

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
28 February 2002 (28.02.2002)

PCT

(10) International Publication Number
WO 02/17309 A3

(51) International Patent Classification⁷: **G11B 7/013**,
7/09, 11/105

(21) International Application Number: PCT/JP01/07069

(22) International Filing Date: 16 August 2001 (16.08.2001)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
2000-248486 18 August 2000 (18.08.2000) JP

(71) Applicant (for all designated States except US): **MAT-SUSHITA ELECTRIC INDUSTRIAL CO., LTD.**
[JP/JP]; 1006-banchi, Oaza-Kadoma, Kadoma-shi, Osaka
571-8501 (JP).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **HINO, Yasumori**
[JP/JP]; 13-55, Shikanodaihigashi 1-chome, Ikoma-shi,
Nara 630-0112 (JP). **SHIOYA, Masayoshi** [JP/JP];

1-19-1-618, Higashiarioka, Itami-shi, Hyogo 664-0845
(JP). **HIRANO, Kazumasa** [JP/JP]; 45-3, Matsuki,
Tamana-shi, Kumamoto 865-0052 (JP). **YUMITA, Shohei**
[JP/JP]; 2-24-1, Takaramachi, Kasuga-shi, Fukuoka
816-0807 (JP).

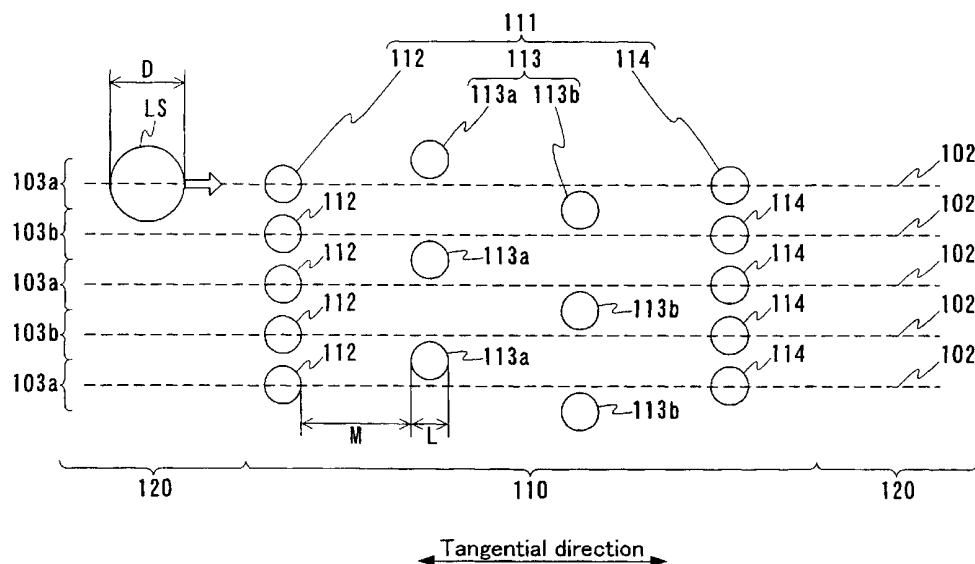
(74) Agent: **IKEUCHI SATO & PARTNER PATENT AT-TORNEYS**; Suite 401, UMEDA PLAZA Building, 3-25,
Nishitenma 4-chome, Kita-ku, Osaka-shi, Osaka 530-0047
(JP).

(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, 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,

[Continued on next page]

(54) Title: INFORMATION RECORDING MEDIUM AND RECORDING/REPRODUCING METHOD THEREOF



(57) Abstract: An information recording medium for reproducing information by irradiation with a laser beam condensed by an objective lens with a numerical aperture NA includes a disk-shaped substrate and a recording layer disposed on the substrate. On the surface of the substrate, a plurality of prepit regions (110) and a plurality of data regions (120) are disposed alternately along spiral or concentric virtual track centers. Each prepit region includes a pair of wobble pits (113) for tracking servo, and a length L (μm) of the wobble pit along the virtual track center, a wavelength λ (μm) of the laser beam, and a numerical aperture NA satisfy a relationship: $0.3 \leq L \cdot NA/\lambda \leq 0.65$.



CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD,
TG).

(88) Date of publication of the international search report:
20 June 2002

Published:

— with international search report

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

International Application No

PCT/JP 01/07069

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 G11B7/013 G11B7/09 G11B11/105

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 G11B

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, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 98 54709 A (SEAGATE TECHNOLOGY) 3 December 1998 (1998-12-03)	1-4, 7-11, 14-17
Y	page 16 -page 17; figure 8	5,6,12, 13
Y	----- PATENT ABSTRACTS OF JAPAN vol. 1999, no. 09, 30 July 1999 (1999-07-30) & JP 11 120636 A (CANON INC), 30 April 1999 (1999-04-30) cited in the application abstract	5,6,12, 13
X	----- US 5 214 629 A (WATANABE HITOSHI ET AL) 25 May 1993 (1993-05-25) column 6, line 22 - line 38 ----- -/--	1,16



Further documents are listed in the continuation of box C.



Patent family members are listed in 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 document 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.

G document member of the same patent family

Date of the actual completion of the international search

21 March 2002

Date of mailing of the international search report

02/04/2002

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,
Fax: (+31-70) 340-3016

Authorized officer

Holubov, C

INTERNATIONAL SEARCH REPORT

International Application No

PCT/JP 01/07069

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 829 854 A (SONY CORP) 18 March 1998 (1998-03-18) column 18, line 15 - line 21 ----	1,16
X	US 5 459 711 A (KATAYAMA HIROYUKI ET AL) 17 October 1995 (1995-10-17) column 14, line 6 - line 14 column 6, line 50 - line 55 -----	1,16

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/JP 01/07069

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 9854709	A	03-12-1998	US 6275455 B1 WO 9854709 A1	14-08-2001 03-12-1998
JP 11120636	A	30-04-1999	NONE	
US 5214629	A	25-05-1993	FR 2658943 A1	30-08-1991
EP 0829854	A	18-03-1998	JP 3227803 B2 JP 5298706 A EP 0829854 A1 EP 0829855 A1 EP 0829856 A1 DE 69324858 D1 DE 69324858 T2 DE 69330503 D1 DE 69331163 D1 EP 0580876 A1 JP 3225668 B2 JP 6044572 A WO 9317417 A1 US 5633854 A US 5684783 A US 5559786 A US 5513161 A US 5557602 A US 5606545 A US 5602810 A	12-11-2001 12-11-1993 18-03-1998 18-03-1998 18-03-1998 17-06-1999 14-10-1999 30-08-2001 20-12-2001 02-02-1994 05-11-2001 18-02-1994 02-09-1993 27-05-1997 04-11-1997 24-09-1996 30-04-1996 17-09-1996 25-02-1997 11-02-1997
US 5459711	A	17-10-1995	JP 2056748 A JP 2807470 B2 JP 2121124 A JP 2667685 B2 JP 2177022 A JP 2559137 B2 JP 2220243 A JP 2617220 B2 US 5335220 A CA 1333093 A1 DE 68919455 D1 DE 68919455 T2 DE 68929228 D1 DE 68929228 T2 EP 0356201 A2 EP 0603171 A2 KR 9210000 B1 KR 9210018 B1 US 5170390 A	26-02-1990 08-10-1998 09-05-1990 27-10-1997 10-07-1990 04-12-1996 03-09-1990 04-06-1997 02-08-1994 15-11-1994 05-01-1995 08-06-1995 10-08-2000 30-11-2000 28-02-1990 22-06-1994 10-11-1992 10-11-1992 08-12-1992