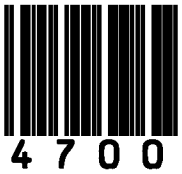
Office of Petitions: Routing Sheet



Application No. 12340005

This application is being forwarded to your office for further processing. A decision has been rendered on a petition filed in this application, as indicated below. For details of this decision, please see the document PET.OP.DEC filed on the same date as this document.

- ☐ **GRANTED**
- ☒ **DISMISSED**
- ☐ **DENIED**

Office of Petitions: Decision Count Sheet

Mailing Month: 4

Application No.: 12340005

12340005

For US serial numbers: enter number only, no slashes or commas. Ex: 10123456
For PCT: enter "51+single digit of year of filing+last 5 numbers", Ex. for PCT/US05/12345, enter 51512345

Deciding Official: ALESIA M. BROWN

Count (1) - Palm Credit 12/340,005

Decision: DISMISSED

FINANCE WORK NEEDED
☐ Select Check Box for YES

DISMISSED

Decision Type: 535 - 37 CFR 1.78(a)(3) & (a)(6) UNINTENTIONAL DELAY

535

Notes:

Count (2)

Decision: n/a

FINANCE WORK NEEDED
☐ Select Check Box for YES

Decision Type: NONE

Notes:

Count (3)

Decision: n/a

FINANCE WORK NEEDED
☐ Select Check Box for YES

Decision Type: NONE

Notes:

Initials of Approving Official (if required)

If more than 3 decisions, attach 2nd count sheet & mark this box ☐

Printed on: 4/1/2017

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/340,005	12/19/2008	Seung-Chul Lee	12579-6201	8241

757 7590 04/05/2017

BGL
P.O. BOX 10395
CHICAGO, IL 60610

EXAMINER
NGUYEN, STEVEN C

ART UNIT	PAPER NUMBER
2443	

MAIL DATE	DELIVERY MODE
04/05/2017	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

In re Application of	:	
Lee, et al.	:	
Application No. 12/340,005	:	DECISION ON PETITION
Filed: December 19, 2008	:	
Attorney Docket No. 12579-6201	:	

This is a decision on the petition under 37 CFR 1.55(e), filed September 1, 2016, to accept an unintentionally delayed claim under 35 U.S.C. § 119(a)-(d) or (f), or 35 U.S.C. § 365 (a) or (b), for the benefit of priority to foreign a foreign application.

The petition is DISMISSED.

This pending nonprovisional application did not include a reference to the foreign application, for which benefit is now sought, within the later of four months from the actual filing date of the application or sixteen months from the filing date of the prior foreign application. Since the claim for priority is submitted after the period specified in 37 CFR 1.55(d), this is an appropriate petition under the provisions of 37 CFR 1.55(e).

A petition under 37 CFR 1.55(e) to accept an unintentionally delayed claim for priority requires:

(1) The priority claim under 35 U.S.C. 119(a) through (d) or (f), 365(a) or (b), or 386(a) or (b) in an application data sheet (§ 1.76(b)(6)), identifying the foreign application to which priority is claimed, by specifying the application number, country (or intellectual property authority), day, month, and year of its filing, unless previously submitted;
(2) A certified copy of the foreign application, unless previously submitted or an exception in paragraph (h), (i), or (j) of this section applies;
(3) The petition fee as set forth in § 1.17(m); and
(4) A statement that the entire delay between the date the priority claim was due under this section and the date the priority claim was filed was unintentional. The Director may require additional information where there is a question whether the delay was unintentional.

The petition does not comply with item (1). The application data sheet is not signed in accordance with 37 CFR 1.33(b). Any request for reconsideration must be accompanied by a properly executed Supplemental Application Data Sheet (pre-AIA). Please note that an additional petition fee is not required.

Further correspondence with respect to this matter should be delivered through one of the following mediums:

By mail:	Mail Stop PETITIONS Commissioner for Patents Post Office Box 1450 Alexandria, VA 22313-1450
By hand:	Customer Service Window Mail Stop Petitions Randolph Building 40l Dulany Street Alexandria, VA 22314
By fax:	(571) 273-8300 ATTN: Office of Petitions
By internet:	EFS-Web[1]

Any questions concerning this matter may be directed to the undersigned at (571) 272-3205.

/ALESIA M. BROWN/

Alesia M. Brown
Attorney Advisor
Office of Petitions

[1] www.uspto.gov/ebc/efs_help.html (for help using EFS-Web call the Patent Electronic Business Center at (866) 217-9197)

CERTIFICATE OF EFS FILING UNDER 37 CFR §1.8

I hereby certify that this correspondence is being electronically transmitted to the United States Patent and Trademark Office, Commissioner for Patents, via the EFS pursuant to 37 CFR §1.8 on the below date:

Date: April 5, 2017 Name: Gustavo Siller, Jr. (Reg. No. 32,305) Signature: /Gustavo Siller, Jr./

BRINKS GILSON & LIONE

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Appln. of:	Seung-Chul LEE et al.		
Appln. No.:	12/340,005	Examiner:	Steven C. NGUYEN
Filed:	December 19, 2008	Art Unit:	2443
For:	STEREOSCOPIC 3D DISPLAY DEVICE	Conf. No.:	8241
Attorney Docket No.:	12579-6201		
Client Ref. No.:	F08-0379US001		

Mail Stop Petition
Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

PETITION TO ACCEPT UNINTENTIONALLY DELAYED CLAIM FOR PRIORITY UNDER 35 U.S.C. § 120

Dear Sir:

Assignee hereby submits a Petition to Accept an Unintentionally Delayed Claim Under 35 U.S.C. § 120 ("petition") and pursuant to 37 CFR §1.78(a)(3). An updated application data sheet setting forth the reference required under 35 U.S.C. § 119 accompany this petition (MPEP § 1481.03.) in response to Decision on Petition dated April 5, 2017.

Assignee petitions to correct he priority claim of U.S. Application No. 12/340,005 to correct the foreign priority application as follows:

~~KR 10-2008-0055329~~ KR 10-2008-0066695

Assignee states that the entire delay between the date the priority claims were due and the date that this petition is being filed was unintentional. No new matter has been added.

The fee for this Petition was previously paid with the original Petition filed September 1, 2016.

The Commissioner is hereby authorized to charge any deficiency in fees, and to credit any overpayment, to Deposit Account No. 23-1925.

Grant of this petition is respectfully requested. Please contact the undersigned attorney if there are any questions or concerns.

Respectfully submitted,

Dated: April 5, 2017

/Gustavo Siller, Jr./
Gustavo Siller, Jr., Reg. No. 32,305
Attorney for Applicants

BRINKS GILSON & LIONE
PO BOX 10395
CHICAGO, IL 60610
(312) 321-4200

CERTIFICATE OF EFS FILING UNDER 37 CFR §1.8

I hereby certify that this correspondence is being electronically transmitted to the United States Patent and Trademark Office, Commissioner for Patents, via the EFS pursuant to 37 CFR §1.8 on the below date:

Date: April 5, 2017 Name: Gustavo Siller, Jr. (Reg. No. 32,305) Signature: /Gustavo Siller, Jr./

BRINKS GILSON & LIONE

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Appln. of:	Seung-Chul LEE et al.		
Appln. No.:	12/340,005	Examiner:	Steven C. NGUYEN
Filed:	December 19, 2008	Art Unit:	2443
For:	STEREOSCOPIC 3D DISPLAY DEVICE	Conf. No.:	8241
Attorney Docket No.:	12579-6201		
Client Ref. No.:	F08-0379US001		

TRANSMITTAL

Mail Stop Petition
Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Sir:

Attached is/are:

☒ Transmittal; Petition to Accept Unintentionally Delayed Claim for Priority Under 35 U.S.C. § 120; and Corrected Application Data Sheet.

Fee calculation:

☒ No additional fee is required.

☐ Per 37 CFR §1.27, ☐ Applicant is small entity ☐ Applicant is micro entity.

☐ An extension fee in an amount of $_____ for a _____-month extension of time under 37 CFR § 1.136(a).

☐ A petition or processing fee in an amount of $_____ under 37 CFR § 1.1_____(_____).

☐ An additional filing fee has been calculated as shown below:

					Fee		Small Entity Fee		Micro Entity Fee	
	Claims Remaining After Amendment		Highest No. Previously Paid	Present Extra	Rate	Add'l Fee	Rate	Add'l Fee	Rate	Add'l Fee
Total		Minus			x $ 80 =	$	x $ 40 =	$	x $20 =	$
Independent		Minus			x $420 =	$	x $210 =	$	x $105 =	$
First Presentation of Multiple Dep. Claim					+ $780 =	$	+ $390 =	$	+ $195 =	$
					Total	$	Total	$	Total	$

Fee payment:

☐ Please charge Deposit Account No. 23-1925 in the amount of $_____ for _____.

☐ Payment by credit card in the amount of $_____ (Form PTO-2038 is attached).
WARNING: Information on this form may become public. **Credit card information should not be included on this form.**

☒ The Director is hereby authorized to charge payment of any additional filing fees required under 37 CFR § 1.16 and any patent application processing fees under 37 CFR § 1.17 (including any extension fee required to ensure that this paper is timely filed), or to credit any overpayment, to Deposit Account No. 23-1925.

Respectfully submitted,

April 5, 2017
Date

/Gustavo Siller, Jr./
Gustavo Siller, Jr. (Reg. No. 32,305)

Electronic Acknowledgement Receipt

EFS ID:	28843503
Application Number:	12340005
International Application Number:	
Confirmation Number:	8241
Title of Invention:	STEREOSCOPIC 3D DISPLAY DEVICE
First Named Inventor/Applicant Name:	Seung-Chul Lee
Customer Number:	757
Filer:	Gustavo Siller Jr./Jeff Skinner
Filer Authorized By:	Gustavo Siller Jr.
Attorney Docket Number:	12579-6201
Receipt Date:	05-APR-2017
Filing Date:	19-DEC-2008
Time Stamp:	16:47:33
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		2017-04-05_12579-6201_Petition_to_Accept_Priority-Filed.pdf	313645 89201d55033d8ccf0a2cb6c67ecd05732d5838ff	yes	6

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Application Data Sheet	4	6
	Petition for review by the Office of Petitions	2	3
	Transmittal Letter	1	1
Warnings:			
Information:			
	Total Files Size (in bytes):	313645	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

CORRECTED APPLICATION DATA SHEET

APPLICATION & PUBLICATION INFORMATION

Application Number:	~~To Be Assigned~~ 12/340,005
Title of Invention:	STEREOSCOPIC 3D DISPLAY DEVICE
Attorney Docket Number:	~~12579/6199~~ 12579/6201
Small Entity Status Claimed:	☐
Filing Date:	December 19, 2008
Application Type:	Utility
Subject Matter:	
Suggested Class (if any):	
Suggested Group Art Unit (if any):	
CD-ROM or CD-R?:	
Total Number of Drawing Sheets (if any):	8
Suggested Figure for Publication (if any):	
Secrecy Order 37 CFR 5.2:	☐
Request for Early Publication:	☐
Request for Non-Publication:	☐

APPLICANT INFORMATION

Applicant Authority:	Inventor
Prefix:	
Inventor One Given Name:	Seung-Chul
Middle Name:	
Family Surname:	LEE
Suffix:	
Mailing Address Line One:	Seowon Maeul Apt. 704-1204
Mailing Address Line Two:	Geumchon-dong
City:	Paju Si
State or Province:	Gyeonggi-Do
Postal Code:	
Country:	Korea
Residency:	Non U.S. Residency
City, State/Province, Country of Residence:	Paju Si, Republic of Korea
Citizenship under 37 CFR 1.41(b):	Republic of Korea
Prefix:	
Inventor Two Given Name:	Hoon
Middle Name:	
Family Surname:	KANG
Suffix:	
Mailing Address Line One:	Elicia Apt. 103-403, 178bunji
Mailing Address Line Two:	Toegyewon-ri, Toegyewon-myeon
City:	Namyangju Si
State or Province:	Gyeonggi-Do
Postal Code:	
Country:	Republic of Korea
Residency:	Non-U.S.
City, State/Province, Country of Residence:	Namyangju Si
Citizenship under 37 CFR 1.41(b):	Republic of Korea

Prefix:	
Inventor Three Given Name:	Sung-Min
Middle Name:	
Family Surname:	JUNG
Suffix:	
Mailing Address Line One:	Woosung Apt. 5-1408
Mailing Address Line Two:	Ganseok 4-dong
City:	Namdong-gu
State or Province:	Incheon
Postal Code:	
Country:	Korea
Residency:	Non U.S. Residency
City, State/Province, Country of Residence:	Namdong-gu, Republic of Korea
Citizenship under 37 CFR 1.41(b):	Republic of Korea

DOMESTIC PRIORITY INFORMATION

This application is a [*Continuation of]:	
Prior Application No.:	
Filing Date:	
which is a [*Continuation of]:	
Prior Application No.:	
Filing Date:	

FOREIGN PRIORITY INFORMATION

Foreign Application No.:	~~10-2008-0055329~~ 10-2008-0066695
Parent Filing Date:	July 9, 2008
Country:	Korea
Priority Claimed:	☒

ASSIGNMENT INFORMATION

Assignee Name:	LG Display Co., Ltd.
Mailing Address Line One:	20 Yoido-dong, Youngdungpogu
Mailing Address Line Two:	
City:	Seoul
State or Province:	
Country:	Korea
Postal Code:	

CORRESPONDENCE INFORMATION

Name:	Brinks Gilson & Lione
Street of Mailing Address:	PO Box 10395
City of Mailing Address:	Chicago
State or Province of Mailing Address:	IL
Country of Mailing Address:	U.S.
Postal or Zip Code of Mailing Address:	60610
Telephone Number:	312-321-4200
Fax Number:	312-321-4299
E-mail Address:	officeactions@brinksgilson.com
Customer Number:	**00757 – Brinks Gilson & Lione**

REPRESENTATIVE INFORMATION	
Representative Designation:	Primary
Signature:	/Gustavo Siller, Jr./
Name:	Gustavo Siller, Jr.
Registration No.:	32,305
Date:	April 5, 2017

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

757 7590 06/02/2016
BGL
P.O. BOX 10395
CHICAGO, IL 60610

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

Gustavo Siller, Jr.	(Depositor's name)
/Gustavo Siller, Jr./	(Signature)
September 02, 2016	(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/340,005	12/19/2008	Seung-Chul Lee	12579-6201	8241

TITLE OF INVENTION: STEREOSCOPIC 3D DISPLAY DEVICE

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960	$0	$0	$960	09/02/2016

EXAMINER	ART UNIT	CLASS-SUBCLASS
NGUYEN, STEVEN C	2443	348-043000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 Brinks Gilson & Lione
2
3

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE: LG Display Co., Ltd.

(B) RESIDENCE: (CITY and STATE OR COUNTRY): Seoul, Republic of Korea

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:
- ☒ Issue Fee
- ☐ Publication Fee (No small entity discount permitted)
- ☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
- ☐ A check is enclosed.
- ☐ Payment by credit card. Form PTO-2038 is attached.
- ☒ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number 23-1925 (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
- ☐ Applicant certifying micro entity status. See 37 CFR 1.29
  NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
- ☐ Applicant asserting small entity status. See 37 CFR 1.27
  NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
- ☐ Applicant changing to regular undiscounted fee status.
  NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature /Gustavo Siller, Jr./ Date September 02, 2016

Typed or printed name GUSTAVO SILLER, JR. Registration No. 32,305

PTOL-85 Part B (10-13) Approved for use through 10/31/2013. OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Electronic Patent Application Fee Transmittal

Application Number:	12340005
Filing Date:	19-Dec-2008
Title of Invention:	STEREOSCOPIC 3D DISPLAY DEVICE
First Named Inventor/Applicant Name:	Seung-Chul Lee
Filer:	Gustavo Siller Jr./Rachelle Holmes
Attorney Docket Number:	12579-6201

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Utility Appl Issue Fee	1501	1	960	960

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**960**

Electronic Acknowledgement Receipt

EFS ID:	26824813
Application Number:	12340005
International Application Number:	
Confirmation Number:	8241
Title of Invention:	STEREOSCOPIC 3D DISPLAY DEVICE
First Named Inventor/Applicant Name:	Seung-Chul Lee
Customer Number:	757
Filer:	Gustavo Siller Jr./Zachary Castillo
Filer Authorized By:	Gustavo Siller Jr.
Attorney Docket Number:	12579-6201
Receipt Date:	02-SEP-2016
Filing Date:	19-DEC-2008
Time Stamp:	13:13:06
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$960
RAM confirmation Number	284
Deposit Account	231925
Authorized User	SILLER, GUSTAVO
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		12579-6201_Issue_Fee_Filing_EFS.pdf	136103 6cff5b64841664ba12822e46c9a74ca145ed81a4	yes	2

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Transmittal Letter	1	1
	Issue Fee Payment (PTO-85B)	2	2

Warnings:

Information:

2	Fee Worksheet (SB06)	fee-info.pdf	30561 9c8c1c302034008b4151a686e2f8014fa675db2e	no	2

Warnings:

Information:

Total Files Size (in bytes):	166664

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

CERTIFICATE OF EFS FILING UNDER 37 CFR §1.8

I hereby certify that this correspondence is being electronically transmitted to the United States Patent and Trademark Office, Commissioner for Patents, via the EFS pursuant to 37 CFR §1.8 on the below date:

Date: September 02, 2016 Name: Gustavo Siller, Jr., Reg. No. 32,305 Signature: /Gustavo Siller, Jr./

BRINKS GILSON & LIONE

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Appln. of:	Seung-Chul LEE et al.		
Appln. No.:	12/340,005	Examiner:	Steven C. NGUYEN
Filed:	December 19, 2008	Art Unit:	2443
For:	STEREOSCOPIC 3D DISPLAY DEVICE	Conf. No.:	8241
Attorney Docket No.:	12579-6201		
Client Ref. No.:	F08-0379US001		

TRANSMITTAL

Mail Stop Issue Fee
Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Sir:

Attached is/are:

☒ Transmittal; Issue Fee Payment.

Fee calculation:

☐ No additional fee is required.

☐ Per 37 CFR §1.27, ☐ Applicant is small entity ☐ Applicant is micro entity.

☐ An extension fee in an amount of $_____ for a _____-month extension of time under 37 CFR § 1.136(a).

☐ A petition or processing fee in an amount of $_____ under 37 CFR § 1.17(_____).

☐ An additional filing fee has been calculated as shown below:

	Claims Remaining After Amendment		Highest No. Previously Paid	Present Extra	Fee Rate	Fee Add'l Fee	Small Entity Fee Rate	Small Entity Fee Add'l Fee	Micro Entity Fee Rate	Micro Entity Fee Add'l Fee
Total		Minus			x $ 80 =	$	x $ 40 =	$	x $20 =	$
Independent		Minus			x $420 =	$	x $210 =	$	x $105 =	$
First Presentation of Multiple Dep. Claim					+ $780 =	$	+ $390 =	$	+ $195 =	$
					Total	$	Total	$	Total	$

Fee payment:

☒ Please charge Deposit Account No. 23-1925 in the amount of $960 for Issue Fee Payment.

☐ Payment by credit card in the amount of $_____ (Form PTO-2038 is attached).
WARNING: Information on this form may become public. **Credit card information should not be included on this form.**

☒ The Director is hereby authorized to charge payment of any additional filing fees required under 37 CFR § 1.16 and any patent application processing fees under 37 CFR § 1.17 (including any extension fee required to ensure that this paper is timely filed), or to credit any overpayment, to Deposit Account No. 23-1925.

Respectfully submitted,

September 02, 2016
Date

/Gustavo Siller, Jr./
Gustavo Siller, Jr. (Reg. No. 32,305)

CERTIFICATE OF EFS FILING UNDER 37 CFR §1.8

I hereby certify that this correspondence is being electronically transmitted to the United States Patent and Trademark Office, Commissioner for Patents, via the EFS pursuant to 37 CFR §1.8 on the below date:

Date: September 01, 2016 Name: Gustavo Siller, Jr., Reg. No. 32,305 Signature: /Gustavo Siller, Jr./

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Appln. of:	Seung-Chul LEE et al.		
Appln. No.:	12/340,005	Examiner:	Steven C. NGUYEN
Filed:	December 19, 2008	Art Unit:	2443
For:	STEREOSCOPIC 3D DISPLAY DEVICE	Conf. No.:	8241
Attorney Docket No.:	12579-6201		
Client Ref. No.:	F08-0379US001		

Mail Stop Petition
Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

PETITION TO ACCEPT UNINTENTIONALLY DELAYED CLAIM FOR PRIORITY UNDER 35 U.S.C. § 120

Dear Sir:

Assignee hereby submits a Petition to Accept an Unintentionally Delayed Claim Under 35 U.S.C. § 120 ("petition") and pursuant to 37 CFR §1.78(a)(3). An updated application data sheet setting forth the reference required under 35 U.S.C. § 119 accompany this petition. (MPEP § 1481.03.)

Assignee petitions to correct he priority claim of U.S. Application No. 12/340,005 to correct the foreign priority application as follows:

~~KR 10-2008-0055329~~ KR 10-2008-0066695

Assignee states that the entire delay between the date the priority claims were due and the date that this petition is being filed was unintentional. No new matter has been added.

For acceptance of this petition, please charge Deposit Account No. 23-1925 any fees necessary, including the petition fee prescribed in 37 C.F.R. 1.17(m) of $1,700.00. The

Commissioner is hereby authorized to charge any deficiency in fees, and to credit any overpayment, to Deposit Account No. 23-1925.

Grant of this petition is respectfully requested. Please contact the undersigned attorney if there are any questions or concerns.

Respectfully submitted,

Dated: September 01, 2016

/Gustavo Siller, Jr./
Gustavo Siller, Jr., Reg. No. 32,305
Attorney for Applicants

BRINKS GILSON & LIONE
PO BOX 10395
CHICAGO, IL 60610
(312) 321-4200

CORRECTED APPLICATION DATA SHEET

APPLICATION & PUBLICATION INFORMATION

Application Number:	~~To Be Assigned~~ 12/340,005
Title of Invention:	STEREOSCOPIC 3D DISPLAY DEVICE
Attorney Docket Number:	~~12579/6199~~ 12579/6201
Small Entity Status Claimed:	☐
Filing Date:	December 19, 2008
Application Type:	Utility
Subject Matter:	
Suggested Class (if any):	
Suggested Group Art Unit (if any):	
CD-ROM or CD-R?:	
Total Number of Drawing Sheets (if any):	8
Suggested Figure for Publication (if any):	
Secrecy Order 37 CFR 5.2:	☐
Request for Early Publication:	☐
Request for Non-Publication:	☐

APPLICANT INFORMATION

Applicant Authority:	Inventor
Prefix:	
Inventor One Given Name:	Seung-Chul
Middle Name:	
Family Surname:	LEE
Suffix:	
Mailing Address Line One:	Seowon Maeul Apt. 704-1204
Mailing Address Line Two:	Geumchon-dong
City:	Paju Si
State or Province:	Gyeonggi-Do
Postal Code:	
Country:	Korea
Residency:	Non U.S. Residency
City, State/Province, Country of Residence:	Paju Si, Republic of Korea
Citizenship under 37 CFR 1.41(b):	Republic of Korea
Prefix:	
Inventor Two Given Name:	Hoon
Middle Name:	
Family Surname:	KANG
Suffix:	
Mailing Address Line One:	Elicia Apt. 103-403, 178bunji
Mailing Address Line Two:	Toegyewon-ri, Toegyewon-myeon
City:	Namyangju Si
State or Province:	Gyeonggi-Do
Postal Code:	
Country:	Republic of Korea
Residency:	Non-U.S.
City, State/Province, Country of Residence:	Namyangju Si
Citizenship under 37 CFR 1.41(b):	Republic of Korea

Prefix:	
Inventor Three Given Name:	Sung-Min
Middle Name:	
Family Surname:	JUNG
Suffix:	
Mailing Address Line One:	Woosung Apt. 5-1408
Mailing Address Line Two:	Ganseok 4-dong
City:	Namdong-gu
State or Province:	Incheon
Postal Code:	
Country:	Korea
Residency:	Non U.S. Residency
City, State/Province, Country of Residence:	Namdong-gu, Republic of Korea
Citizenship under 37 CFR 1.41(b):	Republic of Korea

CORRESPONDENCE INFORMATION

Name:	Brinks Hofer Gilson & Lione
Street of Mailing Address:	PO Box 10395
City of Mailing Address:	Chicago
State or Province of Mailing Address:	IL
Country of Mailing Address:	U.S.
Postal or Zip Code of Mailing Address:	60610
Telephone Number:	312-321-4200
Fax Number:	312-321-4299
E-mail Address:	officeactions@brinkshofer.com
Customer Number:	**00757 - Brinks Hofer Gilson Lione**

REPRESENTATIVE INFORMATION

Representative Designation:	Primary
Name:	Gustavo Siller, Jr.
Registration No.:	32,305

DOMESTIC PRIORITY INFORMATION

This application is a [*Continuation of]:	
Prior Application No.:	
Filing Date:	
which is a [*Continuation of]:	
Prior Application No.:	
Filing Date:	

FOREIGN PRIORITY INFORMATION

Foreign Application No.:	~~10-2008-0055329~~ 10-2008-0066695
Parent Filing Date:	July 9, 2008
Country:	Korea
Priority Claimed:	☒

ASSIGNMENT INFORMATION

Assignee Name:	LG Display Co., Ltd.
Mailing Address Line One:	20 Yoido-dong, Youngdungpogu
Mailing Address Line Two:	
City:	Seoul

State or Province:	
Country:	Korea
Postal Code:	

Electronic Patent Application Fee Transmittal

Application Number:	12340005
Filing Date:	19-Dec-2008
Title of Invention:	STEREOSCOPIC 3D DISPLAY DEVICE
First Named Inventor/Applicant Name:	Seung-Chul Lee
Filer:	Gustavo Siller Jr./Rebecca Brown
Attorney Docket Number:	12579-6201

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Pet. Delay Sub or Restore Priority-Claim	1454	1	1700	1700
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**1700**

Electronic Acknowledgement Receipt

EFS ID:	26817753
Application Number:	12340005
International Application Number:	
Confirmation Number:	8241
Title of Invention:	STEREOSCOPIC 3D DISPLAY DEVICE
First Named Inventor/Applicant Name:	Seung-Chul Lee
Customer Number:	757
Filer:	Gustavo Siller Jr./Laura Austing
Filer Authorized By:	Gustavo Siller Jr.
Attorney Docket Number:	12579-6201
Receipt Date:	01-SEP-2016
Filing Date:	19-DEC-2008
Time Stamp:	17:23:28
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$1700
RAM confirmation Number	4232
Deposit Account	231925
Authorized User	Siller, Gustavo
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		09-01-16_12579-6201_Pettion_Unintentional_Delay_Priority_Claim.pdf	190048 8dd36f0f0743c9cb8234ea923b4ff383b73058e0	yes	6

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Transmittal Letter	1	1
	Petition for review by the Office of Petitions	2	3
	Application Data Sheet	4	6

Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30513 bf2ec25b30bfd9b2b3711f864a70be5bc9544ac2	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	220561	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

CERTIFICATE OF EFS FILING UNDER 37 CFR §1.8

I hereby certify that this correspondence is being electronically transmitted to the United States Patent and Trademark Office, Commissioner for Patents, via the EFS pursuant to 37 CFR §1.8 on the below date:

Date: September 01, 2016 Name: Gustavo Siller, Jr., Reg. No. 32,305 Signature: /Gustavo Siller, Jr./

BRINKS GILSON & LIONE

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Appln. of:	Seung-Chul LEE et al.		
Appln. No.:	12/340,005	Examiner:	Steven C. NGUYEN
Filed:	December 19, 2008	Art Unit:	2443
For:	STEREOSCOPIC 3D DISPLAY DEVICE	Conf. No.:	8241
Attorney Docket No.:	12579-6201		
Client Ref. No.:	F08-0379US001		

TRANSMITTAL

Mail Stop Petition
Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Sir:

Attached is/are:

☒ Transmittal; Petition to Accept Unintentionally Delayed Claim for Priority Under 35 U.S.C. § 120; and Corrected Application Data Sheet.

Fee calculation:

☐ No additional fee is required.

☐ Per 37 CFR §1.27, ☐ Applicant is small entity ☐ Applicant is micro entity.

☐ An extension fee in an amount of $_____ for a _____-month extension of time under 37 CFR § 1.136(a).

☒ A petition or processing fee in an amount of $1,700 under 37 CFR § 1.17(m).

☐ An additional filing fee has been calculated as shown below:

					Fee		Small Entity Fee		Micro Entity Fee	
	Claims Remaining After Amendment		Highest No. Previously Paid	Present Extra	Rate	Add'l Fee	Rate	Add'l Fee	Rate	Add'l Fee
Total		Minus			x $ 80 =	$	x $ 40 =	$	x $20 =	$
Independent		Minus			x $420 =	$	x $210 =	$	x $105 =	$
First Presentation of Multiple Dep. Claim					+ $780 =	$	+ $390 =	$	+ $195 =	$
					Total	$	Total	$	Total	$

Fee payment:

☒ Please charge Deposit Account No. 23-1925 in the amount of $1,700 for Petition.

☐ Payment by credit card in the amount of $_____ (Form PTO-2038 is attached).
WARNING: Information on this form may become public. **Credit card information should not be included on this form.**

☒ The Director is hereby authorized to charge payment of any additional filing fees required under 37 CFR § 1.16 and any patent application processing fees under 37 CFR § 1.17 (including any extension fee required to ensure that this paper is timely filed), or to credit any overpayment, to Deposit Account No. 23-1925.

Respectfully submitted,

September 01, 2016
Date

/Gustavo Siller, Jr./
Gustavo Siller, Jr. (Reg. No. 32,305)

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

757 7590 06/02/2016

BGL
P.O. BOX 10395
CHICAGO, IL 60610

EXAMINER
NGUYEN, STEVEN C

ART UNIT	PAPER NUMBER
2443	

DATE MAILED: 06/02/2016

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/340,005	12/19/2008	Seung-Chul Lee	12579-6201	8241

TITLE OF INVENTION: STEREOSCOPIC 3D DISPLAY DEVICE

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960	$0	$0	$960	09/02/2016

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

757 7590 06/02/2016
BGL
P.O. BOX 10395
CHICAGO, IL 60610

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/340,005	12/19/2008	Seung-Chul Lee	12579-6201	8241

TITLE OF INVENTION: STEREOSCOPIC 3D DISPLAY DEVICE

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960	$0	$0	$960	09/02/2016

EXAMINER	ART UNIT	CLASS-SUBCLASS
NGUYEN, STEVEN C	2443	348-043000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
- ❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.
1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. The following fee(s) are submitted:
- ❑ Issue Fee
- ❑ Publication Fee (No small entity discount permitted)
- ❑ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
- ❑ A check is enclosed.
- ❑ Payment by credit card. Form PTO-2038 is attached.
- ❑ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
- ❑ Applicant certifying micro entity status. See 37 CFR 1.29
  NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
- ❑ Applicant asserting small entity status. See 37 CFR 1.27
  NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
- ❑ Applicant changing to regular undiscounted fee status.
  NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

PTOL-85 Part B (10-13) Approved for use through 10/31/2013. OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/340,005	12/19/2008	Seung-Chul Lee	12579-6201	8241

757 7590 06/02/2016

BGL
P.O. BOX 10395
CHICAGO, IL 60610

EXAMINER	
NGUYEN, STEVEN C	

ART UNIT	PAPER NUMBER
2443	

DATE MAILED: 06/02/2016

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	Application No. 12/340,005	Applicant(s) LEE ET AL.	
	Examiner STEVEN NGUYEN	Art Unit 2443	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *Amendments filed on 05/04/2016*.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on_____.
2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
3. ☒ The allowed claim(s) is/are *1-11,13,14 and 16*. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov .
4. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☒ All b) ☐ Some *c) ☐ None of the:
   1. ☒ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
4. ☒ Interview Summary (PTO-413), Paper No./Mail Date *05/17/2016* .
5. ☐ Examiner's Amendment/Comment
6. ☒ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/JUNE SISON/ Primary Examiner, Art Unit 2443	/S. N./ Examiner, Art Unit 2443

Reason for Allowance

1. Claims 1-11, 13, 14, 16, are allowed in view of the previous Notice of Allowance mailed on 02/05/2016 and Applicant's Arguments and Remarks filed 05/04/2016. The following is an Examiner's statement of reasons for allowance: This communication warrants no Examiner's reason for allowance, as the prosecution history makes evident the reason for allowance, satisfying the record as whole as required by rule 37 CFR 1.104 (e). In this case, the amendments and arguments filed on 11/20/2014 and 05/04/2016 point out the reason claims are patentable over the prior art of record. Thus, the reason for allowance is in all probability evident from the record and no statement for examiner's reason for allowance is necessary (see MPEP 13202.14).

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to STEVEN NGUYEN whose telephone number is (571)270-5663. The examiner can normally be reached on Monday through Thursday with alternating Friday 7:30AM - 5:00PM, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tonia Dollinger can be reached on (571) 272-4170. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/S. N./
Examiner, Art Unit 2443
05/18/2016

/JUNE SISON/
Primary Examiner, Art Unit 2443

Examiner-Initiated Interview Summary	Application No.	Applicant(s)	
	12/340,005	LEE ET AL.	
	Examiner	Art Unit	
	STEVEN NGUYEN	2443	

All participants (applicant, applicant's representative, PTO personnel):

(1) *STEVEN NGUYEN*. (3)_____.

(2) *FRANKIE WONG (Reg. 61,832)*. (4)_____.

Date of Interview: *17 May 2016*.

Type: ☒ Telephonic ☐ Video Conference
☐ Personal [copy given to: ☐ applicant ☐ applicant's representative]

Exhibit shown or demonstration conducted: ☐ Yes ☒ No.
If Yes, brief description: _____.

Issues Discussed ☐101 ☐112 ☐102 ☐103 ☒Others
(For each of the checked box(es) above, please describe below the issue and detailed description of the discussion)

Claim(s) discussed: *1*.

Identification of prior art discussed: *N/A*.

Substance of Interview
(For each issue discussed, provide a detailed description and indicate if agreement was reached. Some topics may include: identification or clarification of a reference or a portion thereof, claim interpretation, proposed amendments, arguments of any applied references etc...)

The Examiner contacted the Attorney in order to discuss the new amendment to claim 1, namely, the removal of the light source.

Applicant recordation instructions: It is not necessary for applicant to provide a separate record of the substance of interview.

Examiner recordation instructions: Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

☐ Attachment

/JUNE SISON/ Primary Examiner, Art Unit 2443	/S. N./ Examiner, Art Unit 2443

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12340005	LEE ET AL.
	Examiner	**Art Unit**
	STEVEN NGUYEN	2443

CPC						
Symbol					**Type**	**Version**
G02B		27	/	26	F	2013-01-01
H04N		13	/	0434	I	2013-01-01
			/			
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CPC Combination Sets							
Symbol					**Type**	**Set**	**Ranking**	**Version**
			/					
			/					

/S.N./ Examiner.Art Unit 2443 (Assistant Examiner)	05/18/2016 (Date)	**Total Claims Allowed:** 14	
/JUNE SISON/ Primary Examiner.Art Unit 2443 (Primary Examiner)	05/24/2016 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 9

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12340005	LEE ET AL.
	Examiner	**Art Unit**
	STEVEN NGUYEN	2443

US ORIGINAL CLASSIFICATION		INTERNATIONAL CLASSIFICATION										
CLASS	SUBCLASS	CLAIMED					NON-CLAIMED					
348	43	H	0	4	N	13 / 00 (2006.01.01)						
CROSS REFERENCE(S)												
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)											

/S.N./ Examiner.Art Unit 2443	05/18/2016	**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	14	
/JUNE SISON/ Primary Examiner.Art Unit 2443	05/24/2016	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	9

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12340005	LEE ET AL.
	Examiner	**Art Unit**
	STEVEN NGUYEN	2443

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	1														
2	2														
3	3														
4	4														
5	5														
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11	11														
	12														
12	13														
13	14														
	15														
14	16														

/S.N./ Examiner.Art Unit 2443	05/18/2016	**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	14	
/JUNE SISON/ Primary Examiner.Art Unit 2443	05/24/2016	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	9

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12340005	LEE ET AL.
	Examiner	Art Unit
	STEVEN NGUYEN	2443

CPC- SEARCHED		
Symbol	Date	Examiner
G02B 27/26	02/01/2016	SCN
H04N 13/0434	02/01/2016	SCN
Updated CPC Search	05/16/2016	SCN

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
348	43	12/13/2011	SCN

SEARCH NOTES		
Search Notes	Date	Examiner
Inventor/Assignee Search (Double Patenting)	12/13/2011	SCN
EAST Search	12/13/2011	SCN
Updated EAST Search	05/09/2012	SCN
Updated EAST Search	02/03/2014	SCN
Updated EAST Search	08/18/2014	SCN
Updated EAST Search	01/19/2016	SCN
Consulted with Allen Wong (PE, AU 2488) regarding Allowable Subject Matter	01/20/2016	SCN
Consulted with June Sison (PE, AU 2443)	01/20/2016	SCN
Consulted with Chris Grant (101/112 Help Panel) regarding possible issues with claim 1	01/21/2016	SCN
Updated EAST Search	05/16/2016	SCN

INTERFERENCE SEARCH

US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
G02B	27/26	02/02/2016	SCN
H04N	13/0434	02/02/2016	SCN
G02B	27/26	05/16/2016	SCN
H04N	13/0434	05/16/2016	SCN

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	12549	((seung near2 lee) or (hoon near2 kang) or (sung near2 jung)).in.	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2016/05/18 14:16
L2	7091	(lg near display).asn.	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2016/05/18 14:16
L3	19502	L1 or L2	US-PGPUB; USPAT; FPRS; EPO; JPO	OR	OFF	2016/05/18 14:16
L4	1688	G02B27/26.CPC.	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2016/05/18 14:18
L5	1765	H04N13/0434.CPC.	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2016/05/18 14:19
L6	1673278	(television or tv or hdtv or ((image or imaging) adj3 (display$3 or render$4 or output$3 or view$3 or system)))	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2016/05/18 14:19
L7	96659	(television or tv or hdtv or ((image or imaging) adj3 (display$3 or render$4 or output$3 or view$3 or system))) near10 (stereoscop$4 or stereovis$4 or 3d or (three adj3 dimension$4) or ("3" adj3 dimension$4) or multiview$4 or 2d or (two adj3 dimension$4) or ("2" adj3 dimension$4))	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2016/05/18 14:21
L8	1538494	(panel or pane or screen or layer or display or lcd) near3 (auxiliary or aux or ancillary or alternat$4 or second$3 or 2nd) or polarizer	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2016/05/18 14:21

L9	481687	(polarization$4 or angle) near3 (switch$3 or chang$4 or modif$8 or alter$4 or adjust$4 or adapt$4 or toggl$4 or revers$4)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2016/05/18 14:22
L10	959248	(power or (on adj3 off) or state or status) near3 (cycl$4 or toggl$4 or switch$3 or flip$4 or (turn$3 adj2 (on or off)))	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2016/05/18 14:23
L11	27487	((panel or pane or screen or layer or display or lcd) near3 (auxiliary or aux or ancillary or alternat$4 or second$3 or 2nd) or polarizer) near5 (activat$4 or deactivat$4 or inactiv$4 or on or off)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2016/05/18 14:23
L12	10272	((panel or pane or screen or layer or display or lcd) near3 (auxiliary or aux or ancillary or alternat$4 or second$3 or 2nd) or polarizer) near10 (polarization$4 or angle) near3 (switch$3 or chang$4 or modif$8 or alter$4 or adjust$4 or adapt$4 or toggl$4 or revers$4)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2016/05/18 14:23
L13	221	12 near10 (10 or 11)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2016/05/18 14:25
L14	15	13 near30 (left or right or ((first or 1st or second or 2nd) adj3 (image or frame or picture or photo or photograph$4)))	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2016/05/18 14:26
L15	11	("6252624" | "6252570" | "20040012851" | "20020118276" | "20050036082" | "20050285997" | "20070206134" | "6510002" | "20060203339" | "20060268196" | "20080284699").PN.	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2016/05/18 14:27
L16	2788	4 or 5	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2016/05/18 14:27
L17	29	16 and 13	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2016/05/18 14:27
L18	8	16 and 14	US-PGPUB; USPAT; EPO; JPO;	ADJ	ON	2016/05/18 14:27

			IBM_TDB			
L19	6	16 and 15	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2016/05/18 14:27
L20	0	15 and 13	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2016/05/18 14:27
L21	4	3 and 13	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2016/05/18 14:28
L44	10	3 and (without near4 polariz$8).clm.	US-PGPUB; USPAT; FPRS; EPO; JPO	ADJ	ON	2016/05/18 14:41
L45	6	44 and (substrat$4).clm.	US-PGPUB; USPAT; FPRS; EPO; JPO	ADJ	ON	2016/05/18 14:42
L46	4	45 and (electrod$4).clm.	US-PGPUB; USPAT; FPRS; EPO; JPO	ADJ	ON	2016/05/18 14:42
L47	0	46 and (retardation near4 layer$1).clm.	US-PGPUB; USPAT; FPRS; EPO; JPO	ADJ	ON	2016/05/18 14:42
S1	1	"12340005"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:10
S2	7535	((seung near2 lee) or (hoon near2 kang) or (sung near2 jung)).in.	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:10
S3	2913	(lg near display).asn.	US-PGPUB; USPAT; EPO; JPO;	ADJ	ON	2011/12/15 10:11

			IBM_TDB			
S4	68	S2 and S3	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:11
S5	11	S4 and 3D	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:14
S7	4	("20020118276" | "20050036082" | "6252570" | "6252624").PN.	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:17
S8	2	"2006268196"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:29
S9	1	"20060268196"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:29
S10	2	"2004012851"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:32
S11	1	"20040012851"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:32
S12	2244	parallax near3 barrier	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:45
S13	1692	S12 and (3D or (three near2 dimension$3))	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:46
S14	121	S13 and (polariz$4 and (indium near3 oxide))	US-PGPUB; USPAT; EPO; JPO;	ADJ	ON	2011/12/15 10:46

			IBM_TDB			
S15	112	S14 and (left and right)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:47
S16	19276116	@ad<"20080709" or @rlad<"20080709"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:48
S17	0	S15 and S6	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:48
S18	98	S15 and S16	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:48
S19	1	"7199845".pn.	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:49
S20	2	"20050285997"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:49
S21	8964	S16 and ("120" near2 HZ)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 11:04
S22	366011	S16 and (HZ or hertz)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 11:04
S23	4	S15 and ("120" near2 HZ)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 11:04
S24	2	"20050285997" and (between or (in near2 between))	US-PGPUB; USPAT; EPO; JPO;	ADJ	ON	2011/12/15 12:26

			IBM_TDB			
S25	2	"20050285997" and (ITO or (indium near3 oxide))	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:36
S26	2	"20050285997" and (height)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:37
S27	2	"20050285997" and (height or width)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:38
S28	0	"20050285997" and (synch$7)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:39
S29	0	"20060268196" and (synch$7)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:39
S30	59	S14 and (parallel and perpendicular)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:44
S31	55	S30 and S16	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:44
S32	1	"20100007716" and (substantial$4).clm.	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:48
S33	20	S14 and (perpendicular and (twisted near3 nematic))	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:49
S34	3	S14 and (perpendicular and (twisted near3 nematic)) and (HZ or hertz)	US-PGPUB; USPAT; EPO; JPO;	ADJ	ON	2011/12/15 12:49

			IBM_TDB			
S35	0	((3D or (three near3 dimension$4)) same (perpendicular near20 (twisted near3 nematic)) and (HZ or hertz))	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:53
S36	62	(perpendicular near20 (twisted near3 nematic)) and (HZ or hertz)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:54
S37	62	S36 and (LCD or (liquid near3 crystal))	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:55
S38	57	S37 and S16	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:55
S39	23	(perpendicular near20 (twisted near3 nematic)) and ("120" near3 (HZ or hertz))	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:57
S40	22	S39 and S16	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:57
S41	2	"20080284699"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:58
S42	2	"20080284699" and (nematic and perpendicular and "120")	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:58
S43	2	"20050285997" and (rub$5)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:11
S44	2	"20050285997" and (perpendic$7)	US-PGPUB; USPAT; EPO; JPO;	ADJ	ON	2011/12/15 13:12

			IBM_TDB			
S45	2	"20050285997"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:22
S46	2	"20060269496"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:27
S47	1	"20060268196"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:27
S48	1	"20020118276"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:27
S49	483	348/43.ccls.	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:28
S50	1	"20050036082"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:28
S51	1	"6252570".pn.	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:28
S52	1	"6252624".pn.	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:28
S53	1	"12340005"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/11 12:36
S54	0	"12340005" and synchroni$5	US-PGPUB; USPAT; EPO; JPO;	ADJ	ON	2012/05/11 12:36

			IBM_TDB			
S55	0	"12340005" and synch$8	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/11 12:36
S56	1	"20100007716"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/11 12:36
S57	0	"20100007716" and synch$8	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/11 12:36
S58	1	"20100007716" and polariz$5	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/11 12:38
S59	7	"6510002"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/11 12:41
S60	1	"20100007716" and subframe	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/11 13:13
S61	0	"20050285997" and subframe	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/11 13:14
S62	0	"20050285997" and frame	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/11 13:14
S63	2	"20050285997" and separat$4	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/11 13:18
S64	0	"6510002".pn. and elect$4	US-PGPUB; USPAT; EPO; JPO;	ADJ	ON	2012/05/14 12:39

			IBM_TDB			
S65	1	"6510002".pn. and elect$6	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/14 12:39
S66	2	"20050285997" and elect$6	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/14 12:40
S67	1	"20100007716" and "60"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/14 12:46
S68	1	"6510002".pn. and frame$2	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/14 12:49
S69	4	"6510002".pn. or "20050285997" or "20060268196"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/14 13:02
S70	0	S69 and on	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/14 13:02
S71	4	S69 and (on or off)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/14 13:02
S72	3	S69 and alternat$5	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/14 13:22

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L22	689	G02B27/26.CPC.	USPAT	ADJ	ON	2016/05/18 14:29
L23	889	H04N13/0434.CPC.	USPAT	ADJ	ON	2016/05/18 14:30
L24	1280	22 or 23	USPAT	ADJ	ON	2016/05/18 14:30

L25	25	(without near4 polariz$8).clm. and 24	USPAT	ADJ	ON	2016/05/18 14:33
L26	157	(electrod$4).clm. and 24	USPAT	ADJ	ON	2016/05/18 14:33
L27	243	(substrat$4).clm. and 24	USPAT	ADJ	ON	2016/05/18 14:33
L28	87	(polarization near5 axis).clm. and 24	USPAT	ADJ	ON	2016/05/18 14:34
L29	425	(right near5 image$1).clm. and 24	USPAT	ADJ	ON	2016/05/18 14:34
L30	427	(left near5 image$1).clm. and 24	USPAT	ADJ	ON	2016/05/18 14:34
L31	12	(off near10 electrod$3).clm. and 24	USPAT	ADJ	ON	2016/05/18 14:34
L32	201	(perpendicular).clm. and 24	USPAT	ADJ	ON	2016/05/18 14:34
L33	32	(retardation near4 layer$1).clm. and 24	USPAT	ADJ	ON	2016/05/18 14:34
L34	5	25 and 26	USPAT	ADJ	ON	2016/05/18 14:35
L35	1	34 and 27	USPAT	ADJ	ON	2016/05/18 14:35
L36	0	28 and 35	USPAT	ADJ	ON	2016/05/18 14:36
L37	41	28 and 29	USPAT	ADJ	ON	2016/05/18 14:36
L38	41	28 and 30	USPAT	ADJ	ON	2016/05/18 14:36
L39	39	37 and 38	USPAT	ADJ	ON	2016/05/18 14:37
L40	1	39 and 31	USPAT	ADJ	ON	2016/05/18 14:37
L41	1	40 and 33	USPAT	ADJ	ON	2016/05/18 14:38
L42	1	41 and 32	USPAT	ADJ	ON	2016/05/18 14:38

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C:\ Users\ snguyen3\ Documents\ EAST\ Workspaces\ 12340005.wsp

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P.O. Box 1450
Alexandria, Virginia 22313-1450
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BIB DATA SHEET

CONFIRMATION NO. 8241

SERIAL NUMBER	FILING or 371(c) DATE RULE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
12/340,005	12/19/2008	348	2443	12579-6201

APPLICANTS

INVENTORS

Seung-Chul Lee, Paju Si, KOREA, REPUBLIC OF;
Hoon Kang, Namyangju Si, KOREA, REPUBLIC OF;
Sung-Min Jung, Incheon, KOREA, REPUBLIC OF;

**** CONTINUING DATA ***************************

**** FOREIGN APPLICATIONS ***************************

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ****
01/07/2009

Foreign Priority claimed ☑ Yes ☐ No 35 USC 119(a-d) conditions met ☑ Yes ☐ No Verified and Acknowledged /STEVEN C NGUYEN/ Examiner's Signature	☑ Met after Allowance SCN Initials	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
		KOREA, REPUBLIC OF	8	14	1

ADDRESS

BGL
P.O. BOX 10395
CHICAGO, IL 60610
UNITED STATES

TITLE

STEREOSCOPIC 3D DISPLAY DEVICE

FILING FEE RECEIVED		
1090	FEES: Authority has been given in Paper No._____ to charge/credit DEPOSIT ACCOUNT No._____ for following:	☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit

CERTIFICATE OF EFS FILING UNDER 37 CFR §1.8

I hereby certify that this correspondence is being electronically transmitted to the United States Patent and Trademark Office, Commissioner for Patents, via the EFS pursuant to 37 CFR §1.8 on the below date:

Date: May 4, 2016 Name: Gustavo Siller, Jr. Signature: /Gustavo Siller, Jr./

Case No.: 12579-6201

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Seung-Chul LEE et al.	Examiner: Steven C. Nguyen
Serial No: 12/340,005	Art Unit: 2443
Filed: December 19, 2008	Confirmation No: 8241
For: STEREOSCOPIC 3D DISPLAY DEVICE	

WITHRAWAL FROM ISSUE TO NOTICE OF ALLOWANCE

Mail Stop RCE
Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Dear Sir:

This RCE is filed to re-open prosecution and to withdraw from issue to the Notice of Allowance dated February 5, 2016, with a three-month reply period through May 5, 2016. Please grant allowance of this Application in view of the following remarks and amended claims.

Amendments to the Claims begin on page 2 of this paper.

Remarks begin on page 6 of this paper.

In the Claims:

Please amend the claims as follows (the changes in these Claims are shown with ~~strikethrough~~ for deleted matter and underlines for added matter). A complete listing of the claims proper claim identifiers is set forth below.

Amendments to the Claims

1. (Currently Amended) A stereoscopic image display device comprising:

a main display panel operable to alternately display left and right images according to each subframe;

an auxiliary display panel that changes polarization information of one of the displayed left and right images without a polarizer, the auxiliary display panel including first and second substrates having a pixel part corresponding to that of the main display panel and a sub-liquid crystal layer formed between the first and second substrates, and positioned in front of the main display panel,

a plurality of first electrodes patterned on the first substrate along the rows of pixels formed on the main display panel;

a second single electrode on an entire surface of the pixel part of the second substrate;

wherein the changes of polarization information comprises:

turning on the first and second electrodes in the auxiliary display panel to align liquid crystal molecules in the sub-liquid crystal layer formed between the first and second substrate such that polarization axis of the left or right image that has passed through the auxiliary display panel is unchanged when one of the left and right images is displayed on the main display panel, and

turning off the first and second electrodes in the auxiliary display panel to align liquid crystal molecules in the sub-liquid crystal layer formed between the first and second substrate such that polarization axis of the left or right image is substantially perpendicular to that of the left or right image made incident on the auxiliary display panel when the other one of the left and right images is displayed on the main display panel; and

~~a light source supplies light to the rear side of the main display panel;~~

wherein a $\lambda/4$ retardation layer is formed on the first substrate of the auxiliary display panel which changes a linearly polarized left or right image made incident to the auxiliary display panel into a left circularly polarized or right circularly polarized state.

2. (Original) The device of claim 1, wherein the second electrode is on the entire surface of the pixel part of the second substrate without any patterns.

3. (Original) The device of claim 1, wherein the first and second electrodes are made of a transparent conductive material such as ITO.

4. (Original) The device of claim 1, wherein the height of the first electrode corresponds to the height of a single pixel of the main display panel, and the width of the first electrode corresponds to 'n' (n=1,2,...) times the width of the pixel part.

5. (Previously Presented) The device of claim 1, wherein the main display panel is driven to have 60 frames, and each frame includes a first subframe displaying the left image and a second subframe displaying the right image.

6. (Previously Presented) The device of claim 1, wherein the sub-liquid crystal layer includes a plurality of liquid crystal molecules, and when the auxiliary display panel is driven, the liquid crystal molecules are arranged to be perpendicular to the first and second substrates, and when the auxiliary display panel is not driven, the liquid crystal molecules are arranged in a twisted nematic structure.

7. (Previously Presented) The device of claim 1, wherein the sub-liquid crystal layer includes a plurality of liquid crystal molecules, and when the auxiliary display panel is driven, the liquid crystal molecules are arranged to be perpendicular to the first and second substrates, and when the auxiliary display panel is not driven, the liquid crystal molecules are arranged to be parallel to the first and second substrates.

8. (Previously Presented) The device of claim 1, wherein a polarization axis of the left or right image made incident to the auxiliary display panel and a rubbing direction of the auxiliary display panel are positioned at 45°.

9. (Previously Presented) The device of claim 4, wherein when the auxiliary display panel is not driven, a polarization axis of the left or right image that has passed through the auxiliary display panel is perpendicular to a polarization axis of the left or right image made incident to the auxiliary display panel.

10. (Original) The device of claim 1, wherein the main display panel is driven at 120Hz or higher.

11. (Original) The device of claim 1, wherein the main display panel comprises:

an array substrate;

a color filter substrate disposed to face the array substrate;

a main liquid crystal layer positioned between the array substrate and the color filter substrate;

a first polarizer attached on an outer surface of the array substrate; and

a second polarizer attached on an outer surface of the color filter substrate.

12. (Canceled)

13. (Previously Presented) The device of claim 1, wherein the $\lambda/4$ retardation layer in formed in an in-cell form on an upper surface of the first substrate of the auxiliary display panel together with the first substrate.

14. (Previously Presented) The device of claim 1, wherein the $\lambda/4$ retardation layer is attached in a form of a film on a lower surface of the first substrate of the auxiliary display panel.

15. (Canceled)

16. (Previously Presented) The device of claim 5, wherein when the auxiliary display panel is turned on, it outputs polarization information of the left image outputted from the main display panel without changing it, and when the auxiliary display panel is

turned off, it changes the polarization information of the right image outputted from the main display panel, and outputs the image.

REMARKS

Claims 1-11, 13-14 and 16 are pending and have been previously allowed. Claims 12 and 15 has been previously canceled. Claim 1 has been amended to delete the limitation of "a light source" in order to broaden the claim scope. The Examiner is respectfully requested to reconsider claim 1 (as amended) and grant allowance after examination.

Conclusion

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. If any fee is due as a result of the filing of this paper, please appropriately charge such fee to Deposit Account Number 23-1925. Should the Examiner feel that there are any issues outstanding after consideration of the response, the Examiner is invited to contact Applicants' undersigned representative to expedite prosecution.

Respectfully submitted,

Dated: May 4, 2016

/Gustavo Siller, Jr./
Gustavo Siller, Jr., Reg. No. 32,305
Attorney for Applicants

BRINKS GILSON & LIONE
PO BOX 10395
CHICAGO, IL 60610
(312) 321-4200 (FWW)

CERTIFICATE OF EFS FILING UNDER 37 CFR §1.8

I hereby certify that this correspondence is being electronically transmitted to the United States Patent and Trademark Office, Commissioner for Patents, via the EFS pursuant to 37 CFR §1.8 on the below date:

Date: May 4, 2016 Name: Gustavo Siller, Jr. Signature: /Gustavo Siller, Jr./

BRINKS GILSON & LIONE

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Appln. of:	Seung-Chul LEE et al.		
Appln. No.:	12/340,005	Examiner:	Steven C. Nguyen
Filed:	December 19, 2008	Art Unit:	2443
For:	STEREOSCOPIC 3D DISPLAY DEVICE	Conf. No.:	8241
Attorney Docket No.:	12579-6201		

Mail Stop RCE
Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

REQUEST FOR CONTINUED EXAMINATION (37 CFR § 1.114)

Dear Sir/Madam:

Applicant(s) requests continued examination of the above-identified application under 37 CFR §1.114.

☒ This is the THIRD request under 37 CFR §1.17(e) in this application.

☒ Submission under 37 CFR 1.114 (*check at least one of the following*):

- ☐ Previously submitted:
  - ☐ Applicant(s) requests nonentry of any previously-filed unentered amendments.
  - ☐ Please enter and consider the Amendment After Final Under 37 CFR §1.116 previously filed on _____.
  - ☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____.
  - ☐ Other: _____.
- ☒ Attached is/are:
  - ☐ An Information Disclosure Statement
  - ☒ An Amendment to the written description, claims, or drawings
  - ☐ New Arguments and/or New Evidence in support of Patentability
  - ☐ Other: _____

☐ Request for suspension of action:

Applicant(s) hereby requests suspension of action on the above-identified application under 37 CFR §1.103(c) for a period of _____ months. (Period of suspension shall not exceed 3 months; requires Processing Fee under 37 CFR §1.17(i)).

☐ Small/Micro Entity Status:

- ☐ Applicant(s) hereby asserts entitlement to claim ☐ small or ☐ micro entity status under 37 CFR §§ 1.9 and 1.27.
- ☐ A small/micro entity statement or assertion of entitlement to claim small/micro entity status was filed in prior application no. _____/_____ and such status is still proper and desired.
- ☐ Is no longer desired.

☒ Applicant(s) calculates the following fees to be due in connection with this Request:

- ☒ A request fee of $1,700 under 37 CFR §1.17(e)(1) or (2).
- ☐ A suspension processing fee of $_____ under 37 CFR §1.17(i).
- ☐ An additional filing fee of $_____ under 37 CFR §1.16 (_____ additional independent claims and/or _____ additional total claims).
- ☐ An extension fee of $_____ under 37 CFR §1.17(a) for a _____-month extension of time.

☒ Fee payment to cover the above-enumerated fee(s):

- ☒ Please charge Deposit Account No. 23-1925 (BRINKS GILSON & LIONE) in the amount of $1,700.
- ☐ A payment by credit card in the amount of $_____ (Form PTO-2038 is attached).
- ☒ The Commissioner is hereby authorized to charge payment of any additional filing fees required under 37 CFR § 1.16 and any patent application processing fees under 37 CFR § 1.17 associated with this paper (including any extension fee required to ensure that this paper is timely filed), or to credit any overpayment, to Deposit Account No. 23-1925 (BRINKS GILSON & LIONE).

Respectfully submitted,

May 4, 2016
Date

/Gustavo Siller, Jr./
Gustavo Siller, Jr. (Reg. No. 32,305)

Electronic Patent Application Fee Transmittal

Application Number:	12340005
Filing Date:	19-Dec-2008
Title of Invention:	STEREOSCOPIC 3D DISPLAY DEVICE
First Named Inventor/Applicant Name:	Seung-Chul Lee
Filer:	Gustavo Siller Jr./Carrie Wagner
Attorney Docket Number:	12579-6201

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
RCE- 2nd and Subsequent Request	1820	1	1700	1700
		Total in USD ($)		**1700**

Electronic Acknowledgement Receipt

EFS ID:	25686629
Application Number:	12340005
International Application Number:	
Confirmation Number:	8241
Title of Invention:	STEREOSCOPIC 3D DISPLAY DEVICE
First Named Inventor/Applicant Name:	Seung-Chul Lee
Customer Number:	757
Filer:	Gustavo Siller Jr./Jesus Rodriguez
Filer Authorized By:	Gustavo Siller Jr.
Attorney Docket Number:	12579-6201
Receipt Date:	04-MAY-2016
Filing Date:	19-DEC-2008
Time Stamp:	17:03:29
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$1700
RAM confirmation Number	3960
Deposit Account	231925
Authorized User	SILLER, GUSTAVO
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Miscellaneous Incoming Letter	12579_6201_Withdrawal_and_RCE_Transmittal.pdf	108281 9de1b78efc165644614c4156846c21a1606cd5c0	no	1
Warnings:					
Information:					
2		12579_6201_RCE_to_withdraw_from_issue.pdf	73076 7b603455a2443ffd731009b73d191310bd03e27f	yes	6

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Request for Continued Examination (RCE)	1	1
	Claims	2	5
	Applicant Arguments/Remarks Made in an Amendment	6	6

Warnings:					
Information:					
3	Request for Continued Examination (RCE)	12579_6201_RCE.pdf	91983 ee7b0b20f5430f08e2b0e0ba7505723221dd9afe	no	2
Warnings:					
This is not a USPTO supplied RCE SB30 form.					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	30378 af23f3df1f0c44b25bfc4b5c838eed15f2bfcbe2	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	303718		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

CERTIFICATE OF EFS FILING UNDER 37 CFR §1.8

I hereby certify that this correspondence is being electronically transmitted to the United States Patent and Trademark Office, Commissioner for Patents, via the EFS pursuant to 37 CFR §1.8 on the below date:

Date: May 4, 2016 Name: Gustavo Siller, Jr. Signature: /Gustavo Siller, Jr./

BRINKS GILSON & LIONE

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Appln. of:	Seung-Chul LEE et al.		
Appln. No.:	12/340,005	Examiner:	Steven C. Nguyen
Filed:	December 19, 2008	Art Unit:	2443
For:	STEREOSCOPIC 3D DISPLAY DEVICE	Conf. No.:	8241
Attorney Docket No.:	12579-6201		

TRANSMITTAL

Mail Stop RCE
Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Sir:

Attached is/are:

☒ Withdrawal From Issue To Notice Of Allowance; Request for Continued Examination (37 CFR § 1.114).

Fee calculation:

☐ No additional fee is required.

☐ Per 37 CFR §1.27, ☐ Applicant is small entity ☐ Applicant is micro entity.

☐ An extension fee in an amount of $_____ for a _____-month extension of time under 37 CFR § 1.136(a).

☒ A petition or processing fee in an amount of $1,700 under 37 CFR § 1.17(e).

☐ An additional filing fee has been calculated as shown below:

					Fee		Small Entity Fee		Micro Entity Fee	
	Claims Remaining After Amendment		Highest No. Previously Paid	Present Extra	Rate	Add'l Fee	Rate	Add'l Fee	Rate	Add'l Fee
Total		Minus			x $ 80 =	$	x $ 40 =	$	x $20 =	$
Independent		Minus			x $420 =	$	x $210 =	$	x $105 =	$
First Presentation of Multiple Dep. Claim					+ $780 =	$	+ $390 =	$	+ $195 =	$
					Total	$	Total	$	Total	$

Fee payment:

☒ Please charge Deposit Account No. 23-1925 in the amount of $1,700 for the Request for Continued Examination fees.

☐ Payment by credit card in the amount of $_____ (Form PTO-2038 is attached).
WARNING: Information on this form may become public. **Credit card information should not be included on this form.**

☒ The Director is hereby authorized to charge payment of any additional filing fees required under 37 CFR § 1.16 and any patent application processing fees under 37 CFR § 1.17 (including any extension fee required to ensure that this paper is timely filed), or to credit any overpayment, to Deposit Account No. 23-1925.

Respectfully submitted,

May 4, 2016
Date

/Gustavo Siller, Jr./
Gustavo Siller, Jr. (Reg. No. 32,305)

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number	Filing Date	☐ To be Mailed
12/340,005	12/19/2008	

ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT **05/04/2016**

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 14	Minus	** 20	= 0	X $80 =	0
Independent (37 CFR 1.16(h))	* 1	Minus	***3	= 0	X $420 =	0
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	0

AMENDMENT

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =	
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
/JACQUELYN WILLIAMS/

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
12/340,005	12/19/2008	Seung-Chul Lee	12579-6201

CONFIRMATION NO. 8241

IMPROPER CFR REQUEST

757
BGL
P.O. BOX 10395
CHICAGO, IL 60610

OC000000082156834

Date Mailed: 04/13/2016

RESPONSE TO REQUEST FOR CORRECTED FILING RECEIPT

Continuity, Priority Claims, Petitions, and Non-Publication Requests

In response to your request for a corrected Filing Receipt, the Office is unable to comply with your request because:

- The priority or continuity claim has not been entered because it was not filed during the required time period. Applicant may wish to consider filing a petition to accept an unintentionally delayed claim for priority. See 37 CFR 1.55 or 1.78.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/cbowen/

CERTIFICATE OF EFS FILING UNDER 37 CFR §1.8

I hereby certify that this correspondence is being electronically transmitted to the United States Patent and Trademark Office, Commissioner for Patents, via the EFS pursuant to 37 CFR §1.8 on the below date:

Date: April 6, 2016 Name: Gustavo Siller, Jr., Reg. No. 32,305 Signature: /Gustavo Siller, Jr./

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Appln. of:	Seung-Chul LEE et al.	
Appln. No.:	12/340,005	Examiner: Steven C. NGUYEN
Filed:	December 19, 2008	Art Unit: 2443
For:	STEREOSCOPIC 3D DISPLAY DEVICE	Conf. No.: 8241
Attorney Docket No.:	12579-6201	
Client Ref. No.:	F08-0379US001	

REQUEST FOR CORRECTION OF FILING RECEIPT

Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Attention : Application Processing Division
Customer Correction Branch

Dear Sir:

The Applicant respectfully request the issuance of a Corrected Filing Receipt for the above-referenced patent application. Please correct the foreign priority application as follows:

~~**KR 10-2008-0055329**~~ **KR 10-2008-0066695;**

A marked-up copy of the Filing Receipt is attached indicating the request correction.

A Corrected Application Data Sheet noting the correction is also submitted.

Respectfully submitted,

Dated: April 6, 2016

/Gustavo Siller, Jr./
Gustavo Siller, Jr., Reg. No. 32,305
Attorney for Applicants

BRINKS GILSON & LIONE
PO BOX 10395
CHICAGO, IL 60610
(312) 321-4200

Marked Up

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
12/340,005	12/19/2008	2621	1090	12579/6199	14	1

CONFIRMATION NO. 8241

757
BRINKS HOFER GILSON & LIONE
P.O. BOX 10395
CHICAGO, IL 60610

FILING RECEIPT

OC000000033944297

Date Mailed: 01/09/2009

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Applicant(s)

Seung-Chul Lee, Paju Si, KOREA, REPUBLIC OF;
Hoon Kang, Namyangju Si, KOREA, REPUBLIC OF;
Sung-Min Jung, Incheon, KOREA, REPUBLIC OF;

Assignment For Published Patent Application

LG Display Co., Ltd., Seoul, KOREA, REPUBLIC OF

Power of Attorney: The patent practitioners associated with Customer Number 00757

Domestic Priority data as claimed by applicant

Foreign Applications

REPUBLIC OF KOREA ~~10-2008-0055329~~ 07/09/2008
10-2008-0066695

Request to Retrieve - This application either claims priority to one or more applications filed in an intellectual property Office that participates in the Priority Document Exchange (PDX) program or contains a proper **Request to Retrieve Electronic Priority Application(s)** (PTO/SB/38 or its equivalent). Consequently, the USPTO will attempt to electronically retrieve these priority documents.

If Required, Foreign Filing License Granted: 01/07/2009

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 12/340,005**

Projected Publication Date: 01/14/2010

Non-Publication Request: No

Early Publication Request: No

Title

STEREOSCOPIC 3D DISPLAY DEVICE

Preliminary Class

348

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4158).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as

set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

CORRECTED APPLICATION DATA SHEET

APPLICATION & PUBLICATION INFORMATION

Application Number:	~~To Be Assigned~~ 12/340,005
Title of Invention:	STEREOSCOPIC 3D DISPLAY DEVICE
Attorney Docket Number:	~~12579/6199~~ 12579/6201
Small Entity Status Claimed:	☐
Filing Date:	December 19, 2008
Application Type:	Utility
Subject Matter:	
Suggested Class (if any):	
Suggested Group Art Unit (if any):	
CD-ROM or CD-R?:	
Total Number of Drawing Sheets (if any):	8
Suggested Figure for Publication (if any):	
Secrecy Order 37 CFR 5.2:	☐
Request for Early Publication:	☐
Request for Non-Publication:	☐

APPLICANT INFORMATION

Applicant Authority:	Inventor
Prefix:	
Inventor One Given Name:	Seung-Chul
Middle Name:	
Family Surname:	LEE
Suffix:	
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Mailing Address Line Two:	Geumchon-dong
City:	Paju Si
State or Province:	Gyeonggi-Do
Postal Code:	
Country:	Korea
Residency:	Non U.S. Residency
City, State/Province, Country of Residence:	Paju Si, Republic of Korea
Citizenship under 37 CFR 1.41(b):	Republic of Korea
Prefix:	
Inventor Two Given Name:	Hoon
Middle Name:	
Family Surname:	KANG
Suffix:	
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State or Province:	Gyeonggi-Do
Postal Code:	
Country:	Republic of Korea
Residency:	Non-U.S.
City, State/Province, Country of Residence:	Namyangju Si
Citizenship under 37 CFR 1.41(b):	Republic of Korea

Prefix:	
Inventor Three Given Name:	Sung-Min
Middle Name:	
Family Surname:	JUNG
Suffix:	
Mailing Address Line One:	Woosung Apt. 5-1408
Mailing Address Line Two:	Ganseok 4-dong
City:	Namdong-gu
State or Province:	Incheon
Postal Code:	
Country:	Korea
Residency:	Non U.S. Residency
City, State/Province, Country of Residence:	Namdong-gu, Republic of Korea
Citizenship under 37 CFR 1.41(b):	Republic of Korea

CORRESPONDENCE INFORMATION

Name:	Brinks Hofer Gilson & Lione
Street of Mailing Address:	PO Box 10395
City of Mailing Address:	Chicago
State or Province of Mailing Address:	IL
Country of Mailing Address:	U.S.
Postal or Zip Code of Mailing Address:	60610
Telephone Number:	312-321-4200
Fax Number:	312-321-4299
E-mail Address:	officeactions@brinkshofer.com
Customer Number:	**00757 - Brinks Hofer Gilson Lione**

REPRESENTATIVE INFORMATION

Representative Designation:	Primary
Name:	Gustavo Siller, Jr.
Registration No.:	32,305

DOMESTIC PRIORITY INFORMATION

This application is a [*Continuation of]:	
Prior Application No.:	
Filing Date:	
which is a [*Continuation of]:	
Prior Application No.:	
Filing Date:	

FOREIGN PRIORITY INFORMATION

Foreign Application No.:	~~10-2008-0055329~~ 10-2008-0066695
Parent Filing Date:	July 9, 2008
Country:	Korea
Priority Claimed:	☒

ASSIGNMENT INFORMATION

Assignee Name:	LG Display Co., Ltd.
Mailing Address Line One:	20 Yoido-dong, Youngdungpogu
Mailing Address Line Two:	
City:	Seoul

State or Province:	
Country:	Korea
Postal Code:	

Electronic Acknowledgement Receipt

EFS ID:	25415014
Application Number:	12340005
International Application Number:	
Confirmation Number:	8241
Title of Invention:	STEREOSCOPIC 3D DISPLAY DEVICE
First Named Inventor/Applicant Name:	Seung-Chul Lee
Customer Number:	757
Filer:	Gustavo Siller Jr./Jesus Rodriguez
Filer Authorized By:	Gustavo Siller Jr.
Attorney Docket Number:	12579-6201
Receipt Date:	06-APR-2016
Filing Date:	19-DEC-2008
Time Stamp:	15:25:06
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		04-06-2016_12579-6201_Request_for_Corrected_Filing_Receipt-Filed.pdf	958725 2a0ef5e0cec90be078fc0cdab801dce35e4224ce	yes	8

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Transmittal Letter	1	1
	Request for Corrected Filing Receipt	2	2
	Miscellaneous Incoming Letter	3	5
	Application Data Sheet	6	8

Warnings:	
Information:	
Total Files Size (in bytes):	958725

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

CERTIFICATE OF EFS FILING UNDER 37 CFR §1.8

I hereby certify that this correspondence is being electronically transmitted to the United States Patent and Trademark Office, Commissioner for Patents, via the EFS pursuant to 37 CFR §1.8 on the below date:

Date: April 6, 2016 Name: Gustavo Siller, Jr., Reg. No. 32,305 Signature: /Gustavo Siller, Jr./

BRINKS GILSON & LIONE

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Appln. of:	Seung-Chul LEE et al.		
Appln. No.:	12/340,005	Examiner:	Steven C. NGUYEN
Filed:	December 19, 2008	Art Unit:	2443
For:	STEREOSCOPIC 3D DISPLAY DEVICE	Conf. No.:	8241
Attorney Docket No.:	12579-6201		
Client Ref. No.:	F08-0379US001		

TRANSMITTAL

Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Sir:

Attached is/are:

☒ Transmittal; Request for Corrected Filing Receipt, Marked-Up Copy Filing Receipt; and Corrected Application Data Sheet.

Fee calculation:

☒ No additional fee is required.

☐ Per 37 CFR §1.27, ☐ Applicant is small entity ☐ Applicant is micro entity.

☐ An extension fee in an amount of $_____ for a _____-month extension of time under 37 CFR § 1.136(a).

☐ A petition or processing fee in an amount of $_____ under 37 CFR § 1.17(_____).

☐ An additional filing fee has been calculated as shown below:

					Fee		Small Entity Fee		Micro Entity Fee	
	Claims Remaining After Amendment		Highest No. Previously Paid	Present Extra	Rate	Add'l Fee	Rate	Add'l Fee	Rate	Add'l Fee
Total		Minus			x $ 80 =	$	x $ 40 =	$	x $20 =	$
Independent		Minus			x $420 =	$	x $210 =	$	x $105 =	$
First Presentation of Multiple Dep. Claim					+ $780 =	$	+ $390 =	$	+ $195 =	$
					Total	$	Total	$	Total	$

Fee payment:

☐ Please charge Deposit Account No. 23-1925 in the amount of $_____ for _____.

☐ Payment by credit card in the amount of $_____ (Form PTO-2038 is attached).
WARNING: Information on this form may become public. **Credit card information should not be included on this form.**

☒ The Director is hereby authorized to charge payment of any additional filing fees required under 37 CFR § 1.16 and any patent application processing fees under 37 CFR § 1.17 (including any extension fee required to ensure that this paper is timely filed), or to credit any overpayment, to Deposit Account No. 23-1925.

Respectfully submitted,

April 6, 2016
Date

/Gustavo Siller, Jr./
Gustavo Siller, Jr. (Reg. No. 32,305)

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/340,005	12/19/2008	Seung-Chul Lee	12579-6201	8241

7590 03/14/2016

BGL
P.O. BOX 10395
CHICAGO, IL 60610

EXAMINER	
NGUYEN, STEVEN C	
ART UNIT	PAPER NUMBER
2443	

DATE MAILED: 03/14/2016

PRIORITY ACKNOWLEDGMENT

☑ 1. Receipt is acknowledged of priority papers submitted under 35 U.S.C. 119. The papers have been placed of record in the file.

☐ 2. Applicant's claim for priority, based on papers filed in parent Application Number _____ submitted under 35 U.S.C. 119, is acknowledged.

☐ 3. The priority papers, submitted _____, after payment of the issue fee are

- ☐ acknowledged
  While the priority claim or certified copy filed will be placed in the file record, neither will be reviewed and the patent when published will not include the priority claim.
  See 37 CFR 1.55(a)(2).
- ☐ not acknowledged since the processing fee in 37 CFR 1.17(i) has not been received.

☐ 4. For utility and plant applications filed on or after November 29, 2000, the priority claim is not entered because the claim was not presented within the time limit required by 37 CFR 1.55(a)(1). A petition to accept a delayed claim for priority under 35 U.S.C. 119(a) - (d) or (f), or 365(a) may be filed. See 37 CFR 1.55(c) and MPEP 201.14(a).

Charles Bowers

571-272-4200 or 1-888-786-0101
Application Assistance Unit
Office of Data Management

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/340,005	12/19/2008	Seung-Chul Lee	12579-6201	8241

757 7590 03/10/2016

BGL
P.O. BOX 10395
CHICAGO, IL 60610

EXAMINER
NGUYEN, STEVEN C

ART UNIT	PAPER NUMBER
2443	

MAIL DATE	DELIVERY MODE
03/10/2016	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Examiner-Initiated Interview Summary	Application No.	Applicant(s)	
	12/340,005	LEE ET AL.	
	Examiner	Art Unit	
	STEVEN NGUYEN	2443	

All participants (applicant, applicant's representative, PTO personnel):

(1) *STEVEN NGUYEN*. (3)_____.

(2) *FRANKIE WONG*. (4)_____.

Date of Interview: *29 February 2016*.

Type: ☒ Telephonic ☐ Video Conference
☐ Personal [copy given to: ☐ applicant ☐ applicant's representative]

Exhibit shown or demonstration conducted: ☐ Yes ☒ No.
If Yes, brief description: _____.

Issues Discussed ☐101 ☐112 ☐102 ☐103 ☒Others
(For each of the checked box(es) above, please describe below the issue and detailed description of the discussion)

Claim(s) discussed: *N/A*.

Identification of prior art discussed: *N/A*.

Substance of Interview
(For each issue discussed, provide a detailed description and indicate if agreement was reached. Some topics may include: identification or clarification of a reference or a portion thereof, claim interpretation, proposed amendments, arguments of any applied references etc...)

The Examiner contacted the Attorney in order to correct the foreign priority date of the document has two different dates had been listed in the ADS/Oath and a different priority document had been filed.

Applicant recordation instructions: It is not necessary for applicant to provide a separate record of the substance of interview.

Examiner recordation instructions: Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

☐ Attachment

/JUNE SISON/ Primary Examiner, Art Unit 2443	/S. N./ Examiner, Art Unit 2443

UNITED STATES DEPARTMENT OF COMMERCE
U.S. Patent and Trademark Office
Address : COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450

APPLICATION NO./ CONTROL NO.	FILING DATE	FIRST NAMED INVENTOR / PATENT IN REEXAMINATION	ATTORNEY DOCKET NO.
12/340,005	19 December, 2008	LEE ET AL.	12579-6201

BGL
P.O. BOX 10395
CHICAGO, IL 60610

EXAMINER	
STEVEN NGUYEN	
ART UNIT	PAPER
2443	20160302

DATE MAILED:

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner for Patents

The foreign priority date has been fixed along with a corrected ADS. Please see attached Interview Summary.

/S. N./ Examiner, Art Unit 2443	/JUNE SISON/ Primary Examiner, Art Unit 2443

Examiner-Initiated Interview Summary	Application No.	Applicant(s)	
	12/340,005	LEE ET AL.	
	Examiner	Art Unit	
	STEVEN NGUYEN	2443	

All participants (applicant, applicant's representative, PTO personnel):

(1) *STEVEN NGUYEN*. (3)_____.

(2) *FRANKIE WONG*. (4)_____.

Date of Interview: *29 February 2016*.

Type: ☒ Telephonic ☐ Video Conference
☐ Personal [copy given to: ☐ applicant ☐ applicant's representative]

Exhibit shown or demonstration conducted: ☐ Yes ☒ No.
If Yes, brief description: _____.

Issues Discussed ☐101 ☐112 ☐102 ☐103 ☒Others
(For each of the checked box(es) above, please describe below the issue and detailed description of the discussion)

Claim(s) discussed: *N/A*.

Identification of prior art discussed: *N/A*.

Substance of Interview
(For each issue discussed, provide a detailed description and indicate if agreement was reached. Some topics may include: identification or clarification of a reference or a portion thereof, claim interpretation, proposed amendments, arguments of any applied references etc...)

The Examiner contacted the Attorney in order to correct the foreign priority date of the document has two different dates had been listed in the ADS/Oath and a different priority document had been filed.

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☐ Attachment

/JUNE SISON/ Primary Examiner, Art Unit 2443	/S. N./ Examiner, Art Unit 2443

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
12/340,005	12/19/2008	2443	1090	12579-6201	14	1

CONFIRMATION NO. 8241

CORRECTED FILING RECEIPT

757
BGL
P.O. BOX 10395
CHICAGO, IL 60610

Date Mailed: 03/03/2016

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Seung-Chul Lee, Paju Si, KOREA, REPUBLIC OF;
Hoon Kang, Namyangju Si, KOREA, REPUBLIC OF;
Sung-Min Jung, Incheon, KOREA, REPUBLIC OF;

Applicant(s)

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Assignment For Published Patent Application

LG Display Co., Ltd., Seoul, KOREA, REPUBLIC OF

Power of Attorney: The patent practitioners associated with Customer Number 00757

Domestic Applications for which benefit is claimed - None.
A proper domestic benefit claim must be provided in an Application Data Sheet in order to constitute a claim for domestic benefit. See 37 CFR 1.76 and 1.78.

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: No

Permission to Access Search Results: No

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

Request to Retrieve - This application either claims priority to one or more applications filed in an intellectual property Office that participates in the Priority Document Exchange (PDX) program or contains a proper **Request to Retrieve Electronic Priority Application(s)** (PTO/SB/38 or its equivalent). Consequently, the USPTO will attempt to electronically retrieve these priority documents.

If Required, Foreign Filing License Granted: 01/07/2009

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 12/340,005**

Projected Publication Date: Not Applicable

Non-Publication Request: No

Early Publication Request: No

Title

STEREOSCOPIC 3D DISPLAY DEVICE

Preliminary Class

348

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications:

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Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

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출 원 인 : Applicant(s)	엘지디스플레이 주식회사 LG Display Co.,Ltd.

2008년 08월 12일

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【서지사항】

【서류명】 특허출원서

【참조번호】 0002

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【대리인코드】 9-1998-000202-3

【포괄위임등록번호】 2007-019191-6

【발명의 국문명칭】 입체영상표시장치

【발명의 영문명칭】 STEREOSCOPIC 3D DISPLAY DEVICE

【발명자】

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대리인 박장원 (인)

【수수료】

【출원료】	0 면	38,000 원
【가산출원료】	39 면	0 원
【우선권주장료】	0 건	0 원
【심사청구료】	0 항	0 원
【합계】	38,000 원	

【요약서】

【요약】

본 발명의 입체영상표시장치는 편광안경을 이용하여 입체영상을 시청할 수 있는 입체영상표시장치에 있어서, 메인 표시패널의 화소들의 행(line)과 화소부에 대응하도록 보조 표시패널에 제 1 전극과 제 2 전극을 형성한 후 120Hz 구동을 하여 메인 표시패널의 신호 어드레싱(addressing)에 따라 대응되는 보조 표시패널의 제 1 전극과 제 2 전극에 신호를 가하여 각각의 서브 프레임(sub frame)에 표시되는 좌우 이미지에 따라 편광 상태를 변경함으로써 3D 상하 시야각과 2D 휘도를 동시에 향상시키기 위한 것으로, 좌측 영상과 우측 영상을 번갈아 가며 표시하는 메인 표시패널; 상기 메인 표시패널의 화소부에 대응하는 화소부를 갖는 제 1 기판과 제 2 기판 및 상기 제 1 기판과 제 2 기판 사이에 형성된 서브 액정층으로 이루어지며, 상기 메인 표시패널의 전방에 위치하여 입사된 좌측 영상 또는 우측 영상의 편광정보를 변경시키는 보조 표시패널; 상기 메인 표시패널에 형성된 화소들의 행을 따라 상기 제 1 기판에 패터닝된 다수개의 제 1 전극; 상기 제 2 기판의 화소부 전면에 형성된 제 2 전극; 및 상기 메인 표시패널의 후방으로 빛을 공급하는 광원을 포함한다.

【대표도】

도 4b

【색인어】

입체영상표시장치, 메인 표시패널, 보조 표시패널, 서브 프레임, 120Hz 구동

【명세서】

【발명의 명칭】

입체영상표시장치{STEREOSCOPIC 3D DISPLAY DEVICE}

【발명의 상세한 설명】

【기술분야】

<1> 본 발명은 입체영상표시장치에 관한 것으로, 보다 상세하게는 편광안경을 이용하여 입체영상을 시청할 수 있는 입체영상표시장치에 관한 것이다.

【배경기술】

<2> 3D 디스플레이(display)란 간단히 정의를 내리자면 "인위적으로 3D화면을 재생시켜 주는 시스템의 총체"라고 할 수 있다.

<3> 여기서, 시스템이란 3D로 보여질 수 있는 소프트웨어적인 기술과 그 소프트웨어적 기술로 만든 컨텐츠를 실제로 3D로 구현해내는 하드웨어를 동시에 포함한다. 소프트웨어 영역까지 포함시키는 이유는 3D 디스플레이 하드웨어의 경우 각각의 입체 구현방식마다 별도의 소프트웨어적 방식으로 구성된 컨텐츠가 따로 필요하기 때문이다.

<4> 또한, 가상 3D 디스플레이는 사람이 입체감을 느끼는 여러 요인 중 우리 눈이 가로방향으로 약 65㎜ 떨어져 있어서 나타나게 되는 양안시차(binocular disparity)를 이용하여 평면적인 디스플레이 하드웨어에서 말 그대로 가상적으로 입체감을 느낄 수 있게 하는 시스템의 총체이다. 다시 말해 우리의 눈은 양안시차

때문에 똑같은 사물을 바라보더라도 각각 약간은(정확히 말하면 좌우의 공간적 정보를 약간씩 나눠 가지고 있는) 다른 화상을 보게 되고, 이 두 화상이 망막을 통해 뇌로 전달되면 뇌는 이를 정확히 서로 융합시킴으로써 우리가 입체감을 느낄 수 있게 되는데, 그것을 이용하여 2D 디스플레이 장치에서 좌우 화상 두개를 동시에 표시하여 각각의 눈으로 보내는 설계를 통해 가상적인 입체감을 만들어 내는 것이 바로 가상 3D 디스플레이인 것이다.

<5> 이러한 가상 3D 디스플레이 하드웨어 장치에서 하나의 화면으로 두 채널의 화상을 나타내기 위해서는 대부분의 경우 하나의 화면에서 가로나 세로의 한쪽 방향으로 줄을 한 줄씩 바꿔가며 한 채널씩 출력하게 된다. 그렇게 동시에 두 채널의 화상이 하나의 디스플레이 장치에서 출력되면 하드웨어적 구조상 무안경 방식의 경우에는 오른쪽 화상은 그대로 오른쪽 눈으로 들어가고, 왼쪽 화상은 왼쪽 눈으로만 들어가게 된다. 또한, 안경을 착용하는 방식의 경우에는 각각의 방식에 맞는 특수한 안경을 통하여 오른쪽 화상은 왼쪽 눈이 볼 수 없게 가려주고, 왼쪽 화상은 오른쪽 눈이 볼 수 없게 각각 가려주는 방법을 사용한다.

<6> 이와 같이 한 줄씩 바꿔가며 출력한다고 해도 줄의 두께와 간격이 0.1~0.5㎜ 정도의 아주 미세한 수준이므로 우리의 눈은 그 정도의 간격은 인지하지 못하고 각 채널의 두 화상을 각 눈에서 하나씩의 화면인 것으로 인식하게 되지만, 2D 화면으로 사용할 때에 비해 똑같은 크기의 화면에서 눈으로 들어가는 정보량은 각 채널당 반을 나눠 가지므로 해상도와 체감밝기가 절반 정도로 줄어들게 되는 단점이 있다.

<7> 이러한 입체영상의 표시방법으로는 크게 안경을 착용하는 방식과 안경을 착용하지 않는 무안경 방식이 있다.

<8> 안경을 착용하지 않는 방식으로서 알려진 대표적인 것으로는 원통형의 렌즈를 수직으로 배열한 렌티큘러(lenticular) 렌즈 판을 표시패널 전방에 설치하는 렌티큘러 방식과 패러렉스 배리어(parallax barrier) 방식이 있다.

<9> 상기 패러렉스 배리어 방식은 패러렉스 배리어로 불리는 가느다란 슬릿상의 개구부 뒤쪽에 적당한 간격을 두고 좌우 두개의 화상을 교대로 배치하여 특정한 시점에서 이 개구부를 통해 보았을 때 정확하게 양쪽 화상을 분리해서 볼 수 있는 방식이다. 쉽게 말하자면 편광 방식과 같은 광학적 기술을 사용하는 것이 아니라 단순히 좌우 채널을 벽으로 막아 구분시키는 것이다.

<10> 도 1은 일반적인 패러렉스 배리어 방식에 의한 입체영상표시장치의 구성을 개략적으로 나타내는 예시도로써, 특히 입체영상과 평면영상을 선택적으로 스위칭(switching)할 수 있도록 한 입체영상표시장치를 나타내고 있다.

<11> 도면에 도시된 바와 같이, 입체영상표시장치(1)는 백라이트 광원(40), 표시패널(30) 및 스위칭패널(20)로 구성된다.

<12> 이때, 상기 스위칭패널(20)은 전기신호를 인가하였을 때, 소정의 폭을 가지고 불투명해지는 불투명슬릿부와 투명한 투명슬릿부로 이루어져 있으며, 상기 불투명슬릿부와 투명슬릿부는 교대로 배치되어 있다.

<13> 관찰자(10)는 스위칭패널(20)의 투명슬릿부를 통해 표시패널(30)을 보게 되

는데, 이때 관찰자(10)의 좌안(L)은 스위칭패널(20)의 투명슬릿부를 통해 표시패널(30)의 좌안영역(Lp)을 보게되고, 관찰자(10)의 우안(R)은 스위칭패널(20)의 투명슬릿부를 통해 표시패널(30)의 우안영역(Rp)을 보게 된다.

<14> 이와 같이 관찰자(10)의 좌안(L)과 우안(R)은 각각 표시패널(30)의 다른 영역을 보게 되는데, 이때 표시패널(30)은 관찰자(10)의 좌안과 우안에 대응되는 영상을 각각 좌안영역(Lp)과 우안영역(Rp)에 표시하게 된다. 이로써 관찰자는 양안시차에 의해 입체감을 느끼게 된다.

<15> 그러나, 이와 같은 패러렉스 배리어 방식은 특별히 광학적인 기술을 사용하는 것이 아닌 단순한 시야가리개 정도의 구조를 이미지를 구분시킴에 따라 설계 당시에 의도했던 위치에서가 아니면 시선이 벗어나 화상이 깨져 보이는 문제가 있다. 이 위치의 제약엔 좌우 위치 및 전후 위치까지도 포함된다.

<16> 그리고, 이 외에 2D 모드로 사용시 배리어가 화면의 밝기를 떨어뜨림과 동시에 사람에 따라서는 2D 화면에서 배리어가 눈에 거슬리게 느껴질 수도 있다.

【발명의 내용】

【해결하고자 하는 과제】

<17> 본 발명은 상기한 문제를 해결하기 위한 것으로, 편광안경을 이용하여 입체영상을 시청할 수 있는 입체영상표시장치를 제공하는데 목적이 있다.

<18> 본 발명의 다른 목적은 안경방식 2D 디스플레이에서의 3D 상하 시야각과 2D 휘도를 동시에 향상시킬 수 있는 입체영상표시장치를 제공하는데 있다.

<19> 본 발명의 다른 목적 및 특징들은 후술되는 발명의 구성 및 특허청구범위에서 설명될 것이다.

【과제 해결 수단】

<20> 상기한 목적을 달성하기 위하여, 본 발명의 입체영상표시장치는 좌측 영상과 우측 영상을 번갈아 가며 표시하는 메인 표시패널; 상기 메인 표시패널의 화소부에 대응하는 화소부를 갖는 제 1 기판과 제 2 기판 및 상기 제 1 기판과 제 2 기판 사이에 형성된 서브 액정층으로 이루어지며, 상기 메인 표시패널의 전방에 위치하여 입사된 좌측 영상 또는 우측 영상의 편광정보를 변경시키는 보조 표시패널; 상기 메인 표시패널에 형성된 화소들의 행을 따라 상기 제 1 기판에 패터닝된 다수개의 제 1 전극; 상기 제 2 기판의 화소부 전면에 형성된 제 2 전극; 및 상기 메인 표시패널의 후방으로 빛을 공급하는 광원을 포함한다.

【효과】

<21> 상술한 바와 같이, 본 발명에 따른 입체영상표시장치는 편광안경을 이용하여 입체영상을 시청하는 경우에 3D 상하 시야각이 향상되는 한편 패널의 최대 해상도로 3D 표현이 가능한 효과를 제공한다.

【발명의 실시를 위한 구체적인 내용】

<22> 이하, 첨부한 도면을 참조하여 본 발명에 따른 입체영상표시장치의 바람직한 실시예를 상세히 설명한다.

<23> 안경방식은 디스플레이 기기의 주류가 브라운관(Cathode Ray Tube; CRT)에서

액정표시장치(Liquid Crystal Display; LCD)와 같은 평판 디스플레이 쪽으로 점점 이동함에 따라, 안경방식 가상 3D 디스플레이 방식의 연구와 실용화도 CRT에 최적화된 방식에서 점점 평판 디스플레이에 최적화된 쪽으로 이동하고 있는 추세이다.

<24> 이 중 편광방식은 직교한 편광소자의 조합에 의한 차광효과를 이용해서 좌, 우안의 화상을 분리하는 것으로, 편광방식 디스플레이 장치에서 동시에 두 이미지가 출력될 때, 전체 화면을 한 줄씩 번갈아 가면서 오른쪽 영상과 왼쪽 영상을 나타내게 된다. 그렇게 동시에 출력된 이미지는 그 상태 그대로는 한 눈에 두 이미지가 다 보여지게 되므로 편광안경을 통해 영상을 걸러주어야 한다. 즉, 안경을 통해 오른쪽 눈엔 왼쪽 이미지가 보이지 않게 걸러내고, 왼쪽 눈엔 오른쪽 이미지가 보이지 않게 걸러내는 것이다.

<25> 이 편광방식에서 쓰이는 편광필터란 다양한 방향으로 산란되는 빛 중 특정한 한 방향으로 진동하는 빛만 통과시키고 나머지 방향으로 진동하는 빛은 흡수하는 필터를 의미한다.

<26> 편광방식에서 편광필터를 이용하여 양 눈으로 각각의 이미지가 들어가는 과정은 다음과 같다.

<27> 우선 디스플레이 장치에서 좌우 이미지를 각각 다른 방향의 편광필터에 통과시켜 좌우 이미지가 각각 다른 방향으로 진동하는 빛으로 이루어지게 만든다. 그 후 편광안경을 통해 한번 더 걸러내는 작업을 거칠 때 좌우 이미지 각각과 똑같은 방향의 편광필터를 안경으로 사용함으로써 반대편의 이미지가 들어오지 않게 만든다. 예를 들면, 모니터에서 왼쪽 이미지를 -45도, 오른쪽 이미지를 45도로 진동하

는 빛으로만 이루어지게 편광시킨다면, 편광안경에서도 왼쪽 안경알은 -45도, 오른쪽 안경알은 45도의 편광필터로 만들 경우 -45도로 진동하는 빛으로 이루어진 왼쪽 이미지는 45도의 오른쪽 안경알을 통과하지 못하게 되고, 오른쪽의 경우에도 마찬가지가 되어 결과적으로 각각의 눈에 맞는 영상 하나만 인식되게 하는 것이다.

<28> 상기 편광방식은 두 채널의 이미지를 분할하는 방향에 따라 좌우나 상하 한 방향으로의 시야각을 굉장히 넓게 가질 수 있다. 일반적으로는 다수가 시청할 때의 위치를 감안하여 가로 방향으로 좌우 이미지를 분할하여 좌우 시야각을 확보하는 편이다. 그렇게 편광방식은 좌우 시야각을 거의 180도에 가깝게 확보할 수 있으므로 다수 시청용으로 적합하다고 할 수 있겠다. 다만, 좌우 시야각을 확보할 경우 상하 시야각을 포기해야 하는데, 상하 시야각 방향에서 좌안 영상과 우안 영상의 편광 상태가 사로 바뀌어 좌안 영상이 우안으로, 우안 영상이 좌안으로 보여지는 위경체(pseudoscopic) 현상이 발생한다.

<29> 도 2는 본 발명의 제 1 실시예에 따른 입체영상표시장치의 구조를 개략적으로 나타내는 단면도이다.

<30> 도면에 도시된 바와 같이, 본 발명의 제 1 실시예에 따른 입체영상표시장치(100)는 좌측 영상과 우측 영상을 번갈아 가며 표시하는 메인 표시패널(110), 상기 메인 표시패널(110)의 전방에 위치하는 보조 표시패널(120), 상기 메인 표시패널(110)의 후방으로 빛을 공급하는 광원(130) 및 상기 보조 표시패널(120)에서 출력되는 좌측 영상 및 우측 영상을 편광상태에 따라 선택적으로 투과시켜 입체영상을 구현하는 편광안경(140)을 포함한다.

<31> 상기 메인 표시패널(110)은 입체영상을 구현하기 위하여 시청자의 좌안으로 입사될 좌측 영상과 우안으로 입사될 우측 영상을 번갈아 가며 표시하게 된다.

<32> 이때, 상기 본 발명의 제 1 실시예에 따른 메인 표시패널(110)은 액정표시패널일 수 있으며, 상기 메인 표시패널(110)은 일반적인 액정표시패널이 60Hz로 구동되는 경우 120Hz로 구동되는 것이 바람직하다. 이는 일정수준 이상의 입체영상의 화질을 확보하면서 좌측 영상과 우측 영상을 번갈아 가며 표시하기 위한 것이다.

<33> 이러한 메인 표시패널(110)은 후술할 구동원리 이외에 통상의 액정표시패널과 동일한 구조로 이루어져 있다.

<34> 즉, 상기 메인 표시패널(110)이 액정표시패널인 경우, 상기 메인 표시패널(110)은 박막 트랜지스터 어레이 기판(111), 상기 어레이 기판(111)에 대향 배치되는 컬러필터 기판(112), 상기 어레이 기판(111)과 컬러필터 기판(112)의 사이에 위치하는 메인 액정층(113) 및 상기 어레이 기판(111)과 컬러필터 기판(112)의 외측면에 부착된 제 1 편광판(114)과 제 2 편광판(115)을 포함한다. 여기서, 상기 제 1 편광판(114)과 제 2 편광판(115)은 편광축이 실질적으로 서로 직교하도록 배치되어 있다.

<35> 한편, 상기 메인 표시패널(110)은 액정표시패널 뿐만 아니라, 플라즈마 디스플레이 패널(Plasma Display Panel; PDP), 유기전계발광소자(Organic Light Emitting Diode; OLED) 등의 평판 표시패널일 수 있다.

<36> 전술한 바와 같이, 상기 메인 표시패널(110)의 전방에는 본 발명의 제 1 실

시예에 따른 보조 표시패널(120)이 위치하는데, 상기 보조 표시패널(120)은 메인 표시패널(110)의 좌측 영상 및 우측 영상 중 어느 하나에 동기(synchronize)되어 구동되며, 입사된 좌측 영상 또는 우측 영상의 편광정보를 변경시키는 역할을 한다. 이때, 상기 보조 표시패널(120)은 서로 마주하고 있는 제 1 기판(121)과 제 2 기판(122) 및 상기 제 1 기판(121)과 제 2 기판(122) 사이에 위치하는 서브 액정층(123)을 포함한다.

<37> 그리고, 상기 제 1 기판(121)과 제 2 기판(122)에는 서브 액정층(123)의 배열을 제어하기 위한 제 1, 제 2 전극(미도시) 및 배향막(미도시)이 각각 마련되어 있으며, 이를 도면을 참조하여 상세히 설명한다.

<38> 도 3a 및 도 3b는 본 발명의 입체영상표시장치에 있어, 보조 표시패널의 하부 기판 및 상부 기판의 구조를 개략적으로 나타내는 평면도이다.

<39> 또한, 도 4a 및 도 4b는 도 3a에 도시된 보조 표시패널의 상부 기판에 있어, A-A'선 및 B-B'선에 따라 절단한 단면을 개략적으로 나타내는 도면이다.

<40> 먼저, 도 3a(도 4a 및 도 4b 참조)에 도시된 바와 같이, 보조 표시패널(120)의 하부 기판인 제 1 기판(121)에는 인듐-틴-옥사이드(Indium Tin Oxide; ITO)와 같은 투명한 도전물질로 이루어진 제 1 전극(128)이 메인 표시패널의 화소들의 행(line)을 따라 패터닝되어 있다.

<41> 이때, 상기 제 1 전극(128)의 높이(h)는 메인 표시패널의 하나의 화소 높이에 해당하며, 상기 제 1 전극(128)의 폭(w)은 화소부(125)의 폭의 n(n=1,2,,,)배에

해당한다.

<42> 참고로, 도면부호 126 및 127은 신호를 인가하는 드라이버 집적회로 및 상기 드라이버 집적회로와 제 1 전극(128) 사이를 연결하기 위한 신호배선을 나타내며, 상기 신호배선(127)은 구리나 몰리브덴과 같은 도전물질로 이루어지게 된다.

<43> 또한, 도 3b(도 4a 및 도 4b 참조)에 도시된 바와 같이, 상기 보조 표시패널(120)의 상부 기판인 제 2 기판(122)의 화소부(125) 전면에는 상기 제 1 전극(128)과 동일한 물질로 이루어진 제 2 전극(129)이 어떠한 패턴도 없이 통짜로 형성되어 있다.

<44> 이와 같이 구성된 상기 제 1 기판(121)과 제 2 기판(122)의 대향하는 표면에는 서브 액정층(123)을 정렬하기 위한 배향막(124a, 124b)이 각각 위치하게 된다.

<45> 이러한 보조 표시패널(120)은 서로 다른 종류의 서브 액정층(123)을 포함할 수 있다.

<46> 도 5는 보조 표시패널이 트위스티드 네마틱(Twisted Nematic; TN) 모드의 서브액정층을 갖는 경우, 보조 표시패널의 동작특성을 설명하기 위한 도면이다.

<47> 도면에 도시된 바와 같이, 서브 액정층(123)을 이루는 복수의 액정분자(123a)는 보조 표시패널(120)이 오프(off) 되었을 때, 제 1 기판(121)과 제 2 기판(122)의 배향막(미도시)의 러빙방향(rubbing direction)에 따라 상기 제 1 기판(121)과 제 2 기판(122) 사이에서 90도(TN 구조) 또는 240도(STN 구조)로 비틀어지도록 배열된다. 그리고, 보조 표시패널(120)이 온(on) 되었을 때, 상기 제 1 기

판(121)과 제 2 기판(122) 사이에 형성된 전계에 의하여 액정분자(123a)는 제 1 기판(121)과 제 2 기판(122) 사이에서 수직으로 배열된다.

<48> 이에 따라 보조 표시패널(120)이 오프 상태인 경우, 좌측 영상 또는 우측 영상은 보조 표시패널(120)을 통과하면서 편광축이 90도 회전된다. 즉, 보조 표시패널(120)이 구동되지 않은 경우, 보조 표시패널(120)을 통과한 좌측 영상 또는 우측 영상의 편광축은 보조 표시패널(120)로 입사되는 좌측 영상 또는 우측 영상의 편광축과 실질적으로 수직을 이루도록 변화되어 출력된다.

<49> 이와 같이 좌측 영상 또는 우측 영상의 편광축이 변화되는 이유는 서브 액정층(123)의 굴절률 이방성(Δn) 때문이다. 액정분자(123a)는 장축과 단축이 서로 다른 굴절률을 보이는데, 이를 굴절률 이방성(Δn)이라고 한다. 굴절률 이방성(Δn)은 장축방향의 굴절률에서 단축방향의 굴절률을 뺀 값으로 정의된다. 액정분자(123a)가 도시된 바와 같이 90도 또는 240도 트위스트(twist)되어 배열됨에 따라, 입사된 빛은 서브 액정층(123)의 굴절률 이방성(Δn)을 느끼며 진행하여 입사된 빛의 편광상태 또는 편광정보가 상술한 바와 같이 변화된다.

<50> 한편, 보조 표시패널(120)이 온 상태인 경우, 보조 표시패널(120)을 통과한 좌측 영상 또는 우측 영상의 편광축은 변화되지 않는다. 이는 액정분자가 제 1 기판(121)과 제 2 기판(122)에 대하여 수직으로 배열됨에 따라, 서브 액정층(123)을 통과하는 빛은 굴절률 이방성(Δn)이 아닌 단축방향의 굴절률만 느끼며 통과하기 때문에 편광상태 또는 편광정보가 변화되지 않기 때문이다.

<51> 다음으로, 도 6은 보조 표시패널이 균질한(homogeneous) 서브 액정층을 갖는

경우, 보조 표시패널의 동작특성을 설명하기 위한 도면이다.

<52> 또한, 도 7은 보조 표시패널이 균질한 서브액정층을 갖는 경우, 보조표시패널의 러빙방향을 나타내는 도면이다.

<53> 도면에 도시된 바와 같이, 보조 표시패널(120)이 균질한 서브 액정층(123')을 갖는 경우, 보조 표시패널(120)이 오프 되었을 때 액정분자(123a')는 제 1 기판(121)과 제 2 기판(122)에 대하여 실질적으로 평행하게 배열된다. 그리고, 보조 표시패널(120)의 러빙방향은 보조 표시패널(120)로 입사되는 좌측 영상 또는 우측 영상의 편광축에 대하여 실질적으로 45도를 이루도록 마련되어 있다.

<54> 이에 따라 보조 표시패널(120)이 구동되지 않은 경우, 액정분자(123a')들은 입사되는 좌측 영상 또는 우측 영상의 편광축과 45도 경사진 방향으로 제 1 기판(121)과 제 2 기판(122)에 대하여 평행하게 배열된다. 또한, 보조 표시패널(120)이 온 되었을 때, 액정분자(123a')는 제 1 기판(121)과 제 2 기판(122)에 대하여 실질적으로 수직으로 배열된다.

<55> 이때, 서브 액정층(123')이 균질한 배열을 이루고 있는 경우, 상기 서브 액정층(123')은 $\Delta n \times d = \lambda/2$를 만족하는 것이 바람직하다. 여기서, d는 상기 서브 액정층(123')의 셀갭(cell gap)이고, Δn은 상기 서브 액정층(123')의 굴절률 이방성을 나타내며, λ는 상기 서브 액정층(123')을 통과한 빛의 파장을 나타낸다.

<56> 이와 같이 서브 액정층(123')이 $\Delta n \times d = \lambda/2$를 만족하도록 마련되어야 하는 이유는, 입사된 좌측 영상 또는 우측 영상의 위상을 180도 변경하기 위한 것이다.

이에 따라, 도 6에 도시된 바와 같이, 보조 표시패널(120)이 오프 상태인 경우, 보조 표시패널(120)을 통과한 좌측 영상 또는 우측 영상은 보조 표시패널(120)로 입사되는 좌측 영상 또는 우측 영상의 편광축에 대하여 실질적으로 수직을 이루는 편광축을 가지며 보조 표시패널(120)의 외부로 출사되게 된다.

<57> 한편, 보조 표시패널(120)이 온 상태인 경우, 보조 표시패널(120)을 통과한 좌측 영상 또는 우측 영상의 편광축은 변화되지 않는다. 이는 액정분자(123a')가 제 1 기판(121)과 제 2 기판(122)에 대하여 수직으로 배열됨에 따라 서브 액정층(123')을 통과하는 빛은 굴 정율 이방성(Δn)이 아닌 단축방향의 굴절률만 느끼며 통과하기 때문에 편광상태 또는 편광정보가 변화되지 않기 때문이다.

<58> 이와 같이 본 발명의 제 1 실시예의 경우에는 메인 표시패널의 화소들의 행과 화소부에 대응하도록 보조 표시패널의 제 1 기판과 제 2 기판에 각각 제 1 전극과 제 2 전극을 형성한 후 120Hz 구동을 하여 메인 표시패널의 신호 어드레싱에 따라 대응되는 보조 표시패널의 제 1 전극과 제 2 전극에 신호를 가하여 각각의 서브 프레임(sub frame)에 표시되는 좌우 이미지에 따라 편광 상태를 변경함으로써 3D 상하 시야각과 2D 휘도를 동시에 향상시킬 수 있게 된다.

<59> 도 8은 본 발명의 제 2 실시예에 따른 입체영상표시장치의 구조를 개략적으로 나타내는 단면도로써, 보조 표시패널의 하부 기판에 $\lambda/4$ 리타데이션 층(retardation layer)이 삽입된 것을 제외하고는 상기 제 1 실시예에 따른 입체영상표시장치의 구조와 실질적으로 동일하다.

<60> 도면에 도시된 바와 같이, 본 발명의 제 2 실시예에 따른 입체영상표시장치

(200)는 좌측 영상과 우측 영상을 번갈아 가며 표시하는 메인 표시패널(210), 상기 메인 표시패널(210)의 전방에 위치하는 보조 표시패널(220), 상기 메인 표시패널(210)의 후방으로 빛을 공급하는 광원(230) 및 상기 보조 표시패널(220)에서 출력되는 좌측 영상 및 우측 영상을 편광상태에 따라 선택적으로 투과시켜 입체영상을 구현하는 편광안경(240)을 포함한다.

<61> 이때, 상기 광원(230)은 메인 표시패널(210)의 후방에 위치하여 메인 표시패널(210)로 빛을 조사한다. 여기서, 광원(230)은 직하형(direct type) 또는 에지형(edge type)일 수 있으며, 냉음극형광램프(Cold Cathode Fluorescent Lamp; CCFL)가 사용되나, 고휘도, 저비용 및 저소비전력의 특성을 가지며 하나의 인버터로 광원을 구동할 수 있는 외부전극형광램프(External Electrode Fluorescent Lamp; EEFL)가 사용될 수도 있다. 그리고, 휘도가 좋고 색재현성이 우수한 발광다이오드(LED)가 광원으로 사용될 수도 있다.

<62> 또한, 상기 편광안경(240)은 보조 표시패널(220)에서 출사되는 좌측 영상 또는 우측 영상의 편광상태에 따라 좌측 영상과 우측 영상을 구분하여 입체영상을 보기 위한 것이다. 상기 편광안경(240)은 좌측편광렌즈와 우측편광렌즈를 포함하며, 좌측편광렌즈의 편광축은 우측편광렌즈의 편광축과 실질적으로 수직을 이루도록 마련되어 있다. 그리고, 상기 좌측편광렌즈는 편광축이 보조 표시패널(220)로부터 출력되는 좌측 영상 및 우측 영상 중 어느 하나의 편광축과 일치하도록 마련되고, 우측편광렌즈는 편광축이 보조 표시패널(220)로부터 출력되는 좌측 영상 및 우측 영상 중 다른 하나의 편광축과 일치하도록 마련되어 있다. 이에 따라, 보조 표시패널

(220)로부터 출력되는 좌측 영상과 우측 영상은 상기 편광안경(240)에 의하여 좌측 영상과 우측 영상의 편광상태에 따라 구분되어 각각 시청자의 좌안과 우안으로 입사되게 되고, 시청자는 입체영상을 시청할 수 있게 된다.

<63> 상기 메인 표시패널(210)은 입체영상을 구현하기 위하여 시청자의 좌안으로 입사될 좌측 영상과 우안으로 입사될 우측 영상을 번갈아 가며 표시하게 된다.

<64> 이때, 상기 본 발명의 제 2 실시예에 따른 메인 표시패널(210)은 상기 본 발명의 제 1 실시예와 동일하게 액정표시패널일 수 있으며, 일반적인 액정표시패널이 60Hz로 구동되는 경우 120Hz로 구동되는 것이 바람직하다.

<65> 이러한 메인 표시패널(210)은 박막 트랜지스터 어레이 기판(211), 상기 어레이 기판(211)에 대향 배치되는 컬러필터 기판(212), 상기 어레이 기판(211)과 컬러필터 기판(212)의 사이에 위치하는 메인 액정층(213) 및 상기 어레이 기판(211)과 컬러필터 기판(212)의 외측 면에 부착된 제 1 편광판(214)과 제 2 편광판(215)을 포함한다. 여기서, 상기 제 1 편광판(214)과 제 2 편광판(215)은 편광축이 실질적으로 서로 직교하도록 배치되어 있다.

<66> 전술한 바와 같이, 상기 메인 표시패널(210)의 전방에는 본 발명의 제 2 실시예에 따른 보조 표시패널(220)이 위치하는데, 상기 보조 표시패널(220)은 메인 표시패널(210)의 좌측 영상 및 우측 영상 중 어느 하나에 동기되어 구동되며, 입사된 좌측 영상 또는 우측 영상의 편광정보를 변경시키는 역할을 한다. 이때, 상기 보조 표시패널(220)은 서로 마주하고 있는 제 1 기판(221)과 제 2 기판(222) 및 상기 제 1 기판(221)과 제 2 기판(222) 사이에 위치하는 서브 액정층(223)을 포함한

다.

<67> 그리고, 상기 제 1 기판(221)과 제 2 기판(222)에는 서브 액정층(223)의 배열을 제어하기 위한 제 1, 제 2 전극(미도시) 및 배향막(미도시)이 각각 마련되어 있으며, 상기 제 1 전극과 제 2 전극의 구조는 상기 본 발명의 제 1 실시예의 경우와 실질적으로 동일하다.

<68> 즉, 보조 표시패널(220)의 하부 기판인 제 1 기판(221)에는 ITO와 같은 투명한 도전물질로 이루어진 제 1 전극이 메인 표시패널의 화소들의 행을 따라 패터닝되어 있다. 이때, 상기 제 1 전극의 높이는 메인 표시패널의 하나의 화소 높이에 해당하며, 상기 제 1 전극의 폭은 화소부의 폭의 n(n=1,2,,,)배에 해당한다.

<69> 또한, 상기 보조 표시패널(220)의 상부 기판인 제 2 기판(222)의 화소부 전면에는 상기 제 1 전극과 동일한 물질로 이루어진 제 2 전극이 어떠한 패턴도 없이 통짜로 형성되어 있다.

<70> 이와 같이 구성된 상기 제 1 기판(221)과 제 2 기판(222)의 대향하는 표면에는 서브 액정층(223)을 정렬하기 위한 배향막이 각각 위치하게 된다.

<71> 이때, 본 발명의 제 2 실시예에 따른 입체영상표시장치는 상기 보조 표시패널(220)의 제 1 기판(221)의 상부면에 상기 메인 표시패널(210)에서 입사되는 선편광을 원편광으로 변화시키는 λ/4 리타데이션 층(250)이 형성되어 있는 것을 특징으로 한다.

<72> 또한, 본 발명의 제 2 실시예에 따른 상기 λ/4 리타데이션 층(250)은 상기

제 1 기판(221)과 함께 인-셀(in cell) 형태로 형성되는 것을 특징으로 한다.

<73> 도 9는 도 8에 도시된 입체영상표시장치에 있어, 보조 표시패널의 동작특성을 설명하기 위한 도면으로써, 보조 표시패널이 균질한 서브 액정층을 갖는 경우를 나타내고 있다.

<74> 도면에 도시된 바와 같이, 보조 표시패널(220)이 균질한 서브 액정층(223)을 갖는 경우, 보조 표시패널(220)이 오프 되었을 때 액정분자(223a)는 제 1 기판(221)과 제 2 기판(222)에 대하여 실질적으로 평행하게 배열된다. 그리고, 보조 표시패널(220)의 러빙방향과 $\lambda/4$ 리타데이션 층(250)의 광축은 보조 표시패널(220)로 입사되는 좌측 영상 또는 우측 영상의 편광축에 대하여 실질적으로 45도를 이루도록 마련되어 있다.

<75> 이에 따라 보조 표시패널(220)이 구동되지 않은 경우, 액정분자(223a)들은 입사되는 좌측 영상 또는 우측 영상의 편광축과 45도 경사진 방향으로 제 1 기판(221)과 제 2 기판(222)에 대하여 평행하게 배열된다. 또한, 보조 표시패널(220)이 온 되었을 때, 액정분자(223a)는 제 1 기판(221)과 제 2 기판(222)에 대하여 실질적으로 수직으로 배열된다.

<76> 이때, 전술한 바와 같이, 서브 액정층(223)이 균질한 배열을 이루고 있는 경우, 상기 서브 액정층(223)은 $\Delta n \times d = \lambda/2$를 만족하는 것이 바람직하다.

<77> 이에 따라, 도시된 바와 같이, 보조 표시패널(220)이 오프 상태인 경우, 보조 표시패널(220)로 입사되는 선편광된 좌측 영상 또는 우측 영상은 보조 표시패널

(220)의 제 1 기판(221)을 통과하여 좌원편광(또는 우원편광)으로 상태가 변화되어 서브 액정층(223)을 통과하게 된다. 이때, 상기 서브 액정층(223)에 입사되는 좌원편광(또는 우원편광)된 좌측 영상 또는 우측 영상은 상기 서브 액정층(223)을 통과하여 우원편광(또는 좌원편광)으로 상태가 변화되어 보조 표시패널(220)의 외부로 출사되게 된다.

<78> 한편, 보조 표시패널(220)이 온 상태인 경우, 보조 표시패널(220)을 통과한 좌원편광(또는 우원편광)된 좌측 영상 또는 우측 영상의 편광 상태는 변화되지 않고 보조 표시패널(220)의 외부로 출사되게 된다. 이는 액정분자(223a)가 제 1 기판(221)과 제 2 기판(222)에 대하여 수직으로 배열됨에 따라 서브 액정층(223)을 통과하는 빛은 굴절률 이방성(Δn)이 아닌 단축방향의 굴절률만 느끼며 통과하기 때문에 편광상태 또는 편광정보가 변화되지 않기 때문이다.

<79> 도 10은 본 발명의 제 3 실시예에 따른 입체영상표시장치의 구조를 개략적으로 나타내는 단면도로써, $\lambda/4$ 리타데이션 층이 보조 표시패널의 하부 기판 배면에 부착된 것을 제외하고는 상기 제 2 실시예에 따른 입체영상표시장치의 구조와 실질적으로 동일하다.

<80> 도면에 도시된 바와 같이, 본 발명의 제 3 실시예에 따른 입체영상표시장치(300)는 좌측 영상과 우측 영상을 번갈아 가며 표시하는 메인 표시패널(310), 상기 메인 표시패널(310)의 전방에 위치하는 보조 표시패널(320), 상기 메인 표시패널(310)의 후방으로 빛을 공급하는 광원(330) 및 상기 보조 표시패널(320)에서 출력되는 좌측 영상 및 우측 영상을 편광상태에 따라 선택적으로 투과시켜 입체영상을

구현하는 편광안경(340)을 포함한다.

<81> 이때, 상기 광원(330)은 메인 표시패널(310)의 후방에 위치하여 메인 표시패널(310)로 빛을 조사하며, 상기 편광안경(340)은 좌측편광렌즈와 우측편광렌즈를 포함하며, 좌측편광렌즈의 편광축은 우측편광렌즈의 편광축과 실질적으로 수직을 이루도록 마련되어 있다. 그리고, 상기 좌측편광렌즈는 편광축이 보조 표시패널(320)로부터 출력되는 좌측 영상 및 우측 영상 중 어느 하나의 편광축과 일치하도록 마련되고, 우측편광렌즈는 편광축이 보조 표시패널(320)로부터 출력되는 좌측 영상 및 우측 영상 중 다른 하나의 편광축과 일치하도록 마련되어 있다. 이에 따라, 보조 표시패널(320)로부터 출력되는 좌측 영상과 우측 영상은 상기 편광안경(340)에 의하여 좌측 영상과 우측 영상의 편광상태에 따라 구분되어 각각 시청자의 좌안과 우안으로 입사되게 되고, 시청자는 입체영상을 시청할 수 있게 된다.

<82> 상기 메인 표시패널(310)은 입체영상을 구현하기 위하여 시청자의 좌안으로 입사될 좌측 영상과 우안으로 입사될 우측 영상을 번갈아 가며 표시하게 된다.

<83> 이때, 상기 본 발명의 제 3 실시예에 따른 메인 표시패널(310)은 상기 본 발명의 제 1 실시예 및 제 2 실시예와 동일하게 액정표시패널일 수 있으며, 일반적인 액정표시패널이 60Hz로 구동되는 경우 120Hz로 구동되는 것이 바람직하다.

<84> 이러한 메인 표시패널(310)은 박막 트랜지스터 어레이 기판(311), 상기 어레이 기판(311)에 대향 배치되는 컬러필터 기판(312), 상기 어레이 기판(311)과 컬러필터 기판(312)의 사이에 위치하는 메인 액정층(313) 및 상기 어레이 기판(311)과 컬러필터 기판(312)의 외측 면에 부착된 제 1 편광판(314)과 제 2 편광판(315)을

포함한다. 여기서, 상기 제 1 편광판(314)과 제 2 편광판(315)은 편광축이 실질적으로 서로 직교하도록 배치되어 있다.

<85> 전술한 바와 같이, 상기 메인 표시패널(310)의 전방에는 본 발명의 제 3 실시예에 따른 보조 표시패널(320)이 위치하는데, 상기 보조 표시패널(320)은 메인 표시패널(310)의 좌측 영상 및 우측 영상 중 어느 하나에 동기되어 구동되며, 입사된 좌측 영상 또는 우측 영상의 편광정보를 변경시키는 역할을 한다. 이때, 상기 보조 표시패널(320)은 서로 마주하고 있는 제 1 기판(321)과 제 2 기판(322) 및 상기 제 1 기판(321)과 제 2 기판(322) 사이에 위치하는 서브 액정층(323)을 포함한다.

<86> 그리고, 상기 제 1 기판(321)과 제 2 기판(322)에는 서브 액정층(323)의 배열을 제어하기 위한 제 1, 제 2 전극(미도시) 및 배향막(미도시)이 각각 마련되어 있으며, 상기 제 1 전극과 제 2 전극의 구조는 상기 본 발명의 제 1 실시예 및 제 2 실시예의 경우와 실질적으로 동일하다.

<87> 즉, 보조 표시패널(320)의 하부 기판인 제 1 기판(321)에는 ITO와 같은 투명한 도전물질로 이루어진 제 1 전극이 메인 표시패널의 화소들의 행을 따라 패터닝되어 있다. 이때, 상기 제 1 전극의 높이는 메인 표시패널의 하나의 화소 높이에 해당하며, 상기 제 1 전극의 폭은 화소부의 폭의 n(n=1,2,,,)배에 해당한다.

<88> 또한, 상기 보조 표시패널(320)의 상부 기판인 제 2 기판(322)의 화소부 전면에는 상기 제 1 전극과 동일한 물질로 이루어진 제 2 전극이 어떠한 패턴도 없이 통짜로 형성되어 있다.

<89> 이와 같이 구성된 상기 제 1 기판(321)과 제 2 기판(322)의 대향하는 표면에는 서브 액정층(323)을 정렬하기 위한 배향막이 각각 위치하게 된다.

<90> 이때, 본 발명의 제 3 실시예에 따른 입체영상표시장치는 상기 보조 표시패널(320)의 제 1 기판(321)의 하부면, 즉 배면에 상기 메인 표시패널(310)에서 입사되는 선편광을 원편광으로 변화시키는 λ/4 리타데이션 층(350)이 형성되어 있는 것을 특징으로 한다. 또한, 본 발명의 제 3 실시예에 따른 상기 λ/4 리타데이션 층(350)은 상기 제 1 기판(321)의 배면에 필름 형태로 부착될 수 있다.

<91> 도 11은 도 10에 도시된 입체영상표시장치에 있어, 보조 표시패널의 동작특성을 설명하기 위한 도면으로써, 보조 표시패널이 균질한 서브 액정층을 갖는 경우를 나타내고 있다.

<92> 도면에 도시된 바와 같이, 보조 표시패널(320)이 균질한 서브 액정층(323)을 갖는 경우, 보조 표시패널(320)이 오프 되었을 때 액정분자(323a)는 제 1 기판(321)과 제 2 기판(322)에 대하여 실질적으로 평행하게 배열된다. 그리고, 보조 표시패널(320)의 러빙방향과 λ/4 리타데이션 층(350)의 광축은 보조 표시패널(320)로 입사되는 좌측 영상 또는 우측 영상의 편광축에 대하여 실질적으로 45도를 이루도록 마련되어 있다.

<93> 이에 따라 보조 표시패널(320)이 구동되지 않은 경우, 액정분자(323a)들은 입사되는 좌측 영상 또는 우측 영상의 편광축과 45도 경사진 방향으로 제 1 기판(321)과 제 2 기판(322)에 대하여 평행하게 배열된다. 또한, 보조 표시패널(320)이

온 되었을 때, 액정분자(323a)는 제 1 기판(321)과 제 2 기판(322)에 대하여 실질적으로 수직으로 배열된다.

<94> 이때, 전술한 바와 같이, 서브 액정층(323)이 균질한 배열을 이루고 있는 경우, 상기 서브 액정층(323)은 $\Delta n \times d = \lambda/2$를 만족하는 것이 바람직하다.

<95> 이에 따라, 도시된 바와 같이, 보조 표시패널(320)이 오프 상태인 경우, 보조 표시패널(320)로 입사되는 선편광된 좌측 영상 또는 우측 영상은 보조 표시패널(320)의 제 1 기판(321)을 통과하여 좌원편광(또는 우원편광)으로 상태가 변화되어 서브 액정층(323)을 통과하게 된다. 이때, 상기 서브 액정층(323)에 입사되는 좌원편광(또는 우원편광)된 좌측 영상 또는 우측 영상은 상기 서브 액정층(323)을 통과하여 우원편광(또는 좌원편광)으로 상태가 변화되어 보조 표시패널(320)의 외부로 출사되게 된다.

<96> 한편, 보조 표시패널(320)이 온 상태인 경우, 보조 표시패널(320)을 통과한 좌원편광(또는 우원편광)된 좌측 영상 또는 우측 영상의 편광 상태는 변화되지 않고 보조 표시패널(320)의 외부로 출사되게 된다. 이는 액정분자(323a)가 제 1 기판(321)과 제 2 기판(322)에 대하여 수직으로 배열됨에 따라 서브 액정층(323)을 통과하는 빛은 굴절률 이방성(Δn)이 아닌 단축방향의 굴절률만 느끼며 통과하기 때문에 편광상태 또는 편광정보가 변화되지 않기 때문이다.

<97> 이하, 도 12를 참조하여 본 발명에 따르는 입체영상표시장치의 구동원리에 대하여 구체적으로 설명한다.

<98> 도 12는 본 발명에 따른 입체영상표시장치의 구동원리를 설명하기 위한 예시도이다.

<99> 본 발명에 따르는 메인 표시패널이 전술한 바와 같이 구동되기 위하여, 게이트라인에 연결된 박막 트랜지스터는 2배 더 빨리 스위칭 되고, 데이터라인으로 인가되는 데이터 신호도 2배 빨리 공급되게 된다. 여기서, 데이터 신호는 박막 트랜지스터의 스위칭 속도에 따라 좌안용 데이터 신호와 우안용 데이터 신호가 번갈아 가며 데이터라인에 인가된다.

<100> 구체적으로, 도면에 도시된 바와 같이, 본 발명에 따르는 메인 표시패널은 60개의 프레임을 갖도록 구동되며, 각 프레임은 좌측 영상을 표시하는 제 1 서브프레임과 우측 영상을 표시하는 제 2 서브프레임을 포함한다.

<101> 이때, 예를 들어 첫 번째 프레임 중에서, 0~8초 동안의 제 1 서브프레임에서는 좌측 영상이 표시되도록 메인 표시패널이 구동되고, 8~16초 동안의 제 2 서브프레임에서는 우측 영상이 표시되도록 메인 표시패널이 구동될 수 있다. 그리고, 두 번째 프레임 중에서, 16~24초 동안의 제 1 서브프레임에서는 좌측 영상이 표시되도록 메인 표시패널이 구동되고, 24~32초 동안의 제 2 서브프레임에서는 우측 영상이 표시되도록 메인 표시패널이 구동될 수 있다.

<102> 이와 같이, 60개의 프레임이 순차적으로 구동되어, 메인 표시패널은 입체영상을 구현하기 위한 좌측 영상과 우측 영상을 번갈아 가며 표시할 수 있다.

<103> 앞에서 언급한 바와 같이 각 프레임은 좌측 영상을 표시하는 제 1 서브프레임과 우측 영상을 표시하는 제 2 서브프레임을 포함한다.

<104> 그리고, 보조 표시패널은 메인 표시패널의 좌측 영상에 동기되어 온 되도록 마련되어 있고, 예를 들어 메인 표시패널이 우측 영상을 표시하는 동안에는 보조 표시패널은 구동되지 않도록 마련되어 있다. 다만, 본 발명이 이에 한정되는 것은 아니며, 본 발명의 보조 표시패널은 우측 영상에 동기되어 온 되도록 마련되고, 좌측 영상이 표시되는 동안에는 구동되지 않도록 마련될 수도 있다.

<105> 또한, 보조 표시패널이 온 된 경우, 보조 표시패널은 메인 표시패널에서 출력되는 좌측 영상의 편광정보를 변화시키지 않고 출력시키고, 보조 표시패널이 오프 된 경우, 보조 표시패널은 메인 표시패널에서 출력되는 우측 영상의 편광정보를 변경시켜 출력시킨다.

<106> 구체적으로, 광원에서 출사된 빛은 메인 표시패널을 통과하여 보조 표시패널로 입사된다. 여기서, 메인 표시패널의 제 1 편광판과 제 2 편광판은 수직을 이루도록 마련되어 있다. 이때, 광원으로부터 메인 표시패널로 향하는 빛은 상기 제 2 편광판의 편광축과 일하는 편광상태의 빛만이 메인 표시패널을 통과하게 된다.

<107> 그리고, 첫 번째 프레임의 제 1 서브프레임 동안(0~8초)에는 보조 표시패널이 오프 상태로 유지되어, 보조 표시패널을 통과한 빛의 편광상태는 변경되게 된다. 즉, 보조 표시패널은 입사되는 좌측 영상의 편광축을 90도 회전하여 출력시킨다. 결과적으로, 출사된 좌측 영상의 편광상태는 제 1 편광판을 통과한 빛의 편

광상태와 동일해진다.

<108> 이때, 도면에는 λ/4 리타데이션 층이 적용되지 않은 본 발명의 제 1 실시예의 경우를 예를 들어 나타내고 있으나, 본 발명이 이에 한정되는 것은 아니며, 본 발명은 상기 λ/4 리타데이션 층이 적용됨에 따라 출사된 광이 좌원편광 또는 우원편광으로 편광된 경우에도 적용된다.

<109> 또한, 첫 번째 프레임의 제 2 서브프레임 동안(8~16초)에는 보조 표시패널이 온 상태로 되어, 보조 표시패널을 통과한 빛의 편광상태는 변경되지 않는다. 즉, 보조 표시패널은 입사되는 우측 영상의 편광축과 동일한 편광축을 갖는 우측 영상을 출력시킨다.

<110> 이에 따라, 편광안경의 좌측편광렌즈의 편광축은 좌측 영상의 편광축과 일치하므로 출력된 좌측 영상은 시청자의 좌안으로 입사되나, 출력된 우측 영상의 편광축은 좌측편광렌즈의 편광축과 수직을 이루고 있어 출력된 우측 영상은 좌안으로 입사되지 않는다. 그리고, 편광안경의 우측편광렌즈의 편광축은 우측 영상의 편광축과 일치하므로 출력된 우측 영상은 시청자의 우안으로 입사되나, 좌측 영상의 편광축은 우측편광렌즈의 편광축과 수직을 이루고 있어 출력된 우측 영상은 우안으로 입사되지 않는다.

<111> 이와 같이, 서로 다른 편광축을 갖는 좌측 영상과 우측 영상이 시간차를 두어 형성되고, 형성된 좌측 영상 및 우측 영상 중 어느 하나의 편광상태가 변경되어 시청자에게 출력됨으로써, 시청자는 편광안경을 이용하여 좌측 영상과 우측 영상을 편광상태에 따라 구분하여 볼 수 있게 된다. 이에 따라, 시청자는 입체영상을 시청

할 수 있게 된다.

<112> 상기한 설명에 많은 사항이 구체적으로 기재되어 있으나 이것은 발명의 범위를 한정하는 것이라기보다 바람직한 실시예의 예시로서 해석되어야 한다. 따라서 발명은 설명된 실시예에 의하여 정할 것이 아니고 특허청구범위와 특허청구범위에 균등한 것에 의하여 정하여져야 한다.

【특허청구범위】

【청구항 1】

좌측 영상과 우측 영상을 번갈아 가며 표시하는 메인 표시패널;

상기 메인 표시패널의 화소부에 대응하는 화소부를 갖는 제 1 기판과 제 2 기판 및 상기 제 1 기판과 제 2 기판 사이에 형성된 서브 액정층으로 이루어지며, 상기 메인 표시패널의 전방에 위치하여 입사된 좌측 영상 또는 우측 영상의 편광정보를 변경시키는 보조 표시패널;

상기 메인 표시패널에 형성된 화소들의 행을 따라 상기 제 1 기판에 패터닝된 다수개의 제 1 전극;

상기 제 2 기판의 화소부 전면에 형성된 제 2 전극; 및

상기 메인 표시패널의 후방으로 빛을 공급하는 광원을 포함하는 입체영상표시장치.

【청구항 2】

제 1 항에 있어서, 상기 제 2 전극은 어떠한 패턴도 없이 통짜로 상기 제 2 기판의 화소부 전면에 형성된 것을 특징으로 하는 입체영상표시장치.

【청구항 3】

제 1 항에 있어서, 상기 제 1 전극과 제 2 전극은 ITO와 같은 투명한 도전물질로 이루어진 것을 특징으로 하는 입체영상표시장치.

【청구항 4】

제 1 항에 있어서, 상기 제 1 전극의 높이는 상기 메인 표시패널의 하나의 화소 높이에 해당하며, 상기 제 1 전극의 폭은 화소부의 폭의 n(n=1,2,,,)배에 해당하는 것을 특징으로 하는 입체영상표시장치.

【청구항 5】

제 1 항에 있어서, 상기 보조 표시패널은 상기 좌측 영상 및 우측 영상 중 어느 하나에 동기되어 구동되는 것을 특징으로 하는 입체영상표시장치.

【청구항 6】

제 1 항에 있어서, 상기 서브 액정층은 복수의 액정분자를 포함하며, 상기 보조 표시패널이 구동되는 경우 상기 액정분자는 상기 제 1 기판과 상기 제 2 기판에 대하여 실질적으로 수직으로 배열되고, 상기 보조 표시패널이 구동되지 않은 경우 상기 액정분자는 트위스티드 네마틱(Twisted Nematic; TN) 구조로 배열되는 것을 특징으로 하는 입체영상표시장치.

【청구항 7】

제 1 항에 있어서, 상기 서브 액정층은 복수의 액정분자를 포함하며, 상기 보조 표시패널이 구동되는 경우 상기 액정분자는 상기 제 1 기판과 상기 제 2 기판에 대하여 실질적으로 수직으로 배열되고, 상기 보조 표시패널이 구동되지 않은 경우 상기 액정분자는 상기 제 1 기판과 상기 제 2 기판에 대하여 실질적으로 평행하게 배열되는 것을 특징으로 하는 입체영상표시장치.

