#### (12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

## (19) World Intellectual Property Organization International Bureau





# (43) International Publication Date 16 January 2003 (16.01.2003)

#### **PCT**

# (10) International Publication Number WO 03/004280 A3

(51) International Patent Classification<sup>7</sup>: B29C 67/00

B41J 2/21,

(21) International Application Number: PCT/CA01/00996

(22) International Filing Date: 5 July 2001 (05.07.2001)

(25) Filing Language:

English

(26) Publication Language:

English

(71) Applicant (for all designated States except US): CREO SRL [CA/CA]; c/o Creo Products Inc., 3700 Gilmore Way, Burnaby, British Columbia V5G 4M1 (CA).

(72) Inventors; and

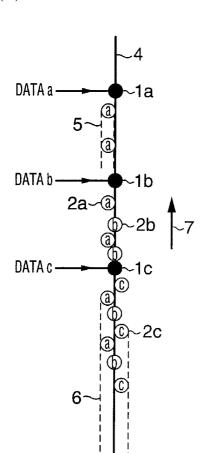
(75) Inventors/Applicants (for US only): GELBART, Daniel [CA/CA]; 4688 Pine Crescent, Vancouver, British Columbia V6J 4L2 (CA). MICHELSON, Amos [CA/CA]; c/o

Creo Products Inc., 3700 Gilmore Way, Burnaby, British Columbia V5G 4M1 (CA).

- (74) Agent: MANNING, Gavin, N.; OYEN WIGGS GREEN & MUTALA, 480 601 West Cordova Street, Vancouver, British Columbia V6B 1G1 (CA).
- (81) Designated States (national): AE, AG, AL, AM, AT (utility model), AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ (utility model), CZ, DE (utility model), DE, DK (utility model), DK, DM, DZ, EC, EE (utility model), EE, ES, FI (utility model), 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 (utility model), 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

[Continued on next page]

(54) Title: IMPROVED UNIFORMITY INK JET SYSTEM



WO 03/004280 A3

(57) Abstract: Ink jet printers and other systems using multi-nozzle ink jet heads can be made to print with a high degree of uniformity by assigning multiple jets (1-a, 1-b, 1-c) to each track (6). In order to avoid the throughput loss caused by simple overwriting, the marks created by the nozzles of a given track write in an interleaved mode, with interleaving performed along the track. Since each track is formed by multiple nozzles a high degree of redundancy can be achieved at a low overhead by having one or more spare nozzles (1-e) in each track.

### WO 03/004280 A3



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).

#### **Declarations under Rule 4.17:**

- as to the identity of the inventor (Rule 4.17(i)) for all designations
- of inventorship (Rule 4.17(iv)) for US only

#### Published:

with international search report

### (88) Date of publication of the international search report: 7 August 2003

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

nal Application No PCT/CA 01/00996

A. CLASSIFICATION OF SUBJECT MATTER IPC 7 B41J2/21 B29C67/00 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 B41J B29C 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. 1,2,8, US 4 540 996 A (SAITO SEIJI) χ 10 September 1985 (1985-09-10) 13,14, 18,20 Υ figures 2,4,8,9,12 5,9,12, 16,19-21 χ WO 99 54139 A (DUCHOVNE YORAM ; SCITEX WIDE 1,2,8, 13,14 FORMAT PRINTING LT (IL)) 28 October 1999 (1999-10-28) figures 2A, 2B, 4 column 4, line 9 - line 11 χ US 5 767 875 A (SAWADA HIDEKI) 8,13,14, 16 June 1998 (1998-06-16) 18 figures 3,5

χ Further documents are listed in the continuation of box C.	Patent family members are listed in annex.
<ul> <li>Special categories of cited documents:</li> <li>"A" document defining the general state of the art which is not considered to be of particular relevance</li> <li>"E" earlier document but published on or after the international filling date</li> <li>"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)</li> <li>"O" document referring to an oral disclosure, use, exhibition or other means</li> <li>"P" document published prior to the international filling date but later than the priority date claimed</li> </ul>	<ul> <li>"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</li> <li>"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</li> <li>"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.</li> <li>"&amp;" document member of the same patent family</li> </ul>
Date of the actual completion of the international search	Date of mailing of the international search report
13 February 2002	22/02/2002
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	Bardet, M

#### INTERNATIONAL SEARCH REPORT

Internation No
PCT/CA 01/00996

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT  Category Citation of document, with indication, where appropriate, of the relevant passages Relevant to claim						
Jaiegury		nelevalit to Galffi No.				
Х	EP 0 931 668 A (FUJI PHOTO FILM CO LTD) 28 July 1999 (1999-07-28) figures 2,4C,5C page 5, paragraphs 30-34	1,8,13, 14,18				
Y	US 5 640 183 A (HACKLEMAN DAVID E) 17 June 1997 (1997-06-17) figure 5	5,9,19, 20				
Y	WO 00 52624 A (GOTHAIT HANAN ;OBJET GEOMETRIES LTD (IL)) 8 September 2000 (2000-09-08) abstract; figure 4	12,16,21				
A	PATENT ABSTRACTS OF JAPAN vol. 009, no. 252 (M-420), 9 October 1985 (1985-10-09) & JP 60 104338 A (CANON KK), 8 June 1985 (1985-06-08) abstract; figures 1,3	5,9,19				
		,				

#### INTERNATIONAL SEARCH REPORT

Information on patent family members

Interior No
PCT/CA 01/00996

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
US 4540996	A	10-09-1985	JP JP JP JP JP JP DE	1730020 C 4019029 B 58194540 A 58194543 A 1706587 C 3076226 B 58194544 A 3317079 A1	29-01-1993 30-03-1992 12-11-1983 12-11-1983 27-10-1992 04-12-1991 12-11-1983 17-11-1983
WO 9954139	A	28-10-1999	AU EP WO	3343699 A 1073967 A2 9954139 A2	08-11-1999 07-02-2001 28-10-1999
US 5767875	A	16-06-1998	JP	8224911 A	03-09-1996
EP 0931668	Α	28-07-1999	EP JP	0931668 A2 11277732 A	28-07-1999 12-10-1999
US 5640183	Α	17-06-1997	JP	8048040 A	20-02-1996
WO 0052624	A	08-09-2000	US AU WO	6259962 B1 2823900 A 0052624 A1	10-07-2001 21-09-2000 08-09-2000
JP 60104338	A	08-06-1985	JP JP	1769915 C 4060023 B	30-06-1993 24-09-1992