

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
29 December 2005 (29.12.2005)

PCT

(10) International Publication Number
WO 2005/124289 A3

(51) International Patent Classification:
G01D 5/34 (2006.01)

(74) Agents: **THOMPSON, James F.** et al.; Westborough Office Park, 1700 West Park Drive, Westborough, MA 01581 (US).

(21) International Application Number:
PCT/US2005/019390

(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, KM, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(22) International Filing Date: 2 June 2005 (02.06.2005)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
10/867,096 14 June 2004 (14.06.2004) US

(71) Applicant (*for all designated States except US*): **GSI LUMONICS CORPORATION** [US/US]; 22300 Haggerty Road, Northville, MI 48167 (US).

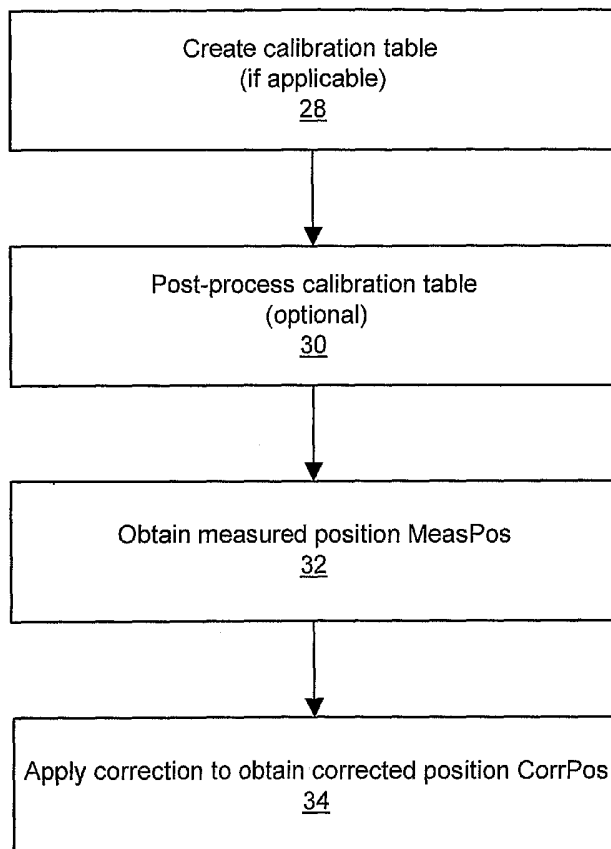
(84) Designated States (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT,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

(72) Inventors; and

(75) Inventors/Applicants (*for US only*): **GOLDMAN, Andrew** [US/US]; 16 Kings Way, #201B, Waltham, MA 02451 (US). **THORBURN, William G.** [US/US]; 24 Rachel Lane, Whitinsville, MA 01588 (US).

[Continued on next page]

(54) Title: ENCODER SCALE ERROR COMPENSATION EMPLOYING COMPARISON AMONG MULTIPLE DETECTORS



(57) Abstract: An encoder calculates position error values and applies compensation values to encoder position measurements in-situ. The encoder includes a scale and a multi-section detector for detecting a spatially periodic pattern, such as an optical interference pattern, produced by the scale. The detector includes spatially separated first and second sections. A signal processor estimates respective phase values from detector sections and calculates a phase difference reflecting a spatial position error in the scale. A compensation value is calculated from the phase difference and included in the estimate of the scale position to compensate for this spatial position error. The compensation values may be calculated and used on the fly, or calculated and saved during an in-situ calibration operation and then utilized during normal operation to compensate uncorrected measurements.

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**Declarations under Rule 4.17:**

- *as to the identity of the inventor (Rule 4.17(i))*
- *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))*

Published:

- *with international search report*

(88) Date of publication of the international search report:
4 May 2006

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/US05/19390

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) : G01D 5/34

US CL : 250/231.13, 231.14, 231.16, 237R, 237G

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)

U.S. : 250/231.13, 231.14, 231.16, 237R, 237G; 356/614-618; 33/1PT; 341/13

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
NONE

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
Please See Continuation Sheet

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X, P	US 6,828,783 B2 (SCHROTER et al) 07 December 2004 (07.12.2004) see entire document.	1, 2, 5, 9-11, 14-19, 21, 22, 26-28
A	US 5,438,330 A (YAMAZAKI et al) 01 August 1995 (01.08.1995) see entire document.	1-30
A	US 5,066,129 A (MATSOI) 19 November 1991 (19.11.1991) see entire document.	1-30
A	US 4,580,046 A (SASAKI et al) 01 April 1986 (01.04.1986) see entire document.	1-30



Further documents are listed in the continuation of Box C.



See patent family annex.

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"A" document defining the general state of the art which is not considered to be of particular relevance	"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
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Date of the actual completion of the international search

19 January 2006 (19.01.2006)

Date of mailing of the international search report

27 JAN 2006

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US

Commissioner for Patents

P.O. Box 1450

Alexandria, Virginia 22313-1450

Facsimile No. (571) 273-3201

Authorized officer

Jose Dees

Telephone No. 571-272-1569

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US05/19390

Continuation of B. FIELDS SEARCHED Item 3:

EAST; US-PGPUB; USPAT; EPO; JPO; DERWENT; (grat\$5 or encod\$5) near5 scale, (calibrat\$5 or compensat\$5 or correct\$5) near5 (value or signal), (calculat\$5 or determin\$5 or measur\$6) near5 (positon\$5 near5 error, (detect\$5 or sens\$5 or measure\$5 or monitor\$5) near5 phase.