IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re *Ex Parte* Reexamination of:	)	
U. S. Patent No. 11,201,500 B2	)	Control No.: *To be assigned*
Issue Date: Dec. 14, 2021	)	Group Art Unit: *To be assigned*
Inventors: Afshin Partovi, *et al.*	)	Examiner: *To be assigned*
Appl. No. 16/055,109	)	Confirmation No.: *To be assigned*
Filing Date: August 5, 2018	)	
For: EFFICIENCIES AND 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. 11,201,500

Reexamination is requested under 35 U.S.C. § 302 and 37 C.F.R. § 1.510 for claims 1, 2, 23, and 30 of U.S. Patent No. 11,201,500 B2 (the ’500 patent), which issued on December 14, 2021 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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I. Introduction

An *ex parte* reexamination is requested on claims 1, 2, 23, and 30 of U.S. Patent No. 11,201,500 B2, which issued on December 14, 2021 to Partovi ("the '500 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 '500 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 '500 patent. Specifically, this request establishes that the challenged claims of the '500 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 '500 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 '500 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 '500 patent on June 27, 2023. IPR2023-01091, Paper 1; IPR2023-01092, Paper 1; IPR2023-01093, 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 IPR2023-01091, IPR2023-01092, and IPR2023-1093. 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 ’500 patent, and that the PTAB did not have before it in IPR2023-01091, IPR2023-01092, and IPR2023-1093, 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, 2, 23, and 30 of the ’550 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*”)

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 ’500 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 ’500 Patent

A. Specification and Drawings of the ’500 Patent

The ’500 patent is titled “Efficiencies and Flexibilities in Inductive (Wireless) Charging.” The named inventors are Afshin Partovi and Michael Sears. (Ex. PAT-A, Cover.) It issued from United States Patent Application No. 16/055,109, which was filed on August 5, 2018. (*Id.*) The ’109 application 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 ’500 patent claims priority to provisional application Nos. 60/763,816, 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, filed on May 8, 2007, 60/952,835, filed July 30, 2007, 61/012,922 (“’922 provisional”), filed on December 12, 2007, 61/012,924, filed on Dec. 12, 2007, 61/015,606, filed on December 20, 2007, and 61/043,027, filed on April 7, 2008. (*Id*., *see also id.*, 1:7-2:2.)

The ’500 patent is directed to “[s]ystems and methods are provided for inductive powering and/or charging of electric or electronic devices or batteries.” (Ex. PAT-A at 4:13-14.) Figure 1 of the ’500 patent, excerpted below, shows an embodiment:

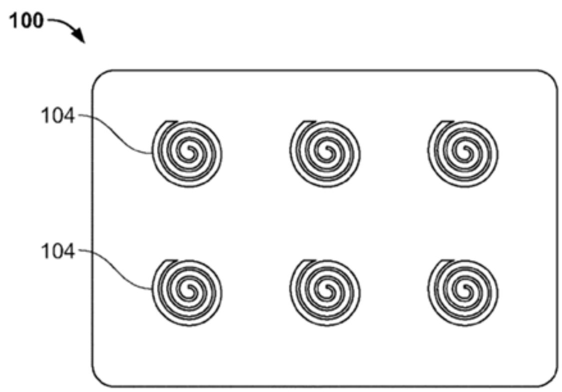

FIG. 1

(Ex. PAT-A at FIG. 1.)

The ’500 patent describes Figure 1 as follows:

> 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.* at 9:47-58.)

Figure 10 of the ’500 Patent excerpted below shows a more detailed view of the charger:

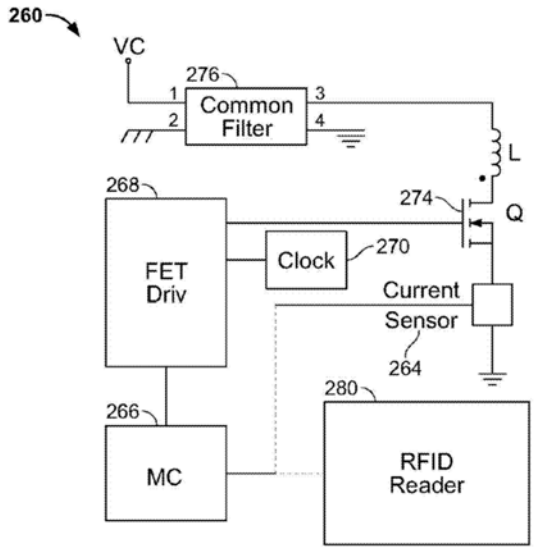

FIG. 10

(*Id.* at Figure 10.)

The ’500 Patent describes Figue 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.* at 22:52-58.)

Figure 11 of the ’500 Patent excerpted below shows a view of the receiver capable of charging by the wireless charger:

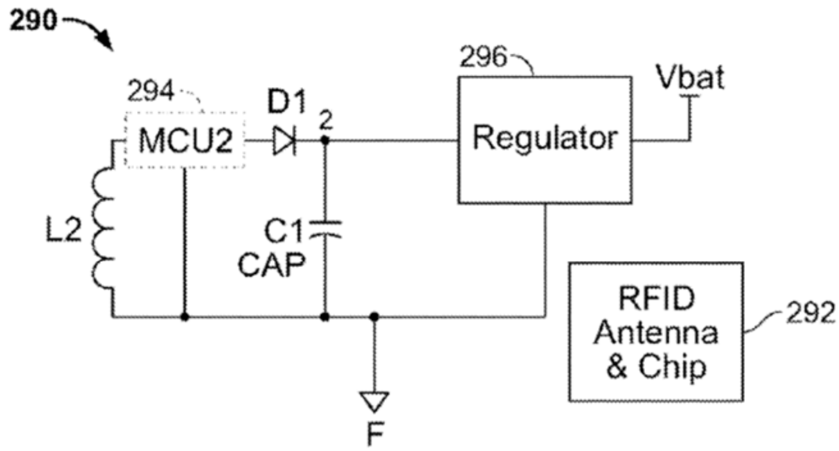

FIG. 11

(*Id.* at Figure 11.)

The '500 Patent descibes 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.* at 23:32-45.)

The inventors of the '500 patent were involved with problems related to efficiency of a wireless charger capable of wirelessly charging many devices. (*See, e.g.*, *id.* at 3:48-63.)

The '500 patent and the provisional applications incorporated therein admit that numerous claimed features of the alleged invention were known in the prior art prior to the alleged invention of the '500 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, power is transformed from one part to the other inductively without any connection.

(Ex. PAT-G, at 2.)

The ’262 provisional further acknowledges that wireless charging and wireless power transfer were known prior to the priority date of the application of the ’500 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 35^{th} 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 “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 coil for charger operation

> A typical 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:

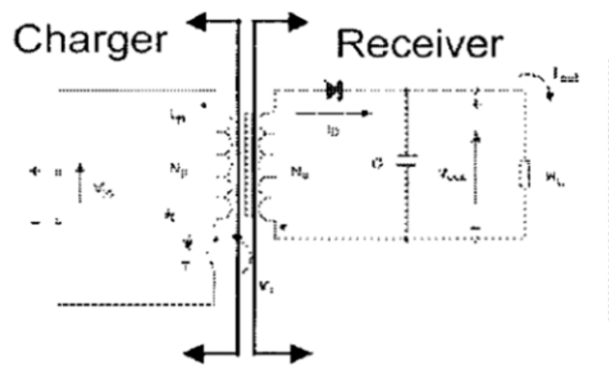

Figure 1 - Simplified picture of an inductive power transfer unit.

(*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 as shown in Figure 1**.

(*Id.*, 9.)

The '500 Patent provides more detail on the "typical" wireless charging system:

> FIG. 2 shows the main components of a **typical inductive power transfer system 110**. The circuit illustrated is **used to illustrate the principle of inductive power transfer** 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 **typically** 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, 11:56-12:50.)

Figure 2 of the '500 patent depicts the "typical" wireless charging system:

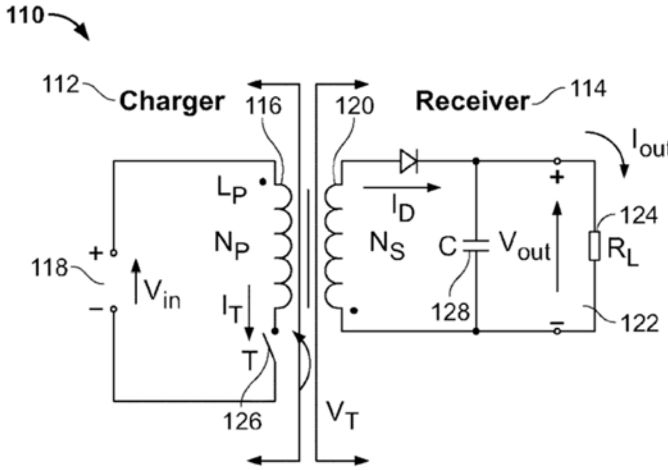

FIG. 2

(*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 '500 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, 16:44-47.)

In addition to these admitted prior art references, each of the components utilized in the alleged invention of the '500 patent was known prior to the priority date of the '500 patent. (Ex. PA-DEC, ¶86.)

B. Prosecution History of the '500 patent

During prosecution of the '500 patent, the applicant was rejected multiple times and replaced the filed claims with completely new claims. (*See, e.g.,* Ex. PAT-B at 648-657, 636-642, 578-587, 560-570, 548-557, 408-413.) The original claims, filed on August 5, 2018, were directed to wireless chargers that included a specific arrangement comprising a "plurality of coils arrayed in one or multiple layers to provide substantially continuous charging . . . over an effective area . . . larger than a single coil surface area" and "ferromagnetic and/or electrically conductive layers or structures positioned within the charger or power supply to shield components within the charger or power supply or to shield [the] nearby environment," as shown in the below exemplary excerpt of original claim 1. (*Id.*, 788.)

> 1. A charger or power supply for providing substantially continuous charging or for supplying wireless power to one, a plurality, or a combination of electrical, electronic or mobile devices and/or batteries, on a surface of the charger or power supply, comprising:
>
> a plurality of coils arrayed in one or multiple layers to provide substantially continuous charging or to supply wireless power over an effective charging area of the surface of the charger or power supply, wherein the effective charging area is larger than a single coil surface area, and the coils are arrayed such that any location on the effective charging area is at a distance equal to or less than a radius or a side-to-center length of at least one coil; and
>
> ferromagnetic and/or electrically conductive layers or structures positioned within the charger or power supply to shield components within the charger or power supply or to shield nearby environment.

(*Id.*)

The originally filed abstract tracked claim 1 almost verbatim, confirming that the application as filed was directed to a charger/power supply with an array of multiple coils and ferromagnetic and/or electrically conductive layers or structures to shield components or the nearby environment. (*See id.*, 791.)

> **IMPROVED EFFICIENCIES AND FLEXIBILITIES IN INDUCTIVE (WIRELESS) CHARGING**
>
> **ABSTRACT**
>
> A charger or power supply is provided that effects substantially continuous charging to one or more devices and/or batteries, on a surface of the charger or power supply. The charger or power supply comprises: a plurality of coils arrayed in one or multiple layers to provide substantially continuous charging or to supply wireless power over an effective charging area of the surface of the charger or power supply, wherein the effective charging area is larger than a single coil surface area, and the coils are arrayed such that any location on the effective charging area is at a distance equal to or less than a radius or a side-to-center length of at least one coil. Ferromagnetic and/or electrically conductive layers or structures positioned within the charger or power supply shield components within the charger or power supply (or shield the nearby environment of the charger or power supply).

(*Id.*)

The originally filed claims were rejected as anticipated by U.S. Patent Pub. No. 2009/0096413 to Partovi. (*Id.*, 648-657.) Mojo responded by amending its claims on May 8, 2020. (*Id.*, 636-642.)

Application Serial No. 16/055,109 Atty Dkt No. AFPA-01013US6
Response submitted no later than May 14, 2020 (3-month extension)
Reply to Office Action dated November 14, 2019

LISTING OF THE CLAIMS

This listing of the claims will replace all prior versions and listings of claims in the application:

1. (Currently Amended) A charger or power supply for providing substantially continuous charging or for supplying wireless power to one, a plurality, or a combination of electrical, electronic or mobile devices and/or batteries, on a surface of the charger or power supply, comprising:

a plurality of coils arrayed in two or more layers ~~in one or multiple layers~~ to provide substantially continuous charging or to supply wireless power over an effective charging area of the surface of the charger or power supply, wherein the effective charging area is larger than a single coil surface area, and the coils in multiple layers are arrayed such that any location on the effective charging area is at a distance equal to or less than a radius or a side-to-center length of at least one coil in one of the layers; and

ferromagnetic and/or electrically conductive layers or structures positioned within the charger or power supply to shield components within the charger or power supply or to shield nearby environment.

(*Id.*, 637.)

The amendments narrowed the claim scope by removing the option for the plurality of coils be in "one . . . layer[]," and instead required two or more (multiple) layers of coils. (*Id.*) The claims retained all other limitations, including those pertaining to the shielding structures. (*Id.*) On December 21, 2020, the examiner finally rejected these narrower claims. (*Id.*, 578-587.)

