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**Datasheet for the decision
of 23 August 2018**

Case Number: T 2276/12 - 3.5.04

Application Number: 06123455.5

Publication Number: 1784026

IPC: H04N13/04

Language of the proceedings: EN

Title of invention:

Three-dimensional display device and driving method thereof

Applicant:

Samsung Display Co., Ltd.

Headword:

Relevant legal provisions:

EPC 1973 Art. 56

Keyword:

Inventive step - (no)

Decisions cited:

Catchword:



Beschwerdekammern
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Case Number: T 2276/12 - 3.5.04

D E C I S I O N
of Technical Board of Appeal 3.5.04
of 23 August 2018

Appellant: Samsung Display Co., Ltd.
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Giheung-Gu
Yongin-si
Gyeonggi-do (KR)

Representative: Gulde & Partner
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Decision under appeal: **Decision of the Examining Division of the
European Patent Office posted on 9 July 2012
refusing European patent application No.
06123455.5 pursuant to Article 97(2) EPC**

Composition of the Board:

Chairman C. Kunzelmann
Members: A. Dumont
G. Decker

Summary of Facts and Submissions

- I. The appeal is against the decision of the examining division to refuse European patent application No. 06 123 455.5.
- II. The examining division refused the application *inter alia* on the grounds that the subject-matter of claim 1 of the sole request then on file lacked an inventive step in view of a combination of the disclosures of the following documents:

D2: GB 2 410 093 A and
D3: JP 2005 134663 A.
- III. With its appeal, the appellant had requested that the decision under appeal be set aside and that a patent be granted on the basis of the claims underlying the decision under appeal or, in the alternative, the claims of the auxiliary request filed with its statement of grounds of appeal. It had also requested oral proceedings.
- IV. In a communication annexed to the summons to oral proceedings, the board indicated that it essentially shared the reasons in the decision under appeal and that the subject-matter of both requests appeared to lack an inventive step. It also annexed a copy of an unofficial translation of document D3 which it had used to determine the disclosure of that document.
- V. With a letter dated 24 July 2018, the appellant withdrew its request for oral proceedings and requested a decision according to the state of the file. It did not comment on the board's communication.

VI. Oral proceedings took place on 23 August 2018, in the absence of the duly summoned appellant.

VII. Claim 1 according to the main request reads as follows:

"A three-dimensional display device comprising:

a panel (100) adapted to time-share an image to display left and right eye images, wherein each pixel of the panel is adapted to successively display the left eye image and the right eye image wherein the panel is adapted to display, during the first period (T1), a first image including the left and right eye images formed in a first pattern, and the panel displays, during the third period (T3), a second image including the left and right eye images formed in a second pattern, and wherein the second pattern is opposite to the first pattern;

a panel control unit (110) adapted to control the panel (100) by applying a display control signal including vertical and horizontal signals to the panel (100);

a barrier (200) facing the panel (100) and for separating the image of the panel (100) into the left and right eye images; and

a barrier control unit (210) adapted to control the barrier (200),

wherein the display device is adapted to be oriented in a first mode to provide a portrait-type view and a second mode to provide a landscape-type view, wherein the barrier (200) is operated corresponding to the orientation mode of the display device,

wherein the barrier (200) comprises:

a first substrate (10);

a plurality of first electrodes (14) arranged along a first direction (X) on the first substrate (10);

a plurality of second electrodes (16) arranged between the first electrodes (14) on the first substrate (10);
a second substrate (12) facing the first substrate (10);
a plurality of third electrodes (18) arranged on the second substrate (12) along a second direction (Y) perpendicular to the first direction (X);
a plurality of fourth electrodes (20) arranged between the third electrodes (18) on the second substrate (20);
and
a liquid crystal layer (22) located between the first substrate (10) and the second substrate (12), and

characterized in that

the barrier (200) further comprises:

a first connection electrode (14a) for electrically connecting the first electrodes (14) to each other;
a second connection electrode (16a) for electrically connecting the second electrodes (16) to each other;
a third connection electrode (18a) for electrically connecting the third electrodes (18) to each other; and
a fourth connection electrode (20a) for electrically connecting the fourth electrodes (20) to each other,
and

the barrier control unit (210) is adapted to apply a reference voltage or a driving voltage to the first electrodes (14), the second electrodes (16), the third electrodes (18), and the fourth electrodes (20) according to a barrier control signal synchronized with the vertical signal."