【청구항 8】

제 1 항에 있어서, 상기 보조 표시패널로 입사되는 좌측 영상 또는 우측 영상의 편광축과 상기 보조 표시패널의 러빙방향은 실질적으로 45도를 이루는 것을 특징으로 하는 입체영상표시장치.

【청구항 9】

제 4 항에 있어서, 상기 보조 표시패널이 구동되지 않은 경우, 상기 보조 표시패널을 통과한 좌측 영상 또는 우측 영상의 편광축은 상기 보조 표시패널로 입사되는 좌측 영상 또는 우측 영상의 편광축과 실질적으로 수직을 이루는 것을 특징으로 하는 입체영상표시장치.

【청구항 10】

제 1 항에 있어서, 상기 메인 표시패널은 120Hz이상으로 구동되는 것을 특징으로 하는 입체영상표시장치.

【청구항 11】

제 1 항에 있어서, 상기 메인 표시패널은

어레이 기판;

상기 어레이 기판과 대향 배치되는 컬러필터 기판;

상기 어레이 기판과 상기 컬러필터 기판 사이에 위치하는 메인 액정층;

상기 어레이 기판의 외부 면에 부착된 제 1 편광판; 및

상기 컬러필터 기판의 외부 면에 부착된 제 2 편광판을 포함하는 것을 특징

으로 하는 입체영상표시장치.

【청구항 12】

제 1 항에 있어서, 상기 보조 표시패널의 제 1 기판에 형성되어 상기 보조 표시패널로 입사되는 선편광된 좌측 영상 또는 우측 영상을 좌원편광(또는 우원편광)으로 상태를 변화시키는 λ/4 리타데이션 층을 추가로 포함하는 것을 특징으로 하는 입체영상표시장치.

【청구항 13】

제 12 항에 있어서, 상기 λ/4 리타데이션 층은 상기 보조 표시패널의 제 1 기판 상부면에 인-셀(in cell) 형태로 상기 제 1 기판과 함께 형성되는 것을 특징으로 하는 입체영상표시장치.

【청구항 14】

제 12 항에 있어서, 상기 λ/4 리타데이션 층은 상기 보조 표시패널의 제 1 기판 하부면에 필름 형태로 부착되는 것을 특징으로 하는 입체영상표시장치.

【도면의 간단한 설명】

<113> 도 1은 일반적인 패러렉스 배리어 방식에 의한 입체영상표시장치의 구성을 개략적으로 나타내는 예시도.

<114> 도 2는 본 발명의 제 1 실시예에 따른 입체영상표시장치의 구조를 개략적으로 나타내는 단면도.

<115> 도 3a 및 도 3b는 본 발명의 입체영상표시장치에 있어, 보조 표시패널의 하

부 기판 및 상부 기판의 구조를 개략적으로 나타내는 평면도.

<116> 도 4a 및 도 4b는 도 3a에 도시된 보조 표시패널의 상부 기판에 있어, A-A'선 및 B-B'선에 따라 절단한 단면을 개략적으로 나타내는 도면.

<117> 도 5는 보조 표시패널이 TN 모드의 서브 액정층을 갖는 경우, 보조 표시패널의 동작특성을 설명하기 위한 도면.

<118> 도 6은 보조 표시패널이 균질한(homogeneous) 서브 액정층을 갖는 경우, 보조 표시패널의 동작특성을 설명하기 위한 도면.

<119> 도 7은 보조 표시패널이 균질한 서브 액정층을 갖는 경우, 보조 표시패널의 러빙방향을 나타내는 도면.

<120> 도 8은 본 발명의 제 2 실시예에 따른 입체영상표시장치의 구조를 개략적으로 나타내는 단면도.

<121> 도 9는 도 8에 도시된 입체영상표시장치에 있어, 보조 표시패널의 동작특성을 설명하기 위한 도면.

<122> 도 10은 본 발명의 제 3 실시예에 따른 입체영상표시장치의 구조를 개략적으로 나타내는 단면도.

<123> 도 11은 도 10에 도시된 입체영상표시장치에 있어, 보조 표시패널의 동작특성을 설명하기 위한 도면.

<124> 도 12는 본 발명에 따른 입체영상표시장치의 구동원리를 설명하기 위한 예시도.

<125> ** 도면의 주요부분에 대한 부호의 설명 **

<126> 100~300 : 입체영상표시장치 110~310 : 메인 표시패널

<127> 111~311 : 어레이 기판 112~312 : 컬러필터 기판

<128> 113~313 : 메인 액정층 114~314 : 제 1 편광판

<129> 115~315 : 제 2 편광판 120~320 : 보조 표시패널

<130> 121~321 : 제 1 기판 122~322 : 제 2 기판

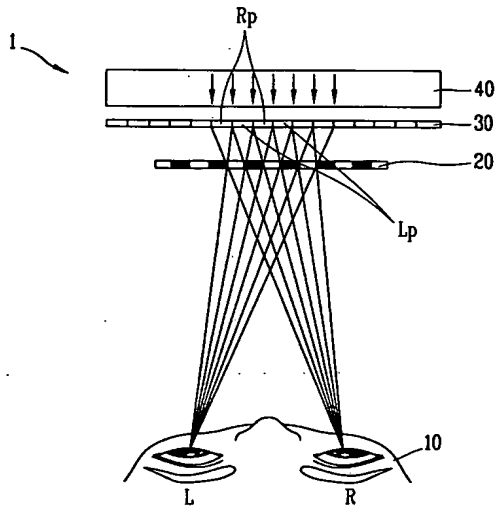
<131> 123~323 : 서브 액정층 125 : 화소부

<132> 128 : 제 1 전극 129 : 제 2 전극

<133> 130~330 : 광원 140~340 : 편광안경

【도면】

【도 1】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Lp
10
L
R

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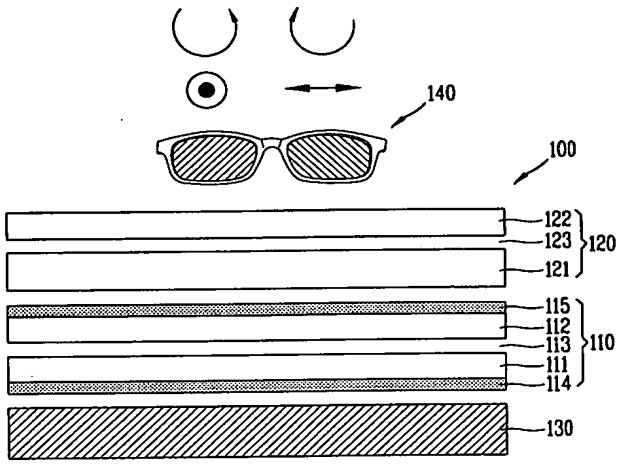
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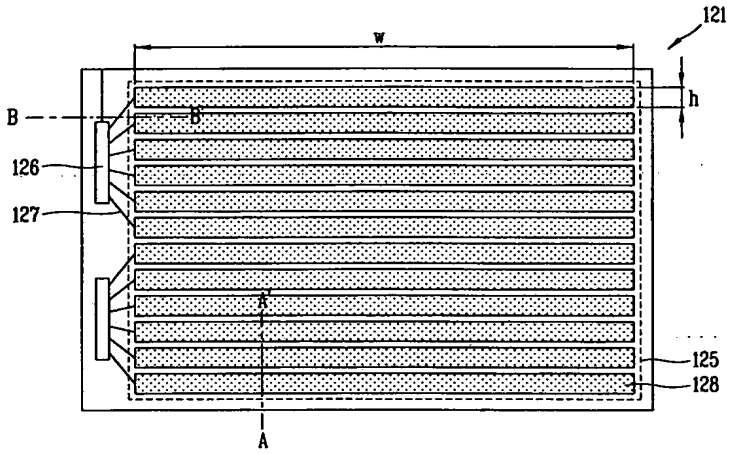
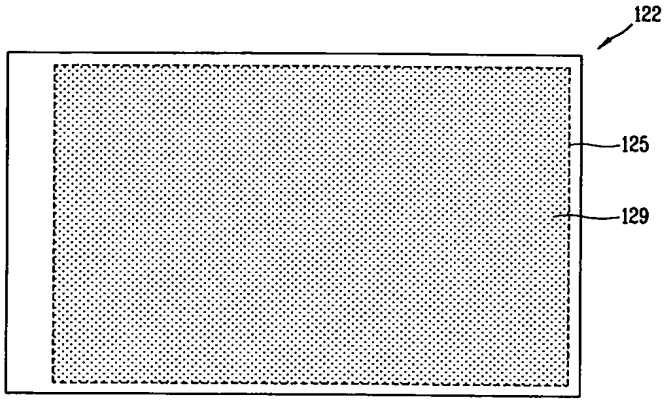
114
130

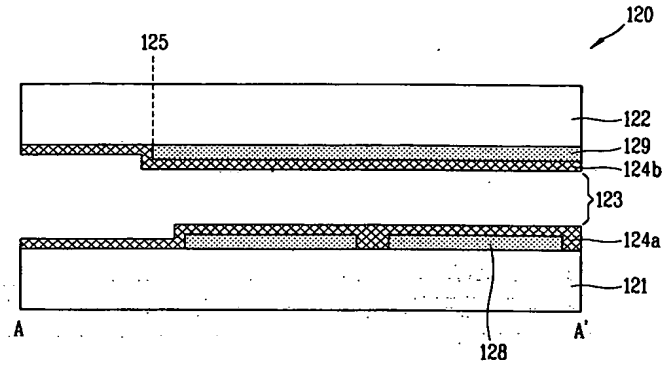
【도 3a】



【도 3b】



【도 4a】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124b
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124a
121
A
A'
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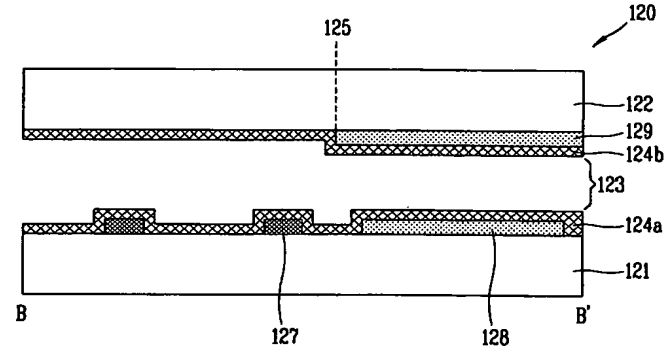
【도 4b】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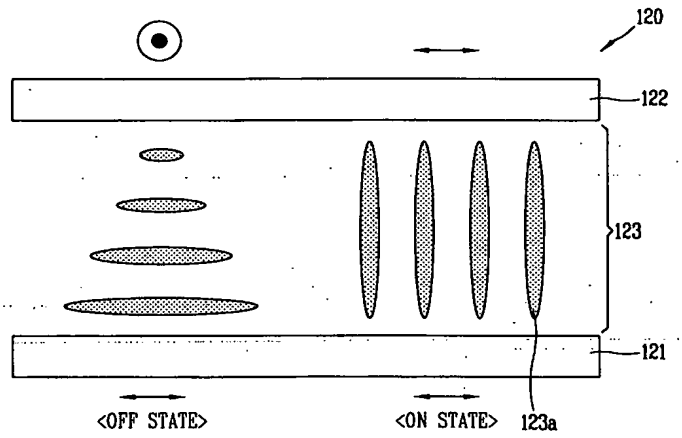
【도 5】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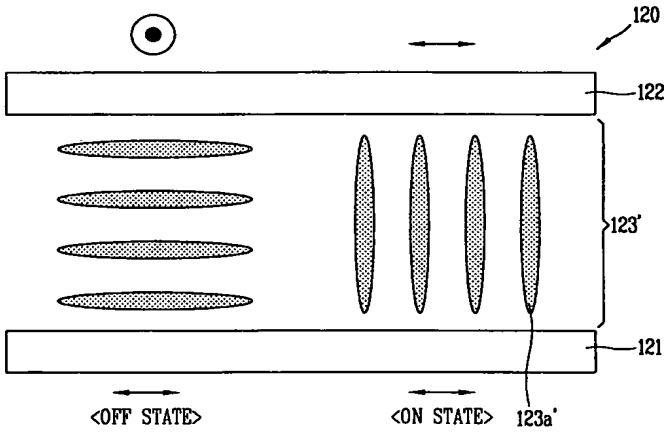
【도 6】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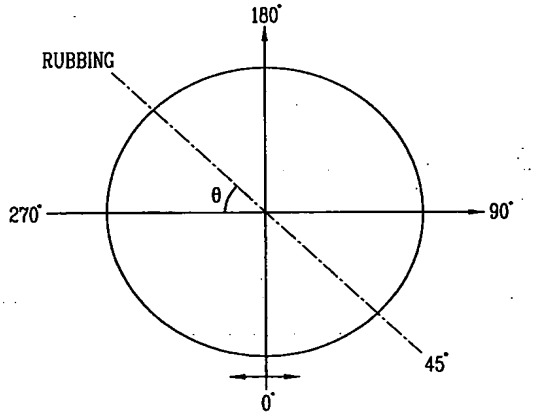
【도 7】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90°
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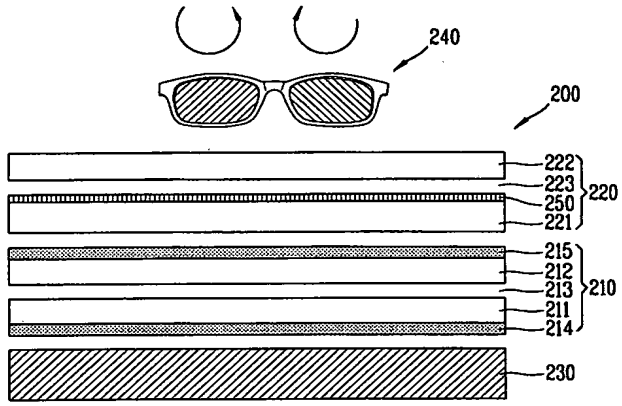
【도 8】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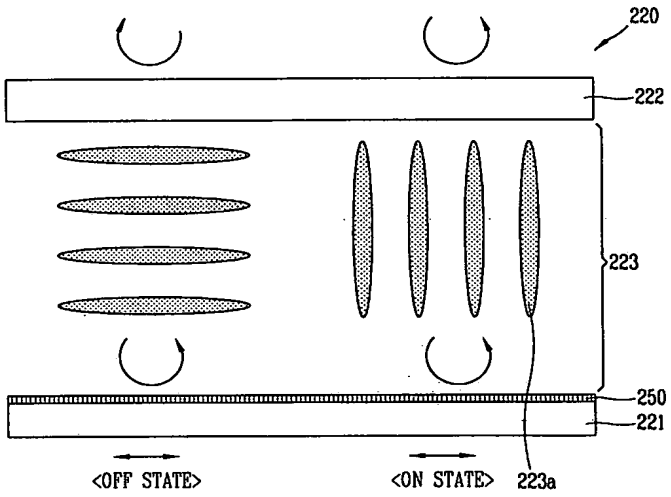
【도 9】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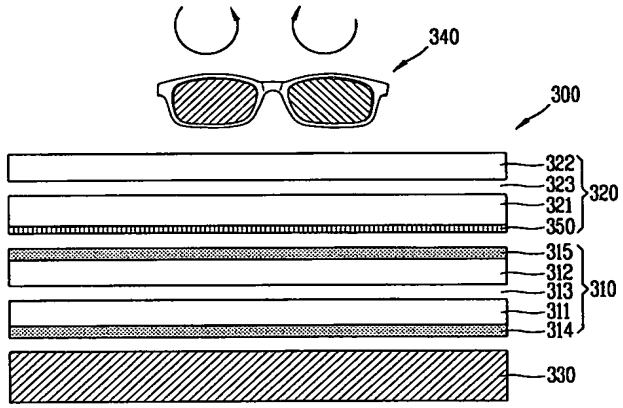
【도 10】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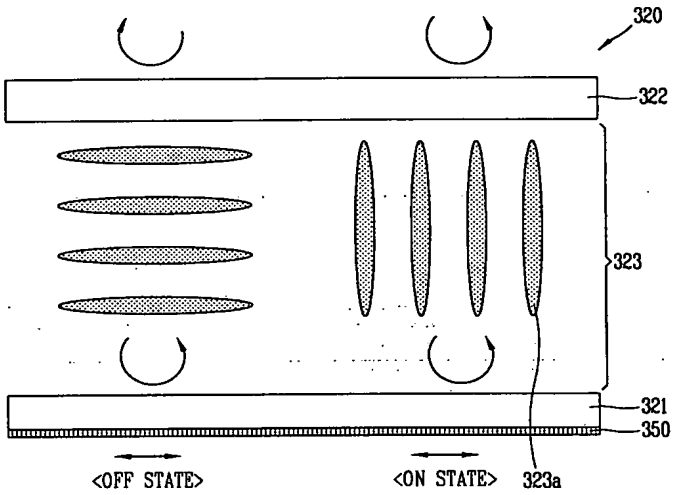
【도 11】



【도 12】

	1 프레임		2 프레임		3 프레임	
시간[ms]	0-8	8-16	16-24	24-32	32-40	40-48
메인 LCD 표시영상						
출사된 편광	⟷	⊙	⟷	⊙	⟷	⊙
보조 LCD 구동여부	⊙	⊖	⊙	⊖	⊙	⊖
상부 편광판	⊙	⊙	⊙	⊙	⊙	⊙
하부 편광판	⟷	⟷	⟷	⟷	⟷	⟷

CERTIFICATE OF MAILING UNDER 37 CFR §1.8

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail, with sufficient postage, in an envelope addressed to: Commissioner for Patents, PO Box 1450, Alexandria, VA 22313-1450, on the below date:

Date: February 26, 2016 Name: Gustavo Siller, Jr. Signature: /Gustavo Siller, Jr./

BRINKS GILSON & LIONE

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Appln. of: Seung-Chul LEE et al.

Appln. No.:	12/340,005	Examiner:	Steven C. NGUYEN
Filed:	December 19, 2008	Art Unit:	2443
For:	STEREOSCOPIC 3D DISPLAY DEVICE	Conf. No.:	8241

Attorney Docket No.: 12579-6201
Client Ref. No.: F08-0379US001

TRANSMITTAL

Commissioner for Patents
P O Box 1450
Alexandria, VA 22313-1450

Dear Sir/Madam:
Attached is/are:

☒ Transmittal (in duplicate); Submission of Certified Copy of Priority Document; Certified Copy of Korean Patent Application No. 10-2008-0066695; and

☒ Return Receipt Postcard.

Fee Calculation:

☒ No additional fee is required.

☐ Per 37 CFR §1.27, ☐ Applicant is small entity ☐ Applicant is micro entity.

☐ An extension fee in an amount of $_____ for a _____-month extension of time under 37 CFR § 1.136(a).

☐ A petition or processing fee in an amount of $_____ under 37 CFR § 1.17(_____).

☐ An additional filing fee has been calculated as shown below:

					Fee		Small Entity Fee		Micro Entity Fee	
	Claims Remaining After Amendment		Highest No. Previously Paid	Present Extra	Rate	Add'l Fee	Rate	Add'l Fee	Rate	Add'l Fee
Total		Minus			x $ 80 =	$	x $ 40 =	$	x $20 =	$
Independent		Minus			x $420 =	$	x $210 =	$	x $105 =	$
First Presentation of Multiple Dep. Claim					+ $780 =	$	+ $390 =	$	+ $195 =	$
					Total	$	Total	$	Total	$

Fee Payment:

☐ A check in the amount of $_____ is enclosed.

☐ Payment by credit card in the amount of $_____ (Form PTO-2038 is attached).

☐ Please charge Deposit Account No. 23-1925 in the amount of $_____ for _____.

☒ The Director is hereby authorized to charge payment of any additional filing fees required under 37 CFR § 1.16 and any patent application processing fees under 37 CFR § 1.17 associated with this paper (including any extension fee required to ensure that this paper is timely filed), or to credit any overpayment, to Deposit Account No. 23-1925.

February 26, 2016
Date

Respectfully submitted,
/Gustavo Siller, Jr./
Gustavo Siller, Jr. (Reg. No. 32,305)

CERTIFICATE OF MAILING UNDER 37 CFR §1.8

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Date: February 26, 2016 Name: Gustavo Siller, Jr. Signature: /Gustavo Siller, Jr./

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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Client Ref. No.: F08-0379US001

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					Fee		Small Entity Fee		Micro Entity Fee	
	Claims Remaining After Amendment		Highest No. Previously Paid	Present Extra	Rate	Add'l Fee	Rate	Add'l Fee	Rate	Add'l Fee
Total		Minus			x $ 80 =	$	x $ 40 =	$	x $20 =	$
Independent		Minus			x $420 =	$	x $210 =	$	x $105 =	$
First Presentation of Multiple Dep. Claim					+ $780 =	$	+ $390 =	$	+ $195 =	$
					Total	$	Total	$	Total	$

Fee Payment:

☐ A check in the amount of $_____ is enclosed.

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February 26, 2016
Date

Respectfully submitted,
/Gustavo Siller, Jr./
Gustavo Siller, Jr. (Reg. No. 32,305)

CERTIFICATE OF MAILING UNDER 37 CFR §1.8

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail, with sufficient postage, in an envelope addressed to: Commissioner for Patents, PO Box 1450, Alexandria, VA 22313-1450, on the below date

Date: February 26, 2016 Name: Gustavo Siller, Jr. Signature

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Appln. of: Seung-Chul LEE et al.			
Appln. No.:	12/340,005	Examiner:	Steven C. NGUYEN
Filed:	December 19, 2008	Art Unit:	2443
For:	STEREOSCOPIC 3D DISPLAY DEVICE	Conf. No.:	8241
Attorney Docket No.:	12579-6201		
Client Ref. No.:	F08-0379US001		

SUBMISSION OF CERTIFIED COPY OF PRIORITY DOCUMENT

Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Dear Sir/Madam:

Applicant(s) submits herewith a certified copy of Korean Patent Application No. 10-2008-0066695, filed July 09, 2008, to which the above-identified United States Patent Application claims the right of foreign priority under 35 U.S.C. §119.

Respectfully submitted,

Date: February 26, 2016

Gustavo Siller, Jr., Reg. No. 32,305
Attorney for Applicant

BRINKS GILSON & LIONE
PO BOX 10395
CHICAGO, ILLINOIS 60610
(312) 321-4200

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
12/340,005	12/19/2008	Seung-Chul Lee	12579-6201

CONFIRMATION NO. 8241

IMPROPER CFR REQUEST

757
BGL
P.O. BOX 10395
CHICAGO, IL 60610

OC00000081098276

Date Mailed: 03/02/2016

RESPONSE TO REQUEST FOR CORRECTED FILING RECEIPT

Continuity, Priority Claims, Petitions, and Non-Publication Requests

In response to your request for a corrected Filing Receipt, the Office is unable to comply with your request because:

- The priority or continuity claim has not been entered because it was not filed during the required time period. Applicant may wish to consider filing a petition to accept an unintentionally delayed claim for priority. See 37 CFR 1.55 or 1.78.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/hnguyen/

Doc Code: PD.REQ.RETR
Document Description: Request for USPTO to retrieve priority docs

PTO/SB/38 (04-13)
Approved for use through 05/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Request to Retrieve Electronic Priority Application(s)

Send completed form to: Commissioner for Patents
P.O. Box 1450, Alexandria, VA 22313-1450

COMPLETE IF KNOWN	
Application Number	12/340,005
Filing Date	December 19, 2008
First Named Inventor	Seung-Chul LEE et al.
Art Unit	2443
Examiner Name	Steven C. NGUYEN
Attorney Docket Number	12579-6201 (F08-0379US001)

Pursuant to 37 CFR 1.55(h), the undersigned hereby requests that the USPTO retrieve an electronic copy of each of the following foreign applications for which priority has been claimed under 35 U.S.C. 119(a)-(d) from a foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement. This Request must be submitted:

- within the later of sixteen months from the filing date of the prior foreign application or four months from the actual filing date of an application under 35 U.S.C. 111(a),
- within four months from the later of the date of commencement (37 CFR 1.491(a)) or the date of the initial submission under 35 U.S.C. 371 of an application entering the national stage under 35 U.S.C. 371, or
- with a petition under 37 CFR 1.55(e).

☐ **OPTION A**

Please retrieve the priority application identified in Column C, a certified copy of which is contained in the EP or JP application identified in Columns A and B:

	A	B		C	
	Code for Participating Office (EP or JP only)	Application containing the non-participating priority application		Non-participating priority application to be retrieved	
		App. No.	Filing Date	Country Code	App. No.
1					

☑ **OPTION B**

This Request may be used for the infrequent circumstance when a claim for priority to an application filed in a participating foreign intellectual property office was made prior to that foreign intellectual property office becoming a participating foreign intellectual property office.

Please retrieve the priority application identified in Columns A and B:

	A	B		
	Code for Participating Office (e.g., EP, JP, KR) or WIPO DAS Depositing Office (e.g., AU, DK, ES, FI)	Application to be retrieved		
		App. No.	Filing Date	Access Code (for WIPO DAS Depositing Office)
1	KR	10-2008-0066695	July 09, 2008	
2				

The USPTO will not attempt to retrieve the identified priority application(s) unless an identical claim for foreign priority to the application identified above is made pursuant to 37 CFR 1.55(c) or (d) or a petition is granted under 37 CFR 1.55(e). Applicants are advised to consult Private PAIR (accessed through www.uspto.gov) to assure that the retrieval has been successful. The applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period set forth in 37 CFR 1.55(g)(1).

I hereby declare that I have the authority to grant access to the above-identified foreign application(s).

/Gustavo Siller, Jr./	March 01, 2016
Signature	Date
Gustavo Siller, Jr.	312-321-4200
Printed or Typed Name	Telephone Number
Attorney for Applicant	32,305
Title	Registration Number, if applicable

Electronic Acknowledgement Receipt

EFS ID:	25067939
Application Number:	12340005
International Application Number:	
Confirmation Number:	8241
Title of Invention:	STEREOSCOPIC 3D DISPLAY DEVICE
First Named Inventor/Applicant Name:	Seung-Chul Lee
Customer Number:	757
Filer:	Gustavo Siller Jr./Jesus Rodriguez
Filer Authorized By:	Gustavo Siller Jr.
Attorney Docket Number:	12579-6201
Receipt Date:	01-MAR-2016
Filing Date:	19-DEC-2008
Time Stamp:	16:39:47
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		03-01-16_12579-6201_Request_Retrieve_Elec_Priority_App.pdf	716830 3c29d61a287f69036a0b9b922aebd40d388ef26d	yes	2

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Transmittal Letter	1	1
	Request for USPTO to retrieve priority docs	2	2
Warnings:			
Information:			
	Total Files Size (in bytes):	716830	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

CERTIFICATE OF EFS FILING UNDER 37 CFR §1.8

I hereby certify that this correspondence is being electronically transmitted to the United States Patent and Trademark Office, Commissioner for Patents, via the EFS pursuant to 37 CFR §1.8 on the below date:

Date: March 01, 2016 Name: Gustavo Siller, Jr. Signature: /Gustavo Siller, Jr./

BRINKS GILSON & LIONE

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Appln. of:	Seung-Chul LEE et al.		
Appln. No.:	12/340,005	Examiner:	Steven C. NGUYEN
Filed:	December 19, 2008	Art Unit:	2443
For:	STEREOSCOPIC 3D DISPLAY DEVICE	Conf. No.:	8241
Attorney Docket No.:	12579-6201		
Client Ref. No.:	F08-0379US001		

TRANSMITTAL

Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Sir:

Attached is/are:

☒ Transmittal; Request to Retrieve Electronic Priority Application.

Fee calculation:

☒ No additional fee is required.

☐ Per 37 CFR §1.27, ☐ Applicant is small entity ☐ Applicant is micro entity.

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					Fee		Small Entity Fee		Micro Entity Fee	
	Claims Remaining After Amendment		Highest No. Previously Paid	Present Extra	Rate	Add'l Fee	Rate	Add'l Fee	Rate	Add'l Fee
Total		Minus			x $ 80 =	$	x $ 40 =	$	x $20 =	$
Independent		Minus			x $420 =	$	x $210 =	$	x $105 =	$
First Presentation of Multiple Dep. Claim					+ $780 =	$	+ $390 =	$	+ $195 =	$
					Total	$	Total	$	Total	$

Fee payment:

☐ Please charge Deposit Account No. 23-1925 in the amount of $_____ for _____.

☐ Payment by credit card in the amount of $_____ (Form PTO-2038 is attached).
WARNING: Information on this form may become public. **Credit card information should not be included on this form.**

☒ The Director is hereby authorized to charge payment of any additional filing fees required under 37 CFR § 1.16 and any patent application processing fees under 37 CFR § 1.17 (including any extension fee required to ensure that this paper is timely filed), or to credit any overpayment, to Deposit Account No. 23-1925.

Respectfully submitted,

March 01, 2016
Date

/Gustavo Siller, Jr./
Gustavo Siller, Jr. (Reg. No. 32,305)

CERTIFICATE OF EFS FILING UNDER 37 CFR §1.8

I hereby certify that this correspondence is being electronically transmitted to the United States Patent and Trademark Office, Commissioner for Patents, via the EFS pursuant to 37 CFR §1.8 on the below date:

Date: February 26, 2016 Name: Gustavo Siller, Jr., Reg. No. 32,305 Signature: /Gustavo Siller, Jr./

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Appln. of:	Seung-Chul LEE et al.		
Appln. No.:	12/340,005	Examiner:	Steven C. NGUYEN
Filed:	December 19, 2008	Art Unit:	2443
For:	STEREOSCOPIC 3D DISPLAY DEVICE	Conf. No.:	8241
Attorney Docket No.:	12579-6201		
Client Ref. No.:	F08-0379US001		

REQUEST FOR CORRECTION OF FILING RECEIPT

Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Attention : Application Processing Division
Customer Correction Branch

Dear Sir:

The Applicant respectfully request the issuance of a Corrected Filing Receipt for the above-referenced patent application. Please correct the foreign priority application as follows:

~~**KR 10-2008-0055329**~~ **KR 10-2008-0066695;**

A marked-up copy of the Filing Receipt is attached indicating the request correction.

A Corrected Application Data Sheet noting the correction is also submitted.

Respectfully submitted,

Dated: February 26, 2016

/Gustavo Siller, Jr./
Gustavo Siller, Jr., Reg. No. 32,305
Attorney for Applicants

BRINKS GILSON & LIONE
PO BOX 10395
CHICAGO, IL 60610
(312) 321-4200

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE RECD	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
12/340,005	12/19/2008	2621	1090	12579/6199	14	1

CONFIRMATION NO. 8241

757
BRINKS HOFER GILSON & LIONE
P.O. BOX 10395
CHICAGO, IL 60610

FILING RECEIPT

OC000000033944297

Date Mailed: 01/09/2009

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Applicant(s)

Seung-Chul Lee, Paju Si, KOREA, REPUBLIC OF;
Hoon Kang, Namyangju Si, KOREA, REPUBLIC OF;
Sung-Min Jung, Incheon, KOREA, REPUBLIC OF;

Assignment For Published Patent Application

LG Display Co., Ltd., Seoul, KOREA, REPUBLIC OF

Power of Attorney: The patent practitioners associated with Customer Number 00757

Domestic Priority data as claimed by applicant

Foreign Applications

REPUBLIC OF KOREA ~~10-2008-0055329~~ 07/09/2008
10-2008-0066095

Request to Retrieve - This application either claims priority to one or more applications filed in an intellectual property Office that participates in the Priority Document Exchange (PDX) program or contains a proper **Request to Retrieve Electronic Priority Application(s)** (PTO/SB/38 or its equivalent). Consequently, the USPTO will attempt to electronically retrieve these priority documents.

If Required, Foreign Filing License Granted: 01/07/2009

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 12/340,005**

Projected Publication Date: 01/14/2010

Non-Publication Request: No

Early Publication Request: No

Title

STEREOSCOPIC 3D DISPLAY DEVICE

Preliminary Class

348

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4158).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as

set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

CORRECTED APPLICATION DATA SHEET

APPLICATION & PUBLICATION INFORMATION

Application Number:	~~To Be Assigned~~ 12/340,005
Title of Invention:	STEREOSCOPIC 3D DISPLAY DEVICE
Attorney Docket Number:	~~12579/6199~~ 12579/6201
Small Entity Status Claimed:	☐
Filing Date:	December 19, 2008
Application Type:	Utility
Subject Matter:	
Suggested Class (if any):	
Suggested Group Art Unit (if any):	
CD-ROM or CD-R?:	
Total Number of Drawing Sheets (if any):	8
Suggested Figure for Publication (if any):	
Secrecy Order 37 CFR 5.2:	☐
Request for Early Publication:	☐
Request for Non-Publication:	☐

APPLICANT INFORMATION

Applicant Authority:	Inventor
Prefix:	
Inventor One Given Name:	Seung-Chul
Middle Name:	
Family Surname:	LEE
Suffix:	
Mailing Address Line One:	Seowon Maeul Apt. 704-1204
Mailing Address Line Two:	Geumchon-dong
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State or Province:	Gyeonggi-Do
Postal Code:	
Country:	Korea
Residency:	Non U.S. Residency
City, State/Province, Country of Residence:	Paju Si, Republic of Korea
Citizenship under 37 CFR 1.41(b):	Republic of Korea
Prefix:	
Inventor Two Given Name:	Hoon
Middle Name:	
Family Surname:	KANG
Suffix:	
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City:	Namyangju Si
State or Province:	Gyeonggi-Do
Postal Code:	
Country:	Republic of Korea
Residency:	Non-U.S.
City, State/Province, Country of Residence:	Namyangju Si
Citizenship under 37 CFR 1.41(b):	Republic of Korea

Prefix:	
Inventor Three Given Name:	Sung-Min
Middle Name:	
Family Surname:	JUNG
Suffix:	
Mailing Address Line One:	Woosung Apt. 5-1408
Mailing Address Line Two:	Ganseok 4-dong
City:	Namdong-gu
State or Province:	Incheon
Postal Code:	
Country:	Korea
Residency:	Non U.S. Residency
City, State/Province, Country of Residence:	Namdong-gu, Republic of Korea
Citizenship under 37 CFR 1.41(b):	Republic of Korea

CORRESPONDENCE INFORMATION

Name:	Brinks Hofer Gilson & Lione
Street of Mailing Address:	PO Box 10395
City of Mailing Address:	Chicago
State or Province of Mailing Address:	IL
Country of Mailing Address:	U.S.
Postal or Zip Code of Mailing Address:	60610
Telephone Number:	312-321-4200
Fax Number:	312-321-4299
E-mail Address:	officeactions@brinkshofer.com
Customer Number:	**00757 - Brinks Hofer Gilson Lione**

REPRESENTATIVE INFORMATION

Representative Designation:	Primary
Name:	Gustavo Siller, Jr.
Registration No.:	32,305

DOMESTIC PRIORITY INFORMATION

This application is a [*Continuation of]:	
Prior Application No.:	
Filing Date:	
which is a [*Continuation of]:	
Prior Application No.:	
Filing Date:	

FOREIGN PRIORITY INFORMATION

Foreign Application No.:	~~10-2008-0055329~~ 10-2008-0066695
Parent Filing Date:	July 9, 2008
Country:	Korea
Priority Claimed:	☒

ASSIGNMENT INFORMATION

Assignee Name:	LG Display Co., Ltd.
Mailing Address Line One:	20 Yoido-dong, Youngdungpogu
Mailing Address Line Two:	
City:	Seoul

State or Province:	
Country:	Korea
Postal Code:	

Electronic Acknowledgement Receipt

EFS ID:	25038583
Application Number:	12340005
International Application Number:	
Confirmation Number:	8241
Title of Invention:	STEREOSCOPIC 3D DISPLAY DEVICE
First Named Inventor/Applicant Name:	Seung-Chul Lee
Customer Number:	757
Filer:	Gustavo Siller Jr./Alice Juhasz
Filer Authorized By:	Gustavo Siller Jr.
Attorney Docket Number:	12579-6201
Receipt Date:	26-FEB-2016
Filing Date:	19-DEC-2008
Time Stamp:	17:15:28
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		02-26-16_12579-6201_Req_Corr_FR_Corrected_ADS.pdf	388452 89a29b698d2af16d1242fb0a1ae9d366d5f07474	yes	8

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Transmittal Letter	1	1
	Request for Corrected Filing Receipt	2	5
	Application Data Sheet	6	8
Warnings:			
Information:			
	Total Files Size (in bytes):	388452	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

CERTIFICATE OF EFS FILING UNDER 37 CFR §1.8

I hereby certify that this correspondence is being electronically transmitted to the United States Patent and Trademark Office, Commissioner for Patents, via the EFS pursuant to 37 CFR §1.8 on the below date:

Date: February 26, 2016 Name: Gustavo Siller, Jr. Signature: /Gustavo Siller, Jr./

BRINKS GILSON & LIONE

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Appln. of:	Seung-Chul LEE et al.		
Appln. No.:	12/340,005	Examiner:	Steven C. NGUYEN
Filed:	December 19, 2008	Art Unit:	2443
For:	STEREOSCOPIC 3D DISPLAY DEVICE	Conf. No.:	8241
Attorney Docket No.:	12579-6201		
Client Ref. No.:	F08-0379US001		

TRANSMITTAL

Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Sir:

Attached is/are:

☒ Transmittal; Request for Corrected Filing Receipt, Marked-Up Copy Filing Receipt; and Corrected Application Data Sheet.

Fee calculation:

☒ No additional fee is required.

☐ Per 37 CFR §1.27, ☐ Applicant is small entity ☐ Applicant is micro entity.

☐ An extension fee in an amount of $_____ for a _____-month extension of time under 37 CFR § 1.136(a).

☐ A petition or processing fee in an amount of $_____ under 37 CFR § 1.17(_____).

☐ An additional filing fee has been calculated as shown below:

					Fee		Small Entity Fee		Micro Entity Fee	
	Claims Remaining After Amendment		Highest No. Previously Paid	Present Extra	Rate	Add'l Fee	Rate	Add'l Fee	Rate	Add'l Fee
Total		Minus			x $ 80 =	$	x $ 40 =	$	x $20 =	$
Independent		Minus			x $420 =	$	x $210 =	$	x $105 =	$
First Presentation of Multiple Dep. Claim					+ $780 =	$	+ $390 =	$	+ $195 =	$
					Total	$	Total	$	Total	$

Fee payment:

☐ Please charge Deposit Account No. 23-1925 in the amount of $_____ for _____.

☐ Payment by credit card in the amount of $_____ (Form PTO-2038 is attached).
WARNING: Information on this form may become public. **Credit card information should not be included on this form.**

☒ The Director is hereby authorized to charge payment of any additional filing fees required under 37 CFR § 1.16 and any patent application processing fees under 37 CFR § 1.17 (including any extension fee required to ensure that this paper is timely filed), or to credit any overpayment, to Deposit Account No. 23-1925.

Respectfully submitted,

February 26, 2016
Date

/Gustavo Siller, Jr./
Gustavo Siller, Jr. (Reg. No. 32,305)

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

757 7590 02/05/2016

BGL
P.O. BOX 10395
CHICAGO, IL 60610

EXAMINER
NGUYEN, STEVEN C

ART UNIT	PAPER NUMBER
2443	

DATE MAILED: 02/05/2016

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/340,005	12/19/2008	Seung-Chul Lee	12579-6201	8241

TITLE OF INVENTION: STEREOSCOPIC 3D DISPLAY DEVICE

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960	$0	$0	$960	05/05/2016

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

757 7590 02/05/2016
BGL
P.O. BOX 10395
CHICAGO, IL 60610

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/340,005	12/19/2008	Seung-Chul Lee	12579-6201	8241

TITLE OF INVENTION: STEREOSCOPIC 3D DISPLAY DEVICE

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960	$0	$0	$960	05/05/2016

EXAMINER	ART UNIT	CLASS-SUBCLASS
NGUYEN, STEVEN C	2443	348-043000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
- ❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.
1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. The following fee(s) are submitted:
- ❑ Issue Fee
- ❑ Publication Fee (No small entity discount permitted)
- ❑ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
- ❑ A check is enclosed.
- ❑ Payment by credit card. Form PTO-2038 is attached.
- ❑ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
- ❑ Applicant certifying micro entity status. See 37 CFR 1.29
  NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
- ❑ Applicant asserting small entity status. See 37 CFR 1.27
  NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
- ❑ Applicant changing to regular undiscounted fee status.
  NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

PTOL-85 Part B (10-13) Approved for use through 10/31/2013. OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/340,005	12/19/2008	Seung-Chul Lee	12579-6201	8241

757 7590 02/05/2016

BGL
P.O. BOX 10395
CHICAGO, IL 60610

EXAMINER	
NGUYEN, STEVEN C	

ART UNIT	PAPER NUMBER
2443	

DATE MAILED: 02/05/2016

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	Application No. 12/340,005	Applicant(s) LEE ET AL.	
	Examiner STEVEN NGUYEN	Art Unit 2443	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *the RCE filed 11/20/2014*.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on_____.
2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
3. ☒ The allowed claim(s) is/are *1-11,13,14 and 16*. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov .
4. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☒ All b) ☐ Some *c) ☐ None of the:
   1. ☒ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
4. ☒ Interview Summary (PTO-413), Paper No./Mail Date *02/02/2016* .
5. ☒ Examiner's Amendment/Comment
6. ☒ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/JUNE SISON/ Primary Examiner, Art Unit 2443	/S. N./ Examiner, Art Unit 2443

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.

2. Authorization for this Examiner's amendment was given in a telephone interview with Attorney Frankie Wong, on 01/28/2016 and 02/02/2016.

3. **Claims 1-11, 13, 14, 16,** are allowed in view of the Examiner's Amendment.

4. **Claims 1, 13, 14,** have been amended.

5. **Claims 12, 15,** have been cancelled.

In the claims:

1. (Currently Amended) A stereoscopic image display device comprising:

a main display panel operable to alternately display left and right images according to each subframe;

an auxiliary display panel that changes polarization information of one of the displayed left and right images without a polarizer, the auxiliary display panel including first and second substrates having a pixel part corresponding to that of the main display panel and a sub-liquid crystal layer formed between the first and second substrates, and positioned in front of the main display panel,

a plurality of first electrodes patterned on the first substrate along the rows of pixels formed on the main display panel;

a second single electrode on an entire surface of the pixel part of the second substrate;

wherein the changes of polarization information comprises:

turning on the first and second electrodes in the auxiliary display panel to align liquid crystal molecules in the sub-liquid crystal layer formed between the first and second substrate such that polarization axis of the left or right image that has passed through the auxiliary display panel is unchanged when one of the left and right images is displayed on the main display panel, and

turning off the first and second electrodes in the auxiliary display panel to align liquid crystal molecules in the sub-liquid crystal layer formed between the first and second substrate such that polarization axis of the left or right image is substantially perpendicular to that of the left or right image made incident on the auxiliary display panel when the other one of the left and right images is displayed on the main display panel; and

a light source supplies light to the rear side of the main display panel;

wherein a $\lambda/4$ retardation layer is formed on the first substrate of the auxiliary display panel which changes a linearly polarized left or right image made incident to the auxiliary display panel into a left circularly polarized or right circularly polarized state.

2. (Original) The device of claim 1, wherein the second electrode is on the entire surface of the pixel part of the second substrate without any patterns.

3. (Original) The device of claim 1, wherein the first and second electrodes are made of a transparent conductive material such as ITO.

4. (Original) The device of claim 1, wherein the height of the first electrode corresponds to the height of a single pixel of the main display panel, and the width of the first electrode corresponds to 'n' (n=1,2,…) times the width of the pixel part.

5. (Previously Presented) The device of claim 1, wherein the main display panel is driven to have 60 frames, and each frame includes a first subframe displaying the left image and a second subframe displaying the right image.

6. (Previously Presented) The device of claim 1, wherein the sub-liquid crystal layer includes a plurality of liquid crystal molecules, and when the auxiliary display panel is driven, the liquid crystal molecules are arranged to be perpendicular to the first and second substrates, and when the auxiliary display panel is not driven, the liquid crystal molecules are arranged in a twisted nematic structure.

7. (Previously Presented) The device of claim 1, wherein the sub-liquid crystal layer includes a plurality of liquid crystal molecules, and when the auxiliary display panel is driven, the liquid crystal molecules are arranged to be perpendicular to the first and second substrates, and when the auxiliary display panel is not driven, the liquid crystal molecules are arranged to be parallel to the first and second substrates.

8. (Previously Presented) The device of claim 1, wherein a polarization axis of the left or right image made incident to the auxiliary display panel and a rubbing direction of the auxiliary display panel are positioned at 45°.

9. (Previously Presented) The device of claim 4, wherein when the auxiliary display panel is not driven, a polarization axis of the left or right image that has passed through the auxiliary display panel is perpendicular to a polarization axis of the left or right image made incident to the auxiliary display panel.

10. (Original) The device of claim 1, wherein the main display panel is driven at 120Hz or higher.

11. (Original) The device of claim 1, wherein the main display panel comprises:
an array substrate;
a color filter substrate disposed to face the array substrate;

a main liquid crystal layer positioned between the array substrate and the color filter substrate;

a first polarizer attached on an outer surface of the array substrate; and

a second polarizer attached on an outer surface of the color filter substrate.

12. (Canceled)

13. (Currently Amended) The device of claim 1 ~~12~~, wherein the λ/4 retardation layer in formed in an in-cell form on an upper surface of the first substrate of the auxiliary display panel together with the first substrate.

14. (Currently Amended) The device of claim 1 ~~12~~, wherein the λ/4 retardation layer is attached in a form of a film on a lower surface of the first substrate of the auxiliary display panel.

15. (Canceled)

16. (Previously Presented) The device of claim 5, wherein when the auxiliary display panel is turned on, it outputs polarization information of the left image outputted from the main display panel without changing it, and when the auxiliary display panel is turned off, it changes the polarization information of the right image outputted from the main display panel, and outputs the image.

Reason for Allowance

1. Claims 1-11, 13, 14, 16, are allowed in view of the Examiner's Amendment. The following is an Examiner's statement of reasons for allowance: This communication warrants no Examiner's reason for allowance, as the prosecution history makes evident the reason for allowance, satisfying the record as whole as required by rule 37 CFR

1.104 (e). In this case, the amendments and arguments filed on 11/20/2014 and the Examiner's Amendment point out the reason claims are patentable over the prior art of record. Thus, the reason for allowance is in all probability evident from the record and no statement for examiner's reason for allowance is necessary (see MPEP 13202.14).

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to STEVEN NGUYEN whose telephone number is (571)270-5663. The examiner can normally be reached on Monday through Thursday with alternating Friday 7:30AM - 5:00PM, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tonia Dollinger can be reached on (571) 272-4170. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/S. N./
Examiner, Art Unit 2443
02/02/2016

/JUNE SISON/
Primary Examiner, Art Unit 2443

Examiner-Initiated Interview Summary	Application No.	Applicant(s)	
	12/340,005	LEE ET AL.	
	Examiner	Art Unit	
	STEVEN NGUYEN	2443	

All participants (applicant, applicant's representative, PTO personnel):

(1) *STEVEN NGUYEN*. (3)_____.

(2) *FRANKIE WONG (Reg. 61,832)*. (4)_____.

Date of Interview: *02 February 2016*.

Type: ☒ Telephonic ☐ Video Conference
☐ Personal [copy given to: ☐ applicant ☐ applicant's representative]

Exhibit shown or demonstration conducted: ☐ Yes ☐ No.
If Yes, brief description: _____.

Issues Discussed ☐101 ☐112 ☐102 ☒103 ☐Others
(For each of the checked box(es) above, please describe below the issue and detailed description of the discussion)

Claim(s) discussed: *1 and 12-14*.

Identification of prior art discussed: *N/A*.

Substance of Interview
(For each issue discussed, provide a detailed description and indicate if agreement was reached. Some topics may include: identification or clarification of a reference or a portion thereof, claim interpretation, proposed amendments, arguments of any applied references etc...)

The Examiner contacted the Attorney of record in order to propose a possible Examiner's Amendment. The Attorney agreed to the amendments and also to change the dependencies of claims 13/14 to depend upon claim 1 instead of cancelled claim 12.

Applicant recordation instructions: It is not necessary for applicant to provide a separate record of the substance of interview.

Examiner recordation instructions: Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

☒ Attachment

/JUNE SISON/	/S. N./
Primary Examiner, Art Unit 2443	Examiner, Art Unit 2443

Proposed Examiner's Amendments (Discussion Only)

1. (Currently Amended) A stereoscopic image display device comprising:

a main display panel operable to alternately display left and right images according to each subframe;

an auxiliary display panel that changes polarization information of one of the displayed left and right images without a polarizer, the auxiliary display panel including first and second substrates having a pixel part corresponding to that of the main display panel and a sub-liquid crystal layer formed between the first and second substrates, and positioned in front of the main display panel,

a plurality of first electrodes patterned on the first substrate along the rows of pixels formed on the main display panel;

a second single electrode on an entire surface of the pixel part of the second substrate;

wherein the changes of polarization information comprises:

turning on the first and second electrodes in the auxiliary display panel to align liquid crystal molecules in the sub-liquid crystal layer formed between the first and second substrate such that polarization axis of the left or right image that has passed through the auxiliary display panel is unchanged when one of the left and right images is displayed on the main display panel, and

turning off the first and second electrodes in the auxiliary display panel to align liquid crystal molecules in the sub-liquid crystal layer formed between the first and second substrate such that polarization axis of the left or right image is substantially perpendicular to that of the left or right image made incident on the auxiliary display panel when the other one of the left and right images is displayed on the main display panel; and

a light source supplies light to the rear side of the main display panel;

wherein a $\lambda/4$ retardation layer is formed on the first substrate of the auxiliary display panel which changes a linearly polarized left or right image made incident to the auxiliary display panel into a left circularly polarized or right circularly polarized state.

2. (Original) The device of claim 1, wherein the second electrode is on the entire surface of the pixel part of the second substrate without any patterns.

3. (Original) The device of claim 1, wherein the first and second electrodes are made of a transparent conductive material such as ITO.

4. (Original) The device of claim 1, wherein the height of the first electrode corresponds to the height of a single pixel of the main display panel, and the width of the first electrode corresponds to 'n' (n=1,2,…) times the width of the pixel part.

5. (Previously Presented) The device of claim 1, wherein the main display panel is driven to have 60 frames, and each frame includes a first subframe displaying the left image and a second subframe displaying the right image.

6. (Previously Presented) The device of claim 1, wherein the sub-liquid crystal layer includes a plurality of liquid crystal molecules, and when the auxiliary display panel is driven, the liquid crystal molecules are arranged to be perpendicular to the first and second substrates, and when the auxiliary display panel is not driven, the liquid crystal molecules are arranged in a twisted nematic structure.

7. (Previously Presented) The device of claim 1, wherein the sub-liquid crystal layer includes a plurality of liquid crystal molecules, and when the auxiliary display panel is driven, the liquid crystal molecules are arranged to be perpendicular to the first and second substrates, and when the auxiliary display panel is not driven, the liquid crystal molecules are arranged to be parallel to the first and second substrates.

8. (Previously Presented) The device of claim 1, wherein a polarization axis of the left or right image made incident to the auxiliary display panel and a rubbing direction of the auxiliary display panel are positioned at 45°.

9. (Previously Presented) The device of claim 4, wherein when the auxiliary display panel is not driven, a polarization axis of the left or right image that has passed through the auxiliary display panel is perpendicular to a polarization axis of the left or right image made incident to the auxiliary display panel.

10. (Original) The device of claim 1, wherein the main display panel is driven at 120Hz or higher.

11. (Original) The device of claim 1, wherein the main display panel comprises:

an array substrate;

a color filter substrate disposed to face the array substrate;

a main liquid crystal layer positioned between the array substrate and the color filter substrate;

a first polarizer attached on an outer surface of the array substrate; and

a second polarizer attached on an outer surface of the color filter substrate.

12. (Canceled)

13. (Currently Amended) The device of claim 1 ~~12~~, wherein the λ/4 retardation layer in formed in an in-cell form on an upper surface of the first substrate of the auxiliary display panel together with the first substrate.

14. (Currently Amended) The device of claim 1 ~~12~~, wherein the λ/4 retardation layer is attached in a form of a film on a lower surface of the first substrate of the auxiliary display panel.

15. (Canceled)

16. (Previously Presented) The device of claim 5, wherein when the auxiliary display panel is turned on, it outputs polarization information of the left image outputted from the main display panel without changing it, and when the auxiliary display panel is turned off, it changes the polarization information of the right image outputted from the main display panel, and outputs the image.

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	14	"20100007716"	US-PGPUB; USPAT; FPRS; EPO; JPO	OR	OFF	2016/02/02 14:19
L2	4794	g02b27/26.cpc.	US-PGPUB; USPAT; FPRS; EPO; JPO	OR	OFF	2016/02/02 14:22
L3	5581	h04n13/0434.cpc.	US-PGPUB; USPAT; FPRS; EPO; JPO	OR	OFF	2016/02/02 14:23
L4	12186	((seung near2 lee) or (hoon near2 kang) or (sung near2 jung)).in.	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2016/02/02 14:37
L5	6794	(lg near display).asn.	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2016/02/02 14:37
L6	18850	L4 or L5	US-PGPUB; USPAT; FPRS; EPO; JPO	OR	OFF	2016/02/02 14:37
L7	7	6 and (without near4 polariz$4).clm.	US-PGPUB; USPAT; FPRS; EPO; JPO	OR	OFF	2016/02/02 14:37
L8	5	7 and (substrate).clm.	US-PGPUB; USPAT; FPRS; EPO; JPO	OR	OFF	2016/02/02 14:38
L9	3	8 and (electrode$1).clm.	US-PGPUB;	OR	OFF	2016/02/02 14:38

			USPAT; FPRS; EPO; JPO			
L10	1920843	(television or tv or hdtv or ((image or imaging) adj3 (display$3 or render$3 or output$3 or view$3 or system)))	US-PGPUB; USPAT; FPRS; EPO; JPO	OR	OFF	2016/02/02 14:40
L11	2076124	(television or tv or hdtv or ((image or imaging) adj3 (display$3 or render$3 or output$3 or view$3 or system)))	US-PGPUB; USPAT; FPRS; EPO; JPO	OR	ON	2016/02/02 14:40
L12	117455	11 near10 (stereoscop$4 or stereovis$4 or 3d or (three adj3 dimension$4) or ("3" adj3 dimension$4) or multiview$3 or (multi adj3 view$3) or 2D or (two adj3 dimension$4) or ("2" adj3 dimension$4))	US-PGPUB; USPAT; FPRS; EPO; JPO	OR	ON	2016/02/02 14:45
L13	1886096	(panel or pane or screen or layer or display or lcd) near3 (auxiliary or aux or ancillary or alternat$4 or second$3 or 2nd) or polarizer	US-PGPUB; USPAT; FPRS; EPO; JPO	OR	ON	2016/02/02 14:46
L14	588844	(polarization$4 or angle) near3 (switch$3 or chang$4 or modif$4 or alter$4 or adjust$4 or adapt$4 or toggl$4 or revers$4)	US-PGPUB; USPAT; FPRS; EPO; JPO	OR	ON	2016/02/02 14:46
L15	1176177	(power or (on adj3 off) or state or status) near3 (cycl$4 or toggl$4 or switch$3 or flip$4 or (turn$3 adj2 (on or off)))	US-PGPUB; USPAT; FPRS; EPO; JPO	OR	ON	2016/02/02 14:47
L16	29307	13 near5 (activat$4 or deactivat$4 or inactiv$4 or on or off)	US-PGPUB; USPAT; FPRS; EPO; JPO	OR	ON	2016/02/02 14:48
L17	9105	13 near10 14	US-PGPUB; USPAT; FPRS; EPO; JPO	OR	ON	2016/02/02 14:48
L18	209	17 near10 (15 or 16)	US-PGPUB; USPAT; FPRS; EPO; JPO	OR	ON	2016/02/02 14:49
L19	4	18 near30 (left or right or ((first or 1st	US-	OR	ON	2016/02/02

		or second or 2nd) adj3 eye)) adj3 (image or frame or picture or photo or photograph$3)	PGPUB; USPAT; FPRS; EPO; JPO			14:49
S1	1	"12340005"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:10
S2	7535	((seung near2 lee) or (hoon near2 kang) or (sung near2 jung)).in.	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:10
S3	2913	(lg near display).asn.	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:11
S4	68	S2 and S3	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:11
S5	11	S4 and 3D	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:14
S7	4	("20020118276" | "20050036082" | "6252570" | "6252624").PN.	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:17
S8	2	"2006268196"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:29
S9	1	"20060268196"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:29
S10	2	"2004012851"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:32
S11	1	"20040012851"	US-	ADJ	ON	2011/12/15

			PGPUB; USPAT; EPO; JPO; IBM_TDB			10:32
S12	2244	parallax near3 barrier	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:45
S13	1692	S12 and (3D or (three near2 dimension$3))	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:46
S14	121	S13 and (polariz$4 and (indium near3 oxide))	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:46
S15	112	S14 and (left and right)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:47
S16	19276116	@ad<"20080709" or @rlad<"20080709"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:48
S17	0	S15 and S6	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:48
S18	98	S15 and S16	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:48
S19	1	"7199845".pn.	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:49
S20	2	"20050285997"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:49
S21	8964	S16 and ("120" near2 HZ)	US-	ADJ	ON	2011/12/15

			PGPUB; USPAT; EPO; JPO; IBM_TDB			11:04
S22	366011	S16 and (HZ or hertz)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 11:04
S23	4	S15 and ("120" near2 HZ)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 11:04
S24	2	"20050285997" and (between or (in near2 between))	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:26
S25	2	"20050285997" and (ITO or (indium near3 oxide))	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:36
S26	2	"20050285997" and (height)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:37
S27	2	"20050285997" and (height or width)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:38
S28	0	"20050285997" and (synch$7)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:39
S29	0	"20060268196" and (synch$7)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:39
S30	59	S14 and (parallel and perpendicular)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:44
S31	55	S30 and S16	US-	ADJ	ON	2011/12/15

			PGPUB; USPAT; EPO; JPO; IBM_TDB			12:44
S32	1	"20100007716" and (substantial$4).clm.	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:48
S33	20	S14 and (perpendicular and (twisted near3 nematic))	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:49
S34	3	S14 and (perpendicular and (twisted near3 nematic)) and (HZ or hertz)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:49
S35	0	((3D or (three near3 dimension$4)) same (perpendicular near20 (twisted near3 nematic)) and (HZ or hertz))	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:53
S36	62	(perpendicular near20 (twisted near3 nematic)) and (HZ or hertz)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:54
S37	62	S36 and (LCD or (liquid near3 crystal))	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:55
S38	57	S37 and S16	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:55
S39	23	(perpendicular near20 (twisted near3 nematic)) and ("120" near3 (HZ or hertz))	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:57
S40	22	S39 and S16	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:57
S41	2	"20080284699"	US-	ADJ	ON	2011/12/15

			PGPUB; USPAT; EPO; JPO; IBM_TDB			12:58
S42	2	"20080284699" and (nematic and perpendicular and "120")	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:58
S43	2	"20050285997" and (rub$5)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:11
S44	2	"20050285997" and (perpendic$7)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:12
S45	2	"20050285997"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:22
S46	2	"20060269496"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:27
S47	1	"20060268196"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:27
S48	1	"20020118276"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:27
S49	483	348/43.ccls.	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:28
S50	1	"20050036082"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:28
S51	1	"6252570".pn.	US-	ADJ	ON	2011/12/15

			PGPUB; USPAT; EPO; JPO; IBM_TDB			13:28
S52	1	"6252624".pn.	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:28
S53	1	"12340005"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/11 12:36
S54	0	"12340005" and synchroni$5	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/11 12:36
S55	0	"12340005" and synch$8	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/11 12:36
S56	1	"20100007716"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/11 12:36
S57	0	"20100007716" and synch$8	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/11 12:36
S58	1	"20100007716" and polariz$5	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/11 12:38
S59	7	"6510002"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/11 12:41
S60	1	"20100007716" and subframe	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/11 13:13
S61	0	"20050285997" and subframe	US-	ADJ	ON	2012/05/11

			PGPUB; USPAT; EPO; JPO; IBM_TDB			13:14
S62	0	"20050285997" and frame	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/11 13:14
S63	2	"20050285997" and separat$4	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/11 13:18
S64	0	"6510002".pn. and elect$4	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/14 12:39
S65	1	"6510002".pn. and elect$6	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/14 12:39
S66	2	"20050285997" and elect$6	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/14 12:40
S67	1	"20100007716" and "60"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/14 12:46
S68	1	"6510002".pn. and frame$2	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/14 12:49
S69	4	"6510002".pn. or "20050285997" or "20060268196"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/14 13:02
S70	0	S69 and on	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/14 13:02
S71	4	S69 and (on or off)	US-	ADJ	ON	2012/05/14

			PGPUB; USPAT; EPO; JPO; IBM_TDB			13:02
S72	3	S69 and alternat$5	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/14 13:22

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L20	649	g02b27/26.cpc.	USPAT	OR	OFF	2016/02/02 14:51
L21	861	h04n13/0434.cpc.	USPAT	OR	OFF	2016/02/02 14:51
L22	1225	20 or 21	USPAT	OR	OFF	2016/02/02 14:51
L23	8	(without near4 polariz$4).clm. and 22	USPAT	OR	OFF	2016/02/02 14:51
L24	144	(electrode$1).clm. and 22	USPAT	OR	OFF	2016/02/02 14:52
L25	220	(substrate$1).clm. and 22	USPAT	OR	OFF	2016/02/02 14:52
L26	82	(polarization near5 axis).clm. and 22	USPAT	OR	OFF	2016/02/02 14:52
L27	338	(right near4 image).clm. and 22	USPAT	OR	OFF	2016/02/02 14:53
L28	344	(left near4 image).clm. and 22	USPAT	OR	OFF	2016/02/02 14:53
L29	12	(off near10 electrode$1).clm. and 22	USPAT	OR	OFF	2016/02/02 14:53
L30	188	(perpendicular).clm. and 22	USPAT	OR	OFF	2016/02/02 14:53
L31	28	(retardation near4 layer).clm. and 22	USPAT	OR	OFF	2016/02/02 14:53
L32	84	24 and 25	USPAT	OR	OFF	2016/02/02 14:54
L33	22	32 and 27	USPAT	OR	OFF	2016/02/02 14:54
L34	22	33 and 28	USPAT	OR	OFF	2016/02/02 14:54
L35	1	34 and 31	USPAT	OR	OFF	2016/02/02 14:54
L36	1	35 and 30	USPAT	OR	OFF	2016/02/02 14:54
L37	1	36 and 29	USPAT	OR	OFF	2016/02/02 14:56
L38	0	37 and 23	USPAT	OR	OFF	2016/02/02 14:56

2/2/2016 2:57:00 PM

C:\ Users\ snguyen3\ Documents\ EAST\ Workspaces\ 12340005.wsp

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12340005	LEE ET AL.
	Examiner	**Art Unit**
	STEVEN NGUYEN	2443

CPC						
Symbol					**Type**	**Version**
G02B		27	/	26	F	2013-01-01
H04N		13	/	0434	I	2013-01-01
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CPC Combination Sets							
Symbol					**Type**	**Set**	**Ranking**	**Version**
			/					
			/					

/S.N./ Examiner.Art Unit 2443 (Assistant Examiner)	02/02/2016 (Date)	**Total Claims Allowed:** 14	
/JUNE SISON/ Primary Examiner.Art Unit 2443 (Primary Examiner)	02/02/2016 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 9

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12340005	LEE ET AL.
	Examiner	**Art Unit**
	STEVEN NGUYEN	2443

US ORIGINAL CLASSIFICATION		INTERNATIONAL CLASSIFICATION										
CLASS	SUBCLASS	CLAIMED					NON-CLAIMED					
348	43	H	0	4	N	13 / 00 (2006.01.01)						
CROSS REFERENCE(S)												
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)											

/S.N./ Examiner.Art Unit 2443	02/02/2016	**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	14	
/JUNE SISON/ Primary Examiner.Art Unit 2443	02/02/2016	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	9

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12340005	LEE ET AL.
	Examiner	**Art Unit**
	STEVEN NGUYEN	2443

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	1														
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14	16														

/S.N./ Examiner.Art Unit 2443 (Assistant Examiner)	02/02/2016 (Date)	**Total Claims Allowed:** 14	
/JUNE SISON/ Primary Examiner.Art Unit 2443 (Primary Examiner)	02/02/2016 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 9

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12340005	LEE ET AL.
	Examiner	Art Unit
	STEVEN NGUYEN	2443

CPC- SEARCHED		
Symbol	Date	Examiner
G02B 27/26	02/01/2016	SCN
H04N 13/0434	02/01/2016	SCN

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
348	43	12/13/2011	SCN

SEARCH NOTES		
Search Notes	Date	Examiner
Inventor/Assignee Search	12/13/2011	SCN
EAST Search	12/13/2011	SCN
Updated EAST Search	05/09/2012	SCN
Updated EAST Search	02/03/2014	SCN
Updated EAST Search	08/18/2014	SCN
Updated EAST Search	01/19/2016	SCN
Consulted with Allen Wong (PE, AU 2488) regarding Allowable Subject Matter	01/20/2016	SCN
Consulted with June Sison (PE, AU 2443)	01/20/2016	SCN
Consulted with Chris Grant (101/112 Help Panel) regarding possible issues with claim 1	01/21/2016	SCN

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
G02B	27/26	02/02/2016	SCN

INTERFERENCE SEARCH			
US Class/ CPC Symbol	**US Subclass / CPC Group**	**Date**	**Examiner**
H04N	13/0434	02/02/2016	SCN

Mon 2/1/2016 12:44 PM

Wong, Frankie <fwong@brinksgilson.com>

RE: 12-340,005 (12579-6201) Proposed Examiner's Amendments 2-1-2016

To Nguyen, Steven C. ([illegible])

Cc Baker, Gary; [illegible]; Camacho (Calderon), Maria; Brown, Rebecca

Message | 12-340,005 (12579-6201) Proposed Examiner's Amendments 2-1-2016.docx (19 KB)

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Dear Examiner Nguyen,

This is to confirm that we authorize you to communicate with us by email.

Our client has agreed to the proposed Examiner's amendments (see attached, placing dependent claim 12 into independent claim 1).

Please reply to confirm receipt of the proposed Examiner's amendments. If there are any questions, please contact us, thank you.

Frankie Wong

Scientific Advisor & Patent Agent

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Wong Biography

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/340,005	12/19/2008	Seung-Chul Lee	12579-6201	8241

757 7590 11/26/2014

BGL
P.O. BOX 10395
CHICAGO, IL 60610

EXAMINER
NGUYEN, STEVEN C

ART UNIT	PAPER NUMBER
2443	

MAIL DATE	DELIVERY MODE
11/26/2014	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Applicant-Initiated Interview Summary	Application No.	Applicant(s)	
	12/340,005	LEE ET AL.	
	Examiner	Art Unit	
	STEVEN NGUYEN	2443	

All participants (applicant, applicant's representative, PTO personnel):

(1) *STEVEN NGUYEN*. (3)_____.

(2) *FRANKIE WONG (Reg. 61,832)*. (4)_____.

Date of Interview: *17 November 2014*.

Type: ☒ Telephonic ☐ Video Conference
☐ Personal [copy given to: ☐ applicant ☐ applicant's representative]

Exhibit shown or demonstration conducted: ☐ Yes ☒ No.
If Yes, brief description: _____.

Issues Discussed ☐101 ☐112 ☐102 ☒103 ☐Others
(For each of the checked box(es) above, please describe below the issue and detailed description of the discussion)

Claim(s) discussed: *1*.

Identification of prior art discussed: *Koyama*.

Substance of Interview
(For each issue discussed, provide a detailed description and indicate if agreement was reached. Some topics may include: identification or clarification of a reference or a portion thereof, claim interpretation, proposed amendments, arguments of any applied references etc...)

The Attorney discussed proposed amendments to claim 1. The Examiner stated that the negative limitation ("without using a polarizer") does not seem to be supported by the specification as the specification does not explicitly state that a polarizer is not used and does not teach every single method for polarization that can be accomplished without a polarizer. The Examiner suggested to amend the claims to state what the invention includes instead of what the invention does not include. The Attorney stated that the rest of the claim amendments detailed how polarization is changed without using a polarizer and that figure 2 shows no polarization layer in the auxiliary display panel. Upon formal filing, further search and/or consideration would be required.

Applicant recordation instructions: The formal written reply to the last Office action must include the substance of the interview. (See MPEP section 713.04). If a reply to the last Office action has already been filed, applicant is given a non-extendable period of the longer of one month or thirty days from this interview date, or the mailing date of this interview summary form, whichever is later, to file a statement of the substance of the interview

Examiner recordation instructions: Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

☒ Attachment

/S. N./ Examiner, Art Unit 2443	/TONIA L.M. DOLLINGER/ Supervisory Patent Examiner, Art Unit 2443

Summary of Record of Interview Requirements

Manual of Patent Examining Procedure (MPEP), Section 713.04, Substance of Interview Must be Made of Record
A complete written statement as to the substance of any face-to-face, video conference, or telephone interview with regard to an application must be made of record in the application whether or not an agreement with the examiner was reached at the interview.

Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews
Paragraph (b)

In every instance where reconsideration is requested in view of an interview with an examiner, a complete written statement of the reasons presented at the interview as warranting favorable action must be filed by the applicant. An interview does not remove the necessity for reply to Office action as specified in §§ 1.111, 1.135. (35 U.S.C. 132)

37 CFR §1.2 Business to be transacted in writing.
All business with the Patent or Trademark Office should be transacted in writing. The personal attendance of applicants or their attorneys or agents at the Patent and Trademark Office is unnecessary. The action of the Patent and Trademark Office will be based exclusively on the written record in the Office. No attention will be paid to any alleged oral promise, stipulation, or understanding in relation to which there is disagreement or doubt.

The action of the Patent and Trademark Office cannot be based exclusively on the written record in the Office if that record is itself incomplete through the failure to record the substance of interviews.

It is the responsibility of the applicant or the attorney or agent to make the substance of an interview of record in the application file, unless the examiner indicates he or she will do so. It is the examiner's responsibility to see that such a record is made and to correct material inaccuracies which bear directly on the question of patentability.

Examiners must complete an Interview Summary Form for each interview held where a matter of substance has been discussed during the interview by checking the appropriate boxes and filling in the blanks. Discussions regarding only procedural matters, directed solely to restriction requirements for which interview recordation is otherwise provided for in Section 812.01 of the Manual of Patent Examining Procedure, or pointing out typographical errors or unreadable script in Office actions or the like, are excluded from the interview recordation procedures below. Where the substance of an interview is completely recorded in an Examiners Amendment, no separate Interview Summary Record is required.

The Interview Summary Form shall be given an appropriate Paper No., placed in the right hand portion of the file, and listed on the "Contents" section of the file wrapper. In a personal interview, a duplicate of the Form is given to the applicant (or attorney or agent) at the conclusion of the interview. In the case of a telephone or video-conference interview, the copy is mailed to the applicant's correspondence address either with or prior to the next official communication. If additional correspondence from the examiner is not likely before an allowance or if other circumstances dictate, the Form should be mailed promptly after the interview rather than with the next official communication.

The Form provides for recordation of the following information:
- Application Number (Series Code and Serial Number)
- Name of applicant
- Name of examiner
- Date of interview
- Type of interview (telephonic, video-conference, or personal)
- Name of participant(s) (applicant, attorney or agent, examiner, other PTO personnel, etc.)
- An indication whether or not an exhibit was shown or a demonstration conducted
- An identification of the specific prior art discussed
- An indication whether an agreement was reached and if so, a description of the general nature of the agreement (may be by attachment of a copy of amendments or claims agreed as being allowable). Note: Agreement as to allowability is tentative and does not restrict further action by the examiner to the contrary.
- The signature of the examiner who conducted the interview (if Form is not an attachment to a signed Office action)

It is desirable that the examiner orally remind the applicant of his or her obligation to record the substance of the interview of each case. It should be noted, however, that the Interview Summary Form will not normally be considered a complete and proper recordation of the interview unless it includes, or is supplemented by the applicant or the examiner to include, all of the applicable items required below concerning the substance of the interview.

A complete and proper recordation of the substance of any interview should include at least the following applicable items:
1) A brief description of the nature of any exhibit shown or any demonstration conducted,
2) an identification of the claims discussed,
3) an identification of the specific prior art discussed,
4) an identification of the principal proposed amendments of a substantive nature discussed, unless these are already described on the Interview Summary Form completed by the Examiner,
5) a brief identification of the general thrust of the principal arguments presented to the examiner,
   (The identification of arguments need not be lengthy or elaborate. A verbatim or highly detailed description of the arguments is not required. The identification of the arguments is sufficient if the general nature or thrust of the principal arguments made to the examiner can be understood in the context of the application file. Of course, the applicant may desire to emphasize and fully describe those arguments which he or she feels were or might be persuasive to the examiner.)
6) a general indication of any other pertinent matters discussed, and
7) if appropriate, the general results or outcome of the interview unless already described in the Interview Summary Form completed by the examiner.

Examiners are expected to carefully review the applicant's record of the substance of an interview. If the record is not complete and accurate, the examiner will give the applicant an extendable one month time period to correct the record.

Examiner to Check for Accuracy

If the claims are allowable for other reasons of record, the examiner should send a letter setting forth the examiner's version of the statement attributed to him or her. If the record is complete and accurate, the examiner should place the indication, "Interview Record OK" on the paper recording the substance of the interview along with the date and the examiner's initials.

Application No. 12/340,005

Attorney's Docket No.: 12579-6201 (Client's ref No.:)

Examiner Steven C. Nguyen (571) 270-5663 Tel

Applicant's Representative: Frankie Wong (312) 840-3283

Requested Date of Phone Interview: 11/17/2014 at 4pm EST

Interview Agenda

Proposed Amendments

Applicant's claim 1 has been amended to clarify the claim language (see Figs. 5-6 and [0061-0064] for support).

1. (Currently Amended) A stereoscopic image display device comprising:

a main display panel operable to alternately display left and right images according to each subframe;

an auxiliary display panel that changes polarization information of one of the displayed left and right images without using a polarizer, the auxiliary display panel including first and second substrates having a pixel part corresponding to that of the main display panel and a sub-liquid crystal layer formed between the first and second substrates, and positioned in front of the main display panel,

a plurality of first electrodes patterned on the first substrate along the rows of pixels formed on the main display panel;

a second single electrode on an entire surface of the pixel part of the second substrate;

wherein the changes of polarization information comprises:

turning on the first and second electrodes in the auxiliary display panel ~~is turned on~~ to align liquid crystal molecules in the sub-liquid crystal layer formed between the first and second substrate such that polarization axis of the left or right image that has passed through the auxiliary display panel is unchanged when one of the left and right images is displayed on the main display panel, and

turning off the first and second electrodes in the auxiliary display panel to align liquid crystal molecules in the sub-liquid crystal layer formed between the first and second substrate such that polarization axis of the left or right image is

substantially perpendicular to that of the left or right image made incident on the auxiliary display panel ~~is turned off~~ when the other one of the left and right images is displayed on the main display panel;

~~a plurality of first electrodes patterned on the first substrate along the rows of pixels formed on the main display panel;~~

~~a second electrode on an entire surface of the pixel part of the second substrate;~~ and

a light source ~~that~~ supplies light to the rear side of the main display panel.

In brief, the Office Action (see pp. 2-3) relies upon Koyama (see Figs. 2-4 and [0056, 0060, 0068, 0077, 0093, 0097]) and equates Koyama's LCD panel (10) and switching LC panel (30) to Applicant's "main display panel" and "auxiliary display panel", respectively.

Koyama, however, has at least the following deficiencies:

(1) Koyama does not disclose or suggest that the switching LC panel (30) (alleged as the "auxiliary display panel") is "positioned in front of the main display panel" (a point also conceded in the Office Action, see p. 3).

(2) Koyama does not disclose or suggest that the switching LC panel (30) (alleged as the "auxiliary display panel") performs the function of "changes polarization information of one of the displayed left and right images without using a polarizer," as recited in Applicant's claim 1 (as amended).

On the contrary, Koyama's Fig. 2 clearly discloses that the switching LC panel (30) includes at least a 3rd polarizer (34).

(3) Koyama does not disclose or suggest that the switching LC panel (30) (alleged as the "auxiliary display panel") includes "a plurality of first electrodes patterned on the first substrate along the rows of pixels formed on the main display panel" or "a second single electrode on an entire surface of the pixel part of the second substrate," as recited in Applicant's claim 1 (as amended).

Koyama (see [0060]) merely discloses that there are driving electrodes (plurality of electrodes) in both the driving side substrate (31) and the opposing substrate (33) formed over an entire surface of an active area of the switching LC panel (30). Koyama, however, is silent in disclosing how the plurality of electrodes in the driving side substrate (31) is arranged. In this regard, Koyam does not disclose "a plurality of first electrodes patterned on the first substrate along the rows of pixels formed on the main display panel". In addition, since Koyama discloses that there are driving electrodes (i.e, plurality), consequently, Koyama also cannot disclose or suggest "a second single electrode on an entire surface of the pixel part of the second substrate," as recited in Applicant's claim 1 (as amended).

(4) Koyama does not disclose or suggest "wherein the changes of polarization information comprises: turning on the first and second electrodes in the auxiliary display panel to align liquid crystal molecules in the sub-liquid crystal layer formed between the first and second substrate such that polarization axis of the left or right image that has passed through the auxiliary display panel is unchanged when one of the left and right images is displayed on the main display panel, and turning off the first and second electrodes in the auxiliary display panel to align liquid crystal molecules in the sub-liquid crystal layer formed between the first and second substrate such that polarization axis of the left or right image is substantially perpendicular to that of the left or right image made incident on the auxiliary display panel when the other one of the left and right images is displayed on the main display panel," as recited in Applicant's claim 1 (as amended) (a point also conceded in the Office Action, see p. 3).

(5) Koyama does not disclose "a light source ~~that~~ supplies light to the rear side of the main display panel," as recited in Applicant's claim 1 (a point also conceded in the Office Action, see p. 3).

The Office Action (see p. 3) looks to Kleinberger (see Fig. 5, [0175, 0179, 0182]) to overcome Koyama's above deficiencies (1) and (4). The Office Action seems to equate Kleinberger's switching layer (49) to Applicant's "auxiliary display panel". If so, Kleinberger still does not overcome Koyama's deficiency (4) (in addition to not overcoming Koyama's deficiencies (2)-(3) or (5)) for the following reasons:

Applicant's claim 1 clearly recites a sub-LC layer formed between two opposing substrates, where a first substrate having a plurality of electrodes patterned along the rows of pixels formed on the main display panel, and the second substrate having a single electrode formed on an entire surface of the pixel part of the second substrate.

By inspection, Kleinberger (see Fig. 5) clearly discloses that the switching layer (49) is a single substrate layer, and a switching voltage is applied across the switching layer (49) (the alleged "auxiliary display panel") and the display (1) (the alleged "main display panel"). In other words, Kleinberger at least does not disclose "turning on/turning off" of the electrodes in the two substrates of the auxiliary display panel to align the LC molecules of the sub-LC layer to perform the alleged "polarization information changes" function. Instead, Kleinberger discloses that the alleged "polarization information changes" function is performed by applying a voltage across two separate panels, namely, the "main display panel" and the switching layer (40) (alleged as the "auxiliary display panel").

Kleinberger is silent in disclosing the details of the construction of the switching layer (49). Instead, Kleinberger merely discloses activating/deactivating the switching layer (49) to produce Kerr effect (an electo-optical to change refractive index of material) without disclosing whether such effect is achieved through "aligning liquid crystal molecules in the sub-liquid crystal layer formed between the first and second substrate".

Kleinberger also discloses the use of polarizer Based on the foregoing arguments, the Applicant respectfully maintains that Kleinberger does not overcome Koyama's deficiency (4). In addition, Kleingberger also does not overcome Koyams's deficiencies (2)-(3) or (5).

The Office Action (see p. 4) looks to Jung (see [0032]) to overcome Koyama's above deficiencies (3). Jung (see [0032, 0035, 0037]), however, discloses an image panel (300) (which is a main display panel) having a plurality of electrodes disposed on the entire surface both substrates (310, 320). In this regard, the Office Action seems to equate Jung's main display panel to an alleged "auxiliary display panel". In addition, Jung does not display in details how each of the plurality of electrodes is formed, let alone disclosing an alleged "single electrode" on one of the substrates. Jung in this regard, does not overcome Koyama's deficiency (3). In addition, Jung also does not overcome Koyamam's (2) and (4).

Based on the foregoing differences, the combination of Koyama, Kleinberger and Jung at least does not disclose or suggest the above limitations (2)-(4) in Applicant's claim 1 (as amended). Applicant's claim 1 is therefore, submitted to be allowable.

CERTIFICATE OF EFS FILING UNDER 37 CFR §1.8

I hereby certify that this correspondence is being electronically transmitted to the United States Patent and Trademark Office, Commissioner for Patents, via the EFS pursuant to 37 CFR §1.8 on the below date:

Date: November 20, 2014 Name: Gustavo Siller, Jr. Signature: /Gustavo Siller, Jr./

BRINKS GILSON & LIONE

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Appln. of:	Seung-Chul LEE et al.		
Appln. No.:	12/340,005	Examiner:	Steven C. Nguyen
Filed:	December 19, 2008	Art Unit:	2443
For:	STEREOSCOPIC 3D DISPLAY DEVICE	Conf. No.:	8241
Attorney Docket No.:	12579-6201		

Mail Stop RCE
Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

REQUEST FOR CONTINUED EXAMINATION (37 CFR § 1.114)

Dear Sir/Madam:

Applicant(s) requests continued examination of the above-identified application under 37 CFR §1.114.

☒ This is the SECOND request under 37 CFR §1.17(e) in this application.

☒ Submission under 37 CFR 1.114 (*check at least one of the following*):

- ☐ Previously submitted:
  - ☐ Applicant(s) requests nonentry of any previously-filed unentered amendments.
  - ☐ Please enter and consider the Amendment After Final Under 37 CFR §1.116 previously filed on _____.
  - ☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____.
  - ☐ Other: _____.
- ☒ Attached is/are:
  - ☐ An Information Disclosure Statement
  - ☒ An Amendment to the written description, claims, or drawings
  - ☐ New Arguments and/or New Evidence in support of Patentability
  - ☐ Other: _____

☐ Request for suspension of action:

Applicant(s) hereby requests suspension of action on the above-identified application under 37 CFR §1.103(c) for a period of _____ months. (Period of suspension shall not exceed 3 months; requires Processing Fee under 37 CFR §1.17(i)).

☐ Small/Micro Entity Status:

- ☐ Applicant(s) hereby asserts entitlement to claim ☐ small or ☐ micro entity status under 37 CFR §§ 1.9 and 1.27.
- ☐ A small/micro entity statement or assertion of entitlement to claim small/micro entity status was filed in prior application no. _____/_____ and such status is still proper and desired.
- ☐ Is no longer desired.

☒ Applicant(s) calculates the following fees to be due in connection with this Request:

- ☒ A request fee of $1,700 under 37 CFR §1.17(e)(1) or (2).
- ☐ A suspension processing fee of $_____ under 37 CFR §1.17(i).
- ☐ An additional filing fee of $_____ under 37 CFR §1.16 (_____ additional independent claims and/or _____ additional total claims).
- ☐ An extension fee of $_____ under 37 CFR §1.17(a) for a _____-month extension of time.

☒ Fee payment to cover the above-enumerated fee(s):

- ☒ Please charge Deposit Account No. 23-1925 (BRINKS GILSON & LIONE) in the amount of $1,700.
- ☐ A payment by credit card in the amount of $_____ (Form PTO-2038 is attached).
- ☒ The Commissioner is hereby authorized to charge payment of any additional filing fees required under 37 CFR § 1.16 and any patent application processing fees under 37 CFR § 1.17 associated with this paper (including any extension fee required to ensure that this paper is timely filed), or to credit any overpayment, to Deposit Account No. 23-1925 (BRINKS GILSON & LIONE).

Respectfully submitted,

November 20, 2014
Date

/Gustavo Siller, Jr./
Gustavo Siller, Jr. (Reg. No. 32,305)

CERTIFICATE OF EFS FILING UNDER 37 CFR §1.8

I hereby certify that this correspondence is being electronically transmitted to the United States Patent and Trademark Office, Commissioner for Patents, via the EFS pursuant to 37 CFR §1.8 on the below date:

Date: November 20, 2014 Name: Gustavo Siller, Jr. Signature: /Gustavo Siller, Jr./

Case No.: 12579-6201

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Seung-Chul LEE et al.	Examiner: Steven C. Nguyen
Serial No: 12/340,005	Art Unit: 2443
Filed: December 19, 2008	Confirmation No: 8241
For: STEREOSCOPIC 3D DISPLAY DEVICE	

RESPONSE TO FINAL OFFICE ACTION

Mail Stop RCE
Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Dear Sir:

This RCE responds to the Final Office Action dated August 20, 2014, with a three-month reply period through November 20, 2014. Please grant allowance of this Application in view of the following remarks and amended claims.

Amendments to the Claims begin on page 2 of this paper.

Remarks begin on page 6 of this paper.

In the Claims:

Please amend the claims as follows (the changes in these Claims are shown with ~~strikethrough~~ for deleted matter and underlines for added matter). A complete listing of the claims proper claim identifiers is set forth below.

Amendments to the Claims

1. (Currently Amended) A stereoscopic image display device comprising:

a main display panel operable to alternately display left and right images according to each subframe;

an auxiliary display panel that changes polarization information of one of the displayed left and right images without a polarizer, the auxiliary display panel including first and second substrates having a pixel part corresponding to that of the main display panel and a sub-liquid crystal layer formed between the first and second substrates, and positioned in front of the main display panel,

a plurality of first electrodes patterned on the first substrate along the rows of pixels formed on the main display panel;

a second single electrode on an entire surface of the pixel part of the second substrate;

wherein the changes of polarization information comprises:

turning on the first and second electrodes in the auxiliary display panel ~~is turned on~~ to align liquid crystal molecules in the sub-liquid crystal layer formed between the first and second substrate such that polarization axis of the left or right image that has passed through the auxiliary display panel is unchanged when one of the left and right images is displayed on the main display panel, and

turning off the first and second electrodes in the auxiliary display panel to align liquid crystal molecules in the sub-liquid crystal layer formed between the first and second substrate such that polarization axis of the left or right image is substantially perpendicular to that of the left or right image made incident on the auxiliary display panel ~~is turned off~~ when the other one of the left and right images is displayed on the main display panel;

~~a plurality of first electrodes patterned on the first substrate along the rows of pixels formed on the main display panel;~~

~~a second electrode on an entire surface of the pixel part of the second substrate;~~ and

a light source ~~that~~ supplies light to the rear side of the main display panel.

2. (Original) The device of claim 1, wherein the second electrode is on the entire surface of the pixel part of the second substrate without any patterns.

3. (Original) The device of claim 1, wherein the first and second electrodes are made of a transparent conductive material such as ITO.

4. (Original) The device of claim 1, wherein the height of the first electrode corresponds to the height of a single pixel of the main display panel, and the width of the first electrode corresponds to 'n' (n=1,2,…) times the width of the pixel part.

5. (Previously Presented) The device of claim 1, wherein the main display panel is driven to have 60 frames, and each frame includes a first subframe displaying the left image and a second subframe displaying the right image.

6. (Previously Presented) The device of claim 1, wherein the sub-liquid crystal layer includes a plurality of liquid crystal molecules, and when the auxiliary display panel is driven, the liquid crystal molecules are arranged to be perpendicular to the first and second substrates, and when the auxiliary display panel is not driven, the liquid crystal molecules are arranged in a twisted nematic structure.

7. (Previously Presented) The device of claim 1, wherein the sub-liquid crystal layer includes a plurality of liquid crystal molecules, and when the auxiliary display panel is driven, the liquid crystal molecules are arranged to be perpendicular to the first and second substrates, and when the auxiliary display panel is not driven, the liquid crystal molecules are arranged to be parallel to the first and second substrates.

8. (Previously Presented) The device of claim 1, wherein a polarization axis of the left or right image made incident to the auxiliary display panel and a rubbing direction of the auxiliary display panel are positioned at 45°.

9. (Previously Presented) The device of claim 4, wherein when the auxiliary display panel is not driven, a polarization axis of the left or right image that has passed through the auxiliary display panel is perpendicular to a polarization axis of the left or right image made incident to the auxiliary display panel.

10. (Original) The device of claim 1, wherein the main display panel is driven at 120Hz or higher.

11. (Original) The device of claim 1, wherein the main display panel comprises:

an array substrate;

a color filter substrate disposed to face the array substrate;

a main liquid crystal layer positioned between the array substrate and the color filter substrate;

a first polarizer attached on an outer surface of the array substrate; and

a second polarizer attached on an outer surface of the color filter substrate.

12. (Original) The device of claim 1, further comprising:

a $\lambda/4$ retardation layer formed on the first substrate of the auxiliary display panel that changes a linearly polarized left or right image made incident to the auxiliary display panel into a left circularly polarized (or right circularly polarized) state.

13. (Original) The device of claim 12, wherein the $\lambda/4$ retardation layer in formed in an in-cell form on an upper surface of the first substrate of the auxiliary display panel together with the first substrate.

14. (Original) The device of claim 12, wherein the $\lambda/4$ retardation layer is attached in a form of a film on a lower surface of the first substrate of the auxiliary display panel.

15. (Canceled)

16. (Previously Presented) The device of claim 5, wherein when the auxiliary display panel is turned on, it outputs polarization information of the left image outputted from the main display panel without changing it, and when the auxiliary display panel is turned off, it changes the polarization information of the right image outputted from the main display panel, and outputs the image.

REMARKS

Claims 1-14 and 16 are pending. Claim 15 has been previously canceled. Claim 1 has been amended. Support to the amendments may be found at least in Applicant's Figs. 2, 5-6, and paragraphs [0058, 0063-0054]. The Examiner is respectfully requested to reconsider and withdraw the rejections in view of the claim amendments and remarks contained herein

Summary of Interview

Applicants thank the Examiner for a telephone interview with Applicants' representative on November 17, 2014 to discuss Applicants' proposed claim amendments in the interview agenda. An agreement was reached that the proposed claim amendments would overcome the current rejection and an updated search was needed.

Claim Rejections under 35 USC 103

A. Claims 1~5, 8, 9 and 11~14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koyama et al. (US 2005/0285997) in view of Kleinberger (US 2006/0203339) and Jung (US 2006/0268196). The rejection is respectfully traversed.

In brief, the Office Action (see pp. 2-3) relies upon Koyama (see Figs. 2-4 and [0056, 0060, 0068, 0077, 0093, 0097]) and equates Koyama's LCD panel (10) and switching LC panel (30) to Applicant's "main display panel" and "auxiliary display panel", respectively.

Koyama, however, has at least the following deficiencies:

(1) Koyama does not disclose or suggest that the switching LC panel (30) (alleged as the "auxiliary display panel") is "positioned in front of the main display panel" (a point also conceded in the Office Action, see p. 3).

(2) Koyama does not disclose or suggest that the switching LC panel (30) (alleged as the "auxiliary display panel") performs the function of "changes polarization information of one of the displayed left and right images without a polarizer," as recited in Applicant's claim 1 (as amended).

On the contrary, Koyama's Fig. 2 clearly discloses that the switching LC panel (30) includes at least a 3rd polarizer (34).

(3) Koyama does not disclose or suggest that the switching LC panel (30) (alleged as the "auxiliary display panel") includes "a plurality of first electrodes patterned on the first substrate along the rows of pixels formed on the main display panel" or "a second single electrode on an entire surface of the pixel part of the second substrate," as recited in Applicant's claim 1 (as amended).

Koyama (see [0060]) merely discloses that there are driving electrodes (plurality of electrodes) in both the driving side substrate (31) and the opposing substrate (33) formed over an entire surface of an active area of the switching LC panel (30). Koyama, however, is silent in disclosing how the plurality of electrodes in the driving side substrate (31) is arranged. In this regard, Koyam does not disclose "a plurality of first electrodes patterned on the first substrate along the rows of pixels formed on the main display panel". In addition, since Koyama discloses that there are driving electrodes (i.e, plurality), consequently, Koyama also cannot disclose or suggest "a second single electrode on an entire surface of the pixel part of the second substrate," as recited in Applicant's claim 1 (as amended).

(4) Koyama does not disclose or suggest "wherein the changes of polarization information comprises: turning on the first and second electrodes in the auxiliary display panel to align liquid crystal molecules in the sub-liquid crystal layer formed between the first and second substrate such that polarization axis of the left or right image that has passed through the auxiliary display panel is unchanged when one of the left and right images is displayed on the main display panel, and turning off the first and second electrodes in the auxiliary display panel to align liquid crystal molecules in the sub-liquid crystal layer formed between the first and second substrate such that polarization axis of the left or right image is substantially perpendicular to that of the left or right image made incident on the auxiliary display panel when the other one of the left and right images is displayed on the main display panel," as recited in Applicant's claim 1 (as amended) (a point also conceded in the Office Action, see p. 3).

(5) Koyama does not disclose "a light source that supplies light to the rear side of the main display panel," as recited in Applicant's claim 1 (a point also conceded in the Office Action, see p. 3).

The Office Action (see p. 3) looks to Kleinberger (see Fig. 5, [0175, 0179, 0182]) to overcome Koyama's above deficiencies (1) and (4). The Office Action seems to equate Kleinberger's switching layer (49) to Applicant's "auxiliary display panel". If so, Kleinberger still does not overcome Koyama's deficiency (4) (in addition to not overcoming Koyama's deficiencies (2)-(3) or (5)) for the following reasons:

Applicant's claim 1 clearly recites a sub-LC layer formed between two opposing substrates, where a first substrate having a plurality of electrodes patterned along the rows of pixels formed on the main display panel, and the second substrate having a single electrode formed on an entire surface of the pixel part of the second substrate.

By inspection, Kleinberger (see Fig. 5) clearly discloses that the switching layer (49) is a single substrate layer, and a switching voltage is applied across the switching layer (49) (the alleged "auxiliary display panel") and the display (1) (the alleged "main display panel"). In other words, Kleinberger at least does not disclose "turning on/turning off" of the electrodes <u>in the two substrates of the auxiliary display panel</u> to align the LC molecules of the sub-LC layer to perform the alleged "polarization information changes" function. Instead, Kleinberger discloses that the alleged "polarization information changes" function is performed by applying a voltage <u>across two separate panels, namely, the "main display panel" and the switching layer (40)</u> (alleged as the "auxiliary display panel").

In addition, Kleinberger is silent in disclosing the details of the construction of the switching layer (49). Instead, Kleinberger merely discloses activating/deactivating the switching layer (49) to produce a Kerr effect (an electo-optical to change refractive index of material) without disclosing whether such effect is achieved through "aligning liquid crystal molecules in the sub-liquid crystal layer formed between the first and second substrate". Moreover, Kleinberger (see [0179]) also discloses the need of a polarizer layer (39) to facilitate the alleged "changes of polarization information" function.

Based on the foregoing arguments, the Applicant respectfully maintains that Kleinberger does not overcome Koyama's deficiency (4). In addition, Kleingberger also does not overcome Koyams's deficiencies (2)-(3) or (5).

The Office Action (see p. 4) looks to Jung (see [0032]) to overcome Koyama's above deficiencies (3). Jung (see [0032, 0035, 0037]), however, discloses an image panel (300) (which seems to be a main display panel) having a plurality of electrodes disposed on the entire surface both substrates (310, 320). In this regard, the Office Action seems to equate Jung's main display panel to an alleged "auxiliary display panel".

In addition, even assuming that Jung's image panel (300) may be an alleged "auxiliary display panel" (a point the Applicants do not concede), Jung still does not disclose in details how each of the plurality of electrodes is formed within each of the substrates (310, 320), let alone disclosing an alleged "single electrode" on one of the substrates, and "a plurality of first electrodes patterned on the first substrate along the rows of pixels formed on the main display panel". Jung in this regard, does not overcome Koyama's deficiency (3). In addition, Jung also does not overcome Koyamam's (2) and (4).

Based on the foregoing differences, the combination of Koyama, Kleinberger and Jung at least does not disclose or suggest the above limitations (2)-(4) in Applicant's claim 1 (as amended). Applicant's claim 1 is therefore, submitted to be allowable.

Claims 2-5, 8-9, 11-14 and 16 depend from independent claim 1, are submitted to be allowable based on their dependency.

B. Claims 6 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koyama in view of Kleinberger, Jung and Yano et al. (US 2008/0284699).

Claims 6 and 10 depend from independent claim 1, are submitted to be allowable based on their dependency. In addition, Yano does not overcome all the deficiencies of Koyama in claim 1.

C. **Claim 7** is rejected under 35 U.S.C. 103(a) as being unpatentable over Koyama in view of Kleinberger, Jung and Sung (US 2007/0206134).

Claim 7 depends from independent claim 1, is submitted to be allowable based on its dependency. In addition, Sung does not overcome all the deficiencies of Koyama in claim 1.

Conclusion

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. If any fee is due as a result of the filing of this paper, please appropriately charge such fee to Deposit Account Number 23-1925. Should the Examiner feel that there are any issues outstanding after consideration of the response, the Examiner is invited to contact Applicants' undersigned representative to expedite prosecution.

Respectfully submitted,

Dated: November 20, 2014

/Gustavo Siller, Jr./
Gustavo Siller, Jr., Reg. No. 32,305
Attorney for Applicants

BRINKS GILSON & LIONE
PO BOX 10395
CHICAGO, IL 60610
(312) 321-4200 (FWW)

CERTIFICATE OF EFS FILING UNDER 37 CFR §1.8

I hereby certify that this correspondence is being electronically transmitted to the United States Patent and Trademark Office, Commissioner for Patents, via the EFS pursuant to 37 CFR §1.8 on the below date:

Date: November 20, 2014 Name: Gustavo Siller, Jr. Signature: /Gustavo Siller, Jr./

BRINKS GILSON & LIONE

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Appln. of:	Seung-Chul LEE et al.		
Appln. No.:	12/340,005	Examiner:	Steven C. Nguyen
Filed:	December 19, 2008	Art Unit:	2443
For:	STEREOSCOPIC 3D DISPLAY DEVICE	Conf. No.:	8241
Attorney Docket No.:	12579-6201		

TRANSMITTAL

Mail Stop RCE
Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Sir:

Attached is/are:

☒ Response to Final Office Action; Request for Continued Examination (37 CFR § 1.114).

Fee calculation:

☐ No additional fee is required.

☐ Per 37 CFR §1.27, ☐ Applicant is small entity ☐ Applicant is micro entity.

☐ An extension fee in an amount of $_____ for a _____-month extension of time under 37 CFR § 1.136(a).

☒ A petition or processing fee in an amount of $1,700 under 37 CFR § 1.17(e).

☐ An additional filing fee has been calculated as shown below:

					Fee		Small Entity Fee		Micro Entity Fee	
	Claims Remaining After Amendment		Highest No. Previously Paid	Present Extra	Rate	Add'l Fee	Rate	Add'l Fee	Rate	Add'l Fee
Total		Minus			x $ 80 =	$	x $ 40 =	$	x $20 =	$
Independent		Minus			x $420 =	$	x $210 =	$	x $105 =	$
First Presentation of Multiple Dep. Claim					+ $780 =	$	+ $390 =	$	+ $195 =	$
					Total	$	Total	$	Total	$

Fee payment:

☒ Please charge Deposit Account No. 23-1925 in the amount of $1,700 for the Request for Continued Examination fees.

☐ Payment by credit card in the amount of $_____ (Form PTO-2038 is attached).
WARNING: Information on this form may become public. **Credit card information should not be included on this form.**

☒ The Director is hereby authorized to charge payment of any additional filing fees required under 37 CFR § 1.16 and any patent application processing fees under 37 CFR § 1.17 (including any extension fee required to ensure that this paper is timely filed), or to credit any overpayment, to Deposit Account No. 23-1925.

Respectfully submitted,

November 20, 2014
Date

/Gustavo Siller, Jr./
Gustavo Siller, Jr. (Reg. No. 32,305)

Electronic Patent Application Fee Transmittal

Application Number:	12340005
Filing Date:	19-Dec-2008
Title of Invention:	STEREOSCOPIC 3D DISPLAY DEVICE
First Named Inventor/Applicant Name:	Seung-Chul Lee
Filer:	Gustavo Siller Jr.
Attorney Docket Number:	12579-6201

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
RCE - 2nd and Subsequent Request	1820	1	1700	1700
		Total in USD ($)		**1700**

Electronic Acknowledgement Receipt

EFS ID:	20754191
Application Number:	12340005
International Application Number:	
Confirmation Number:	8241
Title of Invention:	STEREOSCOPIC 3D DISPLAY DEVICE
First Named Inventor/Applicant Name:	Seung-Chul Lee
Customer Number:	757
Filer:	Gustavo Siller Jr./Jeff Skinner
Filer Authorized By:	Gustavo Siller Jr.
Attorney Docket Number:	12579-6201
Receipt Date:	20-NOV-2014
Filing Date:	19-DEC-2008
Time Stamp:	15:01:57
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$1700
RAM confirmation Number	1370
Deposit Account	231925
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.19 (Document supply fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.20 (Post Issuance fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Request for Continued Examination (RCE)	12579_6201_RCE.pdf	94132 9cdac96a9ad78469f825a03299bc87400e01f36b	no	2
Warnings:					
This is not a USPTO supplied RCE SB30 form.					
Information:					
2		12579_6201_RCE_Response.pdf	89393 2929b65179390cbc196ad2c7e05ccb963d411069	yes	10

Multipart Description/PDF files in .zip description

Document Description	Start	End
Amendment Submitted/Entered with Filing of CPA/RCE	1	1
Claims	2	5
Applicant Arguments/Remarks Made in an Amendment	6	10

Warnings:					
Information:					
3	Miscellaneous Incoming Letter	12579_6201_RCE_Transmittal.pdf	110109 8b5d7a265bd4390c9c661a0bcb0cca689fffb9922	no	1
Warnings:					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	29984 4a2766c288ed989938bdb1090e5eb06e14d9ea31	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	323618		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/06 (09-11)
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 12/340,005	Filing Date 12/19/2008	☐ To be Mailed

ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT **11/20/2014**

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 15	Minus	** 20	= 0	X $80 =	0
Independent (37 CFR 1.16(h))	* 1	Minus	***3	= 0	X $420 =	0
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	0

AMENDMENT

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =	
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
/JAMES MASON/

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/340,005	12/19/2008	Seung-Chul Lee	12579-6201	8241

757 7590 08/20/2014

BGL
P.O. BOX 10395
CHICAGO, IL 60610

EXAMINER	
NGUYEN, STEVEN C	
ART UNIT	PAPER NUMBER
2443	
MAIL DATE	DELIVERY MODE
08/20/2014	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 12/340,005	Applicant(s) LEE ET AL.	
	Examiner STEVEN NGUYEN	Art Unit 2443	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05/13/2014*.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5)☒ Claim(s) *1-14 and 16* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1-14, 16* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

4) ☐ Other: _____.

DETAILED ACTION

1. This action is responsive to the communications filed on 05/13/2014.

2. **Claims 1-14, 16,** are pending in this application.

3. **Claim 1** has been amended.

4. **Claim 15** has been previously cancelled.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. **Claims 1-5, 8, 9, 11-14, 16,** are rejected under 35 U.S.C. 103(a) as being unpatentable over Koyama et al (US 2005/0285997) in view of Kleinberger et al. (US 2006/0203339) and Jung (US 2006/0268196).

2. **Regarding Claim 1,** Koyama disclosed:

a stereoscopic image display device comprising: a main display panel operable to display left and right images according to each subframe *(Paragraph 68, separating images for the left and right eye)*;

an auxiliary display panel, including first and second substrates having a pixel part corresponding to that of the main display panel and a sub-liquid crystal layer formed between the first and second substrates *(Paragraph 56, opposing substrate and*

active matrix substrate. Paragraphs 93, 97, the distance between the display liquid panel and the retardation plate);

a plurality of first electrodes *(Paragraphs 60, 77, driving electrodes for the substrates are formed over the entire surface of the panel)*;

a light source that supplies light to the rear side of the main display panel *(Paragraph 55, a backlight)*;

Koyama did not explicitly disclose alternating displaying left and right images, the auxiliary display panel is turned on when one of the left and right images is displayed on the main display panel and is turned off when the other one of the left and right images is displayed on the main display panel, the panel is positioned in front of the main display panel, and that the panel is to be turned on with respect to one of the displayed left and right images and serves to change polarization information of one of the displayed left and right images.

However, in an analogous art, Kleinberger disclosed utilizing a light polarizing layer to direct left and right images to left and right eyes respectively. The left and right images are distributed in a frame and alternate *(Paragraph 175)*. The light polarizing layer includes an on/off switchable element of light rotating that switches the layer on/off. The on/off switching is employed to ensure that the switching of light rotating layer coincides with the change in the distribution of the left and right image picture elements on the display *(Paragraphs 179, 182)*. The polarizing layer is in front of the display *(Figure 5)*.

One of ordinary skill in the art would have been motivated to combine the teachings of Koyama and Kleinberger because the references involve displaying images in three dimensional displays, and as such, both are within the same environment.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the turning on/off of the auxiliary display panel of Kleinberger with the teachings of Koyama in order to properly display a three dimensional image, thereby increasing the functionality of Koyama.

Koyama and Kleinberger did not explicitly disclose a plurality of first electrodes patterned on a first substrate along rows of pixels on the main display panel and a second electrode on an entire surface of the pixel part of the second substrate.

However, in an analogous art, Jung disclosed a first electrode formed on a first substrate and a second electrode formed on a second substrate *(Paragraph 32)*.

One of ordinary skill in the art would have been motivated to combine the teachings of Koyama and Kleinberger with Jung because as the references involve three dimensional displays, and as such, both are within the same environment.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the first and second electrodes formed on first and second substrates of Jung with the teachings of Koyama and Kleinberger in order to utilize a widely known technology, LCDs, in order to display three dimensional images.

3. Regarding Claim 2, the limitations of claim 1 have been addressed. Koyama, Kleinberger, and Jung disclosed:

wherein the second electrode is on the entire surface of the pixel part of the second substrate without any patterns *(Jung, Paragraph 32, second electrode formed on an entire surface of the second substrate)*;

4. Regarding Claim 3, the limitations of claim 1 have been addressed. Koyama, Kleinberger, and Jung disclosed:

wherein the first and second electrodes are made of a transparent conductive material such as ITO *(Koyama, Paragraph 77, electrodes made of ITO)*.

5. Regarding Claim 4, the limitations of claim 1 have been addressed. Koyama, Kleinberger, and Jung disclosed:

wherein the height of the first electrode corresponds to the height of a single pixel of the main display panel, and the width of the first electrode corresponds to 'n' (n=1,2, . . .) times the width of the pixel part *(Koyama, Paragraphs 99, 124, width of the active area and the substrate crack prevention height)*.

6. Regarding Claim 5, the limitations of claim 1 have been addressed. Koyama, Kleinberger, and Jung disclosed:

the main display panel is driven to have 60 frames, and each frame includes a first subframe displaying the left image and a second subframe displaying the right image *(Kleinberger, Paragraph 175, left and right images distributed in a frame with first and second subregions)*.

7. Regarding Claim 8, the limitations of claim 1 have been addressed. Koyama, Kleinberger, and Jung disclosed:

wherein a polarization axis of the left or right image made incident to the auxiliary display panel and a rubbing direction of the auxiliary display panel are positioned at 45° *(Koyama, Paragraph 64, 72, different rubbing directions)*.

8. Regarding Claim 9, the limitations of claim 4 have been addressed. Koyama, Kleinberger, and Jung disclosed:

wherein when the auxiliary display panel is not driven, a polarization axis of the left or right image that has passed through the auxiliary display panel is perpendicular to a polarization axis of the left or right image made incident to the auxiliary display panel *(Koyama, Paragraph 101, perpendicular direction)*.

9. Regarding Claim 11, the limitations of claim 1 have been addressed. Koyama, Kleinberger, and Jung disclosed:

an array substrate *(Koyama, Paragraph 56, substrate)*;

a color filter substrate disposed to face the array substrate *(Koyama, Paragraph 56, active matrix substrate)*;

a main liquid crystal layer positioned between the array substrate and the color filter substrate *(Koyama, Paragraph 56, display liquid crystal layer)*;

a first polarizer attached on an outer surface of the array substrate *(Koyama, Paragraph 56, first polarizer)*;

a second polarizer attached on an outer surface of the color filter substrate *(Koyama, Paragraph 56, second polarizer)*.

10. Regarding Claim 12, the limitations of claim 1 have been addressed. Koyama, Kleinberger, and Jung disclosed:

a λ/4 retardation layer formed on the first substrate of the auxiliary display panel that changes a linearly polarized left or right image made incident to the auxiliary display panel into a left circularly polarized (or right circularly polarized) state *(Koyama, Paragraph 66, retardation plate)*.

11. Regarding Claim 13, the limitations of claim 12 have been addressed. Koyama, Kleinberger, and Jung disclosed:

wherein the λ/4 retardation layer in formed in an in-cell form on an upper surface of the first substrate of the auxiliary display panel together with the first substrate *(Koyama, Paragraph 92, the patterned retardation plate shielding off the light in the area outside the active area of the retardation plate)*.

12. Regarding Claim 14, the limitations of claim 12 have been addressed. Koyama, Kleinberger, and Jung disclosed:

wherein the λ/4 retardation layer is attached in a form of a film on a lower surface of the first substrate of the auxiliary display panel *(Koyama, Figure 2, Paragraph 92, passing light through the patterned retardation plate or the liquid crystal panel)*.

14. Regarding Claim 16, the limitations of claim 5 have been addressed. Koyama, Kleinberger, and Jung disclosed:

wherein when the auxiliary display panel is turned on, it outputs polarization information of the left image outputted from the main display panel without changing it, and when the auxiliary display panel is turned off, it changes the polarization information

of the right image outputted from the main display panel, and outputs the image *(Kleinberger, Paragraphs 175, 179, 182, utilizing a light polarizing layer to direct left and right images to left and right eyes respectively. The left and right images are distributed in a frame and alternate. The light polarizing layer includes an on/off switchable element of light rotating that switches the layer on/off. The on/off switching is employed to ensure that the switching of light rotating layer coincides with the change in the distribution of the left and right image picture elements on the display)*.

15. Claims 6, 10, are rejected under 35 U.S.C. 103(a) as being unpatentable over Koyama et al (US 2005/0285997) in view of Kleinberger et al. (US 2006/0203339), Jung (US 2006/0268196), and Yano et al (US 2008/0284699).

16. Regarding Claim 6, the limitations of claim 1 have been addressed. Koyama, Kleinberger, and Jung did not explicitly disclose:

wherein the sub-liquid crystal layer includes a plurality of liquid crystal molecules, and when the auxiliary display panel is driven, the liquid crystal molecules are arranged to be perpendicular to the first and second substrates, and when the auxiliary display panel is not driven, the liquid crystal molecules are arranged in a twisted nematic structure;

However, in an analogous art, Yano disclosed wherein the sub-liquid crystal layer includes a plurality of liquid crystal molecules, and when the auxiliary display panel is driven, the liquid crystal molecules are arranged to be perpendicular to the first and

second substrates, and when the auxiliary display panel is not driven, the liquid crystal molecules are arranged in a twisted nematic structure *(Paragraphs 47, 49, 120 Hz picture signal and a nematic liquid crystal or perpendicular orientation mode)*;

One of ordinary skill in the art would have been motivated to combine the teachings of Koyama, Kleinberger, and Jung, with Yano because the references involve three dimensional displays, and as such, both are within the same environment.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the twisted nematic structure of Yano with the teachings of Koyama, Tsang, and Jung, in order to allow realignment of crystals in the LCD, thereby allowing the display three dimensional images.

17. Regarding Claim 10, the limitations of claim 1 have been addressed. Koyama, Kleinberger, Jung, and Yano disclosed:

wherein the main display panel is driven at 120 Hz or higher *(Yano, Paragraphs 47, 49, 120 Hz picture signal)*;

18. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Koyama et al (US 2005/0285997) in view of Kleinberger et al. (US 2006/0203339), Jung (US 2006/0268196), and Sung et al (US 2007/0206134).

19. Regarding Claim 7, the limitations of claim 1 have been addressed. Koyama, Kleinberger, and Jung, did not explicitly disclose:

wherein the sub-liquid crystal layer includes a plurality of liquid crystal molecules, and when the auxiliary display panel is driven, the liquid crystal molecules are arranged to be perpendicular to the first and second substrates, and when the auxiliary display panel is not driven, the liquid crystal molecules are arranged to be parallel to the first and second substrates.

However, in an analogous art, Sung disclosed wherein the sub-liquid crystal layer includes a plurality of liquid crystal molecules, and when the auxiliary display panel is driven, the liquid crystal molecules are arranged to be perpendicular to the first and second substrates, and when the auxiliary display panel is not driven, the liquid crystal molecules are arranged to be parallel to the first and second substrates *(Paragraph 33).*

One of ordinary skill in the art would have been motivated to combine the teachings of Koyama, Kleinberger, and Jung, with Sung because the references involve three dimensional displays, and as such, both are within the same environment.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the parallel and perpendicular liquid crystal molecules of Sung with the teachings of Koyama, Kleinberger, and Jung, in order to allow the apparatus to display both 2D and 3D images, thereby increasing the functionality of Koyama, Tsang, and Jung.

Response to Arguments

1. Applicant's arguments with respect to claims 1-14, 16, have been considered but are moot because the arguments do not apply to any of the references being used in the current rejection.

Conclusion

Examiner's Note: Examiner has cited particular columns and line numbers in the references applied to the claims above for the convenience of the applicant. Although the specified citations are representative of the teachings of the art and are applied to specific limitations within the individual claim, other passages and figures may apply as well. It is respectfully requested from the applicant in preparing responses, to fully consider the references in entirety as potentially teaching all or part of the claimed invention, as well as the context of the passage as taught by the prior art or disclosed by the Examiner.

In the case of amending the claimed invention, Applicant is respectfully requested to indicate the portion(s) of the specification which dictate(s) the structure relied on for proper interpretation and also to verify and ascertain the metes and bounds of the claimed invention.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to STEVEN NGUYEN whose telephone number is (571)270-5663. The examiner can normally be reached on Monday through Thursday with alternating Friday 7:30AM - 5:00PM, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tonia Dollinger can be reached on (571) 272-4170. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/S. N./
Examiner, Art Unit 2443
08/1/2014

/JERRY DENNISON/
Primary Examiner, Art Unit 2443

Notice of References Cited	Application/Control No. 12/340,005	Applicant(s)/Patent Under Reexamination LEE ET AL.	
	Examiner STEVEN NGUYEN	Art Unit 2443	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-2006/0203339 A1	09-2006	Kleinberger et al.	359/465
	B	US-			
	C	US-			
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12340005	LEE ET AL.
	Examiner	Art Unit
	STEVEN NGUYEN	2443

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
348	43	12/13/2011	SCN

SEARCH NOTES		
Search Notes	Date	Examiner
Inventor/Assignee Search	12/13/2011	SCN
EAST Search	12/13/2011	SCN
Updated EAST Search	05/09/2012	SCN
Updated EAST Search	02/03/2014	SCN
Updated EAST Search	08/18/2014	SCN

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	2	"20060203339"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; IBM_TDB	OR	OFF	2014/08/19 12:21
L2	0	"20060203339" and on	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; IBM_TDB	OR	OFF	2014/08/19 12:22
L3	2	"20060203339" and ("on/off")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; IBM_TDB	OR	OFF	2014/08/19 12:22
L4	1	"12340005"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; IBM_TDB	OR	OFF	2014/08/19 13:21
L5	1	"12340005" and off	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; IBM_TDB	OR	OFF	2014/08/19 13:21
L6	2	"20060203339" and alternat$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; IBM_TDB	OR	OFF	2014/08/19 13:41
L7	2	"20060203339" and frame$1	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; IBM_TDB	OR	OFF	2014/08/19 13:46
S1	1	"12340005"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:10
S2	7535	((seung near2 lee) or (hoon near2 kang) or (sung near2 jung)).in.	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:10
S3	2913	(lg near display).asn.	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:11
S4	68	S2 and S3	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:11
S5	11	S4 and 3D	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:14
S7	4	("20020118276" | "20050036082" | "6252570" | "6252624").PN.	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:17
S8	2	"2006268196"	US-PGPUB; USPAT; EPO;	ADJ	ON	2011/12/15 10:29

			JPO; IBM_TDB			
S9	1	"20060268196"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:29
S10	2	"2004012851"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:32
S11	1	"20040012851"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:32
S12	2244	parallax near3 barrier	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:45
S13	1692	S12 and (3D or (three near2 dimension$3))	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:46
S14	121	S13 and (polariz$4 and (indium near3 oxide))	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:46
S15	112	S14 and (left and right)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:47
S16	19276116	@ad<"20080709" or @rlad<"20080709"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:48
S17	0	S15 and S6	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:48
S18	98	S15 and S16	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:48
S19	1	"7199845".pn.	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:49
S20	2	"20050285997"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:49
S21	8964	S16 and ("120" near2 HZ)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 11:04
S22	366011	S16 and (HZ or hertz)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 11:04
S23	4	S15 and ("120" near2 HZ)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 11:04
S24	2	"20050285997" and (between or (in near2 between))	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:26
S25	2	"20050285997" and (ITO or (indium near3 oxide))	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:36
S26	2	"20050285997" and (height)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:37
S27	2	"20050285997" and (height or width)	US-PGPUB; USPAT; EPO;	ADJ	ON	2011/12/15 12:38

			JPO; IBM_TDB			
S28	0	"20050285997" and (synch$7)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:39
S29	0	"20060268196" and (synch$7)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:39
S30	59	S14 and (parallel and perpendicular)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:44
S31	55	S30 and S16	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:44
S32	1	"20100007716" and (substantial$4).clm.	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:48
S33	20	S14 and (perpendicular and (twisted near3 nematic))	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:49
S34	3	S14 and (perpendicular and (twisted near3 nematic)) and (HZ or hertz)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:49
S35	0	((3D or (three near3 dimension$4)) same (perpendicular near20 (twisted near3 nematic)) and (HZ or hertz))	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:53
S36	62	(perpendicular near20 (twisted near3 nematic)) and (HZ or hertz)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:54
S37	62	S36 and (LCD or (liquid near3 crystal))	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:55
S38	57	S37 and S16	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:55
S39	23	(perpendicular near20 (twisted near3 nematic)) and ("120" near3 (HZ or hertz))	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:57
S40	22	S39 and S16	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:57
S41	2	"20080284699"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:58
S42	2	"20080284699" and (nematic and perpendicular and "120")	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:58
S43	2	"20050285997" and (rub$5)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:11
S44	2	"20050285997" and (perpendic$7)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:12
S45	2	"20050285997"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:22

S46	2	"20060269496"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:27
S47	1	"20060268196"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:27
S48	1	"20020118276"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:27
S49	483	348/43.ccls.	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:28
S50	1	"20050036082"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:28
S51	1	"6252570".pn.	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:28
S52	1	"6252624".pn.	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:28
S53	1	"12340005"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/11 12:36
S54	0	"12340005" and synchroni$5	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/11 12:36
S55	0	"12340005" and synch$8	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/11 12:36
S56	1	"20100007716"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/11 12:36
S57	0	"20100007716" and synch$8	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/11 12:36
S58	1	"20100007716" and polariz$5	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/11 12:38
S59	7	"6510002"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/11 12:41
S60	1	"20100007716" and subframe	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/11 13:13
S61	0	"20050285997" and subframe	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/11 13:14
S62	0	"20050285997" and frame	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/11 13:14
S63	2	"20050285997" and separat$4	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/11 13:18
S64	0	"6510002".pn. and elect$4	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/14 12:39

S65	1	"6510002".pn. and elect$6	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/14 12:39
S66	2	"20050285997" and elect$6	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/14 12:40
S67	1	"20100007716" and "60"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/14 12:46
S68	1	"6510002".pn. and frame$2	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/14 12:49
S69	4	"6510002".pn. or "20050285997" or "20060268196"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/14 13:02
S70	0	S69 and on	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/14 13:02
S71	4	S69 and (on or off)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/14 13:02
S72	3	S69 and alternat$5	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/14 13:22

EAST Search History (Interference)

<This search history is empty>

8/19/2014 2:43:18 PM
C:\Users\snguyen3\Documents\EAST\Workspaces\12340005.wsp

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12340005	LEE ET AL.
	Examiner	Art Unit
	STEVEN NGUYEN	2443

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	12/15/2011	05/14/2012	02/06/2014	08/19/2014					
	1	✓	✓	✓	✓					
	2	✓	✓	✓	✓					
	3	✓	✓	✓	✓					
	4	✓	✓	✓	✓					
	5	✓	✓	✓	✓					
	6	✓	✓	✓	✓					
	7	✓	✓	✓	✓					
	8	✓	✓	✓	✓					
	9	✓	✓	✓	✓					
	10	✓	✓	✓	✓					
	11	✓	✓	✓	✓					
	12	✓	✓	✓	✓					
	13	✓	✓	✓	✓					
	14	✓	✓	✓	✓					
	15		✓	-	-					
	16		✓	✓	✓					

CERTIFICATE OF EFS FILING UNDER 37 CFR §1.8

I hereby certify that this correspondence is being electronically transmitted to the United States Patent and Trademark Office, Commissioner for Patents, via the EFS pursuant to 37 CFR §1.8 on the below date:

Date: May 13, 2014 Name: Gustavo Siller, Jr. Signature: /Gustavo Siller, Jr./

Case No. : 12579-6201

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Seung-Chul LEE et al.	Examiner: Steven C. Nguyen
Serial No: 12/340,005	Art Unit: 2443
Filed: December 19, 2008	Confirmation No: 8241
For: STEREOSCOPIC 3D DISPLAY DEVICE	

AMENDMENT

Mail Stop Amendment
Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Dear Sir:

In reply to the Office Action dated February 26, 2014, Applicant submits this Amendment. Applicant respectfully requests the Examiner to withdraw the objections and rejections to this application and to grant allowance of this Application in view of the following remarks and amended claims.

Amendments to the Claims begin on page 2 of this paper.

Remarks begin on page 5 of this paper.

In the Claims:

Please amend the claims as follows (the changes in these Claims are shown with ~~strikethrough~~ for deleted matter and underlines for added matter). A complete listing of the claims proper claim identifiers is set forth below.

Amendments to the Claims

1. (Currently Amended) A stereoscopic image display device comprising:

a main display panel operable to alternately display left and right images according to each subframe;

an auxiliary display panel that changes polarization information of one of the displayed left and right images, including first and second substrates having a pixel part corresponding to that of the main display panel and a sub-liquid crystal layer formed between the first and second substrates, and positioned in front of the main display panel,

wherein the auxiliary display panel is ~~driven to be~~ turned on ~~with respect to~~ when one of the ~~displayed~~ left and right images is displayed on the main display panel and is turned off when the other one of the left and right images is displayed on the main display panel ~~serves to change polarization information of one of the displayed left and right images~~;

a plurality of first electrodes patterned on the first substrate along the rows of pixels formed on the main display panel;

a second electrode on an entire surface of the pixel part of the second substrate; and

a light source that supplies light to the rear side of the main display panel.

2. (Original) The device of claim 1, wherein the second electrode is on the entire surface of the pixel part of the second substrate without any patterns.

3. (Original) The device of claim 1, wherein the first and second electrodes are made of a transparent conductive material such as ITO.

4. (Original) The device of claim 1, wherein the height of the first electrode corresponds to the height of a single pixel of the main display panel, and the width of the first electrode corresponds to 'n' (n=1,2,...) times the width of the pixel part.

5. (Previously Presented) The device of claim 1, wherein the main display panel is driven to have 60 frames, and each frame includes a first subframe displaying the left image and a second subframe displaying the right image.

6. (Previously Presented) The device of claim 1, wherein the sub-liquid crystal layer includes a plurality of liquid crystal molecules, and when the auxiliary display panel is driven, the liquid crystal molecules are arranged to be perpendicular to the first and second substrates, and when the auxiliary display panel is not driven, the liquid crystal molecules are arranged in a twisted nematic structure.

7. (Previously Presented) The device of claim 1, wherein the sub-liquid crystal layer includes a plurality of liquid crystal molecules, and when the auxiliary display panel is driven, the liquid crystal molecules are arranged to be perpendicular to the first and second substrates, and when the auxiliary display panel is not driven, the liquid crystal molecules are arranged to be parallel to the first and second substrates.

8. (Previously Presented) The device of claim 1, wherein a polarization axis of the left or right image made incident to the auxiliary display panel and a rubbing direction of the auxiliary display panel are positioned at 45°.

9. (Previously Presented) The device of claim 4, wherein when the auxiliary display panel is not driven, a polarization axis of the left or right image that has passed through the auxiliary display panel is perpendicular to a polarization axis of the left or right image made incident to the auxiliary display panel.

10. (Original) The device of claim 1, wherein the main display panel is driven at 120Hz or higher.

11. (Original) The device of claim 1, wherein the main display panel comprises:

an array substrate;

a color filter substrate disposed to face the array substrate;

a main liquid crystal layer positioned between the array substrate and the color filter substrate;

a first polarizer attached on an outer surface of the array substrate; and

a second polarizer attached on an outer surface of the color filter substrate.

12. (Original) The device of claim 1, further comprising:

a $\lambda/4$ retardation layer formed on the first substrate of the auxiliary display panel that changes a linearly polarized left or right image made incident to the auxiliary display panel into a left circularly polarized (or right circularly polarized) state.

13. (Original) The device of claim 12, wherein the $\lambda/4$ retardation layer in formed in an in-cell form on an upper surface of the first substrate of the auxiliary display panel together with the first substrate.

14. (Original) The device of claim 12, wherein the $\lambda/4$ retardation layer is attached in a form of a film on a lower surface of the first substrate of the auxiliary display panel.

15. (Canceled)

16. (Previously Presented) The device of claim 5, wherein when the auxiliary display panel is turned on, it outputs polarization information of the left image outputted from the main display panel without changing it, and when the auxiliary display panel is turned off, it changes the polarization information of the right image outputted from the main display panel, and outputs the image.

REMARKS

Claims 1-14 and 16 are pending in the present application and are rejected. The Examiner is respectfully requested to reconsider and withdraw the rejections in view of the claim amendments and remarks contained herein

Summary of Interview

Applicants thank the Examiner for a telephone interview with Applicants' representative on April 22, 2014 to discuss Applicants' proposed claim amendments. An agreement was reached that the proposed claim amendments would overcome the current rejection and an updated search was needed.

Claim Rejections under 35 USC 103

Claims 1~5, 8, 9 and 11~14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koyama et al. (US 2005/0285997) in view of Tsang (US 6,510,002) and Jung (US 2006/0268196). **Claims 6 and 10** are rejected under 35 U.S.C. 103(a) as being unpatentable over Koyama et al. (US 2005/0285997) in view of Tsang (US 6,510,002), Jung (US 2006/0268196) and Yano et al. (US 2008/0284699). **Claim 7** is rejected under 35 U.S.C. 103(a) as being unpatentable over Koyama et al. (US 2005/0285997) in view of Tsang (US 6,510,002), Jung (US 2006/0268196) and Sung (US 2007/0206134). The rejection is respectfully traversed.

Claim 1 has been amended according to the proposed claim amendments discussed during the telephone interview noted above. More specifically, Claim 1 has been amended to clarify that the auxiliary display panel is turned on when one of the left and right images is displayed on the main display panel and is turned off when the other one of the left and right images is displayed on the main display panel. The amendments are supported by paragraph [0111] of the specification. No new matter has been introduced.

In the claimed invention, the left and right images are displayed **alternately** on the main display panel, and the auxiliary display panel changes polarization information of **one of the displayed left and right images** (not both the displayed left and right images). Koyama fails to disclose an auxiliary display panel or any means that is turned

on and off to change polarization information of only one of the displayed left and right images.

The other references do not cure the deficiencies of Koyama as previously noted. Accordingly, Applicants respectfully request that the rejection of the pending claims be withdrawn.

Conclusion

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue.

Respectfully submitted,

Dated: May 13, 2014

/Gustavo Siller, Jr./
Gustavo Siller, Jr., Reg. No. 32,305
Attorney for Applicants

BRINKS GILSON & LIONE
PO BOX 10395
CHICAGO, IL 60610
(312) 321-4200

Electronic Acknowledgement Receipt

EFS ID:	19018585
Application Number:	12340005
International Application Number:	
Confirmation Number:	8241
Title of Invention:	STEREOSCOPIC 3D DISPLAY DEVICE
First Named Inventor/Applicant Name:	Seung-Chul Lee
Customer Number:	757
Filer:	Gustavo Siller Jr./Maggie Pieczonka
Filer Authorized By:	Gustavo Siller Jr.
Attorney Docket Number:	12579-6201
Receipt Date:	13-MAY-2014
Filing Date:	19-DEC-2008
Time Stamp:	15:19:25
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		12579-6201Amendment.pdf	331068 264754398994f5db58cb6aa744fdb2ccbcdd4208	yes	7

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Transmittal Letter	1	1
	Amendment/Req. Reconsideration-After Non-Final Reject	2	7
Warnings:			
Information:			
	Total Files Size (in bytes):	331068	

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New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

CERTIFICATE OF EFS FILING UNDER 37 CFR §1.8

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Date: May 13, 2014 Name: Gustavo Siller, Jr. Signature: /Gustavo Siller, Jr./

BRINKS GILSON & LIONE

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Appln. of:	Seung-Chul Lee et al.		
Appln. No.:	12/340,005	Examiner:	Steven C. Nguyen
Filed:	December 19, 2008	Art Unit:	2443
For:	STEREOSCOPIC 3D DISPLAY DEVICE	Conf. No.:	8241
Attorney Docket No.:	12579-6201		

TRANSMITTAL

Mail Stop Amendment
Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Sir:

Attached is/are:

☒ Transmittal - Amendment.

Fee calculation:

☒ No additional fee is required.

☐ Per 37 CFR §1.27, ☐ Applicant is small entity ☐ Applicant is micro entity.

☐ An extension fee in an amount of $_____ for a _____-month extension of time under 37 CFR § 1.136(a).

☐ A petition or processing fee in an amount of $_____ under 37 CFR § 1.17(_____).

☐ An additional filing fee has been calculated as shown below:

	Claims Remaining After Amendment		Highest No. Previously Paid	Present Extra	Fee Rate	Fee Add'l Fee	Small Entity Fee Rate	Small Entity Fee Add'l Fee	Micro Entity Fee Rate	Micro Entity Fee Add'l Fee
Total		Minus			x $ 80 =	$	x $ 40 =	$	x $20 =	$
Independent		Minus			x $420 =	$	x $210 =	$	x $105 =	$
First Presentation of Multiple Dep. Claim					+ $780 =	$	+ $390 =	$	+ $195 =	$
					Total	$	Total	$	Total	$

Fee payment:

☐ Please charge Deposit Account No. 23-1925 in the amount of $_____ for _____.

☐ Payment by credit card in the amount of $_____ (Form PTO-2038 is attached).
WARNING: Information on this form may become public. **Credit card information should not be included on this form.**

☒ The Director is hereby authorized to charge payment of any additional filing fees required under 37 CFR § 1.16 and any patent application processing fees under 37 CFR § 1.17 (including any extension fee required to ensure that this paper is timely filed), or to credit any overpayment, to Deposit Account No. 23-1925.

Respectfully submitted,

May 13, 2014
Date

/Gustavo Siller, Jr./
Gustavo Siller, Jr. (Reg. No. 32,305)

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 12/340,005	Filing Date 12/19/2008	☐ To be Mailed

ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT **05/13/2014**

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 15	Minus	** 20	=	X $ =	
Independent (37 CFR 1.16(h))	* 1	Minus	***3	=	X $ =	
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	

AMENDMENT

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =	
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
/KATRINA . TURNER/

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/340,005	12/19/2008	Seung-Chul Lee	12579-6201	8241

757 7590 04/30/2014

BGL
P.O. BOX 10395
CHICAGO, IL 60610

EXAMINER	
NGUYEN, STEVEN C	
ART UNIT	PAPER NUMBER
2443	
MAIL DATE	DELIVERY MODE
04/30/2014	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Applicant-Initiated Interview Summary	Application No.	Applicant(s)	
	12/340,005	LEE ET AL.	
	Examiner	Art Unit	
	STEVEN NGUYEN	2443	

All participants (applicant, applicant's representative, PTO personnel):

(1) *STEVEN NGUYEN*. (3)_____.

(2) *LI-HUA WENG*. (4)_____.

Date of Interview: *22 April 2014*.

Type: ☒ Telephonic ☐ Video Conference
☐ Personal [copy given to: ☐ applicant ☐ applicant's representative]

Exhibit shown or demonstration conducted: ☐ Yes ☒ No.
If Yes, brief description: _____.

Issues Discussed ☐101 ☐112 ☐102 ☒103 ☐Others
(For each of the checked box(es) above, please describe below the issue and detailed description of the discussion)

Claim(s) discussed: *1*.

Identification of prior art discussed: *Koyama, Tsang*.

Substance of Interview
(For each issue discussed, provide a detailed description and indicate if agreement was reached. Some topics may include: identification or clarification of a reference or a portion thereof, claim interpretation, proposed amendments, arguments of any applied references etc...)

The Attorney went over 2 proposed amendments to claim 1. The Examiner reviewed the amendments (alternating images displayed and turning on an auxiliary display panel depending on which image is currently displayed) and upon formal filing, further search and/or consideration would be required. .

Applicant recordation instructions: The formal written reply to the last Office action must include the substance of the interview. (See MPEP section 713.04). If a reply to the last Office action has already been filed, applicant is given a non-extendable period of the longer of one month or thirty days from this interview date, or the mailing date of this interview summary form, whichever is later, to file a statement of the substance of the interview

Examiner recordation instructions: Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

☒ Attachment

/JERRY DENNISON/
Primary Examiner, Art Unit 2443

Summary of Record of Interview Requirements

Manual of Patent Examining Procedure (MPEP), Section 713.04, Substance of Interview Must be Made of Record
A complete written statement as to the substance of any face-to-face, video conference, or telephone interview with regard to an application must be made of record in the application whether or not an agreement with the examiner was reached at the interview.

Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews
Paragraph (b)

In every instance where reconsideration is requested in view of an interview with an examiner, a complete written statement of the reasons presented at the interview as warranting favorable action must be filed by the applicant. An interview does not remove the necessity for reply to Office action as specified in §§ 1.111, 1.135. (35 U.S.C. 132)

37 CFR §1.2 Business to be transacted in writing.
All business with the Patent or Trademark Office should be transacted in writing. The personal attendance of applicants or their attorneys or agents at the Patent and Trademark Office is unnecessary. The action of the Patent and Trademark Office will be based exclusively on the written record in the Office. No attention will be paid to any alleged oral promise, stipulation, or understanding in relation to which there is disagreement or doubt.

The action of the Patent and Trademark Office cannot be based exclusively on the written record in the Office if that record is itself incomplete through the failure to record the substance of interviews.

It is the responsibility of the applicant or the attorney or agent to make the substance of an interview of record in the application file, unless the examiner indicates he or she will do so. It is the examiner's responsibility to see that such a record is made and to correct material inaccuracies which bear directly on the question of patentability.

