

(19) World Intellectual Property  
Organization  
International Bureau



(43) International Publication Date  
18 December 2003 (18.12.2003)

PCT

(10) International Publication Number  
**WO 2003/104831 A3**

(51) International Patent Classification<sup>7</sup>: **G01R 33/385**

(21) International Application Number:  
PCT/GB2003/002448

(22) International Filing Date: 9 June 2003 (09.06.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
0213131.6 7 June 2002 (07.06.2002) GB

(71) Applicant (for all designated States except US): **TESLA ENGINEERING LTD** [GB/GB]; Water Lane, Storrington, West Sussex RH20 3EA (GB).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **GOLDIE, Frederick Thomas, David** [GB/GB]; 18 Northfield Road, Worthing, West Sussex BN13 1QW (GB). **BEGG, Michael, Colin** [GB/GB]; 104 Rectory Road, Worthing, West Sussex BN14 7PN (GB).

(74) Agents: **SMITH, Norman, Ian** et al.; FJ Cleveland, 40-43 Chancery Lane, London WC2A 1JQ (GB).

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

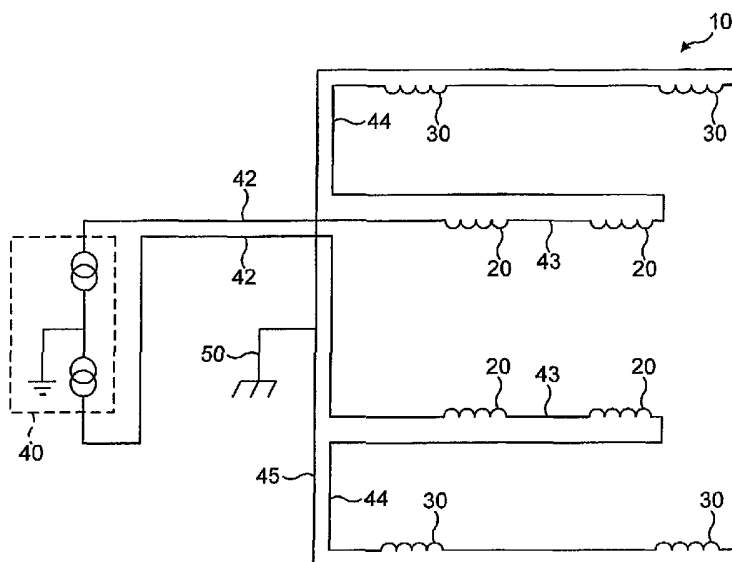
Published:

— with international search report

(88) Date of publication of the international search report:  
28 July 2005

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: SELF-SHIELDED GRADIENT COIL ARRANGEMENTS WITH MINIMISED RISK OF PARTIAL DISCHARGE



(57) Abstract: Apparatus (10) for use in MRIS includes a coil arrangement having drive coils (20), shield coils (30) and a power supply unit (PSU) (40). The drive coils (20) and the shield coils (30) are connected in series to the PSU (40) to form a circuit. The shield coils (30) are connected between a first and second length of the drive coils (20) so as to straddle a virtual earth of the circuit. This is advantageous in minimising potential differences within the shield coil (30) assembly and thereby in minimising partial discharge therewithin. Partial discharge between adjacent parts of the drive coils (20) is minimised by spatially arranging those coils (20) such that parts thereof that are at a high electrical potential are spatially adjacent parts thereof that are simultaneously at a potential of the same polarity of at a low electrical potential of either polarity.

WO 2003/104831 A3

# INTERNATIONAL SEARCH REPORT

International Application No.  
GB 03/02448

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 G01R33/385

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)

IPC 7 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, INSPEC, MEDLINE, EMBASE, COMPENDEX, WPI Data, PAJ

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category ° | Citation of document, with indication, where appropriate, of the relevant passages                               | Relevant to claim No. |
|------------|------------------------------------------------------------------------------------------------------------------|-----------------------|
| X          | EP 0 317 775 A (GEN ELECTRIC)<br>31 May 1989 (1989-05-31)                                                        | 1-3, 16               |
| Y          | * the whole document *                                                                                           | 4-7, 15               |
| A          | ---                                                                                                              | 8-13                  |
| Y          | US 6 311 389 B1 (YAMASHITA MASATOSHI ET AL) 6 November 2001 (2001-11-06)<br>column 5, line 66 -column 6, line 19 | 4-7, 15               |
| A          | ---                                                                                                              |                       |
| A          | US 5 406 205 A (MUELLER WOLFGANG H) 11 April 1995 (1995-04-11)<br>column 10, line 54 -column 11, line 5          | 1-13, 15              |
| A          | ---                                                                                                              |                       |
| A          | US 6 144 204 A (SEMENTCHENKO MIKHAIL G) 7 November 2000 (2000-11-07)<br>column 6, line 1 - line 11; figure 8     | 1, 14                 |
|            | -----                                                                                                            |                       |

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

☒ Patent family members are listed in 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

29 August 2003

Date of mailing of the international search report

09/09/2003

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Skalla, J

# INTERNATIONAL SEARCH REPORT

International Application No

GB 03/02448

| Patent document<br>cited in search report |    | Publication<br>date | Patent family<br>member(s) | Publication<br>date |
|-------------------------------------------|----|---------------------|----------------------------|---------------------|
| EP 0317775                                | A  | 31-05-1989          | US 4794338 A               | 27-12-1988          |
|                                           |    |                     | CA 1275693 C               | 30-10-1990          |
|                                           |    |                     | DE 3855493 D1              | 02-10-1996          |
|                                           |    |                     | DE 3855493 T2              | 27-03-1997          |
|                                           |    |                     | EP 0317775 A2              | 31-05-1989          |
|                                           |    |                     | FI 884398 A                | 26-05-1989          |
|                                           |    |                     | IL 87965 A                 | 12-12-1991          |
|                                           |    |                     | JP 1212412 A               | 25-08-1989          |
|                                           |    |                     | JP 1858214 C               | 27-07-1994          |
|                                           |    |                     | JP 5063087 B               | 09-09-1993          |
| -----                                     |    |                     |                            |                     |
| US 6311389                                | B1 | 06-11-2001          | JP 2000082627 A            | 21-03-2000          |
| -----                                     |    |                     |                            |                     |
| US 5406205                                | A  | 11-04-1995          | DE 3937148 A1              | 16-05-1991          |
|                                           |    |                     | WO 9107669 A1              | 30-05-1991          |
|                                           |    |                     | EP 0500618 A1              | 02-09-1992          |
| -----                                     |    |                     |                            |                     |
| US 6144204                                | A  | 07-11-2000          | EP 0919825 A2              | 02-06-1999          |
|                                           |    |                     | JP 11244259 A              | 14-09-1999          |
| -----                                     |    |                     |                            |                     |