(19) World Intellectual Property Organization International Bureau





(43) International Publication Date 22 November 2001 (22.11.2001)

PCT

(10) International Publication Number WO 01/88638 A3

(51) International Patent Classification⁷: G05B 13/02, B23K 26/08

(21) International Application Number: PCT/US01/15553

(22) International Filing Date: 15 May 2001 (15.05.2001)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:

60/204,275 16 May 2000 (16.05.2000) US

- (71) Applicant (for all designated States except US): GEN-ERAL SCANNING, INC. [US/US]; 60 Fordham Road, Wilmington, MA 01877 (US).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): HUNTER, Bradley, L. [US/US]; 48 Peacock Farm Road, Lexington, MA 02421 (US). ANDREI, Paul [US/US]; 93 Cameron Drive, Marlborough, MA 01752 (US).
- (74) Agents: SYROWIK, David, R. et al.; Brooks & Kushman, 22nd floor, 1000 Town Center, Southfield, MI 48075 (US).

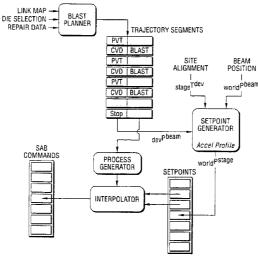
- (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.
- (84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian 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:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments
- (88) Date of publication of the international search report:

[Continued on next page]

(54) Title: METHOD AND SUBSYSTEM FOR DETERMINING A SEQUENCE IN WHICH MICROSTRUCTURES ARE TO BE PROCESSED



(57) Abstract: Method and subsystem are provided for determining a sequence in which microstructures are to be processed at a laser-processing site by taking into account microstructures located near travel limits of a motor-driven stage. The method includes receiving reference data which represent locations of microstructures to be processed at the site and coalescing adjacent groups of microstructures into clusters of microstructures including edge clusters which contain the microstructures located near the travel limits of the motor-driven stage which moves the microstructures relative to a laser beam at the site. The method also includes dividing a cluster fragment from each edge cluster. The cluster fragments contain the microstructures located near the travel limits. The method then includes sorting the clusters and cluster fragments to obtain data which represent a substantially optimum sequence in which the microstructures are to be processed to increase throughput at the site.



VO 01/88638 A3



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

In ational Application No

A. CLASSIFICATION OF SUBJECT MATTER IPC 7 G05B13/02 B23K B23K26/08 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 G05B 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 C. DOCUMENTS CONSIDERED TO BE RELEVANT Relevant to claim No. Citation of document, with indication, where appropriate, of the relevant passages 1,6 Α WO OO 17724 A (GEN SCANNING INC) 30 March 2000 (2000-03-30) cited in the application page 12, line 17 -page 14, line 10 1,6 EP 0 862 089 A (NIPPON KOGAKU KK) Α 2 September 1998 (1998-09-02) claim 1 EP 0 864 929 A (NIPPON KOGAKU KK) 1.6 Α 16 September 1998 (1998-09-16) claim 1 US 5 808 887 A (TROVATO KAREN IRENE ET 1,6 Α AL) 15 September 1998 (1998-09-15) column 3, line 46 -column 6, line 42 Further documents are listed in the continuation of box C. Patent family members are listed in annex ° Special categories of cited documents "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 "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 "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to filing date involve an inventive step when the document is taken alone "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another "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 docucitation or other special reason (as specified) ments, such combination being obvious to a person skilled in the art. "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 "&" document member of the same patent family Date of mailing of the international search report Date of the actual completion of the international search 16/04/2002 10 April 2002 Authorized officer Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl. Kelperis, K Fax: (+31-70) 340-3016

1

INTERNATIONAL SEARCH REPORT

In' ational Application No
PUI/US 01/15553

	ation) DOCUMENTS CONSIDERED TO BE RELEVANT	
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	KOHNO Y: "PATH PLANNING IN WAFER TRANSFER SYSTEM WITH MOBILE ROBOT" PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON INDUSTRIAL ELECTRONICS, CONTROL AND INSTRUMENTATION. (IECON). INDUSTRIAL APPLICATIONS OF MINI, MICRO & PERSONAL COMPUTERS. MILWAUKEE, SEPT. 29 - OCT. 3, 1986, NEW YORK, IEEE, US, vol. 2, 29 September 1986 (1986-09-29), pages 811-816, XP000044825	
Α	US 5 871 805 A (LEMELSON JEROME) 16 February 1999 (1999-02-16) figure 3	
Α	WO 99 28798 A (LACENT TECHNOLOGIES INC) 10 June 1999 (1999-06-10) claim 1	
A	US 5 200 677 A (DUECK GUNTER ET AL) 6 April 1993 (1993-04-06) the whole document	1,6

INTERNATIONAL SEARCH REPORT

Information on patent family members

In' ational Application No PCT/US 01/15553

Patent document cited in search report	Publication date		Patent family member(s)	Publication date
WO 0017724 A	30-03-2000	US DE EP TW WO	6144118 A 19982072 TO 1055163 A1 449680 B 0017724 A1	07-11-2000 04-01-2001 29-11-2000 11-08-2001 30-03-2000
EP 0862089 A	02-09-1998	EP JP	0862089 A2 10303126 A	02-09-1998 13-11-1998
EP 0864929 A	16-09-1998	JP EP US	10312961 A 0864929 A2 2001053962 A1	24-11-1998 16-09-1998 20-12-2001
US 5808887 A	15-09-1998	US US DE DE EP JP KR US US	5751573 A 5764510 A 5220497 A 3853616 D1 3853616 T2 0317020 A2 1205205 A 2840608 B2 133294 B1 5870303 A 6324476 B1 5663879 A	12-05-1998 09-06-1998 15-06-1993 24-05-1995 30-11-1995 24-05-1989 17-08-1989 24-12-1998 24-04-1998 09-02-1999 27-11-2001 02-09-1997
US 5871805 A	16-02-1999	NONE		
WO 9928798 A	10-06-1999	AU CA WO EP US US	1477599 A 2312348 A1 9928798 A2 1044397 A2 6294755 B1 6194566 B1	16-06-1999 10-06-1999 10-06-1999 18-10-2000 25-09-2001 27-02-2001
US 5200677 A	06-04-1993	EP	0523270 A1	20-01-1993