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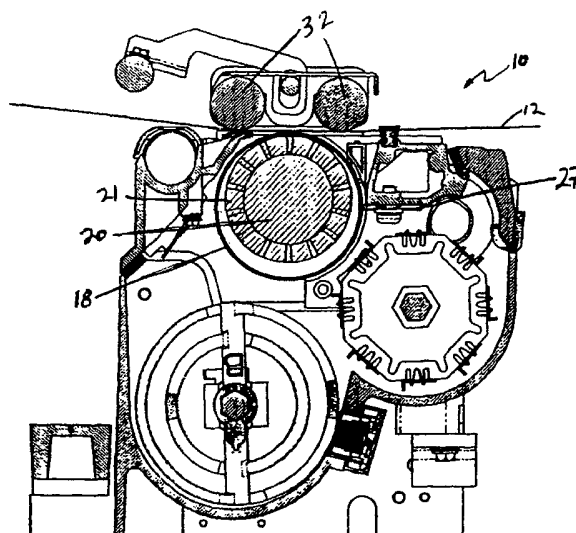
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- (71) Applicant (for all designated States except US): EAST-MAN KODAK COMPANY [US/US]; 343 State Street, Rochester, NY 14650 (US).
- (72) Inventors: STELTER, Eric, C.; 10 Oak Meadow Trail, Pittsford, NY 14534 (US). GUTH, Joseph, E.; 4616 Bennetts Corners Road, Holley, NY 14470 (US).
- (74) Agent: LEFFEL, Kevin, L.; Heidelberg Digital L.L.C., 2600 Manitou Road, Rochester, NY 14624 (US).
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[Continued on next page]

(54) Title: ELECTROGRAPHIC IMAGE DEVELOPING APPARATUS AND PROCESS



(57) Abstract: Apparatus and methods for electrographic image development, wherein the image development process is optimized by subjecting the developer to magnetic field maxima, thereby imparting to the developer a velocity component in a direction perpendicular to the process direction, ensuring that the toner particles thus accelerated have sufficient kinetic energy to overcome the binding energy binding the toner particles to the carrier particles in the developer, and to be deposited on a receiver bearing an electrostatic latent image. The optimized image is developed to completion, where development to completion is characterized by a proportionality between the cube of the toner charge to mass ratio and a quantity consisting of the magnitude of the voltage of the toning shell minus the magnitude of the voltage of the toned image

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# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US04/10105

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC(7) : G03G 15/09  
 US CL : 399/267

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)  
 U.S. : 399/53, 55, 267, 270, 272, 282, 277, 728, 265; 430/122, 111.1, 111.4, 111.41

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched  
 NONE

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
 Please See Continuation Sheet

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

| Category * | Citation of document, with indication, where appropriate, of the relevant passages   | Relevant to claim No.    |
|------------|--|--------------------------|
| X          | US 4,602,863 A (FRITZ et al) 29 July 1986 (29.07.1986), Figure 5a; column 3, lines 17-27; column 9, lines 27-32; column 12, lines 49-60; column 14, lines 27-32. | 1, 5, 7, 24, 28<br>----- |
| ---        |  |                          |
| Y          |  | 4, 6, 27, 29             |
| Y          | US 2003/0035663 A1 (OYAMA et al) 20 February 2003 (20.02.2003), paragraphs 0043-0044.  | 4, 6, 27, 29             |
| A          | US 4,473,029 A (FRITZ et al) 25 September 1984 (25.09.1984), see entire document.  | 1-36                     |
| A          | US 5,376,492 A (STELTER et al) 27 December 1984 (27.12.1984), see entire document.   | 1-36                     |
| A          | US 5,489,975 A (KAUKEINEN et al) 06 February 1996 (06.02.1996), see entire document.   | 1-36                     |
| A          | US 5,839,020 A (RUSHING et al) 17 November 1998 (17.11.1998), see entire document.   | 1-36                     |
| A          | US 2002/0168200 A1 (STELTER et al) 14 November 2002 (14.11.2002), see entire document.   | 1-36                     |
| A          | EP 0 625 734 A1 (STELTER et al) 05 June 1994 (05.06.1994), see entire document.  | 1-36                     |

Further documents are listed in the continuation of Box C.

See patent family annex.

| * Special categories of cited documents:  | "T"  |
|---|--|
| "A" document defining the general state of the art which is not considered to be of particular relevance  | 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  |
| "E" earlier application or patent published on or after the international filing date   | "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   |
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| "O" document referring to an oral disclosure, use, exhibition or other means  | "&" document member of the same patent family  |
| "P" document published prior to the international filing date but later than the priority date claimed  |  |

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Mail Stop PCT, Attn: ISA/US  
 Commissioner for Patents  
 P.O. Box 1450  
 Alexandria, Virginia 22313-1450

Facsimile No. (703) 305-3230

Authorized officer

JOSE G. DEES

Telephone No. (571) 272-1607

*Renee Pabla*

# INTERNATIONAL SEARCH REPORT

International application No.  
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## Continuation of B. FIELDS SEARCHED Item 3:

EAST: US-PGPUB; USPAT; EPO; JPO

search terms: (magnet\$6 adj1 pole\$1) near2 transit\$4; pole\$1 adj3 per adj2 second\$1; (magnet\$6 adj3 pole\$1) near2 transit\$4 and pole\$1 adj3 per adj2 second\$1; (charg\$3 adj2 mass\$2) near3 ratio\$1; (charg\$3 adj2 mass\$2) near3 ratio\$1 with toner\$1; (charg\$3 adj2 mass\$2) near3 ratio\$1 with toner\$1 same (voltage\$1 or potential\$1); (charg\$3 adj1 per adj1 toner\$1) same (voltage\$1 or potential\$1); (toner\$1 near2 charg\$3) with (carrier\$1 near2 charg\$3); (toner\$1 near2 charg\$3) with (carrier\$1 near2 charg\$3) with proportion\$4; (dielectric\$4 or insulat\$3) with (diameter\$1 or size\$1 or radius) with carrier\$1; dielectric adj1 length\$1