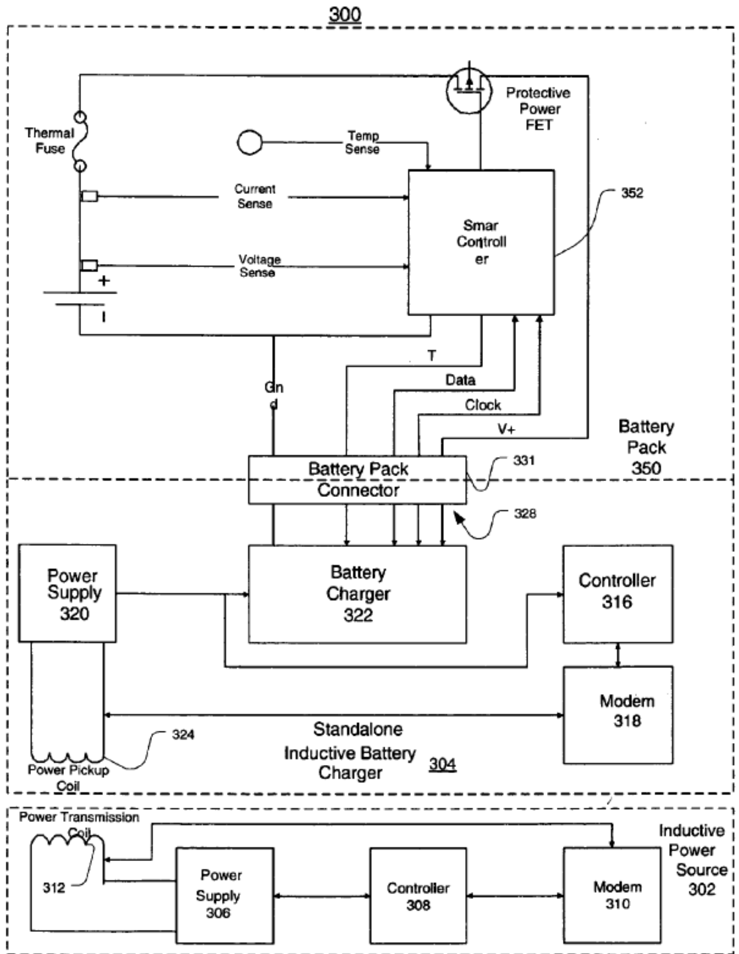


FIGURE 3

(*Id.*, Figure 3.)

Calhoon's charging system can avoid overcharging.

> After the negotiation process, in process block 514, when the battery charger assembly 304 begins to receive its requested voltage and power, the controller 316 may turn on the battery charger 322 in order to charge the battery pack 350. In process block 520, <u>if the battery is charged to the desired level, the battery charger 322 can be switched off-line</u>**.** When power from the source is lost, the battery

> pack returns to its listening mode. In process block 522, if the battery 314 is not at the desired level of charge, then the charging process is continued.

(*Id.*, ¶[0048] (emphasis added).)

Furthermore, charger assembly 304 can transmit information to the inductive power source 302, including "charging parameters ... such as the required charging voltage and maximum power requirement. [and] . . . other information relevant to the battery charger assembly 304, such as a battery charger identification (ID) number, battery type chemistry of the battery pack, or serial number of the battery charger or the serial number of the battery pack [which] can be used for security, data integrity, or other purposes." (*Id.* ¶[0047] (emphasis added).)

Calhoon explains that the inductive power source 302 can authenticate the battery charger assembly 304.

> In process block 606, upon receiving the battery pack's request for power, the inductive charging source 302 may request for a security certificate or digital signature from the battery charger assembly 304 to authenticate it. The security certification or digital signature may be stored in the computer readable storage of the controller 308. In process block 608, if battery charger assembly 304 has a digital certificate or digital signature stored, the battery charger assembly 304 transmits it to the source 302. In process block 610, if the battery charger assembly 304 is authenticated in view of the certification or signature, the source 302 supplies the requested voltage and power the battery charger as shown in process block 612.

(*Id.*, ¶[0052] (emphasis added).)

Calhoon is also in the same field as the '942 patent because *Calhoon* relates to an inductive charging system. (*See, e.g.*, *id.*, ¶[0022].) *Calhoon* is also pertinent to the same types of problems the inventor was trying to solve. For example, *Calhoon* relates to a universal charger that allows "device independence" (*id.*, ¶¶[0006]-[0008]) and can handle "multiple battery packs [with] different power requirements." (*Id.*, ¶¶[0045], [0033] ("This feature provides a more flexible and adaptable solution for persons or organizations with different electronic devices.")) These are problems with which the inventor was concerned. (*See, e.g.*, Ex. PAT-A, at 1:51-3:41.)

4. Claim 1

a. A system for providing power inductively to a portable device comprising a battery and an inductive receiver unit including a receiver coil and a receiver circuit, the system comprising:

To the extent the preamble is limiting, *Partovi* discloses this limitation. (Ex. PA-DEC, ¶¶148-151.) *Partovi* discloses a system for "powering or charging electrical, electronic, battery-operated, mobile, rechargeable batteries . . . ." (Ex. PA-1, ¶[0091].) The system includes "two parts." (*Id.*) "The first part is a pad or similar base unit that contains a primary, which creates an alternating magnetic field by means of applying an alternating current to a winding, coil, or any type of current carrying wire." (*Id.*) "[T]he pad can also contain multiple coils or sections to charge or power various devices or to allow charging or powering of devices or batteries placed anywhere on the pad." (*Id.*) *Partovi* discloses many examples of such a charging pad. For example, "FIG. 3 shows a charging pad using multiple coils" whereas "FIG. 4 shows a charging pad using multiple overlapping coil layers." (*Id.*, ¶¶[0121]-[0122].) Further examples of the coil arrangement in the charging pad are set forth with reference to Figures 36-38. (*Id.*, ¶¶[0051]-[0053].)

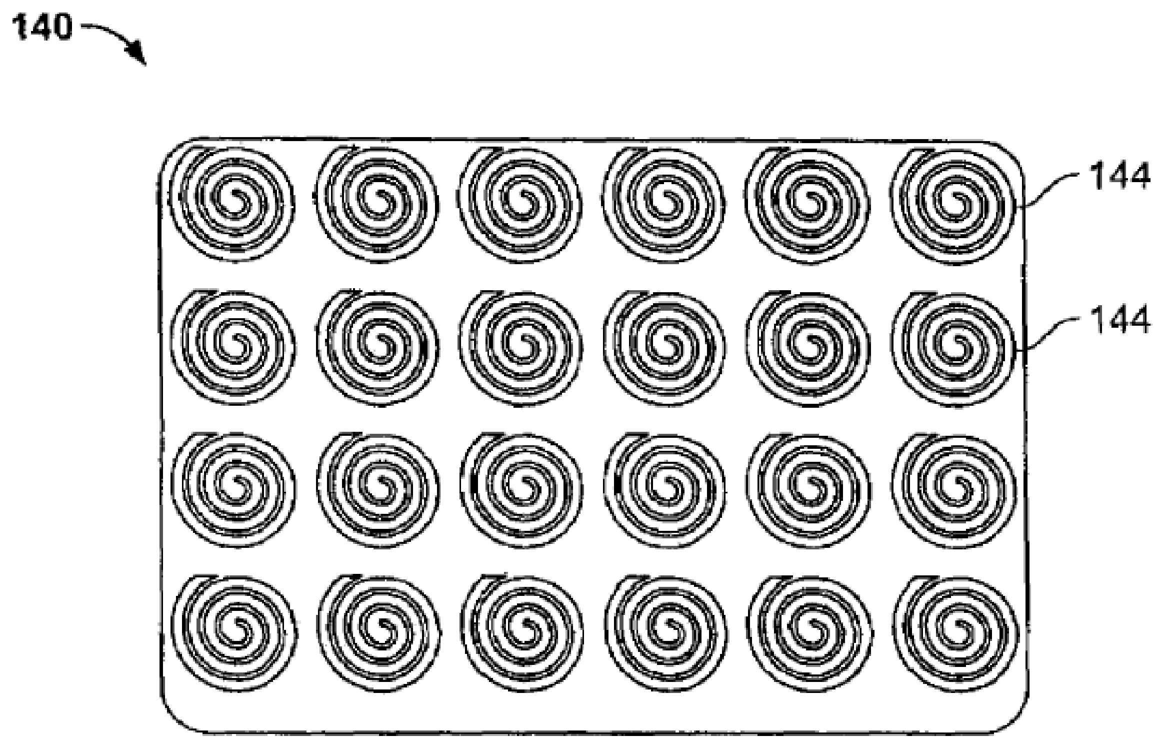


FIG. 3

(*Id*., FIG. 3.)

"The second part of the system is a receiver that comprises a means for receiving the energy from the alternating magnetic field from the pad and transferring it to a mobile battery, or other device. The receiver can comprise coils, windings, or any wire that can sense a changing magnetic field, and rectify it to produce a direct current (DC) voltage, which is then used to charge or power the device or battery." (*Id*., ¶[0091].) The "receiver can also contain circuitry to sense and determine the status of the electronic device or battery to be charged, the battery inside a device, or a variety of other parameters and to communicate this information to the pad." (*Id*., ¶[0092].)

Partovi thus discloses "**[a] system for providing power inductively to a portable device comprising a battery and an inductive receiver unit including a receiver coil and a receiver circuit**."

A specific example of the circuitry associated with the charging pad and the receiver is set forth with reference to "FIG. 34," which "shows the main components of a more advanced wireless power/charging system." (*Id*., ¶[0285].) As shown in Figure 34, the charger provides power to a receiver, which is integrated into a mobile device or electronic device battery. (*Id*., ¶[0285].) The receiver shown in Figure 34 has a receiver coil L2, a battery, and a circuit that includes, *inter alia*, microcontroller MCU2 ("**a battery and an inductive receiver unit including a receiver coil and a receiver circuit**.") (*Id.*, Figure 34.) Moreover, the primary coil L1 (*see* Figure 34) can be one or more coils of the charging pad. (*Id*., ¶¶[0287] ("[a]t the beginning of charging (when a device is placed on a pad first) . . ."), [0323]-[0339], [0364] ("If a receiver coil is placed on the pad, it will cause the appropriate charger or power supply coil center port to contact the pad on the flexible film and therefore the appropriate coil is contacted to points A and C in FIG. 34.").) *Partovi* thus discloses a system, comprising a charger and receiver for charging portable devices.

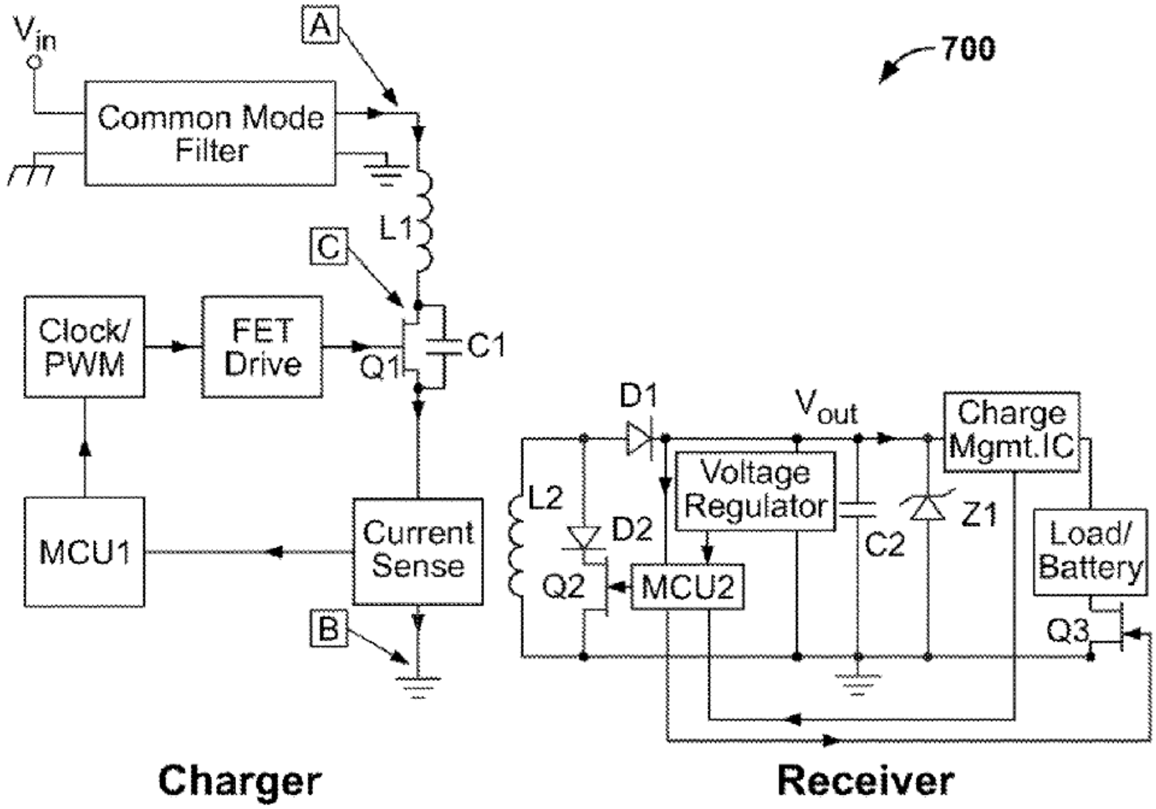


FIG. 34

(*Id.*, FIG. 34.)

The above-described mobile device and charger are a "**system for providing power inductively to a portable device**" wherein the portable device "**comprises a battery and an inductive receiver unit including a receiver coil and a receiver circuit**."

b. a first primary coil that is substantially planar and substantially parallel to a charging surface of the system for providing power inductively to the portable device:

Partovi discloses this limitation. (Ex. PA-DEC, ¶¶152-155.) *Partovi* discloses that the charging pad "contains a primary, which creates an alternating magnetic field by means of applying an alternating current to a winding, coil, or any type of current carrying wire." (Ex. PA-1, ¶[0091].) "[T]he pad can also contain multiple coils or sections to charge or power various devices or to allow charging or powering of devices or batteries placed anywhere on the pad." (*Id.*)

In the Figure 34 implementation, there is a primary coil L1 ("**a first primary coil**") that is used to send power to the receiver, which is incorporated into a mobile device having a battery ("**for providing power inductively to the portable device**"). (*Id.*, ¶¶[0285]-[0286], FIG. 34.)

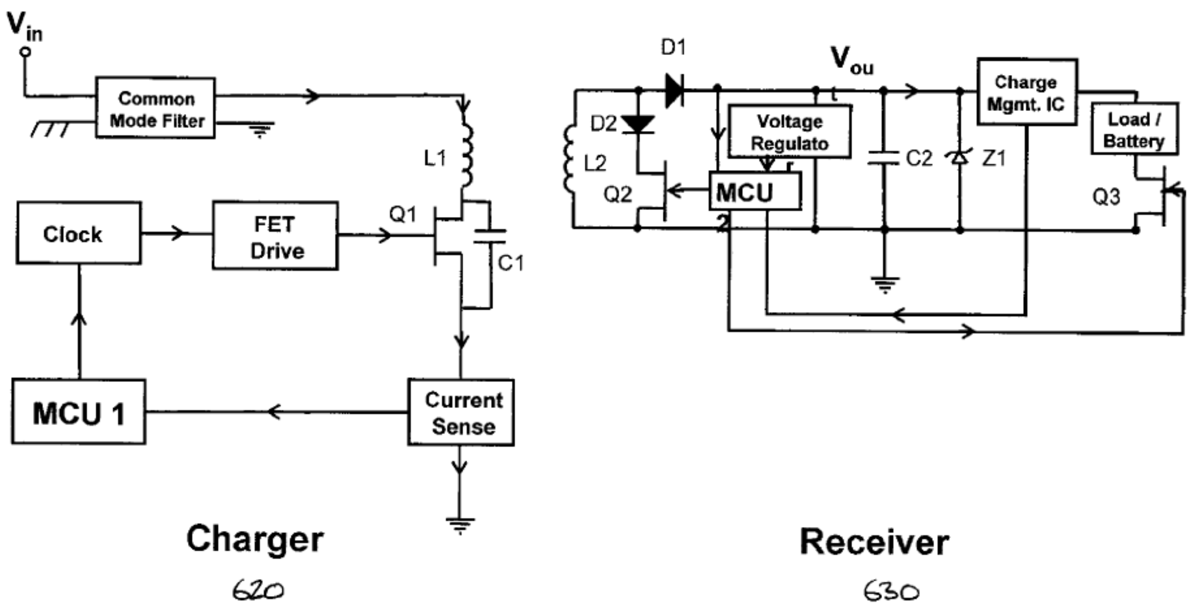


Figure 28

Partovi further discloses that the primary coils in the charging pad are "**substantially planar and substantially parallel to a charging surface of the system**," as claimed. For example, "the mobile device or battery charger or power supply preferably has a substantially <u>flat</u> configuration, such as the configuration of a pad 100, and comprises multiple coils or sets of wires 104." (Ex. PA-1, ¶[0104] (emphasis added).) Furthermore, "the coils can be formed in any number of different shapes, including, for example, flat or planar hexagonal shapes, or spirals." (*Id.*, ¶[0225]; claim 13 ("the primary coil having a generally planar shape").) And the coils are depicted as being parallel to the surface of the pad. (*Id.*, FIGS. 1, 3, 4.)

