(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization International Bureau

(43) International Publication Date 19 August 2010 (19.08.2010)

(10) International Publication Number WO 2010/093973 A3

- (51) International Patent Classification: H04B 5/00 (2006.01)
- (21) International Application Number:

PCT/US2010/024161

(22) International Filing Date:

12 February 2010 (12.02.2010)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

13 February 2009 (13.02.2009) 61/152,359 12/695,911 28 January 2010 (28.01.2010)

US US

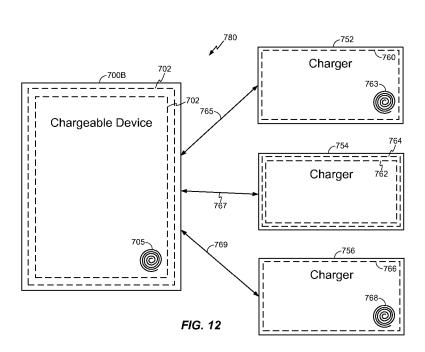
- (71) Applicant (for all designated States except US): QUAL-COMM INCORPORATED [US/US]; International Ip Administration, 5775 Morehouse Drive, San Diego, CA 92121 (US).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): KIRBY, Miles, A. [GB/US]; 5775 Morehouse Drive, San Diego, CA 92121 (US). GROB, Matthew, S. [US/US]; 5775 Morehouse Drive, San Diego, CA 92121 (US).

- (74) Agent: MOBARHAN, Ramin; International Ip Administration, 5775 Morehouse Drive, San Diego, CA 92121 (US).
- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.
- (84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

[Continued on next page]

(54) Title: WIRELESS POWER FOR CHARGEABLE AND CHARGING DEVICES



(57) Abstract: Exemplary embodiments are directed to wireless power. A method may comprise detecting one or more transmit elements positioned within an associated charging region. The method may further comprise selecting at least one transmit element of the detected one or more transmit elements to receive wireless power therefrom to enable for optimal charging of a charging device.



- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))
- (88) Date of publication of the international search report: 11 November 2010

Published:

— with international search report (Art. 21(3))

INTERNATIONAL SEARCH REPORT

International application No PCT/US2010/024161

a. classification of subject matter INV . $\,H04B5/00\,$

ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols) H04B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data

| C. DOCUM | ENTS CONSIDERED TO BE RELEVANT | |
|-----------|---|--|
| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
| Х | WO 2008/125072 A1 (SIEMENS AG [DE]; MEYER MARTIN [DE]; SCHMIDT RICHARD [DE]) 23 October 2008 (2008-10-23) | 1-13, 15-30,34 |
| Y | * abstract page 6, paragraphs 3, 4 page 8, paragraph 2 - page 10, paragraph 3 page 20, paragraph 1 - page 26, paragraph 3 claims 1-4 figures 2, 3 | 14,31-33 |
| Α | US 2005/181823 A1 (HAARTSEN JACOBUS C [NL]) 18 August 2005 (2005-08-18) | 1,2,5,6, 11,13, 18,19, 22,23, |
| | paragraphs [0063], [0 89], [0 94] | 26,28 |
| <u> </u> | | |

| X Further documents are listed in the continuation of Box C. | X See patent family annex. |
|---|---|
| * Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed | "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. "&" document member of the same patent family |
| Date of the actual completion of the international search 10 September 2010 | Date of mailing of the international search report 17/09/2010 |
| Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Fax: (+31–70) 340–3016 | Authorized officer Helms, Jochen |

2

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2010/024161

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. | |
|-----------|--|-----------------------|--|
| A | US 2008/162029 A1 (ITOH YUUSUKE [JP]) 3 July 2008 (2008-07-03) paragraphs [0057] - [0081] figure 5 | 1,7,18, | |
| Υ | US 2007/274373 A1 (CORNWALL MARK K [US] ET AL) 29 November 2007 (2007-11-29) paragraphs [0007], [0 20] | 14,33 | |
| Y | US 2009/033280 A1 (CHOI SUNG-UK [KR] ET AL) 5 February 2009 (2009-02-05) * abstract paragraph [0012] claims 1-4 | 31,32 | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | · | | |
| | | | |
| | | | |
| | | | |

