UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD.
Petitioner

v.

MOJO MOBILITY INC.
Patent Owner

Patent No. 11,201,500

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,201,500

TABLE OF CONTENTS

I. INTRODUCTION 1

II. MANDATORY NOTICES 1

III. PAYMENT OF FEES 2

IV. GROUNDS FOR STANDING...2

V. PRECISE RELIEF REQUESTED AND GROUNDS 2

VI. LEVEL OF ORDINARY SKILL...4

VII. THE ’500 PATENT...5

VIII. CLAIM CONSTRUCTION 5

IX. DETAILED EXPLANATION OF GROUNDS..6

A. Ground 1: Claims 23, 25, 28, and 29 are obvious over *Okada* in view of *Odendaal*, *Cho*, *Berghegger*, and *Black* 6

1. Claim 23 6

2. Claim 25 59

3. Claim 28 61

4. Claim 29 61

B. Ground 2: Claim 24 is obvious over *Okada* in view of *Odendaal*, *Cho*, *Berghegger*, *Black*, and *Calhoon*..63

1. Claim 24 63

C. Ground 3: Claim 26 is obvious over *Okada* in view of *Odendaal*, *Cho*, *Berghegger*, *Black*, and *Meadows* 68

1. Claim 26 68

D. Ground 4: Claim 27 is obvious over *Okada* in view of *Odendaal*, *Cho*, *Berghegger*, *Black*, and *Shima* 71

1. Claim 27 71

E. Ground 5: Claim 30 is obvious over *Okada* in view of *Odendaal*, *Cho*, *Berghegger*, *Black*, and *Takagi* 75

1. Claim 30 75

F. Ground 6: Claim 31 is obvious over *Okada* in view of *Odendaal*, *Cho*, *Berghegger*, *Black*, and *Labrou* 79

1. Claim 31 79

X. DISCRETIONARY DENIAL IS NOT APPROPRIATE 82

XI. CONCLUSION 86

LIST OF EXHIBITS

Ex. 1001	U.S. Patent No. 11,201,500
Ex. 1002	Declaration of R. Jacob Baker, Ph.D., P.E.
Ex. 1003	Curriculum Vitae of R. Jacob Baker, Ph.D., P.E.
Ex. 1004	Prosecution History of U.S. Patent No. 11,201,500
Ex. 1005	Translation of Japanese Patent Application Publication No. 2006-141170A ("*Okada*")[1]
Ex. 1006	U.S. Patent No. 6,912,137 ("*Berghegger*")
Ex. 1007	U.S. Patent Application Publication No. 2006/0145660A1 ("*Black*")
Ex. 1008	U.S. Patent No. 6,960,968 ("*Odendaal*")
Ex. 1009	U.S. Patent No. 6,489,745 ("*Koreis*")
Ex. 1010	U.S. Patent No. 6,366,817 ("*Kung*")
Ex. 1011	Physics, Henry Semat et al., Rinehart & Co., Inc., 1958, Chapters 29-32 ("*Semat*")
Ex. 1012	U.S. Patent No. 5,702,431 ("*Wang*")
Ex. 1013	International Patent Application Publication No. WO1996040367 ("*WangII*")
Ex. 1014	Handbook of Radio and Wireless Technology, Stan Gibilisco, McGraw-Hill, 1999 ("*Gibilisco*")
Ex. 1015	U.S. Patent No. 4,942,352 ("*Sano*")

[1] Exhibit 1005 includes the original Japanese version and a certified English translation. Citations to *Okada* are to the English translation.

Ex. 1016	Fundamentals of Electric Circuits, 2d., Charles Alexander et al., McGraw-Hill, 2004 (“*Alexander*”)
Ex. 1017	International Patent Application Publication No. WO1994/18683 (“*Koehler*”)
Ex. 1018	Mojo Mobility’s Infringement Chart for U.S. Patent No. 11,201,500 (Ex. 3) accompanying Mojo Mobility’s Infringement Contentions in *Mojo Mobility Inc. v. Samsung Elecs. Co., Ltd.*, No. 2:22-cv-00398 (E.D. Tx.) (February 28, 2023)
Ex. 1019	U.S. Patent Application Publication No. 2005/0068019 (“*Nakamura*”)
Ex. 1020	U.S. Patent Application Publication No. 2007/0109708 (“*Hussman*”)
Ex. 1021	U.S. Patent Application Publication No. 2003/0210106 (“*Cheng*”)
Ex. 1022	Mojo Mobility’s Infringement Contentions in *Mojo Mobility Inc. v. Samsung Elecs. Co., Ltd.*, No. 2:22-cv-00398 (E.D. Tx.) (February 28, 2023)
Ex. 1023	U.S. Patent Application Publication No. 2004/0201988 (“*Allen*”)
Ex. 1024	U.S. Patent No. 7,378,817 (“*Calhoon-817*”)
Ex. 1025	International Patent Application Publication No. WO2003/096361 (“*Cheng*”)
Ex. 1026	International Patent Application Publication No. WO2004/038888 (“*ChengII*”)
Ex. 1027	Spiral Inductor Design for Quality Factor, Sang-Gug Lee et al., Journal of Semiconductor Technology and Science, Vol. 2. No. 1, March 2002 (“*Lee*”)
Ex. 1028	U.S. Patent Application Publication No. 2001/0055207 (“*Barbeau*”)
Ex. 1029	AN710 Antenna Circuit Design for RFID Applications
Ex. 1030	U.S. Patent No. 6,606,247 (“*Credelle*”)

Ex. 1031	RESERVED
Ex. 1032	U.S. Patent No. 5,808,587 ("*Shima*")
Ex. 1033	U.S. Patent Application Publication No. 2005/0134213A1 ("*Takagi*")
Ex. 1034	RESERVED
Ex. 1035	RESERVED
Ex. 1036	International Patent Application Publication No. WO2003/105308A1 ("*Hui*")
Ex. 1037	U.S. Patent No. 5,780,992 ("*Beard-1*")
Ex. 1038	RESERVED
Ex. 1039	U.S. Patent No. 5,631,539 ("*Beard-2*")
Ex. 1040	RESERVED
Ex. 1041	U.S. Patent Application Publication No. 2005/0127868A1 ("*Calhoon*")
Ex. 1042	RESERVED
Ex. 1043	U.S. Patent No. 7,791,311 ("*Sagoo*")
Ex. 1044	U.S. Patent Application Publication No. 2007/0145830A1 ("*Lee-II*")
Ex. 1045	U.S. Patent Application Publication No. 2007/0267718A1 ("*Lee-Via*")
Ex. 1046	RESERVED
Ex. 1047	U.S. Patent Application Publication No. 2006/0202665 ("*Hsu*")
Ex. 1048	International Patent Application Publication No. WO2009155000A2 ("*Lin*")
Ex. 1049	U.S. Patent Application Publication No. 2008/0067874 ("*Tseng*")
Ex. 1050	U.S. Patent No. 9,356,473 ("*Ghovanloo*")

Ex. 1051	International Patent Application Publication No. WO2002/37641 ("*Cho*")
Ex. 1052	U.S. Patent Application Publication No. 2003/0195581A1 ("*Meadows*")
Ex. 1053	U.S. Patent Application Publication No. 2007/0022058 ("*Labrou*")
Ex. 1054	RESERVED
Ex. 1055	RESERVED
Ex. 1056	RESERVED
Ex. 1057	RESERVED
Ex. 1058	RESERVED
Ex. 1059	Watson, J., Mastering Electronics, Third Ed., McGraw-Hill, Inc. (1990) ("*Watson*")
Ex. 1060	Sedra, A., *et al.*, Microelectronic Circuits, Fourth Ed., Oxford University Press (1998) ("*Sedra*")
Ex. 1061	GB Patent Application Publication No. 2202414 ("*Logan*")
Ex. 1062	U.S. Patent No. 7,226,442 ("*Sheppard*")
Ex. 1063	RESERVED
Ex. 1064	Memorandum from Director Vidal (June 21, 2022)
Ex. 1065	Federal Court Management Statistics (December 2022)
Ex. 1066	Docket Control Order of March 28, 2023, *Mojo Mobility Inc. v. Samsung Elecs. Co., Ltd.*, No. 2:22-cv-00398 (E.D. Tex.)

I. INTRODUCTION

Samsung Electronics Co., Ltd. ("Petitioner") requests *inter partes* review of claims 23-31 ("challenged claims") of U.S. Patent No. 11,201,500 ("'500 patent") (Ex. 1001) assigned to Mojo Mobility Inc. ("PO"). For the reasons below, the challenged claims should be found unpatentable and canceled.

II. MANDATORY NOTICES

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

Related Matter: The '500 patent is at issue in the following matter(s):

- *Mojo Mobility Inc. v. Samsung Electronics Co., Ltd.*, No. 2-22-cv-00398 (E.D. Tex.) (asserting the '500 patent and also U.S. Patent Nos. 9,577,440, 11,292,349, 11,316,371, 7,948,208, 11,342,777, and 11,462,942) ("Texas Litigation").
- Petitioner is filing concurrently herewith petitions for *inter partes* review challenging other claims of the '500 patent.

The '500 patent originates from U.S. Patent Application No. 16/055,109, filed on August 5, 2018, which is a continuation or continuation-in-part of a sequence of applications dated as early as Jan. 30, 2007. (Ex. 1001, Cover.) The '500 patent also lists multiple provisional applications dated as early as Jan. 31, 2006. (*Id.*)

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

III. PAYMENT OF FEES

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

IV. GROUNDS FOR STANDING

Petitioner certifies that the ’500 patent is available for review and Petitioner is not barred or estopped from requesting review on the grounds identified herein.

V. PRECISE RELIEF REQUESTED AND GROUNDS

The challenged claims should be canceled as unpatentable based on the following grounds:

<u>Ground 1</u>: Claims 23, 25, 28, and 29 are unpatentable under pre-AIA 35 U.S.C. § 103(a) as obvious over *Okada*, *Odendaal*, *Cho*, *Berghegger*, and *Black*;

<u>Ground 2</u>: Claim 24 is unpatentable under pre-AIA 35 U.S.C. § 103(a) as obvious over *Okada*, *Odendaal, Cho, Berghegger, Black,* and *Calhoon*;

Ground 3: Claim 26 is unpatentable under pre-AIA 35 U.S.C. § 103(a) as obvious over *Okada*, *Odendaal, Cho, Berghegger, Black,* and *Meadows*;

Ground 4: Claim 27 is unpatentable under pre-AIA 35 U.S.C. § 103(a) as obvious over *Okada*, *Odendaal, Cho, Berghegger, Black,* and *Shima*;

Ground 5: Claim 30 is unpatentable under pre-AIA 35 U.S.C. § 103(a) as obvious over *Okada*, *Odendaal, Cho, Berghegger, Black,* and *Takagi*; and

Ground 6: Claim 31 is unpatentable under pre-AIA 35 U.S.C. § 103(a) as obvious over *Okada*, *Odendaal, Cho, Berghegger, Black,* and *Labrou*.

PO has stated in the Texas Litigation the following priority dates for the challenged claims (and possibly up to three months earlier): (a) 12/5/2006: claims 23, 24, and 28-31; (b) 7/30/2007: claims 25 and 27; and (c) 12/12/2007: claim 26. (Ex. 1022, 6-8.) Without conceding such dates are appropriate, Petitioner assumes for this proceeding those are the effective date(s) for the challenged claims. The asserted prior art herein qualifies as prior art at least under the following sections of pre-AIA 35 U.S.C. (depending on the priority dates above):

<table>
<tr><td>Okada (published: 6/2/2006)</td><td>§102(a)</td></tr>
<tr><td>Odendaal (filed: 6/26/2002; issued: 11/1/2005)</td><td rowspan="2">§§102(a), 102(e)</td></tr>
<tr><td>Black (filed: 12/8/2005; published: 7/6/2006)</td></tr>
<tr><td>Berghegger (issued: 6/28/2005)</td><td></td></tr>
</table>

Shima (issued: 9/15/1998)	§102(b)
Takagi (published: 6/23/2005)	
Cho (published: 5/10/2002)	
Meadows (published: 10/16/2003)	
Calhoon (filed: 12/12/2003)	§102(e)
Labrou (filed: 7/18/2006)	

None of these references were considered during prosecution, except for the issued patent corresponding to *Calhoon* (submitted but not applied). (Ex. 1001, cover; *infra* §X.)

VI. LEVEL OF ORDINARY SKILL

A person of ordinary skill in the art as of the claimed priority date of the '500 patent ("POSITA") would have had at least a master's degree in electrical engineering, or a similar discipline, and two or more years of experience with wireless charging systems, including, for example, inductive power transfer systems. (Ex. 1002, ¶¶20-21.)[2] More education can supplement practical experience and vice versa. (*Id.*)

[2] Petitioner submits the declaration of R. Jacob Baker, Ph.D., P.E. (Ex. 1002), an expert in the field of the '500 patent. (Ex. 1002, ¶¶1-13; Ex. 1003.)

VII. THE '500 PATENT

During prosecution, the applicant replaced the initially rejected claims (Ex. 1004, 484-493, 414-423) with new ones, which were subsequently allowed without rejections (*id.*, 186-193 (NOA), 244-249, 384-406). The examiner alleged the art did not "teach or suggest the inclusion of the system comprising" limitations 1(f), 1(i)-1(l). (*Id.,* 191-192; §IX.) However, those claimed features, and the others, are a compilation of technologies/techniques known in the art, as demonstrated below. *See In re Gorman*, 933 F.2d 982, 986 (Fed. Cir. 1991). (*Infra* §IX; Ex. 1002, ¶¶22-67, 69-260; Exs. 1005-1017, 1019-1021, 1023-1030, 1032-1033, 1036-1037, 1039, 1041, 1043-1045, 1047-1053, 1059-1062.)

VIII. CLAIM CONSTRUCTION

The Board only construes the claims when necessary to resolve the underlying controversy. *Toyota Motor Corp. v. Cellport Systems, Inc.*, IPR2015-00633, Paper No. 11 at 16 (Aug. 14, 2015). For purposes of this proceeding, Petitioner believes that no special constructions are necessary to assess whether the challenged claims are unpatentable over the asserted prior art.[3] (Ex. 1002, ¶68.)

---

[3] Petitioner reserves all rights to raise claim construction and other arguments, including challenges under 35 U.S.C. §112, in district court as relevant to those proceedings. *Target Corp. v. Proxicom Wireless, LLC*, IPR2020-00904, Paper 11 at

IX. DETAILED EXPLANATION OF GROUNDS

A. Ground 1: Claims 23, 25, 28, and 29 are obvious over *Okada* in view of *Odendaal*, *Cho*, *Berghegger*, and *Black*

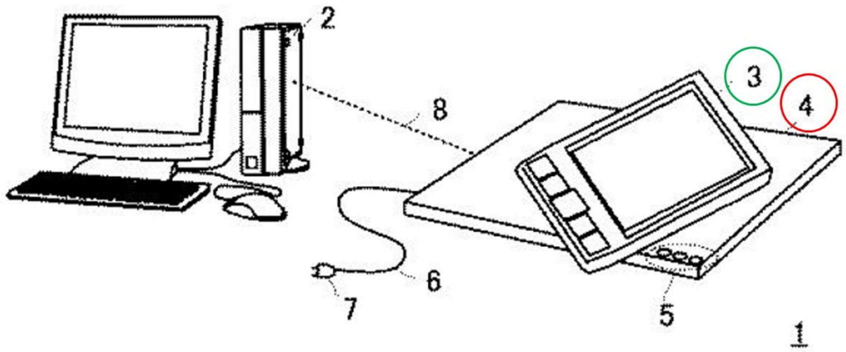
1. Claim 23

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 limiting, *Okada* discloses this limitation. (Ex. 1002, ¶¶70-85, 119-129; §§IX.A.1(b)-(i).) *Okada* discloses a "mobile-enabled electronic device[]" ("**portable device**") including a rechargeable battery and capable of receiving inductive power from a "power supply system." (Ex. 1005, Abstract, ¶¶0001, 0009, 0012 ("power receiving device…equipped with a rechargeable secondary battery"), FIG. 2 (battery), ¶¶0015, 0037, FIG. 14, ¶¶0134-0136, FIG. 15, ¶¶0138-0140, FIG. 16, ¶¶0142-0144, claim 4.) FIG. 1 (annotated below) shows PDA3 ("**portable device**") (green), cradle 4 (with wire/plug 6/7, LEDs 5) ("**inductive charging system**") (red), and PC2. (Ex. 1005, ¶¶0034-0036.)

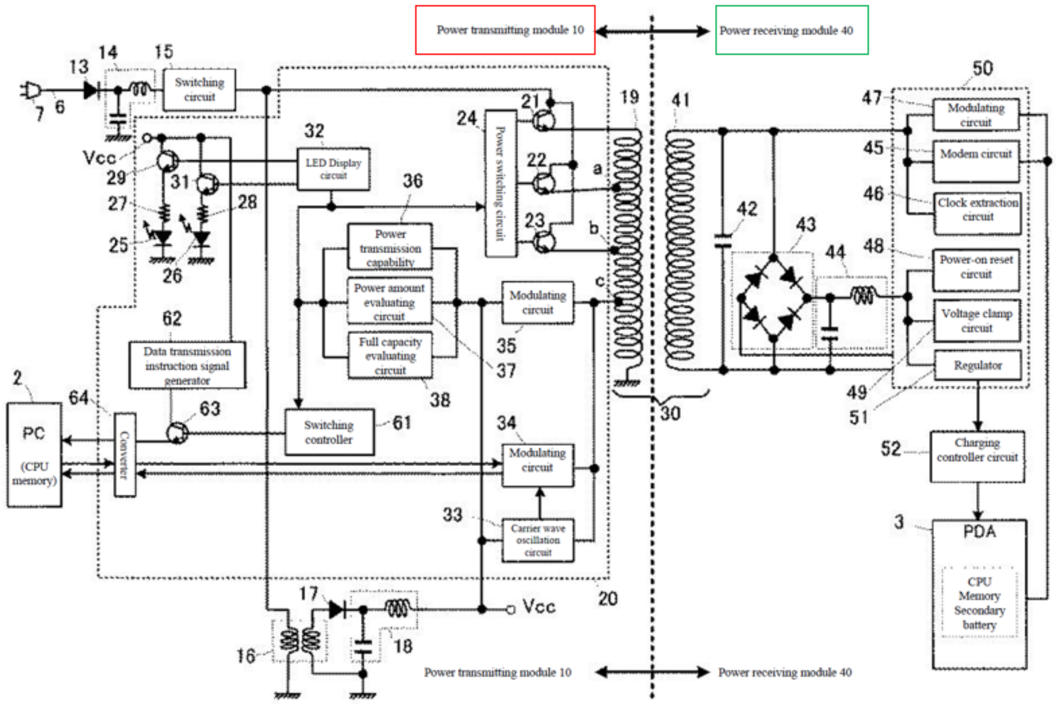
11–13 (Nov. 10, 2020). A comparison of the claims to any accused products in litigation may raise controversies that are not presented here given the similarities with the prior art.

FIG. 1



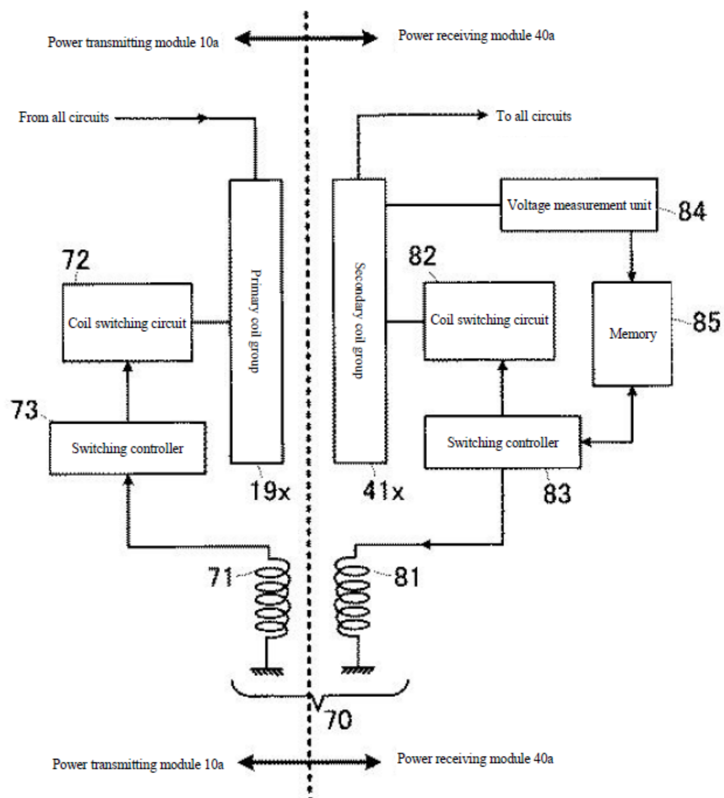
"[M]agnetic coupling" occurs between cradle coil(s) and PDA3 coil, which "induces voltage" in the coil to "suppl[y] power to the PDA." (*Id.*, ¶0035.) The "**inductive charging system**" includes a "**base unit**" (*e.g.*, cradle 4), consistent with the '500 patent. (*Id.*; FIG. 1; Ex. 1001, 4:15-16, 25:42-43; Ex. 1002, ¶121.)