In particular, Figure 16 of *Partovi* shows cell phones 340 ("**portable devices**") placed on a surface of the charging pad 330 and receiving power. (*Id.*, ¶¶[0031], [0200]) As shown below in Figure 16 of *Partovi*, the primary coils 342 are parallel to the surface of the charging pad upon which the cellphones sit ("**substantially parallel to a charging surface of the system**"). (*Id.*)

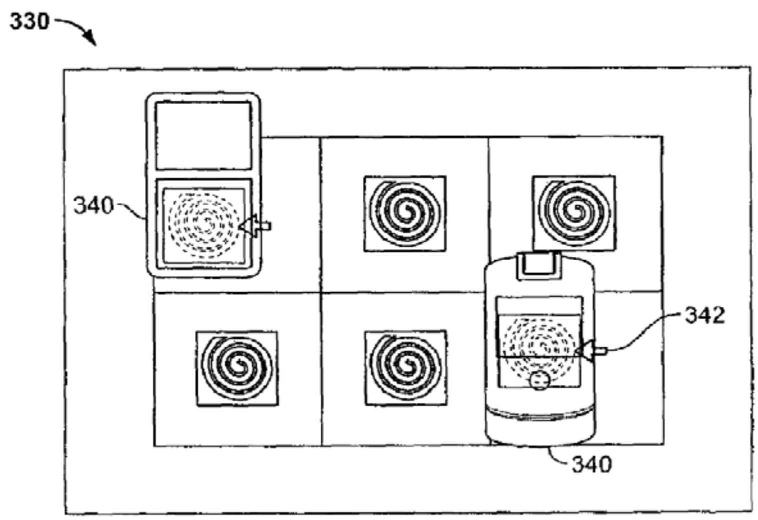


FIG. 16

(*Id.*, Figure 16.)

c. **Limitation 1(c)**

(1) **1(c)(1): a first drive circuit, including a FET driver, a capacitor, and a FET switch, coupled to a DC voltage input and coupled to the first primary coil,**

Partovi discloses this limitation. (Ex. PA-DEC, ¶¶156-158.) Figure 34 of *Partovi* discloses a charger having a drive circuit comprising, *inter alia*, FET drive ("**FET driver**"), capacitor C1 ("**capacitor**"), and Q1 ("**FET switch**,"). (Ex. PA-1, ¶[0290] (stating Q1 is a field effect transistor that may switch primary coil L1).), ¶[0284] ("the coil inductor in the charger pad is switched by Switch T which is typically a FET transistor. A capacitor in parallel with the FET may be used to improve performance."), FIG. 34.)

Partovi discloses the FET driver, FET switch (Q1), and capacitor (C1) are coupled to the primary coil L1 and DC voltage input V_{in} ("**coupled to a DC voltage input and coupled to the first primary coil**"), as shown below in Figure 34. (Ex. PA-1, FIG. 34, ¶[0259] ("In the implementation shown, the primary (Control Circuit, Clock, FET Driver, FET, primary coil, etc.) and the receiver (secondary coil, rectifier, capacitor, other circuitry, etc.) are able to communicate . . .").)

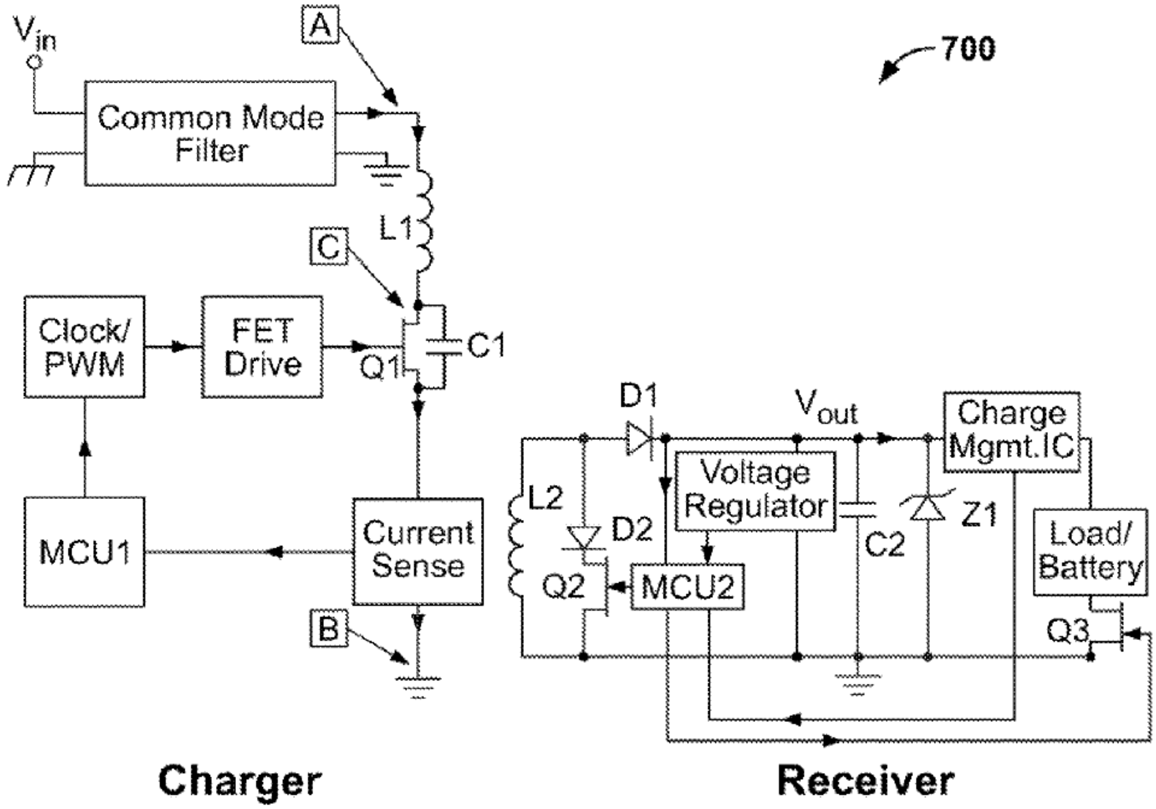


FIG. 34

(Ex. PA-1, Figure 34.)

The combination of the Clock, FET drive, FET switch Q1, and capacitor C1 constitutes a "**drive circuit**."

(2) 1(c)(2): wherein during operation the first drive circuit is configured to apply an alternating electrical current to the first primary coil at an operating frequency and duty cycle to generate an alternating magnetic field in a direction substantially perpendicular to the plane of the first primary coil and the charging surface of the system to provide power inductively to the portable device,

Partovi discloses this limitation. (Ex. PA-DEC, ¶¶159-161.) For example, the microcontroller MCU1 enables the FET driver to drive the primary coil on the pad "to energize the receiver." (Ex. PA-1, ¶[0298].) The FET driver drives the coil by switching the primary coil through the FET Q1. (*Id*., ¶[0290].) When the coil is switched, an AC voltage is generated across the primary coil, which results in an AC magnetic field. (*Id.*, ¶[0117].[4]) In other words, the drive circuit is configured to apply an AC electrical current to the primary coil at an operating frequency to generate a magnetic field, as claimed. (*See id.*, ¶[0091] ("a pad or similar base unit that contains a primary, which creates an alternating magnetic field by means of applying an alternating current to a winding, coil, or any type of current carrying wire"), claim 13 ("when a current is passed through the primary coil a magnetic field is generated in a direction substantially perpendicular to the plane of the primary coil").) *Partovi* thus discloses that "**during operation the first drive circuit is configured to apply an alternating electrical current to the first primary coil . . . to generate an alternating magnetic field**."

The FET driver switches the primary coil at "**an operating frequency and duty cycle**." In one implementation, the operating frequency of the FET drive is "1-2 MHz." (*Id.*, ¶¶[0265], [0259], [0263]-[0264].[5]) The "duty cycle" is set very low at least initially. (*Id.*, ¶[0327].) Indeed, *Partovi* discloses that "a chip or a Micro Controller Unit (MCU) varies the frequency or the duty cycle of the FET driver to achieve optimum operation and controlled output voltage with a changing load." (*Id.*, ¶[259].) This disclosure is applicable to the implementation shown in Figure 34 because, for example, it uses a microcontroller MCU1 to achieve "optimum charging or supply of power" to the receiver. (*Id.*, ¶[285].)

The magnetic field is generated in "**a direction substantially perpendicular to the plane of the first primary coil and the charging surface of the system to provide power inductively to the portable device**." *Partovi* discloses that "the coils can be formed in any number of different shapes, including, for example, flat or planar hexagonal shapes, or spirals." (*Id.*, ¶[0225].) For example, a POSITA would have understood that when an AC current is passed through a spiral coil (such as the one in *Partovi*), a magnetic field will be generated that is perpendicular to the surface of the coil. (Ex. PA-DEC, ¶161.) Indeed, claim 13 of *Partovi* confirms this when it states that "when a current is passed through the primary coil a magnetic field is generated in a direction

[4] Paragraph 117 merely describes the basic principles of inductive charging applicable to the various inductive charging systems disclosed in *Partovi*.

[5] Figures 34 and 28 of *Partovi* have identical components. Therefore, the implementation described in Figure 28 is applicable to Figure 34 as the structures shown in the figures are identical. Indeed, Figure 34 builds upon the description of Figure 28 and the earlier implementations given that Figure 34 is "a more **advanced** wireless power/charging system." (Ex. PA-1, ¶[0285] (emphasis added).)

substantially perpendicular to the plane of the primary coil."[6] (Ex. PA-1, claim 13.) As discussed in Section VI.A.4.b, *Partovi* discloses the surface of the charger system and the primary coils may be substantially parallel to one another, therefore, if the magnetic field is substantially perpendicular to the plane of the primary coil, as disclosed by claim 13, then *Partovi* inherently discloses the magnetic field being substantially perpendicular to the plane of the surface of the system. (Ex. PA-DEC, ¶161.)

(3) 1(c)(3): wherein the operating frequency is within a range of frequencies (i) that are near a resonance frequency of a circuit comprising the first primary coil and the capacitor, (ii) such that increasing values of the operating frequency within the range of frequencies would correspond to a lower voltage or current induced in an output of the receiver circuit and (iii) that allow activation and powering of the receiver unit and charging the battery of the portable device;

Partovi discloses this limitation. (Ex. PA-DEC, ¶¶162-166.) As discussed above, the FET driver switches the primary coil at "**an operating frequency and duty cycle**." (*See* Section VI.A.4.c.2.) In one implementation, the operating frequency of the FET drive is "1-2 MHz." (*Id*., ¶¶[0265], [0259], [0263]-[0264].) Based on Patent Owner's representations in district court, *Partovi* discloses "**wherein the operating frequency is within a range of frequencies (i) that are near a resonance frequency of a circuit comprising the first primary coil and the capacitor**.[7]"

Partovi discloses to save energy it is desirable to regulate the power that is emitted by the charger. (Ex. PA-1, [0129].) To regulate the power emitted by the charger, *Partovi* discloses the receiver may inform the charger about the voltage/current characteristics of the mobile device or battery and then a microprocessor, in the charger, may control the duty cycle of the charger switching circuit to provide the correct power levels to the receiver. (*Id.*) *Partovi* further discloses that the microprocessor could be programmed to change the frequency of the charger switching

[6] Patent Owner cannot dispute that *Partovi* discloses this limitation because Patent Owner claims that the '876 Application (i.e., *Partovi*) provides support for the claims of the '942 Patent.

[7] Mojo has argued that paragraph [0131] of the '109 Application provides written description support for this limitation. (Ex. LIT-2, Rickett Appendix G at 3-5). Paragraph [0131] in the '109 Application is identical to paragraph [130] of *Partovi*, therefore, if there is written description support, which Samsung takes no position on here, then *Partovi* must disclose this limitation.

circuit to move the circuit into, and out of, resonance to create the appropriate voltage in the receiver ("**wherein the operating frequency is within a range of frequencies (i) that are near a resonance frequency of a circuit comprising the first primary coil and the capacitor**."). (*Id.*, ¶[0130].) *Partovi* also discloses that "[t]he coil in the wireless charger system is driven by switching the FET at the resonance frequency of the circuit when the receiver is present." (*Id.*, ¶[0173].) Patent Owner has again taken the position that this disclosure in *Partovi* supports the claim limitation. (Ex. LIT-2, Ricketts Appendix G at 8.)[8]

The embodiment described in paragraphs [0129]-[0130] and [0173] may be applied to the implementation shown in Figure 34 because Figure 34's description expressly contemplates the receiver providing voltage and current information to the charger's microcontroller MCU1, wherein microcontroller MCU1 regulates the power output of the charger to ensure overvoltage conditions do not occur. (Ex. PA-1, ¶¶[0296]-[0298].)

Partovi further discloses "**that increasing values of the operating frequency within the range of frequencies would correspond to a lower voltage or current induced in an output of the receiver circuit**," as claimed. *Partovi* discloses a "[h]igher drive frequency corresponds to lower output power by shortening the time for integration of power in the resonant ZVS cycle and lower frequency corresponds to higher output power." (*Id.*, ¶[0263] (emphasis added).) A POSITA would have understood that a lower output power corresponds to a lower voltage or current induced in the receiver circuit. (Ex. PA-DEC, ¶165.)

Partovi discloses the operating frequency is within a range of frequencies "**that allow activation and powering of the receiver unit and charging the battery of the portable device**." For example, *Partovi* discloses that "MCU1 can periodically start the FET driver" and if a receiver is nearby "the emitted power from L1 will power the receiver circuit" which then "draws current in a pre-programmed manner" that can be detected "as current modulation in current through L1 by the charger" which allows for bidirectional communication between the charger and power supply "for optimum charging" of the battery of the portable device. (*Id.*, ¶¶[0295]-[0296].)

[8] Mojo withdrew its confidentiality designation for this exhibit (Ex. LIT-2) prior to filing.

d. a first sense circuit, including a low pass filter and an amplifier, coupled to the first primary coil to detect communication of information induced in the first primary coil by the receiver coil; and

Partovi discloses this limitation. (Ex. PA-DEC, ¶¶167-169.) *Partovi* discloses that MCU1 periodically starts the FET driver to drive primary coil L1 to determine if a receiver is nearby. (Ex. PA-1., ¶[0295].) If a receiver is nearby, the microcontroller MCU2 in the receiver is powered up by the emitted power from the primary coil L1. (*Id.*, ¶[0295].) MCU2 then executes a predetermined program that modulates "the current being drawn in the receiver in a predetermined code" such that "the receiver modulation can be detected as a current modulation in the current through the L1 by the charger or power supply current sensor in FIG. 34." (*Id.*, ¶[0295] (emphasis added), ¶[0262] ("The Charge Management IC is in communication with the MCU2 which also monitors the output voltage (Vout) and tries to maintain this Vout within a pre-programmed range. This is achieved by MCU2 sending a digital signal to Q2 to modulate the switch. This modulation is prior to the rectifier stage and is at high frequency so the rectified and smoothed Vout is not affected. However, this modulation of the impedance of the secondary stage affects the current through the primary coil stage and can be easily detected by the Current Sense circuit in the primary.") (emphasis added), ¶[0261] ("The primary (charger or power supply) 620 is controlled by a Micro Control Unit (MCU1) that receives signals from a Current Sensor in series with the coil.").) *Partovi*'s "Current Sense" is "**a first sense circuit**" and it is coupled to the primary coil and monitors the current through primary coil L1 to detect communications from the receiver ("**detect communication of information induced in the first primary coil by the receiver coil**.").