On March 22, 2021, Mojo filed a Request for Continued Examination ("RCE"). (*Id.*, 560-570.). With that RCE, Mojo cancelled all of its pending claims, and submitted new replacement claims. (*Id.*, 561-570.). These new claims took a different path. Instead of claiming an array of coils in multiple layers, having ferromagnetic or electrically conductive shielding, they were broadened and dispensed with those features. (*Id.*) For example, in place of the array of coils, for which Mojo had previously surrendered the claim scope that the array could be in a single layer, the new claims required only "one or more" ***coils***, such that they could encompass a single coil on a single layer, instead of an array of coils on multiple layers. (*Id.*) Mojo also dropped any mention of shielding from the claims. (*Id.*) In addition, Mojo added substantial new and not previously presented claim elements, including FET drivers, FET switches, capacitors coupled to the primary coil(s), sense circuits to monitor the current through the primary coil(s) to sense communications from the receiver, communication and control circuits including microcontrollers to detect communications, the communications themselves, operation near a resonant frequency of a specific circuit, and circuits configured to determine coil alignment and activate FET switches in response, among other new claim elements. (*Id.*) Where the original independent claims were less than a half page long, the new independent claims were around one-and-a-half pages. (*Id.*) These changes can be seen in claim 19, below, which replaced claim 1.

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Response submitted no later than Monday, March 22, 2021
Reply to Office Action dated December 21, 2020

LISTING OF THE CLAIMS

This listing of the claims will replace all prior versions and listings of claims in the application:

1-18. (Cancelled)

19. (New) A system for inductive powering or charging of portable devices, the system comprising:

one or more primary coils that are substantially planar and parallel to a surface of the system for powering or charging portable devices including batteries and receiver units each including a receiver coil and a receiver circuit including a receiver rectifier circuit;

one or more drive circuits including FET drivers, FET switches, and capacitors coupled to the one or more primary coils that when operated apply an alternating electrical current to the one or more primary coils to generate a magnetic field in a direction substantially perpendicular to the plane of the one or more primary coils and the surface of the system to provide power to one or more of the portable devices capable of being powered or charged by the system when present and near the one or more primary coils;

one or more sense circuits to monitor the current through the one or more primary coils to sense communications from the one or more receiver coils; and

one or more communication and control circuits including one or more microcontrollers coupled to the one or more drive circuits and the one or more sense circuits that detect communication through the one or more sense circuits via the one or more primary coils and control the one or more drive circuits to control the charging process;

wherein the one or more communication and control circuits:

operate the one or more drive circuits near a first resonant frequency of a circuit formed by a primary coil and a drive circuit and a receiver coil and a receiver circuit of one of the portable devices when nearby;

sequentially switch the one or more primary coils at a frequency and power level sufficient to transfer power to one or more of the receiver units when near the one or

> more primary coils for a sufficiently long period of time to activate the one or more receiver circuits and to receive a response from the one or more receiver circuits via the one or more receiver coils which the one or more primary coils sense via the one or more sense circuits as a modulation of one or more primary coil currents;
>
> detect through the one or more sense circuits communications from the one or more receiver units through the one or more receiver coils including information corresponding to one or more voltages at one or more outputs of the one or more receiver rectifier circuits induced by the one or more primary coils and the one or more receiver coils, and information identifying the one or more portable devices and receiver units;
>
> determine the one or more primary coils electromagnetically most aligned with the one or more receiver coils;
>
> drive FET switches associated with those most aligned one or more primary coils; periodically receive information corresponding to one or more output voltages or currents of the one or more receiver rectifier circuits via the one or more primary coils and the one or more sense circuits; and
>
> regulate in a closed loop feedback manner the one or more output voltages or currents of the one or more receiver rectifier circuits by adjusting the frequency or duty cycle of the one or more drive circuits during the charging or powering of the one or more portable devices .

(*Id.*, 561-562.) Mojo also added claim 38 as a new independent claim written from the perspective of the receiver, replacing claim 15. (*Id.*, 565-566.) The changes to that claim generally mirror those to claim 1, including removing the requirement that the charger have a coil array and shielding, and adding new limitations similar to claim 1 that greatly lengthened the claim. *Id.* Mojo made a few other minor claim revisions in a supplemental amendment. (*Id.*)

Following these amendments, on May 19, 2021, the examiner indicated that the claims needed a few formal corrections but were otherwise allowable. (*Id.*, 408-413.) After Mojo corrected the claims, the examiner issued a Notice of Allowance. (*Id.*, 350-357.) In the notice, the examiner stated that the prior art failed to teach the combination of features that included "operat[ing] ... near a first resonance frequency," "determin[ing] the one or more primary coils electromagnetically most aligned," "periodically receiv[ing] information corresponding to" the voltage at the rectifier output, and "regulat[ing] in a closed feedback manner" the voltage at the rectifier output. (*Id.*, 355-356.) However, the features identified by the examiner were known in the art at the time of the invention.

Per the district court, "electromagnetically most aligned" means "highest power transfer efficiency." (Ex. LIT-3, 21.)

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 special constructions of the challenged claims, are needed over the asserted prior art. (Ex. PA-DEC, ¶¶87-88.)

VI. Statement of Substantial New Questions of Patentability

The following combinations of prior art disclose or suggest all of the features of claims 1, 2, 23, and 30 of the '500 patent.

<u>**SNQ1**</u>: *Partovi* (U.S. 2009/0096413) and *Nedungadi* (U.S. Patent No. 5,713,939) raise a substantial new question of patentability with respect to claims 1, 2, 23, and 30 of the '500 patent.

The above combination was not applied in a rejection by the Patent Office during prosecution. Nor was it presented in IPR2023-01091, IPR2023-01092, IPR2023-01093, which involved different prior art. For example, *Partovi* was not presented as a primary reference like in

1 Requester reserves all rights and defenses available including, without limitation, defenses as to invalidity, unenforceability, and non-infringement regarding the '500 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 '500 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.

the instant request. Moreover, as explained in detail below, *Partovi* discloses the "planar coil" limitations that the Board found non-obvious 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* and *Nedungadi* raise a substantial new question of patentability with respect to claims 1, 2, 23, and 30 of the '500 patent.

A. SNQ1: *Partovi* in View of *Nedungadi* Discloses or Suggests Claim 1

1. Effective Filing Date of the '500 Patent

Mojo asserts that claims 1, 23, and 30 are entitled to at least an effective filing date of December 5, 2006 and claim 2 is 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 '500 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 '500 patent. This is relevant because the lack of entitlement to the filing date of the'876 application results in the publication of the '876 application becoming prior art to the '500 patent claims. (*See infra* Section VI.A.1.a-d.)

The '500 Patent issued from a chain of applications, including 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").

Claims 1, 2, 23, and 30 of the'500 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, 2, 23, and 30.

"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.k] which requires the "**one or more communication and control circuits**" to "**<u>periodically</u> receive information corresponding to one or more output voltages or currents of the one or more receiver rectifier circuits via the one or more primary coils and the one or more sense circuits**." (Ex.

PAT-A, 70:43-44; 71:11-14) (emphasis added). Claim limitation [23.i] likewise requires the "**receiver circuit**" to "**<u>periodically</u> communicates information corresponding to an output voltage or current of the receiver rectifier circuit to the base unit to enable the base unit to regulate in a closed loop manner the output voltage or current of the receiver rectifier circuit during the charging or powering of the portable device**." (Ex. PAT-A, 73:43-49.) As explained in detail below, these limitations concern the charger "**periodically**" receiving information from the receiver, where the certain information is the output voltage or current at the rectifier circuit in the receiver. But there is no such disclosure in the '876 application or any applications before it. (Ex. PA-DEC, ¶¶97-114.)

a. Claims 1, 2, 23, and 30 of the '500 Patent Requires the Charger to "Periodically" Receive Certain Information from the Receiver

Claim 1 recites "one or more communication control circuits" in the **charger**. (Ex. PAT-A, 70:32-34.) Claim 1 recites that the "**one or more communication control circuits [in the charger]. . . <u>periodically</u> receive <u>information corresponding to one or more output voltages or currents of the one or more receiver rectifier circuits</u> via the one or more primary coils and the one or more sense circuits**." (Ex. PAT-A, 71:11-14 (emphasis added).) This limitation thus requires at least the communication control circuits in the charger to "**periodically**" receive <u>specific information from the receiver</u>, where the specific information is "**one or more output voltages or currents of the one or more receiver rectifier circuits**." (*Id.* (emphasis added).) Similarly, claim 23 requires the "receiver circuit" to "**periodically** communicate information corresponding to an output voltage or current of the receiver rectifier circuit **to the base unit**." (Ex. PAT-A, 73:43-49 (emphasis added).) This limitation thus requires the receiver unit to **<u>periodically</u>** communicate information on the output voltage or current of the receiver rectifier circuit to the base unit (i.e., the charger). (*Id.*) As claim 2 depends from claim 1, and claim 30 depends from claim 23, they also requires these limitations.

Periodically carries a particular meaning to a person of ordinary skill in the art, which is that something occurs at <u>regular intervals</u>. (Ex. PA-DEC, ¶99.) This meaning is confirmed by the specification of the '500 Patent. (*See e.g.*,'500 Patent, 23:7-8 ("In another embodiment the MCU1 relies on a clock 270 to periodically start the FET driver."); *id*., (25:14-16, "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.").)

b. The ’876 Application Does Not Disclose the Charger “Periodically” Receiving the Claimed Information from the Receiver

The ’876 application does not disclose “**one or more communication and control circuits**” that “**periodically receive information corresponding to one or more output voltages or currents of the one or more receiver rectifier circuits via the one or more primary coils and the one or more sense circuits**.” (Ex. PAT-A, 71:11-14 (emphasis added).) Therefore, the ’500 Patent cannot claim the benefit of the ’876 Patent as there is no written description support in the ’876 Application for claim limitation [1.k] of the ’500 Patent. For similar reasons, independent claim 23 also lacks written description support in the ’876 application.

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 limitations [1.k] and [23.i] of the ’500 Patent because, while they concern periodic activity, they relate to initial detection of a receiver or portable device. Claim limitation [1.k] requires a "**one or more communication and control circuits**" to "**periodically receive information corresponding to one or more output voltages or currents of the one or more receiver rectifier circuits via the one or more primary coils and the one or more sense circuits**" 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 limitations [1.k] and [23.i] 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 [1.k] and [23.i] of the '500 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 periodically powered up sequentially to sense whether the receiver is nearby by measuring the current through the primary coil.").) 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 '500 Patent claims cannot claim the benefit of the '876 Application as there is no written description support in the '876 Application for claim limitation [1.k] or [23.i] of the '500 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.

c. The ’113 Application Also Does Not Disclose the Charger “Periodically” Receiving the Claimed Information from the Receiver

There is no disclosure of “**one or more communication and control circuits**” that “**<u>periodically</u> receive information corresponding to one or more output voltages or currents of the one or more receiver rectifier circuits via the one or more primary coils and the one or more sense circuits**” 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, the aforementioned disclosures cannot provide written description support for limitation [1.k] or [23.i] of the ’500 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 receiving 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 above, the aforementioned disclosures cannot provide written description support for limitation [1.k] or [23.i] of the ’500 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.

d. The Provisional Applications Also Do Not Disclose the Charger “Periodically” Receiving the Claimed Information from the Receiver

There is no disclosure of “**one or more communication and control circuits**” that “**periodically receive information corresponding to one or more output voltages or currents of the one or more receiver rectifier circuits via the one or more primary coils and the one or more sense circuits**” in the ’262, ’298, ’922, ’606, ’027, ’748, ’835, and ’674 Applications.

For example, the disclosure in the ’262, ’298, ’922, ’606, ’027, ’748, ’835, and ’674 Applications, related to “periodically,” concern powering on the primary coil to initially detect whether a portable device is nearby. *See e.g.*, (Ex. G, ’262 Application at 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. I, ’674 Application at 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, ’298 Provisional at 18 (“[s]ince 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, ’922 Provisional at 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, ’606 Provisional at 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, ’027 Provisional at 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, ’748 Provisional at 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, '835 Provisional at 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, the aforementioned disclosures cannot provide written description support for limitation [1.k] or [23.i] of the '500 Patent because, while they may concern periodic activity, they relate to initial detection of a receiver or portable device.

The disclosures in the '262, '298, '922, '924, '606, '027, '748, '835, and '674 Applications relating to conveying information about the current and voltage of the receiver similarly fails to disclose periodically receiving information corresponding to the output voltage or circuit of the receiver rectifier. *See e.g.*, (Ex. G, '262 Patent at 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, ts authenticity (manufacturer code) and the charging requirements (required voltage, battery capacity, charge algorithm profile, etc.."); Ex. PAT-K, '922 Provisional at 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, '924 Provisional at 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, '606 Provisional at 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, '835 Provisional at 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. G, '262 Patent at 8, ("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. H, '298 Patent at 7, ("[i]n 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. H, '298 Patent at 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. H, '298 Patent at 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 t~at 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. G, '262 Patent at 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. G, 262 Patent at 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. I, '674 Patent at 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. I, '674 Patent at

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 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, the aforementioned disclosures cannot provide written description support for limitation [1.k] or [23.i] of the '500 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, and qualifies as prior art at least under pre-AIA 35 U.S.C. § 102(b) because the '500 patent claims are not entitled to the May 7, 2008 filing date of the '876 Application. Because the '500 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 '500 patent after the '876 application. 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.[2]

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

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[2] To be sure, the '500 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 '500 patent claims. But that does not matter for this request. Even assuming arguendo that the '500 patent claims could get the April 9, 2012 filing date, *Partovi* would still be prior art.