FIG. 2 (below) describes exemplary components associated with PDA3 and cradle 4. (Ex. 1005, FIG. 2, ¶0037.) Cradle 4 includes a **power transmitting module 10** ("PTM10"), and PDA3 includes a **power receiving module 40** ("PRM40"). (*Id.*, ¶¶0035-0037, 0038-0058, FIG. 8, ¶¶0110-0111.) PTM10 includes a primary coil 19 ("**one or more primary coils**") (*id.*, ¶0040) and various circuits (e.g., rectifier 13, circuit 14, and/or switching circuit 15, etc.) ("**associated circuits**") (*id.*, ¶¶0037-0046; Ex. 1002, ¶122).



PTM10 converts received power (*e.g.*, via wire/plug 6/7) to a DC signal via circuits 13-14. (Ex. 1005, ¶¶0038, 0049.) Switching circuit 15 generates a switching pulse signal using the DC signal (*id*.), which is converted to a DC signal (V_{CC}) powering components in PTM10 (via circuits 16-18). (*Id.*, ¶0039.) The pulse signal is also supplied to primary coil 19 via switches 21/22/23. (*Id.*, ¶¶0040, 0049-0051.) Power switching circuit 24 selects a switch 21/22/23, allowing the pulse signal to traverse selected turns of coil 19 and enabling adjustment of the power level transmitted to PRM40 (PDA3). (*Id.*, ¶¶0040, 0051, 0057, 0069-0073.) The power level may be determined based on portable device "power consumption information" provided by PRM40. (*Id.*, ¶¶0057, 0063-0064, 0069-0073; Ex. 1002, ¶¶123-124.)

Okada discloses configurations/applications of its power/charging system and portable device configuration having similar functionalities associated with PTM10 and PRM40. (Ex. 1005, FIGS. 2, 7-17, ¶¶0009-0032, 0094-0154.) For example, FIG. 7 (below) shows PTM10 including multiple primary coils (group 19x) and PRM40 including multiple secondary coils (41x). (Ex. 1005, FIG. 7, ¶¶0094-0096.)



Circuits in PTM10 and PRM40 allow selective activation of coils "having a highest power transmission efficiency" to accommodate shifted positions of PDA3 relative to cradle 4. (*Id.*, ¶¶0103-0105; *id.*, ¶¶0097-0102, 0106-0109; Ex. 1002, ¶¶125-126.)

Applications of these features are described with respect to other examples. (Ex. 1005, ¶0107 (one module may have a plurality of coils), FIG. 9 (below),

¶¶0116-0118 (tabletop multi-coil charging pad 100), FIG. 10, ¶0119 (charging multiple portable devices), FIGS. 11(a)-(b) (below), ¶¶0120-0122 (multiple PTM10s powering/charging multiple devices), FIGS. 12(a)-(b) (below) ¶¶0123-0126, FIGS. 13(a)-(b) (below), ¶¶127-132 (mulit-coil mouse pad); Ex. 1002, ¶127.) Thus, multiple types of "portable device(s)" can operate with different types of "charging systems"/"base unit(s)." (*Id.*)

FIG. 9

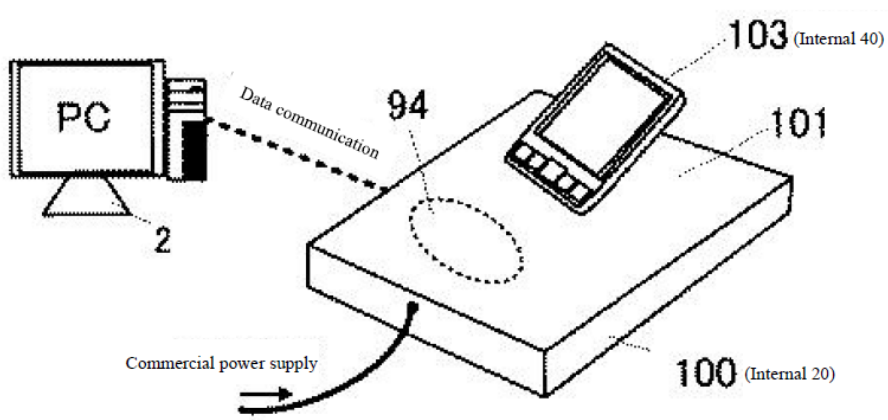


FIG. 10

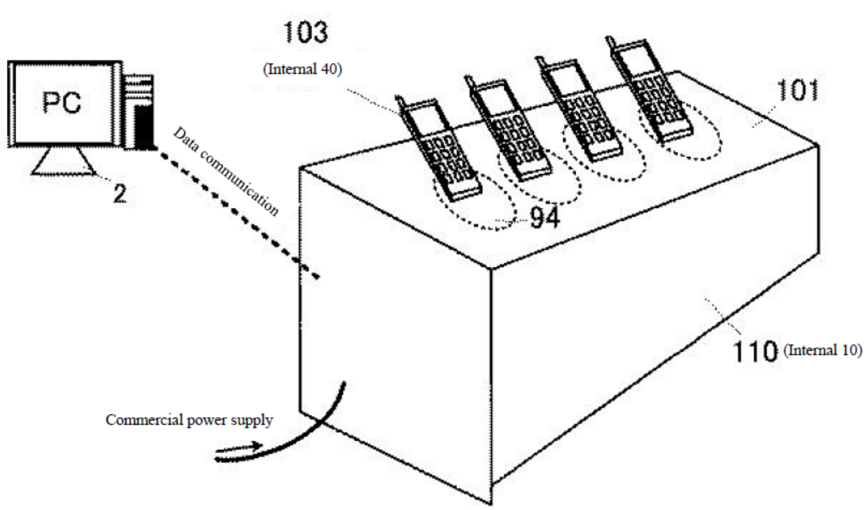


FIG. 11

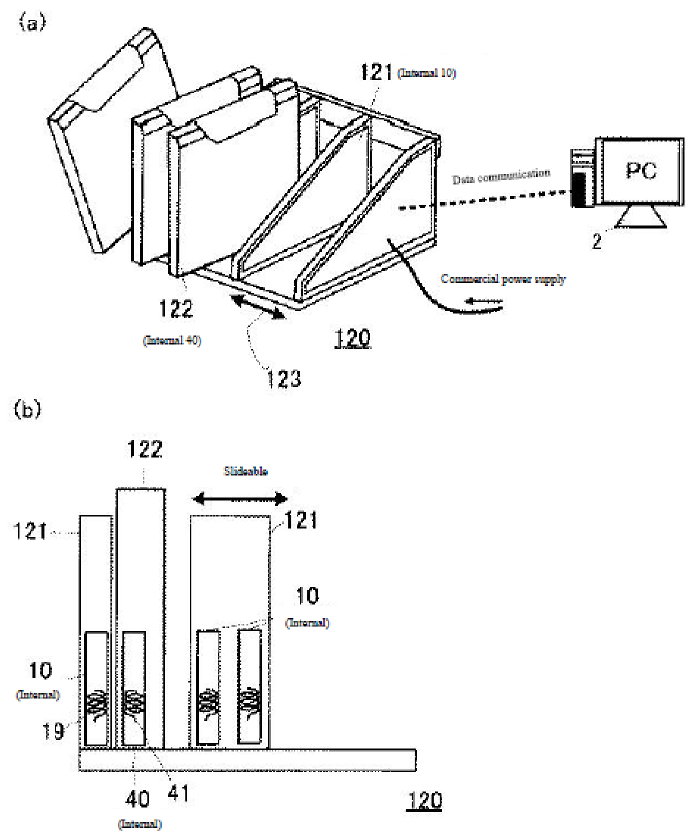

(a)
121 (Internal 10)
Data communication
PC
2
Commercial power supply
122
(Internal 40)
120
123
(b)
122
Slideable
121
121
10
(Internal)
10
(Internal)
19
40
(Internal)
41
120

FIG. 12

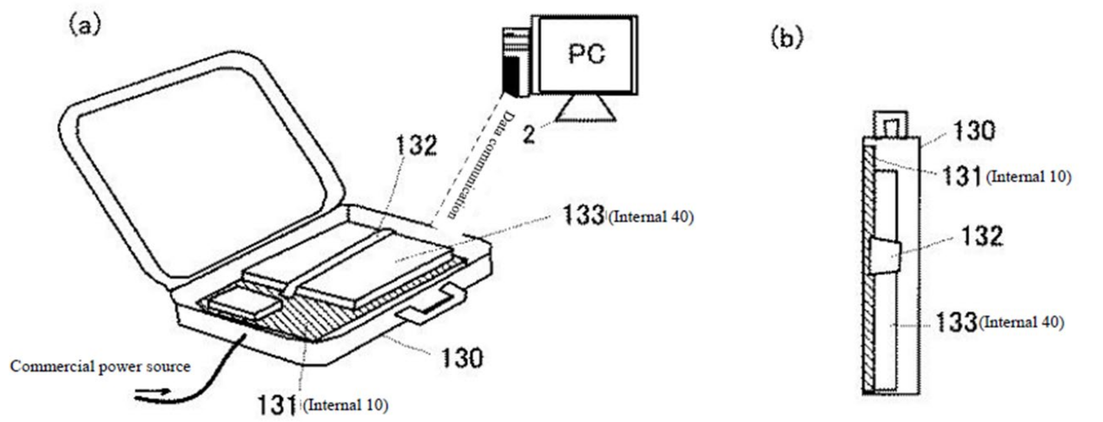

(a)
PC
Data communication
2
132
133 (Internal 40)
130
Commercial power source
131 (Internal 10)
(b)
130
131 (Internal 10)
132
133 (Internal 40)

FIG. 13

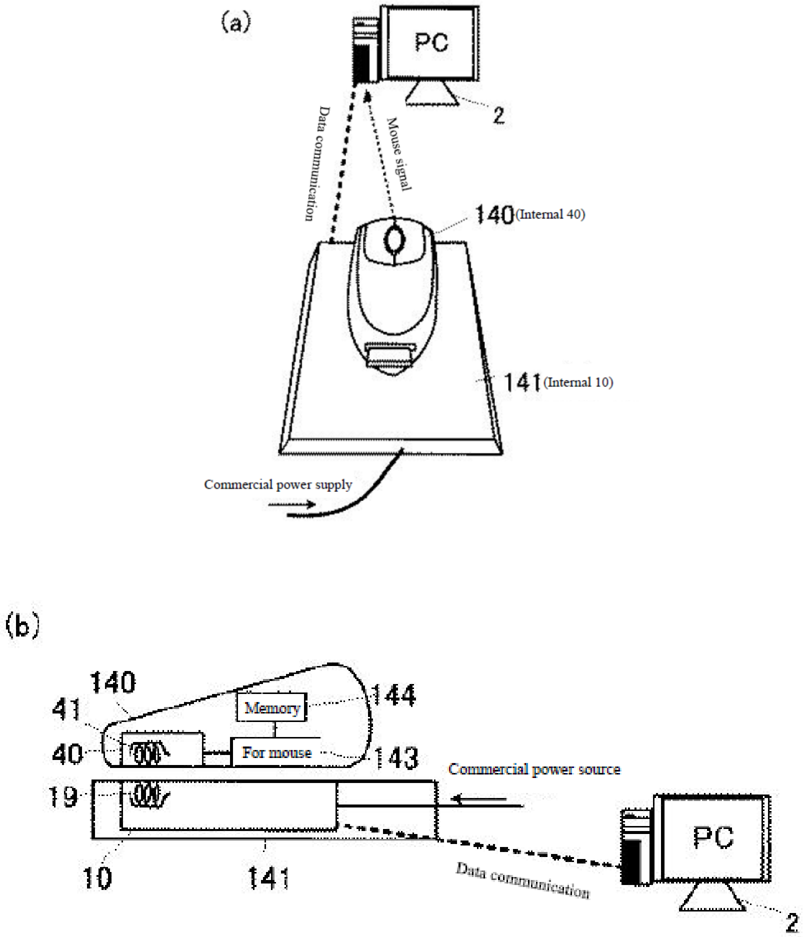
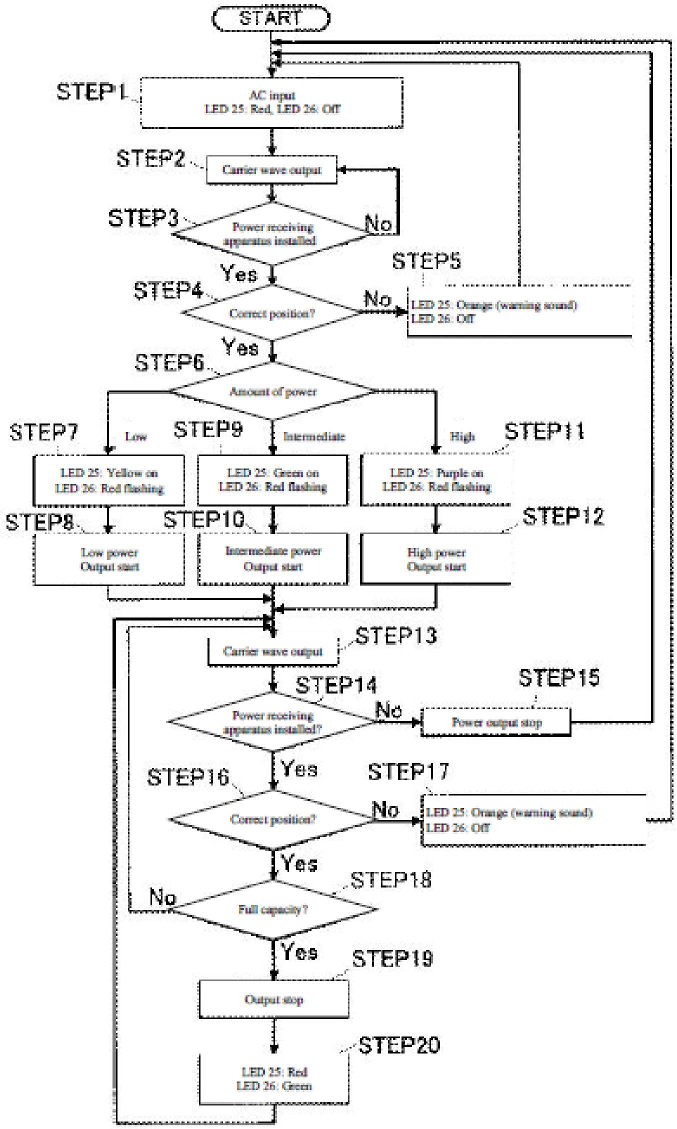
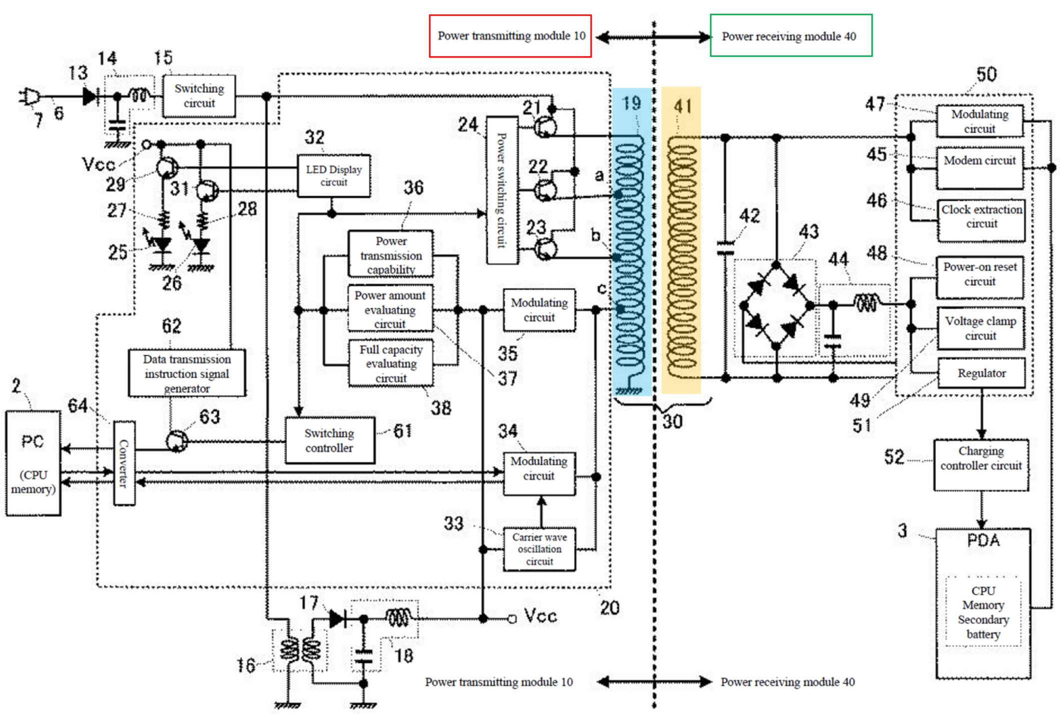


FIG. 3 (below) shows "power supply operations carried out between [PTM10 and PRM40]," applicable to the various configurations. (Ex. 1005, FIG. 3, ¶¶0059-0090; ¶¶0094-0115; Ex. 1002, ¶¶128-129.)


START
STEP1
AC input
LED 25: Red, LED 26: Off
STEP2
Carrier wave output
STEP3
Power receiving apparatus installed
No
Yes
STEP4
Correct position?
No
STEP5
LED 25: Orange (warning sound)
LED 26: Off
Yes
STEP6
Amount of power
STEP7
Low
STEP9
Intermediate
High
STEP11
LED 25: Yellow on
LED 26: Red flashing
LED 25: Green on
LED 26: Red flashing
LED 25: Purple on
LED 26: Red flashing
STEP8
STEP10
STEP12
Low power
Output start
Intermediate power
Output start
High power
Output start
STEP13
Carrier wave output
STEP14
Power receiving apparatus installed?
No
STEP15
Power output stop
Yes
STEP16
Correct position?
No
STEP17
LED 25: Orange (warning sound)
LED 26: Off
Yes
STEP18
No
Full capacity?
Yes
STEP19
Output stop
STEP20
LED 25: Red
LED 26: Green

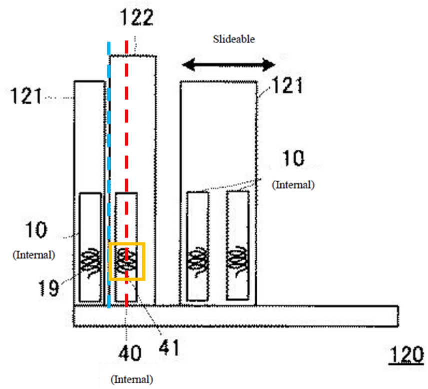
b) a receiver coil which has a substantially planar shape and located parallel to a surface of the portable device so that a magnetic field received from a primary coil in a base unit of an inductive charging system in a direction substantially perpendicular to the plane of the receiver coil is used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

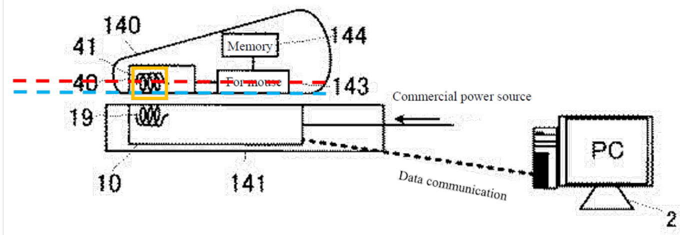
Okada in view of *Odendaal* discloses/suggests this limitation. (Ex. 1002, ¶¶130-154.) As discussed, *Okada*'s "**portable device**" includes "**a receiver coil**" and *Okada*'s "**base unit of inductive charging system**" includes a "**primary coil**." (§IX.A.1(a); Ex. 1005, ¶¶0035, 0040.) FIG. 2 (annotated below) exemplifies PRM40 (in each "**portable device**") having coil 41 (**orange**) ("**receiver coil**"), and PTM10 (in each "**base unit of an inductive charging system**") having coil 19 (**blue**) ("**primary coil**"). (Ex. 1005, ¶0040.)