Examiners must complete an Interview Summary Form for each interview held where a matter of substance has been discussed during the interview by checking the appropriate boxes and filling in the blanks. Discussions regarding only procedural matters, directed solely to restriction requirements for which interview recordation is otherwise provided for in Section 812.01 of the Manual of Patent Examining Procedure, or pointing out typographical errors or unreadable script in Office actions or the like, are excluded from the interview recordation procedures below. Where the substance of an interview is completely recorded in an Examiners Amendment, no separate Interview Summary Record is required.

The Interview Summary Form shall be given an appropriate Paper No., placed in the right hand portion of the file, and listed on the "Contents" section of the file wrapper. In a personal interview, a duplicate of the Form is given to the applicant (or attorney or agent) at the conclusion of the interview. In the case of a telephone or video-conference interview, the copy is mailed to the applicant's correspondence address either with or prior to the next official communication. If additional correspondence from the examiner is not likely before an allowance or if other circumstances dictate, the Form should be mailed promptly after the interview rather than with the next official communication.

The Form provides for recordation of the following information:
- Application Number (Series Code and Serial Number)
- Name of applicant
- Name of examiner
- Date of interview
- Type of interview (telephonic, video-conference, or personal)
- Name of participant(s) (applicant, attorney or agent, examiner, other PTO personnel, etc.)
- An indication whether or not an exhibit was shown or a demonstration conducted
- An identification of the specific prior art discussed
- An indication whether an agreement was reached and if so, a description of the general nature of the agreement (may be by attachment of a copy of amendments or claims agreed as being allowable). Note: Agreement as to allowability is tentative and does not restrict further action by the examiner to the contrary.
- The signature of the examiner who conducted the interview (if Form is not an attachment to a signed Office action)

It is desirable that the examiner orally remind the applicant of his or her obligation to record the substance of the interview of each case. It should be noted, however, that the Interview Summary Form will not normally be considered a complete and proper recordation of the interview unless it includes, or is supplemented by the applicant or the examiner to include, all of the applicable items required below concerning the substance of the interview.

A complete and proper recordation of the substance of any interview should include at least the following applicable items:
1) A brief description of the nature of any exhibit shown or any demonstration conducted,
2) an identification of the claims discussed,
3) an identification of the specific prior art discussed,
4) an identification of the principal proposed amendments of a substantive nature discussed, unless these are already described on the Interview Summary Form completed by the Examiner,
5) a brief identification of the general thrust of the principal arguments presented to the examiner,
   (The identification of arguments need not be lengthy or elaborate. A verbatim or highly detailed description of the arguments is not required. The identification of the arguments is sufficient if the general nature or thrust of the principal arguments made to the examiner can be understood in the context of the application file. Of course, the applicant may desire to emphasize and fully describe those arguments which he or she feels were or might be persuasive to the examiner.)
6) a general indication of any other pertinent matters discussed, and
7) if appropriate, the general results or outcome of the interview unless already described in the Interview Summary Form completed by the examiner.

Examiners are expected to carefully review the applicant's record of the substance of an interview. If the record is not complete and accurate, the examiner will give the applicant an extendable one month time period to correct the record.

Examiner to Check for Accuracy

If the claims are allowable for other reasons of record, the examiner should send a letter setting forth the examiner's version of the statement attributed to him or her. If the record is complete and accurate, the examiner should place the indication, "Interview Record OK" on the paper recording the substance of the interview along with the date and the examiner's initials.

Interview Agenda—12/340,005

1. (Currently Amended) A stereoscopic image display device comprising:

a main display panel operable to alternately display left and right images according to each subframe;

an auxiliary display panel that changes polarization information of one of the displayed left and right images, including first and second substrates having a pixel part corresponding to that of the main display panel and a sub-liquid crystal layer formed between the first and second substrates, and positioned in front of the main display panel,

wherein the auxiliary display panel is ~~driven to be~~ turned on ~~with respect to~~ when one of the ~~displayed~~ left and right images is displayed on the main display panel and is turned off when the other one of the left and right images is displayed on the main display panel ~~serves to change polarization information of one of the displayed left and right images~~;

a plurality of first electrodes patterned on the first substrate along the rows of pixels formed on the main display panel;

a second electrode on an entire surface of the pixel part of the second substrate; and

a light source that supplies light to the rear side of the main display panel.

Support for the amendments:

Paragraph [00111]: The auxiliary display panel is provided to be turned on in synchronization with the left image of the main display panel, and is not driven, for example, while the main display panel is displaying the right image.

Additional claim limitations to consider:

1. When the auxiliary display panel is turned off, the left image or the right image that is displayed on the main display panel is outputted to the outside of the auxiliary display panel with the polarization state unchanged and when the auxiliary display panel is turned on, the left image or the right image that is displayed on the main display panel is outputted to the outside of the auxiliary display panel with the polarization information changed. Paragraphs [0055] to [0058]

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/340,005	12/19/2008	Seung-Chul Lee	12579-6201	8241

757 7590 02/26/2014

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CHICAGO, IL 60610

EXAMINER	
NGUYEN, STEVEN C	
ART UNIT	PAPER NUMBER
2443	
MAIL DATE	DELIVERY MODE
02/26/2014	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 12/340,005	Applicant(s) LEE ET AL.	
	Examiner STEVEN NGUYEN	Art Unit 2443	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08/21/2012*.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5)☒ Claim(s) *1-14 and 16* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1-14 and 16* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☒ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date *06/12/2012, 01/31/2013*.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

4) ☐ Other: _____.

DETAILED ACTION

1. This action is responsive to the communications filed on 08/15/2012.

2. **Claims 1-14, 16,** are pending in this application.

3. **Claims 1, 7, 16,** have been amended.

4. **Claim 15** has been cancelled.

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 08/21/2012 has been entered.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. **Claims 1-5, 8, 9, 11-14, 16,** are rejected under 35 U.S.C. 103(a) as being unpatentable over Koyama et al (US 2005/0285997) in view of Tsang (US 6,510,002) and Jung (US 2006/0268196).

2. **Regarding Claim 1,** Koyama disclosed:

a stereoscopic image display device comprising: a main display panel operable to alternately display left and right images according to each subframe *(Paragraph 68, separating images for the left and right eye)*;

an auxiliary display panel, including first and second substrates having a pixel part corresponding to that of the main display panel and a sub-liquid crystal layer formed between the first and second substrates *(Paragraph 56, opposing substrate and active matrix substrate. Paragraphs 93, 97, the distance between the display liquid panel and the retardation plate)*;

a plurality of first electrodes *(Paragraphs 60, 77, driving electrodes for the substrates are formed over the entire surface of the panel)*;

a light source that supplies light to the rear side of the main display panel *(Paragraph 55, a backlight)*;

Koyama did not explicitly disclose changing polarization information of one of the displayed left and right images, the panel is positioned in front of the main display panel, and that the panel is to be turned on with respect to one of the displayed left and right images and serves to change polarization information of one of the displayed left and right images.

However, in an analogous art, Tsang disclosed a liquid crystal polarizer that is positioned in front of a screen and that left and right images are separated in order to ensure that left images are only seen by the left eye and right images only by the right eye. The process is achieved by switching the polarization between 0° and 90° *(Column 3, Lines 34-44, Column 4, Lines 1-21)*.

One of ordinary skill in the art would have been motivated to combine the teachings of Koyama and Tsang because both references involve three dimensional displays, and as such, both are within the same environment.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the changing polarization information and panel position of Tsang with the teachings of Koyama in order to properly display a three dimensional image, thereby increasing the functionality of Koyama.

Koyama and Tsang did not explicitly disclose a plurality of first electrodes patterned on a first substrate along rows of pixels on the main display panel and a second electrode on an entire surface of the pixel part of the second substrate.

However, in an analogous art, Jung disclosed a first electrode formed on a first substrate and a second electrode formed on a second substrate *(Paragraph 32)*.

One of ordinary skill in the art would have been motivated to combine the teachings of Koyama and Tsang with Jung because as the references involve three dimensional displays, and as such, both are within the same environment.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the first and second electrodes formed on first and second substrates of Jung with the teachings of Koyama and Tsang in order to utilize a widely known technology, LCDs, in order to display three dimensional images.

3. Regarding Claim 2, the limitations of claim 1 have been addressed. Koyama, Tsang, and Jung disclosed:

wherein the second electrode is on the entire surface of the pixel part of the second substrate without any patterns *(Jung, Paragraph 32, second electrode formed on an entire surface of the second substrate)*;

4. Regarding Claim 3, the limitations of claim 1 have been addressed. Koyama, Tsang, and Jung disclosed:

wherein the first and second electrodes are made of a transparent conductive material such as ITO *(Koyama, Paragraph 77, electrodes made of ITO)*.

5. Regarding Claim 4, the limitations of claim 1 have been addressed. Koyama, Tsang, and Jung disclosed:

wherein the height of the first electrode corresponds to the height of a single pixel of the main display panel, and the width of the first electrode corresponds to 'n' (n=1,2, . . .) times the width of the pixel part *(Koyama, Paragraphs 99, 124, width of the active area and the substrate crack prevention height)*.

6. Regarding Claim 5, the limitations of claim 1 have been addressed. Koyama, Tsang, and Jung disclosed:

the main display panel is driven to have 60 frames, and each frame includes a first subframe displaying the left image and a second subframe displaying the right image *(Tsang, Column 2, Lines 45-61, the image may have a plurality of frames, the frames being alternated left and right images)*.

7. Regarding Claim 8, the limitations of claim 1 have been addressed. Koyama, Tsang, and Jung disclosed:

wherein a polarization axis of the left or right image made incident to the auxiliary display panel and a rubbing direction of the auxiliary display panel are positioned at 45° *(Koyama, Paragraph 64, 72, different rubbing directions)*.

8. Regarding Claim 9, the limitations of claim 4 have been addressed. Koyama, Tsang, and Jung disclosed:

wherein when the auxiliary display panel is not driven, a polarization axis of the left or right image that has passed through the auxiliary display panel is perpendicular to a polarization axis of the left or right image made incident to the auxiliary display panel *(Koyama, Paragraph 101, perpendicular direction)*.

9. Regarding Claim 11, the limitations of claim 1 have been addressed. Koyama, Tsang, and Jung disclosed:

an array substrate *(Koyama, Paragraph 56, substrate)*;

a color filter substrate disposed to face the array substrate *(Koyama, Paragraph 56, active matrix substrate)*;

a main liquid crystal layer positioned between the array substrate and the color filter substrate *(Koyama, Paragraph 56, display liquid crystal layer)*;

a first polarizer attached on an outer surface of the array substrate *(Koyama, Paragraph 56, first polarizer)*;

a second polarizer attached on an outer surface of the color filter substrate *(Koyama, Paragraph 56, second polarizer)*.

10. Regarding Claim 12, the limitations of claim 1 have been addressed. Koyama, Tsang, and Jung disclosed:

a $\lambda/4$ retardation layer formed on the first substrate of the auxiliary display panel that changes a linearly polarized left or right image made incident to the auxiliary display panel into a left circularly polarized (or right circularly polarized) state *(Koyama, Paragraph 66, retardation plate)*.

11. Regarding Claim 13, the limitations of claim 12 have been addressed. Koyama, Tsang, and Jung disclosed:

wherein the $\lambda/4$ retardation layer in formed in an in-cell form on an upper surface of the first substrate of the auxiliary display panel together with the first substrate *(Koyama, Paragraph 92, the patterned retardation plate shielding off the light in the area outside the active area of the retardation plate)*.

12. Regarding Claim 14, the limitations of claim 12 have been addressed. Koyama, Tsang, and Jung disclosed:

wherein the $\lambda/4$ retardation layer is attached in a form of a film on a lower surface of the first substrate of the auxiliary display panel *(Koyama, Figure 2, Paragraph 92, passing light through the patterned retardation plate or the liquid crystal panel)*.

14. Regarding Claim 16, the limitations of claim 5 have been addressed. Koyama, Tsang, and Jung disclosed:

wherein when the auxiliary display panel is turned on, it outputs polarization information of the left image outputted from the main display panel without changing it, and when the auxiliary display panel is turned off, it changes the polarization information of the right image outputted from the main display panel, and outputs the image *(Tsang, Column 4, Lines 1-44, the polarizer switches the polarization between 0° (off) to 90° (on) based on the right and left image data from the main display that the polarizer is synchronized with)*;

15. Claims 6, 10, are rejected under 35 U.S.C. 103(a) as being unpatentable over Koyama et al (US 2005/0285997) in view of Tsang (US 6,510,002), Jung (US 2006/0268196), and Yano et al (US 2008/0284699).

16. Regarding Claim 6, the limitations of claim 1 have been addressed. Koyama, Tsang, and Jung did not explicitly disclose wherein the sub-liquid crystal layer includes a plurality of liquid crystal molecules, and when the auxiliary display panel is driven, the liquid crystal molecules are arranged to be perpendicular to the first and second substrates, and when the auxiliary display panel is not driven, the liquid crystal molecules are arranged in a twisted nematic structure;

However, in an analogous art, Yano disclosed wherein the sub-liquid crystal layer includes a plurality of liquid crystal molecules, and when the auxiliary display panel is

driven, the liquid crystal molecules are arranged to be perpendicular to the first and second substrates, and when the auxiliary display panel is not driven, the liquid crystal molecules are arranged in a twisted nematic structure *(Paragraphs 47, 49, 120 Hz picture signal and a nematic liquid crystal or perpendicular orientation mode)*;

One of ordinary skill in the art would have been motivated to combine the teachings of Koyama, Tsang, and Jung, with Yano because the references involve three dimensional displays, and as such, both are within the same environment.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the twisted nematic structure of Yano with the teachings of Koyama, Tsang, and Jung, in order to allow realignment of crystals in the LCD, thereby allowing the display three dimensional images.

17. Regarding Claim 10, the limitations of claim 1 have been addressed. Koyama, Tsang, Jung, and Yano disclosed:

wherein the main display panel is driven at 120 Hz or higher *(Yano, Paragraphs 47, 49, 120 Hz picture signal)*;

18. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Koyama et al (US 2005/0285997) in view of Tsang (US 6,510,002), Jung (US 2006/0268196), and Sung et al (US 2007/0206134).

19. Regarding Claim 7, the limitations of claim 1 have been addressed. Koyama, Tsang, and Jung, did not explicitly disclose wherein the sub-liquid crystal layer includes

a plurality of liquid crystal molecules, and when the auxiliary display panel is driven, the liquid crystal molecules are arranged to be perpendicular to the first and second substrates, and when the auxiliary display panel is not driven, the liquid crystal molecules are arranged to be parallel to the first and second substrates.

However, in an analogous art, Sung disclosed wherein the sub-liquid crystal layer includes a plurality of liquid crystal molecules, and when the auxiliary display panel is driven, the liquid crystal molecules are arranged to be perpendicular to the first and second substrates, and when the auxiliary display panel is not driven, the liquid crystal molecules are arranged to be parallel to the first and second substrates *(Paragraph 33, parallel and perpendicular plates determining light transmission)*;

One of ordinary skill in the art would have been motivated to combine the teachings of Koyama, Tsang, and Jung, with Sung because the references involve three dimensional displays, and as such, both are within the same environment.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the parallel and perpendicular liquid crystal molecules of Sung with the teachings of Koyama, Tsang, and Jung, in order to allow the apparatus to display both 2D and 3D images, thereby increasing the functionality of Koyama, Tsang, and Jung.

Response to Arguments

1. Applicant's arguments filed 0821/2012 have been fully considered but they are not persuasive. In the remarks, Applicant argued that:

a. Koyama, Tsang, and Jung, fail to disclose or suggest "wherein the auxiliary display panel is driven to be turned on with respect to one of the displayed left and right images and serves to change polarization information of one of the displayed left and right images" *(page 6)*.

In response: The Examiner respectfully disagrees. As a note, the remarks state that the Examiner relied on Koyama to teach this limitation. However, the Tsang reference was cited. Nonetheless, the Applicant has argued that Koyama does not disclose switching polarization information of one of the images. Koyama states that the liquid crystal panel servers as a switching means for switching a polarization state of light passing through the panel *(Paragraph 60)*. As the polarization state is switched, polarization information of one of the images is changed. The Examiner relied upon the Tsang reference to disclose the rest of the limitations. Namely, Tsang disclosed that the polarizer polarizes images emitted from the display to 0, 45, or 90 when a certain voltage is respectfully applied. Therefore, the polarization information in Tsang is also changed *(Column 3, Lines 34-44, Column 4, Lines 1-21)*.

b. The auxiliary display panel of the present invention changes polarization information of one of the displayed left and right images and not both of the displayed left and right images *(page 7)*.

In response: The Examiner respectfully disagrees. The claim language states that one of the displayed left and right images needs to have polarization information changed. As Tsang disclosed that both images have polarization information changed *(Column 3, Lines 34-44, Column 4, Lines 1-21)*, Tsang covers the limitation. The claim language as filed does not preclude from changing polarization information from both images.

Conclusion

Examiner's Note: Examiner has cited particular columns and line numbers in the references applied to the claims above for the convenience of the applicant. Although the specified citations are representative of the teachings of the art and are applied to specific limitations within the individual claim, other passages and figures may apply as well. It is respectfully requested from the applicant in preparing responses, to fully consider the references in entirety as potentially teaching all or part of the claimed invention, as well as the context of the passage as taught by the prior art or disclosed by the Examiner.

In the case of amending the claimed invention, Applicant is respectfully requested to indicate the portion(s) of the specification which dictate(s) the structure relied on for proper interpretation and also to verify and ascertain the metes and bounds of the claimed invention.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to STEVEN NGUYEN whose telephone number is (571)270-5663. The examiner can normally be reached on Monday through Thursday with alternating Friday 7:30AM - 5:00PM, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tonia Dollinger can be reached on (571) 272-4170. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/S. N./
Examiner, Art Unit 2443
02/06/2014

/JERRY DENNISON/
Primary Examiner, Art Unit 2443

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	2	"20050285997" and polar$8	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; IBM_TDB	OR	OFF	2014/02/06 15:42
S1	1	"12340005"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:10
S2	7535	((seung near2 lee) or (hoon near2 kang) or (sung near2 jung)).in.	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:10
S3	2913	(lg near display).asn.	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:11
S4	68	S2 and S3	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:11
S5	11	S4 and 3D	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:14
S7	4	("20020118276" | "20050036082" | "6252570" | "6252624").PN.	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:17
S8	2	"2006268196"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:29
S9	1	"20060268196"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:29
S10	2	"2004012851"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:32
S11	1	"20040012851"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:32
S12	2244	parallax near3 barrier	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:45
S13	1692	S12 and (3D or (three near2 dimension$3))	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:46
S14	121	S13 and (polariz$4 and (indium near3 oxide))	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:46
S15	112	S14 and (left and right)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:47
S16	19276116	@ad<"20080709" or	US-PGPUB;	ADJ	ON	2011/12/15

		@rlad<"20080709"	USPAT; EPO; JPO; IBM_TDB			10:48
S17	0	S15 and S6	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:48
S18	98	S15 and S16	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:48
S19	1	"7199845".pn.	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:49
S20	2	"20050285997"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:49
S21	8964	S16 and ("120" near2 HZ)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 11:04
S22	366011	S16 and (HZ or hertz)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 11:04
S23	4	S15 and ("120" near2 HZ)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 11:04
S24	2	"20050285997" and (between or (in near2 between))	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:26
S25	2	"20050285997" and (ITO or (indium near3 oxide))	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:36
S26	2	"20050285997" and (height)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:37
S27	2	"20050285997" and (height or width)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:38
S28	0	"20050285997" and (synch$7)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:39
S29	0	"20060268196" and (synch$7)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:39
S30	59	S14 and (parallel and perpendicular)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:44
S31	55	S30 and S16	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:44
S32	1	"20100007716" and (substantial$4).clm.	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:48
S33	20	S14 and (perpendicular and (twisted near3 nematic))	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:49
S34	3	S14 and (perpendicular and (twisted near3 nematic)) and (HZ or hertz)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:49
S35	0	((3D or (three near3	US-PGPUB;	ADJ	ON	2011/12/15

		dimension$4)) same (perpendicular near20 (twisted near3 nematic)) and (HZ or hertz))	USPAT; EPO; JPO; IBM_TDB			12:53
S36	62	(perpendicular near20 (twisted near3 nematic)) and (HZ or hertz)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:54
S37	62	S36 and (LCD or (liquid near3 crystal))	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:55
S38	57	S37 and S16	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:55
S39	23	(perpendicular near20 (twisted near3 nematic)) and ("120" near3 (HZ or hertz))	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:57
S40	22	S39 and S16	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:57
S41	2	"20080284699"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:58
S42	2	"20080284699" and (nematic and perpendicular and "120")	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:58
S43	2	"20050285997" and (rub$5)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:11
S44	2	"20050285997" and (perpendic$7)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:12
S45	2	"20050285997"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:22
S46	2	"20060269496"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:27
S47	1	"20060268196"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:27
S48	1	"20020118276"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:27
S49	483	348/43.ccls.	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:28
S50	1	"20050036082"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:28
S51	1	"6252570".pn.	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:28
S52	1	"6252624".pn.	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:28
S53	1	"12340005"	US-PGPUB; USPAT; EPO;	ADJ	ON	2012/05/11 12:36

			JPO; IBM_TDB			
S54	0	"12340005" and synchroni$5	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/11 12:36
S55	0	"12340005" and synch$8	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/11 12:36
S56	1	"20100007716"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/11 12:36
S57	0	"20100007716" and synch$8	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/11 12:36
S58	1	"20100007716" and polariz$5	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/11 12:38
S59	7	"6510002"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/11 12:41
S60	1	"20100007716" and subframe	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/11 13:13
S61	0	"20050285997" and subframe	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/11 13:14
S62	0	"20050285997" and frame	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/11 13:14
S63	2	"20050285997" and separat$4	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/11 13:18
S64	0	"6510002".pn. and elect$4	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/14 12:39
S65	1	"6510002".pn. and elect$6	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/14 12:39
S66	2	"20050285997" and elect$6	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/14 12:40
S67	1	"20100007716" and "60"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/14 12:46
S68	1	"6510002".pn. and frame$2	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/14 12:49
S69	4	"6510002".pn. or "20050285997" or "20060268196"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/14 13:02
S70	0	S69 and on	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/14 13:02
S71	4	S69 and (on or off)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/14 13:02
S72	3	S69 and alternat$5	US-PGPUB; USPAT; EPO;	ADJ	ON	2012/05/14 13:22

			JPO; IBM_TDB			
S73	1	"12340005"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; IBM_TDB	OR	OFF	2014/02/06 11:23
S74	0	"12340005" and synch$6	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; IBM_TDB	OR	OFF	2014/02/06 11:23
S75	2	"20050285997"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; IBM_TDB	OR	OFF	2014/02/06 13:35

EAST Search History (Interference)

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2/ 6/ 2014 3:58:41 PM
C:\ Users\ snguyen3\ Documents\ EAST\ Workspaces\ 12340005.wsp

FORM PTO-1449	SERIAL NO. 12/340,005	CASE NO. 12579-6201
LIST OF PATENTS AND PUBLICATIONS FOR APPLICANT'S INFORMATION DISCLOSURE STATEMENT	FILING DATE 12/19/2008	GROUP ART UNIT 2443
(use several sheets if necessary)	APPLICANT(S): Seung-Chul Lee et al.	CONFIRMATION NO. 8241

REFERENCE DESIGNATION U.S. PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER Number-Kind Code (if known)	DATE	NAME	CLASS/ SUBCLASS	FILING DATE
	D1					
	D2					
	D3					
	D4					
	D5					
	D6					
	D7					
	D8					
	D9					
	D10					
	D11					
	D12					
	D13					

FOREIGN PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER Number-Kind Code (if known)	DATE	COUNTRY	CLASS/ SUBCLASS	TRANSLATION YES OR NO
	D14	JP 06-165221	06/10/1994	Japan		Abstract
	D15	JP 2003-189208	07/04/2003	Japan		Abstract

EXAMINER INITIAL		OTHER ART – NON PATENT LITERATURE DOCUMENTS (Include name of author, title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date page(s), volume-issue number(s), publisher, city and/or country where published.
	D16	Copy of Office Action issued in corresponding Japanese Patent Application No. 2008-316168, mailed March 13, 2012.
	D17	
	D18	
	D19	
	D20	
	D21	

EXAMINER /Steven Nguyen/	DATE CONSIDERED 02/06/2014

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /S.N./

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12340005	LEE ET AL.
	Examiner	Art Unit
	STEVEN NGUYEN	2443

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	12/15/2011	05/14/2012	02/06/2014						
	1	✓	✓	✓						
	2	✓	✓	✓						
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	10	✓	✓	✓						
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	12	✓	✓	✓						
	13	✓	✓	✓						
	14	✓	✓	✓						
	15		✓	-						
	16		✓	✓						

FORM PTO-1449	SERIAL NO. 12/340,005	CASE NO. 12579-6201
LIST OF PATENTS AND PUBLICATIONS FOR APPLICANT'S INFORMATION DISCLOSURE STATEMENT	FILING DATE 12/19/2008	GROUP ART UNIT 2443
(use several sheets if necessary) APPLICANT(S): Seung-Chul Lee et al.		CONFIRMATION NO. 8241

REFERENCE DESIGNATION U.S. PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER Number-Kind Code (if known)	DATE	NAME	CLASS/ SUBCLASS	FILING DATE
	E1					
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	E3					
	E4					
	E5					
	E6					
	E7					
	E8					
	E9					
	E10					
	E11					
	E12					
	E13					

FOREIGN PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER Number-Kind Code (if known)	DATE	COUNTRY	CLASS/ SUBCLASS	TRANSLATION YES OR NO
	E14	JP 2002-296540	10/09/2002	Japan		Abstract
	E15	JP 2005-181668	07/07/2005	Japan		Abstract
	E16	KR 1020040062251 A	07/07/2004	Korea		Abstract

EXAMINER INITIAL	OTHER ART – NON PATENT LITERATURE DOCUMENTS (Include name of author, title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date page(s), volume-issue number(s), publisher, city and/or country where published.	
	E17	Copy of Office Action issued in corresponding Korean Patent Application No. 10-2008-0066695, mailed November 29, 2012.
	E18	
	E19	
	E20	
	E21	
	E22	

EXAMINER /Steven Nguyen/	DATE CONSIDERED 02/06/2014

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /S.N./

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12340005	LEE ET AL.
	Examiner	Art Unit
	STEVEN NGUYEN	2443

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
348	43	12/13/2011	SCN

SEARCH NOTES		
Search Notes	Date	Examiner
Inventor/Assignee Search	12/13/2011	SCN
EAST Search	12/13/2011	SCN
Updated EAST Search	05/09/2012	SCN
Updated EAST Search	02/03/2014	SCN

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

FORM PTO-1449	SERIAL NO. 12/340,005	CASE NO. 12579-6201
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(use several sheets if necessary) APPLICANT(S): Seung-Chul Lee et al.		CONFIRMATION NO. 8241

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	E4					
	E5					
	E6					
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	E8					
	E9					
	E10					
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	E13					

FOREIGN PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER Number-Kind Code (if known)	DATE	COUNTRY	CLASS/ SUBCLASS	TRANSLATION YES OR NO
	E14	JP 2002-296540	10/09/2002	Japan		Abstract
	E15	JP 2005-181668	07/07/2005	Japan		Abstract
	E16	KR 1020040062251 A	07/07/2004	Korea		Abstract

EXAMINER INITIAL	OTHER ART – NON PATENT LITERATURE DOCUMENTS (Include name of author, title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date page(s), volume-issue number(s), publisher, city and/or country where published.	
	E17	Copy of Office Action issued in corresponding Korean Patent Application No. 10-2008-0066695, mailed November 29, 2012.
	E18	
	E19	
	E20	
	E21	
	E22	

EXAMINER	DATE CONSIDERED

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2002-296540
(43)Date of publication of application : 09.10.2002

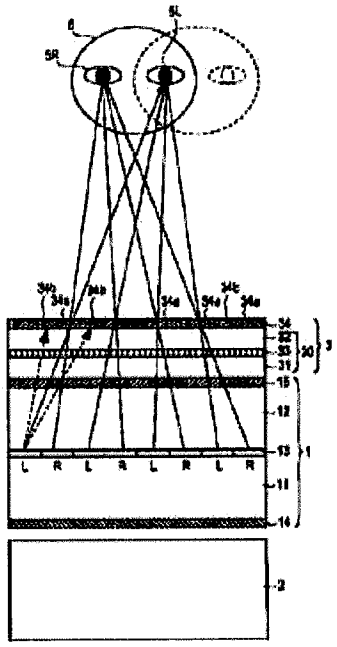
(51)Int.Cl. G02B 27/22
G02F 1/13
G09G 3/20
G09G 3/36
H04N 13/04

(21)Application number : 2001-095508
(22)Date of filing : 29.03.2001

(71)Applicant : SANYO ELECTRIC CO LTD
(72)Inventor : HAMAGISHI GORO

(54) STEREOSCOPIC IMAGE DISPLAY DEVICE WITHOUT SPECTACLES

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a stereoscopic image display device simplifying a structure and enlarging possible lateral range which enables stereoscopic display at a relatively low cost.
SOLUTION: This stereoscopic image display device is provided with a liquid crystal panel 1 for display constituting a display screen by a pixel group for a left eye and the pixel group for a right eye, a light source 2 provided on the light incident side of the liquid crystal panel for the display and an image separation means 3 arranged on the light emission side of the liquid crystal panel 1 for the display and constituting a barrier part generating a binocular parallax effect. The image separation means 3 is constituted of a liquid crystal panel part 30 for polarizing the polarization axis of image light from the liquid crystal panel 1 for the display and a polarization part 34 formed having the pattern of the different axial directions of polarized light alternately transmitted so as to separate left and right image light from the liquid crystal panel. The drive of the liquid crystal panel part 30 is controlled by the position of an observer 5 and the position of the light transmitted through the polarization part is switched.



(19)日本国特許庁（ＪＰ）　(12) 公開特許公報（Ａ）　(11)特許出願公開番号
特開2002－296540
（P2002－296540A）
(43)公開日　平成14年10月９日(2002.10.9)

(51)Int.Cl.'	識別記号	ＦＩ		テーマコード'（参考）
Ｇ０２Ｂ　27/22		Ｇ０２Ｂ　27/22		２Ｈ０８８
Ｇ０２Ｆ　1/13	５０５	Ｇ０２Ｆ　1/13	５０５	５Ｃ００６
Ｇ０９Ｇ　3/20	６６０	Ｇ０９Ｇ　3/20	６６０Ｘ	５Ｃ０６１
3/36		3/36		５Ｃ０８０
Ｈ０４Ｎ　13/04		Ｈ０４Ｎ　13/04		

審査請求　有　請求項の数４　ＯＬ　（全８頁）

(21)出願番号　特願2001－95508(P2001－95508)

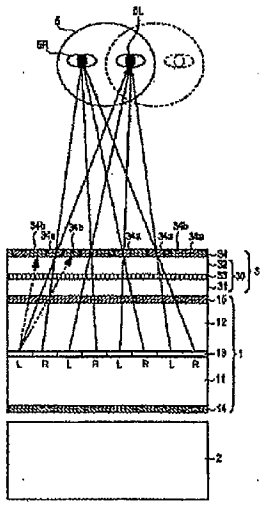
(22)出願日　平成13年３月29日(2001.3.29)

(71)出願人　000001889
三洋電機株式会社
大阪府守口市京阪本通２丁目５番５号
(72)発明者　濱岸　五郎
大阪府守口市京阪本通２丁目５番５号　三洋電機株式会社内
(74)代理人　100085213
弁理士　鳥居　洋

最終頁に続く

(54)【発明の名称】　眼鏡無し立体映像表示装置

(57)【要約】
【課題】構造を簡略化し、左右の立体可能な範囲を比較的低コストで拡大できる立体映像表示装置を提供することを目的とする。
【解決手段】この発明は、左眼用の画素群と右眼用画素群とにより表示画面を構成する表示用液晶パネル１と、表示用液晶パネルの光入射側に設けられた光源２と、表示用液晶パネル１の光出射側に配置され両眼視差効果を生じさせるバリア部を構成する映像分離手段３と、を備え、映像分離手段３は、前記表示用液晶パネル１からの映像光の偏光軸を偏光させるための液晶パネル部３０と、前記液晶パネルからの左右の映像光を分離するために交互に透過する偏光の軸方向が異なるパターンを有して形成された偏光部３４と、で構成され、観察者５の位置により、前記液晶パネル部３０の駆動を制御し、前記偏光部を透過する光の位置を切り替える。



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【特許請求の範囲】

【請求項１】　左眼用の画素群と右眼用画素群とにより表示画面を構成する表示用液晶パネルと、前記表示用液晶パネルの光入射側に設けられた光源と、前記表示用液晶パネルの光出射側に配置され両眼視差効果を生じさせるバリア部を構成する映像分離手段と、を備え、前記映像分離手段は、前記表示用液晶パネルからの映像光の偏光軸を偏光させるための液晶パネル部と、前記液晶パネルからの左右の映像光を分離するために交互に透過する偏光の軸方向が異なるパターンを有して形成された偏光部と、で構成され、観察者の位置により、前記液晶パネル部の駆動を制御し、前記偏光部を透過する光の位置を切り替えることを特徴とする眼鏡無し立体映像表示装置。

【請求項２】　左眼用の画素群と右眼用画素群とにより表示画面を構成する表示用液晶パネルと、前記液晶パネルの光入射側に設けられた光源と、前記光源と前記表示用液晶パネルとの間に配置され両眼視差効果を生じさせるバリア部を構成する映像分離手段と、を備え、前記映像分離手段は、交互に透過する偏光の軸方向が異なるパターンを有して形成された偏光部と、この偏光部を透過した光の偏光軸を偏光させるための液晶パネル部と、で構成され、観察者の位置により、前記液晶パネル部の駆動を制御し、前記表示用液晶パネルに入射させる左右の光の位置を切り替えることを特徴とする眼鏡無し立体映像表示装置。

【請求項３】　前記液晶パネル部の電極は全面ベタ電極であることを特徴とする請求項１又は２に記載の眼鏡無し立体映像表示装置。

【請求項４】　前記液晶パネル部に印加する駆動電圧を高速に切り替え、２次元映像を観察することを特徴とする請求項１ないし３のいずれかに記載の眼鏡無し立体映像表示装置。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】この発明は、特殊な眼鏡を用いることなく立体映像を観察することができる立体映像表示装置に関し、特に観察者が左右方向に移動した場合においても立体映像を観察することができる立体映像表示装置を提供する。

【０００２】

【従来の技術】従来、特殊な眼鏡を使用せずに立体映像を表示する装置として、液晶パネル等の表示パネルの表示画面の観察者側にパララックスバリアやレンチキュラレンズを配置し、表示画面に１縦ライン毎に交互に表示される右眼画像と左眼画像からの光を分離して立体映像を視覚できるようにしているものがある。

【０００３】また、液晶パネル等の透過型の表示パネルに左眼用の光と右眼用の光とを分離して入射することにより、特殊な眼鏡を使用することなく立体映像を表示する装置もある。

【０００４】上記した立体映像表示装置では、観察者の適視距離など最適観察位置が装置の構造により決められている。この最適観察位置から観察者が左右に移動すると、良好な立体映像が観察できなくなる。

【０００５】観察者の左右の立体視域を拡げる方法が、特開平７－２７０７４５号公報（ＩＰＣ：Ｇ０２Ｆ　１／１３）に提案されている。この方法は、左眼用画素からの光と右眼用画素からの光を分離する遮光バリアとして、電気的にスリットが形成及び消失させるアクティブバリア方式の素子を用い、観察者の左右方向の移動に対して、アクティブバリア方式の素子のスリットの形成位置を電気的に移動させる構成により対応している。

【０００６】

【発明が解決しようとする課題】しかしながら、上述した方法においては、スリットを電気的に横方向に移動できる構成を実現するために、構成が非常に複雑になり、コストが高くなるという問題がある。

【０００７】この発明は、上記の事情を鑑み、構造を簡略化し、左右の立体可能な範囲を比較的低コストで拡大できる立体映像表示装置を提供することを目的とする。

【０００８】

【課題を解決するための手段】この発明は、左眼用の画素群と右眼用画素群とにより表示画面を構成する表示用液晶パネルと、前記表示用液晶パネルの光入射側に設けられた光源と、前記表示用液晶パネルの光出射側に配置され両眼視差効果を生じさせるバリア部を構成する映像分離手段と、を備え、前記映像分離手段は、前記表示用液晶パネルからの映像光の偏光軸を偏光させるための液晶パネル部と、前記液晶パネルからの左右の映像光を分離するために交互に透過する偏光の軸方向が異なるパターンを有して形成された偏光部と、で構成され、観察者の位置により、前記液晶パネル部の駆動を制御し、前記偏光部を透過する光の位置を切り替えることを特徴とする。

【０００９】また、この発明は、左眼用の画素群と右眼用画素群とにより表示画面を構成する表示用液晶パネルと、前記液晶パネルの光入射側に設けられた光源と、前記光源と前記表示用液晶パネルとの間に配置され両眼視差効果を生じさせるバリア部を構成する映像分離手段と、を備え、前記映像分離手段は、交互に透過する偏光の軸方向が異なるパターンを有して形成された偏光部と、この偏光部を透過した光の偏光軸を偏光させるための液晶パネル部と、で構成され、観察者の位置により、前記液晶パネル部の駆動を制御し、前記表示用液晶パネルに入射させる左右の光の位置を切り替えることを特徴とする。

【００１０】前記液晶パネル部の電極は全面ベタ電極であることを特徴とする。

【００１１】上記のように構成することで、液晶パネル

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部の駆動を制御することで左右の立体可能な範囲を広げることができる。

【００１２】又、この発明の立体映像表示装置は、前記液晶パネル部に印加する駆動電圧を高速に切り替えることで、２次元映像を観察することができる。

【００１３】

【発明の実施の形態】以下、この発明の実施の形態につき図面を参照して説明する。図１は、この発明の第１の実施の形態における正視位置での観察状態の構成を示す模式図、図２は、この発明の第１の実施の形態における逆視位置での観察状態の構成を示す模式図、図３は、この発明の立体映像表示装置の構成を示すブロック図である。

【００１４】この発明の立体映像表示装置は、表示パネル用の液晶パネル１を挟んで観察者５側に、映像分離手段３が配置され、平面光源であるバックライト２からの光が液晶パネル１で変調され、この変調された映像光が映像分離手段３で左右の映像光に分離され、観察者５の左右の眼５Ｌ、５Ｒにそれぞれ与えられる。この実施形態の基本的な構成は、通常のパララックスバリア方式の立体映像表示装置と同様である。

【００１５】前記液晶パネル１は、光入射側ガラス基板１１と、光出射側ガラス基板１２と、これら基板１１、１２間に設けられた液晶層１３と、光入射側ガラス基板１１に貼付された光入射側偏光板１４と、光出射側ガラス基板１２に貼付された光出射側偏光板１５と、を有する。この液晶パネル１は、例えば、マトリクス駆動方式により駆動され、図示しない透明画素電極に画像信号に応じて電圧が印加されることによって画像が表示される。そして、液晶パネル１に供給する映像信号を処理することにより、１縦ラインおきに右眼用画像Ｒと左眼用画像Ｌが交互に表示される。

【００１６】周知の通り、液晶パネル１は、入射側偏光板１４により、一方向の振動方向に偏光された偏光光として光が入射し、出射側偏光板１５より所定の偏光方向の光として出射する。そして、液晶層１３への与える電界を制御することにより、出射側偏光板１５からの光の透過又は遮断を制御する。

【００１７】前記映像分離手段３は、液晶パネル３０とその液晶パネル３０の観察側に設けられた偏光部３４とからなる。偏光部３４は、交互に透過する偏光の軸方向が異なるパターンを有して形成されている。例えば、偏光部３４は、偏光パターン部３４ａと３４ｂとが互いに偏光の軸方向に対して９０度の位相差を有する位相差板で構成され、液晶パネル１を透過する光を左右に分離して、観察者５の左右の眼５Ｌ、５Ｒに与えるように所定のピッチで形成されている。

【００１８】この偏光パターン部３４ａ、例えば、光出射側偏光板１５と同じ偏光光を透過させるように構成され、偏光パターン部３４ｂは、光出射側偏光板１５とは位相差が９０度異なるように構成されている。従って、１つの偏光光である映像光は、どちらかの偏光パターン部３４ａ又は３４ｂにより、遮断されることになる。この結果、この偏光部３４が、パララックスバリアと同じ機能を有することになる。

【００１９】この偏光部３４は、例えば、偏光板上に所定のピッチによりストライプ状に１／２位相差パターンを形成した透明位相差フィルムを貼り付けて形成することができる。

【００２０】液晶パネル３０は、ガラス基板３１とガラス基板３２との間にＴＮ型液晶からなる液晶層３３が形成されている。ガラス基板３１、３２の内側の全面にはＩＴＯ等の透明ベタ電極が形成されており、電圧の印加の有無によって、液晶パネル１からの映像光の偏光方向をそのまま、透過させたり、９０度回転させて透過させる。

【００２１】上記した偏光部３４は、液晶パネル３０の光出射側ガラス板３２に貼り付けるなどして設けられている。

【００２２】液晶パネル３０に電圧を印加しない場合には、図１に示す実施形態では、液晶パネル１の偏光板１５を経て出射された映像光は、光出射側偏光板１５と同じ偏光光を透過させる偏光パターン部３４ａを透過し、その隣の偏光パターン部３４ｂでは光が遮断される。従って、この偏光部３４により、左右の映像光が分離されて、それぞれ観察者５の左右眼５Ｌ、５Ｒに与えられ、立体視が行える。

【００２３】図１は、正視状態のときを示している。観察者の頭が図１の実線の状態から破線で示すように左右どちらかに移動し（図１の破線では左に移動）逆視領域にあると、左右の眼には、左右異なる映像光が入射することになる。そこで、この発明では、観察者の頭が逆視領域にあるときには、液晶パネル３０に電圧を印加し、液晶パネル１からの映像光の偏光方向を９０度回転させて、偏光部３４に与える。この状態を図２に示す。

【００２４】図２に示すように、液晶パネル３０で、液晶パネル１からの映像光の偏光方向が９０度回転された結果、偏光パターン部３４ａでは光が遮断され、その隣の偏光パターン部３４ｂでは光が透過することになる。従って、この偏光部３４により、左右の映像光が分離されて、それぞれ観察者５の左右眼５Ｌ、５Ｒに与えられ、立体視が行える。即ち、液晶パネル３０のＯＮ／ＯＦＦ制御により、スリットの形成位置を移動させたことと同じになる。

【００２５】このように、観察者の頭の位置に応じて、液晶パネル３０のＯＮ／ＯＦＦ制御を行うことで、観察者の左右の立体視域を拡げることができる。

【００２６】図４は、この発明の立体映像表示装置の構成を示すブロック図である。液晶パネル１に表示された立体映像を観察する観察者の位置を検出するセンサ１０

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１からの出力が位置検出制御回路１０２に与えられ、この位置検出制御回路１０２は、センサ１０１の出力により、観察者が正視観察位置にいるか、逆視観察位置にいるかを検知し、その位置情報を分離制御回路１０３に与える。

【００２７】表示回路１００は液晶パネル１に表示する左眼用映像信号及び右眼用映像信号をそれぞれ生成し、液晶パネル１に与える。

【００２８】また、分離制御回路１０３は位置検出制御回路１０２からの出力により、観察者が正視観察位置にいるときには、液晶パネル３０への電圧の印加を停止し、逆視観察位置にいるときには、液晶パネル３０へ電圧を印加するように制御する。

【００２９】すなわち、観察者が正視観察位置にいるときには、図１に示すように、液晶パネル３０をＯＦＦし、液晶パネル１からの映像光をそのまま偏光部３４に与える。

【００３０】また、観察者が逆視観察位置にいるときは、図２に示すように、液晶パネル３０をＯＮし、液晶パネル１からの映像光の偏光方向を９０度偏光させ偏光部３４に与える。

【００３１】以上のように、液晶パネル３０のＯＮ／ＯＦＦ制御により、観察者が正視位置、逆視位置のどちらにいても観察が容易に行える。

【００３２】次に、この発明の第２の実施形態につき説明する。図４は、この発明の第２の実施の形態における正視位置での観察状態の構成を示す模式図、図５は、この発明の第２の実施の形態における逆視位置での観察状態の構成を示す模式図である。なお、図１の実施形態と同じ構成には同じ符号を付す。

【００３３】この第２の実施形態の立体映像表示装置は、平面光源であるバックライト２と液晶パネル１との間に映像分離手段３’が配置される。この映像分離手段３’は、偏光部３４’とＴＮ型液晶パネル３０で構成され、バックライト２，偏光部３４’，ＴＮ型液晶パネル３０，液晶パネル１の順で配置されている。

【００３４】偏光部３４’は、上記した偏光部３４と同様に、偏光パターン部３４ａ’と３４ｂ’とが互いに偏光の軸方向に対して９０度の位相差を有する位相差板で構成されいる。この偏光部３４’は、偏光パターン部３４ａ’と３４ｂ’と液晶パネル１の入射側偏光板１４とにより、バックライト２からの光をスリット化し、前記液晶パネル１を透過する光を左右に分離して、観察者５の左右の眼５Ｌ、５Ｒに与えるように、所定のピッチで形成されている。

【００３５】この偏光パターン部３４ｂ’，例えば、光入射側偏光板１４と同じ偏光光を透過させるように構成され，偏光パターン部３４ａ’は、光入射側偏光板１４とは位相差が９０度異なるように構成されている。従って、バックライト２からの光は互いに位相が９０度異なってストライプ状に液晶パネル３０に入射される。そして，液晶パネル１の入射側偏光板１４に与えられる。入射側偏光板１４では、１つの偏光光の光を液晶パネル１内に入射させる。この結果、この偏光部３４’が、バックライト２からの光をスリット化し、前記液晶パネル１を透過する光を左右に分離する光源側遮光スバリアと同じ機能を有することになる。

【００３６】この偏光部３４’は，例えば、偏光板上に所定のピッチによりストライプ状に１／２位相差パターンを形成した透明位相差フィルムを貼り付けて形成することができる

【００３７】液晶パネル３０は、ガラス基板３１とガラス基板３２との間にＴＮ型液晶からなる液層層３３が形成されている。ガラス基板３１、３２の内側の全面にはＩＴＯ等の透明ベタ電極が形成されており、電圧の印加の有無によって、液晶パネル１からの映像光の偏光方向をそのまま、透過させたり、９０度回転させて透過させる。

【００３８】液晶パネル３０に電圧を印加しない場合には，図４に示す実施形態では、偏光部３４’の光入射側偏光板１４と同じ偏光光を透過させる偏光パターン部３４ｂ’を透過した光は，液層パネル１内に入射される。一方、その隣の偏光パターン部３４ａ’を透過した光は、光入射側偏光板１４で光が遮断される。従って、この偏光部３４’により、左右の光に分離され、液晶パネル１で変調された映像光は、それぞれ観察者５の左右眼５Ｌ、５Ｒに与えられ、立体視が行える。

【００３９】図４は、正視状態のときを示している。観察者の頭が図１の実線の状態から破線で示すように左右どちらかに移動し（図４の破線では左に移動）逆視領域にあると、左右の眼には、左右異なる映像光が入射することのなる，そこで、この発明では、観察者の頭が逆視領域にあるときには、液晶パネル３０に電圧を印加し、偏光部３４’からの光の偏光方向を９０度回転させて、液晶パネル１に与える。この状態を図５に示す。

【００４０】図５に示すように、液晶パネル３０で、偏光部３４’からの光の偏光方向が９０度回転された結果、偏光パターン部３４ａ’で透過した光が入射され、その隣の偏光パターン部３４ｂ’を透過した光が遮断されることになる。従って、この偏光部３４’により、左右の光が分離されて、それぞれ観察者５の左右眼５Ｌ、５Ｒに与えられ、立体視が行える。即ち、液晶パネル３０のＯＮ／ＯＦＦ制御により、スリットの形成位置を移動させたことと同じになる，

【００４１】このように、観察者の頭の位置に応じて、液晶パネル３０のＯＮ／ＯＦＦ制御を行うことで、観察者の左右の立体視域を拡げることができる。

【００４２】上記した第１及び第２の実施形態において，液晶パネル３０の駆動を高速，例えば，１２０Ｈｚ以上の高速でＯＮ／ＯＦＦ駆動をすると、２次元映像を

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観察者は見ることができる．図６，図７に第１の実施形態を用いて２次元映像を見る場合を示す．図８，図９に第２の実施形態を用いて２次元映像を見る場合を示す．

【００４３】図６，図７（又は図８，図９）に示す状態が１２０Ｈｚ以上の間隔で切り替わることになる．この結果，観察者５は，Ａの画像とＢの画像を時分割的に観察することになる．従って，液晶パネル３０（３０'）を例えば，１２０Ｈｚ以上の高速でＯＮ／ＯＦＦ駆動すると，２次元映像を観察することができる．

【００４４】

【発明の効果】以上説明したように，この発明によれば，極めて簡単な構成で左右の立体可能な範囲を比較的低コストで拡大できる．また，映像分離手段の液晶パネル部に印加する駆動電圧を高速に切り替えることで，２次元映像も簡単に観察することができる．

【図面の簡単な説明】

【図１】この発明の第１の実施の形態における正視位置での観察状態の構成を示す模式図である．

【図２】この発明の第１の実施の形態における逆視位置での観察状態の構成を示す模式図である．

【図３】この発明の立体映像表示装置の構成を示すブロック図である．

【図４】この発明の第２の実施の形態における正視位置での観察状態の構成を示す模式図である．

【図５】この発明の第２の実施の形態における逆視位置での観察状態の構成を示す模式図である．

【図６】第１の実施形態を用いて２次元映像を観察する場合を示す模式図である．

【図７】第１の実施形態を用いて２次元映像を観察する場合を示す模式図である．

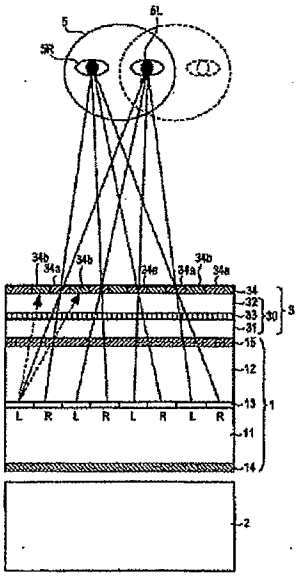
【図８】第２の実施形態を用いて２次元映像を観察する場合を示す模式図である．

【図９】第２の実施形態を用いて２次元映像を観察する場合を示す模式図である．

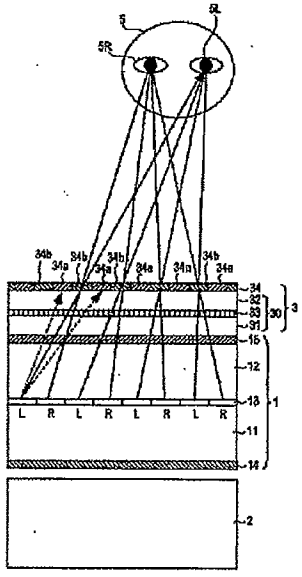
【符号の説明】

１　表示用液晶パネル
２　バックライト
３　映像分離手段
３０　ＴＮ型液晶パネル
３４　偏光部
５　観察者

【図１】



【図２】



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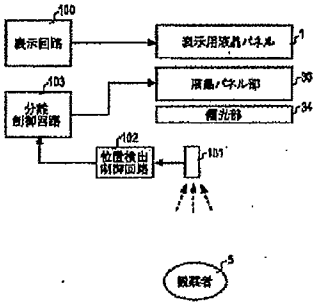
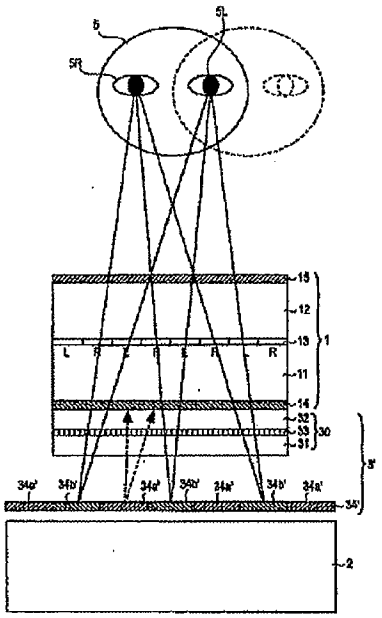
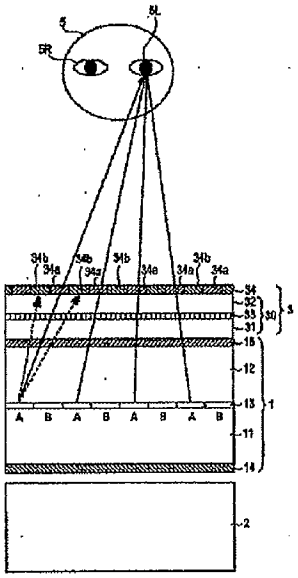
【図３】


100
表示回路
表示用液晶パネル
1
103
分離制御回路
液晶パネル部
30
偏光部
34
102
位置検出制御回路
101
5
観察者

【図４】

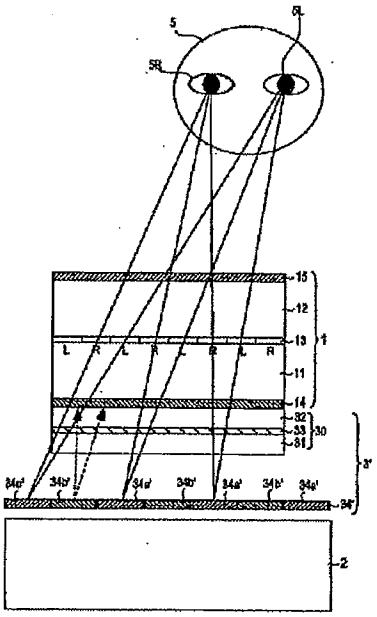

5
5L
5R
15
12
13
1
L
R
11
14
32
33
30
31
3'
34a'
34b'
34'
2

【図６】

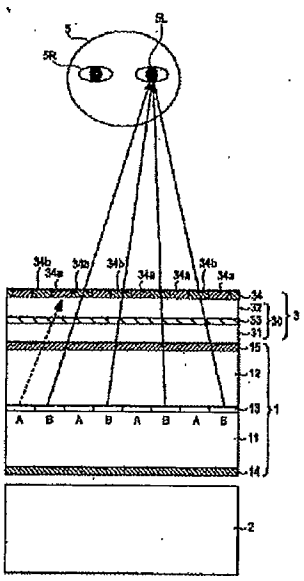

5
5L
5R
34b
34a
34
32
33
30
31
3
15
12
13
1
A
B
11
14
2

8-6

【図５】

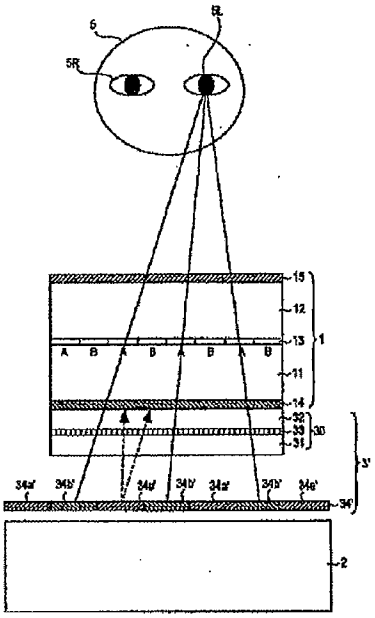

5
5L
5R
15
12
13
1
L R L R L R L R
11
14
32
33
31
30
3'
34a'
34b'
34a'
34b'
34a'
34b'
34a'
34'
2

【図７】

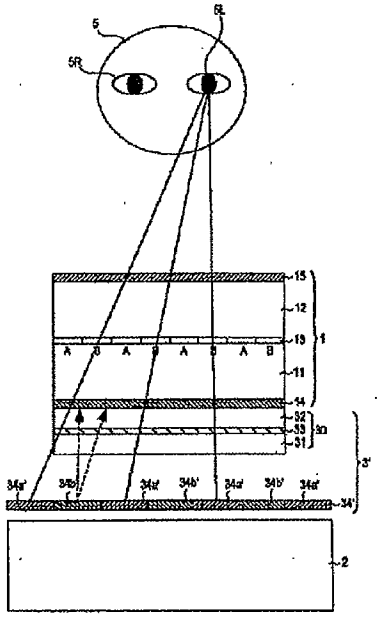

5
5L
5R
34b
34a
34b
34a
34b
34a
34
32
33
31
30
3
15
12
13
1
A B A B A B A B
11
14
2

8-7

【図８】



【図９】



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8-8

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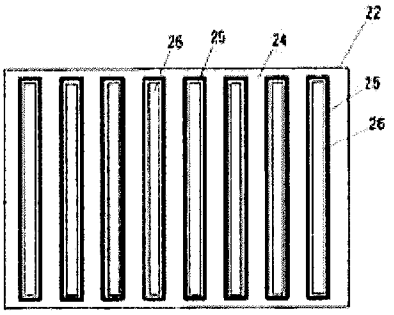
TOTTORI SANYO ELECTRIC CO LTD
(72)Inventor : TANAKA SHINICHIRO

(54) THREE-DIMENSIONAL VIDEO DISPLAY

(57)Abstract:
PROBLEM TO BE SOLVED: To suppress lowering of display quality during two-dimensional display in particular in a parallax barrier type three-dimensional video display enabling two-dimensional and three-dimensional display using simple structure barrier cells in order to provide an inexpensive three-dimensional video display.
SOLUTION: The three-dimensional video display by a parallax type using the barrier cells 20 forming a beta pattern of a transparent electrode 23 on an upper side transparent substrate 21 and a transparent electrode 24 having an opening part 25 matched with a barrier shape on a lower side substrate reduces a barrier effect during the two-dimensional display by forming a transparent film 26 electrically independent from the transparent electrode 24 in the opening part 25.



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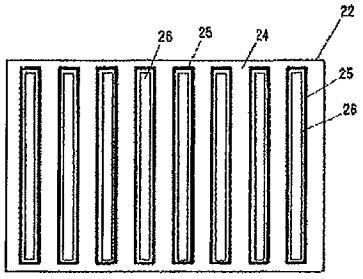
5C061 AA06 AA08 AA21 AB14 AB16
AB17

(54)【発明の名称】３次元映像表示装置



[0001]　本発明は、３次元映像を提供する３次元映像表示装置に関し、特にその方式としてパララックスバリアと呼ばれるものを用いた３次元映像表示装置に関する。

[0002]　近年、医療やアミューズメント等様々な分野において急速に３次元映像の利用が進んでいる。また従来から表示装置においてこの３次元映像を表示する方法が種々考えられており、その中に所謂パララックスバリア方式と呼ば

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れるものが知られている。

[0003] これはスリット状に形成された所謂パララックスバリアを用いて左右の映像を分離することで３次元映像を表示するものであり、特許文献１等多数記載されている。

[0004] 一方このパララックスバリアとして、例えば透明基板の上にスリット状の遮光膜を形成したような所謂固定式バリアを用いた表示装置の場合、２次元表示を行うことはできず、３次元表示専用の表示装置になってしまう。そこでこのパララックスバリアに液晶パネルを用いることで、バリアパターンを選択的に形成し、３次元表示だけでなく２次元表示も可能にする２次元３次元兼用の表示装置も特許文献２等に記載されている。

[0005] この液晶パネルを用いたパララックスバリア（以下バリアセルという）として通常の液晶パネルを使用することはもちろん可能であるが、バリアセルを通常の液晶パネルと同様のプロセスで製造する必要があるため３次元映像表示装置も高価なものとならざるを得ない。

[0006] そこで本出願人はこのバリアセルとして先に出願した特願２０００３－５７２３４にも開示するものを用いることで、安価なパララックスバリア方式による３次元映像表示装置を考えている。

[0007] このバリアセルの構成を図４の平面図、図５の断面図を用いて説明する。なお図４は以下に記載する下側透明基板２の平面図を示す。１と２はガラスからなる一対の透明基板である。一方の上側透明基板１において、下側の透明基板２と対向する側の表面略全域に透明電極３が形成されている。この透明電極３は例えばＩＴＯ等、通常の液晶パネルの透明電極として用いられる導電性の透明材料と同様のものである。他方の下側透明基板２において、上側の透明基板１と対向する側の表面にストライプ状の開口部４を有する透明電極５が形成されている。この開口部４は透明電極５を形成するＩＴＯ等を取り除いて形成されている。そして上側透明基板１と下側透明基板２との間に、９０° 捩りツイスト配向されたネマティック液晶からなる液晶層６が形成されている。また一対の透明基板１、２の液晶層６側とは反対側の表面にそれぞれ偏光板７、８がクロスニコルするように貼り付けられている。そしてこれらによりバリアセル１０が構成されている。なお図示していないが、透明基板１の透明電極３と、透明基板２の透明電極５と開口部４の表面には、配向膜が形成されている。

[0008] バリアセル１０は一対の透明基板１、２の間に電圧を印加していないときには液晶層６の液晶分子はツイスト配向のままで、下側透明基板２の下方より入射してきた光がバリアセル１０をそのまま通過していく。一方一対の透明基板１、２の間に電圧を印加すると、透明基板２の透明電極５が形成されている部分では透明基板１と透明基板２との間に電界が発生し、液晶層６の液晶分子が基板表面対し垂直な状態となるため、透明基板２の下方より入射してきた光は偏光板７で吸収されバリアセル１０を通過することができない（以下バリア部１１）。また透明基板２の開口部４の部分では透明基板１と透明基板２との間に電界が発生せず、液晶層６の液晶分子はツイスト配向をキープするため、透明基板２の下方より入射してきた光はバリアセル１０を通過してしまう（以下透過部１２）。

[0009] つまり、バリア部１１では光を遮断し、透過部１２では光を通過させるため、バリアセル１０に擬似的なストライプ状のバリアが形成されることになる。

[0010] このようなバリアセル１０は、通常の液晶パネルとは異なり、画素ごとにＴＦＴ等のスイッチング素子を形成しておらず、また透明基板２上の開口部の形状、配置を変えるだけで様々なバリアに対応でき、安価なパララックスバリア方式による３次元映像表示装置を提供する上で非常に有効である。

[0011] ここで、以前よりパララックスバリア方式における３次元表示装置の問題点の一つとして所謂モアレの発生が挙げられている。このモアレの発生する原因を図６、図７を用いて簡単に説明する。まずパララックスバリア方式の場合には、その構造上表示装置前方の決められた位置（以下、３Ｄ表示領域という）から観察しなければ３Ｄ表示を観察者が認識することはできない。３Ｄ表示領域から外れると右目に左眼用の映像が、左眼に右目用の映像が認識され遠近が逆になる等、３次元表示として不適切な映像となってしまう。

[0012] 図６はこの３Ｄ表示領域におけるバリアセル１０を介してみえる液晶表示パネルの画素１３の状態を概念的に示す。液晶表示パネルは通常の液晶パネルと同様の構成であり、バリアセル１０の背面側に位置している。そしてストライプ状の縦列に右目用の映像を表示し、隣の縦列に左眼用の映像を表示している。そしてバリアセル１０の透過部１２からは表示装置全体を通して左右の画素１３が均等に観察者には認識される。したがって斜線の網掛で示した液晶表示パネルにおける画素１３と画素１３の間における遮光領域１４が透過部１２に占める割合はどこも同じである。なおこの遮光領域１４とは液晶パネルにおける各画素１３間を区切るためのブラックマトリクスのことである。

[0013] 次に図７は３Ｄ表示領域から観察者が前後或は左右に移動し、３Ｄ表示領域から外れてしまった場合のバリアセル１０を介してみえる液晶表示パネルの画素１３の状態を概念的に示す。この場合、バリアセル１０の透過部１２からは、透過部１２の位置によって右目用の映像を表示する画素１３の占める割合の多い個所や、左眼用の映像を

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表示する画素１３の占める割合の多い個所など様々となる。したがって斜線の網掛で示した液晶表示パネルにおける画素１３と画素１３の間における遮光領域１４が透過部１２に占める割合は図６とは異なりそれぞれの個所で異なっている。したがって観察者においては遮光領域１４の多い透過部１２、つまり輝度の低い暗い透過部１２、遮光領域１４の少ない透過部１２、つまり輝度の高い明るい透過部１２が認識されることで所謂モアレが発生してしまう。

【特許文献 1】 特開平９－１８８９７

【特許文献 2】 特開平３－１１９８８９

[0014] バリアセル１０を用いた際、上記の通り３Ｄ表示を行い観察者が３Ｄ表示領域から外れるとモアレが観察者に認識されてしまう。ところが、バリアセル１０においてなんらバリアを発生していない２Ｄ表示を行った際に表示品位の低下、特に３Ｄ表示と同様に観察者がモアレを感じてしまうという問題が発生していた。

[0015] この原因を本発明者が調査したところ、バリアセル１０においてバリア部１１と透過部１２と形成するために透明基板２上に形成した開口部４と透明電極５に起因していることがわかった。透明電極５に用いられているＩＴＯ、或はＩＺＯなどの光透過率は、可視光領域で８０～９５％くらいである。したがって透明電極５が形成されている領域と開口部４が形成されている領域とでその透過率が異なってしまう。これはつまり透明電極５が形成されている領域は、遮光率は高くはないが３Ｄ表示と同じバリア部として機能し、開口部４が形成されている領域は透過部として機能してしまうからであった。

[0016] このことで２Ｄ表示の際も、観察者が遮光領域１４の多い透過部１２、つまり輝度の低い暗い透過部１２と、遮光領域１４の少ない透過部１２、つまり輝度の高い明るい透過部１２とを認識してしまい、所謂モアレが発生してしまっていた。

[0017] パララックスバリア方式による３Ｄ表示の際には、観察者も３Ｄ表示領域を意識しているため、モアレの発生は余り生じ難く、また発生したとしても観察者は３Ｄ表示領域へ観察位置をとっさに移すのでそれほど大きな問題とはならない。

[0018] しかし２次元３次元兼用の表示装置の場合、通常主に使用されているのはあくまでも２次元表示であり、３次元表示の機能は表示装置に付加価値をつけたものに過ぎない。そして２次元表示の際には観察者は特に観察位置を意識することはなく様々な位置において映像をみることになる。したがって２次元表示の際の表示品位の低下、特にモアレの発生は３次元表示の際のモアレの発生に比べ非常に大きな問題となる。

[0019] そこで本発明は、安価な３次元映像表示装置を提供するため、簡単な構造のバリアセルを用いた２次元及び３次元表示が可能なパララックスバリア方式の３次元映像表示装置において、２次元表示の際の表示品位の低下を抑えた３次元映像表示装置を提供することを目的とする。

[0020] 上記課題を解決するため、請求項１の本発明は、対向する一対の透明基板間に液晶層を設け、一方の基板の内側には透明電極膜のベタパターンが形成され、他方の基板にはバリアの形状に合わせた開口部を有する透明電極膜が形成されてなるバリアセルと、該バリアセルに重ねて配置した表示パネルと、を備えたパララックスバリア方式による３次元映像表示装置において、前記バリアセルの開口部に対応する位置には、前記他方の基板の透明電極膜から電気的に独立する透明膜が形成されていることを特徴とする。

[0021] また請求項２の本発明は、対向する一対の透明基板間に液晶層を設け、一方の基板の内側には透明電極膜のベタパターンが形成され、他方の基板にはバリアの形状に合わせた開口部を有する透明電極膜が形成されてなるバリアセルと、該バリアセルの背面側に配置した表示パネルと、を備えたパララックスバリア方式による３次元映像表示装置において、前記バリアセルの開口部に対応する位置には、前記他方の基板の透明電極膜から電気的に独立する透明膜が形成されていることを特徴とする。

[0022] また請求項３の本発明は、対向する一対の透明基板間に液晶層を設け、一方の基板の内側には透明電極膜のベタパターンが形成され、他方の基板にはバリアの形状に合わせた開口部を有する透明電極膜が形成されてなるバリアセルと、該バリアセルの背面側に配置した液晶パネルと、該液晶パネルの背面側に配置されたバックライトと、を備えたパララックスバリア方式による３次元映像表示装置において、前記バリアセルの開口部に対応する位置には、前記他方の基板の透明電極膜から電気的に独立する透明膜が形成されていることを特徴とする。

[0023] また請求項４の本発明は、請求項１から３に記載する３次元映像表示装置において、前記透明膜は、前記開口部に形成されていることを特徴とする。

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[0024] また請求項５の本発明は、請求項１から４に記載する３次元映像表示装置において、　前記透明膜は、前記開口部を有する透明電極膜と同じ材料により形成されていることを特徴とする。

[0025] また請求項６の本発明は、請求項１から５に記載する３次元映像表示装置において、　前記バリアの形状は、階段状となっていることを特徴とする。

[0026] 請求項１、請求項２、請求項３に係る発明においては、簡単な構造のバリアセルを用いることでコストの増加を抑えた２次元表示及び３次元表示が可能なパララックスバリア方式の３次元映像表示装置を提供することができ、また２次元表示の際の表示品位の低下、特にモアレの発生を抑えた３次元映像表示装置を提供することができる。

[0027] 請求項４に係る発明においては、バリアセルにおけるセルギャップを安定させることができる。

[0028] 請求項５に係る発明においては、別と製造工程の増加を必要とすることなく、請求項１から３の発明を実現することができる。

[0029] 請求項６に係る発明においては、視点数を増やした際にも水平方向の解像度の劣化を抑えることができる。

[0030] 対向する一対の透明基板間に液晶層を設け、一方の基板の内側には透明電極膜のベタパターンが形成され、他方の基板にはバリアの形状に合せた開口部を有する透明電極膜が形成されてなるバリアセルと、バリアセルに重ねて配置した表示パネルと、を備えた２次元表示及び３次元表示が可能な３次元映像表示装置において、バリアセルの開口部に対応する位置には、透明電極から独立する透明膜が形成されている。

[0031] 図１は本発明の２次元表示及び３次元表示が可能なパララックスバリア方式の３次元表示装置５０の構成を示している。

[0032] ３次元表示装置５０は、３次元表示の際にパララックスバリア表示するバリアセル２０と、バリアセル２０の背面側に配置された透過型の液晶パネル４０、及び液晶パネル４０の背面側に配置され液晶パネル４０へ光を照射するバックライト４５から構成されている。なお３次元表示装置５０が大型化すると、バリアセル２０と液晶パネル４０との距離をある程度広くしなければならないため、バリアセル２０と液晶パネル４０との距離を調整するためのガラスやアクリル樹脂などからなる透明板（破線で示す）がバリアセル２０と液晶パネル４０との間に配置されていてもよい。

[0033] 図２は、このバリアセル２０の平面図、図３はそのバリアセル２０の断面図を示している。なお図２は以下に記載する下側透明基板２２の平面図を示す。

[0034] バリアセル２０は、対向して配置された上側の透明基板２１と、下側の透明基板２２を備えている。上側透明基板２１の表面のうち下側透明基板２２と対向する側の表面には、ＩＴＯやＩＺＯ等の導電性の透明材料で形成された透明電極２３が透明基板２１の略全域を覆うようベタパターンで形成されている。また図示してはいないが透明電極２３の表面には配向膜が形成されている。

[0035] 一方下側透明基板２２の表面のうち上側透明基板２１と対向する側の表面には、同じくＩＴＯやＩＺＯ等の導電性の透明材料で形成された透明電極２４が形成されている。また下側透明基板２２の表面には透明電極２４が形成された領域内においてストライプ状に形成された導電性透明材料未塗布の開口部２５が形成されている。

[0036] そして下側透明基板２２の表面に形成された開口部２５の領域内には、下側透明基板２２の表面に透明電極２４から電気的に独立し浮島状態となる透明膜２６が形成されている。この透明膜２６は開口部２５の形状に対応した形状となっており、略開口部２５を埋めるように形成されており、透明電極２４と略同じ膜厚さを有している。透明膜２６は透明電極２４と同じ導電性の透明材料で形成されており、開口部２５を形成する際に透明膜２６を残すように開口を設けているため、別途透明膜２６だけを設ける工程を必要としていない。ただし透明膜２６は別工程により形成されるものでも構わない。また透明電極２４と異なる材料で形成してよいが、この場合できるだけ透明電極２４と透過率が同じものである必要がある。また開口部２５の位置に対応しているのであれば、透明電極２４と開口部２５が形成されている側とは反対側の下側透明基板２２表面でも構わないし、上側透明基板２１に形成されていてもよいが、バリアセル２０におけるセルギャップの安定等の観点から開口部２５の領域内に形成するのが望ましい。なお図示してはいないが透明電極２４、開口部２５、透明膜２６を覆うように配向膜が形成されている。

[0037] そして上側透明基板２１と下側透明基板２２との間には９０° 捩りツイスト配向されたネマティック液晶からなる液晶層２７が形成されている。また一対の透明基板２１、２２の液晶層２７側とは反対側の表面にそれぞれ偏光板２８、２９がクロスニコルするように貼り付けられている。

[0038] このような構成によるバリアセル２０は、透明電極２３と透明電極２４の間に電圧を印加していないときには液晶層２７の液晶分子はツイスト配向のままで、バリアセルにはバリアが表示されず、３次元映像表示装置５０は２

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次元映像を表示する。

[0039] 一方透明電極２３と透明電極２４の間に電圧を印加すると電界が発生し液晶層２７の液晶分子が基板表面対し垂直な状態となるため、バリアセル２０の背面側から入射してきた光は偏光板２８で吸収されバリアセル２０を通過することができない（以下バリア部）。しかし透明電極２３と透明電極２４の間に電圧を印加しても、開口部２５及び透明膜２６と透明電極２３との間に電界は発生せず、液晶層２７の液晶分子はツイスト配向をキープするため、バリアセル２０の背面側から入射してきた光はバリアセル２０を通過してしまう（以下透過部）。この状態のときに３次元映像表示装置５０は３次元映像を表示することができる。

[0040] 透過型の液晶パネル４０とバックライト４５は一般的な液晶表示装置に用いられているものと同様であり、ＴＮ方式、ＭＶＡ方式、ＩＰＳ方式など様々な液晶パネル４０を用いることができる。そして３次元映像表示装置で３次元表示を行う際には液晶パネル４０において、右目用の映像と左眼用の映像が縦列に交互に表示される。またバックライト４５も均一な光を液晶パネル４０に照射できるものであれば良く、線状光源を用いた直下型、サイドライト型何れを用いることができ、また光源も面状光源や点状光源などを用いることができる。

[0041] そして３次元表示装置５０において、上記のようなバリアセル２０を用いることで、３次元表示の際にはバックライト４５から照射され液晶パネル４０を通過した右眼用の映像光と左眼用の映像光とを観察者の右眼と左眼にそれぞれ入射させて３次元映像を認識させる。

[0042] また、２次元表示の際にはバックライト４５から照射され液晶パネル４０を通過した映像光を観察者の眼に入射させ２次元映像を認識させる。この２次元表示の際にバリアセル２０の開口部２５には透明膜２６が形成されているため、透明電極２４と透明膜２６の領域で光透過率は同じになるため、バリア部と透過部とで輝度の違いはほとんど生じない。したがって２次元表示において観察者がいかなる位置でみようともモアレはほとんど発生することがなく、また表示品位の低下も少ない。

[0043] なお、本発明は実施例１に限定されるものではなく、対向する一対の透明基板間に液晶層を設け、一方の基板の内側には透明電極膜のベタパターンが形成され、他方の基板にはバリアの形状に合せた開口部を有する透明電極膜が形成されてなるバリアセルにおいて、バリアセルの開口部に対応する位置には、透明電極から独立する透明膜が形成されているバリアセルを用いた２次元表示と３次元表示が可能なパララックスバリア方式の３次元映像表示装置であれば適用可能である。

[0044] したがって、２次元用の映像及び３次元用の映像を表示する表示パネルは、実施例１の液晶パネル４０に限定されるものではなく、他の表示パネル、具体的にはＰＤＰや有機ＥＬパネルなどを用いてもよい。

[0045] また、実施例１においては液晶パネル４０の前方にバリアセル２０を配置していたが、バリアセル２０を液晶パネル４０とバックライト４５の間に配置してもよい。この場合であっても、バリアセル２０における透明電極２４と開口部２５との透過率の違いによる表示品位の低下を抑えることができる。

[0046] また、実施例１のような所謂２眼式の３次元映像表示装置に限らず、多眼式の３次元映像表示装置であっても当然適用可能である。

[0047] また、実施例１において開口部２５をストライプ状に形成し、バリアセル２０において３次元表示の際にストライプ状のバリアを形成するものを示していが、バリアの形状はストライプ状のものに限定されるものではない。例えば液晶パネル４０のおける一画素程度の大きさ開口部２５を階段状に形成した所謂斜めバリアを用い、開口部２５の領域内に透明膜２６を形成したバリアセルであってもよい。この斜めバリアを用いることにより、多眼式による視点数を増やした際にも水平方向の解像度の劣化を抑えることができる。

[0049] ２０　バリアセル

２１　上側透明基板

２２　下側透明基板

２３、２４　透明電極

２５　開口部

２６　透明膜

４０　液晶パネル

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４５　バックライト

５０　３次元映像表示装置

【請求項 1】

対向する一対の透明基板間に液晶層を設け、一方の基板の内側には透明電極膜のベタパターンが形成され、他方の基板にはバリアの形状に合わせた開口部を有する透明電極膜が形成されてなるバリアセルと、該バリアセルに重ねて配置した表示パネルと、を備えたパララックスバリア方式による３次元映像表示装置において、前記バリアセルの開口部に対応する位置には、前記他方の基板の透明電極膜から電気的に独立する透明膜が形成されていることを特徴とする３次元映像表示装置。

【請求項 2】

対向する一対の透明基板間に液晶層を設け、一方の基板の内側には透明電極膜のベタパターンが形成され、他方の基板にはバリアの形状に合わせた開口部を有する透明電極膜が形成されてなるバリアセルと、該バリアセルの背面側に配置した表示パネルと、を備えたパララックスバリア方式による３次元映像表示装置において、前記バリアセルの開口部に対応する位置には、前記他方の基板の透明電極膜から電気的に独立する透明膜が形成されていることを特徴とする３次元映像表示装置。

【請求項 3】

対向する一対の透明基板間に液晶層を設け、一方の基板の内側には透明電極膜のベタパターンが形成され、他方の基板にはバリアの形状に合わせた開口部を有する透明電極膜が形成されてなるバリアセルと、該バリアセルの背面側に配置した液晶パネルと、該液晶パネルの背面側に配置されたバックライトと、を備えたパララックスバリア方式による３次元映像表示装置において、前記バリアセルの開口部に対応する位置には、前記他方の基板の透明電極膜から電気的に独立する透明膜が形成されていることを特徴とする３次元映像表示装置。

【請求項 4】

前記透明膜は、前記開口部に形成されていることを特徴とする請求項１から３のいずれか一項に記載の３次元映像表示装置。

【請求項 5】

前記透明膜は、前記開口部を有する透明電極膜と同じ材料により形成されていることを特徴とする請求項１から４のいずれか一項に記載の３次元映像表示装置。

【請求項 6】

前記バリアの形状は、階段状となっていることを特徴とする請求項１から５のいずれか一項に記載の３次元映像表示装置。

(57)【要約】

【課題】　安価な３次元映像表示装置を提供するため、簡単な構造のバリアセルを用いた２次元及び３次元表示が可能なパララックスバリア方式の３次元映像表示装置において、特に２次元表示の際の表示品位の低下を抑えることを課題とする。

【解決手段】　上側透明基板２１には透明電極２３のベタパターンを、下側基板にはバリアの形状に合せた開口部２５を有する透明電極２４を形成したバリアセル２０を用いたパララックスバリア方式による３次元映像表示装置において、開口部２５に透明電極２４から電気的に独立した透明膜２６を形成することで、２次元表示の際のバリア

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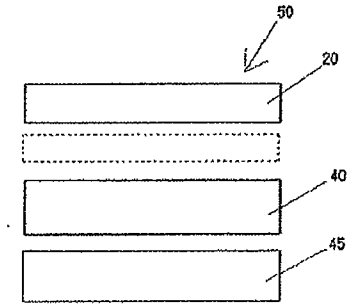
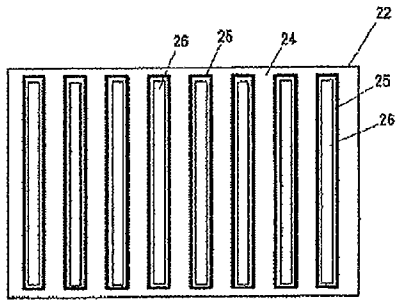
効果を低減する。

【選択図】　　図２

【図 1】



【図 2】



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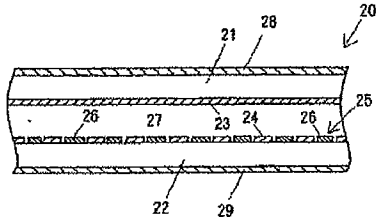
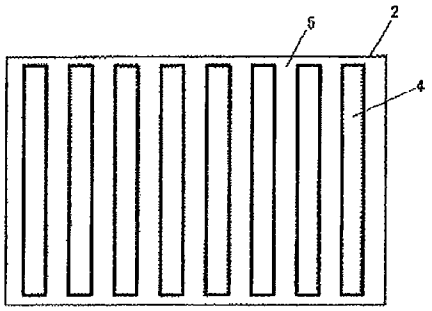
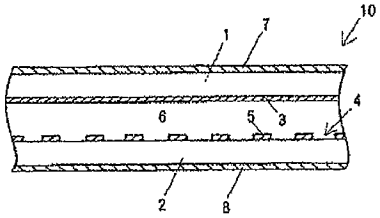
【圖 3】



【圖 4】



【圖 5】



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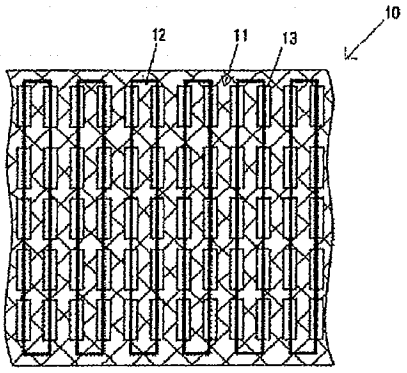
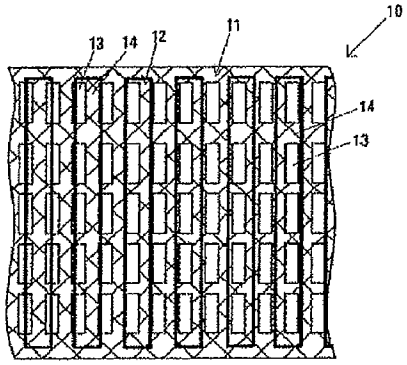
【図 6】



【図 7】



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(51) Int. Cl: H04N 13/00

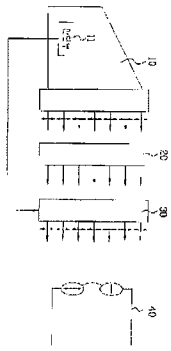
(71) Applicant: • LG ELECTRONICS INC.
(72) Inventor: • LEE, JAE SEUNG

(54) THREE-DIMENSIONAL IMAGE DISPLAY DEVICE

(57) Abstract:

PURPOSE: A three-dimensional image display device is provided to watch a three-dimensional image at home or at a public place.

CONSTITUTION: A display device(10) receives three-dimensional image signals to alternately transmits left image signals and right image signals. A polarizing plate(20) polarizes the image signals output from the display device in one direction for outputting the polarized image signals. A liquid crystal plate(30) polarizes a phase in a direction of 0 degree or 90 degrees according to the left image signals and the right image signals. Polarizing glasses(40) has one glass for passing only vertical direction polarizing signals and the other glass for passing only horizontal direction polarizing signals.



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5	4-1-2009-0023850-26	2009.11.03	Notification of change of applicant's information (출원인정보변경(경정)신고서)	Acceptance (수리)

공개특허공보 제10-2004-0062251호(2004.07.07.) 1부.

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심사청구 : 없음

(54) 3차원 영상 표시장치

요약

본 발명은 일반적인 표시장치를 통해 가정이나 공공장소에서도 3차원 입체 영상을 시청할 수 있는 표시 장치를 제공하기 위한 것으로서, 3차원 영상신호를 입력으로 좌측 영상신호와 우측 영상신호를 번갈아 송출하여 표시하는 표시장치와, 상기 표시장치에서 출력되는 영상신호를 일방향으로 편광시켜 출력하는 편광판과, 상기 편광판에서 출력되는 영상신호 중 좌측 영상신호와 우측 영상신호에 따라서 위상을 0° 또는 90° 방향으로 편광시켜 출력하는 액정판으로 구성된다.

대표도

도1

색인어

3차원 입체 영상, 표시 장치.

명세서

도면의 간단한 설명

도 1 은 본 발명에 따른 3차원 영상 표시장치를 나타낸 구성도

도 2 는 본 발명에 따른 3차원 영상 표시장치의 동작을 나타낸 흐름도

*도면의 주요부분에 대한 부호의 설명

10 : 표시장치11 : 판단부

20 : 편광판30 : 액정판

40 : 편광 안경

발명의 상세한 설명

발명의 목적

발명이 속하는 기술분야 및 그 분야의 종래기술

본 발명은 3차원 영상 표시 장치에 관한 것으로, 특히 CRT, PDP, LCD 등의 일반적인 표시장치에 부가적인 전면 필터를 추가함으로써 3차원 입체 영상을 표시하는 장치에 관한 것이다.

3차원 영상은 전용 상영관에서만 시청할 수 있으며 일반 가정이나 공공장소의 CRT, LCD, PDP 등의 표시장치로는 관람이 불가능했다.

최근에는 PC 용으로 3차원 입체 영상을 시청할 수 있는 기술이 제안되고 있으나, 이 경우에는 왼쪽과 오른쪽 눈으로 입사되는 영상의 셔터 역할을 하는 LCD 셔터글라스를 착용하여야만 한다.

이와 같이 일반 가정에서 3차원 영상을 시청하기 위해서는 고가의 셔터글라스를 시청자 개개인이 착용하여야 하며, 이 또한 일반적인 CRT, LCD, PDP 등의 표시장치에서는 시청이 불가능하다.

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발명이 이루고자 하는 기술적 과제

따라서 본 발명은 상기와 같은 문제점을 해결하기 위해 안출한 것으로서, 일반적인 표시장치를 통해 가정이나 공공장소에서도 3차원 영상을 시청할 수 있는 표시 장치를 제공하는데 그 목적이 있다.

발명의 구성 및 작용

상기와 같은 목적을 달성하기 위한 본 발명에 따른 3차원 영상 표시장치의 특징은 3차원 영상신호를 입력으로 좌측 영상신호와 우측 영상신호를 번갈아 송출하여 표시하는 표시장치와, 상기 표시장치에서 출력되는 영상신호를 일방향으로 편광시켜 출력하는 편광판과, 상기 편광판에서 출력되는 영상신호 중 좌측 영상신호와 우측 영상신호에 따라 위상을 0° 또는 90° 방향으로 편광시켜 출력하는 액정판을 포함하여 구성되는데 있다.

상기 표시장치는 CRT, PDP, LCD 표시장치 중 적어도 어느 하나인 것이 바람직하다.

상기 3차원 영상신호는 좌측 영상신호와 우측 영상신호를 별도로 정의하고, 상기 좌측 영상신호와 우측 영상신호의 비율은 1:1로 정의되는 것이 바람직하다.

상기 액정판에서 출력되는 영상신호 중 한쪽 안경은 수직 방향 편광 신호만이 통과하고, 다른 한쪽 안경은 수평 방향 편광 신호만을 통과하는 편광 안경을 더 포함하여 구성되는데 다른 특징이 있다.

본 발명의 다른 목적, 특성 및 잇점들은 첨부한 도면을 참조한 실시예들의 상세한 설명을 통해 명백해질 것이다.

본 발명에 따른 3차원 영상 표시장치의 바람직한 실시예에 대하여 첨부한 도면을 참조하여 설명하면 다음과 같다.

도 1 은 본 발명에 따른 3차원 영상 표시장치를 나타낸 구성도 이다.

도 1과 같이, 3차원 영상신호를 입력으로 좌측 영상신호와 우측 영상신호를 번갈아 송출하여 표시하는 표시장치(10)와, 상기 표시장치(10)에서 출력되는 영상신호를 일방향으로 편광시켜 출력하는 편광판(20)과, 상기 편광판(20)에서 출력되는 영상신호 중 좌측 영상신호와 우측 영상신호에 따라서 위상을 0° 또는 90° 방향으로 편광시켜 출력하는 액정판(30)으로 구성된다.

그리고 상기 액정판(30)에서 출력되는 영상신호 중 한쪽 안경은 수직 방향 편광 신호만이 통과하고, 다른 한쪽 안경은 수평 방향 편광 신호만을 통과하는 편광 안경(40)을 더 포함하여 구성된다.

여때, 상기 표시장치(10)는 일반 가정에서 사용하고 있는 CRT, PDP, LCD 표시장치를 사용하는 것이 바람직하며, 여기에 입력되는 영상신호가 좌측 영상신호인지 우측 영상신호인지를 판단하는 판단부(11)를 추가로 구성한다.

상기 판단부(11)는 입력되는 영상신호의 헤더부에 추가된 데이터를 검사하여 간단하게 좌측 영상신호인지 우측 영상신호인지를 판단할 수 있으며, 이렇게 판단된 정보를 상기 액정판(30)에 전달하여 동기를 맞추어 준다.

바람직한 실시예로서, 입력되는 3차원 입체 영상신호가 1초에 60번의 영상 주사로 한 프레임을 나타낸다면, 이 중 홀수 번째 주사는 좌측 영상신호로, 그리고 짝수 번째 주사는 우측 영상신호로 헤더부에 정의하여 표시장치로 전송하면, 이를 상기 판단부에서 판단하여 처리하게 된다.

상기 LCD 표시장치는 자체적으로 편광된 일방향 영상신호가 출력되므로 상기 편광판을 사용하지 않는다.

또한, 상기 3차원 영상신호는 입체 영상을 위해 제작된 영상신호로서, 좌측 영상신호와 우측 영상신호를 별도로 정의하고 있으며, 한 프레임에 60번의 영상 주사선이 출력된다고 가정할 때, 이 중 좌측 영상신호와 우측 영상신호의 비율을 1:1로 정의되어 제작되는 것이 바람직하다. 그러면 상기 표시장치(10)는 제작된 영상신호를 체크하여 좌측 영상신호와 우측 영상신호를 각각 검출한다.

그리고 상기 액정판(30)은 상기 정의된 좌측 영상신호와 우측 영상신호의 동기신호를 표시장치(10)에서 입력받아 좌측 영상신호로 정의된 영상신호는 수평 편광시키고, 우측 영상신호로 정의된 영상신호를 수직 편광시키게 된다.

이때, 수평/수직 편광은 정의해주기에 따라 좌측 영상신호를 수직 편광시키고, 우측 영상신호를 수평 편광시킬 수도 있다.

이와 같이 구성된 본 발명에 따른 3차원 영상 표시장치의 동작을 첨부한 도면을 참조하여 상세히 설명하면 다음과 같다.

도 2 는 본 발명에 따른 3차원 영상 표시장치의 동작을 나타낸 흐름도 이다.

먼저, 방송국에서 송신되는 공중파 방송 영상신호나 비디오, DVD, CD 등의 저장장치에 저장된 영상신호 중 3차원 입체 영상으로 정의된 영상신호가 CRT, PDP, LCD등의 일반적인 표시장치(S10)로 전송된다.

이때, 상기 3차원 영상신호는 1초에 60번의 영상 주사에서 좌측 영상신호와 우측 영상신호가 번갈아 가면서 송출하게 되며, 상기 표시장치(10)는 송출되는 좌측 영상신호와 우측 영상신호를 각각 체크하여 분리한다(S20), 그리고, 표시장치내 판단부(11)를 통해 다음단에 위치하는 액정판(30)에 좌측 영상신호와 우측 영상신호에 따른 동기신호를 전달한다(S40)(S70).

이어, 편광판(20)은 입력되는 상기 좌측 영상신호와 우측 영상신호를 임의의 일방향으로 편광시켜 모두 동일한 방향으로 편광시킨다(S50)(S80).

그리고, 상기 편광된 영상신호는 액정판(30)으로 입사되고, 상기 액정판(30)은 일방향으로 입력되는 영상

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신호를 상기 표시장치내 판단부(10)에서 전달된 동기신호에 따라 입력되는 편광 방향을 수평 또는 수직 방향으로 편광시키게 된다(S60)(S90).

바람직한 실시예로서, 상기 편광판(20)은 일방향인 수평(0°)방향으로 편광되고, 상기 액정판은 좌측 영상신호인 경우는 수평(0°) 방향으로, 우측 영상신호인 경우는 수직(90°) 방향으로 편광된다고 가정한다.

이때, 상기 액정판(30)으로 입력되는 영상신호가 좌측 영상신호일 경우는(S30) 편광판(20)을 거쳐서 수평 방향으로 편광되어 출력된다(S50). 그리고 상기 편광판(20)에서 출력되는 영상신호(S50)를 상기 액정판(30)은 표시장치내 판단부(11)에서 전달된 동기신호를 통해 수평 방향으로 출력되는 영상신호를 송출되는 동안 위상의 변화 없이 그대로 출력한다(S60).

또한, 상기 액정판(30)으로 입력되는 영상신호가 우측 영상신호일 경우는(S30) 편광판(20)을 거쳐서 수평 방향으로 편광되어 출력된다(S80). 그리고 상기 편광판(20)에서 출력되는 영상신호(S50)를 상기 액정판(30)은 표시장치내 판단부(11)에서 전달된 동기신호를 통해 수평 방향으로 출력되는 영상신호의 위상을 90 ° 변화시켜 수직 방향으로 편광되어 출력한다(S90).

그러면 시청자는 한쪽 안경은 수직 방향 편광 신호만이 통과하고, 다른 한쪽 안경은 수평 방향 편광 신호만을 통과하는 편광 안경(40)을 착용하여, 상기 액정판(30)에서 출력되는 영상신호 중 수직 방향 편광 신호와 수평 방향 편광 신호를 좌측 및 우측 안경으로 각각 독립적으로 시청하게 된다(S100).

이와 같이, 좌측 영상이 송출되는 경우는 액정판(30)의 위상 변화없이 수평 방향의 편광 신호가 출력되어 편광 안경(40)의 왼쪽으로만 영상이 입력되고, 우측 영상이 송출되는 경우는 액정판(30)의 위상이 90° 변화되어 수직 방향의 편광신호가 출력되어 편광 안경(40)의 오른쪽으로만 영상이 입력된다.

이에 따라, 시청자는 3차원 입체 영상의 느낌을 갖게 된다.

이때, 표시장치(10)가 LCD의 경우에는 자체에서 편광 필터를 거쳐서 편광된 빛이 송출되므로 상기 편광판(20)이 필요 없게 된다.

이와 같은 방법의 반복 수행을 통해 일반적인 디스플레이 장치에서 좌측영상과 우측영상을 독립적으로 표시되어 입력되는 3차원 입체 영상신호를 시청하게 된다(S110).

발명의 효과

이상에서 설명한 바와 같은 본 발명에 따른 3차원 영상 표시장치는 다음과 같은 효과가 있다.

기존의 CRT, PDP, LCD 등의 디스플레이 장치에 약간의 부가적인 필터 및 구동회로를 추가함으로써, 3차원 영상 전용 상영관에서나 시청할 수 있었던 입체영상을 가정이나 공공장소에서 시청할 수 있으므로 비디오, DVD, 공중파 방송 등의 다양한 분야에서 새로운 시장으로 떠오를 것으로 기대된다.

이상 설명한 내용을 통해 당업자라면 본 발명의 기술 사상을 이탈하지 아니하는 범위에서 다양한 변경 및 수정이 가능함을 알 수 있을 것이다.

따라서, 본 발명의 기술적 범위는 실시예에 기재된 내용으로 한정되는 것이 아니라 특허 청구의 범위에 의하여 정해져야 한다.

(57) 청구의 범위

청구항 1

3차원 영상신호를 입력으로 좌측 영상신호와 우측 영상신호를 번갈아 송출하여 표시하는 표시장치와,

상기 표시장치에서 출력되는 영상신호를 일방향으로 편광시켜 출력하는 편광판과,

상기 편광판에서 출력되는 영상신호 중 좌측 영상신호와 우측 영상신호에 따라 위상을 0° 또는 90° 방향으로 편광시켜 출력하는 액정판을 포함하여 구성되는 것을 특징으로 하는 3차원 영상 표시장치.

청구항 2

제 1 항에 있어서,

상기 3차원 영상신호는 좌측 영상신호와 우측 영상신호를 별도로 정의하고, 상기 좌측 영상신호와 우측 영상신호의 비율은 1:1로 정의되는 것을 특징으로 하는 3차원 입체 표시장치.

청구항 3

제 1 항에 있어서,

상기 액정판에서 출력되는 영상신호 중 한쪽 안경은 수직 방향 편광 신호만이 통과하고, 다른 한쪽 안경은 수평 방향 편광 신호만을 통과하는 편광 안경을 더 포함하여 구성되는 것을 특징으로 하는 3차원 영상 표시장치.

청구항 4

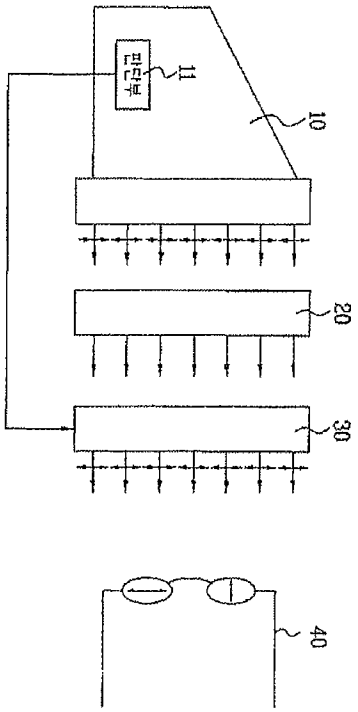
제 1 항에 있어서,

상기 표시장치는 입력되는 영상신호의 헤더부에 추가된 데이터를 검사하여 좌측 영상신호인지 우측 영상신호인지를 판단하고, 상기 판단된 정보를 상기 액정판에 전달하여 동기를 맞추는 판단부를 포함하여 구성되는 것을 특징으로 하는 3차원 영상 표시장치.

5-3

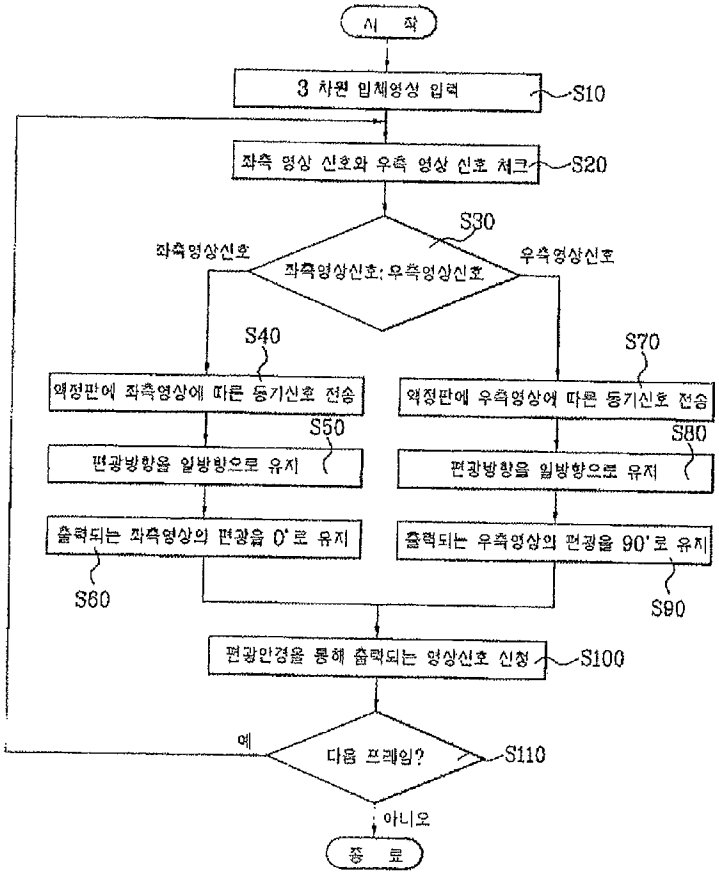
도면

도면1



5-4

도면2


시 작
3 차원 입체영상 입력
S10
좌측 영상 신호와 우측 영상 신호 체크
S20
S30
좌측영상신호
좌측영상신호: 우측영상신호
우측영상신호
S40
액정판에 좌측영상에 따른 동기신호 전송
S50
편광방향을 일방향으로 유지
출력되는 좌측영상의 편광을 0°로 유지
S60
S70
액정판에 우측영상에 따른 동기신호 전송
S80
편광방향을 일방향으로 유지
출력되는 우측영상의 편광을 90°로 유지
S90
편광안경을 통해 출력되는 영상신호 신청
S100
예
다음 프레임?
S110
아니오
종 료

Electronic Acknowledgement Receipt

EFS ID:	14844595
Application Number:	12340005
International Application Number:	
Confirmation Number:	8241
Title of Invention:	STEREOSCOPIC 3D DISPLAY DEVICE
First Named Inventor/Applicant Name:	Seung-Chul Lee
Customer Number:	757
Filer:	Gustavo Siller Jr./Jeff Skinner
Filer Authorized By:	Gustavo Siller Jr.
Attorney Docket Number:	12579-6201
Receipt Date:	31-JAN-2013
Filing Date:	19-DEC-2008
Time Stamp:	16:10:47
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		12579-6201_IDS-FORMS.pdf	118846 e0d447cedfa946ac9d55f2c3ed7ebbf3ff600329	yes	4

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Miscellaneous Incoming Letter	1	1
	Transmittal Letter	2	3
	Information Disclosure Statement (IDS) Form (SB08)	4	4

Warnings:					
Information:					
2	Foreign Reference	JP2002-296540.pdf	319523 09d483d28c558af2d9535d56d36d5155d33e705b	no	9
Warnings:					
Information:					
3	Foreign Reference	JP2005181668.pdf	406014 9ea20a85a21b125d3862de97ee71bab8b40da37a	no	10
Warnings:					
Information:					
4	Foreign Reference	KR_1020040062251.pdf	207115 e827d32f9c70d5d463bec3c015b1ea5799c43e1b	no	6
Warnings:					
Information:					
5	Other Reference-Patent or Application Document	08323US_KR_OA.pdf	176515 722b75b89335a7c22501687533133fa9af0a66ff	no	4
Warnings:					
Information:					
		Total Files Size (in bytes):	1228013		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

CERTIFICATE OF EFS FILING UNDER 37 CFR §1.8

I hereby certify that this correspondence is being electronically transmitted to the United States Patent and Trademark Office, Commissioner for Patents, via the EFS pursuant to 37 CFR §1.8 on the below date:

Date: January 31, 2013 Name: Gustavo Siller, Jr. Signature: /Gustavo Siller, Jr./

BRINKS HOFER GILSON &LIONE

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Appln. of: Seung-Chul Lee et al.

Appln. No.: 12/340,005

Filed: December 19, 2008

For: STEREOSCOPIC 3D DISPLAY DEVICE

Attorney Docket No: 12579-6201

Examiner: Steven C. Nguyen

Art Unit: 2443

Confirmation No.: 8241

TRANSMITTAL

Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Sir:

Attached is/are:

☒ Transmittal; Information Disclosure Statement; PTO-1449; Cited References E14 through E17.

Fee calculation:

☒ No additional fee is required.

☐ Small Entity.

☐ An extension fee in an amount of $_____ for a ____- month extension of time under 37 CFR § 1.136(a).

☐ A petition or processing fee in an amount of $_____ under 37 CFR § 1.17(___) .

☐ An additional filing fee has been calculated as shown below:

						Small Entity			Not a Small Entity	
	Claims Remaining After Amendment		Highest No. Previously Paid For	Present Extra		Rate	Add'l Fee	OR	Rate	Add'l Fee
Total		Minus				x $26=			x $52=	
Indep.		Minus				x 110=			x $220=	
First Presentation of Multiple Dep. Claim						+$195=			+ $390=	
						Total	$		Total	$

Fee payment:

☐ Please charge Deposit Account No. 23-1925 in the amount of $____ for ____.

☐ Payment by credit card in the amount of $_____ (Form PTO-2038 is attached).

☒ The Director is hereby authorized to charge payment of any additional filing fees required under 37 CFR § 1.16 and any patent application processing fees under 37 CFR § 1.17 associated with this paper (including any extension fee required to ensure that this paper is timely filed), or to credit any overpayment, to Deposit Account No. 23-1925.

Respectfully submitted,

January 31, 2013
Date

/Gustavo Siller, Jr./
Gustavo Siller, Jr. (Reg. No. 32,305)

I hereby certify that this correspondence is being Electronically Transmitted on the date noted below to:
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450
1/31/2013
Date of Deposit
Gustavo Siller, Jr.
Name of applicant, assignee or Registered Representative
/Gustavo Siller, Jr./
Signature
1/31/2013
Date of Signature

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Appln. of:	Seung-Chul Lee et al.		
Appln. No.:	12/340,005	Examiner:	Steven C. Nguyen
Filed:	December 19, 2008	Art Unit:	2443
For:	STEREOSCOPIC 3D DISPLAY DEVICE	Confirmation No.:	8241
Attorney Docket No:	12579-6201		

FOURTH SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

In accordance with the duty of disclosure under 37 CFR §1.56 and §§1.97-1.98, and more particularly in accordance with 37 CFR §1.97(b), Applicants hereby cite the following reference(s):

FOREIGN PATENT DOCUMENTS		
DOCUMENT NO.	**DATE**	**COUNTRY**
JP 2002-296540	10/09/2002	Japan
JP 2005-181668	07/07/2005	Japan
KR 1020040062251 A	07/07/2004	Korea

OTHER ART – NON PATENT LITERATURE DOCUMENTS
Copy of Office Action issued in corresponding Korean Patent Application No. 10-2008-0066695, mailed November 29, 2012.

Applicants are enclosing Form PTO-1449 (one sheet), along with a copy of each listed reference for which a copy is required under 37 CFR §1.98(a)(2). Pursuant to the undersigned attorney's obligation and duties under 37 CFR §§ 1.56 and 1.98(a)(3) and (c), either English language abstracts, partial translations, or full translations are included for patent documents which are not in English for the express purpose of providing a concise explanation of the references to the Patent and Trademark Office with the opportunity to evaluate the same. Applicants respectfully request the Examiner's consideration of the above reference(s) and entry thereof into the record of this application.

By submitting this Statement, Applicants are attempting to fully comply with the duty of candor and good faith mandated by 37 CFR §1.56. As such, this Statement is not intended to constitute an admission that any of the enclosed references, or other information referred to therein, constitutes "prior art" or is otherwise "material to patentability," as that phrase is defined in 37 CFR §1.56(a).

The Applicant or Applicants have calculated no fee to be due in connection with the filing of this Information Disclosure Statement. However, the Director is authorized to charge any fee deficiency associated with the filing of this Information Disclosure Statement to a deposit account, as authorized in the Transmittal accompanying this Information Disclosure Statement.

Respectfully submitted,

January 31, 2013
Date

/Gustavo Siller, Jr./
Gustavo Siller, Jr.
(Reg. No. 32,305)

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/340,005	12/19/2008	Seung-Chul Lee	12579-6201	8241

757 7590 08/28/2012

BRINKS HOFER GILSON & LIONE
P.O. BOX 10395
CHICAGO, IL 60610

EXAMINER	
NGUYEN, STEVEN C	
ART UNIT	PAPER NUMBER
2443	

MAIL DATE	DELIVERY MODE
08/28/2012	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Advisory Action Before the Filing of an Appeal Brief	**Application No.** 12/340,005	**Applicant(s)** LEE ET AL.
	Examiner STEVEN NGUYEN	**Art Unit** 2443

--The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

THE REPLY FILED 15 August 2012 FAILS TO PLACE THIS APPLICATION IN CONDITION FOR ALLOWANCE.

NO NOTICE OF APPEAL FILED

1. ☒ The reply was filed after a final rejection. No Notice of Appeal has been filed. To avoid abandonment of this application, applicant must timely file one of the following replies: (1) an amendment, affidavit, or other evidence, which places the application in condition for allowance;

(2) a Notice of Appeal (with appeal fee) in compliance with 37 CFR 41.31; or (3) a Request for Continued Examination (RCE) in compliance with 37 CFR 1.114 if this is a utility or plant application. Note that RCEs are not permitted in design applications. The reply must be filed within one of the following time periods:

a) ☒ The period for reply expires *3* months from the mailing date of the final rejection.

b) ☐ The period for reply expires on: (1) the mailing date of this Advisory Action; or (2) the date set forth in the final rejection, whichever is later. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of the final rejection.

c) ☐ A prior Advisory Action was mailed more than 3 months after the mailing date of the final rejection in response to a first after-final reply filed within 2 months of the mailing date of the final rejection. The current period for reply expires months from the mailing date of *the prior Advisory Action* or SIX MONTHS from the mailing date of the final rejection, whichever is earlier.

Examiner Note: If box 1 is checked, check either box (a), (b) or (c). ONLY CHECK BOX (b) WHEN THIS ADVISORY ACTION IS THE FIRST RESPONSE TO APPLICANT'S FIRST AFTER-FINAL REPLY WHICH WAS FILED WITHIN TWO MONTHS OF THE FINAL REJECTION. ONLY CHECK BOX (c) IN THE LIMITED SITUATION SET FORTH UNDER BOX (c). See MPEP 706.07(f).

Extensions of time may be obtained under 37 CFR 1.136(a). The date on which the petition under 37 CFR 1.136(a) and the appropriate extension fee have been filed is the date for purposes of determining the period of extension and the corresponding amount of the fee. The appropriate extension fee under 37 CFR 1.17(a) is calculated from: (1) the expiration date of the shortened statutory period for reply originally set in the final Office action; or (2) as set forth in (b) or (c) above, if checked. Any reply received by the Office later than three months after the mailing date of the final rejection, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

NOTICE OF APPEAL

2. ☐ The Notice of Appeal was filed on _____. A brief in compliance with 37 CFR 41.37 must be filed within two months of the date of filing the Notice of Appeal (37 CFR 41.37(a)), or any extension thereof (37 CFR 41.37(e)), to avoid dismissal of the appeal. Since a Notice of Appeal has been filed, any reply must be filed within the time period set forth in 37 CFR 41.37(a).

AMENDMENTS

3. ☒ The proposed amendments filed after a final rejection, but prior to the date of filing a brief, will not be entered because
   a) ☒ They raise new issues that would require further consideration and/or search (see NOTE below);
   b) ☐ They raise the issue of new matter (see NOTE below);
   c) ☐ They are not deemed to place the application in better form for appeal by materially reducing or simplifying the issues for appeal; and/or
   d) ☐ They present additional claims without canceling a corresponding number of finally rejected claims.

   NOTE: *See Continuation Sheet*. (See 37 CFR 1.116 and 41.33(a)).

4. ☐ The amendments are not in compliance with 37 CFR 1.121. See attached Notice of Non-Compliant Amendment (PTOL-324).

5. ☐ Applicant's reply has overcome the following rejection(s): _____.

6. ☐ Newly proposed or amended claim(s) _____ would be allowable if submitted in a separate, timely filed amendment canceling the non-allowable claim(s).

7. ☒ For purposes of appeal, the proposed amendment(s): (a) ☒ will not be entered, or (b) ☐ will be entered, and an explanation of how the new or amended claims would be rejected is provided below or appended.

AFFIDAVIT OR OTHER EVIDENCE

8. ☐ The affidavit or other evidence filed after final action, but before or on the date of filing a Notice of Appeal will not be entered because applicant failed to provide a showing of good and sufficient reasons why the affidavit or other evidence is necessary and was not earlier presented. See 37 CFR 1.116(e).

9. ☐ The affidavit or other evidence filed after the date of filing the Notice of Appeal, but prior to the date of filing a brief, will not be entered because the affidavit or other evidence failed to overcome all rejections under appeal and/or appellant fails to provide a showing of good and sufficient reasons why it is necessary and was not earlier presented. See 37 CFR 41.33(d)(1).

10. ☐ The affidavit or other evidence is entered. An explanation of the status of the claims after entry is below or attached.

REQUEST FOR RECONSIDERATION/OTHER

11. ☐ The request for reconsideration has been considered but does NOT place the application in condition for allowance because: _____.

12. ☐ Note the attached Information *Disclosure Statement*(s). (PTO/SB/08) Paper No(s). _____

13. ☐ Other: _____.

STATUS OF CLAIMS

14. The status of the claim(s) is (or will be) as follows:

Claim(s) allowed: .
Claim(s) objected to: .
Claim(s) rejected: .
Claim(s) withdrawn from consideration: .

/TONIA L.M. DOLLINGER/ Supervisory Patent Examiner, Art Unit 2443	/STEVEN C NGUYEN/ Examiner, Art Unit 2443

Continuation of 3. NOTE: The amendments include new limitations that change the scope of the invention, thereby requiring further search and/or consideration.

DO NOT ENTER: /S.N./ 08/23/2012

CERTIFICATE OF EFS FILING UNDER 37 CFR §1.8

I hereby certify that this correspondence is being electronically transmitted to the United States Patent and Trademark Office, Commissioner for Patents, via the EFS pursuant to 37 CFR §1.8 on the below date:

Date: August 15, 2012 Name: Gustavo Siller, Jr. Signature: /Gustavo Siller, Jr./

Case No. : 12579-6201

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Seung-Chul LEE et al.	Examiner: Steven C. Nguyen
Serial No: 12/340,005	Art Unit: 2443
Filed: December 19, 2008	Confirmation No: 8241
For: STEREOSCOPIC 3D DISPLAY DEVICE	

AMENDMENT

Mail Stop Amendment
Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Dear Sir:

In reply to the Office Action dated June 4, 2012, Applicant submits this Amendment. Applicant respectfully requests the Examiner to withdraw the objections and rejections to this application and to grant allowance of this Application in view of the following remarks and amended claims.

Amendments to the Claims begin on page 2 of this paper.

Remarks begin on page 5 of this paper.

CERTIFICATE OF EFS FILING

I hereby certify that this correspondence is being electronically transmitted to the United States Patent and Trademark Office, Commissioner for Patents, via the EFS on the below date:

Date: August 21, 2012 Name: Gustavo Siller, Jr. Signature: /Gustavo Siller, Jr./

BRINKS HOFER GILSON & LIONE

Case No. : 12579-6201

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Seung-Chul LEE et al.	Examiner: Steven C. Nguyen
Serial No: 12/340,005	Art Unit: 2443
Filed: December 19, 2008	Confirmation No: 8241
For: STEREOSCOPIC 3D DISPLAY DEVICE	

Mail Stop RCE
Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

REQUEST FOR CONTINUED EXAMINATION (37 CFR § 1.114)

Sir:

Applicant(s) requests continued examination of the above-identified application under 37 CFR §1.114.

☒ Submission under 37 CFR 1.114 (*check at least one of the following*):

- ☒ Previously submitted:
  - ☐ Applicant(s) requests nonentry of any previously-filed unentered amendments.
  - ☒ Please enter and consider the Amendment After Final Under 37 CFR §1.116 previously filed on August 14, 2012.
  - ☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____.
  - ☐ Other: _____.
- ☒ Attached is/are:
  - ☐ An Information Disclosure Statement
  - ☐ An Amendment to the written description, claims, or drawings
  - ☐ New Arguments and/or New Evidence in support of Patentability
  - ☒ Other: Previously Submitted Amendment dated 8/14/2012

☐ Request for suspension of action:

Applicant(s) hereby requests suspension of action on the above-identified application under 37 CFR §1.103(c) for a period of _____ months. (Period of suspension shall not exceed 3 months; requires Processing Fee under 37 CFR §1.17(i)).

☐ Small Entity Status:

- ☐ Applicant(s) hereby asserts entitlement to claim small entity status under 37 CFR §§ 1.9 and 1.27.
- ☐ A small entity statement or assertion of entitlement to claim small entity status was filed in prior application no. _____/_____ and such status is still proper and desired.
- ☐ Is no longer desired.

☒ Applicant(s) calculates the following fees to be due in connection with this Request:

- ☒ A request fee of $930 under 37 CFR §1.17(e).
- ☐ A suspension processing fee of $_____ under 37 CFR §1.17(i).
- ☐ An additional filing fee of $_____ under 37 CFR §1.16 (_____ additional independent claims and/or _____ additional total claims).
- ☐ An extension fee of $_____ under 37 CFR §1.17(a) for a _____-month extension of time.

☒ Fee payment to cover the above-enumerated fee(s):

- ☒ Please charge Deposit Account No. 23-1925 (BRINKS HOFER GILSON & LIONE) in the amount of $930.
- ☐ A payment by credit card in the amount of $_____ (Form PTO-2038 is attached).
- ☒ The Commissioner is hereby authorized to charge payment of any additional filing fees required under 37 CFR § 1.16 and any patent application processing fees under 37 CFR § 1.17 associated with this paper (including any extension fee required to ensure that this paper is timely filed), or to credit any overpayment, to Deposit Account No. 23-1925 (BRINKS HOFER GILSON & LIONE).

Respectfully submitted,

August 21, 2012
Date

/Gustavo Siller, Jr./
Gustavo Siller, Jr. (Reg. No. 32,305)

CERTIFICATE OF EFS FILING UNDER 37 CFR §1.8

I hereby certify that this correspondence is being electronically transmitted to the United States Patent and Trademark Office, Commissioner for Patents, via the EFS pursuant to 37 CFR §1.8 on the below date:

Date: August 15, 2012 Name: Gustavo Siller, Jr. Signature: /Gustavo Siller, Jr./

Case No. : 12579-6201

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Seung-Chul LEE et al.	Examiner: Steven C. Nguyen
Serial No: 12/340,005	Art Unit: 2443
Filed: December 19, 2008	Confirmation No: 8241
For: STEREOSCOPIC 3D DISPLAY DEVICE	

AMENDMENT

Mail Stop Amendment
Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Dear Sir:

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Amendments to the Claims begin on page 2 of this paper.

Remarks begin on page 5 of this paper.

In the Claims:

Please amend the claims as follows (the changes in these Claims are shown with ~~strikethrough~~ for deleted matter and underlines for added matter). A complete listing of the claims proper claim identifiers is set forth below.

Amendments to the Claims

1. (Currently Amended) A stereoscopic image display device comprising:

a main display panel operable to alternately display ~~a left image and a right image~~ left and right images according to each subframe;

an auxiliary display panel that changes polarization information of ~~an incident left or right image~~ one of the displayed left and right images, including first and second substrates having a pixel part corresponding to that of the main display panel and a sub-liquid crystal layer formed between the first and second substrates, and positioned in front of the main display panel,

wherein the auxiliary display panel is driven ~~in synchronization with one of the left and right images of the main display panel~~ to be turned on with respect to one of the displayed left and right images and serves to change polarization information of ~~the incident left or right image~~ one of the displayed left and right images;

a plurality of first electrodes patterned on the first substrate along the rows of pixels formed on the main display panel;

a second electrode on an entire surface of the pixel part of the second substrate; and

a light source that supplies light to the rear side of the main display panel.

2. (Original) The device of claim 1, wherein the second electrode is on the entire surface of the pixel part of the second substrate without any patterns.

3. (Original) The device of claim 1, wherein the first and second electrodes are made of a transparent conductive material such as ITO.

4. (Original) The device of claim 1, wherein the height of the first electrode corresponds to the height of a single pixel of the main display panel, and the width of the first electrode corresponds to 'n' (n=1,2,...) times the width of the pixel part.

5. (Previously Presented) The device of claim 1, wherein the main display panel is driven to have 60 frames, and each frame includes a first subframe displaying the left image and a second subframe displaying the right image.

6. (Previously Presented) The device of claim 1, wherein the sub-liquid crystal layer includes a plurality of liquid crystal molecules, and when the auxiliary display panel is driven, the liquid crystal molecules are arranged to be perpendicular to the first and second substrates, and when the auxiliary display panel is not driven, the liquid crystal molecules are arranged in a twisted nematic structure.

7. (Currently Amended) The device of claim 1, wherein the sub-liquid crystal layer includes a plurality of liquid crystal molecules, and when the auxiliary display panel is driven, the liquid crystal molecules are arranged to be perpendicular to the first and second substrates, and when the auxiliary display panel is not driven, the liquid crystal molecules are arranged to be ~~substantially~~ parallel to the first and second substrates.

8. (Previously Presented) The device of claim 1, wherein a polarization axis of the left or right image made incident to the auxiliary display panel and a rubbing direction of the auxiliary display panel are positioned at 45°.

9. (Previously Presented) The device of claim 4, wherein when the auxiliary display panel is not driven, a polarization axis of the left or right image that has passed through the auxiliary display panel is perpendicular to a polarization axis of the left or right image made incident to the auxiliary display panel.

10. (Original) The device of claim 1, wherein the main display panel is driven at 120Hz or higher.

11. (Original) The device of claim 1, wherein the main display panel comprises:

an array substrate;

a color filter substrate disposed to face the array substrate;

a main liquid crystal layer positioned between the array substrate and the color filter substrate;

a first polarizer attached on an outer surface of the array substrate; and

a second polarizer attached on an outer surface of the color filter substrate.

12. (Original) The device of claim 1, further comprising:

a $\lambda/4$ retardation layer formed on the first substrate of the auxiliary display panel that changes a linearly polarized left or right image made incident to the auxiliary display panel into a left circularly polarized (or right circularly polarized) state.

13. (Original) The device of claim 12, wherein the $\lambda/4$ retardation layer in formed in an in-cell form on an upper surface of the first substrate of the auxiliary display panel together with the first substrate.

14. (Original) The device of claim 12, wherein the $\lambda/4$ retardation layer is attached in a form of a film on a lower surface of the first substrate of the auxiliary display panel.

15. (Canceled)

16. (Currently Amended) The device of claim [[15]]5, wherein when the auxiliary display panel is turned on, it outputs polarization information of the left image outputted from the main display panel without changing it, and when the auxiliary display panel is turned off, it changes the polarization information of the right image outputted from the main display panel, and outputs the image.

REMARKS

At the outset, the Examiner is thanked for the thorough review and consideration of the pending application. The Office Action dated May 29, 2012, has been received and its contents carefully reviewed.

Summary of the Office Action

In the Office Action mailed 11/05/2012, claims 1~16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1~5, 8, 9 and 11~14 are rejected under 35 U.S.C. 103(a) as being unpatentable over United States Patent Publication No. 2005/0285997 to *Koyama* (hereinafter "*Koyama*") in view of United States Patent No. 6,510,002 to *Tsang* (hereinafter "*Tsang*") and United States Patent Publication No. 2006/0268196 to *Jung* (hereinafter "*Jung*"). Claims 6 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Koyama* in view of *Tsang*, *Jung* and United States Patent Publication No. 2008/0284699 to *Yano* (hereinafter "*Yano*"). Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over *Koyama* in view of *Tsang*, *Jung* and United States Patent Publication No. 2007/0206134 to *Sung* (hereinafter "*Sung*").

Summary of the Response to the Office Action

With this response, claims 1, 7 and 16 have been amended, and claim 15 has been canceled without prejudice or disclaimer. No new matter is added as a result of the amendment.

Accordingly, claims 1~14 and 16 are currently pending in this application.

Claim Rejections

Claims 1 and 7 have been amended. Applicants submit that claims 1~14 and 16 fully comply with the written description requirement of 35 U.S.C. 112, second paragraph, and respectfully requests that these rejections be withdrawn.

The rejection of claims 1~5, 8, 9 and 11~14 under 35 U.S.C. 103(a) as being unpatentable over *Koyama* in view of *Tsang* and *Jung*, the rejection of claims 6 and 10 under 35 U.S.C. 103(a) as being unpatentable over *Koyama* in view of *Tsang*, *Jung* and *Yano*, and the rejection of claim 7 under 35 U.S.C. 103(a) as being unpatentable over *Koyama* in view of *Tsang*, *Jung* and *Sung* are respectfully traversed and reconsideration is requested.

With respect to the rejection under 35 U.S.C. §103(a), it is respectfully submitted that *Koyama* in view of *Tsang* and *Jung*, either individually or in combination, fail to disclose or suggest a method where, among others, the following underlined features are present:

a main display panel operable to alternately display left and right images according to each subframe;

an auxiliary display panel that changes polarization information of one of the displayed left and right images, including first and second substrates having a pixel part corresponding to that of the main display panel and a sub-liquid crystal layer formed between the first and second substrates, and positioned in front of the main display panel,

wherein the auxiliary display panel is **driven to be turned on with respect to one of the displayed left and right images** and serves **to change polarization information of one of the displayed left and right images**;

a plurality of first electrodes patterned on the first substrate along the rows of pixels formed on the main display panel;

a second electrode on an entire surface of the pixel part of the second substrate; and

a light source that supplies light to the rear side of the main display panel.

Koyama merely discloses that as shown in Fig. 2, the 2D/3D switching type liquid crystal display panel is constructed by assembling a display liquid crystal panel 10, a patterned retardation plate 20, and a switching liquid crystal panel 30 (see. paragraph [0055]).

That is, the switching liquid crystal panel 30 of *Koyama* is provided for **2D/3D switching (not for changing polarization information of one of the displayed left and right images)**. The switching liquid crystal panel 30 of *Koyama* serves as a switching means for switching, a polarization state of light passing through the switching liquid crystal panel 30, in response to turning ON/OFF of the liquid crystal layer 32.

Specifically, the switching liquid crystal panel 30 optically modulates the light differently in 2D display or 3D display (paragraph 0060).

In a 3D display, the switching liquid crystal panel 30 is off and serves as a 1/2 wavelength plate. After passing through the switching liquid crystal panel 30, the light enters the patterned retardation plate 20, in which the first area 20A and the second area 20B have different rubbing directions, i.e., different retardation axis directions. ~ In contrast, in cases where the 2D display is carried out, the switching liquid crystal panel 30 is turned ON, and the light passing through the switching liquid crystal panel 30 will not be optically modulated (paragraphs 0063 ~ 0070).

Substantially, **the patterned retardation plate 20** (not the switching liquid crystal panel 30) of *Koyama* corresponds to the auxiliary display panel of the present invention.

Figs. 2 and 8 of *Koyama* are reproduced and annotated below for convenience.

FIG. 2

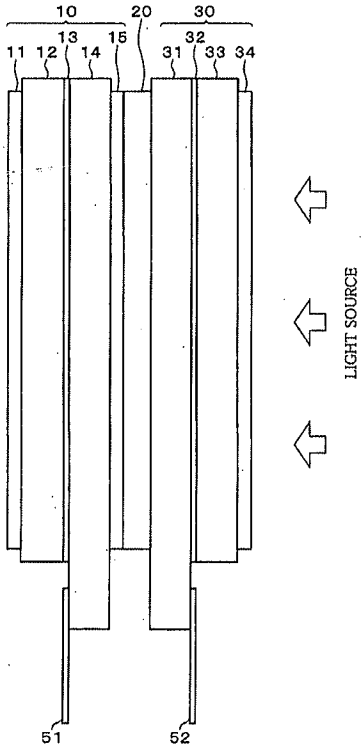
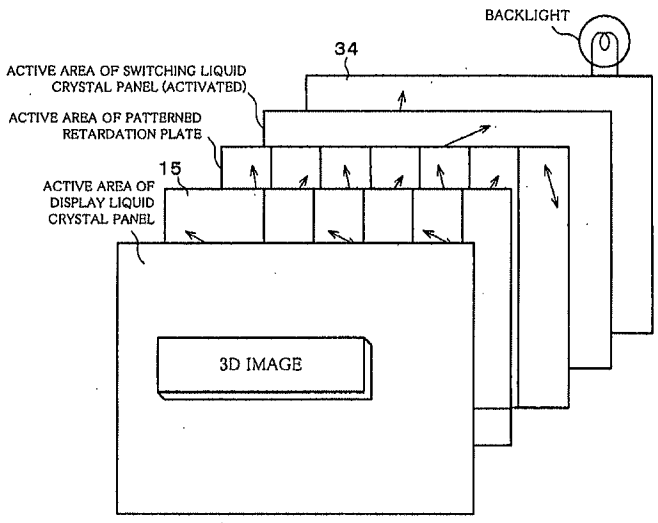


FIG. 8



Moreover, the auxiliary display panel of the present invention changes polarization information of **one of the displayed left and right images** (not both the displayed left and right images).

In contrast, the switching liquid crystal panel 30 of *Koyama* changes polarization information of **light entered from the light source**.

Applicants respectfully submit that none of the cited references remedy the deficient teachings of *Koyama*. As such, no combination of *Koyama* in view of *Tsang* and *Jung* would provide all of the features recited in amended claim 1 of the present application.

Accordingly, none of the cited references, singly or in combination, teaches or suggests the features of the present invention. For at least these reasons, Applicant respectfully requests that the Office withdraw the 35 U.S.C. 103(a) rejection of independent claim 1. Claims 2~14 and 16 depend from independent claim 1and thus the 35 U.S.C. 103(a) rejections of those dependent claims should be withdrawn as well.

Applicants believe the foregoing amendments and remarks place the application in condition for allowance and early, favorable action is respectfully solicited.

Respectfully submitted,

Dated: August 15, 2012

/Gustavo Siller, Jr./
Gustavo Siller, Jr., Reg. No. 32,305
Attorney for Applicants

BRINKS HOFER GILSON & LIONE
PO BOX 10395
CHICAGO, IL 60610
(312) 321-4200

Electronic Patent Application Fee Transmittal

Application Number:	12340005
Filing Date:	19-Dec-2008
Title of Invention:	STEREOSCOPIC 3D DISPLAY DEVICE
First Named Inventor/Applicant Name:	Seung-Chul Lee
Filer:	Steven P. Shurtz/Maria Calderon
Attorney Docket Number:	12579-6201

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
Request for continued examination	1801	1	930	930
		Total in USD ($)		**930**

Electronic Acknowledgement Receipt

EFS ID:	13548520
Application Number:	12340005
International Application Number:	
Confirmation Number:	8241
Title of Invention:	STEREOSCOPIC 3D DISPLAY DEVICE
First Named Inventor/Applicant Name:	Seung-Chul Lee
Customer Number:	757
Filer:	Steven P. Shurtz/Jesus Rodriguez
Filer Authorized By:	Steven P. Shurtz
Attorney Docket Number:	12579-6201
Receipt Date:	21-AUG-2012
Filing Date:	19-DEC-2008
Time Stamp:	17:04:50
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$930
RAM confirmation Number	4146
Deposit Account	231925
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.19 (Document supply fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.20 (Post Issuance fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		12579-6201RCE.pdf	563372 5481656e99739e1dd816dd37a1b45dbcf8172deb	yes	11

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Miscellaneous Incoming Letter	1	1
	Request for Continued Examination (RCE)	2	3
	Amendment Submitted/Entered with Filing of CPA/RCE	4	11

Warnings:

Information:

2	Fee Worksheet (SB06)	fee-info.pdf	30268 9a6d0bb3465e773236e2ac5b5458fb126fb22a28	no	2

Warnings:

Information:

Total Files Size (in bytes):	593640

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

CERTIFICATE OF EFS FILING UNDER 37 CFR §1.8

I hereby certify that this correspondence is being electronically transmitted to the United States Patent and Trademark Office, Commissioner for Patents, via the EFS pursuant to 37 CFR §1.8 on the below date:

Date: August 21, 2012 Name: Gustavo Siller, Jr. Signature: /Gustavo Siller, Jr./

BRINKS HOFER GILSON &LIONE

Case No. : 12579-6201

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In re Application of:
Seung-Chul LEE et al.

Examiner: Steven C. Nguyen

Serial No: 12/340,005

Art Unit: 2443

Filed: December 19, 2008

Confirmation No: 8241

For: STEREOSCOPIC 3D DISPLAY DEVICE

TRANSMITTAL

Mail Stop RCE
Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Sir:

Attached is/are:

☒ A Transmittal; RCE and copy of Previously Filed Amendment.

Fee calculation:

☐ No additional fee is required.

☐ Small Entity.

☐ An extension fee in an amount of $_ for a _-month extension of time under 37 CFR § 1.136(a).

☐ A petition or processing fee in an amount of $_____ under 37 CFR § 1.17(___) .

☐ An additional filing fee has been calculated as shown below:

						Small Entity			Not a Small Entity	
	Claims Remaining After Amendment		Highest No. Previously Paid For	Present Extra		Rate	Add'l Fee	OR	Rate	Add'l Fee
Total		Minus				x $30=			x $60=	
Indep.		Minus				x 125=			x $250=	
First Presentation of Multiple Dep. Claim						+$225=			+ $450=	
						Total	$		Total	$

Fee payment:

☒ Please charge Deposit Account No. 23-1925 in the amount of $930 for the RCE.

☐ Payment by credit card in the amount of $_____ (Form PTO-2038 is attached).

☒ The Director is hereby authorized to charge payment of any additional filing fees required under 37 CFR § 1.16 and any patent application processing fees under 37 CFR § 1.17 associated with this paper (including any extension fee required to ensure that this paper is timely filed), or to credit any overpayment, to Deposit Account No. 23-1925.

Respectfully submitted,

August 21, 2012
Date

/Gustavo Siller, Jr./
Gustavo Siller, Jr. (Reg. No. 32,305)

BRINKS HOFER GILSON &LIONE

PTO/SB/06 (07-06)
Approved for use through 1/31/2007. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 12/340,005	Filing Date 12/19/2008	☐ To be Mailed

APPLICATION AS FILED – PART I

	(Column 1)	(Column 2)	SMALL ENTITY ☐		OR	OTHER THAN SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE ($)	FEE ($)		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =		OR	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =			X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT	08/21/2012	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE ($)	ADDITIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 15	Minus	** 20	= 0	X $ =		OR	X $60=	0
	Independent (37 CFR 1.16(h))	* 1	Minus	***3	= 0	X $ =		OR	X $250=	0
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	0

AMENDMENT		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =		OR	X $ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =		OR	X $ =	
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

Legal Instrument Examiner:
/GAIL WOOTEN/

CERTIFICATE OF EFS FILING UNDER 37 CFR §1.8

I hereby certify that this correspondence is being electronically transmitted to the United States Patent and Trademark Office, Commissioner for Patents, via the EFS pursuant to 37 CFR §1.8 on the below date:

Date: August 15, 2012 Name: Gustavo Siller, Jr. Signature: /Gustavo Siller, Jr./

Case No. : 12579-6201

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Seung-Chul LEE et al.	Examiner: Steven C. Nguyen
Serial No: 12/340,005	Art Unit: 2443
Filed: December 19, 2008	Confirmation No: 8241
For: STEREOSCOPIC 3D DISPLAY DEVICE	

AMENDMENT

Mail Stop Amendment
Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Dear Sir:

In reply to the Office Action dated June 4, 2012, Applicant submits this Amendment. Applicant respectfully requests the Examiner to withdraw the objections and rejections to this application and to grant allowance of this Application in view of the following remarks and amended claims.