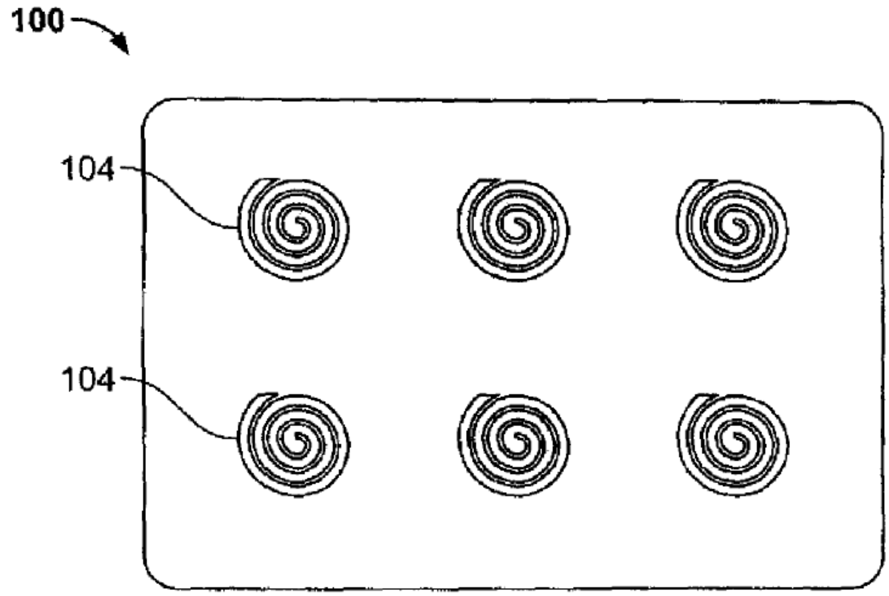
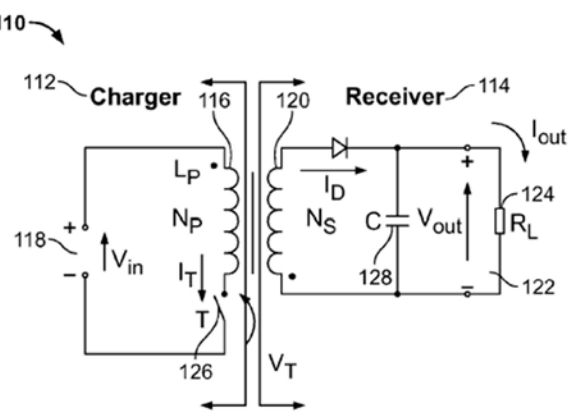


FIG. 1

(*Id.*, FIG. 1.)

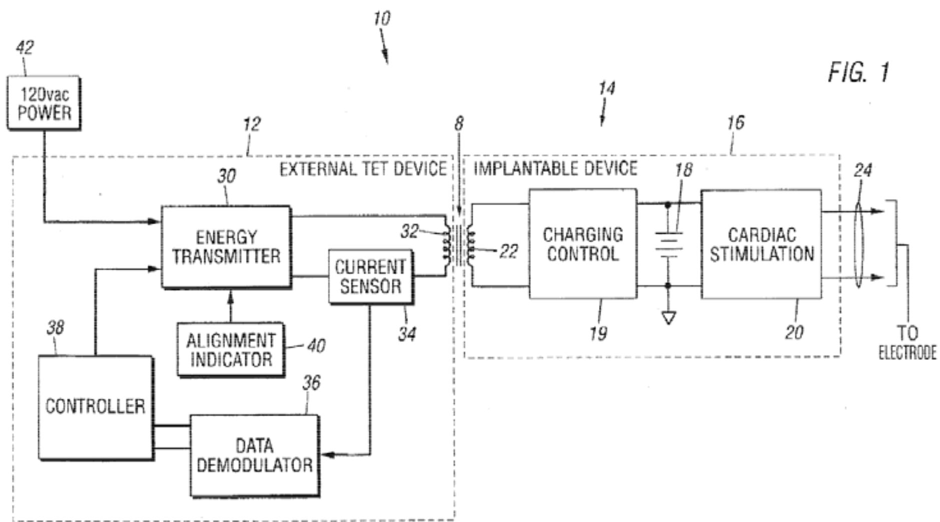


(*Id.*, FIG. 2.)

3. Overview of *Nedungadi*

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

4. Claim 1

a) A system for inductive powering or charging of portable devices, the system comprising:

To the extent the preamble is limiting, *Partovi* discloses this limitation. (Ex. PA-DEC, ¶¶115-117.) *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].)

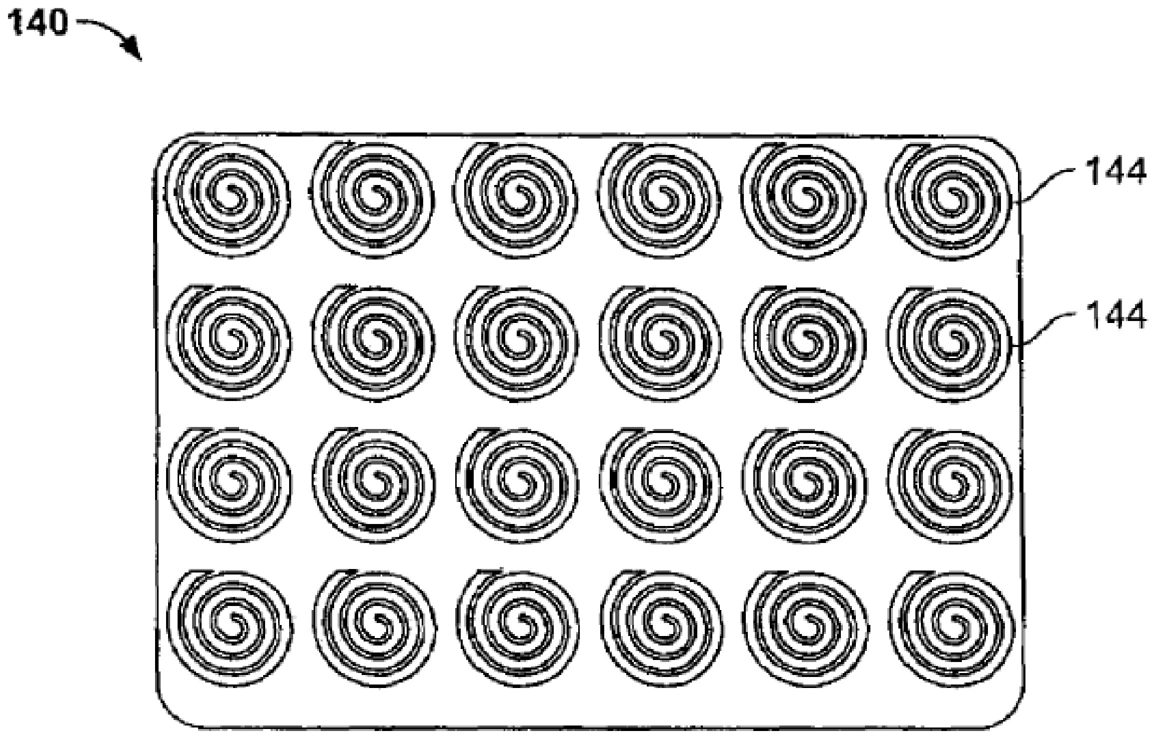


FIG. 3

(*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, charger provides power to a receiver, which is integrated into a mobile device or electronic device battery. (*Id.*, ¶[0285].) 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.

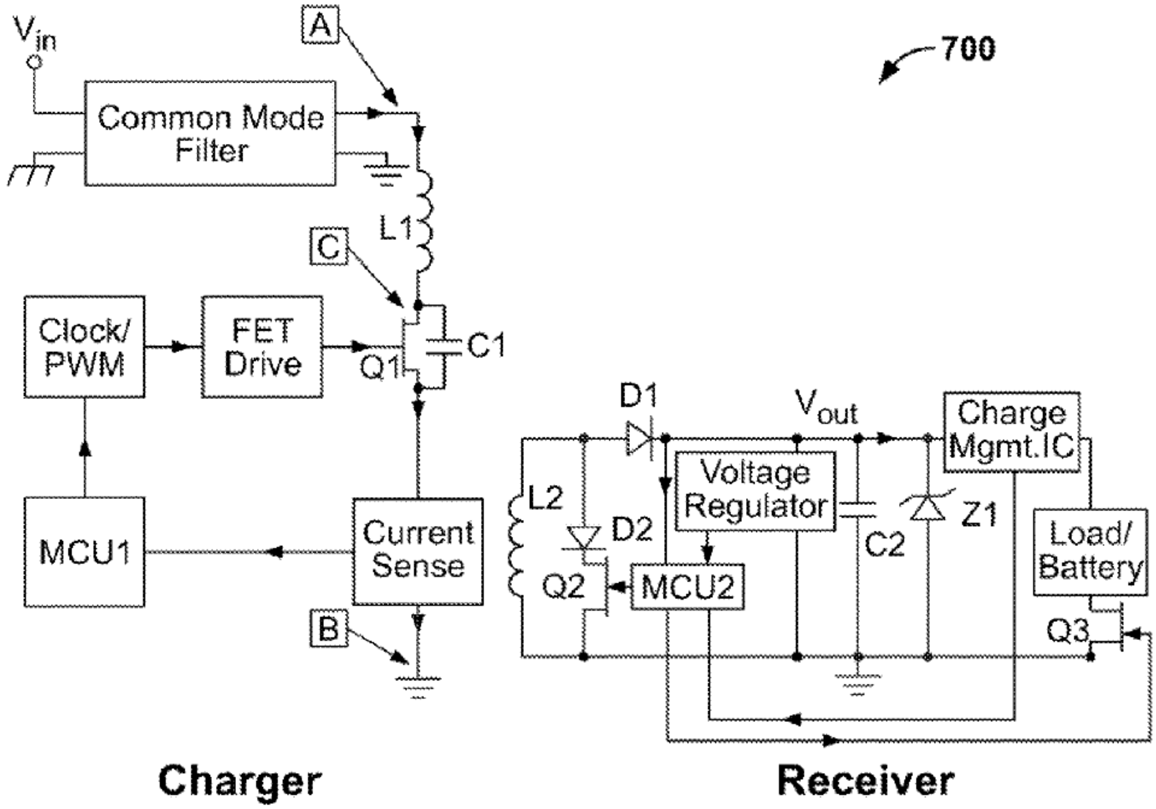


FIG. 34

(*Id.*, FIG. 34.)

b) one or more primary coils that are substantially planar and parallel to a surface of the system for powering or charging one or more compatible portable devices including batteries and receiver units, each receiver unit including a receiver coil and a receiver circuit including a receiver rectifier circuit;[3]

Partovi discloses this limitation. (Ex. PA-DEC, ¶¶118-121.) *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 ("**one or more primary coils**") that is used to send power to the receiver, which is incorporated into a mobile device having a battery ("**powering or charging one or more compatible portable devices including batteries and receiver units")**. (*Id.*, ¶¶[0285]-[0286], FIG. 34.) The Figure 34 implementation also has a receiver, a receiver coil L2, and a circuit that includes, *inter alia*, receiver rectifier circuit D1 ("**receiver unit including a receiver coil and a receiver circuit including a receiver rectifier circuit**.") (*Id.*, ¶[0262], (stating D1 is a rectifier).)[4]

[3] Requester interprets the claim language as requiring that the one or more "compatible portable devices" includes at least one "batter[y]" and at least one "receiver unit[]."

[4] 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.

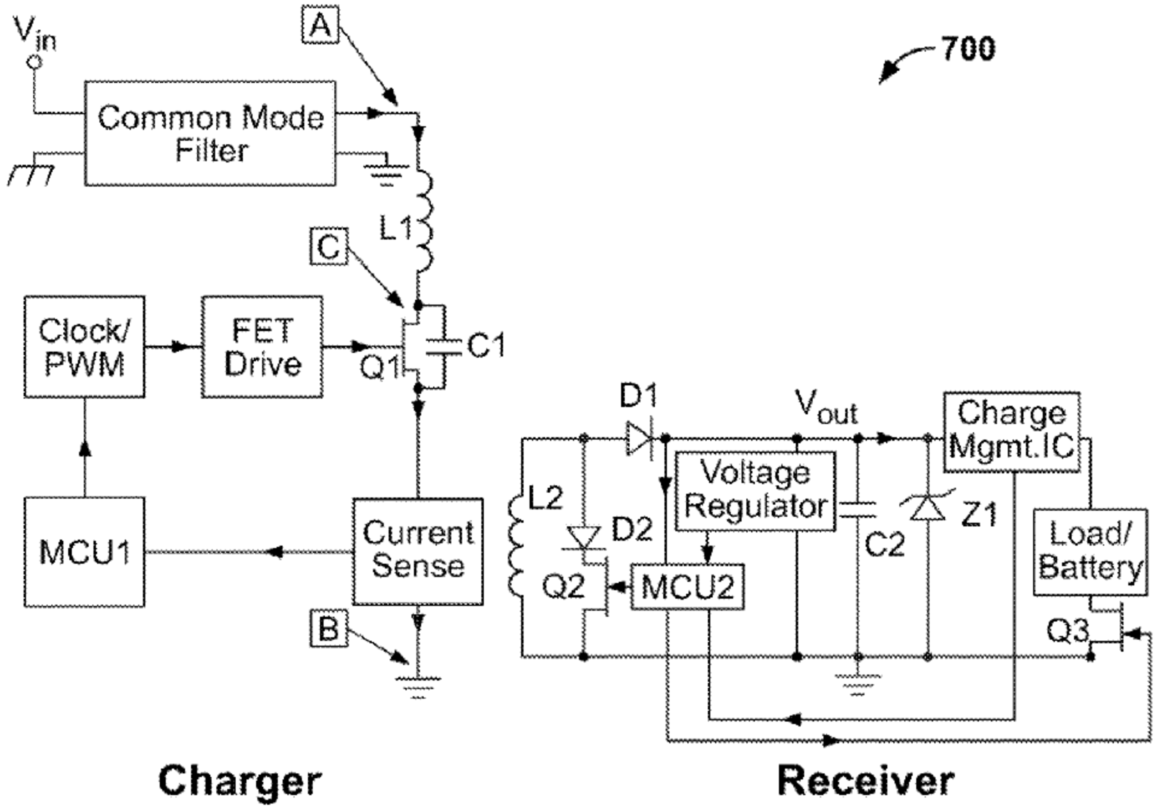


FIG. 34

(*Id.*, FIG. 34.)

