

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
13 March 2008 (13.03.2008)

PCT

(10) International Publication Number
WO 2008/031029 A3

(51) International Patent Classification:

G01R 15/14 (2006.01) **G01R 29/08** (2006.01)
G01R 19/25 (2006.01)

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(21) International Application Number:

PCT/US2007/077881

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(22) International Filing Date:

7 September 2007 (07.09.2007)

(81) **Designated States** (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, 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, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

60/825,093 8 September 2006 (08.09.2006) US

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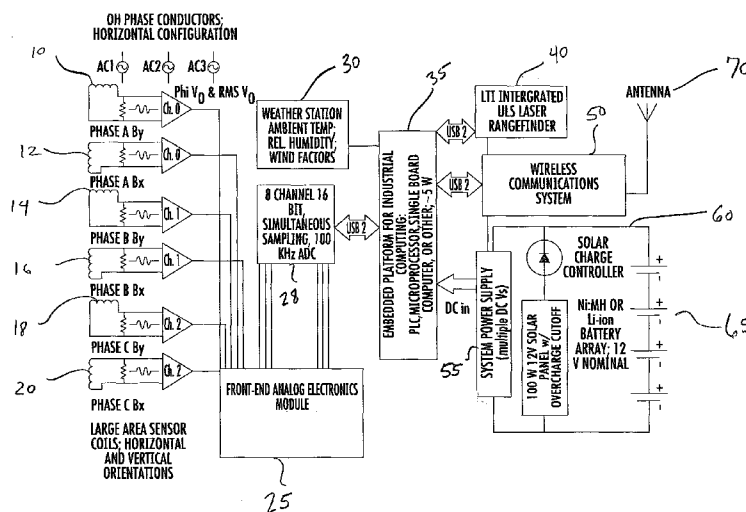
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(84) **Designated States** (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, PL,

[Continued on next page]

(54) **Title:** SENSOR, METHOD AND SYSTEM OF MONITORING TRANSMISSION LINES



(57) **Abstract:** An apparatus, method, and system for measuring the magnetic field produced by phase conductors in multi-phase power lines. The magnetic field measurements are used to determine the current load on the conductors. The magnetic fields are sensed by coils placed sufficiently proximate the lines to measure the voltage induced in the coils by the field without touching the lines. The x and y components of the magnetic fields are used to calculate the conductor sag, and then the sag data, along with the field strength data, can be used to calculate the current load on the line and the phase of the current. The sag calculations of this invention are independent of line voltage and line current measurements. The system applies a computerized fitter routine to measured and sampled voltages on the coils to accurately determine the values of parameters associated with the overhead phase conductors.



PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM,
GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

— *before the expiration of the time limit for amending the
claims and to be republished in the event of receipt of
amendments*

Published:

— *with international search report*

(88) Date of publication of the international search report:

29 January 2009

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2007/077881

A. CLASSIFICATION OF SUBJECT MATTER

INV. G01R15/14 G01R19/25 G01R29/08

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)

G01R

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. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2005/073295 A1 (HASTINGS JEROME K [US] ET AL) 7 April 2005 (2005-04-07) figures 5,6	1-13
A	US 2002/047709 A1 (FLING RICHARD WILLIAM [GB]) 25 April 2002 (2002-04-25) figure 5	14-53

☐ Further documents are listed in the continuation of Box C.

☒ 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.
- *8* document member of the same patent family

Date of the actual completion of the international search

26 November 2008

Date of mailing of the international search report

04/12/2008

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2007/077881

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:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ 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 allsearchable 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.:

Remark on Protest

- ☐ 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.
- ☐ 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 - 13

an apparatus for measuring the three dimensional phase

2. claims: 14 - 29

a computerized method for determining the physical location

3. claims: 30 - 53

a method of remotely measuring the physical height of
conductors

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2007/077881

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2005073295 A1	07-04-2005	US 2006284613 A1	21-12-2006
US 2002047709 A1	25-04-2002	NONE	