



(12) **EUROPEAN PATENT APPLICATION**

(88) Date of publication A3:
16.12.2015 Bulletin 2015/51

(51) Int Cl.:
G09G 3/34 ^(2006.01) **G09G 3/30** ^(2006.01)
G09G 3/32 ^(2006.01) **G09G 3/36** ^(2006.01)

(43) Date of publication A2:
25.11.2015 Bulletin 2015/48

(21) Application number: **15000723.5**

(22) Date of filing: **30.06.2004**

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IT LI LU MC NL PL PT RO SE SI SK TR**

(30) Priority: **30.06.2003 US 481040 P**
02.07.2003 US 481053 P
22.09.2003 US 481405 P
31.03.2004 US 814205

(62) Document number(s) of the earlier application(s) in
accordance with Art. 76 EPC:
04777306.4 / 1 639 574

(71) Applicant: **E Ink Corporation**
Billerica, MA 01821-4165 (US)

(72) Inventors:
• **Amundson, Karl, R.**
Cambridge, MA 02138 (US)
• **Zehner, Robert, W.**
Los Gatos, CA 95032 (US)
• **Knaian, Ara, N.**
Newton, MA 02460 (US)
• **Zion, Benjamin**
State College, PA 16801 (US)

(74) Representative: **Cole, David John**
46 Kirkhill Gardens,
West Greenlees Estate
Cambuslang,
Glasgow G72 8EZ (GB)

(54) **Methods for driving electro-optic displays**

(57) An electro-optic display having a plurality of pixels divided into a plurality of groups is driven by selecting each of the plurality of groups of pixels in succession and applying to each of the pixels in the selected group either a drive voltage or a non-drive voltage, the scanning of all the groups of pixels being completed in a first frame pe-

riod; repeating the scanning of the groups of pixels during a second frame period, and interrupting the scanning of the groups of pixels during a pause period between the first and second frame periods, this pause period being not longer than the first or second frame period.

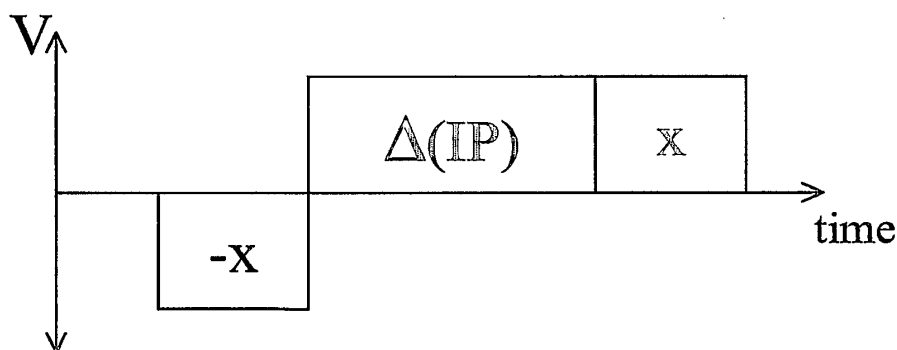


Fig. 2



EUROPEAN SEARCH REPORT

 Application Number
 EP 15 00 0723

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X,D A	WO 03/044765 A (E INK CORP [US]) 30 May 2003 (2003-05-30) * page 3, line 15 - page 5, line 27 * * page 20, line 15 - line 19 * * page 30, line 17 - line 27 * * page 44, line 3 - line 17 * * page 50, line 30 - page 54, line 5; figures 11A,11B * -----	1-4,6,8 5,7,9-14	INV. G09G3/34 G09G3/30 G09G3/32 G09G3/36
X	US 2002/135595 A1 (MORITA TOMOKA [JP] ET AL) 26 September 2002 (2002-09-26) * paragraphs [0184] - [0190]; figures 4-10 * -----	15	
X	US 5 245 328 A (GARRETT JAMES H [US]) 14 September 1993 (1993-09-14) * column 9, line 23 - column 9, line 37; figure 17 * -----	15	
T	WO 2004/090857 A1 (E INK CORP [US]; AMUNDSON KARL R [US]; ZEHNER ROBERT W [US]; KNAIAN AR) 21 October 2004 (2004-10-21) * figure 21 * -----	7,9-14	TECHNICAL FIELDS SEARCHED (IPC) G09G
T	US 2005/001812 A1 (AMUNDSON KARL R [US] ET AL) 6 January 2005 (2005-01-06) * figure 32 * -----	7,9-14	
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 28 October 2015	Examiner Giancane, Iacopo
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03/02 (P04C01)



Application Number

EP 15 00 0723

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☒ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).



**LACK OF UNITY OF INVENTION
SHEET B**

Application Number

EP 15 00 0723

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-14

A method for driving an electro-optic display, wherein a pixel is driven to at least one extreme optical state after that the number of its optical transitions has exceeded a predetermined value.

2. claim: 15

A method for driving an electro-optic display having a plurality of pixels, wherein adjacent pixels having the same desired grey level are detected and their grey levels are controlled such that one pixel is driven below the desired grey level, while the other pixel is driven above the desired grey level.

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 15 00 0723

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

28-10-2015

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 03044765 A	30-05-2003	AU 2002366174 A1	10-06-2003
		CN 1589462 A	02-03-2005
		CN 101676980 A	24-03-2010
		CN 102789758 A	21-11-2012
		CN 102789764 A	21-11-2012
		EP 1446791 A2	18-08-2004
		EP 2916312 A1	09-09-2015
		HK 1073380 A1	09-08-2013
		HK 1142162 A1	30-01-2015
		JP 4615860 B2	19-01-2011
		JP 4852478 B2	11-01-2012
		JP 5618811 B2	05-11-2014
		JP 5758440 B2	05-08-2015
		JP 2005509925 A	14-04-2005
		JP 2007249230 A	27-09-2007
		JP 2007249231 A	27-09-2007
		JP 2011128625 A	30-06-2011
		JP 2012098733 A	24-05-2012
		JP 2013178580 A	09-09-2013
		JP 2015028649 A	12-02-2015
		JP 2015064588 A	09-04-2015
		WO 03044765 A2	30-05-2003
US 2002135595 A1	26-09-2002	CN 1383540 A	04-12-2002
		EP 1300823 A1	09-04-2003
		JP 3357666 B2	16-12-2002
		JP 2002082649 A	22-03-2002
		TW 514853 B	21-12-2002
		US 2002135595 A1	26-09-2002
		WO 0205253 A1	17-01-2002
US 5245328 A	14-09-1993	NONE	
WO 2004090857 A1	21-10-2004	CN 102074200 A	25-05-2011
		CN 102768822 A	07-11-2012
		EP 1614097 A1	11-01-2006
		HK 1088107 A1	29-05-2009
		HK 1128809 A1	14-09-2012
		HK 1157925 A1	03-05-2013
		JP 4599349 B2	15-12-2010
		JP 5005800 B2	22-08-2012
		JP 5632861 B2	26-11-2014
		JP 5734395 B2	17-06-2015
		JP 2006522372 A	28-09-2006
		JP 2011008271 A	13-01-2011
		JP 2012133380 A	12-07-2012

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 15 00 0723

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

28-10-2015

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		JP 2014059577 A	03-04-2014
		JP 2014063185 A	10-04-2014
		KR 20050116160 A	09-12-2005
		WO 2004090857 A1	21-10-2004

US 2005001812 A1	06-01-2005	US 2005001812 A1	06-01-2005
		US 2006232531 A1	19-10-2006
