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Published:

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(54) Title: CHARGED PARTICLE MULTI-BEAMLET APPARATUS

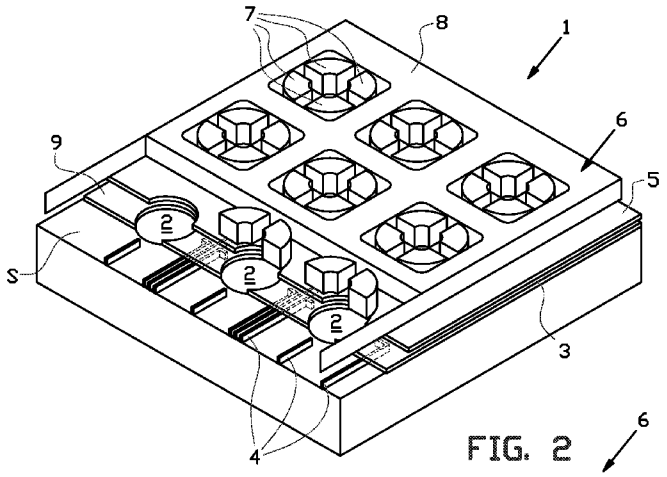

FIG. 2

(57) Abstract: The invention relates to a method and a device for manipulation of one or more charged particle beams of a plurality of charged particle beamlets in a charged particle multi-beamlet apparatus. The manipulator device comprises a planar substrate comprising an array of through openings in the plane of the substrate, each of these through openings is arranged for passing the at least one charged particle beamlet there through, wherein each of the through openings is provided with one or more electrodes arranged around the through opening, and a electronic control circuit for providing control signals to the one or more electrodes of each through opening, wherein the electronic control circuit is arranged for providing the one or more electrodes of each individual through opening with an at least substantially analog adjustable voltage.

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INTERNATIONAL SEARCH REPORT

International application No
PCT/NL2012/050376

A. CLASSIFICATION OF SUBJECT MATTER
INV. H01J37/317
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)
H01J

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	US 6 175 122 B1 (GROVES TIMOTHY R [US] ET AL) 16 January 2001 (2001-01-16) column 4, line 41 - column 6, line 56 -----	1,3-11, 39-42 2,34
Y	WO 2010/134026 A2 (MAPPER LITHOGRAPHY IP BV [NL]; VAN DE PEUT TEUNIS [NL]; WIELAND MARCO) 25 November 2010 (2010-11-25) paragraph [0043] -----	2,34
X	JP 2004 165076 A (ADVANTEST CORP) 10 June 2004 (2004-06-10) paragraphs [0042], [0069] - [0071]; figure 13 -----	1,4-11, 39-42

☐ 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

Date of the actual completion of the international search	Date of mailing of the international search report
30 August 2012	07/12/2012

Name and mailing address of the ISA/	Authorized officer
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INTERNATIONAL SEARCH REPORT

International application No.
PCT/NL2012/050376

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.:

1-11, 34, 39-42

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: 1-11, 34, 39-42

   Method and apparatus using a beamlet manipulator device, allowing individual ajustment of beamlets in a substantially analog way, with a sensor determining a characteristic of the beamlets, providing individual control to the manipulator device.

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2. claims: 12-17

   Method and apparatus using a beamlet manipulator device, allowing individual ajustment of beamlets in a substantially analog way, having at least part of the control circuit for the manipulator device integrated on its substrate.

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3. claims: 18-21

   Method and apparatus using a beamlet manipulator device, allowing individual ajustment of beamlets in a substantially analog way, having electrodes made of metal.

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4. claims: 22-26

   Method and apparatus using a beamlet manipulator device, allowing individual ajustment of beamlets in a substantially analog way, wherein the electrodes are surrounded by grounded electrodes

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5. claims: 27, 28

   Method and apparatus using a beamlet manipulator device, allowing individual ajustment of beamlets in a substantially analog way, wherein the electrode lead conductors are surrounded by grounded conductors

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6. claims: 29-33

   Method and apparatus using a beamlet manipulator device, allowing individual ajustment of beamlets in a substantially analog way, using a demultiplexer or otherwise reducing the data transfer.

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7. claims: 35-38

   Method and apparatus using two beamlet manipulator devices, allowing individual ajustment of beamlets in a substantially

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

analog way.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/NL2012/050376

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6175122 B1	16-01-2001	NONE	
WO 2010134026 A2	25-11-2010	CN 102460631 A	16-05-2012
		EP 2433295 A2	28-03-2012
		KR 20120036876 A	18-04-2012
		TW 201123253 A	01-07-2011
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JP 2004165076 A	10-06-2004	NONE	