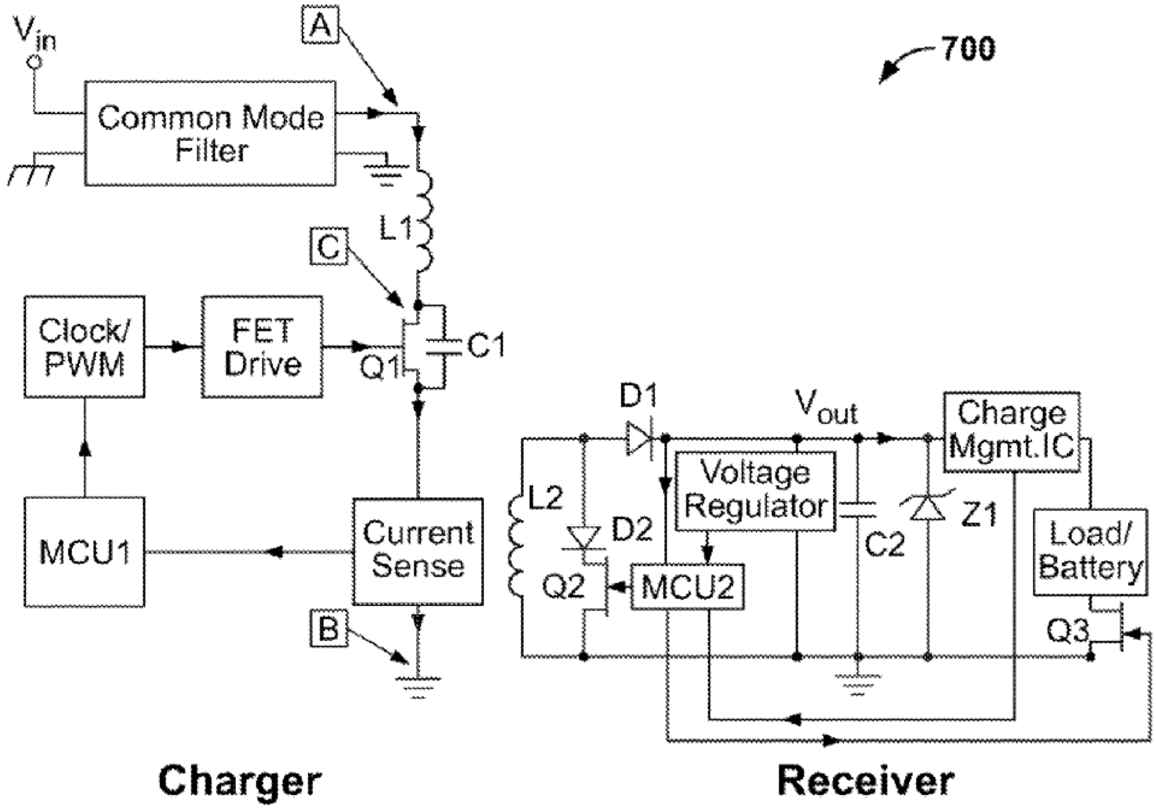


FIG. 34

(Ex. PA-1, FIG. 34.)

Furthermore, the receiver modulation discussed above is a "**communication of information induced in the first primary coil by the receiver coil**." This is because the current through the receiver coil is being modulated by turning on/off transistor Q2 in order to transmit the communication to the charger from the receiver. (*Id.*, ¶[0262] ("The Charge Management IC is in communication with the MCU2 which also monitors the output voltage (Vout) and tries to maintain this Vout within a pre-programmed range. This is achieved by MCU2 sending a digital signal to Q2 to modulate the switch. This modulation is prior to the rectifier stage and is at high frequency so the rectified and smoothed Vout is not affected. However, this modulation of the impedance of the secondary stage affects the current through the primary coil stage and can be easily detected by the Current Sense circuit in the primary.").)

Partovi discloses the Current Sense circuit includes "**a low pass filter and an amplifier**." For example, *Partovi* discloses with reference to Figure 19 (reproduced below) an amplifier (circuit element denoted by a triangle) and a low pass filter in series. (*Id.*, FIG. 19.) The low pass filter and amplifier functions as a sense circuit to sense the information transmitted by the receiver, as shown in Figure 19.[9] (*Id.*)

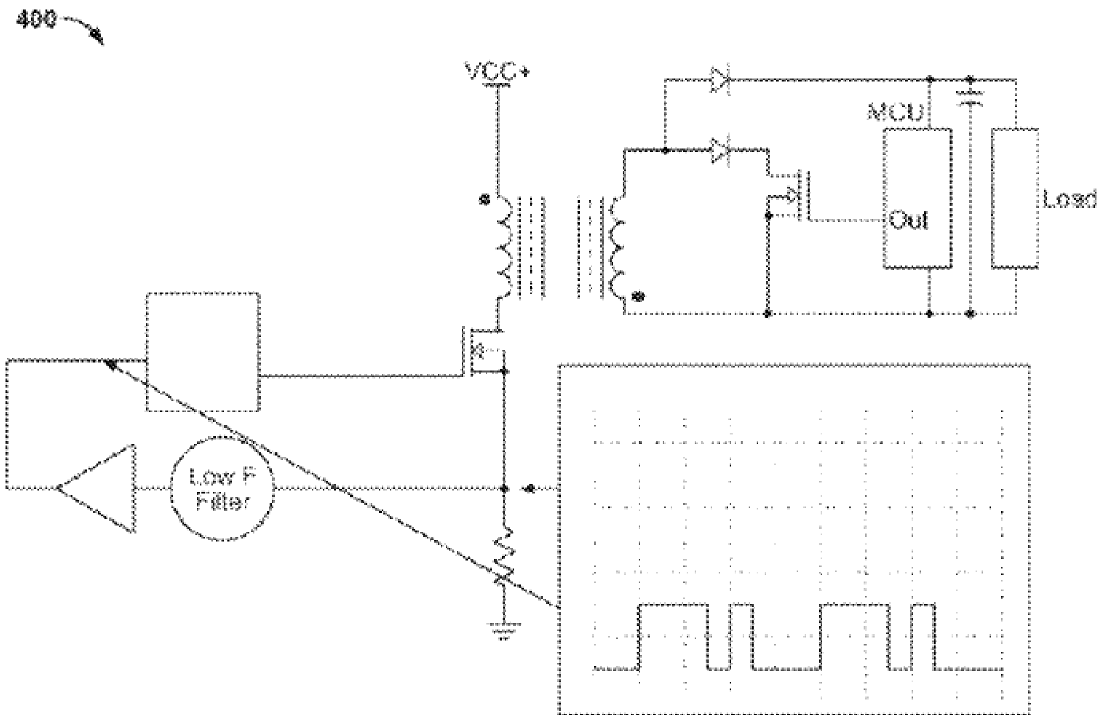


Fig. 19

(Ex. PA-1, Figure 34.)

e. a communication and control circuit, including a microcontroller coupled to the first drive circuit and the first sense circuit, configured to:

Partovi discloses this limitation. (Ex. PA-DEC, ¶170.) As shown in Figure 34 of *Partovi*, reproduced below, the charger includes a Micro Control Unit (MCU1) ("**a communication and control circuit, including a microcontroller**") coupled to the drive circuit (clock, FET Drive, Q1, and C1) ("**coupled to the first drive circuit**") and the Current Sense circuit ("**coupled to the . . . first sense circuit**"). (Ex. PA-1, FIG.34, ¶[0286]).

9 If Patent Owner disagrees, then there is no support for this limitation in the '942 patent or any of its parent applications, including *Partovi*.

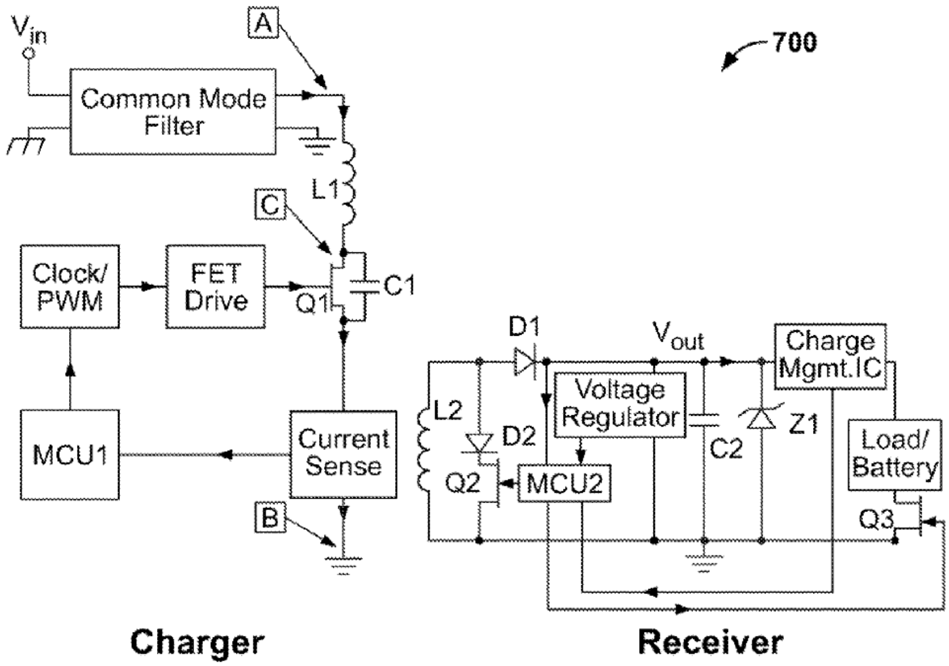


FIG. 34

(*Id.*, Figure 34.)

f. [the communication and control circuit configured to] detect, through the first sense circuit, a received communication of information in the first primary coil;

Partovi discloses this limitation. (Ex. PA-DEC, ¶171.) For example, the MCU1, Current Sense circuit, and MCU2 can provide bi-directional communication between the charger and the receiver for optimum charging and to regulate the power and voltage received at the receiver charge control circuit. (*Id.*, ¶[0296], ("After the initial handshake and verification, the MCU1 and current sense chips in the charger or power supply and MCU2 can provide bi-directional communication between the charger or power supply and the receiver for optimum charging or supply of power. The system can also regulate the power and Voltage received at the Charge Control Circuit to insure overvoltage conditions do not occur.") (emphasis added).) In particular, MCU2 modulates the current in the receiver to communicate the voltage generated in the receiver to the charger, where the communicated voltage is sensed by the Current Sense circuit through the primary coil and a corresponding signal is provided to MCU1. (*Id.*, ¶¶[0262]-[0263].) MCU2 also executes a predetermined program that modulates "the current being drawn in the receiver in a predetermined code" such that "the receiver modulation can be detected as a current modulation in the current through the L1 by the charger or <u>power supply current sensor</u> in FIG. 34." (*Id*., ¶[0295] (emphasis added).)

g. [the communication and control circuit configured to] operate the first drive circuit to inductively transfer power from the first primary coil to the receiver coil to activate and power the receiver unit to enable the receiver circuit to communicate the information detected in the first primary coil via the first sense circuit, wherein the received communication of information includes information to enable the communication and control circuit to configure the inductive transfer of power to the portable device,

Partovi discloses this limitation. (Ex. PA-DEC, ¶¶172-173) For example, *Partovi* discloses an initial handshake and verification process in which "[t]he MCU1 receives input from another sensor mechanism that provides information that it can use to decide whether a device or battery is nearby, what voltage the device or battery requires, and/or to authenticate the device or battery to be charged or powered." (Ex. PA-1, ¶[0289].) As part of this process, microcontroller MCU1 ("**the communication and control circuit**") periodically starts the FET driver and the primary coil L1 ("**operate the first drive circuit**") to begin emitting power. (*Id*., ¶¶[0294], [0295].) If a receiver is nearby, the power emitted from primary coil L1 will power the receiver circuit ("**activate and power the receiver unit**"). (*Id.*) Once the receiver circuit receives power, microcontroller MCU2 modulates the current being drawn in the receiver in a predetermined manner which "can be detected as current modulation in the current through the L1 by the charger or power supply sense . . ." ("**enable the receiver circuit to communicate the information detected in the first primary coil via the first sense circuit**"). (*Id.*) MCU2 also modulates the current in the receiver to communicate the voltage generated in the receiver to the charger, where the communicated voltage is sensed by the Current Sense circuit through the primary coil and a corresponding signal is provided to MCU1. (*Id*., ¶[0262]-[0263].) *Partovi* thus discloses "**operat[ing] the first drive circuit to inductively transfer power from the first primary coil to the receiver coil to activate and power the receiver unit to enable the receiver circuit to communicate the information detected in the first primary coil via the first sense circuit**," as claimed.

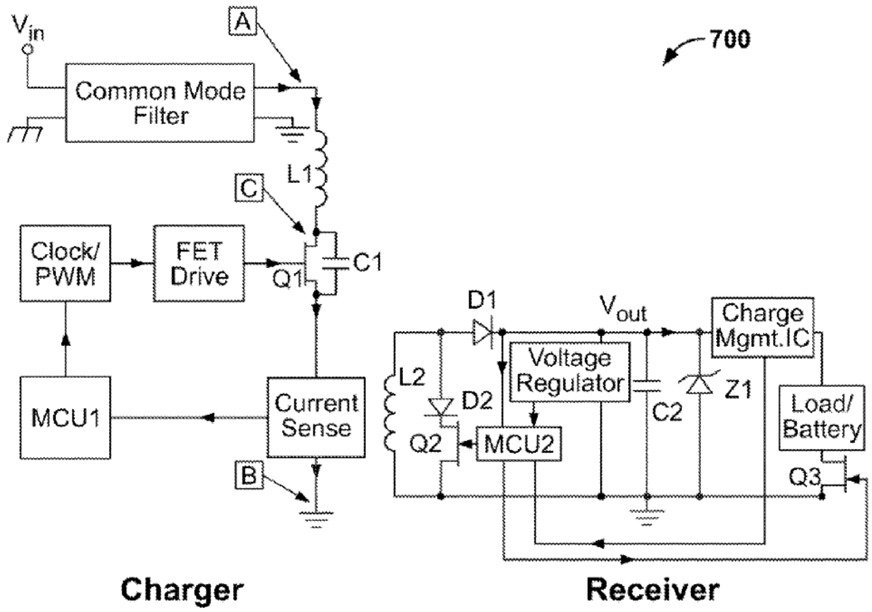


FIG. 34

(*Id.* Figure 34.)

Partovi discloses "**the received communication of information includes information to enable the communication and control circuit to configure the inductive transfer of power to the portable device**," as claimed. For example, "[t]he MCU1 receives input from another sensor mechanism that provides information that it can use to decide whether a device or battery is nearby, what voltage the device or battery requires, and/or to authenticate the device or battery to be charged or powered." (Ex. PA-1, ¶[0289].) Indeed, "the mobile device or battery, during its hand shake and verification process can indicate its power/voltage requirements to the mobile device or battery charger or power supply." (Ex. PA-1, ¶¶[0124], [0107], [0112]-[0114], [0142] ("[T]he receiver in the battery or mobile device also includes a means for providing information regarding battery manufacturer, required voltage, capacity; current, charge status, serial number, temperature, etc. to the charger.").) This information is received for example, through the primary coil. (*Id.*, ¶[0107] ("[T]he coils in the mobile device charger/power supply that are used for powering or charging the mobile device, or another set of coils in the same PCB layer or in a separate layer, can be used for data transfer between the mobile device charger/power supply and the mobile device to be charged or powered or the battery directly.").) And *Partovi* discloses that the handshake and verification process involves the receiver (in the mobile device or battery) communicating information to MCU1 in the charger via the primary coil. (*Id.*, ¶¶[0295]-[0296].)

The power/voltage requirements enable the charger to "**configure the inductive transfer of power to the portable device**." (*Id*., ¶[0142] ("This information is used by the charger or power supply to adjust the primary to provide the correct charge or power conditions.").)

h. wherein the received communication of information includes: information corresponding to a voltage or current induced by the first primary coil at the output of the receiver circuit; a unique identification code; and a power requirement; and

Partovi discloses this limitation. (Ex. PA-DEC, ¶¶174-176) *Partovi* discloses the microcontroller MCU2 monitors the output voltage V_{out} of the rectifier D1 ("**a voltage or current induced by the first primary coil at the output of the receiver circuit**") and tries to maintain the output voltage within a pre-programmed range. (Ex. PA-1, ¶¶[0262], [0265], FIG. 34.) For example, "the receiver sends a digital code corresponding to the output voltage and MCU**1** compares this to the earlier output voltage value and makes a determination about which direction and by how many steps to move the frequency." (*Id*., ¶[0265].) Furthermore, "the induced voltage/current in the mobile device can be sensed and communicated to the charger to form a closed-loop, and the duty cycle, frequency, and/or voltage of the switch can be adjusted to achieve the desired voltage/current in the mobile device." (*Id*., ¶[0130].) To do this, MCU2 modulates the switch Q2 to change the impedance of the receiver circuit which affects the current through the primary coil, which is detected by the current sense circuit ("**the received communication of information includes: information corresponding to a voltage or current induced by the first primary coil at the output of the receiver circuit**.") (*Id.*, ¶[0262]) The voltage V_{out} is "**induced by the first primary coil at the output of the receiver circuit**." (*Id*., ¶[0013], [0091], [0118], [0119], [0262] ("As the primary charger or power supply sends power to the secondary receiver, the circuit in the receiver turns on. The power received is rectified and filtered by rectifier D**1** and Capacitor C**2** respectively").)