Switching circuit 15 provides a switching pulse signal to primary coil 19. (§IX.A.1(a); Ex. 1005, ¶¶0039-0040, 0049-0051.) When PDA3 is properly positioned/aligned on/with cradle 4, "magnetic coupling induces a voltage" (and thus current) on coil 41 (Ex. 1005, ¶¶0051; *id.*, ¶¶0035, 0056, 0066-0068) to power/charge PDA3 (*id.*, ¶0047). Because coils 19/41 are magnetically coupled and power is transmitted to PDA3, coil 41 receives "**a magnetic field**" from coil 19, which "**inductively generate[s] a current**" in coil 41 to power/charge PDA3, consistent with that known in the art. (Ex, 1002, ¶¶131-132; Ex. 1041, ¶¶0022 ("magnetic flux induces an alternating current through the magnetic field and across the receiver coil, completing an energy transfer circuit."), 0031; Ex. 1009, 2:62-3:8, 1:54-2:18, 3:20-4:11, FIGS. 1-3; Ex. 1010, FIGS. 1-5B, 8:55-9:52 ("as is *well known by those skilled in the relevant art*, primary coil 510 *induces a current to flow in secondary coil* 230"), FIGS. 6A-10, 7:21-8:54, 9:53-10:22, 11:27-14:67.)

Okada's "**receiver coil**" is "**located parallel to a surface of the portable device**." (Ex. 1002, ¶133.) Figures 11(b) and 13(b) show examples of coil 41 positioned substantially parallel to a surface (**blue** parallel (**red**) to coil 41 (**orange**) below) of the portable device. (Ex. 1005, FIGS. 11(b)–left, 13(b)–right (annotated below), §IX.A.1(a); Ex. 1002, ¶133.) A POSITA would have understood a similar arrangement exists with the other exemplary configurations discussed above. (*Id.*)





While *Okada* does not expressly state the "receiver coil which has a **substantially planar shape** and located parallel to a surface of the portable device," a POSITA would have found it obvious to configure *Okada*'s portable device to implement/use planar coils for the receiver-side (and also primary-side) in view of *Odendaal*'s teachings/suggestions, which also contemplates inductive charging applications for mobile devices. (Ex. 1002, ¶134.)

The use of **planar coils** placed in parallel to a portable/charging device surfaces were known. (Ex. 1002, ¶¶50-53, 135-139; Ex. 1027, 1-3 (planar spiral inductor); Ex. 1015, FIGS. 1-2, 3-4, 7-12, Abstract, 1:5-2:29, 2:64-3:27, 3:39-51, 5:5-47, 5:48-9:5; Ex. 1047, FIGS. 1-3, 6, 8A-9, ¶¶0002, 0006-0007, 0018-0025-0034; Ex. 1025, FIGS. 1, 3, 8-9, 13, 1:10-2:3, 2:5-12 (reasons for thin coil designs), 2:14-3:2, 4:19-32, 7:25-9:28, 12:27-32, 14:4-17; Ex. 1026, FIGS. 1-2, 5, 9A-9C, Abstract, 1:3-4:4, 4:6-9:4, 11:4-15 (flat coils); Ex. 1009, Abstract, FIGS. 1-3, 1:4-51, 1:54-2:26, 2:47-3:8, 3:9-39 (thin flat coil), 4:18-60); 1024, FIGS. 3, 8-9, 1:12-

15, 1:39-2:29, 9:41-53, 10:45-57, 11:60-13:4; Ex. 1028, Abstract, FIGS. 2-7, ¶¶0001, 0004-0007, 0025-0032, 0041; Ex. 1029, 1-4, 9-19 (planar, spiral coils); Ex. 1030, FIGS. 3-7B, 1:5-9, 1:59-61, 3:19-56, 4:62-567, 5:25-44; Ex. 1036, Abstract, 2:22-3:6 ("primary winding…**substantially parallel** to…planar charging surface" and formed on planar PCB), 5:22, 11:18, 23:20-24:8 ("flat surface…preferably parallel to the plane of the secondary winding within the housing"), 24:19-22 ("The secondary coil or PCB winding **should be placed close to the (preferably flat) 20 surface of the housing of the secondary charging module so as to pick up maximum changing AC magnetic flux** from the primary inductive charging extension system or platform.").)

Aware of such coil designs and associated tradeoffs (*e.g.*, size/weight/cost/performance), a POSITA would have been motivated to consider relevant teachings (*e.g.*, *Odendaal*) when configuring/implementing device/system similar to *Okada*. (Ex. 1002, ¶140; Ex. 1047, ¶0033.)

Odendaal discloses inductive power/data transfer/reception technologies/techniques, and like *Okada*, is in the same technical field as the '500 patent. (§IX.A.1(a); Ex. 1008, Title, Abstract, FIGS. 1A-4, 11-12, 1:5-3:57, 4:50-5:8, 5:24-28, 6:59-64; Ex. 1001, Abstract, 4:13-14.) Also like *Okada*, *Odendaal* discloses features that were reasonably pertinent to particular problem(s) the '500 patent inventor (and POSITA) were trying to solve. (*E.g.*, Ex. 1001, 4:13-29; Ex.

1008, Abstract, 1:5-3:57, 4:50-5:8, 5:24-28, 6:59-64; §§IX.A.1(a)-(b); Ex. 1005, FIGS. 1, 2, 7, 9-12 ¶¶0037-0048, 0049-0058, 0094-0109, 0116-0126; Ex. 1002, ¶¶86-89, 141-142.) Such teachings thus would have been consulted when designing/implementing a contactless/inductive charging system, like *Okada*. (*Id.*)

Odendaal discloses known use of **planar-type inductor coils** for contactless power/data transfer/reception, for, *e.g*., charging a cellphone battery. (Ex. 1008, FIGS. 1A-1B, 2A, 2C, 8E, 1:58-2:43.) *Odendaal* describes using planar resonators having characteristics of an integrated inductor-capacitor transformer. (*Id.*, 1:53-57.) The planar resonator includes spirals on opposite sides for energy transfer/reception "so that a battery of a cellphone could be charged without physical wires." (*Id.*, 1:60-67.) The planar resonator "transfer[s] power across the 'interface-of-energy-transfer' (IOET) in either an electric or **magnetic form**, or both." (*Id.*, 2:1-7.) Thus, while *Odendaal* discusses capacitive-type energy transfer, "[t]he physical arrangement and/or material can permit transformer action…**without** [such] capacitive energy transfer." (*Id.*, 2:7-10; *id.*, 2:65-3:5, 4:44-5:8, 6:1-18; Ex. 1002, ¶¶143-144.)

The planar coils may have "a thin and/or relatively flat top coil surface" and be arranged in upper and lower configurations "with an air gap." (Ex. 1008, 2:44-54.) "The spiral-shaped conductor may comprise **pcb** spiral-wound conductors" and "a battery charging circuit can be coupled to one of the first and second spiral shaped conductors, and **load can be coupled to the other**…" where "coupling between the battery charging circuit and the battery may comprise…**magnetic coupling, wherein power is transferred by the coupling of…and/or magnetic flux** across the IOET." (*Id*., 2:55-64.) *Odendaal*'s teachings regarding use of a "**planar**" coils for contactless power/data transfer/reception (*id.*, 1:60-67) is consistent with that known in the art. (Ex. 1002, ¶145; *supra* state-of-art disclosures; Ex. 1008, 1:60-67, 2:19-21, 2:29-44, 3:65-67.) Moreover, consistent with the thin form factor designs contemplated by *Okada* (e.g., PDAs/mobile phones/laptops, charger pad, etc.), *Odendaal* discloses that the spiral coils "are preferably integrated into a **planar (flat/thin) structure**" (Ex. 1008, 3:3-5) and may conform to the housing surface to facilitate power transfer "in close proximity" (*id.*, 2:29-44). Such arrangements disclose coils that are parallel to a surface of a portable device and charger. (Ex. 1002, ¶146.)

In light of such teachings, and state-of-art knowledge, a POSITA would have been motivated, and found obvious, to modify the *Okada* system to use "**a receiver coil which has a substantially planar shape and located parallel to a surface of the portable device**" (as well as complemented such a design with corresponding planar primary coil(s)) to expand/complement applications compatible with those contemplated by *Okada* to enhance mobile usage and form factors of portable devices and corresponding thin charging systems/base units. (Ex. 1002, ¶147;

§IX.A.1(a).) Such modification would have, *e.g.*, reduced the volume coil(s) occupy (in portable device and/or charging systems/base units), portable device's (and charging system/base unit's) size/weight, and expanded/enhanced portable device and/or charging system/base unit applications/configurations contemplated by *Okada*, *e.g.*, PDAs, mobile phones, laptops, charging pads, desktop applications, etc. (Ex. 1002, ¶147; §IX.A.1(a); Ex. 1005, FIGS. 1, 9, 10-16, ¶¶0033-0034, 0116-0146; Ex. 1051, 2:15-27 ("**the volume and the weight of the secondary circuitry [of portable devices] should be reduced**.").) Also, planar coils would have provided options to reduce the distance between primary and secondary coils (promoting close proximity coupling (Ex. 1008, 2:29-44)) for improving power transmission efficiency, reducing energy waste, and shortening charging time. (Ex. 1002, ¶¶147-148; Ex. 1005, ¶¶0066-0068, 0112, FIGS. 4(a)-4(b); Ex. 1036, 24:19-22 (the coil "**should be placed close to the (preferably flat) 20 surface of the housing…to pick up maximum changing AC magnetic flux**….").)

A POSITA would have had the skills and rationale in light of the teachings/suggestions of *Okada*, *Odendaal*, and a POSITA's state-of-art knowledge, to implement the above modification while considering design tradeoffs and techniques/technologies with a reasonable expectation of success, especially given such modification would have involved known technologies/techniques (*e.g.*, planar coil receiving/transmitting wireless power) to yield the predictable result of providing a portable device with enhanced mobile usage and form factors and a charging system/base unit with improved form factors, like that contemplated by *Okada-Odendaal*. (Ex. 1002, ¶149; §IX.A.1(a)) *See KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398, 416 (2007).

A POSITA would have understood implementing a planar receiver coil located parallel to the portable device surface in *Okada-Odendaal* (along with similarly positioned primary planar coil(s) in a base unit) would have resulted in the planar receiver coil receiving a magnetic field that was substantially perpendicular to the plane of the receiver coil from the planar primary coil located parallel to a surface of the *Okada-Odendaal* base unit, when the portable device is properly positioned on the base unit, consistent with that known in the art. (Ex. 1002, ¶¶150-153; Ex. 1005, FIGS. 1, 9-16; Ex. 1008, 2:51-52 ("The coils may be…substantially axially aligned."); Ex. 1011, 558, 559 ("magnetic field at the center of [a wire] loop is perpendicular to the plane of the loop"), 562-564, 592; Ex. 1048, Abstract, FIGS. 1-6, 1:28-2:4, 2:27-3:14, 4:11-24, 5:23-6:15, claims 1-88; Ex. 1049, Abstract, FIGS. 1, 5-6, 9, 11-12, 24-26, ¶¶0008-0010, 0044-0050, 0051, 0065-0066; Ex. 1050, Abstract, FIGS. 1-5, 9A-9C, 5:22-6:45, 11:22-33, 12:28-38, 16:25-17:23, 17:61-18:3 ("**substantially perpendicular**" magnetic field from planar coils).) A POSITA would have appreciated that implementing planar coils (primary-secondary) would have promoted efficient energy transmission between the charger system and portable device, especially where the respective coils were aligned to allow the perpendicular magnetic field generated by the primary coil(s) to be efficiently received by the receiving coil(s). (Ex. 1002, ¶¶36-53, 148, 154.)

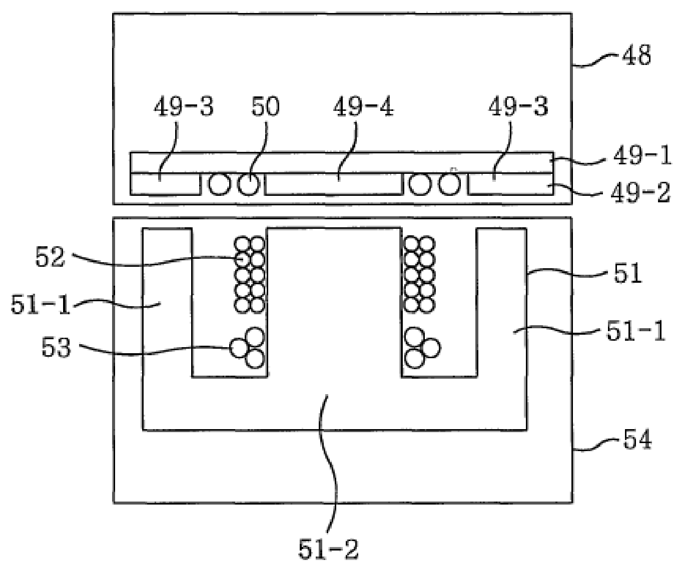
c) a ferrite material layer placed behind the receiver coil and opposite to the surface of the portable device to provide shielding in the portable device from electromagnetic fields;

Okada-Odendaal in view of *Cho* discloses/suggests this limitation. (Ex. 1002, ¶¶155-162; §§IX.A.1(a)-1(b).) While *Okada-Odendaal* does not expressly disclose "**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**," a POSITA would have found it obvious to implement such a feature in view of *Cho*. (Ex. 1002, ¶156.)

Cho, like *Okada-Odendaal*, discloses features/configurations for contactless powering/charging of a mobile device battery by utilizing inductive windings/coils (Ex. 1051, Abstract, 1:5-18, 1:35-2:14) and thus is in the same technical field as the '500 patent. (§IX.A.1(a); Ex. 1001, Abstract.) *Cho* discloses features reasonably pertinent to particular problem(s) the '500 patent inventor and a POSITA were trying to solve. (Ex. 1051, 17:10-23:13; Ex. 1001, 16:32-49; Ex. 1002, ¶¶90-92, 157.) Therefore, a POSITA had reasons to consider/consult *Cho* when looking to design/implement the *Okada-Odendaal* combination discussed above. (*Id.*)

Cho discloses designs/materials associated with planar receiver coils used for charging/powering portable devices. (Ex. 1051, 17:10-18 ("a transformer…divided into two parts implemented in a charger 54 and such portable device 48"), 17:18-19:19.) Such configurations include using ferrite sheets for implementing planar receiver coils in portable devices. (Ex. 1002, ¶158; Ex. 1051, FIG. 8A (below).)

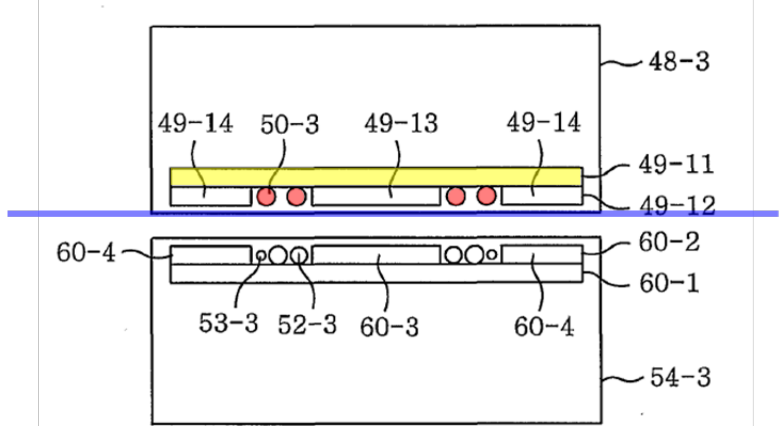
FIG. 8A



Portable device 48 (Figure 8A above) includes a secondary circuit, a "thin film shape winding 50," and two layers of ferrite sheets 49-1 and 49-2, where winding 50 is located in the groove formed by the ferrite sheets. (Ex. 1051, 17:10-18:15, FIG. 8A.) Charger 54 includes windings 52/53 located around ferrite core 51-2 for transferring energy to device 48. (*Id.*, 17:26-35.) Alternatively, windings 52/53 may have "a planar shape," as shown in Figure 11 (annotated below). (*Id.*, 22:4-23:13,

FIG. 11.) Accordingly, *Cho* discloses a ferrite sheet 49-11 (yellow) placed behind a planar secondary coil 50-3 (red) ("**a ferrite material layer placed behind the receiver coil**") and "**opposite to the surface of the portable device**" 48 (blue). (*Id.*, FIGS. 8A, 11; Ex. 1002, ¶158.)

FIG. 11



In light of such teachings/suggestions, a POSITA would have been motivated and found it obvious to implement/configure the *Okada-Odendaal* system (including the "charging system" and "portable device") such that the portable device includes a ferrite sheet/layer placed behind the planar receiver coil to shield circuitry in the portable device from electromagnetic waves generated during inductive charging operations. A POSITA would have appreciated *Cho*'s guidance associated with forming planar receiver coils using ferrite material/layers/sheets and been motivated to implement similar features in the *Okada-Odendaal* system, and done so with a reasonable expectation of success. (Ex. 1002, ¶159.) Indeed, *Cho* explains that "[a] ferrite sheet [can be] very soft," "not easily breakable by an impact," though "can be easily shaped." (Ex. 1051, 18:16-20.) "[B]y tailoring a thickness of a desired ferrite and a thickness and a width of a wire, a charging device **having a high charging efficiency can be obtained without increasing a volume and a weight of a portable device**," consistent with the *Okada-Odendaal* combination. (*Id.*, 18:20-24; Ex. 1002, ¶159.)

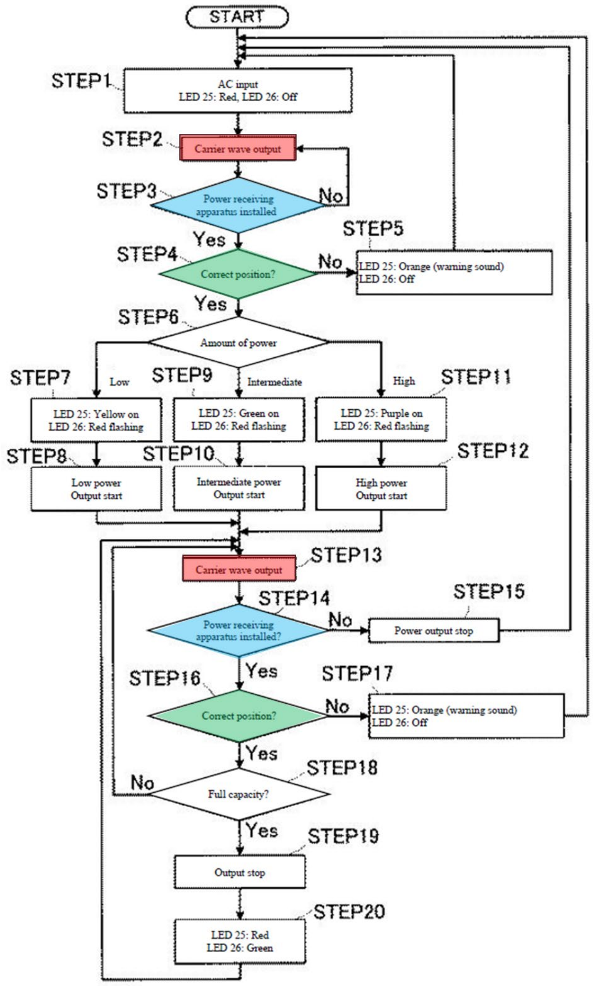
A POSITA would have also understood that the ferrite sheet placed behind the receiver coil and opposite to the surface of the portable device, similar to that discussed in *Cho*, would have shielded portable device circuits from the electromagnetic fields, *e.g.*, those generated by the primary coil. (Ex. 1002, ¶¶160-161.) Such a feature would have reduced/minimized the electromagnetic field's detrimental effects on the portable device's circuits, *e.g.*, unwanted radiations and heat on the circuits, causing faulty signals, reduced reliability, and service life. (*Id.*)

A POSITA would have had the skill, rationale, and knowledge in implementing, and reasonable expectation of success in achieving, such modification. (Ex. 1002, ¶162.) Indeed, it was known to employ ferrite sheet(s) in portable device receiver coil designs (*Cho*) and that such material as implemented in the modified *Okada-Odendaal* system would have mitigated potential detrimental effects of electromagnetic fields on the portable device. Thus, such modification would have involved applying known technologies/techniques (*e.g.,* ferrite sheet(s) placed behind a receiver coil and opposite to the surface of the portable device) to yield the predictable result of shielding a portable device's circuits from electromagnetic fields and reducing detrimental effects thereof, consistent with that discussed above by *Cho* and known in the art. (*Id.*) *KSR* at 416-18.

