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Datasheet for the decision of 29 July 2014

Case Number: T 1401/09 - 3.4.03

Application Number: 99940348.8

Publication Number: 1114473

IPC: H01L51/20, H01L27/15

Language of the proceedings: EN

Title of invention:
DISPLAY DEVICES

Applicant:
Cambridge Display Technology Limited

Headword:

Relevant legal provisions:
EPC 1973 Art. 56

Keyword:
Inventive step - main request (yes)

Decisions cited:

Catchword:

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Case Number: T 1401/09 - 3.4.03

D E C I S I O N
of Technical Board of Appeal 3.4.03
of 29 July 2014

Appellant: (Applicant)	Cambridge Display Technology Limited Greenwich House, Madingley Rise, Madingley Road Cambridge, CB3 OHJ (GB)
Representative:	Driver, Virginia Rozanne Page White & Farrer Bedford House John Street London WC1N 2BF (GB)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 5 March 2009 refusing European patent application No. 99940348.8 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman	G. Eliasson
Members:	V. L. P. Frank
	T. Bokor

Summary of Facts and Submissions

I. This is an appeal against the refusal of European patent application No. 99 940 348 for lack of inventive step (Article 56 EPC 1973).

II. As final request on appeal the applicant requested in writing that the decision under appeal be set aside and that a patent be granted on the basis of the following documents:

Claims: 1-11 of the 1st auxiliary request submitted with letter of 17 June 2009
Description: pages 1, 3, 5-9 as published
page 4 as submitted with letter of 18 September 2008
pages 2, 2a, 10 submitted with letter of 9 May 2014
Drawing sheets 1/2-2/2 as published.

III. Claim 1 of this request reads as follows (the difference with respect to the version refused by the examining division was highlighted by the board):

"An organic light-emissive display device comprising:
an array of light-emissive pixels, each pixel comprising red, green and blue light emitters (41, 43, 45) and at least one further light emitter (42, 44) for emitting a colour to which the human eye is more sensitive than the emission colour of at least one of the red and blue emitters as measured on a photopic curve, wherein each light emitter comprises light-emissive organic material;
and
a display controller for receiving a signal defining a desired colour and controlling the

brightness of each light emitter (41-45) to cause the array of pixels to display that colour, wherein the display controller is configured to control the at least one further light emitter (42, 44) to emit light in preference to the red and/or blue light emitters (41,45)."

IV. The following documents are mentioned in this decision:

D1 = EP 0 774 787 A

D3 = US 5 724 062 A

D4 = EP 0 831 451 A

D6 = EP 0 717 446 A

V. The examining division essentially found in the decision under appeal that:

- The display device of claim 1 of the then sole request did not involve an inventive step over a combination of documents D3 or D4 and the common general knowledge of the skilled person, represented eg by document D6, since the skilled person, starting from an inorganic LED display having in addition to the three RGB light emitters a further light emitter (as in D3 or D4), would replace inorganic by organic light emitters for the well known advantages of organic light emitters, eg low driving energy, low production temperatures, use of thin film technology.

VI. The appellant applicant argued in writing essentially as follows:

- There was no disclosure in the cited prior art that a display controller was configured to control the at least one further light emitter to emit light in preference to the red and/or blue light emitters. Rather, the prior art taught that one or more further inorganic light emitters would be provided so as to be driven at the same time as the existing inorganic light emitters in order to compensate for the poor colour quality of the existing inorganic light emitters. Further still, there was no disclosure that the display controller would be configured to cause the red and/or blue light emitters in a given pixel not to emit light unless they were essential to generate the desired visual output.

Reasons for the Decision

1. The appeal is admissible.

2. Amendments (Article 123(2) EPC)

2.1 Claim 1 was amended by appending to claims 1 and 8 as filed that the display device further comprises a display controller configured to drive the further light emitter in preference to the red and/or blue light emitters. These features were disclosed on page 3, 3rd and 4th paragraphs.

