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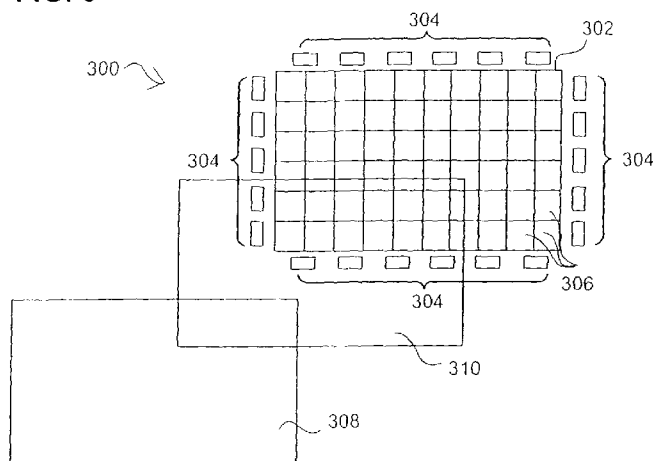
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(54) Title: LASER ILLUMINATED BACKLIGHT FOR FLAT PANEL DISPLAYS

FIG. 3



(57) Abstract: Laser lit flat panel displays are disclosed including edge-lit and direct lit backlights. In certain embodiments, laser assemblies (304) are selected to obtain bandwidth distributions to reduce speckle.



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INTERNATIONAL SEARCH REPORT

International application No
PCT/US2008/012178

A. CLASSIFICATION OF SUBJECT MATTER
INV. G02F1/13357 G02B6/00 G02B27/48

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)
G02F 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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2007/094304 A (MATSUSHITA ELECTRIC IND CO LTD [JP]; MIZUUCHI KIMINORI; YAMAMOTO KAZUH) 23 August 2007 (2007-08-23)	1-11
Y	abstract; figures 2-17 paragraphs [0053] - [0056], [0011]	11-14
A	US 6 975 294 B2 (MANNI JEFFREY GLENN [US] ET AL) 13 December 2005 (2005-12-13) abstract; figure 5 column 2, lines 30-45	1
A	WO 2007/083805 A (FUJIFILM CORP [JP]; IWASAKI OSAMU [JP]) 26 July 2007 (2007-07-26) abstract; figures 6,15 paragraphs [0053], [0063] - [0065]	6
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☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

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- *E* earlier document but published on or after the international filing date
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INTERNATIONAL SEARCH REPORT

International application No

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2006/059264 A (KONINKL PHILIPS ELECTRONICS NV [NL]; DE VAAN ADRIANUS J S M [NL]) 8 June 2006 (2006-06-08) abstract; figures 2,3 page 7, lines 28-33 page 11, lines 20-25 -----	6
Y	WO 2007/049823 A (TAKIRON CO [JP]; OMURA YUTAKA [JP]; KAJITANI FUJIO [JP]; IWASAKI MASAR) 3 May 2007 (2007-05-03) abstract paragraph [0032] -----	11-14

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2008/012178

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers allsearchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International search reportcovers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-14

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-14

A flat panel display, comprising:

- a backlight including a plurality of lasing elements of at least two primary colors arranged in a plurality of laser assemblies, wherein the plurality of lasing elements of at least one of the three primary colors are selected such that each lasing element emits a laser beam with a center wavelength λ_i and a spectral bandwidth $\Delta\lambda_i$, wherein the center wavelength of at least one of the lasing elements is wavelength-shifted with respect to the center wavelength of at least one other lasing element, and wherein said laser beams, when combined, have an ensemble spectrum with an overlap parameter $O = \Delta\lambda_i / \Delta\lambda_j$, with $\Delta\lambda_i$ being a mean spectral bandwidth of the lasing elements and $\Delta\lambda_j$ being a mean wavelength shift between the center wavelengths λ_i of the at least one and the at least one other lasing elements, with $\Delta\lambda_i$ and $\Delta\lambda_j$ selected such that $O \geq 1$;
- an array of light modulators arranged across the flat panel display for modulating light emitted by the backlight,
- wherein the backlight comprises a light guide for substantially distributing light output by the plurality of laser assemblies across the flat panel display (i.e. the features of claims 1 and 5).

2. claims: 15-20

A flat panel display, comprising:

- a backlight including a plurality of lasing elements of at least two primary colors arranged in a plurality of laser assemblies, wherein the plurality of lasing elements of at least one of the three primary colors are selected such that each lasing element emits a laser beam with a center wavelength λ_i and a spectral bandwidth $\Delta\lambda_i$, wherein the center wavelength of at least one of the lasing elements is wavelength-shifted with respect to the center wavelength of at least one other lasing element, and wherein said laser beams, when combined, have an ensemble spectrum with an overlap parameter $O = \Delta\lambda_i / \Delta\lambda_j$, with $\Delta\lambda_i$ being a mean spectral bandwidth of the lasing elements and $\Delta\lambda_j$ being a mean wavelength shift between the center wavelengths λ_i of the at least one and the at least one other lasing elements, with $\Delta\lambda_i$ and $\Delta\lambda_j$ selected such that $O \geq 1$;
- an array of light modulators arranged across the flat panel display for modulating light emitted by the backlight,
- wherein the plurality of laser assemblies of the backlight are configured to directly illuminate the array of light modulators from behind (i.e. the features of claims 1 and 15).

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

3. claims: 21-24

- A flat panel display, comprising:
- a backlight including a plurality of lasing elements of at least two primary colors arranged in an array of laser assemblies;
 - an array of light modulators directly illuminated from behind by the plurality of laser assemblies;
 - a plurality of optical elements for diffusing light from the laser assemblies across corresponding regions of the array of light modulators (i.e. the features of claim 21).
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2008/012178

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2007094304 A	23-08-2007	CN 101395425 A	25-03-2009
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