

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
12 June 2008 (12.06.2008)

PCT

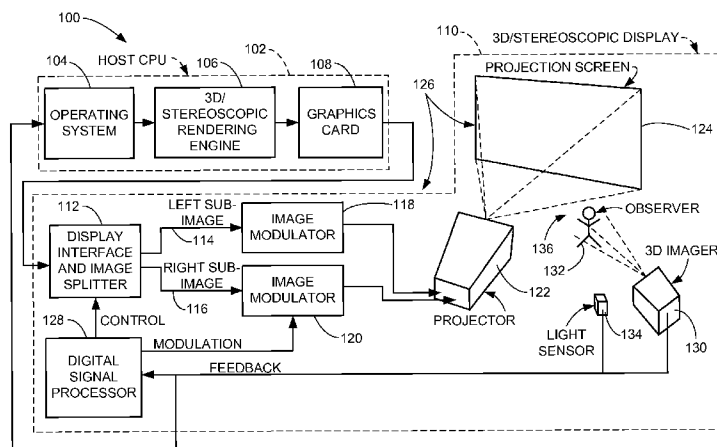
(10) International Publication Number
WO 2008/070246 A3

- (51) International Patent Classification:
H04N 13/00 (2006.01)
- (21) International Application Number:
PCT/US2007/079101
- (22) International Filing Date:
20 September 2007 (20.09.2007)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
11/533,580 20 September 2006 (20.09.2006) US
- (71) Applicant (for all designated States except US): **APPLE INC.** [US/US]; Apple Inc., 1 Infinite Loop, M/S 3-PAT, Cupertino, California 95014 (US).
- (72) Inventor; and
- (75) Inventor/Applicant (for US only): **KRAH, Christoph** [US/US]; P.O. Box 1483, Los Altos, California 94023-1483 (US).
- (74) Agents: **KIM, Richard, C.** et al.; Morrison & Foerster LLP, 12531 High Bluff Drive, Suite 100, San Diego, CA 92130 (US).

- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.
- (84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, 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:
6 November 2008

(54) Title: THREE-DIMENSIONAL DISPLAY SYSTEM



(57) Abstract: A three-dimensional display system (100) provides (902) a projection screen (124) having a predetermined angularly-responsive reflective surface function (302). Three-dimensional images (114, 116) are respectively modulated (904) in coordination with the predetermined angularly-responsive reflective surface function (302) to define a programmable mirror (126) with a programmable deflection angle.

WO 2008/070246 A3

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2007/079101

A. CLASSIFICATION OF SUBJECT MATTER
INV. H04N13/00

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)
H04N G03B

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

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2004/252187 A1 (ALDEN RAY M [US]) 16 December 2004 (2004-12-16)	1, 4, 7, 8, 12, 16, 17, 24, 27, 30, 31, 35, 39, 40
Y	paragraphs [0004], [0008], [0018] paragraphs [0050], [0069], [0071] ----- -/--	2, 3, 11, 13, 14, 18-20, 25, 26, 34, 36, 37, 41-43

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 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.
- *&* document member of the same patent family

Date of the actual completion of the international search

8 September 2008

Date of mailing of the international search report

16/09/2008

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

Borcea, Veronica

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2007/079101

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5 528 263 A (PLATZKER DANIEL M [US] ET AL) 18 June 1996 (1996-06-18) column 2, lines 10-19 column 2, lines 27-34 figure 102	2, 25
X	US 6 421 174 B1 (OOSHIMA TETSUYA [JP] ET AL) 16 July 2002 (2002-07-16) column 1, line 66 - column 2, line 11 column 5, lines 7-26 figures 1a, 1b, 2, 4a, 4b	1, 7, 8, 24, 30, 31
Y	COTTING D ET AL: "Embedding Imperceptible Patterns into Projected Images for Simultaneous Acquisition and Display" MIXED AND AUGMENTED REALITY, 2004. ISMAR 2004. THIRD IEEE AND ACM INTERNATIONAL SYMPOSIUM ON ARLINGTON, VA, USA 02-05 NOV. 2004, PISCATAWAY, NJ, USA, IEEE, 2 November 2004 (2004-11-02), pages 100-109, XP010769633 ISBN: 978-0-7695-2191-6 page 1, column 1, paragraph 2 - page 1, column 2, paragraph 2 page 2, column 1, paragraph 2 page 3, column 1, paragraph 1 figure 9	3, 26
A	WO 98/43126 A (KONINKL PHILIPS ELECTRONICS NV [NL]; PHILIPS NORDEN AB [SE]; SHIMAKAWA) 1 October 1998 (1998-10-01) page 2, line 20, paragraph 26 page 4, line 22, paragraph 28 page 5, line 17, paragraph 19 figure 1	3, 26
X	WO 2004/111913 A (ALDEN RAY M [US]) 23 December 2004 (2004-12-23)	1, 5, 9, 10, 12, 15, 24, 28, 29, 32, 33, 35, 38
Y	page 3, lines 5-8 page 14, lines 10-26 page 15, line 8 - page 16, line 5 page 17, lines 4-20 page 18, lines 1-8 page 20, line 16 - page 22, line 9	6, 29
Y	US 6 533 420 B1 (EICHENLAUB JESSE B [US]) 18 March 2003 (2003-03-18) column 14, lines 6-31	6, 29