Partovi further discloses that the primary coils in the charging pad are "**parallel to a surface of the system for powering or charging one or more compatible portable devices**, as claimed. For example, "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." (Ex. PA-1, ¶[0104].) Furthermore, "the coils can be formed in any number of different shapes, including, for example, flat or planar hexagonal shapes, or spirals." (*Id.*, ¶[0225]; *see also id.*, 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 ("**parallel to a surface of the system for powering or charging one or more compatible portable devices**"). (*Id.*)

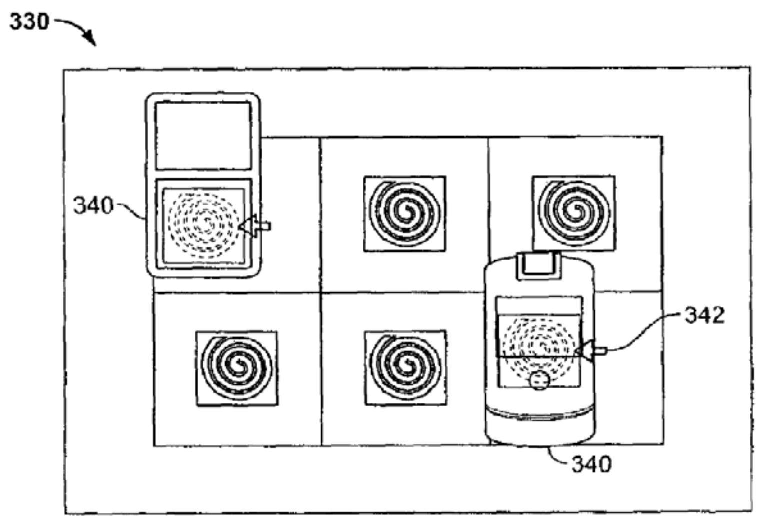


FIG. 16

(*Id.*, Figure 16.)

c) Limitation 1(c)

(1) **<u>1(c)(1):</u> one or more drive circuits including one or more FET drivers, FET switches, and capacitors coupled to the one or more primary coils…**

Partovi discloses this limitation. (Ex. PA-DEC, ¶¶122-124.) Figure 34 of *Partovi* discloses a charger having a drive circuit comprising, *inter alia*, FET drive ("**FET driver**"), Q1 ("**FET switch**,") and capacitor C1 ("**capacitor**"). (Ex. PA-1, ¶[0290], (stating Q1 is a field effect transistor that may switch primary coil L1).); *see also id.*, ¶[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.").)

Partovi discloses the FET drive, FET switch (Q1), and capacitor (C1) are coupled to the primary coil L1, as shown below in Figure 34. (Ex. PA-1, Figure 34; *see also*, Ex. PA-1, [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 . . .").)

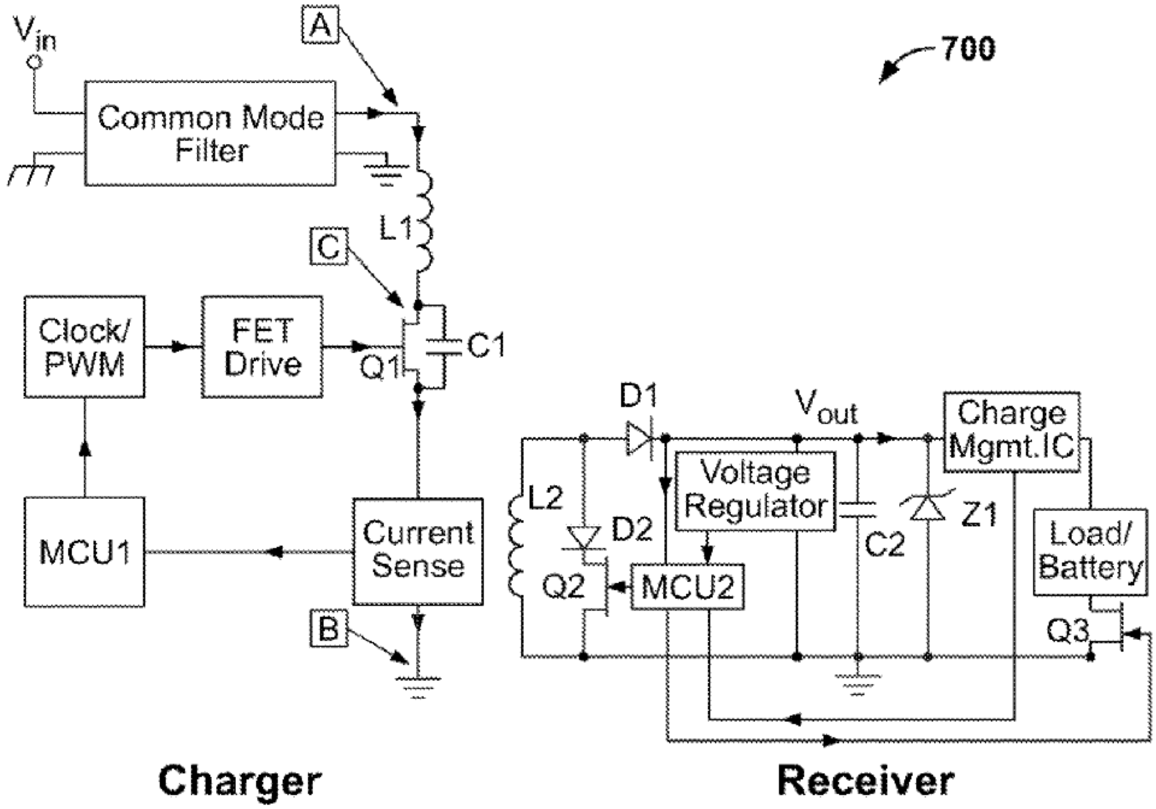


FIG. 34

(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): …**that when operated apply an alternating electrical current to the one or more primary coils to generate a magnetic field in a direction substantially perpendicular to the plane of the one or more primary coils and the surface of the system**…

Partovi discloses this limitation. (Ex. PA-DEC, ¶¶125-126.) 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].) In one implementation, the operating frequency of the FET drive is "1-2 MHz." (*Id.*, ¶¶[0265], [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].[5]) In other words, an AC electrical current is applied to the primary coil to generate a magnetic field, as claimed ("**that when operated apply an alternating electrical current to the one or more primary coils to generate a magnetic field**"). (*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").)

This magnetic field is generated "**in a direction substantially perpendicular to the plane of the one or more primary coils and the surface of the system**." *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, ¶126.) 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."[6] (*Id.*, 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, ¶126.)

(3) 1(c)(3): … **to provide power to the one or more portable devices capable of being powered or charged by the system when present and near the one or more primary coils**;

Partovi discloses this limitation. (Ex. PA-DEC, ¶127.) In particular, concerning Figure 34, *Partovi* discloses the FET driver may be periodically started and primary coil L1 may be switched at high frequency through the FET switch Q1 in order to sense the presence of a nearby

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

[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 '500 Patent.

device capable of drawing power. (Ex. PA-1, [0290].) *Partovi* further discloses if a receiver is nearby the emitted power from the primary coil L1 will power the receiver circuit ("**provid[ing] power to the one or more portable devices capable of being powered or charged by the system when present and near the one or more primary coils**." (*Id.*, [0295]; *see also id.*, claim 13.)

d) one or more sense circuits to monitor the current through the one or more primary coils to sense communications from the one or more receiver coils; and

Partovi discloses this limitation. (Ex. PA-DEC, ¶¶128-129.) With reference to Figure 34, *Partovi* discloses to detect a receiver, MCU1 periodically starts the FET driver to drive primary coil L1. (Ex. PA-1., ¶[0295].) If a receiver is nearby, primary coil L1 will draw current to power up microcontroller MCU2 in the receiver. (*Id.*, ¶[0295].) MCU2, upon power up, 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); *see also 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."); *id.*, ¶[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* therefore discloses the circuit "Current Sense" ("**one or more sense circuits**") monitors the current through L1 ("**monitor the current through the one or more primary coils**") to detect communications ("**to sense communications**.").

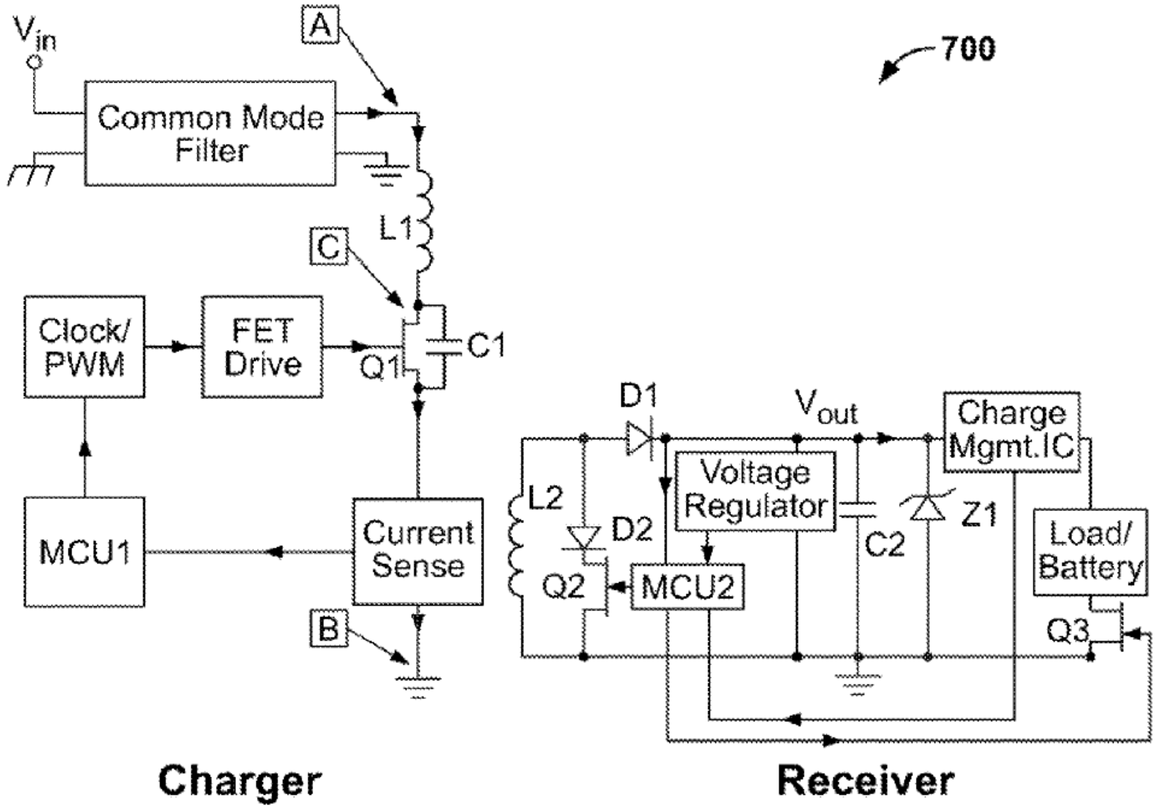


FIG. 34

(Ex. PA-1, Figure 34.)

Furthermore, the receiver modulation discussed above is a "**communication[] from the one or more receiver coils**." 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.").)

e) one or more communication and control circuits including one or more microcontrollers coupled to the one or more drive circuits and the one or more sense circuits that detect communications through the one or more sense circuits via the one or more primary coils and control the one or more drive circuits to control the powering or charging of the one or more compatible portable devices;

Partovi discloses this limitation. (Ex. PA-DEC, ¶¶130-131.) As shown in Figure 34 of *Partovi*, reproduced below, the charger includes Micro Control Unit (MCU1) ("**one or more communication and control circuits including one or more microcontrollers**") coupled to the drive circuit (clock, FET Drive, Q1, and C1) ("**coupled to the one or more drive circuits**") and the Current Sense ("**coupled to the . . . one or more sense circuits**"). (Ex. PA-1, Figure 34, [0286]).

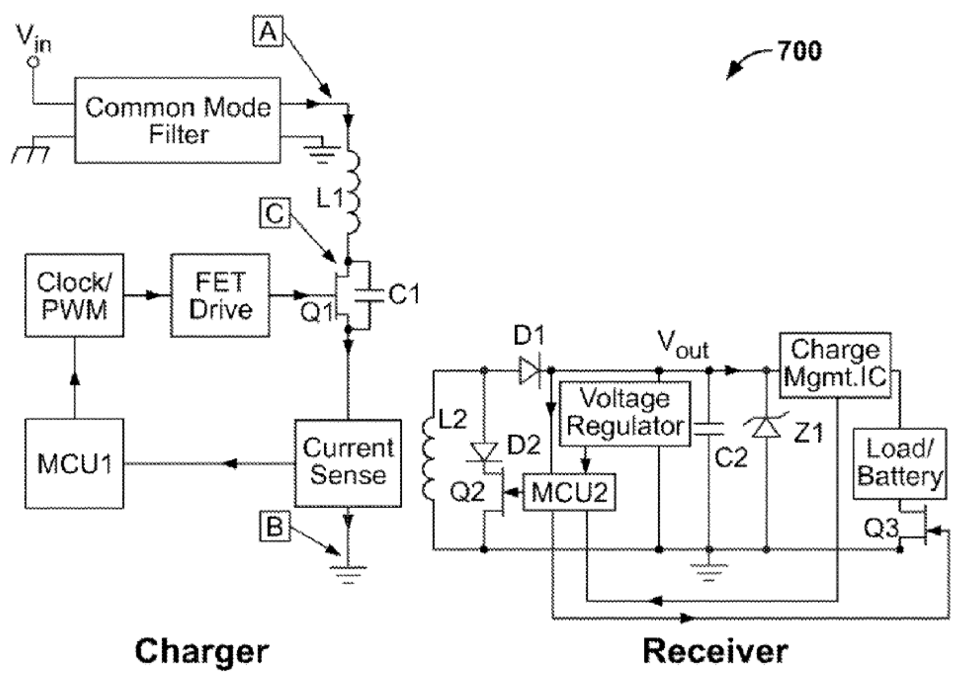


FIG. 34

(*Id.*, Figure 34.)