Partovi further discloses similar features with respect to Figure 38.[10] Concerning Figure 38, *Partovi* discloses "the receiver circuit can note the amount of voltage or power being received and report back to the charger or power supply. This information can be encoded by modulating the input impedance of the receiver circuit by MCU2. This information is then sensed by the

[10] The implantation of Figure 38 incorporates the switching and sense circuity of Figure 34. (Ex. PA-1, ¶[0326].) Therefore, the implementation described in Figure 38 is also applicable to Figure 34.

charger or power supply sense circuitry, digitized by MCU1 and saved." (Ex. PA-1, ¶[0331].) A POSITA would understand that modulating the input impedance of the receiver circuit discloses communications from the receiver unit to the charger through the receiver's coil.

Partovi further discloses "**wherein the received communication of information includes . . . a unique identification code; and a power requirement**." For example, "[t]he MCU1 receives input from another sensor mechanism that provides information that it can use to decide whether a device or battery is nearby, what voltage the device or battery requires, and/or to authenticate the device or battery to be charged or powered." (Ex. PA-1, ¶[0289] (emphasis added).) What voltage the device or battery requires is a "**power requirement**." And a unique ID code is used to "**authenticate**." *Partovi* discloses once a receiver is detected nearby the charger, the charger and the receiver begin to exchange information including a "unique ID code" and the "voltage requirements of the battery" ("**a unique identification code; and a power requirement**"). (Ex. PA-1, ¶¶[0112], [0113], ("This information can include a unique ID code that can verify the authenticity and manufacturer of the charger or power supply and mobile device or battery, the voltage requirements of the battery or the mobile device, and the capacity of the battery.") (emphasis added), [0307].) The verification code can verify the authenticity and manufacturer of the mobile device as well as provide information to the charger regarding the necessary "voltage, power, temperature, or other diagnostic information for achieving reliable charging." (Ex. PA-1, [307], [0113].) The implementation described in paragraphs [0112], [0113], and [0307] may be applied to the implementation shown in Figure 34 because Figure 34 of *Partovi* expressly contemplates the portable device and the charger exchanging information to authenticate the portable device (Ex. PA-1, ¶[0297].)

i. [the communication and control circuit configured to] operate the first drive circuit according to the power requirement to provide the power from the first primary coil to the receiver coil to power the receiver unit and charge the battery of the portable device,

Partovi discloses this limitation. (Ex. PA-DEC, ¶177.) *Partovi* discloses that "[t]he MCU1 receives input from another sensor mechanism that provides information that it can use to decide whether a device or battery is nearby, what voltage the device or battery requires, and/or to authenticate the device or battery to be charged or powered." (Ex. PA-1, ¶[0289] (emphasis added).) *Partovi* discloses that "[t]his information is used by the charger or power supply to adjust the primary to provide the correct charge or power conditions." (Ex. PA-1, ¶¶[0142], [0119] ("The mobile device or battery charger or power supply, after exchanging information with the mobile device or battery, determines the appropriate charging/powering conditions to the mobile device. It then proceeds to power the mobile device with the appropriate parameters required.").) The implementation described in paragraphs [0119] and [0142] may be applied to the implementation shown in Figure 34 because Figure 34 of *Partovi* expressly contemplates the receiver communicating information to the charger to enable the optimum charging or supply of power to the battery. (*Id.*, ¶[0285], ("The MCU1 and current sense chips in the charger and MCU2 can provide bidirectional communication between the charger or power supply and the receiver for optimum charging or supply of power."), ¶¶[0262]-[0266].)

j. wherein to charge the battery of the portable device the communication and control circuit is further configured to: receive additional information in the first primary coil corresponding to the voltage or current at the output of the receiver circuit while charging the battery of the portable device;

Partovi discloses this limitation for reasons discussed in Section VI.A.4.h. (Ex. PA-DEC, ¶178.) *Partovi* further discloses that during the charging process, the receiver MCU2 communicates an output voltage (Vout) of the rectifier to the charger MCU 1, which then adjusts the frequency at which the FET drive is driven. (Ex. PA-1, ¶¶[0262]-[0265].)

k. [the communication and control circuit configured to] regulate in a closed loop feedback manner the voltage or current at the output of the receiver circuit in accordance with the received additional information corresponding to the voltage or current at the output of the receiver circuit by adjusting at least one of the operating frequency, the duty cycle, and a DC voltage at the DC voltage input of the first drive circuit while charging the battery of the portable device;

Partovi discloses this limitation. (Ex. PA-DEC, ¶179.) *Partovi* discloses that "the induced voltage/current in the mobile device can be sensed and communicated to the charger to form a closed-loop, and the duty cycle, frequency, and/or voltage of the switch can be adjusted to achieve the desired voltage/current in the mobile device." (Ex. PA-1, [0130].) In the Figure 28 implementation, during the charging process, the receiver MCU2 communicates an output voltage (Vout) of the rectifier to the charger MCU 1, which then adjusts the frequency at which the FET drive is driven. (*Id.*, ¶¶[0262]-[0265].) Therefore, the MCU 1 performs closed loop regulation as claimed. The implementation shown in Figure 28 may be applied to the implementation shown in Figure 34 because Figures 34 and 28 have identical components.

l. [the communication and control circuit configured to] monitor for continued presence of the portable device and completion of the charging of the battery of the portable device detected by the communication and control circuit through the first sense circuit;

Partovi in view of *Calhoon* discloses or suggests this limitation. (Ex. PA-DEC, ¶¶180-184.) *Partovi* discloses that "[a]t the end of the charge cycle, the Charge Management IC can signal end of charge cycle to MCU**2** which sends a pre-determined code to MCU**1** to shut down the charger, move to hibernation mode or take some other pre-determined step." (Ex. PA-1, ¶[0266].) MCU2 sends the signal by affecting the current in the primary coil that is detected by the Current Sense Circuit. (*Id*., ¶[0262] ("The Charge Management IC is in communication with the MCU**2** which also monitors the output voltage (Vout) and tries to maintain this Vout within a pre-programmed range. This is achieved by MCU**2** sending a digital signal to Q**2** to modulate the switch. This modulation is prior to the rectifier stage and is at high frequency so the rectified and smoothed Vout is not affected. However, this modulation of the impedance of the secondary stage affects the current through the primary coil stage and can be easily detected by the Current Sense circuit in the primary.").) Thus, *Partovi* discloses the MCU1 is configured to "**monitor for . . . completion of the charging of the battery of the portable device detected by the communication and control circuit through the first sense circuit**."

Partovi, however, does not disclose that the MCU1 is configured to "**monitor for continued presence of the portable device**." *Calhoon*, however, discloses such a feature.

Like *Partovi*, *Calhoon* discloses "[a]n inductive charging system [that] transfers energy by inductively coupling a source coil on a power source to a receiver coil for a battery charger." (Ex. PA-3, at Abstract.) In particular, an inductive charging source 302 inductively transfers power to a battery charger assembly 304. (*Id*., ¶[0031], FIG. 3.) "The battery charger assembly 304 may be configured to receive electrical energy from inductive power source 302" through "a power pickup coil 324 that is operatively connected to a power supply 320." (*Id.*) "In one operation, the power supply 320 of battery charger assembly 304 provides electrical energy to a battery charger 322 that supplies energy to legacy battery pack 350 . . . ." (*Id.*) Figure 3, which illustrates the components of the inductive charger system, is excerpted below:

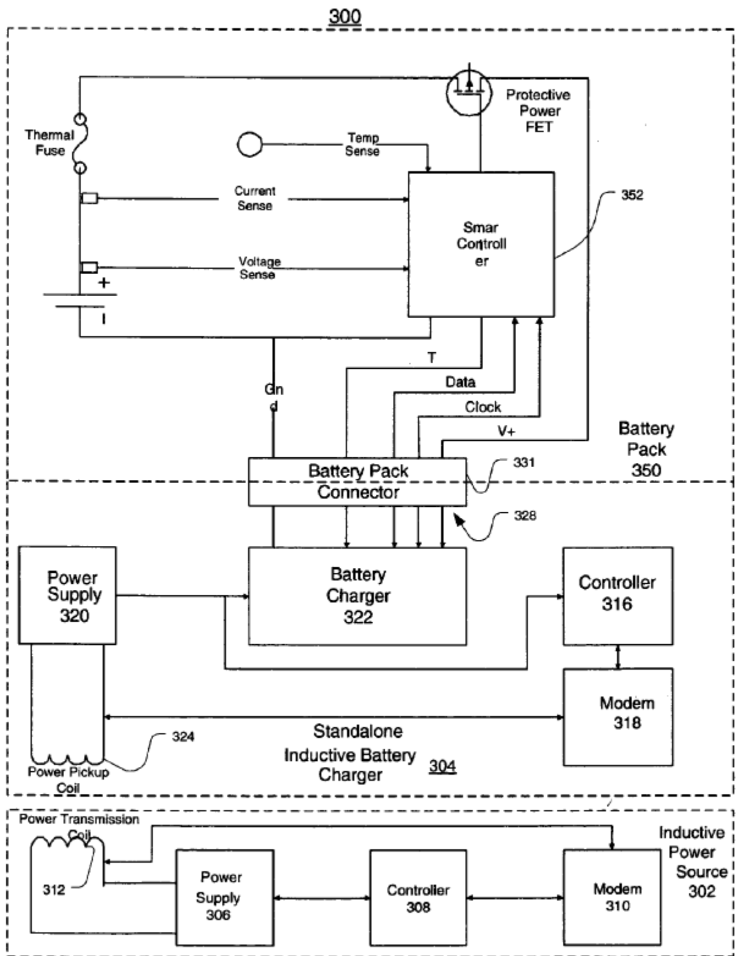


FIGURE 3

(*Id.*, FIG. 6.)

Calhoon teaches a method of polling performed by the source 302 to determine if the battery charger assembly 304 is present. (Ex. PA-3, ¶[0052].) During the powering process, the source 302 periodically polls the battery charger assembly 304 and if no response is received ("**monitor for continued presence of the portable device**") or inductive coupling is removed, the source 302 changes state from charging mode to return to polling mode. (*Id.*)

A POSITA would have been motivated to adopt *Calhoon*'s method of polling during charging to verify the continued presence of the portable device in *Partovi* for efficiency purposes. (Ex. PA-DEC, ¶184.) For example, including such a functionality would allow the charger to shut off or stop powering certain coils if the portable device is removed therefrom or if charging is complete, thereby resulting in power savings. (*Id.*) A POSITA would have had a reasonable expectation of success in making such a modification given the above teachings of *Partovi* and

Calhoon, and the modification would have been a straightforward combination of well-known technologies using known methods and techniques familiar to such a skilled person. (Ex. PA-DEC, ¶184.) For example, a POSITA would have known that incorporating such a functionality in *Partovi* would have simply required configuring the MCU1 to monitor signals from the portable device and stop power transmission if the requisite signals are not received. (*Id.*) *Partovi* already discloses polling capabilities to sense the presence of a portable device thereby confirming that a POSITA would have been able to modify *Partovi* as necessary based on *Calhoon*. (Ex. PA-1, ¶[0290].)

m. if the portable device is no longer present or charging is complete, stop operation of the first drive circuit for the provision of power inductively to the portable device.

Partovi discloses this limitation. (Ex. PA-Dec, ¶185.) *Partovi* discloses that MCU1 shuts down the charger if the end of charge cycle is reached. (Ex. PA-1, ¶[0266]). This means that the FET driver stops energizing the primary coil. (Ex. PA-Dec, ¶185; Ex. PA-1, ¶[0295] (FET driver drives the primary coil to transmit power to the portable device).) *Partovi* thus discloses "**if the portable device is no longer present or charging is complete, stop operation of the first drive circuit for the provision of power inductively to the portable device**." Requester notes that there is an "or" in the above limitation and therefore, the prior art only needs to disclose stopping operation of the first drive in response to one of the two conditions (portable device is no longer present <u>or</u> charging is complete).

5. Claim 5

a. The system of claim 1, wherein the system further comprises: a voltage regulator circuit coupled to the DC voltage input and to the microcontroller, wherein the microcontroller is configured to control the voltage regulator circuit to vary the DC voltage at the DC voltage input based on at least one of the received communication of information and the additional information received by the communication and control circuit from the portable device.

Partovi discloses this limitation. (Ex. PA-DEC, ¶¶186-187.) The Figure 34 implementation does not include a voltage regulator in the charger. But such a circuit is further described by *Partovi* with reference to Figure 29:

> In the fully regulated power supply shown in FIG. 29, <u>a voltage regulator (Voltage Regulator 1) that can switch the input voltage between 2 values or more is used</u>. In normal operation, Q2 is

> closed and the Voltage Regulator 1 is shut down though its enable pin. Therefore, the input Voltage is directly available for the Coil L1 and is regulated as described earlier. However, if the output requires extremely low powers (such as end of charge stage for batteries), and the charger determines that a switch to a different range is required. Q2 is opened, and Voltage Regulator 1 is switched on to change the input to Coil 1 to a lower voltage value. Regulation is maintained at this range by shifting to the appropriate frequency to achieve required output power. For example, if V_{in} is 5 V, this lower voltage level may be 3 V. Multiple voltage levels are also possible.

(Ex. PA-1, ¶[0272] (emphasis added).) Figure 29 of *Partovi*, showing the voltage regulator circuit, is shown below.

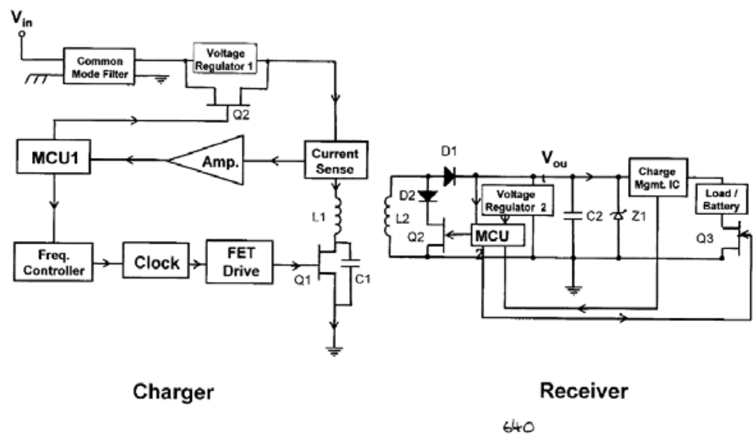


Figure 29

(Ex. PA-1, Figure 29.) As shown in Figure 29, the voltage regulator is coupled to and controlled by the microcontroller MCU1 and is coupled to the voltage input to Coil 1 ("**DC voltage input**"). (*Id.*)

Partovi discloses the voltage regulator of Figure 29 is an "enhancement" that may be applied to the implementation shown in Figure 28 to allow the charger to provide very low output power, for example, to charge a battery at the end of its charge stage. (Ex. PA-1, ¶¶[0270]-[0271], [0272].) As Figures 28 and 34 of *Partovi* have identical components, the voltage regulator of Figure 29 could also be applied to Figure 34 of *Partovi*.

6. Claim 12

a. The system of claim 1, wherein the system is incorporated into a second portable device, the second portable device further comprising:

Partovi discloses this limitation. (Ex. PA-DEC, ¶188.) For example, Figure 65 of *Partovi* discloses an inductive charging case and a mobile device receiver unit (collectively, "the second portable device") that incorporates the charger ("the system") such as the one shown in Figure 34. (Ex. PA-1, ¶¶[468]-[470].) The inductive charging case can receive power from the inductive charger and also provide power inductively to the mobile device receiver. (Ex. PA-1, ¶[468].)