International application No. PCT/US2010/024161

INTERNATIONAL SEARCH REPORT

| Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet) |
|---|
| This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons: |
| Claims Nos.: because they relate to subject matter not required to be searched by this Authority, namely: |
| Claims Nos.: because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically: |
| 3. Claims Nos.: because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a). |
| Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet) |
| This International Searching Authority found multiple inventions in this international application, as follows: |
| see additional sheet |
| |
| 1. As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims. |
| 2. As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees. |
| 3. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.: |
| 4. No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.: |
| The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee. The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation. X No protest accompanied the payment of additional search fees. |
| |

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-4, 8, 11, 12, 17-21, 25-27, 34

Independent claim 1 relates to a chargeable device, comprising:

at least one receive element configured to receive wireless power:

wherein the chargeable device is configured to: detect one or more transmit elements positioned within an associated charging region; and

select at least one transmit element of the detected one or more transmit elements to receive wireless power therefrom to enable for optimal charging of the charging device. Independent claims 11 and 17 correspond to claim 1. Independent claims 18, 26 and 34 relate to the corresponding charger, method of operating a wireless charger and wireless charger, respectively.

Claim 2 depending on claim 1 states that the chargeable device is configured to detect the one or more transmit elements according to at least one of one or more specific protocols and one or more specific frequencies.

Claim 3 depending on claim 2 states that the chargeable device is further configured to detect the one or more transmit elements by sampling for transmit elements operating with at least one of the one or more specific protocols.

1.1. claims: 8, 25

Claims 8 and 25 depending on claims 1 and 18 state that the at least one receive/transmit element comprises at least one of a receive/transmit antenna and a coil.

2. claims: 5, 6, 13, 22, 23, 28

Claim 5 depending on claim 2 state that the chargeable device is further configured to detect the one or more transmit elements by sampling for transmit elements resonating at the one or more specific frequencies.

3. claims: 7, 24

Claim 7 depending on claim 1 further comprising a location device configured for determining a location thereof.

4. claim: 9

Claim 9 depending on claim 1 states that the chargeable device is further configured to wirelessly communicate with one or more wireless chargers associated with the detected

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

one or more transmit elements.

5. claim: 10

Claim 10 depending on claim 1 states that the chargeable device is further configured to control at least one operation of one or more wireless chargers associated with the detected one or more transmit elements.

6. claims: 14, 33

Claim 14 depending on claim 11 states that the selecting comprises:

sequentially receiving wireless power from each transmit element of each detected one or more transmit elements; and measuring an amount of power received from each transmit element of each of the detected one or more transmit elements.

7. claims: 15, 29

Claim 15 depending on claim 11 states that selecting comprises selecting a plurality of transmit elements of the detected one or more transmit elements to receive wireless power therefrom in a time-domain multiplexing method.

8. claims: 16, 30

Claim 16 depending on claim 11 further comprising detecting a version of one or more wireless chargers associated with at least one of the detected one or more transmit elements.

9. claims: 31, 32

Claims 31 and 32 depending on claim 26 state that selecting comprises selecting the at least one receive elements of the detected one or more receive elements having the highest charging efficiency with the wireless charger or having the lowest charging level of the detected one or more receive elements, respectively

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2010/024161

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|--|------------------|--|--|
| WO 2008125072 A1 | 23-10-2008 | DE 112007003545 A5 | 01-04-2010 |
| US 2005181823 A1 | 18-08-2005 | EP 1721415 A1 WO 2005079005 A1 KR 20060135755 A | 15-11-2006 25-08-2005 29-12-2006 |
| US 2008162029 A1 | 03-07-2008 | JP 2008162576 A | 17-07-2008 |
| US 2007274373 A1 | 29-11-2007 | CA 2652577 A1 EP 2022173 A2 WO 2007139678 A2 | 06-12-2007 11-02-2009 06-12-2007 |
| US 2009033280 A1 | 05-02-2009 | CN 101375483 A EP 1980008 A1 JP 2009525715 T WO 2007089086 A1 KR 20070078889 A | 25-02-2009 15-10-2008 09-07-2009 09-08-2007 03-08-2007 |