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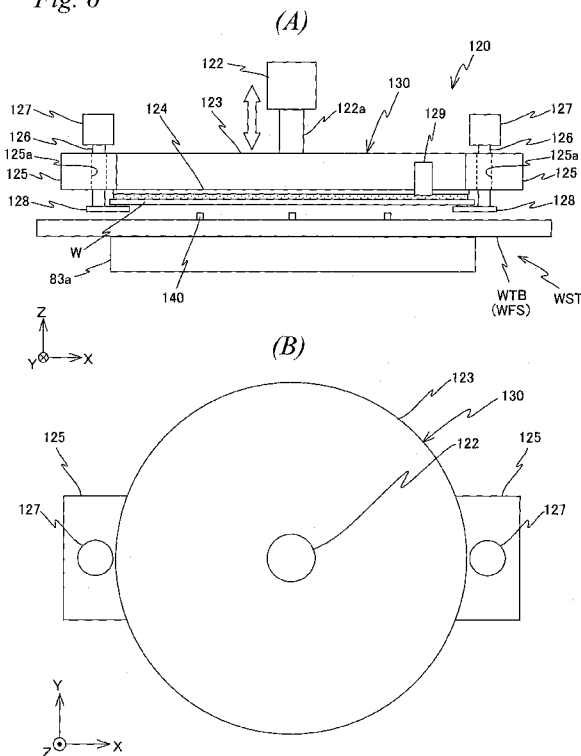
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(71) Applicant: **NIKON CORPORATION** [JP/JP]; 12-1,
Yurakucho 1-chome, Chiyoda-ku, Tokyo, 1008331 (JP).(72) Inventor: **SHIBAZAKI, Yuichi**; c/o NIKON CORPORA-
TION, 12-1, Yurakucho 1-chome, Chiyoda-ku, Tokyo,
1008331 (JP).(74) Agent: **TATEISHI, Atsuji**; TATEISHI & CO., Karakida
Center Bldg., 1-53-9, Karakida, Tama-shi, Tokyo, 2060035
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[Continued on next page]

(54) Title: APPARATUS FOR LOADING A FLEXIBLE SUBSTRATE AND A LITHOGRAPHY APPARATUS

Fig. 6

(57) Abstract: A carrier system is equipped with a fine move-
ment stage (WFS) which holds a wafer (W) that is mounted and
can move along a predetermined plane, a chuck main section
(130) which holds the wafer from above in a non-contact manner
and can move vertically, and vertical movement pins (140) which
can support the wafer held by the chuck main section on the fine
movement stage from below and are vertically movable. And, a
controller drives the chuck main section and the vertical move-
ment pins downward until a lower surface of the wafer comes
into contact with the fine movement stage while maintaining a
hold state by the chuck main section to the wafer and a support
state by the vertical movement pins to the wafer, and releases the
hold state and the support state.



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,
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INTERNATIONAL SEARCH REPORT

International application No
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A. CLASSIFICATION OF SUBJECT MATTER
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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)
G03F

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	EP 2 053 648 A1 (TOKYO ELECTRON LTD [JP]) 29 April 2009 (2009-04-29)	1,10-15
Y	abstract figures 1-3 paragraphs [0001], [0007], [0025] - [0039], [0048]	8,9,16, 17,91, 94-96, 111
Y	EP 1 063 186 A1 (NIPPON KOGAKU KK [JP]) 27 December 2000 (2000-12-27) abstract figure 11 paragraphs [0001], [0139], [0155] - [0157] ----- -/--	8,9,16, 17,91, 94-96, 111



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 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

"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

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European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