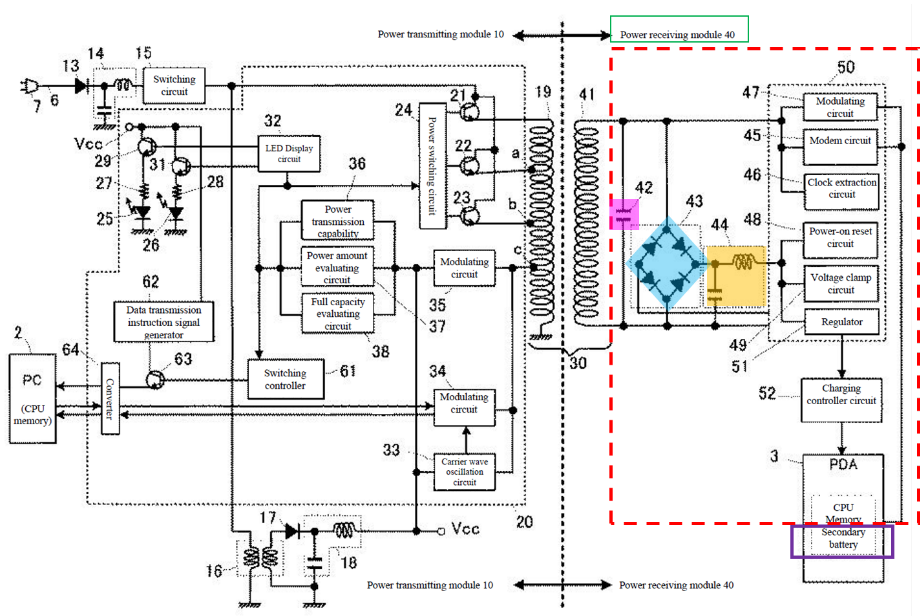
d) a receiver circuit designed to operate near a resonant frequency of a circuit formed by the receiver coil, the receiver circuit, and a compatible base unit primary coil and associated circuit when adjacent to the portable device for inductive powering or charging;

Okada-Odendaal-Cho in view of *Berghegger* discloses/suggests this limitation. (Ex. 1002, ¶¶163-179; §§IX.A.1(a)-(c).)

As discussed, *Okada* discloses cradle 4 including a "**base unit**" with a "**primary coil**" and "**associated circuits**," which applies a switching pulse signal to the primary coil for powering/charging PDA3 ("**portable device for inductive powering or charging**"). (§IX.A.1(a); Ex. 1005, ¶¶0034-0036, 0037-0046, 0051, 0057, 0069-0073; Ex. 1002, ¶164.) Cradle 4 (including a "**base unit**") powers/charges PDA3 "**when adjacent**" to PDA3. For example, the "charger system" detects the **presence**, **proximity**, and **alignment** of a mobile device capable of being powered/charged by cradle 4 before transmitting power. (Ex. 1005, ¶¶0056-0058.) Circuit 36 of PTM10 uses information received from modulating circuit 47 of PRM40 (*e.g.*, "code indicating that a device is capable of receiving power") to "evaluate whether supplying power to the device via the common cradle 4 is feasible," and whether the relative position of the portable device on cradle 4 does not exceeds a prescribed offset amount. (*Id.*, ¶0057, FIG. 3 (annotated below), ¶¶0059-0064 (whether device is mounted (FIG. 3, Step 3)), 0065-0068 (whether coil 41 is "arranged at positions having high power transmission efficiency" based on positional offset (FIG. 3, Step 4) (*see, e.g.*, FIGS. 4(a)-(b) describing detection of "[a]mount of misalignment")), 0069-0076 (providing appropriate power to properly positioned device (FIG. 3, Steps 6-12) and continuously checking after onset of power/charge operations (FIG. 3, Steps 13-20)), 0090.) *Okada* refers to devices capable/feasible to receive power from cradle 4 as a "common cradle 4 **compatible** device" or "device capable of receiving power." (*Id.*, ¶¶0057, 0064-0073.) A POSITA would have understood that, if the portable device is compatible/feasible to receive power from cradle 4, then cradle 4 is likewise a "**compatible base unit**" for powering/charging the portable device. (Ex. 1002, ¶¶164-165.)



PDA3 includes a PRM40 ("**receiver unit**" (recited in limitation 23(e) *infra*)), which comprises a "**receiver circuit**" (e.g., **red** below) that includes one or more circuits, *e.g.*, smoothing capacitor 42 (**pink**), rectifying circuit 43 (**blue**), smoothing circuit 44 (capacitor/inductor) (**orange**), clock circuit 46, modulating circuit 47, and/or one or more other components in PRM40 (other than the **battery**), *e.g.*, one or more of circuits 45, 48-49, and 51-52. (Ex. 1005, ¶0047, FIG. 2; Ex. 1002, ¶166.)[4]



Okada's "**receiver circuit**" converts the signal induced on coil 41 (magnetically coupled to coil 19 (*supra* limitation 23(b))) into a DC signal to charge/power PDA3. (Ex. 1005, ¶0047; Ex. 1002, ¶167; §IX.A.1(b); Ex. 1041, ¶¶0022, 0031; Ex. 1009,

---

[4] The annotated figure(s) provided here/elsewhere are exemplary visual aids and are not intended to define precise boundaries/schematics or limit/constrain the prior art mappings (alone or as modified). Variations of components, or other components/circuitry, etc. not shown but described/suggested by *Okada* (or the modified *Okada* system) may be encompassed that meet the challenged claims discussed herein. (Ex. 1002, ¶166.)

8:55-9:52.) Given that *Okada*'s **receiver circuit** is driven by the signal from the primary side through the coils, a POSITA would have understood that *Okada*'s "**receiver circuit**" operates at the same frequency at which the switching pulse signal oscillates on the primary and secondary coils. (Ex. 1002, ¶167.) Thus, *Okada*'s primary-side circuit (*e.g.*, including switching circuit 15) operates at the same frequency of the "**receiver circuit**" determined by the operating frequency of switching circuit 15. (*Id.*)

Okada, however, does not expressly state that the primary-side and/or the receiver circuit are "**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." Nevertheless, a POSITA would have found it obvious to modify the *Okada-Odendaal-Cho* system to include such features in light of *Berghegger*. (Ex. 1002, ¶168.)

Berghegger discloses a system for inductively powering/charging a device/battery. (Ex. 1006, FIGS. 1a-1b, 4-6, Abstract, 1:65-2:17, 2:18-3:30, 5:27-30, 6:12-19, 6:37-45.) A controller 40 (FIG. 4 annotated below) drives resonant capacitor C_P and primary-side inductor L_P that is "magnetically coupled to" secondary-side inductor L_S to induce an AC voltage on L_S, which is rectified by rectifier GL and supplied to load R_L (including a battery). (Ex. 1006, 6:5-15, 6:38-

40 ("charging tray" and "mobile...telephone").) Because controller 40 controls the operating/oscillating frequency of the signal applied to the primary coil, the secondary-side circuit operates at the same operating frequency of controller 40. (Ex. 1002, ¶¶93-101, 169; Ex. 1006, 6:5-15 (explaining that controller 40 includes the circuits described in FIGS. 1 and 2), 3:58-61, 4:12-6:4 (explaining that the FIGS. 1 and 2 circuits operate at a certain oscillating frequency).)

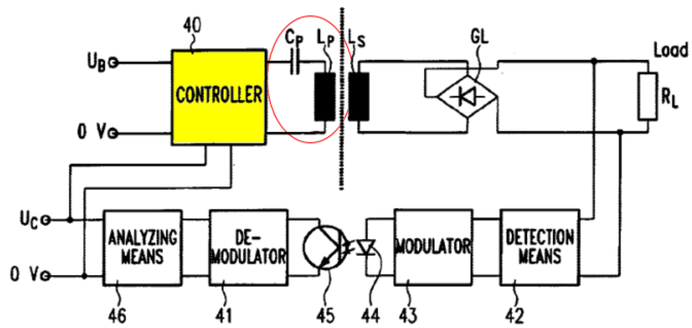


Fig.4

Like *Okada*'s charging system that receives mobile device information to perform charging operations in a closed-loop feedback manner (Ex. 1005, ¶¶0057, 0064; *supra*), *Berghegger* likewise uses a closed-loop feedback configuration, where controller 40 receives a control signal U_C that "depends on the power demand of the secondary side," *e.g.*, the voltage across the load R_L, to perform charging operations (Ex. 1006, 3:51-4:50, 4:51-61, 4:62-5:64, 6:16-29; *infra* §§IX.A.1(h)-(i)). The FIG. 5 configuration (below) is similar to FIG. 4 (Ex. 1006, 5:65-6:37), but where U_C is provided using coils L_S and L_P. (*Id.*, 6:50-53, 6:53-8:8; Ex. 1002, ¶170.)

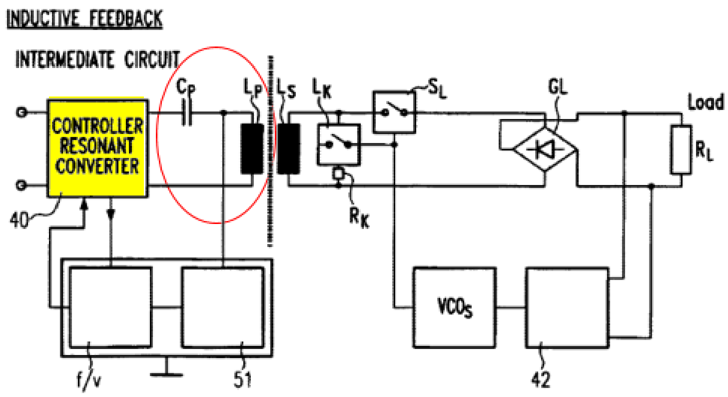


Fig.5

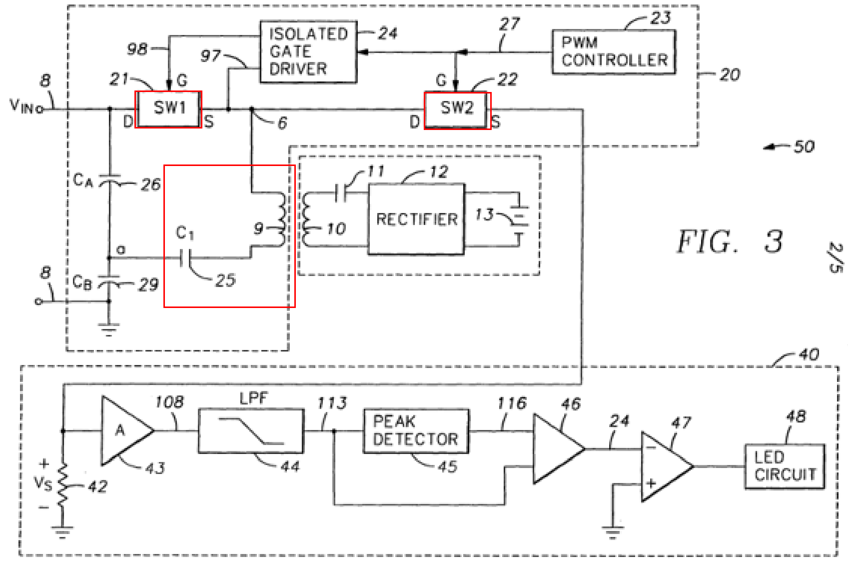
Berghegger is thus in the same technical field as the ’500 patent and *Okada-Odendaal-Cho*. (Ex. 1001, Abstract, 4:13-14; §§IX.A.1(a)-(c).) Moreover, given *Berghegger*, like *Okada*, discloses features reasonably pertinent to particular problem(s) the ’500 patent inventor (and POSITA) were trying to solve, a POSITA would have consulted *Berghegger* in context of *Okada-Odendaal-Cho*. (*E.g.*, Ex. 1001, 4:13-29; Ex. 1006, Abstract, 2:18-20; §§IX.A.1(a)-(b); Ex. 1002, ¶171.)

Additionally, *Berghegger* explains that inductor L_P and resonant capacitor C_P form a resonant circuit (Ex. 1006, 5:65-6:8) and that using a capacitor with the primary-side inductor (*e.g.,* as shown in Figures 4 and 5 in *Berghegger*) “to obtain a serial resonant circuit **has the advantage that the power transmission** from the primary side to the secondary side **is improved**” (Ex. 1006, 2:58-64). Moreover, when a load is placed on the secondary side, “the oscillation frequency [of drive circuit 40] **approaches the *resonant frequency***, **whereby the transmitted power increases**.” (Ex. 1006, 4:32-40.) A POSITA would have understood that such "***resonant frequency***" is that of a **circuit** formed by secondary-side components (including secondary coil and associated receiver-side circuits) and primary-side components (including primary coil and associated primary-side circuits) ("**a circuit formed by the receiver coil, the receiver circuit, and a compatible base unit primary coil and associated circuit**") (Ex. 1002, ¶172.) For example, *Berghegger* explains that **when there is no load** to the secondary side, the resonance frequency is that of a circuit "formed by the inductor L_P on the primary side and the resonant capacitor C_P." (Ex. 1006, 4:27-32.) **When a load exists on the secondary side**, the resonant frequency **factors into the impedance of the components on the secondary side**. (*Id.*, 4:32-35 ("A load on the coil on the secondary side results in a change in impedance of the coil L_S on the secondary side and thus in an off-resonance setting of the resonant circuit towards higher frequencies.").)

In light of such teachings/suggestions, a POSITA would have been motivated and found it beneficial to modify the *Okada-Odendaal-Cho* system to implement resonant circuitry such that primary-side circuit and the secondary side-circuit ("**receiver circuit**") operate at or near a resonant frequency of a circuit formed by the coils and related circuits in the primary- and secondary-sides like that claimed to improve the power transfer efficiency. (Ex. 1002, ¶173.)

Additionally, *Berghegger* discloses controller 40 is capable of adjusting power levels **during** charging to provide a more efficient power signal via a closed-loop feedback arrangement. (Ex. 1002, ¶174.) Thus, a POSITA would have implemented such a feature in the *Okada-Odendaal-Cho* system, where the primary-side circuit adjusts its oscillating frequency and thus the power delivered to the secondary-side based on device information (*e.g.*, control signal U_C that "depends on the power demand of the secondary side"). Such a configuration would have improved/complemented the modified *Okada* system, which also uses device information to control/adjust power delivery in a closed-loop feedback fashion, but does so at the **onset** of charging, **not during** charging. (Ex. 1005, ¶¶0069-0076, FIG. 3.) Indeed, *Berghegger* teaches that power required by a load "is **variable in time**" and thus a closed-looped control feature (as described in *Berghegger* above) would enable accurately adjusted power delivery based on the time-varying power demand during powering/charging operations. (Ex. 1006, 6:12-15; *supra* regarding *Berghegger*.) Implementing features similar to that of *Berghegger* would have ensured "a sufficient amount" of power is "available on the secondary side" **during** a power delivery (whether initiated at a low/intermediate/high level as in *Okada*) while also preventing "an unnecessarily large amount of energy being consumed on the primary side" to achieve a "more energy-efficient continuous operation" as suggested by *Berghegger* (Ex. 1006, 2:28-44). A POSITA would have thus been motivated to configure/modify the charging system in the *Okada-Odendaal-Cho* system to implement such features to allow fine tuning of the determined power level while the mobile device is charged. (Ex. 1002, ¶¶174-175.)

Moreover, a POSITA would have been aware that capacitor circuits, *e.g.*, resonant capacitor C_P discussed above, provided benefits in improving power transmissions in inductive-based systems, like *Okada-Odendaal-Cho-Berghegger* (*e.g.*, minimizing/reducing unwanted radiations and heat issues caused by harmonics, etc.) (Ex. 1002, ¶¶57-65, 176-177; Ex. 1016, 631 ("Resonant circuits…useful for constructing filters"), 641, 798, ("**blocks out all higher harmonics**"); Ex. 1013, (capacitor/switches reducing harmonics from primary coil), FIGS. 3 (annotated below), 6, 3:29-4:5, 4:19-5:7 (capacitor-based resonant circuit that "**reduce harmonics and eddy current**" to minimize heat and "without causing excessive energy loss"), 7:24-8:14, 8:17-23 (tuning capacitor 24 designed so that a sinusoidal waveform "flows through the primary coil 9 with **little high order frequency content**"), 8:24-31, 9:26-12:27; Ex. 1008, 2:16-19 (resonant tank); Ex. 1001, 21:17-34 (acknowledging harmonics are "undesirable").)



(*See also* Ex. 1012, FIGS. 2, 5 (C1 25, inductor 9), 8, 3:30-62, 8:47-9:51; Ex. 1014, 67-68 ("filter…for **reduction of harmonic output**"); *id.*, 62-68; Ex. 1015, FIGS. 1-2, 5-12, Abstract, 1:55-2:10, 3:28-51, 4:22-44, 5:45-6:4; Ex. 1020, Abstract (harmonic reducing tuning capacitor in inductive power transfer system); Ex. 1021, ¶¶00164-0165 ("**known in the art to drive coils using parallel or series resonant circuits**" to allow "maximum current flow[] through the primary coil"); Ex. 1029, 22-25; Ex. 1002, ¶177.)

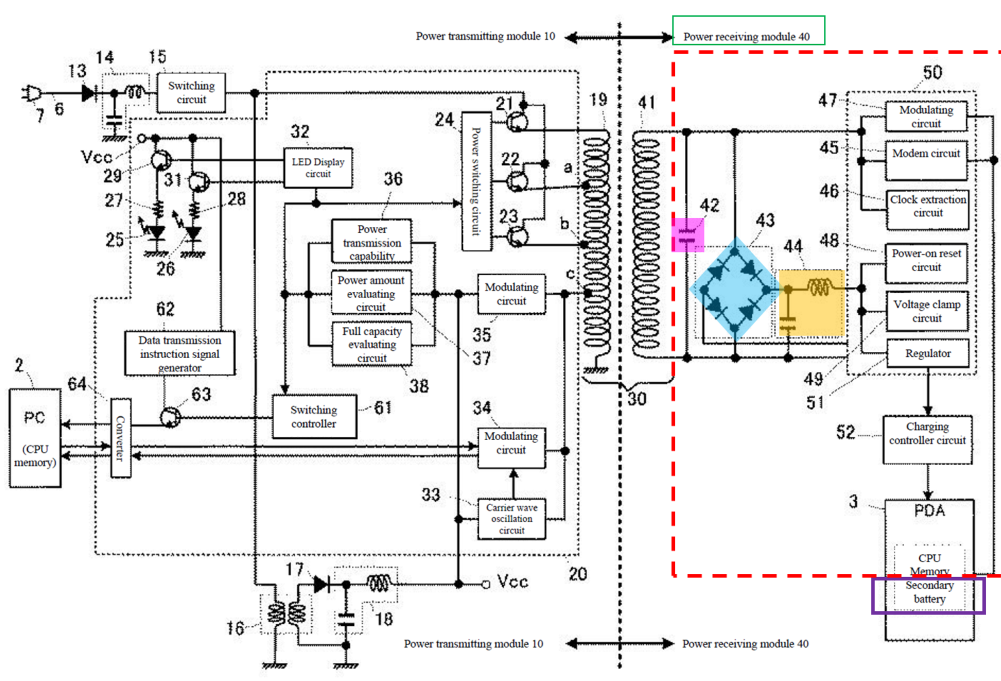
A POSITA would have had the skill/knowledge/rationale in implementing, and expectation of success in achieving, the above-modification. (Ex. 1002, ¶178.) Especially given the use of resonance circuitry, capacitors, and closed-loop feedback control technologies/techniques for adjusting power delivery was known (*e.g.*, as discussed in *Okada*/*Berghegger* above). Such modification would have involved applying known technologies/techniques (*e.g.*, resonant circuitry having closed-loop feedback power transfer configuration with capacitive filtering to adjust power delivery (*Okada*/*Berghegger*/state-of-art knowledge)) to yield the predictable result of an inductive power/charging system that ensures sufficient power is available to portable device during power delivery that achieves energy-efficient continuous power transfer with reduced heat waste and signal distortion. (Ex. 1002, ¶178.) *KSR* at 416-18.