Amendments to the Claims begin on page 2 of this paper.

Remarks begin on page 5 of this paper.

In the Claims:

Please amend the claims as follows (the changes in these Claims are shown with ~~strikethrough~~ for deleted matter and underlines for added matter). A complete listing of the claims proper claim identifiers is set forth below.

Amendments to the Claims

1. (Currently Amended) A stereoscopic image display device comprising:

a main display panel operable to alternately display ~~a left image and a right image~~ left and right images according to each subframe;

an auxiliary display panel that changes polarization information of ~~an incident left or right image~~ one of the displayed left and right images, including first and second substrates having a pixel part corresponding to that of the main display panel and a sub-liquid crystal layer formed between the first and second substrates, and positioned in front of the main display panel,

wherein the auxiliary display panel is driven ~~in synchronization with one of the left and right images of the main display panel~~ to be turned on with respect to one of the displayed left and right images and serves to change polarization information of ~~the incident left or right image~~ one of the displayed left and right images;

a plurality of first electrodes patterned on the first substrate along the rows of pixels formed on the main display panel;

a second electrode on an entire surface of the pixel part of the second substrate; and

a light source that supplies light to the rear side of the main display panel.

2. (Original) The device of claim 1, wherein the second electrode is on the entire surface of the pixel part of the second substrate without any patterns.

3. (Original) The device of claim 1, wherein the first and second electrodes are made of a transparent conductive material such as ITO.

4. (Original) The device of claim 1, wherein the height of the first electrode corresponds to the height of a single pixel of the main display panel, and the width of the first electrode corresponds to 'n' (n=1,2,...) times the width of the pixel part.

5. (Previously Presented) The device of claim 1, wherein the main display panel is driven to have 60 frames, and each frame includes a first subframe displaying the left image and a second subframe displaying the right image.

6. (Previously Presented) The device of claim 1, wherein the sub-liquid crystal layer includes a plurality of liquid crystal molecules, and when the auxiliary display panel is driven, the liquid crystal molecules are arranged to be perpendicular to the first and second substrates, and when the auxiliary display panel is not driven, the liquid crystal molecules are arranged in a twisted nematic structure.

7. (Currently Amended) The device of claim 1, wherein the sub-liquid crystal layer includes a plurality of liquid crystal molecules, and when the auxiliary display panel is driven, the liquid crystal molecules are arranged to be perpendicular to the first and second substrates, and when the auxiliary display panel is not driven, the liquid crystal molecules are arranged to be ~~substantially~~ parallel to the first and second substrates.

8. (Previously Presented) The device of claim 1, wherein a polarization axis of the left or right image made incident to the auxiliary display panel and a rubbing direction of the auxiliary display panel are positioned at 45°.

9. (Previously Presented) The device of claim 4, wherein when the auxiliary display panel is not driven, a polarization axis of the left or right image that has passed through the auxiliary display panel is perpendicular to a polarization axis of the left or right image made incident to the auxiliary display panel.

10. (Original) The device of claim 1, wherein the main display panel is driven at 120Hz or higher.

11. (Original) The device of claim 1, wherein the main display panel comprises:

an array substrate;

a color filter substrate disposed to face the array substrate;

a main liquid crystal layer positioned between the array substrate and the color filter substrate;

a first polarizer attached on an outer surface of the array substrate; and

a second polarizer attached on an outer surface of the color filter substrate.

12. (Original) The device of claim 1, further comprising:

a $\lambda/4$ retardation layer formed on the first substrate of the auxiliary display panel that changes a linearly polarized left or right image made incident to the auxiliary display panel into a left circularly polarized (or right circularly polarized) state.

13. (Original) The device of claim 12, wherein the $\lambda/4$ retardation layer in formed in an in-cell form on an upper surface of the first substrate of the auxiliary display panel together with the first substrate.

14. (Original) The device of claim 12, wherein the $\lambda/4$ retardation layer is attached in a form of a film on a lower surface of the first substrate of the auxiliary display panel.

15. (Canceled)

16. (Currently Amended) The device of claim [[15]]5, wherein when the auxiliary display panel is turned on, it outputs polarization information of the left image outputted from the main display panel without changing it, and when the auxiliary display panel is turned off, it changes the polarization information of the right image outputted from the main display panel, and outputs the image.

REMARKS

At the outset, the Examiner is thanked for the thorough review and consideration of the pending application. The Office Action dated May 29, 2012, has been received and its contents carefully reviewed.

Summary of the Office Action

In the Office Action mailed 11/05/2012, claims 1~16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1~5, 8, 9 and 11~14 are rejected under 35 U.S.C. 103(a) as being unpatentable over United States Patent Publication No. 2005/0285997 to *Koyama* (hereinafter "*Koyama*") in view of United States Patent No. 6,510,002 to *Tsang* (hereinafter "*Tsang*") and United States Patent Publication No. 2006/0268196 to *Jung* (hereinafter "*Jung*"). Claims 6 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Koyama* in view of *Tsang*, *Jung* and United States Patent Publication No. 2008/0284699 to *Yano* (hereinafter "*Yano*"). Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over *Koyama* in view of *Tsang*, *Jung* and United States Patent Publication No. 2007/0206134 to *Sung* (hereinafter "*Sung*").

Summary of the Response to the Office Action

With this response, claims 1, 7 and 16 have been amended, and claim 15 has been canceled without prejudice or disclaimer. No new matter is added as a result of the amendment.

Accordingly, claims 1~14 and 16 are currently pending in this application.

Claim Rejections

Claims 1 and 7 have been amended. Applicants submit that claims 1~14 and 16 fully comply with the written description requirement of 35 U.S.C. 112, second paragraph, and respectfully requests that these rejections be withdrawn.

The rejection of claims 1~5, 8, 9 and 11~14 under 35 U.S.C. 103(a) as being unpatentable over *Koyama* in view of *Tsang* and *Jung*, the rejection of claims 6 and 10 under 35 U.S.C. 103(a) as being unpatentable over *Koyama* in view of *Tsang*, *Jung* and *Yano*, and the rejection of claim 7 under 35 U.S.C. 103(a) as being unpatentable over *Koyama* in view of *Tsang*, *Jung* and *Sung* are respectfully traversed and reconsideration is requested.

With respect to the rejection under 35 U.S.C. §103(a), it is respectfully submitted that *Koyama* in view of *Tsang* and *Jung*, either individually or in combination, fail to disclose or suggest a method where, among others, the following underlined features are present:

a main display panel operable to alternately display left and right images according to each subframe;

an auxiliary display panel that changes polarization information of one of the displayed left and right images, including first and second substrates having a pixel part corresponding to that of the main display panel and a sub-liquid crystal layer formed between the first and second substrates, and positioned in front of the main display panel,

wherein the auxiliary display panel is **driven to be turned on with respect to one of the displayed left and right images** and serves **to change polarization information of one of the displayed left and right images**;

a plurality of first electrodes patterned on the first substrate along the rows of pixels formed on the main display panel;

a second electrode on an entire surface of the pixel part of the second substrate; and

a light source that supplies light to the rear side of the main display panel.

Koyama merely discloses that as shown in Fig. 2, the 2D/3D switching type liquid crystal display panel is constructed by assembling a display liquid crystal panel 10, a patterned retardation plate 20, and a switching liquid crystal panel 30 (see. paragraph [0055]).

That is, the switching liquid crystal panel 30 of *Koyama* is provided for **2D/3D switching (not for changing polarization information of one of the displayed left and right images)**. The switching liquid crystal panel 30 of *Koyama* serves as a switching means for switching, a polarization state of light passing through the switching liquid crystal panel 30, in response to turning ON/OFF of the liquid crystal layer 32.

Specifically, the switching liquid crystal panel 30 optically modulates the light differently in 2D display or 3D display (paragraph 0060).

In a 3D display, the switching liquid crystal panel 30 is off and serves as a 1/2 wavelength plate. After passing through the switching liquid crystal panel 30, the light enters the patterned retardation plate 20, in which the first area 20A and the second area 20B have different rubbing directions, i.e., different retardation axis directions. ~ In contrast, in cases where the 2D display is carried out, the switching liquid crystal panel 30 is turned ON, and the light passing through the switching liquid crystal panel 30 will not be optically modulated (paragraphs 0063 ~ 0070).

Substantially, **the patterned retardation plate 20** (not the switching liquid crystal panel 30) of *Koyama* corresponds to the auxiliary display panel of the present invention.

Figs. 2 and 8 of *Koyama* are reproduced and annotated below for convenience.

FIG. 2

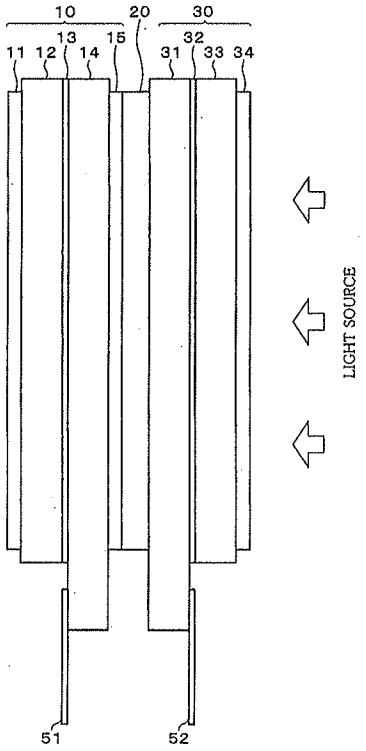
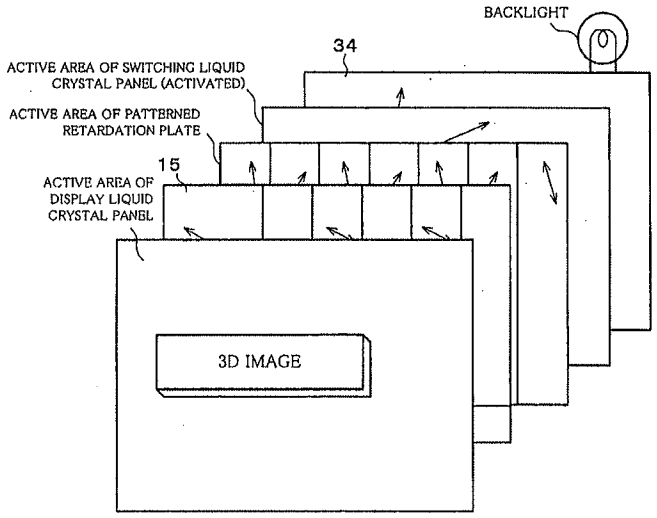


FIG. 8



Moreover, the auxiliary display panel of the present invention changes polarization information of **one of the displayed left and right images** (not both the displayed left and right images).

In contrast, the switching liquid crystal panel 30 of *Koyama* changes polarization information of **light entered from the light source**.

Applicants respectfully submit that none of the cited references remedy the deficient teachings of *Koyama*. As such, no combination of *Koyama* in view of *Tsang* and *Jung* would provide all of the features recited in amended claim 1 of the present application.

Accordingly, none of the cited references, singly or in combination, teaches or suggests the features of the present invention. For at least these reasons, Applicant respectfully requests that the Office withdraw the 35 U.S.C. 103(a) rejection of independent claim 1. Claims 2~14 and 16 depend from independent claim 1and thus the 35 U.S.C. 103(a) rejections of those dependent claims should be withdrawn as well.

Applicants believe the foregoing amendments and remarks place the application in condition for allowance and early, favorable action is respectfully solicited.

Respectfully submitted,

Dated: August 15, 2012

/Gustavo Siller, Jr./

Gustavo Siller, Jr., Reg. No. 32,305
Attorney for Applicants

BRINKS HOFER GILSON & LIONE
PO BOX 10395
CHICAGO, IL 60610
(312) 321-4200

Electronic Acknowledgement Receipt

EFS ID:	13504609
Application Number:	12340005
International Application Number:	
Confirmation Number:	8241
Title of Invention:	STEREOSCOPIC 3D DISPLAY DEVICE
First Named Inventor/Applicant Name:	Seung-Chul Lee
Customer Number:	757
Filer:	Gustavo Siller Jr./Maggie Pieczonka
Filer Authorized By:	Gustavo Siller Jr.
Attorney Docket Number:	12579-6201
Receipt Date:	15-AUG-2012
Filing Date:	19-DEC-2008
Time Stamp:	16:50:21
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		12579-6201Amendment.pdf	459973 ac90a77ff9a8f99d65cf6fd84ea500df5b537bf8	yes	9

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Miscellaneous Incoming Letter	1	1
	Amendment After Final	2	9
Warnings:			
Information:			
	Total Files Size (in bytes):	459973	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

CERTIFICATE OF EFS FILING UNDER 37 CFR §1.8

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Date: August 15, 2012 Name: Gustavo Siller, Jr. Signature: /Gustavo Siller, Jr./

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Case No. : 12579-6201

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:
Seung-Chul LEE et al.

Examiner: Steven C. Nguyen

Serial No: 12/340,005

Art Unit: 2443

Filed: December 19, 2008

Confirmation No: 8241

For: STEREOSCOPIC 3D DISPLAY DEVICE

TRANSMITTAL

Mail Stop Amendment
Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Sir:

Attached is/are:

☒ A Transmittal; and Amendment.

Fee calculation:

☒ No additional fee is required.

☐ Small Entity.

☐ An extension fee in an amount of $_ for a _-month extension of time under 37 CFR § 1.136(a).

☐ A petition or processing fee in an amount of $_____ under 37 CFR § 1.17(___) .

☐ An additional filing fee has been calculated as shown below:

						Small Entity			Not a Small Entity	
	Claims Remaining After Amendment		Highest No. Previously Paid For	Present Extra		Rate	Add'l Fee	OR	Rate	Add'l Fee
Total		Minus				x $30=			x $60=	
Indep.		Minus				x 125=			x $250=	
First Presentation of Multiple Dep. Claim						+$225=			+ $450=	
						Total	$		Total	$

Fee payment:

☐ Please charge Deposit Account No. 23-1925 in the amount of___ for _____.

☐ Payment by credit card in the amount of $_____ (Form PTO-2038 is attached).

☒ The Director is hereby authorized to charge payment of any additional filing fees required under 37 CFR § 1.16 and any patent application processing fees under 37 CFR § 1.17 associated with this paper (including any extension fee required to ensure that this paper is timely filed), or to credit any overpayment, to Deposit Account No. 23-1925.

Respectfully submitted,

August 15, 2012
Date

/Gustavo Siller, Jr./
Gustavo Siller, Jr. (Reg. No. 32,305)

BRINKS HOFER GILSON &LIONE

PTO/SB/06 (07-06)
Approved for use through 1/31/2007. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number	Filing Date	☐ To be Mailed
12/340,005	12/19/2008	

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY ☐ RATE ($)	SMALL ENTITY ☐ FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =		OR	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =			X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							
			TOTAL			TOTAL	

* If the difference in column 1 is less than zero, enter "0" in column 2.

APPLICATION AS AMENDED – PART II

AMENDMENT	08/15/2012	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE ($)	SMALL ENTITY ADDITIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 15	Minus	** 20	=	X $ =		OR	X $ =	
	Independent (37 CFR 1.16(h))	* 1	Minus	***3	=	X $ =		OR	X $ =	
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

AMENDMENT		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =		OR	X $ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =		OR	X $ =	
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

Legal Instrument Examiner:
/PEGGY YARBOROUGH/

I hereby certify that this correspondence is being Electronically Transmitted on the date noted below to:
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450
6/12/2012
Date of Deposit
Gustavo Siller, Jr.
Name of applicant, assignee or Registered Representative
/Gustavo Siller, Jr./
Signature
6/12/2012
Date of Signature

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Appln. of:	Seung-Chul Lee et al.	
Appln. No.:	12/340,005	Examiner: Steven C. Nguyen
Filed:	December 19, 2008	Art Unit: 2443
For:	STEREOSCOPIC 3D DISPLAY DEVICE	Confirmation No.: 8241
Attorney Docket No:	12579-6201	

THIRD SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

In accordance with the duty of disclosure under 37 CFR §1.56 and §§1.97-1.98, and more particularly in accordance with 37 CFR §1.97(d), Applicants hereby cite the following reference(s):

FOREIGN PATENT DOCUMENTS		
DOCUMENT NO.	**DATE**	**COUNTRY**
JP 06-165221	06/10/1994	Japan
JP 2003-189208	07/04/2003	Japan

OTHER ART – NON PATENT LITERATURE DOCUMENTS
Copy of Office Action issued in corresponding Japanese Patent Application No. 2008-316168, mailed March 13, 2012.

Applicants are enclosing Form PTO-1449 (one sheet), along with a copy of each listed reference for which a copy is required under 37 CFR §1.98(a)(2). Pursuant to the undersigned attorney's obligation and duties under 37 CFR §§ 1.56 and 1.98(a)(3) and (c), either English language abstracts, partial translations, or full translations are included for patent documents which are not in English for the express purpose of providing a concise explanation of the references to the Patent and Trademark Office with the opportunity to evaluate the same. Applicants respectfully request the Examiner's consideration of the above reference(s) and entry thereof into the record of this application.

By submitting this Statement, Applicants are attempting to fully comply with the duty of candor and good faith mandated by 37 CFR §1.56. As such, this Statement is not intended to constitute an admission that any of the enclosed references, or other information referred to therein, constitutes "prior art" or is otherwise "material to patentability," as that phrase is defined in 37 CFR §1.56(a).

Applicants hereby certify pursuant to 37 CFR §1.97(e)(1) that no item of information in this Information Disclosure Statement was first cited in any communication from a patent office in a counterpart foreign or international application more than three months prior to the filing of this Information Disclosure Statement (a copy of any foreign communication first citing a listed reference is attached for the Examiner's reference). Applicants have further calculated a processing fee in the amount of $180.00 to be due under 37 CFR §1.17(p) in connection with the filing of this Information Disclosure Statement. Applicants have enclosed a check covering this fee, or authorized charging the fee to a deposit account or credit card, as indicated in the Transmittal accompanying this Information Disclosure Statement.

Respectfully submitted,

June 12, 2012
Date

/Gustavo Siller, Jr./
Gustavo Siller, Jr.
(Reg. No. 32,305)

FORM PTO-1449	SERIAL NO. 12/340,005	CASE NO. 12579-6201
LIST OF PATENTS AND PUBLICATIONS FOR APPLICANT'S INFORMATION DISCLOSURE STATEMENT	FILING DATE 12/19/2008	GROUP ART UNIT 2443
(use several sheets if necessary)	APPLICANT(S): Seung-Chul Lee et al.	CONFIRMATION NO. 8241

REFERENCE DESIGNATION **U.S. PATENT DOCUMENTS**

EXAMINER INITIAL		DOCUMENT NUMBER Number-Kind Code (if known)	DATE	NAME	CLASS/ SUBCLASS	FILING DATE
	D1					
	D2					
	D3					
	D4					
	D5					
	D6					
	D7					
	D8					
	D9					
	D10					
	D11					
	D12					
	D13					

FOREIGN PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER Number-Kind Code (if known)	DATE	COUNTRY	CLASS/ SUBCLASS	TRANSLATION YES OR NO
	D14	JP 06-165221	06/10/1994	Japan		Abstract
	D15	JP 2003-189208	07/04/2003	Japan		Abstract

EXAMINER INITIAL		OTHER ART – NON PATENT LITERATURE DOCUMENTS (Include name of author, title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date page(s), volume-issue number(s), publisher, city and/or country where published.
	D16	Copy of Office Action issued in corresponding Japanese Patent Application No. 2008-316168, mailed March 13, 2012.
	D17	
	D18	
	D19	
	D20	
	D21	

EXAMINER	DATE CONSIDERED

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2003-189208
(43)Date of publication of application : 04.07.2003

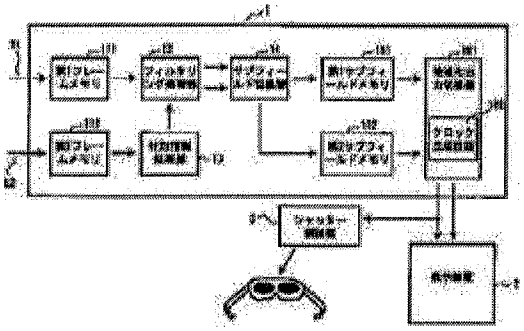
(51)Int.Cl. H04N 5/66
G02F 1/13
G09G 5/00
G09G 5/02
G09G 5/36

(21)Application number : 2001-386936
(22)Date of filing : 20.12.2001

(71)Applicant : TOSHIBA CORP
(72)Inventor : ITO TAKESHI
OKUMURA HARUHIKO

(54) DISPLAY SYSTEM AND DISPLAY METHOD

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a system which makes users putting on no glasses observe a picture without degradation of the picture quality and gives additional information to users putting on glasses while observing the same picture, by giving a difference between pictures to be observed with a shutter and pictures to be observed without the shutter.
SOLUTION: One frame picture is divided into sub-fields to be successively displayed along the time base, and they are divided to sub-fields for displaying additional information and sub-fields for displaying a picture obtained by subtracting the additional information from the original frame picture. The shutter is opened and closed synchronously with the vertical frequency of sub-fields. Thus users using the shutter can see the additional information for the purpose of seeing only the picture having the additional information subtracted. Meanwhile, users who don't use the shutter see the original frame picture.



(19)日本国特許庁（ＪＰ）　(12) **公開特許公報（Ａ）**　(11)特許出願公開番号
特開2003－189208
（P2003－189208A）
(43)公開日　平成15年７月４日(2003.7.4)

(51)Int.Cl.⁷		識別記号	FI		テーマコード*（参考）
H04N	5/66		H04N	5/66	D　2H088
G02F	1/13	505	G02F	1/13	505　5C058
G09G	5/00	530	G09G	5/00	530Z　5C082
		550			550A
	5/02			5/02	B

審査請求　未請求　請求項の数７　ＯＬ　（全 12 頁）　最終頁に続く

(21)出願番号　特願2001－386936(P2001－386936)
(22)出願日　平成13年12月20日(2001.12.20)

(71)出願人　000003078
株式会社東芝
東京都港区芝浦一丁目１番１号
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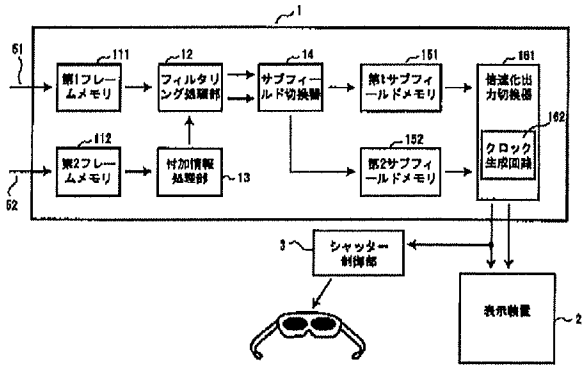
(54)【発明の名称】　表示システム及び表示方法

(57)【要約】
【課題】　シャッターを使用した場合と使用しない場合とで、観察される画像を異ならせることにより、同一画面を観察していながら、眼鏡不使用者には画質劣化を生じさせることなく、眼鏡使用者には付加情報を与えるシステムを提供する。
【解決手段】　１枚のフレーム画像を時間軸に沿って順に表示するサブフィールドに分割し、付加情報を表示するサブフィールドと、元のフレーム画像から付加情報を差し引いた画像を表示するサブフィールドとする。また、シャッターは、サブフィールドの垂直周波数に同期して開閉される。これにより、シャッター使用者は付加情報を差し引いた画像のみを見るので、付加情報を視認できる。一方、シャッター不使用者は元のフレーム画像を見る。



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【特許請求の範囲】

【請求項１】入力画像を第１副画像及び前記入力画像から前記第１副画像を差し引いた第２副画像とに分割する手段と、前記第１副画像及び前記第２副画像を交互に表示する表示手段と、前記第２副画像のみを透過させるシャッターとを備えることを特徴とする表示システム。

【請求項２】前記第１副画像は、文字情報であることを特徴とする請求項１記載の表示システム。

【請求項３】前記第１副画像は色を有し、前記第２副画像中の前記第１副画像を差し引いた部分は前記色の補色であることを特徴とする請求項１記載の表示システム。

【請求項４】前記色は、前記入力画像中の前記第１副画像の位置における三原色成分のうち、最大輝度であることを特徴とする請求項３記載の表示システム。

【請求項５】右眼用入力画像を第１副画像及び前記右眼用入力画像から前記第１副画像を差し引いた第２副画像と、左眼用入力画像を第３副画像及び前記左眼用入力画像から前記第３副画像を差し引いた第４副画像とに分割する手段と、前記第１副画像及び前記第２副画像及び前記第３副画像及び前記第４副画像を表示する表示手段と、前記表示手段に同期して画像を透過するシャッター眼鏡とを備えることを特徴とする表示システム。

【請求項６】１枚の入力画像を複数の副画像に分割する分割手段と、前記副画像を順次表示する表示手段と、前記副画像を選択的に透過させるシャッターとを備えることを特徴とする表示システム。

【請求項７】入力画像を第１副画像及び前記入力画像から前記第１副画像を差し引いた第２副画像とに分割し、前記第１副画像及び前記第２副画像を交互に表示し、前記第２副画像のみを透過させるシャッターを介して前記入力画像とは異なる前記第１副画像を伝達する表示方法。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、シャッターを通して画面を見る者と、シャッターを通さないで画面を見る者とで観察される画像を異ならせることができる表示システムに関する。

【０００２】

【従来の技術】画像表示装置としてはカソードレイチューブ（ＣＲＴ）や液晶表示装置（ＬＣＤ）などがあり、従来の表示方法は６０Ｈｚで画面のリフレッシュを行っている。例えば、静止画においては同じ画面を、動画においては異なる画面を夫々１／６０ｓ毎に表示する。観察者は同じ画面を観察し、同じ内容を観察することになる。

【０００３】観察者毎に異なる情報を提供する手段の例は、眼鏡を全ての観察者に着用させ、観察者毎に眼鏡の開閉のタイミングが異なるように制御するものである。このようにすると、例えば、第１フィールドの画像を観察する観察者と第２フィールドの画像を観察する観察者を分けることができる。しかしこの場合、観察者の数だけ眼鏡が必要になる欠点や、眼鏡を外した場合には両方の情報が重なって見えてしまう欠点がある。

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【０００４】この他、眼鏡式の立体表示装置は数多く提案されており、基本的に表示装置は１２０Ｈｚで左眼用の画像と右眼用の画像を交互に表示し、眼鏡は左眼の視界部分と右眼の視界部分を交互に開閉する構成になっている。この場合、左眼用の画像が表示されている期間に眼鏡の左眼の視界部分が開となり、右眼用の画像が表示されている期間に眼鏡の右眼の視界部分が開となるため、眼鏡を着用した観察者は所望の立体画像を観察することができるが、眼鏡を着用していない観察者は左右の画像が混成され、輪郭のずれた画像を見ることになる。

【０００５】

【発明が解決しようとする課題】本発明は、眼鏡を使用していない観察者には自然な画像を、眼鏡等を使用している観察者にはその画像に付加情報の加わった画像を提供できるようにする。

【０００６】

【課題を解決するための手段】本発明の形態は、入力画像を第１副画像及び前記入力画像から前記第１副画像を差し引いた第２副画像とに分割する手段と、前記第１副画像及び前記第２副画像を交互に表示する表示手段と、前記第２副画像のみを透過させるシャッターとを備えることを特徴とする表示システムである。

【０００７】ここで、前記第１副画像は、文字情報であっても良い。

【０００８】また、前記第１副画像は色を有し、前記第２副画像中の前記第１副画像を差し引いた部分は前記色の補色であっても良い。

【０００９】前記色は、前記入力画像中の前記第１副画像の位置における三原色成分のうち、最大輝度であっても良い。

【００１０】本発明の別形態は、入力画像を右眼用第１副画像及び前記入力画像から前記右眼用第１副画像を差し引いた右眼用第２副画像と左眼用第１副画像及び前記入力画像から前記左眼用第１副画像を差し引いた左眼用第２副画像とに分割する手段と、前記右眼用第１副画像及び前記右眼用第２副画像及び前記左眼用第１副画像及び前記左眼用第２副画像を表示する表示手段と、前記表示手段に同期して画像を透過するシャッター眼鏡とを備えることを特徴とする表示システムである。

【００１１】また、別の形態は、１枚の入力画像を複数の副画像に分割する分割手段と、前記副画像を順次表示する表示手段と、前記副画像を選択的に透過させるシャッターとを備えることを特徴とする表示システムである。

【００１２】また、別の形態は、入力画像を第１副画像及び前記入力画像から前記第１副画像を差し引いた第２

副画像とに分割し、前記第１副画像及び前記第２副画像を交互に表示し、前記第２副画像のみを透過させるシャッターを介して前記入力画像とは異なる前記第１副画像を伝達する表示方法である。

【００１３】

【発明の実施の形態】以下、例示的ではあるが、限定的ではない実施例を説明する。

（実施形態１）本発明の第１の形態は、１枚のフレーム画像を時間軸に沿って順に表示する２つのサブフィールド（ＳＦ）に分割する。ここで、２つのサブフィールドは重ね合わせれば、分割前の１枚のフレーム画像となるものであり、第1のサブフィールドでは付加情報を表示し、第２のサブフィールドは第１のサブフィールドを分割前のフレーム画像から差し引いたものである。

【００１４】このように加工した画像を、直接見る観察者と、シャッターを介して見る観察者とが見られるようにする。

【００１５】分割された画像を直接見る観察者は、２つサブフィールドを重ね合わせた状態で見るので、実質的にフレーム画像を見ることになる。従って、この観察者にとっては、サブフィールドに画像が分割されていることを認識することなく、通常の映像を見る。

【００１６】一方、シャッターを介して分割された画像を見る観察者は、サブフィールドの片方を選択的に観察するようにシャッターを開閉する。すなわち、第１のサブフィールド表示中はシャッターが閉まり、第２のサブフィールドのみを見るようにするのである。すると、シャッターを介して見る観察者は、第１のサブフィールドが差し引かれた画像のみを見るので、フレーム画像から第１のサブフィールドの画像が欠けた画像を見ることになる。結果として、第１のサブフィールド上の情報を認識することになる。

【００１７】サブフィールドのフィールド周波数は画面全体のちらつき（フリッカ）が発生しない８０Ｈｚ（フリッカ周波数は８０／２＝４０Ｈｚ）を最小周波数とすればよい。また、シャッターはサブフィールドの垂直周波数に同期して開閉させればよい。

【００１８】以下、シャッターの例として、シャッター眼鏡を使用する場合を説明するが、これに限定されない。たとえば、液晶シャッター板を用いた窓を用いて、特定の観察者はこの窓を介して画像を見るようにすることなども可能である。シャッター眼鏡を用いる場合は、本実施形態においては、左右のシャッターを同時に開閉することで対応できる。

【００１９】第１のサブフィールドに表示する付加情報は、典型的には文字情報であるが、その他、任意の画像であってもよい。

【００２０】本実施形態のシステムは、図１図示のように、主に、画像信号を受ける信号処理部１、信号処理部１の出力を表示する表示装置２、信号処理部１から同期信号を受けるシャッター制御部３、及びシャッター制御部３からの制御信号を受けるシャッター眼鏡４からなる。

【００２１】表示装置２は高周波の画像信号を表示できるものが好ましく、例えば、高速リフレッシュ型液晶表示装置を用いることができる。

【００２２】信号処理部１は、表示装置２に表示する画像の信号を受ける第1フレームメモリ１１１、これから画像信号を受けるフィルタリング処理部１２を備える。また、シャッター眼鏡着用者のみに表示したい付加情報を受ける第２フレーム１１２、これから信号を画像処理し、フィルタリング処理部１２へ出力する付加情報処理部１３がある。フィルタリング処理部１２からの画像信号とアドレス信号をうけるサブフィールド切替器１４は、第1サブフィールドメモリ１５１及び第２サブフィールドメモリ１５２へ、分割したサブフィールド画像を出力する。これらのサブフィールド画像を受けて、クロック生成回路１６２を有する倍速化出力切替器１６１が出力画像信号を生成する。

【００２３】フィルタリング処理部１２は、第１フレームメモリ１１１の出力信号と付加情報処理部１３の出力信号とが同期していない場合に、サブフィールド切換器１４へ同期して出力できるようにメモリを有する構成にすることもできる。

【００２４】倍速化出力切換器１６１内のクロック生成回路１６２は、ベース画像の２倍の速さのクロックを生成する。

【００２５】信号処理部１には、表示装置２に表示する画像（ベース画像）５１と、シャッター眼鏡着用者に表示する付加情報５２が入力される。

【００２６】例えば、図２図示のように、ベース画像５１として図２（ａ）を、付加情報５２として図２（ｂ）図示の文字画像を入力する。

【００２７】付加情報は画像として入力するほかに、アドレスと文字コード等を与え、信号処理部１内の付加情報処理部１３で画像信号に変換しても良い。この場合、第２フレームメモリ１１２は省略できる場合もある。また、付加情報５２は、予め入力して第２フレームメモリに記憶させ、その後、第２フレームメモリに蓄積させた情報を繰り返し表示させることなども可能である。

【００２８】信号処理部１では、ベース画像５１を第１フレームメモリ１１１へ、付加情報５２を第２フレームメモリ１１２へ記録する。情報の更新がされない場合は、フレームメモリの情報も書き換わることなく保持される。

【００２９】第２フレームメモリ１１２内の付加情報５２は付加情報処理部１３に送られ、２値化処理されて、フィルタ信号に変換される。

【００３０】フィルタリング処理部１２では第１フレームメモリ１１１と付加情報処理部１３からの出力を受

け、サブフィールド切換器１４に垂直同期信号で同期させて、画像信号とアドレス信号を出力する。

【００３１】ここで、アドレス信号は付加情報に基づき、画素毎に画像を第１または第２のサブフィールドメモリのいずれに記録するかを切り替える信号である。例えば、付加情報を表示する画素ではＯＮとし、その他の画素についてはＯＦＦとなるようにする。

【００３２】図３図示のように、アドレス信号がＯＮとなる場合は、付加情報が表示される画素位置のベース画像のデータを黒とし、アドレス信号がＯＦＦとなる場合はベース画像データをそのまま第１サブフィールドメモリ１５１へ入力する。一方、第２サブフィールドメモリ１５２へはアドレス信号がＯＮの場合、付加情報が表示される画素位置のベース画像データをそのまま出力し、アドレス信号がＯＦＦとなる場合はベース画像のデータを黒とする。なお、図３ではそれぞれのサブフィールドメモリへ入力される画像信号を第１ＳＦ画像信号、第２ＳＦ画像信号としている。図中のＶｃｌｋは画像信号の画素単位のクロック信号を示しており、アドレス信号のＯＮ，ＯＦＦもＶｃｌｋに同期して画素単位で選択できる。図４には図２の画像を用いた場合の第１ＳＦ画像及び第２ＳＦ画像を示す。

【００３３】サブフィールド切替器１４によって分割されたサブフィールド画像は各々第１及び第２サブフィールドメモリ１５１、１５２に保持される。即ち、入力された１枚のフレーム画像は、第１サブフィールドか、第２サブフィールドに割り振られるように分割される。また、これらのサブフィールドは、合成すれば元のフレーム画像となるものである。

【００３４】倍速化出力切替器１６１は、ベース画像の２倍に高速化された画像信号、即ち第１サブフィールド及び第２サブフィールド画像を、出力同期信号とともに出力させる。

【００３５】例えば、ベース画像の垂直同期信号が６０Ｈｚ（１／６０ｓで書き換え）で駆動されていた場合は、第１サブフィールド画像と第２サブフィールド画像が１２０Ｈｚ（１／１２０ｓ）で交互に出力される。

【００３６】表示装置２は画面の書き換え速度が倍速化された垂直同期信号に対応できれば良く、高速応答の液晶材料を使用したＬＣＤやＣＲＴ，有機ＥＬディスプレイなどが使用できる。発明者らは高速リフレッシュ表示可能なＣＲＴを用いてその効果を確かめた。

【００３７】次に、シャッター眼鏡の動作方法について説明する。

【００３８】信号処理部１から出力される出力同期信号はシャッター制御部３に入力され、シャッター制御信号がシャッターへ出力される。ここでは、シャッター眼鏡４を用いる例を説明する。

【００３９】シャッター眼鏡は多種多様なものを利用可能である。例えば、高速応答性の液晶材料を注入したセルの両面に偏向フィルムをクロスニコル配置となるように貼り付けたものをレンズの代わりに設けた眼鏡がある。液晶セルへ電圧を印加した状態で閉状態となり、無印加時に開状態となるようにすることができる。この場合、シャッター制御信号がＯＮのとき、液晶セルに電圧が印加され、シャッターが開く。即ち、光透過状態となる。

【００４０】シャッター眼鏡は、図５図示のように、左眼及び右眼のシャッターの開閉がシャッター制御信号に従って制御される。ここでは、シャッター制御信号がＯＮの場合に左眼及び右眼のシャッターが同時に開状態となる例を示している。

【００４１】図６は眼鏡使用者と眼鏡不使用者が観察する画像の例である。眼鏡使用者は第１サブフィールド画像のみを観察するため、付加情報が欠けた画像を見ることになる。従って、付加情報を黒文字として認識する。一方、眼鏡不使用者は第１サブフィールド画像及び第２サブフィールド画像を観察するため、２つの画像が合成され付加情報を観察できない。

【００４２】さらに、眼鏡使用者は第１サブフィールド画像のみ、第２サブフィールド画像のみ、または第１サブフィールド画像と第２サブフィールド画像の両方を観察するのいずれかを選択できるように、眼鏡使用者がシャッター制御部に選択信号を入力できるようにしてもよい。

【００４３】ところで、サブフィールド画像の切換周波数であるが、切換周波数によっては画面全体がちらつくフリッカ以外に、付加情報の輪郭部に相当する位置に輪郭ノイズが発生することがある。これは第１サブフィールドから第２サブフィールドへの切り換わり時に、視線が少しずれることにより、第１サブフィールド画像の付加情報と第２フィールド画像の付加情報が完全に重ならないためである。この輪郭ノイズは安定して観察されることはなく、ちらつくように認識される。この輪郭ノイズはサブフィールド画像の切換周波数を高くすることを視認され難くすることができる。発明者らの実験によると、１８０Ｈｚ以上にすることが望ましい。

（実施形態２）本発明の第２の形態は、１枚のフレーム画像を時間軸に沿って順に表示するｎ枚（ｎは２以上の整数）のサブフィールドに分割し、サブフィールド毎に付加情報に応じて前記画素の内で表示する画素と表示しない画素を選択する。これらのサブフィールドは、重ね合わせれば元のフレーム画像となるものである。このとき、シャッターは、サブフィールドの垂直周波数に同期して動作させる。

【００４４】このように、多数枚のサブフィールドに分割すると、シャッターの開閉タイミングによって複数の情報を多重表示することが可能になる。

【００４５】例えば、４つのサブフィールドに分割し、順に第１～第４サブフィールドを表示するとする。これ

らのサブフィールドは重ね合わせれば、元のフレーム画像となるものである。

【００４６】第１及び第２サブフィールドについて、実施形態１と同様にして、第１付加情報をもちいて第１サブフィールドとし、第１付加情報を差し引いて第２サブフィールドとする。また、第３及び第４サブフィールドについても、第２付加情報をもちいて第３サブフィールドとし、第２付加情報を差し引いて第４サブフィールドとする。

【００４７】一方、第１シャッターは、第１サブフィールド表示時には閉、その他は開とし、第２シャッターは、第３サブフィールド表示時には閉、その他は開となるように制御する。

【００４８】この場合、第１シャッタを介して表示を見る観察者は、第１付加情報を認識するが、第２付加情報は認識できない。逆に、第２シャッターを介して表示を見る観察者は、第２付加情報のみ認識するが、第１付加情報は認識できない。シャッターを介さずに見る観察者は、第１及び第２付加情報のいずれも観察できない。

【００４９】このようにして、サブフィールド数を増すことで、複数の付加情報を多重化することが可能となる。

（実施形態３）本発明の第３の実施形態は付加情報を立体表示させるものである。このため、左眼に入る付加情報と右眼に入る付加情報とで視差を与える。

【００５０】ここで、付加情報は、予め右眼用付加情報と左眼用付加情報を入力しても良いし、入力された付加情報に設定された視差を与える画像生成手段を、例えば、図１の付加情報処理部１３内に内蔵させても良い。

【００５１】図７図示のように、１枚のフレーム画像を時間軸に沿って順に表示する４個のサブフィールドに分割し、例えば、第１サブフィールドでは左眼用付加情報を差し引いた画像を、第２サブフィールドでは左目用付加情報を、第３サブフィールドでは右眼用付加情報を、第４サブフィールドでは右目用付加情報を差し引いた画像を順次表示させる。

【００５２】一方、シャッター眼鏡は、図８図示のように、左眼と右眼のシャッターが各サブフィールドに対応して交互に開閉している。図８では、シャッター制御部からの制御信号がＯＦＦの時、左眼のシャッターが開状態となり、右眼のシャッターが閉状態となる。また、制御信号がＯＮの時、左眼のシャッターが閉状態となり、右眼のシャッターが開状態となる。

【００５３】この場合、左眼は第１サブフィールド画像と第３サブフィールド画像を、右眼は第２サブフィールド画像と第４サブフィールド画像を観察する。これによりシャッター眼鏡使用者は図９図示のように、２つの立体映像を観察することができる。第１の立体映像は図９（ａ）のように、付加情報の黒文字が画面手前に飛び出して見えるものである。また、第２の立体映像は図９（ｂ）図示のように、ベース画像色の付加情報が奥に見えるものである。

【００５４】発明者らの実験から、黒色を手前に、ベース画像の色を奥に配置することで、手前の付加情報が、より立体視しやすくなることが分かった。また、２つの画像は基本的に奥行きが異なるため、焦点調節を合わせた色がより見やすくなる。

【００５５】なお、眼鏡不使用者には第１乃至第４のサブフィールド画像が合成されて観察されるため、付加情報は視認できない。

【００５６】ここで、サブフィールド画像の切換周波数であるが、シャッター眼鏡の開閉周波数が高い場合においては、眼鏡使用者の片目へのちらつき（単眼フリッカと呼ぶ）が発生しない１６０Ｈｚ（フリッカ周波数は１６０／２／２＝４０Ｈｚ）以上とする必要がある。発明者らの実験によると更に望ましくは２４０Ｈｚ以上にすることでよりちらつきが抑えられることが分かった。

【００５７】この他、本実施形態の変形として、シャッター眼鏡の開閉周波数を上記の１／２に下げる方法もある。

【００５８】例えば、図１０に示すように、１枚のフレーム画像を時間軸に沿って順に表示する４個のサブフィールドに分割する。即ち、第１サブフィールドで左眼用付加情報を差し引いた画像を、第２サブフィールドで右眼用付加情報を、第３サブフィールドで右目用付加情報を差し引いた画像を、第４サブフィールドで左眼用付加情報を表示する。

【００５９】それに対し、シャッター眼鏡は、図１１図示のように、第１及び第２のサブフィールドで左眼シャッターを開状態とし、第３及び第４のサブフィールドで右眼シャッターを開状態とする。シャッター制御部からの制御信号がＯＦＦの時、左眼のシャッターが開状態となり、右眼のシャッターが閉状態に、シャッター眼鏡制御信号がＯＮの時、左眼のシャッターが閉状態となり、右眼のシャッターが開状態となっていることは図８の例と同じである。

【００６０】従って、左眼は第１サブフィールド画像と第２サブフィールド画像を、右眼は第３サブフィールド画像と第４サブフィールド画像を観察する。

【００６１】シャッター眼鏡の開閉周波数が低い場合においては、単眼フリッカが発生しないように８０Ｈｚ（フリッカ周波数は８０／２＝４０Ｈｚ）以上とする必要がある。更に望ましくは１２０Ｈｚ以上にすることでよりちらつきが抑えられる。

【００６２】以上では、４つのサブフィールドを左右の眼で交互に見る例を説明してきたが、付加情報を表示している２つのサブフィールドではシャッターが閉じるようにして、付加情報を差し引いた２つのサブフィールドを左右の眼で交互に観察するようにしても良い。その場合、付加情報は、突出して見えるようにすることができ

る。

（実施形態４）本発明の第４の実施形態は、付加情報をカラー化させるものである。

【００６３】例えば、１枚のフレーム画像を時間軸に沿って順に表示する２個のサブフィールドに分割する。この第１サブフィールドでは付加情報を赤色で表示し、第２サブフィールドではフレーム画像から付加情報の画素から赤成分の差し引いた画像を表示する。ここで、付加情報を表示する画素についてみると、第１サブフィールドにおいては赤色を表示し、第２サブフィールドにおいては、赤色を差し引いた緑色及び青色を表示するようにする。

【００６４】この場合も、サブフィールドのフィールド周波数はフリッカが発生しない８０Ｈｚを最小周波数とする。

【００６５】また、シャッターはサブフィールドの垂直周波数に同期して開閉させる。これにより、シャッターを介さずに観察する者は、第１サブフィールドと第２サブフィールドが重なって見えるため、付加情報を視認できない。一方、シャッターを介して観察する者は、第２サブフィールドのみを観察するため、赤またはシアンに色付けされた付加情報が得られる。

【００６６】付加情報の表示色を決定する手段としては、あらかじめ表示色を設定する方法と、ベース画像信号から表示色を選択する方法がある。

【００６７】あらかじめ表示色を設定する方法としては、例えば、付加情報に表示色データを加える。

【００６８】図１の第１フレームメモリ１１１へベース画像５１を記憶させ、色情報つきの付加情報５２を第２フレームメモリ１１２へ夫々記録するようにする。ここでは、便宜的に色情報つきの付加情報に第１の実施形態と同じ引用番号５２をつけて説明する。第２フレームメモリ１１２内の付加情報は付加情報処理部１３によりフィルタ信号に変換され、フィルタリング処理部１２に送られる。また、このとき表示色データもフィルタリング処理部１２に送られる。フィルタリング処理部１２では第１フレームメモリ１１１からの出力信号と付加情報処理部１３から送られるフィルタ信号及び表示色データを受けると共に、サブフィールド切換器に垂直同期信号で同期させて、赤，緑，青各色の画像信号と赤，緑，青各色のアドレス信号を出力する。ここで、アドレス信号は付加情報を第１及び第２のサブフィールドメモリ１５１、１５２のいずれかに記録するための制御信号であり、これ以降の処理は実施例１と同じ方法による。

【００６９】一方、ベース画像信号から表示色を選択する場合は、付加情報を表示する領域の色を検出する必要がある。

【００７０】この場合には、付加情報５２には表示色データが付与されていても、されていなくてもよく、付加情報５２は、表示色データを除いてフィルタリング処理部１２へ送られる。

【００７１】付加情報処理部１３からフィルタリング処理部１２へ送られるフィルタ信号から付加情報を表示すべき領域が分かるので、フィルタリング処理部１２ではその領域の色分布を検出するようにする。例えば、この付加情報を表示すべき領域のベース画像上の色で、もっとも強い色（最も輝度の高い色）を付加情報に与えればよい。仮に、付加情報５２を表示すべきベース画像５１上の領域の色分布が図１２に示すようなときには、赤をフィルタリング処理する。これにより、ベース画像からは赤成分が除かれるため、残った色（シアン）は周辺に比べ相関の低い色になる。よって、付加情報が視認しやすくなる。

（実施形態５）本実施形態は、付加情報をカラー化させるとともに、左眼に入る付加情報と右眼に入る付加情報とで視差を与える。

【００７２】例えば、図１３図示のように、１枚のフレーム画像を時間軸に沿って順に表示する４個のサブフィールドに分割する。ここで、第１サブフィールドでは左眼用付加情報を赤色で表示し、第２サブフィールドでは、左眼用付加情報の画素は青及び緑を表示する。また、第３サブフィールドでは右眼用付加情報を表示する画素については赤色を差し引き、青及び緑を表示し、第４サブフィールドでは赤色の右目用付加情報を表示する。

【００７３】それに対し、シャッター眼鏡の切換方法は、図１４図示のように、左眼と右眼のシャッターを交互に開閉させる。図１４の例では、シャッター制御部からのシャッター眼鏡の制御信号がＯＦＦの時、左眼シャッターが開状態、右眼シャッターが閉状態に、シャッター眼鏡の制御信号がＯＮの時、左眼シャッターが閉状態、右眼シャッターが開状態となる。

【００７４】よって、左眼は第１サブフィールド画像と第３サブフィールド画像を、右眼は第２サブフィールド画像と第４サブフィールド画像を観察する。これにより、眼鏡使用者には図１５図示のように、２つの立体映像を観察することができる。第１の立体映像は図１５（ａ）のように、付加情報の赤文字が画面手前に飛びだして見えるもので、第２の立体映像は図１５（ｂ）図示のように、付加情報の青と緑の混合色の文字が奥に見えるものである。

【００７５】発明者らの実験から、ベース画像と相関の低い色を手前に、ベース画像と相関の高い色を奥に配置することで、手前の付加情報により立体視しやすくなることが分かった。また、２つの画像は基本的に奥行きが異なるため、焦点調節を合わせた色がより見やすくなる。

【００７６】この場合も、サブフィールドのフィールド周波数は単眼フリッカが発生しない１６０Ｈｚを最小周波数とする。

【００７７】また、眼鏡を使用しない観察者は、サブフィールド画像を重ね合わせて見るので、付加情報を視認できない。

【００７８】サブフィールド画像の切換周波数であるが、これについても第３の実施形態と同様に１６０Ｈｚを最小周波数とし、２４０Ｈｚ以上にすることでよりちらつきが抑えられる。

（実施形態６）本実施形態は、表示装置の表示方法としてパルス幅変調表示方式を使用し、シャッター眼鏡の開閉のタイミングに合わせて、画素毎にパルスの入力タイミングを変えることで付加情報を眼鏡使用者に与えるものである。これは、表示装置としてプラズマディスプレイパネル（ＰＤＰ）やデジタル・マイクロミラー・デバイスを使用したデジタル・ライト・プロセッシング（ＤＬＰ）など、パルス幅変調方式（ＰＷＭ）によって階調表現を行うディスプレイを使用した場合に適用される。

【００７９】ＰＷＭは、図１６図示のように、画素の発光期間と非発光期間の比率によって階調表示を行うものである。最大輝度は１フレーム期間に亘り発光しつづけ（図１６（ａ））、５０％階調レベルは１／２フレーム期間にわたり発光し（図１６（ｂ））、０％階調レベル（黒表示）は１フレーム期間に亘り非発光状態にする（図１６（ｃ））。

【００８０】また、５０％階調レベルの表示方法としても、図１７図示のように、例えば、２つの方法が考えられる。

【００８１】図１７のパターン１は前半の１／２フレーム期間を発光状態、後半の１／２フレーム期間を非発光状態としている。フレーム周期が６０Ｈｚであれば、中間輝度レベルは１２０Ｈｚで点滅している。

【００８２】これに対し、図１７のパターン２では１フレームを４つ小期間に分割し、第１小期間と第３小期間を発光状態とし、第２小期間と第４小期間を非発光状態としている。このように、１フレームの小期間数が増えるほど発光状態と非発光状態の配置の方法を多種多様にすることができる。このように発光期間を分散させる効果としては、輪郭部が２重に見える画質劣化を改善できる。

【００８３】輪郭部のずれが観察される画質劣化を低減するため、更に高い周波数で点滅させる方法も行われるが、ここでは、付加情報を表示する点滅タイミングをシャッター眼鏡の開閉のタイミングに合わせる。

【００８４】本実施形態では、図１８図示のように、シャッター眼鏡の開閉に応じて付加情報を表示する画素の発光及び非発光のタイミングを変えている。

【００８５】ここでは分かりやすくするために、左眼と右眼は同時に開閉するものとし、シャッター眼鏡の制御信号がONの時、開状態となり、OFFの時、閉状態とする例を説明する。この場合は、シャッター眼鏡を用いなくても、シャッター板を介して画像を見るようにしても良い。また、右眼と左眼で視差画像を与える上述の実施形態を併用することが可能である。

【００８６】また、サブフィールド周波数は、輪郭部が二重に見える画質劣化を抑制するために、２４０Ｈｚ程度とすればよい。

【００８７】更に、１フレーム期間中、第２及び第３サブフィールドで付加情報画像以外は黒表示とするため、全体の輝度が半減する。そこで、図１８では、輝度１００％を発光期間の合計が１／２フレーム期間で表示する。

【００８８】本実施形態においても、表示する画像は付加情報とそれを差し引いたベース画像の２個である。ただし、画素は各画像の輝度に応じて時分割で発光・非発光を行なうため、図１７におけるパターン２の表示方法を用いる場合を説明する。即ち、１フィールド期間関を４つの小期間に分割して輝度表示を行なうのである。

【００８９】図１８の例では、１フレーム期間を４つの小期間に分け、シャッター制御信号は第１小期間、第３小期間、…をＯＦＦとして、シャッターはシャッター制御信号ＯＦＦのときに開状態となる。他方の第２小期間、第４小期間、…はＯＮであり、シャッターは閉状態である。

【００９０】フレーム画像の１００％輝度レベルの画素において、図１８（ｃ），（ｄ）に示すように、シャッターを開状態の時にベース画像を表示する画素が発光し、付加情報を表示する画素は非発光状態となっている。また、眼鏡のシャッターを閉状態の時にベース画像を表示する画素は非発光であり、付加情報を表示する画素は発光状態となっている。

【００９１】また、５０％輝度レベル画素においては、図１８（ｅ），（ｆ）図示のように、各小期間の半分だけ発光するようにして、輝度を表現する。

【００９２】眼鏡使用者には、第２及び第４小期間においてシャッターが閉状態になっているため、付加情報を表示する画素位置の発光は観察されない。よって、付加情報を表示する画素位置の画素は常に非発光状態となり、付加情報が黒として観察される。

【００９３】眼鏡不使用者には、第１～第４小期間のすべてを見ることになるので、もとの１フレーム画像を見て、付加情報は視認できない。

【００９４】この実施形態の変形例として、画面の輝度を増す方法も考えられる。

【００９５】即ち、第２及び第３サブフィールドで付加情報以外を黒表示状態としていたのを変更して、図１９に示すように、第２及び第３サブフィールドで付加情報以外についても輝度の低いベース情報を表示する方法である。

【００９６】それぞれの画素の輝度を１フレーム平均で求めると、眼鏡使用者にはベース画像を表示する画素の平均輝度は５０％、付加情報を表示する画素の平均輝度

は２５％、眼鏡不使用者にはベース画像を表示する画素の平均輝度は７５％、付加情報を表示する画素の平均輝度も７５％となる。眼鏡使用者にとってはコントラストが下がることになるが、眼鏡不使用者にとっては画面が明るくなる上、付加情報の輪郭部のコントラストが下がるため、輪郭ノイズも視認され難くなる。

【００９７】このように付加情報を表示する画素を必ずしも黒とすることはなく、付加情報を表示する画素については複数の小期間に亘って表示を行うこともできる。

【００９８】

【発明の効果】本発明によれば、シャッターを使用した場合と使用しない場合とで、観察される画像を異ならせることにより、同一画面を観察していながらにして、シャッター使用者と不使用者とで提供される情報を異ならせることができる。

【図面の簡単な説明】

【図１】本発明に係る表示システムの構成の例。

【図２】実施形態１の表示画像例を示す図。

【図３】実施形態１の信号波形を説明する図。

【図４】実施形態１のサブフィールド毎の画像例を示す図。

【図５】実施形態１のシャッターの制御信号とシャッターの開閉状態を説明する図。

【図６】実施形態１のシャッター使用者と不使用者のそれぞれに観察される画像の例を示す図。

【図７】実施形態３に係るサブフィールド毎の画像例を示す図。

＊【図８】実施形態３の信号波形を説明する図。

【図９】実施形態３の眼鏡使用者に観察される画像を説明する図。

【図１０】実施形態３の変形例に係るサブフィールド毎の画像の例を示す図。

【図１１】実施形態３の変形例に係る信号波形を説明する図。

【図１２】実施形態４に係る色分布の例を示す図。

【図１３】実施形態５に係るサブフィールド毎の画像の例を示す図。

【図１４】実施形態５に係る信号波形を説明する図。

【図１５】実施形態５の眼鏡使用者に観察される画像を説明する図。

【図１６】従来のパルス幅変調方式の表示装置における信号波形の例を示す図。

【図１７】従来のパルス幅変調方式の表示装置における別の信号波形を示す図。

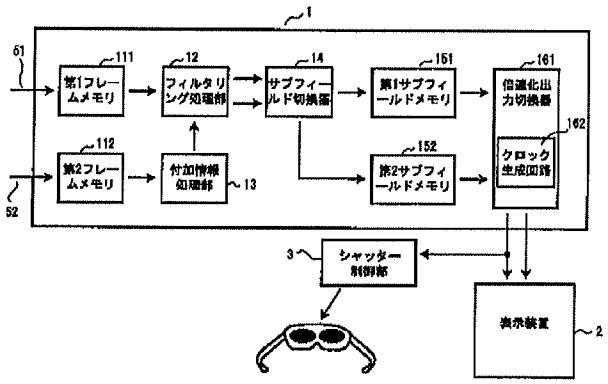
【図１８】実施形態６に係る信号波形を説明する図。

【図１９】実施形態６の変形例に係る信号波形を説明する図。

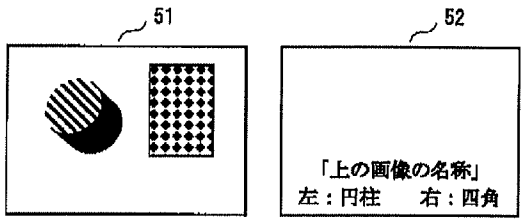
【符号の説明】

１　信号処理部
２　表示装置
３　シャッター制御部
５１　ベース画像
５２　付加情報

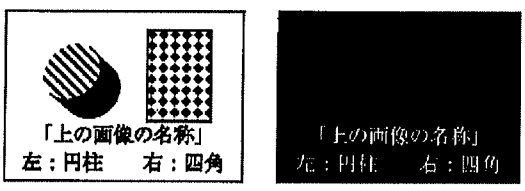
【図１】



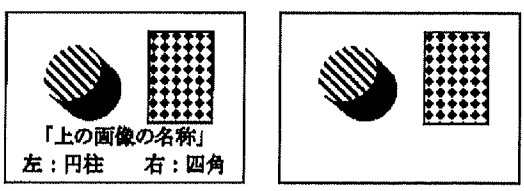
【図２】



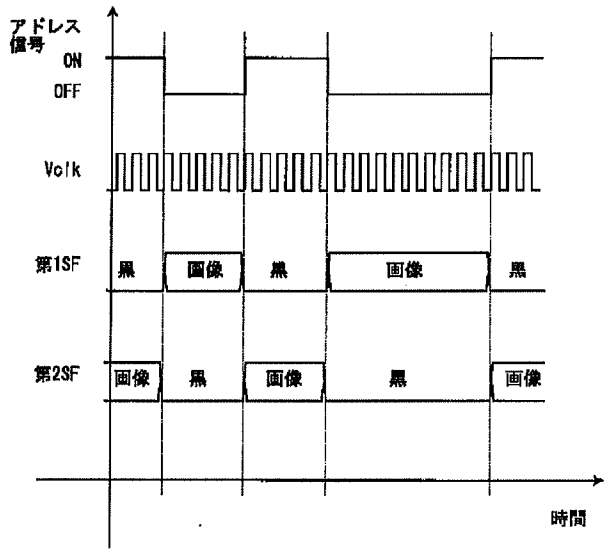
【図４】



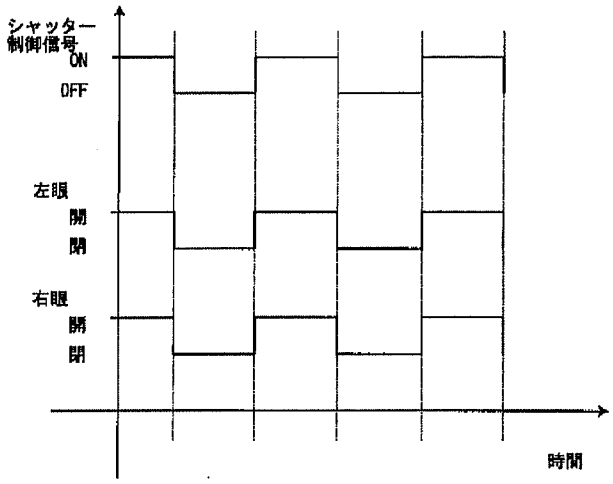
【図６】



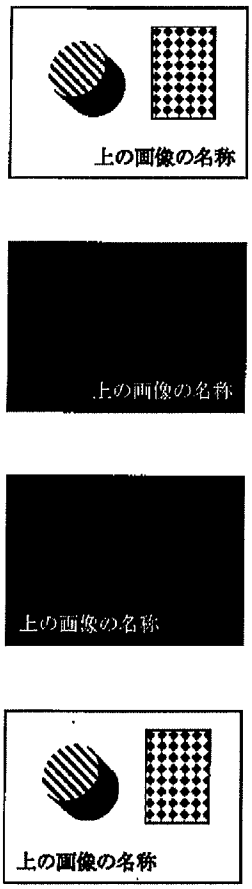
【図３】


アドレス信号
ON
OFF
Vclk
第1SF
黒
画像
黒
画像
黒
第2SF
画像
黒
画像
黒
画像
時間

【図５】


シャッター制御信号
ON
OFF
左眼
開
閉
右眼
開
閉
時間

【図７】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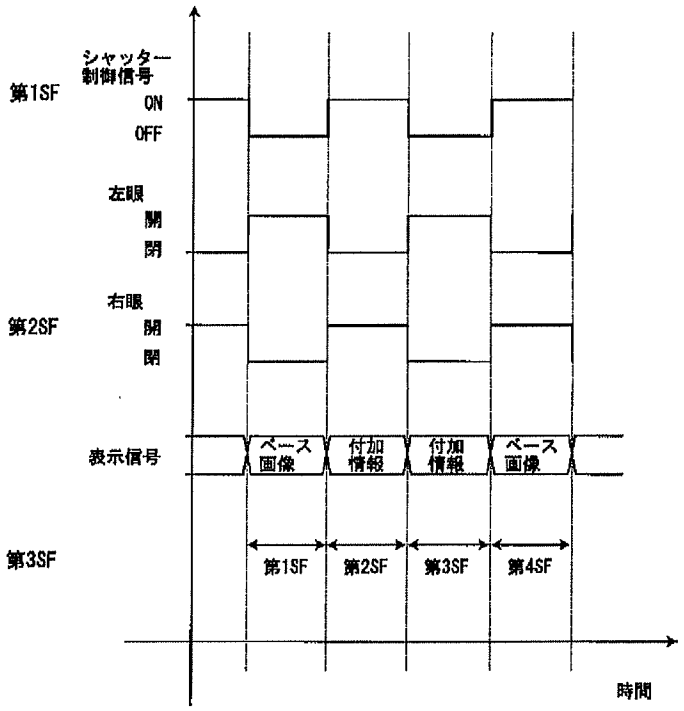
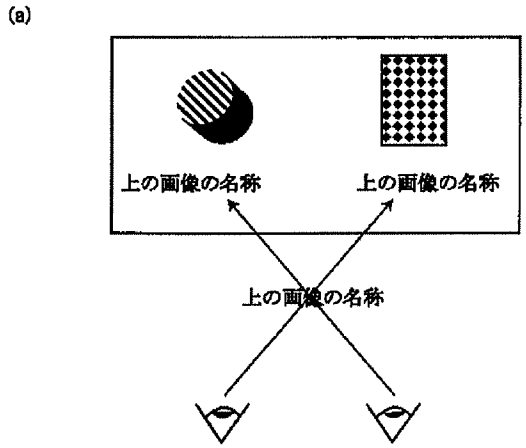
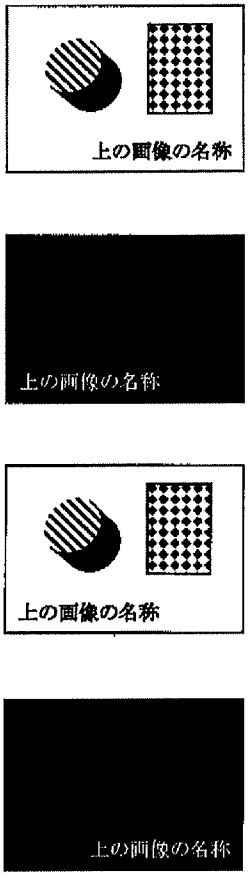
【図８】


第1SF
第2SF
第3SF
第4SF
シャッター制御信号
ON
OFF
左眼
開
閉
右眼
開
閉
表示信号
ベース画像
付加情報
付加情報
ベース画像
第1SF
第2SF
第3SF
第4SF
時間

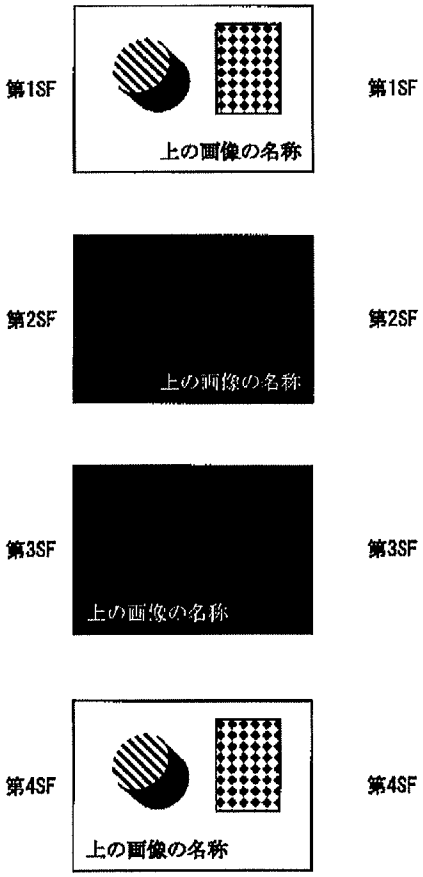
【図９】



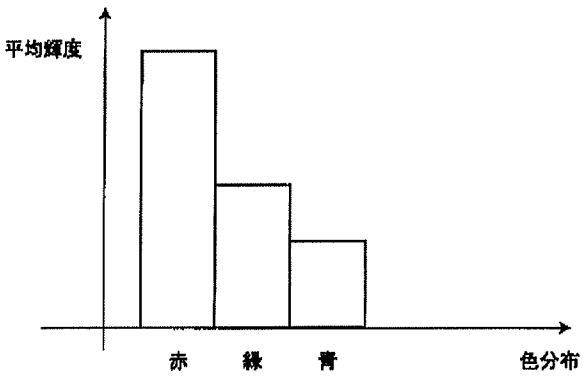
【図１０】



【図１３】



【図１２】



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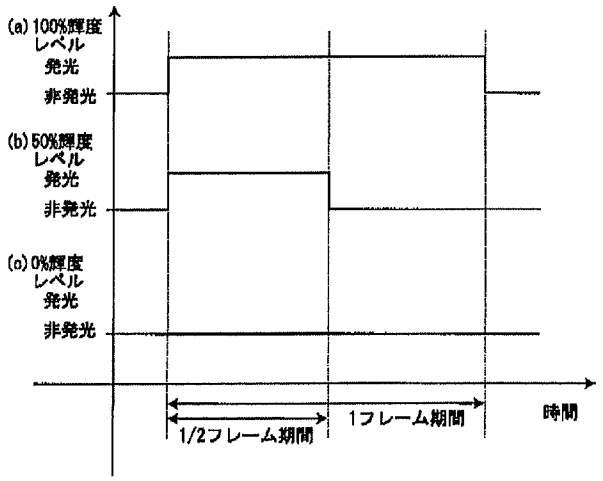

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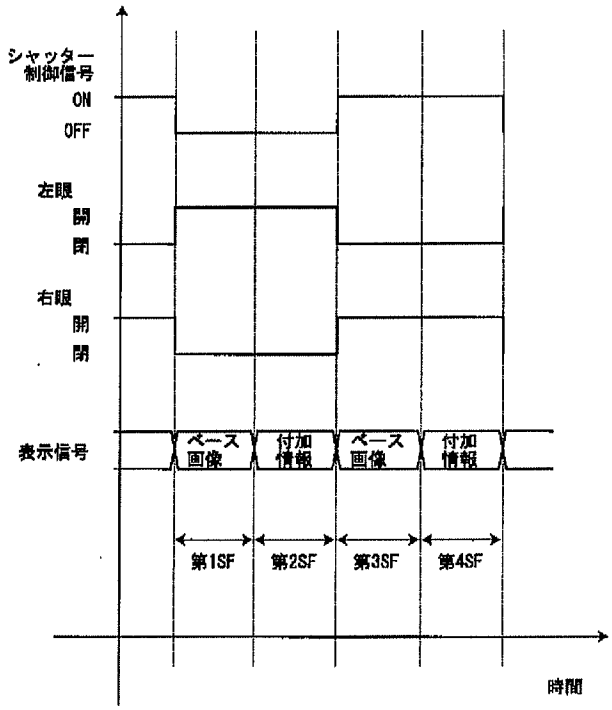

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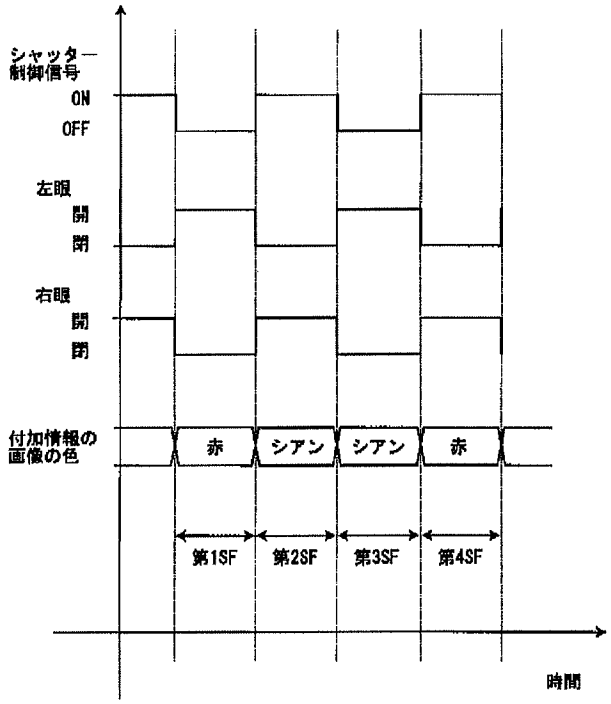

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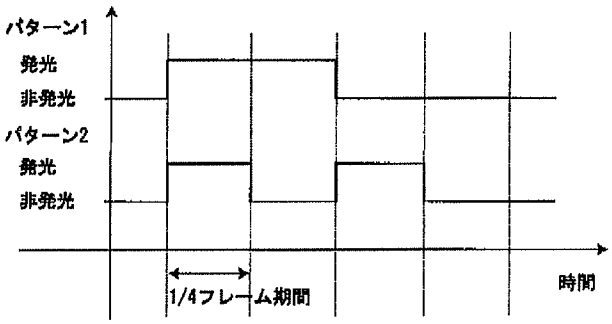

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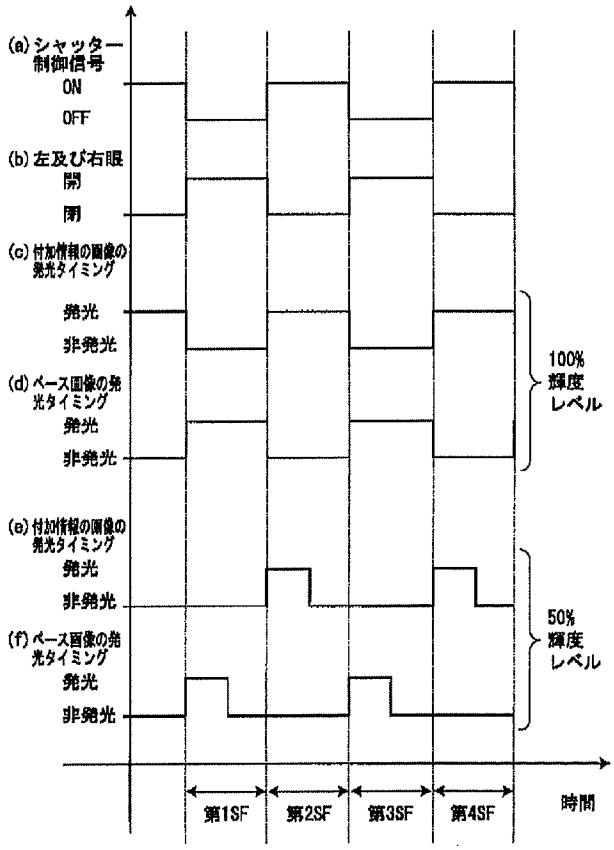

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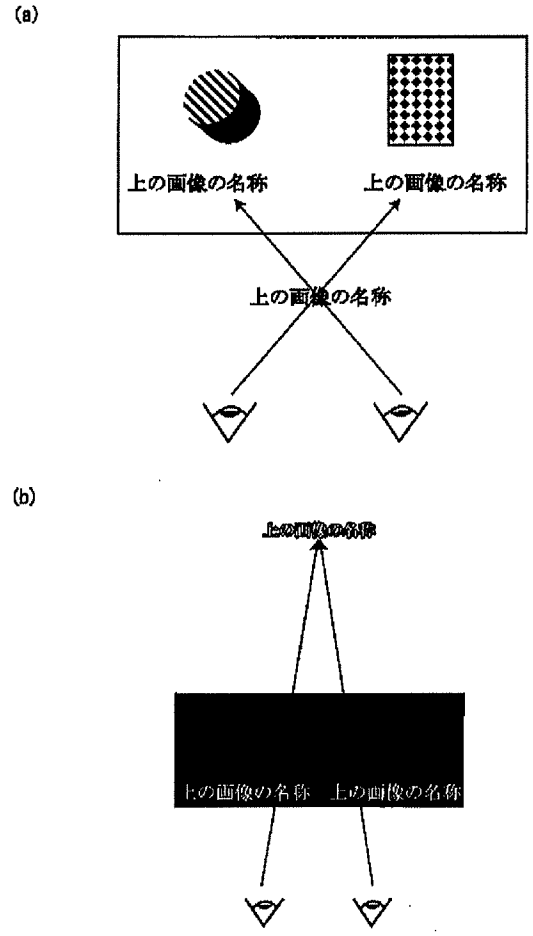
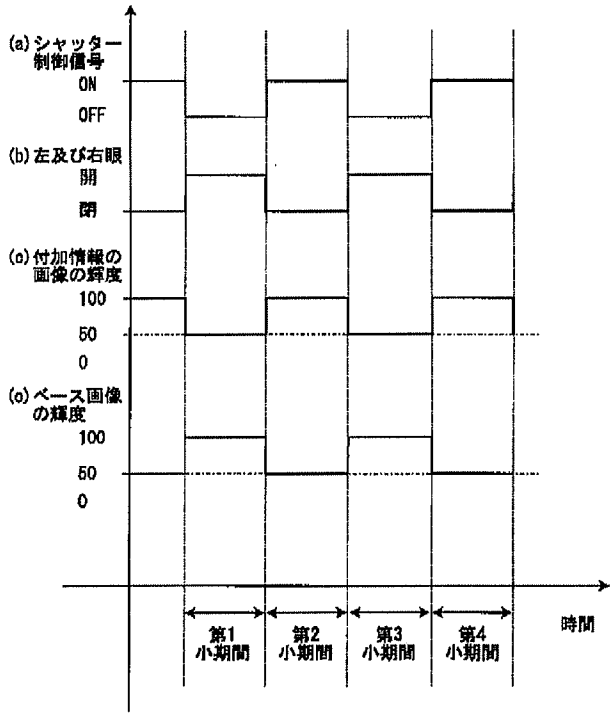


【図１９】



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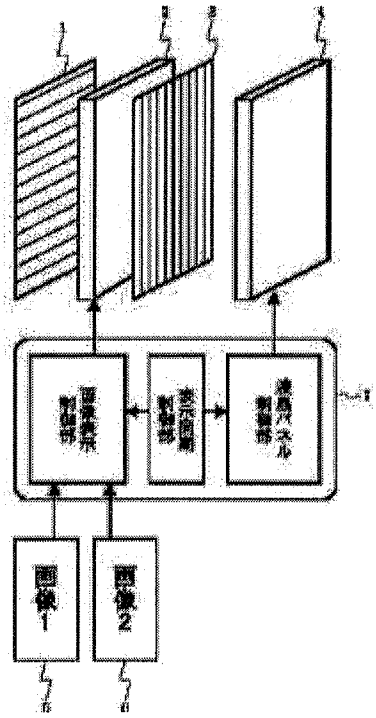
(22)Date of filing : 25.11.1992

(71)Applicant : CANON INC
(72)Inventor : OYA TAKASHI

(54) BINOCULAR PARALLAX SYSTEM PICTURE DISPLAY CONTROLLER

(57)Abstract:
PURPOSE: To visualize a natural light as it is, to make it difficult to rise consciousness that a visual field is using the method of interrupting a specific light by a polarizing filter.
CONSTITUTION: A liquid crystal display is constituted of a polarizing filter (polarizer) 1, liquid crystal panel 2 for a picture display, and polarizing filter (detector)3. Moreover, this device is equipped with a liquid crystal panel 4 which controls the plane of polarization of a straight polarized picture displayed by the liquid crystal display, and a controller 7 which controls two kinds of picture data 5 and 6. The controller 7 is constituted of a picture display control part which alternately display-controls the picture data 5 and 6, liquid crystal panel control part which controls the plane of polarization of a picture light, and display synchronization control part which synchronizes the both control parts. Then, the picture data 5 and 6 to which a binocular parallax is calculated are alternately switching-displayed by a time-division, and a display picture is controlled so that the picture light of each picture can be a straight polarization having an orothogonally crossing polarization plane angle corresponding to the polarizing filters 1 and 3 synchronously with the switching display.



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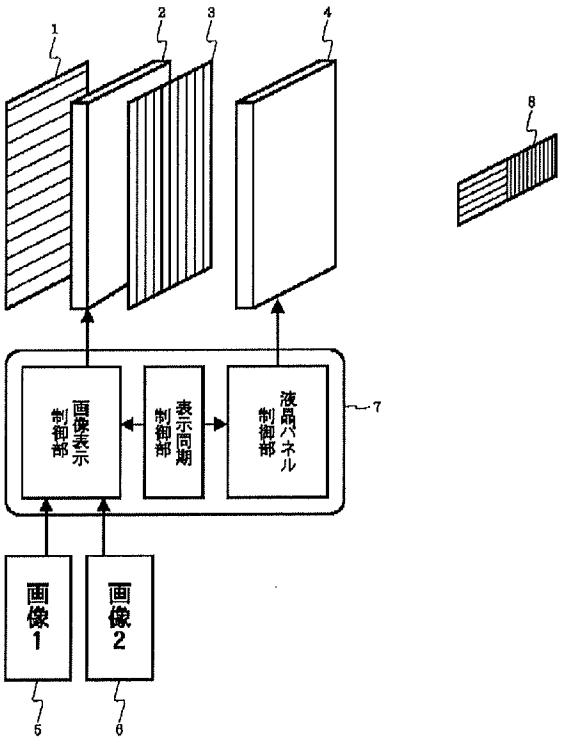
(54)【発明の名称】　両眼視差方式画像表示制御装置

(57)【要約】

【目的】　従来例での課題、即ちフリッカー増大による精神的な疲労、装着時の違和感、眼鏡装置の大きさや取扱いに対しての使用上の不便等を解消する。

【構成】　左右眼それぞれ用に互いに直交する偏波面を有する偏光フィルターを備えた眼鏡手段を装着した視者に対して、両眼視差を計算した２種類の画像を時分割で交互に切り替え表示し、かつ該切り替え表示に同期して各画像の画像光を、前記偏光フィルターにそれぞれ対応して互いに直交する偏波面角度を持つ直線偏光になるように表示画像を制御することを特徴とする。



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【特許請求の範囲】

【請求項１】　左右眼それぞれ用に互いに直交する偏波面を有する偏光フィルターを備えた眼鏡手段を装着した視者に対して、両眼視差を計算した２種類の画像を時分割で交互に切り替え表示し、かつ該切り替え表示に同期して各画像の画像光を、前記偏光フィルターにそれぞれ対応して互いに直交する偏波面角度を持つ直線偏光になるように表示画像を制御することを特徴とする両眼視差方式画像表示制御装置。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】本発明は，画像表示制御装置に関し、特に左右の眼に片方ずつの画像を視覚でき，立体感のある画像を視覚できる両眼視差方式の画像表示の制御装置に関する。

【０００２】

【従来の技術】従来，立体的な画像表示の技術に，シャッターレンズを備えた眼鏡を利用する技術がある。この構成を図４を元に説明する。図中Ｓ１は左目用の第１の画像、Ｓ２は右目用の第２の画像である。単位時間あたりでフレームに区切り，各フレーム毎に各々の画像を表示画面上に交互に表示する。Ｓ３は，左右のレンズ部にシャッターを備えた眼鏡であり、フレームに同期して左右のシャッターが交互に開閉する。この時第１画像表示のフレームの時に左のシャッターが開き，第２画像のフレームの時は右のシャッターが開く。これにより、この眼鏡を通して画面を見ると，片方の眼では第１画像のみ視覚し，他方の眼では第２画像のみを視覚することになる。

【０００３】一般的に，シャッターには液晶が用いられる。液晶の原理を図５，図６に示し，液晶シャッターの原理を図７に示す。図５は，偏光を制御する液晶の構造を示す原理図であり，液晶の分子軸の構成を示す。Ｓ４は，液晶セルを構成するガラス板，Ｓ５は液晶に電圧を加えるための電極，Ｓ６はネマチック液晶である。２枚のガラス板Ｓ４の間に液晶Ｓ６をひねりながら１０μｍ程度の厚さで挟み，両サイドに電極をつけて液晶セルとなる。Ｓ７は液晶セルに電圧を加えるための電源である。電圧を加えないとき，分子軸は９０°ひねった形のままである（図５－ａ）。電圧を加えると分子軸が整列する性質を持つ（図５－ｂ）。

【０００４】図６は図５に示した液晶を透過する光の流れを示す。Ｓ１０，Ｓ１１は光源から発せられた光の軌跡である。光源から発せられた光は偏光フィルターＳ８を通って，直線偏光となる。図６－ａは，液晶セルに電圧を加えていない場合である。偏光が液晶を透過するとき，光の偏波面が分子軸に沿って回転し，偏光フィルターで偏光された偏波面と直交する角度の偏波面をもつ直線偏光Ｓ１０となる。図６－ｂは，液晶セルに電圧を加えた場合である．電圧付加により液晶の分子軸が光路と

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同じ向きになるため，偏光はそのまま液晶を透過し，偏光フィルターで偏光された偏波面と同角度の偏光Ｓ１１となる。

【０００５】図７は，液晶シャッターの原理を示す。液晶の後部に偏光フィルターＳ１２（検光子）を直交ニコルで配置する。Ｓ８，Ｓ９を透過した直線偏光は，図６に示すように，液晶の駆動により偏波面角度が変化する。結果，電圧を加えない場合，液晶により偏波面角度と変え，検光子を通過する（図７－ａ）。電圧を加えた時の直線偏光はそのまま透過し，検光子により遮られ，光を遮断する（図７－ｂ）。この方法により，液晶に電圧を加えないと光を透過し，電圧を加えると光を遮断する液晶シャッターが構成される。

【０００６】検光子を平行ニコルに配置することで，電圧を加えないと光を遮断し，電圧を加えると光を透過することもできる。

【０００７】この液晶シャッターをもつ眼鏡をレンズ部に持ち，視差を計算した２種類の画像を高速に交互に表示し，フレームに同期させてレンズ部のシャッターを交互に開くことで，片眼ずつに画像を映し込み，立体感のある画像を視覚する。

【０００８】

【発明が解決しようとしている課題】上記従来例では，次のような課題を持つ。

①レンズ部のシャッターにより全ての光を一時的に遮断するため，被験者の視野が一時的に遮られる。シャッターは高速に動作するため，被験者には視野の遮断は直接実感しないが，フリッカーが増大し精神的な疲労が大きくなる。

②液晶シャッターを駆動するためのケーブルなどを必要とするため装着時の違和感があり，また液晶をレンズ部に持つため眼鏡装置の大きさや取扱いに対しても使用上の不便がある。

③複数の被験者で同時に利用する場合，人数分の眼鏡及び眼鏡を駆動する装置が必要である。

【０００９】

【課題を解決するための手段】上述課題を解決するべく、本発明では，左右眼それぞれ用に互いに直交する偏波面を有する偏光フィルターを備えた眼鏡手段を装着した視者に対して、両眼視差を計算した２種類の画像を時分割で交互に切り替え表示し、かつ該切り替え表示に同期して各画像の画像光を、前記偏光フィルターにそれぞれ対応して互いに直交する偏波面角度を持つ直線偏光になるように表示画像を制御することを特徴とする。

【００１０】

【実施例】「表示システム」図１は，本発明の特徴を最もよく表す図である。画像表示装置として液晶パネルを用いた例である。同図において，１は偏光フィルター（偏光子），２は画像表示用の液晶パネル，３は偏光フィルター（検光子）であり，１，２，３により液晶ディ

スプレイを構成する。４は液晶ディスプレイで表示される直線偏光画像の偏波面を制御する液晶パネルである。５，６は表示する２種類の画像データである。７は２種類の画像を表示するための制御装置であり，２種類の画像を交互に表示制御する画像表示制御部，画像光の偏波面を制御する液晶パネル制御部，両制御部の同期をとる表示同期制御部からなる。

【００１１】「表示方法」図１中の表示同期制御部により，単位時間あたりでフレームを句切り，フレーム信号を画面表示制御部，液晶パネル制御部に送る。画面表示制御部では，フレーム１信号を受けると画像１データの画像を表示液晶パネル２に表示し，フレーム２信号を受けると画像２データの画像を表示液晶パネル２に表示する。

【００１２】液晶ディスプレイの背面より照明され，偏光子１を透過して得られる直線偏光１－１は表示液晶パネル２を透過することにより画像の暗部からの光２－１と明部からの光２－２が互いに偏光方向の異なる光となり、画像光が形成される。この画像光は，検光子を透過するときに検光子の向きに沿った偏波面角度の偏光のみが透過するため，明部からの光のみが透過する。この結果，液晶ディスプレイにより直線偏光３－２の画像が表示される（図２－ａ）。

【００１３】液晶パネル制御部では，フレーム１信号を受けると液晶パネルに電圧を加えず，フレーム２信号を受けると，液晶パネルに電圧を加える。この制御により，画像１を表示するとき，その画像光の偏波面角度は直角に曲げられ（図２－ｂ），画像２を表示するとき，画像光の偏波面角度はそのままの直線偏光（図２－ｃ）となる。

【００１４】これらの画像光を左眼レンズに片方の偏光を遮断する偏光フィルター，右眼レンズに他方の偏光を遮断する偏光フィルターを備えた眼鏡８でみると，左眼で画像１（図２－ｂ）を右眼で画像２（図２－ｃ）を視覚する。画像に視差を計算した画像を利用すると，立体的な画像を視覚できる。

【００１５】このように本実施例においては眼鏡の側に配線等を必要とせず、視聴者が多人数であっても問題なく表示でき、かつ視聴者に違和感を与えない立体画像表示が可能となる。また、画面の偏光方向が切り替わっても、切り替えられた側を完全に遮光せず、周囲からの光は幾らか目に入るようになっているので、フリッカーによる目の負担を緩和できる。

【００１６】図３により第２実施例を説明する。第２実施例では，表示装置としてＣＲＴディスプレイを用いたときの例を挙げる。すなわち第１実施例の１，２，３で構成される液晶ディスプレイの代わりにＣＲＴディスプレイを用いる。第１実施例と同様の部材には同じ符番を冠する。１１はＣＲＴディスプレイであり，１２は液晶ディスプレイの検光子と同様の偏光フィルターである。本実施例の場合，ＣＲＴディスプレイから表示される画像光の偏波面は整列化されていないので，偏光フィルター１２が必要となる。４は図１と同様の偏光制御用の液晶パネルである。

【００１７】画像１を表示する場合，画像表示制御部によりＣＲＴディスプレイに表示された画像は，１２を透過して直線偏光となり，第１実施例と同様に液晶パネル制御部で制御された液晶パネル４により図２－ｂ中９の直線偏光１の画像光となる。画像２を表示する場合，同様に図２－ｃ中１０の画像光となる。偏光フィルター１２に対して直交ニコルに配置された偏光フィルターを通して見ると画像１のみを得る。１２に対して平行ニコルに配置された偏光フィルターを通して見ると画像２のみを得る。よって視差を計算した２種類の画像として，画像１に左目の画像，画像２に右目の画像を用い，左目に１２と直交ニコルに配置した偏光フィルターを，右目に１２と平行ニコルに配置した偏光フィルターをもった眼鏡を用いると立体感のある画像を得ることができる。

【００１８】

【発明の効果】以上述べたように本発明により，従来の方法に対して，

①偏光フィルターにより特定の光を遮断する方法を用いるため，自然光はそのまま視覚でき、視野を制限される意識は生じにくく，被験者は疲労感が少ない。

②眼鏡自体に液晶駆動系の制御がないため，眼鏡の装着の抵抗が少ない。また偏光フィルターのみをレンズとするため，通常の眼鏡と変わらない大きさ，形状で眼鏡を作成，利用できる。これは作成コストの削減とともに，利用時の精神的負担を軽減する。

③画像の偏光処理が表示装置に接続するため，複数の被験者で同時に見る場合，被験者数分の偏光フィルター付きの眼鏡を用意すればよく、簡便である。などの効果がある。

【図面の簡単な説明】

【図１】本発明の第１実施例を説明するための概略構成図である。

【図２】偏光の制御を示す説明図である。

【図３】ＣＲＴディスプレイを用いた実施例の概略構成図である。

【図４】従来の時分割式の立体画像表示の原理図である。

【図５】ネマチック液晶の分子軸を表す図である。

【図６】液晶内を透過する偏光の透過経路を示す図である。

【図７】液晶シャッター方式の原理を示す図である。

【符号の説明】

１　偏光子
２　液晶パネル
３　検光子
４　液晶パネル

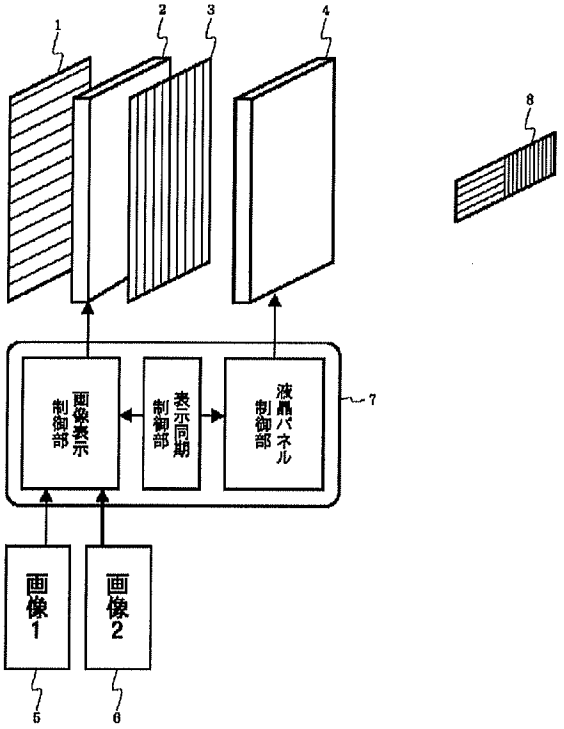
5

５　画像１データ
６　画像２データ
７　表示制御装置
８　眼鏡
９　偏光の透過経路
１０　偏光の透過経路
１１　ＣＲＴディスプレイ
１２　偏光フィルター
Ｓ１　画像１
Ｓ２　画像２

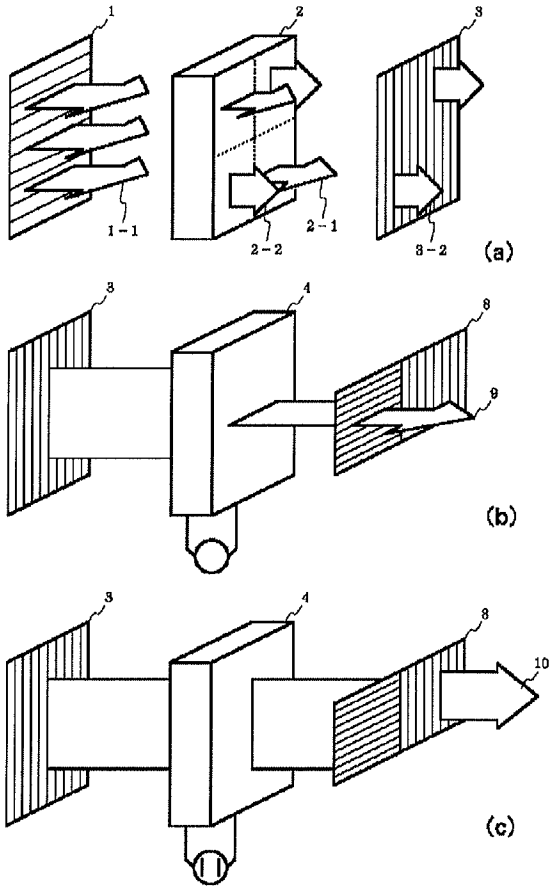
6

＊Ｓ３　眼鏡
Ｓ４　ガラス板
Ｓ５　電極
Ｓ６　液晶
Ｓ７　電源
Ｓ８　偏光フィルター
Ｓ９　液晶セル
Ｓ１０　画像１の偏光経路
Ｓ１１　画像２の偏光経路
＊10　Ｓ１２　検光子

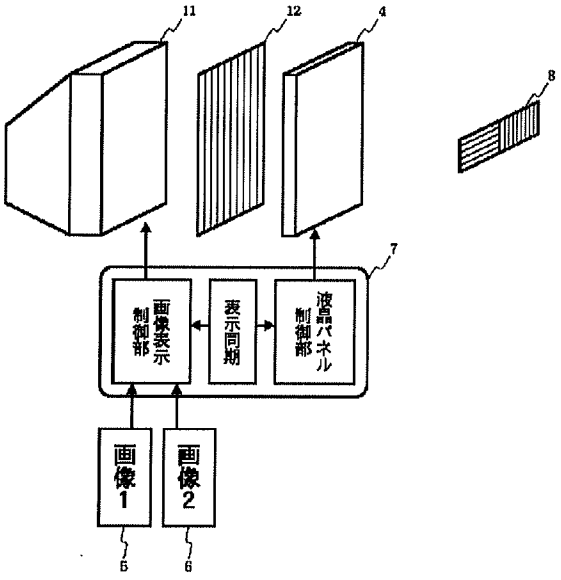
【図１】



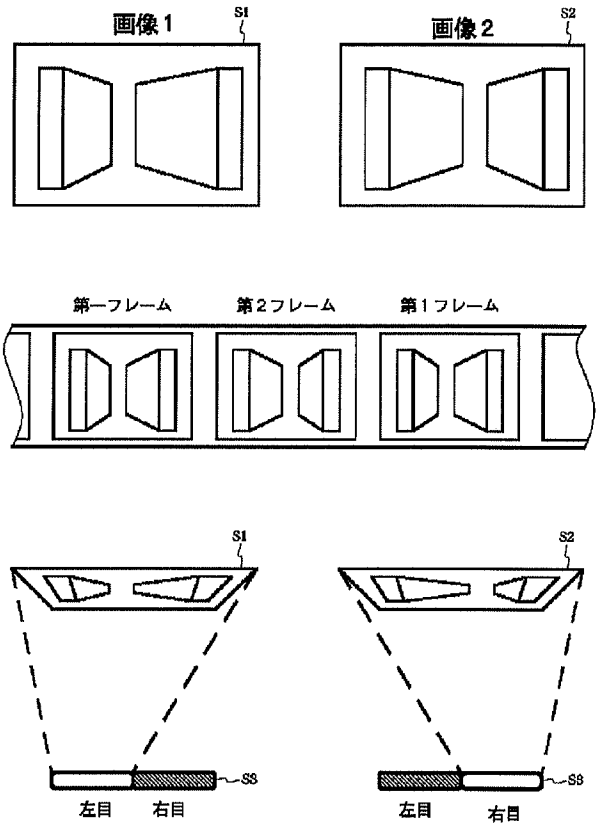
【図２】



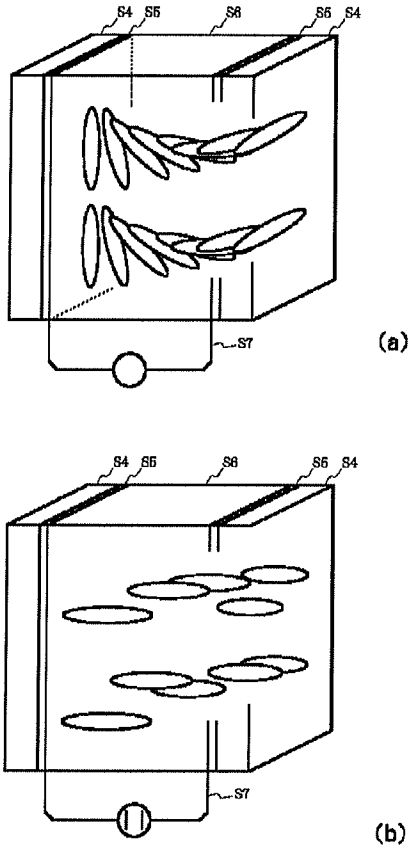
【図３】


11
12
4
8
7
画像表示制御部
表示同期
液晶パネル制御部
画像1
画像2
5
6

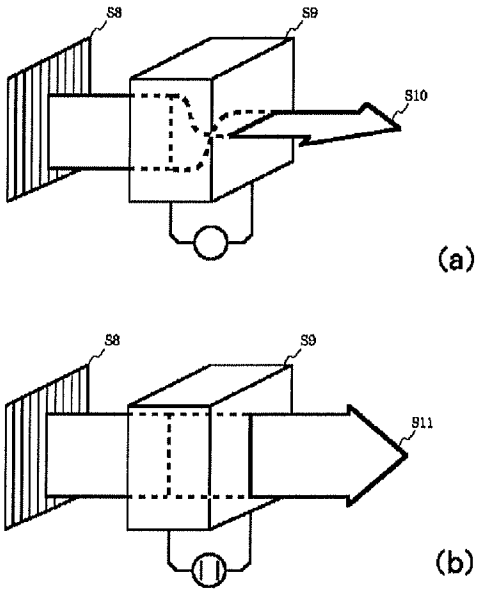
【図４】


画像1
S1
画像2
S2
第一フレーム
第2フレーム
第1フレーム
S1
S2
S3
左目
右目
S3
左目
右目

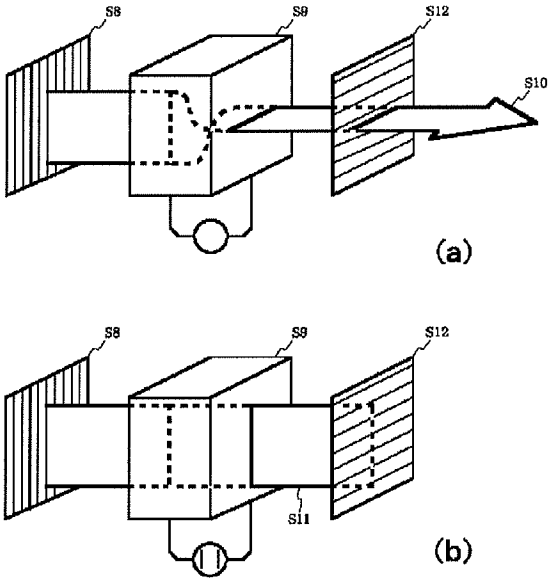
【図５】


S4
S5
S6
S5
S4
S7
(a)
S4
S5
S6
S5
S4
S7
(b)

【図６】


S8
S9
S10
(a)
S8
S9
S11
(b)

【図７】



Electronic Acknowledgement Receipt

EFS ID:	12994619
Application Number:	12340005
International Application Number:	
Confirmation Number:	8241
Title of Invention:	STEREOSCOPIC 3D DISPLAY DEVICE
First Named Inventor/Applicant Name:	Seung-Chul Lee
Customer Number:	757
Filer:	Gustavo Siller Jr./Masoud Naseri
Filer Authorized By:	Gustavo Siller Jr.
Attorney Docket Number:	12579-6201
Receipt Date:	12-JUN-2012
Filing Date:	19-DEC-2008
Time Stamp:	17:42:38
Application Type:	Utility under 35 USC 111(a)

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Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		12579-6201ids.pdf	237888 d14401bcb43bec248232f7f8f19a0936c6243d91	yes	5

	Multipart Description/PDF files in .zip description				
	Document Description	**Start**	**End**		
	Miscellaneous Incoming Letter	1	1		
	Information Disclosure Statement (IDS) Form (SB08)	2	4		
	Information Disclosure Statement (IDS) Form (SB08)	5	5		
Warnings:					
Information:					
2	Foreign Reference	12579-6201ids1.pdf	1061476 17aa0d36a8d5b5d849da79cee3915741f2276396	no	13
Warnings:					
Information:					
3	Foreign Reference	12579-6201ids2.pdf	456312 a7df64ab53045ff2ff0ab0c6e4fe1f5536473074	no	7
Warnings:					
Information:					
4	Non Patent Literature	12579-6201ids3.pdf	167239 53c9743bbbdd5bf5ba7856278f027c3b8658995c	no	3
Warnings:					
Information:					
		Total Files Size (in bytes):	1922915		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

CERTIFICATE OF EFS FILING UNDER 37 CFR §1.8

I hereby certify that this correspondence is being electronically transmitted to the United States Patent and Trademark Office, Commissioner for Patents, via the EFS pursuant to 37 CFR §1.8 on the below date:

Date: June 12, 2012 Name: Gustavo Siller, Jr. Signature: /Gustavo Siller, Jr./

BRINKS HOFER GILSON &LIONE

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Appln. of: Seung-Chul Lee et al.

Appln. No.: 12/340,005

Filed: December 19, 2008

For: STEREOSCOPIC 3D DISPLAY DEVICE

Attorney Docket No: 12579-6201

Examiner: Steven C. Nguyen

Art Unit: 2443

Confirmation No.: 8241

TRANSMITTAL

Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Sir:

Attached is/are:

☒ Transmittal; Information Disclosure Statement; PTO-1449; Cited References D14 through D16.

Fee calculation:

☐ No additional fee is required.

☐ Small Entity.

☐ An extension fee in an amount of $_____ for a ____- month extension of time under 37 CFR § 1.136(a).

☐ A petition or processing fee in an amount of $_____ under 37 CFR § 1.17(___) .

☐ An additional filing fee has been calculated as shown below:

						Small Entity			Not a Small Entity	
	Claims Remaining After Amendment		Highest No. Previously Paid For	Present Extra		Rate	Add'l Fee	OR	Rate	Add'l Fee
Total		Minus				x $26=			x $52=	
Indep.		Minus				x 110=			x $220=	
First Presentation of Multiple Dep. Claim						+$195=			+ $390=	
						Total	$		Total	$

Fee payment:

☒ Please charge Deposit Account No. 23-1925 in the amount of $180.00 for IDS.

☐ Payment by credit card in the amount of $_____ (Form PTO-2038 is attached).

☒ The Director is hereby authorized to charge payment of any additional filing fees required under 37 CFR § 1.16 and any patent application processing fees under 37 CFR § 1.17 associated with this paper (including any extension fee required to ensure that this paper is timely filed), or to credit any overpayment, to Deposit Account No. 23-1925.

June 12, 2012
Date

Respectfully submitted,
/Gustavo Siller, Jr./
Gustavo SIller, Jr. (Reg. No. 32,305)

UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/340,005	12/19/2008	Seung-Chul Lee	12579-6201	8241

757 7590 05/29/2012

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P.O. BOX 10395
CHICAGO, IL 60610

EXAMINER	
NGUYEN, STEVEN C	
ART UNIT	PAPER NUMBER
2443	
MAIL DATE	DELIVERY MODE
05/29/2012	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	12/340,005	LEE ET AL.	
	Examiner	Art Unit	
	STEVEN NGUYEN	2443	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *31 January 2012*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

5)☒ Claim(s) *1-16* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1-16* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

12)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This action is responsive to the amendment and remarks filed on 01/31/2012.

2. **Claims 1-16** are pending in this application.

3. **Claims 1, 5-9** have been amended.

4. **Claims 15-16** have been added.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

1. **Claims 1-16** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

2. **Claims 1 and 15** recite the term “synchronization” in regards to the polarization information of right and left images and also turning on this “synchronization.” The Applicant’s specification has no mention of this “synchronization” or how it is accomplished. The Examiner will construe this to mean any polarization information regarding the left or right image will mean that it is synchronized. Also, if the polarization information of the left image is present, the auxiliary display panel is synchronized.

3. **Claim 7** recites the term "substantially." The term substantially is vague and the Examiner cannot determine the metes and bounds of the claim language. For purposes of examination, the Examiner will construe this limitation to mean parallel.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. Claims 1-5, 8, 9, 11-14, are rejected under 35 U.S.C. 103(a) as being unpatentable over Koyama et al (US 2005/0285997) in view of Tsang (US 6,510,002) and Jung (US 2006/0268196).

2. Regarding Claim 1, Koyama disclosed:

a. A stereoscopic image display device comprising: a main display panel operable to alternately display a left image and a right image according to each subframe *(Paragraph 68, separating images for the left and right eye)*;

b. an auxiliary display panel that changes polarization information of an incident left or right image, including first and second substrates having a pixel part corresponding to that of the main display panel and a sub-liquid crystal layer formed between the first and second substrates *(Paragraph 56, opposing substrate and active matrix substrate. Paragraphs 93, 97, the distance between the display liquid panel and the retardation plate)*;

c. a plurality of first electrodes *(Paragraphs 60, 77, driving electrodes for the substrates are formed over the entire surface of the panel)*;

d. a light source that supplies light to the rear side of the main display panel *(Paragraph 55, a backlight)*;

Koyama did not explicitly disclose:

e. and positioned in front of the main display panel;

f. wherein the auxiliary display panel is driven in synchronization with one of the left and right images of the main display panel and serves to change polarization information of the incident left or right image;

g. a plurality of first electrodes patterned on the first substrate along the rows of pixels formed on the main display panel;

h. a second electrode on an entire surface of the pixel part of the second substrate;

However, Tsang disclosed:

i. and positioned in front of the main display panel *(Column 3, Lines 34-44, a liquid crystal polarizer that is adapted to be positioned in front of a screen)*;

j. wherein the auxiliary display panel is driven in synchronization with one of the left and right images of the main display panel and serves to change polarization information of the incident left or right image *(Column 4, Lines 1-21, left images occupying odd fields and right images occupying even fields in order for the viewer to see stereoscopic three-dimensional images. This ensures that left images are*

only seen by the left eye and right images are only seen by the right eye and is achieved by switching the polarization between 0° and 90°. All of this is done in synchronization with the display);

k. The utilization of the readily available positioning of the auxiliary panel and synchronizing the panel with left or right images would have been obvious to one of ordinary skill in the art in view of the teachings of Koyama since all the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions. *KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398 (2007). The combination would have yielded nothing more than predictable results to one of ordinary skill in the art at the time of the invention, for example, to properly display a three-dimensional image.

and Jung disclosed:

l. a first electrode patterned on the first substrate along the rows of pixels formed on the main display panel *(Paragraph 32, first electrode formed on the first substrate)*;

m. a second electrode on an entire surface of the pixel part of the second substrate *(Paragraph 32, second electrode formed on the second substrate)*;

n. The utilization of the readily available first and second electrodes of Jung would have been obvious to one of ordinary skill in the art in view of the teachings of Koyama since all the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no

change in their respective functions. *KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398 (2007). The combination would have yielded nothing more than predictable results to one of ordinary skill in the art at the time of the invention, for example, to accurately determine the shapes that will appear on the LCD.

3. Regarding Claim 2, the limitations of claim 1 have been addressed. Koyama did not explicitly disclose:

a. wherein the second electrode is on the entire surface of the pixel part of the second substrate without any patterns;

However, Jung disclosed:

b. wherein the second electrode is on the entire surface of the pixel part of the second substrate without any patterns *(Paragraph 32, second electrode formed on an entire surface of the second substrate)*;

c. The utilization of the readily available second electrode of Jung would have been obvious to one of ordinary skill in the art in view of the teachings of Koyama since all the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions. *KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398 (2007). The combination would have yielded nothing more than predictable results to one of ordinary skill in the art at the time of the invention, for example, to accurately determine the shapes that will appear on the LCD.

4. Regarding Claim 3, the limitations of claim 1 have been addressed. Koyama disclosed:

a. wherein the first and second electrodes are made of a transparent conductive material such as ITO *(Paragraph 77, electrodes made of ITO)*.

5. Regarding Claim 4, the limitations of claim 1 have been addressed. Koyama disclosed:

a. wherein the height of the first electrode corresponds to the height of a single pixel of the main display panel, and the width of the first electrode corresponds to 'n' (n=1,2, . . .) times the width of the pixel part *(Paragraphs 99, 124, width of the active area and the substrate crack prevention height)*.

6. Regarding Claim 5, the limitations of claim 1 have been addressed. Koyama did not explicitly disclose:

a. the main display panel is driven to have 60 frames, and each frame includes a first subframe displaying the left image and a second subframe displaying the right image;

However, Tsang disclosed:

b. the main display panel is driven to have 60 frames, and each frame includes a first subframe displaying the left image and a second subframe displaying the right image *(Column 2, Lines 45-61, the image may have a plurality of frames, the frames being alternated left and right images)*;

c. The utilization of the readily available frames including a left and right image of Tsang would have been obvious to one of ordinary skill in the art in view of the teachings of Koyama since all the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known

methods with no change in their respective functions. *KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398 (2007). The combination would have yielded nothing more than predictable results to one of ordinary skill in the art at the time of the invention, for example, to properly display a three-dimensional image.

7. Regarding Claim 8, the limitations of claim 1 have been addressed. Koyama disclosed:

a. wherein a polarization axis of the left or right image made incident to the auxiliary display panel and a rubbing direction of the auxiliary display panel are positioned at 45° *(Paragraph 64, 72, different rubbing directions)*.

8. Regarding Claim 9, the limitations of claim 4 have been addressed. Koyama disclosed:

a. wherein when the auxiliary display panel is not driven, a polarization axis of the left or right image that has passed through the auxiliary display panel is perpendicular to a polarization axis of the left or right image made incident to the auxiliary display panel *(Paragraph 101, perpendicular direction)*.

9. Regarding Claim 11, the limitations of claim 1 have been addressed. Koyama disclosed:

a. an array substrate *(Paragraph 56, substrate)*;

b. a color filter substrate disposed to face the array substrate *(Paragraph 56, active matrix substrate)*;

c. a main liquid crystal layer positioned between the array substrate and the color filter substrate *(Paragraph 56, display liquid crystal layer)*;

d. a first polarizer attached on an outer surface of the array substrate *(Paragraph 56, first polarizer)*;

e. a second polarizer attached on an outer surface of the color filter substrate *(Paragraph 56, second polarizer)*.

10. Regarding Claim 12, the limitations of claim 1 have been addressed. Koyama disclosed:

a. a $\lambda/4$ retardation layer formed on the first substrate of the auxiliary display panel that changes a linearly polarized left or right image made incident to the auxiliary display panel into a left circularly polarized (or right circularly polarized) state *(Paragraph 66, retardation plate)*.

11. Regarding Claim 13, the limitations of claim 12 have been addressed. Koyama disclosed:

a. wherein the $\lambda/4$ retardation layer in formed in an in-cell form on an upper surface of the first substrate of the auxiliary display panel together with the first substrate *(Paragraph 92, the patterned retardation plate shielding off the light in the area outside the active area of the retardation plate)*.

12. Regarding Claim 14, the limitations of claim 12 have been addressed. Koyama disclosed:

a. wherein the $\lambda/4$ retardation layer is attached in a form of a film on a lower surface of the first substrate of the auxiliary display panel *(Figure 2, Paragraph 92, passing light through the patterned retardation plate or the liquid crystal panel)*.

13. Regarding Claim 15, the limitations of claim 5 have been addressed. Koyama disclosed:

a. wherein the auxiliary display panel is provided to be turned on *(Paragraph 60, in response to turning on/off of the liquid crystal layer, a polarization state of light is accomplished)*;

Koyama did not explicitly disclose:

b. turned on in synchronization with the left image of the main display panel;

However, Tsang disclosed:

c. turned on in synchronization with the left image of the main display panel *(Column 4, Lines 1-21, the polarizer is in synch with the display, therefore it would need to be on in order to operate correctly)*;

d. The utilization of the readily available turned on in synchronization with an image of Tsang would have been obvious to one of ordinary skill in the art in view of the teachings of Koyama since all the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions. *KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398 (2007). The combination would have yielded nothing more than predictable results to one of ordinary skill in the art at the time of the invention, for example, to properly display three-dimensional images.

14. Regarding Claim 16, the limitations of claim 15 have been addressed. Koyama did not explicitly disclose:

a. wherein when the auxiliary display panel is turned on, it outputs polarization information of the left image outputted from the main display panel without changing it, and when the auxiliary display panel is turned off, it changes the polarization information of the right image outputted from the main display panel, and outputs the image;

However, Tsang disclosed:

b. wherein when the auxiliary display panel is turned on, it outputs polarization information of the left image outputted from the main display panel without changing it, and when the auxiliary display panel is turned off, it changes the polarization information of the right image outputted from the main display panel, and outputs the image *(Column 4, Lines 1-44, the polarizer switches the polarization between 0° (off) to 90° (on) based on the right and left image data from the main display that the polarizer is synchronized with)*;

c. The utilization of the readily available outputting polarization information of a left and right image of Tsang would have been obvious to one of ordinary skill in the art in view of the teachings of Koyama since all the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions. *KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398 (2007). The combination would have yielded nothing more than predictable results to one of ordinary skill in the art at the time of the invention, for example, to properly display three-dimensional images.

15. Claims 6, 10, are rejected under 35 U.S.C. 103(a) as being unpatentable over Koyama in view of Tsang, Jung, and Yano et al (US 2008/0284699).

16. Regarding Claim 6, the limitations of claim 1 have been addressed. Koyama did not explicitly disclose:

a. wherein the sub-liquid crystal layer includes a plurality of liquid crystal molecules, and when the auxiliary display panel is driven, the liquid crystal molecules are arranged to be perpendicular to the first and second substrates, and when the auxiliary display panel is not driven, the liquid crystal molecules are arranged in a twisted nematic structure;

However, Yano disclosed:

b. wherein the sub-liquid crystal layer includes a plurality of liquid crystal molecules, and when the auxiliary display panel is driven, the liquid crystal molecules are arranged to be perpendicular to the first and second substrates, and when the auxiliary display panel is not driven, the liquid crystal molecules are arranged in a twisted nematic structure *(Paragraphs 47, 49, 120 Hz picture signal and a nematic liquid crystal or perpendicular orientation mode)*;

c. The utilization of the readily available 120 Hz and twisted nematic structure of Yano would have been obvious to one of ordinary skill in the art in view of the teachings of Koyama since all the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions. *KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398 (2007). The combination would have yielded nothing more than predictable results to

one of ordinary skill in the art at the time of the invention, for example, to achieve any level of grey.

17. Regarding Claim 10, the limitations of claim 1 have been addressed. Koyama did not explicitly disclose:

a. wherein the main display panel is driven at 120 Hz or higher;

However, Yano disclosed:

b. wherein the main display panel is driven at 120 Hz or higher *(Paragraphs 47, 49, 120 Hz picture signal)*;

c. The utilization of the readily available 120 Hz of Yano would have been obvious to one of ordinary skill in the art in view of the teachings of Koyama since all the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions. *KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398 (2007). The combination would have yielded nothing more than predictable results to one of ordinary skill in the art at the time of the invention, for example, to have less apparent motion blur.

18. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Koyama in view of Tsang, Jung, and Sung et al (US 2007/0206134).

19. Regarding Claim 7, the limitations of claim 1 have been addressed. Koyama did not explicitly disclose:

a. wherein the sub-liquid crystal layer includes a plurality of liquid crystal molecules, and when the auxiliary display panel is driven, the liquid crystal molecules are arranged to be perpendicular to the first and second substrates, and when the auxiliary display panel is not driven, the liquid crystal molecules are arranged to be substantially parallel to the first and second substrates;

However, Sung disclosed:

b. wherein the sub-liquid crystal layer includes a plurality of liquid crystal molecules, and when the auxiliary display panel is driven, the liquid crystal molecules are arranged to be substantially perpendicular to the first and second substrates, and when the auxiliary display panel is not driven, the liquid crystal molecules are arranged to be substantially parallel to the first and second substrates *(Paragraph 33, parallel and perpendicular plates determining light transmission)*;

c. The utilization of the readily available perpendicular or parallel molecules of Sung would have been obvious to one of ordinary skill in the art in view of the teachings of Koyama since all the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions. *KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398 (2007). The combination would have yielded nothing more than predictable results to one of ordinary skill in the art at the time of the invention, for example, to accurately control light throughput.

Response to Arguments

Applicant's arguments filed 01/31/2012 have been fully considered but they are not persuasive. In the Remarks, Applicant argued that:

a. Koyama and Jung fail to disclose or suggest "a main display panel operable to alternately display a left image and a right image according to each subframe."

In response: The Examiner respectfully disagrees. Koyama disclosed that pixels corresponding to a right image and pixels corresponding to a left image for the respective eyes are separated *(paragraph 68)*. Therefore, the images came as a single frame and needed to be separated into subframes for the respective eyes.

b. Koyama and Jung fail to disclose or suggest "an auxiliary display panel that changes polarization information of an incident left or right image, including first and second substrates having a pixel part corresponding to that of the main display panel and a sub-liquid crystal layer formed between the first and second substrates."

In response: The Examiner respectfully disagrees. Koyama disclosed an opposing substrate and active matrix substrate *(paragraph 56)* and also switching polarization state of light passing through the liquid crystal panel *(paragraph 60)*.

c. Jung does not disclose the claimed "a plurality of first electrodes patterned on the first substrate along the rows of pixels formed on the main display panel."

In response: The Examiner respectfully disagrees. Koyama disclosed a plurality of first electrodes *(paragraphs 60, 77).* Jung disclosed that the electrode is formed on an entire surface of a first substrate *(paragraph 32)*. Being that it is on the entire surface, it is also along the rows of pixels.

All other arguments with respect to the claims have been considered but are moot because the arguments do not apply to any of the references being used in the current rejection.

Conclusion

Examiner's Note: Examiner has cited particular columns and line numbers in the references applied to the claims above for the convenience of the applicant. Although the specified citations are representative of the teachings of the art and are applied to specific limitations within the individual claim, other passages and figures may apply as well. It is respectfully requested from the applicant in preparing responses, to fully consider the references in entirety as potentially teaching all or part of the claimed invention, as well as the context of the passage as taught by the prior art or disclosed by the Examiner.

In the case of amending the claimed invention, Applicant is respectfully requested to indicate the portion(s) of the specification which dictate(s) the structure

relied on for proper interpretation and also to verify and ascertain the metes and bounds of the claimed invention.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to STEVEN NGUYEN whose telephone number is (571)270-5663. The examiner can normally be reached on Monday through Thursday with alternating Friday 7:30AM - 5:00PM, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tonia Dollinger can be reached on (571) 272-4170. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/STEVEN C NGUYEN/
Examiner, Art Unit 2443
05/14/2012

/PHUOC NGUYEN/
Primary Examiner, Art Unit 2443

Notice of References Cited	Application/Control No. 12/340,005	Applicant(s)/Patent Under Reexamination LEE ET AL.	
	Examiner STEVEN NGUYEN	Art Unit 2443	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-6,510,002 B1	01-2003	Tsang, Peter Wai Ming	359/465
	B	US-			
	C	US-			
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	0	"6510002".pn. and elect$4	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/14 12:39
L2	1	"6510002".pn. and elect$6	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/14 12:39
L3	2	"20050285997" and elect$6	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/14 12:40
L4	1	"20100007716" and "60"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/14 12:46
L5	1	"6510002".pn. and frame$2	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/14 12:49
L6	4	"6510002".pn. or "20050285997" or "20060268196"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/14 13:02
L7	0	6 and on	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/14 13:02
L8	4	6 and (on or off)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/14 13:02
L9	3	6 and alternat$5	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/14 13:22
S1	1	"12340005"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:10
S2	7535	((seung near2 lee) or (hoon near2 kang) or (sung near2 jung)).in.	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:10
S3	2913	(lg near display).asn.	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:11

S4	68	S2 and S3	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:11
S5	11	S4 and 3D	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:14
S7	4	("20020118276" | "20050036082" | "6252570" | "6252624").PN.	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:17
S8	2	"2006268196"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:29
S9	1	"20060268196"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:29
S10	2	"2004012851"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:32
S11	1	"20040012851"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:32
S12	2244	parallax near3 barrier	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:45
S13	1692	S12 and (3D or (three near2 dimension$3))	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:46
S14	121	S13 and (polariz$4 and (indium near3 oxide))	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:46
S15	112	S14 and (left and right)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:47
S16	19276116	@ad<"20080709" or @rlad<"20080709"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:48
S17	0	S15 and S6	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:48
S18	98	S15 and S16	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:48
S19	1	"7199845".pn.	US-PGPUB; USPAT; EPO; JPO;	ADJ	ON	2011/12/15 10:49

			IBM_TDB			
S20	2	"20050285997"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:49
S21	8964	S16 and ("120" near2 HZ)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 11:04
S22	366011	S16 and (HZ or hertz)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 11:04
S23	4	S15 and ("120" near2 HZ)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 11:04
S24	2	"20050285997" and (between or (in near2 between))	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:26
S25	2	"20050285997" and (ITO or (indium near3 oxide))	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:36
S26	2	"20050285997" and (height)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:37
S27	2	"20050285997" and (height or width)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:38
S28	0	"20050285997" and (synch$7)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:39
S29	0	"20060268196" and (synch$7)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:39
S30	59	S14 and (parallel and perpendicular)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:44
S31	55	S30 and S16	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:44
S32	1	"20100007716" and (substantial$4).clm.	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:48
S33	20	S14 and (perpendicular and (twisted near3 nematic))	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:49
S34	3	S14 and (perpendicular and	US-PGPUB;	ADJ	ON	2011/12/15

		(twisted near3 nematic)) and (HZ or hertz)	USPAT; EPO; JPO; IBM_TDB			12:49
S35	0	((3D or (three near3 dimension$4)) same (perpendicular near20 (twisted near3 nematic)) and (HZ or hertz))	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:53
S36	62	(perpendicular near20 (twisted near3 nematic)) and (HZ or hertz)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:54
S37	62	S36 and (LCD or (liquid near3 crystal))	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:55
S38	57	S37 and S16	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:55
S39	23	(perpendicular near20 (twisted near3 nematic)) and ("120" near3 (HZ or hertz))	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:57
S40	22	S39 and S16	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:57
S41	2	"20080284699"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:58
S42	2	"20080284699" and (nematic and perpendicular and "120")	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:58
S43	2	"20050285997" and (rub$5)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:11
S44	2	"20050285997" and (perpendic$7)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:12
S45	2	"20050285997"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:22
S46	2	"20060269496"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:27
S47	1	"20060268196"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:27
S48	1	"20020118276"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:27

S49	483	348/43.ccls.	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:28
S50	1	"20050036082"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:28
S51	1	"6252570".pn.	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:28
S52	1	"6252624".pn.	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:28
S53	1	"12340005"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/11 12:36
S54	0	"12340005" and synchroni$5	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/11 12:36
S55	0	"12340005" and synch$8	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/11 12:36
S56	1	"20100007716"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/11 12:36
S57	0	"20100007716" and synch$8	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/11 12:36
S58	1	"20100007716" and polariz$5	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/11 12:38
S59	7	"6510002"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/11 12:41
S60	1	"20100007716" and subframe	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/11 13:13
S61	0	"20050285997" and subframe	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/11 13:14
S62	0	"20050285997" and frame	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2012/05/11 13:14
S63	2	"20050285997" and separat$4	US-PGPUB; USPAT; EPO; JPO;	ADJ	ON	2012/05/11 13:18

			IBM_TDB			

EAST Search History (Interference)

< This search history is empty>

5/ 14/ 2012 2:01:01 PM
C:\ Users\ snguyen3\ Documents\ EAST\ Workspaces\ 12340005.wsp

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12340005	LEE ET AL.
	Examiner	Art Unit
	STEVEN NGUYEN	2443

SEARCHED			
Class	Subclass	Date	Examiner
348	43	12/13/2011	SCN

SEARCH NOTES		
Search Notes	Date	Examiner
Inventor/Assignee Search	12/13/2011	SCN
EAST Search	12/13/2011	SCN
Updated EAST Search	05/09/2012	SCN

INTERFERENCE SEARCH			
Class	Subclass	Date	Examiner

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12340005	LEE ET AL.
	Examiner	Art Unit
	STEVEN NGUYEN	2443

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	12/15/2011	05/14/2012							
	1	✓	✓							
	2	✓	✓							
	3	✓	✓							
	4	✓	✓							
	5	✓	✓							
	6	✓	✓							
	7	✓	✓							
	8	✓	✓							
	9	✓	✓							
	10	✓	✓							
	11	✓	✓							
	12	✓	✓							
	13	✓	✓							
	14	✓	✓							
	15		✓							
	16		✓							

CERTIFICATE OF EFS FILING UNDER 37 CFR §1.8

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Date: January 31, 2012 Name: Gustavo Siller, Jr. Signature: /Gustavo Siller, Jr./

Case No. : 12579-6201

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Seung-Chul LEE et al.	Examiner: Steven C. Nguyen
Serial No: 12/340,005	Art Unit: 2443
Filed: December 19, 2008	Confirmation No: 8241
For: STEREOSCOPIC 3D DISPLAY DEVICE	

AMENDMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

In reply to the Office Action dated December 22, 2011, Applicants submit this Amendment. Applicants respectfully request the Examiner to withdraw the objections and rejections to this application and to grant allowance of this Application in view of the following remarks and amended claims.

Amendments to the Claims begin on page 2 of this paper.

Remarks begin on page 6 of this paper.

In the Claims:

Please amend the claims as follows (the changes in these Claims are shown with ~~strikethrough~~ for deleted matter and underlines for added matter). A complete listing of the claims proper claim identifiers is set forth below.

AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A stereoscopic image display device comprising:

a main display panel operable to alternately display a left image and a right image according to each subframe;

an auxiliary display panel that changes polarization information of an incident left or right image, including first and second substrates having a pixel part corresponding to that of the main display panel and a sub-liquid crystal layer formed between the first and second substrates, and positioned in front of the main display panel,

wherein the auxiliary display panel is driven in synchronization with one of the left and right images of the main display panel and serves to change polarization information of the incident left or right image;

a plurality of first electrodes patterned on the first substrate along the rows of pixels formed on the main display panel;

a second electrode on ~~a front~~ an entire surface of the pixel part of the second substrate; and

a light source that supplies light to the rear side of the main display panel.

2. (Original) The device of claim 1, wherein the second electrode is on the entire surface of the pixel part of the second substrate without any patterns.

3. (Original) The device of claim 1, wherein the first and second electrodes are made of a transparent conductive material such as ITO.

4. (Original) The device of claim 1, wherein the height of the first electrode corresponds to the height of a single pixel of the main display panel, and the width of the first electrode corresponds to 'n' (n=1,2,...) times the width of the pixel part.

5. (Currently Amended) The device of claim 1, wherein ~~the auxiliary display panel is driven in synchronization with one of the left and right images~~ the main display panel is driven to have 60 frames, and each frame includes a first subframe displaying the left image and a second subframe displaying the right image.

6. (Currently Amended) The device of claim 1, wherein the sub-liquid crystal layer includes a plurality of liquid crystal molecules, and when the auxiliary display panel is driven, the liquid crystal molecules are arranged to be ~~substantially~~ perpendicular to the first and second substrates, and when the auxiliary display panel is not driven, the liquid crystal molecules are arranged in a twisted nematic structure.

7. (Currently Amended) The device of claim 1, wherein the sub-liquid crystal layer includes a plurality of liquid crystal molecules, and when the auxiliary display panel is driven, the liquid crystal molecules are arranged to be ~~substantially~~ perpendicular to the first and second substrates, and when the auxiliary display panel is not driven, the liquid crystal molecules are arranged to be substantially parallel to the first and second substrates.

8. (Currently Amended) The device of claim 1, wherein a polarization axis of the left or right image made incident to the auxiliary display panel and a rubbing direction of the auxiliary display panel are positioned ~~substantially~~ at 45°.

9. (Currently Amended) The device of claim 4, wherein when the auxiliary display panel is not driven, a polarization axis of the left or right image that has passed through the auxiliary display panel is ~~substantially~~ perpendicular to a polarization axis of the left or right image made incident to the auxiliary display panel.

10. (Original) The device of claim 1, wherein the main display panel is driven at 120Hz or higher.

11. (Original) The device of claim 1, wherein the main display panel comprises:

an array substrate;

a color filter substrate disposed to face the array substrate;

a main liquid crystal layer positioned between the array substrate and the color filter substrate;

a first polarizer attached on an outer surface of the array substrate; and

a second polarizer attached on an outer surface of the color filter substrate.

12. (Original) The device of claim 1, further comprising:

a $\lambda/4$ retardation layer formed on the first substrate of the auxiliary display panel that changes a linearly polarized left or right image made incident to the auxiliary display panel into a left circularly polarized (or right circularly polarized) state.

13. (Original) The device of claim 12, wherein the $\lambda/4$ retardation layer in formed in an in-cell form on an upper surface of the first substrate of the auxiliary display panel together with the first substrate.

14. (Original) The device of claim 12, wherein the $\lambda/4$ retardation layer is attached in a form of a film on a lower surface of the first substrate of the auxiliary display panel.

15. (New) The device of claim 5, wherein the auxiliary display panel is provided to be turned on in synchronization with the left image of the main display panel.

16. (New) The device of claim 15, wherein when the auxiliary display panel is turned on, it outputs polarization information of the left image outputted from the main display panel without changing it, and when the auxiliary display panel is turned off, it changes the polarization information of the right image outputted from the main display panel, and outputs the image.

REMARKS

At the outset, the Examiner is thanked for the thorough review and consideration of the pending application. The Office Action dated December 22, 2011, has been received and its contents carefully reviewed.

Summary of the Office Action

In the Office Action mailed 12/22/2011, claims 6~9 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1~5, 8, 9 and 11~14 are rejected under 35 U.S.C. 103(a) as being unpatentable over United States Patent Publication No. 2005/0285997 to *Koyama* (hereinafter "*Koyama*") in view of United States Patent Publication No. 2006/0268196 to *Jung* (hereinafter "*Jung*"). Claims 6 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Koyama* in view of *Jung* and United States Patent Publication No. 2008/0284699 to *Yano* (hereinafter "*Yano*"). Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over *Koyama* in view of *Jung* and United States Patent Publication No. 2007/0206134 to *Sung* (hereinafter "*Sung*").

Summary of the Response to the Office Action

With this response, claims 1 and 5~9 have been amended, and claims 15~16 have been added. No new matter is added as a result of the amendment.

Accordingly, claims 1~16 are currently pending in this application.

Claim Rejections

Claims 6~9 have been amended to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Accordingly, Applicants submit that claims 6~9 fully comply with the written description requirement of 35 U.S.C. 112, second paragraph, and respectfully requests that this rejection will be withdrawn.

The rejection of claims 1~5, 8, 9 and 11~14 under 35 U.S.C. 103(a) as being unpatentable over *Koyama* in view of *Jung*, the rejection of claims 6 and 10 under 35 U.S.C. 103(a) as being unpatentable over *Koyama* in view of *Jung* and *Yano*, and the rejection of claim 7 under 35 U.S.C. 103(a) as being unpatentable over *Koyama* in view of *Jung* and *Sung* are respectfully traversed and reconsideration is requested.

With respect to the rejection under 35 U.S.C. §103(a), it is respectfully submitted that *Koyama* and *Jung*, either individually or in combination, fail to disclose or suggest a method where, among others, the following underlined features are present, namely, "a main display panel operable to alternately display a left image and a right image **according to each subframe**;

an auxiliary display panel that changes polarization information of an incident left or right image, including first and second substrates having a pixel part corresponding to that of the main display panel and a sub-liquid crystal layer formed between the first and second substrates, and positioned in **front** of the main display panel, wherein **the auxiliary display panel is driven in synchronization with one of the left and right images of the main display panel and serves to change polarization information of the incident left or right image**;

a plurality of first electrodes **patterned** on the first substrate **along the rows of pixels** formed on the main display panel; and

a second electrode on an entire surface of the pixel part of the second substrate."

In contrast to the claimed arrangment, *Koyama* merely discloses that (as shown in Fig. 2) the 2D/3D switching type liquid crystal display panel is constructed by assembling a display liquid crystal panel 10, a patterned retardation plate 20, and a switching liquid crystal panel 30 (see. paragraph [0055]).

Specifically, the switching liquid crystal panel 30 (= auxiliary display panel of the present invention) of *Koyama* is positioned in **back** of the display liquid crystal panel 10 (= main display panel of the present disclosure).

Figs. 2 and 8 of *Koyama* are reproduced and annotated below for convenience.

FIG. 2

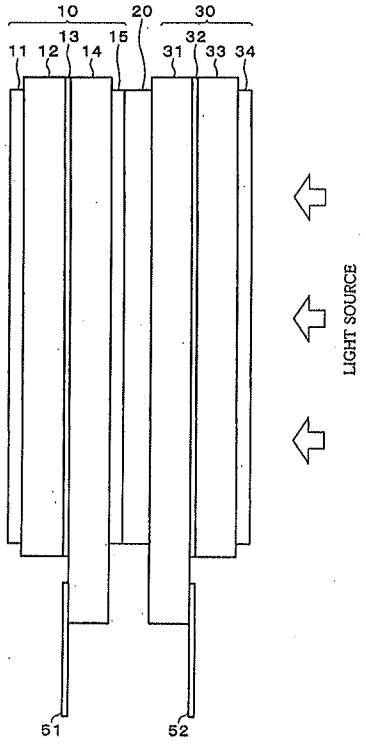
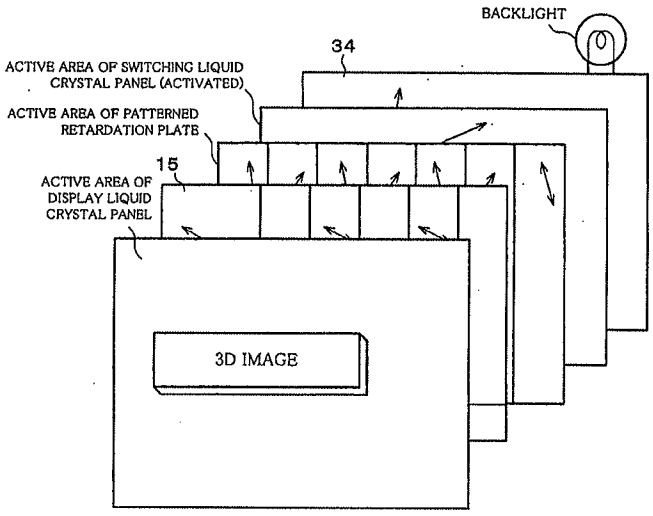


FIG. 8



The Office Action recognizes that *Koyama* did not explicitly disclose:

d. a plurality of first electrodes patterned on the first substrate along the rows of pixels formed on the main display panel;

e. a second electrode on a front surface of the pixel part of the second substrate, and relies upon the various teachings of *Jung* to remedy the deficient teachings of *Koyama*.