Partovi discloses that MCU1 "**detect[s] communications through the one or more sense circuits via the one or more primary coils**." For example, the MCU1, Current Sense circuit, and MCU2 can provide bi-directional communication ("**one or more communication and control circuits . . . that detect communications through the one or more sense circuits via the one or more primary coils**") between the charger and the receiver for optimum charging and to regulate the power and voltage received at the receiver charge control circuit ("**control the one or more drive circuits to control the powering or charging of the one or more compatible portable devices**.") (*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).) The 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 provided to MCU1. (*Id*., ¶[0262]-[0263].)

MCU1 then controls the power output of the charger, which is used to power or charge the battery in the mobile device, by controlling the FET driver ("**control the one or more drive circuits to control the powering or charging of the one or more compatible portable devices**"). (*Id*., ¶¶[0262]-[0266].)

f) wherein the one or more communication and control circuits: operate the one or more drive circuits near a first resonant frequency of a circuit formed by a primary coil and a drive circuit and a receiver coil and a receiver circuit of a compatible portable device when nearby;

Partovi discloses this limitation. (Ex. PA-DEC, ¶¶132-134.) As discussed in Section VI.A.4.e, *Partovi* discloses communication and control circuits (i.e., MCU1) that control one or more drive circuits (e.g., FET driver, FET Q1, and capacitor C1) that in turn modulate the current through the primary coil, which modulation results in a power transfer to the receiver circuit via the receiver coil. Thus, based on Patent Owner's litigation position, *Partovi* discloses "**a circuit formed by a primary coil and a drive circuit and a receiver coil and a receiver circuit of a compatible portable device when nearby**." *Partovi* further 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." (Ex. PA-1, ¶[0173].)

Partovi further discloses that the microprocessor could be programmed to change the frequency of the charger switching circuit to move the circuit into, and out of, resonance to create the appropriate voltage in the receiver ("**operate the one or more drive circuits near a first resonant frequency**.") (*Id.*, ¶[0130].)[7]

The disclosures described in paragraph [0129]-[0130] are applicable to the embodiment shown in Figure 34 because Figure 34 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. (*Id.*, ¶¶[0296]-[0298].)

g) [wherein the one or more communication and control circuits] switch the one or more primary coils at a frequency and power level sufficient to transfer power to one or more of the receiver units when near the one or more primary coils for a sufficiently long period of time to activate the one or more receiver circuits and to receive a response from the one or more receiver circuits via the one or more receiver coils which the one or more primary coils sense via the one or more sense circuits as a modulation of one or more primary coil currents;

Partovi discloses this limitation. (Ex. PA-DEC, ¶135.) The implementation shown in Figure 34 of *Partovi*, discloses the charger can determine if a receiver is nearby. (*Id.*, ¶¶[0294], [0295].) For example, microcontroller MCU1 ("**the communication and control circuit**") can periodically start the FET driver ("**switch the one or more primary coils at a frequency and power level to transfer power**") and the primary coil L1 to begin emitting power. (*Id.* ¶[0295].) If a receiver is nearby, the power emitted from primary coil L1 will power the receiver ("**transfer power to one or more of the receiver units when near the one or more primary coils for a sufficiently long period of time to activate the one or more receiver circuits**"). (*Id.*) *Partovi* further discloses that once the receiver receives power from primary coil L1, microcontroller MCU2 operates in a pre-programmed manner and 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 . . ." ("**receive a response from the one or more receiver circuits via the one or more receiver coils which the one or more primary coils**

[7] Mojo has argued that paragraph [0131] of the '109 Application provides written description support for this limitation. (Ex. LIT-2, Ricketts 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 element.

sense via the one or more sense circuits as a modulation of one or more primary coil currents"). (*Id.*) The 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 provided to MCU1. (*Id.*, ¶[0262]-[0263].) MCU1 then controls the power output of the charger by controlling the FET driver. (*Id.*, ¶¶[0263]-[0266].)

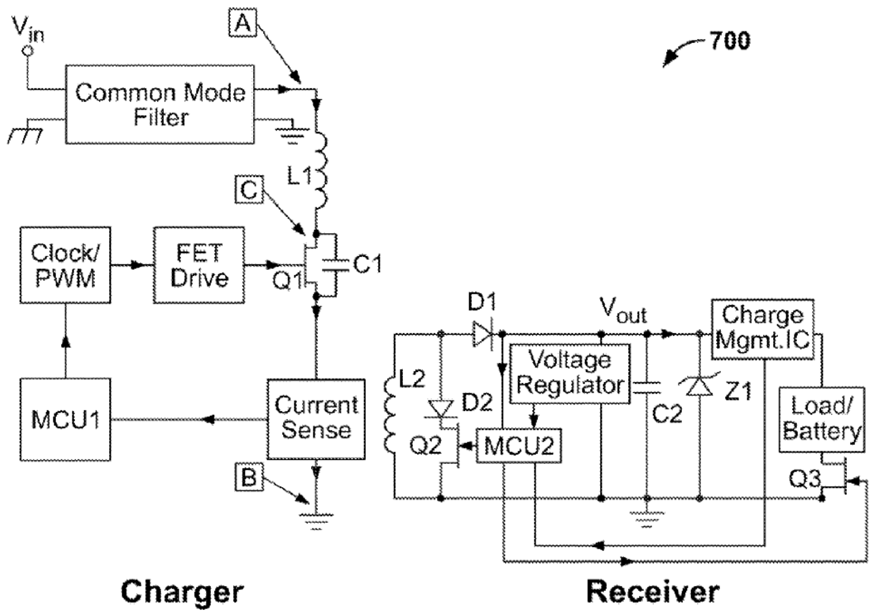


FIG. 34

(*Id.* Figure 34.)

h) [wherein the one or more communication and control circuits] detect, through the one or more sense circuits, communications from the one or more receiver units through the one or more receiver coils including information corresponding to one or more voltages at one or more outputs of the one or more receiver rectifier circuits induced by the one or more primary coils and the one or more receiver coils and information associated with the one or more portable devices and/or receiver units to enable the one or more communication and control circuits to identify the one or more portable devices and/or receiver units and to determine any one or more appropriate charging or powering algorithm profiles therefor;

Partovi discloses this limitation. (Ex. PA-DEC, ¶¶136-139.) 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 to begin emitting power. (*Id.*, ¶¶[0294], [0295].) If a receiver is nearby, the power emitted from primary coil L1 will power the receiver circuit. (*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 . . ." ("**detect, through the one or more sense circuits, communications from the one or more receiver units through the one or more receiver coils**"). (*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 "**detect[ing], through the one or more sense circuits, communications from the one or more receiver units through the one or more receiver coils**," as claimed.

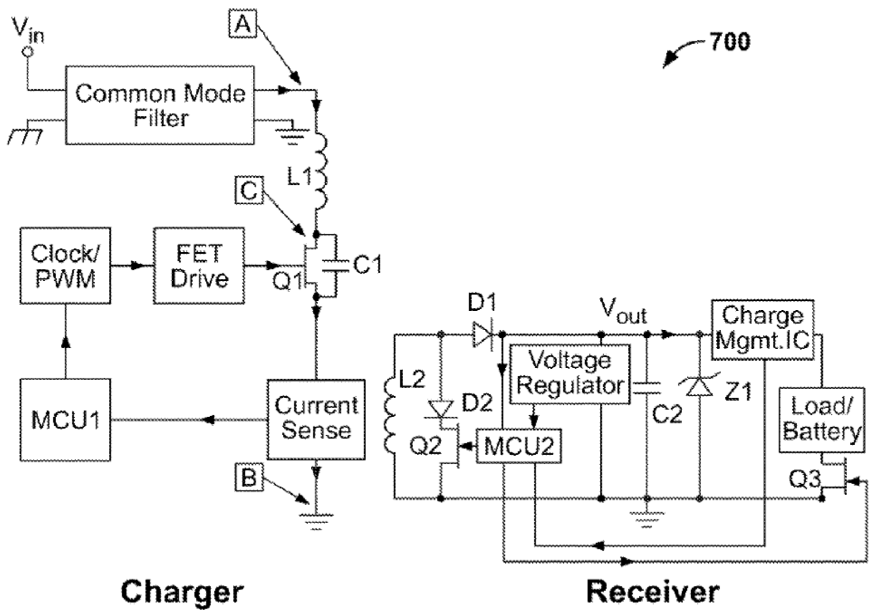


FIG. 34

(*Id.* Figure 34.)

Partovi discloses the communicated information from the receiver unit being "**information associated with the one or more portable devices and/or receiver units to enable the one or more communication and control circuits to identify the one or more portable devices and/or receiver units and to determine any one or more appropriate charging or powering algorithm profiles therefore**," 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 "**to determine any one or more appropriate charging or powering algorithm profiles**." (*Id.*, ¶[0142] ("This information is used by the charger or power supply to adjust the primary to provide the correct charge or power conditions.").)

Partovi also discloses the microcontroller MCU2 monitors the output voltage V_{out} of the rectifier D1 ("**information corresponding to one or more voltages at one or more outputs of the one or more receiver rectifier circuits induced by the one or more primary coils and the one or more receiver coils**") 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. (*Id.*, ¶[0262]) The voltage V_{out} is the "**voltage[] at one or more outputs of the one or more receiver rectifier circuits induced by the one or more primary coils**." (*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.[8] 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 through the receiver's coil. (Ex. PA-DEC, ¶139.)

i) [wherein the one or more communication and control circuits] for each portable device, determine the primary coil electromagnetically most aligned with the receiver coil of the portable device;

Partovi discloses this limitation. (Ex. PA-DEC, ¶140.) *Partovi* discloses, concerning Figure 38, MCU1 ("**one or more communication and control circuits**") gives a command to the FET driver to begin switching the coil to generate a low voltage in any nearby receiver coils. (Ex. PA-1, ¶[0327].) If a receiver coil is nearby it begins drawing power from the charger, which can be sensed as a higher than normal current draw in the sense circuit of the charger. (*Id.*, ¶[328].) The amount of current through the sense circuit is then saved to MCU1's memory. (*Id.*, ¶[330].) MCU1 then disables the FET driver for that primary coil and activates the next coil and executes the preceding steps for each primary coil. (*Id.*, ¶¶[0332]-[0334].) MCU1 then compares the values

[8] The implementation 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.

received for sense currents and determines which coil has the highest sense current when turned on, this corresponds to the coil closest to the receiver coil ("**[wherein the one or more communication and control circuits]** . . . **determine the primary coil electromagnetically most aligned with the receiver coil of the portable device**"). (*Id.*, ¶[0335].) The implementation described in paragraphs [0327]-[0335] and Figure 38 may be applied to the implementation shown in Figure 34 because Figure 38 incorporates the switching and sense circuity of Figure 34. (Ex. PA-1, ¶[0326].)