There were various ways for a POSITA to implement such modifications—*e.g.*, an appropriately designed capacitor circuit positioned between switches 21/22/23 and primary coil 19, or between switching circuit 15 and the switches would have formed a resonance circuitry for achieving above-noted enhancement in power transfer efficiency/filtering benefits (*e.g.*, reduced harmonics). (Ex. 1002, ¶179.) Another example is where *Okada*'s features/components used to receive/pass/process device information in PTM10 for power transfer control (*e.g.*, demodulator 35, circuits 36-38 (Ex. 1005, ¶0064)) would have been leveraged to achieve the noted beneficial power delivery features during charging/powering operations (*e.g.,* use received device information (like U_C in *Berghegger*) to control operating frequency of the modified/configured primary-side circuit (*e.g.*, switching circuit 15, etc.)). (Ex. 1002, ¶179.) [5] Accordingly, *Okada-Odendaal-Cho-Berghegger* discloses limitation 23(d). (*Id.*)

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

Okada-Odendaal-Cho-Berghegger discloses/suggests this limitation. (Ex. 1002, ¶¶180-181; §§IX.A.1(a)-(d).) As discussed, PDA3 includes a PRM40 ("**receiver unit**"), which comprises a "**receiver circuit**" (e.g., **red** below). (§IX.A.1(d); Ex. 1005, FIG. 2.) The "**receiver circuit**" includes, *inter alia*, smoothing capacitor 42 (**pink**) and a capacitor in smoothing circuit 44 (**orange**) ("**one or more capacitors**"), and rectifying circuit 43 (**blue**) ("**one or more rectifiers**"). (§IX.A.1(d); Ex. 1005, ¶0047, FIG. 2.) Above-described components 42-44 correspond to the claimed "**receiver rectifier circuit**" as they rectify the signal from coil 41 and smooth the rectified signal for powering/charging PDA3. (Ex. 1002, ¶181; Ex. 1005, ¶¶0047, 0057.)

[5] The examples do not limit the possible modifications/implementations or propose specific schematics/designs of the modified system. Other successful designs/configurations would have been contemplated by a POSITA. (Ex. 1002, ¶179.)



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;

Okada-Odendaal-Cho-Berghegger discloses/suggests this limitation. (Ex. 1002, ¶¶182-190; §§IX.A.1(a)-(e).)

Okada discloses "**receiver communication and control circuit**." In *Okada*, **clock extracting circuit 46** of PRM40 receives a carrier wave from carrier wave oscillating circuit 33 of PTM10, and extracts a clock signal contained in the carrier wave. (Ex. 1005, ¶¶0056-0057, 0063.) **Modulating circuit 47** "uses the clock signal…to modulate the carrier wave," based on PDA3's information (including "a code indicating that a device is capable of receiving power," "power consumption information," and "full capacity information"), and provides the modulated carrier wave to PTM10 **through primary coil 19**. (*Id.*, ¶¶0057, 0064.) **Based on the information contained in the carrier wave**, evaluation circuits 36-38 of PTM10 "perform various **decision-making processes**" associated with powering/charging PDA3. (Ex. 1005, FIG. 2, ¶¶0042, 0057, 0060-0077, FIG. 3.) These processes determine whether supplying power from cradle 4 to PDA3 is feasible (by circuit 36), amount of power to supply to PDA3 (by circuit 37), and whether the charging of PDA3 is complete (by circuit 38). (*Id.*, FIG. 3, ¶¶0057-0076; Ex. 1002, ¶¶183-184.)

Thus, in one example, at least one of circuits 46-47 (annotated in Figure 2 below) discloses an example of "**a receiver communication and control circuit…to communicate with the base unit through the primary coil**." (Ex. 1002, ¶185; Ex. 1005, FIG. 2.) Other components may be included in the "**receiver communication and control circuit**," *e.g.*, modem circuit 45, power-on reset circuit 48, voltage clamp circuit 49, regulator 51 and/or switching controller 83 in the multi-coil arrangement of FIG. 7 "system." (Ex. 1005, FIG. 7 (annotated below), ¶¶0094-0115; §IX.A.1(a).)

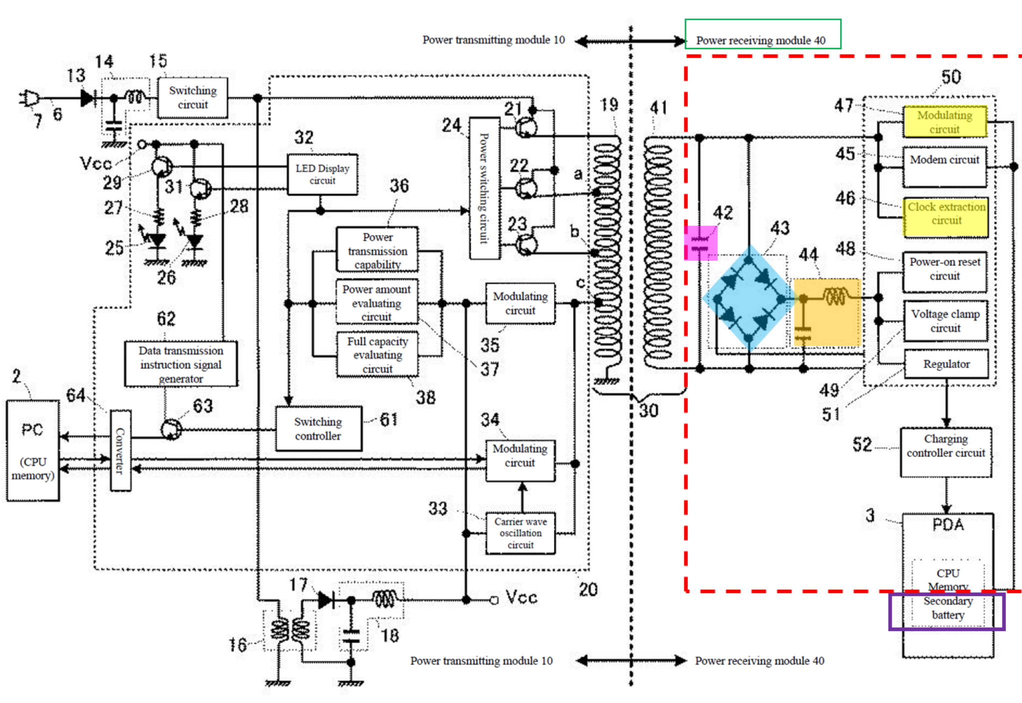
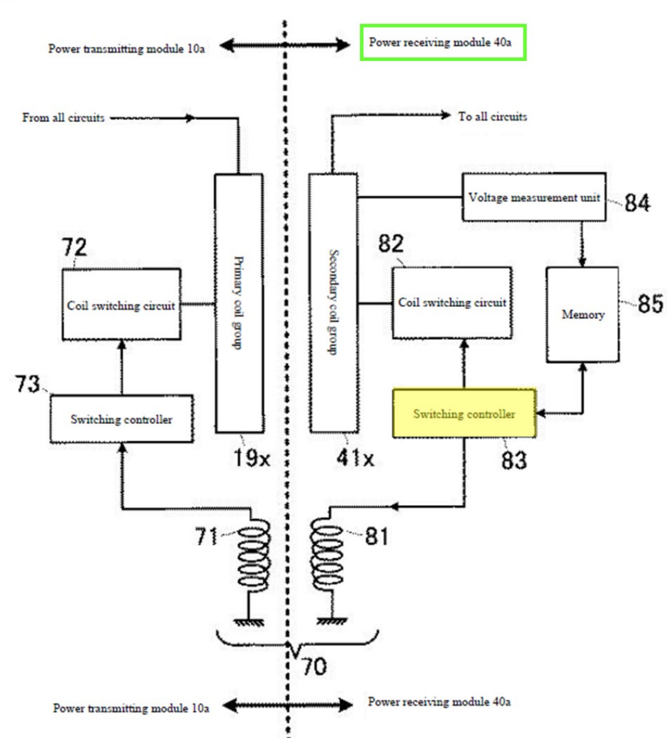

Power transmitting module 10
Power receiving module 40
Switching circuit
LED Display circuit
Power transmission capability
Power amount evaluating circuit
Full capacity evaluating circuit
Power switching circuit
Modulating circuit
Data transmission instruction signal generator
PC
(CPU memory)
Converter
Switching controller
Carrier wave oscillation circuit
Vcc
Modem circuit
Clock extraction circuit
Power-on reset circuit
Voltage clamp circuit
Regulator
Charging controller circuit
PDA
CPU
Memory
Secondary battery

FIG. 7


Power transmitting module 10a
Power receiving module 40a
From all circuits
To all circuits
Voltage measurement unit
Coil switching circuit
Primary coil group
Secondary coil group
Memory
Switching controller

Circuits 46-47 (and also circuits 45/48/49/51) may be "configured on the same IC chip," *e.g.*, "power receiving control IC 50." (Ex. 1005, ¶¶0047-0048, 0057, 0063, 0086-0092, FIGS. 2, 7.) Such circuitry would have been understood as compact integrated circuitry designed to perform given/certain operations in PRM40, which is consistent with a "**microcontroller**" as understood by a POSITA in context of the '500 patent. (Ex. 1002, ¶186; Ex. 1001, 23:28-43, 38:29-34 (exemplifying an "IC" or "chip" as a "microcontroller").) The same is true where switching controller 83 is part of such "**receiver communication and control circuit**" since it sends "instructions" to control the switching to select specific primary coils. (Ex. 1005, ¶¶0096-0097, 0100-0106; Ex. 1002, ¶186.) To the extent it is argued/determined the claimed "**microcontroller**" requires a processor or the like, it would have been obvious to configure PRM40 in the modified *Okada* device/system to include such features because it would have been a foreseeable application of known technologies/techniques in that device/system, which uses ICs to perform "control[ler]"-type operations, consistent with *Okada*. (*Supra*; Ex. 1006, 5:65-6:59, FIGS. 4-5 (controller 40); Ex. 1024, 6:60-7:14 ("microprocessor controller 308" controlling power-supply operation/modes), FIG. 3; Ex. 1002, ¶186.) Such modification would have been an obvious variation to how the communication/control circuit (above) performs similar features, while providing known programmable functionalities. A POSITA would have had the skills and rationale to implement such modification, and given the known technology and *Okada*'s teachings, would have done so with a reasonable expectation of success. (*Id.*)

As discussed, a POSITA would have used the power demand information on the secondary side to control/adjust power delivery in a closed-loop feedback fashion in the *Okada-Odendaal-Cho-Berghegger* system. (§IX.A.1(d).) Indeed, *Berghegger* discloses in the context of Figure 5 transmitting a signal about "power demand on the secondary side…**via the two inductors** $\mathbf{L_P}$ and $\mathbf{L_S}$ to the primary side." (Ex. 1006, 6:50-53, FIG. 5 (annotated below).)

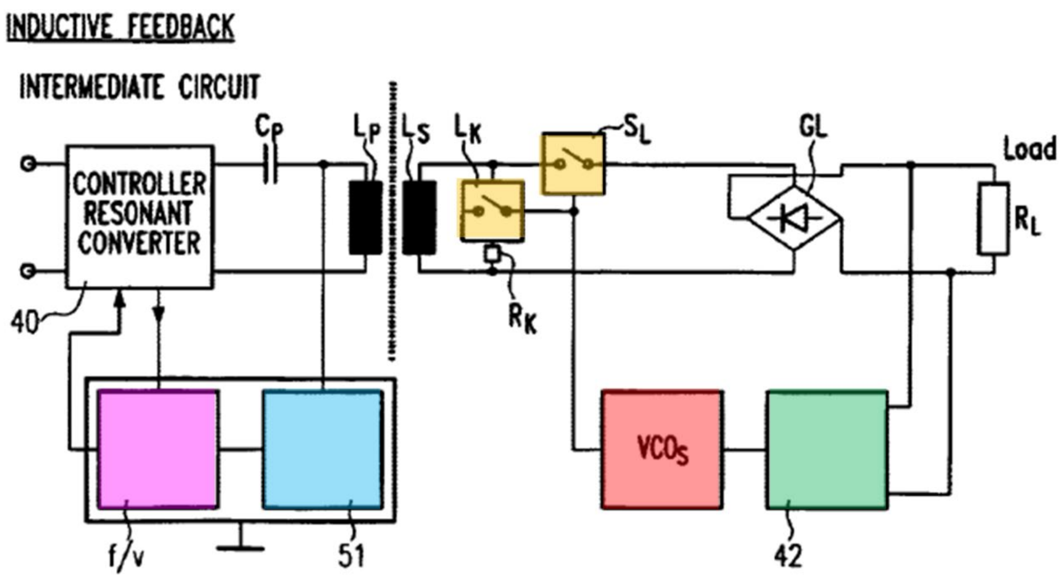


Fig.5

Detection means 42 (**green**) provides power demand information, *e.g.*, voltage across the battery or the load at the output of rectifier GL, to a voltage-controlled oscillator VCO_S (**red**) that controls the oscillating/switching frequencies of switches S_K and/or S_L (**orange**). (*Id.*, 6:5-20, 6:53-64.) S_K and/or S_L generates pulsing signals transmitted through the secondary and primary coils (L_S and L_P), which are detected/received by pulse detector 51 (**blue**) and processed by a frequency-to-voltage converter f/v (**pink**) that provides a control signal to controller 40 for controlling the power transmission. (*Id.*, 6:64-7:65; §IX.A.1(d); Ex. 1002, ¶187.)

A POSITA would have also understood that S_K and/or S_L provide the power demand information to the primary side ("**communicate with the base unit through the primary coil**") by "**modulat[ing] the input impedance of the receiver circuit**" because switches S_K and/or S_L, when generating the pulses across the secondary-primary coils, modulate the input signal provided to the rectifier GL and thus the power delivery to the load or the secondary side. (Ex. 1002, ¶188; Ex. 1006, 6:5-15 ("ac voltage…is rectified in the rectifier GL and supplied to a load RL.").) *Berghegger* explains that operations of the switch(es) would slightly disturb "[t]he power supply of the load" (Ex. 1006, 7:27-34) and that the switches are operated in a way to reduce the impact on the power delivery, *e.g.*, unwanted power loss (*id.*, 6:64-7:2). Thus, *Berghegger* discloses a communication switch(es) to modulate the input impedance of a receiver circuit to communicate with a base unit through a primary coil, similar to that as claimed. (Ex. 1002, ¶188.)

For reasons similar to discussed above (§IX.A.1(d)), a POSITA would have been motivated to configure the portable device in the *Okada-Odendaal-Cho-Berghegger* system to include a "**receiver communication and control circuit**" with a "**communication [switch(es)]**" that provide features similar to those taught/suggested by *Berghegger* (*e.g.,* switches S_K and/or S_L), in a "**receiver communication and control circuit**" for generating/communicating power demand information to the primary-side "**base unit**," via the secondary and primary coils, to control/adjust power delivery in a closed-loop feedback fashion. (*See supra*; Ex. 1002, ¶189.) A POSITA would have had the rationale for considering/implementing such features in light of such teachings, and given *Okada*, while describing use of modulating circuit 47 to modulate and transmit a carrier wave (with device information) to PTM10, does not expressly disclose the detailed mechanism/circuitry for doing so. *Berghegger*, meanwhile, discloses effective mechanisms (*e.g.*, use of switches, such as S_K and/or S_L) for facilitating communications with the primary side. (Ex. 1002, ¶189; Ex. 1006, 7:56-59 ("it is more advantageous to encode the information to be transmitted by **frequency modulation** into the time sequence of the pulses than to use an amplitude modulation").)

Berghegger also discloses that other switches in the power transfer system may be implemented using MOSFETs. (Ex. 1006, 4:4-5 ("switches or MOSFETs"), 4:13-16 ("Switches…are here replaced by MOSFETs").) *Okada* also discloses use of MOSFET switches. (Ex. 1005, ¶0049 (switching element 21/22/23 being MOSFET).) In light of such teachings/suggestions, and given the use of FET switches was a known design option for implementing switching mechanisms (including in inductive power transfer systems like *Okada* and *Berghegger*), a POSITA would have been motivated, and found obvious, to configure the communication switch[es] in the "receiver communication and control circuit" of the above-discussed modified *Okada* system to be FET switch[es]. (Ex. 1002, ¶190.) A POSITA would have appreciated that such modification would have been a predictable implementation of known technologies/techniques (e.g., use of FET switches) to facilitate switching operations in the "receiver circuit" that would have been within the skills, knowledge and capabilities of a POSITA at the time, especially in light of the teachings/suggestions of *Okada* in context of *Berghegger* and the state-of-art. (*Id.*)

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

The *Okada-Odendaal-Cho-Berghegger* combination discloses/suggests this limitation. (Ex. 1002, ¶¶191-195; §§IX.A.1(a)-(f).) As discussed, coil 19 of cradle

4 (including as modified) inductively generates a current in coil 41 of PDA3 ("**a current is generated in the receiver coil inductively by the primary coil in the base unit**"). (§§IX.A.1(b) and 1(d).) When PDA3 is first placed on cradle 4, circuit 33 of PTM10 applies a carrier wave to primary coil 19, and a voltage, and thus current, is induced on secondary coil 41. (Ex. 1005, ¶¶0056-0057, 0062-0063; Ex. 1002, ¶192.) The induced current is rectified by rectifying circuit 43 ("**the one or more rectifiers**") and smoothed by smoothing capacitor 42 and smoothing circuit 44 (which includes a capacitor and an inductor as shown in Figure 2) ("**the one or more capacitors in the receiver rectifier circuit**"). (Ex. 1005, ¶¶0047, 0057, 0063.) The rectified/smoothed current is used to power and activate circuits 46-47 (and may contain additional circuits; *see* §IX.A.1(f)) ("**the receiver communication and control circuit**") as a DC signal "generated by a carrier wave provided by…circuit 33 can be **used as a driving power source for the clock extracting circuit 46 and the modulating circuit 47**." (Ex. 1005, ¶0058; *id.*, ¶¶0056-0057.) "When this DC voltage is applied to the power-on reset circuit 48…(power receiving control IC 50) recognizes that a carrier wave is sent from…circuit 33." (*Id.*, ¶0057; Ex. 1002, ¶193.)

Based on the information provided by modulating circuit 47, cradle 4 starts the power/charging process, which involves switching circuit 15 of PTM10 applying a switching pulse signal to primary coil 19 via one of switches 21/22/23, which induces a voltage and thus current on coil 41. (Ex. 1005, ¶¶0057-0073, FIG. 3; *id.*, ¶¶0049-0051; §IX.A.1(a).) Moreover, power-on reset circuit 48, which receives the output signal (having been rectified by circuit 43) from the smoothing circuit 44, provides "drive instructions to the power receiving control IC 50" to power/charge PDA3 using voltage clamp circuit 49, regulator 51, and charging control circuit 52. (*Id.*, ¶0047; Ex. 1002, ¶194.)

"Even after power transmission has begun," circuit 33 continues to periodically apply a carrier wave to primary coil 19 and perform the above-scribed process involving circuits 46-47 ("**receiver communication and control circuit**"). (Ex. 1005, ¶0074.) Thus, *Okada* discloses "**a current**" that is "**generated in the receiver coil inductively by the primary coil in the base unit**" (based on the periodically transmitted carrier wave from circuit 33 and a switching pulse signal from circuit 15), and that the "**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**" like that claimed. (Ex. 1002, ¶195.) Similar features would have been provided/implemented in the above-discussed *Okada-Odendaal-Cho-Berghegger* combination for reasons explained. (§§IX.A.1(a)-(f).)

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[6]

Okada-Odendaal-Cho-Berghegger in view of *Black* discloses/suggests this limitation. (Ex. 1002, ¶¶196-207; §§IX.A.1(a)-(g).)

