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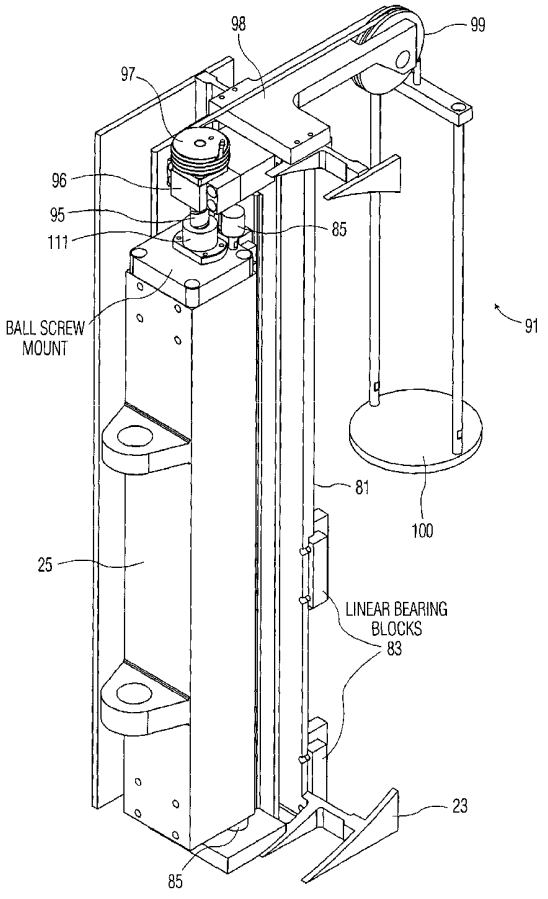
[Continued on next page]

(54) Title: VERTICAL COUNTER BALANCED TEST HEAD MANIPULATOR



(57) Abstract: A positioner, such as a test head carrier for a semiconductor wafer and device tester, includes a vertical support and a main arm for supporting a test head. The main arm is suspended for vernier movement by use of a counterbalancing force such as counterweights. The suspension of the main arm is performed at a mechanical advantage so that reduced counterblancing force and correspondingly large movements on the counterblance side are used to effect the vernier movement. The vertical support may be adjusted with a non-compliant drive such as a ball screw mechanism. The vernier movement can also be used to sense collisions and other positioning errors and actuation of the drive for the vertical support can be controlled accordingly.

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patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:
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6 September 2002

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INTERNATIONAL SEARCH REPORT

Int ›nal Application No
F..., US 01/06456

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G01R1/073

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, 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	US 6 009 670 A (HOWARD GLENN) 4 January 2000 (2000-01-04) abstract; claim 1; figure 3	1
Y		4,11,21

X	US 5 603 677 A (SOLLO ROBERT E) 18 February 1997 (1997-02-18) abstract	2,3,17, 18

Y	US 5 818 219 A (HAMA HIROYUKI ET AL) 6 October 1998 (1998-10-06) abstract figure 5	4,5,11, 17,21

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[X] Further documents are listed in the continuation of box C.

[X] 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

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"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
10 January 2002	26.04.02

Name and mailing address of the ISA	Authorized officer
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	Vytlacilová, L

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Int ...nal Application No
P.../JS 01/06456

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5 059 089 A (KOCAOGLAN HARUTYUN A) 22 October 1991 (1991-10-22) abstract	5
A		12,13
Y		17

A	EP 0 609 633 A (MEGAMATION INC) 10 August 1994 (1994-08-10) abstract	7,14,15

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

national application No.
PCT/US 01/06456

Box I Observations where certain claims were found unsearchable (Continuation of item 1 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 II Observations where unity of invention is lacking (Continuation of item 2 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 fee, this Authority did not invite payment of any additional fee.

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.:

1-39

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ 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: 1-39

   An apparatus for supporting a load comprising a coupling mechanism having a mechanical advantage greater than one

2. Claims: 40 - 89

   An apparatus for sensig a laod condition

INTERNATIONAL SEARCH REPORT

rmation on patent family members

Int ɔnal Application No
PCT/US 01/06456

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