Applicants respectfully submit that none of the cited references remedy the deficient teachings of *Koyama*. As such, no combination of *Koyama* in view of *Jung* would provide all of the features recited in amended independent claim 1 of the present application.

For example, *Jung* does not disclose the claimed **a plurality of** first electrodes **patterned** on the first substrate **along the rows of pixels** formed on the main display panel; and a second electrode on an entire surface of the pixel part of the second substrate.

Jung does disclose that referring to FIG. 3, the two and three-dimensional image panel 300 includes a first substrate 310 and a second substrate 320 that are transparent substrates and arranged to face each other; a first electrode 312 formed on an **entire surface** of the first substrate 310; a first alignment layer 314 formed on an entire surface of the first electrode; a second electrode 322 formed on an entire surface of the second substrate 320; a light refraction device made of a lens-shaped polymer material 340 to have a plurality of light refracting lenses uniformly located on the second electrode 322; a second alignment layer 342 formed on an outer surface of the polymer material 340; and an liquid crystal layer 330 filled in a space between the first alignment layer 314 and the second alignment layer 342 (see. paragraph [0032]).

Figs. 3A and 3B of *Jung* are reproduced and annotated below for convenience.

FIG. 3A

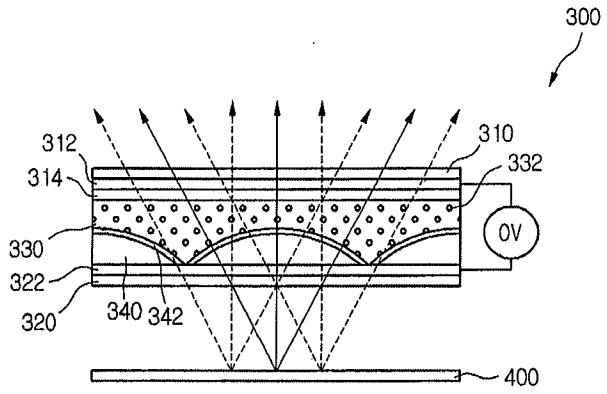
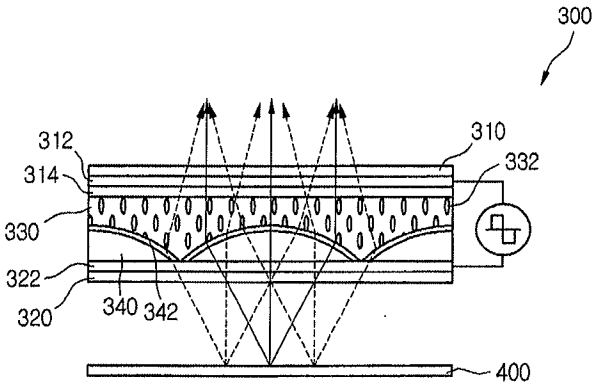


FIG. 3B



Accordingly, none of the cited references, singly or in combination, teaches or suggests the features of the present invention. For at least these reasons, Applicant respectfully requests that the Office withdraw the 35 U.S.C. 103(a) rejection of independent claim 1. Claims 2~14 depend from independent claim 1. It stands to reason that the 35 U.S.C. 103(a) rejections of those dependent claims should be withdrawn as well.

Claims 15 and 16 have been added for the Examiner's consideration. Applicant submits that claims 15 and 16 depend, either directly or indirectly, from independent claim 1, and are therefore allowable based on their dependence from claim 1 which is believed to be allowable. In addition, claims 15 and 16

recite further limitations which are not disclosed or made obvious by the applied prior art references.

Consideration and allowance of claims 15 and 16 are respectfully requested.

Applicants believe the foregoing amendments and remarks place the application in condition for allowance and early, favorable action is respectfully solicited.

Respectfully submitted,

/Gustavo Siller, Jr /
Gustavo Siller, Jr. Reg. No. 32,305
Attorney for Applicant

BRINKS HOFER GILSON & LIONE
P.O. BOX 10395
CHICAGO, IL 60610
(312) 321-4200

Electronic Acknowledgement Receipt

EFS ID:	11966224
Application Number:	12340005
International Application Number:	
Confirmation Number:	8241
Title of Invention:	STEREOSCOPIC 3D DISPLAY DEVICE
First Named Inventor/Applicant Name:	Seung-Chul Lee
Customer Number:	757
Filer:	Gustavo Siller Jr./Maggie Pieczonka
Filer Authorized By:	Gustavo Siller Jr.
Attorney Docket Number:	12579-6201
Receipt Date:	31-JAN-2012
Filing Date:	19-DEC-2008
Time Stamp:	16:38:32
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		12579-6201Response.pdf	509820 4a84e7a07a2dff86e03a5c1f9e92f7d1f92ea13b	yes	12

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Miscellaneous Incoming Letter	1	1
	Amendment/Req. Reconsideration-After Non-Final Reject	2	12
Warnings:			
Information:			
	Total Files Size (in bytes):	509820	

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New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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Date: January 31, 2012 Name: Gustavo Siller, Jr. Signature: /Gustavo Siller, Jr./

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Case No. : 12579-6201

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:
Seung-Chul LEE et al.

Serial No: 12/340,005

Filed: December 19, 2008

For: STEREOSCOPIC 3D DISPLAY DEVICE

Examiner: Steven C. Nguyen

Art Unit: 2443

Confirmation No: 8241

TRANSMITTAL

Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Sir:

Attached is/are:

☒ A Transmittal; and Amendment.

Fee calculation:

☒ No additional fee is required.

☐ Small Entity.

☐ An extension fee in an amount of $_____ for a ____- month extension of time under 37 CFR § 1.136(a).

☐ A petition or processing fee in an amount of $_____ under 37 CFR § 1.17(___) .

☐ An additional filing fee has been calculated as shown below:

					Small Entity			Not a Small Entity	
	Claims Remaining After Amendment		Highest No. Previously Paid For	Present Extra	Rate	Add'l Fee	OR	Rate	Add'l Fee
Total		Minus			x $30=			x $60=	
Indep.		Minus			x 125=			x $250=	
First Presentation of Multiple Dep. Claim					+$225=			+ $450=	
					Total	$		Total	$

Fee payment:

☐ Please charge Deposit Account No. 23-1925 in the amount of $_____ for _____.

☐ Payment by credit card in the amount of $_____ (Form PTO-2038 is attached).

☒ The Director is hereby authorized to charge payment of any additional filing fees required under 37 CFR § 1.16 and any patent application processing fees under 37 CFR § 1.17 associated with this paper (including any extension fee required to ensure that this paper is timely filed), or to credit any overpayment, to Deposit Account No. 23-1925.

Respectfully submitted,

January 31, 2012
Date

/Gustavo Siller, Jr./
Gustavo Siller, Jr. (Reg. No. 32,305)

BRINKS HOFER GILSON & LIONE
NBC Tower – Suite 3600, 455 N. Cityfront Plaza Drive, Chicago, IL 60611-5599

BRINKS HOFER GILSON &LIONE

PTO/SB/06 (07-06)
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 12/340,005	Filing Date 12/19/2008	☐ To be Mailed

APPLICATION AS FILED – PART I

	(Column 1)	(Column 2)	SMALL ENTITY ☐		OR	OTHER THAN SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE ($)	FEE ($)		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =		OR	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =			X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT	01/31/2012	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE ($)	ADDITIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 16	Minus	** 20	= 0	X $ =		OR	X $60=	0
	Independent (37 CFR 1.16(h))	* 1	Minus	***3	= 0	X $ =		OR	X $250=	0
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	0

AMENDMENT		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =		OR	X $ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =		OR	X $ =	
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

Legal Instrument Examiner:
/LINDA BADIE/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/340,005	12/19/2008	Seung-Chul Lee	12579-6201	8241

757 7590 12/22/2011

BRINKS HOFER GILSON & LIONE
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EXAMINER	
NGUYEN, STEVEN C	
ART UNIT	PAPER NUMBER
2443	
MAIL DATE	DELIVERY MODE
12/22/2011	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	12/340,005	LEE ET AL.	
	Examiner	Art Unit	
	STEVEN NGUYEN	2443	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 December 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

5)☒ Claim(s) *1-14* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1-14* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☒ The drawing(s) filed on *19 December 2008* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

12)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *05/26/2009, 05/11/2011, 10/14/2011*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

1. **Claims 6-9** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The claims recites the term "substantially." The term "substantially" is vague (substantially compared to what?) and the Examiner cannot determine the metes and bounds of the claim language. For purposes of examination, the Examiner will construe this limitation to mean that the display panels are positioned.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. **Claims 1-5, 8, 9, 11-14,** are rejected under 35 U.S.C. 103(a) as being unpatentable over Koyama et al (US 2005/0285997) in view of Jung (US 2006/0268196).

3. **Regarding Claim 1,** Koyama disclosed:

a. A stereoscopic image display device comprising: a main display panel operable to alternately display a left image and a right image *(Paragraph 68, separating images for the left and right eye)*;

b. an auxiliary display panel that changes polarization information of an incident left or right image, including first and second substrates having a pixel part corresponding to that of the main display panel and a sub-liquid crystal layer formed between the first and second substrates, and positioned in front of the main display panel *(Paragraph 56, opposing substrate and active matrix substrate. Paragraphs 93, 97, the distance between the display liquid panel and the retardation plate)*;

c. a light source that supplies light to the rear side of the main display panel *(Paragraph 55, a backlight)*;

Koyama did not explicitly disclose:

d. a plurality of first electrodes patterned on the first substrate along the rows of pixels formed on the main display panel;

e. a second electrode on a front surface of the pixel part of the second substrate;

However, Jung disclosed:

d. a plurality of first electrodes patterned on the first substrate along the rows of pixels formed on the main display panel *(Paragraph 32, first electrode formed on the first substrate)*;

e. a second electrode on a front surface of the pixel part of the second substrate *(Paragraph 32, second electrode formed on the second substrate)*;

f. The utilization of the readily available first and second electrodes of Jung would have been obvious to one of ordinary skill in the art in view of the teachings of Koyama since all the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions. *KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398 (2007). The combination would have yielded nothing more than predictable results to one of ordinary skill in the art at the time of the invention, for example, to accurately determine the shapes that will appear on the LCD.

4. Regarding Claim 2, the limitations of claim 1 have been addressed. Koyama did not explicitly disclose:

a. wherein the second electrode is on the entire surface of the pixel part of the second substrate without any patterns;

However, Jung disclosed:

b. wherein the second electrode is on the entire surface of the pixel part of the second substrate without any patterns *(Paragraph 32, second electrode formed on an entire surface of the second substrate)*;

c. The utilization of the readily available second electrode of Jung would have been obvious to one of ordinary skill in the art in view of the teachings of Koyama since all the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no

change in their respective functions. *KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398 (2007). The combination would have yielded nothing more than predictable results to one of ordinary skill in the art at the time of the invention, for example, to accurately determine the shapes that will appear on the LCD.

5. Regarding Claim 3, the limitations of claim 1 have been addressed. Koyama disclosed:

a. wherein the first and second electrodes are made of a transparent conductive material such as ITO *(Paragraph 77, electrodes made of ITO)*.

6. Regarding Claim 4, the limitations of claim 1 have been addressed. Koyama disclosed:

a. wherein the height of the first electrode corresponds to the height of a single pixel of the main display panel, and the width of the first electrode corresponds to 'n' (n=1,2, . . .) times the width of the pixel part *(Paragraphs 99, 124, width of the active area and the substrate crack prevention height)*.

7. Regarding Claim 5, the limitations of claim 1 have been addressed. Koyama disclosed:

a. wherein the auxiliary display panel is driven in synchronization with one of the left and right images *(Paragraph 68, having the right eye image and left eye image separated into different viewing angles)*.

8. Regarding Claim 8, the limitations of claim 1 have been addressed. Koyama disclosed:

a. wherein a polarization axis of the left or right image made incident to the auxiliary display panel and a rubbing direction of the auxiliary display panel are positioned substantially at 45° *(Paragraph 64, 72, different rubbing directions)*.

9. Regarding Claim 9, the limitations of claim 4 have been addressed. Koyama disclosed:

a. wherein when the auxiliary display panel is not driven, a polarization axis of the left or right image that has passed through the auxiliary display panel is substantially perpendicular to a polarization axis of the left or right image made incident to the auxiliary display panel *(Paragraph 101, perpendicular direction)*.

10. Regarding Claim 11, the limitations of claim 1 have been addressed. Koyama disclosed:

a. an array substrate *(Paragraph 56, substrate)*;

b. a color filter substrate disposed to face the array substrate *(Paragraph 56, active matrix substrate)*;

c. a main liquid crystal layer positioned between the array substrate and the color filter substrate *(Paragraph 56, display liquid crystal layer)*;

d. a first polarizer attached on an outer surface of the array substrate *(Paragraph 56, first polarizer)*;

e. a second polarizer attached on an outer surface of the color filter substrate *(Paragraph 56, second polarizer)*.

11. Regarding Claim 12, the limitations of claim 1 have been addressed. Koyama disclosed:

a. a λ/4 retardation layer formed on the first substrate of the auxiliary display panel that changes a linearly polarized left or right image made incident to the auxiliary display panel into a left circularly polarized (or right circularly polarized) state *(Paragraph 66, retardation plate)*.

12. Regarding Claim 13, the limitations of claim 12 have been addressed. Koyama disclosed:

a. wherein the λ/4 retardation layer in formed in an in-cell form on an upper surface of the first substrate of the auxiliary display panel together with the first substrate *(Paragraph 92, the patterned retardation plate shielding off the light in the area outside the active area of the retardation plate)*.

13. Regarding Claim 14, the limitations of claim 12 have been addressed. Koyama disclosed:

a. wherein the λ/4 retardation layer is attached in a form of a film on a lower surface of the first substrate of the auxiliary display panel *(Figure 2, Paragraph 92, passing light through the patterned retardation plate or the liquid crystal panel)*.

14. Claims 6, 10, are rejected under 35 U.S.C. 103(a) as being unpatentable over Koyama in view of Jung and Yano et al (US 2008/0284699).

15. Regarding Claim 6, the limitations of claim 1 have been addressed. Koyama did not explicitly disclose:

a. wherein the sub-liquid crystal layer includes a plurality of liquid crystal molecules, and when the auxiliary display panel is driven, the liquid crystal molecules are arranged to be substantially perpendicular to the first and second substrates, and when the auxiliary display panel is not driven, the liquid crystal molecules are arranged in a twisted nematic structure;

However, Yano disclosed:

b. wherein the sub-liquid crystal layer includes a plurality of liquid crystal molecules, and when the auxiliary display panel is driven, the liquid crystal molecules are arranged to be substantially perpendicular to the first and second substrates, and when the auxiliary display panel is not driven, the liquid crystal molecules are arranged in a twisted nematic structure *(Paragraphs 47, 49, 120 Hz picture signal and a nematic liquid crystal or perpendicular orientation mode)*;

c. The utilization of the readily available 120 Hz and twisted nematic structure of Yano would have been obvious to one of ordinary skill in the art in view of the teachings of Koyama since all the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions. *KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398 (2007). The combination would have yielded nothing more than predictable results to one of ordinary skill in the art at the time of the invention, for example, to achieve any level of grey.

16. Regarding Claim 10, the limitations of claim 1 have been addressed. Koyama did not explicitly disclose:

a. wherein the main display panel is driven at 120 Hz or higher;

However, Yano disclosed:

b. wherein the main display panel is driven at 120 Hz or higher *(Paragraphs 47, 49, 120 Hz picture signal)*;

c. The utilization of the readily available 120 Hz of Yano would have been obvious to one of ordinary skill in the art in view of the teachings of Koyama since all the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions. *KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398 (2007). The combination would have yielded nothing more than predictable results to one of ordinary skill in the art at the time of the invention, for example, to have less apparent motion blur.

17. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Koyama in view of Jung and Sung et al (US 2007/0206134).

18. Regarding Claim 7, the limitations of claim 1 have been addressed. Koyama did not explicitly disclose:

a. wherein the sub-liquid crystal layer includes a plurality of liquid crystal molecules, and when the auxiliary display panel is driven, the liquid crystal molecules are arranged to be substantially perpendicular to the first and second substrates, and when the auxiliary display panel is not driven, the liquid crystal molecules are arranged to be substantially parallel to the first and second substrates;

However, Sung disclosed:

b. wherein the sub-liquid crystal layer includes a plurality of liquid crystal molecules, and when the auxiliary display panel is driven, the liquid crystal molecules are arranged to be substantially perpendicular to the first and second substrates, and when the auxiliary display panel is not driven, the liquid crystal molecules are arranged to be substantially parallel to the first and second substrates *(Paragraph 33, parallel and perpendicular plates determining light transmission)*;

c. The utilization of the readily available perpendicular or parallel molecules of Sung would have been obvious to one of ordinary skill in the art in view of the teachings of Koyama since all the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions. *KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398 (2007). The combination would have yielded nothing more than predictable results to one of ordinary skill in the art at the time of the invention, for example, to accurately control light throughput.

Conclusion

Examiner's Note: Examiner has cited particular columns and line numbers in the references applied to the claims above for the convenience of the applicant. Although the specified citations are representative of the teachings of the art and are applied to specific limitations within the individual claim, other passages and figures may apply as well. It is respectfully requested from the applicant in preparing responses, to fully consider the references in entirety as potentially teaching all or part of the claimed invention, as well as the context of the passage as taught by the prior art or disclosed by the Examiner.

In the case of amending the claimed invention, Applicant is respectfully requested to indicate the portion(s) of the specification which dictate(s) the structure relied on for proper interpretation and also to verify and ascertain the metes and bounds of the claimed invention.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to STEVEN NGUYEN whose telephone number is (571)270-5663. The examiner can normally be reached on Monday through Thursday with alternating Friday 7:30AM - 5:00PM, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tonia Dollinger can be reached on (571) 272-4170. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/S.C.N./
Examiner, Art Unit 2443
12/15/2011

/TONIA L.M. DOLLINGER/
Supervisory Patent Examiner, Art Unit 2443

Notice of References Cited	Application/Control No. 12/340,005	Applicant(s)/Patent Under Reexamination LEE ET AL.	
	Examiner STEVEN NGUYEN	Art Unit 2443	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-6,252,624 B1	06-2001	Yuasa et al.	348/56
*	B	US-6,252,570 B1	06-2001	Mangerson, Mark M.	345/87
*	C	US-2002/0118276 A1	08-2002	Seong, Phil Moon	348/53
*	D	US-2004/0012851 A1	01-2004	Sato et al.	359/464
*	E	US-2005/0036082 A1	02-2005	Lai, Chi-Kuang	349/061
*	F	US-2005/0285997 A1	12-2005	Koyama et al.	349/117
*	G	US-2006/0268196 A1	11-2006	Jung, Jin Hee	349/095
*	H	US-2007/0206134 A1	09-2007	Sung et al.	349/096
*	I	US-2008/0284699 A1	11-2008	Yano et al.	345/89
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12340005	LEE ET AL.
	Examiner	**Art Unit**
	STEVEN NGUYEN	2443

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	12/15/2011								
	1	✓								
	2	✓								
	3	✓								
	4	✓								
	5	✓								
	6	✓								
	7	✓								
	8	✓								
	9	✓								
	10	✓								
	11	✓								
	12	✓								
	13	✓								
	14	✓								

FORM PTO-1449	SERIAL NO. 12/340,005	CASE NO. 12579-6201
LIST OF PATENTS AND PUBLICATIONS FOR APPLICANT'S INFORMATION DISCLOSURE STATEMENT	FILING DATE 12/19/2008	GROUP ART UNIT 2443
(use several sheets if necessary) APPLICANT(S): Seung-Chul Lee et al.		CONFIRMATION NO. 8241

REFERENCE DESIGNATION **U.S. PATENT DOCUMENTS**

EXAMINER INITIAL		DOCUMENT NUMBER Number-Kind Code (if known)	DATE	NAME	CLASS/ SUBCLASS	FILING DATE
	B1	20040012851 A1	01/22/2004	Sato et al.		
	B2	20060268196 A1	11/30/2006	Jung		

FOREIGN PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER Number-Kind Code (if known)	DATE	COUNTRY	CLASS/ SUBCLASS	TRANSLATION YES OR NO
	B3	CN 1873482 A	12/06/2006	China		Abstract

EXAMINER INITIAL		OTHER ART – NON PATENT LITERATURE DOCUMENTS (Include name of author, title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date page(s), volume-issue number(s), publisher, city and/or country where published.
	B4	Copy of Office Action issued in corresponding Chinese Patent Application No. 200810180777.5, mailed February 11, 2011.

EXAMINER /Steven Nguyen/	DATE CONSIDERED 12/15/2011

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /S.N./

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	1	"12340005"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:10
L2	7535	((seung near2 lee) or (hoon near2 kang) or (sung near2 jung)).in.	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:10
L3	2913	(lg near display).asn.	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:11
L4	68	2 and 3	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:11
L5	11	4 and 3D	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:14
L7	4	("20020118276" | "20050036082" | "6252570" | "6252624").PN.	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:17
L8	2	"2006268196"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:29
L9	1	"20060268196"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:29
L10	2	"2004012851"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:32
L11	1	"20040012851"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:32
L12	2244	parallax near3 barrier	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:45

L13	1692	12 and (3D or (three near2 dimension$3))	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:46
L14	121	13 and (polariz$4 and (indium near3 oxide))	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:46
L15	112	14 and (left and right)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:47
L16	19276116	@ad<"20080709" or @rlad<"20080709"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:48
L17	0	15 and 6	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:48
L18	98	15 and 16	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:48
L19	1	"7199845".pn.	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:49
L20	2	"20050285997"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 10:49
L21	8964	16 and ("120" near2 HZ)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 11:04
L22	366011	16 and (HZ or hertz)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 11:04
L23	4	15 and ("120" near2 HZ)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 11:04
L24	2	"20050285997" and (between or (in near2 between))	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:26
L25	2	"20050285997" and (ITO or (indium near3 oxide))	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:36

L26	2	"20050285997" and (height)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:37
L27	2	"20050285997" and (height or width)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:38
L28	0	"20050285997" and (synch $7)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:39
L29	0	"20060268196" and (synch $7)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:39
L30	59	14 and (parallel and perpendicular)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:44
L31	55	30 and 16	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:44
L32	1	"20100007716" and (substantial$4).clm.	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:48
L33	20	14 and (perpendicular and (twisted near3 nematic))	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:49
L34	3	14 and (perpendicular and (twisted near3 nematic)) and (HZ or hertz)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:49
L35	0	((3D or (three near3 dimension$4)) same (perpendicular near20 (twisted near3 nematic)) and (HZ or hertz))	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:53
L36	62	(perpendicular near20 (twisted near3 nematic)) and (HZ or hertz)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:54
L37	62	36 and (LCD or (liquid near3 crystal))	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:55
L38	57	37 and 16	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:55

L39	23	(perpendicular near20 (twisted near3 nematic)) and ("120" near3 (HZ or hertz))	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:57
L40	22	39 and 16	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:57
L41	2	"20080284699"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:58
L42	2	"20080284699" and (nematic and perpendicular and "120")	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 12:58
L43	2	"20050285997" and (rub$5)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:11
L44	2	"20050285997" and (perpendic$7)	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:12
L45	2	"20050285997"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:22
L46	2	"20060269496"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:27
L47	1	"20060268196"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:27
L48	1	"20020118276"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:27
L49	483	348/43.ccls.	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:28
L50	1	"20050036082"	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:28
L51	1	"6252570".pn.	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:28

L52	1	"6252624".pn.	US-PGPUB; USPAT; EPO; JPO; IBM_TDB	ADJ	ON	2011/12/15 13:28

EAST Search History (Interference)

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12/15/2011 1:33:33 PM
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FORM PTO-1449	SERIAL NO. 12/340,005	CASE NO. 12579-6201
LIST OF PATENTS AND PUBLICATIONS FOR APPLICANT'S INFORMATION DISCLOSURE STATEMENT	FILING DATE 12/19/2008	GROUP ART UNIT 2443
(use several sheets if necessary)	APPLICANT(S): Seung-Chul Lee et al.	CONFIRMATION NO. 8241

FOREIGN PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER Number-Kind Code (if known)	DATE	COUNTRY	CLASS/ SUBCLASS	TRANSLATION YES OR NO
	C1	JP 61-227498	10/09/1986	Japan		Abstract
	C2	JP 62-191824	08/22/1987	Japan		Abstract
	C3	JP 05-232403	09/10/1993	Japan		Abstract
	C4	JP 06-029914	02/04/1994	Japan		Abstract
	C5	JP 11-038361	02/12/1999	Japan		Abstract
	C6	JP 11-298918	10/29/1999	Japan		Abstract
	C7	JP 2001-214566	08/10/2001	Japan		Abstract

EXAMINER INITIAL	OTHER ART – NON PATENT LITERATURE DOCUMENTS (Include name of author, title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date page(s), volume-issue number(s), publisher, city and/or country where published.	
	C8	Copy of Office Action issued in corresponding Japanese Patent Application No. 2008-316168, mailed July 12, 2011.
	C9	Copy of Office Action issued in corresponding Chinese Patent Application No. 200810180777.5, mailed August 12, 2011.

EXAMINER /Steven Nguyen/	DATE CONSIDERED 12/15/2011

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

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FORM PTO-1449	SERIAL NO. 12/340,005	CASE NO. 12579-6201
LIST OF PATENTS AND PUBLICATIONS FOR APPLICANT'S INFORMATION DISCLOSURE STATEMENT	FILING DATE December 19, 2008	GROUP ART UNIT 2621
(use several sheets if necessary) APPLICANT(S): Seung-Chul Lee et al.		CONFIRMATION NO. 8241

REFERENCE DESIGNATION **U.S. PATENT DOCUMENTS**

EXAMINER INITIAL		DOCUMENT NUMBER Number-Kind Code (if known)	DATE	NAME	CLASS/ SUBCLASS	FILING DATE
	A1	6,252,624 B1	June 26, 2001	Yuasa et al.		
	A2	6,252,570 B1	June 26, 2001	Mangerson		
	A3	2002/0118276 A1	August 29, 2002	Seong		
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	A10					
	A11					
	A12					
	A13					

FOREIGN PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER Number-Kind Code (if known)	DATE	COUNTRY	CLASS/ SUBCLASS	TRANSLATION YES OR NO
	A14	02/0569683 A1	August 1, 2002	PCT		
	A15	61-227498	October 9,1986	Japan		ABSTRACT
	A16	0 376 278	July 4, 1990	EPO		
	A17					
	A18					

EXAMINER INITIAL		OTHER ART – NON PATENT LITERATURE DOCUMENTS (Include name of author, title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date page(s), volume-issue number(s), publisher, city and/or country where published.
	A19	Copy of Search Report issued in corresponding British Application 0821455.3; issued March 25, 2009
	A20	
	A21	
	A22	
	A23	
	A24	

EXAMINER	/Steven Nguyen/	DATE CONSIDERED	12/15/2011

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CONFIRMATION NO. 8241

SERIAL NUMBER	FILING or 371(c) DATE RULE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
12/340,005	12/19/2008	348	2443	12579-6201

APPLICANTS

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**** CONTINUING DATA ***************************

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REPUBLIC OF KOREA 10-2008-0055329 07/09/2008

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01/07/2009

Foreign Priority claimed	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
☑ Yes ☐ No	KOREA, REPUBLIC OF	8	14	1

35 USC 119(a-d) conditions met ☑ Yes ☐ No ☐ Met after Allowance

Verified and Acknowledged /STEVEN C NGUYEN/ Examiner's Signature _____ Initials

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UNITED STATES

TITLE

STEREOSCOPIC 3D DISPLAY DEVICE

FILING FEE RECEIVED	FEES: Authority has been given in Paper	
1090	No._____ to charge/credit DEPOSIT ACCOUNT No._____ for following:	☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12340005	LEE ET AL.
	Examiner	Art Unit
	STEVEN NGUYEN	2443

SEARCHED			
Class	Subclass	Date	Examiner
348	43	12/13/2011	SCN

SEARCH NOTES		
Search Notes	Date	Examiner
Inventor/Assignee Search	12/13/2011	SCN
EAST Search	12/13/2011	SCN

INTERFERENCE SEARCH			
Class	Subclass	Date	Examiner

FORM PTO-1449	SERIAL NO. 12/340,005	CASE NO. 12579-6201
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	C6	JP 11-298918	10/29/1999	Japan		Abstract
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EXAMINER	DATE CONSIDERED

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PATENT ABSTRACTS OF JAPAN

(11)Publication number : 61-227498
(43)Date of publication of application : 09.10.1986

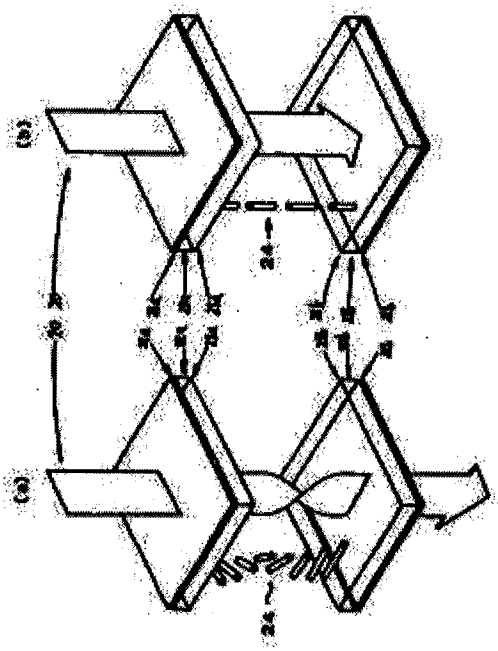
(51)Int.Cl. H04N 13/04
G02F 1/13
G02F 1/133

(21)Application number : 60-068444
(22)Date of filing : 02.04.1985

(71)Applicant : TOSHIBA CORP
(72)Inventor : YAMAGATA HITOSHI

(54) STEREOSCOPIC TELEVISION SET

(57)Abstract:
PURPOSE: To obtain a stereoscopic television set having uniform stereoscopic spectacles with excellent light transmissivity substantially and excellent response characteristics by combining a torsional nematic liquid crystal and a polarized plate to use them as an optical shutter.
CONSTITUTION: In the optical shutter, polarized plates 21a, 21b are arranged relatively so that the polarized axes are orthogonal, transparent glass substrates 22a, 22b are arranged in parallel to the opposite face, flat transparent electrodes 23a, 23b are stuck by vapor-deposition or sputtering and the torsional nematic liquid crystal 24 is sealed between the electrodes 23a and 23b. In applying an AC voltage having a frequency lower than a frequency f9 between the transparent electrodes 23a and 23b, the liquid crystal molecule 24 is oriented while being twisted by 90° , the polarized plane of the incident light 20 is rotated by 90° , the light is transmitted through the plate 21b, and the optical shutter is in the opened state. In increasing the frequency of the applied AC voltage than the frequency f9, the liquid crystal molecule 24 changes the arrangement in the electric field direction, the light does not transmit the polarized plate 21b and the optical shutter is closed.



⑲日本国特許庁（JP）　⑪特許出願公開

⑫公開特許公報（A）　昭61－227498

⑤1Int.Cl.⁴	識別記号	庁内整理番号	⑬公開　昭和61年(1986)10月9日
H 04 N 13/04		6668－5C	
G 02 F 1/13		7448－2H	
1/133		8205－2H	審査請求　未請求　発明の数 1　（全5頁）

⑤4発明の名称　立体テレビジョン

⑳特　願　昭60－68444
㉒出　願　昭60(1985)4月2日

㉑発明者　山形　仁　大田原市下石上1385番の1　株式会社東芝那須工場内
㉑出願人　株式会社東芝　川崎市幸区堀川町72番地
㉔代理人　弁理士 則近 憲佑　外1名

明　細　書

1．発明の名称

立体テレビジョン

2．特許請求の範囲

（1）立体視用の眼鏡の左眼及び右眼に設けた光シャッタを、テレビ画面上に表示される被写体の左像及び右像のフィールド毎若しくはフレーム毎の切り替え周期に同期させて交互に開閉することにより、被写体の画像を立体的に認識可能となした立体テレビジョンにおいて、前記左右の光シャッタは、平行配置した一対の偏光板と、その両偏光板の内面に対向配置した一対の透明電極と、これら透明電極間に封入し交流電圧印加によりその分子軸方向が変化するねじれネマティック型液結晶からなり、その両ねじれネマティック型液晶に前記左像及び右像の切り替え周期に同期させて交互に所定交流電圧を供給する光シャッタ駆動手段を備えたことを特徴とする立体テレビジョン。

（2）前記光シャッタ駆動手段は、左像及び右像の映像信号の立上りより所定時間早く光シャッタを不透明にするための所定周波数の交流電圧を光シャッタに供給するとともに、立下りより所定時間早く光シャッタを透明にするための所定周波数の交流電圧を印加するように構成したことを特徴とする特許請求の範囲第1項に記載の立体テレビジョン。

3．発明の詳細な説明

［発明の技術分野］

本発明は立体テレビジョンに関するものである。

［発明の技術的背景］

被写体の画像を立体的に認識させる手段として以下の2つ（以下で（1）は製品として、（2）は試作品）があり、これらは遮光素子の違いによるものである。

（1）遮光素子としてPLZT（Pead Lanthanum Zirconate Titanate）素子を立体視用の眼鏡部分に用いる手段がある。

第8図は、このPLZT素子を用いて被写

体の立体像を認識する立体テレビジョンの眼鏡部分を示す説明図である。

同図において、1a、1bは眼鏡の左眼及び右眼にそれぞれ組込んだ光シャッタである。光シャッタ1a，1bは同一構成であるため一方の光シャッタ1aについて説明すると、2枚の偏光板2，3の間にPLZT素子4を挿入し、これらを互いに密着することにより光シャッタ1aを構成している。

このように構成した光シャッタ1a，1bに対し、テレビ画面上にフィルド毎若しくはフレーム毎に交互に表示される被写体の左像、右像の切り替え信号に同期させた電圧をシャッタ駆動手段5から交互に供給し、PLZT素子4，4の光の透過率を交互に切り替えて、その両光シャッタ1a、1bを光学的に開閉するようにしてなるものである。

かかる光シャッタ1a、1bを眼鏡として用いるとともに目の残像性をも利用することによって、被写体の立体像を認識することのできる立体テレビジョンを構成していた。

(2) 遮光素子として動的散乱型液晶素子を立体視用の眼鏡部分に用いる手段がある。

この場合には上記(1)のPLZT素子のように偏光板を用いることなく、動的散乱型液晶の電圧印加に対する液晶分子の乱流による白濁を遮光に利用して光シャッタを構成していた。

シャッタ駆動手段、及び立体テレビジョンへの構成法は(1)と同一であると言える。

[背景技術の問題点]

上述した立体テレビジョンにおける問題点は、遮光素子の種類により以下の(1)，(2)に分けられる。

(1) 遮光素子としてPLZTを使用した場合は、光シャッタの構成要素として特性の良い偏光板を積極的に用いることと、構造上の問題で光透過時の透過率が35%以下と低いことである。

また、シャッタ駆動電圧が通常300V程度と高く、この光シャッタを備える眼鏡を実用を考慮してワイヤレス形式にしたような場合に、その電圧駆動回路を小型化することは困難である。

(2) 遮光素子として

動的散乱型液晶素子を使用した場合は、偏光板を使わないため透明度は上がるが、特に白濁状態から透明状態に戻る立下り特性が著しく悪く、毎秒30枚以上のフレーム数に同期をとる場合には、結局、動的に見た透明度は低下することになる。

さらに、一対の全面電極構造をとっているため、眼鏡の全領域に渡って、均一な液晶層を得るのは困難である。従って、シャッタの空間的な応答特性にバラつきが生じることになる。

[発明の目的]

本発明は上記事情に鑑みてなされたものであり、応答特性が良く、均一で実質上光透過率が良好な立体視用眼鏡を備えた、3次元画像認識が可能な立体テレビジョンを提供することを目的とするものである。

[発明の概要]

前記目的を達成するための本発明の概要は、立体視用の眼鏡の左眼及び右眼に設けた光シャッタを、テレビ画面上に表示される被写体の左像及び右像のフィールド毎若しくはフレーム毎の切り替え周期に同期させて交互に開閉することにより、被写体の画像を立体的に認識可能となした立体テレビジョンにおいて、前記左右の光シャッタは、平行配置にした一対の偏光板と、その両偏光板の内面に対向配置した一対の透明電極と、これら透明電極間に封入し、交流電圧印加によりその分子軸方向が変化するねじれネマティック型液晶とからなり、その両ねじれネマティック型液晶に前記左像及び右像の切り替え周期に同期させて交互に所定交流電圧を供給する光シャッタ駆動手段を備えたことを特徴とするものである。

[発明の実施例]

以下に本発明の実施例を詳細に説明する。

第１図は立体テレビジョンの概要を示すブロック図である。

同図において１０ａ、１０ｂは左右のＴＶカメラであり、被写体Ｓを両方ＴＶカメラ１０ａ、１０ｂで同時に撮影してそれぞれ映像信号に変換し、ミキサ回路１１でその両映像信号を左右交互に混合する。ミキサ回路１１の出力は映像増幅回路１２で増幅され、テレビジョン１３のテレビ画面上に被写体Ｓの左像を例えば奇数フィールド若しくは奇数フレーム毎に、右像を偶数フィールド若しくは偶数フレーム毎に同期信号発生器１４よりの同期信号に対応させて交互に表示する。

一方、その同期信号は同期信号分離回路１５により分離してシャッタ駆動手段１６に入力する。

シャッタ駆動手段１６は、眼鏡１７の左眼及び右眼にそれぞれ形成した同一構造の光シャッタ１８ａ，１８ｂを前記同期信号の周期に対応して交互に開閉する。

ここで、光シャッタ１８ａの構造を具体的に説明する。

第２図（ａ）（ｂ）に示すように、偏光板２１ａ，２１ｂを偏光軸が互いに直交するように相対配置する。この場合、一方の偏光板の偏波方向としては、外部からの入射光に対しては任意な角度に配置することが望ましい。これは、例えば９０°に配置したとすれば、光の性質によりこの偏光板を介して得られる光量は５０％に減少してしまうからである。しかしながら、これら２つの偏光板２１ａ，２１ｂ間の偏波方向は、直交していることは言うまでもない。その偏光板２１ａ，２１ｂの対抗面側に透明ガラス基板２２ａ，２２ｂをそれぞれ平行配置し、それらガラス基盤の２２ａ，２２ｂの対向内面に平板状の透明電極２３ａ，２３ｂを蒸着、あるいはスパッタなどの方法でつけ、両透明電極２３ａ，２３ｂ間に交流電圧で２周駆動することにより、その分子軸が急峻に変わるねじれネマティック型液晶２４を封入し、図示していないが両透明ガラス板２２ａ，２２ｂの外周部を密封してなるものである。

このような構造からなる光シャッタ１８ａは、両平板形透明電極２３ａ，２３ｂ間にある周波数f_1より低い周波数の交流電圧が印加されると、液晶２４は正の誘電異方性を示し、同図（ａ）のように液晶分子２４は９０°ねじれて配向し、入射光２０はその分子軸に沿って伝搬し、偏波面が９０°回転することにより２１ｂの偏光板を透過する。すなわち、光シャッタは開状態となる。

一方、印加する交流電圧の周波数をf_1より高くすると、液晶分子２４は負の誘電異方性を示し、同図（ｂ）のように液晶分子２４は電界方向に配列を変え、入射光はそのまま２１ｂの偏光板に入射し、偏光板との偏波面が９０°ずれているため光は透過しない。すなわち、光シャッタは閉状態となる。

このように印加する交流電圧の周波数を変えることで、逆方向のトルクが液晶分子２４に働くので、単に電界を切って自然にもとの状態に緩和させる動的散乱型液晶の駆動方法よりも、より高速応答が可能である。

第３図は、上記の２周波駆動のねじれネマティック型液晶２４の遅延時間及び立上り、立下りの時間特性の一例を、横軸に時間、縦軸に光の透過、遮断状態をとって示すものである。

同図において、時間t_{on}の瞬間に印加交流電圧の周波数を上記のf_1より高くしたとすると、液晶２４のコントラスト変化が生じるまでに時間遅れτ_{on}があり、立上り時間にt_rを要することを示している。逆にt_{off}の瞬間に上記周波数をf_1より低くした場合の時間遅れτ_{off}、立下り時間t_sだけかかることを示している。

上記パラメータはt_r＝１（msec），τ_{on}＝４（msec），t_s＝２（msec），τ_{off}＝５（msec）以内であることが知られている。

次に上述の構成からなる立体テレビジョンの動作を、第４図に及至第６図の各部の波形図をも参照して説明する。

第４図（ａ）はテレビ画面上に表示される右像の映像信号波形Ｒを、第４図（ｂ）は左像の映像信号波形Ｌをそれぞれ示すものである。

第５図（ａ）は光シャッタ１８ａの透明電極２

Oa，20bに印加する電圧波形を、第5図（b）は光シャッタ18bの透明電極23a，23bに印加する電圧波形をそれぞれ示すものである。

第6図（a）（b）はそれぞれ光シャッタ18a，18bの各ねじれネマティック型液晶24，24の動作状態を示す波形図である。

シャッタ駆動手段16により、左像の映像信号Lに同期させて左側の光シャッタ18aへ所定の周波数f_Lを、右像の映像信号Rに同期させて右側の光シャッタ18bへ所定の周波数f_Hを、交互に一定の周期をもって印加する。

この場合、既述したようなねじれネマティック型液晶24の遅延時間特性、図4のτ_{don}，τ_{doff}を考慮して、映像信号R，Lの立ち上りより時間aだけ早く周波数f_L，f_Hの交流電圧をそれぞれ印加する。

このような時間関係を有するように周波数f_L，f_Hの交流電圧を印加することにより、左側の眼鏡18bがを透明度を失う時間を右像の映像信号Rの立上り時に合致させ、また、右側の眼鏡18aが透明度を失う時間を左像の映像信号Lの立上り時に合致させることができる。

一方、映像信号R，Lの立下り時より時間bだけ早く周波数f_L，f_Hを切換える。

尚、本発明の立体テレビジョンは通常のテレビジョン、電子顕微鏡、X線テレビ等に応用することが可能である。

本発明は上述した実施例に限定されることなく、その要旨の範囲内で種々の変形が可能であることは言うまでもない。

例えば、上記実施例では液晶分子を動作させる電極として、平板形の透明電極を用いることで説明したが、電極の透明度をさらに上げるために、第7図に示すように、一方は平板形電極23で、他方をくし形構造の透明電極33としても良い。この場合、各スリット33Sの幅は、液晶分子に作用する電界分布が均一となる様設定すれば良い。透明電極といえども若干の不透明さを有しているものであるが、この第7図に示す構成によれば、光透過率をさらに向上可能となる。

さらには、電界分布の均一性を確保できるならば、両方の電極をくし形構造としても良い。

［発明の効果］

本発明によれば、動的な光透過率が良好な高速応答特性を有するねじれネマティック型液晶と偏光板との組合せを光シャッタとして利用するものであるため、テレビ画面に表示される被写体の画像を充分な明るさをもって認識することができる立体テレビジョンを提供することができる。

また、X線テレビジョンとして本発明の立体テレビジョンを用いた場合には、テレビ画面を立体的にかつ充分な明るさをもって観察できるとともに、光シャッタに電圧を不印加とすることにより実用上は問題とならない程度の透明眼鏡として直接患者の観察をもすることができることも特徴である。

さらに工業用立体テレビジョンとして用いた場合にも原子炉の操作等において極めて有益である。

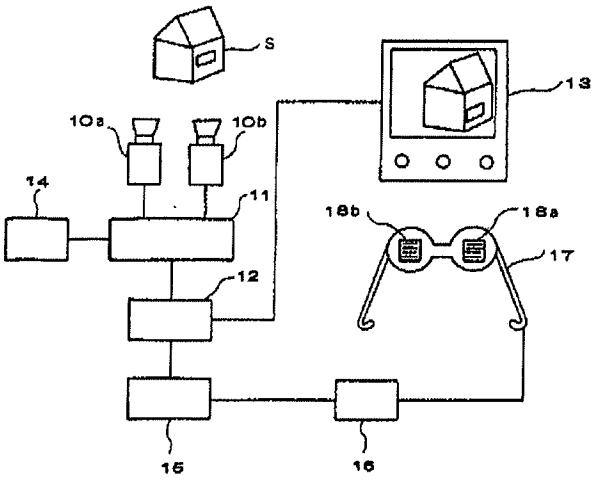
4．図面の簡単な説明

第1図は本発明の立体テレビジョンの実施例を示すブロック図、第2図（a），（b）は上記実施例における光シャッタの構造を示す拡大断面図で、同図（a）は低周波の交流電圧印加状態を、同図（b）は高周波の交流電圧印加状態をそれぞれ示す、第3図は光シャッタの光遮断、光透過状態を示す特性図、第4図（a），（b）はそれぞれ右、左の映像信号波形図、第5図（a），（b）はそれぞれ左右の光シャッタに印加する電圧の波形図、第6図（a）（b）はそれぞれ左右の光シャッタの動作波形図、第7図は本発明における透明電極の他の実施例を示す図、第8図は従来の立体テレビジョンの光シャッタ及び光シャッタ駆動手段を示す説明図である。

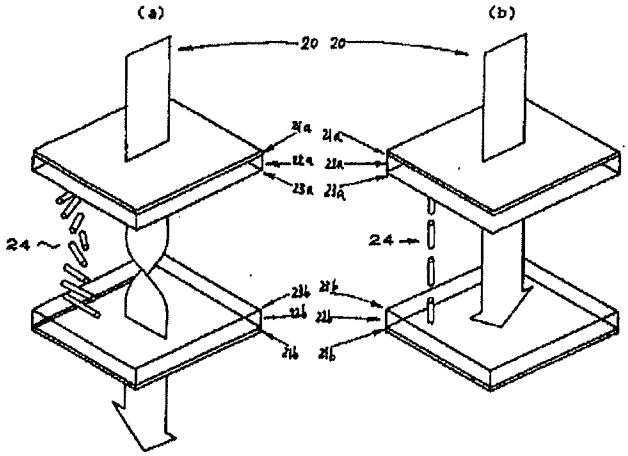
13…テレビジョン、16…光シャッタ駆動手段、
17…眼鏡、18a、18b…光シャッタ、
21a、21b…偏光板、
23a、23b…透明電極、
24…ねじれネマティック型液晶。

代理人　弁理士　則　近　憲　佑（ほか1名）

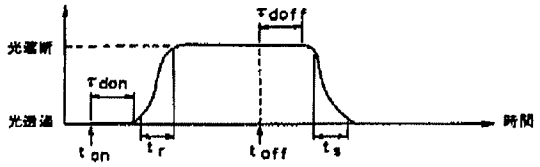
第 1 図



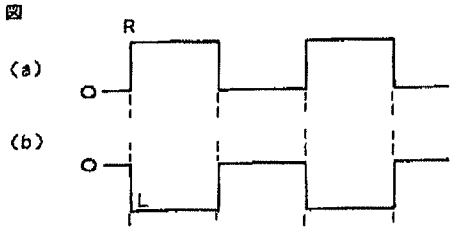
第 2 図



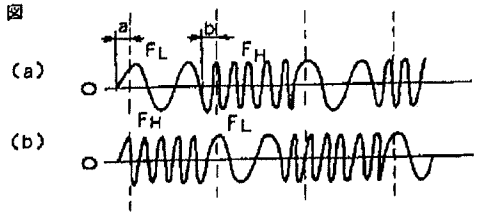
第 3 図



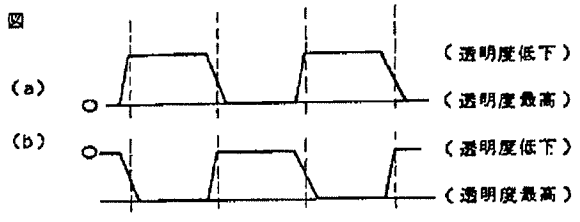
第 4 図



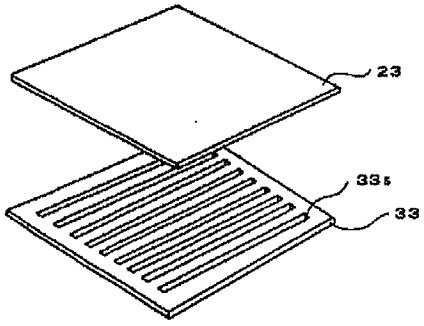
第 5 図



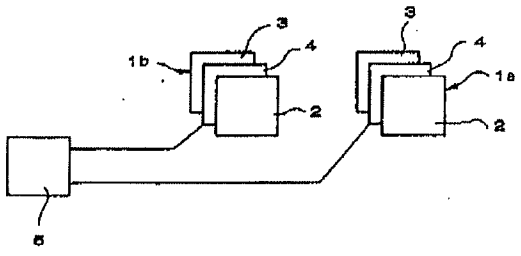
第 6 図



第 7 図



第 8 図



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(71)Applicant : SHARP CORP
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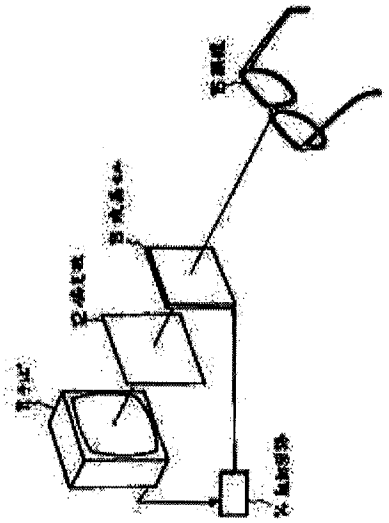
TSUBOTA KOJIRO
YAMAMOTO KUNIHIKO

(54) PSEUDO STEREOSCOPIC DISPLAY SYSTEM

(57)Abstract:
PURPOSE: To permit easy observation of stereoscopic images with light and inexpensive spectacles by disposing a liquid crystal cell on the front surface of a television screen, alternately and time-dividedly changing the polarizing direction of the light passed the cell and viewing the images with the spectacles having polarizing plates.
CONSTITUTION: The polarizing plate 12 and the ferroelectric smectic liquid crystal cell 13 are disposed on the front face of the screen of a television 11. The liquid crystal 13 is so provided that the optical axis of the cell is alternately changed over in synchronization with the frame signal of the television by a driving circuit 14. An observer views the images with the spectacles 15 having the polarizing plates which are respectively opposite in the polarizing directions on the right and left. The right and left eyes, therefore, recognize the images separately and observe the television images by having the stereoscopic parallax between the right and left eyes. The stereoscopic images are thus easily observed by using the light and inexpensive polarizing spectacles.



⑲日本国特許庁（JP）　⑪特許出願公開

⑫公開特許公報（A）　昭62－191824

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G 02 B 27/26		8106－2H	
G 09 F 9/00	361	6731－5C	
H 04 N 13/04		6668－5C	審査請求　未請求　発明の数 1　（全6頁）

⑤4発明の名称　擬似立体表示システム

②1特　願　昭61－33145

②2出　願　昭61(1986)2月17日

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⑦4代理人　弁理士　杉山　毅至　外1名

明　細　書

1. 発明の名称

擬似立体表示システム

2. 特許請求の範囲

1. 表示画面の前方に偏光板を配置し、該偏光板の前方に強誘電性スメクチック液晶を配向させた液晶セルを配置し、前記表示画面の画像のフレーム信号に同期した交流電圧を前記液晶セルに印加して前記表示画面から前記偏光板及び前記液晶セルを通過して進行する表示光の偏光方向を時分割で切り替える駆動回路を前記液晶セルに接続し、前記表示光を視認する左眼用と右眼用の偏光方向が互いに異なる偏光眼鏡を具設したことを特徴とする擬似立体表示システム。

2. 液晶セルが0.1ないし0.15ミクロンのレターデーションを有しかつ印加電圧の極性反転による光軸の回転角度が70°ないし110°であり、光軸として採り得る2方向軸の中線と偏光板の偏光軸とが概ね一致しており、偏光眼鏡の偏光板が円偏光板または円偏光に近い偏光能を有する楕円偏光板である特許請求の範囲第1項記載の擬似立体表示システム。

3. 液晶セルが0.2ないし0.3ミクロンのレターデーションを有しかつ印加電圧の極性反転による光軸の回転角度が35°ないし55°であり、光軸として採り得る2方向軸の一方と偏光板の偏光軸とが概ね一致しており、偏光眼鏡の偏光板が直線偏光板である特許請求の範囲第1項記載の擬似立体表示システム。

4. 液晶セルが0.2ないし0.3ミクロンのレターデーションを有しかつ印加電圧の極性反転による光軸の回転角度が35°ないし55°であり、光軸として採り得る2方向軸の一方と偏光板の偏光軸とが概ね一致しており、前面に光軸が前記偏光板の偏光軸と35°ないし55°の角度をなすように四分の一波長板が配置され、偏光眼鏡の偏光板が円偏光板または円偏光に近い偏光能を有する楕円偏光板である特許請求の範囲第1項記載の擬似立体表示システム。

3. 発明の詳細な説明

〈産業上の利用分野〉

本発明は左右両眼の視差を利用した立体視テレビ等の画像表示システムに関するものである。

〈従来技術〉

3次元画像あるいは立体画像を実現しようという試みの歴史は非常に古く、その方式はレーザ・ホログラム等も含めるときわめて多種のものとなる。しかしながら、3原色フルカラーで動画を表示できる立体画像表示方式として成功しているものは、次の二方式であり、いずれも右目用と左目用の画像を個々に表示し、鑑賞者の網膜上で合成される個々の像のずれに基いて立体による視差があるかの如く鑑賞者に錯覚させ、立体画像表示を行なう方式を基本としている。

(1) 左右両眼用の画像を偏光方向が互いに90°の角度をなす直線偏光にしておき、偏光板付きの眼鏡で分離して見る。劇場用立体映画では主流の方式である。

(2) 左右両眼用の画像を交互に時分割で表示し、電子的な光バルブ機能のある眼鏡を表示の周期と同期して交互に開閉させることによって立体画像表示を行なう。

上記(1)の方式で得られる立体画像はフリッカが感じられず、また鑑賞者が着用する偏光板付きの眼鏡は軽くて安価であるなど理想に近いものである。しかし、偏光軸の異なる画像2枚を常に同時に映し出すためには2台の表示装置や映写装置が必要となり、装置の数が多くなって操作も複雑となるため、一般家庭用としては不向きである。

上記(2)の方式は、左右両眼に入る毎秒フレーム数が半分となるために、フリッカが感じられるが、1台のテレビで立体画像化が可能である点で現実的である。しかし、電子的な光バルブ機能のある眼鏡を着用しなければならない点で問題がある。すなわちこのような眼鏡は重くて長時間の使用による疲労が避けられない。その上、このような光バルブ機能のある眼鏡は高価であり、1人に1個必要となるため、鑑賞者の人数分だけ購入する場合の費用は相当に高いものとなる。

〈発明の目的〉

本発明は、一般家庭や教室など多人数で鑑賞する場合に適した時分割2画像方式の立体画像表示システムを提供することを目的として為されたもので、従来用いられている上記二つの方式のそれぞれの長所を採り入れたものである。

〈実施例〉

本発明は、テレビ画面の前面に液晶セルを配置してこれを通過する光の偏光方向を交互に時分割的に切り替え、偏光板付きの眼鏡で左右の目に分離して見ることにより、立体画像表示を実行することを特徴とする。

以下、実施例に従って詳細に説明する。第1図及び第2図はそれぞれ本発明の1実施例を示す表示システムの構成図である。図中、11はテレビであって、その画面の前には偏光板12が設けてある。さらにその偏光板12の前は液晶セル13が配置されている。液晶セル13は強誘電性スメクチック液晶をホモジニアス配向させたもので、この液晶セル13の基板の内側には透明電極が設けてある。このシステムにおいて液晶セル13は印加電圧の極性を反転することにより光軸をセルの面内で回転させることのできる光学的補償板として働く。液晶セル13の駆動回路14は、液晶セル13に印加する電圧波形を作るためのもので、画像を表示するテレビ11から送られるテレビ信号のフレーム信号に同期して液晶セル13の光軸を交互に切り替える。鑑賞者が着用する眼鏡15は、左右それぞれに偏光方向が反対の偏光板を備えている。テレビ画像の光の偏光方向を交互に切り替え、偏光板付きの眼鏡で左右の目に時分割的に分離して見ることにより左右の目が個別にテレビ画像を視認することとなり、この際にテレビ画像が左右の目で立体的視差を有して観測される。偏光の利用のしかたによっては第2図に示したように液晶セル13の前方に四分の一波長板16を設けて、液晶セル13を通過した直線偏光を略々円偏光に変換する構成としても良い。

上述のような基本構成を具体化するに当っては、偏光の種類と液晶セル13のレターデーションによって、以下に示す典型的な三方式が考えられる。

第1の方式は、第1図の構成で眼鏡15に円偏光板を用いるものである。液晶セル13は0.1ないし0.15ミクロンのレターデーションを有しかつ印加電圧の極性反転による光軸の回転角度が70°ないし110°であるものを用いる。液晶セル13は四分の一波長板として作用させるために、特にレターデーションが0.13ミクロンで光軸の回転角度が90°のものが好適である。液晶セル13と偏光板12の配置は第3図(A)に示すように液晶セル13の光軸が採り得る2つの光軸32，33の中線と偏光板12の偏光軸31とを一致または概ね一致させて設定する。テレビ画像の光は、偏光板12と液晶セル13によって円偏光となり、その偏光方向は液晶セル13に印加する電圧の極性反転によって右または左に交互に切り替えられる。

第2の方式は、第1図の構成で眼鏡15に直線偏光板を用いるものである。液晶セル13は0.2ないし0.3ミクロンのレターデーションを有し、かつ印加電圧の極性反転による光軸の回転角度が35°ないし55°であるものを用いる。液晶セル13は二分の一波長板として作用させるために、特にレターデーションが0.25ミクロンで光軸の回転角度が45°のものが好適である。液晶セル13と偏光板12の配置は第3図(C)に示したように液晶セル13の光軸が採り得る2つの光軸32，33の一方と該偏光板12の偏光軸31とを一致または概ね一致させて設定する。四分の一波長板16の光軸36は、偏光板12の偏光軸に対して略々45°の角度をなすように設置する。テレビ画像の光は偏光板12と液晶セル13と四分の一波長板16によって円偏光となり、その偏光方向は液晶セル13に印加する電圧の極性反転によって右または左に交互に切り替えられる。

以上詳述した3方式において、液晶セル13のレターデーション、光軸の回転角度もしくは設定角度または四分の一波長板16のレターデーションもしくは光軸の設定角度あるいは眼鏡15の偏光板の角度設定などは、最適設計のためにここに記した条件からずらしてもよい。

第3の方式は、第2図の構成で眼鏡15に円偏光板を用いるものである。液晶セル13は、0.2ないし0.3ミクロンのレターデーションを有し、かつ印加電圧の極性反転による光軸の回転角度が35°ないし55°であるものを用いる。液晶セル13は二分の一波長板として作用させるために、特にレターデーションが0.25ミクロンで光軸の回転角度が45°のものが好適である。液晶セル13と偏光板12の配置は第3図(B)に示したように液晶セル13の光軸が採り得る2つの光軸32，33の一方と該偏光板12の偏光軸31とを一致または概ね一致させて設定する。テレビ画像の光は偏光板12と液晶セル13によって直線偏光となって透過し、その偏光方向は液晶セル13に印加する電圧の極性反転によって直交する2方向に交互に切り替えられる。眼鏡15に取り付ける2枚の直線偏光板の偏光軸34，35の設定角度は、片方をテレビ画面側の偏光板12の偏光軸と一致させ、他方はそれと直交する角度に設定する。

強誘電性スメクチック液晶セルは、本発明の実施には非常に好適である。すなわち、数十ないし数百マイクロ秒の高速応答に充分耐えることができ、また液晶セル13の平面内だけで光軸の方向が動くことさらにスイッチング状態にメモリー効果を有することなど他の液晶セルにはない種々の優れた特性がある。

以下この強誘電性スメクチック液晶セルの動作原理について説明する。

強誘電性を示すキラル・スメクチック液晶を利用したこの光スイッチング素子は、N.A.ClarkとS.T.Lagerwallによって、アプライド フィジックス レターズ（第36巻、第899頁、1980年刊）に公表され、サーフェイス スタビライズド フェロエレクトリック リクイド クリスタルと命名されている。第4図(A)は電界を印加した時のこの液晶セルの断面を示したもので、1はガラス基板、2は透明電極、3は液晶分子である。セル内部の電界は図中の上から下に向かっている。この電界に対して、液晶分子3の双極子は矢印の

ように配列する。第4図(B)はこの状態の分子配向をセル面に垂直な方向から見た図であるが、液晶分子3はその配列格子面の垂線から角度θだけ傾いている。次に、印加電界の極性を反転すると第5図(A)に示したように液晶分子3の双極子は矢印のように反転し、第5図(B)に示したように液晶分子3は角度$-\theta$の方向にその方位角を変える。

この液晶セルの結晶光学的な性質は、実用上分子長軸の配向方向を光軸とする1軸性結晶と考えてよい。すなわち、この液晶セルは印加電圧の極性を反転することによって光軸を角度2θだけ回転させることのできる光学的補償板と見なすことができる。なお、この光軸の回転はスメクチック層の法線の回りに対称であり、またこの液晶セルのレターデーションは、液晶の複屈折Δnとセル厚dの積$\Delta n \cdot d$で表わされる。

液晶分子の傾き角θは液晶材料によって異なるが、第1の方式に適用するためには、2θが90°であることが望ましいのでθが45°の材料が好適であり、第2及び第3の方式に適用するためには、2θが45°であることが望ましいのでθが22.5°の材料が好適である。しかし、θがこれらの条件から±10°程度の範囲でずれていても実用上差し支えない。

この液晶セルは、オンオフスイッチング状態にメモリー効果を示す。すなわち、第6図に示したように正負のパルス状の電界によってスイッチングした後に電圧を0Vにしてもそれぞれの分子配向状態が略々保持される。この液晶セルの応答時間τは、前述の文献によれば、

$$\tau \propto \eta / (Ps \cdot E)$$

(ここに、η, Ps, Eは、それぞれ液晶材料の粘度、自発分極、電界強度をあらわす。)という式で表わされており、高速スイッチングをさせるためには強い電界ほど有利である。この液晶セルに印加する電圧は、テレビ画面の切り替え速度よりも速く、また左右の目に正しく画面が送られるように位相が制御されておれば良く、種々の波形が考えられる。最も単純な波形は矩形波である。

さらに、メモリ効果を活用して省電力化と液晶セルの長寿命化を計るならば、第7図に示したような波形でもよい。この波形は、期間t_{71}や期間t_{73}の波高値の高い電圧で高速スイッチングさせ、その後の期間t_{72}と期間t_{74}はメモリ効果を利用して分子配向をその状態に保持するために必要な電圧を印加するものである。さらに、二つのスイッチング速度を等しくし、メモリ効果の保持特性を向上する目的で、印加電圧波形に直流のオフセット電圧を重畳してもよい。

〈発明の効果〉

本発明に係る時分割2画像方式の立体画像表示システムは、装置構成が簡単であり鑑賞者が着用する眼鏡が軽い、安価であるなどの利点があるため、一般家庭や教室などで容易に使用することができ、実用性がきわめて高い。

4. 図面の簡単な説明

〈図面の簡単な説明〉

第1図及び第2図は本発明の1実施例を示す表示システムの概式構成図である。

第3図は第1図及び第2図に示す光学系の光軸および偏光軸の角度設定を示す説明図である。

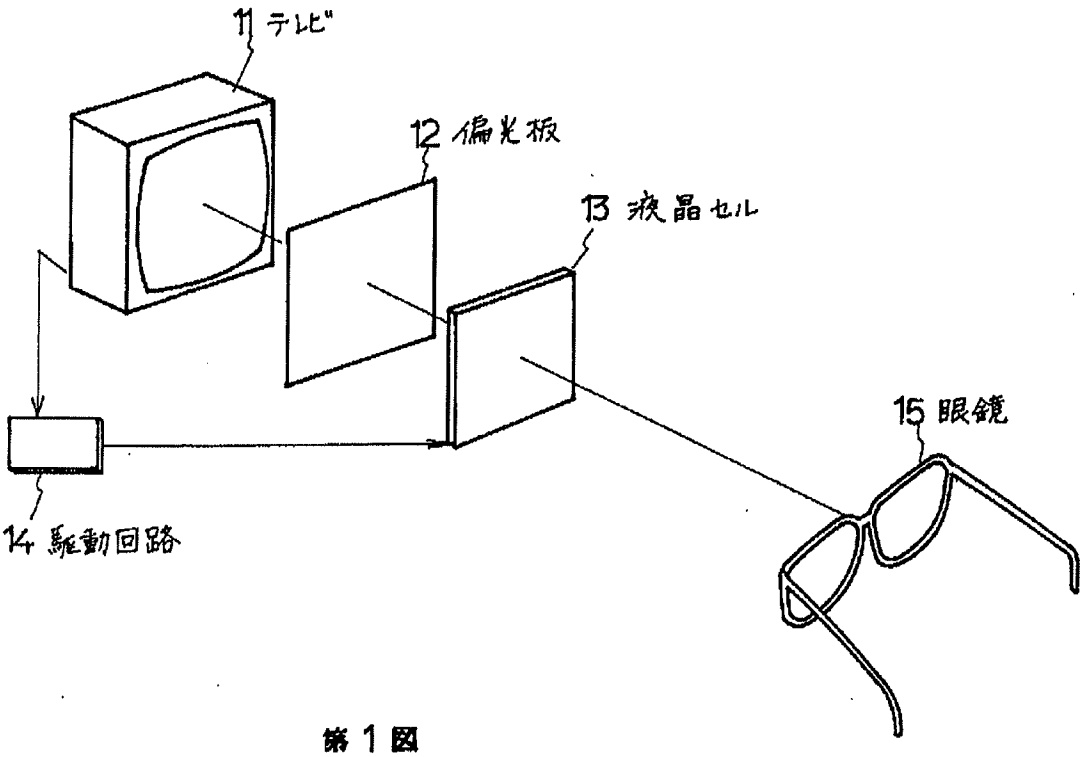
第4図及び第5図は本発明の1実施例に用いる液晶セルの動作原理を説明する説明図である。

第6図は本発明の1実施例に用いる液晶セルのメモリー効果を示す説明図である。

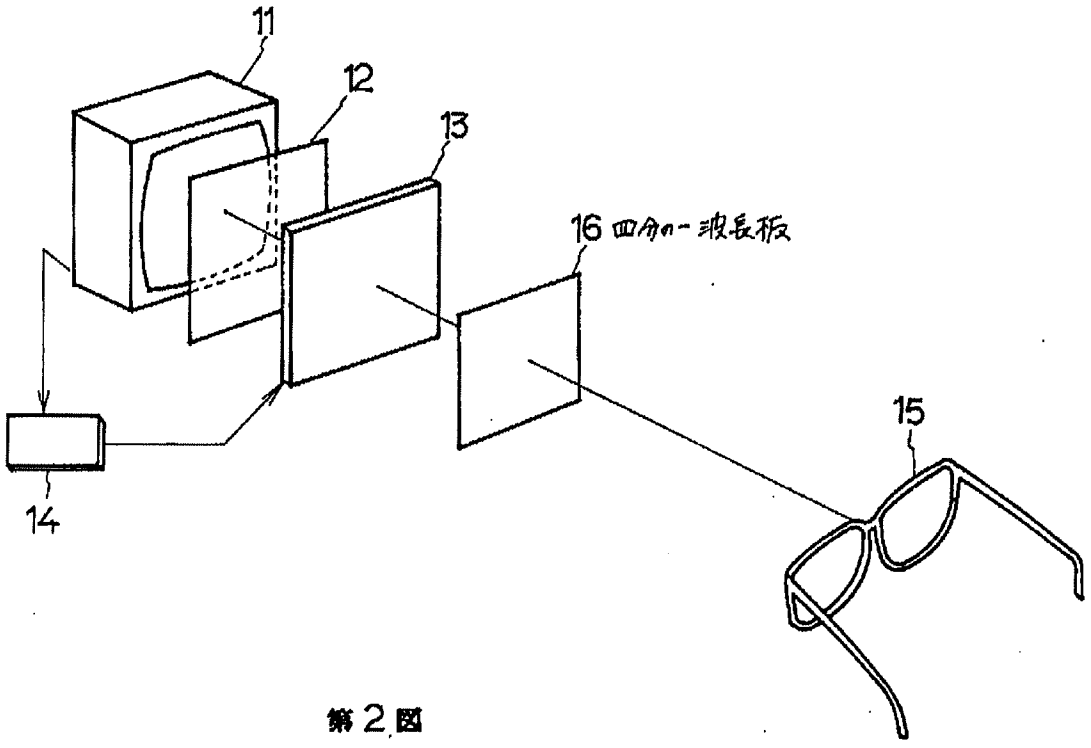
第7図は液晶セルに印加する電圧波形の例である。

11…テレビ、 12…偏光板、 13…液晶セル、 14…駆動回路、 15…眼鏡、 16…四分の一波長板、 31…偏光板12の偏光軸、 32, 33…液晶セルの採り得る光軸、 34…眼鏡の片側の偏光軸、 35…眼鏡の他の片側の偏光軸、 36…四分の一波長板の光軸。

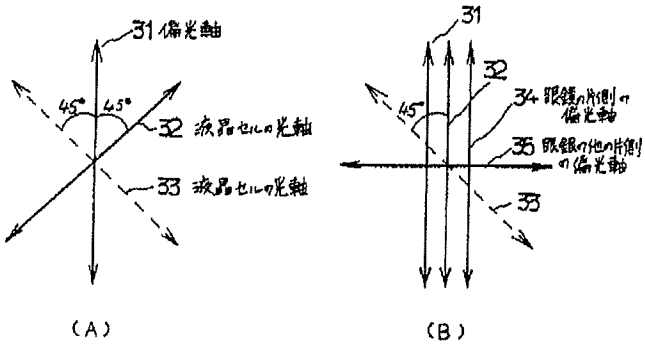
代理人 弁理士 杉山毅至(他1名)

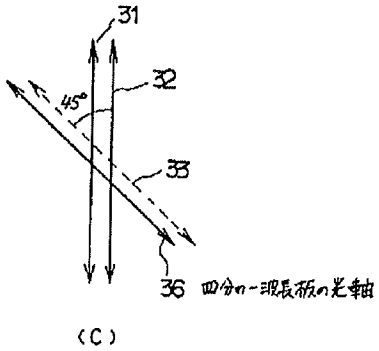


第1図

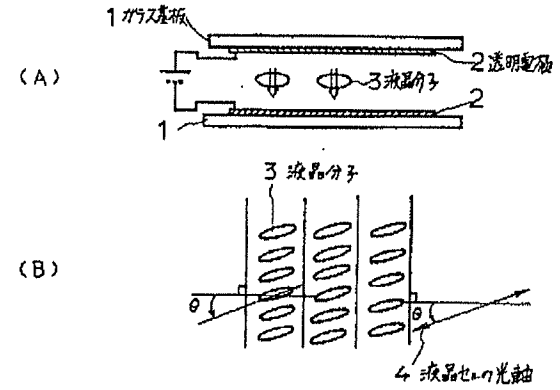


第2図

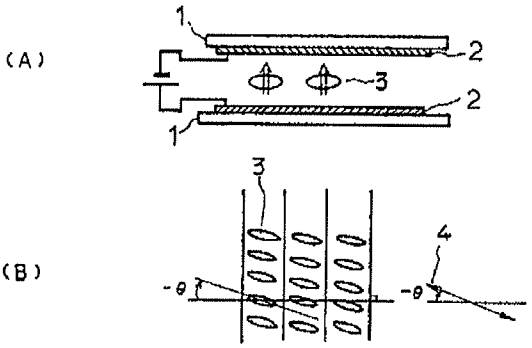




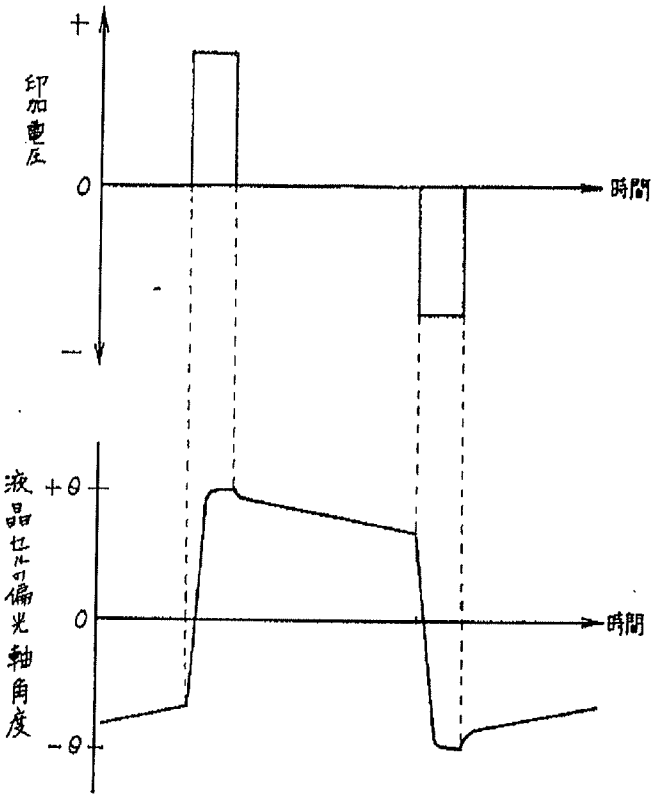
第3図



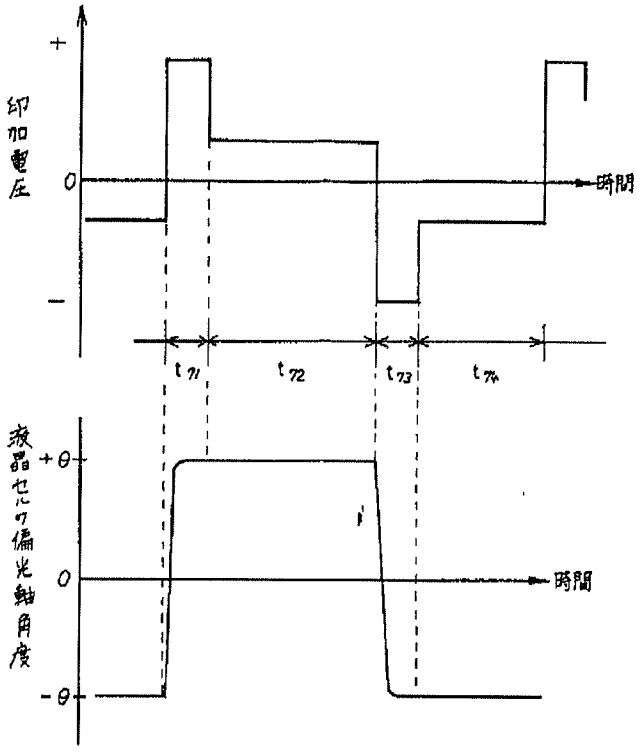
第4図



第5図



第6図



第7図

PATENT ABSTRACTS OF JAPAN

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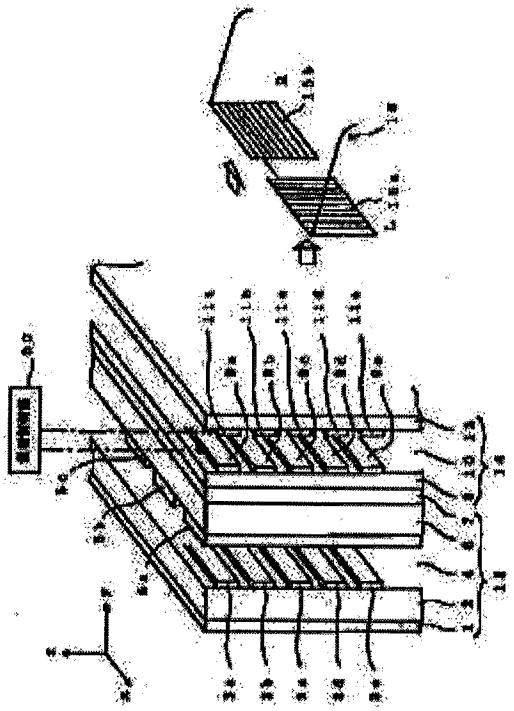
G02F 1/13

(21)Application number : 04-070208
(22)Date of filing : 20.02.1992

(71)Applicant : RICOH CO LTD
(72)Inventor : KATO IKUO

(54) DISPLAY DEVICE

(57)Abstract:
PURPOSE: To make a stereoscopic display by time division and to reduce crosstalk between images of a left and a right eye.
CONSTITUTION: When a screen is scanned with scanning lines and display light is emit from a display unit 13, a polarized light control unit 4 controls the polarizing direction of the display light from the display unit 13. Namely, the polarized light control unit 14 drives couples of electrodes 9a and 11a, 9b and 11b, 9c and 1c, 9d and 11d, and 9e and 11e, provided corresponding to the scanning lines of the display unit 13, under the control from an electrode control part 50 in synchronism with the scanning of the scanning lines, and consequently the polarizing directions for the left and right eyes is performed by the time division.



(19)日本国特許庁（ＪＰ）　(12)**公開特許公報（Ａ）**　(11)特許出願公開番号

特開平5－232403

(43)公開日　平成５年(1993)９月10日

(51)Int.Cl.[5]	識別記号	庁内整理番号	ＦＩ	技術表示箇所
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Ｇ０２Ｆ　1/13	５０５	8806－2K		

審査請求　未請求　請求項の数６(全 13 頁)

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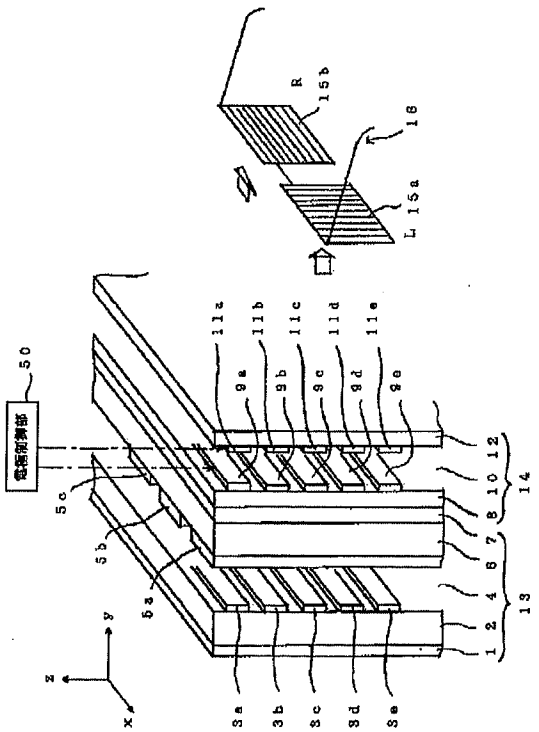
(74)代理人　弁理士　植本　雅治

(54)【発明の名称】　表示装置

(57)【要約】
【目的】　時間的な分割によって立体表示を行なわせるときにも、左眼と右眼との間で画像のクロストークを低減させることが可能である。
【構成】　画面を走査線により走査して表示ユニット１３から表示光が出射すると、偏光制御ユニット１４は、表示ユニット１３からの表示光に対し、その偏光方向を制御する。すなわち、偏光制御ユニット１４は、電極制御部５０からの制御に基づき、表示ユニット１３の走査線に対応して設けられた一対の電極９ａ，１１ａ；９ｂ，１１ｂ；９ｃ，１１ｃ；９ｄ，１１ｄ；９ｅ，１１ｅを表示ユニット１３の走査線の走査と同期させて駆動し、これにより、左眼，右眼用の偏光方向の制御を時分割で行なう。



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【特許請求の範囲】

【請求項１】　画面を走査線により走査して表示光を出射する表示ユニットと、該表示ユニットからの表示光に対し、その偏光方向を制御する偏光制御ユニットとを備え、前記偏光制御ユニットは、前記表示ユニットの走査線に対応して設けられた偏光方向制御手段と、該偏光方向制御手段に対し駆動制御を行なう駆動制御手段とを有しており、前記駆動制御手段は、表示ユニットの走査線の走査と同期させて、該走査線に対応した偏光方向制御手段を駆動するようになっていることを特徴とする表示装置。

【請求項２】　請求項１記載の表示装置において、前記表示ユニットは、液晶ディスプレイであることを特徴とする表示装置。

【請求項３】　請求項１記載の表示装置において、前記偏光方向制御手段は、対向する電極と、これらの電極間に設けられている電気光学効果をもつ物質層とを有し、前記電極の一方は、表示ユニットの全走査線に共通のものとなっていることを特徴とする表示装置。

【請求項４】　請求項１記載の表示装置において、前記駆動制御手段は、表示ユニットの画面ごとに表示光の偏光方向を切り換えるよう前記偏向方向制御手段を制御するようになっていることを特徴とする表示装置。

【請求項５】　請求項１記載の表示装置において、前記駆動制御手段は、一画面内において走査線ごとに表示光の偏光方向を切り換えるように、また、最初の画面と次の画面とで、同じ走査線に対する表示光の偏光状態が異なるように、前記偏光方向制御手段を制御するようになっていることを特徴とする表示装置。

【請求項６】　請求項１記載の表示装置において、前記偏光方向制御手段にはさらに、カラーフィルタおよび／またはブラックマトリックスが設けられていることを特徴とする表示装置。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】本発明は、コンピュータ用の３次元表示や３次元テレビ受信機，人工現実感装置などに利用される表示装置に関する。

【０００２】

【従来の技術】従来、表示ユニットとしてＣＲＴディスプレイを用い、また、左眼と右眼とに互いに直交する異なる検出子（偏光子）をもつメガネを設けて、左右眼に異なる画像を表示させ、画像の立体表示を行なう表示装置が知られている。この種の表示装置としては、例えば特開平３－１２０５１７号に開示されているように空間的な分割によって、１つの画面を左右眼用に分割して立体表示を行なわせるものと、例えば文献「テレビジョン学会誌　Ｖｏｌ．１４３，ＮＯ．８，１９８９，第７６３頁」に開示されているように時間的な分割によって、１つの画面を左右眼用に分割して立体表示を行なわせるものとがある。

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【０００３】空間的な分割によって１つの画面を左右眼用にそれぞれ分割して立体表示しようとする場合には、左眼用Ｌと右眼用Ｒとで空間的に異なる画素が用いられるので、左眼と右眼との間で画像のクロストークは存在しないが、実質的な（すなわち有効な）画素が半分になるという問題がある。

【０００４】一方、時間的な分割によって１つの画面を左右眼用にそれぞれ分割して立体表示する装置では、人間の眼が６０Ｈｚ程度でフリッカが目立たなくなるのを利用して、同一の画素を時間的に交互に（通常は１００～１２０Ｈｚで交互に）左眼用Ｌ，右眼用Ｒとして切り換えるようになっている。従って、この場合には、左眼用Ｌと右眼用Ｒとで同一の画素を共用することができ、空間的な分割による上記の問題を回避することが可能となる。

【０００５】

【発明が解決しようとする課題】しかしながら、時間的な分割によって立体表示を行なわせる上述の文献に開示の装置では、ＣＲＴディスプレイの画面前面で，あるいは画面を上下に２分割して、画面をステレオシャッタで左眼用Ｌ，右眼用Ｒと時間的に切り換えているので、左眼と右眼との間で後述のように画像のクロストークが生じるという問題があり、またシャッタ切り換えにより輝度が低くなるという問題があった。

【０００６】本発明は、時間的な分割によって、立体表示を行なわせるときにも、左眼と右眼との間で画像のクロストークを低減させることの可能な表示装置を提供することを目的している。

【０００７】

【課題を解決するための手段】上記目的を達成するために、請求項１記載の表示装置は、画面を走査線により走査して表示光を出射する表示ユニットと、該表示ユニットからの表示光に対し、その偏光方向を制御する偏光制御ユニットとを備え、偏光制御ユニットは、表示ユニットの走査線に対応して設けられた偏光方向制御手段と、該偏光方向制御手段に対し駆動制御を行なう駆動制御手段とを有し、駆動制御手段は、表示ユニットの走査線の走査と同期させて、該走査線に対応した偏光方向制御手段を駆動するようになっていることを特徴としている。

【０００８】請求項２記載の表示装置では、上記表示ユニットが、液晶ディスプレイであることを特徴としている。

【０００９】請求項３記載の表示装置では、上記偏光方向制御手段が、対向する電極と、これらの電極間に設けられている電気光学効果をもつ物質層とを有し、前記電極の一方は、表示ユニットの全走査線に共通のものとなっていることを特徴としている。

【００１０】請求項４記載の表示装置では、上記駆動制御手段が、表示ユニットの画面ごとに表示光の偏光方向

を切り換えるよう偏向方向制御手段を制御するようになっていることを特徴としている。

【００１１】請求項５記載の表示装置では、上記駆動制御手段が、一画面内において走査線ごとに表示光の偏光方向を切り換えるように、また、最初の画面と次の画面とで、同じ走査線に対する表示光の偏光状態が異なるように、偏光方向制御手段を制御するようになっていることを特徴としている。

【００１２】請求項６記載の表示装置では、上記偏光方向制御手段にさらに、カラーフィルタおよび／またはブラックマトリックスが設けられていることを特徴としている。

【００１３】

【作用】画面を走査線により走査して表示ユニットから表示光が出射すると、偏光制御ユニットは、表示ユニットからの表示光に対し、その偏光方向を制御する。すなわち、偏光制御ユニットは、前記表示ユニットの走査線に対応して設けられた偏光方向制御手段を表示ユニットの走査線の走査と同期させて駆動し、これにより、左眼，右眼用の偏光方向の制御を時分割で行なう。

【００１４】

【実施例】以下、本発明の実施例を図面に基づいて説明する。図１は本発明に係る表示装置の第１の実施例の構成図である。図１の表示装置は、表示ユニット１３と、表示ユニット１３からの表示光に対しその偏光方向を制御する偏光制御ユニット１４とを有している。

【００１５】この実施例では、表示ユニット１３には、アクティブ・マトリックスの液晶ディスプレイが用いられており、この表示ユニット１３は、ｚ方向の偏光のみを通過させる偏光子１，７と、基板ガラス２，６と、走査電極３ａ，３ｂ，３ｃ，３ｄ，３ｅと、ＴＮ液晶層４と、信号線５ａ，５ｂ，５ｃとを有している。

【００１６】また、偏光制御ユニット１４は、基板ガラス８，１２と、表示ユニット１３の各走査電極３ａ，３ｂ，３ｃ，３ｄ，３ｅにそれぞれ対応させて走査方向に平行に分割されて設けられた一対の電極９ａ，１１ａ；９ｂ，１１ｂ；９ｃ，１１ｃ；９ｄ，１１ｄ；９ｅ，１１ｅと、液晶層１０と、一対の各電極への印加電圧を制御する電極制御部５０とを有している。

【００１７】また、この実施例の表示装置は、左眼と右眼とに互いに直交する異なる検出子（偏光子）１５ａ，１５ｂをもつ偏光メガネ１６を用いるようになっている。

【００１８】図２（ａ），（ｂ），（ｃ）は上記表示ユニット１３および偏光制御ユニット１４の基本的な機能を説明するための図である。表示ユニット１３において、偏光子１は、ｚ方向の偏光のみを透過させ、これをＴＮ液晶層４に与えるようになっている。この場合、走査線３と信号線５との間に電圧が印加されていない画素のＴＮ液晶部分は、図２（ａ）に示すように、偏光子１から透過光の偏光方向を９０°回転しｘ方向の偏光にして偏光子７に与える。しかしながら、偏光子７はｚ方向の偏光のみを透過させるので、表示ユニット１３は、走査線３と信号線５との間に電圧が印加されていない画素については、偏光子７から表示光として透過させない。信号線５との間に電圧が印加された画素のＴＮ液晶は、図２（ｂ），または図２（ｃ）に示すように、偏光子１からの透過光の偏光方向を変化させないで、これを偏光子７に与える。すなわち偏光子１からのｚ方向の偏光をそのままの偏光状態で偏光子７に与える。偏光子７はｚ方向の偏光のみを透過させるので、表示ユニット１３は、走査線３と信号線５との間に電圧が印加された画素については、偏光子７から表示光として透過させることができる。さらに、偏光子７，すなわち表示ユニット１３を透過した表示光は、偏光制御ユニット１４によって、左眼用Ｌ，右眼用Ｒの制御，すなわち偏光方向の制御がなされ、左眼に画像情報を表示させる場合には、偏光制御ユニット１４の一対の電極，例えば９ａ，１１ａ間に電圧を印加する。これにより、図２（ｂ）に示すように、表示ユニット１３からのｚ方向に偏光した表示光を、偏光方向を変化させずにそのままの状態で偏光制御ユニット１４を透過させ、メガネ１６の偏光子１５ａを介し、左眼に入射させることができる。一方、右眼に画像情報を表示させる場合には、偏光制御ユニット１４の一対の電極，例えば９ａ，１１ａ間に電圧を印加しない。これにより、図２（ｃ）に示すように、表示ユニット１３からのｚ方向に偏光した表示光の偏光方向を液晶層１０において９０°回転してｘ方向に変化させて偏光制御ユニット１４を透過させ、メガネ１６の偏光子１５ｂを介し、右眼に入射させることができる。

【００１９】ところで、この第１の実施例では、偏光制御ユニット１４の電極制御部５０は、１画面ごとに偏光方向の切換え，すなわち左眼用Ｌ，右眼用Ｒの切換えが交互になされるよう電極対９ａ，１１ａ；９ｂ，１１ｂ；９ｃ，１１ｃ；９ｄ，１１ｄ；９ｅ，１１ｅの駆動制御を行なうようになっている。すなわち、右眼用Ｒの画面では、この１画面中、全ての電極対の駆動は行なわないようになっている。また、左眼用Ｌの画面では、１走査線ごとにこれに対応して設けられている各電極対９ａ，１１ａ；９ｂ，１１ｂ；９ｃ，１１ｃ；９ｄ，１１ｄ；９ｅ，１１ｅを時分割で順次に駆動するようになっている。

【００２０】次にこのような構成の表示装置の動作について説明する。図３には、表示ユニット１３の走査電極の駆動例が示されている。図３を参照すると、最初の画面において走査線，すなわち走査電極は、左眼用Ｌの画像として３ａ，３ｂ，３ｃ，３ｄ，３ｅの順にパルス電圧印加によって駆動され、次の画面においては、右眼用Ｒの画像として３ａ，３ｂ，３ｃ，３ｄ，３ｅの順にパルス電圧印加によって駆動される。なお、表示ユニット

１３がアクティブ・マトリックス液晶ディスプレイであって、各走査線３ａ，３ｂ，３ｃ，３ｄ，３ｅにパルス電圧を印加した後もコンデンサ効果により実効的な電圧が電極間に印加される駆動では（図３の破線部参照）、パルス電圧が印加された後、次の画面における走査が始まるまでの間もＴＮ液晶層４には電圧が印加されている。すなわち、次の画面における走査が始まる直前まで表示光を透過させており、これが表示光の輝度に大きく関与している。実際のアクティブ・マトリックス駆動では、さらに２つ以上のフィールドに分割して駆動するなどしているが、ここでは、簡単のため、図３のように、ＴＮ液晶層４の偏光方向を変化させるのに必要なパルス電圧，または実効的な電圧の２つだけが走査線に印加されるとする。また、このとき、ＴＮ液晶層４は、印加電圧にほぼ比例した偏光作用を示すと考える。

【００２１】図３のように、走査線３ａ，３ｂ，３ｃ，３ｄ，３ｅを、左眼用Ｌの画像表示用に順次に駆動し、次いで、右眼用Ｒの画像表示用に順次に駆動するときに、先づ、図４Ａに示すように、全ての走査線３ａ，３ｂ，３ｃ，３ｄ，３ｅに対する偏光制御ユニット１４の各電極対９ａ，１１ａ；９ｂ，１１ｂ；９ｃ，１１ｃ；９ｄ，１１ｄ；９ｅ，１１ｅの全てに、（ア）の時期に同時にパルス電圧を印加する場合を考える。なお、この際、各電極対９ａ，１１ａ；９ｂ，１１ｂ；９ｃ，１１ｃ；９ｄ，１１ｄ；９ｅ，１１ｅにおいても、各走査線３ｂ，３ｃ，３ｄ，３ｅにおけるのと同様に、パルス電圧を印加した後もコンデンサ効果により実効的な電圧が電極間にも印加されるようになっている（図４Ａの破線部分）。

【００２２】図４Ａのような制御の仕方では、走査線３ａの表示については、左右の画像を完全に分離することができるが、走査線３ａ以外の走査線については、３ｂ，３ｃ，３ｄ，３ｅの順に左右の画像クロストークが大きくなり、立体視が不可能となる。例えば、走査線３ｅに着目すると、図３に示すように、（オ）の時期のパルス電圧による左眼表示用の表示光は、（オ）から（ケ）の時期まで表示ユニット１３から透過する。一方、図４Ａを参照すると、走査線３ｅに対応した電極対９ｅ，１１ｅは、（ア）から（オ）の時期まで駆動されるが、（カ）から（コ）までの期間は駆動されない。換言すれば、偏光制御ユニット１４の電極対９ｅ，１１ｅは、（ア）から（オ）の時期までは、表示ユニット１３からの透過光をｚ方向の偏光状態でメガネ１６に向けて出射させる一方、（カ）から（コ）までの期間は、表示ユニット１３からの透過光をｘ方向の偏光状態でメガネ１６に向けて出射させる。この結果、走査線３ｅの左眼用Ｌの画像は（オ）の時期では左眼に入射するが、（カ）から（ケ）までの時期では右眼に入射してしまう。すなわち、本来左眼に表示されるべき画像のほとんどが右眼に表示されてしまう。このようなクロストークは、走査線数が増加すればするほど、増加し、このときには、複雑な画像の立体表示が困難となる。なお、図４Ａのような制御の仕方は、前述した従来技術に対応したものとなっており、ディスプレイの画面全面で左眼用Ｌ，右眼用Ｒと時間的に切り換える制御となっている。

【００２３】これに対し、第１の実施例の表示装置では、偏光制御ユニット１４の電極制御部５０は、例えば、図４Ｂに示すように、各走査線３ａ，３ｂ，３ｃ，３ｄ，３ｅの駆動順序に対応させて各電極対９ａ，１１ａ；９ｂ，１１ｂ；９ｃ，１１ｃ；９ｄ，１１ｄ；９ｅ，１１ｅを時分割で順次に駆動制御する。すなわち、電極対９ａ，１１ａには、走査線３ａへのパルス電圧印加と同期させてパルス電圧を印加し、また、電極対９ｅ，１１ｅには走査線３ｅへのパルス電圧印加と同期させてパルス電圧を印加するというように制御する（この場合、表示部分と同じ２端子または３端子等のアクティブ駆動となる）。このような制御の仕方では、表示ユニット１３から左眼用Ｌ，右眼用Ｒとして出射された表示光を、ほとんどクロストークさせずに、左眼，右眼にそれぞれ入射させることができる。例えば、走査線３ｂの着目すると、図３に示すように、（イ）の時期のパルス電圧による左眼表示用の表示光は、（イ）から（カ）の時期まで表示ユニット１３から透過する。一方、図４Ｂを参照すると、走査線３ｂに対応した電極対９ｂ，１１ｂも、（イ）から（カ）の時期まで駆動される。これにより、（イ）から（カ）までの走査線３ｂ駆動の全時間を通じて、表示ユニット１３からの透過光をｚ方向の偏光状態でメガネ１６に向けて出射させ、その全てを左眼のみに入射させることができて、クロストークは生じない。他の走査線，例えば３ｅについて同様にして、（オ）から（ケ）までの走査線３ｅ駆動の全期間を通じて、表示ユニット１３からの透過光をｚ方向の偏光状態でメガネ１６に向けて出射させ、その全てを左眼のみに入射させることができて、この場合にもクロストークは生じない。

【００２４】このように図４Ｂの制御の仕方では、全ての走査線３ａ，３ｂ，３ｃ，３ｄ，３ｅの表示について、左右の画像をほぼ完全に分離することができて、表示ユニット１３から左眼用Ｌ，右眼用Ｒにそれぞれ出射された表示光をほとんどクロストークすることなく左眼，右眼にそれぞれ入射させ、表示することができる。なお、図４Ｂの制御例において、各走査線の駆動と偏光制御ユニット１４の各電極対の駆動との間の同期は、液晶層４と１０とに同じものが用いられる場合には、走査線駆動用の電源からの各電圧を単に各電極対に入力させるように電極制御部５０を構成することによって達成される。また、液晶層４と１０との間に応答速度や偏光度の制御性等の相違がある場合には、電極制御部５０としては、液晶層４との相違に基づき、液晶層１０の駆動タイミングを適宜に調節する構成のものを用いる必要があ

る。

【００２５】また、電極制御部５０は、必ずしも図４Ｂのように液晶層１０をアクティブ駆動する必要はなく、例えば図４Ｃのように、ある走査線が反対の眼に対応した次の画像表示を行なう直前まで、液晶層１０に電圧を印加するように構成されていても良い。また、この場合の方が偏光制御ユニット１４をより簡単に構成することができる。

【００２６】また、上述の例では、偏光制御ユニット１４の電極対は、表示ユニット１３における１本の走査線に対応させて走査線ごとに分割されており、従って、走査線数と同じ個数の電極対が設けられており、左右眼のクロストークを生じさせないためにはこれが最も望ましいが、走査線の本数が多いときには、偏光制御ユニット１４の電極対を２本以上の複数本の走査線に対応させて分割し、複数本の走査線に同期させて１つの電極対を駆動するようにしても良い。この場合にも、クロストークの比較的少ない画像表示が可能である。

【００２７】また、上記例において表示ユニット１３として用いられた液晶ディスプレイは、その多くが液晶の電気光学効果を利用しており、偏光方向の制御によるシャッター効果を利用するものは、表示光の偏光方向がｘ方向かｚ方向に予めなっているものが多く、ＣＲＴ前面に新たに偏光子を設ける必要がないため（すなわち、これによる光量の低下が全くないため）、偏光を利用した立体表示に向いている。もちろん、表示ユニット１３にＣＲＴディスプレイ等を用いる場合においても、偏光制御ユニット１４を設け、走査線ごとに対応させて偏光制御ユニット１４の電極対を駆動することにより、偏光方向を変化させることができ、クロストークを減少させることが可能である。ただし、ＣＲＴの表示面は曲面であるので、偏光制御ユニット１４の各電極との間で位置ずれが生じやすい。この位置ずれを防止するためには、偏光制御ユニット１４にプラスティックフィルムＬＣＤ等を用いるのが良く、これにより、走査線１本１本に対応した偏光方向制御ユニット１４を簡単に作製することができる。

【００２８】図５は本発明に係る表示装置の第２の実施例の構成図である。なお、図５において、図１と同様の箇所には同じ符号を付している。この第２の実施例の表示装置では、偏光制御ユニット２４には、電極対の一方の電極に、表示ユニット１３全面と同じ大きさをもち、かつ表示ユニット１３の全走査線３ａ，３ｂ，３ｃ，３ｄ，３ｅに共通な１枚の透明電極１７が設けられている。表示ユニット１３としての液晶ディスプレイは、走査線３ａ，３ｂ，３ｃ，３ｄ，３ｅごとに時分割されて駆動されるので、偏光制御ユニット２４としては、信号線５の方向に電圧を印加する部分を分割する必要はない。すなわち、液晶層１０を挟む２つの電極のうちの一方を全面に共通のものとしても問題はない。これにより、第１の実施例に比べ、偏光制御ユニットの構造をより簡単なものにすることができる。なお、図５においては、全面に共通な電極を表示ユニット１３側に設けたが、これを観察者側に設けても良い。

【００２９】図６は本発明に係る表示装置の第３の実施例の構成図である。この第３の実施例の表示装置では、偏光制御ユニット１４の観測者側に、Ｒ，Ｇ，Ｂに相当するカラーフィルタ３２と、ブラックマトリックス３３とが設けられている。このように、カラーフィルタ３２と、ブラックマトリックス３３とを設けることにより、カラーの立体表示を行なわせることが可能となる。なお、カラーフィルタ３２とブラックマトリックス３３とのいずれか一方が設けられている場合にも、カラーの立体表示が可能である。また、カラーフィルタ３２やブラックマトリックス３３を例えば表示ユニット１３の電極５ａ，５ｂ，５ｃと基板ガラス６との間に設けることも考えられる。しかしながら、表示部分としての表示ユニット１３にカラーフィルタやブラックマトリックスを設けるときには、表示光をその後、偏光制御ユニット１４に通過させるので、表示画像のコントラストが低下したり、また液晶層１０等の電気光学効果を有する材料の影響によって、もとのカラーフィルタといくらか異なる色が表示されることがある。従って、カラーフィルタ３２またはブラックマトリックス３３は、図６に示したように、偏光制御ユニット１４の一部に設けられるのが良く、最良には、観測者に近い側に設けられるのが良い。この場合には、偏光制御ユニット１４の液晶層１０等の影響を受けず、コントラストに優れた色再現性の高い立体表示が可能となる。なお、図６の例は、図１の表示装置の偏光制御ユニット１４にカラーフィルタ３２，ブラックマトリックス３３をさらに付加した構成となっているが、これらを図５の構成の表示装置の偏光制御ユニット２４に付加することももちろん可能であり、この場合にも、上述したと同様にカラーの立体表示が可能となる。

【００３０】上述の各実施例では、偏光制御ユニット１４，または２４の電極制御部５０は、各電極対への印加電圧を制御することで、表示ユニット１３からの表示光の偏光方向を最初の画面と次の画面とで左眼用Ｌ，右眼用Ｒに切り換え制御していた。すなわち、例えば図１の構成において、電極制御部５０は、図３，図４Ｂに示したように、最初の画面では、表示ユニット１３の各走査線に対応させて偏光制御ユニット１４の各電極対を時分割で順次に駆動し、表示光の偏光状態をｚ方向にして左眼に入射させ、これにより１画面分の左眼用Ｌの画像表示を行ない、次いで、次の画面では、偏光制御ユニット１４の各電極対を駆動せず、各走査線に対応させて表示光の偏光状態をｘ方向にして右眼に入射させ、これにより１画面分の右眼用Ｒの画像表示を行なっていた。

【００３１】これに対し、一画面内において、各走査線

ごとに左眼用Ｌ，右眼用Ｒの偏光制御を交互に行なうように偏光制御ユニット１４，または２４の電極制御部５０を構成することもできる。すなわち、最初の画面では、走査線ごとにＬ，Ｒ，Ｌ，Ｒ，…の順で切り換え制御がなされ、次の画面では、走査線ごとに、最初の画面とは、反対にＲ，Ｌ，Ｒ，Ｌ，…の順で切り換え制御がなされるよう電極制御部５０を構成することもできる。図７には、この場合に、走査線に印加した電圧が、左右どちらの画像情報によるものであるかが示されており、図７では、簡単のため、走査線数を６本とし、６０Ｈｚの通常の走査がなされるとしている。

【００３２】図７の例に基づき、上記制御動作例を説明する。先づ、最初の画面では、（ア），（イ），（ウ），（エ），（オ），（カ）の各時期に、パルス電圧印加により、各走査線３ａ，３ｂ，３ｃ，３ｄ，３ｅ，３ｆを順次に駆動し、ｚ方向に偏光した表示光を出射させる。この際、偏光制御ユニット１４，または２４の電極制御部５０では、奇数番目の走査線３ａ，３ｃ，３ｅに対応する表示光については、左眼用Ｌにｚ方向に偏光して、これを偏光メガネ１６から左眼に入射させる。また、偶数番目の走査線３ｂ，３ｄ，３ｆに対応する表示光については、右眼用Ｒにｘ方向に偏光して、これを偏光メガネ１６から右眼に入射させるように、偏光制御ユニット１４の各電極を制御する。このようにして、最初の画面では、各３ａ，３ｂ，３ｃ，３ｄ，３ｅ，３ｆに対応した表示光を、この順序で、左眼，右眼，左眼，右眼，左眼，右眼と交互に順次に入射させることができる。

【００３３】最初の画面についての表示を終了後、次の画面では、（キ），（ク），（ケ），（コ），（サ），（シ）の各時期に、同様にして、パルス電圧印加により、各走査線３ａ，３ｂ，３ｃ，３ｄ，３ｅ，３ｆを順次に駆動し、ｚ方向に偏光した表示光を出射させる。この際、偏光制御ユニット１４の電極制御部５０では、奇数番目の走査線３ａ，３ｃ，３ｅに対応する表示光については、右眼用Ｒにｘ方向に偏光して、これを偏光メガネ１６から右眼に入射させる。また、偶数番目の走査線３ｂ，３ｄ，３ｆに対応する表示光については、左眼用Ｌにｚ方向に偏光して、これを偏光メガネ１６から左眼に入射させるように、偏光制御ユニット１４の各電極を制御する。このようにして、次の画面では、各３ａ，３ｂ，３ｃ，３ｄ，３ｅ，３ｆに対応した表示光を、この順序で、右眼，左眼，右眼，左眼，右眼，左眼と交互に順次に入射させることができる。

【００３４】以後、同様の仕方で、画面ごとに上記の動作を行なう。このような制御によって、表示画像は、最初の画面では、図８（ａ）のように、また、次の画面では、図８（ｂ）のように、左右眼それぞれについて、垂直６０Ｈｚの走査速度をもつ２：１インターレースで表示される。この結果、フリッカの少ない立体画像が、現行のＮＴＳＣテレビと同様の垂直走査速度で、同様の画質で表示できる。このように、図６のような制御を行なえば、比較的小さい垂直走査速度で、フリッカの少ない高精細な立体表示が可能となる。

【００３５】これと同様のことは、ＣＲＴの前面に走査線ごとに分割した偏光制御手段またはシャッタを設けノンインターレースを表示する場合にも可能である。但し、ＣＲＴで走査線ごとに分割していない偏光方向を制御する手段をもつものや、液晶シャッタメガネを利用したもので、左右眼それぞれ６０Ｈｚの２：１インターレースを表示するときには、１２０Ｈｚの４：１インターレースにする必要があり、従って、その装置の作製は一般に難しくなる。

【００３６】

【発明の効果】以上に説明したように、請求項１乃至６記載の発明では、表示ユニットの走査線の走査と同期させて、該走査線に対応した偏光方向制御手段を駆動するようになっているので、時間的な分割によって立体表示を行なわせるときにも、表示ユニットの種類によらずに、左眼と右眼との間での画像のクロストークを著しく低減させることができる。

【００３７】また、請求項２記載のように表示ユニットに液晶ディスプレイを用いる場合には、ＣＲＴディスプレイを用いる場合に比べ、新たな偏光子を設けたりする必要がなくなり、また表示面が平面であることにより、偏光制御ユニットを表示ユニット上に容易に作製することができるなどの利点がある。

【００３８】また、請求項３記載の発明では、偏光方向制御手段の電極の一方を表示ユニットの全走査線に共通のものとしているので、偏光方向制御手段をより簡単な仕方で作製することができる。

【００３９】また、請求項４記載の発明では、上記駆動制御手段が、表示ユニットの画面ごとに表示光の偏光方向を切り換えるよう偏向方向制御手段を制御するようになっているので、２画面で左右眼にそれぞれ対応する画像を表示させることができる。

【００４０】また、請求項５記載の発明では、上記駆動制御手段が、一画面内において走査線ごとに表示光の偏光方向を切り換えるように、また、最初の画面と次の画面とで、同じ走査線に対する表示光の偏向状態が異なるように、前記偏光方向制御手段を制御するようになっているので、請求項４記載の発明と同様に２画面で左右眼にそれぞれ対応する画像を表示させることができるとともに、さらに比較的小さい垂直走査速度で、フリッカの少ない高精細な立体表示が可能となる。

【００４１】また、請求項６記載の発明では、上記偏光方向制御手段にはさらに、カラーフィルタおよび／またはブラックマトリックスが設けられているので、コントラストの高い色再現性に優れたカラーの立体表示を行なうことができる。

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【図面の簡単な説明】

【図１】本発明に係る表示装置の一実施例の構成図である。

【図２】（ａ），（ｂ），（ｃ）は図１の表示装置の表示ユニットおよび偏光制御ユニットの基本的な機能を説明するための図である。

【図３】表示ユニットの走査線の駆動例を示す図である。

【図４Ａ】偏光制御ユニットの各電極対の駆動例をそれぞれ示す図である。

【図４Ｂ】偏光制御ユニットの各電極対の駆動例をそれぞれ示す図である。

【図４Ｃ】偏光制御ユニットの各電極対の駆動例をそれぞれ示す図である。

【図５】本発明に係る表示装置の第２の実施例の構成図である。

【図６】本発明に係る表示装置の第３の実施例の構成図である。

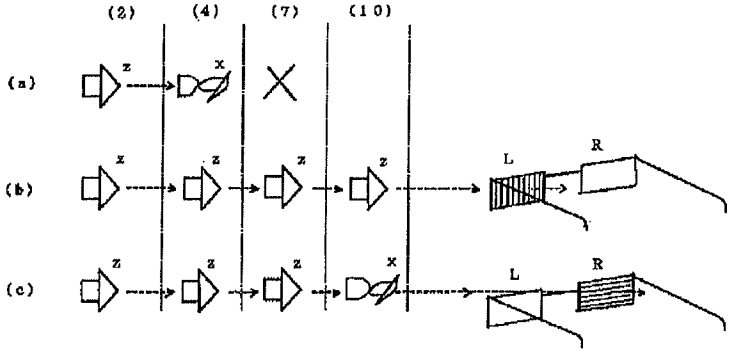
【図７】図１の表示装置の他の偏光制御例を示す図である。

【図８】（ａ），（ｂ）は図７の偏光制御がなされる場合の最初の画面，次の画面の表示画像をそれぞれ示す図である。

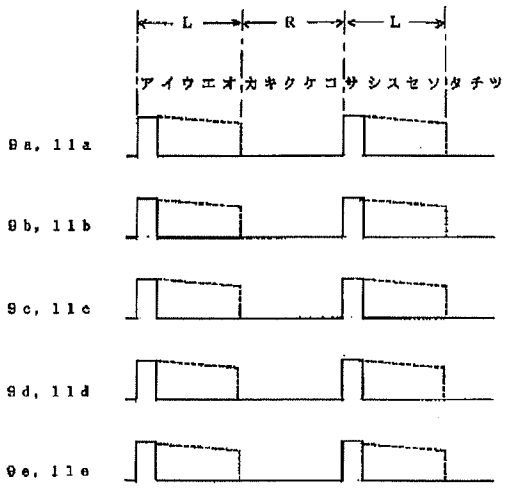
＊【符号の説明】

１，７	偏光子
２，６	基板ガラス
３ａ，３ｂ，３ｃ，３ｄ，３ｅ	走査電極
４	ＴＮ液晶層
５ａ，５ｂ，５ｃ	信号線
８，１２	基板ガラス
９ａ，１１ａ	電極対
９ｂ，１１ｂ	電極対
９ｃ，１１ｃ	電極対
９ｄ，１１ｄ	電極対
９ｅ，１１ｅ	電極対
１０	液晶層
１３	表示ユニット
１４，２４	偏光制御ユニット
１５ａ，１５ｂ	偏光子
１６	偏光メガネ
３２	カラーフィルタ
３３	ブラックマトリックス
５０	電極制御部

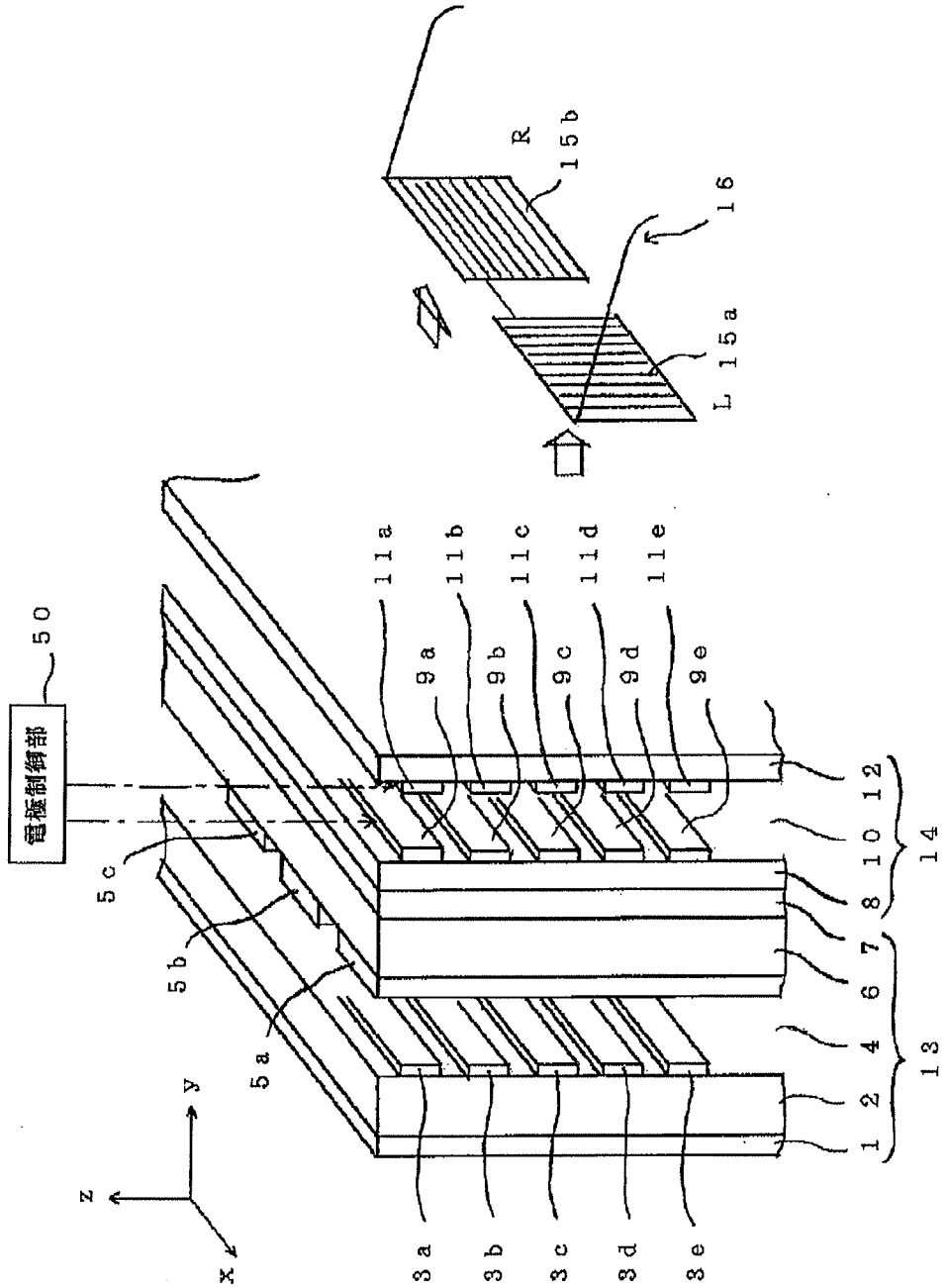
【図２】



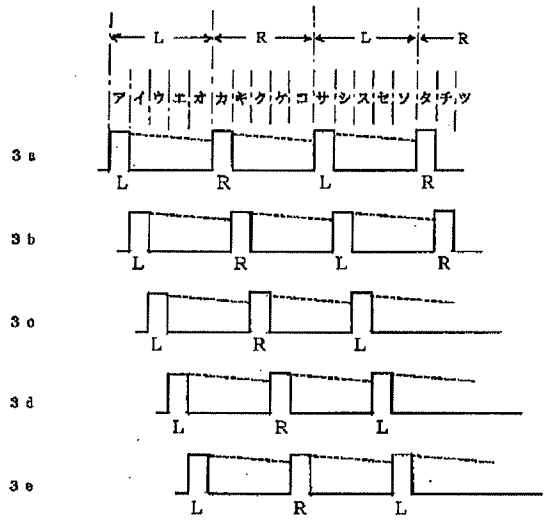
【図４Ａ】



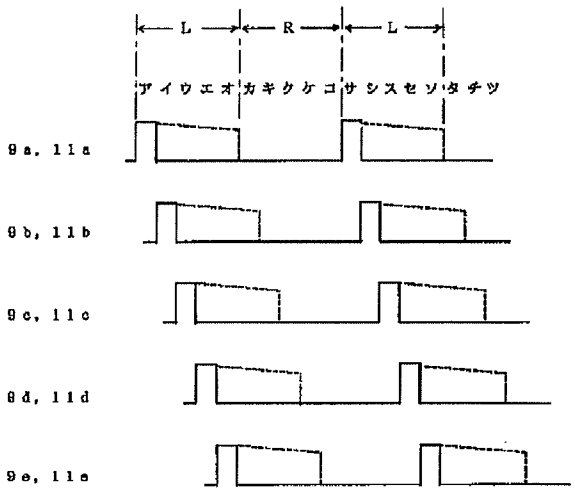
【図1】


R
15b
16
L 15a
11a
11b
11c
11d
11e
9a
9b
9c
9d
9e
50
電極制御部
5c
5b
5a
y
z
x
3a
3b
3c
3d
3e
1 2 4 6 7 8 10 12
13
14

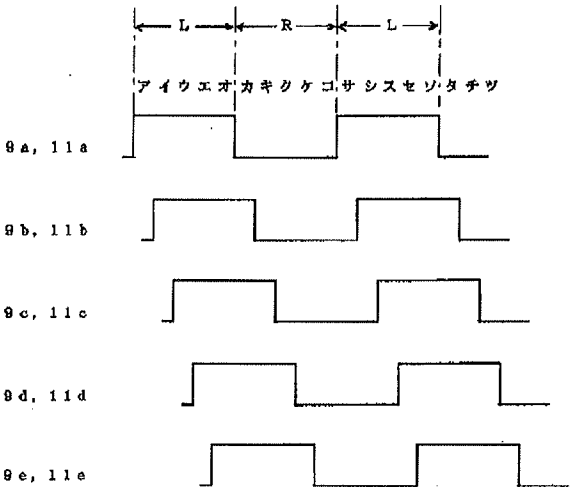
【図３】


L
R
L
R
アイウエオカキクケコサシスセソタチツ
3a
3b
3c
3d
3e

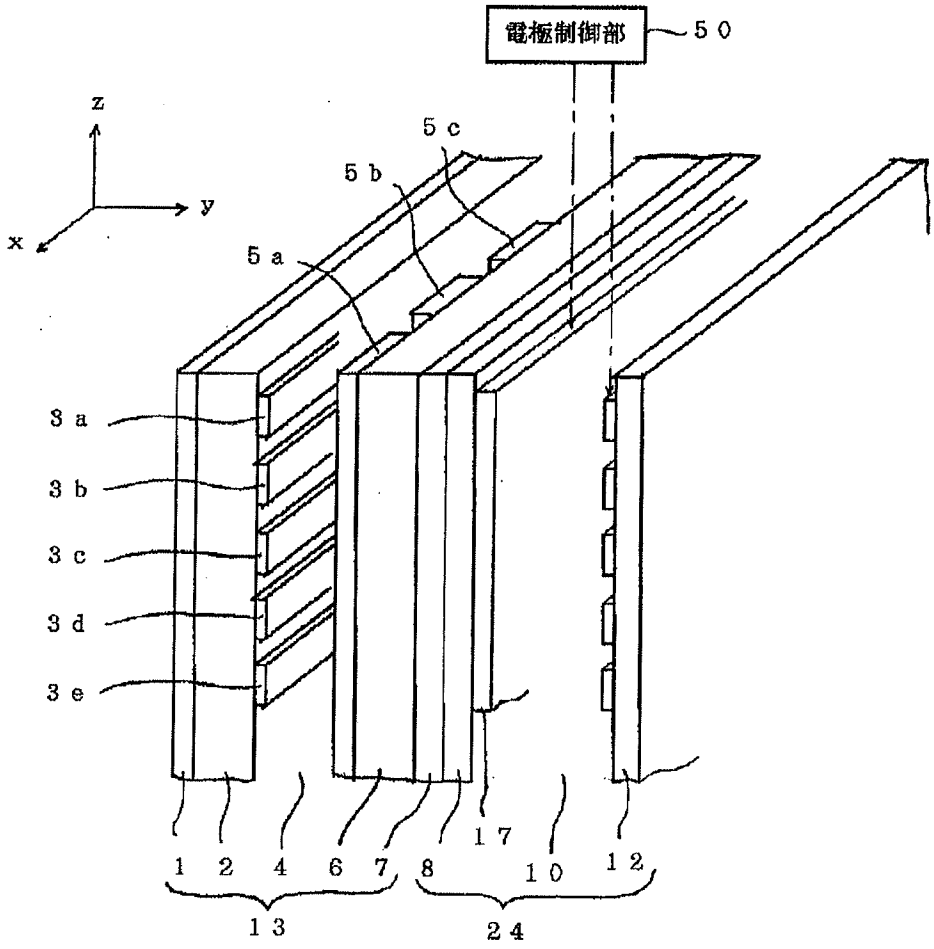
【図４Ｂ】


L
R
L
アイウエオカキクケコサシスセソタチツ
9a, 11a
9b, 11b
9c, 11c
9d, 11d
9e, 11e

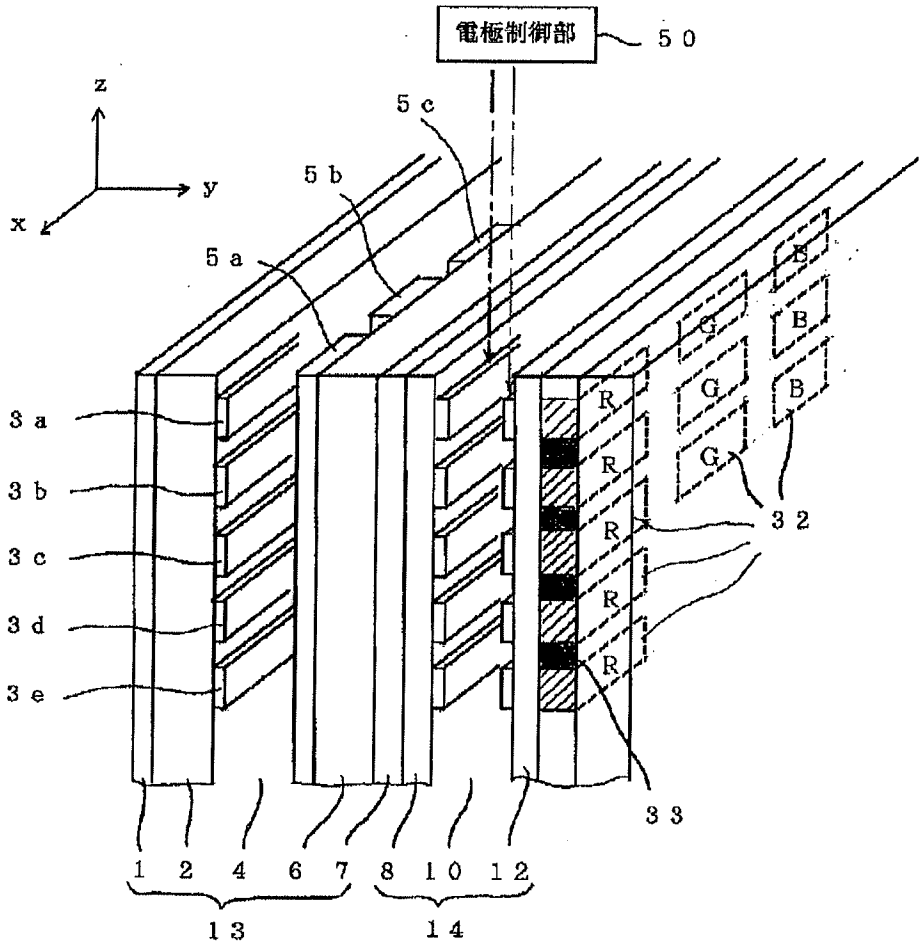
【図４Ｃ】


L
R
L
アイウエオカキクケコサシスセソタチツ
9a, 11a
9b, 11b
9c, 11c
9d, 11d
9e, 11e

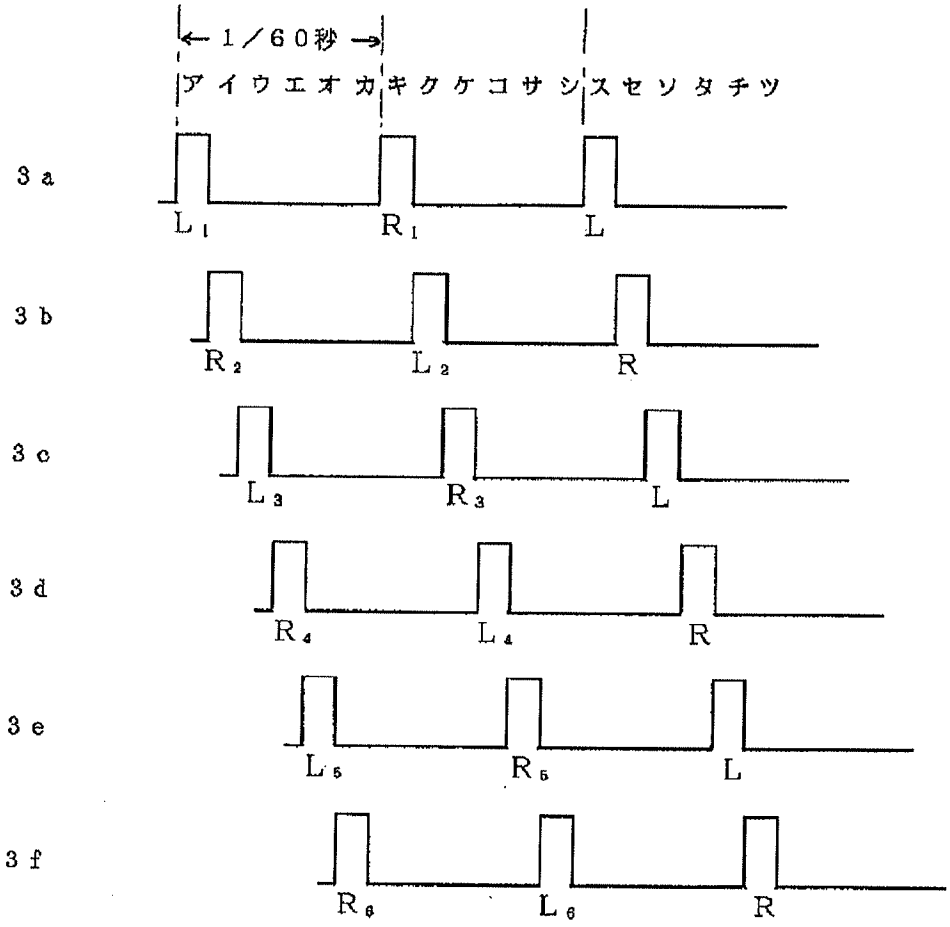
【図５】



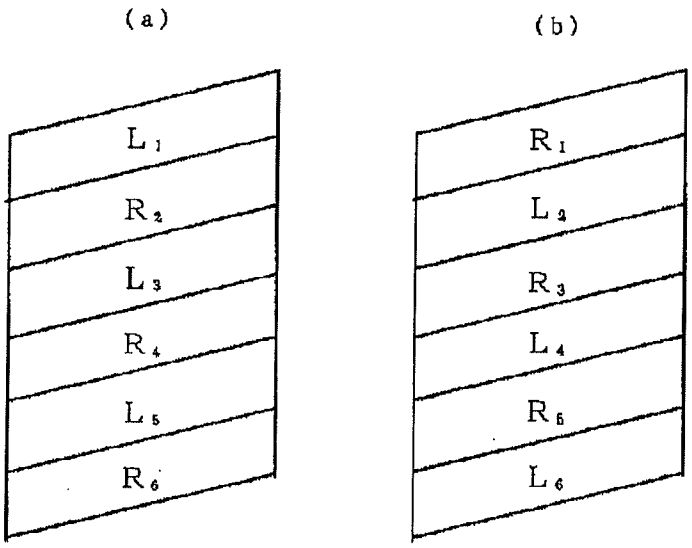
【図６】



【図７】


←１／６０秒→
ア イ ウ エ オ カ キ ク ケ コ サ シ ス セ ソ タ チ ツ
３ａ
L1
R1
L
３ｂ
R2
L2
R
３ｃ
L3
R3
L
３ｄ
R4
L4
R
３ｅ
L5
R5
L
３ｆ
R6
L6
R

【図８】



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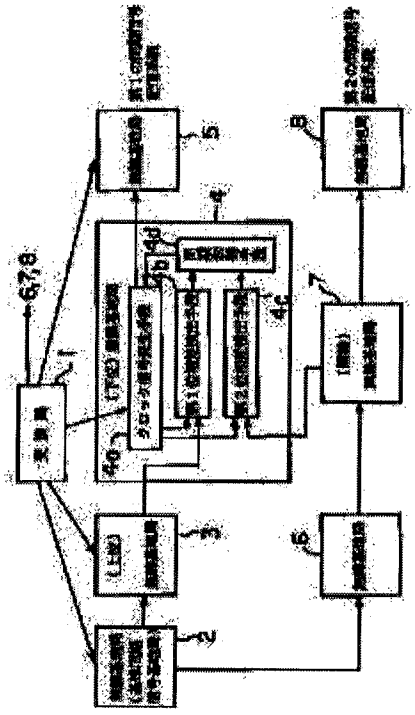
(72)Inventor : SHIMIZU TAKAFUMI

(54) SYNCHRONIZATION SYSTEM FOR MOBILE OBJECT COMMUNICATION NETWORK

(57)Abstract:
PURPOSE: To prevent hindrance in the synchronization adjustment of a subordinate radio base station even when a fault takes place in the clock signal of the radio base station on the half-way of a synchronous signal distribution system.
CONSTITUTION: The 1st phase difference detecting means 4b of a subordinate radio base station 4 always detects a phase difference between a synchronous signal from a host radio base station 3 and a clock signal generated from a clock signal generating means 4a. When the detected phase difference is larger than a prescribed phase difference, a 2nd phase difference detecting means 4c detects a phase difference between the synchronous signal from an adjacent radio base station 7 and a clock signal from the clock signal generating means 4a. A synchronization control means 4d detects the abnormality of the host radio base station 3 based on the phase difference detected by the 1st phase difference detection means 4b and the 2nd phase difference detection means 4c, and when it is detected, the clock signal generating means 4a generates a clock signal in phase synchronously with the synchronous signal of the adjacent radio base station 7.