As discussed, circuit 33 of cradle 4 applies a carrier wave to primary coil 19, which powers/activates circuits 46-47 and causes power-on reset circuit 48 to provide "drive instructions to the power receiving control IC 50" to power/charge PDA3. (§IX.A.1(g).) Before the powering/charging process starts, circuit 47 modulates a carrier wave, based on PDA3's information, and provides the modulated carrier wave to PTM10 through primary coil 19. (*Id.*, ¶¶0057, 0064.) Based on the information contained in the carrier wave, evaluation circuits 36-38 of PTM10

[6] Limitation 23(h) recites "**one or** more **primary coils**" (§IX.A.1(a)), and thus, the modified *Okada* system when implemented with a single primary coil magnetically coupled to a receiver coil of a determined properly positioned/aligned PDA3 (as discussed above) meets this limitation as explained herein.

"perform various decision-making processes" associated with powering/charging PDA3. (Ex. 1005, FIG. 2, ¶¶0042, 0057; *id.*, FIG. 3, ¶¶0060-0077; §IX.A.1(d); Ex. 1002, ¶197.)

As discussed for limitation 23(d), a POSITA would have been motivated to configure the *Okada-Odendaal-Cho-Berghegger* system to implement a closed-loop feedback configuration to adjust power delivery based on device information to accommodate changes in PDA3's load during power/charging operations. (§IX.A.1(d).) Also explained above and consistent with *Okada*'s operations, circuit 47 (part of "**receiver circuit**") would have communicated information associated with PDA3 ("**portable device**"), *e.g.*, "a code indicating that **a device is capable of receiving power**," to enable cradle 4 ("**base unit**") to identify PDA3 (or its receiver unit) given that *Okada* explains how circuit 36 uses such information to determine whether a device capable of receiving power is present/properly positioned/aligned with the charger to maintain or initiate power delivery. (§IX.A.1(d); Ex. 1005, ¶¶0056-0077, FIG. 3; Ex. 1002, ¶198.)

The "code indicating that a device is capable of receiving power" is also used 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**." As discussed, the "code" is used to determine whether portable device is mounted on the cradle and whether its *mounting position exceeds a prescribed amount of offset* with respect to the cradle. (*Id.*, ¶¶0057, 0059-0076, 0090, FIG. 3.) Likewise, in the multi-coil configuration (FIG. 7 (coil group 19x and 41x), *Okada* explains how switching controller circuitry (*e.g.*, 73), in PTM10 can select a coil from primary coils group 19x based on detected voltage values so that a pair of primary and secondary coils "having a highest power transmission efficiency" (*e.g.*, least misalignment) is used for power transfer. (§IX.A.1(a); Ex. 1005, ¶0105; *id.*, ¶¶0017, 0094-0115, Claims 9-10; Ex. 1002, ¶199.)

Moreover, as discussed, in *Berghegger*, power demand information at the load, *e.g.*, a voltage at the output of a receiver rectifier circuit GL ("**information corresponding to a voltage at an output of the receiver rectifier circuit**") may be communicated to the primary side to adjust the switching frequency of the primary coil and the power delivery. (§§IX.A.1(d), IX.A.1(f).) In light of such teachings, in addition to the reasons discussed above (*id.*), a POSITA would have found it obvious to configure *Okada-Odendaal-Cho-Berghegger* such that the information communicated from PRM40's "**receiver circuit**" to PTM10 includes information corresponding to PDA3, *e.g.*, (*Okada*'s device capability, charge status, and) power demand information reflecting the "**information corresponding to a voltage at an output of the receiver rectifier circuit**," *e.g.*, voltage at the output of the "rectifier circuit" (§IX.1(e)) (which provides the DC signal to charge/power PDA3) (similar to that taught/suggested by *Berghegger*) to facilitate the power adjustment features discussed above. (§§IX.A.1(d), IX.A.1(f); Ex. 1002, ¶200.) A POSITA would have had similar rationale, skills, knowledge, and expectation of success as that discussed above for the modifications involving *Berghegger*'s teachings (in context with the *Odendaal-Cho*). (*Id.*; §§IX.A.1(d), IX.A.1(f).) Indeed, like above, configuring *Okada-Odendaal-Cho-Berghegger* as discussed above would have involved the use of known technologies/techniques (*e.g.*, voltage detection/measuring mechanism and inductive power/data transfer mechanism to adjust power delivery based on device power information), similar to those taught/suggested by *Okada-Berghegger*. (Ex. 1002, ¶200.)

While *Okada-Odendaal-Cho-Berghegger* discloses and/or suggests PRM40's circuits communicating device information for adjusting charging/powering operations, it does not expressly disclose "**enable[ing] the base unit…to determine any appropriate charging or powering algorithm therefor**" based on such information. However, a POSITA would been motivated, and found obvious, to implement such features in view of *Black*. (Ex. 1002, ¶201.)

A POSITA would have been motivated to implement such features given *Okada* discloses using the device information to determine a power level (*e.g.,* low/intermediate/high) based on the portable device's power requirements. (Ex. 1002, ¶202; Ex. 1005, FIGS. 3, 5, ¶¶0069, 0073-0076, 0090.) Moreover, it was known to use charging algorithm profile(s) to control the charging of mobile device batteries (to avoid overcharging, etc.). (Ex. 1002, ¶202.) Indeed, the '500 patent acknowledges "[m]ost mobile devices today already include a Charge Management IC…to control charging of their internal battery." (Ex. 1001, 37:19-17.) Consistent with such knowledge, *Black* describes communicating charging profile information for determining charging algorithms to control charging operations ("**charging algorithm**") in an inductive power transfer system having similar features like those of *Okada-Odendaal-Cho-Berghegger*.

Black discloses inductive charging a portable device battery, where the battery includes a transceiver for communications with a charger. (Ex. 1007, Abstract, FIGS. 1-2, ¶¶0002, 0013-0017.) As shown in FIGS. 1-2 (below), a battery 100/200 includes a charging coupler 108/208 that is coupled to cell 104/204 through a charging circuit 110/210, and a communications coupler 112/212. (*Id.*, ¶¶0015, 0017.)

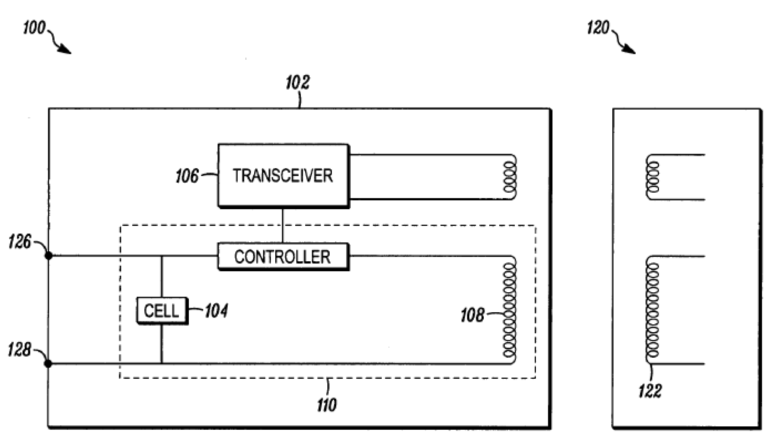
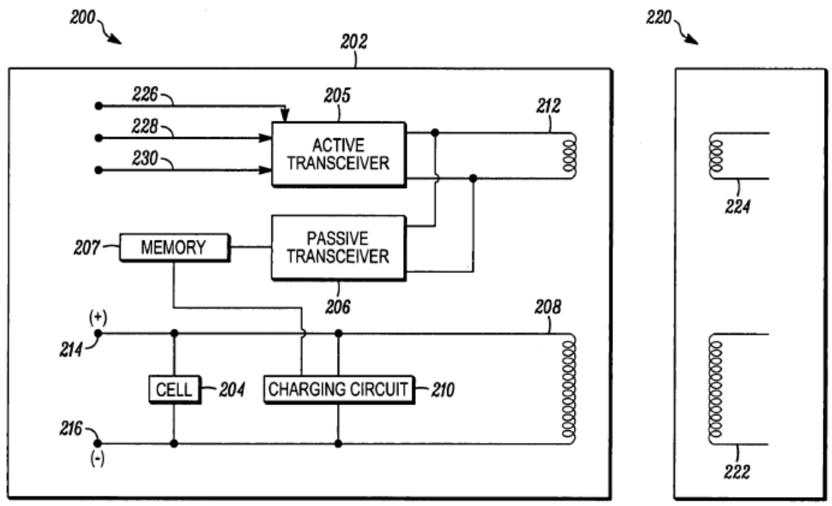


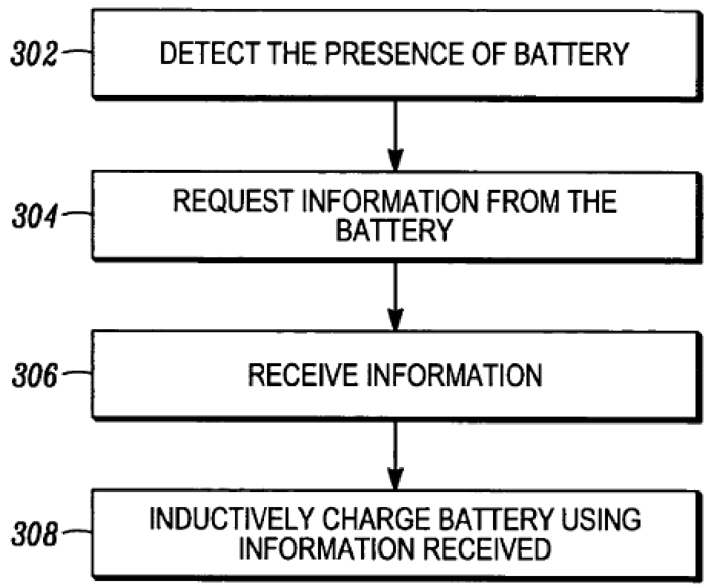
FIG. 1



"The first coil 212 may be a portion of the second coil 208." (*Id.*, FIG. 2, ¶0018.) When the battery is placed in range of the inductive charger, communications between them "may take place and inductive charging can occur." (*Id.*, ¶0019; Ex. 1002, ¶¶102-104, 203.)

Thus, *Black* is in the same technical field as *Okada-Odendaal-Cho-Berghegger*, and the '500 patent, given it describes an inductive power transfer system where information is communicated between a primary and secondary-side. (§§IX.A.1(a), IX.A.1(d), IX.A.1(f); Ex. 1007, FIGS. 1-4, ¶¶0002, 0005, 0012-0028.) Also like *Okada-Odendaal-Cho-Berghegger*, *Black* discloses features that were reasonably pertinent to particular problem(s) the '500 patent inventor was trying to solve. (*Id.*; Ex. 1001, 10:43-51 Ex. 1007, Abstract, ¶0021; Ex. 1002, ¶204.) Therefore, a POSITA would have considered *Black*'s teachings in the context of *Okada-Odendaal-Cho-Berghegger*, and such teachings thus would have been consulted by the inventor and a POSITA, looking to design/implement *Okada-Odendaal-Cho-Berghegger*. (*Id.*)

Black additionally discloses a procedure for "device identification and charging," where battery information is requested/received upon detecting the presence of the battery. (Ex. 1007, FIG. 3 (below), ¶0020.)



The information may include, *e.g.*, device ID and additional information, "such as the type of device the battery 100 is coupled to, encryption information, **battery characteristics** or **charging profile** or the like." (*Id.*, ¶0021.) Charger 120 inductively charges the battery based on the received information. (*Id.*, ¶0022 ("[t]o determine how to inductively charge the battery 100,…determine the charger profile or settings for that particular battery 100" and "more information" to "set the charging parameters."); Ex. 1002, ¶205.)

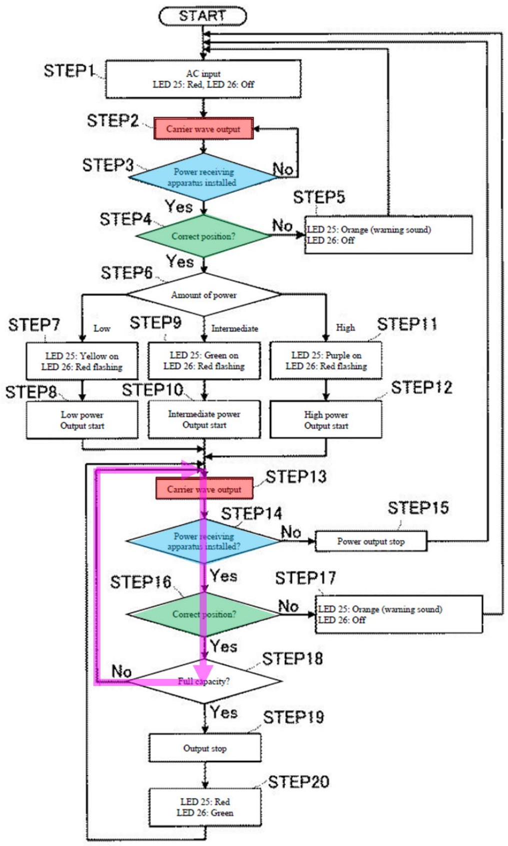
In light of *Black,* a POSITA would have been motivated and found obvious to modify the above-discussed *Okada-Odendaal-Cho-Berghegger* system to include charging profiles associated with PDA3's battery in the device information communicated by PRM40's "**receiver circuit**" (*e.g.*, including modulating circuit 47), and to enable cradle 4 ("**base unit**") to determine an algorithm(s) for controlling charging operations to improve the charging process as described/implemented by the *Okada-Odendaal-Cho-Berghegger* system. (*Supra*; §§IX.A.1(a), IX.A.1(d), IX.A.1(f).) A POSITA would have appreciated having charging profile information would have allowed the modified PTM10 to determine any appropriate algorithms for controlling charging operations to ensure proper/efficient battery charging, *e.g.*, including how to charge the battery and determining associated settings/parameters, for each specific battery or device mated with the charging system/base unit, as discussed above, as taught/suggested by *Black*. (*Id.*; Ex. 1002, ¶206; Ex. 1007, ¶0022 ("[t]o **determine how to inductively charge the battery 100**,…**determine the charger profile or settings for that particular battery 100**" and "more information" to "**set the charging parameters**.").)

A POSITA would have had reasons to consider and implement such features as different types of batteries/portable devices have different power/charge characteristics/profiles. (Ex. 1007, ¶0003; Ex. 1037, 1:56-2:6, 2:18-19, 6:51-7:2, 7:36-53 ("utilize a particular battery charging algorithm which is optimized for the particular electrochemical cell technology"), FIGS. 4A-4C; Ex. 1039, Abstract, 3:23-35, FIG. 1, 5:20-34; Ex. 1002, ¶207.) Thus, a POSITA had the requisite motivation, skills, knowledge to implement, and reasonable expectation of success in achieving, the above-discussed modification. (*Id.*) Especially since such modification would have involved applying known technologies/techniques (*e.g.,* use of charging profiles to determine proper charging algorithms to control device charging (*Okada-Odendaal-Cho-Berghegger-Black*)) to yield the predictable result of providing an inductive power/charging process that uses specific device information to control power transfer, consistent with the features disclosed by *Okada-Odendaal-Cho-Berghegger* and *Black*. (*Id.*) *KSR* at 416-18.

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.

The *Okada-Odendaal-Cho-Berghegger-Black* combination discloses/suggests this limitation. (Ex. 1002, ¶¶208-210; §§IX.A.1(a)-(h).)

As discussed for limitation 23(g), "[e]ven after power transmission has begun," the carrier wave is "periodically transmitted" from PTM10 to PRM40 to determine whether PDA3 is properly positioned and whether it is fully charged. (Ex. 1005, ¶¶0074-0076, FIG. 3 (annotated below); §IX.A.1(g); Ex. 1002, ¶209.)

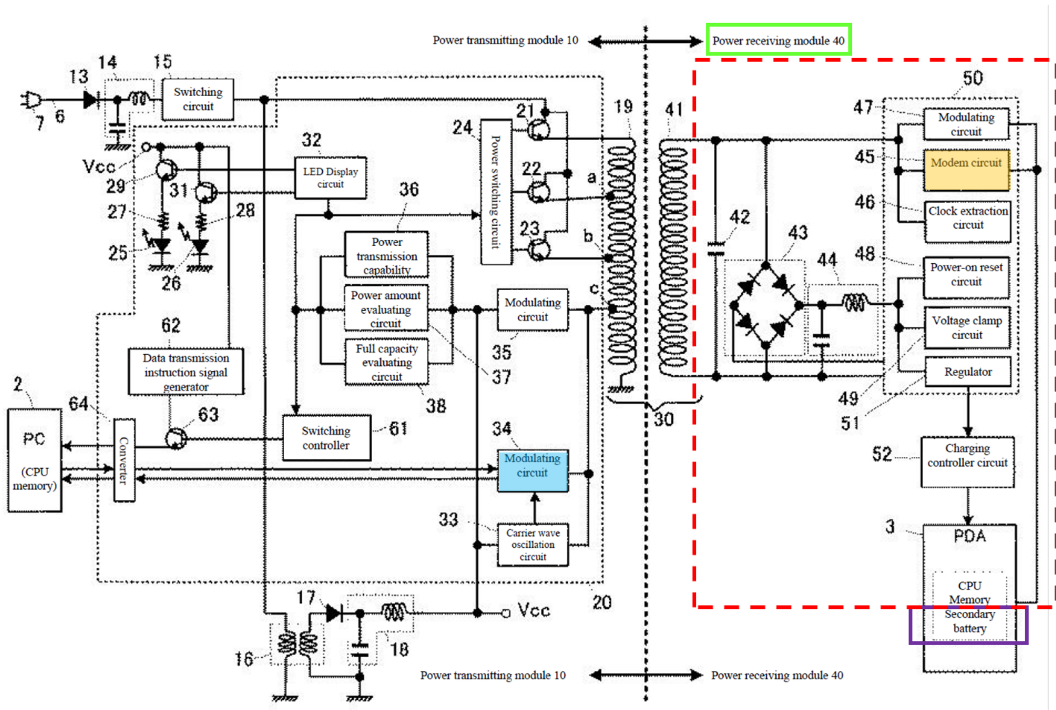


Likewise, consistent with *Okada*'s system (as modified above), the "**receiver circuit**" of PRM40 would "**periodically communicate information corresponding to an output voltage or current of the receiver rectifier circuit**" to cradle 4 ("**base unit**"). (§IX.A.1(h); Ex. 1002, ¶210.) Such "**information**" would have enabled cradle 4 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**," consistent with that discussed above for limitations 23(d), 23(f), and 23(h), because, as explained, the *Okada-Odendaal-Cho-Berghegger-Black* system would have been configured to provide/adjust power transfer based on the device power demand information, *e.g.*, voltage measured at the output of a rectifier circuit, from the secondary side, in a closed loop manner during charging/powering of a portable device. (§§IX.A.1(d), 1(f), 1(h); Ex. 1002, ¶210.) Thus, for reasons explained here and above (§§IX.A.1(a)-1(h)), the *Okada-Odendaal-Cho-Berghegger-Black* combination discloses/suggests the features of limitation 23(i). (Ex. 1002, ¶210.)

2. Claim 25

a) The portable device of claim 23, further wherein the receiver circuit can additionally receive communication from the base unit via the receiver coil inductively from the primary coil for bi-directional communication.

The *Okada-Odendaal-Cho-Berghegger-Black* combination discloses/suggests this limitation. (Ex. 1002, ¶¶211-213; §IX.A.1.) *Okada* discloses bi-directional data communication between PDA3 and PC2 through cradle 4. (Ex. 1005, ¶0078 ("reception and transmission of data between the PDA 3 mounted on the common cradle 4 and a PC 2").) In operation, "data capacity information" is transmitted from modern circuit 34 of PTM10 (included in "**base unit**") inductively via coils 19 and 41 ("**via the receiver coil inductively from the primary coil**") to modem circuit 45 of PRM40 (part of "**receiver circuit**"). (*Id.*, ¶¶0085-0086; *id.*, ¶¶0079-0084.) Following verification processes, including verifying "PDA 3 is provided with a charging capacity exceeding an amount of power required for data transmission" based on the received "data capacity information" (*id.*, ¶¶0087-0088), data may be (1) sent from PC2 to cradle 4's modem circuit 34, and then to PDA3's modem circuit 45 via coils 19 and 41 (*id.*, ¶¶0089-0091), and (2) sent from PDA3's modem circuit 45 to cradle 4's modem circuit 34 via coils 41 and 19, and then to PC2 (*id.*, ¶¶0091-0092). (Ex. 1002, ¶212.)