-/--

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2007/079101

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2006/012542 A1 (ALDEN RAY M [US]) 19 January 2006 (2006-01-19) paragraphs [0011], [0013] paragraph [0051] -----	5, 15, 28, 38
A	US 2006/109200 A1 (ALDEN RAY M [US]) 25 May 2006 (2006-05-25) paragraphs [0016], [0051] -----	5, 15, 28, 38
Y	US 4 649 425 A (PUND MARVIN L [US]) 10 March 1987 (1987-03-10) column 1, line 56 - column 2, line 6 column 6, line 62 - column 7, line 7 -----	11, 34
Y	US 2003/107712 A1 (PERLIN KENNETH [US]) 12 June 2003 (2003-06-12) paragraph [0006] paragraph [0125] paragraphs [0130] - [0131] -----	18-20, 41-43
X	US 6 220 709 B1 (HEGER ATILLA [DE]) 24 April 2001 (2001-04-24) column 2, line 40 - line 67 -----	21, 23, 44, 46
Y	column 4, line 20 - line 33 -----	13, 14, 22, 36, 37, 45
Y	US 5 065 236 A (DINER DANIEL B [US]) 12 November 1991 (1991-11-12) column 14, lines 24-47 -----	22, 45

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2007/079101

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 allsearchable 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.:

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: 1,2,4,7,8,12,16,17,24,25,27,30,31,35,39,40

three-dimensional display with interactive control by the observer

2. claims: 3,26

three-dimensional display with observer tracking

3. claims: 5,6,9,10,15,28,29,32,33,38

three dimensional display ensuring privacy in multiple viewing directions

4. claims: 11,18,34,41

three-dimensional display with observer/non-observer distinguishing

5. claims: 13,14,21,22,23,36,37,44,45,46

three-dimensional display producing pseudo-holograms

6. claims: 19,20,42,43

three-dimensional display calibration

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No PCT/US2007/079101
--

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2004252187	A1		16-12-2004

US 5528263	A	AU 2944095 A	05-01-1996
		DE 69530395 D1	22-05-2003
		DE 69530395 T2	19-02-2004
		EP 0771460 A1	07-05-1997
		JP 9512656 T	16-12-1997
		WO 9534881 A1	21-12-1995

US 6421174	B1	US 6437917 B1	20-08-2002

WO 9843126	A	CN 1220738 A	23-06-1999
		EP 0907901 A1	14-04-1999
		JP 10268231 A	09-10-1998
		US 6313867 B1	06-11-2001

WO 2004111913	A		23-12-2004

US 6533420	B1		18-03-2003

US 2006012542	A1		19-01-2006

US 2006109200	A1		25-05-2006

US 4649425	A		10-03-1987

US 2003107712	A1		12-06-2003

US 6220709	B1	AT 208511 T	15-11-2001
		AU 4699097 A	05-05-1998
		CA 2268864 A1	16-04-1998
		CN 1233328 A	27-10-1999
		WO 9815869 A1	16-04-1998
		DE 19641480 A1	30-04-1998
		DE 19781104 D2	28-10-1999
		EP 0931277 A1	28-07-1999
		ES 2167718 T3	16-05-2002
		JP 2001502071 T	13-02-2001
		KR 20000049011 A	25-07-2000
		NO 991663 A	01-06-1999

US 5065236	A		12-11-1991