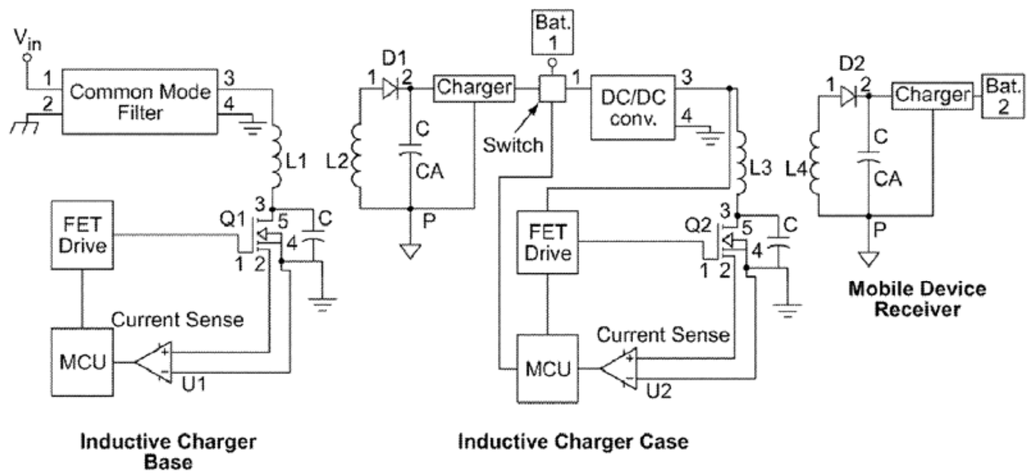


FIG. 65

(Ex. PA-1, FIG. 65.)

b. an internal, rechargeable battery; a DC-to-DC voltage regulator coupled to the DC voltage input to provide power to operate the system; and

Partovi discloses this limitation. (Ex. PA-DEC, ¶189.) For example, concerning Figure 65, *Partovi* discloses a receiver connected to a battery charger circuit that charges one or more internal batteries ("**an internal rechargeable, battery**") in the inductive charger case. (Ex. PA-1, ¶[470].) As shown in Figure 65, reproduced below, the inductive charger case has a DC/DC converter ("**DC-to-DC voltage regulator**") coupled to the DC voltage input ("**coupled to the DC voltage input to provide power to operate the system**"). For example, the circuit element denoted by '3' in Figure 65 constitutes a DC voltage input to coil L3.

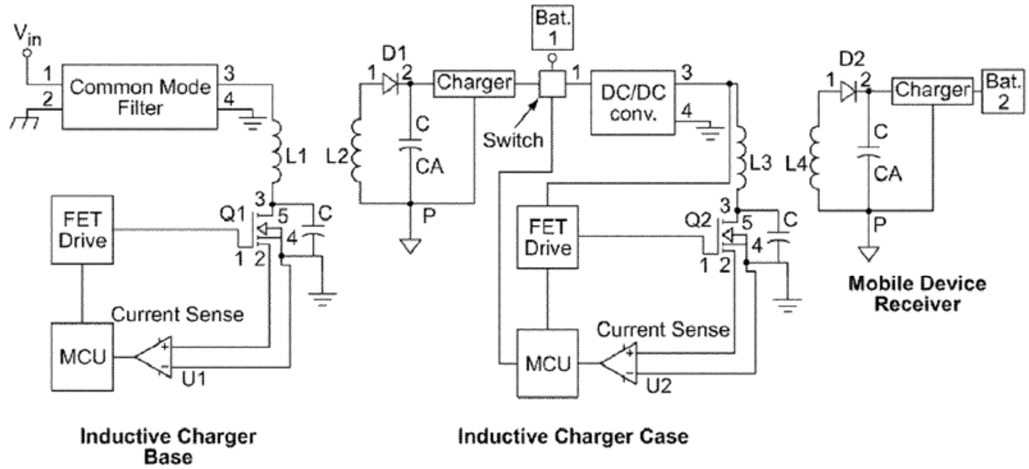


FIG. 65

(Ex. PA-1, Figure 65.)

c. a second receiver circuit coupled to the primary coil;

Partovi discloses this limitation. (Ex. PA-DEC, ¶190.) For example, Figure 65 of *Partovi* discloses the inductive charger case has a receiver circuit ("**a second receiver circuit**") that receives power from the primary coil L1 of the inductive charger base. (Ex. PA-1, ¶[0470].) The receiver circuit of the inductive charger case receives power from the primary coil L1 via the receiver coil L2 and its associated circuitry, which is coupled to the inductive charger case's primary coil L3 ("**coupled to the primary coil**"). (Ex. PA-1, ¶[0470].)

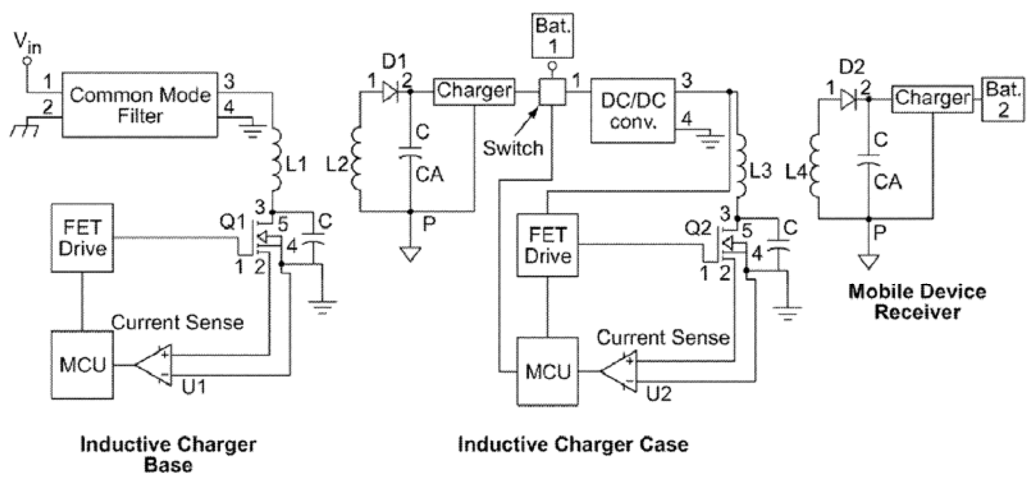


FIG. 65

(Ex. PA-1, Figure 65.)

d. wherein the second portable device is configured to operate in a first mode in which the second portable device is powering the system at the DC voltage input by the DC-to-DC voltage regulator to provide power inductively through the first primary coil and in a second mode in which the second portable device is receiving power inductively through the first primary coil to power the second receiver circuit and charge the internal, rechargeable battery; and

Partovi discloses this limitation. (Ex. PA-DEC, ¶191.) For example, concerning the implementation shown in Figure 65, *Partovi* discloses the inductive charging case has a mode for "charging another device" via primary coil L3 ("**a first mode in which the second portable device is powering the system at the DC voltage input by the DC-to-DC voltage regulator to provide power inductively through the first primary coil**") and has a second mode in which "the case has means for receipt of power inductively (from the charger or power supply base)" ("**a second mode in which the second portable device is receiving power inductively through the first primary coil to power the second receiver circuit and charger the internal, rechargeable battery**"). (Ex. PA-1, ¶[0470].)

e. wherein in the first mode, the closed loop feedback manner comprises a Proportional-Integral-Derivative (PID) control technique for regulating the voltage or current at the output of the receiver circuit.

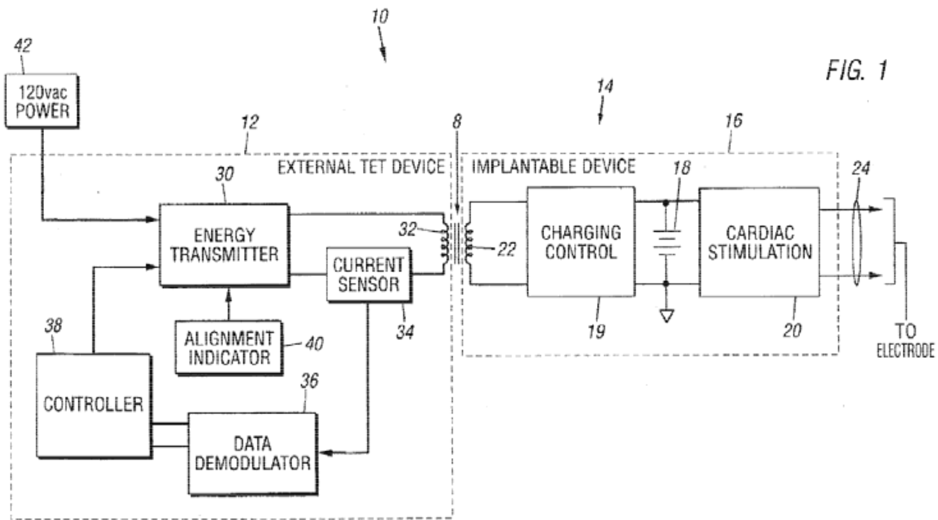
Partovi discloses this limitation. (Ex. PA-DEC, ¶192.) The implementation shown in Figure 65 of *Partovi* does not explicitly disclose "wherein in the first mode, the closed loop feedback manner comprises a Proportional-Integral-Derivative (PID) control technique for regulating the voltage or current at the output of the receiver circuit." However, *Partovi* discloses this elsewhere. For example, *Partovi* discloses proportional-integral-derivative (PID) techniques may be used to regulate the voltage at the receiver. (Ex. PA-1, ¶[0265] ("Many variations of these basic methods are possible to allow rapid, efficient locking of the output voltage. Proportional-Integral-Derivative (PID) techniques, etc. can also be used.").)

B. SNQ2: *Partovi* in View of *Nedungadi* Discloses or Suggests Claim 21

1. Overview of *Nedungadi*

Nedungadi issued on February 3, 1998 and thus qualifies as prior art pursuant to pre-AIA 35 U.S.C. § 102(e). (Ex. PA-2, Cover.)

Nedungadi discloses an implantable device, having a battery, that is capable of being inductively charged by an external transcutaneous device (labelled "External TET Device" in Figure 1). (Ex. PA-2, 5:34-56.) As shown in Figure 1 of *Nedungadi* the external TET device has a coil 32 that is used to provide power to the coil 22 of the implantable device. (*Id.*) *Nedungadi* discloses the implantable device 14 may communicate with the external TET device 12. (*Id.*) This communication may include the control circuitry 19 in the implantable device "sampl[ing] battery voltage and current" and then "transmit[ting] that data to TET 12 via coils 32, 22, in order to control the energy transmission between TET device 12 and implantable device 14." (*Id.*)



(Ex. PA-2, FIG. 1.) To transmit the "sampled data," the charging control circuit of the implantable device "alternately disconnects and reconnects the battery from the charging circuit in a predetermined manner, causing the current in the coil 32 of TET device 12 to change in response to the change in load across coil 22." (Ex. PA-2, 5:45-51.) The resulting change in the current of the charging coil 32 can be detected by "current sensor 34 and transmitted to data demodulator 36 . . . [which] decodes voltage and current values and communicates these values to controller 38 which, pursuant to predetermined parameters, control the power output of the transmitter 30." (Ex. PA-2, 5:51-56.)

2. Claim 21

a. A portable device configured to receive inductive power from an inductive charging system comprising a primary coil and associated circuit, the portable device comprising: a battery;

To the extent the preamble is limiting, *Partovi* discloses this limitation. (Ex. PA-DEC, ¶¶193-197.) *Partovi* discloses a system for "powering or charging electrical, electronic, battery-operated, mobile, rechargeable batteries . . ." (Ex. PA-1, ¶[0091].) The system includes "two parts." (*Id.*) "The first part is a pad or similar base unit that contains a primary, which creates an alternating magnetic field by means of applying an alternating current to a winding, coil, or any type of current carrying wire." (*Id.*) "[T]he pad can also contain multiple coils or sections to charge or power various devices or to allow charging or powering of devices or batteries placed anywhere on the pad." (*Id.*) *Partovi* discloses many examples of such a charging pad. For example, "FIG. 3 shows a charging pad using multiple coils" whereas "FIG. 4 shows a charging pad using multiple overlapping coil layers." (*Id.*, ¶¶[0121]-[0122].) Further examples of the coil arrangement in the charging pad are set forth with reference to Figures 36-38. (*Id.*, ¶¶[0051]-[0053].)

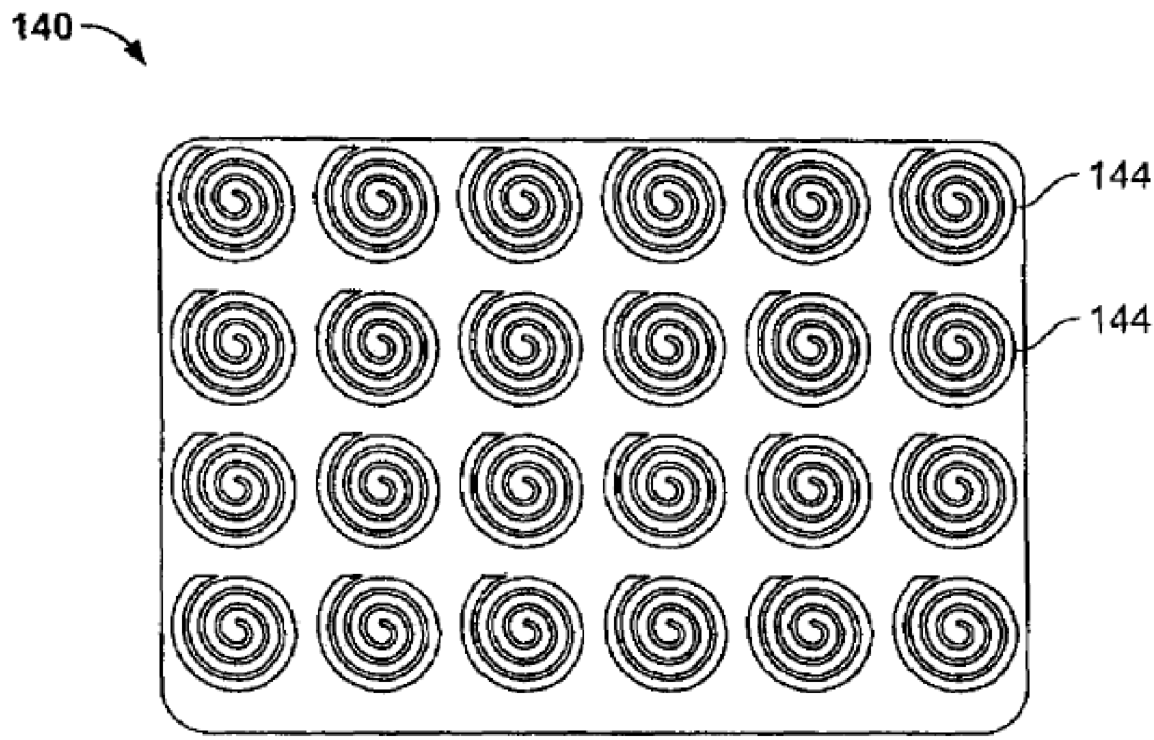


FIG. 3

(*Id*., FIG. 3.)

"The second part of the system is a receiver that comprises a means for receiving the energy from the alternating magnetic field from the pad and transferring it to a mobile battery, or other device. The receiver can comprise coils, windings, or any wire that can sense a changing magnetic field, and rectify it to produce a direct current (DC) voltage, which is then used to charge or power the device or battery." (*Id*., ¶[0091].) The "receiver can also contain circuitry to sense and determine the status of the electronic device or battery to be charged, the battery inside a device, or a variety of other parameters and to communicate this information to the pad." (*Id*., ¶[0092].)

A specific example of the circuitry associated with the charging pad and the receiver is set forth with reference to "FIG. 34," which "shows the main components of a more advanced wireless power/charging system." (*Id*., ¶[0285].) As shown in Figure 34, the charger provides power to a receiver, which is integrated into a mobile device or electronic device battery, and the receiver provides the power to the battery. (*Id*., ¶[0285].) The Charger has a primary coil L1 and associated circuitry (*see* Figure 34) which can be one or more coils of the charging pad. (*Id*., ¶¶[0287] ("At the beginning of charging (when a device is placed on a pad first) . . ."), [0323]-[0339], [0364] ("If a receiver coil is placed on the pad, it will cause the appropriate charger or power supply coil center port to contact the pad on the flexible film and therefore the appropriate coil is contacted to points A and C in FIG. 34."))

Partovi thus discloses a system, comprising a charger and receiver for charging portable devices.