Thus, *Okada* discloses "**the receiver circuit can additionally receive communication**" (*e.g.*, data capacity information) "**for bi-directional communication**" (*e.g.*, between cradle 4 and PDA3 and/or between PDA3 and PC2). For reasons explained here and above for claim 23, the *Okada-Odendaal-Cho-Berghegger-Black* system would have been configured to perform similar bi-directional communications for enabling data communications between PDA3 and

PC2 when PDA3 is placed on cradle 4 for charging. (§IX.A.1; Ex. 1002, ¶¶212-213.)

3. Claim 28

a) The portable device of claim 23, wherein the receiver circuit communicates an end of charge message to terminate power transfer from the base unit upon the battery reaching a desired charged state.

The *Okada-Odendaal-Cho-Berghegger-Black* combination discloses/suggests this limitation. (Ex. 1002, ¶¶214-215; §IX.A.1.) In the above-discussed system, modulating circuit 47 (part of "**receiver circuit**") transmits "full capacity information" ("**an end of charge message**") to cradle 4, where circuit 38 uses this information to "determine whether charging of the compatible device [battery]…is completed." (Ex. 1005, ¶0057.) If at full capacity, the power transfer to PDA3 stops. (*Id.*, ¶0076, FIG. 3; Ex. 1002, ¶215.)

4. Claim 29

a) The portable device of claim 23, wherein the receiver circuit further comprises a regulator or charge management circuit, coupled to the output of the receiver rectifier circuit, that regulates or controls an output voltage or output current provided to the battery, to ensure proper charging of the battery.

The *Okada-Odendaal-Cho-Berghegger-Black* combination discloses/suggests this limitation. (Ex. 1002, ¶¶216-219; §IX.A.1.)

As discussed, PRM40's "**receiver circuit**" includes voltage clamp circuit 49, regulator 51, and charging control circuit 52. (§§IX.A.1(d), (f)-(g).) Circuit 49 receives output from circuit 44 and provides "a prescribed voltage." (Ex. 1005, ¶0047.) Regulator 51—connected to circuit 44—provides an output to charging control circuit 52, which charges PDA3. (*Id.*) Circuit 44 "smooths the DC voltage **output from the rectifier circuit 43**." (*Id.*) Thus, circuits 49, 51, and 52 ("**a regulator or charge management circuit**") is "**coupled to the output of the receiver rectifier circuit**" and "***regulates or controls* an output voltage or output current provided to the battery, to ensure proper charging of the battery**." (Ex. 1002, ¶¶217-219; §IX.A.1.) For reasons explained, such features would have been included in the modified *Okada* system as discussed for claim 23. (*Id.*)

B. Ground 2: Claim 24 is obvious over *Okada* in view of *Odendaal*, *Cho*, *Berghegger*, *Black*, and *Calhoon*

1. Claim 24

a) The portable device of claim 23, wherein the communication and control circuit communicates information including one or more codes identifying the manufacturer of the portable device, a unique portable device and/or receiver unit ID, a charge algorithm profile, and a power requirement of the portable device and/or receiver unit.

Okada-Odendaal-Cho-Berghegger-Black in view of *Calhoon* discloses/suggests this limitation. (Ex. 1002, ¶¶220-228; §IX.A.1.)

As discussed (limitation 23(d)), circuit 47 (part of "**communication and control circuit**") communicates PDA3's information ("power consumption information") to PTM10 to determine PDA3's power requirement ("**a power requirement of the portable device and/or receiver unit**"). (§IX.A.1(d); Ex. 1005, ¶¶0057, 0063-0064, 0069, FIG. 3.) Additionally, as discussed (limitation 23(h)), a POSITA would have modified *Okada-Odendaal-Cho-Berghegger* in view of *Black* to include **charge algorithm profile(s)** in the information communicated to PTM10. (§IX.A.1(h).) Thus, *Okada-Odendaal-Cho-Berghegger-Black* discloses/suggests "**the communication and control circuit communicates information including…a charge algorithm profile, and a power requirement of the portable device and/or receiver unit**." (Ex. 1002, ¶222.)

To the extent that *Okada-Odendaal-Cho-Berghegger-Black* does not disclose the communicated information include "**one or more codes identifying the manufacturer of the portable device**, **a unique portable device and/or receiver unit ID**," a POSITA would have found it obvious to include such features in view of *Calhoon*. (Ex. 1002, ¶223.)

Calhoon discloses an inductive charging system for a mobile device's battery charger/battery pack. (Ex. 1041, Abstract, FIGS. 2-3 (below), ¶¶0002, 0008-0010, 0022-0029, 0045, 0065.)

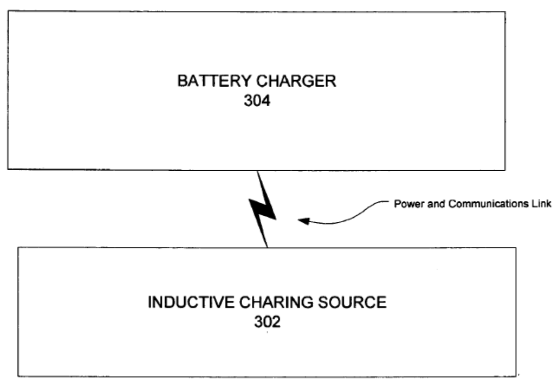


FIGURE 2

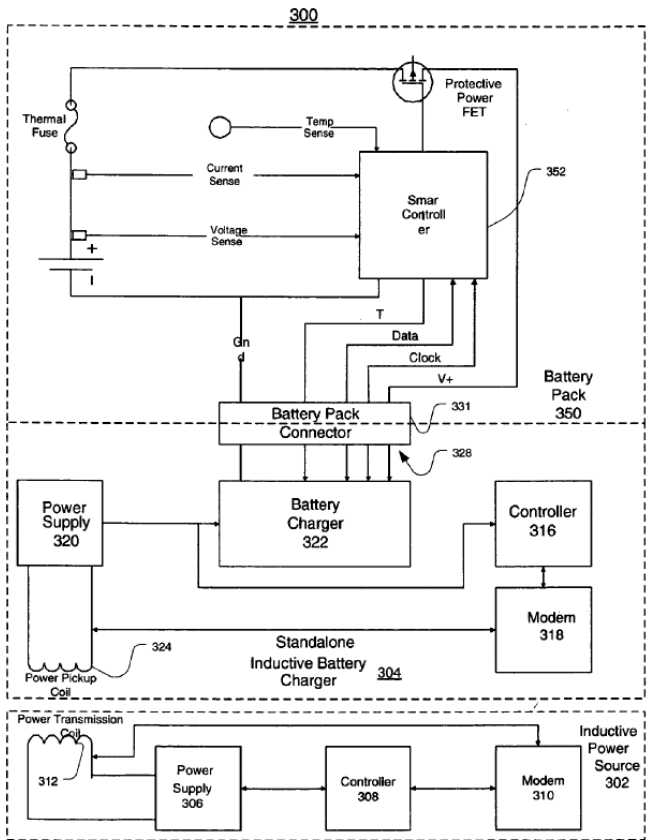


FIGURE 3

Calhoon describes obtaining an **ID/serial number of a power receiver**, *e.g.*, battery charger assembly 304 or battery pack 350 and wirelessly communicating that information to a power source (*e.g.*, inductive charging source 302). (Ex. 1041, Abstract, ¶¶0022, 0034, 0046-0048, 0050-0052, 0056, FIGS. 3, 5A, 6.) Controller 316 in battery charger 304 may include data, "such as **a battery charger ID number**, **serial number**, **manufacturer's name**," used "for novel power operations…such as shown in FIGS. 5A, 5B, and 6." (*Id.*, ¶0038; *id.*, FIGS. 5A-6, ¶¶0034, 0042-0044, 0045-0052, 0056.)

> [T]he **inductive charging source 302** can request other information relevant to the **battery charger assembly 304**, such as a **battery charger identification (ID) number**,…**serial number of the battery charger** or the **serial number of the battery pack**. *This information can be used for* **security, data integrity, or other purposes**. In process block 508, the **battery charger assembly 304 transmits the requested information**.

(Ex. 1041, ¶0047; Ex. 1002, ¶¶105-107, 224.)

Thus, *Calhoon*'s power receiver includes **code(s)** "**identifying the manufacturer of the portable device**" (*e.g.*, manufacturer's name) and "**a unique portable device and/or receiver unit ID**" (*e.g.*, a battery charger ID number, serial number), consistent with *Calhoon*'s disclosure that the information "can be used **for security, data integrity**, or other purposes." (Ex. 1041, ¶0047; *id.*, FIGS. 3-5A, ¶¶0036-0037, 0040-0043; Ex. 1002, ¶225.)

Calhoon is in the same technical field as the *Okada*-based combination and the '500 patent given, *e.g.,* they describe features concerning wireless/inductive powering/charging of portable device(s) and transmitting information used by a base unit to control power transfer. (§ IX.A.1; Ex. 1041, ¶¶0022, 0029, 0034, 0045-0048, 0050, 0065, FIGS. 3, 5A, 6; Ex. 1002, ¶226.) Like *Okada*, *Calhoon* also discloses features reasonably pertinent to particular problem(s) the '500 patent inventor was trying to solve. (Ex. 1001, 1:19-42; Ex. 1041, ¶¶0003-0010, 0050; Ex. 1005, ¶0110, 0147-0151.) *Calhoon*'s teachings thus would have been consulted by the inventor and a POSITA, looking to design/implement contactless power/data transfer/reception, like that described by *Okada*. (Ex. 1002, ¶226.)

In light of such teachings/suggestions, a POSITA would have been motivated, and found obvious, to modify the *Okada* system to include in the information communicated by the disclosed "communication and control circuit" information "including **one or more codes identifying the manufacturer of the portable device**, **a unique portable device and/or receiver unit ID**." (Ex. 1002, ¶227.) Such modification would have allowed cradle 4 to verify and/or authenticate each mobile device by using the device's manufacturer's name and/or serial number or ID associated with the device. (*Id.*; §IX.A.1.)

A POSITA would have had the skill/rationale in implementing, and reasonable expectation of success in achieving, such modification, especially where implementing it would have involved applying known technologies (*e.g.*, use of identifier information (*e.g.*, ID/serial number) (*Okada*/*Calhoon*)) to verify/authenticate/confirm device(s) (receiver/battery) receiving power from inductive power source (*Okada*/*Calhoon*) according to known methods (*e.g.*, control power transfer using device/identifier information (*Okada*/*Calhoon*)) to yield a predictable inductive power transfer/charging system that wirelessly identifies the device (and its receiver) to monitor, detect, facilitate, and/or ensure proper use of the system by authorized/verified power reception equipment. (Ex. 1002, ¶228; §§IX.A.1(a), 1(e).) *KSR* at 416-18.

C. Ground 3: Claim 26 is obvious over *Okada* in view of *Odendaal*, *Cho*, *Berghegger*, *Black*, and *Meadows*

1. Claim 26

a) The portable device of claim 23, further including an output disconnect switch under the control of the receiver communication and control circuit to disconnect the battery from the receiver rectifier circuit output.

Okada-Odendaal-Cho-Berghegger-Black in view of *Meadows* discloses/suggests this limitation. (Ex. 1002, ¶¶229-236.)

While *Okada-Odendaal-Cho-Berghegger-Black* does not expressly disclose an output disconnect switch as recited in claim 26, a POSITA would have found it obvious to implement such features in view of *Meadows*. (Ex. 1002, ¶231.)

Meadows, like *Okada-Odendaal-Cho-Berghegger-Black*, discloses an inductive powering/charging system (Ex. 1052, FIG. 7A, Abstract, ¶¶0085-0097) and thus is in the same technical field as the ’500 patent. (§IX.A.1; Ex. 1001, Abstract.) *Meadows* also discloses features reasonably pertinent to particular problem(s) the ’500 patent inventor (and POSITA) were trying to solve. (Ex. 1052, ¶¶0086-0089; Ex. 1001, 38:44-47; Ex. 1002, ¶¶108-110, 232.) Therefore, a POSITA had reasons to consider/consult *Meadows* when looking to design/implement the above-discussed *Okada-Odendaal-Cho-Berghegger-Black* system. (*Id.*; §IX.A.1.)

Meadows discloses a battery protection IC 686 controlling a FET switch 688 to ensure that battery 180 is not overcharged. (Ex. 1052, ¶¶0086-0087, FIG. 7A (annotated below).)

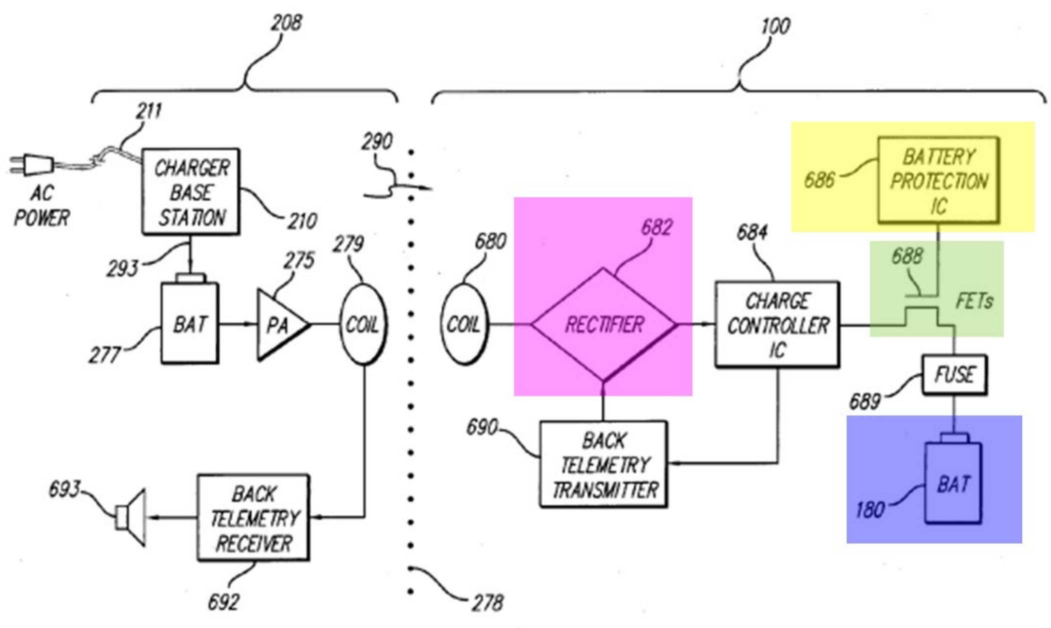


FIG. 7A

Rectifier 682 converts an AC signal from coil 680 to a DC signal for charging battery 180. (*Id.*, ¶0086.) If abnormality occurs when charging the battery (*e.g.*, overvoltage/undervoltage/short-circuit), "IC 686 opens…switches 688 to prevent further charging." (*Id.*, ¶¶0087-0089; *id.*, ¶0022; Ex. 1002, ¶233.)

A POSITA would have been motivated and found obvious to configure the receiver communication and control circuit in the *Okada-Odendaal-Cho-Berghegger-Black* system (§IX.A.1(f)) to control a switch-based battery protection mechanism (*e.g.*, FET switch 688 controlled by a battery protection IC 686, similar to that taught by *Meadows*) to prevent further supply of power from the rectifier in the device's receiver circuit. (§IX.A.1(e); Ex. 1002, ¶234.) A POSITA would have understood, charging abnormality would be detrimental to the battery, and cause potential safety issues. (Ex. 1052, ¶¶0013, 0016, 0097 (overcharging may cause breakdown, gas leakage and thus, cell voltage monitoring is "paramount" and "battery protection circuitry [] necessary to keep the cell in a safe operating region").) A POSITA would have known that it was advantageous to address overcharging issues with respect to portable devices/batteries and configure/consider multiple ways to avoid overcharging (in case one fails). (*Id.*; Ex. 1002, ¶¶234-235.) Thus, while *Okada* relies on feedback information at the charging system to control/monitor full charge state (Ex. 1005, ¶¶0057, 0076, FIGS. 2-3), a POSITA would have found it beneficial to avoid overcharging in case such components/process fail to stop charging (due to disruptions, component/signal failure/issues, etc.) (Ex. 1002, ¶235.)

A POSITA would have had the skill/rationale in implementing, and reasonable expectation of success in achieving, such modification. (Ex. 1002, ¶236.) Battery protection mechanisms were known and used to "monitor[] the voltage and current of the [battery] to ensure safe operation." (Ex. 1052, ¶0089.) Thus, such modification would have involved applying known technologies/techniques (*e.g.,* known switch-based battery protection mechanisms) to yield the predictable result of providing an inductive charging system that prevents battery damage and safety issues, consistent with that discussed by *Meadows* and known in the art. (Ex. 1002, ¶236.) *KSR* at 416-18.

D. Ground 4: Claim 27 is obvious over *Okada* in view of *Odendaal*, *Cho*, *Berghegger*, *Black*, and *Shima*

1. Claim 27

a) The portable device of claim 23, wherein the receiver coil is constructed of a Printed Circuit Board comprising multiple layers connected by vias and a layer of ferrite material.

Okada-Odendaal-Cho-Berghegger-Black in view of *Shima* discloses/suggests this limitation. (Ex. 1002, ¶¶237-245; §IX.A.1.)

As discussed, it would have been obvious to configure the modified *Okada-Odendaal* portable device with planar receiver coils. (§IX.A.1(b).) *Odendaal* discloses that coils may be constructed of a multi-layer PCB. (Ex. 1008, 2:25-28 ("***each spiral being a conductor trace on a separate substrate****, such as…****printed circuit board***"), 2:56-57, 3:46-48 ("desirable to have **several layers of coils**."), 7:1-10 ("coils may ***occupy more than one plane***").) In light of such teachings and reasons in §IX.A.1(b), a POSITA would have been motivated, and found obvious, to configure *Okada-Odendaal-Cho-Berghegger-Black* with multi-layer planar PCB receiver coil. (Ex. 1002, ¶239.)

While *Okada-Odendaal-Cho-Berghegger-Black* do not expressly state the multi-layer PCB-based coils were connected by vias, a POSITA would have found it obvious to do so given that was a common design for interconnecting multi-layer PCB circuits, as exemplified by *Shima*. (Ex. 1002, ¶240.)

Shima, like *Okada-Odendaal-Cho-Berghegger-Black*, is in the same technical field as the '500 patent as it discloses an inductive power/signal transfer system using coils and discloses features reasonably pertinent to particular problem(s) the '500 patent inventor and a POSITA were trying to solve. (Ex. 1032, Abstract, 1:42-50, 2:12-4:10, 5:62-6:53, 7:17-8:38; §IX.A.1; Ex. 1001, Abstract, 10:17-22; Ex. 1002, ¶¶111-113, 241.) Therefore, a POSITA had reasons to consider/consult *Shima* when looking to design/implement the *Okada-Odendaal-Cho-Berghegger-Black* system. (*Id.*)

Shima discloses connecting coil patterns residing on different PCB layers by using through-holes ("vias"). FIG. 3A (below) is described as having "a plurality of thin printed-circuit substrates 30-1 to 30-n" with similar "coil patterns 32-1 to 32-n." (Ex. 1032, 5:62-6:1, FIGS. 3D-3E (below), 6:13-35.) Starting and terminating ends of the coil patterns are connected using through-holes 33 and 34, respectively. (*Id.*, 6:4-21.) Layers of loop patterns (*e.g.*, 37-1 to 37-n (FIG. 5A (below))) may also "have the respective through-holes [39] connected in such a way that a spiral coil is formed in the direction in which the printed-circuit substrates 30-1 to 30-n are stacked." (*Id.*, 7:17-35; Ex. 1002, ¶242.)