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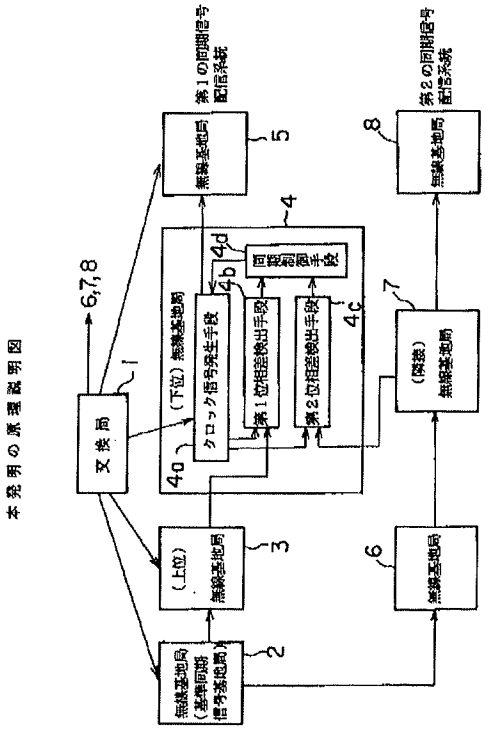
(54)【発明の名称】　移動体通信網の同期方式

(57)【要約】
【目的】　移動体通信網の同期方式に関し、同期信号配信系統の途中の無線基地局のクロック信号に異常が生じても、その下位の無線基地局の同期調整に支障がでないようにすることを目的とする。
【構成】　下位無線基地局４の第１位相差検出手段４ｂが、常時、上位無線基地局３からの同期信号と、クロック信号発生手段４ａで発生したクロック信号との位相差を検出する。検出した位相差が所定値より大きいときには、第２位相差検出手段４ｃが、隣接無線基地局７からの同期信号と、クロック信号発生手段４ａからのクロック信号との位相差を検出する。同期制御手段４ｄは、第１位相差検出手段４ｂおよび第２位相差検出手段４ｃが検出した位相差に基づき、上位無線基地局の異常を検出し、これが検出されたとき、クロック信号発生手段４ａは、隣接無線基地局７の同期信号に位相同期してクロック信号を発生する。

本発明の原理説明図



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【特許請求の範囲】

【請求項１】　移動体通信用の交換局（１）と、前記交換局（１）から遅延時間を伴って同期信号が配信される複数の無線基地局（２～８）とからなる移動体通信網の同期方式において、

前記同期信号に対し前記遅延時間分の位相補正をし、補正された同期信号に従いクロック信号をそれぞれ発生する前記複数の無線基地局（２～８）の各クロック信号発生手段と、

前記複数の無線基地局（２～８）のうちの基準同期信号基地局（２）が自己のクロック信号発生手段からのクロック信号に基づき同期信号を自己を除く前記複数の無線基地局（３～８）に配信するために用いられる複数の同期信号配信系統と、

前記複数の同期信号配信系統のうちの第１の同期信号配信系統（２，３，４，５）の下位無線基地局（４）に設けられ、上位無線基地局（３）から送られた同期信号と、前記下位無線基地局（４）のクロック信号発生手段（４ａ）で発生したクロック信号との位相差を検出する第１位相差検出手段（４ｂ）と、

前記下位無線基地局（４）に設けられ、前記第１位相差検出手段（４ｂ）が検出した位相差が所定値より大きいとき、前記下位無線基地局（４）に隣接する第２の同期信号配信系統（２，６，７，８）の隣接無線基地局（７）から送られた同期信号と、前記下位無線基地局（４）のクロック信号発生手段（４ａ）で発生したクロック信号との位相差を検出する第２位相差検出手段（４ｃ）と、

前記第１位相差検出手段（４ｂ）が検出した位相差および前記第２位相差検出手段（４ｃ）が検出した位相差を多数決論理処理により評価し、その結果に基づき前記下位無線基地局（４）のクロック信号発生手段（４ａ）の同期制御を行う同期制御手段（４ｄ）と、

を有することを特徴とする移動体通信網の同期方式。

【請求項２】　前記同期制御手段（４ｄ）は、前記第１位相差検出手段（４ｂ）が検出した位相差および前記第２位相差検出手段（４ｃ）が検出した位相差が、いずれも前記所定値より大きいならば、前記下位無線基地局（４）に異常があると判断し、また、前記第１位相差検出手段（４ｂ）が検出した位相差が前記所定値より大きいが、前記第２位相差検出手段（４ｃ）が検出した位相差が前記所定値以下であれば、前記下位無線基地局（４）よりも上位の前記第１の同期信号配信系統（２，３，４，５）の無線基地局に異常があると判断するように構成したことを特徴とする請求項１記載の移動体通信網の同期方式。

【請求項３】　前記下位無線基地局（４）のクロック信号発生手段（４ａ）は、前記同期制御手段（４ｄ）により前記下位無線基地局（４）に異常があると判断されたとき、前記上位無線基地局（３）から送られた同期信号

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に同期したクロック信号を発生するように構成したことを特徴とする請求項２記載の移動体通信網の同期方式。

【請求項４】　前記下位無線基地局（４）のクロック信号発生手段（４ａ）は、前記同期制御手段（４ｄ）により、前記下位無線基地局（４）よりも上位の前記第１の同期信号配信系統（２，３，４，５）の無線基地局に異常があると判断されたとき、前記第２の同期信号配信系統（２，６，７，８）の隣接無線基地局（７）から送られた同期信号に同期したクロック信号を発生するように構成したことを特徴とする請求項２記載の移動体通信網の同期方式。

【請求項５】　前記同期制御手段（４ｄ）は、前記異常を検出したとき、前記異常の内容および自無線基地局（４）の識別コードを監視制御局に報知するように構成したことを特徴とする請求項２記載の移動体通信網の同期方式。

【請求項６】　前記監視制御局は、前記報知に基づき障害のある無線基地局を特定し、前記特定された障害無線基地局に対し発信および着信の規制を行うように構成したことを特徴とする請求項５記載の移動体通信網の同期方式。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】本発明は移動体通信網の同期方式に関し、特に移動体通信網を構成する複数の無線基地局間で位相同期が確立されている移動体通信網の同期方式に関する。

【０００２】自動車電話、携帯電話等のためのセルラー無線システムでは、小ゾーンをカバーする複数の無線基地局を設置して運用し、それらのトータルとして所定のサービスエリアを確保することが行われているが、各々の基地局で送受信する信号は、回線品質確保のために、位相同期が確立されている必要がある。そのため、基地局間で位相同期制御が実施されている。

【０００３】

【従来の技術】図６は、従来の移動体通信網を示すブロック図である。すなわち、小ゾーン６１～６３の中心に無線基地局Ｂ１～Ｂｎがそれぞれ設置され、各無線基地局Ｂ１～Ｂｎは、移動体通信用の交換局６４からの信号を自己の小ゾーン６１～６３内に居る移動端末装置Ｃ１１～Ｃ１ｐ、Ｃ２１～Ｃ２ｑ、Ｃｎ１～Ｃｎｚにそれぞれ無線送信する。また、逆方向へ無線送信が行われる。交換局６４は固定端末用の交換局（図示せず）を経て一般電話に接続される。

【０００４】交換局６４から各無線基地局Ｂ１～Ｂｎへは同期信号が伝送路を介して送信されるが、交換局６４と各無線基地局Ｂ１～Ｂｎとを結ぶ各伝送路の長さの違いにより同期信号の到達時間に差がある。そのため、各無線基地局Ｂ１～Ｂｎは、それらの差に相当する予め設定された遅延補正値で上記各同期信号を補正して各位相

を揃えた上で、それら補正済の同期信号に位相同期したクロック信号をそれぞれ発生するようにしている。

【０００５】しかし、伝送路途中の工事等により迂回路が設定されたりすると、上記補正は必ずしも適正なものではなくなるため、上記補正は大まかに行うためのものと位置づけ、次に説明するように、さらに精密な位相同期をとるようにしている。

【０００６】図７（Ａ）は、無線基地局間の同期網を示す図である。図６に示した無線基地局Ｂ１～Ｂｎのうちの１つを基準基地局Ｍとし、残りを従属基地局Ｓとする。基準基地局Ｍから各従属基地局Ｓに対して基準同期信号が配信され、各従属基地局Ｓでは、基準同期信号に位相同期したクロック信号をそれぞれ発生するようにして、無線基地局間の正確な同期網を構築する。なお、各無線基地局の送信出力が小さいため、基準基地局Ｍから基準同期信号が配信される複数の同期信号配信系統を構成し、順に上位局の同期信号を受信して、それに位相同期した自局のクロック信号を発生するようにする。例えば、基準基地局Ｍから従属基地局Ｓ１，Ｓ２，Ｓ３・・・の第１系統、また、基準基地局Ｍから従属基地局Ｓ２１，Ｓ２２，Ｓ２３，Ｓ２４・・・の第２系統が構成される。これにより、無線基地局Ｂ１～Ｂｎ間の位相同期が微調整されることになる。

【０００７】

【発明が解決しようとする課題】しかし、従来の無線基地局間の同期網においては、図７（Ｂ）に示すように、例えば、従属基地局Ｓ１のクロック信号に異常が発生した場合、その下位の従属基地局が従属基地局Ｓ１のクロック信号の異常を判断できないから、異常なクロック信号に追随して従属基地局Ｓ２，Ｓ３が誤った同期調整を行なってしまい、各無線基地局がいもづる式に誤った同期調整を行なってしまうという問題点があった。

【０００８】本発明はこのような点に鑑みてなされたものであり、同期信号配信系統の途中の無線基地局のクロック信号に異常が生じても、その下位の無線基地局の同期調整に支障がでないようにした移動体通信網の同期方式を提供することを目的とする。

【０００９】

【課題を解決するための手段】本発明では上記目的を達成するために、図１に示すように、移動体通信用の交換局１と、交換局１から遅延時間を伴って同期信号が配信される複数の無線基地局２～８とからなる移動体通信網において、複数の無線基地局２～８の各クロック信号発生手段と、複数の同期信号配信系統と、第１位相差検出手段４ｂと、第２位相差検出手段４ｃと、同期制御手段４ｄとを有する移動体通信網の同期方式が提供される。

【００１０】複数の無線基地局２～８の各クロック信号発生手段は、交換局１から配信される同期信号に対し伝送路での遅延時間分の位相補正をし、補正された同期信号に従い、クロック信号をそれぞれ発生する。複数の同期信号配信系統は、複数の無線基地局２～８のうちの基準同期信号基地局２が自己のクロック信号発生手段からのクロック信号に基づき同期信号を自己を除く複数の無線基地局３～８に配信するために用いられる。第１位相差検出手段４ｂは、複数の同期信号配信系統のうちの第１の同期信号配信系統２，３，４，５の下位無線基地局４に設けられ、上位無線基地局３から送られた同期信号と、下位無線基地局４のクロック信号発生手段４ａで発生したクロック信号との位相差を検出する。第２位相差検出手段４ｃは、下位無線基地局４に設けられ、第１位相差検出手段４ｂが検出した位相差が所定値より大きいとき、下位無線基地局４に隣接する第２の同期信号配信系統２，６，７，８の隣接無線基地局７から送られた同期信号と、下位無線基地局４のクロック信号発生手段４ａで発生したクロック信号との位相差を検出する。同期制御手段４ｄは、第１位相差検出手段４ｂが検出した位相差および第２位相差検出手段４ｃが検出した位相差を多数決論理処理により評価し、その結果に基づき下位無線基地局４のクロック信号発生手段４ａの同期制御を行う。

【００１１】

【作用】以上の構成により、図１において、各無線基地局２～８は、通常、自己のクロック信号発生手段からのクロック信号に基づき無線基地局としての送受信を行う。同時に、下位無線基地局４の第１位相差検出手段４ｂが、常時、上位無線基地局３から送られた同期信号と、下位無線基地局４のクロック信号発生手段４ａで発生したクロック信号との位相差を検出する。そして、検出した位相差が所定値より大きいときには、第２位相差検出手段４ｃが、下位無線基地局４に隣接する第２の同期信号配信系統２，６，７，８の隣接無線基地局７から送られた同期信号と、下位無線基地局４のクロック信号発生手段４ａで発生したクロック信号との位相差を検出する。この間、下位無線基地局４は、クロック信号発生手段４ａで自発的に発生したクロック信号に基づき無線基地局としての送受信を行い続ける。

【００１２】同期制御手段４ｄが、第１位相差検出手段４ｂが検出した位相差および第２位相差検出手段４ｃが検出した位相差を多数決論理処理により評価し、位相差が大きい原因が、下位無線基地局４のクロック信号異常によるものか、または下位無線基地局４より上位の無線基地局のクロック信号異常によるものかを特定する。下位無線基地局４の異常によるものならば、下位無線基地局４のクロック信号発生手段４ａが上位無線基地局３の同期信号に追随するように制御し、また、下位無線基地局４より上位の無線基地局の異常によるものならば、隣接無線基地局７の同期信号に追随するように制御する。

【００１３】

【実施例】以下、本発明の一実施例を図面に基づいて説明する。図２は無線基地局間の同期網を示す図であり、

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この図を参照して本実施例の作動原理を説明する。

【００１４】まず、図２（Ａ）に示すように、同期網を構成する複数の無線基地局のうちの１つを基準基地局Ｍとし、残りを従属基地局Ｓとする。基準基地局Ｍから基準同期信号が配信される複数の同期信号配信系統を構成し、すなわち、基準基地局Ｍから従属基地局Ｓ１，Ｓ２，Ｓ３・・・の第１系統、また、基準基地局Ｍから従属基地局Ｓ２１，Ｓ２２，Ｓ２３，Ｓ２４・・・の第２系統を構成し、順に上位局の同期信号を受信して、通常、その受信同期信号に位相同期した自局のクロック信号を発生するようにする。例えば従属基地局Ｓ２が上位局Ｓ１の同期信号に位相同期した自局のクロック信号を発生している。このクロック信号の発生に際し、従属基地局Ｓ２は、上位局Ｓ１の同期信号と自己のクロック信号との位相差を常時、監視するようにする。

【００１５】ところで、図２（Ｂ）に示すように、上位局Ｓ１のクロック信号に異常が発生した場合、従属基地局Ｓ２で検出される上記位相差が大きくなる。この大きな位相差を検出した従属基地局Ｓ２は、クロック信号を自走させるとともに、隣接の第２同期信号配信系統の隣接局Ｓ２２の同期信号を受信する。そして、隣接局Ｓ２２の同期信号と自己のクロック信号との位相差を検出し、上記の上位局Ｓ１のクロック信号異常の場合には当然、隣接局Ｓ２２の同期信号と自己のクロック信号との位相差は大きくないから、この小さな位相差を確認した上で、従属基地局Ｓ２は、隣接局Ｓ２２の同期信号に追随してクロック信号を発生するようにする。

【００１６】以上のようにして、同期信号配信系統の途中の無線基地局Ｓ１のクロック信号に異常が生じても、その下位の無線基地局Ｓ２，Ｓ３の同期調整に支障がでないようにすることが可能となる。

【００１７】なお、もし、隣接局Ｓ２２の同期信号と自己のクロック信号との位相差も大きいときには、自己のクロック信号が異常と判断して、従属基地局Ｓ２は、初めて、上位局Ｓ１の同期信号に追随してクロック信号を発生するようにする。すなわち、従属基地局Ｓ２は、上位局Ｓ１の同期信号との間に位相差が生じても、直ぐに上位局Ｓ１の同期信号に追随するのではなく、隣接局Ｓ２２の同期信号との位相差も確認の上で、上位局Ｓ１の同期信号に追随する。

【００１８】図３は、図２に示した同期網の無線基地局間で行われる同期信号の送受信の様子を示す図である。図３（Ａ）は図２（Ａ）に対応し、図３（Ｂ）は図２（Ｂ）に対応する。すなわち、各無線基地局Ｓ１，Ｓ２，Ｓ２１，Ｓ２２，Ｓ２３は、移動端末装置Ｃ（図６参照）との間で主信号の送受信を行う送受信装置の他に、上位局および隣接局から送信された主信号に含まれる同期信号を受信する受信部Ｒをそれぞれ備える。そして、例えば、従属基地局Ｓ２の受信部Ｒ２が、上位局Ｓ１の同期信号を受信しているが〔図３（Ａ）〕、大きい

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位相差が検出されると、従属基地局Ｓ２の受信部Ｒ２は、隣接局Ｓ２２の同期信号を受信するようにする〔図３（Ｂ）〕。

【００１９】図４は、無線基地局の内部構成を示すブロック図である。すなわち、移動端末装置（図示せず）との間で主信号の送受信を行う主信号送受信部４１には、交換局３０（無線基地局を構成せず）が接続されるとともに、クロック信号発生部４２が接続される。クロック信号発生部４２は、通常、交換局３０から供給される同期信号に対して伝送路での遅延時間分を補正して、他の無線基地局に供給された同期信号との位相同期をとる。そして、その補正された同期信号に同期したクロック信号を発生し、主信号送受信部４１に出力する。

【００２０】一方、受信部４３は、上位局または隣接局から送信された主信号に含まれる同期信号を受信する。受信局指定部４４は、受信部４３が上位局および隣接局のうちのいずれを受信すべきかを指定する指定部であり、通常は上位局の同期信号を受信するように指定している。位相差検出部４５は、受信部４３が受信した同期信号と、クロック信号発生部４２が出力するクロック信号との位相差を検出し、異常判断部４６へ出力する。

【００２１】異常判断部４６は、まず、位相差検出部４５から送られた、上位局の同期信号とクロック信号発生部４２のクロック信号との位相差を所定値と比較し、その位相差が所定値以下ならば、クロック信号発生部４２に対し、通常のように、交換局３０からの同期信号に基づきクロック信号を発生させる。上記所定値は、同期信号（クロック信号）の位相変動が許容される範囲の最大値に設定される。一方、その位相差が所定値よりも大きいとき、クロック信号発生部４２に対して直前までのクロック信号の発振をそのまま継続させる（所謂、自走状態）とともに、受信局指定部４４に対して受信変更指令を出し、受信局指定部４４は、受信部４３に隣接局の同期信号を受信するように指令する。

【００２２】したがって、今度は、位相差検出部４５は、隣接局の同期信号とクロック信号発生部４２のクロック信号との位相差を検出し、異常判断部４６は、隣接局の同期信号とクロック信号発生部４２のクロック信号との位相差を所定値と比較する。この結果、この位相差が所定値より大きいならば、異常判断部４６は、自クロック信号が異常であると判断し、受信局指定部４４に上位局を受信指定させるとともに、クロック信号発生部４２に対し、上位局の同期信号に同期してクロック信号を発生するようにさせる。すなわち、クロック信号発生部４２へは、異常判断部４６を介して上位局の同期信号との位相差が送られ、クロック信号発生部４２は、この差が減少するようにクロック信号の位相を制御する。

【００２３】一方、その位相差が所定値以下ならば、異常判断部４６は、上位局のクロック信号が異常であると判断し、クロック信号発生部４２へ隣接局の同期信号と

の位相差を送り、クロック信号発生部４２で、その位相差が減少するように制御して隣接局の同期信号に同期したクロック信号を発生させる。なお、上位局のクロック信号が異常であると判断するまでの間、クロック信号発生部４２は自走状態となるが、クロック信号発生部４２の発振回路を安定性のあるもので構成することにより、その間の主信号送受信部４１の作動を安定させることができる。さらに、異常判断部４６は、交換局３０内に設けられた中央監視装置に、上位局（必ずしも直ぐ上位とは限らない）のクロック信号に異常がある旨、および隣接の同期信号配信系統に同期網を変更した旨等を自局コードを添えて報知信号として報知する。

【００２４】交換局３０の中央監視装置は、各無線基地局からの報知信号に基づき、障害基地局を特定し、特定された無線基地局への発信や着信の規制をかけたり、あるいは早期修復を指令したりする。

【００２５】図５は、異常判断部４６で行われる自局異常または上位局異常の判断の仕方を説明するタイミングチャートである。（Ａ），（Ｄ）は自局のクロック信号発生部４２で発生されるクロック信号を示し、（Ｂ），（Ｅ）は上位局からの同期信号を示し、（Ｃ），（Ｆ）は隣接局からの同期信号を示す。（Ａ），（Ｂ），（Ｃ）によって自局異常を説明し、（Ｄ），（Ｅ），（Ｆ）によって上位局異常を説明する。

【００２６】まず、自局のクロック信号が、信号５１，５２のように異常になると、上位局からの同期信号との間に大きな位相差５３が発生し、隣接局からの同期信号との間にも大きな位相差５４が発生する。したがって、逆に、位相差５３および位相差５４が検出されれば、自局のクロック信号に異常があると判別できる。

【００２７】つぎに、上位局からの同期信号が、信号５５，５６のように異常になると、自局のクロック信号との間に大きな位相差５７が発生するが、隣接局からの同期信号と自局のクロック信号との間の位相差５８は許容変動値以上にはならない。したがって、逆に、位相差５７が検出されても、位相差５８が許容変動値より小さいときには、上位局の同期信号（クロック信号）に異常があると判別できる。

【００２８】上記実施例では、異常判断部４６が自局異常と判断したときに、クロック信号発生部４２が、上位局の同期信号に同期してクロック信号を発生するようにするが、検出された上位局との位相差が或る判別値より大きいときには、自局に特別な異常が発生した旨を交換局３０の中央監視装置に報知するようにして、中央監視装置から自局に対して送信、受信の規制が加えられるようにしてもよい。

【００２９】また、上記実施例では、異常判断部４６が、位相差検出部４５から出力される位相差を所定値と比較し、一度、位相差が所定値より大きいことがあれば即刻、クロック信号発生部４２や受信局指定部４４へ指令を出力するようにしているが、位相差が所定値より大きいことが所定回数発生したときに、初めてクロック信号発生部４２や受信局指定部４４へ指令を出力するようにしてもよい。

【００３０】

【発明の効果】以上説明したように本発明では、上位無線基地局の同期信号と、下位無線基地局のクロック信号との位相差を検出し、検出した位相差が所定値より大きいときに、隣接無線基地局の同期信号と、下位無線基地局のクロック信号との位相差を検出する。検出された両位相差を多数決論理処理により評価し、上位無線基地局のクロック信号に異常があると判断されたならば、下位無線基地局は、隣接無線基地局の同期信号に追随するように制御する。これにより、同期信号配信系統の途中の無線基地局のクロック信号に異常が生じても、その下位の無線基地局の同期調整に支障がでないようにすることができる。

【００３１】また、中央監視装置により障害局の特定が可能となるから、通信網の保守監視が容易になる。さらに、障害局よりも下位の無線基地局に障害が波及しないため、通信網の運用効率を向上できる。

【図面の簡単な説明】

【図１】本発明の原理説明図である。

【図２】無線基地局間の同期網を示す図である。

【図３】同期網の無線基地局間で行われる同期信号の送受信の様子を示す図である。

【図４】無線基地局の内部構成を示すブロック図である。

【図５】異常判断部で行われる自局異常または上位局異常の判断の仕方を説明するタイミングチャートである。

【図６】従来の移動体通信網を示すブロック図である。

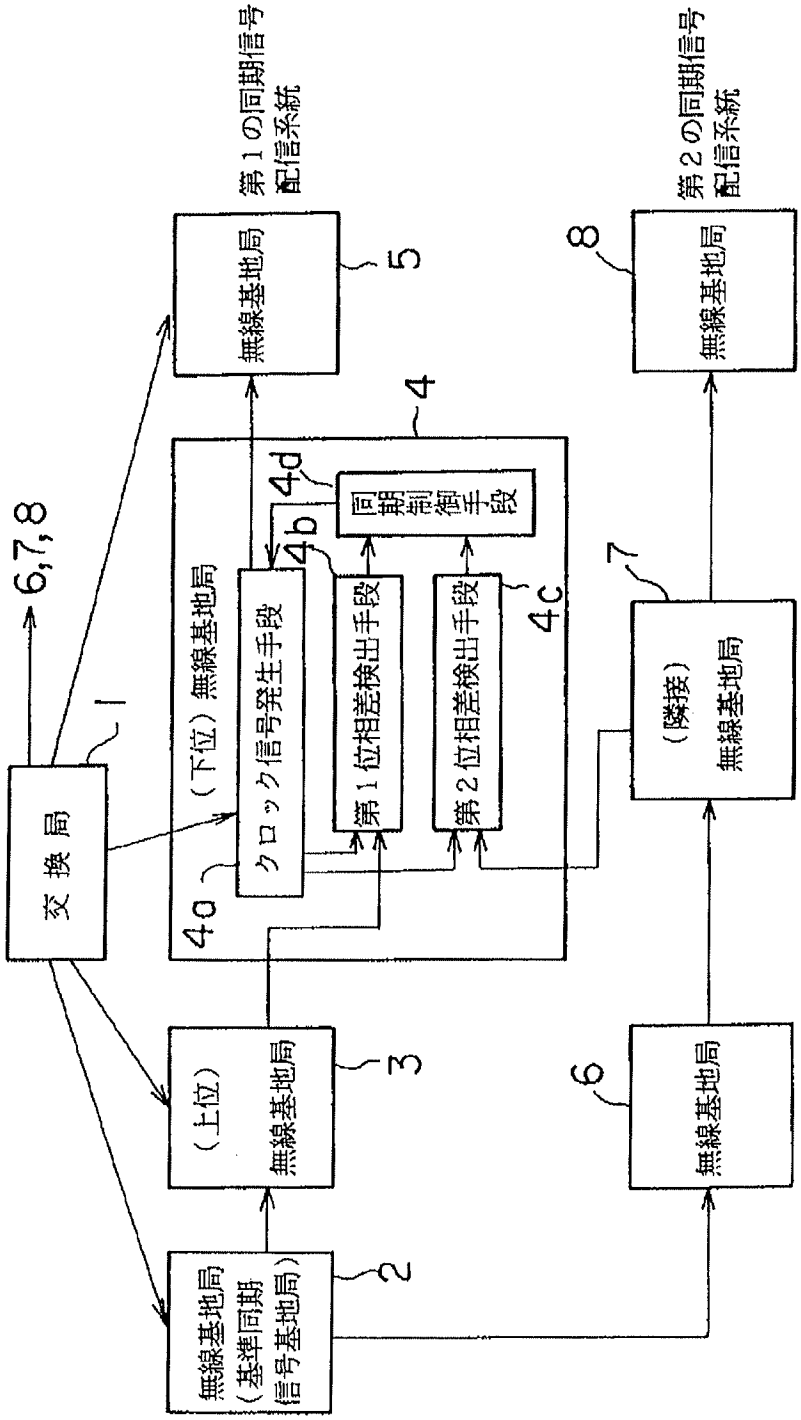
【図７】無線基地局間の同期網を示す図である。

【符号の説明】

１　交換局
２　無線基地局（基準同期信号基地局）
３　（上位）無線基地局
４　（下位）無線基地局
４ａ　クロック信号発生手段
４ｂ　第１位相差検出手段
４ｃ　第２位相差検出手段
４ｄ　同期制御手段
５　無線基地局
６　無線基地局
７　（隣接）無線基地局
８　無線基地局
２，３，４，５　第１の同期信号配信系統
２，６，７，８　第２の同期信号配信系統

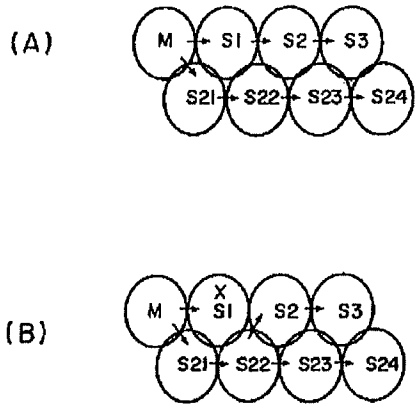
【図1】

本発明の原理説明図



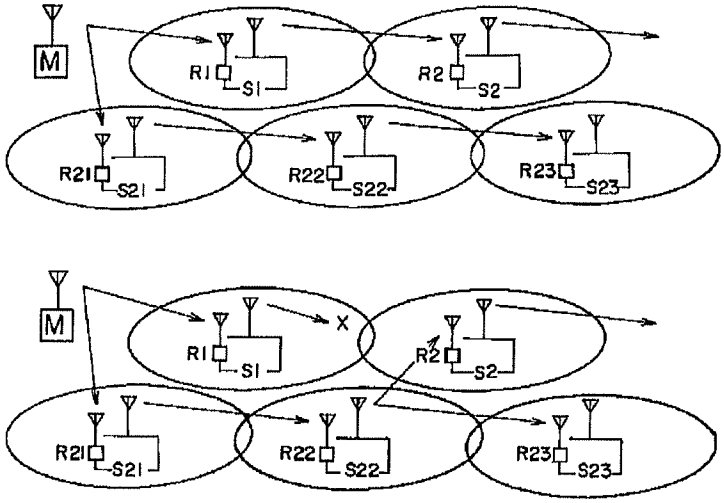
【図2】

無線基地局間の同期網を示す図



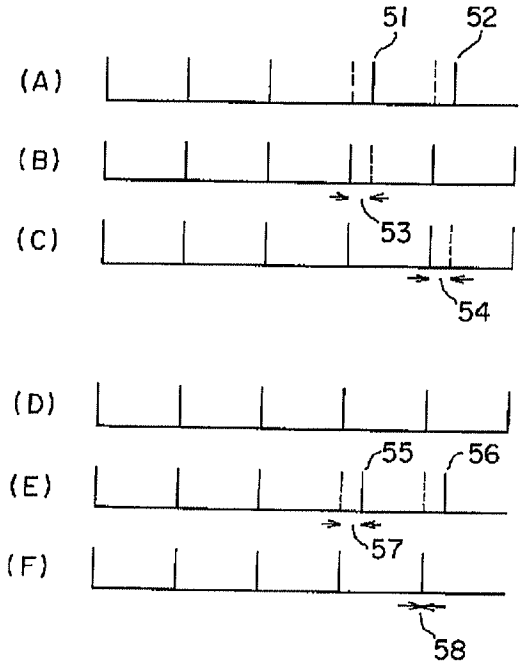
【図3】

同期網の無線基地局間で行われる同期信号の送受信の様子を示す図



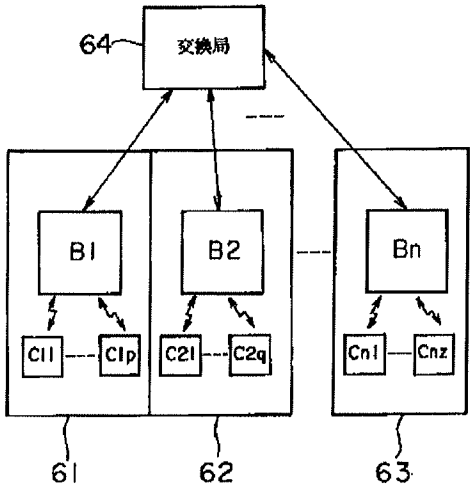
【図5】

自局異常、上位局異常を説明するタイミングチャート



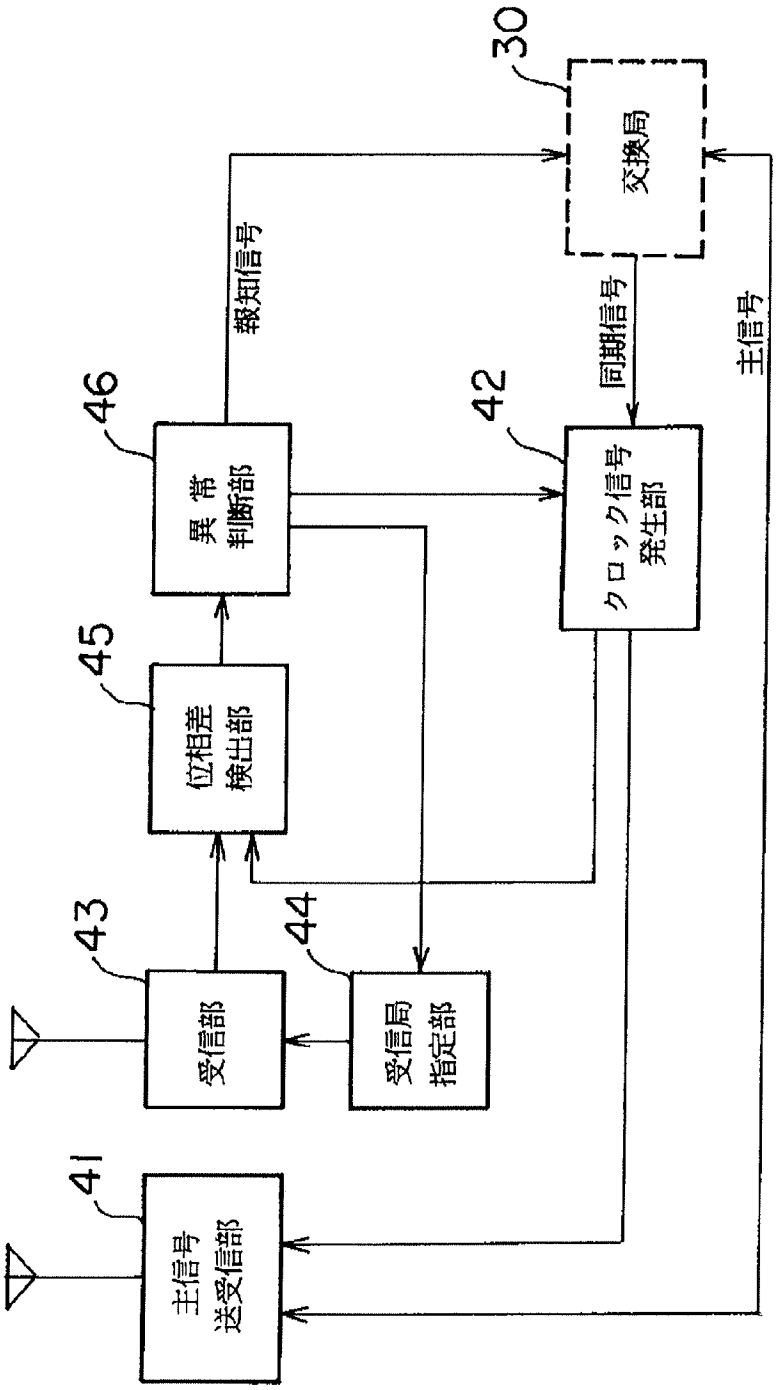
【図6】

従来の移動体通信網のブロック図



【図4】

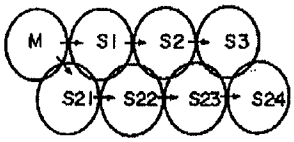
無線基地局の内部構成を示すブロック図



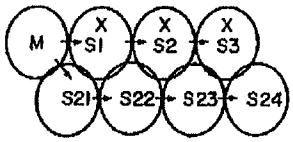
【図7】

無線基地局間の同期網を示す図

(A)



(B)



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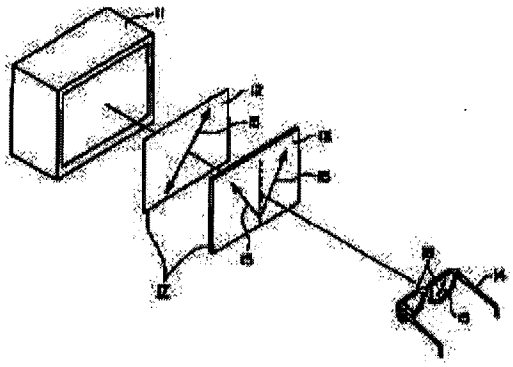
(54) THREE-DIMENSIONAL DISPLAY DEVICE

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a three dimensional display device that is adaptable to a large-sized display element, and also capable of coping with a high-speed operation.
SOLUTION: The device is provided with the display element 11 for alternately displaying a right eye image and a left eye image in time-division manner, and a liquid crystal shutter 17 arranged in front of the display element 11, and the liquid crystal shutter 17 is operated in synchronism with the image switching of the display element 11, then, the image transmitted through the liquid crystal shutter 17 is observed as a stereoscopic image through a pair of polarizing spectacles 14 whose polarizing direction through the right lens is different from that through the left one. In this case, a liquid crystal cell 13 as the liquid crystal shutter 17 is constituted by holding ferroelectric liquid crystal between two resin film substrates. The ferroelectric liquid crystal contains ferroelectric high-molecular liquid crystal ≥10 wt.%.



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1/1335	５１０	1/1335	５１０
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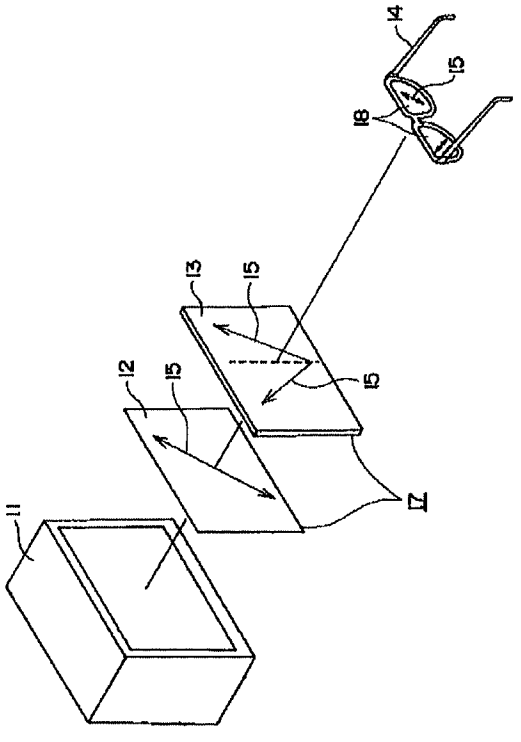
(54)【発明の名称】　立体表示装置

(57)【要約】
【課題】　大型の表示素子に対応でき、また高速動作にも対応できる立体表示装置を提供する。
【解決手段】　右眼用画像と左眼用画像を時分割で交互に表示する表示素子11と、この表示素子11の前方に配置された液晶シャッター17とを備え、この液晶シャッター17を表示素子11の画像切り替えと同期して動作させ、この液晶シャッター17を通過した画像を左右で偏光方向が異なる偏光眼鏡14を通して立体画像として観察する立体表示装置において、液晶シャッター17となる液晶セル13は、強誘電性液晶が２枚の樹脂フィルム基板の間に狭持されて構成されたものである。強誘電性液晶は、強誘電性高分子液晶を１０wt%以上含有する。



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【特許請求の範囲】

【請求項１】　右眼用画像と左眼用画像を時分割で交互に表示する表示素子と、この表示素子の前方に配置された液晶シャッターとを備え、この液晶シャッターを前記表示素子の画像切り替えと同期して動作させ、この液晶シャッターを通過した画像を左右で偏光方向が異なる偏光眼鏡を通して立体画像として観察する立体表示装置において、

前記液晶シャッターとなる液晶セルは、強誘電性液晶が２枚の樹脂フィルム基板の間に狭持されて構成されたものであることを特徴とする立体表示装置。

【請求項２】　請求項１に記載の立体表示装置において、

前記強誘電性液晶は、強誘電性高分子液晶の含有割合が１０wt%以上であることを特徴とする立体表示装置。

【請求項３】　請求項１又は２に記載の立体表示装置において、

前記表示素子は、その画面サイズが１４インチ以上であることを特徴とする立体表示装置。

【請求項４】　請求項１～３のいずれかに記載の立体表示装置において、

前記表示素子と前記液晶シャッターとの間に、偏光板が配置され、前記液晶セルのリターデーションが0.2μｍ以上であることを特徴とする立体表示装置。

【請求項５】　請求項１～４のいずれかに記載の立体表示装置において、

前記液晶シャッターは、液晶中に２色性色素を含有するゲストホスト型であることを特徴とする立体表示装置。

【請求項６】　請求項４又は５に記載の立体表示装置において、

前記液晶セルの前方及び後方の少なくとも一方に位相差板が配置されていることを特徴とする立体表示装置。

【請求項７】　請求項１～６のいずれかに記載の立体表示装置において、

前記表示素子がＣＲＴ、液晶パネル、プラズマディスプレー、ＥＬパネル及びＬＥＤのいずれかであることを特徴とする立体表示装置。

【請求項８】　請求項１～７のいずれかに記載の立体表示装置において、

前記表示画像の切り替えを表示画面上で検出し、その検出結果に応じて液晶シャッターを切り替えるための電圧波形を発生させる電圧波形発生手段を設け、この電圧波形発生手段により前記表示素子の画像切り替えと同期して液晶シャッターを動作させることを特徴とする立体表示装置。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、左右両眼の視差を利用して立体画像を観察できるようにした立体表示装置に関する。この立体表示装置の応用は、例えばコンピュータの端末表示として、ＣＡＤ、ＣＡＭ等の立体視化、インターネット情報の立体視化の他、コンピュータゲームの立体視化、医療、芸術分野での立体表示、等が挙げられる。

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【０００２】

【背景技術及び発明が解決しようとする課題】パソコンを中心とした情報端末の発達、インターネットに代表される情報ネットワークの発達により、個人が扱う情報量は飛躍的に増加している。特に画像情報はその圧縮や転送技術の向上により個人が扱える情報量が増えるに伴い、より正確でリアルなものを表現できる表示装置を望む声が高まっている。高精細化への要求には、ＬＣＤ、ＥＬパネル、ＣＲＴ等の各種表示素子において改良が進んでいる。一方、工業用、ゲームなどのアミューズメント用として、立体視への潜在的要求は強いが、例えば液晶光シャッター方式でそれを実現しようとすると、その光シャッターのサイズの限界からどうしても眼鏡にシャッター機能を持たせたものにならざるを得ず、その違和感から十分に普及しているとは言い難い。

【０００３】左右の目で別々の画像を同時的に見ることにより擬似的な立体感が得られることは古くから知られている。二枚の写真などの画像を直接裸眼で立体的に見る方法として、平行法、交差法が知られている。しかし、これらの方法による場合、一般的に観察者の訓練が必要となり、また２枚の画像の大きさ、配置する間隔を自由に変えることができない。一方、１枚の領域に、右眼用画像と左眼用画像とをそれぞれ異なる色で重ね書きしておき、観察者が左右で異なる色（例えば赤と青）を通す色眼鏡をかけて、それを右眼と左眼にそれぞれ分解してみることにより立体感を得るようにしたアナグリフ法がある。この方式の場合、画像の大きさに制限はないが、２色のカラーフィルターを使用するために画像の色彩が損なわれるという欠点がある。

【０００４】また、近年、液晶パネルを光シャッターとして応用した立体視の方法が多数提案されている。これはＣＲＴ等による表示画像を光シャッターで時分割し、右眼、左眼それぞれに、右眼用画像、左眼用画像を切り換えて送るものである。この光シャッターを配置する位置によって、大別して次の２方式がある。

【０００５】（１）　眼鏡に液晶光シャッターを用いる方法

例えば、立体視用の眼鏡の左眼及び右眼に設けた光シャッターを、テレビ画面上に表示される被写体の左像および右像のフィールド毎もしくはフィールド毎の切り換え周期に同期させて交互に開閉させることにより、被写体の画像を立体的に認識可能とした立体テレビジョンにおいて、両眼の光シャッターとしてのねじれネマチック型液晶セルを左眼用及び右眼用に使用し、前記画像の切り換えに同期させて所定の交流電圧を両液晶セルに交互に供給する駆動手段を備えた立体テレビジョンが提案され

ている（特開昭61-227498号公報）。

【０００６】この方法による場合、眼鏡に光シャッターを使用するため、眼鏡の重量が増して長時間の使用により疲労感を覚えさせ、またその駆動のための電極配線が眼鏡装着の際、観察者に違和感を感じさせる。また、複数の観察者で見る場合には同様の光シャッター付き眼鏡が必要となって費用の増加が大きくなる。更に、光シャッターとしてねじれネマチック（ＴＮ）型液晶セルを使用しているので、応答が遅く、本質的にちらつきのない動画表示ができない。

【０００７】（２）表示素子の前方に液晶光シャッターを配置し、観察者は偏光眼鏡を使用する方法

例えば、表示画面の前方に偏光板及び液晶セルを間隔をあけて配置し、前記表示画面のフレーム信号に同期した交流電圧を前記液晶セルに印加して表示画面から液晶セルを透過する光の偏光方向を時分割で切り換える駆動回路を液晶セルに接続し、この表示光を認識する左眼用と右眼用の偏光方向が互いに異なる偏光眼鏡を具備する疑似立体表示システムにおいて、液晶セルのリターデーションを0.1～0.15μｍとし、かつ印加電圧の極性反転による光軸の回転角度が70度から110度であり、光軸として採り得る２方向軸の中線と偏光板の偏光軸が概ね一致しており、偏光眼鏡の偏光板が円偏光又は円偏光に近い偏光能を有する楕円偏光板であることを特徴とする疑似立体表示システムが提案されている（特公平05-78017号公報）。

【０００８】このシステムの場合、液晶として強誘電性液晶を使用するので動画表示に対応できるが、従来のガラス基板を用いたセルなので大型化が難しく、大型のＣＲＴ等への適用が難しい。また、液晶セルをλ／４板として動作させるためにセルのリターデーションを0.1～0.15μｍと小さくする必要がある。これに伴って、実際のセル厚もかなり小さくする必要があるため、セル作製の歩留りが低下する。また、液晶材料としては傾き角θが45度程度の大きなものが必要になり、一般にその分、電界応答性や配向性が損なわれるため、新たな材料開発が必要になる場合がある。更に、観察者側の偏光板として円偏光板が必要なので、通常の直線偏光板よりも高価なものになる。

【０００９】また、表示画面の前方に、２色性色素を混合した強誘電性液晶セルを配置し、この液晶セルに画像フレーム信号に同期した交流電圧を印加する駆動手段を接続することにより液晶セルを通過する表示光を時分割で二つの偏光方向に切り換え、更にこの液晶セルの前方にλ／４板を配置して表示光を異なる方向の円偏光に変え、かつこの円偏光を観察するために、偏光眼鏡の左右の偏光板はそれぞれ偏光方向が逆の円偏光を持たせた疑似立体表示システムも提案されている（特公平6-29914号公報）。

【００１０】このシステムによる場合、ガラス基板を用いたセルであるため、大型化が難しく、大型のＣＲＴ等への適用が難しい。また、λ／４板や円偏光板を使用する分システムとして高価になる。更に、映像信号を画面表示する動画表示装置と、この前方に設けられた偏光板と、その前方に設けられて前記映像信号の同期信号に基づいて偏光方向を切り換える液晶パネルと、左右偏光板の偏光方向が互いに90度異なり、映像を透光、遮光する立体視用眼鏡とを備えた立体映像表示装置において、液晶パネルの液晶材に重量比１％以下の多色性色素を混合することにより楕円偏光の影響を小さくし、視認性を改良した立体映像表示装置が提案されている（特公平8-23663号公報）。

【００１１】この表示装置によれば、従来のＴＮセルを使用しているため、その特性上高速の動画表示ができず、また視認性改善のために混合する多色性色素も応答性を更に阻害するため混合量を１％以上にできない。また、従来型液晶セルを用いているので、大画面の動画表示装置に対応できない、という欠点がある。

【００１２】そこで、本発明は、大型の表示素子に対応でき、また高速動作にも対応できる立体表示装置を提供することを目的とする。

【００１３】

【課題を解決するための手段】本発明の第１発明は、右眼用画像と左眼用画像を時分割で交互に表示する表示素子と、この表示素子の前方に配置された液晶シャッターとを備え、この液晶シャッターを前記表示素子の画像切り替えと同期して動作させ、この液晶シャッターを通過した画像を左右で偏光方向が異なる偏光眼鏡を通して立体画像として観察する立体表示装置において、前記液晶シャッターとなる液晶セルは、強誘電性液晶が２枚の樹脂フィルム基板の間に狭持されて構成されたものであることを特徴とする。

【００１４】前記表示素子の交互表示速度としては、観察者がちらつきを感じない程度に高速であることが好ましい。具体的には30Hz程度以上であれば、ほとんどちらつきを感じなくなる。従って、表示素子としては30Hz程度以上の高速で画像を切り換えることができるものが好ましい。表示素子の具体例としては、ＣＲＴ（陰極線管）、ＴＦＴ（薄膜トランジスタ）等の液晶パネル、プラズマディスプレー、ＥＬ（エレクトロルミネッセンス）パネル、ＬＥＤ（発光ダイオード）、等が挙げられる。本発明では液晶シャッターとして大型化が容易な樹脂フィルム液晶セルを用いるので、大型の表示素子に対応できる。特に、従来のガラス基板を用いた液晶パネルでは実現が難しい14インチ以上の大型化が可能である。また、樹脂フィルム基板を使用しているので、液晶シャッターを曲面状にして曲面のパネルに密着させて使用することができる。これは、例えば表示面が曲面となっている安価なＣＲＴの利用を容易にするものである。

【００１５】前記強誘電性液晶としては、下記の具体例

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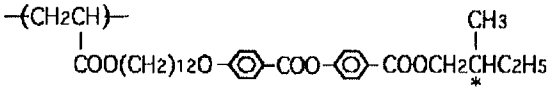
（ａ）～（ｌ）を挙げることができる。本発明では、強誘電性液晶を用いることで高速応答が可能となり、動画表示にも容易に対応できる立体表示装置を実現できる。

（ａ）アクリレート主鎖系高分子液晶

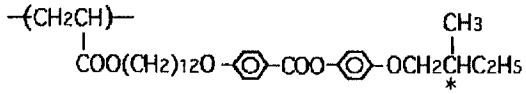
【００１６】

【化１】



【００１７】

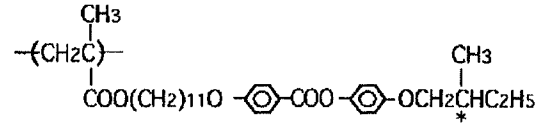
【化２】



＊【００１８】（ｂ）メタクリレート主鎖系高分子液晶

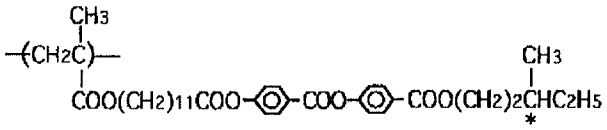
【００１９】

【化３】



【００２０】

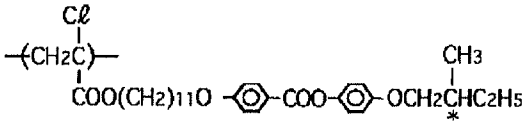
【化４】



【００２１】（ｃ）クロロアクリレート主鎖系高分子液晶

【００２２】

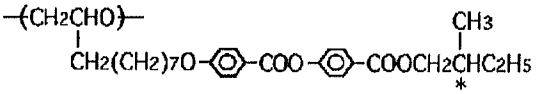
【化５】



【００２３】（ｄ）オキシラン主鎖系高分子液晶

【００２４】

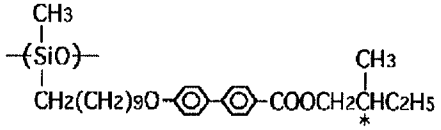
【化６】



※【００２５】（ｅ）シロキサン主鎖系高分子液晶

【００２６】

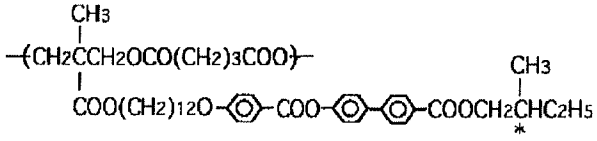
【化７】



【００２７】（ｆ）エステル主鎖系高分子液晶

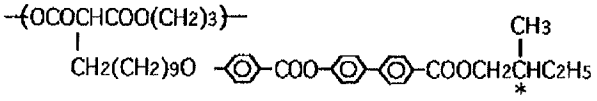
【００２８】

【化８】



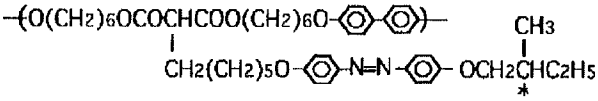
【００２９】

★ ★【化９】



【００３０】

☆ ☆【化１０】

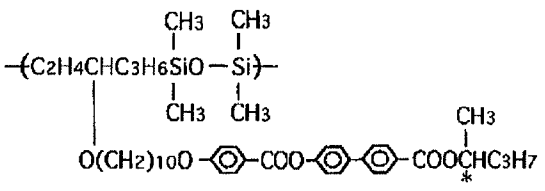


【００３１】（ｇ）シロキサン－オレフィン主鎖系高分子液晶

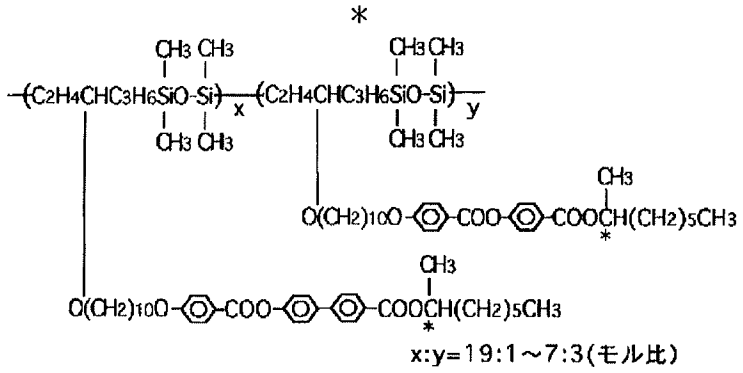
【００３２】

【化１１】

7　　8

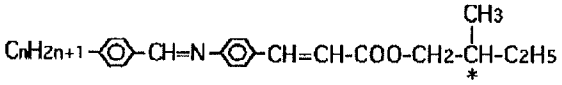


＊【００３３】
【化１２】



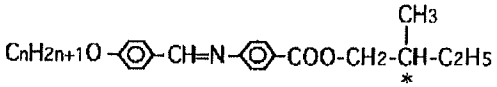
x:y=19:1～7:3(モル比)

【００３４】（ｈ）シッフ塩基系強誘電性低分子液晶　　※【化１３】
【００３５】



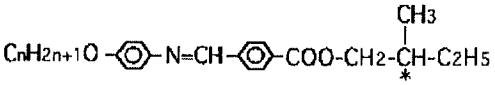
n=5～10、12、14

【００３６】
【化１４】



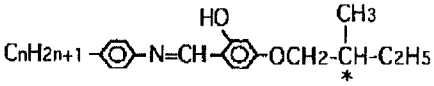
n=7～10、11

【００３７】
【化１５】



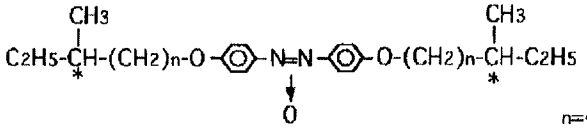
n=7、8、14

【００３８】
【化１６】



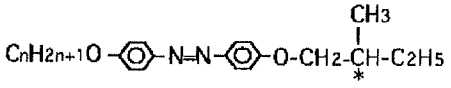
n=4、8、12

【００３９】（ｉ）アゾ及びアゾキシ系強誘電性低分子液晶
【００４０】
【化１７】



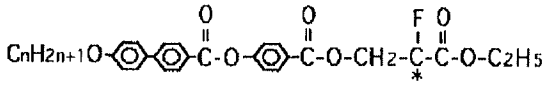
n=4、5

【００４１】
【化１８】



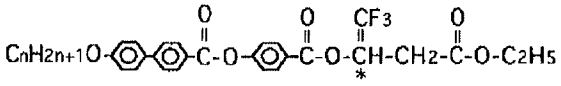
n=16

【００４２】（ｊ）ビフェニル及びアロマティックスエステル系強誘電性低分子液晶
【００４３】
【化１９】



n=8

【００４４】
【化２０】



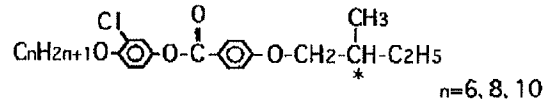
n=8

【００４５】（ｋ）ハロゲン、シアノ基等の環置換基を

導入した強誘電性低分子液晶

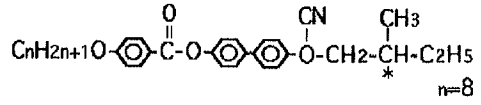
【００４６】

【化２１】



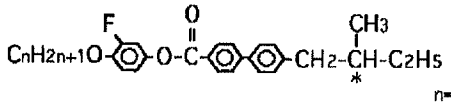
【００４７】

【化２２】



【００４８】

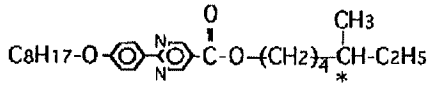
【化２３】



【００４９】（ｌ）複素環を有する強誘電性低分子液晶

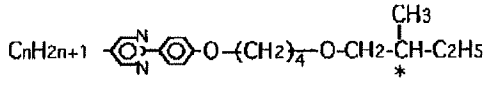
【００５０】

【化２４】



【００５１】

【化２５】



【００５２】なお、これら（ｈ）～（ｌ）の化合物は強誘電性低分子液晶の代表的なものであり、本発明の強誘電性低分子液晶はこれらの液晶に限定されるものではなく、通常の市販品等を利用してもよい。

【００５３】上記強誘電性高分子液晶の繰り返し単位は、側鎖の骨格がビフェニル骨格、フェニルベンゾエート骨格、ビフェニルベンゾエート骨格、フェニル４－フェニルベンゾエート骨格で置き換えられてもよい。また、これらの骨格中のベンゼン環のピリミジン環、ピリジン環、ピリタジン環、ピラジン環、テトラジン環、シクロヘキサン環、ジオキサン環、ジオキサボリナン環による置換、フッ素、塩素等のハロゲン基又はシアノ基による置換、１－メチルアルキル基、２－フルオロアルキル基、２－クロロアルキル基、２－クロロ－３－メチルアルキル基、２－トリフルオロメチルアルキル基、１－アルコキシカルボニルエチル基、２－アルコキシ－１－メチルエチル基、２－アルコキシプロピル基、２－クロロ－１－メチルアルキル基、２－アルコキシカルボニル－１－トリフルオロメチルプロピル基、等の光学活性基による置換も可能である。また、スペーサーの長さは、

メチレン鎖長が２～30の範囲で変化してもよい。強誘電性高分子液晶の数平均分子量は、1,000～200,000のものが好ましい。

【００５４】液晶シャッターは、印加電圧の符号を切り換えることにより、偏光状態を２状態に切り替える役目を果たす。この液晶シャッターとなる液晶セルは、強誘電性液晶が２枚の電極付き樹脂フィルム基板で狭持されたものである。前記樹脂フィルム基板の材質としては、例えば、一軸又は二軸延伸ポリエチレンテレフタレート等の結晶性ポリマー、ポリスルホン、ポリエーテルスルホン、ポリアリレート等の非結晶性ポリマー、ポリエチレン、ポリプロピレン等のポリオレフィン、ポリカーボネート、ナイロン等のポリアミドを挙げることができる。これらの中でも、特に一軸延伸ポリエチレンテレフタレート、ポリエーテルスルホン、ポリカーボネート等が好ましい。本発明において、前記２枚の樹脂フィルム基板は、互いに同じ材質のものであってもよく、又は異なる材質であってもよいが、上記２枚の基板のうち少なくとも一方の基板を光学的に透明なものとし、この基板上に透明な電極を設けて、使用することが好ましい。

【００５５】液晶セルの基板として樹脂フィルムを使用することにより、ガラスと比べてシャッター部の軽量化が図れ、しかも可撓性があるため、衝撃に対してガラスのような割れが生じないないという安全性を確保できる。また、樹脂フィルム基板の場合、セルの製造法として、長尺の一方の基板フィルムに連続的に液晶を塗工し、他方の対向する基板とラミネートして製造することができる。従って、従来のガラスセルで行われている真空注入法を使用した製造方法と比べて、セルの大型化が容易で、生産性に優れた製造法を採用できる。この結果、従来の液晶パネルでは技術的、コスト的に実用化が難しかった14インチ以上の大型セルも容易に実現できる。

【００５６】図１に示す構成の場合、液晶シャッター17は１枚の直線偏光板12と液晶セル13を組み合わせて構成し、この液晶シャッター17を表示素子であるＣＲＴ11の前方に配置する。前記偏光眼鏡としては、通常の直線偏光板を用いる。この偏光眼鏡によって左眼用画像と右眼用画像を分離するので、偏光軸としては左右で異なった方向とする。最も分離性がよいのは、左右眼鏡の偏光軸が互いに90度異なる場合である。

【００５７】本発明の構成では、左右で偏光方向が異なる偏光板眼鏡を使用するので、左右眼鏡で見える画像の色合いの差が大きくなることがある。これを防止するには、液晶セルの前方及び後方の少なくとも一方に位相差板を積層して色補償することができる。位相差板としては数多く市販されているものから、液晶セルの光学特性に合わせて選定する。本発明では前記偏光眼鏡を複数用意することにより、一つの装置を複数の人で同時に鑑賞することができる。また、前記偏光眼鏡は、表示装置以

外を見たときには単なるサングラス的なものであるため、長時間の使用に際しても違和感の少ないものである。

【００５８】本発明の第２発明に係る立体表示装置は、第１発明において、前記強誘電性液晶の強誘電性高分子液晶の含有割合が１０wt%以上であることを特徴とする。液晶としては、通常の強誘電性液晶を利用できるが、好ましくは強誘電性高分子液晶を１０重量%以上添加する。これにより、製造時の製膜性を改善したり、出来上がったセルの配向状態が機械的により安定化される。応答速度の阻害がなければ、混合比の上限は特にない。一般に、通常の強誘電性高分子液晶は、ネマチック液晶よりは十分に高速な応答が可能である。

【００５９】本発明の第３発明に係る立体表示装置は、第１又は第２発明において、前記表示素子は、その画面サイズが１４インチ以上であることを特徴とする。液晶セルが本発明に係る構成を有するため、従来のガラス液晶セルでは、実現できない大型ディスプレーに適用できるようになる。

【００６０】本発明の第４発明に係る立体表示装置は、第１～第３発明のいずれかにおいて、前記表示素子と前記液晶シャッターとの間に、偏光板が配置され、前記液晶セルのリターデーションが0.2μｍ以上であることを特徴とする。液晶セルのリターデーションとしては、0.2μｍ以上とすることにより、実際のセル厚を比較的厚めにすることができ、セル製造の歩留りを向上することができる。しかし一般にリターデーションが大きくなるにつれ、偏光板を通して見たときの表示色が着色されていく。

【００６１】図１の構成の場合、液晶シャッター17を複屈折型として利用するので、リターデーションによっては、左右で見える色合いが微妙に異なる場合がある。その場合、偏光板12に左右の見え方を補償する分光特性を持たせても良い。具体的方法としては偏光板に用いる色素の配合比を変える、薄い色補償フィルターを積層する、等がある。また、左右の偏光板のうち一方に対して、表示素子側の面に位相差板を配置してもよい。

【００６２】本発明の第５発明に係る立体表示装置は、第１～第４発明のいずれかにおいて、前記液晶シャッターは、液晶中に２色性色素を含有するゲストホスト型であることを特徴とする。ゲストホスト型液晶セルは、液晶中に２色性色素を混合することにより構成できる。２色性色素としては市販品等から適宜選定したものを使用できるが、もとの表示素子の表示画像の色合いを忠実に再現したい場合には黒色の２色性色素が好ましい。混合量としては特に限定しないが、強誘電性液晶セルの場合はセル厚が薄いので、通常は１～５重量%程度に混合することにより良好なコントラストが得られる。

【００６３】図２に示すように、前記液晶シャッター17がゲストホストモードの場合、偏光板12を設ける必要ない。駆動電圧の符号変化によって液晶シャッター17は偏光方向を切り替える役割を果たすので、観察者は左右の偏光方向が異なる偏光眼鏡14をかけるだけで立体像を認識することができる。一方、図３に示すように、液晶シャッター17を複屈折モードとして利用する場合は、ゲストホスト型液晶セル13の前面に複屈折を有するフィルム22を配置する。これによって観察者は複屈折フィルム22のリターデーションに応じた表示色のオンオフを得ることができ、結果として立体像を認識できる。複屈折フィルム22の材質としては特に問わないが、通常の一軸延伸した樹脂フィルムが安価で好適である。そのリターデーションとしては0.1～0.4程度と広い範囲で利用可能である。

【００６４】本発明の第６発明に係る立体表示装置は、第４又は第５発明において、前記液晶セルの前方及び後方の少なくとも一方に位相差板が配置されていることを特徴とする。左右で偏光方向が異なる偏光眼鏡を使用した場合、左右眼鏡で見える画像の色合いの差が大きくなる。これを防止するには、液晶セルの前方及び後方の少なくとも一方に位相差板を配置して色補償することができる。位相差板としては数多く市販されているものから、液晶セルの光学特性に合わせて選定すればよい。

【００６５】本発明の第７発明に係る立体表示装置は、第１～第６発明のいずれかにおいて、前記表示素子がＣＲＴ、液晶パネル、プラズマディスプレー、ＥＬパネル及びＬＥＤのいずれかであることを特徴とする。これらは、表示素子の具体例であり、これらに限定されるものではない。

【００６６】本発明の第８発明に係る立体表示装置は、第１～第７発明のいずれかにおいて、前記表示画像の切り替えを表示画面上で検出し、その検出結果に応じて液晶シャッターを切り替えるための電圧波形を発生させる電圧波形発生手段を設け、この電圧波形発生手段により前記表示素子の画像切り替えと同期して液晶シャッターを動作させることを特徴とする。

【００６７】通常は、表示装置の制御信号から直接タイミングをとって液晶シャッターを駆動すればよいが、表示装置自体には全く手を加えない方法として本発明の方法もある。即ち、表示装置は、左眼用画像と右眼用画像を高速で切り替えることは前述の通りであるが、その際に例えば画像の一部分にマークを付けておく。例えば、左眼用画像の場合は小さな白丸、右目用画像の場合は小さな黒丸を画像の一部に表示する。そして、例えばフォトダイオード等の光センサーを画面上のそのマーク位置に対して固定しておけば、実際の画像の切替えに応じた切替え信号を作ることができる。センサーは吸盤等で画面となるパネルに直接固定してもよく、又は液晶シャッターの一部に固定しておいてもよい。これにより、例えばＣＲＴ等の表示装置自体には何ら手を加えることなく、液晶シャッターを駆動するための切替え信号を作り

出すことが可能となる。強誘電性液晶の応答は、従来のネマチック液晶と比較してきわめて高速であるので、実用上タイミングのずれなどが生じることはない。

【００６８】

【発明の実施の形態】

［第１実施形態］図１を参照して本発明の第１実施形態に係る立体表示装置を説明する。この立体表示装置は、表示素子であるＣＲＴ11と、このＣＲＴ11の前方に配置された直線偏光板12と、この直線偏光板12の前方に配置された液晶セル13と、偏光眼鏡14とを備えて構成されている。また、前記ＣＲＴ11と液晶セル13との間には、前記表示素子の画像切り替えと同期して偏光方向15を交互に切り替えるシャッター駆動回路（図示せず）が設けられている。本実施形態では、直線偏光板12と液晶セル13により液晶シャッター17が構成され、これらの直線偏光板12と液晶セル13がＣＲＴ11のパネル面に密着するようにして設けられている。

【００６９】前記ＣＲＴ11は、画面サイズが14インチ以上のものであり、右眼用画像と左眼用画像を時分割で交互に表示する。前記直線偏光板12は、ＣＲＴ11から出た画像光を直線偏光にする。前記液晶セル13は、強誘電性高分子液晶を10wt%以上含有する強誘電性液晶が２枚の樹脂フィルム基板の間に狭持されて構成されたものである。この強誘電性液晶は、前記（ａ）、（ｂ）、（ｃ）等である。また、樹脂フィルム基板の材質は、前記一軸又は二軸延伸ポリエチレンテレフタレート、ポリスルホン、ポリエーテルスルホン等である。

【００７０】この液晶セル13の２枚の樹脂フィルム基板には、液晶駆動用電極群が形成されている。これらの電極群の材料としては、導電性を有する材料であれば特に制限はないが、少なくとも一方の電極には、導電性及び透明性の両性質を有する材料を用いることが好ましい。具体的には、例えば、酸化インジウム又は酸化インジウムと酸化錫との混合物からなるＩＴＯ(indium tin oxide)膜等の透明電極の使用が好ましい。樹脂フィルム基板上に液晶駆動用電極を形成する方法については特に制限はなく、従来公知の蒸着、スパッタリング等の方法によって形成することができる。電極上には、配向制御膜は必ずしも必要ない。必要に応じて導通防止のための絶縁膜などを設けることもできる。

【００７１】前記偏光眼鏡14は、左右で偏光方向15がそれぞれ液晶セル13のスイッチング方向と同じになるように偏光方向15が異なる偏光板18が取り付けられている。本表示装置において、ＣＲＴ11から出た画像光は、直線＊偏光板12で直線偏光にされ、その後液晶シャッター17により時分割で２つの偏光状態にされる。観察者は、偏光眼鏡14をかけることにより、右眼と左眼それぞれで別々の画像を観察するため、擬似的に立体画像を認識することができるようになる。

【００７２】［第２実施形態］図４に示すように、本実施形態に係る立体表示装置は、表示素子であるＣＲＴ11と、このＣＲＴ11の前方に配置された液晶シャッター17となるゲストホスト型液晶セル13と、シャッター駆動回路16と、偏光眼鏡14とを備えて構成されている。前記ＣＲＴ11の画面となるパネルには、光センサーであるフォトダイオード19が吸盤等で固定されている。そして、画像のこのフォトダイオードに対応する位置には、左眼用画像用及び右目用画像用のマーク20が表示される。

【００７３】前記シャッター駆動回路16は、フォトダイオード19で画像の前記マーク20を検出し、画像の切替えに応じて表示された切替え信号を液晶シャッター17に供給する。前記ゲストホスト型液晶セル13は、２色性色素が混合された強誘電性液晶が２枚の樹脂フィルム基板の間に狭持されて構成されたものである。本実施形態における偏光眼鏡14、等の他の構成は、第１実施形態と同様である。

【００７４】［第３実施形態］図５に示すように、本実施形態に係る立体表示装置は、表示素子であるプラズマディスプレー21と、このプラズマディスプレー21の前方に配置された液晶シャッター17となるゲストホスト型液晶セル13と、シャッター駆動回路16と、偏光眼鏡14とを備えて構成されている。本実施形態における偏光眼鏡14、等の他の構成は、第１及び第２実施形態と同様である。

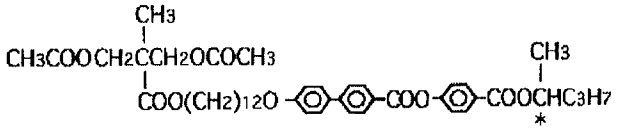
【００７５】

【実施例】

［実施例１］上記第１実施形態において、具体的条件を下記の通りとして本実施例に係る立体表示装置を作製した。下記化学式２６の構造と数式１の相転移温度を有する低分子の強誘電性液晶95重量部、数平均分子量3000のポリメチルメタクリレート（ＰＭＭＡ）4.8重量部、粒径2.2μｍの球状シリカスペーサ0.2重量部を20質量%含有するジクロルメタン溶液を調製し、この溶液をＩＴＯ電極付きポリエーテルスルホン（ＰＥＳ）フィルム基板（住友ベークライト株式会社製ＦＳＴ）のＩＴＯ電極面側にグラビアコーターで塗工した。

【００７６】

【化２６】



【００７７】

【数１】

$$Iso\ \frac{83}{83}\ SmA\ \frac{60}{60}\ SmC^*\ \frac{5}{5}\ g\ (℃)$$

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【００７８】溶媒を乾燥させた後、直ちにこの塗工された基板と、同種の基板とを一対のラミネートロールを用いてラミネートし、210mm×280mmのサイズに切出した。次に、両基板の電極間に±40V、20Hzの矩形波電圧を印加しながら、パネル全体に一様なたわみ変形による微小なせん断を与えて一軸水平配向処理を行った。このように作製した液晶セル13のリターデーション値を測定したところ、320ｎｍであった。

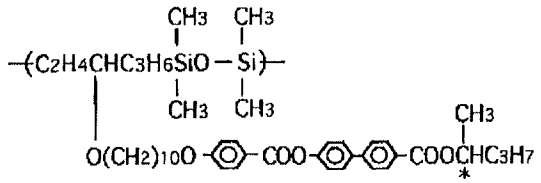
【００７９】図１に示すように、液晶の傾き角θは室温で約30度なので、直線偏光板の偏光軸は30度傾けた方向とした。また、偏光眼鏡は右眼側を直線偏光板と同方向、左眼用はそれと90度をなすような方向に偏光軸を合せた。これらの偏光板はいずれもサンリッツ製の黒色偏光板92-18を用いた。ＣＲＴの画面は、１７インチである。先ず、位相差板を設けない状態で、パーソナルコンピューターを用いてＣＲＴと液晶シャッターを同期させて動作させたところ、偏光眼鏡を通して擬似的な立体画像を認識できた。左右の見えかたとしては、左眼側がやや黄味を帯び、また右眼はやや青味を帯びていたが、両目で見たときの色合いは、自然なものであった。

【００８０】次に、リターデーションが200ｎｍの位相差板（日東電工株式会社製）12を光学主軸が水平となるように液晶セル13の前面に配置したところ、左右の眼の見えかたはほぼ同一の色合いとなり、より自然な立体表示が実現できた。また、ＣＲＴ11のパネル面は断面円弧状の曲面であったが、液晶シャッター17自体がフィルムで構成されているため、ＣＲＴ11のパネル面に密着して配置することができ、界面反射による光のロスもなく、視認性の優れたものであった。

【００８１】［実施例２］上記第２実施形態において、具体的条件を下記の通りとして本実施例に係る立体表示装置を作製した。液晶セルの液晶材料は、下記化学式２７の構造を有する強誘電性高分子液晶（数平均分子量Mn＝3100）、化学式２８の構造を有する強誘電性低分子液晶、２色性色素（日本感光色素株式会社製NKX-1033）を各15重量部、83重量部、２重量部の割合で含有するものである。この液晶材料の相転移温度を数式２に示す。

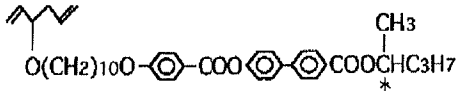
【００８２】

【化２７】



【００８３】

【化２８】



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【００８４】

【数２】

$$I \underset{96}{\text{—}} SmA \underset{93}{\text{—}} SmC^{*} \underset{20}{\text{—}} g\ (℃)$$

【００８５】上記液晶材料を20重量%含むアセトン溶液とし、実施例１と同じ基板の電極側にグラビアコーターにより塗布して製膜し、膜厚４μｍの液晶膜を作製した。次に、この基板に、対向する基板を積層した後、400mm×500mmのサイズに切出し、室温で±50V、周波数10Hzの矩形波電圧を印加しながら、直径50mmの鉄製ロールを用いて一方向に曲げ変形を与えることにより一軸水平配向処理を行った。分光器でリターデーション値を測定したところ、610ｎｍであった。本実施例のＣＲＴの画面は、２１インチである。

【００８６】表示装置の画像と液晶シャッターの動作の同期をとるため、表示画像の一部にマーカ20を表示させ、その点滅をフォトダイオード19で検出し、液晶シャッター17のオンオフを行った。偏光眼鏡14を通して画像を観察したところ、リアルな立体画像を認識することができた。また、左右の色合いの差も感じられなかった。

【００８７】［実施例３］上記第３実施形態において、具体的条件を下記の通りとして本実施例に係る立体表示装置を作製した。本実施例のプラズマディスプレー21の画面は、４２インチである。また、液晶セル13の大きさは、65cm×86cmである。

【００８８】プラズマディスプレー21の画像切り替えに同期させて液晶シャッター17への印加電圧の符号を変化させて駆動したところ、違和感のない鮮明な立体画像を認識できた。また、液晶セル13は、強誘電性液晶が２枚の樹脂フィルム基板の間に狭持されて構成されたものであるため、従来のガラス液晶セルでは、実現できない大型プラズマディスプレー21に適用できることが明らかになった。更に、偏光眼鏡14は偏光板18のみとする方式を用いれば良いため、構成が簡単である。

【００８９】

【発明の効果】本発明に係る立体表示装置によれば、液晶シャッターとなる液晶セルが、強誘電性液晶が２枚の樹脂フィルム基板の間に狭持されて構成されたものであるため、大型の表示素子に対応でき、また高速動作にも対応できる。

【図面の簡単な説明】

【図１】本発明に係る立体表示装置の第１の例を示す斜視図である。

【図２】本発明に係る立体表示装置の第２の例を示す斜視図である。

【図３】本発明に係る立体表示装置の第３の例を示す斜視図である。

【図４】本発明に係る立体表示装置の第４の例を示す斜視図である。

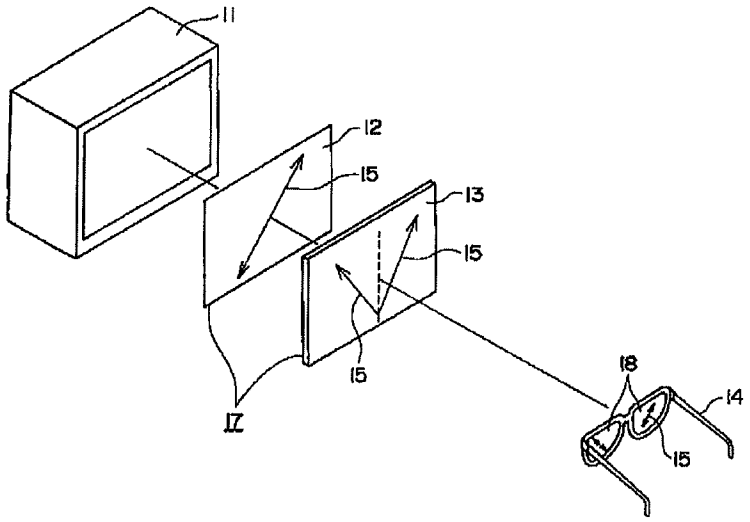
【図５】本発明に係る立体表示装置の第５の例を示す斜

視図である。

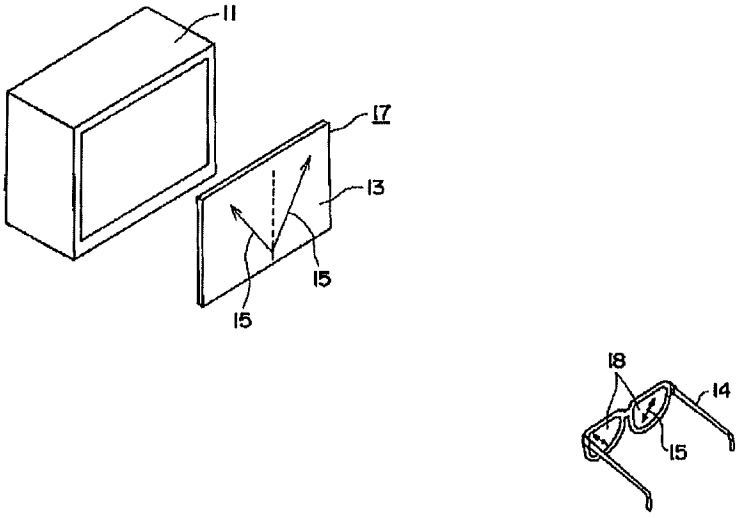
【符号の説明】

11　表示素子であるＣＲＴ
13　液晶セル
14　偏光眼鏡
＊15　偏光方向
16　シャッター駆動回路
17　液晶シャッター
20　マーク
＊　21　表示素子であるプラズマディスプレー

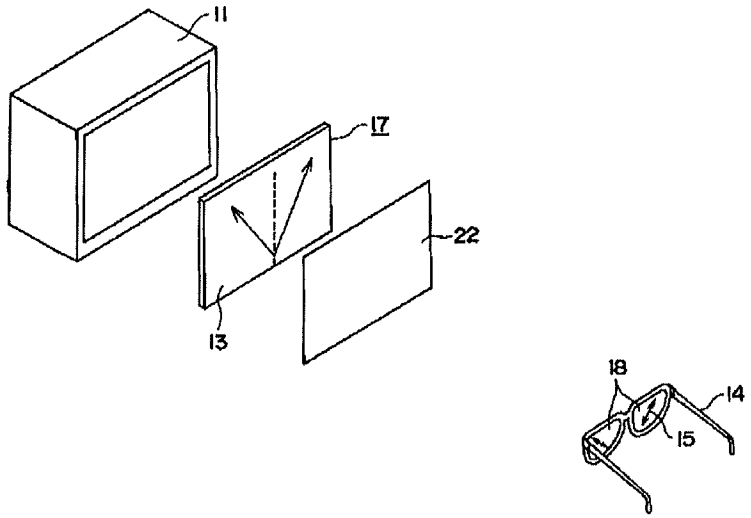
【図１】



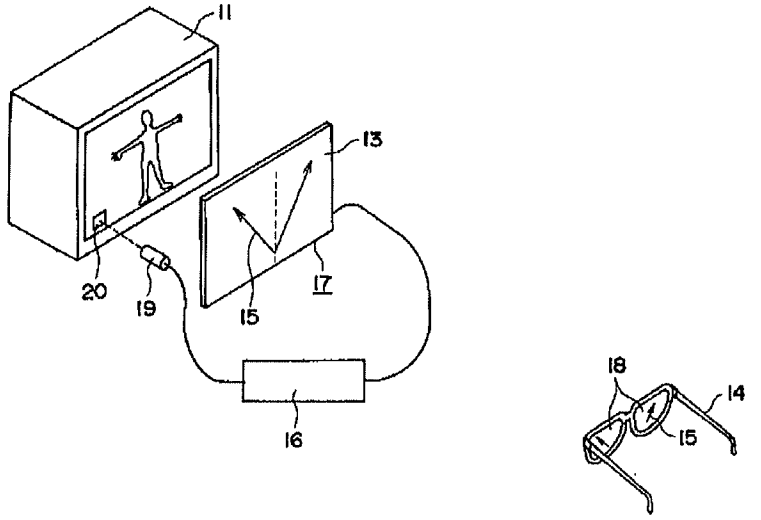
【図２】



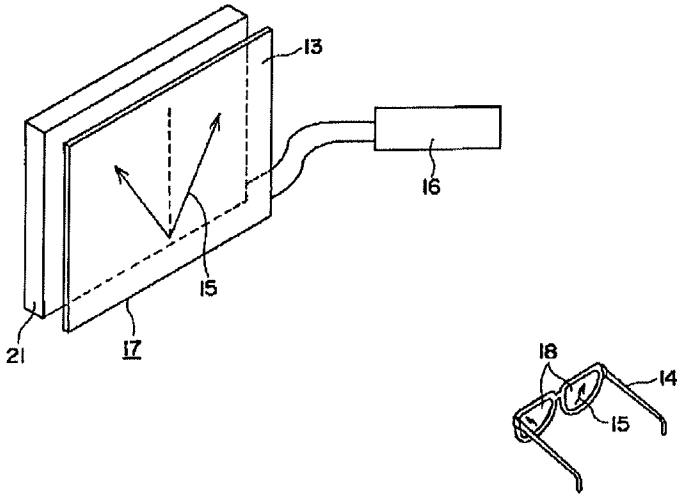
【図３】



【図４】



【図５】



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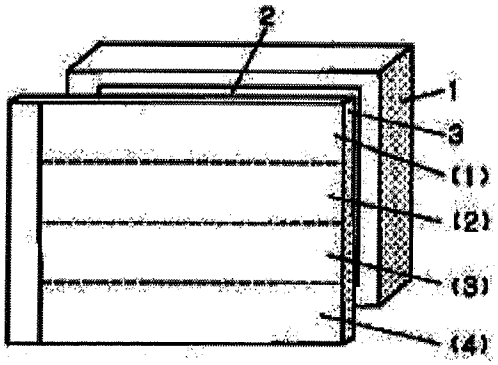
UOMORI KENYA

(54) THREE-DIMENSIONAL LIQUID CRYSTAL DISPLAY DEVICE

(57)Abstract:
PROBLEM TO BE SOLVED: To eliminate turbidity of right/left information and to provide a polarizing spectacles-type three-dimensional picture which can simultaneously be obtained for plural persons with less annoyances by synchronously operating the vertical scanning of a liquid crystal display device and a polarized axis conversion device to three- dimensional display of the image.
SOLUTION: Since light output becomes a linearly polarized light in a general TN liquid crystal display device. TN liquid crystal is used for a polarizing plate in a polarized axis conversion device 3 which is divided into four in a vertical direction. The device is 90 degrees polarized, with voltage is turned off. When the voltage is turned on, light is transmitted at 0 degree, and a polarized axis is converted. Then in an upper 1/4 region, a conversion is started from the start of vertical scanning and the polarized axis is converted by executing synchronization, so that the conversion of the polarized axis for the field terminates when scanning terminates. In a 3/4 period excepting the period of 1/4, the left eye video of an n-field reaches an observed through the left eye polarized axis. A right eye video so led by a right eye polarized acid in the 3/4 period in the next n+1 field and a three-dimensional image is displayed. Thus, the polarized axis conversion device is divided in the vertical direction and is operated, while synchronizing with the screen scanning and the image is displayed three-dimensionally by a holding-type displa device.



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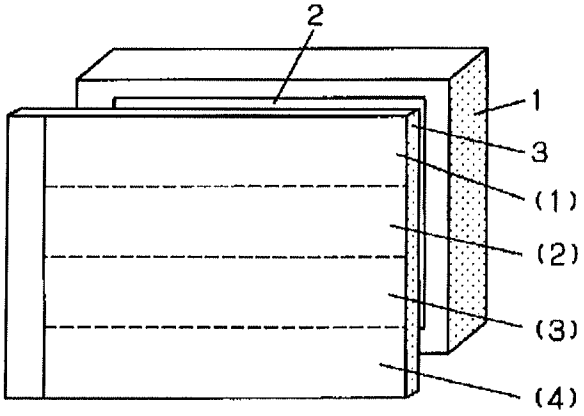
最終頁に続く

(54)【発明の名称】　三次元液晶表示装置

(57)【要約】　（修正有）

【課題】　保持型表示である液晶表示装置（１）を実用的な偏光眼鏡方式の三次元画像表示に適用する。

【解決手段】　垂直方向に複数分割された偏光軸変換装置（３）を設け、液晶表示装置の走査と偏光軸変換タイミングを同期して動作させ、フィールド毎の左右画像を混濁無く表示させる。更に、偏光軸変換装置に重ねて、光シャッタ（４）を配置できる。高分子分散液晶あるいはゲストホスト型液晶で構成される。



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【特許請求の範囲】

【請求項１】　直線偏光された光出力を生ずる液晶表示装置と、前記液晶表示装置に重ねて配置され、垂直走査方向に複数個分割された偏光軸変換装置を備え、前記液晶表示装置の垂直走査と前記偏光軸変換装置が同期して動作することを特徴とする三次元液晶表示装置。

【請求項２】　直線偏光された光出力を生ずる液晶表示装置と、前記液晶表示装置に重ねて配置され、垂直走査方向に複数個分割された偏光軸変換装置と、前記偏光軸変換装置に重ねて配置され垂直走査方向に複数個分割され透明と散乱ないし遮断の２つの動作モードをもつ光シャッター装置を備え、前記液晶表示装置の垂直走査と前記偏光軸変換装置ならびに前記光シャッターが同期して動作することを特徴とする三次元液晶表示装置。

【請求項３】　分割された偏光軸変換装置が、分割された透明電極構造を有する液晶素子であることを特徴とする請求項１又は２記載の三次元液晶表示装置。

【請求項４】　液晶素子に用いる液晶材料がＴＮ型液晶、強誘電性液晶、反強誘電液晶、強誘電性液晶ポリマー、垂直配向液晶のいずれかであることを特徴とする請求項３記載の三次元液晶表示装置。

【請求項５】　光シャッターが高分子分散液晶で構成されていることを特徴とする請求項２記載の三次元液晶表示装置。

【請求項６】　光シャッターがゲストホスト型液晶で構成されていることを特徴とする請求項２記載の三次元液晶表示装置。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、視聴者が右眼、左眼で偏光軸が直交する眼鏡をかけ、表示装置がフィールド毎に偏光軸を９０度回転させることにより両眼視差による三次元情報を表示する装置に関し、液晶表示装置に適応可能とするものである。

【０００２】

【従来の技術】従来の右眼、左眼で偏光軸が直交する、いわゆる偏光眼鏡をかけて三次元画像を表示する装置にはＣＲＴとその全面を覆う偏光軸変換装置が用いられてきた。

【０００３】この偏光軸変換装置の多くは製造のしやすから応答速度の速いＴＮ液晶が用いられることが多かった。そして、フィールド毎に右情報、左情報と交互に映出し、これと同期してＴＮ液晶をオン／オフ駆動して偏光軸を９０度捻るかそのまま透過させるかで三次元表示を行ってきた。

【０００４】

【発明が解決しようとする課題】このＣＲＴの場合は左右の情報がまざることなく視聴者の眼に到達するに、垂直帰還帰還内に液晶状態が変化出来れば良いという制約だけがあった。これはＣＲＴが発光するのはｍｓ以下の

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短時間であるため、垂直走査の始めまでに偏光軸の状態が決まっていれば、そのフィールドが右ないし左の発光だけ表示されるからである。

【０００５】しかしながらＣＲＴに替わり、例えばアクティブマトリクス型液晶を表示装置と用いると前述のごとくフィールド単位の切り替えでは、大部分の表示域で左右の情報が混濁することが判明した。その理由は液晶表示装置は次の情報が来るまで前の情報をそのまま保つ保持型の表示装置であるためである。垂直走査時間全部をかけて画面を書き換えるため、例えば画面上部の垂直走査後の部分は左の情報を、画面下部の垂直走査前の部分は前のフィールドである右の情報を表示している状態が普通となる。本発明はこの課題を解決し、液晶表示装置でも左右の情報の混濁がない三次元表示装置装置を提供しようとするものである。

【０００６】

【課題を解決するための手段】第一の本発明は、直線偏光された光出力を生ずる液晶表示装置と、前記液晶表示装置に重ねて配置され垂直走査方向に複数個分割された偏光軸変換装置を備え、前記液晶表示装置の垂直走査と前記偏光軸変換装置が同期して動作することにより三次元表示を行うものである。第二の本発明は第一の発明に加え垂直走査方向に複数個分割され透明と散乱ないし遮断の２つの動作モードをもつ光シャッター装置を備え、前記液晶表示装置の垂直走査と前記偏光軸変換装置ならびに前記光シャッターが同期して動作することにより三次元表示を行うものである。

【０００７】

【発明の実施の形態】（実施の形態１）第１の本発明の実施例を図１に示し、図と共に説明する。図１において１はアクティブマトリクス型ＴＮ液晶表示装置を、２はその画面領域を示し、ここにフィールド毎に左眼用映像と右眼用映像を交互に表示する。これらの動作原理は通常の液晶表示装置の入力信号をフィールド毎に交代するだけであるので詳細な動作説明は省略する。３は垂直方向に複数個、この図１に示す例では（１）から（４）まで４つに分割された偏光軸変換装置である。一般のＴＮ液晶表示装置は光出力が直線偏光になっているので、この偏光軸変換装置３は偏光板がＴＮ液晶を利用できる。電圧オフで９０度偏光、電圧オンで０度透過で偏光軸変換が可能となる。次に動作を図２と共に説明する。図２において横軸は時間経過を表し、（Ｖｓｃａｎ）で示すようにｎフィールドでは左眼Ｌｅｆｔ用の映像を、ｎ＋１フィールドでは右眼Ｒｉｇｈｔ用映像を表示する。（１）は上部１／４領域の動作であり、ほぼ垂直走査の始めから変換が始まり、１／４の走査が終えた時点でそのフィールド用の偏光軸に変換が終了するよう同期させる。同様に次の１／４領域もその領域の走査に同期して偏光軸の変換を行う。このようにして分割数分の１、この例では１／４の期間を除きその他の大部分３／４の期

間は、ｎフィールドの左眼映像は左眼用偏光軸で観測者に到達する。次のｎ＋１フィールドでは、同様に３／４の期間に右眼用映像は右眼用偏光軸で観測者に到達し、三次元画像を表示することが可能となる。このように垂直方向に偏光軸変換装置を分割し画面の走査に同期して動作させることにより、保持型の表示装置である液晶表示装置でも三次元画像を表示することが可能となる。

【０００８】なお、図１および図２の例では偏光軸変換装置にＴＮ型液晶装置の例を示したが、もっと高速な例えば強誘電性液晶を用いれば数μｓの応答も可能となる。この場合も液晶表示装置１の垂直走査に同期して、一番上部なら最初の１／４の期間に切り替えれば良い。他に反強誘電性液晶、強誘電性液晶ポリマー、垂直配向液晶などが応答性が速く、使用可能である。また、液晶表示装置１の応答が若干遅い場合は、偏光軸変換装置の切り替えタイミングをその応答に応じて後ろへずらす方が望ましい。

【０００９】（実施の形態２）第２の本発明の実施例を図３に示し、図と共に説明する。図１と同一構成のものは同一番号を付し、説明を省略する。図３において、本発明は図１の液晶表示装置１と偏光軸変換装置３に加へ、垂直方向に複数個分割された光シャーター装置４を備えたものである。この分割は偏光軸変換装置３の分割数と位置も同一である。これは図１の例では１／４の遷移時間の情報が観測され三次元映像として見づらい場合に対処しようとするものである。動作を説明する図４において、図３同様（Ｖｓｃａｎ）でｎフィールドでは左眼Ｌｅｆｔ用の映像を、ｎ＋１フィールドでは右眼Ｒｉｇｈｔ用映像を表示する。そして（１）の最初の１／４の遷移期間をへて偏光軸が変化するが、この遷移期間の映像を光シャッター４の（１）の部分で透過しないよう＊にする。これにより残りの正常な３／４期間の映像だけ表示されることになる。この光シャッター４は一例として分散型液晶を用いて遷移時間に電圧オフで散乱、残りの時間は電圧オンで透過というモードを利用できる。他の例としてはゲストホスト型液晶を用いて１／４遷移時間は電圧オフで遮断、残りの時間は電圧オンで透過というモードも利用可能である。どちらも４分割であるから平行平板の簡単なパターンで基本的なスタテック駆動で可能な引き出し本数（図示の例では５本）である。これによりまったく左右の画像の混濁のない三次元画像をえることが出来る。

【００１０】なお、以上動作は４分割で説明したがこれにとらわれることなく、もっと多数分割でも可能である。ただし偏光軸変換装置、光シャッターだけでなく液晶表示装置自身の応答速度も、分割数に応じて速くする必要がある。

【００１１】

【発明の効果】本発明により、保持型表示素子である液晶表示装置であっても、多人数同時かつ煩わしさの少ない偏光眼鏡方式の三次元画像を得ることが可能となる。さらに光シャッターを用いることによりより混濁のない三次元画像を得ることが可能となる。

【図面の簡単な説明】

【図１】第１の本発明の構成図

【図２】図１の動作説明図

【図３】第２の本発明の構成図

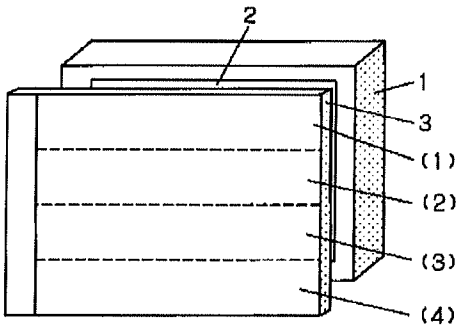
【図４】図３の動作説明図

【符号の説明】

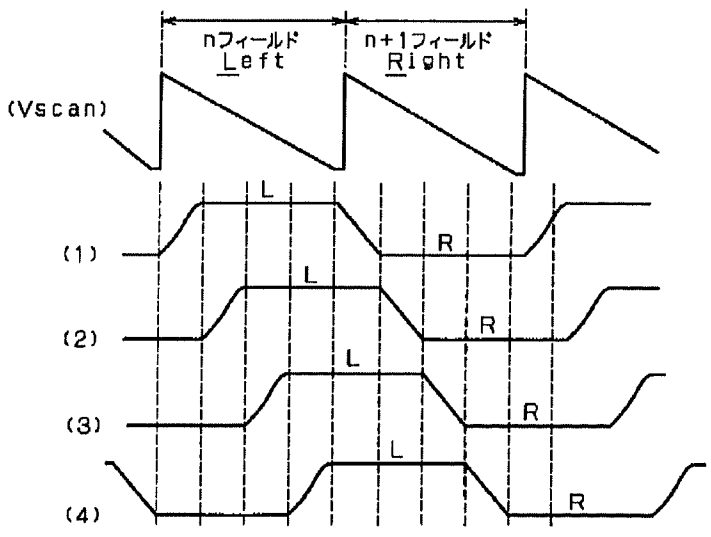
１　液晶表示装置

３　偏光軸変換装置

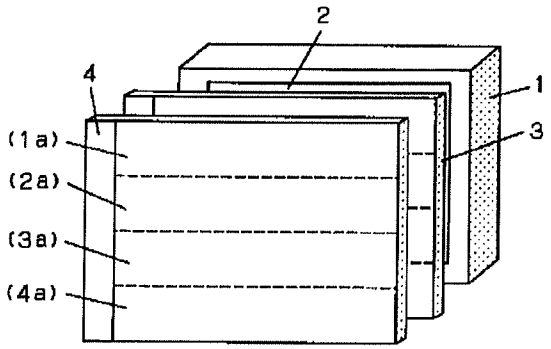
【図１】



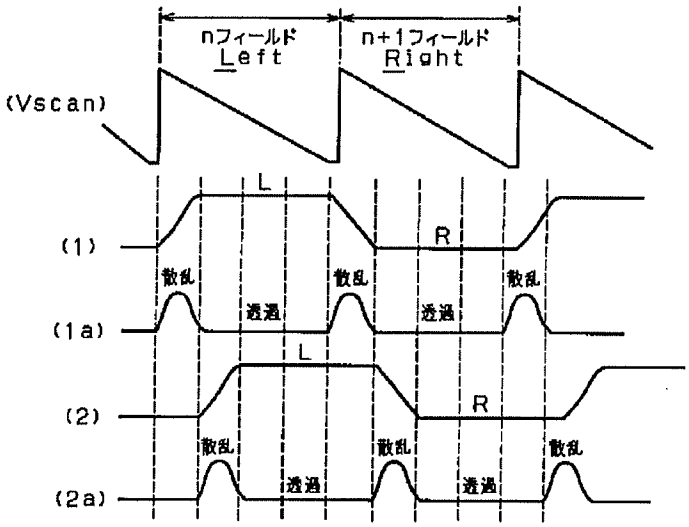
【図２】



【図３】



【図４】



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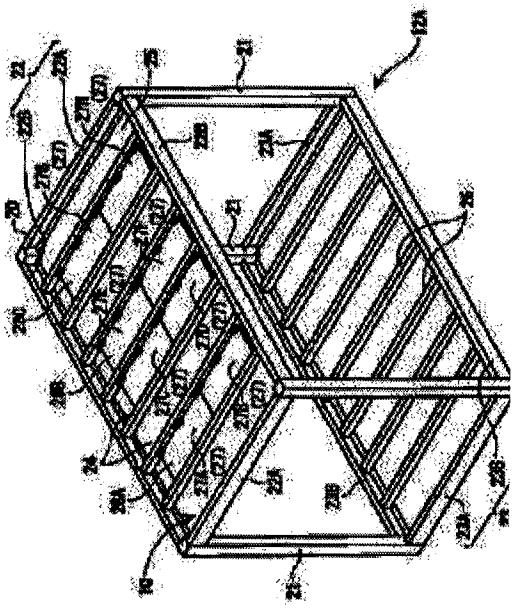
(54) VIBRATION CONTROLLING CEILING STRUCTURE FOR BUILDING

(57)Abstract:
PROBLEM TO BE SOLVED: To provide an easily constructible vibration controlling ceiling structure capable of controlling vibration efficiently.
SOLUTION: In the vibration controlling ceiling structure provided with a ceiling facing material 25 stuck to the inside of a predetermined section and a vibration controlling material 27 arranged in the ceiling facing material 25, the vibration controlling material 27 is arranged apart from the circumferential edge of the ceiling facing material 25. In this way, the vibration controlling material 27 is arranged in the part of a high degree of freedom to the vibration such as the center of the ceiling or the like, so that vibration is controlled efficiently. Arrangement of the vibration controlling material 27 is carried out only in the required part of the ceiling facing material 25, so that installation is facilitated in comparison with that requiring arrangement of the vibration controlling material 27 over the whole ceiling, and the amount of used vibration controlling material 27 can be lowered. In this way, construction is facilitated and its cost can be lowered.



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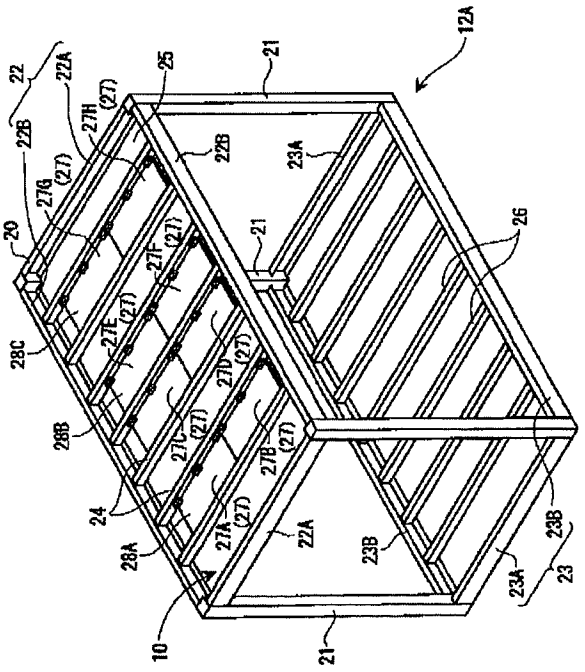
最終頁に続く

(54)【発明の名称】　建物の制振天井構造

(57)【要約】
【課題】効率的な制振が可能であるとともに、施工容易な建物の制振天井構造を提供すること。
【解決手段】所定区画内に貼られた天井面材２５と、この天井面材２５に設置された制振材２７とを有する建物の制振天井構造１０において、制振材２７を天井面材２５の周縁から離れた位置に設置する。これにより、天井中央等の振動に対する自由度の高い部分に制振材２７を設置して、効率的な制振が可能となる。また、必要な部分の天井面材２５のみに制振材２７を敷設すればよいから、天井全面に制振材２７を敷設する場合より、敷設作業が容易になるのに加えて、制振材２７の使用量も削減できる。これにより、施工作業の容易化および施工コストの削減を図ることができる。



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【特許請求の範囲】

【請求項１】所定区画内に貼られた天井面材と、この天井面材に設置された制振材とを有する建物の制振天井構造であって、

前記制振材は、前記天井面材の周縁から離れた位置に設置されることを特徴とする建物の制振天井構造。

【請求項２】請求項１に記載の建物の制振天井構造において、

前記建物は、四隅の柱の上下端を天井梁および床梁で連結した直方体状の骨組みを有する建物ユニットを複数建築現場で積み重ねて建てるユニット式建物であり、

前記所定区画は、前記建物ユニットの前記天井梁に囲まれた区画であることを特徴とする建物の制振天井構造。

【請求項３】請求項１または請求項２に記載の建物の制振天井構造において、

前記制振材は、前記天井面材の固有振動モードの腹部に対応する位置を含んで設置されることを特徴とする建物の制振天井構造。

【請求項４】請求項３に記載の建物の制振天井構造において、

前記制振材を複数隣接して形成される島状部を、互いに間隔を空けて前記所定区画内に複数設置することを特徴とする建物の制振天井構造。

【請求項５】請求項４に記載の建物の制振天井構造において、

前記複数の島状部の少なくとも２個は、連結部によって互いに連結されることを特徴とする建物の制振天井構造。

【請求項６】請求項１から請求項５のいずれかに記載の建物の制振天井構造において、

前記制振材は、面状に形成され、前記天井面材の裏面に設置されることを特徴とする建物の制振天井構造。

【請求項７】請求項１から請求項６のいずれかに記載の建物の制振天井構造において、

前記複数の野縁が、前記所定区画内に配列され、これらの野縁で前記天井面材が支持されるとともに、

前記制振材は、隣り合う２本の野縁間に架け渡されることを特徴とする建物の制振天井構造。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、建物の制振天井構造に関する。

【０００２】

【背景技術】従来から、工場で製造した箱状の建物ユニットを、建築現場で複数組合わせて建築されるユニット式建物が利用されている。このようなユニット式建物の天井構造においては、一般的に建物ユニットの天井梁に架設された野縁に天井面材を支持する構造が採用されている。ところで、近年、ユニット式建物における上階から下階への騒音伝達を防止し、遮音性を向上させる目的

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で、天井面材の裏面側にグラスウール等の吸音材を貼り付けたり、天井面材等の質量を増加させる等で振動を抑制する手法が採用されている（特開平１０－６１０５８号公報）。

【０００３】

【発明が解決しようとする課題】しかしながら、グラスウールを天井面材の裏面に貼り付けるのみでは、天井の制振効果、遮音効果が十分でないという問題がある。一方、天井面材の質量を増加させる方法では、天井全体の重量が増加するため、天井支持構造を強化する等の特別の対策が必要となり、結果として既存の建物ユニットをそのまま使用できなくなる可能性がある。また、これに伴い、施工部品が増加し、作業も煩雑化する等の問題がある。

【０００４】本発明の目的は、効率的な制振が可能であるとともに、施工容易な建物の制振天井構造を提供することにある。

【０００５】

【課題を解決するための手段】本発明は、建物の天井構造を構成する天井面材において、効率よく制振できる部位に制振材を設置することで、前記目的を達成しようとするものである。具体的に添付図面を参照して説明すると、請求項１に記載の発明は、所定区画内に貼られた天井面材２５と、この天井面材２５に設置された制振材２７とを有する建物の制振天井構造１０、４０であって、前記制振材２７は、前記天井面材２５の周縁から離れた位置に設置されることを特徴とする建物の制振天井構造１０、４０である。ここで、所定区画とは、例えば、建物の間仕切り壁等により仕切られた天井部分の区画や、ユニット式建物を構成する建物ユニットの天井梁に囲まれた区画等をいい、天井面材の周縁とは、前記壁、天井梁によってその振動が拘束される部分をいう。

【０００６】この発明によれば、所定区画内に貼られた天井面材の周縁から離れた位置に、制振材が設置された制振天井構造を採用している。したがって、天井中央等の振動に対する自由度の高い部分に制振材を設置して、効率的な制振が可能となる。また、必要な部分の天井面材のみに制振材を敷設すればよいから、天井全面に制振材を敷設する場合よりも、敷設作業が容易になるのに加えて、制振材の使用量も削減できる。これにより、施工作業の容易化および施工コストの削減を図ることができる。さらに、天井面材の全面に制振材を敷設する場合よりも、天井全体の重量が低減するため、天井支持構造を簡易なものにできる。

【０００７】請求項２に記載の発明は、請求項１に記載の建物の制振天井構造１０、４０において、前記建物は、四隅の柱２１の上下端を天井梁２２および床梁２３で連結した直方体状の骨組み２０を有する建物ユニット１２Ａを、複数建築現場で積み重ねて建てるユニット式建物１であり、前記所定区画は、前記建物ユニットの前

記天井梁に囲まれた区画Ａであることを特徴とする建物の制振天井構造１０、４０である。

【０００８】この発明によれば、建物としてユニット式建物を採用するとともに、ユニット式建物を構成する建物ユニットの天井梁で囲まれた区画を所定区画としている。したがって、複数の建物ユニット間に跨って制振材を設置する必要がないから、予め建物ユニットを工場で製造する際に、各建物ユニットに制振材を設置しておくことができる。これにより、工場で製造され、制振材の設置された建物ユニットを現場で設置するだけで、制振材を備えた制振天井構造を有するユニット式建物を施工することができる。つまり、制振材を現場で設置する作業を必要としないので、現場作業を簡略化して、施工効率を向上することができる。

【０００９】また、天井面材の周縁部分の制振材が省略されるため、建物ユニットの天井全面に制振材を設置するのと比較して、天井全体の重量が低減し、建物ユニットの梁や柱を特殊な構造とする必要がない。すなわち、従来の建物ユニットをそのまま採用することができるので、新しい建物ユニットを開発する必要もなく、効率的である。

【００１０】請求項３に記載の発明は、請求項１または請求項２に記載の建物の制振天井構造１０、４０において、前記制振材２７は、前記天井面材２５の固有振動モードＬの腹部Ｂに対応する位置を含んで設置されることを特徴とする建物の制振天井構造１０、４０である。この発明によれば、制振材が、天井面材の固有振動モードの腹部に対応する位置を含んで設置されている。したがって、天井面における最も振動の大きい腹部を含んだ周辺部を効率的に制振することができ、制振効果および遮音効果を一層向上させることができる。

【００１１】請求項４に記載の発明は、請求項３に記載の建物の制振天井構造１０、４０において、前記制振材２７を複数隣接して形成される島状部２８を、互いに間隔を空けて前記所定区画内に複数設置することを特徴とする建物の制振天井構造１０、４０である。

【００１２】この発明によれば、制振材を複数隣接して形成される島状部を、互いに間隔を空けて複数設置しているから、複数の島状部を天井面材の振動の大きい場所に分散させて設置することができ、島状部が配置される各ポイントで効果的な制振が可能となる。特に、各島状部を天井面材の固有振動モードの腹部となる位置を含んで設置することで、一層制振効果を向上できる。また、複数の制振材を隣接させて島状部としているから、制振材の数を増減させることで、島状部の質量の増減を容易に行うことができ、制振材を敷設する天井の種類に応じて、効率的な制振を行うことができる。

【００１３】請求項５に記載の発明は、請求項４に記載の建物の制振天井構造４０において、前記複数の島状部２８の少なくとも２個は、連結部４１によって互いに連結されることを特徴とする建物の制振天井構造４０である。この発明によれば、制振材の設置された複数の島状部の少なくとも２個が、連結部によって互いに連結されている。したがって、ある振動モードに対応して設置された各島状部の間に位置する部分、すなわち、制振材が設置されていない部分を腹部とする他の振動モードに対応することが可能となり、制振効果および遮音効果をより一層向上できる。

【００１４】すなわち、図１０を用いて具体的に説明すると、天井面材２５の固有振動モードである３次振動モードＬに対応して３つの腹部Ｂを含んで設置されている３つの島状部２８Ａ～２８Ｃでは、これとは異なる振動モードであり、Ｂ’位置を腹部とするような、例えば２次振動モードＭを効率的に制振することは困難である。したがって、これに対応できるように２つの腹部Ｂ’を含むように、連結部４１を各島状部２８間に設置することで、２次振動モードＭをも効率的に制振することが可能となり、制振効果を一層向上できることとなる。

【００１５】請求項６に記載の発明は、請求項１から請求項５のいずれかに記載の建物の制振天井構造１０、４０において、前記制振材２７は、面状に形成され、前記天井面材２５の裏面２５１に設置されることを特徴とする建物の制振天井構造１０、４０である。

【００１６】この発明によれば、制振材が面状に形成されているから、制振材が嵩張らず、設置スペースを少なくすることができる。また、制振材を薄くすることができるので、天井自体も薄くして天井裏スペースを広くすることができる。さらに、制振材が天井面材の裏面に設置されているから、天井面材の表面、すなわち、居室側に制振材を設置する場合と比較して、制振材を居室側から見えなくする手段、または制振材表面にクロス貼り等をする必要なく、施工作業を簡易にできる。

【００１７】請求項７に記載の発明は、請求項１から請求項６のいずれかに記載の建物の制振天井構造１０、４０において、前記複数の野縁２４が、前記所定区画内に配列され、これらの野縁２４で前記天井面材２５が支持されるとともに、前記制振材２７は、隣り合う２本の野縁２４間に架け渡されることを特徴とする建物の制振天井構造１０、４０である。

【００１８】この発明によれば、天井面材が野縁で支持されるとともに、制振材が隣り合う２本の野縁間に架け渡されているから、天井面材を確実に固定できるとともに、制振材の設置作業を容易に行うことができる。すなわち、制振材を野縁間に設置する作業は、制振材を野縁の下、すなわち、野縁と天井面材との間に設置する作業と比べて、容易に行うことができ。施工作業および施工効率の向上を図ることができる。また、制振材を設置するに当たって、野縁や天井面材を特殊な構造とする必要もないから、従来と同じものを使用することができ、効率的である。

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【００１９】

【発明の実施の形態】以下、本発明の実施の形態を図面に基づいて説明する。図１から図８には、本発明の第１実施形態に係る建物の制振天井構造１０、およびそれを用いた建物としてのユニット式建物１が示されている。ユニット式建物１は、図１に示されるように、基礎１１の上に載置される建物本体１２および屋根１３を備えたものである。また、建物本体１２は、箱状に形成された複数の下階建物ユニット１２Ａおよび上階建物ユニット１２Ｂを組合わせて造られたものである。

【００２０】１階を構成する下階建物ユニット１２Ａは、図２に示されるように、四隅に立設される４本の金属製の柱２１と、これらの柱２１の上端同士および下端同士を結合する各々４本の天井梁２２および床梁２３により構成される骨組み２０を備えている。ここにおいて、天井梁２２は、断面Ｃ型に形成された金属製の短辺天井梁２２Ａおよび同様の長辺天井梁２２Ｂの２種類から構成されている。一方、床梁２３も断面Ｃ型に形成された金属製の短辺床梁２３Ａおよび同様の長辺床梁２３Ｂの２種類から構成されている。

【００２１】対向する長辺天井梁２２Ｂの間には、木製柱状の野縁２４が複数本、本実施形態では８本、架け渡され、この野縁２４に石膏ボードからなる天井面材２５が固定されている。この天井面材２５は、上述の４本の天井梁２２で囲まれた矩形状の区画Ａを所定区画として、この区画Ａ内に適合するように貼り付けられている（図３参照）。ここで、天井面材２５は、上部天井面材２５Ａおよび下部天井面材２５Ｂを張り合わせて形成されている（図８参照）。一方、対向する長辺床梁２３Ｂの間には、根太２６が複数本、本実施形態では８本、架け渡されており、この上に必要に応じてパーチクルボード等からなる床面材（図示省略）が貼られることとなる。

【００２２】また、天井面材２５の裏面２５１における天井面材２５の周縁から離れた位置には、面状に形成された第１～第８制振材２７Ａ～２７Ｈが設置されている。これら各制振材２７Ａ～２７Ｈは、天井面材２５の上に塗布された接着剤による固定、および後述する受部材２７３と、野縁２４とのビス止めによる固定を併用して、隣り合う野縁２４の間に架け渡されている。

【００２３】制振材２７（２７Ａ～２７Ｈ）は、図５および図６に示されるように、重量ゴム等を平面矩形状に形成した遮音マット２７１と、この遮音マット２７１に積層された合板２７２とを備えている。ここで、合板２７２は遮音マット２７１と略同一の形状に形成されている。これらの遮音マット２７１と合板２７２とは、遮音マット２７１の周縁に沿うように、および対向する長辺の中点を結ぶ線分上に貼付された両面テープ２９により、互いに接着されている。また、合板２７２の４隅と長辺の中点部とには、木製四角柱上の受部材２７３が、

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合板２７２上に塗布された接着剤、および遮音マット２７１側からの釘３０の打ち込みにより固定されている。

【００２４】図２、図３に戻って、各制振材２７Ａ～２７Ｈの内、少なくとも２枚を隣接して第１～第３の３個の島状部２８Ａ、２８Ｂ、２８Ｃを構成するとともに、これらの各島状部２８Ａ、２８Ｂ、２８Ｃは互いに間隔を空けて区画Ａ内に設置されている。すなわち、第１、第２制振材２７Ａ、２７Ｂが互いに短辺側を隣接した状態で、図３中左側の２本の野縁２４間に設置され、第１島状部２８Ａが形成されている。また、第３、第４制振材２７Ｃ、２７Ｄが中央左よりの２本の野縁２４間に、および第５、第６制振材２７Ｅ、２７Ｆが中央右よりの２本の野縁２４間に、それぞれ設置され、これら４個の制振材２７Ｃ、２７Ｄ、２７Ｅ、２７Ｆにより第２島状部２８Ｂが形成されている。さらに、第７、第８制振材２７Ｇ、２７Ｈが右側の２本の野縁２４間に設置され、第３島状部２８Ｃが形成されている。

【００２５】これら各島状部２８Ａ、２８Ｂ、２８Ｃは、図４に示されるように、天井面に生じる固有振動モードである３次振動モードＬの３つの腹部Ｂに対応する位置を含んで設置され、これにより、天井面における振動のより大きい部分が効率的に制振されることとなる。このような天井面の固有振動モードは、建物ユニット１２Ａの長辺天井梁２２Ｂの長さに伴って変化する値であり、これに伴い、島状部の配置位置もその固有振動モードに対応して変化することとなる。

【００２６】すなわち、図７に示されるように、建物ユニットの長辺方向長さを変えた場合、例えば、２次の固有振動モードを有する建物ユニット５２Ａでは、その２つの腹部Ｃを含むように各島状部５８を配置すればよい（図７（Ａ）参照）。同様にして４次の固有振動モードを有する建物ユニット６２Ａでは、その４つの腹部Ｄを含むように各島状部６８を（図７（Ｂ）参照）、５次の固有振動モードを有する建物ユニットでは、その５つの腹部Ｅを含むように各島状部７８を（図７（Ｃ）参照）、配置すればよい。

【００２７】このように構成された制振天井構造１０は、次のように施工される。まず、遮音マット２７１の周縁に沿うように、および相対向する長辺の中点を結ぶ線分上に、両面テープ２９を貼付し、その上に、合板２７２を重ね合わせ接着する（図５参照）。続いて、合板２７２の４隅と長辺の中点部に接着剤を塗布して受部材２７３を取り付けるとともに、遮音マット２７１側からの釘３０の打ち込みにより固定する（図６参照）。これにより制振材２７が組み立てられる。

【００２８】次に、予め柱２１、天井梁２２、および床梁２３を直方体状に組み、野縁２４、根太２６、天井面材２５等を取り付けた下階建物ユニット１２Ａにおける、制振材２７を取り付ける野縁２４間に、接着剤を塗布する。その後、上述のように組み立てた制振材２７を

載置して、接着するとともに、受部材２７３と野縁２４とをビス止め（図示省略）することで、制振材２７を確実に固定する。これにより制振天井構造１０を備えた下階建物ユニット１２Ａが完成する。

【００２９】このように構成された下階建物ユニット１２Ａ上には、図８に示されるように、上階建物ユニット１２Ｂが載置される。ここで、２階を構成する上階建物ユニット１２Ｂは、前述の下階建物ユニット１２Ａとほぼ同様の構成を備えているが、以下の点において相違する。すなわち、断面Ｃ型の各長辺床梁２３Ｂにおける上下フランジ間に、長尺状に形成された補強用の金属製ブラケット３１が取り付けられている。２本のブラケット３１における上階建物ユニット１２Ｂの内部側面には、断面略Ｌ字形状の金属製の支持部材３２が、それぞれボルト３３により取り付けられ、この支持部材３２の上面に架け渡すように軽量気泡コンクリートパネル３４が載置され、その上に、支持板３５を介してパーチクルボードからなる床面材３６が貼られている。また、天井面材には制振材が設置されていない。

【００３０】また、以上のように構成されたユニット式建物１は次のように施工する。上述のように、予め工場で組み立てられた下階建物ユニット１２Ａ、同じく工場で柱２１、天井梁２２、床梁２３等を直方体状に組んだ上階建物ユニット１２Ｂをはじめとした建築資材を現場に輸送する。そして、建築敷地上に基礎１１を構築して、この基礎上に下階建物ユニット１２Ａを載置することで、住宅の１階部分を構成した後、この下階建物ユニット１２Ａの上に連結プレート（図示省略）を介して、上階建物ユニット１２Ｂを載置して、住宅の２階部分を構成する。最後に、上階建物ユニット１２Ｂにより構成された２階部分の上に、屋根１３を載置して住宅の施工を完了する。ユニット式建物１の施工と同時に、制振材２７の設置された制振天井構造１０が１階の天井部分に施工されることとなる。

【００３１】上述のような第１実施形態によれば、次のような効果がある。

（１）４本の天井梁２２により形成された所定区画としての区画Ａ内に貼られた天井面材２５の周縁から離れた位置に、制振材２７が設置された制振天井構造１０を採用している。したがって、上階建物ユニット１２Ｂから衝撃を受けた際に、より大きく振動する部位を重点的に制振することが可能となり、効率のよい制振を行うことができる。

（２）必要な部分の天井面材２５のみに制振材２７を敷設すればよいから、天井全面に制振材２７を敷設する場合よりも、敷設作業が容易になるのに加えて、制振材２７の使用量も削減できる。これにより、施工作業の容易化および施工コストの削減を図ることができる。

【００３２】（３）天井面材２５の全面に制振材２７を敷設する場合よりも、天井全体の重量が低減するため、天井支持構造を簡易にすることができる。

（４）建物としてユニット式建物１を採用するとともに、ユニット式建物１を構成する下階建物ユニット１２Ａの天井梁２２で囲まれた区画Ａを所定区画としている。したがって、複数の下階建物ユニット１２Ａ間に跨って制振材２７を設置する必要がないから、予め下階建物ユニット１２Ａを工場で製造する際に、制振材２７を設置しておくことができる。これにより、工場で製造され、制振材２７の設置された下階建物ユニット１２Ａを現場で組み合わせるだけで制振材２７を備えた制振天井構造１０を有するユニット式建物１を施工することができる。つまり、制振材２７を現場で設置する作業を必要とせず、施工効率の向上を図ることができる。

【００３３】（５）制振材２７が、天井面材２５の３次振動モードＬの腹部Ｂに対応する位置を含んで設置されている。したがって、天井面材２５における最も振動の大きい腹部Ｂを含んだ周辺部を効率的に制振することができ、制振効果および遮音効果を一層向上させることができる。

（６）制振材２７を複数隣接して形成した第１～第３島状部２８Ａ、２８Ｂ、２８Ｃを、互いに間隔を空けて３次振動モードＬの３つの腹部Ｂを含むように設置している。したがって、各島状部２８Ａ、２８Ｂ、２８Ｃが配置される振動のより大きいポイントを効率的に制振することができ、一層制振効果が向上する。

【００３４】（７）複数の制振材２７を隣接させて各島状部２８Ａ、２８Ｂ、２８Ｃとしているから、制振材２７の数を増減させることで、各島状部２８Ａ、２８Ｂ、２８Ｃの質量の増減を容易に行うことができ、制振材２７を敷設する天井の種類に応じて、効率的な制振を行うことができる。

（８）制振材２７が面状に形成されているから、制振材２７が嵩張らず、設置スペースを少なくすることができる。また、制振材２７を薄くすることができるので、天井自体を薄くして天井裏スペースを広くすることができる。

（９）制振材２７が天井面材２５の裏面２５１に設置されているから、天井面材２５の表面、すなわち、居室側に制振材２７を設置する場合と比較して、制振材２７を居室側から見えなくする手段、または制振材２７の表面にクロス貼り等をする必要なく、施工作業を簡易にできる。

【００３５】（１０）天井面材２５が野縁２４で支持されるとともに、制振材２７が野縁２４間に架け渡されているから、天井面材２５を確実に固定できるとともに、制振材２７の設置作業を容易に行うことができる。すなわち、制振材２７を野縁２４間に設置する作業は、制振材２７を野縁２４の下、すなわち、野縁２４と天井面材２５との間に設置する作業と比べて、容易に行うことができ。施工作業および施工効率の向上を図ることができ

る。

（１１）制振材２７を設置するに当たって、野縁２４や天井面材２５を特殊な構造とする必要もないから、従来と同じ部材等を使用することができて効率的である。

（１２）制振材２７を接着剤による固定、および受部材２７３と野縁２４とのビス止めによる固定の併用により、天井面材２５に設置しているから、確実に固定することができ、下階建物ユニット１２Ａの輸送時等に、制振材２７が外れることを防止できる。

【００３６】図９には、本発明の第２実施形態に係る建物の制振天井構造４０が示されている。制振天井構造４０では、第１～第３島状部２８Ａ、２８Ｂ、２８Ｃの間が連結部４１により連結された構造である点が、前記第１実施形態と異なるのみであり、他の構造は第１実施形態と同一である。したがって、以下の説明では、前記第１実施形態と同一構造については、同一符号を付すとともに、その説明を省略または簡略化する。

【００３７】第１～第３島状部２８Ａ、２８Ｂ、２８Ｃを連結する２つの連結部４１は、制振材２７の長辺寸法を約２分の１にした以外、その他の構成は制振材２７と同一である。この連結部４１は、島状部２８Ａ、２８Ｂ、２８Ｃの配置されていない野縁２４間における野縁２４の長手方向のほぼ中間位置に、２本の野縁２４間に架け渡されている。このように各島状部２８を連結部４１で連結した場合、図１０に示されるように、固有振動である３次振動モードＬ以外の振動モードとして生じる可能性のある、２次振動モードＭの腹部Ｂ’を含んで連結部が設置されることとなる。これにより、３つの島状部２８で固有振動を確実に制振するとともに、各連結部４１で２次振動モードＭも確実に制振することとなる。

【００３８】このように構成された制振天井構造４０は、前記第１実施形態と同様の手順で施工される。上述のような第２実施形態によれば、前記第１実施形態の（１）～（１２）と同様の効果が得られる他、以下のような効果も得られる。

（１３）制振材２７の設置された第１～第３島状部２８Ａ、２８Ｂ、２８Ｃが、連結部４１によって互いに連結されている。したがって、固有振動モードである３次振動モードＬに対応して腹部Ｂを含んで設置された各島状部２８で３次振動モードＬを抑制することができるとともに、島状部２８が設置されていない部分を腹部Ｂ’とする、例えば２次振動モードＭをも制振することができ、制振効果および遮音効果をより一層向上できる。

【００３９】なお、本発明は前記各実施形態に限定されるものではなく、本発明の目的を達成できる範囲での変形、改良は、本発明に含まれるものである。例えば、前記各実施形態において、下階建物ユニット１２Ａの短辺方向長さは、一定であったが、これに限られない。例えば、図１１示されるように、短辺方向を下階建物ユニット１２Ａの約２分の１とした下階建物ユニット８２Ａ（図１１（Ａ））や、約４分の３にした下階建物ユニット９２Ａ（図１１（Ｂ））を採用してもよい。また、短辺方向の長さを短くすることに伴い、制振材の数、大きさ等は適宜に設定して構わない。すなわち、建物ユニット８２Ａのように、中央部分のみ制振材２７を隣接して島状部８８を構成し、その両側は、制振材２７を単独で設置するものでもよい。また、建物ユニット９２Ａのように、前述の連結部と同じ大きさの制振材６７と制振材２７とを隣接して島状部９８を構成するものでもよい。

【００４０】さらに、下階建物ユニット１２Ａに設置される制振材２７の配置は、前記各実施形態の配置に限定されない。すなわち、制振材２７については、所定区画内で天井面材の周縁から離れた位置に設置されていれば、どのような配置でも構わない。例えば、図１２に示されるように、制振材６７を対向する長辺天井梁２２Ｂに沿って設置し、これらを連結部４２で連結したものでもよい。さらに、前記各実施形態では、制振材２７は野縁２４間に架け渡されていたが、これに限られず、野縁から離れて設置されていても、野縁の下に設置されていてもよい。

【００４１】前記第２実施形態において、連結部４１は、第１～第３島状部２８Ａ、２８Ｂ、２８Ｃを連結するように設置されていたが、これに限られず、複数の島状部の内の少なくとも２つを連結していればよい。また、連結部４１は、短辺方向の中間位置を含むように配置されていたが、これに限られない。要するに、間隔を空けて配置されている島状部を連結できる配置であればどのような配置でもよく、例えば、長辺天井梁近傍に配置するものでもよい。さらに、複数の連結部によって隣り合う２つの島状部を連結する構造を採用してもよい。

【００４２】前記各実施形態において、制振材２７は、平面矩形状に形成されていたが、これに限られず、円形状、多角形状等の任意の形状を採用することができる。また、制振材２７には、遮音マット２７１と合板２７２とを貼り付けたものを採用していたがこれに限られず、遮音マットのみの構成でもよい。さらに、遮音マット２７１と合板２７２との貼り付けに、両面テープ２９を採用していたが、これに限られない。要するに、貼り付けできるものであればよく、釘、接着剤等を採用して貼り付けてもよい。

【００４３】前記各実施形態では、制振材２７は、受部材２７３により、２本の野縁２４間に架け渡されて固定されていたが、これに限らず、受部材を使用しなくてもよい。すなわち、図１３に示されるように、受部材の取り付けられていない制振材６７を、直接天井面材２５上における２本の野縁２４間に接着剤等で貼り付ける構造を採用しても構わない。

【００４４】前記各実施形態では、建物としてユニット式建物１を採用していたが、これに限られず、パネル式建物、在来工法建物等の他の工法の建物を採用すること

もできる。また、前記各実施形態には示されていないが、天井面材の上には、ロックウール、グラスウール等の断熱、吸音材が敷設されていてもよい。その他、本発明を実施する際の具体的な構造および形状等は、本発明の目的を達成できる範囲内で他の構造としてもよい。

【００４５】

【発明の効果】本発明によれば、以下のような効果が得られる。すなわち、請求項１に記載の発明によれば、所定区画内に貼られた天井面材の周縁から離れた位置に制振材が設置された制振天井構造を採用している。したがって、天井中央等の振動に対する自由度の高い部分に制振材を設置して、効率的な制振が可能となる。また、必要な部分の天井面材のみに制振材を敷設すればよいから、天井全面に制振材を敷設する場合よりも、敷設作業が容易になるのに加えて、制振材の使用量も削減できる。これにより、施工作業の容易化および施工コストの削減を図ることができる。さらに、天井面材の全面に制振材を敷設する場合よりも、天井全体の重量が低減するため、天井支持構造を簡易なものにできる。

【００４６】請求項２に記載の発明によれば、建物としてユニット式建物を採用するとともに、ユニット式建物を構成する建物ユニットの天井梁で囲まれた区画を所定区画としている。したがって、複数の建物ユニット間に跨って制振材を設置する必要がないから、予め建物ユニットを工場で製造する際に、各建物ユニットに制振材を設置しておくことができる。これにより、工場で製造され、制振材の設置された建物ユニットを現場で設置するだけで制振材を備えた制振天井構造を有するユニット式建物を施工することができる。つまり、制振材を現場で設置する作業を必要としないので、現場作業を簡略化して、効率を向上することができる。

【００４７】また、天井面材の周縁部分の制振材が省略されるため、建物ユニットの天井全面に制振材を設置するのと比較して、天井全体の重量が低減し、建物ユニットの梁や柱を特殊な構造とする必要がない。すなわち、従来の建物ユニットをそのまま採用することができるので、新しい建物ユニットを開発する必要もなく、効率的である。

【００４８】請求項３に記載の発明によれば、制振材が、天井面材の固有振動の腹部に対応する位置を含んで設置されている。したがって、天井面における最も振動の大きい腹部を含んだ周辺部を効率的に制振することができ、制振効果および遮音効果を一層向上させることができるという効果がある。

【００４９】請求項４に記載の発明によれば、制振材を複数隣接して形成される島状部を、互いに間隔を空けて複数設置しているから、複数の島状部を天井面材の振動の大きい場所に分散させて設置することができ、島状部が配置される各ポイントで効果的な制振が可能となる。特に、各島状部を天井面材の固有振動の腹部となる位置を含んで設置することで、一層制振効果を向上できる。また、複数の制振材を隣接させて島状部としているから、制振材の数を増減させることで、島状部の質量の増減を容易に行うことができ、制振材を敷設する天井の種類に応じて、効率的な制振を行うことができる。

【００５０】請求項５に記載の発明によれば、制振材の設置された複数の島状部の少なくとも２個が、連結部によって互いに連結されている。したがって、ある振動モードに対応して設置された各島状部の間に位置する部分、すなわち、制振材が設置されていない部分が腹部となる他の振動モードに対応することが可能となり、制振効果および遮音効果をより一層向上できる。

【００５１】請求項６に記載の発明によれば制振材が面状に形成されているから、制振材が嵩張らず、設置スペースを少なくすることができる。また、制振材を薄くすることができるので、天井自体を薄くして天井裏スペースを広くすることができる。さらに、制振材が天井面材の裏面に設置されているから、天井面材の表面、すなわち、居室側に制振材を設置する場合と比較して、制振材を居室側から見えなくする手段、または制振材表面にクロス貼り等をする必要なく、施工作業を簡易にできる。

【００５２】請求項７に記載の発明によれば、天井面材が野縁で支持されるとともに、制振材が隣り合う２本の野縁間に架け渡されているから、天井面材を確実に固定できるとともに、制振材の設置作業を容易に行うことができる。すなわち、制振材を野縁間に設置する作業は、制振材を野縁の下、すなわち、野縁と天井面材との間に設置する作業と比べて、容易に行うことができ。施工作業および施工効率の向上を図ることができる。また、制振材を設置するに当たって、野縁や天井面材を特殊な構造とする必要もないから、従来と同じものを使用することができ、効率的である。

【図面の簡単な説明】

【図１】本発明の第１実施形態の制振天井構造を使用したユニット式建物を示す斜視図である。

【図２】図１の実施形態における下階建物ユニットを示す斜視図である。

【図３】図１の実施形態における下階建物ユニットを示す上面模式図である。

【図４】図１の実施形態における下階建物ユニットを示す部分断面図である。

【図５】図１の実施形態における制振材を示す分解斜視図である。

【図６】図１の実施形態における制振材を示す図である。

【図７】図１の実施形態における建物ユニットの長辺方向長さと固有振動モードの対応を示す図である。

【図８】図１の実施形態における建物ユニットの載置部を示す拡大断面図である。

【図９】本発明の第２実施形態における図３相当の上面

模式図である。

【図１０】図９の実施形態における図４相当の部分断面図である。

【図１１】本発明の変形例を示す図３相当の上面模式図である。

【図１２】本発明の変形例を示す図３相当の上面模式図である。

【図１３】本発明の変形例を示す部分分解斜視図である。

【符号の説明】

１　建物としてのユニット式建物

１０、４０　制振天井構造

１２Ａ　建物ユニットとしての下階建物ユニット

＊２０　骨組み

２１　柱

２２　天井梁

２３　床梁

２４　野縁

２５　天井面材

２５１　裏面

２７、６７　制振材

２８、５８、６８、７８、８８、９８　島状部

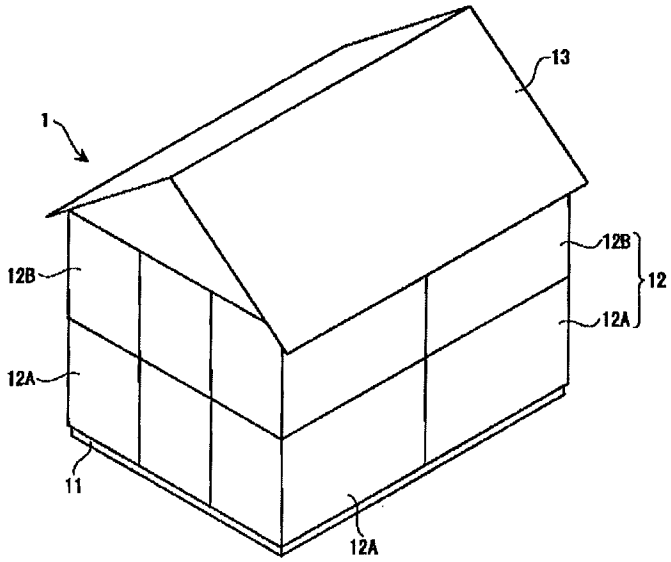
４１、４２　連結部

Ａ　所定区画としての区画

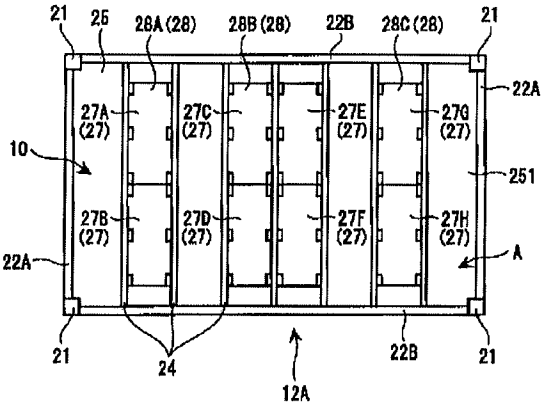
Ｂ、Ｂ’、Ｃ、Ｄ、Ｅ　腹部

Ｌ　固有振動モード

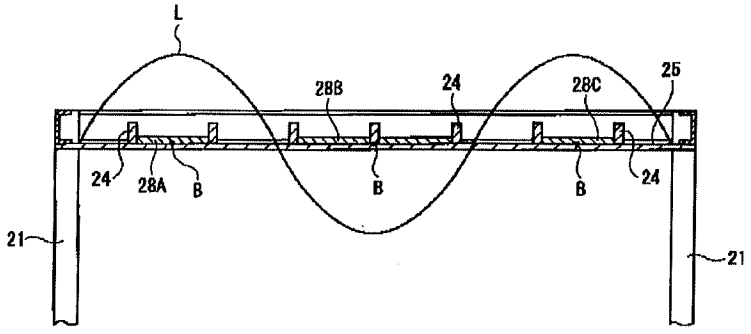
【図１】



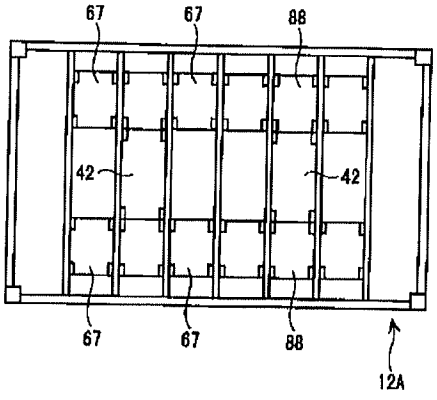
【図３】



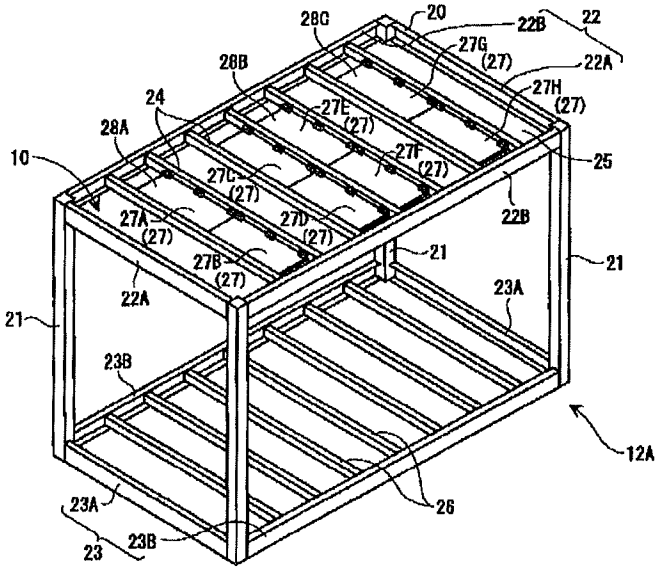
【図４】



【図１２】



【図２】


28C
20
22B
22
27G
(27)
22A
28B
27H
(27)
24
27E
(27)
28A
27F
(27)
25
10
27C
(27)
22B
27A
(27)
27D
(27)
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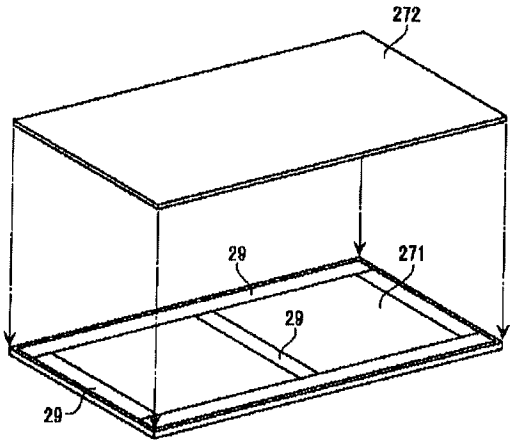
21
27B
(27)
22A
23A
21
23B
12A
26
23A
23B
23

【図５】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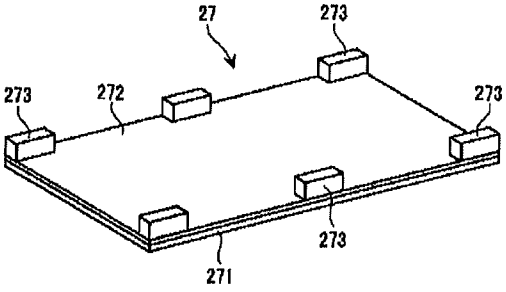
【図６】

(A)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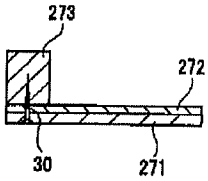
(B)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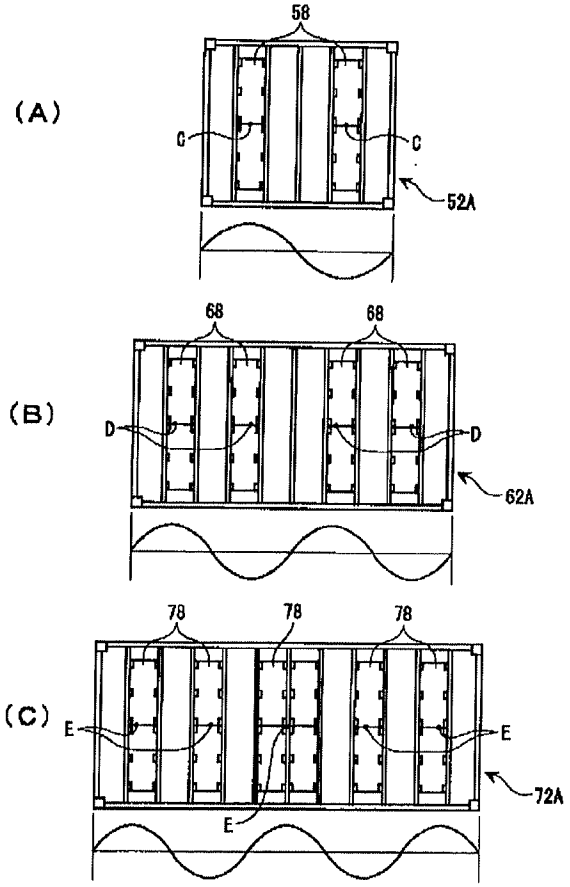
271

【図７】


(A)
58
C
C
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(B)
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62A
(C)
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72A
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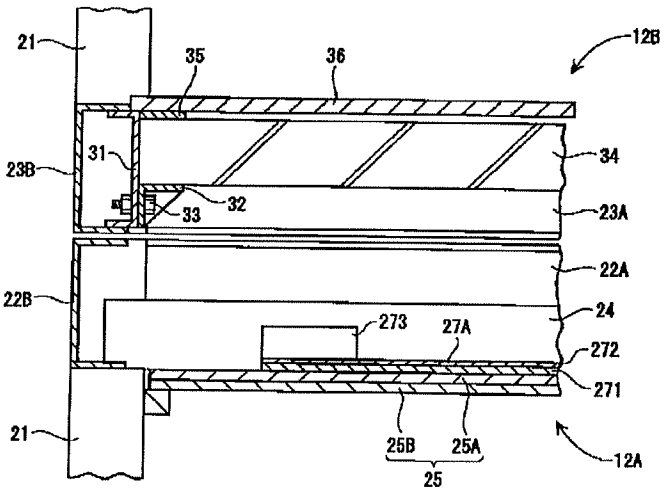
【図８】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23B
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25B
25A
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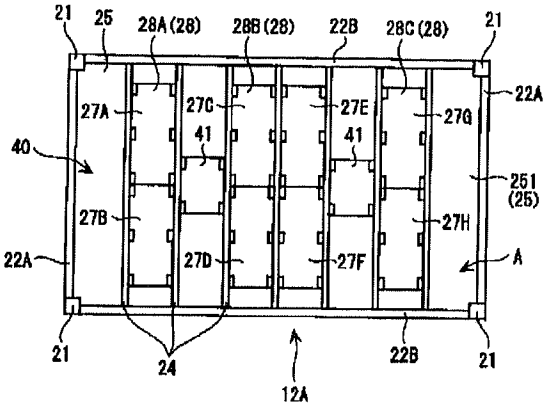
12A

【図９】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28B(28)
22B
28C(28)
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27C
27E
27G
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(25)
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22B
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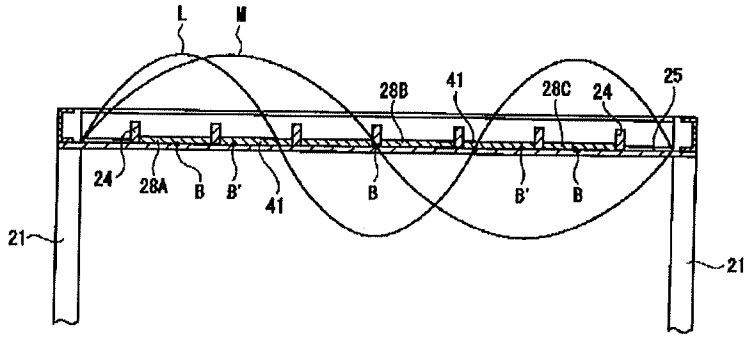
12A

【図１０】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M
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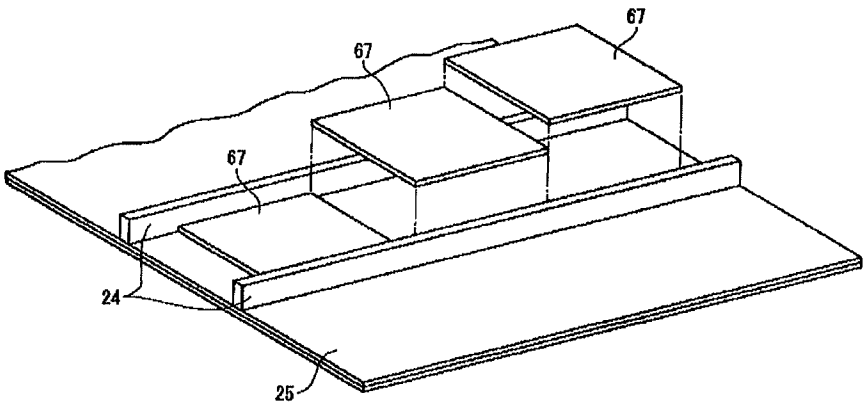
B'
B
21
21

【図１３】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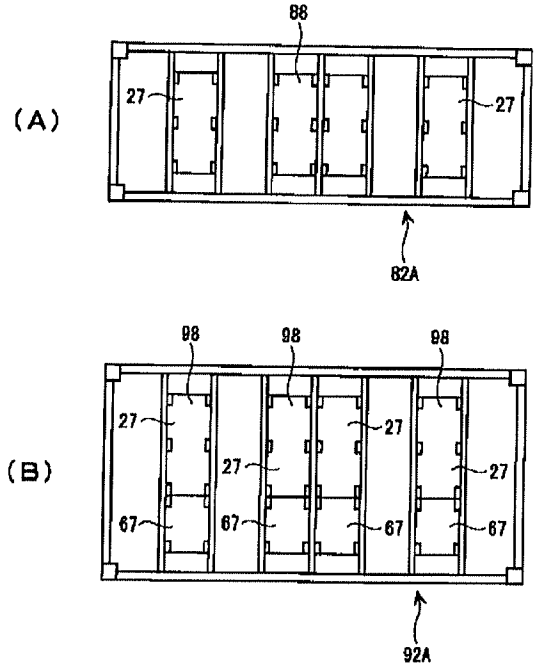
【図１１】



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Ｆターム(参考)　2E001 DG01 EA06 FA14 FA15 GA12 GA42 HC02 HE01 KA05 LA04 LA12

Electronic Acknowledgement Receipt

EFS ID:	11191856
Application Number:	12340005
International Application Number:	
Confirmation Number:	8241
Title of Invention:	STEREOSCOPIC 3D DISPLAY DEVICE
First Named Inventor/Applicant Name:	Seung-Chul Lee
Customer Number:	757
Filer:	Gustavo Siller Jr./Maggie Pieczonka
Filer Authorized By:	Gustavo Siller Jr.
Attorney Docket Number:	12579-6201
Receipt Date:	14-OCT-2011
Filing Date:	19-DEC-2008
Time Stamp:	16:58:51
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		12579-6201IDS.pdf	224313 3328cb42902882fdf480ba15732e010449f5b461	yes	5

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Miscellaneous Incoming Letter	1	1
	Transmittal Letter	2	4
	Information Disclosure Statement (IDS) Form (SB08)	5	5

Warnings:					
Information:					
2	Foreign Reference	C1.pdf	361506 23cb2f70869ae3b0897943d1d850a6828205da02	no	6
Warnings:					
Information:					
3	Foreign Reference	C2.pdf	404187 edf4f9c9def116db5904d095dbb224a5456a7389	no	7
Warnings:					
Information:					
4	Foreign Reference	C3.pdf	900346 8b2c1c003351a8bfd71bac6537995c658bce9afa	no	14
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5	Foreign Reference	C4.pdf	748653 cb2a9da11c278d00c0fd3e8e52b4498c64e982f4	no	10
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6	Foreign Reference	C5.pdf	948490 1175a08fbc564841aece1a8777443cdf6fc3d40a	no	13
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7	Foreign Reference	C6.pdf	379971 318c8de64dac786088133e70ba68e830f6a0a715	no	5
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8	Foreign Reference	C7.pdf	1100510 fd5c602bb650fee253e90fdd7532974fd79de2a9	no	12
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			Total Files Size (in bytes):	9084205	

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If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

CERTIFICATE OF EFS FILING UNDER 37 CFR §1.8

I hereby certify that this correspondence is being electronically transmitted to the United States Patent and Trademark Office, Commissioner for Patents, via the EFS pursuant to 37 CFR §1.8 on the below date:

Date: October 14, 2011 Name: Gustavo Siller, Jr. Signature: /Gustavo Siller, Jr./

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Appln. of: Seung-Chul Lee et al.