2.2 The description was further amended to acknowledge the relevant prior art and adapted to the amended claims.

2.3 The board is thus satisfied that the requirements of Article 123(2) EPC are fulfilled.

3. Inventive step (Article 56 EPC 1973)

3.1 The only remaining issue in this appeal is that of inventive step.

3.2 The examining division started in their argumentation on inventive step from an inorganic LED display having in addition to the three RGB light emitters a further light emitter (ie documents D3 or D4). The board however considers that for assessing the inventiveness of the present claims it is more appropriate to start from a prior art directly related to the subject-matter of the claims, ie an organic LED display, eg document D1, instead of an inorganic LED display as done by the examining division.

3.3 Document D1 discloses an organic light emitting display device comprising an array of light emissive pixels comprising red (R), blue (B) and green (G) emitters (202, 203, 204) wherein each light emitter comprises light emissive organic material (Figures 5-7, column 7, line 42 to column 8, line 39). The display of D1 further comprises a display controller 225 for receiving a signal defining a desired colour and controlling the brightness of each light emitter to cause the array of pixels to display that colour (Figure 7; column 9, line 46 - column 10, line 16).

3.4 The display device of claim 1 differs from this conventional device in that:

(a) it comprises at least a further light emitter for emitting a colour to which the human eye is more sensitive than the emission colour of at least one of the red and blue emitters as measured on a photopic curve, and

(b) wherein the display controller is configured to control the at least one further light emitter to emit light in preference to the red and/or blue light emitters.

3.5 The human eye is, as explained in the application, more sensitive to green than to red or blue light. This is schematically shown in the photoptic curve of figure 1 of the application. Hence for red, green and blue light emitters to be perceived with the same intensity the red and blue emitters must emit more brightly than the green one. Red and blue emitters consume thus more power than green emitters (Figure 1; page 1, 1st paragraph).

3.6 The objective technical problem addressed by the invention may thus be seen in reducing the power consumption of an organic light-emissive display device.

3.7 The combined measures of providing the display device with a further light emitter that emits a colour to which the human eye is more sensitive than the emission colour of at least one of the red and blue emitters as measured on the photopic curve, ie feature (a) mentioned above, and configuring the drive controller to control the further light emitter to emit light in preference to the red and/or blue light emitters, ie feature (b) above, allow the reduction of the power consumption of the display device, since the further light emitter may emit less brightly than it would be required for the corresponding red or blue light emitter and would thus consume less power.

3.8 It is not disputed by the appellant that organic light emitters that emit a colour to which the human eye is

more sensitive than the emission colour of red or blue emitters are known from the prior art (see eg pages 4 and 5 of the present application or document D6). Furthermore, as pointed out in the decision under appeal, it is known from eg documents D3 or D4 to provide an additional inorganic light emitter other than the RGB emitters that emits a colour other than red or blue. For example, D3 discloses the use of an additional inorganic yellow light emitter (Figure 3; column 4, lines 36-52), while D4 discloses the use of more than three inorganic LEDs (eg red, green, blue, yellow, orange, purple and light blue) for enhancing the color reproducibility of a LED display device (Figures 4, 6, 7 and 9-11; page 4, lines 29-31).

3.9 However, no prior art document discloses or suggests to control the further light emitter to emit light in preference to the red and/or blue light emitters. In this context the feature *"in preference"* is important, since it specifies that although the red or blue light emitter might be used to display the desired colour it is preferred, involving hence a decision, to use the further light emitter instead.

3.10 The assessment on inventiveness is not altered if one starts from documents D3 or D4, as was done in the analysis of the examining division, since the observations concerning the display controller made under point 3.9 are still valid.

3.11 The board judges for these reasons that the display device of claim 1 involves an inventive step within the meaning of Article 56 EPC 1973.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the department of first instance with the order to grant a patent in the following version:

Claims: 1-11 of the 1st auxiliary request submitted with letter of 17 June 2009
Description: pages 1, 3, 5-9 as published
page 4 as submitted with letter of 18 September 2008
pages 2, 2a, 10 submitted with letter of 9 May 2014
Drawing sheets 1/2-2/2 as published.

The Registrar: The Chairman:

S. Sánchez Chiquero G. Eliasson

Decision electronically authenticated