VIII. Claim 1 according to the auxiliary request reads as follows:

"A three-dimensional display device comprising:

a panel (100) adapted to time-share an image to display left and right eye images, wherein each pixel of the panel is adapted to successively display the left eye image and the right eye image wherein the panel is adapted to display, during the first period (T1), a first image including the left and right eye images formed in a first pattern, and the panel displays, during the third period (T3), a second image including the left and right eye images formed in a second pattern, and wherein the second pattern is opposite to the first pattern;

a panel control unit (110) adapted to control the panel (100) by applying a display control signal including vertical and horizontal signals to the panel (100);

a barrier (200) facing the panel (100) and for separating the image of the panel (100) into the left and right eye images; and

a barrier control unit (210) adapted to control the barrier (200),

wherein the display device is adapted to be oriented in a first mode to provide a portrait-type view and a second mode to provide a landscape-type view,

wherein the barrier (200) is operated corresponding to the orientation mode of the display (sic) device,

wherein the barrier comprises:

a first substrate (10);

a plurality of first electrodes (14) arranged along a first direction (X) on the first substrate (10);

a plurality of second electrodes (16) arranged between the first electrodes (14) on the first substrate (10);

a second substrate (12) facing the first substrate (10);

a plurality of third electrodes (18) arranged on the second substrate (12) along a second direction (Y) perpendicular to the first direction (X);

a plurality of fourth electrodes (20) arranged between the third electrodes (18) on the second substrate (20); and

a liquid crystal layer (22) located between the first substrate (10) and the second substrate (12)

characterized in that the barrier (200) further comprises a (sic)

first connection electrode (14a) for electrically connecting the first electrodes (14) to each other; a second connection electrode (16a) for electrically connecting the second electrodes (16) to each other; a third connection electrode (18a) for electrically connecting the third electrodes (18) to each other; and a fourth connection electrode (20a) for electrically connecting the fourth electrodes (20) to each other, and

the barrier control unit (210) is adapted to apply a reference voltage or a driving voltage to the first electrodes (14), the second electrodes (16), the third electrodes (18), and the fourth electrodes (20) according to a barrier control signal synchronized with the vertical signal, wherein the vertical signal has: a higher level voltage during a first period; a lower level voltage during a second period following the first period; the higher level voltage during a third period following the second period; and the lower level voltage during a fourth period following the third period,

wherein the first period, the second period, the third period, and the fourth period constitute a repeatable cycle, wherein the panel is adapted to display, during the first period, a first image including the left and right eye images formed in a first pattern, and the panel displays, during the third period, a second image including the left and right eye images formed in a

second pattern, and wherein the second pattern is opposite to the first pattern, wherein, when the panel is oriented in the first mode, a plurality of first pixel columns and a plurality of second pixel columns respectively corresponding to the third electrodes (18) and the fourth electrodes (20) are arranged along the second direction and are arranged alternately and repeatedly along the first direction on the panel (100), the left eye image and the right eye image of the first image are respectively displayed on the first pixel columns and the second pixel columns during the first period, and the right eye image and the left eye image of the second image are respectively displayed on the first pixel columns and the second pixel columns during the third period, and wherein, when the panel is oriented in the second mode, a plurality of first pixel rows and a plurality of second pixel rows respectively corresponding to the first electrodes and the second electrodes are arranged along the second direction and arranged alternately and repeatedly along the first direction on the panel, the left eye image and the right eye image of the first image are respectively displayed on the first pixel rows and the second pixel rows during the first period, and the right eye image and the left eye image of the second image are respectively displayed on the first pixel rows and the second pixel rows during the third period."

- IX. In the decision under appeal the examining division held that the subject-matter of claim 1 (of the main request) lacked an inventive step if either D2 or D3 was considered as the closest prior art.

X. The examining division essentially argued as follows, when considering D3 as the closest prior art:

- The device of document D3 provided a stereoscopic portrait view. The device of claim 1 differed from the known device in that, when the device was rotated, it also provided a stereoscopic landscape view.
- In order to solve the technical problem of providing an additional full-resolution stereoscopic format, it would be obvious for the skilled person to adapt the device because it had the same configuration of the electrodes in the parallax barrier in both orientations (portrait and landscape).
- In addition, the skilled person would readily consider the device known from document D2, having two perpendicular parallax optics using a striped backlight for providing stereoscopic views in both orientations. The skilled person would be prompted to take advantage of this in order to solve the problem in the device of D3.

XI. The appellant's arguments in favour of inventive step where relevant for the present decision may be summarised as follows:

- The display device of D3 had a parallax barrier as in the present invention, but capable of displaying a three-dimensional image only in a single (portrait) orientation. In a multi-screen mode, it could display different two-dimensional images to be observed from respective different viewing angles. It did not hint towards operation in

landscape mode. D3 contained no hint towards the technical problem solved in the invention.

- The line of argument taken in the decision under appeal resulted from an *ex post facto* approach. The case law confirmed that the correct question to answer was whether the skilled person would, not could, make the invention in the hope of solving a technical problem which did not contain elements of or pointers to the solution.
- The problem as formulated in the impugned decision, namely "to provide a 3D display in landscape format", impermissibly contained such pointers. Rather, the present invention derived from the discovery of an unrecognised problem of "improving the display of 3D content". Its solution was only trivial in retrospect.
- The display device of D2 used an alternative technique, namely a backlight modulator, for displaying a three-dimensional image in the two perpendicular orientations. D2 taught away from the invention.
- The skilled person would not consider combining D3 with D2.
- D3 did not suggest applying the voltages during the time periods (T1-T4) according to the orientation of the panel, as set out in claim 1 of the auxiliary request.