Appln. No.: 12/340,005

Filed: December 19, 2008

For: STEREOSCOPIC 3D DISPLAY DEVICE

Attorney Docket No: 12579-6201

Examiner: Steven C. Nguyen

Art Unit: 2443

Confirmation No.: 8241

TRANSMITTAL

Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Sir:

Attached is/are:

☒ Transmittal; Information Disclosure Statement; PTO-1449; Cited References C1 through C9.

Fee calculation:

☒ No additional fee is required.

☐ Small Entity.

☐ An extension fee in an amount of $_____ for a ____- month extension of time under 37 CFR § 1.136(a).

☐ A petition or processing fee in an amount of $_____ under 37 CFR § 1.17(___) .

☐ An additional filing fee has been calculated as shown below:

					Small Entity			Not a Small Entity	
	Claims Remaining After Amendment		Highest No. Previously Paid For	Present Extra	Rate	Add'l Fee	OR	Rate	Add'l Fee
Total		Minus			x $26=			x $52=	
Indep.		Minus			x 110=			x $220=	
First Presentation of Multiple Dep. Claim					+$195=			+ $390=	
					Total	$		Total	$

Fee payment:

☐ Please charge Deposit Account No. 23-1925 in the amount of $_____for _____.

☐ Payment by credit card in the amount of $_____ (Form PTO-2038 is attached).

☒ The Director is hereby authorized to charge payment of any additional filing fees required under 37 CFR § 1.16 and any patent application processing fees under 37 CFR § 1.17 associated with this paper (including any extension fee required to ensure that this paper is timely filed), or to credit any overpayment, to Deposit Account No. 23-1925.

Respectfully submitted,

October 14, 2011
Date

/Gustavo Siller, Jr./
Gustavo Siller, Jr. (Reg. No. 32,305)

I hereby certify that this correspondence is being Electronically Transmitted on the date noted below to:
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450
10/14/2011
Date of Deposit
Gustavo Siller, Jr.
Name of applicant, assignee or Registered Representative
/Gustavo Siller,Jr./
Signature
10/14/2011
Date of Signature

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Appln. of:	Seung-Chul Lee et al.		
Appln. No.:	12/340,005	Examiner:	Steven C. Nguyen
Filed:	December 19, 2008	Art Unit:	2443
For:	STEREOSCOPIC 3D DISPLAY DEVICE	Confirmation No.:	8241
Attorney Docket No:	12579-6201		

SECOND SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

In accordance with the duty of disclosure under 37 CFR §1.56 and §§1.97-1.98, and more particularly in accordance with 37 CFR §1.97(b), Applicants hereby cite the following reference(s):

FOREIGN PATENT DOCUMENTS		
DOCUMENT NO.	**DATE**	**COUNTRY**
JP 61-227498	10/09/1986	Japan
JP 62-191824	08/22/1987	Japan
JP 05-232403	09/10/1993	Japan
JP 06-029914	02/04/1994	Japan
JP 11-038361	02/12/1999	Japan

JP 11-298918	10/29/1999	Japan
JP 2001-214566	08/10/2001	Japan

OTHER ART – NON PATENT LITERATURE DOCUMENTS
Copy of Office Action issued in corresponding Japanese Patent Application No. 2008-316168, mailed July 12, 2011.
Copy of Office Action issued in corresponding Chinese Patent Application No. 200810180777.5, mailed August 12, 2011.

Applicants are enclosing Form PTO-1449 (one sheet), along with a copy of each listed reference for which a copy is required under 37 CFR §1.98(a)(2). Pursuant to the undersigned attorney's obligation and duties under 37 CFR §§ 1.56 and 1.98(a)(3) and (c), either English language abstracts, partial translations, or full translations are included for patent documents which are not in English for the express purpose of providing a concise explanation of the references to the Patent and Trademark Office with the opportunity to evaluate the same. Applicants respectfully request the Examiner's consideration of the above reference(s) and entry thereof into the record of this application.

By submitting this Statement, Applicants are attempting to fully comply with the duty of candor and good faith mandated by 37 CFR §1.56. As such, this Statement is not intended to constitute an admission that any of the enclosed references, or other information referred to therein, constitutes "prior art" or is otherwise "material to patentability," as that phrase is defined in 37 CFR §1.56(a).

The Applicant or Applicants have calculated no fee to be due in connection with the filing of this Information Disclosure Statement. However, the Director is authorized to charge any fee deficiency associated with the filing of this Information Disclosure Statement to a deposit account, as authorized in the Transmittal accompanying this Information Disclosure Statement.

Respectfully submitted,

October 14, 2011
Date

/Gustavo Siller, Jr./
Gustavo Siller, Jr.
(Reg. No. 32,305)

FORM PTO-1449	SERIAL NO. 12/340,005	CASE NO. 12579-6201
LIST OF PATENTS AND PUBLICATIONS FOR APPLICANT'S INFORMATION DISCLOSURE STATEMENT	FILING DATE 12/19/2008	GROUP ART UNIT 2443
(use several sheets if necessary)	APPLICANT(S): Seung-Chul Lee et al.	CONFIRMATION NO. 8241

REFERENCE DESIGNATION **U.S. PATENT DOCUMENTS**

EXAMINER INITIAL		DOCUMENT NUMBER Number-Kind Code (if known)	DATE	NAME	CLASS/ SUBCLASS	FILING DATE
	B1	20040012851 A1	01/22/2004	Sato et al.		
	B2	20060268196 A1	11/30/2006	Jung		

FOREIGN PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER Number-Kind Code (if known)	DATE	COUNTRY	CLASS/ SUBCLASS	TRANSLATION YES OR NO
	B3	CN 1873482 A	12/06/2006	China		Abstract

EXAMINER INITIAL		OTHER ART – NON PATENT LITERATURE DOCUMENTS (Include name of author, title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date page(s), volume-issue number(s), publisher, city and/or country where published.
	B4	Copy of Office Action issued in corresponding Chinese Patent Application No. 200810180777.5, mailed February 11, 2011.

EXAMINER	DATE CONSIDERED

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

Espacenet

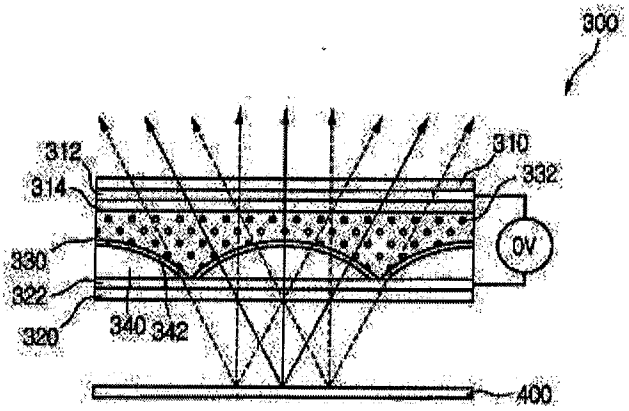
Bibliographic data: CN 1873482 (A)

Liquid crystal panel, display device having liquid crystal panel, and driving method thereof

Publication date:	2006-12-06
Inventor(s):	JUNG JIN H [KR] ±
Applicant(s):	LG PHILIPS LCD CO LTD [KR] ±
Classification:	**- international:** ***G02B3/00; G02F1/133; G02F1/1335***
	- European: G02F1/1335L
Application number:	CN20061083714 20060531
Priority number(s):	KR20050045918 20050531
Also published as:	• US 2006268196 (A1) • KR 20060124143 (A)

Abstract of CN 1873482 (A)

A liquid crystal panel includes a first substrate and a second substrate; a first electrode on a surface of the first substrate; a light refraction device on the second substrate, the light refraction device including a plurality of light refracting lenses facing the surface of the first substrate; and a liquid crystal layer interposed between the first electrode and the light refracting lenses.



[19] 中华人民共和国国家知识产权局

[51] Int. Cl.
G02F 1/133 (2006.01)
G02F 1/1335 (2006.01)
G02B 3/00 (2006.01)

[12] 发明专利申请公开说明书

[21] 申请号 200610083714.9

[43] 公开日 2006 年 12 月 6 日

[11] 公开号 CN 1873482A

[22] 申请日 2006.5.31
[21] 申请号 200610083714.9
[30] 优先权
[32] 2005.5.31 [33] KR [31] 10-2005-0045918
[71] 申请人 LG. 菲利浦 LCD 株式会社
地址 韩国首尔
[72] 发明人 郑真希

[74] 专利代理机构 北京律诚同业知识产权代理有限公司
代理人 徐金国 祁建国

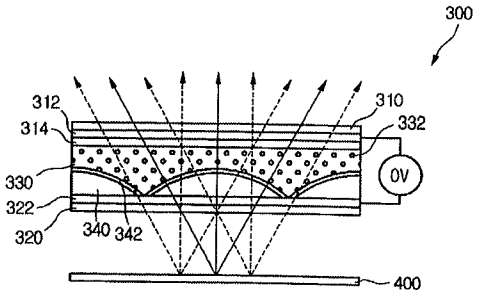
权利要求书 5 页 说明书 7 页 附图 7 页

[54] 发明名称

液晶板、具有液晶板的显示器件及其驱动方法

[57] 摘要

一种液晶面板，包括：第一基板和第二基板；位于所述第一基板表面上的第一电极；位于所述第二基板上的光折射器件；所述光折射器件包括面对所述第一基板表面的多个光折射透镜；以及夹在所述第一电极和所述光折射器件之间的液晶层。



1、一种液晶面板，包括：

第一基板和第二基板；

位于所述第一基板整个表面的第一电极；

位于所述第二基板上的光折射器件；所述光折射器件包括面对所述第一基板表面的多个光折射透镜；以及

夹在所述第一电极和所述光折射器件之间的液晶层。

2、根据权利要求 1 所述的液晶面板，其特征在于，各光折射透镜具有面对所述第一基板的凸表面。

3、根据权利要求 1 所述的液晶面板，其特征在于，所述光折射透镜彼此平行并且沿第一方向延伸。

4、根据权利要求 3 所述的液晶面板，其特征在于，所述第一方向是垂直方向。

5、根据权利要求 3 所述的液晶面板，其特征在于，每两相邻的光反射透镜之间具有沿第一方向延伸的槽。

6、根据权利要求 3 所述的液晶面板，其特征在于，所述液晶层中液晶分子的排列方向与所述第一方向一致。

7、根据权利要求 1 所述的液晶面板，其特征在于，各光折射透镜包括具有凸顶表面和基本上平的底表面的部分圆柱的透镜，所述凸顶表面面对所述第一基板，并且所述基本上平的底表面面对所述第二基板。

8、根据权利要求 1 所述的液晶面板，其特征在于，所述光折射器件是双凸透镜。

9、根据权利要求 1 所述的液晶面板，其特征在于，所述第一电极位于所述第一基板的基本整个表面上。

10、根据权利要求 1 所述的液晶面板，其特征在于，还包括位于第一电极的基本整个表面的第一定向层。

11、根据权利要求 1 所述的液晶面板，其特征在于，还包括位于所述多个光折射透镜上方的第二定向层。

12、根据权利要求 1 所述的液晶面板，其特征在于，所述光折射器件由聚

合材料形成。

13、根据权利要求 12 所述的液晶面板，其特征在于，所述聚合材料是导电聚合材料，并且所述光折射材料用作第二电极。

14、根据权利要求 1 所述的液晶面板，其特征在于，还包括电源，用于向所述液晶层有选择地施加电场，其中所述液晶层的折射率根据是否施加电场与所述光折射器件的折射率基本上相同或者不同。

15、根据权利要求 14 所述的液晶面板，其特征在于，当液晶层上未施加电场时，液晶层的折射率与光折射器件的折射率基本上相同；以及当液晶层上施加电场时，液晶层的折射率与光折射器件的折射率不相同。

16、根据权利要求 14 所述的液晶面板，其特征在于，还包括位于所述第二基板的整个表面上的第二电极，其中电源在所述第一电极和第二电极之间有选择地施加电压以产生所述电场。

17、根据权利要求 14 所述的液晶面板，其特征在于，所述光折射器件包括导电聚合物并且用作第二电极，以及所述电源在所述第一电极和第二电极之间有选择地施加电压以产生所述电场。

18、一种用于有选择地显示二维图像和三维图像之一的显示器件，包括：

平板显示器，用于显示至少一图像；以及

二维和三维图像面板，所述二维和三维图像面板根据在所述二维和三维图像面板上是否施加有电场或者折射来自所述平板显示器的至少一图像以显示三维图像或者透过来自所述平板显示器的至少一图像以显示二维图像。

19、根据权利要求 18 所述的显示器件，其特征在于，所述二维和三维图像面板包括图像折射层，所述图像折射层用于根据在所述图像折射层上是否施加有电场在图像折射层中或者折射所述至少一图像或者在所述图像折射层中没有折射透过所述至少一图像。

20、根据权利要求 19 所述的显示器件，其特征在于，还包括电源，用于根据显示二维图像或者三维图像向所述图像折射层施加电场。

21、根据权利要求 19 所述的显示器件，其特征在于，所述图像折射层包括：

光折射器件，具有多个背向所述平板显示器的光折射透镜；以及

液晶层，位于所述多个光折射透镜上方。

22、根据权利要求 21 所述的显示器件，其特征在于，各光折射透镜具有背向所述平板显示器的凸表面。

23、根据权利要求 21 所述的显示器件，其特征在于，所述光折射透镜彼此平行并且沿第一方向延伸。

24、根据权利要求 23 所述的显示器件，其特征在于，所述第一方向是垂直方向。

25、根据权利要求 21 所述的显示器件，其特征在于，所述光折射器件是双凸透镜。

26、根据权利要求 21 所述的显示器件，其特征在于，所述光折射器件是由聚合材料形成的。

27、根据权利要求 21 所述的显示器件，其特征在于，液晶层的折射率根据在液晶层上是否施加有电场而与所述光折射器件的折射率相同或不同。

28、根据权利要求 21 所述的显示器件，其特征在于，当液晶层上未施加电场时，液晶层的折射率与光折射器件的折射率基本上相同从而来自所述平板显示器件的至少图像在所述光折射器件和液晶层之间的界面不会发生折射；以及当液晶层上施加电场时，液晶层的折射率与光折射器件的折射率不同从而来自所述平板显示器件的至少图像在所述光折射器件和液晶层之间的界面发生折射。

29、根据权利要求 21 所述的显示器件，其特征在于，所述二维和三维图像面板还包括：

第一基板和第二基板；以及

第一电极，位于所述第一基板上基本整个表面上；

其中所述液晶层夹在所述第一电极和所述多个光反射透镜之间。

30、根据权利要求 29 所述的显示器件，其特征在于，所述光折射器件包括导电聚合材料并且用作第二电极，以及在所述第一电极和第二电极之间施加电压以产生所述电场。

31、根据权利要求 29 所述的显示器件，其特征在于，所述二维和三维图像面板还包括位于所述第二基板基本整个表面上的第二电极，以及在所述第一电极和所述第二电极之间施加的电压以产生所述电场。

32、根据权利要求 29 所述的显示器件，其特征在于，所述二维和三维图

像面板还包括：

第一定向层，位于所述第一电极的表面上；以及

第二定向层，位于所述第二电极的表面上。

33、根据权利要求 21 所述的显示器件，其特征在于，还包括位于所述平板显示器和所述二维和三维图像面板之间的偏振板，所述偏振板具有当所述图像折射层中液晶层上未施加电场时所述液晶层中液晶分子的初始排列方向相同的透射方向。

34、根据权利要求 21 所述的显示器件，其特征在于，所述平板显示器是液晶显示器件，当所述图像折射层中的液晶层上未施加时所述液晶层中液晶分子的初始排列方向与所述液晶显示器件的偏振方向相同。

35、根据权利要求 18 所述的显示器件，其特征在于，所述平板显示器件选自液晶显示器件、等离子显示板、场发射显示器件、以及有机电致发光板。

36、一种用于有选择地显示二维图像和三维图像之一的方法，包括：

从平板显示器输出至少一图像；

通过二维和三维图像面板接收至少一图像；以及

根据在所述二维和三维图像面板上是否施加电场通过二维和三维图像面板或者折射来自所述平板显示器的至少一图像以显示三维图像或者透过来自所述平板显示器的至少一图像以显示二维图像。

37、根据权利要求 36 所述的方法，其特征在于，所述二维和三维图像面板包括图像折射层，所述方法还包括根据在所述图像折射层上是否施加电场或者在所述图像折射层内折射所述至少一图像或者在所述图像折射层中没有折射透过所述至少一图像。

38、根据权利要求 37 所述的方法，其特征在于，当在所述图像折射层上施加电场时，来自所述平板显示器的所述至少一图像在所述图像折射层内折射从而在所述二维和三维图像面板上显示三维图像；以及当在所述图像折射层上未施加电场时，来自所述平板显示器的所述至少一图像在所述图像折射层不发生折射而透射从而在所述二维和三维图像面板上显示二维图像。

39、根据权利要求 38 所述的方法，其特征在于，所述图像折射层包括具有多个背向所述平板显示器的光折射透镜的光折射器件，并且液晶层在所述多个光折射透镜上方，

其中当在所述液晶层上施加电场时，所述至少一图像在所述光折射器件和所述液晶层之间的界面发生折射，以及

当在所述液晶层上未施加电场时，所述至少一图像在所述光折射器件和所述液晶层之间的界面不发生折射。

液晶板、具有液晶板的显示器件及其驱动方法

本申请要求2005年5月31日在韩国提交的专利申请No. 10-2005-0045918的优先权，在此将其全部内容结合进来作为参考。

技术领域

本发明涉及一种显示器件，尤其是涉及一种使用透镜方法并能有选择地显示二维（2D）或三维（3D）图像的显示器件。

背景技术

在多媒体技术中对虚拟实现的需求增加。同时，开发出诊断和测量的 3D 可视技术。因此，对能够以三维形式来显示图像的显示器件的需求增加。

3D 显示技术能够应用于用于广告的 3D 显示、用于家庭使用的 3D 多媒体图像显示、用于教学和培训的 3D 仿真器和图像显示终端、用于各种精确测量和诊断的视觉图像显示终端、用于医疗使用的 3D 图像显示终端、用于各种监视和控制的 3D 图像显示终端、用于视频会议和广告的 3D 图像显示器、用于广播的 3D 电视、用于教学/娱乐的 3D 图像显示终端、用于产生各种特定环境的组件以及用于 3D 游戏的图像器件。

通用 3D 显示器件所需的技术包括为形成视野而设计和制作光学板的技术，例如双凸透镜板或者微透镜板，以及用于在显示器件上形成与视野形式相对应的像素图案的驱动控制技术。

用于显示 3D 图像的方法包括使用 2 视点（其中分别显示用于左眼和右眼的图像）的方法以及使用多视点（其中显示在各种方向拍摄的双眼视差图像）的方法。使用多视点的方法具有的缺陷是分辨率与视点数量成反比，但其在视点位置上有很大的灵活度，由此可得到自然的 3D 图像。

典型的无眼镜（non-glasses）方法包括视差栅（parallax barrier）方法和双凸透镜方法，其对应左眼和右眼来分离用于左眼和右眼的图像数据。

图 1 所示为现有技术中棱镜型显示器件的分解透视图。如图 1 所示，双凸

透镜置于如液晶显示器件（LCD）的平板显示器 100 的外表面。双凸透镜基板 110 以如下方式设置，双凸透镜 112 被设置在平板显示器 100 中构成一彩色像素的红、绿和蓝像素的子像素阵列上，以实现水平和垂直视差。

图 2 所示为使用图 1 中的双凸透镜法实现 3D 图像的示意图。参照图 2，说明在平板显示器件中实现 3D 图像的双凸透镜方法。

双凸透镜方法根据左眼和右眼的视差原理，使得人们在观看时可体验三维感觉的物体。有关物体的用于左眼和右眼的图像数据（至少二视点）输入到平板显示器 100，并且经双凸透镜 112 折射多个上述数据并分别在左眼和右眼观看到。双凸透镜 112 折射后的图像数据在人脑中合成，从而实现 3D 图像。

即，根据在 2D 平面显示屏上实现 3D 图像的原理，在显示屏上输入两图像数据，并分别在相应的左眼和右眼观看左眼图像和右眼图像。

然而，现有技术中的双凸透镜型 3D 显示器件在平板显示器 100 上附有用于显示 3D 图像的固定的透镜形板，其只适于显示 3D 图像而不能显示 2D 图像。因此，由于目前大多数的图像和视频流都是 2D 模式，所以现有技术的 3D 显示器件适用于有限的 3D 图像和视频流并且不能用于显示传统的 2D 图像和视频流。

发明内容

因此，本发明涉及一种液晶面板，一种具有液晶面板的显示器件及其驱动方法，从而可避免由现有技术的局限和缺点所产生的一个或多个问题。

本发明的目的是提供一种在平板显示器件前面的二维和三维图像面板，该面板通过在二维和三维图像面板内部提供液晶和多个透镜单元能够根据在液晶上是否施加电源有选择地显示2D图像或3D图像以允许透镜单元执行双凸透镜功能。

本发明的其它优点、目的以及特征将在后面的描述中得以阐明，通过以下描述，将使它们对于本领域普通技术人员在某种程度上显而易见，或者可通过实践本发明来认识它们。本发明的目的和其他优点可通过书面描述及其权利要求以及附图来实现和得到。

为实现本发明的目的和其他优点以及根据本发明的目的，如这里具体和广义所描述的，一种液晶面板，包括：第一基板和第二基板；位于所述第一基板

表面上的第一电极；位于所述第二基板上的光折射器件；所述光折射器件包括面对所述第一基板表面的多个光折射透镜；以及夹在所述第一电极和所述光折射器件之间的液晶层。

根据本发明的另一方面，提供一种用于有选择地显示二维图像和三维图像之一的显示器件，该显示波器件包括：用于显示至少一图像的平板显示器；以及二维和三维图像面板，所述二维和三维图像面板根据在所述二维和三维图像面板上是否施加有电场或者折射来自所述平板显示器的至少一图像以显示三维图像或者透过来自所述平板显示器的至少一图像以显示二维图像。

根据本发明的另一方面，提供一种用于有选择地显示二维图像和三维图像之一的方法，包括：从平板显示器输出至少一图像；通过二维和三维图像面板接收至少一图像；以及根据在所述二维和三维图像面板上是否施加电场通过二维和三维图像面板或者折射来自所述平板显示器的至少一图像以显示三维图像或者透过来自所述平板显示器的至少一图像以显示二维图像。

应该理解，上面的概括性描述和下面的详细描述都是示意性和解释性的，意欲对本发明的权利要求提供进一步的解释。

附图说明

本申请所包含的附图用于进一步理解本发明，其与说明书结合并构成说明书的一部分，所述附图表示本发明的实施方式并与说明书一起解释本发明的原理，在附图中：

图 1 所示为现有技术中棱镜型显示器件的分解透视图；

图 2 所示为使用图 1 中双凸透镜方法实现 3D 图像的示意图；

图 3A 和 3B 所示为根据本发明实施方式的二维和三维图像面板的截面图；

图 4A 和 4B 所示为根据本发明另一个实施方式的二维和三维图像面板的截面图；以及

图 5 所示为根据本发明实施方式用于有选择地显示 2D 图像或 3D 图像的显示器件的透视图。

具体实施方式

现在将详细说明本发明的优选实施方式，在附图中示出了其示例。

图 3A 和 3B 所示为根据本发明实施方式的二维和三维图像面板的截面图。具体地说，图 3A 表示在两基板的电极之间未施加电时的状态，以及图 3B 表示当在两基板的电极上施加电时的状态。

在具体的实施方式中，当施加电时，二维和三维图像面板能够选择性地执行与在双凸透镜方法中的双凸透镜基板的功能相同的功能以显示 3D 图像，而当未施加电时，选择性地使双凸透镜不起作用以显示从平板显示器件输出的 2D 图像。

二维和三维图像面板设置在平板显示器的前面以根据是否在二维和三维图像面板施加电有选择地显示 2D 图像和 3D 图像。因此，当广播或播放 3D 图像和视频流时用户通过控制向二维和三维图像面板的供电能够选择以使能 3D 图像显示功能，并且当广播或播放 2D 图像和视频流时用户通过控制向二维和三维图像面板的供电能够选择以禁止 3D 图像显示功能。

参照图 3A 和图 3B，二维和三维图像面板 300 包括：第一基板 310 和第二基板 320，上述基板为透明基板并且设置为彼此相对；设置于第一基板 310 的整个表面的第一电极 312；设置于第一电极的整个表面的第一定向层 314；设置于第二基板 320 的整个表面的第二电极 322；由聚合材料 340 形成的光折射器件，以具有均匀地位于第二电极 322 上的多个光折射透镜；设置于聚合材料 340 的外表面的第二定向层 342；以及填充于第一定向层 314 和第二定向层 342 之间的液晶层 330。二维和三维图像面板 300 还包括用于向液晶层有选择地提供电场的电源，其中根据是否施加有电场液晶层的折射率与光折射器件的折射率相同或不同。

在此，当液晶层 330 上未施加电场时，即当液晶层 330 在初始排列状态时，透镜形聚合材料 340 的光折射率与液晶层 330 的光折射率相同。

同样，当沿预定方法摩擦聚合材料 340 的外表面并且该外表面沿该方向排列时，可以省略第二定向层 342。例如透镜形聚合材料 340 能够包括部分圆柱的透镜，该透镜具有凸顶表面和基本上平的底表面，凸顶表面面对第一基板，并且基本上平的底表面面对所述第二基板。并且，该圆柱透镜彼此之间基本上平行并且沿垂直方向延伸。在每两个相邻的光折射透镜之间具有沿垂直方向延伸的槽。

下面参考图 3A，说明在二维和三维图像面板 300 的两侧的电极时未施加

电压时的操作。参照 3A 所示，当在基板 310 和基板 320 上设置的电极 312 和 322 上未施加电压时，液晶层 330 中并通过第一和第二定向层 314 和 342 以初始排列方向排列的液晶分子 332 保持初始排列方向。基于此，由于透镜形聚合材料 340 与液晶层 330 的光折射率相同，因此二维和三维图像面板 300 基本上用作透明基板以透过来自平板显示器 400 的图像和视频流。

例如，假设平板显示器 400 是 LCD，来自 LCD 的光线的入射角的轴线平行于液晶层 330 中所包含的液晶分子 332 的光轴，由此来自 LCD 的 2D 图像直接穿过二维和三维图像面板 300 以实现 2D 图像。

另一方面，当在二维和三维图像面板 300 的两基板 310 和 320 上设置的电极 312 和 322 上施加电压时，如图 3B 所示，由于电场对液晶分子 332 的作用，液晶分子 332 竖直。因此，透镜形聚合材料 340 的光折射率大于液晶层 330 的光折射率。

也就是说，透镜形聚合材料 340 执行与现有技术双凸透镜方法中实现 3D 图像的双凸透镜相同功能，从而来显示 3D 图像。

例如，来自平板显示器 400 的光线穿过二维和三维图像面板 300 并且通过聚合材料 340 构成的光折射透镜的凸表面实现水平视差。即，通过透镜形聚合材料 340 图像数据分为左眼信息和右眼信息。因此，左眼和右眼看到不同的信息。通过透镜形聚合材料 340 分开的不同信息（图像数据）在人脑中合成，以使人可感受 3D 图像。

因此，在描述的实施方式中，当广播或播放 3D 图像和视频流时用户通过开启施加到二维和三维图像面板 300 中液晶层的电场的电源能够选择使能 3D 图像功能，并且当广播或播放 2D 图像和视频流时用户通过关断施加到二维和三维图像面板 300 中液晶层的电场的电源能够选择禁止 3D 图像功能。

图 4A 和 4B 所示为根据本发明另一实施方式的二维和三维图像面板 300 的截面图。具体地说，图 4A 表示在基板的两电极之间没有施加电压时的状态，并且图 4B 表示当在基板的两电极之间施加电压时的状态。

如图 4A 和 4B 所示，二维和三维图像面板 300 包括：第一基板 310 和第二基板 320，其为透明基板并彼此相对设置；在第一基板 310 的整个表面上形成的第一电极 312；在第一电极 312 的整个表面上形成的第一定向层 314；均匀地设置于第二基板 320 的整个表面的导电聚合材料 340'；在导电聚合材料

340’的外表面上形成的第二定向层 342；以及填充于在第一定向层 314 和第二定向层 342 之间形成的空间中的液晶层 330。

即，本发明图 4A 和图 4B 所示的另一实施方式与图 3A 和图 3B 所示的实施方式不同，其中去除在第二基板上形成的第二电极 322(图 3A 和图 3B 中所示)，并且由导电聚合材料 340’形成透镜形聚合材料 340（图 3A 和图 3B 中所示）以用作第二电极和光折射透镜二者。

在此，当在液晶层 330 上未施加电场时，即当液晶层 330 在初始排列状态时，导电聚合材料 340’与液晶层 330 的光折射率相同。

同样，当摩擦聚合材料的外表面以使得聚合材料沿预定方向排列时，可省略第二定向层 342。

因为图 4A 和 4B 所示的二维和三维图像面板的操作与图 3A 和 3B 中所给出的实施方式的操作相同，在此不再赘述。

图 5 根据本发明实施方式的用于有选择地显示 2D 图像或 3D 图像的显示器件的透视图。如图 5 所示，二维和三维图像面板 300 位于平板显示器件 400 的前面或者粘在平板显示器件 400 上。因此，实现利用双凸透镜的用于有选择地显示 2D 图像或 3D 图像的显示器件。

在此，平板显示器可以是 LCD（液晶显示器件）、PDP（等离子显示板）、FED（场发射显示器件）以及有机 EL（电致发光）板之一。如果平板显示器件不是 LCD 器件，可在二维和三维图像面板和平板显示器中间插入用于显示 3D 图像的独立的偏振板。

示例性显示器件包括平板显示器和具有液晶层以及透镜形聚合材料的二维和三维图像面板。当在液晶层上未施加电场时，液晶层与透镜形聚合材料的光折射率相同，从而将来自平板显示器的图像作为 2D 图像输出。相反，当在液晶层施加电场时，液晶层与透镜形聚合材料的光折射率不同，从而将来自在平板显示器的图像作为 3D 图像输出。

具体地说，在示出的实施方式中，当在液晶层上未施加电场时，液晶层的折射率与光折射器的折射率基本上相同。因此，在光折射器件和液晶层的办面上不会发生折射。因此，来自平板显示器件的图像将穿过二维和三维图像面板以显示 2D 图像。另一方面，当在液晶层上施加电场时，液晶层的折射改变为与光折射器件的折射率不同。因此，来自平板显示器件的图像在光折射器件和

液晶层之间的界面发生折射从而显示 3D 图像。

因此，通过控制施加到液晶层上的电场可以有选择地显示 2D 图像或 3D 图像。另外，当显示仅 2D 图像是可以降低功耗。

应该注意到，虽然在示出的实施方式中，当施加电场时使能 3D 图像显示功能，并且当不施加电场时禁止 3D 图像显示功能，但是通过重新排列二维和三维图像面板中液晶材料的初始排列方向从而当不施加电场时使能 3D 图像显示功能而当施加电场时禁止 3D 图像显示功能也落入本发明的范围内。

很明显，本领域技术人员可在不背离本发明精神或范围的基础上对本发明做出修改和变型。因此，本发明意欲覆盖落入本发明权利要求及其等效范围内的各种修改和变型。

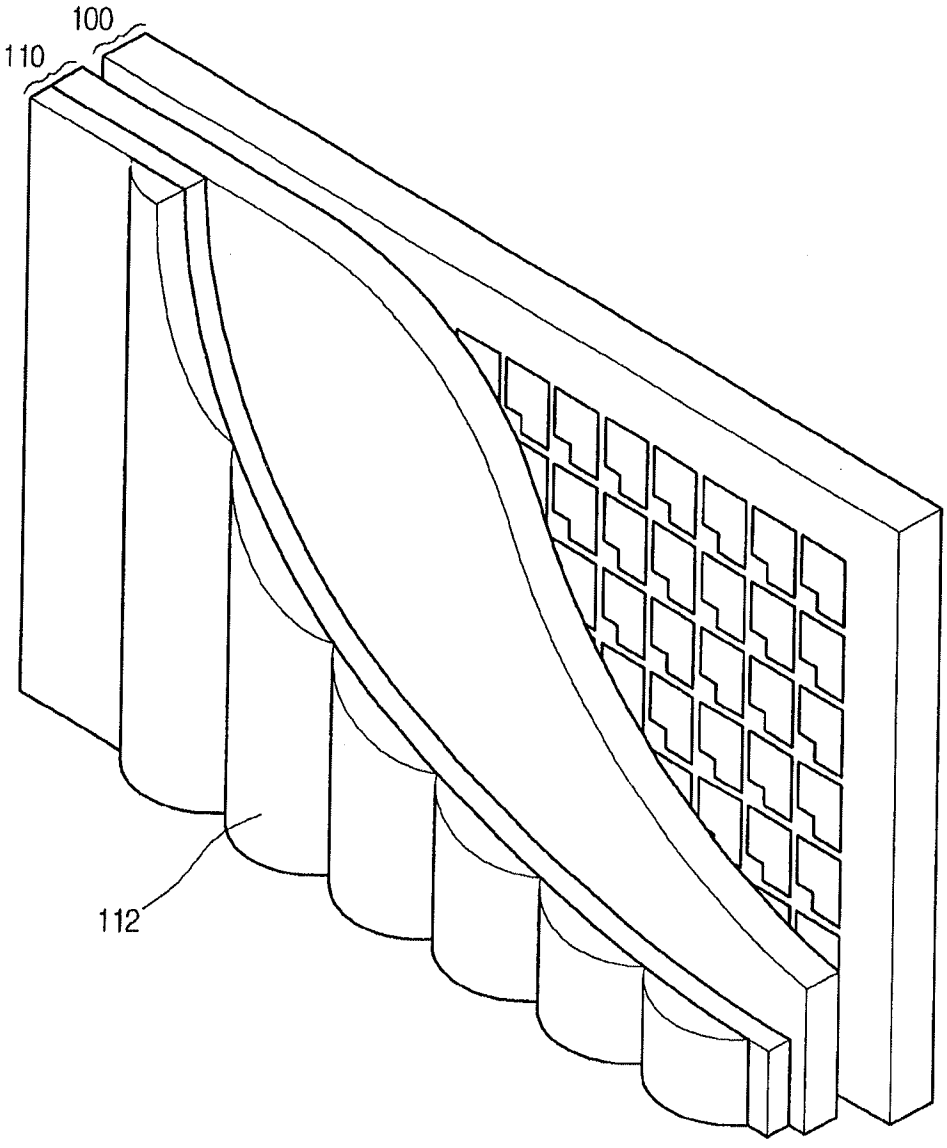


图 1

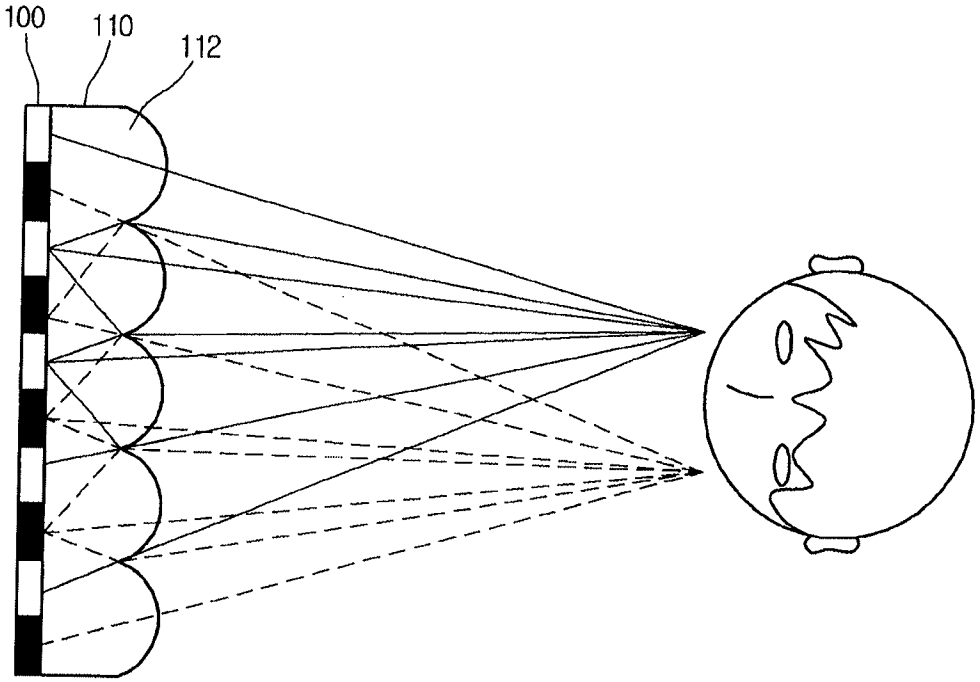


图 2

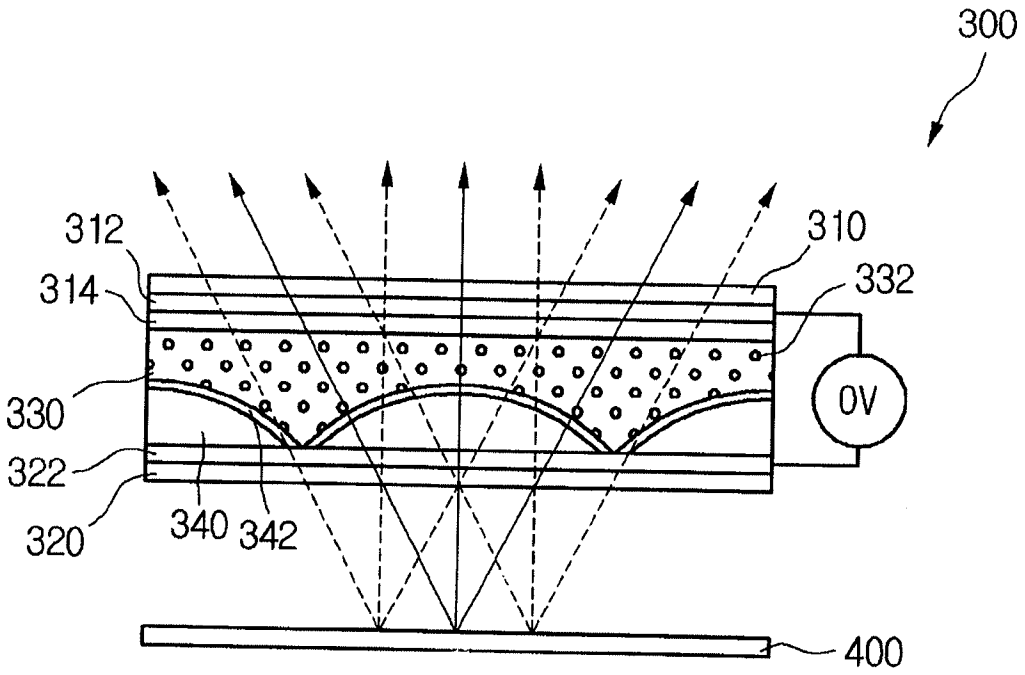


图 3A

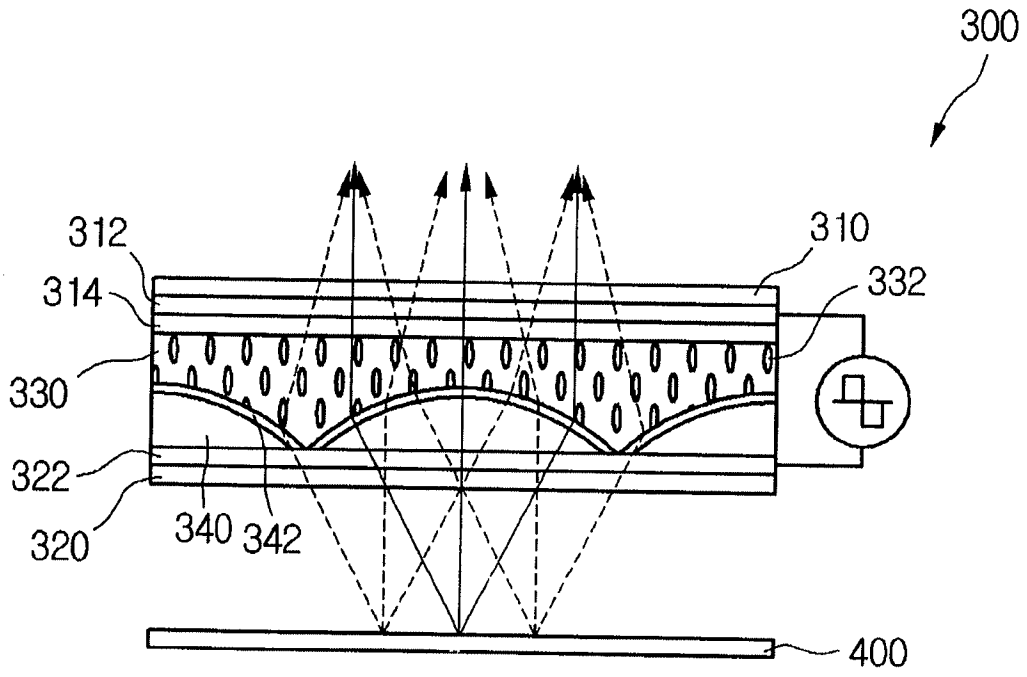


图 3B

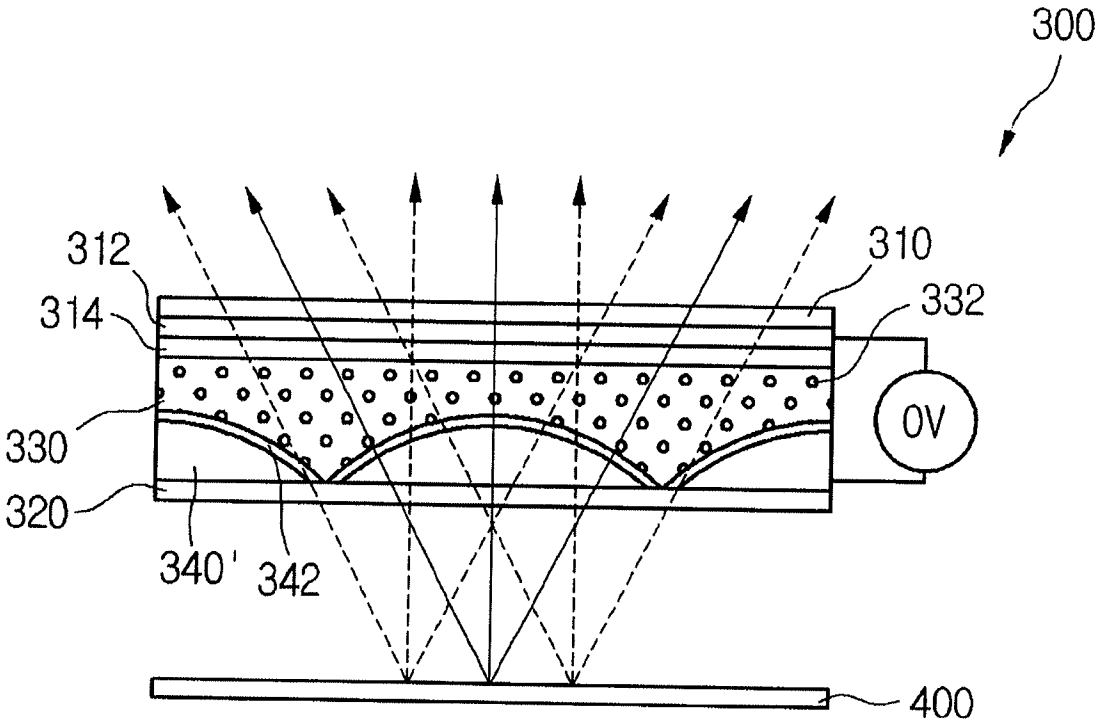


图 4A

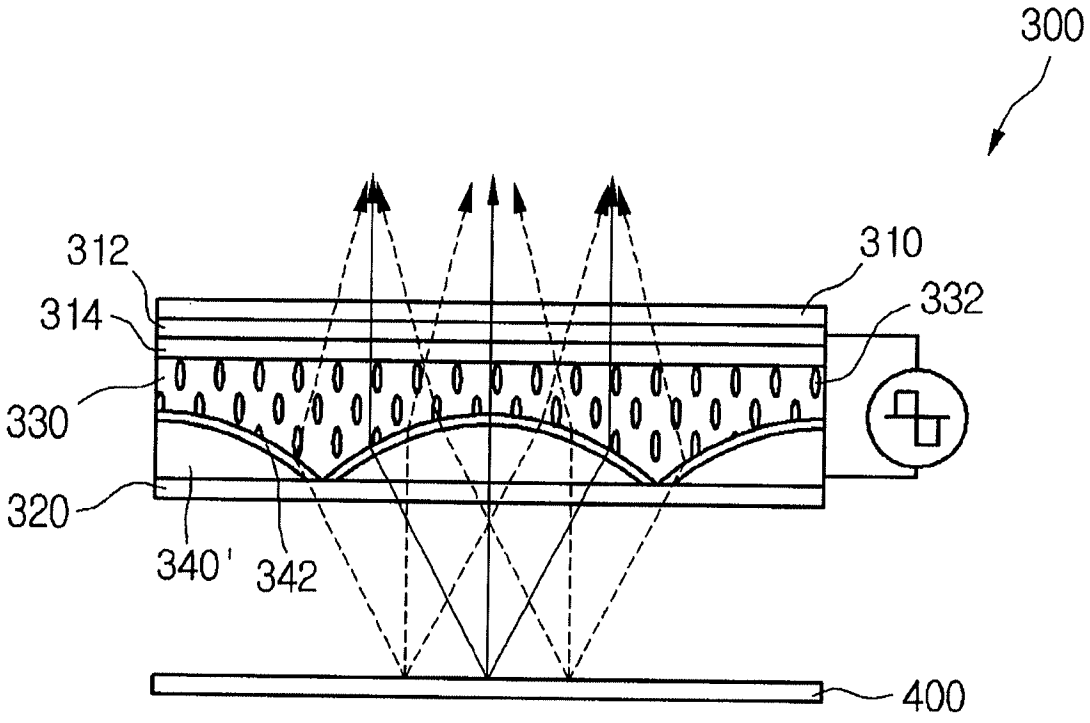


图 4B

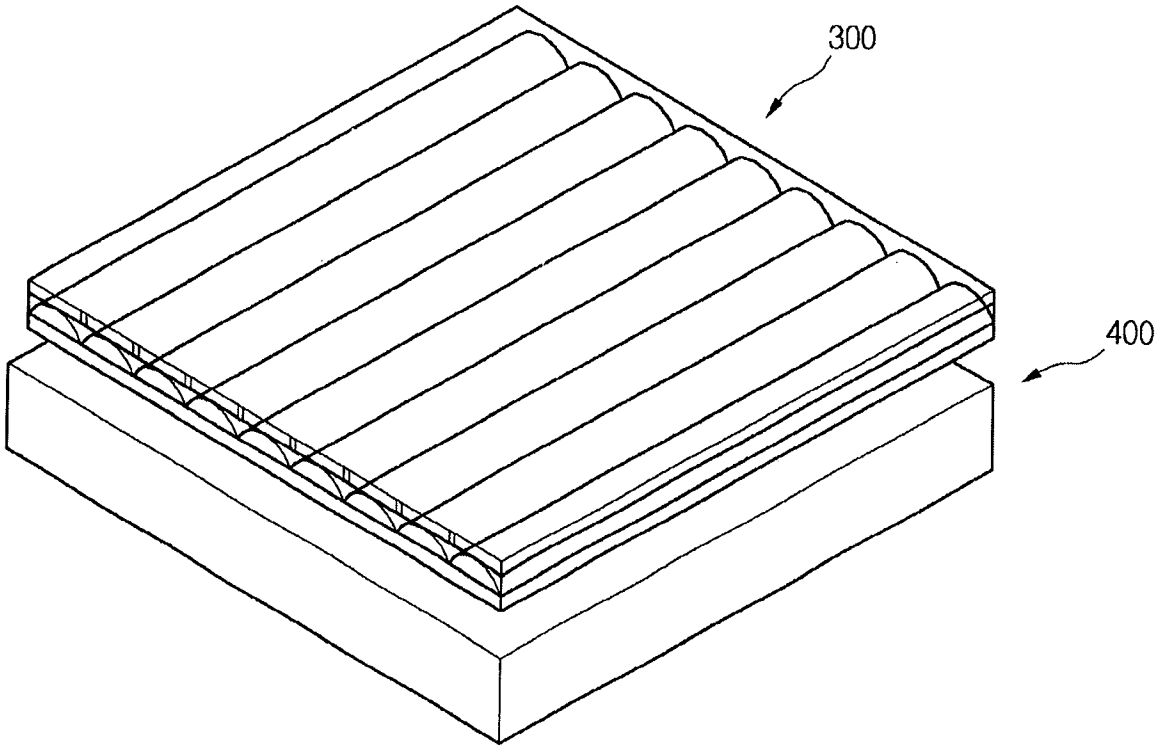


图 5

Electronic Acknowledgement Receipt

EFS ID:	10066182
Application Number:	12340005
International Application Number:	
Confirmation Number:	8241
Title of Invention:	STEREOSCOPIC 3D DISPLAY DEVICE
First Named Inventor/Applicant Name:	Seung-Chul Lee
Customer Number:	00757
Filer:	Gustavo Siller Jr./Nkosi Harvey
Filer Authorized By:	Gustavo Siller Jr.
Attorney Docket Number:	12579-6201
Receipt Date:	11-MAY-2011
Filing Date:	19-DEC-2008
Time Stamp:	14:23:04
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		12579-6201IDS.pdf	202709 a674a7d49c3d086040cbc4aa536401d5978f80f3	yes	4

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Miscellaneous Incoming Letter	1	1
	Transmittal Letter	2	3
	Information Disclosure Statement (IDS) Filed (SB/08)	4	4

Warnings:					
Information:					
2	Foreign Reference	B3.pdf	1108119 09875a4d3beaca898ad19d9a2c03c12cb45d2269	no	21
Warnings:					
Information:					
3	Foreign Reference	B4.pdf	690461 3be2fd84cb9950a27bcc32f1391d2954371efba9	no	9
Warnings:					
Information:					
		Total Files Size (in bytes):	2001289		

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If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

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New International Application Filed with the USPTO as a Receiving Office

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CERTIFICATE OF EFS FILING UNDER 37 CFR §1.8

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Date: May 11, 2011 Name: Gustavo Siller, Jr. Signature: /Gustavo Siller, Jr./

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Appln. of: Seung-Chul Lee et al.

Appln. No.: 12/340,005

Filed: 12/19/2008

For: STEREOSCOPIC 3D DISPLAY DEVICE

Attorney Docket No: 12579-6201

Examiner: Tonia Lynn Meonske Dollinger

Art Unit: 2443

Confirmation No.: 8241

TRANSMITTAL

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Attached is/are:

☒ Transmittal (1 page); Information Disclosure Statement (2 pages); PTO-1449 (1 page); Cited References B3 and B4.

Fee calculation:

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☐ Small Entity.

☐ An extension fee in an amount of $_____ for a ____- month extension of time under 37 CFR § 1.136(a).

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	Claims Remaining After Amendment		Highest No. Previously Paid For	Present Extra		Rate	Add'l Fee	OR	Rate	Add'l Fee
Total		Minus				x $26=			x $52=	
Indep.		Minus				x 110=			x $220=	
First Presentation of Multiple Dep. Claim						+$195=			+ $390=	
						Total	$		Total	$

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☒ The Director is hereby authorized to charge payment of any additional filing fees required under 37 CFR § 1.16 and any patent application processing fees under 37 CFR § 1.17 associated with this paper (including any extension fee required to ensure that this paper is timely filed), or to credit any overpayment, to Deposit Account No. 23-1925.

Respectfully submitted,

May 11, 2011
Date

/Gustavo Siller, Jr./
Gustavo Siller, Jr. (Reg. No. 32,305)

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Appln. of:	Seung-Chul Lee et al.
Appln. No.:	12/340,005
Filed:	12/19/2008
For:	STEREOSCOPIC 3D DISPLAY DEVICE
Attorney Docket No:	12579-6201

Examiner: Tonia Lynn Meonske Dollinger
Art Unit: 2443
Confirmation No.: 8241

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

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In accordance with the duty of disclosure under 37 CFR §1.56 and §§1.97-1.98, and more particularly in accordance with 37 CFR §1.97(b), Applicants hereby cite the following reference(s):

U.S. PATENT DOCUMENTS		
DOCUMENT NO.	**DATE**	**NAME**
20040012851 A1	01/22/2004	Sato et al.
20060268196 A1	11/30/2006	Jung

FOREIGN PATENT DOCUMENTS		
DOCUMENT NO.	**DATE**	**COUNTRY**
CN 1873482 A	12/06/2006	China

OTHER ART – NON PATENT LITERATURE DOCUMENTS
Copy of Office Action issued in corresponding Chinese Patent Application No. 200810180777.5, mailed February 11, 2011.

Applicants are enclosing Form PTO-1449 (one sheet), along with a copy of each listed reference for which a copy is required under 37 CFR §1.98(a)(2). Pursuant to the undersigned attorney's obligation and duties under 37 CFR §§ 1.56 and 1.98(a)(3) and (c), either English language abstracts, partial translations, or full translations are included for patent documents which are not in English for the express purpose of providing a concise explanation of the references to the Patent and Trademark Office with the opportunity to evaluate the same. Applicants respectfully request the Examiner's consideration of the above reference(s) and entry thereof into the record of this application.

By submitting this Statement, Applicants are attempting to fully comply with the duty of candor and good faith mandated by 37 CFR §1.56. As such, this Statement is not intended to constitute an admission that any of the enclosed references, or other information referred to therein, constitutes "prior art" or is otherwise "material to patentability," as that phrase is defined in 37 CFR §1.56(a).

The Applicant or Applicants have calculated no fee to be due in connection with the filing of this Information Disclosure Statement. However, the Director is authorized to charge any fee deficiency associated with the filing of this Information Disclosure Statement to a deposit account, as authorized in the Transmittal accompanying this Information Disclosure Statement.

Respectfully submitted,

May 11, 2011
Date

/Gustavo Siller, Jr./
Gustavo Siller, Jr.
(Reg. No. 32,305)

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
12/340,005	12/19/2008	Seung-Chul Lee	12579-6201

CONFIRMATION NO. 8241

757
BRINKS HOFER GILSON & LIONE
P.O. BOX 10395
CHICAGO, IL 60610

PUBLICATION NOTICE

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NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

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FORM PTO-1449		SERIAL NO. 12/340,005	CASE NO. 12579-6201
LIST OF PATENTS AND PUBLICATIONS FOR APPLICANT'S INFORMATION DISCLOSURE STATEMENT		FILING DATE December 19, 2008	GROUP ART UNIT 2621
(use several sheets if necessary)	APPLICANT(S): Seung-Chul Lee et al.		CONFIRMATION NO. 8241

REFERENCE DESIGNATION **U.S. PATENT DOCUMENTS**

EXAMINER INITIAL		DOCUMENT NUMBER Number-Kind Code (if known)	DATE	NAME	CLASS/ SUBCLASS	FILING DATE
	A1	6,252,624 B1	June 26, 2001	Yuasa et al.		
	A2	6,252,570 B1	June 26, 2001	Mangerson		
	A3	2002/0118276 A1	August 29, 2002	Seong		
	A4	2005/0036082 A1	February 17, 2005	Lai		
	A5					
	A6					
	A7					
	A8					
	A9					
	A10					
	A11					
	A12					
	A13					

FOREIGN PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER Number-Kind Code (if known)	DATE	COUNTRY	CLASS/ SUBCLASS	TRANSLATION YES OR NO
	A14	02/0569683 A1	August 1, 2002	PCT		
	A15	61-227498	October 9,1986	Japan		ABSTRACT
	A16	0 376 278	July 4, 1990	EPO		
	A17					
	A18					

EXAMINER INITIAL	OTHER ART – NON PATENT LITERATURE DOCUMENTS (Include name of author, title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date page(s), volume-issue number(s), publisher, city and/or country where published.	
	A19	Copy of Search Report issued in corresponding British Application 0821455.3; issued March 25, 2009
	A20	
	A21	
	A22	
	A23	
	A24	

EXAMINER	DATE CONSIDERED

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

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

(19) World Intellectual Property Organization
International Bureau

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(72) Inventor; and

(75) Inventor/Applicant *(for US only)*: **TUNG, Carl** [US/US]; 1333 Judy Road, Mohegan Lake, NY 10547 (US).

(74) Agent: **BRILL, Gerow, D.**; VRex, Inc., 85 Executive Boulevard, Elmsford, NY 10523 (US).

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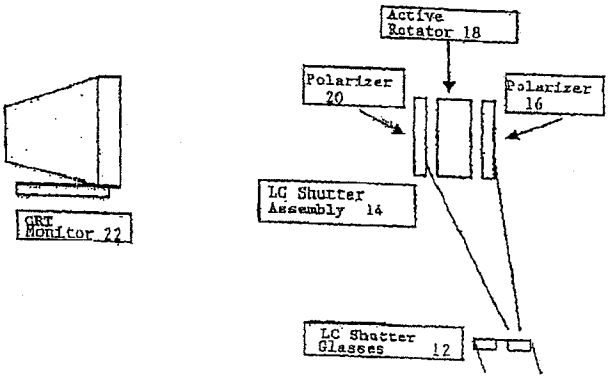
(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, 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*

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.

(54) **Title:** METHOD AND APPARATUS OF FLICKER REDUCTION FOR LC SHUTTER GLASSES



(57) **Abstract:** The preferred embodiment of the invention comprises a method of reducing flicker in a stereoscopic display system LC shutter glasses and a display device, the glasses, having two LC shutter assemblies each having a first polarizing element nearer the eye, a second polarizing element nearer the display and an active rotator between the two polarizing elements. The method of reducing flicker comprises removing the second polarizing material from each LC shutter assembly and installing a third polarizing material in the optical path between said LC shutter glasses and said display device. The third polarizing material has a polarizing characteristics substantially identical to that of said second polarizing material. The display device is a CTR display, a front view projection system or a near projection display screen wherein the third polarizing material is mounted on the near projection screen between the projected image and the LC shutter glasses. A stereoscopic display system with reduce flicker using the method described above includes: LC shutter glasses having two LC shutter assemblies each having a first polarizing material nearer the eye and an active rotator; a display device; and, a second polarizing material in the optical path between said LC shutter glasses and said display device. The second polarizing material has a polarizing characteristic substantially orthogonal to that of said polarizing material.

WO 02/059683 A1

METHOD AND APPARATUS OF FLICKER REDUCTIONFOR LC SHUTTER GLASSES

BACKGROUND OF THE INVENTION

The present invention relates to a method and apparatus for flicker reduction when using liquid crystal shutter glasses while viewing three-dimensional imagery with a CRT monitor, or other display systems, particularly towards reducing the flicker perceived while viewing the non-display environment.

The use of stereoscopic imaging in modern times has gained increasing popularity .The reason for this trend in technological innovation is quite clear. At birth, each human being is endowed with the power of stereoscopic vision. It is this power alone that enables human beings to view the world, and all its inhabitants, in three dimensions with full depth perception.

Presently, there exist a number of known techniques for recording and displaying stereoscopic images of three-dimensional objects and scenery. In the art of video imaging, in particular, two principally different techniques are presently being used to record and display stereoscopic images. The first technique is commonly referred to as "time-multiplexed" or "field-sequential" stereo video or television, whereas the second technique is commonly referred to as "spatially multiplexed" stereo video or television.

In general, each of these stereo-imaging techniques involve image recording (i.e. generation) and image display processes. During the image generation process, left and right perspective images (or sequences of perspective images) of 3-D scenery are produced and subsequently recorded on a suitable recording medium. Notably, the recorded left and right perspective images are produced as if actually viewed with the inter-pupil distance of a human observer. Then, during the image display process, the visible light associated with the left and right perspective images is visually presented to the left and right eyes of viewers, respectively, while minimizing the amount of visible light from the left and right perspective images that impinge upon the right and left eyes of the viewer, respectively. As the left and right perspective images of the 3-D scenery are viewed by the left and right eyes of the viewer,

3-D stereoscopic image of the 3-D scenery is perceived, complete with full spatial and depth information of the actual 3~D scenery.

The differences between the above-described techniques reside in the manner in which left and right perspective images are "channeled" to the left and right eyes of the viewer in order to preserve stereoscopy. These techniques will be briefly described below.

In 3-D video display systems based upon time-multiplexing principles, the left and the right perspective images of the 3-D scenery are displayed to viewers during different display periods (i.e. left and right perspective display periods). To ensure that only left perspective images of the 3-D scenery are presented to the left eye of viewers, the right eye of each viewer is not allowed to view the left perspective image during the left perspective image display period. Similarly, to ensure that only the right perspective images of the 3-D scenery are presented to the right eye of viewers, the left eye of each viewer is not allowed to view the right perspective image during the right perspective image display period. In the contemporary period, this perspective image "blocking," or selective viewing process, is achieved using a pair of liquid crystal light valves (LQV) as the lenses in special eye wear (e.g. goggles) worn by each viewer using a 3-D image viewing system based on such principles. Typically, a controller is required in order to drive the left LCLV lens during each left perspective image display period and to drive the right LCLV lens during each right perspective image display period.

In 3-D video display systems based upon spatial-multiplexing principles, left and right perspective images of 3-D scenery are spatially multiplexed during the image generation process in order to produce a spatially multiplexed composite image. Then during the image display process, the visible light associated with the left and right perspective image components of the composite image are simultaneously displayed, but with spatially different "polarizations" imparted thereto. To ensure that only left perspective images of the 3-D scenery are presented to the left eye of viewers, the right eye of each viewer must not be allowed to view left perspective images. Similarly, to ensure that only the right perspective images of the 3-D scenery are presented to the right eye of viewers, the left eye of each viewer must not be allowed to view right perspective image. Typically, this perspective image "blocking." or selective-viewing process, is achieved using a pair of spatially different polarizing lenses mounted in eye wear (e.g. spectacles)

worn by each viewer using a 3-D video display system based on such principles of operation.

While each of these above-described 3-D image display techniques may be used to display 3-D color or gray-scale images, systems based on such techniques are not without shortcomings and drawbacks.

In particular, 3-D image display systems based upon time-multiplexing principles are plagued by "image flicker' problems. While 3-D video display systems based upon spatial-multiplexing principles are inherently free from the "image flicker" problem associated with time-multiplexed 3-D display systems, spatial- multiplexed 3-D display systems require the use of micropolarizers mounted onto display surfaces (e.g. CRT displays, flat panel liquid-crystal displays, light valve projectors, etc.) from which the polarized light of spatially-multiplexed images emanates. Consequently, this requirement necessitates specially manufactured display and projection surfaces, which in these particular applications can impose undesirable limitations upon the stereoscopic viewing process.

As an alternative to the above described 3-D image display systems and methods, U.S. Pat. No. 4,995.718 to Jachimowicz, et al. proposes a 3-D color video projection display system using spectral-multiplexing and light polarization principles. Similar to the above-described 3-D image display supports both image recording (i.e. generation) and display processes. However, unlike 3-D image display systems based upon time-multiplexing and spatial-multiplexing principles described above, the 3-D color projection display system of U.S. Pat. No. 4,995,718 exploits the spectral properties of both left and right perspective color images in order to ensure that only left right perspective color images of 3-D scenery are seen by the left and right eyes of viewers, respectively, during the image display process. Specifically, during the image generation process, left and right perspective color video images of 3-D scenery are recorded. During a first display period in the image projection process, the red and blue spectral components, (i.e. magenta), of the left perspective color image are imparted with a first light polarization state and then projected onto a display screen using a first image projector, while the green spectral components of the right perspective color image are imparted with a second light polarization state and projected onto the display screen using a second image projector.

During the image projection process of the first display period, the separately projected left and right perspective images must be spatially superimposed, (i.e. aligned), in order that these differently polarized spectral components are recombined or "multiplexed" on the projection display screen, which is adapted to preserve the polarization states of the multiplexed spectral components. To ensure that only the magenta spectral components of the left perspective image are presented to the left eye of viewers during the first display period, while only the green spectral components of the right perspective image are presented to the right eye of viewers, the viewers are each required to wear spectacles having a left lens characterized by the first polarization state, and a right lens characterized by the second polarization state.

During a second display period in the image projection process, the green spectral components of the left perspective color image are imparted with a first light polarization state and then projected onto the display screen using the first image projector, while the magenta spectral components of the right perspective color image are imparted with a second light polarization state and then projected onto the display screen using the second image projector. During the second display period the separately projected left and right perspective images must be spatially superimposed (i.e. aligned) in order that these differently polarized spectral components are re-combined, (i.e. multiplexed), on the projection display screen. Also, the polarized spectacles worn by each viewer ensures that only the green spectral components of the left perspective image are visually presented to the left eye of viewers during the first display period, while only the magenta spectral components of the right perspective image are visually presented to the right eye of me viewers. As the projected spectrally multiplexed images are viewed by the viewers wearing the polarized spectacles during the first and the second display periods, a stereoscopic image of the 3-D scenery is perceived, complete with full spatial and depth information of the actual 3-D scenery.

While the 3-D color projection display system disclosed in U.S. Patent Number 4,795,718 is capable of displaying 3-D stereoscopic color images of 3-D scenery objects and the like, this prior art system and stereoscopic display technique suffers from several significant shortcomings and drawbacks.

In particular, this prior art approach requires the use of three image projectors in order to project spectrally-filtered, polarized left and right images onto a display screen,

upon which the polarized spectral components must recombine during each display period. Such image projection operations require multiple image projectors, a display screen, a large display viewing area and complicated optical signal processing equipment detailed in the Specification of U.S. Pat. No. 4,995,718.

The method of recording and processing left and right color images required by this prior 311 stereoscopic display method is generally incompatible with conventional television transmission and distribution schemes.

Moreover, when using this prior art display techniques, 3-D stereoscopic images cannot be "directly" viewed from CRT display surfaces, flat panel display surfaces, LCD display surfaces, plasma display panel surfaces, electro- luminescent panel display surfaces and the like.

A solution to many of these flicker problems was disclosed in United States Patent N° 5,821.989 entitled "Stereoscopic 3-D viewing system and glasses having electro optical shutters controlled by control signals produced using horizontal pulse detection within the vertical synchronization pulse period of computer generated video signals" by Lazzaro et al. The Lazzaro disclosed provided a system in which lightweighted on a CRT computer or video display device according to the time-multiplexing display technique. The Lazzaro system is such that one shutter switches to the transmissive state while the other shutter switches to the opaque state synchronized to a specific field of information displayed on the CRT or display device. The shutter glasses disclosed by Lazzaro et al. have decoding circuitry which, when detecting no IR pulses, automatically enters a sleep mode or off sleep-state which will place both optical shutter glasses of Lazzaro view a very annoying level of flicker when viewing the non-display environment. This environment includes the walls, lights and other objects not part of the stereoscopic display to which the shutter glasses have a coordinated operation.

When LC shutter glasses open and close, the wear's eyes perceived some flicker on the CRT monitor which displays the field-sequential. (or page-flipped), image and perceived significant flicker from the environment surroundings the display device, depending upon the environment.

Thus, there is a great need in the art for an improved method and system for viewing stereoscopic images on a 3D display without the annoying flicker effects perceived while viewing the non-display environment.

Several patents and patent applications are representative of 3D display systems of stereoscopic images and make direct reference to the flicker problems in such systems. These include: US Patents 6,078,352, Stereoscopic viewing device and stereoscopic viewing method by Wakaya, et al.; 5,991,073, Autostereoscopic display including a viewing window that may receive black view data by Woodgate et al.; 5,907,364, Display device for information signals by Furuhata et al.; 5,821,989 ('989), Stereoscopic 3-D viewing system and glasses having electro optical shutters controlled by control signals produced using horizontal pulse detection within the vertical synchronizations pulse period of computer generated video signals by Lazzaro, et al.; 5,546,120 Autostereoscopic display system using shutter and back to back lenticular screen by Miller, et al. 5,510,832 Synthesized stereoscopic imaging system and method by Garcia, and 4,672,434 Stereoscopic television system and apparatus with 4 to 1 interlace display, all hereby incorporated by reference into this application.

SUMMARY OF THE INVENTION

The preferred embodiment of the invention comprises a method of reducing flicker in a stereoscopic display system having LC shutter glasses and a display device, the glasses, having two LC shutter assemblies each having a first polarizing element nearer the eye, a second polarizing element nearer the display and an active rotator between the two polarizing elements. The method of reducing flicker comprises removing the second polarizing material from each LC shutter assembly and installing a third polarizing material in the optical path between said LC shutter glasses and said display device. The third polarizing material has a polarizing characteristics substantially identical to that of said second polarizing material. The display device is a CRT display, a front view projection system or a rear projection display screen wherein the third polarizing material is mounted on the rear projection screen between the projected image and the LC shutter glasses. A stereoscopic display system with reduce flicker using the method described above includes: LC shutter glasses having two LC shutter assemblies each having a first polarizing material

nearer the eye and an active rotator; a display device; and, a second polarizing material in the optical path between said LC shutter glasses and said display device. The second polarizing material has a polarizing characteristic substantially orthogonal to that of said first polarizing material.

BRIEF DESCRIPTION OF THE DRAWINGS

For a more complete understanding of the present invention, the detailed description of the Invention is to be read in conjunction with the following drawings, in which:

Figure 1 illustrates a block diagram of a 3D system using LC shutter glasses;

Figure 2 illustrates a block diagram of a preferred embodiment of the invention;

Figure 3 illustrates a typical LC shutter operation in the ON state;

Figure 4 illustrates a typical LC shutter operation in the off state; and

Figure 5 illustrates the use of LC shutter glasses in stereoscopic visualization.

DETAILED DESCRIPTION OF THE INVENTION

The preferred embodiment of the invention is a method and apparatus to reduce the total perceived flicker by elin1inating perceived flicker from the environment surrounding the CRT monitor. The method, generally is to remove the polarizer, (closest to the CRT monitor), from each of the two LC shutters and put a polarizer, (of the same orientation as the ones removed), in front of the display device. This polarizer win serve the same function as the two polarizers removed from the LC shutter assembly. The result *is* that the perceived flicker will only appear on the monitor where the polarizer is.

Flicker from the shutter glasses results from the LC shutters opening and closing very rapidly in synchronization with a field sequential 3D stereo image displayed on a CRT monitor. As discussed above, the wearer sees a stereo image on the CRT monitor with some perception of flicker. However, there is much more perceived flicker, as the wearer looks aro1.lnd the environment outside of the display device. The technique of the preferred embodiment eliminates the flicker outside of the display device, thus reducing the total perceived flicker when the wearer uses LC shutter glasses.

Figure 1 illustrates a typical stereoscopic display system 10 using a CRT display 12 and LC shutter glasses 14. The LC shutter assembly 14 illustrates the typical structure of assembly of element in each eyepiece of an LC shutter assembly 16. First polarizer 18 provides a first angle of rotation as will be further illustrated in Figures 3 and 4. Active rotator 20 acts as on/off switch as further described below. The second polarizer 22 provides a second angle of rotation that is orthogonal to the first angle of rotation. The LC shutter glasses 14 comprise two LC shutter assemblies 16 a left eye and right eye assembly one of which is on and the other is off. The switching between the two LC shutter assemblies is coordinated with the display device 12 to produce a stereoscopic effect as discussed in the '989 patent by Lazzaro as well as elsewhere.

A user of the LC shutter glasses 14 with two LC shutter assemblies views the stereoscopic display with some very minimal flicker while viewing the display device 12.

However, if the user's view strays from the display device 12 providing a coordinated stereoscopic switched display to the other areas within the area in which the display is housed, the viewer is viewing walls, people and other objects that do not display the switched stereoscopic display. The user may sense significant flicker from the action of having each eye "shut-off" for the equivalent of the field time of the monitor's display. An exemplary time for the switching time is *1/60th* of a second per eye. Higher rates of switching produce lower amounts of flicker perceived by the user.

Figure 2 illustrates the method and apparatus of a preferred embodiment of the invention 30. Elements of the invention common to more than one figure are numbered identically for clarity. The method conceptually involves using LC shutter glasses with only one polarizer and an active rotator. A single polarizer is placed either on the display device or in the optical path between the display device and the LC shutter glasses. The polarizer remaining in the shutter glasses uses the same polarization characteristics as the polarizer in Figure 1 that is closest to the eye and is located on the eye side of the active rotator.

Each shutter assembly 36 includes an active rotator 20 and a polarizer 22 identical to the active rotator illustrated in Figure 1. The polarization performed by the first polarizer 18 in Figure 1 is accomplished by a single polarizer 32 installed on the display device 12 or within the optical path between the display device and the LC shutter glasses 34. Moving the polarization material from the position nearest the display on the LC shutter glasses to the display does not change the stereoscopic view to the viewer of the LC shutter glasses.

However, the viewer does not see a switching *ON/OFF* of the shutter assemblies the when viewing the environment outside the display area. Since the viewer is not seeing any switching of the non-display environment, there is no flicker observed of the non-display environment.

To assist in the understanding of the operation of the polarization in the system, the operation of a typical liquid crystal shutter is illustrated in Figures 3 and 4. Typical LC shutters employ an active liquid crystal element sandwiched between two crossed polarizers as shown in the figures. The first linear polarizer 18, with the polarization labeled P1 44, polarizes light entering the shutter from the left (display device). The active shutter element has two possible states either ON or OFF. Figure 3 shows the shutter in the ON state and Figure 4 shows the shutter in the OFF state. In the ON state, the LC shutter passes polarized light by rotating the polarization angle 90° 46 parallel to the output polarizer 22. In The OFF state, the shutter blocks light by keeping the input polarization angle the same. Since the input polarization angle is orthogonal to the output polarizer, only a minimal amount of light is passed making the shutter appear dark.

In the exemplary embodiment the polarizer on the left, (input polarizer), polarizing the unpolarized light 32, is the polarization material located on or optically near the display device. As can be observed from a polarization point of view, the physical location of the input polarizer has no affect upon the operation of the stereoscopic viewing of the stereoscopic images on the display device.

The use of liquid crystal shutter glasses for 3D stereoscopic viewing is illustrated in Figure 5 60. A sequence of images that alternate between the left and right view perspective is displayed on a viewing screen. The screen is typically cathode ray tube (CRT)-based display, or a CRT-based projector. However, as will be discussed below, the display device may also be either a direct projection or rear projection device. Two shutters 62 and 64, serving as the primary optical components of the shutter glasses, are opened and closed so that the left eye shutter is open when the left eye image 66 is displayed and the right eye shutter is open when the right eye image 68 is displayed. When a shutter is closed, ideally all light is blocked from passing through the shutter element as shown in the figure. When the shutter is opened, the shutter is transparent allowing the underlying eye to see the intended image. Figure 5 illustrates the transition from the left eye view to the right eye view from left to right with the left eye cycle on the left of the figure and the right eye cycle on the right of the figure. In the figure, time increases from left to right.

As discussed above, the display device may be a projection device as well as a direct view device. A front view projection device has the input polarization material 32 mounted at the output lens of the front projection device. A rear projection device may have the polarization material mounted at the output lens of the projector or as a piece of polarization material laminated to the projection screen.

The LC shutter glasses 34 of the preferred embodiment have only one polarization element as described above. However, it may be desirable: for the user to have multipurpose LC shutter glasses that incorporate the feature of LC shutter glasses 14 and the features of LC shutter glasses 34. In order to accomplish this, the LC shutter glasses may have a pair of fold-down polarization elements that swing up and down depending upon the location of their use. When a user is using a. display device having the input polarization material 32, the user swings up out of the optical path to the input portion of his/her LC shutter glasses containing the polarization element 18. When a user is using a display device not having an input polarization material 32, the users swings into the optical path the input portion of his/her LC shutter glasses containing polarization element 18. The swing. mechanically is similar to that used with moveable sunglasses. If the user uses the swing down operation when there is a polarizing material associated with the display device, there will be a slight drop in the brightness of the display as viewed by the user.

While the preferred embodiment has been described using linearly polarized material with each portion of the system the use of circularly polarized elements is equally useful. In such a system, the input linear polarizer 32 in the preferred embodiment, would be replaced by a passive circular polarizer. The LC shutter glass assemblies in the preferred embodiment would have, in addition to the active rotator 20 and the linear polarizer 22 (nearest the eye), a quarter wave element in the optical path at the location where the second polarizer existed in Figure 1.

The present invention has been described in detail with reference to the above illustrative embodiments, however, modifications to the illustrative embodiments will readily occur to persons with ordinary skill in the art. All such modifications and variations are deemed to be within the scope and spirit of present inventions as defined by the accompanying claims to the invention.

WHAT IS CLAIMED IS:

1. A method of reducing flicker in a stereoscopic display system using LC shutter glasses, said method comprising:

using LC shutter glasses having two LC shutter assemblies each with only one polarizing material nearer the eye as a first palatalizing material and an active rotator nearer said display device; and

using a second polarizing material in the optical path between said LC shutter glasses and said display device.

2. The method of claim 1 wherein said second polarizing material has a polarizing characteristic substantially in quadrature from mat of said first polarizing material.

3. The method of claim 2 wherein said display device is from the group consisting of a direct view display. a front view projection system and a rear projection display screen.

4. The method of claim 3 wherein when using said rear projection device, s.nd second polarizing material is mounted on said screen between said projected image and said LC shutter glasses.

5. A method of reducing flicker in a stereoscopic display system having LC shutter glasses and a display device said glasses having two LC shutter assemblies, each having a first polarizing material nearer the eye, a second polarizing material nearer the display and an active rotator, said method comprising;

removing said second polarizing material from each LC shutter assembly; and, installing a third polarizing material in the optical path between said LC shutter glasses and said display device.

6. The method of claim 5 wherein said third polarizing material has a polarizing characteristics substantially identical to that of said second polarizing material.

7. The method of claim 6 wherein said display device is from the group consisting of a CRT display, a LCD flat panel display or other flat direct view display device.

8. The method of claim 7 wherein said display device is a front view projection system.

9. The method of claim 8 wherein said display is a rear projection display screen and said third polarizing material is mounted on said screen between said projected image and said LC shutter glasses.

10. A stereoscopic display system with reduced flicker comprising: LC shutter glasses having two LC shutter assemblies each having a first polarizing material nearer the eye and an active rotator;
a display device; and a second polarizing material in the optical path between said LC shutter glasses and said display device

11. The system of claim 10 wherein said second polarizing material has a polarizing characteristic substantially orthogonal to that of said first polarizing material.

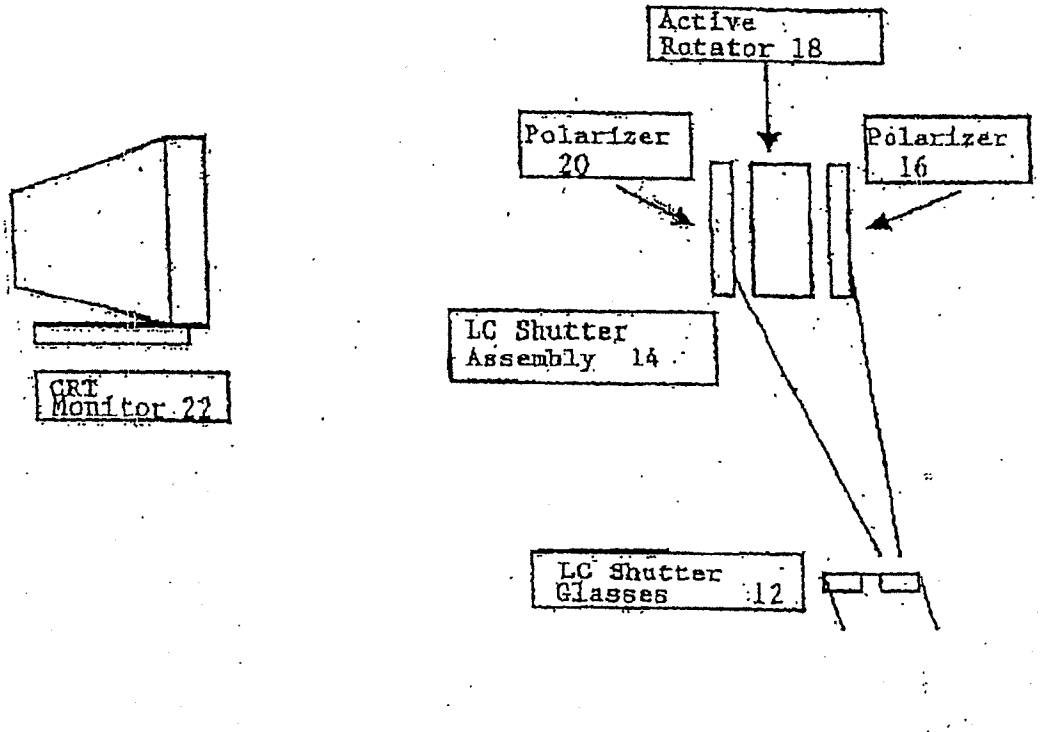

10
Active Rotator 18
Polarizer 20
Polarizer 16
LC Shutter Assembly 14
CRT Monitor 22
LC Shutter Glasses 12

FIGURE 1

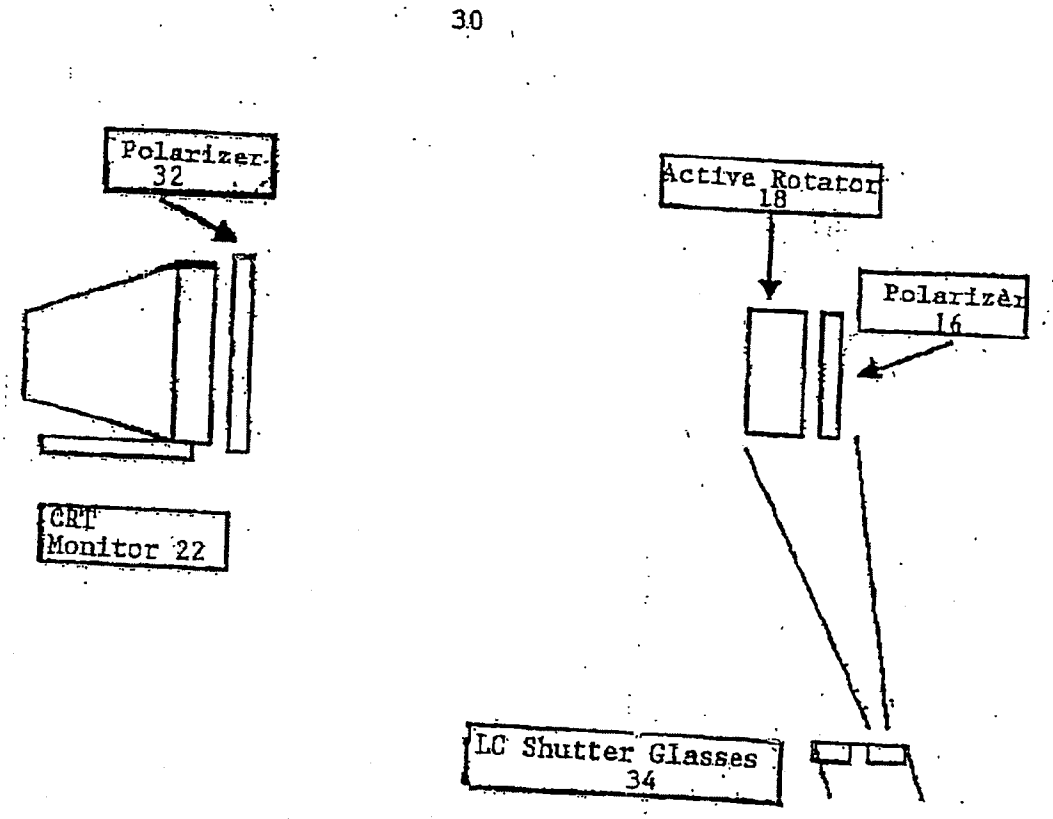

30
Polarizer 32
CRT Monitor 22
Active Rotator 18
Polarizer 16
LC Shutter Glasses 34

FIGURE 2

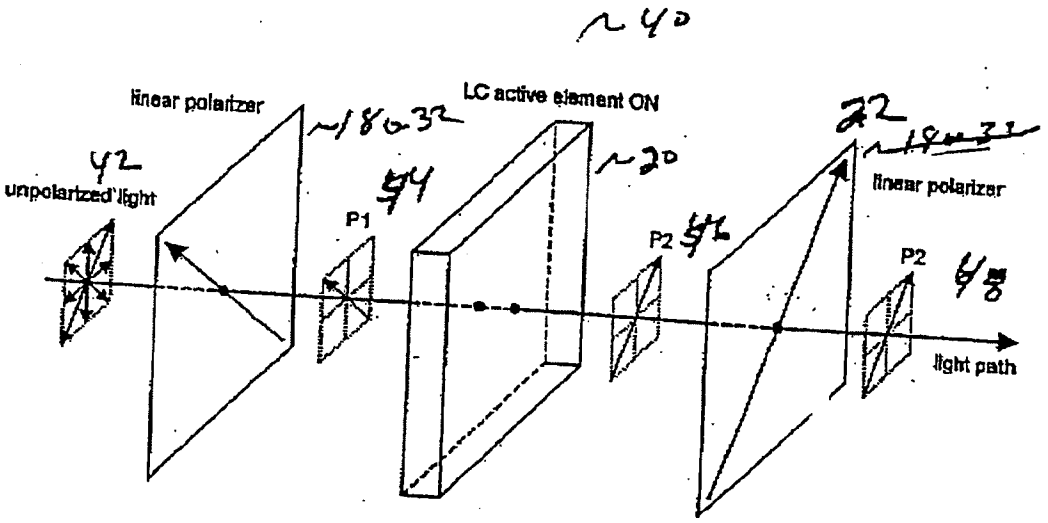


Figure 3 Diagram of Typical LC Shutter Operation in ON State

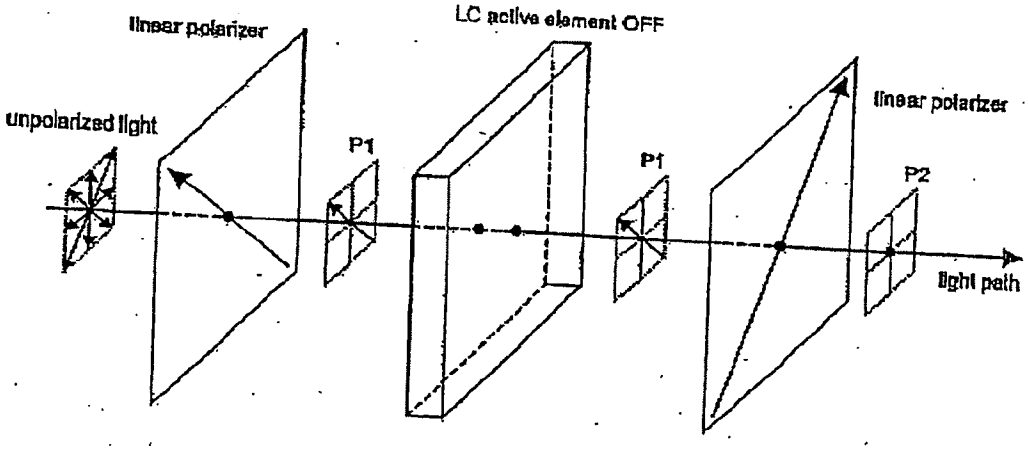


Figure 4 Diagram of Typical LC Shutter Operatio in OFF State

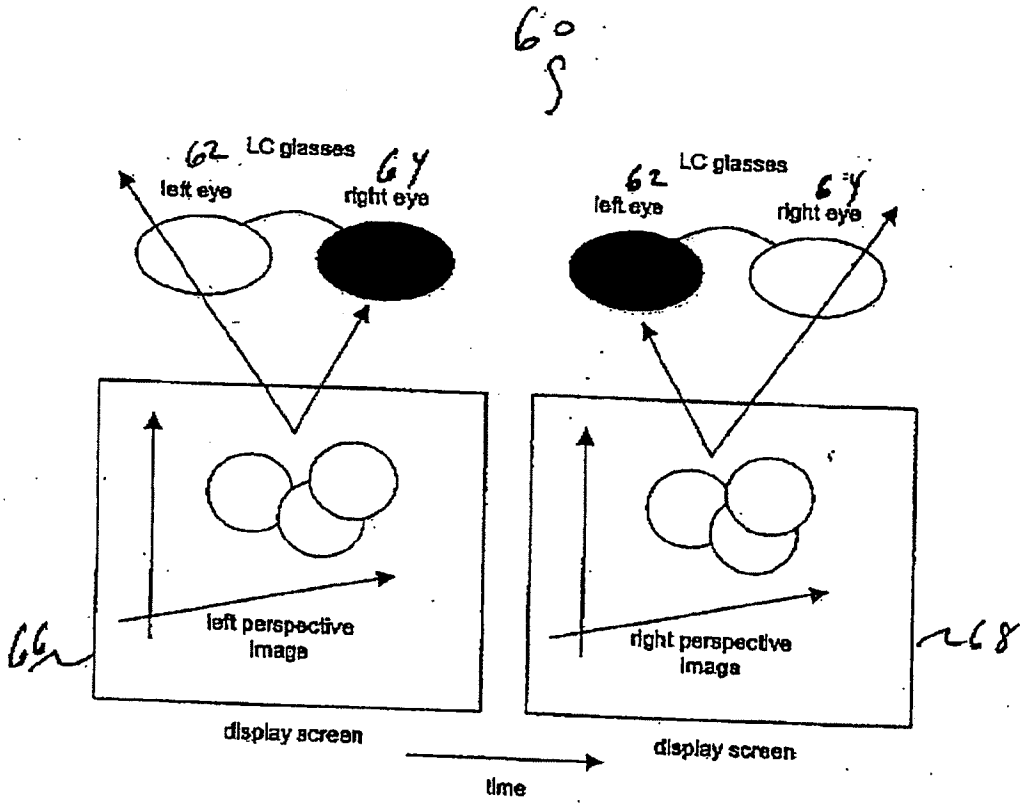


Figure 5 Use of LC Shutter Glasses in Stereoscopic Visualization

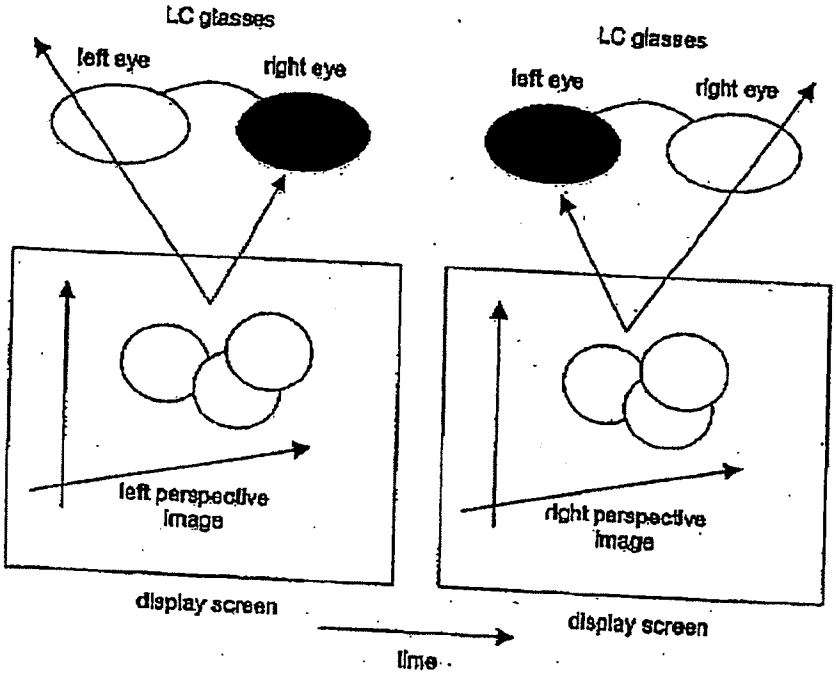


Figure 6 Use of LC Shutter Glasses in Stereoscopic Visualization

INTERNATIONAL SEARCH REPORT

Internal Application No
PCT/US 02/01731

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G02C7/10 H04N13/00 G02B27/22

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 H04N G02C G02B

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, INSPEC, COMPENDEX

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 00 21305 A (LEE YOUNG HWA) 13 April 2000 (2000-04-13) page 4, line 10 -page 5, line 8; figure 2	1-11
X	US 5 886 816 A (FARIS SADEG M) 23 March 1999 (1999-03-23) column 5, line 26 - line 43; figures 6-8	1-11
A	US 4 772 943 A (YAMAMOTO KUNIHIKO ET AL) 20 September 1988 (1988-09-20)	

☐ 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.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
31 May 2002	06/06/2002

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	De Paepe, W

INTERNATIONAL SEARCH REPORT

Information on patent family members

Intern. I Application No
PCT/US 02/01731

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 0021305 A	13-04-2000	WO 0021305 A1	13-04-2000
US 5886816 A	23-03-1999	US 5537144 A	16-07-1996
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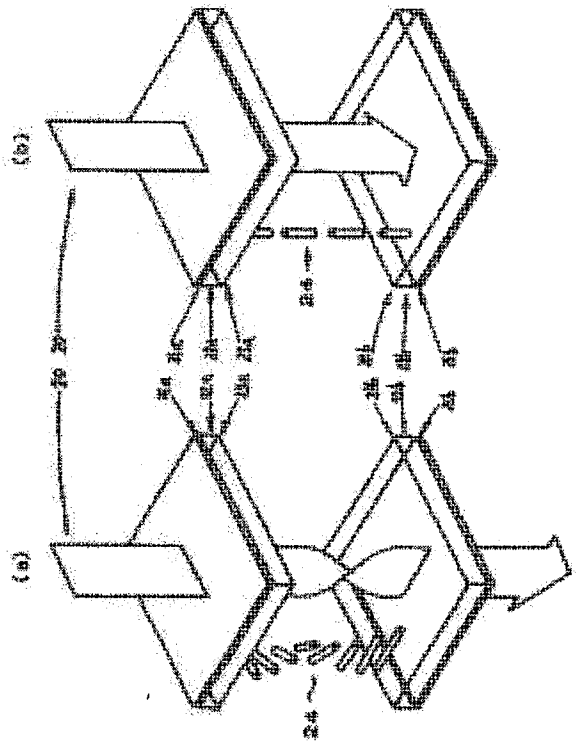
		DE 3788144 T2	10-03-1994
		EP 0233636 A2	26-08-1987
		US 4870486 A	26-09-1989

STEREOSCOPIC TELEVISION SET

Publication number: JP61227498 (A)
Publication date: 1986-10-09
Inventor(s): YAMAGATA HITOSHI
Applicant(s): TOKYO SHIBAURA ELECTRIC CO
Classification:
- international: ***G02F1/133; G02F1/13; H04N13/04;*** **G02F1/13; H04N13/04;** (IPC1-7): G02F1/13; G02F1/133; H04N13/04
- European:
Application number: JP19850068444 19850402
Priority number(s): JP19850068444 19850402

Abstract of **JP 61227498 (A)**

PURPOSE:To obtain a stereoscopic television set having uniform stereoscopic spectacles with excellent light transmissivity substantially and excellent response characteristics by combining a torsional nematic liquid crystal and a polarized plate to use them as an optical shutter. CONSTITUTION:In the optical shutter, polarized plates 21a, 21b are arranged relatively so that the polarized axes are orthogonal, transparent glass substrates 22a, 22b are arranged in parallel to the opposite face, flat transparent electrodes 23a, 23b are stuck by vapor-deposition or sputtering and the torsional nematic liquid crystal 24 is sealed between the electrodes 23a and 23b.; In applying an AC voltage having a frequency lower than a frequency f9 between the transparent electrodes 23a and 23b, the liquid crystal molecule 24 is oriented while being twisted by 90 deg., the polarized plane of the incident light 20 is rotated by 90 deg., the light is transmitted through the plate 21b, and the optical shutter is in the opened state. In increasing the frequency of the applied AC voltage than the frequency f9, the liquid crystal molecule 24 changes the arrangement in the electric field direction, the light does not transmit the polarized plate 21b and the optical shutter is closed.



⑲日本国特許庁(JP)　⑪特許出願公開

⑫公開特許公報(A)　昭61-227498

⑤1Int.Cl.⁴	識別記号	庁内整理番号	④3公開　昭和61年(1986)10月9日
H 04 N 13/04		6668-5C	
G 02 F 1/13		7448-2H	
1/133		8205-2H	審査請求　未請求　発明の数 1　(全5頁)

⑤4発明の名称　立体テレビジョン

②1特　願　昭60-68444

②2出　願　昭60(1985)4月2日

⑦2発明者　山形　仁　大田原市下石上1385番の1　株式会社東芝那須工場内

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⑦4代理人　弁理士 則近 憲佑　外1名

明　細　書

1．発明の名称

立体テレビジョン

2．特許請求の範囲

（1）立体視用の眼鏡の左眼及び右眼に設けた光シャッタを、テレビ画面上に表示される被写体の左像及び右像のフィールド毎若しくはフレーム毎の切り替え周期に同期させて交互に開閉することにより、被写体の画像を立体的に認識可能となした立体テレビジョンにおいて、前記左右の光シャッタは、平行配置した一対の偏光板と、その両偏光板の内面に対向配置した一対の透明電極と、これら透明電極間に封入し交流電圧印加によりその分子軸方向が変化するねじれネマティック型液結晶からなり、その両ねじれネマティック型液晶に前記左像及び右像の切り替え周期に同期させて交互に所定交流電圧を供給する光シャッタ駆動手段を備えたことを特徴とする立体テレビジョン。

（2）前記光シャッタ駆動手段は、左像及び右像の映像信号の立上りより所定時間早く光シャッタを不透明にするための所定周波数の交流電圧を光シャッタに供給するとともに、立下りより所定時間早く光シャッタを透明にするための所定周波数の交流電圧を印加するように構成したことを特徴とする特許請求の範囲第1項に記載の立体テレビジョン。

3．発明の詳細な説明

［発明の技術分野］

本発明は立体テレビジョンに関するものである。

［発明の技術的背景］

被写体の画像を立体的に認識させる手段として以下の2つ（以下で（1）は製品として、（2）は試作品）があり、これらは遮光素子の違いによるものである。

（1）遮光素子としてPLZT（Pead Lanthanum Zirconate Titanate）素子を立体視用の眼鏡部分に用いる手段がある。

第8図は、このPLZT素子を用いて被写

体の立体像を認識する立体テレビジョンの眼鏡部分を示す説明図である。

同図において、1a、1bは眼鏡の左眼及び右眼にそれぞれ組込んだ光シャッタである。光シャッタ1a，1bは同一構成であるため一方の光シャッタ1aについて説明すると、2枚の偏光板2，3の間にPLZT素子4を挿入し、これらを互いに密着することにより光シャッタ1aを構成している。

このように構成した光シャッタ1a，1bに対し、テレビ画面上にフィルド毎若しくはフレーム毎に交互に表示される被写体の左像、右像の切り替え信号に同期させた電圧をシャッタ駆動手段5から交互に供給し、PLZT素子4，4の光の透過率を交互に切り替えて、その両光シャッタ1a、1bを光学的に開閉するようにしてなるものである。

かかる光シャッタ1a、1bを眼鏡として用いるとともに目の残像性をも利用することによって、被写体の立体像を認識することのできる立体テレビジョンを構成していた。

(2) 遮光素子として動的散乱型液晶素子を立体視用の眼鏡部分に用いる手段がある。

この場合には上記(1)のPLZT素子のように偏光板を用いることなく、動的散乱型液晶の電圧印加に対する液晶分子の乱流による白濁を遮光に利用して光シャッタを構成していた。

シャッタ駆動手段、及び立体テレビジョンへの構成法は(1)と同一であると言える。

[背景技術の問題点]

上述した立体テレビジョンにおける問題点は、遮光素子の種類により以下の(1)，(2)に分けられる。

(1) 遮光素子としてPLZTを使用した場合は、光シャッタの構成要素として特性の良い偏光板を積極的に用いることと、構造上の問題で光透過時の透過率が35%以下と低いことである。

また、シャッタ駆動電圧が通常300V程度と高く、この光シャッタを備える眼鏡を実用を考慮してワイヤレス形式にしたような場合に、その電圧駆動回路を小型化することは困難である。

(2) 遮光素子として

動的散乱型液晶素子を使用した場合は、偏光板を使わないため透明度は上がるが、特に白濁状態から透明状態に戻る立下り特性が著しく悪く、毎秒30枚以上のフレーム数に同期をとる場合には、結局、動的に見た透明度は低下することになる。

さらに、一対の全面電極構造をとっているため、眼鏡の全領域に渡って、均一な液晶層を得るのは困難である。従って、シャッタの空間的な応答特性にバラつきが生じることになる。

[発明の目的]

本発明は上記事情に鑑みてなされたものであり、応答特性が良く、均一で実質上光透過率が良好な立体視用眼鏡を備えた、3次元画像認識が可能な立体テレビジョンを提供することを目的とするものである。

[発明の概要]

前記目的を達成するための本発明の概要は、立体視用の眼鏡の左眼及び右眼に設けた光シャッタを、テレビ画面上に表示される被写体の左像及び右像のフィールド毎若しくはフレーム毎の切り替え周期に同期させて交互に開閉することにより、被写体の画像を立体的に認識可能となした立体テレビジョンにおいて、前記左右の光シャッタは、平行配置にした一対の偏光板と、その両偏光板の内面に対向配置した一対の透明電極と、これら透明電極間に封入し、交流電圧印加によりその分子軸方向が変化するねじれネマティック型液晶とからなり、その両ねじれネマティック型液晶に前記左像及び右像の切り替え周期に同期させて交互に所定交流電圧を供給する光シャッタ駆動手段を備えたことを特徴とするものである。

[発明の実施例]

以下に本発明の実施例を詳細に説明する。

第１図は立体テレビジョンの概要を示すブロック図である。

同図において１０ａ、１０ｂは左右のＴＶカメラであり、被写体Ｓを両方ＴＶカメラ１０ａ、１０ｂで同時に撮影してそれぞれ映像信号に変換し、ミキサ回路１１でその両映像信号を左右交互に混合する。ミキサ回路１１の出力は映像増幅回路１２で増幅され、テレビジョン１３のテレビ画面上に被写体Ｓの左像を例えば奇数フィールド若しくは奇数フレーム毎に、右像を偶数フィールド若しくは偶数フレーム毎に同期信号発生器１４よりの同期信号に対応させて交互に表示する。

一方、その同期信号は同期信号分離回路１５により分離してシャッタ駆動手段１６に入力する。

シャッタ駆動手段１６は、眼鏡１７の左眼及び右眼にそれぞれ形成した同一構造の光シャッタ１８ａ，１８ｂを前記同期信号の周期に対応して交互に開閉する。

ここで、光シャッタ１８ａの構造を具体的に説明する。

第２図（ａ）（ｂ）に示すように、偏光板２１ａ，２１ｂを偏光軸が互いに直交するように相対配置する。この場合、一方の偏光板の偏波方向としては、外部からの入射光に対しては任意な角度に配置することが望ましい。これは、例えば９０°に配置したとすれば、光の性質によりこの偏光板を介して得られる光量は５０％に減少してしまうからである。しかしながら、これら２つの偏光板２１ａ，２１ｂ間の偏波方向は、直交していることは言うまでもない。その偏光板２１ａ，２１ｂの対抗面側に透明ガラス基板２２ａ，２２ｂをそれぞれ平行配置し、それらガラス基盤の２２ａ，２２ｂの対向内面に平板状の透明電極２３ａ，２３ｂを蒸着、あるいはスパッタなどの方法でつけ、両透明電極２３ａ，２３ｂ間に交流電圧で２周駆動することにより、その分子軸が急峻に変わるねじれネマティック型液晶２４を封入し、図示していないが両透明ガラス板２２ａ，２２ｂの外周部を密封してなるものである。

このような構造からなる光シャッタ１８ａは、両平板形透明電極２３ａ，２３ｂ間にある周波数f_cより低い周波数の交流電圧が印加されると、液晶２４は正の誘電異方性を示し、同図（ａ）のように液晶分子２４は９０°ねじれて配向し、入射光２０はその分子軸に沿って伝搬し、偏波面が９０°回転することにより２１ｂの偏光板を透過する。すなわち、光シャッタは開状態となる。

一方、印加する交流電圧の周波数をf_cより高くすると、液晶分子２４は負の誘電異方性を示し、同図（ｂ）のように液晶分子２４は電界方向に配列を変え、入射光はそのまま２１ｂの偏光板に入射し、偏光板との偏波面が９０°ずれているため光は透過しない。すなわち、光シャッタは閉状態となる。

このように印加する交流電圧の周波数を変えることで、逆方向のトルクが液晶分子２４に働くので、単に電界を切って自然にもとの状態に緩和させる動的散乱型液晶の駆動方法よりも、より高速応答が可能である。

第３図は、上記の２周波駆動のねじれネマティック型液晶２４の遅延時間及び立上り、立下りの時間特性の一例を、横軸に時間、縦軸に光の透過、遮断状態をとって示すものである。

同図において、時間t_{on}の瞬間に印加交流電圧の周波数を上記のf_cより高くしたとすると、液晶２４のコントラスト変化が生じるまでに時間遅れτ_{on}があり、立上り時間にt_rを要することを示している。逆にt_{off}の瞬間に上記周波数をf_cより低くした場合の時間遅れτ_{off}、立下り時間t_sだけかかることを示している。

上記パラメータは$t_r = 1$（msec），$\tau_{on} = 4$（msec），$t_s = 2$（msec），$\tau_{off} = 5$（msec）以内であることが知られている。

次に上述の構成からなる立体テレビジョンの動作を、第４図に及至第６図の各部の波形図をも参照して説明する。

第４図（ａ）はテレビ画面上に表示される右像の映像信号波形Ｒを、第４図（ｂ）は左像の映像信号波形Ｌをそれぞれ示すものである。

第５図（ａ）は光シャッタ１８ａの透明電極２

０ａ，２０ｂに印加する電圧波形を、第５図（ｂ）は光シャッタ１８ｂの透明電極２３ａ，２３ｂに印加する電圧波形をそれぞれ示すものである。

第６図（ａ）（ｂ）はそれぞれ光シャッタ１８ａ，１８ｂの各ねじれネマティック型液晶２４，２４の動作状態を示す波形図である。

シャッタ駆動手段１６により、左像の映像信号Ｌに同期させて左側の光シャッタ１８ａへ所定の周波数f_Lを、右像の映像信号Ｒに同期させて右側の光シャッタ１８ｂへ所定の周波数f_Hを、交互に一定の周期をもって印加する。

この場合、既述したようなねじれネマティック型液晶２４の遅延時間特性、図４のτ_{don}，τ_{doff}を考慮して、映像信号Ｒ，Ｌの立ち上りより時間ａだけ早く周波数f_L，f_Hの交流電圧をそれぞれ印加する。

このような時間関係を有するように周波数f_L，f_Hの交流電圧を印加することにより、左側の眼鏡１８ｂがを透明度を失う時間を右像の映像信号Ｒの立上り時に合致させ、また、右側の眼鏡１８ａが透明度を失う時間を左像の映像信号Ｌの立上り時に合致させることができる。

一方、映像信号Ｒ，Ｌの立下り時より時間ｂだけ早く周波数f_L，f_Hを切換える。

尚、本発明の立体テレビジョンは通常のテレビジョン、電子顕微鏡、Ｘ線テレビ等に応用することが可能である。

本発明は上述した実施例に限定されることなく、その要旨の範囲内で種々の変形が可能であることは言うまでもない。

例えば、上記実施例では液晶分子を動作させる電極として、平板形の透明電極を用いることで説明したが、電極の透明度をさらに上げるために、第７図に示すように、一方は平板形電極２３で、他方をくし形構造の透明電極３３としても良い。この場合、各スリット３３Ｓの幅は、液晶分子にに作用する電界分布が均一となる様設定すれば良い。透明電極といえども若干の不透明さを有しているものであるが、この第７図に示す構成によれば、光透過率をさらに向上可能となる。

さらには、電界分布の均一性を確保できるならば、両方の電極をくし形構造としても良い。

［発明の効果］

本発明によれば、動的な光透過率が良好な高速応答特性を有するねじれネマティック型液晶と偏光板との組合せを光シャッタとして利用するものであるため、テレビ画面に表示される被写体の画像を充分な明るさをもって認識することができる立体テレビジョンを提供することができる。

また、Ｘ線テレビジョンとして本発明の立体テレビジョンを用いた場合には、テレビ画面を立体的にかつ充分な明るさをもって観察できるとともに、光シャッタに電圧を不印加とすることにより実用上は問題とならない程度の透明眼鏡として直接患者の観察をもすることができることも特徴である。

さらに工業用立体テレビジョンとして用いた場合にも原子炉の操作等において極めて有益である。

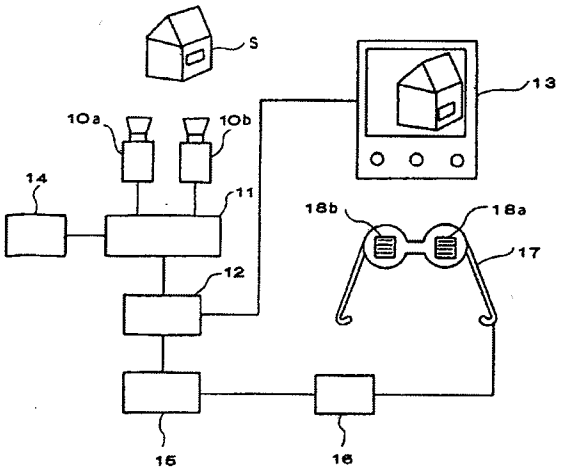
４．図面の簡単な説明

第１図は本発明の立体テレビジョンの実施例を示すブロック図、第２図（ａ），（ｂ）は上記実施例における光シャッタの構造を示す拡大断面図で、同図（ａ）は低周波の交流電圧印加状態を、同図（ｂ）は高周波の交流電圧印加状態をそれぞれ示す、第３図は光シャッタの光遮断、光透過状態を示す特性図、第４図（ａ），（ｂ）はそれぞれ右、左の映像信号波形図、第５図（ａ），（ｂ）はそれぞれ左右の光シャッタに印加する電圧の波形図、第６図（ａ）（ｂ）はそれぞれ左右の光シャッタの動作波形図、第７図は本発明における透明電極の他の実施例を示す図、第８図は従来の立体テレビジョンの光シャッタ及び光シャッタ駆動手段を示す説明図である。

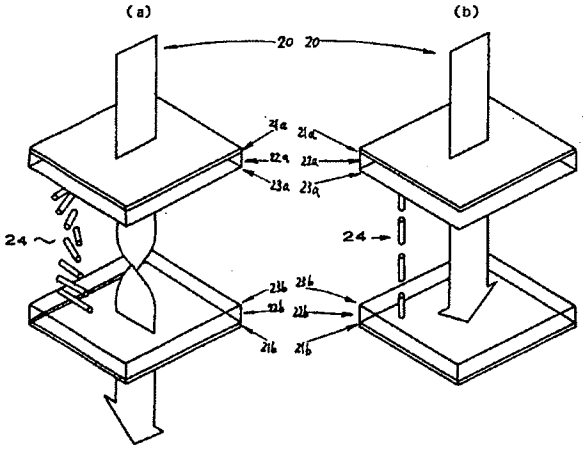
１３…テレビジョン、１６…光シャッタ駆動手段、
１７…眼鏡、１８ａ、１８ｂ…光シャッタ、
２１ａ、２１ｂ…偏光板、
２３ａ、２３ｂ…透明電極、
２４…ねじれネマティック型液晶。

代理人　弁理士　則　近　憲　佑（ほか１名）

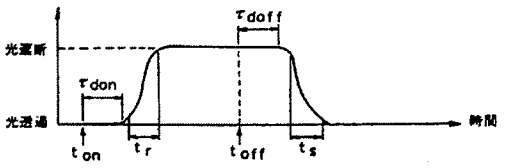
第 1 図



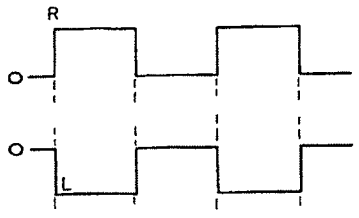
第 2 図



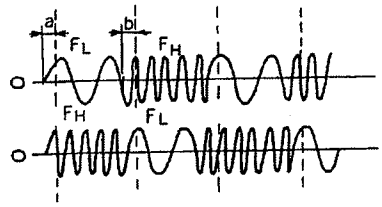
第 3 図



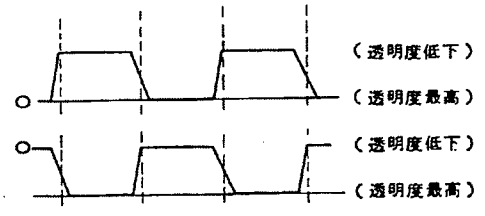
第 4 図



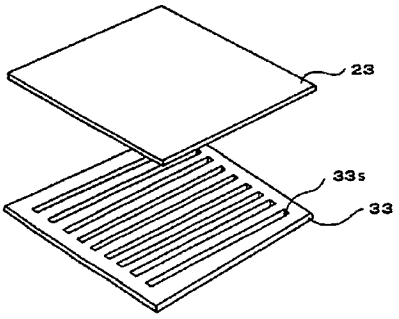
第 5 図



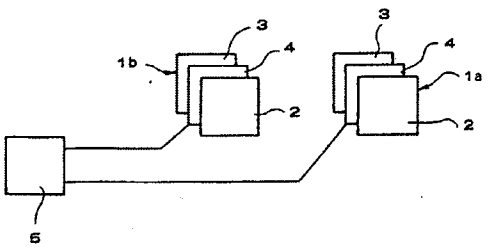
第 6 図



第 7 図



第 8 図



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(54) Liquid crystal display device.

(57) A display cell (101) are mounted on a color-compensating cell (102). The first liquid-crystal cell (101) has a pair of substrates (111, 112) each having a surface alignment-treated, and a first liquid-crystal layer (113), and first and second sets of electrodes (115) are formed on the surfaces of the first and second substrates (111. 112). Multiplex drive signals are supplied to the electrodes. The color-compensating cell (102) has a second liquid-crystal layer. The molecules of the first liquid-crystal layer are twisted by a twist angle ranging from 180° to 270°. The molecules of said second liquid-crystal layer are twisted by the same angle, but in the opposite direction. The substrates are alignment-treated in two directions, respectively, which are substantially at right angles to each other. One of the polarizing plates has an optical axis crossing at 35° to 50° with an aligning direction of the liquid crystal molecules on that substrate adjacent to the polarizing plate, and crossing with the optical axis of the other polarizing plate substantially at right angles. The second liquid-crystal cell compensates for the coloring of the light passing through the first liquid-crystal cell. The second liquid-crystal layer has retardation $\Delta n_2 \cdot d_2$, which is less than the retardation $\Delta n_1 \cdot d_1$ of said first liquid-crystal layer, for compensating a decrease in the retardation $\Delta n_1 \cdot d_1$, which has resulted from the excitation of the liquid-crystal molecules by application of a bias voltage to unselected pixels of the display cell (101).

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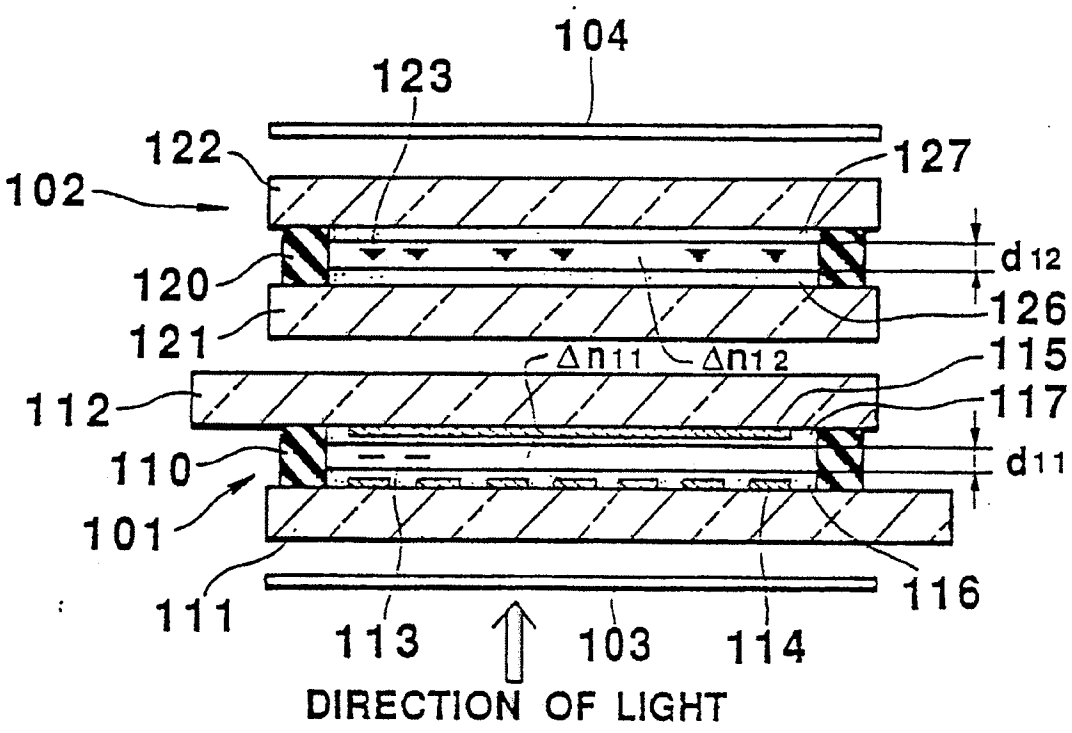
104
123
122
127
102
d12
120
126
121
Δn11
Δn12
115
112
117
110
d11
101
116
111
113
103
114
DIRECTION OF LIGHT

FIG.1

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 89 12 4011

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	S.I.D. INTERNATIONAL SYMPOSIUM, DIGEST OF TECHNICAL PAPERS, Anaheim, California, 24th - 26th May 1988, vol. XIX, pages 49-52,487, SID; N. KIMURA et al.: "Multicolor display by double-layered supertwisted-nematic LCD" * Sections 1-5,8; figures 1,3 * ---	1,3	G 02 F 1/1347
P,X	PATENT ABSTRACTS OF JAPAN, vol. 13, no. 222 (P-876)[3570], 24th May 1989; & JP-A-1 35 420 (SHARP CORP.) 06-02-1989 * Abstract * ---	1,4	
P,X	WO-A-8 903 542 (ASAHI GLASS CO., LTD) * Page 2, line 14 - page 4, line 24; page 6, line 18 - page 10, line 26; page 14, line 18 - page 15, line 3; page 15, line 27 - page 16, line 7; claims 1-11; figure 3 * ---	1-3,8-9	
A	JAPANESE JOURNAL OF APPLIED PHYSICS/PART 2: LETTERS, vol. 26, no.. 11, November 1987, pages L1784-L1786, Toyko, JP; K. KATOH et al.: "Application of retardation compensation; A new highly multiplexable black-white liquid crystal display with two supertwisted nematic layers" * Page L1785, column 2, line 4 - page L1786, column 1, line 11; figures 3-4 * -----	1-2,9	TECHNICAL FIELDS SEARCHED (Int. Cl.5) G 02 F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	30-08-1990	IASEVOLI R.

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 03.82 (P0401)

Electronic Acknowledgement Receipt

EFS ID:	5394354
Application Number:	12340005
International Application Number:	
Confirmation Number:	8241
Title of Invention:	STEREOSCOPIC 3D DISPLAY DEVICE
First Named Inventor/Applicant Name:	Seung-Chul Lee
Customer Number:	00757
Filer:	Gustavo Siller Jr./Kasia Januszewski
Filer Authorized By:	Gustavo Siller Jr.
Attorney Docket Number:	12579-6201
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Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		12579-6201IDS.pdf	206463 3557c6f07ca2613dccc9c5bb027d7675a35a1de1	yes	4

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Miscellaneous Incoming Letter	1	1
	Transmittal Letter	2	3
	Information Disclosure Statement (IDS) Filed (SB/08)	4	4

Warnings:					
Information:					
2	Foreign Reference	A14.pdf	928950 72d6d671f5abda5944c4392ca52418d285d84c0f	no	21
Warnings:					
Information:					
3	Foreign Reference	A15.pdf	552374 541b804030a2088f047eb57ad743620bec5ba597	no	6
Warnings:					
Information:					
4	Foreign Reference	A16.pdf	138240 f8c104299ae3d6e0ccecd50f504b256a8d9e976a	no	3
Warnings:					
Information:					
5	Foreign Reference	A19.pdf	181556 d99ba18ea699a2ea5ed79e2f7883b0aee40b7813	no	5
Warnings:					
Information:					
		Total Files Size (in bytes):	2007583		

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If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

CERTIFICATE OF EFS FILING UNDER 37 CFR §1.8

I hereby certify that this correspondence is being electronically transmitted to the United States Patent and Trademark Office, Commissioner for Patents, via the EFS pursuant to 37 CFR §1.8 on the below date:

Date: May 26, 2009 Name: Gustavo Siller, Jr. Signature: /Gustavo Siller, Jr./

BRINKS HOFER GILSON &LIONE

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Appln. of: Seung-Chul Lee et al.

Appln. No.: 12/340,005

Filed: December 19, 2008

For: STEREOSCOPIC 3D DISPLAY DEVICE

Attorney Docket No: 12579-6201

Examiner: Unknown

Art Unit: 2621

Confirmation No.: 8241

TRANSMITTAL

Mail Stop Amendment
Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Sir:

Attached is/are:

☒ Transmittal; Information Disclosure Statement; PTO-1449; Cited References A14-16 and A19.

Fee calculation:

☒ No additional fee is required.

☐ Small Entity.

☐ An extension fee in an amount of $_____ for a ____- month extension of time under 37 CFR § 1.136(a).

☐ A petition or processing fee in an amount of $_____ under 37 CFR § 1.17(___) .

☐ An additional filing fee has been calculated as shown below:

						Small Entity			Not a Small Entity	
	Claims Remaining After Amendment		Highest No. Previously Paid For	Present Extra		Rate	Add'l Fee	OR	Rate	Add'l Fee
Total		Minus				x $26=			x $52=	
Indep.		Minus				x 110=			x $220=	
First Presentation of Multiple Dep. Claim						+$195=			+ $390=	
						Total	$		Total	$

Fee payment:

☐ Please charge Deposit Account No. 23-1925 in the amount of $_____ for _____.

☐ Payment by credit card in the amount of $_____ (Form PTO-2038 is attached).

☒ The Director is hereby authorized to charge payment of any additional filing fees required under 37 CFR § 1.16 and any patent application processing fees under 37 CFR § 1.17 associated with this paper (including any extension fee required to ensure that this paper is timely filed), or to credit any overpayment, to Deposit Account No. 23-1925.

Respectfully submitted,

May 26, 2009
Date

/Gustavo Siller, Jr./
Gustavo Siller, Jr. (Reg. No. 32,305)

I hereby certify that this correspondence is being Electronically Transmitted on the date noted below to:
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Gustavo Siller, Jr.
Name of applicant, assignee or Registered Representative
/Gustavo Siller, Jr./
Signature
May 26, 2009
Date of Signature

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Appln. of:	Seung-Chul Lee et al.		
Appln. No.:	12/340,005	Examiner:	Unknown
Filed:	December 19, 2008	Art Unit:	2621
For:	STEREOSCOPIC 3D DISPLAY DEVICE	Confirmation No.:	8241
Attorney Docket No:	12579-6201		

INFORMATION DISCLOSURE STATEMENT

Mail Stop Amendment
Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

In accordance with the duty of disclosure under 37 CFR §1.56 and §§1.97-1.98, and more particularly in accordance with 37 CFR §1.97(b), Applicants hereby cite the following reference(s):

U.S. PATENT DOCUMENTS		
DOCUMENT NO.	**DATE**	**NAME**
6,252,624 B1	June 26, 2001	Yuasa et al.
6,252,570 B1	June 26, 2001	Mangerson
2002/0118276 A1	August 29, 2002	Seong
2005/0036082 A1	February 17, 2005	Lai

FOREIGN PATENT DOCUMENTS		
DOCUMENT NO.	DATE	COUNTRY
02/0569683 A1	August 1, 2002	PCT
61-227498	October 9,1986	Japan
0 376 278	July 4, 1990	EPO

OTHER ART – NON PATENT LITERATURE DOCUMENTS
Copy of Search Report issued in corresponding British Application 0821455.3; issued March 25, 2009

Applicants are enclosing Form PTO-1449 (one sheet), along with a copy of each listed reference for which a copy is required under 37 CFR §1.98(a)(2). Pursuant to the undersigned attorney's obligation and duties under 37 C.F.R. §§ 1.56 and 1.98(a)(3) and (c), either English language abstracts, partial translations, or full translations are included for patent documents which are not in English for the express purpose of providing a concise explanation of the references to the Patent and Trademark Office with the opportunity to evaluate the same. Applicants respectfully request the Examiner's consideration of the above reference(s) and entry thereof into the record of this application.

