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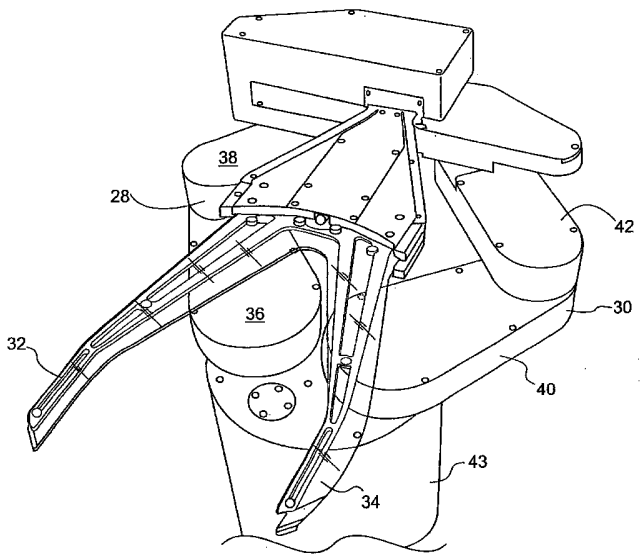
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Published:
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— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

[Continued on next page]

(54) **Title:** ENDEFFECTORS FOR HANDLING SEMICONDUCTOR WAFERS



(57) **Abstract:** Various endeffector designs are disclosed for handling semiconductor wafers. For instance, an endeffector for handling wafers at a relatively low temperature is disclosed along with an endeffector for handling wafers at a relatively high temperature. Both endeffectors include uniquely designed support members that are configured to only contact a wafer at the wafer's edge. The endeffectors may also include a wafer detection system. The endeffector for handling wafers at relatively low temperatures may also include a pushing device that is used not only to position a wafer but to hold a wafer on the endeffector during acceleration or deceleration of the endeffector caused by a robot arm attached to the endeffector. As designed, the endeffectors may have a very slim profile making the endeffectors easily maneuverable.

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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
US2004/008767

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H01L21/00 H01L21/68

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 H01L

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 5 133 635 A (MALIN ET AL) 28 July 1992 (1992-07-28) abstract; claims; figures column 4, line 63 - column 6, line 21	1-6,9, 10,15,17
Y		13,14, 16,19,20
X	US 6 283 701 B1 (SUNDAR SATISH ET AL) 4 September 2001 (2001-09-04) abstract; claims; figures 19-22 column 14, line 49 - column 20, line 44	1-6,15
Y	US 5 810 935 A (LEE ET AL) 22 September 1998 (1998-09-22) abstract; claims; figures 1-8	13,14, 19,20

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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

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"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
14 April 2005	18. 07. 2005

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	Hamdani, F

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INTERNATIONAL SEARCH REPORT

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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 5 022 695 A (AYERS ET AL) 11 June 1991 (1991-06-11) abstract; claims; figures 1,4	16
A	US 2003/052497 A1 (HOLBROOKS ORVILLE RAY) 20 March 2003 (2003-03-20) abstract; claims; figures	1
A	US 2003/053902 A1 (YOKOTA CHUCKSON ET AL) 20 March 2003 (2003-03-20) abstract; claims; figures	1

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INTERNATIONAL SEARCH REPORT

PCT/US2004/008767

Box 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 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 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.:

1-7,9,10,13-17,19,20

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: 1-7,9,10,13-17,19,20

Endeffector comprising biasing means and pneumatic actuator.

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2. claim: 8

Endeffector comprising suction device.

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3. claims: 21-32

Endeffector comprising light sensor for detecting wafers.

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4. claims: 33-46,11,12

Endeffector with maximum profile height less than about 12 mm.

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5. claims: 47-59

Endeffector comprising support member with sloping surface.

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6. claims: 60-85,18

Endeffector comprising a plurality of emergency pins.

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7. claims: 86-100

Endeffector comprising an arcuate support member tapering from radius range of 0.75 mm around the wafer radius.

INTERNATIONAL SEARCH REPORT

International Application No
US2004/008767

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