

(19) World Intellectual Property  
Organization  
International Bureau



(43) International Publication Date  
3 March 2005 (03.03.2005)

PCT

(10) International Publication Number  
WO 2005/019775 A3

(51) International Patent Classification<sup>7</sup>: G01D 5/22

(21) International Application Number:  
PCT/ZA2004/000101

(22) International Filing Date: 20 August 2004 (20.08.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
60/496,554 20 August 2003 (20.08.2003) US

(71) Applicant (for all designated States except US): UNIVERSITY OF CAPE TOWN [ZA/ZA]; Lovers Walk, Lower Campus, Rondebosch 7700 (ZA).

(72) Inventor; and

(75) Inventor/Applicant (for US only): TAPSON, Jonathan, Craig [ZA/ZA]; c/o UCT Innovation, Lovers Walk, Lower Campus, 7700 Rondebosch (ZA).

(74) Agent: BACON, Brian; Brian Bacon & Associates Inc., 2nd floor, Mariendahl House, Newlands on Main, Main Road, 7700 Newlands (ZA).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM,

AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, 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, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, 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, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

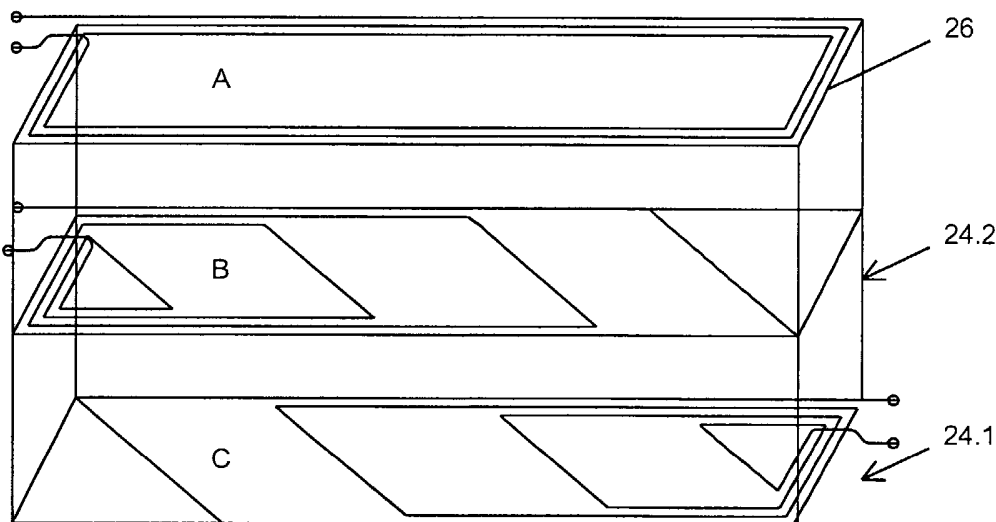
Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

(88) Date of publication of the international search report:  
16 June 2005

[Continued on next page]

(54) Title: POSITION SENSORS



(57) Abstract: A position sensor comprising a primary winding (26) for generating a magnetic flux, a first secondary winding (24.1) the number of turns of which increases in one direction, a second secondary winding (24.2) the number of turns of which increases in the opposite direction to that of the first secondary winding. Both secondary windings (24.1, 24.2) are subjected to the magnetic flux generated by the primary winding (26) whereby voltages are induced in the secondary windings. The sensor further comprises an element movable with respect to the secondary windings. The element is of a magnetic or conductive material and distorts, in its vicinity, the magnetic flux generated by the primary winding (26). By providing third and fourth secondary windings at right angles to the first and secondary windings it is possible to detect position in two dimensions.

WO 2005/019775 A3



---

*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.*

# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/ZA2004/000101

<b>A. CLASSIFICATION OF SUBJECT MATTER</b> IPC 7 G01D5/22				
According to International Patent Classification (IPC) or to both national classification and IPC				
<b>B. FIELDS SEARCHED</b>				
Minimum documentation searched (classification system followed by classification symbols) IPC 7 G01D				
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, PAJ				
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>				
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.		
Y	US 4 678 991 A (SCHMIDT ET AL) 7 July 1987 (1987-07-07) claim 1 figure 1	1-8		
Y	DE 38 01 779 A1 (VDO ADOLF SCHINDLING AG, 6000 FRANKFURT, DE; VDO ADOLF SCHINDLING AG,) 27 July 1989 (1989-07-27) claim 1 figure 1 column 2, lines 8-39	1-8		
A	US 4 847 548 A (LAFLER ET AL) 11 July 1989 (1989-07-11) figure 3 column 1, lines 57-65	4,8		
-/--				
<input checked="" type="checkbox"/> Further documents are listed in the continuation of box C.				
<input checked="" type="checkbox"/> Patent family members are listed in annex.				
° Special categories of cited documents :				
<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none; vertical-align: top;">                     *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                 </td> <td style="width: 50%; border: none; vertical-align: top;">                     *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.                      *&amp;* document member of the same patent family                 </td> </tr> </table>			*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
*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	Date of mailing of the international search report			
2 May 2005	10/05/2005			
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  Moulara, G			

INTERNATIONAL SEARCH REPORT

International Application No  
PCT/ZA2004/000101

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6 489 899 B1 (ELY DAVID T. E ET AL) 3 December 2002 (2002-12-03) column 20, lines 5-53 figure 19	1-8
A	WO 97/39312 A (REGAL COMPONENTS AB; HORE, DONALD, LIONEL) 23 October 1997 (1997-10-23) claims 1,2 figures 1,7 page 2, line 19 - page 3, line 7 claims 10,11	5-8

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/ZA2004/000101

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4678991	A	07-07-1987	NONE
<hr/>			
DE 3801779	A1	27-07-1989	NONE
<hr/>			
US 4847548	A	11-07-1989	NONE
<hr/>			
US 6489899	B1	03-12-2002	US 2002179339 A1 05-12-2002
			US 2003062889 A1 03-04-2003
			US 2004169594 A1 02-09-2004
			AT 165659 T 15-05-1998
			AU 679378 B2 26-06-1997
			AU 2451395 A 05-12-1995
			AU 4435797 A 26-02-1998
			BR 9507650 A 09-09-1997
			CA 2189959 A1 23-11-1995
			CN 1152954 A ,C 25-06-1997
			DE 69502283 D1 04-06-1998
			DE 69502283 T2 05-11-1998
			DK 760087 T3 22-02-1999
			EP 0760087 A1 05-03-1997
			ES 2115382 T3 16-06-1998
			WO 9531696 A1 23-11-1995
			HK 1010796 A1 25-06-1999
			JP 10500481 T 13-01-1998
			SI 760087 T2 31-10-2004
			US 6249234 B1 19-06-2001
			US 5815091 A 29-09-1998
			AT 263359 T 15-04-2004
			AU 748524 B2 06-06-2002
			AU 8222598 A 04-01-1999
			CA 2295047 A1 23-12-1998
			DE 69822828 D1 06-05-2004
			DE 69822828 T2 12-08-2004
			EP 0990122 A1 05-04-2000
			WO 9858237 A1 23-12-1998
			HK 1027619 A1 03-09-2004
			JP 2002508060 T 12-03-2002
<hr/>			
WO 9739312	A	23-10-1997	WO 9739312 A1 23-10-1997
<hr/>			