By submitting this Statement, Applicants are attempting to fully comply with the duty of candor and good faith mandated by 37 CFR §1.56. As such, this Statement is not intended to constitute an admission that any of the enclosed references, or other information referred to therein, constitutes "prior art" or is otherwise "material to patentability," as that phrase is defined in 37 CFR §1.56(a).

The Applicant or Applicants have calculated no fee to be due in connection with the filing of this Information Disclosure Statement. However, the Director is authorized to charge any fee deficiency associated with the filing of this Information Disclosure Statement to a deposit account, as authorized in the Transmittal accompanying this Information Disclosure Statement.

Respectfully submitted,

May 26, 2009
Date

/Gustavo Siller, Jr./
Gustavo Siller, Jr.
(Reg. No. 32,305)

별첨 사본은 아래 출원의 원본과 동일함을 증명함.

This is to certify that the following application annexed hereto is a true copy from the records of the Korean Intellectual Property Office.

출 원 번 호 : 10-2008-0055329
Application Number

출 원 년 월 일 : 2008년 06월 12일
Filing Date JUN. 12, 2008

출 원 인 : 엘지디스플레이 주식회사
Applicant(s) LG Display Co.,Ltd.

2009년 02월 02일

특 허 청
COMMISSIONER

제출 일자 : 2008-06-12

【서지사항】

【서류명】 특허출원서

【참조번호】 0001

【출원구분】 특허출원

【출원인】

【명칭】 엘지디스플레이 주식회사

【출원인코드】 1-1998-101865-5

【대리인】

【성명】 박장원

【대리인코드】 9-1998-000202-3

【포괄위임등록번호】 2007-019191-6

【발명의 국문명칭】 액정표시장치

【발명의 영문명칭】 LIQUID CRYSTAL DISPLAY DEVICE

【발명자】

【성명】 이달재

【성명의 영문표기】 LEE,Dal Jae

【주민등록번호】 800920-1XXXXXX

【우편번호】 132-867

【주소】 서울특별시 도봉구 쌍문3동 138-16

【국적】 KR

【발명자】

【성명】 신재원

【성명의 영문표기】 SHIN,Jae Won

【주민등록번호】 790204-1XXXXXX

【우편번호】 607-110

【주소】 부산 동래구 명장동 112-1

제출 일자 : 2008-06-12

【국적】 KR

위와 같이 특허청장에게 제출합니다.

대리인 박장원 (인)

【수수료】

【출원료】	0	면	38,000 원
【가산출원료】	28	면	0 원
【우선권주장료】	0	건	0 원
【심사청구료】	0	항	0 원
【합계】	38,000 원		

제출 일자 : 2008-06-12

【요약서】

【요약】

본 발명은 R, G, B 컬러의 색 특성을 검출하는 컬러센서와 FPC가 일체로 형성되어 메인 서포트에 구비된 액정표시장치에 관한 것으로서, 액자 형태를 이루는 프레임의 하측 면에서 소정 폭의 넓이를 갖고 형성된 오목한 홈부와 상기 오목한 홈부 중 일부에 관통 홀을 갖는 메인 서포트와, 상기 메인 서포트의 일측에 구비되어 빛을 제공하는 발광수단과, 상기 메인 서포트의 오목한 홈부에 구비되는 FPC와 상기 FPC에 고정되어 상기 메인 서포트의 관통 홀에 삽입되는 컬러센서로 이루어지고 상기 발광수단으로부터 제공된 빛의 색 특성을 검출하는 컬러센서 FPC, 및 상기 메인 서포트의 상측에 구비되어 빛을 제공받는 액정패널을 포함하여 구성되는 것을 특징으로 한다.

【대표도】

도 2

【색인어】

센서 FPC, 컬러센서, FPC(Flexible Printed Circuit)

제출 일자 : 2008-06-12

【명세서】

【발명의 명칭】

액정표시장치{LIQUID CRYSTAL DISPLAY DEVICE}

【발명의 상세한 설명】

【기술분야】

<1> 본 발명은 액정표시장치에 관한 것으로서, 더 자세하게는 적(R), 녹(G), 청(B) 컬러의 색 특성을 검출하는 컬러센서와 FPC가 일체로 형성되어 메인 서포트상에 구비된 액정표시장치에 관련된다.

【배경기술】

<2> 일반적으로 액정표시장치는 서로 대향하는 박막트랜지스터 어레이기판(Thin Film Transistor Array substrate)과 컬러필터기판(Color Filter substrate), 그리고 두 기판 사이에 형성된 액정층을 포함하는 액정패널(Liquid Crystal Display Panel)과, 그 액정패널상에 화상을 구현하기 위한 구동부 및 액정패널에 빛을 공급하는 백라이트장치를 포함하여 구성된다.

<3> 여기서, 어레이기판상에는 단위화소가 매트릭스 형태로 배열된다. 이때 단위화소는 어레이기판상에 종 방향으로 일정하게 이격(離隔)되어 배열되는 복수의 데이터 라인과, 횡 방향으로 일정한 간격을 두고 배열되는 복수의 게이트 라인이 서로 교차함으로써 정의된다.

<4> 그리고, 컬러필터기판상에는 어레이기판의 화소들에 대응하여 R, G, B의 서

브 컬러필터층이 형성된다. 또한, 컬러필터층 사이로 빛이 새는 것을 방지하고, 화소를 통과하는 빛의 색 간섭을 방지하기 위한 블랙매트릭스(Black Matrix)가 더 형성된다.

<5> 또한, 서로 대향하여 합착된 컬러필터기판 및 박막트랜지스터 어레이기판의 내측 면에는 공통전극과 화소전극이 각각 형성되어 액정층에 전계를 인가할 수 있게 되는데, 화소전극은 박막트랜지스터 어레이기판상에 화소별로 형성되는 반면 공통전극은 컬러필터기판의 전면(全面)에 일체화되어 형성된다.

<6> 따라서, 공통전극에 전압을 인가한 상태에서 화소전극에 인가되는 전압을 제어함으로써 액정층에 형성된 액정분자들의 배열상태를 변화시키고 그 결과 화소들의 광 투과율을 개별적으로 조절할 수 있게 된다.

<7> 한편, 백라이트장치는 자발광소자와 달리 자체적으로 발광하지 못하는 액정패널에 빛을 공급하는데, 백라이트장치로부터 제공된 빛이 액정층을 통과할 때 액정들의 배열상태에 의해 광 투과율이 결정되어 화상이 표시된다.

<8> 백라이트장치는 광원으로 사용되는 램프의 위치에 따라 에지방식과 직하방식으로 구분된다. 에지방식은 램프가 액정패널의 일측면 또는 양측면에 배치되어, 램프로부터 발생된 광을 도광판에 의해 유도하여 액정패널의 화면 전체에 투사시키는 방식이다.

<9> 그리고, 직하방식은 액정패널의 크기가 20인치 이상으로 대형화되기 시작하면서 중점적으로 개발되기 시작했는데, 확산판의 하부면에 복수개의 형광램프를 일

렬로 배열시켜 액정패널의 전면에 빛을 직접 조사하는 방식이다. 이러한, 직하방식은 에지방식에 비해 광의 이용 효율이 높기 때문에 고휘도를 요구하는 대화면 액정표시장치에 주로 사용된다.

<10> 이때, 광원으로는 냉음극형광램프(CCFL: Cold Cathode Fluorescent Lamp), 열음극형광램프(HCFL: Hot Cathode Fluorescent Lamp), EL(Electro Luminescence), LED(Light Emitting Diode) 등이 사용되며, 이 가운데에서도 전력소모가 적은 냉음극형광램프 및 LED 램프가 많이 사용되는 추세이다.

<11> 물론 상기 형광램프는 고휘도의 구현이 가능하고 휘도의 균일도를 향상시킬 수 있는 이점이 있으나, 색 재현율은 낮은 단점이 있다.

<12> 또한, LED 또는 EL 램프는 부분적으로 휘도의 제어가 가능하고, 색 재현율이 뛰어난 이점이 있으나, 냉음극형광램프에 비해 휘도 및 휘도의 균일도가 저하되는 단점이 있다.

<13> 도 1a는 종래기술에 따른 백라이트장치의 평면도이고, 도 1b는 도 1a의 백라이트장치를 구비한 액정표시장치의 단면도이다.

<14> 도 1a 및 도 1b를 참조하면, 일반적인 액정표시장치는 R, G, B의 광을 발생시키고 점 발광하는 자발광램프(11a)를 구비하는 제1발광부(10)와 막대형의 복수의 형광램프(21)들이 평행하게 배열되는 제2발광부(20)와, 제1발광부(10)에서 발생하는 광의 파장을 감지하여 전압값으로 출력하는 컬러센서(50)와, 컬러센서(50)로부터 제공되는 전압값에 따라 제1발광부(10)의 자발광램프(11a)의 색온도를 조절하는

구동회로부(30) 및 외부로부터 신호를 인가받아 구동회로부(30)에 전달하는 인터페이스(35)를 구비한다.

<15> 한편, 액정표시장치는 제1발광부(10)와 더불어 백색광을 발생시키는 제2발광부(20)를 더 구비한다. 제2발광부(20)는 백색광을 발생시키는 형광램프(21)로 이루어진다. 이때, 형광램프(21)로는 냉음극형광램프(CCFL) 또는 열음극형광램프(HCFL) 등이 사용될 수 있다.

<16> 좀더 구체적으로 살펴보면, 도 1b에 도시된 바와 같이 액정패널(60)의 직하면에 제2발광부(20)의 형광램프(21)들이 형성되고, 액정패널(60)의 측면에 제1발광부(10)가 형성된다. 또한, 제1발광부(10)의 빛을 액정패널(60)로 유도(誘導)하기 위해 액정패널(60)의 직하면에 도광판(40)이 더 설치된다.

<17> 그리고 제1발광부(10)의 빛의 파장을 감지하기 위한 컬러센서(50)가 도광판(40)의 상단에 설치된다.

<18> 또한, 제2발광부(20)의 빛을 최대한 액정패널(60)로 유도하기 위한 반사판(미도시)이 액정표시장치의 하부커버(1) 내면에 더 설치될 수 있다.

<19> 그런데, 이와 같이 컬러센서를 도광판의 상단에 설치할 경우 외력에 의해 컬러센서가 흔들리게 되어 위치 변동이 이루어지게 되고, 그 결과 컬러 제어 및 색특성 검지(calibration)의 오작동을 유발하게 된다.

<20> 뿐만 아니라, 컬러센서를 도광판의 상단에 설치하기 위한 작업이 번거롭고, 더 나아가 컬러센서를 회로구동부에 전기적으로 접속하기 위한 작업이 까다로워 이

에 따른 비용이 발생하고 있다.

【발명의 내용】

【해결하고자 하는 과제】

<21> 따라서, 본 발명은 상기와 같은 문제점을 개선하기 위하여 안출된 것으로서, 그 목적은 작업의 편이성을 위하여 컬러센서가 일체화된 FPC를 메인 서포트상에 구비하고, 이때 센서 FPC의 고정력을 향상시킨 액정표시장치를 제공함에 있다.

【과제 해결 수단】

<22> 상기의 목적을 달성하기 위한 본 발명에 따른 액정표시장치는 액자 형태를 이루는 프레임의 하측 면에서 소정 폭의 넓이를 갖고 형성된 오목한 홈부와 상기 오목한 홈부 중 일부에 관통 홀을 갖는 메인 서포트와, 상기 메인 서포트의 일측에 구비되어 빛을 제공하는 발광수단과, 상기 메인 서포트의 오목한 홈부에 구비되는 FPC와 상기 FPC에 고정되어 상기 메인 서포트의 관통 홀에 삽입되는 컬러센서로 이루어지고 상기 발광수단으로부터 제공된 빛의 색 특성을 검출하는 컬러센서 FPC 및 상기 메인 서포트의 상측에 구비되어 빛을 제공받는 액정패널을 포함하여 구성되는 것을 특징으로 한다.

【효과】

<23> 상기의 구성 결과, 액정표시장치는 컬러센서 FPC를 메인 서포트상에 구비시킴으로써 작업의 편이성을 극대화하고, 더 나아가서 외력에 의해 컬러센서 FPC가 탈착(脫着)되는 현상을 방지하기 위하여 컬러센서 FPC와 메인 서포트가 서로 접촉

하는 면적을 증대시키며, 이와 동시에 FPC의 구조를 변형함으로써 작업의 효율성을 증대시킬 수 있다.

【발명의 실시를 위한 구체적인 내용】

<24> 이하, 도면을 참조하여 상기 구성과 관련해 좀더 구체적으로 살펴보고자 한다.

<25> 도 2는 본 발명의 제1실시예에 따른 액정표시장치의 분해사시도이고, 도 3a는 도 2의 메인 서포트의 배면도이며, 도 3b는 도 3a의 오목 홈부 및 관통 홀에 고정되는 센서 FPC를 나타내는 도면이다. 또한, 도 4는 도 3a의 메인 서포트상에 체결된 도 3b의 센서 FPC의 상태를 나타내는 도면이다.

<26> 도 2, 도 3a, 도 3b 및 도 4에 도시된 바와 같이, 본 발명에 따른 액정표시장치는 바닥면에 대하여 수평하게 위치하는 수평 프레임과 그 수평 프레임에 수직하게 형성된 수직 프레임으로 형성되어 액자 형태, 예컨대 사각 테 형상을 이루고 상기 수평 프레임의 하부면 일측 모서리 영역에서 소정(혹은 일정) 폭(w)의 넓이를 갖고 오목하게 형성된 오목 홈부(100a)와 상기 오목한 홈부(100a) 중 일부에 관통 홀(100b)이 형성된 메인 서포트(100)와, 상기 메인 서포트(100)의 일측에 구비되어 빛을 제공하는 발광수단(121)과, 상기 메인 서포트(100)의 오목 홈부(100a)에 부착되는 FPC(101)와 관통 홀(100b)에 삽입되는 컬러센서(102)로 이루어져 상기 발광수단(121)으로부터의 색 특성을 검출하는 센서 FPC(103)와, 상기 메인 서포트(100)상에 구비되어 빛을 제공받는 액정패널(130)을 포함하여 구성되어 있다.

<27> 예컨대, 도 2에 도시된 바와 같은 노트북 모델의 경우 대략 사각 틀 형상을 갖는 합성수지 또는 서스 스틸(SUS STEEL)의 몰드물로 이루어진 메인 서포트(100) 상에 백라이트장치(120)와 액정패널(130)이 차례로 적재되고, 그 아래쪽으로는 하부커버(110)가 결합되어 있다. 그리고 이 모두를 고정할 수 있는 상부커버(150)가 액정패널(130)의 전면(前面) 가장자리를 덮는 동시에 메인 서포트(100) 및 하부커버(110)에 조립·체결되어 있다.

<28> 여기서, 메인 서포트(100)의 모서리 영역에 위치하여 수평 프레임의 하부면에 형성되어 있는 오목 홈부(100a)는 대략 소폭(w)의 넓이를 가지고 'L'자 형상을 이루고 있고, 그 'L'자 형상을 이루는 오목 홈부(100a)의 대략 일측 끝 부위에 관통 홀(100b)을 형성하고 있으며, 이때 그 관통 홀(100b)은 메인 서포트(100)의 모서리 부위에 더욱 가깝도록 형성되는 것이 바람직하다. 이와 같이 오목 홈부(100a) 및 관통 홀(100b)을 메인 서포트(100)의 모서리 영역에 형성하는 것은 다름 아닌 메인 서포트(100)의 배면에 위치하는 구동회로부(134)의 간섭을 배제하면서, 그 구동회로부(134)상의 커넥터(134a)와 센서 FPC(103)의 전기적 접속을 용이하게 하기 위해서이다.

<29> 또한, 메인 서포트(100)상에 구비되는 백라이트장치(120)는 백색 혹은 은색의 반사판(122)과, 상기 메인 서포트(100)의 일측면을 따라 구비되어 있는 발광수단(121)과, 그 발광수단(121)과 일정 간격을 유지하면서 반사판(122) 위로 구비되어 있는 도광판(126)과, 상기 도광판(126)의 일측에 체결되어 발광수단(121)을 외부로부터 보호하는 램프하우징(129) 및 상기 도광판(126)의 상측에 구비된 다수의

광학 시트(128)를 포함하고 있다. 이때, 반사판(122)의 하측에는 발광수단(121)으로부터의 열을 외부로 신속하게 방출시키기 위한 방열판(미도시)이 추가적으로 구성될 수 있다.

<30> 여기서, 반사판(122)은 측면에 위치하는 램프, 즉 발광수단(121)의 발광소자(121a)로부터의 빛을 그 상측 혹은 전면(前面)에 위치한 액정패널(130)로 손실 없이 반사시키기 위한 것으로서, 그 재질은 은(Ag), 알루미늄(Al) 등이 코팅된 필름을 많이 사용하게 되고, 필름의 두께는 75~200㎛ 정도이다. 반사판(122)에서의 가시광의 광 반사율은 90~97% 정도이며 코팅된 필름이 두꺼울수록 반사율이 높다.

<31> 또한, 발광수단(121)은 외부로부터 전압이 인가되는 양(+) 및 음(-)의 전극부위 및 도전 배선이 형성되어 있고 램프하우징(129)의 내부에 체결되는 PCB(121b)와, 상기 PCB(121b)상에 고정되는 복수 개의 발광소자(121a), 즉 LED 혹은 OLED 등으로 이루어질 수 있다. 물론 본 발명에서의 발광수단(121)이 이와 같은 것에 특별히 한정되는 것은 아니며, 예컨대 기판상에 발광소자(121a)를 공정상 일체로 형성한 메탈 PCB일 수도 있다.

<32> 도광판(126)은 PMMA(Polymethylmethacrylate)를 재질로 하여 그 측면에 위치하는 발광수단(121)으로부터의 빛을 통과시켜 액정패널(130)의 화면 전체에 균일하게 빛을 분포시키기 위한 투명한 판이다. 발광수단(121)으로부터 나온 빛은 도광판(126)에 입사되어 도광판(126)의 내부로 유도된 후 도광판(126) 하측에 위치하는 반사판(122)에 반사되어 그 수직한 방향으로 빛을 균일하게 내보내 주는 역할을 한다.

<33> 그리고 도광판(126)의 위쪽으로는 광학 시트(128)가 구비되어 있는데, 보통 반사판(122) 및 도광판(126)으로부터 제공되는 광(光)의 효율을 향상시켜 액정패널(130)에 조사하는 확산시트, 프리즘 시트 및 보호시트 등이 각각 구비될 수 있다.

<34> 한편, 액정패널(130)은 서로 대향하여 균일한 셀-갭이 유지되도록 합착된 TFT(Thin Film Transistor) 어레이기판 및 컬러필터기판, 그리고 그 두 기판 사이에 형성된 액정층으로 이루어져 있다. 그리고, 액정패널(130)은 전면(前面)과 후면(後面)으로 각각 1장씩 부착된 편광판(미도시)을 포함하고 있다.

<35> TFT 어레이기판은 매트릭스(matrix) 형태로 배치된 복수의 화소들을 각각 정의하는 다수의 게이트 라인과 데이터 라인이 서로 교차·형성되며, 이때 각각의 화소 내부에는 화소전극이 형성되어 있다. 또한 화소 내에는 박막트랜지스터(TFT)가 각각 구비되어 있어 그 박막트랜지스터는 외부로부터 게이트 라인에 인가되는 게이트 신호에 동작하고 그와 동시에 데이터 라인을 통해 입력되는 화소전압(Vdata) 혹은 영상신호를 화소전극에 인가한다.

<36> 상기 TFT 어레이기판과 컬러필터기판의 화소영역에는 TFT 어레이기판의 화소전극에 각각 대응하여 R, G, B의 컬러를 구현하는 컬러필터가 형성되어 있고, 그 컬러필터상에는 공통전극이 형성되어 화소전극과 대향한다. 물론 컬러필터기판은 컬러필터를 각각 구획하는 블랙매트릭스를 포함하고 있다.

<37> 또한, 액정패널(130)의 가장자리영역, 더 자세하게는 TFT 어레이기판상의 게이트 라인과 데이터 라인의 끝에 형성된 게이트 패드부 및 데이터 패드부에는 그

패드부를 통해 신호를 인가하기 위한 TCP(Tape Carrier Package; 132) 및 구동회로부(134)가 구비되어 있다. 이때, 액정패널(130)의 일측에 부착된 이러한 TCP(132) 및 구동회로부(134)는 조립과정에서 메인 서포트(100)의 배면(背面)으로 위치하게 된다.

<38> 이러한 구동회로부(134)는 이후에 다시 자세히 기술되겠지만 센서 FPC(103)를 구성하는 컬러센서(102)로부터 출력되는 전압값을 받아 최초에 설정된 발광소자(121a)의 색상값과 비교하여 최초로 설정된 색상으로 피드백(feed back) 시킨다. 이때 발광소자(121a)의 색상은 구동회로부(134)를 통해 전압값을 조절함으로써 제어될 수 있다.

<39> 그리고, 구동회로부(134)에 인접한 메인 서포트(100)의 배면 모서리영역에 구비되는 센서 FPC(103)는 'L'자 형상의 FPC(101)와, 상기 FPC(101)의 일측에 고정되어 빛의 색 특성을 감지하는 컬러센서(102), 및 상기 FPC(101)의 타측에 형성되어 컬러센서(102)와 도전배선(101a)을 통해 전기적으로 접속하는 패드부(A)를 포함하는데, 이때 FPC(101)는 메인 서포트(100)의 수평 프레임 배면 모서리영역에 형성되어 소폭(w)의 넓이를 갖는 'L'자 형태의 오목한 홈부(100a)에 부착되고, 컬러센서(102)는 오목 홈부(100b) 중 일부에 형성된 관통 홀(100b)에 삽입된다. 또한, 'L'자 형태를 이루는 FPC(101)의 타측에 형성된 패드부(A)는 메인 서포트(100)의 배면으로 구비되는 구동회로부(134)의 커넥터(134a)에 체결된다.

<40> 여기서, 컬러센서(102)는 특정 파장대의 광을 감지하여 그 값을 전압값으로 출력하는 일종의 광센서로서 R, G, B의 광을 각각 감지할 수 있는 적어도 3개의 컬

러센서(102)로 이루어져 있다. 통상 R, G, B의 광을 생성하는 발광수단(121)은 각 발광소자(121a)의 강도에 따라 적색 편향되거나 청색편향될 수 있는데, 그 중 적색 편향될 때를 색온도가 높다고 하고, 청색편향될 때를 색온도가 낮다고 한다.

<41> 그런데, 색온도는 액정표시장치의 사용시간, 온도 등과 같은 외부환경의 변화에 따라 달라지게 되고, 결국 오랜 사용 후에는 최초의 색온도와 다른 색온도를 표시하게 되는데, 컬러센서(102) 그 자체는 발광수단(121)으로부터 제공된 빛을 왜곡없이 감지하여 색온도의 변화를 보정하고 일정한 색온도가 유지되도록 하며, 더 나아가 본 발명에서는 FPC(101)상에 컬러센서(102)를 고정하여 메인 서포트(100)의 오목 홈부(100a) 및 관통 홀(100b)에 체결함으로써 외력에 의한 센서 FPC(103)의 유동 혹은 위치 이탈을 방지하여 컬러센싱(color sensing)의 오동작을 방지할 수 있다.

<42> 뿐만 아니라, 센서 FPC(103)는 FPC(101)가 메인 프레임(100)상에 밀착될 수 있도록 하기 위하여 양면 테이프를 추가적으로 구성하거나, 또는 이에 더하여 컬러센서(102)가 고정되는 FPC(101)의 일측면과 반대되는 방향의 타측면에 PI(polyimide) 보강재를 추가적으로 형성함으로써 FPC(101)에 경직성(stiffness)을 주어 메인 서포트(100)의 고정구조, 즉 오목 홈부(100a)와 형합될 때 고정 효과가 증가될 수 있도록 할 수 있다.

<43> 이를 통해, 컬러센서(102)는 발광수단(121)과 마주보는 메인 서포트(100)의 일측 모서리영역으로 형성되어 있으므로 메인 서포트(100)의 다른 일측, 더 정확히 말해 메인 서포트(100)의 수평 프레임 배면 모서리영역에 구비된 센서 FPC(103)로

부터 원거리에 위치하는 발광수단(121)으로부터 제공되는 R, G, B 광을 좀더 정확히 감지하는 것이 가능하게 된다.

<44> 바꾸어 말하면, 컬러센서(102)가 발광수단(121)과 너무 가깝게 위치하게 되면 색의 혼합이 원활히 이루어지지 않은 상태가 되므로 컬러센서(102)가 색 특성을 감지한다 하더라도 정확한 색온도의 감지가 불가능하게 된다. 따라서, 컬러센서(102)와 발광수단(121)은 서로 멀게 위치하면 위치할수록 정확한 색보정을 통해 왜곡없는 백색광을 생성하여 액정패널(130)에 제공할 수 있게 된다.

<45> 그런데, 본 발명의 제1실시예와 같은 노트북 모델의 액정표시장치는 컬러센서(102)가 고정되어 메인 서포트(100)의 배면 모서리영역에 구비되는 FPC(101)와 그 FPC(101)에 접촉하는 메인 서포트(100)의 단위 면적이 실질적으로 상당히 작게 형성되어 있고, 또 'L'자 형상의 FPC(101)에서 일측에 고정된 컬러센서(102)와 그 컬러센서(102)를 전기적으로 접속시키는 FPC(101)의 타측에 형성된 패드부(A)를 구동회로부(134)의 커넥터(134a)에 체결하기 위한 공간이 협소하여 작업에 많은 번거로움이 뒤따르고 있다.

<46> 이와 같은 문제점을 개선하고자 본 발명에 따른 제2실시예가 제안되었다.

<47> 도 5a는 본 발명의 제2실시예에 따른 액정표시장치의 일부 배면도로서, 센서 FPC가 체결되기 이전 상태를 나타내는 상태도이고, 도 5b는 도 5a의 메인 서포트에 체결되는 센서 FPC의 사시도이며, 도 6은 도 5b의 센서 FPC가 체결된 이후의 체결 상태를 나타내는 액정표시장치의 일부 배면도이다.

<48> 도면에 자세히 나타나지는 않지만 도 5a, 도 5b 및 도 6을 참조해 볼 때, 본 발명의 제2실시예에 따른 액정표시장치는 바닥면에 대하여 수평한 수평 프레임과 그 수평 프레임에 수직하게 형성된 수직 프레임으로 형성되어 액자 형태의 사각 테 형상을 이루고 상기 수평 프레임의 하부면 일측 모서리 영역에서 'ㅏ'자 형태로 오목하게 형성된 오목 홈부(200a)와 상기 오목한 홈부(200a) 중 일부에 관통 홀(200b)이 형성된 메인 서포트(200)와, 상기 메인 서포트(200)의 일측에 구비되어 빛을 제공하는 발광수단(미도시)과, 상기 메인 서포트(200)의 오목 홈부(200a)에 부착되는 'h'자 형상의 FPC(201)와 관통 홀(200b)에 삽입되는 컬러센서(202)로 이루어져 상기 발광수단으로부터의 색 특성을 검출하는 센서 FPC(203)와, 상기 메인 서포트(200)상에 구비되어 빛을 제공받는 액정패널(미도시)을 포함하여 구성되어 있다.

<49> 이때, 메인 서포트(200)의 수평 프레임 하부면에 형성되어 있는 오목 홈부(200a)는 대략 소폭의 넓이를 가지고 'ㅏ'자 형상을 이루고 있고, 그 'ㅏ'자 형상을 이루는 대략 일측 끝 부위에 관통 홀(200b)을 형성하고 있으며, 이때 그 관통 홀(200b)은 메인 서포트(200)의 모서리 부위에 더욱 가깝게 위치하는 것이 바람직하다. 이와 같이 오목 홈부(200a) 및 관통 홀(200b)을 메인 서포트(200)의 모서리 영역에 형성하는 것은 다름 아닌 메인 서포트(200)의 배면에 위치하는 구동회로부(234)의 간섭을 배제하면서, 동시에 그 구동회로부(234)상의 커넥터(234a)와 센서 FPC(203)의 체결, 혹은 전기적 결합을 용이하도록 하기 위함이다.

<50> 그리고, 메인 서포트(200)의 배면에 위치하는 구동회로부(234)에 인접하여

메인 서포트(200)의 배면 모서리영역에 구비되는 센서 FPC(203)는 'h'자 형상을 이루는 FPC(201)와, 상기 FPC(201)의 일측에 고정되어 빛의 색 특성을 감지하는 컬러센서(202), 및 상기 FPC(201)의 타측에 형성되어 컬러센서(202)와 도전배선을 통해 전기적으로 접속하는 패드부를 포함하고 있다.

<51> 이때, 센서 FPC(203)를 구성하는 FPC(201) 중에서 'ㅣ'자 형태를 이루어 메인 서포트(200)와 접촉하는 부위를 「고정부」라 하고, FPC(201) 중에서 고정부에 연장되어 'ㄱ'자 형태를 이루고 그 끝에 패드부를 포함하는 부위를 「자유부」라 명명하자.

<52> 이와 같은 고정부 및 자유부를 갖는 센서 FPC(203)를 위해 본 발명에서 메인 서포트(200)의 배면으로 구비되는 구동회로부(234), 더 정확하게는 구동회로부(234)가 형성된 기판은 FPC(201)의 자유부의 길이 혹은 소정 폭의 넓이만큼 기판의 일부(B)가 형성되어 있지 않을 뿐만 아니라, 자유부의 일측 끝에 형성된 패드부를 구동회로부(234)에 체결 혹은 접속시키기 위한 커넥터(234a)가 본 발명의 제1실시예 대비 위치 변경되고 있다. 이때, 커넥터(234a)는 일부가 오픈(open) 혹은 제거되어 있는 기판의 하단부에 고정되어 센서 FPC(203)의 패드부가 체결되는 커넥터(234a)의 단자들이 위쪽을 향하도록 구성되어 있다.

<53> 상기의 결과, FPC(201)의 고정부는 메인 서포트(200)의 수평 프레임 배면 모서리영역에 형성되어 소폭의 넓이를 갖는 'ㅏ'자 형태의 오목한 홈부(200a)에 부착되고, 컬러센서(202)는 오목 홈부(200b) 중 일부에 형성된 관통 홀(200b)에 삽입된다. 또한, 'h'자 형태를 이루는 FPC(201) 중에서 'ㄱ'자 형태를 이루며 '고정부의

특정영역에서 연장되는 부위의 타측에 형성된 패드부는 메인 서포트(200)의 배면으로 구비되는 구동회로부(234)의 커넥터(234a)에 체결되어 전기적으로 접속하게 된다.

<54> 이때, FPC(201)의 패드부에는 더 나아가서 구동회로부(234)의 커넥터(234a)와의 체결 및 탈착을 용이하게 할 수 있도록 접속보조수단(201a)이 추가적으로 형성될 수 있는데, 이러한 접속보조수단(201a)은 다소의 경직성을 가진 필름이면 어떠한 것이든 무관하며, 예컨대 폴리계열의 필름으로 형성될 수 있다. 따라서, 구동회로부(234)의 커넥터(234a)로부터 센서 FPC(203)의 패드부를 체결 및 탈착시키기 위해 접속보조수단(201a)을 이용하게 되면 체결 작업 및 재작업이 더욱 편리할 수 있을 것이다.

<55> 뿐만 아니라, FPC(201)의 자유부로 인해 'ㄷ'자 형상으로 기판의 일부가 형성되지 않은, 즉 제거된 부위(B)에서 구동회로부(234)의 일측 부위(C), 즉 상측 부위는 FPC(201)의 자유부 일부를 덮게 되고, 이로 인해 외부의 충격 등에 의해 구동회로부(234)의 유동이 발생하더라도 그 유동에 의해 FPC(201)가 메인 서포트(200)의 오목 홈부(200a)에서 탈착되는 현상이 더욱더 줄어들게 된다.

<56> 요약해 보면, 본 발명의 제2실시예에 따른 액정표시장치는 제1실시예서의 액정표시장치 대비 메인 서포트(200)의 오목 홈부(200a)와 접촉하는 FPC(201)의 접촉면적이 증가되고, 아울러 FPC(201)의 자유부가 'ㄱ'자 형상을 이루게 되어 작업성이 개선된다. 더 나아가서, FPC(201)의 자유부 영역에 이웃하는 구동회로부(234)의 기판 일부가 FPC(201)의 자유부를 일정 영역 덮도록 설계함으로써 외력에 의해 구

동회로부(234)의 유동이 발생하더라도, FPC(201)가 메인 서포트(200)의 오목 홈부(200a)로부터 탈착되는 것이 방지된다.

<57> 물론 이와 같은 경우에도 앞서서와 마찬가지로 센서 FPC(203)를 이루는 FPC(201)가 메인 프레임(200)의 오목 홈부(200a)상에 밀착될 수 있도록 하기 위하여 양면 테이프를 추가적으로 구성할 수 있고, 또한 이에 더하여 컬러센서(202)가 고정되는 FPC(201)의 일측면과 반대되는 타측면의 표면에 PI 보강재를 추가적으로 형성함으로써 FPC(201)에 경직성을 주어 메인 서포트(200)의 고정구조, 즉 오목 홈부(200a)와 형합될 때 그 고정 효과를 증가시켜 작업성을 개선할 수 있다.

<58> 이를 통해, 컬러센서(202)는 발광수단(미도시)과 마주보는 메인 서포트(200)의 일측 모서리영역으로 형성되어 있으므로 메인 서포트(200)의 다른 일측, 더 정확히 말해 메인 서포트(200)의 수평 프레임 배면 모서리영역에 구비된 센서 FPC(203)으로부터 원거리에 위치하는 발광수단으로부터 제공되는 R, G, B의 광을 더욱 정확하게 혹은 세밀하게 감지하는 것이 가능하게 된다.

<59> 바꾸어 말하면, 앞서 설명했듯이 컬러센서(202)가 발광수단과 너무 가깝게 위치하게 되면 색의 혼합이 원활히 이루어지지 않은 상태가 되므로 컬러센서(202)가 색 특성을 감지한다 하더라도 정확한 색온도의 감지가 불가능하게 된다. 따라서, 컬러센서(202)와 발광수단은 서로 멀게 위치하면 위치할수록 더욱 정확한 색보정을 할 수 있어 왜곡없는 백색광을 액정패널(미도시)에 제공할 수 있게 된다.

<60> 도 7은 본 발명의 제3실시예에 따른 액정표시장치에 관한 것으로서, 본 발명의 제1실시예 및 제2실시예에 나타낸 메인 서포트의 오목 홈부(100a, 200a)를 조금

더 개선한 구조를 나타내는 것이다.

<61> 도 7은 도 6의 절단선(I-I')를 따라 살펴본 본 발명의 제3실시예에 따른 액정표시장치의 단면도이다.

<62> 도 7에 도시된 바와 같이, 본 발명의 제3실시예에 따른 메인 서포트(300)는 오목 홈부(미표기)가 형성되는 메인 서포트(300)의 적어도 일측 측벽을 따라, 혹은 그 측벽의 일부 영역에서 센서 FPC(303)를 이루는 FPC(301)가 삽입되도록 오목하게 형성된 FPC 삽입부(300c)와 그 삽입부(300c)의 상측에서 FPC(301)를 가이드(guide)하는 돌출부(300d)가 추가적으로 형성되어 있다.

<63> 이때, 본 발명의 제3실시예에 따른 액정표시장치는 메인 서포트(300)의 일측 배면 모서리영역에 형성된 오목 홈부의 측벽에 형성된 FPC 삽입부(300c) 및 돌출부(300d)를 센서 FPC(303)의 컬러센서(302)가 위치하는 곳에서 형성 되도록 하는 것이 더욱 바람직하다. 이는 액정표시장치에 외력이 발생하는 경우에도 센서 FPC(303)의 유동을 방지하고, 또한 FPC(301)에 부착된 컬러센서(302)의 하중을 지지하는 데에 용이하게 작용할 수 있기 때문이다.

<64> 물론 이때에도 센서 FPC(303)의 FPC(301)가 메인 프레임(300)의 오목 홈부상에 밀착될 수 있도록 하기 위하여 양면테이프(300e)를 추가적으로 구성할 수 있고, 또한 이에 더하여 컬러센서(302)가 고정되는 FPC(301)의 일측면과 반대되는 타측면의 표면에 PI 보강재(300f)를 추가적으로 형성함으로써 FPC(301)에 경직성을 주어 메인 서포트(300)의 고정구조, 즉 오목 홈부와 형합될 때 그 고정 효과를 더욱 증가시켜 작업성을 수월하게 할 수 있다.

<65> 그리고, 상기의 내용들을 제외한 기타 액정표시장치를 구성하는 발광수단, 도광판, 액정패널 등과 관련한 자세한 것들은 앞서서의 내용들로 대신하고자 한다.

<66> 결국, 상기의 내용들에 근거해 볼 때 본 발명의 제1실시예 내지 제3실시예는 센서 FPC(103, 203, 303)의 메인 서포트(100, 200, 300)에의 (재작업을 포함한) 부착작업 및 구동회로부의 커넥터에 체결 작업시 작업성 형상과 함께 고정 효과도 향상되어 센서의 위치이탈에 의한 컬러센싱의 오동작을 방지할 수 있을 것이다.

<67> 한편, 상기의 내용들에 근거해 볼 때 본 발명의 제1실시예 내지 제3실시예는 더 나아가서 다양한 방식으로도 변경될 수 있을 것이다. 다시 말해, 'L'자 형상의 FPC를 'h'자 형상의 FPC로 변형할 수 있다는 것은 또 다른 형상의 FPC를 불러올 수 있음을 의미하는 것이다.

<68> 뿐만 아니라, 이러한 FPC와 메인 서포트를 어느 정도만큼 접착시켜 고정력을 향상시키고, 얼마만큼 FPC의 일부를 자유롭게 하여 작업성을 증대시키냐의 문제는 최초 설계시에 따라 어느 정도 변경될 수 있을 것이다.

<69> 따라서, 본 발명에서는 이러한 것을 특별히 한정하는 것은 아니며, 다만 메인 서포트와 그 메인 서포트에 결합되는 센서 FPC와 관련된 앞서의 기술적 내용들은 현 상황에서 볼 때 가장 바람직한 경우를 상정한 것임을 밝혀두고자 한다.

제출 일자 : 2008-06-12

【특허청구범위】

【청구항 1】

액자 형태를 이루는 프레임의 하측 면에서 소정 폭의 넓이를 갖고 형성된 오목한 홈부과, 상기 오목한 홈부 중 일부에 관통 홀을 갖는 메인 서포트;

상기 메인 서포트의 일측에 구비되어 빛을 제공하는 발광수단;

상기 메인 서포트의 오목한 홈부에 구비되는 FPC(Flexible Printed Circuit)와, 상기 FPC에 고정되어 상기 메인 서포트의 관통 홀에 삽입되는 컬러센서로 이루어져 상기 발광수단으로부터 제공된 빛의 색 특성을 검출하는 센서 FPC;

상기 메인 서포트의 상측에 구비되어 빛을 제공받는 액정패널을 포함하여 구성되는 액정표시장치.

【청구항 2】

제1항에 있어서, 상기 관통 홀을 포함하는 오목한 홈부는 메인 서포트의 모서리 영역에 위치하는 것을 특징으로 하는 액정표시장치.

【청구항 3】

제1항에 있어서, 상기 메인 서포트는 상기 오목한 홈부의 측벽에서 돌출되어 형성된 돌출부와, 상기 돌출부의 하측에서 측벽의 일부가 오목하게 형성되어 FPC가 삽입되는 FPC 삽입부를 추가적으로 형성할 수 있는 것을 특징으로 하는 액정표치.

【청구항 4】

제1항에 있어서, 상기 컬러센서가 고정된 FPC는 'L'자 형상을 이루는 것을

특징으로 하는 액정표시장치.

【청구항 5】

제1항에 있어서, 상기 메인 서포트는 'L'자 형상을 이루는 FPC에 대응하여 'L'자 형상의 오목한 홈부를 갖는 것을 특징으로 하는 액정표시장치.

【청구항 6】

제1항에 있어서, 상기 컬러센서가 고정된 FPC는 'h'자 형상을 이루는 것을 특징으로 하는 액정표시장치.

【청구항 7】

제1항에 있어서, 상기 메인 서포트는 'h'자 형상을 이루는 FPC에 대응하여 'ㅏ'자 형상의 오목한 홈부를 갖는 것을 특징으로 하는 액정표시장치.

【청구항 8】

제1항에 있어서, 상기 발광수단은 LED 혹은 OLED 중 어느 하나인 것을 특징으로 하는 액정표시장치.

【청구항 9】

제1항에 있어서, 상기 FPC는 컬러센서가 고정되는 반대 면에 FPC를 경직(stiffness)시키는 PI(Polyimide) 보강재가 추가적으로 형성될 수 있는 것을 특징으로 하는 액정표시장치.

【청구항 10】

제1항에 있어서, 상기 FPC는 메인 서포트의 오목한 홈부에 밀착되도록 컬러

센서부위를 제외한 영역으로 양면 테이프가 추가적으로 형성될 수 있는 것을 특징으로 하는 액정표시장치.

【도면의 간단한 설명】

<70> 도 1a는 종래기술에 따른 백라이트장치의 평면도

<71> 도 1b는 도 1a의 백라이트장치를 구비한 액정표시장치의 단면도

<72> 도 2는 본 발명의 제1실시예에 따른 액정표시장치의 분해사시도

<73> 도 3a는 도 2의 메인 서포트의 일부 배면도

<74> 도 3b는 도 3a의 오목 홈부 및 관통 홀에 고정되는 센서 FPC를 나타내는 도면

<75> 도 4는 도 3b의 센서 FPC를 도 3a의 메인 서포트상에 체결한 상태를 나타내는 도면

<76> 도 5a는 본 발명의 제2실시예에 따른 액정표시장치의 일부 배면도로서, 센서 FPC가 체결되기 이전 상태를 나타내는 상태도

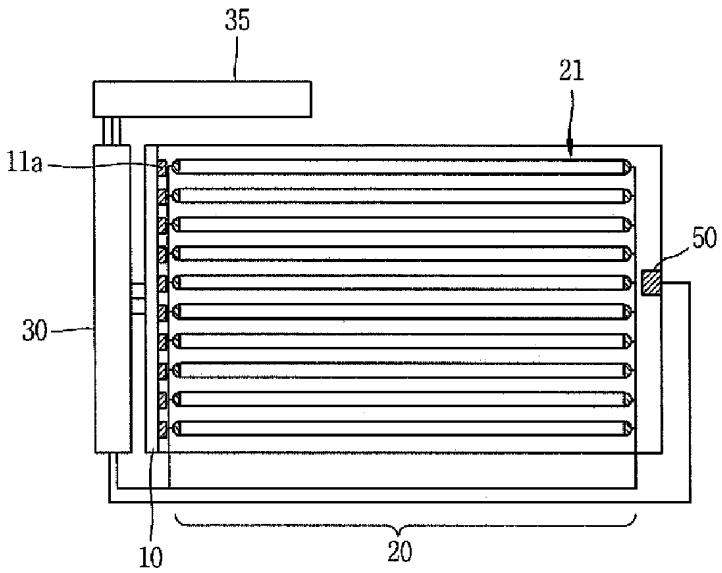
<77> 도 5b는 도 5a의 메인 서포트에 체결되는 센서 FPC의 사시도

<78> 도 6은 도 5b의 센서 FPC가 체결된 이후의 체결 상태를 나타내는 액정표시장치의 일부 배면도

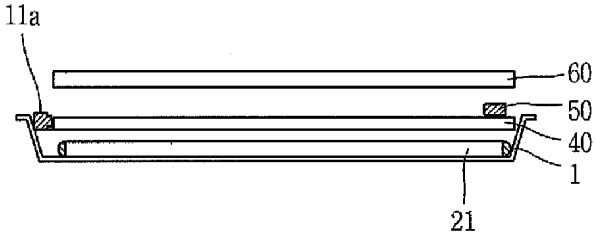
<79> 도 7은 도 6의 절단선(I-I')를 따라 살펴본 본 발명의 제3실시예에 따른 액정표시장치의 단면도

【도면】

【도 1a】



【도 1b】



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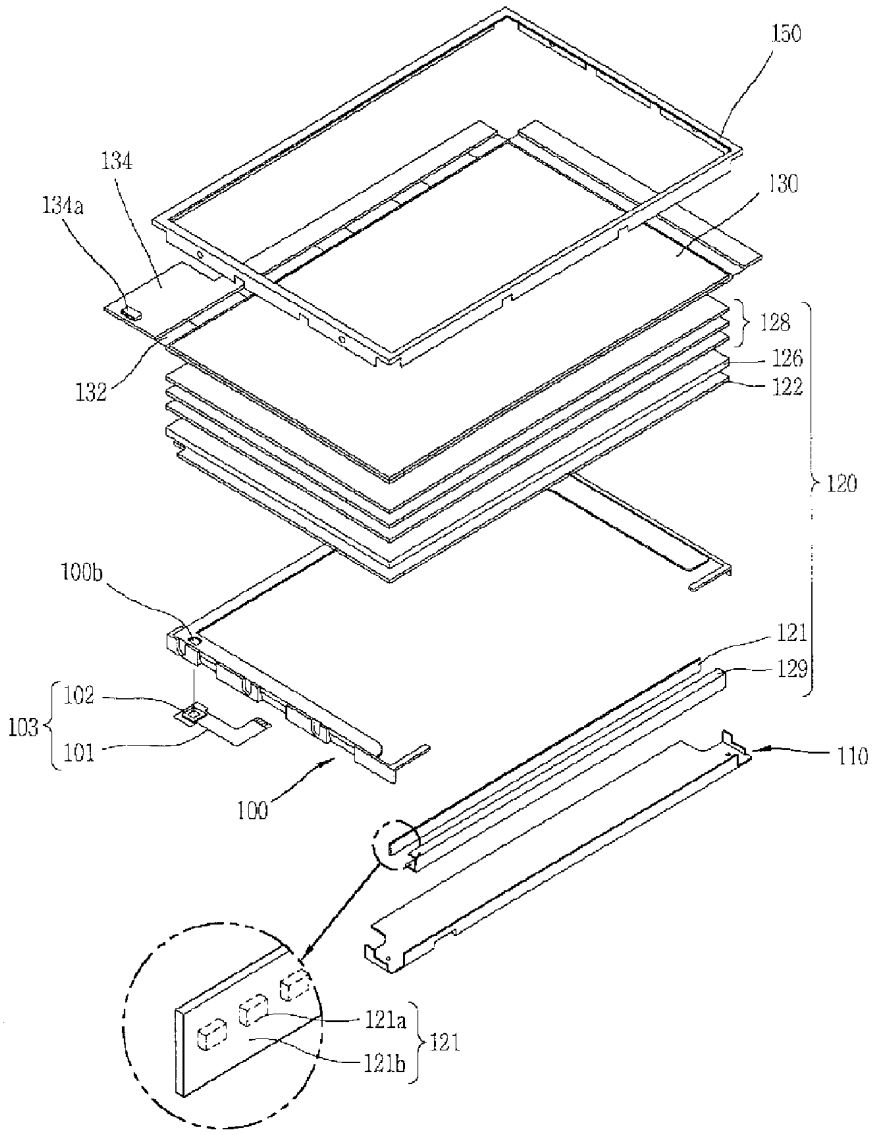
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134a
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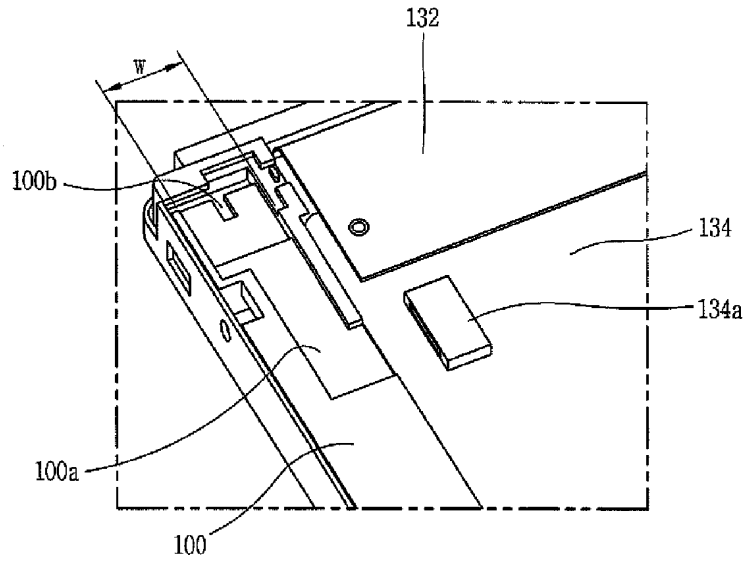
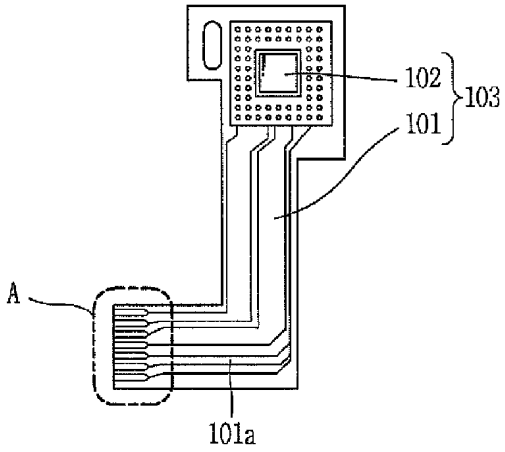
100
121a
121b
121

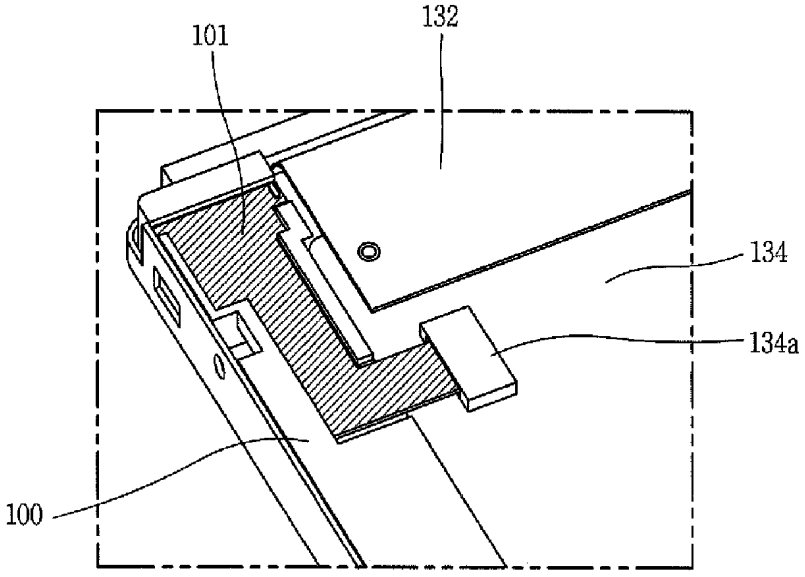
【도 3a】



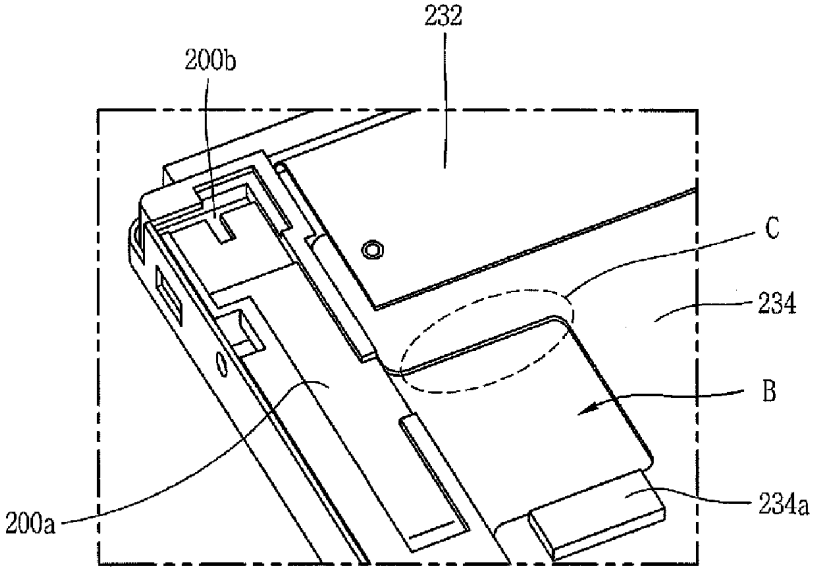
【도 3b】



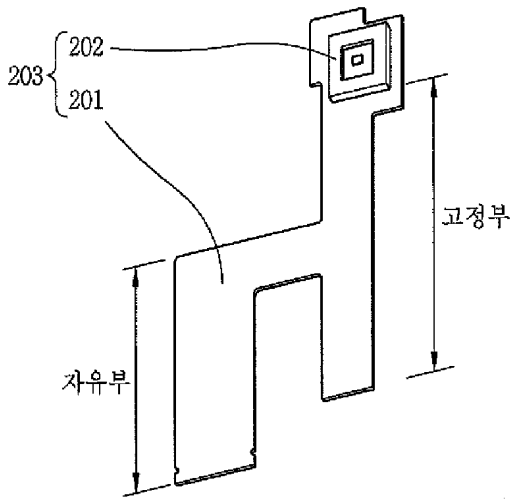
【도 4】



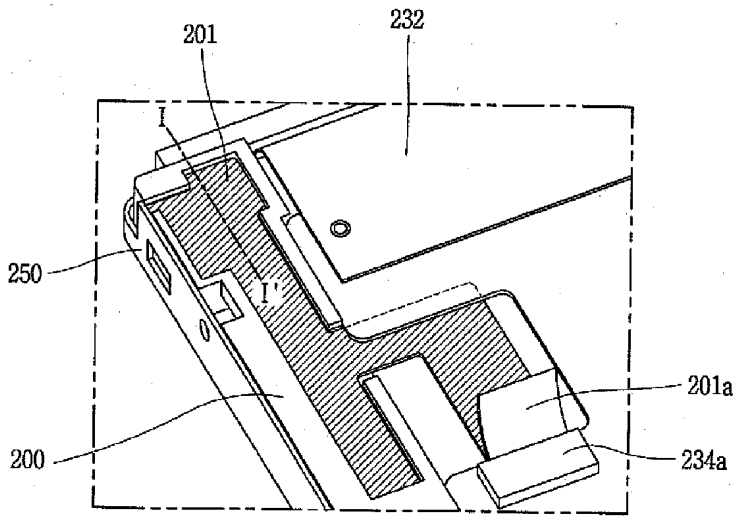
【도 5a】



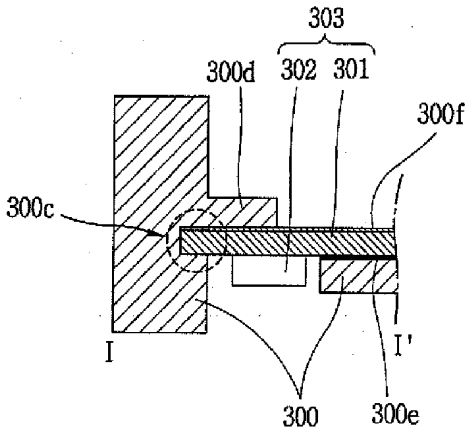
【도 5b】



【도 6】



【도 7】



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FILING RECEIPT

Date Mailed: 01/09/2009

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The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 12/340,005**

Projected Publication Date: 01/14/2010

Non-Publication Request: No

Early Publication Request: No

Title

STEREOSCOPIC 3D DISPLAY DEVICE

Preliminary Class

348

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BRINKS HOFER GILSON & LIONE

In re Appln. of: Seung-Chul LEE, Hoon KANG, and Sung-Min JUNG

For: STEREOSCOPIC 3D DISPLAY DEVICE

Attorney Docket No.: 12579-6201

UTILITY PATENT APPLICATION TRANSMITTAL

Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

1. TRANSMITTED HEREWITH: A new application under 37 CFR §1.53(b), including the following elements and other papers:
   - ☒ Application Data Sheet (see 37 CFR §1.76)
   - ☒ Title page
   - ☒ Specification, including claims and Abstract (25 pages)
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   - ☐ Appendices: _____
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   - ☒ Combined Declaration and Power of Attorney (4 pages; ☒ Executed ☐ Unexecuted)
   - ☐ Information Disclosure Statement, including Form PTO-1449 (_____ sheets), and any required copies
   - ☐ Power of Attorney (_____ pages; ☐ by inventor ☐ by Assignee identified in Assignment)
   - ☐ Nonpublication Request under 35 USC §122(b)(2)(B)(i)
   - ☐ Other: _____
2. SMALL ENTITY STATUS: ☐ Applicant is small entity (per 37 CFR §1.27).
3. FEE CALCULATION:

Claims as Filed	Col. 1	Col. 2		Small Entity			Not a Small Entity	
For	No. Filed	No. Extra		Rate	Fee	or	Rate	Fee
Basic Fee					$ 82	or		$ 330
Total Claims	14-20	0		x$26=	$	or	0 x$52=	$0
Independent Claims	1-3	0		x$110=	$	or	0x$220=	$0
Multiple Dependent Claims Present				+$195=	$	or	+$390=	$0
Utility Application Size Fee (for each additional 50 sheets that exceeds 100 sheets, including specification and drawings)				x$135=	$	or	X$270=	$0
Search Fee				+$270=	$	or	+$540=	$540
Examination Fee				+$110=	$	or	+$220=	$220
*If the difference in col. 1 is less than zero, enter "0" in col. 2.				Total	$	or	Total	$1090

4. FEE PAYMENT:
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5. CORRESPONDENCE ADDRESS: Please recognize the correspondence address for this application as the address associated with the following Customer Number:
   Customer No.: 00757 - Brinks Hofer Gilson Lione
6. PLEASE DIRECT all telephonic communications to: Gustavo Siller, Jr. (tel: (312) 321-4200).

December 19, 2008
Date

Respectfully submitted,
/Gustavo Siller, Jr./
Gustavo Siller, Jr. (Reg. No. 32,305)

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   - ☐ Information Disclosure Statement, including Form PTO-1449 (_____ sheets), and any required copies
   - ☐ Power of Attorney (_____ pages; ☐ by inventor ☐ by Assignee identified in Assignment)
   - ☐ Nonpublication Request under 35 USC §122(b)(2)(B)(i)
   - ☐ Other: _____
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December 19, 2008
Date

Respectfully submitted,
/Gustavo Siller, Jr./
Gustavo Siller, Jr. (Reg. No. 32,305)

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Date: December 19, 2008 Name: Gustavo Siller, Jr. Signature: /Gustavo Siller, Jr./

Our Case No. 12579/6201

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
APPLICATION FOR UNITED STATES LETTERS PATENT

INVENTORS: Seung-Chul LEE
Hoon KANG
Sung-Min JUNG

TITLE: STEREOSCOPIC 3D DISPLAY DEVICE

ATTORNEY: Gustavo Siller, Jr. (Reg. No. 32,305)
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STEREOSCOPIC 3D DISPLAY DEVICE

BACKGROUND

Field of the Disclosure

[0001] The present invention relates to a stereoscopic 3D (Three-Dimensional) display device and, more particularly, to a stereoscopic 3D display device allowing viewing of a stereoscopic image by using polarization glasses.

Description of the Related Art

[0002] A 3D display may be briefly defined as 'the sum of a system artificially reproducing a 3D screen image'.

[0003] Here, the system includes a software technique for displaying an image three-dimensionally and hardware implementing contents created by the software technique as an actual 3D image. The reason of including the software region is because, for 3D display hardware, contents created by a software-wise method are separately required for each stereoscopic implementing method.

[0004] Also, a virtual 3D display is literally the sum of a system providing a virtual 3D effect with planar display hardware by using, among various factors providing stereoscopy, binocular disparity, caused by the fact that users' eyes are separated from each other by about 65mm in a horizontal direction. In other words, when a user looks at an object, the user's eyes see slightly different images (strictly speaking, sharing left and right spatial information) of the object because of the binocular disparity, and when the two images are transferred to the brain of the user via the retina, the brain accurately combines them to allow the user to feel the 3D effect of the image. Based on this, a 2D display device simultaneously displays the two left and right images and sends them to the user's respective eyes to create virtual stereoscopy, which is the so-called virtual 3D display.

[0005] In such a virtual 3D display hardware device, in order to display images of two channels on the single screen, in most cases, the channels are outputted by changing lines, namely, one line at a time, in one of horizontal or vertical directions on the single screen. When the images of the two channels are simultaneously outputted on the single display device, due to the hardware

structure, in case of an autostereoscopic scheme, the right image is transferred to the right eye and the left image is only transferred to the left eye In case of the method using (wearing) glasses, special glasses suitable to each method is used such that the left eye is covered so that it cannot see the right screen image and the right eye is covered so that it cannot see the left screen image.

[0006] Although the channels are outputted by changing lines one by one, because the thickness of the lines and the interval between lines are about 0.1mm to 0.5mm, too fine for the user's eyes to recognize, , the user's eyes recognize the two images of the respective channels as a single screen. However, compared with the case where 2D screen is used, the amount of information reaching the user's eyes from the screen of the same size is halved per channel, so the resolution and a sensible brightness are reduced to about one half as well.

[0007] The stereoscopic image display method includes a method for wearing glasses and an autostereoscopic method in which glasses are not used.

[0008] A typical method that does not use glasses (in which the user does not wear glasses) includes a lenticular method and a parallax barrier method.

[0009] In the lenticular method, a lenticular lens plate on which cylindrical lenses are vertically arranged is installed in front of a display panel.

[0010] In the parallax barrier method, two left and right screens are alternately disposed at certain interval therebetween behind a slit-shaped opening called a parallax barrier, so that the two left and right images can be separately viewed through the opening at a particular point of time. That is, the parallax barrier method simply discriminates the left and right channels by blocking them with a wall, rather than using an optical technique such as a polarization method.

[0011] FIG. 1 is a schematic view showing the configuration of a stereoscopic image display device employing parallelax barrier method according to the related art, in which a stereoscopic image and a planar image are selectively switched.

[0012] As shown, a stereoscopic image display device 1 includes a backlight light source 40, a display panel 30, and a switching panel 20.

[0013] The switching panel 20 includes an opaque slit portion and a transparent slit portion, which have a certain width and are alternately disposed. When an electrical signal is applied to the switching panel, the opaque slit portion becomes opaque and the transparent slit portion becomes transparent.

[0014] An observer 10 looks at the display panel 30 via the transparent slit portion of the switching panel 20, and in this case, the observer's left eye (L) sees a left eye region Lp of the display panel 30 via the transparent slit portion of the switching panel 20 and the observer's right eye (R) sees a right eye region Rp of the display panel 30 via the transparent slit portion.

[0015] In this manner, the observer's left eye (L) and right eye (R) see different regions of the display panel 30, and at this time, the display panel 30 displays images corresponding to the left and right eyes on the left eye region Lp and the right eye region Rp. Accordingly, the observer can feel a three-dimensional effect according to the binocular disparity (binocular parallax).

[0016] However, because the parallax barrier method discriminates images with the structure of simply covering the visual field, not using any particular optical technique, if the observer is not at the position intended initially at the designing, the observer's eyes are not within the corresponding range and the images are seen broken. The restricted positions include left/right positions and front/rear positions.

[0017] In addition, in the 2D mode, the barrier degrades the brightness of screen image, and a certain user (observer) may feel that the barrier is unpleasant to his eyes.

BRIEF SUMMARY

[0018] A stereoscopic image display device includes a main display panel operable to alternately display a left image and a right image; an auxiliary display panel including first and second substrates having a pixel part corresponding to that of the main display panel and a sub-liquid crystal layer formed between the first and second substrates, and positioned in front of the main display panel to change polarization information of an incident left or right image; a plurality of first electrodes patterned on the first substrate along the rows of pixels formed on the

main display panel; a second electrode formed on a front surface of the pixel part of the second substrate; and a light source to supply light to the rear side of the main display panel.

[0019] The foregoing and other features and aspects of the present invention will become more apparent from the following detailed description of the present invention when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] FIG. 1 is a view schematically showing the configuration of a stereoscopic image display device according to a related art parallax barrier method;

[0021] FIG. 2 is a sectional view showing the structure of a stereoscopic image display device according to a first embodiment of the present invention;

[0022] FIGs. 3A and 3B are plan views schematically showing the structure of lower and upper substrates of an auxiliary display panel of the stereoscopic image display device;

[0023] FIGs. 4A and 4B are sectional views taken along lines A-A' and B-B' of the upper substrate of the auxiliary display panel in FIG. 3A;

[0024] FIG. 5 is a view for explaining operational characteristics of an auxiliary display panel having a sub-liquid crystal layer of a TN mode;

[0025] FIG. 6 is a view for explaining operational characteristics of an auxiliary display panel having a homogenous sub-liquid crystal layer;

[0026] FIG. 7 is a view showing a rubbing direction of the auxiliary display panel having the homogenous sub-liquid crystal layer;

[0027] FIG. 8 is a sectional view schematically showing the structure of a stereoscopic image display device according to a second embodiment of the present invention;

[0028] FIG. 9 is a view for explaining operational characteristics of an auxiliary display panel of the stereoscopic image display device in FIG. 8;

[0029] FIG. 10 is a sectional view schematically showing the structure of a stereoscopic image display device according to a third embodiment of the present invention;

[0030] FIG. 11 is a view for explaining operational characteristics of an auxiliary display panel of the stereoscopic image display device in FIG. 10; and

[0031] FIG. 12 is an exemplary view for explaining a driving principle of the stereoscopic image display device according to the present invention.

DETAILED DESCRIPTION OF THE DRAWINGS AND THE PRESENTLY PREFERRED EMBODIMENTS

[0032] As the main stream of display devices is shifted from CRTs (Cathode Ray Tubes) to flat panel displays such as LCDs (Liquid Crystal Displays), research and the practical use of a glass type virtual 3D display scheme are shifting from the scheme optimized for the CRTs to a scheme optimized for the flat panel displays.

[0033] A polarization method is to separate images of left and right eyes by using a light blocking effect according to combination of perpendicular polarization elements. In a polarization mode display device, when two images are simultaneously outputted, right and left images are displayed on the entire screen by turns one line at a time. The two simultaneously outputted images are seen by the observer's eyes, so the images should be filtered through polarization glasses. Namely, the images are filtered such that the left image is not seen to the right eye and the right image is not seen to the left eye through the glasses.

[0034] A polarization filter used in the polarization method refers to a filter that allows light vibrating in a particular direction, among light diffused in various directions, to pass therethrough and absolve light vibrating in the other remaining directions.

[0035] The process in which the respective images are seen to the both eyes by using the polarization filter in the polarization method will be described as follows.

[0036] First, in the display device, the left and right images are allowed to pass through the polarization filter in different directions so as to turn into light vibrating in different directions. Thereafter, when the light is filtered through the polarization glasses, each side of the glasses has polarization filters of the same directions as those of the respective left and right images so as to prevent the

opposite images from being seen. For example, if a left image is polarized to include only light vibrating at -45° and a right image is polarized to include only light vibrating at 45° and the left polarization glass is made to include -45° polarization filter and the right polarization glass is made to include 45° polarization filter, the left image including light vibrating at -45° would not pass through the right glass of 45°, and vice versa, resulting in that only one image suitable for each eye is recognized.

[0037] The polarization method may have a considerably wide viewing angle in horizontal or vertical direction according to the direction in which images of two channels are divided. In general, in consideration of situations where many people watch the screen, left/right images are divided in a horizontal direction to secure a left/right (horizontal) viewing angle. The polarization method can obtain nearly a 180° horizontal viewing angle, so it can be suitable for a screen where many people are watching at the same time. In this case, when the horizontal viewing angle is secured, an up/down (vertical) viewing angle is compromised, and in this case a pseudoscopic phenomenon, in which the polarization states of the left image and the right image are interchanged in the direction of the vertical viewing angle so that the left-eye image is seen to the right eye and the right-eye image is seen to the left eye, occurs.

[0038] FIG. 2 is a sectional view schematically showing the structure of a stereoscopic image display device according to a first embodiment of the present invention.

[0039] As shown, the stereoscopic image display device 100 according to the first embodiment of the present invention includes a main display panel 110 that displays a left image and a right image in turns, an auxiliary display panel 120 positioned in front of the main display panel 110, a light source 130 that supplies light to the rear side of the main display panel 110, and polarization glasses 140 that selectively transmit a left or right image outputted from the auxiliary display panel 120 according to a polarization state to implement a stereoscopic image.

[0040] The main display panel 110 displays a left image to be made incident to the left eye of a viewer (user) and a right image to be made incident to the right eye of the viewer in turns in order to implement a stereoscopic image.

[0041] The main display panel 110 according to the first embodiment of the present invention may be a liquid crystal panel. If a liquid crystal panel according to the related art is driven at 60Hz, the main display panel 110 is preferably driven at 120Hz. This aims to display the left and right images in turns while securing a stereoscopic picture quality of above a certain level.

[0042] The main display panel 110 has the same structure as the liquid crystal panel according to the related art, except for a driving principle to be hereinafter described.

[0043] Where the main display panel 110 is a liquid crystal panel, the main display panel 110 includes a thin film transistor (TFT) array substrate 111, a color filter substrate 112 disposed facing the array substrate 111, a main liquid crystal layer 113 positioned between the array substrate 111 and the color filter substrate 112, first and second polarizers 114 and 115 attached on outer surfaces of the array substrate 111 and the color filter substrate 112. Here, the first and second polarizers 114 and 115 are disposed such that their polarization axes are substantially perpendicular to each other.

[0044] Meanwhile, in addition to a liquid crystal panel, the main display may be a flat display panel such as a plasma display panel (PDP), an organic light emitting diode (OLED), or the like.

[0045] As described above, the auxiliary display panel 120 according to the first embodiment of the present invention is positioned in front of the main display panel 110. The auxiliary display panel 120 is driven in synchronization with one of left and right images of the main display panel 110 and serves to change polarization information of incident left or right image. In this case, the auxiliary display panel includes a first substrate 121 and a second substrate 122 that face each other, and a sub-liquid crystal layer 123 positioned between the first and second substrates 121 and 122.

[0046] First and second electrodes (not shown) and an alignment film (not shown) for controlling an arrangement of the sub-liquid crystal layer 123 are provided on the first and second substrates 121 and 122.

[0047] FIGs. 3A and 3B are plan views schematically showing the structure of lower and upper substrates of the auxiliary display panel of the stereoscopic image display device. FIGs. 4A and 4B are sectional views taken along lines A-A' and B-B' of the upper substrate of the auxiliary display panel in FIG. 3A.

[0048] First, as shown in FIG. 3A (see, FIGs. 4A and 4B), first electrodes 128 made of a transparent conductive material such as indium tin oxide (ITO) are patterned along lines (rows) of pixels of the main display panel on the first substrate 121, the lower substrate of the auxiliary display panel 120.

[0049] The height (h) of the first electrode 128 corresponds to the height of a single pixel of the main display panel, and the width (w) of the first electrode 128 corresponds to 'n' (n=1, 2,...) times the width of a pixel part 125.

[0050] Reference numerals 126 and 127 denote a driver IC (Integrated Circuit) for applying signals and signal wirings for connecting the driver IC and the first electrodes 128. The signal wirings 127 are made of a conductive material such as copper or molybdenum.

[0051] As shown in FIG. 3B (see, FIGs. 4A and 4B), a second electrode 128 made of the same material as the first electrode 128 is wholly formed, without any patterns, on the entire surface of the pixel part 125 of the second substrate 122, the upper substrate of the auxiliary display panel 120.

[0052] Alignment films 124a and 124b for aligning the sub-liquid crystal layer 123 are positioned on the facing surfaces of the first and second substrates 121 and 122, respectively.

[0053] The auxiliary display panel 120 may include different types of sub-liquid crystal layers 123.

[0054] FIG. 5 is a view for explaining operational characteristics of the auxiliary display panel having a sub-liquid crystal layer of a TN mode.

[0055] As illustrated, when the auxiliary display panel 120 is turned off, a plurality of liquid crystal molecules 123a constituting the sub-liquid crystal layer 123 are twisted at 90° (TN structure) or 240° (STN structure) and arranged

between the first and second substrates 121 and 122 along a rubbing direction of the alignment films (not shown) of the first and second substrates 121 and 122. When the auxiliary display panel 120 is turned on, the liquid crystal molecules 123a are vertically arranged between the first and second substrates 121 and 122 due to an electric field formed between the first and second substrates 121 and 122.

[0056] Accordingly, if the auxiliary display panel 120 is in an OFF state, when the left or right image passes the auxiliary display panel 120, their polarization axis is rotated by 90°. Namely, if the auxiliary display panel 120 is not driven, the polarization axis of the left or right image which has passed through the auxiliary display panel 120 is changed to be substantially perpendicular to the polarization axis of the left or right image made incident to the auxiliary display panel 120.

[0057] The reason of the change in the polarization axis of the left or right image is because of a refractive index anisotropy (Δn) of the sub-liquid crystal layer 123. The longer axis and the shorter axis of the liquid crystal molecules 123a have different refractive indexes, which is called a refractive index anisotropy (Δn). The refractive index anisotropy (Δn) is defined by a value obtained by subtracting a refractive index of the shorter axis direction from that of the longer axis direction. As shown, the liquid crystal molecules 123a are arranged after being twisted by 90° or 240°, and incident light proceeds according to the refractive index anisotropy (Δn) of the sub-liquid crystal layer 123, changing the polarization state or polarization information of the incident light as described above.

[0058] When the auxiliary display panel 120 is in an ON state, the polarization axis of the left or right image that has passed through the auxiliary display panel 120 does not change. This is because as the liquid crystal molecules are arranged to be perpendicular to the first and second substrates 121 and 122, light passes through the sub-liquid crystal layer 123 only with the

refractive index in the shorter axis direction, not the refractive index anisotropy ($\triangle n$). Therefore, the polarization state or polarization information is not changed.

[0059] FIG. 6 is a view for explaining operational characteristics of an auxiliary display panel having a homogenous sub-liquid crystal layer. FIG. 7 is a view showing a rubbing direction of the auxiliary display panel having the homogenous sub-liquid crystal layer.

[0060] As illustrated, if the auxiliary display panel 120 includes a homogenous sub-liquid crystal layer 123', when the auxiliary display panel 120 is turned off, the liquid crystal molecules 123a' are arranged to be substantially parallel to the first and second substrates 121 and 122. A rubbing direction of the auxiliary display panel 120 is substantially at 45° with respect to the polarization axis of the left or right image made incident to the auxiliary display panel 120.

[0061] Thus, if the auxiliary display panel 120 is not driven, the liquid crystal molecules 123a' are arranged to be parallel to the first and second substrates 121 and 122 in a direction inclined at 45° from the polarization axis of the incident left or right image. When the auxiliary display panel 120 is turned on, the liquid crystal molecules 123a' are arranged to be substantially perpendicular to the first and second substrates 121 and 122.

[0062] In this case, where the sub-liquid crystal layer 123' has a homogenous arrangement, the sub-liquid crystal layer 123' may preferably satisfy an equation $\triangle nxd=\lambda/2$. Here, 'd' is a cell gap of the sub-liquid crystal layer 123', $\triangle n$ indicates a refractive index anisotropy of the sub-liquid crystal layer 123', and λ indicates wavelength of light that has passed through the sub-liquid crystal layer 123'.

[0063] The reason for the sub-liquid crystal layer 123' preferably satisfying the equation $\triangle nxd=\lambda/2$ is to change the phase of incident left or right image by 180°. Accordingly, as shown in FIG. 6, when the auxiliary display panel 120 is in an OFF state, the left or right image that passes through the auxiliary display panel 120 has a polarization axis substantially perpendicular to that of the left or

right image made incident on the auxiliary display panel 120, and is outputted to outside the auxiliary display panel 120.

[0064] Meanwhile, when the auxiliary display panel 120 is in an ON state, the polarization axis of the left or right image that has passed through the auxiliary display panel 120 is not changed. This is because as the liquid crystal molecules 123a' are arranged to be perpendicular to the first and second substrates 121 and 122, light passes through the sub-liquid crystal layer 123' only with the refractive index in the shorter axis direction, not the refractive index anisotropy ($\triangle n$). Therefore, the polarization state or polarization information is not changed.

[0065] As described above, in the first embodiment of the present invention, the first and second electrodes are formed on the first and second substrates of the auxiliary display panel such that they correspond to the rows of the pixels and the pixel part of the main display panel, and driving is performed at 120Hz to apply signals to the corresponding first and second electrodes of the auxiliary display panel according to a signal addressing of the main display panel to change the polarization state according to left or right image displayed on each subframe, thereby improving both the 3D vertical viewing angle and the 2D luminance.

[0066] FIG. 8 is a sectional view schematically showing the structure of a stereoscopic image display device according to a second embodiment of the present invention, in which the structure is substantially the same as that of the stereoscopic image display device according to the first embodiment of the present invention except that a $\lambda/4$ retardation layer is inserted to the lower substrate of the auxiliary display panel.

[0067] As illustrated, the stereoscopic image display device 200 according to the second embodiment of the present invention includes a main display panel 210 that displays a left image and a right image in turns, an auxiliary display panel 220 positioned in front of the main display panel 210, a light source 230 that supplies light to the rear side of the main display panel 210, and polarization glasses 240 that selectively transmit a left or right image outputted from the

auxiliary display panel 220 according to a polarization state to implement a stereoscopic image.

[0068] The light source 230 is positioned at a rear side of the main display panel 210 and emits light to the main display panel 210. Here, the light source 230 may be a direct type light source or an edge type light source. As the light source 230, a cold cathode fluorescent lamp (CCFL) may be used, and an external electrode fluorescent lamp (EEFL) that has characteristics of high luminance, low cost and low power consumption and that can drive a light source by using a single inverter may be also used. And a light emitting diode (LED) having good luminance and color reproduction can be also used as a light source.

[0069] The polarization glasses 240 are to view a stereoscopic image by dividing left and right images according to a polarization state of the left or right image outputted from the auxiliary display panel 220. The polarization glasses 240 include a left polarization lens and a right polarization lens, and a polarization axis of the left polarization lens is substantially perpendicular to that of the right polarization lens. The polarization axis of the left polarization lens is the same as the polarization axis of one of the left and right images outputted from the auxiliary display panel 220, and the polarization axis of the right polarization lens is the same as the polarization axis of another of the left and right images outputted from the auxiliary display panel 220. Accordingly, the left and right images outputted from the auxiliary display panel 220 are discriminated according to the polarization state of the left and right images by the polarization glasses 240 and made incident to the viewer's (user's) left and right eyes, and thus the user can view a stereoscopic image.

[0070] In order to implement the stereoscopic image, the main display panel 210 alternately displays the left image to be made incident to the user's left eye and the right image to be made incident to the user's right eye.

[0071] The main display panel 210 according to the second embodiment of the present invention may be the same liquid crystal panel as that of the first embodiment of the present invention, and when the liquid crystal panel according

to related art is driven at 60Hz, the main display panel 210 may be driven at 120Hz.

[0072] The main display panel 210 includes a thin film transistor (TFT) array substrate 211, a color filter substrate 212 disposed to face the array substrate 211, a main liquid crystal layer 213 positioned between the array substrate 211 and the color filter substrate 212, first and second polarizers 214 and 215 attached on outer surfaces of the array substrate 211 and the color filter substrate 212. Here, the first and second polarizers 214 and 215 are disposed such that their polarization axes are substantially perpendicular to each other.

[0073] As described above, the auxiliary display panel 220 according to the second embodiment of the present invention is positioned in front of the main display panel 210. The auxiliary display panel 220 is driven in synchronization with one of left and right images of the main display panel 210 and serves to change polarization information of incident left or right image. In this case, the auxiliary display panel includes a first substrate 221 and a second substrate 222 that face each other, and a sub-liquid crystal layer 223 positioned between the first and second substrates 221 and 222.

[0074] First and second electrodes (not shown) and an alignment film (not shown) for controlling an arrangement of the sub-liquid crystal layer 223 are provided on the first and second substrates 221 and 222.

[0075] The first electrodes made of a transparent conductive material such as indium tin oxide (ITO) are patterned along lines (rows) of pixels of the main display panel on the first substrate 221, the lower substrate of the auxiliary display panel 220. The height of the first electrode corresponds to the height of a single pixel of the main display panel, and the width of the first electrode corresponds to 'n' (n=1, 2,...) times the width of a pixel part.

[0076] The second electrode made of the same material as the first electrode is wholly formed, without any patterns, on the entire surface of the pixel part of the second substrate 222, the upper substrate of the auxiliary display panel 220.

[0077] Alignment films for aligning the sub-liquid crystal layer 223 are positioned on the facing surfaces of the first and second substrates 221 and 222, respectively.

[0078] The stereoscopic image display device according to the second embodiment of the present invention includes a $\lambda/4$ retardation layer 250 formed on an upper surface of the first substrate 221 of the auxiliary display panel 220 to change a linear polarization made incident from the main display panel 210 to a circular polarization.

[0079] The $\lambda/4$ retardation layer 250 according to the second embodiment of the present invention is formed in an in-cell form together with the first substrate 221.

[0080] FIG. 9 is a view for explaining operational characteristics of the auxiliary display panel of the stereoscopic image display device in FIG. 8, in which the auxiliary display panel has a homogenous sub-liquid crystal layer.

[0081] As illustrated, when the auxiliary display panel 220 has the homogenous sub-liquid crystal layer 223, if the auxiliary display panel 220 is turned off, liquid crystal molecules 223a are arranged to be substantially parallel to the first and second substrates 221 and 222. A rubbing direction of the auxiliary display panel 220 and an optical axis of the $\lambda/4$ retardation layer 250 are substantially at 45° with respect to the polarization axis of the left or right image made incident to the auxiliary display panel 220.

[0082] Accordingly, if the auxiliary display panel 220 is not driven, the liquid crystal molecules 223a are arranged to be parallel to the first and second substrates 221 and 222 in a 45°-inclined direction with respect to the polarization axis of the incident left or right image. When the auxiliary display panel 220 is turned on, the liquid crystal molecules 223a are arranged to be substantially perpendicular to the first and second substrates 221 and 222.

[0083] In this case, as described above, because the sub-liquid crystal layer 223 has the homogenous arrangement, the sub-liquid crystal layer 223 may satisfy an equation $\triangle nxd=\lambda/2$.

[0084] Thus, as shown, if the auxiliary display panel 220 is in an OFF state, the linearly polarized left or right image made incident to the auxiliary display panel 220 passes through the first substrate 221 of the auxiliary display panel 220 so as to be changed in its state to a left circular polarization (or right circular polarization), which then passes through the sub-liquid crystal layer 223. At this time, a left circularly polarized (or right circularly polarized) left or right image made incident to the sub-liquid crystal layer 223 passes through the sub-liquid crystal layer 223 so as to be changed in its state to a right circular polarization (or left circular polarization), which is then outputted to outside of the auxiliary display panel 220.

[0085] If the auxiliary display panel 220 is in an ON state, the left circularly polarized (or right circularly polarized) left or right image which has passed through the auxiliary display panel 220 is outputted to the outside of the auxiliary display panel 220, with its polarization state unchanged. This is because as the liquid crystal molecules 223A are arranged to be perpendicular to the first and second substrates 221 and 222, light passes through the sub-liquid crystal layer 223 only with the refractive index in the shorter axis direction, not the refractive index anisotropy ($\triangle n$). Therefore, the polarization state or polarization information is not changed.

[0086] FIG. 10 is a sectional view schematically showing the structure of a stereoscopic image display device according to a third embodiment of the present invention, in which the structure is substantially the same as that of the stereoscopic image display device according to the second embodiment of the present invention except that $\lambda/4$ retardation layer is attached to a rear surface of the lower substrate of the auxiliary display panel.

[0087] As illustrated, the stereoscopic image display device 300 according to the third embodiment of the present invention includes a main display panel 310 that displays a left image and a right image in turns, an auxiliary display panel 320 positioned in front of the main display panel 310, a light source 330 that supplies light to the rear side of the main display panel 310, and polarization glasses 340 that selectively transmit a left or right image outputted from the

auxiliary display panel 320 according to a polarization state to implement a stereoscopic image.

[0088] The light source 330 is positioned at a rear side of the main display panel 310 and emits light to the main display panel 310. The polarization glasses 340 include left and right polarization lenses, and a polarization axis of the left polarization lens is substantially perpendicular to that of the right polarization lens. The polarization axis of the left polarization lens is the same as the polarization axis of one of the left and right images outputted from the auxiliary display panel 320, and the polarization axis of the right polarization lens is the same as the polarization axis of another of the left and right images outputted from the auxiliary display panel 320. Accordingly, the left and right images outputted from the auxiliary display panel 320 are discriminated according to the polarization state of the left and right images by the polarization glasses 340 and made incident to the viewer's (user's) left and right eyes, whereby the user can view a stereoscopic image.

[0089] In order to implement the stereoscopic image, the main display panel 310 alternately displays the left image to be made incident to the user's left eye and the right image to be made incident to the user's right eye.

[0090] The main display panel 310 according to the third embodiment of the present invention may be the same liquid crystal panel as those in the first and second embodiments of the present invention, and where the liquid crystal panel according to related art is driven at 60Hz, the main display panel 210 may be driven at 120Hz.

[0091] The main display panel 310 includes a thin film transistor (TFT) array substrate 311, a color filter substrate 312 disposed to face the array substrate 311, a main liquid crystal layer 313 positioned between the array substrate 311 and the color filter substrate 312, first and second polarizers 314 and 315 attached on outer surfaces of the array substrate 311 and the color filter substrate 312. Here, the first and second polarizers 314 and 315 are disposed such that their polarization axes are substantially perpendicular to each other.

[0092] As described above, the auxiliary display panel 320 according to the third embodiment of the present invention is positioned in front of the main

display panel 310. The auxiliary display panel 320 is driven in synchronization with one of left and right images of the main display panel 310 and serves to change polarization information of incident left or right image. In this case, the auxiliary display panel includes a first substrate 321 and a second substrate 322 that face each other, and a sub-liquid crystal layer 323 positioned between the first and second substrates 321 and 322.

[0093] First and second electrodes (not shown) and an alignment film (not shown) for controlling an arrangement of the sub-liquid crystal layer 323 are provided on the first and second substrates 321 and 322.

[0094] The first electrodes made of a transparent conductive material such as indium tin oxide (ITO) are patterned along lines (rows) of pixels of the main display panel on the first substrate 321, the lower substrate of the auxiliary display panel 320. The height of the first electrode corresponds to the height of a single pixel of the main display panel, and the width of the first electrode corresponds to 'n' (n=1, 2,...) times the width of a pixel part.

[0095] The second electrode made of the same material as the first electrode is wholly formed without a pattern on the entire surface of the pixel part of the second substrate 322, the upper substrate of the auxiliary display panel 320.

[0096] Alignment films for aligning the sub-liquid crystal layer 323 are positioned on the facing surfaces of the first and second substrates 321 and 322, respectively.

[0097] The stereoscopic image display device according to the third embodiment of the present invention includes a $\lambda/4$ retardation layer 350 formed on a lower surface, namely, a rear surface, of the first substrate 321 of the auxiliary display panel 320 to change a linear polarization made incident from the main display panel 310 to a circular polarization. In addition, the $\lambda/4$ retardation layer 350 according to the third embodiment of the present invention may be attached in the form of a film on the rear surface of the first substrate 321.

[0098] FIG. 11 is a view for explaining operational characteristics of the auxiliary display panel of the stereoscopic image display device in FIG. 10, in which the auxiliary display panel has a homogenous sub-liquid crystal layer.

[0099] As illustrated, when the auxiliary display panel 320 has the homogenous sub-liquid crystal layer 323, if the auxiliary display panel 320 is turned off, liquid crystal molecules 323a are arranged to be substantially parallel to the first and second substrates 321 and 322. A rubbing direction of the auxiliary display panel 320 and an optical axis of the $\lambda/4$ retardation layer 350 are substantially at 45° with respect to the polarization axis of the left or right image made incident to the auxiliary display panel 320.

[00100] Accordingly, if the auxiliary display panel 320 is not driven, the liquid crystal molecules 323a are arranged to be parallel to the first and second substrates 321 and 322 in a 45°-inclined direction with respect to the polarization axis of the incident left or right image. When the auxiliary display panel 320 is turned on, the liquid crystal molecules 323a are arranged to be substantially perpendicular to the first and second substrates 321 and 322.

[00101] In this case, as described above, because the sub-liquid crystal layer 223 has the homogenous arrangement, the sub-liquid crystal layer 323 may satisfy an equation $\triangle nxd=\lambda/2$.

[00102] Thus, as shown, if the auxiliary display panel 320 is in an OFF state, the linearly polarized left or right image made incident to the auxiliary display panel 320 passes through the first substrate 321 of the auxiliary display panel 320 so as to be changed in its state to a left circular polarization (or right circular polarization), which then passes through the sub-liquid crystal layer 323. At this time, a left circularly polarized (or right circularly polarized) left or right image made incident to the sub-liquid crystal layer 323 passes through the sub-liquid crystal layer 323 so as to be changed in its state to a right circular polarization (or left circular polarization), which is then outputted to outside of the auxiliary display panel 320.

[00103] If the auxiliary display panel 320 is in an ON state, the left circularly polarized (or right circularly polarized) left or right image which has passed through the auxiliary display panel 320 is outputted to the outside of the auxiliary display panel 320, with its polarization state unchanged. This is because as the liquid crystal molecules 323A are arranged to be perpendicular to the first and

second substrates 321 and 322, light passes through the sub-liquid crystal layer 323 only with the refractive index in the shorter axis direction, not the refractive index anisotropy (Δn). Therefore, the polarization state or polarization information is not changed.

[00104] A driving principle of the stereoscopic image display device according to the present invention will now be described in detail with reference to FIG. 12.

[00105] FIG. 12 is an exemplary view for explaining a driving principle of the stereoscopic image display device according to the present invention.

[00106] In order to drive the main display panel according to the present invention, as described above, the TFTs connected to the gate lines are switched twice as fast and data signals are applied to the data lines also twice as fast. Here, as for the data signals, left eye data signals and right eye data signals are applied to the data lines in turns according to a switching speed of the TFTs.

[00107] In detail, as shown, the main display panel is driven to have 60 frames, and each frame includes a first subframe displaying the left image and a second subframe displaying the right image.

[00108] In this case, for example, the main display panel may be driven to display the left image on the first subframe during 0~8 seconds, and the main display panel may be driven to display the right image on the second subframe during 8~16 seconds. And, the main display panel may be driven to display the left image on the first subframe during 16~24 seconds, and the main display panel may be driven to display the right image during the second subframe during 24~32 seconds.

[00109] In this manner, the 60 frames are sequentially driven so that the main display panel can display the left and right images in turns to implement a stereoscopic image.

[00110] As mentioned above, each frame includes the first subframe for displaying the left image and the second subframe for displaying the right image.

[00111] The auxiliary display panel is provided to be turned on in synchronization with the left image of the main display panel, and is not driven, for example, while the main display panel is displaying the right image. However,

the present invention is not limited thereto, and the auxiliary display panel according to the present invention may be turned on in synchronization with the right image and may not be driven while the main display panel is displaying the left image.

[00112] When the auxiliary display panel is turned on, it outputs polarization information of the left image outputted from the main display panel without changing it, and when the auxiliary display panel is turned off, it changes the polarization information of the right image outputted from the main display panel, and outputs the image.

[00113] In detail, light emitted from a light source is made incident to the auxiliary display panel after passing through the main display panel. Here, the first and second polarizers of the main display panel are perpendicular to each other. In this case, for light directed to the main display panel form the light source, only a portion of the light in the same polarization state as the polarization axis of the second polarizer can pass through the main display panel.

[00114] The auxiliary display panel is maintained in an OFF state during the first subframe (0~8 seconds) of the first frame, so the polarization state of the light that passes through the auxiliary display panel is changed. Namely, the auxiliary display panel rotates the polarization axis of the incident left image by 90° and outputs it. As a result, the polarization state of the outputted left image is the same as that of light that has passed through the first polarizer.

[00115] The first embodiment of the present invention in which the $\lambda/4$ retardation layer is not applied is shown as an example. However, the present invention is not limited thereto. That is, the present invention can also be applicable to the case where light is outputted with the $\lambda/4$ retardation layer applied and thus is polarized to a left circular polarization or a right circular polarization.

[00116] During the second subframe (8~16 seconds) of the first frame, the auxiliary display panel is turned on, so polarization state of light that has passed through the auxiliary display panel is not changed. Namely, the auxiliary display panel outputs the right image having the same polarization axis as that of the incident right image.

[00117] Accordingly, because the polarization axis of the left polarization lens of the polarization glasses is identical to that of the left image, the outputted left image is made incident to the left eye of the viewer, and because the polarization axis of the right image is perpendicular to the polarization axis of the left polarization lens, the outputted right image is not made incident to the viewer's left eye. Also, because the polarization axis of the right polarization lens of the polarization glasses is identical to that of the right image, the outputted right image is made incident to the right eye of the viewer, and because the polarization axis of the left image is perpendicular to the polarization axis of the right polarization lens, the outputted right image is not made incident to the viewer's right eye.

[00118] In this manner, the left and right images, each having a different polarization axis, are formed with a time difference, and a polarization state of one of the left and right images is changed and outputted to the viewer. Thus, the viewer can discriminately view the left and right images according to their polarization state by using the polarization glasses, and thus, the viewer can view a stereoscopic image.

[00119] As the present invention may be embodied in several forms without departing from the characteristics thereof, it should also be understood that the above-described embodiments are not limited by any of the details of the foregoing description, unless otherwise specified, but rather should be construed broadly within its scope as defined in the appended claims, and therefore all changes and modifications that fall within the metes and bounds of the claims, or equivalents of such metes and bounds are therefore intended to be embraced by the appended claims.

CLAIMS

1. A stereoscopic image display device comprising:

a main display panel operable to alternately display a left image and a right image;

an auxiliary display panel that changes polarization information of an incident left or right image, including first and second substrates having a pixel part corresponding to that of the main display panel and a sub-liquid crystal layer formed between the first and second substrates, and positioned in front of the main display panel;

a plurality of first electrodes patterned on the first substrate along the rows of pixels formed on the main display panel;

a second electrode on a front surface of the pixel part of the second substrate; and

a light source that supplies light to the rear side of the main display panel.

2. The device of claim 1, wherein the second electrode is on the entire surface of the pixel part of the second substrate without any patterns.

3. The device of claim 1, wherein the first and second electrodes are made of a transparent conductive material such as ITO.

4. The device of claim 1, wherein the height of the first electrode corresponds to the height of a single pixel of the main display panel, and the width of the first electrode corresponds to 'n' (n=1,2,...) times the width of the pixel part.

5. The device of claim 1, wherein the auxiliary display panel is driven in synchronization with one of the left and right images.

6. The device of claim 1, wherein the sub-liquid crystal layer includes a plurality of liquid crystal molecules, and when the auxiliary display panel is driven,

the liquid crystal molecules are arranged to be substantially perpendicular to the first and second substrates, and when the auxiliary display panel is not driven, the liquid crystal molecules are arranged in a twisted nematic structure.

7. The device of claim 1, wherein the sub-liquid crystal layer includes a plurality of liquid crystal molecules, and when the auxiliary display panel is driven, the liquid crystal molecules are arranged to be substantially perpendicular to the first and second substrates, and when the auxiliary display panel is not driven, the liquid crystal molecules are arranged to be substantially parallel to the first and second substrates.

8. The device of claim 1, wherein a polarization axis of the left or right image made incident to the auxiliary display panel and a rubbing direction of the auxiliary display panel are positioned substantially at 45°.

9. The device of claim 4, wherein when the auxiliary display panel is not driven, a polarization axis of the left or right image that has passed through the auxiliary display panel is substantially perpendicular to a polarization axis of the left or right image made incident to the auxiliary display panel.

10. The device of claim 1, wherein the main display panel is driven at 120Hz or higher.

11. The device of claim 1, wherein the main display panel comprises:

an array substrate;

a color filter substrate disposed to face the array substrate;

a main liquid crystal layer positioned between the array substrate and the color filter substrate;

a first polarizer attached on an outer surface of the array substrate; and

a second polarizer attached on an outer surface of the color filter substrate.

12. The device of claim 1, further comprising:

a $\lambda/4$ retardation layer formed on the first substrate of the auxiliary display panel that changes a linearly polarized left or right image made incident to the auxiliary display panel into a left circularly polarized (or right circularly polarized) state.

13. The device of claim 12, wherein the $\lambda/4$ retardation layer in formed in an in-cell form on an upper surface of the first substrate of the auxiliary display panel together with the first substrate.

14. The device of claim 12, wherein the $\lambda/4$ retardation layer is attached in a form of a film on a lower surface of the first substrate of the auxiliary display panel.

ABSTRACT OF THE DISCLOSURE

A stereoscopic image display device including: a main display panel operable to alternately display a left image and a right image; an auxiliary display panel including first and second substrates having a pixel part corresponding to that of the main display panel and a sub-liquid crystal layer formed between the first and second substrates, and positioned in front of the main display panel to change polarization information of an incident left or right image; a plurality of first electrodes patterned on the first substrate along the rows of pixels formed on the main display panel; a second electrode formed on a front surface of the pixel part of the second substrate; and a light source to supply light to the rear side of the main display panel. Both a 3D vertical viewing angle and 2D luminance in a glass-type 2D display can be improved.

FIG. 1
RELATED ART

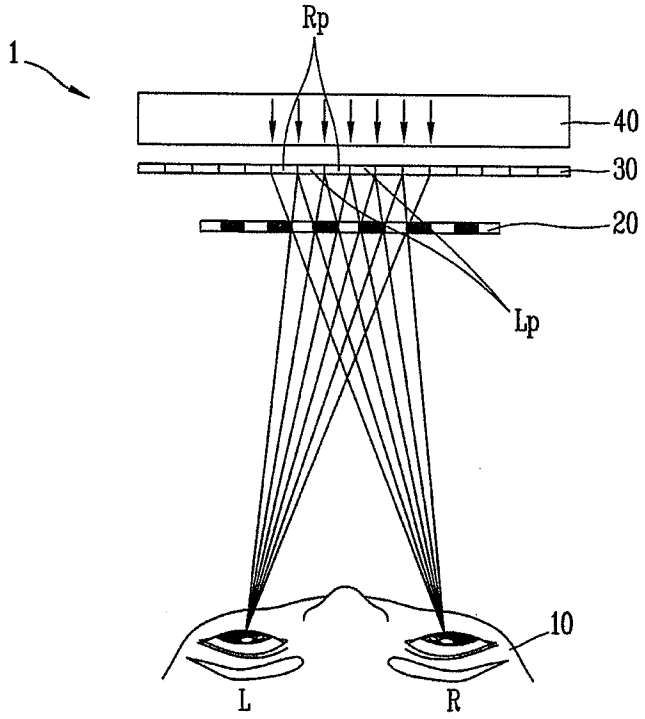


FIG. 2

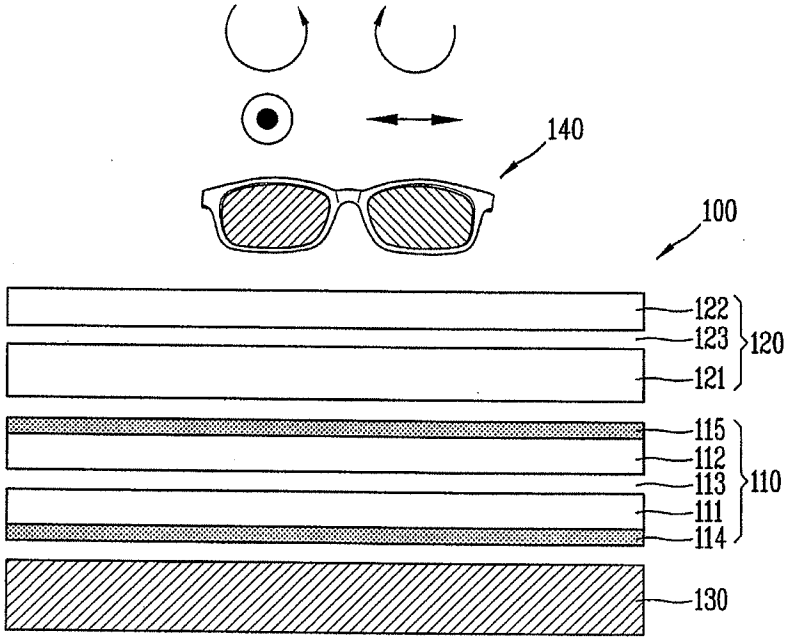


FIG. 3A

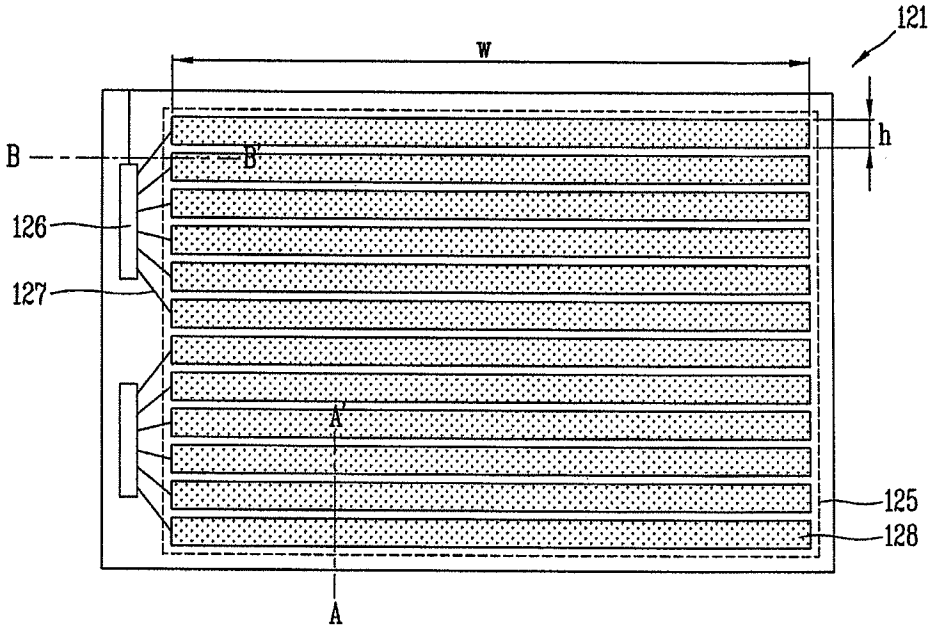


FIG. 3B

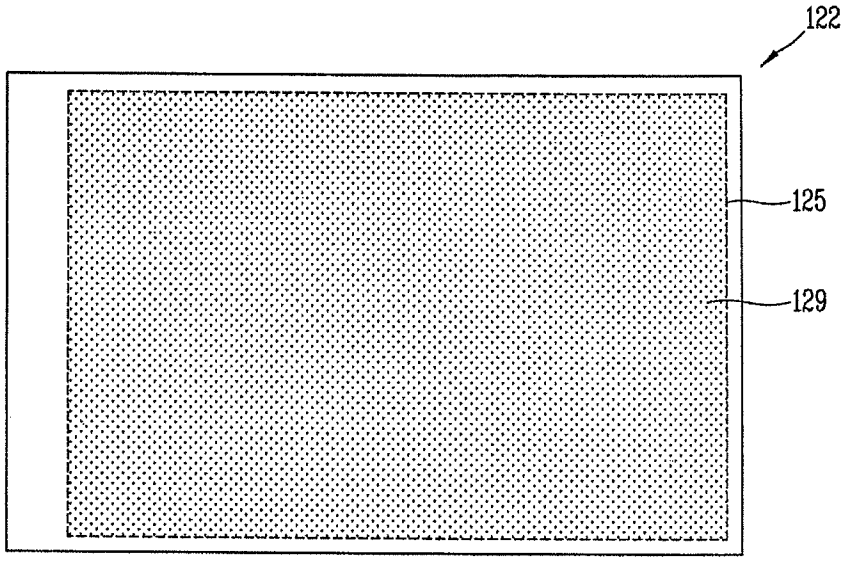


FIG. 4A

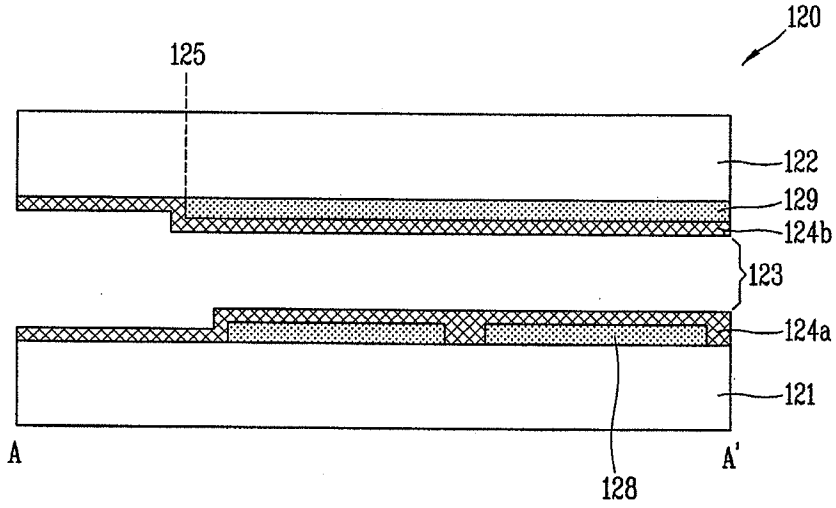

120
125
122
129
124b
123
124a
121
A
A'
128

FIG. 4B

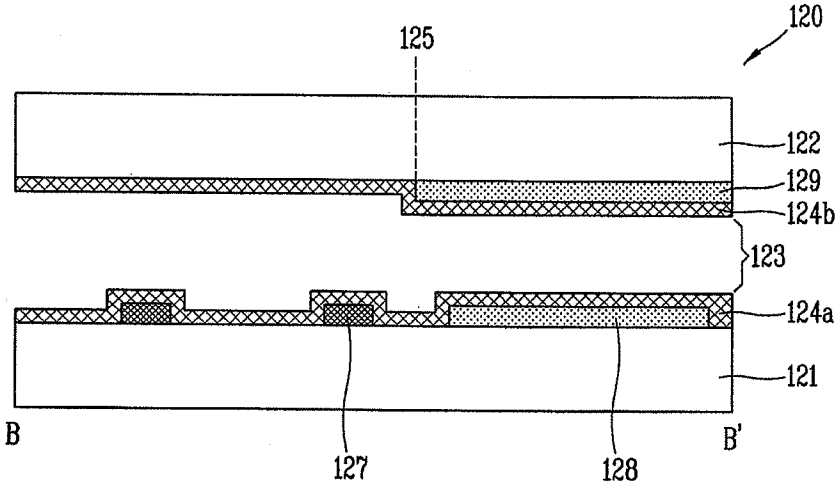

120
125
122
129
124b
123
124a
121
B
B'
127
128

FIG. 5

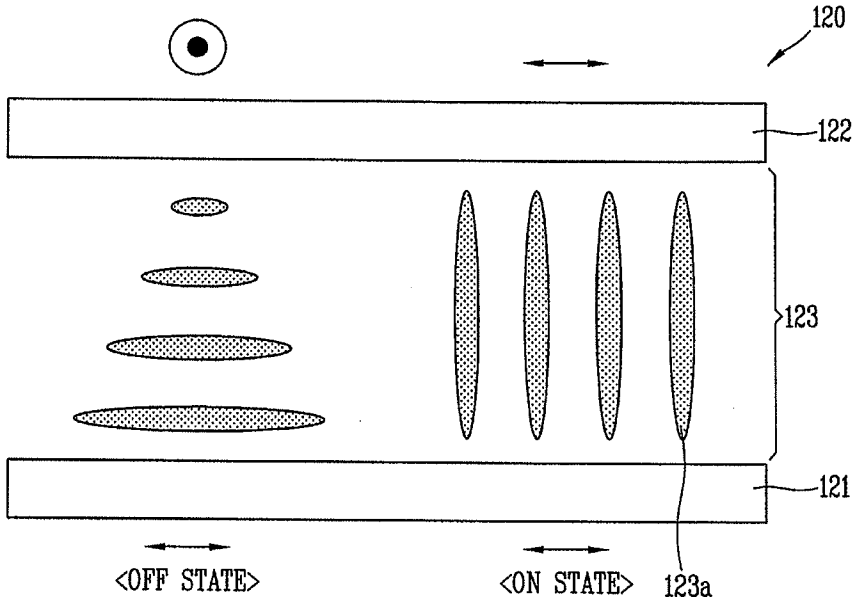

120
122
123
121
<OFF STATE>
<ON STATE>
123a

FIG. 6

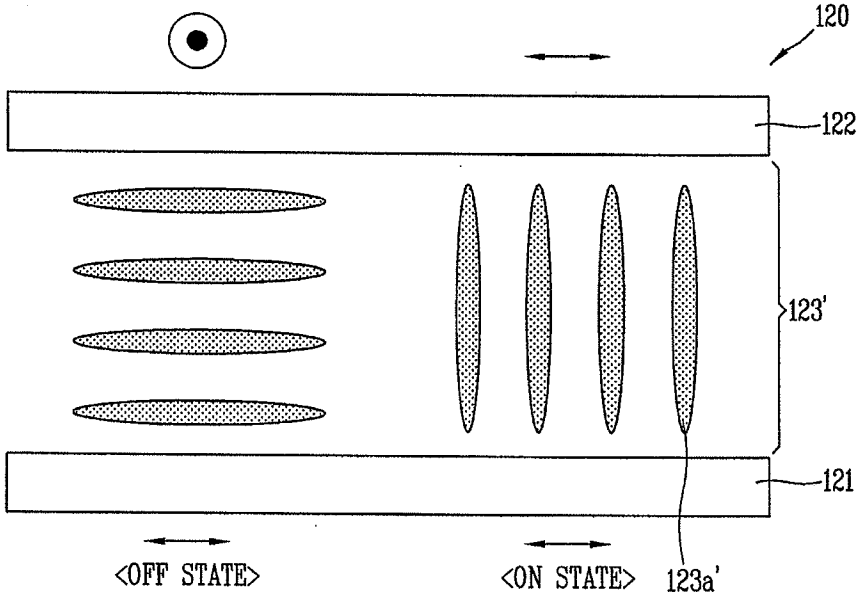

120
122
123'
121
<OFF STATE>
<ON STATE>
123a'

FIG. 7

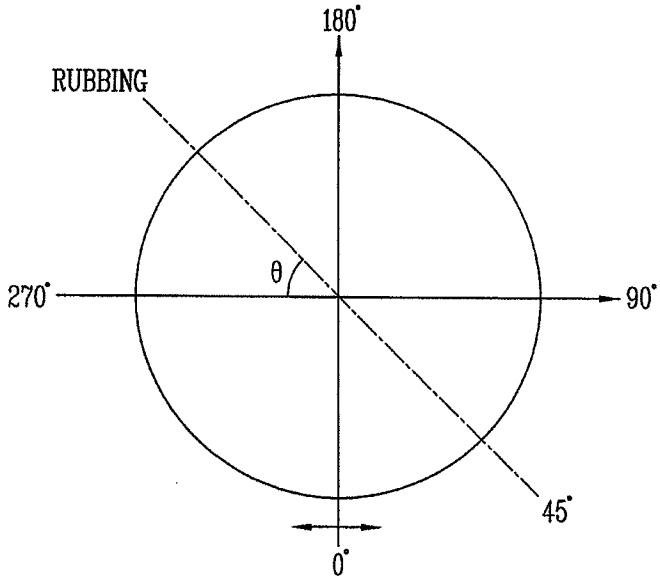

180°
RUBBING
θ
270°
90°
45°
0°

FIG. 8

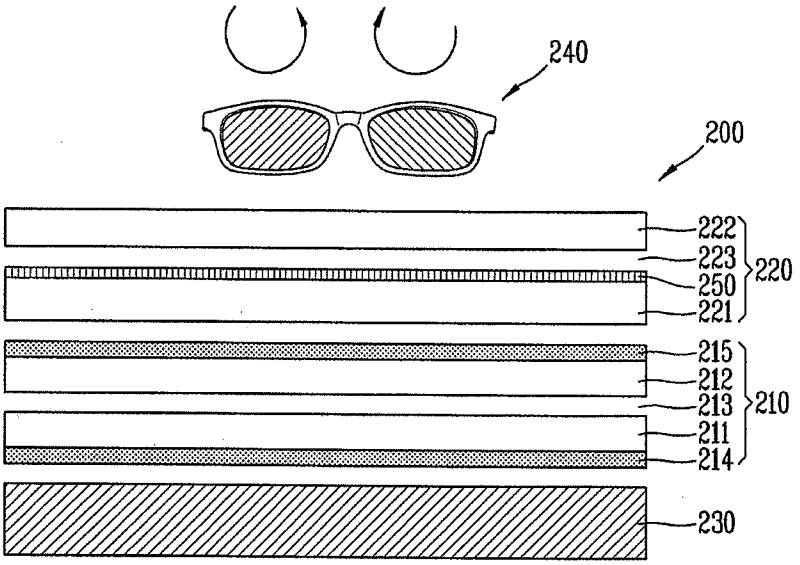

240
200
222
223
250
221
220
215
212
213
211
214
210
230

FIG. 9

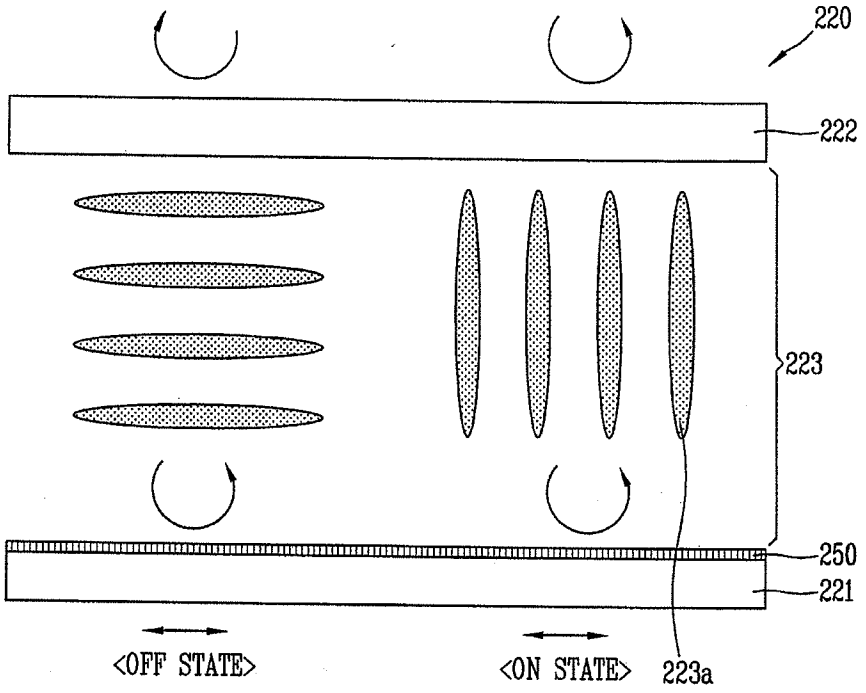

220
222
223
250
221
<OFF STATE>
<ON STATE>
223a

FIG. 10

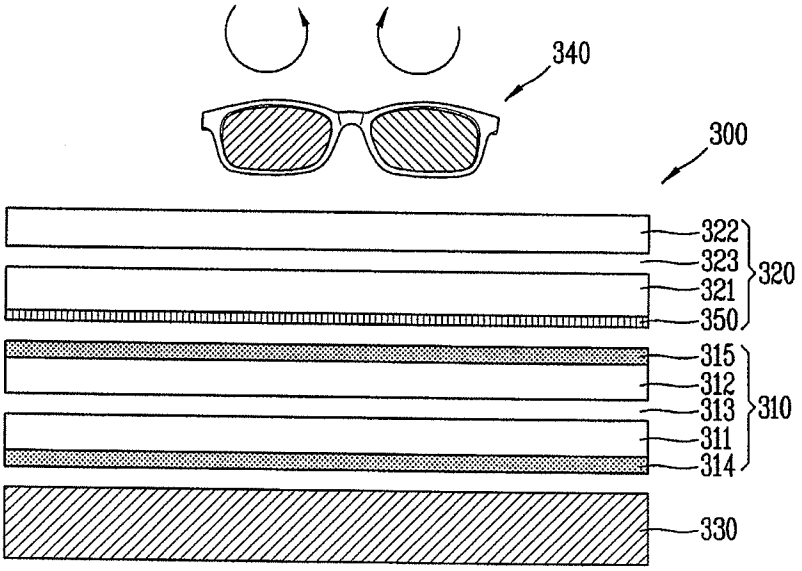

340
300
322
323
321
350
320
315
312
313
311
314
310
330

FIG. 11

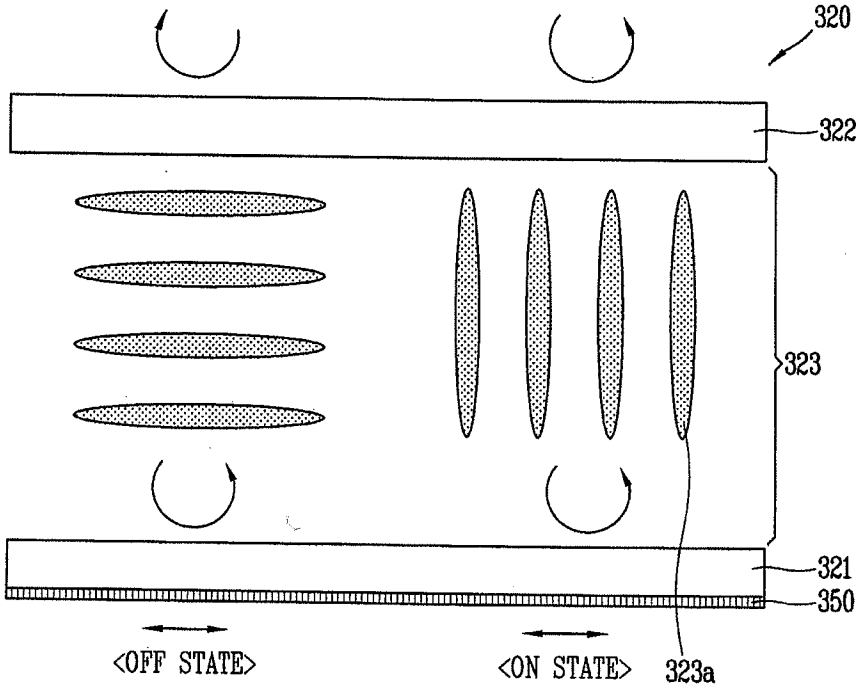
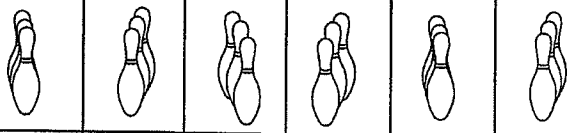


FIG. 12

	1 frame		2 frame		3 frame	
time [ms]	0-8	8-16	16-24	24-32	32-40	40-48
main LCD image						
outputted polarized light	↔	⊙	↔	⊙	↔	⊙
auxiliary LCD is driven	⊓	⊖	⊓	⊖	⊓	⊖
upper polarizer	⊙	⊙	⊙	⊙	⊙	⊙
lower polarizer	↔	↔	↔	↔	↔	↔

PTO/SB/110 (05-95)
Approved for use through 10/31/2002. OMB 0651-0032
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

Declaration and Power of Attorney for Patent Application

특허출원 관련 선언 및 위임권

Korean Language Declaration

Our File No. 12579/6201
Client Ref. No. F08-0379US001 / PA/LGD/08323/US

아래 지명된 발명자로서, 본인은 하기 사항을 선언합니다.

본인의 거주지, 우송 주소 및 국적은 본인의 성명 아래에 지재된 것과 동일합니다.

본인은 하기 명시된 발명에 대한 특허를 청구하는 주제의 최초 원래 단독 발명자이거나 (아래에 한 이름만이 기재된 경우) 또는 최초 원래 공동 발명자임을 (아래에 여러 이름이 기재된 경우) 확인합니다.

_____

_____

다음 난이 체크되어 있지 않으면 본 발명의 명세서가 여기에 첨부됩니다.

☐ 미합중국 출원번호 또는 PCT 국제 출원번호는
_____ 로
_____ 일에 출원되었고
_____ 일에 개정되었음
(해당 경우).

본인은 상기 개정에 의해 수정된 상기 명세서는 물론 특허 청구의 내용을 검사했으며 이해했음을 확인합니다.

본인은 연방 규정 코드인 제37장의 제1.56항에 의거하여 특허 자격에 관한 자료 정보를 공개할 의무를 인정합니다.

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

STEREOSCOPIC 3D DISPLAY DEVICE

_____

the specification of which is attached hereto unless the following box is checked:

☐ was filed on _____
as United States Application Number or PCT International Application Number
_____ and was amended on
_____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56.

PTO/SB/110 (05-95)
Approved for use through 10/31/2002. OMB 0651-0032
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Korean Language Declaration

본인은 외국인 특허 출원(들) 이나 발명자의 증명서 관련 경우에는 미합중국 코드인 제35장의 제119.9(a)-(d) 항이나 제365(b) 항에 의거하여 또는 미합중국 이외에 적어도 한 국가를 지정하는 PCT 국제 출원의 경우에는 제365(a) 항에 의거하여 하기 명시된 특허 출원의 외국 우선권을 주장하며, 외국인 특허 출원, 발명자 증명서 또는 우선권이 주장되는 출원일 이전에 제출된 PCT 국제 출원도 또한 아래에 해당란을 체크함으로서 확인하였습니다.

I hereby claim foreign priority under Title 35, United States Code, § 119(a)-(d) or § 365(b) of any foreign application(s) for patent or inventor's certificate, or § 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or PCT International application having a filing date before that of the application on which priority is claimed.

			Priority Not Claimed 우선권 주장 안함
10-2008-0066695 (Number) (번호)	Korea (Country) (국가)	09/07/2008 (Day/Month/Year Filed) (출원일자 일/월/년)	☐
(Number) (번호)	(Country) (국가)	(Day/Month/Year Filed) (출원일자 일/월/년)	☐

본인은 미합중국 코드인 제35장 제119항(e)에 명시된 바와 같이 하기 미합중국 가출원에 관련된 특권을 요구합니다.

I hereby claim the benefit under Title 35, United States Code, § 119(e) of any United States provisional application(s) listed below.

(Application No.) (출원 번호)	(Filing Date) (출원일자)
(Application No.) (출원 번호)	(Filing Date) (출원일자)

본인은 미합중국 코드인 제35장의 미국인 출원(들) 관련 제120항에 명시된 바와 같이 또는 미합중국을 지정하는 PCT 국제 출원 관련 제365(c) 항에 명시된 바와 같이 하기 출원의 특권을 요구합니다. 이 출원서에 있는 각 특허 청구의 내용이 미합중국 코드인 제35장 제112항의 첫번째 절에서 명시된 바와 같이 종전의 미국 또는 PCT 국제 출원에 발표되지 않았으면 본인은 연방 규정 코드인 제37장 제1.56항에 명시된 바와 같이 종전 출원일자와 이 출원서의 국내 또는 PCT 국제 출원일자 사이에 특허 자격에 대한 자료 정보를 공개할 의무를 인정합니다.

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s), or § 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application.

(Application No.) (출원 번호)	(Filing Date) (출원일자)	(Status) (patented, pending, abandoned) (현황)(특허 획득, 출원중, 포기)
(Application No.) (출원 번호)	(Filing Date) (출원일자)	(Status) (patented, pending, abandoned) (현황)(특허 획득, 출원중, 포기)

본인이 아는 한도 내에서 여기에 제공된 모든 내용이 사실이고, 제공된 정보나 소신이 모두 사실임을 확인하며, 더나아가 미합중국 코드 제18장의 제1001절에 명시된 바와 같이 고의의 허위 진술 및 이와 유사한 행위는 벌금이나 투옥으로 처벌 받거나 벌금과 감옥형을 모두 받을 수 있고 이러한 고의의 허위 진술은 특허 출원이나 후에 발급된 특허의 유효성을 위태롭게 함을 인지하면서 여기에 진술함을 선언합니다.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application of any patent issued thereon.

PTO/SB/110 (05-95)
Approved for use through 10/31/2002. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Korean Language Declaration

관: 지명된 발명자로서 본인은 이 특허를 출원하고 이와 관련하여 및 상표청이 요구하는 심무를 처리하기 위해서 하기 변호사(들) 또는 대리인(들)을 임명합니다. (성명 및 등록번호 기입)

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith (list name and registration number) - ALL REGISTERED PATENT PRACTITIONERS ASSOCIATED WITH CUSTOMER NUMBER 00757

서신 수신자

Brinks Hofer Gilson & Lione

Send Correspondence to:

Post Office Box 10395
Chicago, Illinois 60610

직통 전화 수신지 (성명 및 전화번호)

Direct Telephone Calls to: (name and telephone number)

Gustavo Siller, Jr., Reg. No. 32,305
312/321-4249

단독 또는 첫번째 발명자의 성명	**Full name of sole or first inventor** Seung-Chul LEE
발명자의 서명 일자	**Inventor's signature** Seung-chul LEE **Date** 16th Dec, 2008
거주지	**Residence** Paju Si
국적	**Citizenship** Korean
우송 주소	**Post Office Address** Seowon Maeul Apt. 704-1204,Geumchon-dong, Paju Si, Gyeonggi-Do, Korea
만약 있으면 두번째 공동 발명자의 이름	**Full name of second joint inventor, if any** Hoon KANG
두번째 발명자의 서명 일자	**Second inventor's signature** Hoon KANG **Date** 16th Dec, 2008
거주지	**Residence** Namyangju Si
국적	**Citizenship** Korean
우송 주소	**Post Office Address** Elicia Apt.103-403, 178bunji, Toegyewon-ri Toegyewon-myeon, Namyangju Si, Gyeonggi-Do, Korea

(세번째 그리고 차후의 공동 발명자들에 대한 유사한 정보와 그들의 서명을 제공할 것.)

(Supply information and signature for third and subsequent joint inventors.)

PTO/SB/110 (05-95)
Approved for use through 10/31/2002. OMB 0651-0032
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

Korean Language Declaration

권: 지명된 발명자로서 본인은 이 특허를 출원하고 이와 관련하여 및 상표청이 요구하는 심무를 처리하기 위해서 하기 변호사(들) 는 대리인(들)을 임명합니다. (성명 및 등록번호 기입)

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith (list name and registration number) - ALL REGISTERED PATENT PRACTITIONERS ASSOCIATED WITH CUSTOMER NUMBER 00757

서신 수신자

Brinks Hofer Gilson & Lione

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Post Office Box 10395
Chicago, Illinois 60610

직통 전화 수신자 성명 및 전화번호)

Direct Telephone Calls to: (name and telephone number)
Gustavo Siller, Jr., Reg. No. 32,305
312/321-4249

단독 또는 첫번째 발명자의 성명	Full name of third inventor Sung-Min JUNG
발명자의 서명 일자	Third Inventor's signature Sung Min JUNG Date 16th, Dec., 2008
거주지	Residence Incheon, Korea
국적	Citizenship Korean
우송 주소	Post Office Address Woosung Apt.5-1408, Ganseok 4-dong, Namdong-gu, Incheon, Korea
만약 있으면 두번째 공동 발명자의 이름	Full name of
두번째 발명자의 서명 일자	Fourth inventor's signature Date
거주지	Residence
국적	Citizenship
우송 주소	Post Office Address

(세번째 그리고 차후의 공동 발명자들에 대한 유사한 정보와 그들의 서명을 제공할 것.)

(Supply information and signature for third and subsequent joint inventors.)

APPLICATION DATA SHEET

APPLICATION & PUBLICATION INFORMATION	
Application Number:	To Be Assigned
Title of Invention:	STEREOSCOPIC 3D DISPLAY DEVICE
Attorney Docket Number:	12579/6199
Small Entity Status Claimed:	☐
Filing Date:	December 19, 2008
Application Type:	Utility
Subject Matter:	
Suggested Class (if any):	
Suggested Group Art Unit (if any):	
CD-ROM or CD-R?:	
Total Number of Drawing Sheets (if any):	8
Suggested Figure for Publication (if any):	
Secrecy Order 37 CFR 5.2:	☐
Request for Early Publication:	☐
Request for Non-Publication:	☐

APPLICANT INFORMATION	
Applicant Authority:	Inventor
Prefix:	
Inventor One Given Name:	Seung-Chul
Middle Name:	
Family Surname:	LEE
Suffix:	
Mailing Address Line One:	Seowon Maeul Apt. 704-1204
Mailing Address Line Two:	Geumchon-dong
City:	Paju Si
State or Province:	Gyeonggi-Do
Postal Code:	
Country:	Korea
Residency:	Non U.S. Residency
City, State/Province, Country of Residence:	Paju Si, Republic of Korea
Citizenship under 37 CFR 1.41(b):	Republic of Korea
Prefix:	
Inventor Two Given Name:	Hoon
Middle Name:	
Family Surname:	KANG
Suffix:	
Mailing Address Line One:	Elicia Apt. 103-403, 178bunji
Mailing Address Line Two:	Toegyewon-ri, Toegyewon-myeon
City:	Namyangju Si
State or Province:	Gyeonggi-Do
Postal Code:	
Country:	Republic of Korea
Residency:	Non-U.S.
City, State/Province, Country of Residence:	Namyangju Si
Citizenship under 37 CFR 1.41(b):	Republic of Korea

CORRESPONDENCE INFORMATION

Name:	Brinks Hofer Gilson & Lione
Street of Mailing Address:	PO Box 10395
City of Mailing Address:	Chicago
State or Province of Mailing Address:	IL
Country of Mailing Address:	U.S.
Postal or Zip Code of Mailing Address:	60610
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Fax Number:	312-321-4299
E-mail Address:	officeactions@brinkshofer.com
Customer Number:	**00757 - Brinks Hofer Gilson Lione**

REPRESENTATIVE INFORMATION

Representative Designation:	Primary
Name:	Gustavo Siller, Jr.
Registration No.:	32,305

DOMESTIC PRIORITY INFORMATION

This application is a [*Continuation of]:	
Prior Application No.:	
Filing Date:	
which is a [*Continuation of]:	
Prior Application No.:	
Filing Date:	

FOREIGN PRIORITY INFORMATION

Foreign Application No.:	10-2008-0055329
Parent Filing Date:	July 9, 2008
Country:	Korea
Priority Claimed:	☒

ASSIGNMENT INFORMATION

Assignee Name:	LG Display Co., Ltd.
Mailing Address Line One:	20 Yoido-dong, Youngdungpogu
Mailing Address Line Two:	
City:	Seoul
State or Province:	
Country:	Korea
Postal Code:	

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	STEREOSCOPIC 3D DISPLAY DEVICE
First Named Inventor/Applicant Name:	Seung-Chul Lee
Filer:	Gustavo Siller Jr./Maria Calderon
Attorney Docket Number:	12579-6201

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Utility application filing	1011	1	330	330
Utility Search Fee	1111	1	540	540
Utility Examination Fee	1311	1	220	220
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**1090**

Electronic Acknowledgement Receipt

EFS ID:	4493116
Application Number:	12340005
International Application Number:	
Confirmation Number:	8241
Title of Invention:	STEREOSCOPIC 3D DISPLAY DEVICE
First Named Inventor/Applicant Name:	Seung-Chul Lee
Customer Number:	00757
Filer:	Gustavo Siller Jr./Edward Popoca
Filer Authorized By:	Gustavo Siller Jr.
Attorney Docket Number:	12579-6201
Receipt Date:	19-DEC-2008
Filing Date:	
Time Stamp:	16:29:31
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$1090
RAM confirmation Number	1924
Deposit Account	231925
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.19 (Document supply fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.20 (Post Issuance fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal of New Application	Transmittal.pdf	70461 6a072d13d981b4a3728ae3816559e562ba55c018	no	1
Warnings:					
Information:					
2	Specification	Specification.pdf	1216480 c205119f6712ab0d68274e753ab5ecf05c5ebd9b	no	22
Warnings:					
Information:					
3	Claims	Claims.pdf	109712 e9a9622c51be87636f5fbe4e44089da15b5f8d8c	no	3
Warnings:					
Information:					
4	Abstract	Abstract.pdf	30129 9b98de7f6213f403a73d4a25fc8a8f1d55e21949	no	1
Warnings:					
Information:					
5	Drawings-only black and white line drawings	Drawings.pdf	253513 ae2369606ca8236198ed9e66e0e163b53d559a54	no	8
Warnings:					
Information:					
6	Oath or Declaration filed	Declaration.pdf	279093 5a263fc1a06715d3a9af60656b17f10b02010855	no	4
Warnings:					
Information:					
7	Application Data Sheet	DataSheet.pdf	76058 78542f3a4cc28893a2bd8af5acdd35d7f1af1345	no	2
Warnings:					
Information:					

This is not an USPTO supplied ADS fillable form

8	Fee Worksheet (PTO-06)	fee-info.pdf	32990 8512a91ee05c1c8f5ca97004c6f2661e3094b937	no	2

Warnings:	
Information:	
Total Files Size (in bytes):	2068436

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/06 (12-04)

Filing Date: **12/19/08**

Approved for use through 7/31/2006. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD
Substitute for Form PTO-875

Application or Docket Number: **12/340,005**

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE ($)	SMALL ENTITY FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY FEE ($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	**330**
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	**540**
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	**220**
TOTAL CLAIMS (37 CFR 1.16(i))	**14** minus 20 =		x$26		OR	x$52	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	**1** minus 3 =	*	x$110			x$220	
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $260 ($130 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR						
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))			195			390	
			TOTAL			TOTAL	**1090**

* If the difference in column 1 is less than zero, enter "0" in column 2.

APPLICATION AS AMENDED – PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE ($)	SMALL ENTITY ADDITIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE ($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					N/A		OR	N/A	
						TOTAL ADD'T FEE		OR	TOTAL ADD'T FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)	OR	RATE ($)	ADDITIONAL FEE ($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					N/A		OR	N/A	
						TOTAL ADD'T FEE		OR	TOTAL ADD'T FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

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Application Number: 12340005 Document Date: 12/19/08

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- Design Drawings

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Form Revision Date: October 12, 2006