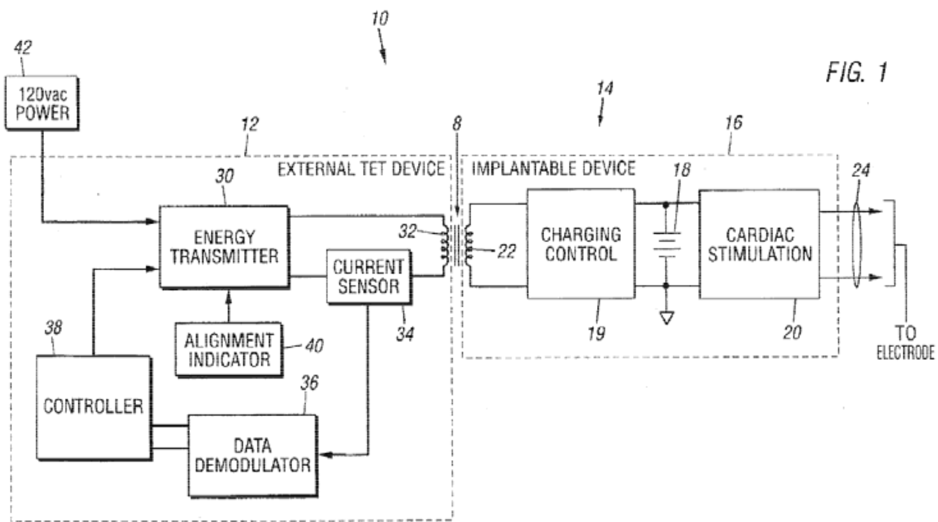
j) [wherein the one or more communication and control circuits] drive the one or more FET switches associated with the most aligned one or more primary coils;

Partovi discloses this limitation. (Ex. PA-DEC, ¶141.) *Partovi* discloses that after the identification of the primary coil closest to the receiver coil is determined "the appropriate coil is turned on and charging starts." (Ex. PA-1, ¶[0336].) As discussed above in Section VI.A.4.i, the MCU1 ("**one or more communication and control circuits**") is responsible for activating the FET driver to begin switching the coil. (Ex. PA-1, ¶[0327].)

k) [wherein the one or more communication and control circuits] periodically receive information corresponding to one or more output voltages or currents of the one or more receiver rectifier circuits via the one or more primary coils and the one or more sense circuits; and

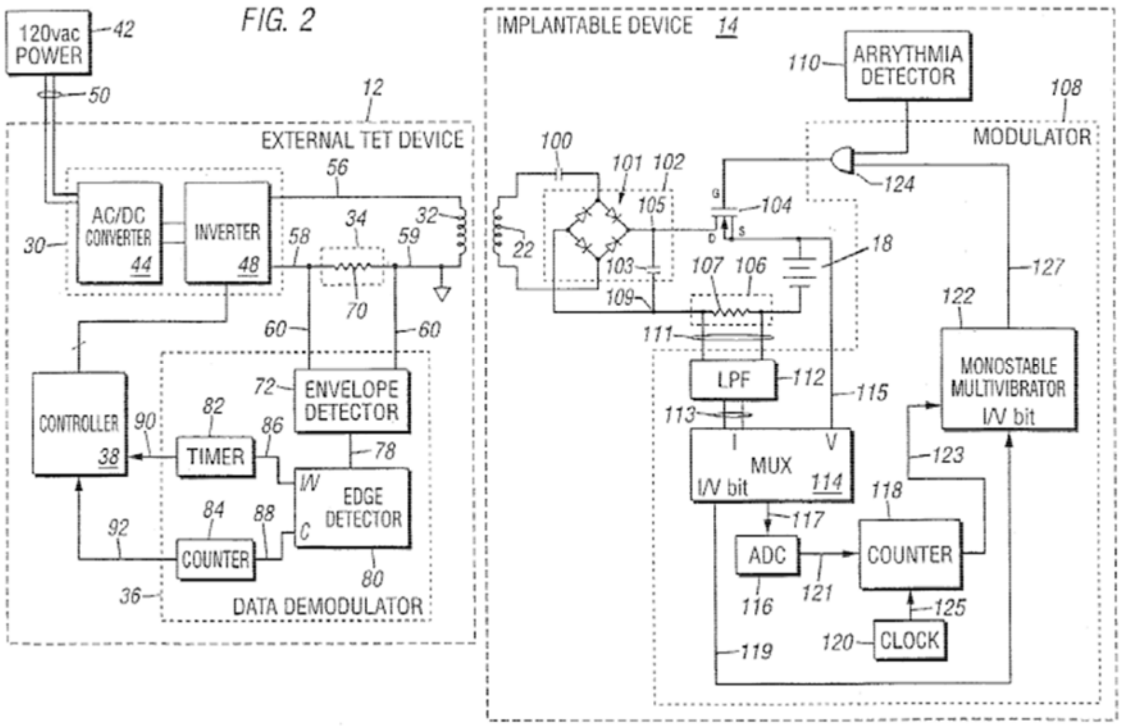
Partovi in view of *Nedungadi* discloses or suggests this limitation. (Ex. PA-DEC, ¶¶142-145.) As discussed above in Section VI.A.4.h, *Partovi* discloses MCU1 receiving information via the sense circuit, communications from the receiver including information corresponding to the output voltage of the receiver's rectifier circuit. However, *Partovi* does not disclose the MCU1 "periodically" receiving this information.

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 "**one or more output voltages or currents of the one or more receiver rectifier circuits**," 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 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 ("**one or more communication and control circuits] . . . periodically receive information corresponding to one or more output voltages or currents of the one or more receiver rectifier circuits via the one or more primary coils and the one or more sense circuits**").



(*Id.*, FIG. 2.)

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, ¶145.) 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 <u>two of a finite number of known, predictable solutions</u> 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 ¶145.) 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].)

l) [wherein the one or more communication and control circuits] regulate in a closed loop feedback manner the one or more output voltages or currents of the one or more receiver rectifier circuits by adjusting the frequency or duty cycle of the one or more drive circuits during the charging or powering of the one or more portable devices.

Partovi discloses this limitation. (Ex. PA-DEC, ¶146.) *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.

5. Claim 2

a. The system of claim 1, further comprising one or more voltage regulator circuits that can change input voltages to the one or more drive circuits between two or more levels to accommodate different powers required by the portable devices.

Partovi discloses this limitation. (Ex. PA-DEC, ¶¶147-148.) 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, a voltage regulator (Voltage Regulator 1) that can switch the input voltage between 2 values or more is used. 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].) Figure 29 of *Partovi*, showing the voltage regulator circuit, is shown below.

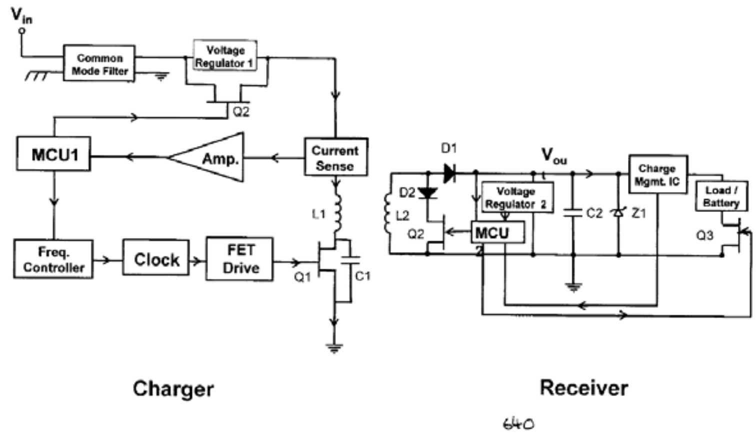


Figure 29

(Ex. PA-1, Figure 29.)

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*. A POSITA would have been motivated to combine the voltage regulator of Figure 29 with the implementation shown in Figure 34 of *Partovi* so that the charger in Figure 34 could charge a battery at the end of the charge stage of the battery where extremely low power is required. (Ex. PA-DEC, ¶148.) 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 ¶148.)

6. Claim 23

a) A portable device including a battery capable of receiving inductive power from an inductive charging system including a base unit with one or more primary coils and associated circuits, the portable device comprising:

To the extent the preamble is limiting, *Partovi* discloses this limitation. (Ex. PA-DEC, ¶¶149-152.) *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].)

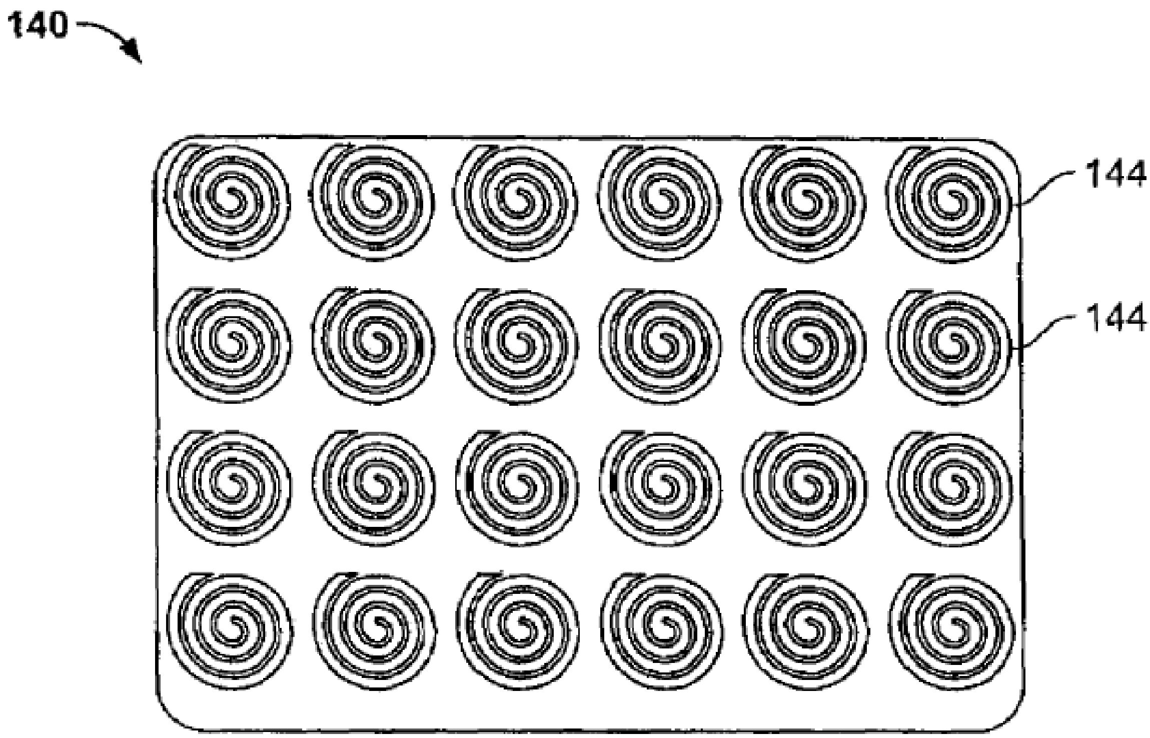


FIG. 3

(*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, charger provides power to a receiver, which is integrated into a mobile device or electronic device battery. (*Id.*, ¶[0285].) Moreover, the primary coil L1 (*see* Figure 34) 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 for charging portable devices and a receiver (incorporated into a mobile device).

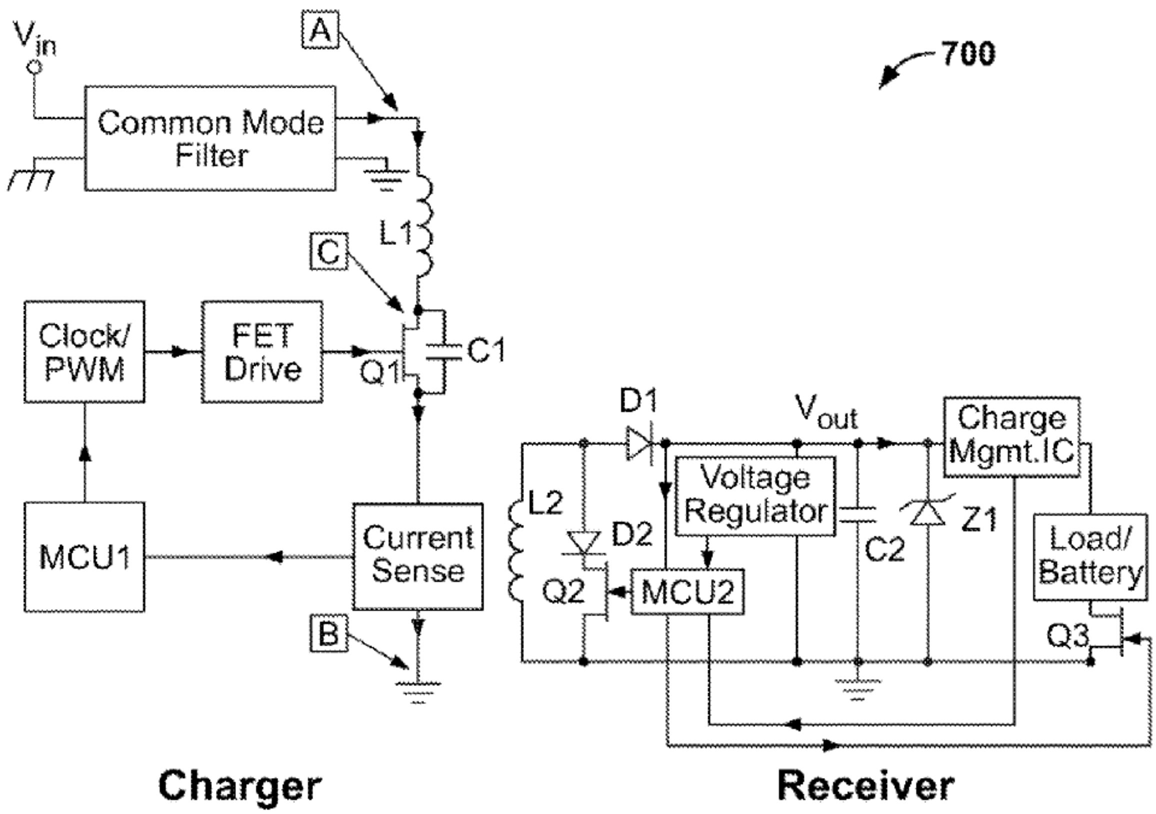


FIG. 34

(*Id.*, FIG. 34.)

The above-described mobile device is a "**portable device including a battery capable of receiving inductive power from an inductive charging system including a base unit with one or more primary coils and associated circuits**," where the charging pad is the "**base unit**."

b) a receiver coil which has a substantially planar shape and located parallel to a surface of the portable device so that a magnetic field received from a primary coil in a base unit of an inductive charging system in a direction substantially perpendicular to the plane of the receiver coil is used to inductively generate a current in the receiver coil to power or charge the portable device;

Partovi discloses this limitation. (Ex. PA-DEC, ¶¶153-157.) *Partovi*'s Figure 34 receiver includes a receiver coil L2 ("**a receiver coil**"). (*Id.*, FIG. 34.)

