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(54) Title: DISPLAY DEVICE WITH DIRECTIONAL CONTROL OF THE OUTPUT, AND A BACKLIGHT FOR SUCH A DISPLAY DEVICE AND A LIGHT DIRECTION METHOD

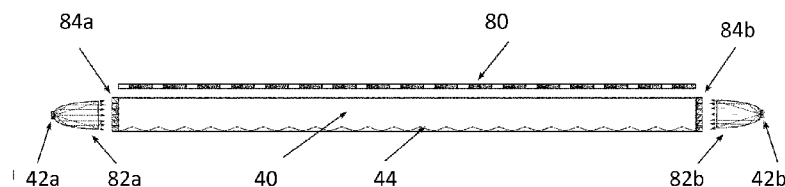


FIG. 8

(57) Abstract: A display backlight comprises an edge-lit lightguide having an array of light out-coupling structures to enable light to escape from the lightguide at the location of the light out-coupling structures. A light source arrangement is used for providing light into the lightguide at one or both of the opposite side edges. The light source arrangement is controllable to provide a selected one of at least first and second light outputs into the lightguide, the two light outputs having a different angle to the general plane of the lightguide and resulting in light which escapes from the lightguide with a different range of exit angles. In this way, a directional backlight output is enabled, based on the way light is coupled into a lightguide. This provides a simple structure only requiring control of the light provided to the lightguide. The backlight may for example enable an autostereoscopic display to be formed without the need for a lenticular array.

A. CLASSIFICATION OF SUBJECT MATTER

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ADD.

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)

G02B H04N

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 practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2011/285927 A1 (SCHULTZ JOHN C [US] ET AL) 24 November 2011 (2011-11-24)	1-5,9-15
Y	figures 1a, 1b, 2 paragraph [0045] paragraph [0042] paragraph [0019] paragraph [0038] paragraph [0047]	6-8
Y	----- US 2014/118825 A1 (SHIKII SHINICHI [JP] ET AL) 1 May 2014 (2014-05-01) figure 2	6
Y	----- EP 1 641 052 A2 (ENPLAS CORP [JP]) 29 March 2006 (2006-03-29) figure 3 -----	7,8



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

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"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

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/EP2016/055614

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

Remark on Protest

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

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

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

1. claims: 1-6, 9-15

a display backlight, comprising:
a lightguide having top and bottom parallel faces, and a pair of opposite side edges, wherein the light output is from the top face;
a light source arrangement for providing light into the lightguide at one or both of the opposite side edges; and
an array of light out-coupling structures formed at the top or bottom parallel face for redirecting light so that it escapes from the lightguide at the location of the light out-coupling structures,
wherein the light source arrangement is controllable to provide a selected one of at least first and second light outputs into the lightguide, the first and second light outputs being at least partially collimated and having a different angular direction with respect to the plane of the top and bottom parallel faces, wherein the first and second light outputs into the lightguide result in different light output angles from the top face,
wherein the shape of the lightguide, in the plane of the top and bottom parallel faces, is a rectangle,
wherein the first and second light outputs result in light which escapes from the lightguide with a different range of exit angles in a normal plane extending between the side edges,
wherein the first and second light outputs are collimated at least in a plane perpendicular to the top and bottom faces,
wherein the light out-coupling structures comprise prismatic strips which extend parallel to the side edges,
characterised in that the light source arrangement comprises at least first and second light sources, which are mounted at different angles to the plane of the top and bottom parallel faces.

2. claims: 7, 8

a display backlight, comprising:
a lightguide having top and bottom parallel faces, and a pair of opposite side edges, wherein the light output is from the top face;
a light source arrangement for providing light into the lightguide at one or both of the opposite side edges; and
an array of light out-coupling structures formed at the top or bottom parallel face for redirecting light so that it escapes from the lightguide at the location of the light out-coupling structures,
wherein the light source arrangement is controllable to provide a selected one of at least first and second light outputs into the lightguide, the first and second light outputs being at least partially collimated and having a

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

different angular direction with respect to the plane of the top and bottom parallel faces, wherein the first and second light outputs into the lightguide result in different light output angles from the top face, characterised in that the light source arrangement comprises at least first and second light sources, each having an associated beam shaping element for setting a light output angle into the lightguide with respect to the plane of the top and bottom parallel faces .

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2016/055614

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