FIG. 3A

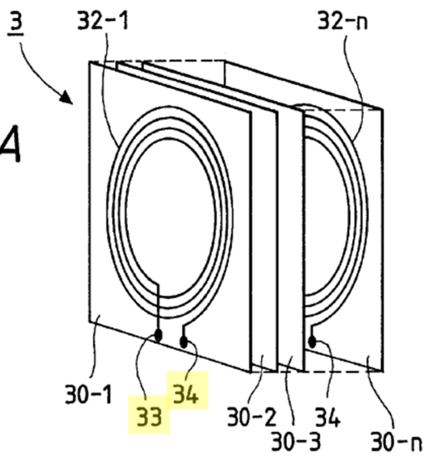


FIG. 5A

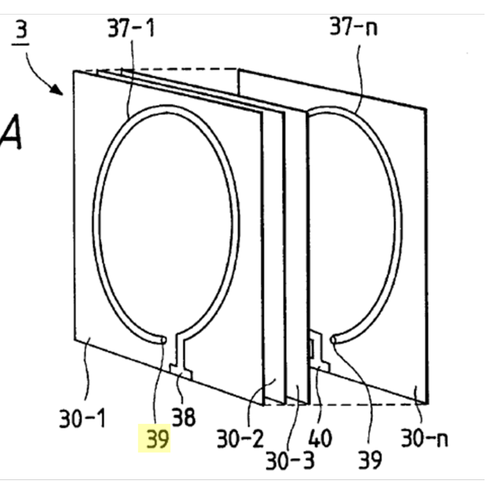


FIG. 3D

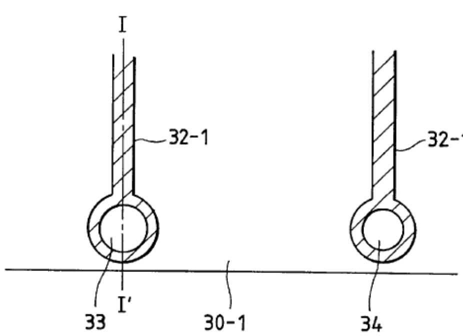
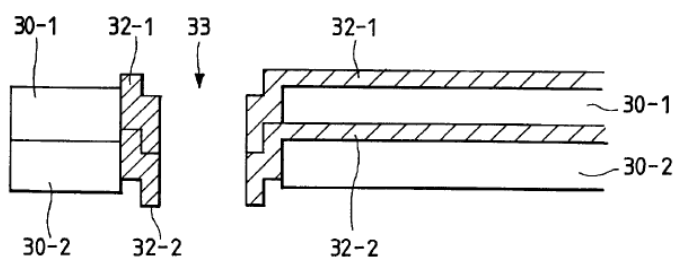


FIG. 3E



In view of *Shima*/*Odendaal* and POSITA's state-of-art knowledge, a POSITA would have been motivated and found obvious to configure/implement the receiver coil in *Okada-Odendaal-Cho-Berghegger-Black* (§IX.A.1) as multi-layer/stacked PCB-planar coils interconnected by vias to allow the coils to maintain continuity while providing a compact configuration with enhanced efficiency and reduced conductor resistance as suggested by *Shima*. (Ex. 1002, ¶243; Ex. 1032, 6:47-53, 7:41-44, 8:28-33.) A POSITA would have appreciated the versatility in applications taught by *Okada* (§IX.A.1(a)) and known stacked PCB coil designs and ways to interconnect them (vias) (*Shima/Odendaal*), and thus been motivated to design/implement various system designs that were consistent with such applications, including thin form factor configurations. (§IX.A.1(b); Ex. 1002, ¶243.)

A POSITA would have had the skill/rationale/knowledge in implementing, and reasonable expectation of success in achieving, such modification, especially since it was known to use vias to connect multi-layered PCBs (including coil patterns). (Ex. 1002, ¶244; Ex. 1045, ¶0026, FIGS. 3A-C; Ex. 1032 (*supra*).) Such modification would have involved applying known technologies/techniques (conventional use of vias to interconnect stacked PCBs) to yield the predictable result of providing a portable device with a stacked-PCB receiver coil that would have performed power/signal communications consistent with that discussed above for *Okada-Odendaal-Cho-Berghegger-Black*. (§IX.A.1.) *KSR* at 416-18.

Moreover, as discussed for limitation 23(c), a POSITA would have been motivated to use a ferrite material layer to shield portable device's circuits from electromagnetic fields by placing such layer behind the receiver coil. (§IX.A.1(c).) A POSITA would have understood that the PCB, where the receiver coil resides (as described above), would include circuitry that would benefit from shielding. Thus, for similar reasons (§IX.A.1(c)/limitation 23(c)), a POSITA would have found it obvious and beneficial to use additional ferrite material layer(s) for shielding the PCB circuits from electromagnetic fields. (*Id.*; Ex. 1002, ¶245.)

E. Ground 5: Claim 30 is obvious over *Okada* in view of *Odendaal*, *Cho*, *Berghegger*, *Black*, and *Takagi*

1. 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.

Okada-Odendaal-Cho-Berghegger-Black in view of *Takagi* discloses/suggests this limitation. (Ex. 1002, ¶¶246-253; §IX.A.1.)

While *Okada-Odendaal-Cho-Berghegger-Black* does not expressly disclose that the portable device further comprises a base unit circuit as recited in claim 30, a POSITA would have found it obvious to implement such features in view of *Takagi*. (Ex. 1002, ¶248.)

Takagi, like *Okada-Odendaal-Cho-Berghegger-Black*, discloses inductive power/signal transfer configurations using coils (Ex. 1033, Abstract, FIGS. 1-7, ¶¶0003, 0013-0030, 0041-0078), and thus is in the same technical field as the ’500 patent. (§IX.A.1; Ex. 1001, Abstract.) *Takagi* discloses features reasonably pertinent to particular problem(s) the ’500 patent inventor and a POSITA were trying to solve. (*Id.*; Ex. 1033, ¶¶0005-0015; Ex. 1001, Abstract, 2:15-4:30; Ex. 1002, ¶¶114-116, 249.) Therefore, a POSITA had reasons to consider/consult *Takagi* when looking to design/implement *Okada-Odendaal-Cho-Berghegger-Black*. (*Id.*)

Takagi discloses a **power transmitting/receiving device** 12 including coil 125, power **transmitting** circuit 121, power **receiving** circuit 122, and secondary battery 123. (Ex. 1033, FIG. 2 (annotated below), ¶0047.) Such features are applicable to portable systems, e.g., cellular phones. (*Id.*, ¶¶0026, 0030, 0043, 0058, 0065, 0070.)

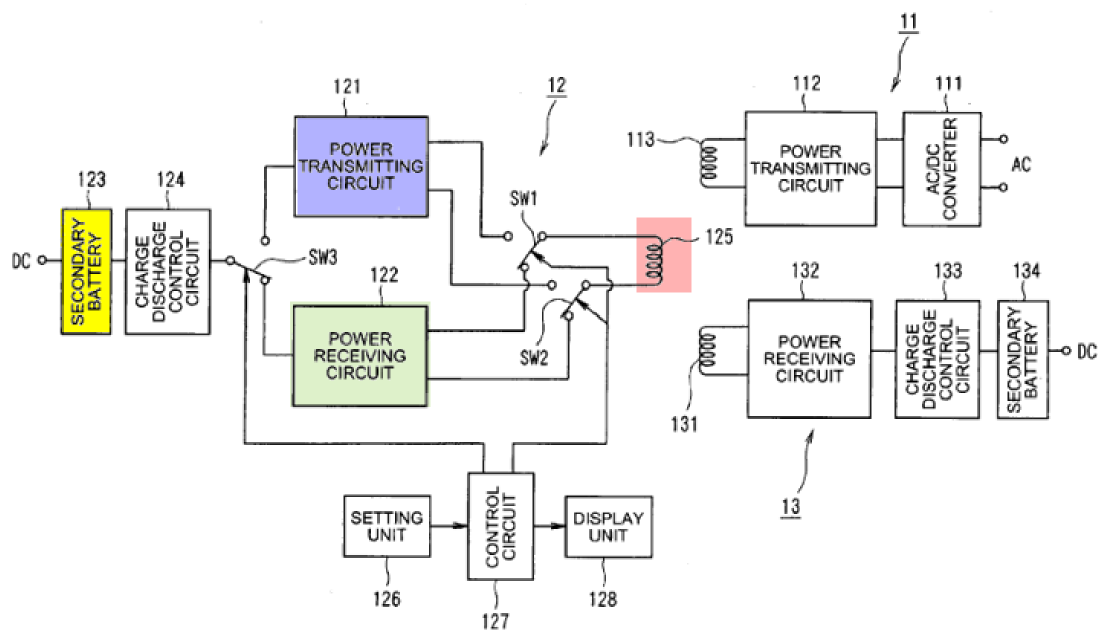


FIG. 2

Transmitting circuit 121 produces an alternating voltage from battery 123, and supplies it to coil 125 for **charging device 13** via coil 131. (*Id.*, ¶¶0048, 0054-0056.) Alternatively, power receiving circuity 122 in device 12 may also **receive power**

from device 11 via coils 125 and 113 for recharging battery 123. (*Id.*, ¶¶0048-0053, 0057-0072.) Thus, when coil 113 approaches coil 125 (and based on switch SW1-SW2 settings), power receiving circuit 122 receives power from device 11 (via the magnetic coupling between coils 125/113) to charge battery 123. (*Id.*, ¶0048, 0052-0053, 0069-0072; *id.*, 0057-0068.) (Ex. 1002, ¶250.)

In light of *Takagi*, a POSITA would have been motivated, and found obvious, to configure *Okada-Odendaal-Cho-Berghegger-Black*'s portable device to include "**a base unit circuit to enable the portable device to operate as an inductive charger or power supply**," similar to the features *Takagi* describes (*e.g.*, power transmitting circuit 121/power receiving circuit and associated components/circuitry) "**using the receiver coil of the portable device**" (§IX.A.1b) (*see also e.g.*, coil 125 in *Takagi* that transmits/receives power), "**to inductively charge or power another portable device including a battery which is capable of receiving power inductively**," *e.g.*, configure PDA3, etc. to use such features to charge/power another portable device having a rechargeable/secondary battery (*e.g.*, device 13 and battery 134 *Takagi* discloses). (Ex. 1002, ¶251.)

A POSITA would have been motivated to implement such modification to improve/enhance applications/features offered by the modified *Okada* system, including that of the portable device. (§IX.A.1; Ex. 1002, ¶252.) A POSITA would have appreciated configuring the device receiver circuitry to include features similar to that taught by *Takagi* would have allowed the portable device to power/charge other devices (while also being capable of being recharged itself), thus expanding the device's functionalities, as taught/suggested by *Takagi*. (*Id.*) A POSITA would have appreciated the benefits of coupling such a "base unit circuit" to "receiver coil" 41 because it would have allowed the "receiver circuit" (§IX.A.1(c)) to use the coil for both transmitting/receiving power, enabling the device "to be compact and occupy little space." (Ex. 1033, ¶0071; Ex. 1002, ¶252.)

A POSITA would have had the skill/rationale in implementing, and reasonable expectation of success in achieving, such modification, especially since it was known to provide devices that can both power other devices and receive power for charging an internal battery. (*See supra* regarding *Takagi*; Ex. 1002, ¶253; Ex. 1043, 4:34-55, FIG. 3, 5:23-25.) Thus, such modification would have involved applying known technologies/techniques (multi-function portable power transfer device using known inductive power components (*Okada*/*Takagi*)) to yield the predictable result of providing a versatile and portable device that would inductively charge/power another portable device having a battery, consistent with that discussed above by *Takagi* and the *Okada-Odendaal-Cho-Berghegger-Black* system. (§IX.A.1.) *KSR* at 416-18.

F. Ground 6: Claim 31 is obvious over *Okada* in view of *Odendaal*, *Cho*, *Berghegger*, *Black*, and *Labrou*

1. Claim 31

a) The portable device of claim 23, whereby the receiver coil and/or receiver circuit further comprises a near-field communication (NFC) antenna and/or circuit.

Okada-Odendaal-Cho-Berghegger-Black in view of *Labrou* discloses/suggests this limitation. (Ex. 1002, ¶¶254-260; §IX.A.1.)

While *Okada-Odendaal-Cho-Berghegger-Black* does not expressly disclose NFC components (of claim 31), a POSITA would have found it obvious to implement such features in view of *Labrou*. (Ex. 1002, ¶256.)

Labrou, like *Okada-Odendaal-Cho-Berghegger-Black*, discloses mobile devices having wireless communication capability (Ex. 1053, ¶0009) and thus is similarly in the same technical field as the '500 patent. (§IX.A.1; Ex. 1001, Abstract.) Likewise, *Labrou* discloses features reasonably pertinent to particular problem(s) the '500 patent inventor and a POSITA were trying to solve. (*Id.*; Ex. 1053, ¶0185; Ex. 1001, 11:9-14, 38:48-58; Ex. 1002, ¶¶117-118, 257.) Therefore, a POSITA had reasons to consider/consult *Labrou* when looking to design/implement the above-discussed *Okada-Odendaal-Cho-Berghegger-Black* system. (*Id.*)

Labrou discloses an NFC chip coupled to a mobile device 104 and being a "part of the circuitry thereof," allowing software of device 104 to "communicate with the…NFC chip." (Ex. 1053, ¶0185, FIG. 1.) Mobile device 104 may be used for "physical POS [point of sale] transactions," where the device sends to the POS a transaction message for "authenticat[ing] and approv[ing] the transaction" via an NFC signal. (*Id.*, ¶¶0022-0026, 0185.) If the NFC chip is "integrated with the circuitry of [the mobile device]," the mobile device may send a confirmation message to the POS upon the consumer entering a PIN on the mobile device. (*Id.*, ¶0185; Ex. 1002, ¶258.)

A POSITA would have been motivated and found obvious to configure the receiver coil 41 and/or receiver circuit (§§IX.A.1(b), IX.A.1(d)) in the "portable device" of the modified *Okada* system to implement known NFC technologies/functionalities (NFC antenna/circuitry), similar to that taught by *Labrou*, to provide additional functionalities for communicating information consistent with that known to be implemented in mobile devices like the PDA3 taught by *Okada* and *Labrou* (*e.g.*, use of mobile device at a POS for authentication/approval). (Ex. 1002, ¶259.) Such an implementation would have enhanced conveniences and security of such device communications (*e.g.*, POS transactions and associated user satisfaction). (*Id.*)

A POSITA would have had the skill/rationale in implementing, and reasonable expectation of success in achieving, such modification, especially given it was known to employ NFC chip(s)/components with mobile device circuitry to provide the benefits of such near-field communications (e.g., POS transactions, etc.).

(Ex. 1002, ¶260.) Thus, such modification would have involved applying known technologies/techniques (*e.g.*, known NFC antenna/circuitry) to yield the predictable result of providing a mobile device that is capable of providing conventional features, such as NFC-based POS transactions, consistent with that discussed by *Labrou* and known in the art. (*Id.*) *KSR* at 416-18.

X. DISCRETIONARY DENIAL IS NOT APPROPRIATE

Section 325(d) denial is not appropriate here given the prior art combinations/arguments raised during prosecution are not the same/substantially similar to the presented grounds. The Office did not consider *Okada* in light of the other asserted references here. (Ex. 1004; Ex. 1001, Cover.) *Okada* discloses/suggests many claimed features, and thus is relevant to the patentability of the challenged claim(s), especially when considered in context of the asserted obviousness positions. (§IX.) The examiner also did not have the benefit of expert testimony to support such teachings/suggestions as presented here. (Ex. 1002.) Thus, the examiner erred in allowing the claims without considering the teachings/suggestions in the prior art relied on in this Petition (*see* §IX). (Ex. 1004, 186-193.) Had the examiner done so, the challenged claims would have likely not have issued.[7]

This is true despite the issued patent from *Calhoon* (Ex. 1041) and other patent references by "Calhoon" was cited during prosecution. (Ex. 1001, Cover (pp.2-3); Ex. 1004.) As with other submitted references, the examiner erred in a manner pertinent to the patentability of the challenged claims by failing to consider and apply

[7] Petitioner reserves the right to seek leave to respond to any §325(d) (and §314) arguments PO may raise to avoid institution.

the similar teachings by *Calhoon* alone or in combination with other prior art. Indeed, *Calhoon* at least discloses features recited in claim 24, and thus should have been considered in combination with other pertinent references (like *Okada*). (§IX.B.)

Furthermore, an evaluation of the factors under *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 (Mar. 20, 2020) (precedential), favors institution.

The **first factor** (stay) is neutral, because Samsung has not yet moved for a stay. *See Hulu LLC v. SITO Mobile R&D IP, LLC et al.*, IPR2021-00298, Paper 11 at 10-11 (P.T.A.B. May 19, 2021).

The **second factor** (proximity) is neutral. "The PTAB will weigh this factor against exercising discretion to deny institution under *Fintiv* if the median time-to-trial is around the same time or after the projected statutory deadline for the PTAB's final written decision" (FWD). (Ex. 1064, 9.) The median time from filing to trial in the Eastern District of Texas is 19 months, meaning trial will be *no earlier* than May 2024 (Ex. 1065, 35), is close to the court's scheduled jury selection for August 5, 2024 (Ex. 1066, 1.) With this petition filed in June 2023, a FWD may be expected by December 2024, not long after the trial date.

That the FWD may come after the trial date is not dispositive. The Board has granted institution in cases where the FWD issued months after the scheduled trial date. The Board has relied on various justifications, such as diligence in filing the petition, a stipulation not to pursue the asserted grounds in litigation, minimal investment in litigation, and the merits of the invalidity challenge were strong. *Verizon Business Network Services, Inc. v. Huawei Techs. Co*., IPR2020-01141, Paper 12 (Jan. 14, 2021). The same factors are present in this case. For instance, Petitioner diligently filed this petition (challenging long, convoluted claims) in advance of the one-year bar date and within four months of PO's infringement contentions in the Texas Litigation. (Exs. 1018, 1022.) Fact discovery is not anticipated to close until March 18, 2024. (Ex. 1066, 3.) Expert discovery has not yet started. (*Id.*) And the *Markman* hearing has been scheduled for February 6, 2024, after the filing of this petition. (*Id.*)

The **third factor** (investment) also weighs against denial. The district court case is in the early stages. Fact discovery is in its infancy and the parties have not engaged in expert discovery. (Ex. 1066, 3.) The parties have not yet identified terms for construction. (*Id.*, 4-6.) Nor have there been any substantive orders in this case.

The **fourth factor** (overlap) also weighs against denial. Petitioner hereby stipulates that, if the IPR is instituted, Petitioner will not pursue the IPR grounds in the district court litigation. Thus, "[i]nstituting trial here serves overall system efficiency and integrity goals by not duplicating efforts and by resolving materially different patentability issues." *Apple, Inc. v. SEVEN Networks, LLC*, IPR2020-00156, Paper 10 at 19 (P.T.A.B. June 15, 2020); *Sand Revolution II, LLC v.*

Continental Intermodal Group-Trucking LLC, IPR2019-01393, Paper 24 at 12 (P.T.A.B. June 16, 2020).

While the **fifth factor** (parties) may weigh slightly in favor of denial, because the Petitioner and PO are the same parties as in district court, based on a "holistic view," the factors favor institution. *Samsung Elecs. Co. Ltd. v. Dynamics Inc.*, IPR2020-00505, Paper 11 at 15 (P.T.A.B. Aug. 12, 2020).

Further, the Board should not discretionarily deny institution, because this petition presents compelling merits. *Commscope Tech. LLC v. Dali Wireless, Inc.*, IPR2022-01242, Paper 23 at 4-5 (P.T.A.B. Feb. 27, 2023) (precedential). As demonstrated above, the claimed features are a compilation of technologies/techniques known to be used in inductive power/charge systems. (§IX) Moreover, this Petition is the ***sole*** challenge to the challenged claims before the Board—a "crucial fact" favoring institution. *Google LLC v. Uniloc 2017 LLC*, IPR2020-00115, Paper 10 at 6 (May 12, 2020).

XI. CONCLUSION

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

Respectfully submitted,

Dated: June 28, 2023

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

CERTIFICATE OF COMPLIANCE

Pursuant to 37 C.F.R. § 42.24(d), the undersigned certifies that the foregoing Petition for *Inter Partes* Review of U.S. Patent No. 11,201,500 contains, as measured by the word-processing system used to prepare this paper, 13,986 words. This word count does not include the items excluded by 37 C.F.R. § 42.24 as not counting towards the word limit.

Respectfully submitted,

Dated: June 28, 2023

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

CERTIFICATE OF SERVICE

I hereby certify that on June 28, 2023, I caused a true and correct copy of the foregoing Petition for *Inter Partes* Review of U.S. Patent No. 11,201,500 and supporting exhibits to be served via express mail on the Patent Owner at the following correspondence address of record as listed on PAIR:

115007 – NK Patent Law
4101 Lake Boone Trail
Suite 218
Raleigh, NC 27607

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