



- (51) International Patent Classification:
G01C 19/56 (2006.01) *G01C 19/5607* (2012.01)
G01C 19/5719 (2012.01) *G01P 9/00* (2006.01)
- (21) International Application Number:
PCT/US2012/035367
- (22) International Filing Date:
27 April 2012 (27.04.2012)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
13/096,450 28 April 2011 (28.04.2011) US
- (71) Applicant (for all designated States except US): **CUSTOM SENSORS & TECHNOLOGIES, INC.** [US/US];
14401 Princeton Avenue, Moorpark, California 93021 (US).
- (72) Inventor; and
(75) Inventor/Applicant (for US only): **MOORE, Robert H.** [US/US]; 4904 Cache Peak Drive, Antioch, California 94531 (US).
- (74) Agents: **GILMAN CLARK & HUNTER LLC** et al.; 4th Floor, 176 Federal Street, Boston, Massachusetts 02110 (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, QA, RO, RS, RU, RW, 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,

[Continued on next page]

(54) Title: SENSOR MOUNT VIBRATION REDUCTION

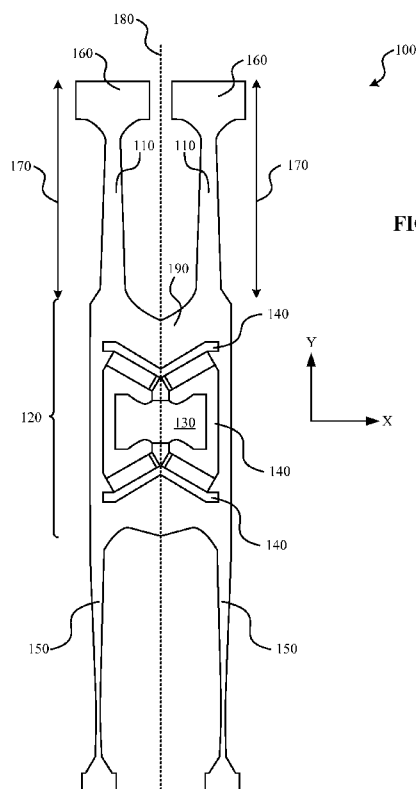


FIG. 1

(57) Abstract: Techniques are provided for reducing mount vibration in an inertial rate sensor (IRS). For example, if oscillation in an IRS's vibratory members, vibrating along a first axis, cause displacement in the IRS's mount along a second axis, the vibratory members can be aligned so that the vibratory members have some component of movement along the second axis during oscillation. This component of movement can help reduce the displacement of the IRS's mount along the second axis. It can further reduce sensitivity to changes in the boundary conditions of an IRS (e.g., vibrations and other movements at the mount from forces external to the IRS). Vibratory members further can have portions of increased mass at the vibratory members' tips, which can impact the alignment of the vibratory members. These examples, however, are not exhaustive.



GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, 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, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

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

(88) Date of publication of the international search report:
28 March 2013

A. CLASSIFICATION OF SUBJECT MATTER*G01C 19/56(2006.01)i, G01C 19/5719(2012.01)i, G01C 19/5607(2012.01)i, G01P 9/00(2006.01)i*

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)

G01C 19/56; H01L 41/04; G01P 9/04

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

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

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

eKOMPASS(KIPO internal) & Keywords: inertial, rate, sensor, vibration, tuning, fork

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2001-0054860 A1 (STUART J. KNOWLES) 27 December 2001 See abstract; paragraphs [0012], [0016]-[0021], [0023], [0025]-[0027]; fig.2.	1-20
A	US 05131273 A (TABATA; MUNEHICO et al.) 21 July 1992 See abstract; column 2, line 42-column 3, line 11; column 4, line 12-column 5, line 31; figs. 1, 2, 5.	1-20
A	JP 2006-275636 A (JAPAN AVIATION ELECTRONICS INDUSTRY LTD) 12 October 2006 See abstract; paragraphs [0001]-[0008], [0024]-[0028], [0038]; figs. 1, 2, 4.	1-20
A	JP 2008-209116 A (FUJITSU MEDIA DEVICE KK) 11 September 2008 See abstract; figs. 1, 10, 13, 18.	1-20



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 application or patent 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 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 NOVEMBER 2012 (29.11.2012)

Date of mailing of the international search report

30 NOVEMBER 2012 (30.11.2012)

Name and mailing address of the ISA/KR

Korean Intellectual Property Office
189 Cheongsu-ro, Seo-gu, Daejeon Metropolitan
City, 302-701, Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

KIM, Hyeong Keun

Telephone No. 82-42-481-8245



INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2012/035367

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2001-0054860 A1	27.12.2001	DE 1085654 T1	23.08.2001
		DE 60032697 D1	15.02.2007
		DE 60032697 T2	04.10.2007
		EP 1085654 A2	21.03.2001
		EP 1085654 A3	27.02.2002
		EP 1085654 B1	03.01.2007
		JP 04118497 B2	16.07.2008
		JP 2001-133269 A	18.05.2001
		US 6262520 B1	17.07.2001
		US 6507141 B2	14.01.2003
US 05131273 A	21.07.1992	EP 0406891 A1	09.01.1991
		EP 0406891 B1	01.06.1994
		JP 03-041312 A	21.02.1991
		JP 03-246415 A	01.11.1991
JP 2006-275636 A	12.10.2006	JP 4262691 B2	13.05.2009
JP 2008-209116 A	11.09.2008	EP 1962055 A2	27.08.2008
		JP 4395171 B2	06.01.2010
		KR 10-0943120 B1	18.02.2010
		KR 10-2008-0078563 A	27.08.2008
		US 2008-0202238 A1	28.08.2008
		US 2010-0229647 A1	16.09.2010
		US 7877848 B2	01.02.2011