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(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, BN, 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, PA, 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.

[Continued on next page]

(54) Title: MULTIPLE DEGREE OF FREEDOM ACTUATOR

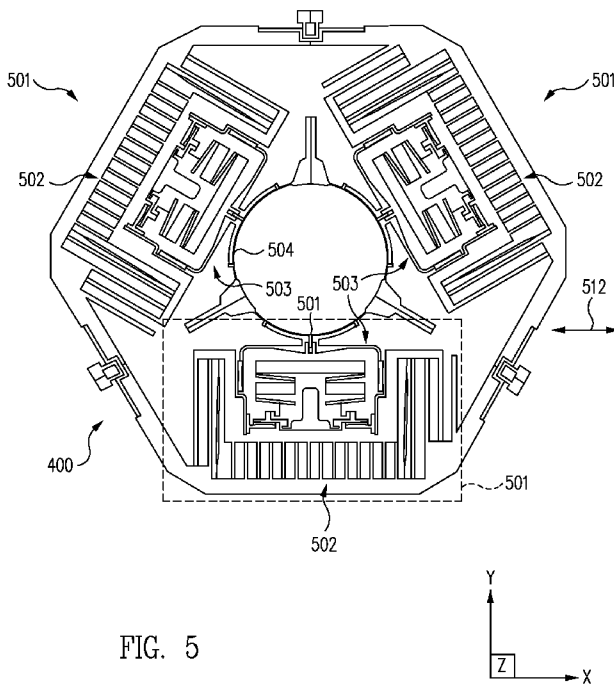
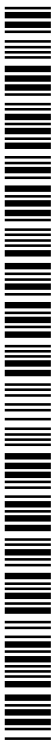


FIG. 5

(57) Abstract: A multiple degree of freedom actuator can have at least one first MEMS actuator configured to move a platform in translation and at least one second MEMS actuator configured to move the platform in a different direction, e.g., tangentially. The first MEMS actuator(s) can facilitate autofocus and/or zoom, for example. The second MEMS actuator(s) can facilitate optical image stabilization (OIS), for example.





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INTERNATIONAL SEARCH REPORT

International application No
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A. CLASSIFICATION OF SUBJECT MATTER
 INV. B81B3/00 G02B7/04 G03B3/00 G03B5/00 H04N5/232
 ADD.
 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)
 B81B G02B G03B H04N

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 practicable, 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.
X	US 6 679 055 B1 (ELLIS MATTHEW D [US]) 20 January 2004 (2004-01-20) column 1, lines 51-64 -----	1-6, 15-19, 21-24,26
X	TAKAHASHI K ET AL: "Switched-Layer Design for SOI Bulk Micromachined XYZ Stage Using Stiction Bar for Interlayer Electrical Connection", JOURNAL OF MICROELECTROMECHANICAL SYSTEMS, IEEE SERVICE CENTER, US, vol. 18, no. 4, 1 August 2009 (2009-08-01), pages 818-827, XP011269187, ISSN: 1057-7157, DOI: 10.1109/JMEMS.2009.2018371 pages 821-823, paragraph IV; figures 5-8 ----- -/--	1,11-14, 20,24

Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents :

<p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier application or patent but published on or after the international filing date</p> <p>"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)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p>	<p>"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</p> <p>"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</p> <p>"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</p> <p>"&" document member of the same patent family</p>
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Date of the actual completion of the international search 19 April 2013	Date of mailing of the international search report 02/05/2013
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Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer Stemmer, Michael
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INTERNATIONAL SEARCH REPORT

International application No
PCT/US2012/058068

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 7 359 131 B1 (GUTIERREZ ROMAN C [US] ET AL) 15 April 2008 (2008-04-15) column 4, line 11 - column 5, line 15; figure 5	1
X	----- US 2003/026547 A1 (TRZECIESKI MIKE [CA]) 6 February 2003 (2003-02-06) paragraph [0045] - paragraph [0057]; figure 4	1
X	----- US 2009/213236 A1 (CHIOU JIN-CHERN [TW] ET AL) 27 August 2009 (2009-08-27) paragraphs [0006] - [0009]	1
X	----- EP 2 264 507 A2 (PIXTRONIX INC [US]) 22 December 2010 (2010-12-22) paragraph [0224] - paragraph [0239]; figure 17	1
X	----- US 2005/000311 A1 (STORM STEFAN [DE]) 6 January 2005 (2005-01-06) paragraphs [0005], [0006]	1
A	----- US 2007/024155 A1 (CALVET ROBERT J [US] ET AL) 1 February 2007 (2007-02-01) paragraphs [0019] - [0061]	1
A	----- US 2010/284081 A1 (GUTIERREZ ROMAN C [US] ET AL) 11 November 2010 (2010-11-11) paragraph [0085]	17
X	----- US 2007/220882 A1 (CULPEPPER MARTIN L [US] ET AL) 27 September 2007 (2007-09-27) paragraphs [0031] - [0042]; figures 1,3	1,7-10, 24-27

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2012/058068

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 all searchable 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: 1-6, 11-24, 26

device and method for translational movement of a platform along two perpendicular axes by MEMS actuators solving the problem of miniaturization of an x-y stage by using MEMS actuators

2. claims: 7-10, 25, 27

device comprising three actuators for rotating a platform about two rotational axes, with solving the problem of gaining rotational degree of freedom

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No PCT/US2012/058068

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6679055	B1	20-01-2004	NONE

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			US 2011304914 A1 15-12-2011

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			WO 2007098277 A2 30-08-2007