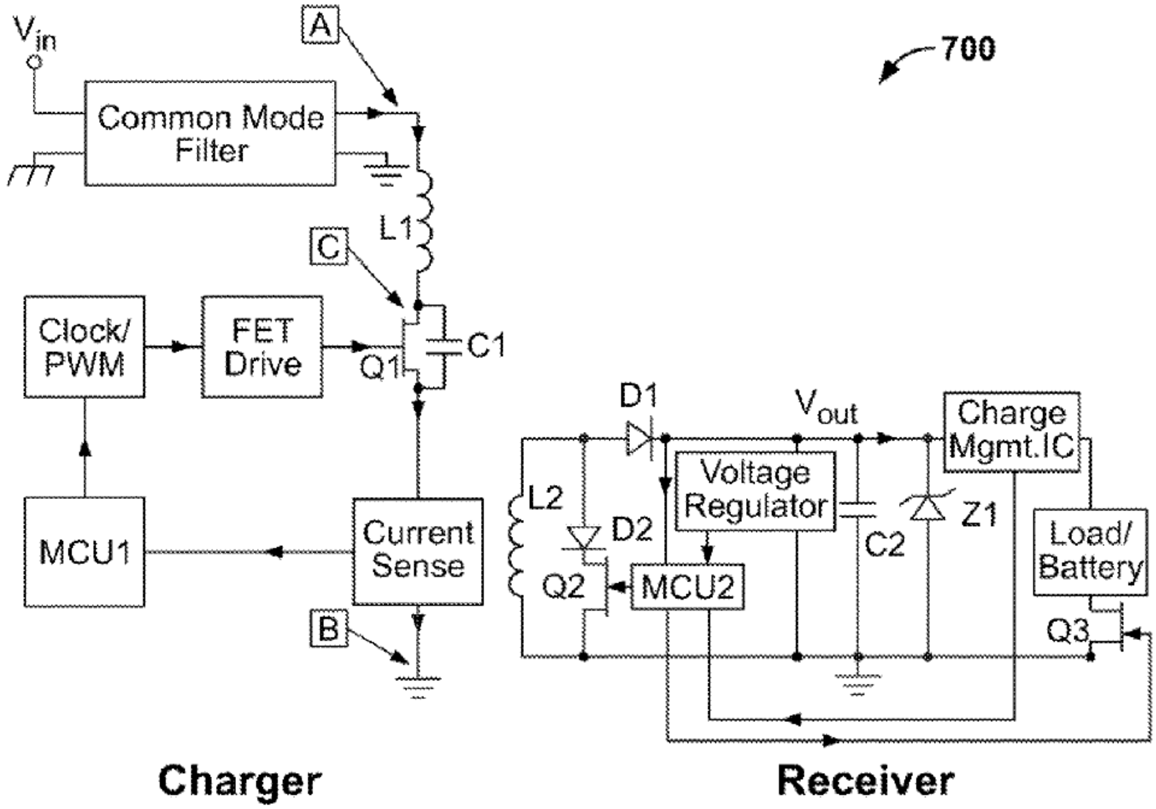


FIG. 34

(*Id.*, FIG. 34.)

The above-described mobile device is "**a portable device configured to receive inductive power from an inductive charging system** . . . **the portable device comprising: a battery**," and the charger is the inductive charging system "**comprising a primary coil and associated circuit**."

b. a coil substantially planar in shape and located parallel to a charging surface of the portable device so that an alternating magnetic field, when received through the charging surface of the portable device from the primary coil of the inductive charging system in a direction substantially perpendicular to the plane of the coil, inductively generates a current in the coil to provide power inductively to the portable device when the portable device is placed on the inductive charging system for charging the battery of the portable device;

Partovi discloses this limitation. (Ex. PA-DEC, ¶¶198-202.) *Partovi*'s Figure 34 receiver includes a receiver coil L2 ("**the portable device comprising** . . . **a coil**"). (Ex. PA-1, FIG. 34.)

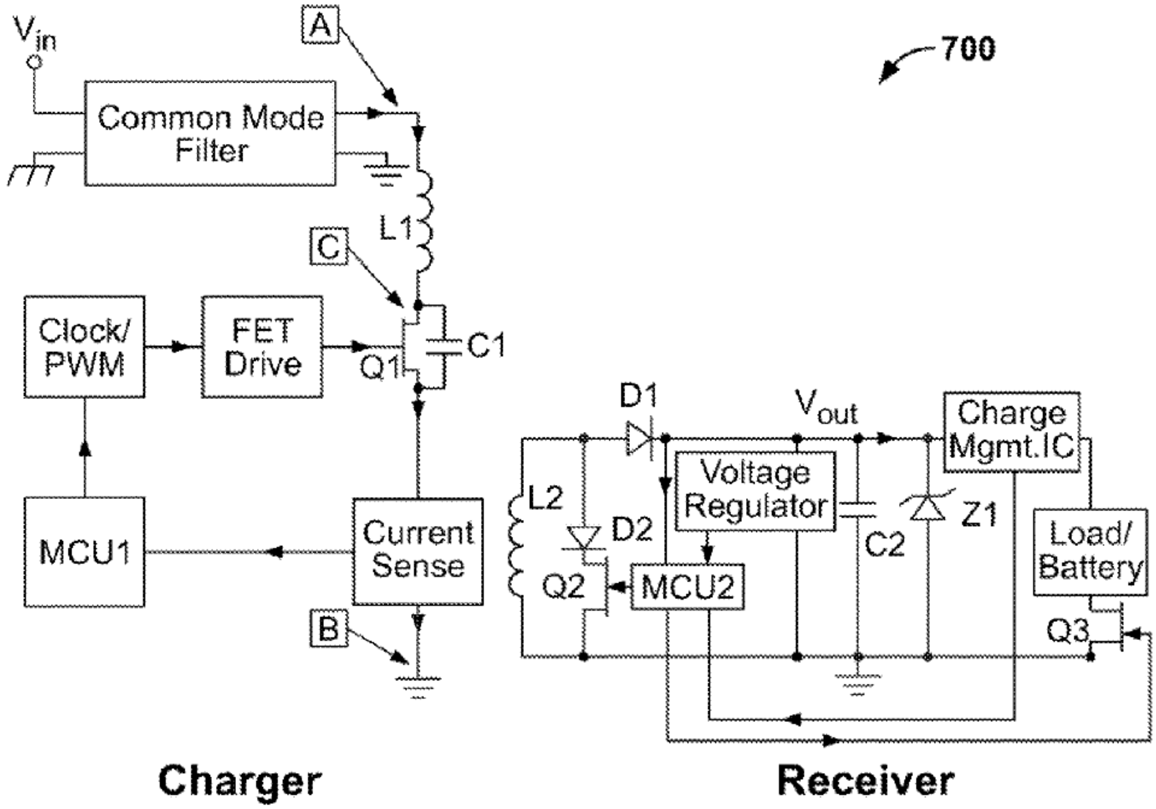


FIG. 34

(*Id.*, FIG. 34.)

The receiver coil is "**substantially planar in shape**." (*Id.*, ¶[0225] ("[T]he system can use a non-ferrite material for both the primary and the secondary (receiver) coils . . . As also described above the coils can be formed in any number of different shapes, including, for example, flat or planar hexagonal shapes, or spirals. The coils can also be distributed in layers of coils, spirals, and other various shapes."), claim 1 ("a receiver unit, including a receiver coil also composed of a non-ferrite material and shaped as a planar spiral coil, which is coupled to or incorporated into a portable device or battery, wherein the secondary coil receives energy inductively from the primary coil and uses it to charge or power the portable device or battery.").)

Furthermore, coil L2 is "**located parallel to a charging surface of the portable device**." In particular, Figure 16 of *Partovi* shows cell phones 340 ("**portable devices**") placed on a surface of the charging pad 330 and receiving power. (*Id.*, ¶¶[0031], [0200].) As shown below in Figure 16 of *Partovi*, the mobile device surface and associated receiver coil L2 are parallel to the surface of the charging pad upon which the cellphones sit ("**a coil substantially planar in shape and located parallel to a charging surface of the portable device**"). (*Id.*)

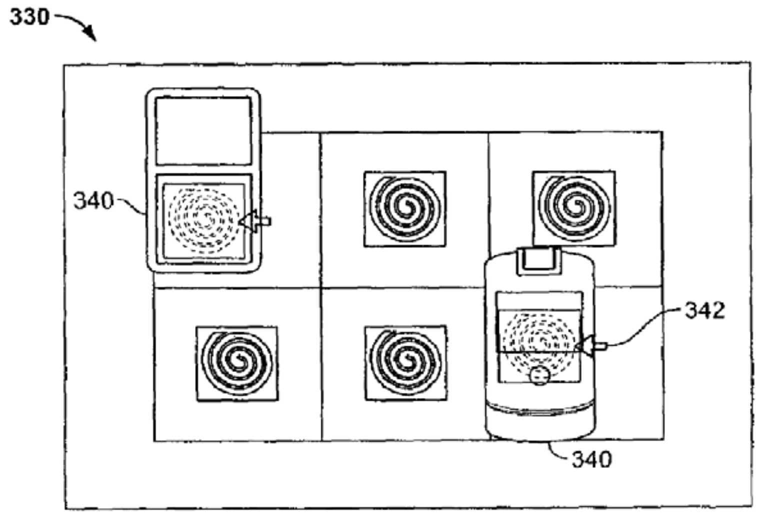


FIG. 16

(*Id.*, Figure 16.)

Partovi also discloses "**an alternating magnetic field, when received through the charging surface of the portable device from the primary coil of the inductive charging system in a direction substantially perpendicular to the plane of the coil inductively generates a current in the coil to provide power inductively to the portable device when the portable device is placed on the inductive charging system for charging the battery of the portable device**." For example, *Partovi* discloses the microcontroller MCU1 enables the FET driver to drive the primary coil L1 on the pad "to energize the receiver." (Ex. PA-1, ¶[0298].) The FET driver drives the coil by switching the primary coil through the FET Q1. (*Id.*, ¶[0290].) In one implementation, the operating frequency of the FET drive is "1-2 MHz." (*Id.*, ¶¶[265], [0259], [0263]-[0264].) When the coil is switched, an AC voltage is generated across the primary coil, which results in an AC magnetic field. (*Id.*, ¶[0117].) In other words, an AC electrical current is applied to the primary coil to generate a magnetic field, as claimed. (*See id.*, ¶[0091] ("a pad or similar base unit that contains a primary, which creates an alternating magnetic field by means of applying an alternating current to a winding, coil, or any type of current carrying wire."), claim 13 ("when a current is passed through the primary coil a magnetic field is generated in a direction substantially perpendicular to the plane of the primary coil").) If a receiver is nearby or placed on the charger pad, the power emitted from primary coil L1 will power the receiver circuit which will then charge the battery of the portable device. (*Id.* ¶¶ [0295]-[0296], [0091] ("[T]he pad can also contain multiple coils or sections to charge or power various devices or to allow charging or powering of devices or batteries placed anywhere on the pad.").) In particular, the AC magnetic field will induce a current in the receiver coil, which is then used to charge the battery. (*Id.*, claim 13 ("wherein the perpendicular magnetic field inductively generates a current in a matching receiver coil or coils within a mobile device or battery placed close to and aligned with the base unit, to charge or power the mobile device or battery), ¶[0117] ("This field in turn generates a voltage in the coil 120 in the receiver 114 that is rectified and then smoothed by a capacitor to provide power 122 to a load RI 124.").)

This magnetic field is generated "**in a direction substantially perpendicular to the plane of the coil**." For example, a POSITA would have understood that when an AC current is passed through a spiral coil (such as the one in *Partovi*), a magnetic field will be generated that is perpendicular to the surface of the coil. (Ex. PA-DEC, ¶202.) Indeed, claim 13 of *Partovi* confirms this when it states that "when a current is passed through the primary coil a magnetic field is generated in a direction substantially perpendicular to the plane of the primary coil."[11] As discussed above, and shown in Figure 16, *Partovi* discloses that the mobile device surface and the receiver coil are located parallel to the surface of the pad (and the primary coil); therefore, if the magnetic field is substantially perpendicular to the plane of the primary coil, as disclosed by claim 13, then *Partovi* inherently discloses the magnetic field being substantially perpendicular to the plane of the surface of the receiver coil. (Ex. PA-DEC, ¶202.)

c. a ferrite layer positioned under the coil on a side of the coil opposite to the charging surface of the portable device; and

Partovi discloses this limitation. (Ex. PA-DEC, ¶203.) The description of Figure 34 does not explicitly disclose "a ferrite layer positioned under the coil on a side of the coil opposite to the charging surface of the portable device." However, *Partovi* discloses this elsewhere. For example, *Partovi* discloses "<u>to provide additional immunity, ferrite material (such as those provided by Ferrish-ield Inc.) can be used between the receiver and the battery to shield the battery or device from the EM fields.</u> These materials can be made so as to be thin, and then used during the

[11] Patent Owner cannot dispute that Partovi discloses this limitation because Patent Owner claims that the '876 Application (i.e., *Partovi*) provides support for the claims of the '942 Patent.

construction of the integrated battery/receiver." (Ex. PA-1, [0141].) A POSITA would have been motivated to apply the ferrite material described in paragraph [0141] to the implementation shown in Figure 34 of *Partovi* to shield the battery from EM fields. (*Id.*) A POSITA would have understood that the ferrite layer is positioned opposite the charging surface of the portable device in order to allow the receiver coil to be directly exposed to the alternating magnetic field of the primary coil. (Ex. PA-Dec, ¶203.)

d. a receiver circuit powered by the received inductive power from the inductive charging system, wherein the receiver circuit comprises:

Partovi discloses this limitation. (Ex. PA-DEC, ¶204.) For example, the Figure 34 implementation has a receiver including a receiver circuit that includes, *inter alia*, a receiver coil L2, a microcontroller MCU2, voltage regulator, battery, and a rectifier circuit D1 ("**a receiver circuit**"). (*Id.*, ¶[0262], (stating D1 is a rectifier).)[12] *Partovi* discloses to detect a receiver, MCU1 periodically starts the FET driver to drive primary coil L1 in the charger, which then emits power. (Ex. PA-1., ¶[0295].) If a receiver is nearby, receiver coil L2 will draw current to power up the microcontroller MCU2 in the receiver and its associated circuitry ("**a receiver circuit powered by the received inductive power from the inductive charging system**.") (*Id.*, ¶[0295].)

[12] Figures 34 and 28 of *Partovi* have identical components. Therefore, the description of D1 as a rectifier from Figure 28 is applicable to Figure 34 as the structures shown in the figures are identical. In fact, Figure 28 shows a basic wireless charging system, whereas Figure 34 is an enhancement of the system shown in Figure 28. (Ex. PA-1, ¶¶[0270], [0285].) Thus, the description of Figure 28 is applicable to Figure 34.

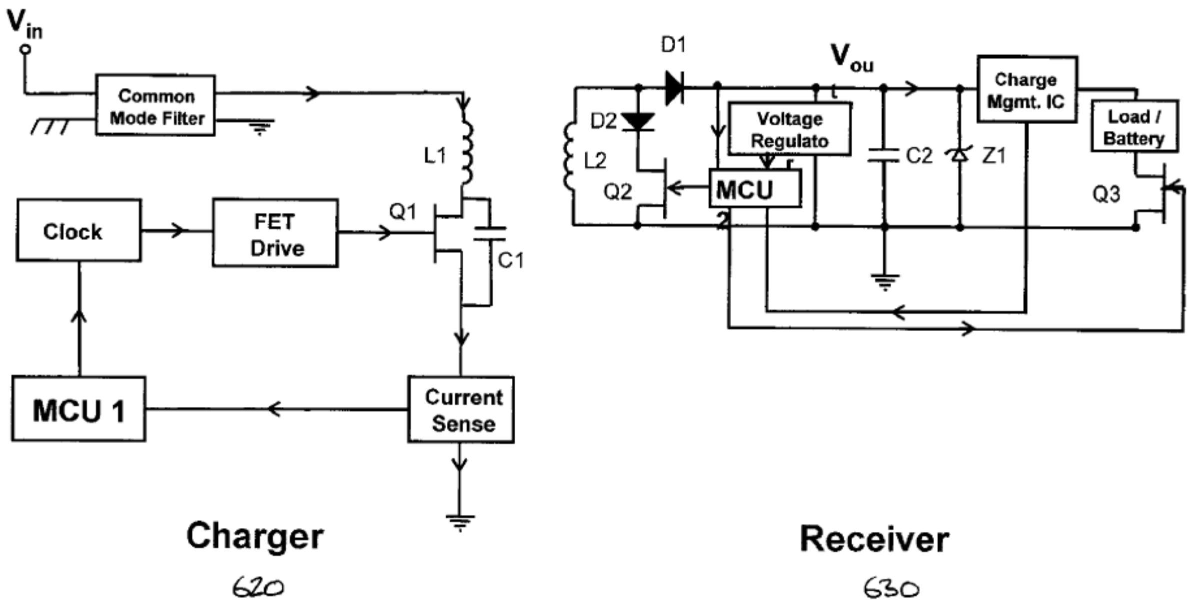


Figure 28

(*Id.*, FIG. 34.)

e. a receiver rectifier circuit including a rectifier and a capacitor;

Partovi discloses this limitation. (Ex. PA-DEC, ¶205.) For example, the Receiver shown in Figure 34 of *Partovi* includes a receiver rectifier circuit D1 and a capacitor C2 ("**a receiver rectifier circuit including a rectifier and a capacitor**"). (*Id.*, ¶[0262], (stating D1 is a rectifier).)[13]

[13] Figures 34 and 28 of *Partovi* have identical components. Therefore, the description of D1 as a rectifier from Figure 28 is applicable to Figure 34 as the structures shown in the figures are identical.