Reasons for the Decision

1. The appeal is admissible.

Main request

2. Document D3 discloses a display device, namely a cellular phone, comprising a panel (100) adapted to time-share an image to display left and right eye images for stereoscopic (or three-dimensional (3D)) effect, wherein each pixel of the panel is adapted to successively display the left eye image and the right eye image and a barrier (200) facing the panel for separating the image of the panel into the left and right eye images (see D3, figure 1 and paragraphs [0011], [0019] and [0026] of its unofficial translation). The barrier comprises first and second substrates (210, 220), first to fourth electrodes (211, 213, 221, 223), first to fourth connection electrodes and a liquid crystal layer as set out in claim 1 (see D3, figure 2 and paragraphs [0018], [0021] and [0022] of the unofficial translation). The device also comprises control units for the panel and for the barrier (see D3, figure 3 and paragraph [0025] of the unofficial translation). This is uncontested.
3. It is also common ground that, in a first mode providing a portrait-type view, the control units generate the appropriate control signals for the panel and the barrier electrodes in order to present a stereoscopic view to the user (see D3, figures 7(a) and (b) and paragraphs [0029] to [0032] of the unofficial translation).

4. It is also common ground that the known device differs from the claimed invention in that, in a second mode, the control units generate control signals in order to present a "two-screen" view to the user. This view is a portrait-type, non-stereoscopic, view. As a result, although the structure of the devices is identical in D3 and in the invention, the devices operate differently in the second mode in that D3 does not provide for a stereoscopic landscape view, whereas the claimed three-dimensional display device is adapted to be oriented to provide both a portrait-type view and a landscape-type view.

5. Starting from D3, the board concurs with the appellant that the technical problem can be formulated as "*improving the display of 3D content*". In this respect it agrees with the appellant that formulating the technical problem as "*to provide a 3D display in landscape format*" might contain elements of or pointers to the solution and thus be based on hindsight.

6. In the board's view, the skilled person would readily envisage extending the stereoscopic capability for portable devices equipped with a rectangular screen: the present application (see paragraph [0008] of the application as published) mentions that operation in both portrait and landscape orientation is conventional. In addition, document D2 provides a concrete implementation of stereoscopic views in two perpendicular portrait/landscape orientations (see page 1, lines 1 to 9, in conjunction with figure 12 and page 10, lines 4 to 19).

7. It results from the foregoing that the present invention does not lie in discovering (and solving) an unrecognised problem.

8. D2 concerns the same technical field as D3 (autostereoscopic displays) and thus would be considered by a person skilled in the art faced with the problem of improving the display of D3. D2 resorts to an alternative, striped-backlight, technique to generate stereoscopic views in two orientations. However, D2 does not teach away from the present invention, i.e. from using parallax barriers for obtaining stereoscopic views in two perpendicular orientations. Both solutions have their own specific drawbacks, for instance in terms of thickness, weight or complexity (see D2, page 5, lines 23 to 30). They also have their own specific advantages, for instance a doubled resolution for the alternative according to D3 (see paragraph [0032] of the unofficial translation of D3). Parallax barriers would thus be routinely favoured in some cases, a striped backlight in others.

9. The skilled person would choose the implementation according to the concrete circumstances. In D3, the electrode structure for implementing a stereoscopic landscape view is already present. The skilled person would merely have to design the control units so that they apply the appropriate signals to the panel (100) and the barrier electrodes (211, 213). This step is considered to be obvious.

10. As a result, the subject-matter of claim 1 of the main request lacks an inventive step within the meaning of Article 56 EPC 1973.

Auxiliary request

11. Claim 1 of the auxiliary request differs from claim 1 of the main request essentially by adding features related to:
 - the timing (T1-T4 in figures 6 or 10) of a two-level "vertical signal" for controlling the panel, synchronised with a "barrier control signal";
 - the assignment of the appropriate part of the images to pixels of the rows/columns of the panel (100) and the activation of the appropriate barrier electrodes according to the orientation (portrait or landscape).
12. Those additional features reflect measures ensuring that correct signals with the correct timing are applied to the barrier electrodes and to the panel, in order to present a stereoscopic view in either orientation of the device. They are straightforward, necessary features for the device to operate correctly. The appellant does not argue that they would bring about any particular effect or advantage.
13. As a result, they do not hint at an inventive step, and the subject-matter of claim 1 of the auxiliary request lacks an inventive step within the meaning of Article 56 EPC 1973.
14. Since none of the appellant's requests is allowable, the appeal is to be dismissed.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:



K. Boelicke

C. Kunzelmann

Decision electronically authenticated