Andersen, Ole

INTERNATIONAL SEARCH REPORT

International application No
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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.
X	JP H05 102287 A (HITACHI LTD; HITACHI TOKYO ELECTRONICS) 23 April 1993 (1993-04-23) abstract figures 1-4 paragraphs [0001], [0010], [0026] - [0038] -----	24
A	WO 2011/062296 A2 (NIPPON KOGAKU KK [JP]; YOSHIMOTO HIROMITSU [JP]) 26 May 2011 (2011-05-26) abstract figures 1,5 page 1, lines 8,9 page 44, line 9 - page 46, line 17 -----	1,10,24, 32,91
A	US 2010/157274 A1 (SHIBAZAKI YUICHI [JP]) 24 June 2010 (2010-06-24) abstract figures 1-4 paragraphs [0003] - [0010], [0045] - [0047], [0055], [0056], [0172] -----	1,10,24, 32,91
A	WO 2011/068254 A1 (NIPPON KOGAKU KK [JP]; YOSHIMOTO HIROMITSU [JP]) 9 June 2011 (2011-06-09) abstract figure 1 page 1, line 12 - page 2, line 18 -----	1,10,24, 32,91

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2012/084311

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.:

1-17, 24-35, 91-111

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: 1-17, 24-35, 91-111

Closest prior art: carrier system and corresponding carrier method for carrying a wafer as known from WO 2011/062296 A. The carrier system comprises amovable holding device (fine motion stage WFS2) and a vertically-movablesuction member (Bernoulli chuck 108) for holding the wafer from above in a non-contact manner. The carrier system is configured such that a wafer is loaded onto the movable holding device by driving the suction member downwards while holding the wafer in a non-contact manner from above and releasing support by the suction member when the lower surface of the wafer comes into contact with the movable holding member (see page 44, line 9 - page 46, line 17 & fig. 5).

Special technical feature: the carrier system comprises a support member forming part of the holding device for supporting the wafer and the carrier system is configured such that the wafer is supported by both the suction member and the support member while being lowered onto the movable holding device.

Technical effect: lateral movement of the wafer during loading is restricted (page 110, line 3 - page 113, line 21 in particular page 111, lines 11 - 28 of the application as filed).

Problem solved: poor lateral positioning accuracy (position reproducibility) of the carrier system (page 4, lines 16 - 19).

2. claims: 18-23, 112-123

Closest prior art: same as for group 1.

Special technical feature: part of the wafer is displaced in a direction perpendicular to the plane of the wafer such as to suppress deformations of the wafer.

Technical effect: the wafer is flattened prior to loading it onto the movable holding device (page 6, lines 3 - 16 of the application as filed).

Problem solved: poor focusing performance of the imaging process.

3. claims: 36-50

Closest prior art: immersion exposure apparatus and method for next-generation wafers (i.e. 450 mm wafers) as known from US 2010/157274 A. The apparatus comprises afirst movable body WST1 , anexposure section 200 having anoptical system PL , ameasurement section 300 . The measurement section comprises a plurality of mark detection systems AL1, AL21 , AL22 , AL23 , AL24 having separate detection areas positioned along asecond direction X perpendicular to afirst

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

direction Y along which the exposure section and the measurement section are separated (see paragraphs 3 - 10, 45 - 47, 55, 56 & figs. 1 - 4). US 2010/157274 A discloses that the wafer loading- and unloading positions are in the vicinity of the measurement section 300 (paragraph 172).

Special technical feature: the exposure apparatus is configured such that a positional relation between the optical system and the plurality of mark detection systems is set so that no part of the first movable body comes into contact with the liquid immersion area until detection of the plurality of marks is completed, when the first movable body is moved from a loading position set on one side in the first axis direction of the measurement section toward the exposure section, and detection of the marks on the object is performed part way on the movement path by the plurality of mark detection systems.

Technical effect: the movable body can perform movement at a high speed and with high acceleration in the movement path from the loading position to the exposure station (see page 153, line 11 - page 154, line 16 of the application as filed).

Problem solved: maintaining throughput with next-generation wafer sizes (see page 3, lines 16 - 22 & page 160, lines 16 - 28 of the application as filed).

4. claims: 51-90

Closest prior art: same as for group 3.

Special technical feature: the immersion exposure apparatus is arranged such that the unloading position, where carry-out of the wafer from an area on the first movable body is performed, is located in a particular position with respect to the exposure section, measurement section and the wafer loading position.

Technical effect: time required between end of exposure and unloading of wafer is reduced (see page 154, lines 1 - 5 of the application as filed).

Problem solved: same as for group 3.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/JP2012/084311

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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