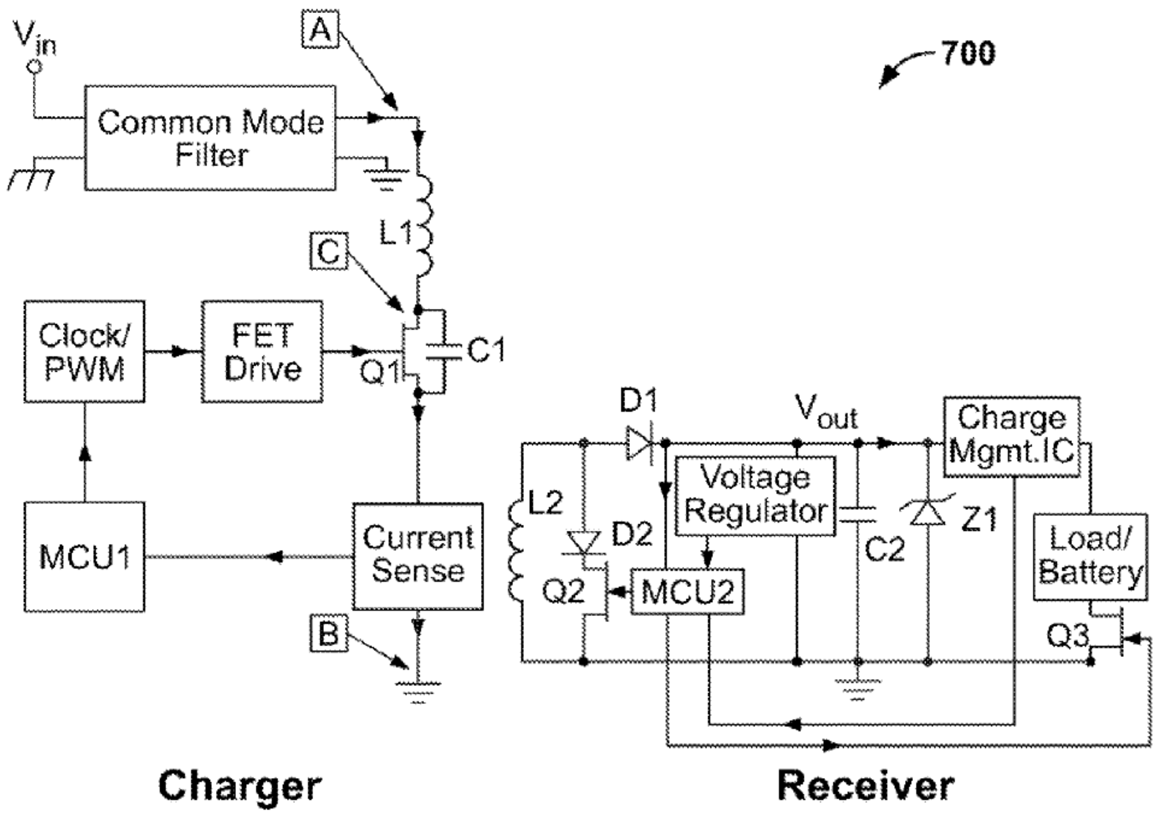


FIG. 34

(*Id.*, FIG. 34.)

The receiver coil has a "**substantially planar 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 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 the associated coil L2 are all parallel to the surface of the charging pad upon which the cellphones sit ("**a receiver coil which has a substantially planar shape and located parallel to a surface of the portable device**"). (*Id.*)

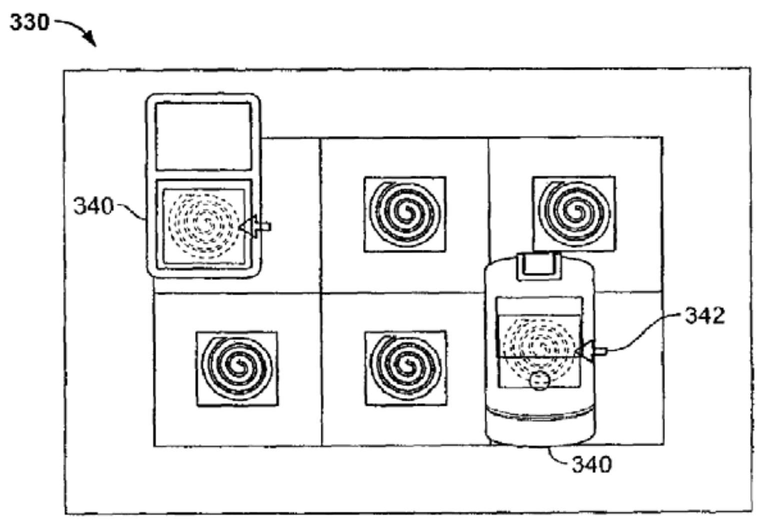


FIG. 16

(*Id.*, Figure 16.)

Partovi also discloses "**a magnetic field received from a primary coil in a base unit of an inductive charging system in a direction substantially perpendicular to the plane of the receiver coil is used to inductively generate a current in the receiver coil to power or charge 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*., ¶¶[0265], [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.").)

Moreover, the magnetic field is generated "**in a direction substantially perpendicular to the plane of the receiver 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, ¶157.) 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."[9] As discussed above, and as shown in Figure 16, *Partovi* discloses the primary coil and the receiver coil are located 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 receiver coil. (Ex. PA-DEC, ¶157.)

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[9] 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 '500 Patent.

c) a ferrite material layer placed behind the receiver coil and opposite to the surface of the portable device to provide shielding in the portable device from electromagnetic fields;

Partovi discloses this limitation. (Ex. PA-DEC, ¶158.) 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 "to provide additional immunity, ferrite material (such as those provided by Ferrishield Inc.) can be used between the receiver and the battery to shield the battery or device from the EM fields. These materials can be made so as to be thin, and then used during the construction of the integrated battery/receiver." (Ex. PA-1, [0141] (emphasis added).) 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, ¶158.)

d) a receiver circuit designed to operate near a resonant frequency of a circuit formed by the receiver coil, the receiver circuit, and a compatible base unit primary coil and associated circuit when adjacent to the portable device for inductive powering or charging;

Partovi discloses this limitation. (Ex. PA-DEC, ¶159.) *Partovi* discloses a receiver circuit, receiver coil, and a compatible base unit primary coil and associated circuit in Figure 34. For example, the receiver circuit could be a combination the circuit components in the receiver unit of Figure 34 excluding the battery, MCU2, Q2, and the receiver coil. *Partovi* also discloses "a receiver unit, including a receiver 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." (Ex. PA-1, claim 1.) *Partovi* also discloses "the receiver or the mobile device can, through an electrical (such as RF), mechanical, or optical method, inform the charger or power supply about the voltage/current characteristics of the device or battery. The primary of the charger or power supply in the circuit diagrams shown 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. PA-1, [0129].) *Partovi* further discloses the duty cycle of the switch can be programmed with a "lookup table" or "the frequency of the switch can be changed to move the circuit into, and out of, resonance to create the appropriate voltage in the receiver." (Ex. PA-1, [0130]. [10]) Patent Owner has again taken the position that this disclosure in *Partovi* supports the claim limitation. (Ex. LIT-2, Ricketts Appendix G at 8.)[11]

e) wherein the receiver circuit is part of a receiver unit and comprises: a receiver rectifier circuit including one or more rectifiers and one or more capacitors; and

Partovi discloses this limitation. (Ex. PA-DEC, ¶160.) *Partovi* discloses "a receiver unit, including a receiver 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." (Ex. PA-1, claim 1.) For example, the Receiver shown in Figure 34 of *Partovi* is a "**receiver unit**" that includes a "receiver circuit," which 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).)[12]

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[10] Mojo has argued that paragraph [0131] of the '109 Application provides written description support for this limitation. (Ex. LIT-2, Ricketts 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 element.

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

[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.

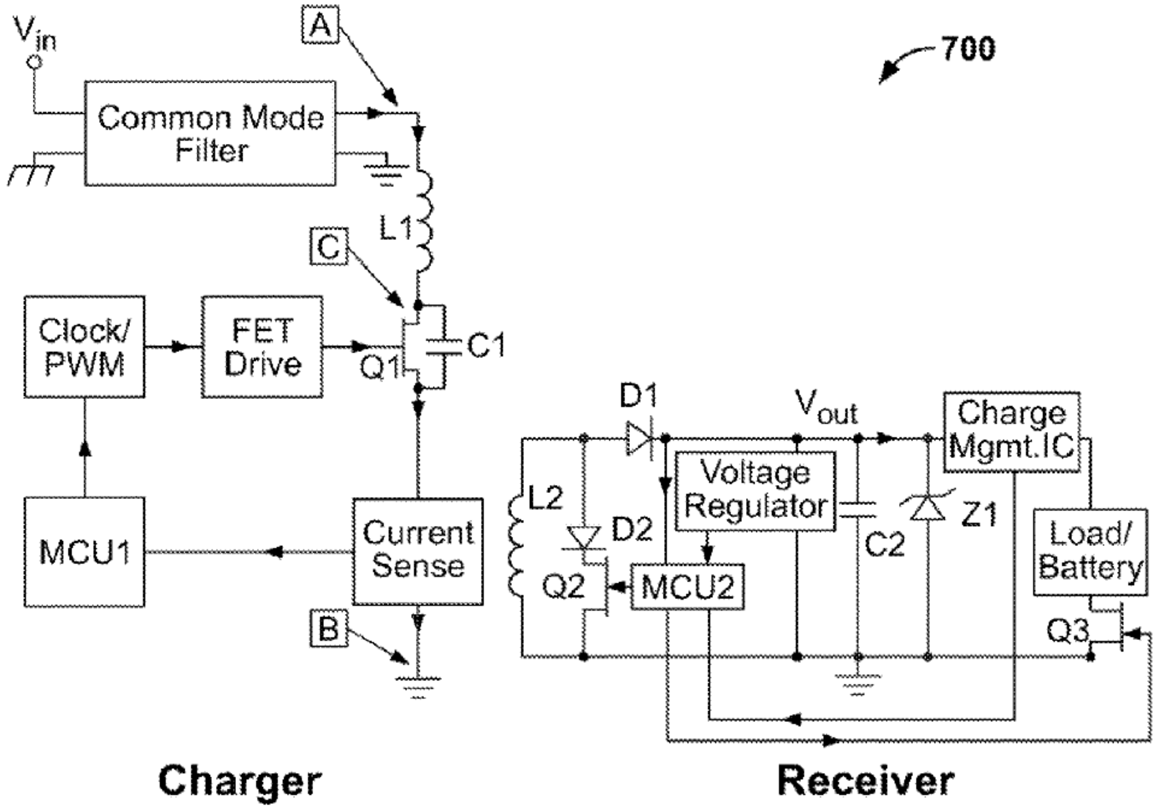


FIG. 34

(*Id.*, FIG. 34.)

f) **a receiver communication and control circuit including a microcontroller and a communication FET to modulate the input impedance of the receiver circuit to communicate with the base unit through the primary coil**;

Partovi discloses this limitation. (Ex. PA-DEC, ¶161.) *Partovi* discloses a receiver communication and control circuit including a 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 <u>the integration of the MCU2</u> and chip model number 10F220 Programmable IC by Microchip Inc. or another inexpensive microcontroller <u>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</u>

> 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.").)

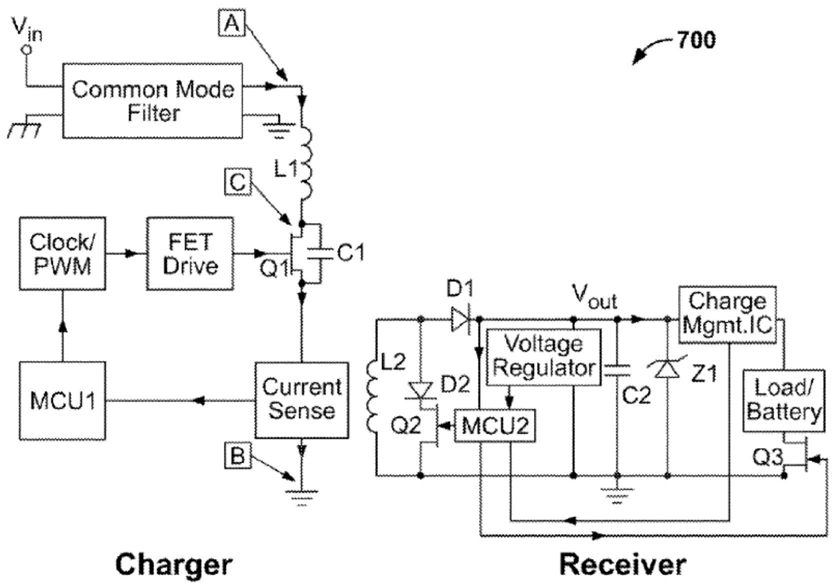


FIG. 34

(Ex. PA-1, Figure 34.) A POSITA would understand the switch Q2 to be a communication FET. *See e.g.*, (Ex. PA-1, [290], ("Field Effect Transistor (FET) such as Q1.").)

g) wherein when a current is generated in the receiver coil inductively by the primary coil in the base unit, the current is rectified by the one or more rectifiers and smoothed by the one or more capacitors in the receiver rectifier circuit and is used to power and activate the receiver communication and control circuit and to power or charge the portable device; and

Partovi discloses this limitation. (Ex. PA-DEC, ¶¶162-164.) For example, as discussed in Section VI.A.6.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 receiver coil inductively by the primary coil in the base unit, the current is rectified by the one or more rectifiers and smoothed by the one or more capacitors in the receiver rectifier circuit**," as claimed.

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. *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 rectified and smoothed current] is used to power and activate the receiver communication and control circuit**"). (*Id.*, ¶[0285].)