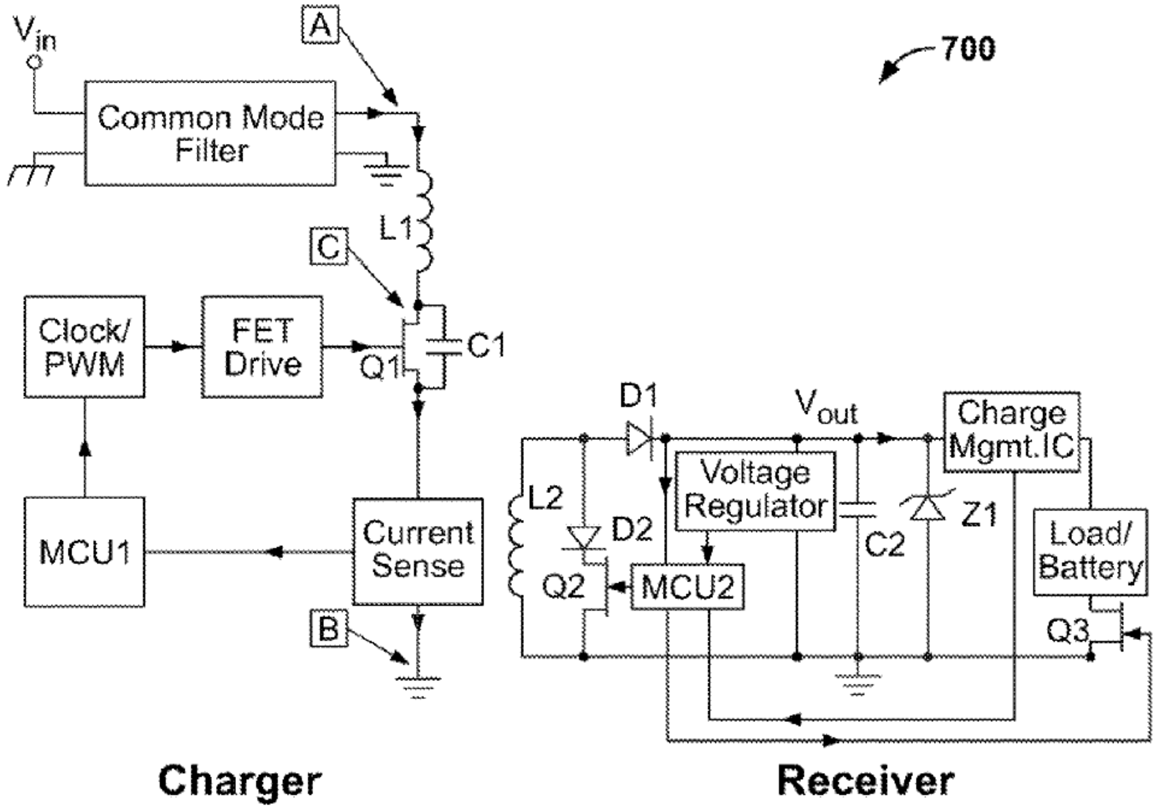


FIG. 34

(*Id.*, FIG. 34.)

f. a receiver communication and control circuit including a microcontroller, wherein the receiver communication and control circuit is configured to modulate the current in the coil to communicate with the inductive charging system while the receiver circuit is being powered by the inductive charging system;

Partovi discloses this limitation. (Ex. PA-DEC, ¶206.) *Partovi* discloses microcontroller MCU2 ("**a receiver communication and control circuit including a microcontroller**") that modulates the input impedance of the receiver circuit to communicate with the base unit through the primary coil:

> The charge control circuit in the figure or another chip in the receiver circuit can be pre-programmed so that on power-up, it draws current in a pre-programmed manner. An example of this is the integration of the MCU2 and chip model number 10F220 Programmable IC by Microchip Inc. or another inexpensive microcontroller that upon power-up, executes a predetermined program that modulates the current being drawn in the receiver in a

> predetermined code (which can be encrypted). This receiver modulation can be detected as a current modulation in the current through the L1 by the charger or power supply current sensor in FIG. 34.

(Ex. PA-1, ¶[0295].) As shown in Figure 34 of *Partovi*, MCU2 is coupled to Q2 (a FET switch) to modulate the input impedance of the receiver circuit to communicate with the base unit through the primary coil. *See e.g.*, (Ex. PA-1, ¶[0262], ("the secondary (receiver) contains circuitry that enables this part to modulate the load as seen by the primary. In accordance with an embodiment this is achieved through modulation of switch Q2 by an MCU2 in the receiver.").)

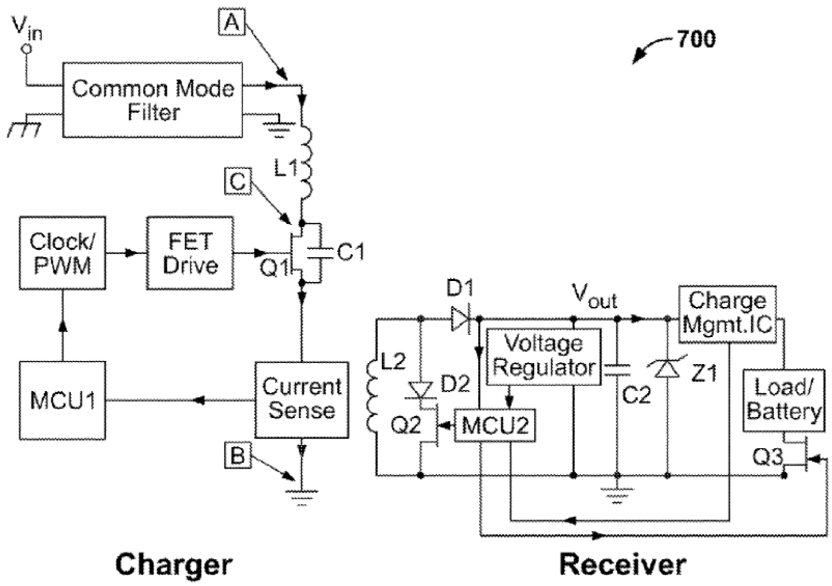


FIG. 34

(Ex. PA-1, Figure 34.)

g. a voltage regulator coupled to an output of the receiver rectifier circuit and coupled to the microcontroller, wherein the voltage regulator is configured to provide a regulated voltage to power the microcontroller from the received inductive power; and

Partovi discloses this limitation. (Ex. PA-DEC, ¶207.) As shown in Figure 34 of *Partovi*, reproduced below, a voltage regulator is coupled to the output of the rectifier circuit D1 and is coupled to the microcontroller MCU2 ("**a voltage regulator coupled to an output of the receiver rectifier circuit and coupled to the microcontroller**"). Moreover, the voltage regulator is "used to provide a constant low current voltage to MCU2" ("**provide a regulated voltage to power the microcontroller from the received inductive power**"). (Ex. PA-1, ¶[0285].) A person of skill in the art would have understood that providing a constant low current voltage to MCU2 requires regulating the voltage going to MCU2. (Ex. PA-DEC, ¶207.)

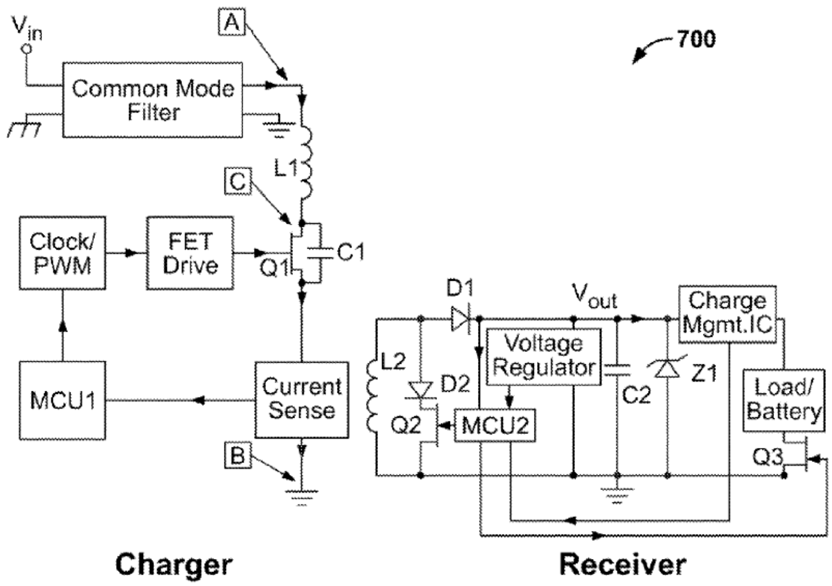


FIG. 34

(Ex. PA-1, Figure 34.)

h. a battery charging circuit configured to charge the battery, wherein the battery charging circuit is coupled to the output of the receiver rectifier circuit and coupled to the battery and is configured to begin drawing current when the output of the receiver rectifier circuit reaches a set minimum voltage value;

Partovi discloses this limitation. (Ex. PA-DEC, ¶¶208-209.) Concerning Figure 34, *Partovi* discloses that a charge management integrated circuit, in the receiver, controls the charging of the battery to ensure appropriate charging ("**a battery charging circuit configured to charge the battery**"). (Ex. PA-1, ¶[0285].) As shown in Figure 34, reproduced below, the charge management integrated circuit is coupled to the output of the receiver rectifier circuit D1 and is coupled to the battery ("**the battery charging circuit is coupled to the output of the receiver rectifier circuit and coupled to the battery**").

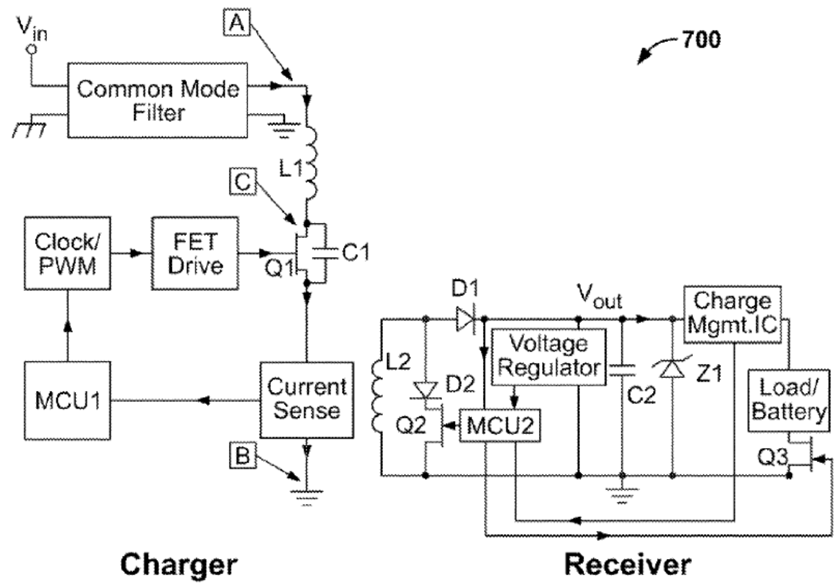


FIG. 34

(Ex. PA-1, Figure 34.)

The description of Figure 34 does not explicitly disclose "a battery charging circuit configured to . . . begin drawing current when the output of the receiver rectifier circuit reaches a set minimum voltage value." However, *Partovi* discloses this elsewhere. For example, *Partovi* discloses a battery charging circuit in a mobile device:

> In another embodiment, the regulators or battery charging circuit in mobile devices or batteries . . . typically has a start voltage (such as 5V) that is required to start the charging process. Once the battery charge circuit detects the presence of this voltage, it switches on and then proceeds to draw current at a preset rate from the input to the feed the battery for charging. The battery charger circuits operate such that an over under or over voltage at the start will prevent startup.

(Ex. PA-1, ¶[0210].) The description of a battery charging circuit in paragraph [0210] is applicable to the charge management integrated circuit of Figure 34 of *Partovi* because a person of skill in the art would have recognized that a charge management integrated circuit is a type of battery charging circuit. Even if the description in paragraph [0210] is not applicable to the charge management integrated circuit of Figure 34, a person of skill in the art would have been motivated to modify the charge management integrated circuit of Figure 34 to begin drawing current when the output of the receiver rectifier circuit reaches a set minimum voltage value to avoid shutdown of the circuit due to misalignment of the primary and receiver coils or other issues that may cause power transmittal variations. (Ex. PA-1, ¶[0210].) This modification would have been a straightforward combination of well-known technologies using known methods and techniques familiar to such a skilled person. (PA-DEC at ¶209.)

i. wherein when a current is generated in the coil inductively by the primary coil: the receiver rectifier circuit is configured to rectify and smooth the current, the voltage regulator is configured to use the current to power and activate the microcontroller, and the battery charging circuit is configured to use the current to charge the battery of the portable device; and

Partovi discloses this limitation. (Ex. PA-DEC, ¶¶210-212.) For example, as discussed in Section VI.B.2.e, the implementation shown in Figure 34 of *Partovi* has a receiver rectifier circuit. *Partovi* discloses "[a]s the primary charger or power supply sends power to the secondary receiver, the circuit in the receiver turns on. The power received is rectified and filtered by rectifier D1 and Capacitor C2 respectively." (Ex. PA-1, ¶[0262].) As Figures 34 and 28 of *Partovi* have identical components the description of Figure 28 is applicable to Figure 34. *Partovi* thus discloses "**when a current is generated in the coil inductively by the primary coil: the receiver rectifier circuit is configured to rectify and smooth the current**," as claimed.

Partovi also discloses "the voltage regulator is configured to use the current to power and activate the microcontroller," as claimed. For example, concerning Figure 34, *Partovi* discloses the "voltage regulator in the receiver is used to provide a constant low current voltage to MCU2" ("**the voltage regulator is configured to use the current to power and activate the microcontroller**"). (*Id.*, ¶[0285].)

Partovi also discloses "**the battery charging circuit is configured to use the current to charge the battery of the portable device**," as claimed. For example, as shown in Figure 34, reproduced below, the charge management circuit receives the rectified and smoothed current from the receiver rectifier circuit D1. (*Id.*, FIG. 34) The charge management circuit uses the current to "control the charging of the battery to ensure appropriate charging" ("**the battery charging circuit is configured to use the current to charge the battery of the portable device**"). (*Id.*, ¶[0285], FIG. 34.)

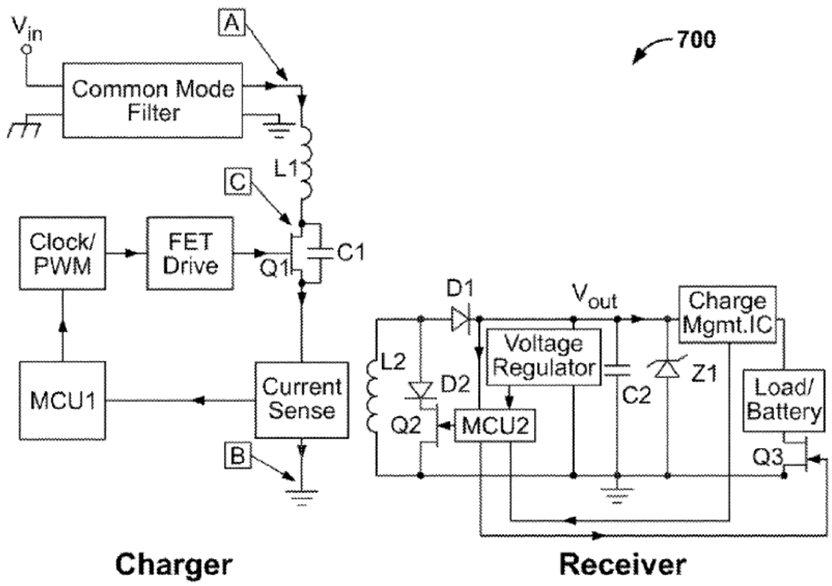


FIG. 34

(Ex. PA-1, Figure 34.)

j. wherein upon powering and activation of the receiver circuit by the primary coil, the receiver circuit is configured to:

Partovi discloses this limitation. (Ex. PA-DEC, ¶213.) *Partovi* discloses MCU1 can periodically start the FET driver and the primary coil L1 to begin emitting power to any receivers that are nearby. (Ex. PA-1, ¶[0295].) If a receiver is nearby the microcontroller MCU2 in the receiver can be programmed to, on power up, draw current in a pre-programmed manner ("**wherein upon powering and activation of the receiver circuit by the primary coil**"). (*Id.*) The microcontroller MCU2 then "executes a predetermined program that modulates the current being drawn in the receiver in a predetermined code (which can be encrypted). This receiver modulation can be detected as a current modulation in the current through the L1 by the charger or power supply current sensor in FIG. 34." (*Id.*)

k. communicate to the inductive charging system information corresponding to a voltage or current value at the output of the receiver rectifier circuit induced by the primary coil, a unique identifier code, and a power requirement; and

Partovi discloses this limitation. (Ex. PA-DEC, ¶¶214-217.) The implementation shown in Figure 28[14] of *Partovi* discloses the microcontroller MCU2 monitors the output voltage V_{out} of

[14] Figures 34 and 28 of *Partovi* have identical components. Therefore, the implementation described in Figure 28 is applicable to Figure 34 as the structures shown in the figures are identical.

the rectifier D1 ("**information corresponding to a voltage or current value at the output of the receiver rectifier circuit induced by the primary coil**") and tries to maintain the output voltage within a pre-programmed range. (Ex. PA-1, ¶¶[0262], [0265], FIG. 34.) This information is then communicated to the charger. In particular, *Partovi* discloses "the receiver sends a digital code corresponding to the output voltage and MCU**1** compares this to the earlier output voltage value and makes a determination about which direction and by how many steps to move the frequency." (*Id.*, ¶[0265].) Furthermore, "the induced voltage/current in the mobile device can be sensed and communicated to the charger to form a closed-loop, and the duty cycle, frequency, and/or voltage of the switch can be adjusted to achieve the desired voltage/current in the mobile device." (*Id.*, ¶[0130].) To do this, MCU2 modulates the switch Q2 to change the impedance of the receiver circuit which affects the current through the primary coil, which is detected by the current sense circuit ("**communicate to the inductive charging system information corresponding to a voltage or current value at the output of the receiver rectifier circuit induced by the primary coil**.") (*Id.*, ¶[0262])

The voltage V_{out} is "**induced by the primary coil**." (*Id.*, ¶[0013], [0091], [0118], [0119], [0262] ("As the primary charger or power supply sends power to the secondary receiver, the circuit in the receiver turns on. The power received is rectified and filtered by rectifier D**1** and Capacitor C**2** respectively.").)