As shown in Figure 34, reproduced below, a charge management circuit receives the rectified and smoothed current from the receiver rectifier circuit (D1 and C2). (*Id.*, FIG. 34) The charge management circuit uses the current to "control the charging of the battery to ensure appropriate charging" ("[the rectified and smoothed current] **is used to [] power or charge the portable device**.") (*Id.*, ¶[0285], FIG. 34.)

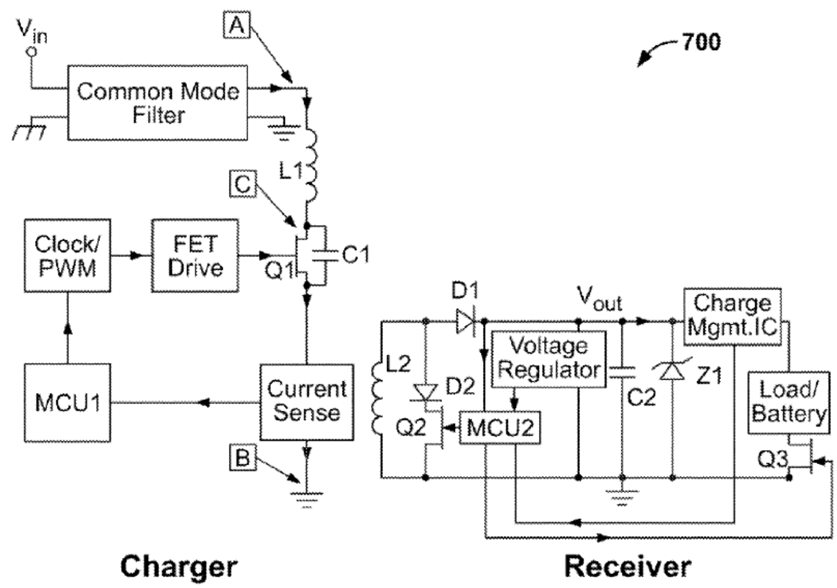


FIG. 34

(Ex. PA-1, Figure 34.)

h) wherein upon powering and activation of the receiver circuit by a primary coil in the base unit, the receiver circuit: communicates information corresponding to a voltage at an output of the receiver rectifier circuit and information associated with the portable device and/or receiver unit to enable the base unit to identify the portable device and/or receiver unit, to determine any appropriate charging or powering algorithm therefor, and to identify one or more primary coils of the base unit most aligned with the receiver coil for use in charging or powering the portable device; and

Partovi discloses this limitation. (Ex. PA-DEC, ¶¶165-167.) For example, *Partovi* discloses this limitation for the reasons set forth above in Sections VI.A.4.h-j. *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].) *Partovi* further 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, [0327-0331].) *Partovi* also discloses the microcontroller MCU2 monitors the output voltage V_{out} of the rectifier D1 ("**information corresponding to a voltage at an output of the receiver rectifier 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].) *Partovi*, thus discloses the receiver circuit communicating the "**information corresponding to a voltage at an output of the receiver rectifier circuit**."

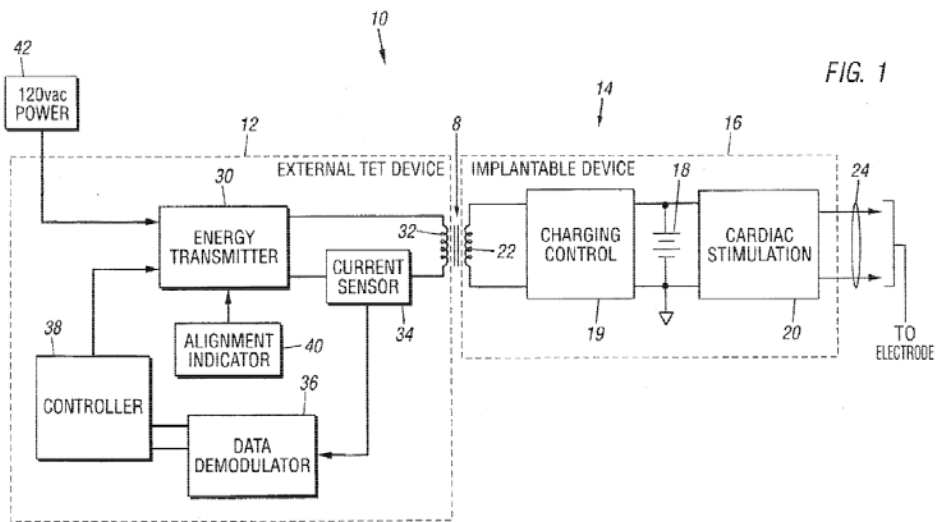
Partovi also discloses once a "mobile device, or battery (or a receiver) is detected, the mobile device charger or power supply and the mobile device or battery proceed to exchange information." (Ex. PA-1, ¶[0112].) The information exchanged "can include a unique ID code that can verify the authenticity and manufacturer of the charger or power supply and mobile device or battery, and the capacity of the battery." (Ex. PA-1, ¶[0113].); *see also* (Ex. PA-1, [307], "Additional verification can be obtained by exchanging a verification code through the coils or by exchange of information through a second wireless data communication link (such as RFID, NFC, WiFi, etc.) between the pad and the device(s) to be charged. The code exchange can also provide information to the charger or power supply coil regarding the necessary voltage, power, temperature, or other diagnostic information for achieving reliable charging.") Therefore, *Partovi* discloses the receiver communicating information associated with the portable device and/or receiver unit to enable the base unit to identify the portable device and/or receiver unit and determine any appropriate charging or powering algorithm therefor.

Partovi also discloses "the information exchange between the charger and receiver can be through an RF link or an optical transmitter/detector, RFID techniques . . . or some other method of information transfer. Similarly, the receiver can 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 or power supply to activate." (Ex. PA-1, ¶[0142]; *see also* Ex. PA-1, ¶[0209], ("In accordance with an embodiment, a global RFID system that can identify the approach of a mobile device to the pad can be used to wake up the board. This can be followed by sequential polling of individual coils to recognize where the device is placed in a manner similar to described above . . . the switching of voltage to the coil will not start unless an electronic device with a verifiable RFID tag is nearby thereby triggering the sequence of events for recognizing the appropriate coil to turn on and operate."); *see supra* Section VI.A.4.i.) Therefore, *Partovi* discloses (1) conveying information from the receiver's RFID tag to the base unit, (2) the base unit using that information to determine the location of the receiver, and (3) the base unit only activating the primary coils at that location. A POSITA would have understood that activating only the primary coils near the receiver inherently discloses only activating the primary coils that are aligned with the receiver coil.

i) subsequently, periodically communicates information corresponding to an output voltage or current of the receiver rectifier circuit to the base unit to enable the base unit to regulate in a closed loop manner the output voltage or current of the receiver rectifier circuit during the charging or powering of the portable device.

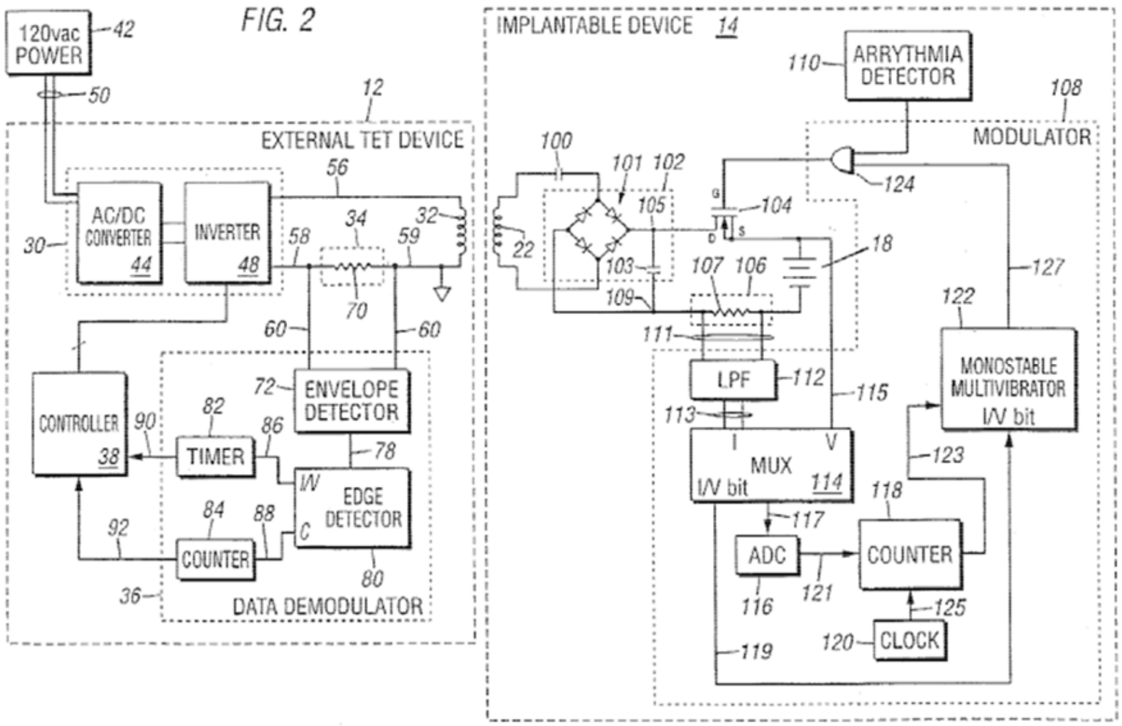
Partovi in view of *Nedungadi* discloses or suggests this limitation. (Ex. PA-DEC, ¶¶168-172.) As discussed above in Section VI.A.6.h, *Partovi* discloses MCU1 receiving information from the receiver including information corresponding to the output voltage of the receiver's rectifier circuit. *Partovi* 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 "**an 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 communicates information corresponding to an output voltage or current of the receiver rectifier circuit to the base unit to enable the base unit**").



(*Id.*, FIG. 2.)

Partovi further discloses "**enable[ing] the base unit to regulate in a closed loop manner the output voltage or current of the receiver rectifier circuit during the charging or powering 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, ¶172; *supra* Section VI.A.4.k.) 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.) 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 ¶172.)

7. Claim 30

a. The portable device of claim 23, further comprising a base unit circuit to enable the portable device to operate as an inductive charger or power supply using the receiver coil of the portable device to inductively charge or power another portable device including a battery which is capable of receiving power inductively.

Partovi discloses this limitation. (Ex. PA-DEC, ¶173.) *Partovi* discloses a system for use with a charger or power supply case to inductively power or charge a mobile device. As shown therein [in FIG. 65], an inductive charger or power supply base or pad charges a case, holster, or other small portable charger that in turn can charge or power a mobile device or battery placed n proximity to it." (Ex. PA-1, [468].) As shown below in FIG. 65 the inductive charging case (the portable device) has a base unit circuit that enables the inductive charging case to inductively charge another portable device (the Mobile Device Receiver), that has a battery. (Ex. PA-1, [470], "Inductive case: In accordance with an embodiment, the case has means for receipt of power inductively (from the charger or power supply base) and charging another device (or number of devices) inductively . . . The case has a receiver part that is connected to a battery charger circuit that charges one or more internal batteries and simultaneously, can also operate the circuitry in the charger or power supply case to charge a nearby mobile device or battery.")

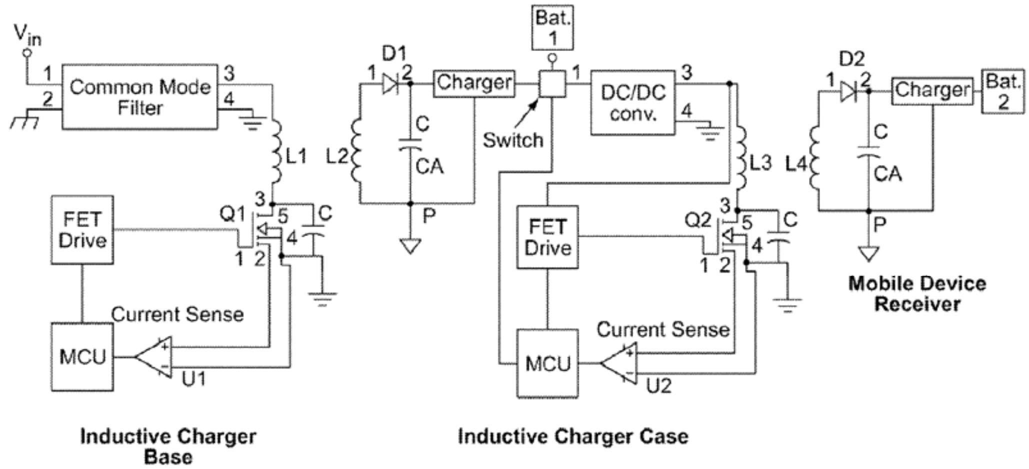


FIG. 65

(Ex. PA-1, Figure 65.) *Partovi* also discloses the "the case or skin can contain the electronics and <u>the coil</u> necessary to allow the device to be charged or charge other devices or both." (Ex. PA-1, [0446].) *Partovi* thus discloses using a single coil in the case that receives power inductively and is used to charge other devices.

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, 2, 23, and 30 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 these claims.

1. Proposed Rejection #1

Claims 1, 2, 23, and 30 are obvious over *Partovi* in view of *Nedungadi* 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.

VIII. Conclusion

For the reasons set forth above, the Requester has established at least one substantial new question of patentability with respect to claims 1, 2, 23, and 30 of the '500 patent. The analysis provided in this Request and in the declaration of Dr. Baker (Ex. PA-DEC) demonstrates the invalidity of claims 1, 2, 23, and 30 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 claims 1, 2, 23, and 30 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)