Partovi further discloses similar features with respect to Figure 38.[15] Concerning Figure 38, *Partovi* discloses "the receiver circuit can note the amount of voltage or power being received and report back to the charger or power supply. This information can be encoded by modulating the input impedance of the receiver circuit by MCU2. This information is then sensed by the charger or power supply sense circuitry, digitized by MCU1 and saved." (Ex. PA-1, ¶[0331].) A POSITA would understand that modulating the input impedance of the receiver circuit discloses communications from the receiver unit to the charger.

The description of Figure 34 does not explicitly disclose "communicate to the inductive charging system information corresponding to . . . a unique identification code, and a power requirement." However, *Partovi* discloses it elsewhere. For example, *Partovi* discloses once a

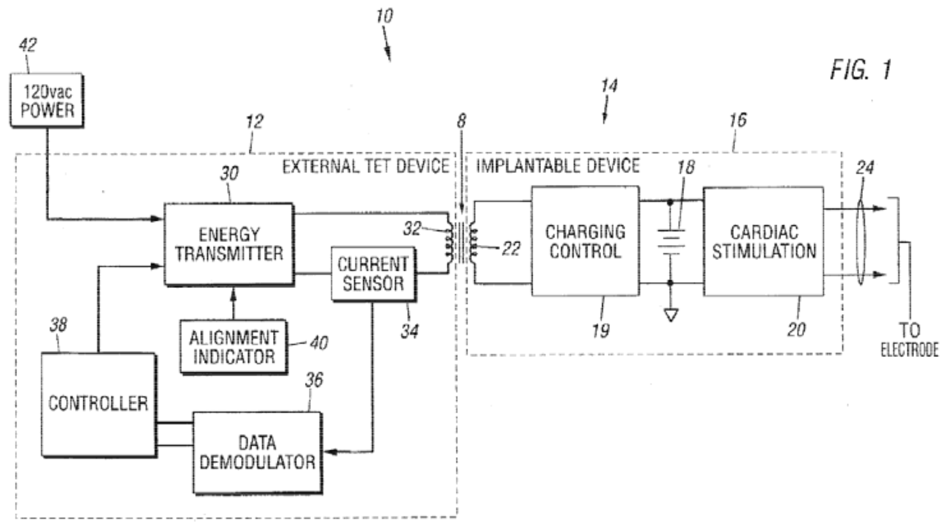
[15] The implantation of Figure 38 incorporates the switching and sense circuity of Figure 34. (Ex. PA-1, ¶[0326].) Therefore, the implementation described in Figure 38 is also applicable to Figure 34.

receiver is detected nearby the charger, the charger and the receiver begin to exchange information including a "unique ID code" and the "voltage requirements of the battery" ("**a unique identification code, and a power requirement**"). (Ex. PA-1, ¶¶[0112], [0113] ("This information can include a unique ID code that can verify the authenticity and manufacturer of the charger or power supply and mobile device or battery, the voltage requirements of the battery or the mobile device, and the capacity of the battery."), [0307].) The verification code can verify the authenticity and manufacturer of the mobile device as well as provide information to the charger regarding the necessary "voltage, power, temperature, or other diagnostic information for achieving reliable charging." (Ex. PA-1, ¶¶[0113], [307].) The implementation described in paragraphs [0112], [0113], and [0307] may be applied to the implementation shown in Figure 34 because Figure 34 of *Partovi* expressly contemplates the portable device and the charger exchanging information to authenticate the portable device (Ex. PA-1, ¶[0297].)

l. periodically communicate to the inductive charging system additional information corresponding to a presently induced output voltage or current of the receiver rectifier circuit to enable the inductive charging system to regulate in a closed loop feedback manner the output voltage or current of the receiver rectifier circuit during the charging of the portable device.

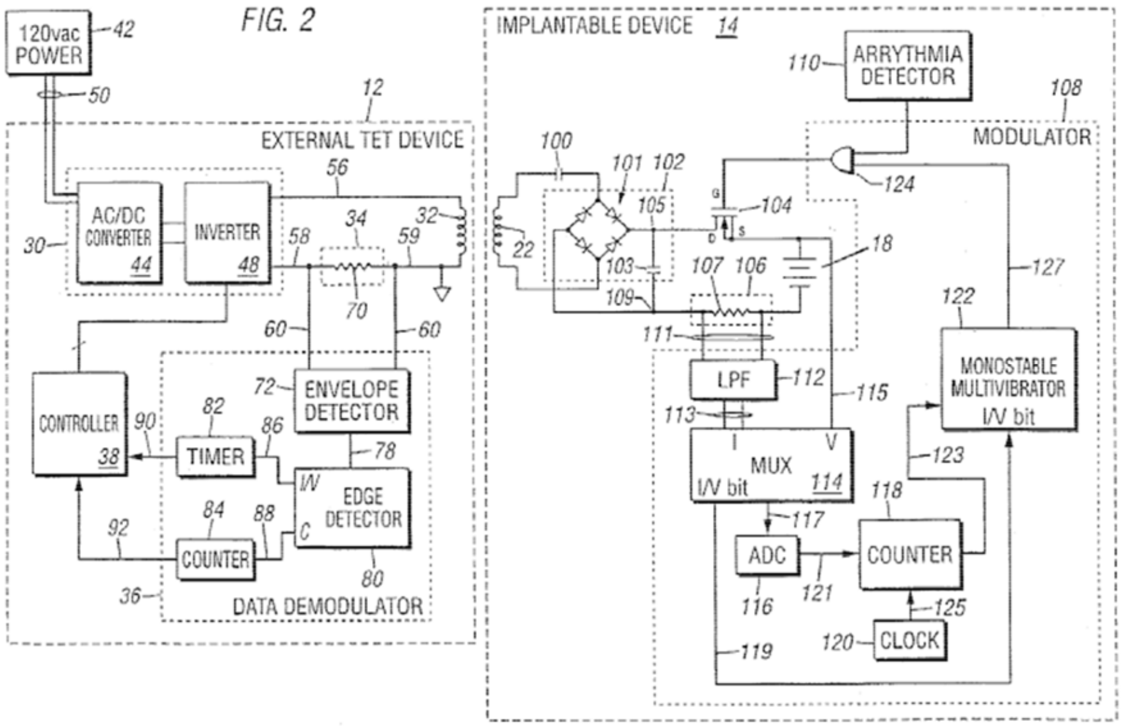
Partovi in view of *Nedungadi* discloses or suggests this limitation. (Ex. PA-DEC, ¶¶218-222.) As discussed above in Section VI.B.2.k, *Partovi* discloses MCU1 receiving information from the receiver including information corresponding to the output voltage of the receiver's rectifier circuit. *Partovi* does not disclose the MCU1 "periodically" receiving this information. However, *Nedungadi* discloses it.

Nedungadi discloses an inductive charging system for charging a battery. (*See, e.g.*, Ex. PA-2, 1:9-13.) As shown in Figure 1 of *Nedungadi* an external device 12 has a primary coil 32 that is used to provide power to a receiver coil 22 of an implantable device 14. (*Id.*, 5:12-40.) *Nedungadi* discloses that the implantable device 14 may communicate with the external TET device 12. (*Id.*, 5:41-45.) For example, the control circuitry 19 in the implantable device "samples battery voltage and current" and "transmits that data to TET 12 via coils 32, 22, in order to control the energy transmission between TET device 12 and implantable device 14." (*Id.*) "The battery voltage is indicative of the level of charge of battery 18." (*Id.*, 5:44-45.) The battery voltage is the "**presently induced output voltage or current of the receiver rectifier circuit**," as claimed.



(*Id.*, FIG. 1.)

In particular, a data modulator 108 in an implantable device 14 senses battery voltage and current at regular intervals (once every minute or two) and communicates those values to the controller 38 in the charger (i.e., the external TET device 12). (*Id.* at 8:40-51.) "Depending on those values, the output power" of the charger is regulated by controller 38. (*Id.*) *Nedungadi* therefore discloses periodically communicating battery voltage and current values from the receiver to the controller in the charger that controls power transfer based on those received values ("**periodically communicate to the inductive charging system additional information corresponding to a presently induced output voltage or current of the receiver rectifier circuit**").



(*Id.*, FIG. 2.)

Partovi further discloses "**enabl[ing] the inductive charging system to regulate in a closed loop feedback manner the output voltage or current of the receiver rectifier circuit during the charging of the portable device**." *Partovi* discloses "the induced voltage/current in the mobile device can be sensed and communicated to the charger to form a closed-loop, and the duty cycle, frequency, and/or voltage of the switch can be adjusted to achieve the desired voltage/current in the mobile device." (Ex. PA-1, ¶[0130].) In the Figure 28 implementation, during the charging process, the receiver MCU2 communicates an output voltage (Vout) of the rectifier to the charger MCU 1, which then adjusts the frequency at which FET 1 is driven. (*Id.*, ¶¶[0262]-[0265].) Therefore, the MCU1 performs closed loop regulation as claimed. The implementation shown in Figure 28 may be applied to the implementation shown in Figure 34 because Figures 34 and 28 have identical components.

A POSITA would have been motivated to adopt *Nedungadi*'s above-identified techniques with *Partovi* so that the power transfer can be controlled in accordance with the charging status of the battery. (Ex. PA-DEC, ¶222.) These techniques (including the periodic exchange of battery voltage between the charger and receiver) allows "control[ling] the delivery of energy to [the] battery [in the portable device]." (Ex. PA-2, 5:7-11.) Furthermore, there are only two options for information transfer from the receiver to the charger: periodic or non-periodic. Thus, there is a finite set of options available for a designer of *Partovi*'s system, and implementing the periodic data transfer option (a feature express in *Nedungadi*) would have been obvious. Uber Techs., Inc. v. X One, Inc., 957 F.3d 1334, 1341 (Fed. Cir. 2020) ("Because terminal-side plotting (as described in Okubo) and server-side plotting (as described in Konishi and claimed in the '593 patent) would have been two of a finite number of known, predictable solutions at the time of the invention of the'593 patent, a person of ordinary skill would have faced a simple design choice between the two, and therefore would have been motivated to combine the teachings of Okubo and Konishi to achieve the limitation.") (emphasis added). A POSITA would have had a reasonable expectation of success in making such a modification to *Partovi* given that the modification would have been a straightforward combination of well-known technologies using known methods and techniques familiar to such a skilled person. (PA-DEC at ¶222.) For example, implementing data transfer from *Partovi*'s receiver "periodically" from the receiver would have been straightforward given *Partovi*'s numerous references to periodic activity. (*E.g.*, Ex. PA-1, ¶[0290], [0294].)

VII. Detailed Explanation of the Pertinence and Manner of Applying the Prior Art to the Claims

A. Bases for Proposed Rejections of the Claims

The following is a quotation of pre-AIA 35 U.S.C. § 102 that forms the basis for all of the identified prior art:

> A person shall be entitled to a patent unless . . .
>
> (e) the invention was described in — (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for the purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language . . . .

The following is a quotation of pre-AIA 35 U.S.C. § 103(a) that forms the basis of all of the following obviousness rejections:

> A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the

> prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negative by the manner in which the invention was made.

The question under 35 U.S.C. § 103 is whether the claimed invention would have been obvious to one of ordinary skill in the art at the time of the invention. In *KSR International Co. v. Teleflex Inc*., 550 U.S. 398 (2007), the Court mandated that an obviousness analysis allow for "common sense" and "ordinary creativity," while at the same time not requiring "precise teachings directed to the specific subject matter of the challenged claim[s]." *KSR*, 550 U.S. at 418, 420-421. According to the Court, "[t]he combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results." *Id.* at 416. In particular, the Court emphasized "the need for caution in granting a patent based on the combination of elements found in the prior art." *Id.* at 401. The Court also stated that "when a patent simply arranges old elements with each performing the same function it had been known to perform and yields no more than one would expect from such an arrangement, the combination is obvious." *Id.* at 417.

The Office has provided further guidance regarding the application of *KSR* to obviousness questions before the Office.

> If a person of ordinary skill can implement a predictable variation, § 103 likely bars its patentability. For the same reason, if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill.

MPEP § 2141(I) (quoting *KSR* at 417.)

The MPEP identifies many exemplary rationales from *KSR* that may support a conclusion of obviousness. Some examples that may apply to this reexamination include:

- Combining prior art elements according to known methods to yield predictable results;
- Simple substitution of one known element for another to obtain predictable results;
- Use of a known technique to improve similar devices in the same way;
- Applying a known technique to improve devices in the same way;
- Choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success ("obvious to try")

MPEP § 2141(III).

In addition, the Office has published *Post-KSR* Examination Guideline Updates. *See* Fed. Reg. Vol. 75, 53464 (the "Guideline Updates"). The Guideline Updates discuss developments after *KSR* and provide teaching points from recent Federal Circuit decisions on obviousness. Some examples are listed below:

> A claimed invention is likely to be obvious if it is a combination of known prior art elements that would reasonably have been expected to maintain their respective properties or functions after they have been combined.

Id. at 53646.

> A combination of known elements would have been prima facie obvious if an ordinary skilled artisan would have recognized an apparent reason to combine those elements and would have known how to do so.

Id. at 53648.

> Common sense may be used to support a legal conclusion of obviousness so long as it is explained with sufficient reasoning.

Id.

B. Proposed Rejections

Pursuant to 37 C.F.R. § 1.510(b)(2), Requester identifies claims 1, 5, 12, and 21 as the claims for which reexamination is requested. The proposed rejections below, in conjunction with the analysis in Sections IV-VI above and the attached declaration of Dr. Baker (Ex. PA-DEC), provide a detailed explanation of the pertinence and manner of applying the prior art to each of claims.

1. Proposed Rejection #1

Claims 1, 5, and 12 are obvious over *Partovi* in view of *Calhoon* under 35 U.S.C. § 103, as shown by the discussion above in Section VI.A and the declaration of Dr. Baker provided in Exhibit PA-DEC.

2. Proposed Rejection #2

Claim 21 is obvious over *Partovi* in view of *Nedungadi* under 35 U.S.C. § 103, as shown by the discussion above in Section VI.B and the declaration of Dr. Baker provided in Exhibit PA-DEC.

VIII. Conclusion

For the reasons set forth above, the Requester has established at least one substantial new question of patentability with respect to claim 1, 5, 12, and 21 of the ’942 patent. The analysis provided in this Request and in the declaration of Dr. Baker (Ex. PA-DEC) demonstrates the invalidity of the claims in view of prior art that was not substantively considered by the Patent Office. Therefore, it is requested that this request for reexamination be granted and claim 1 be cancelled.

As identified in the attached Certificate of Service and in accordance with 37 C.F.R. §§ 1.33(c) and 1.510(b)(5), a copy of this Request has been served, in its entirety, to the address of the attorney of record.

Respectfully submitted,

PAUL HASTINGS LLP

Dated: July 1, 2024 By: /Naveen Modi/

Naveen Modi (Reg. No. 46,224)