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Datasheet for the decision of 16 January 2014

Case Number: T 0682/09 - 3.4.03

Application Number: 03753839.4

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Language of the proceedings: EN

Title of invention:
DISPLAY DEVICE WITH CHARGE SHARING

Applicant:
Entropic Communications, Inc.

Headword:

Relevant legal provisions:
EPC 1973 Art. 54(1), 54(2), 56, 84
EPC Art. 123(2)
EPC 1973 R. 71(2)
RPBA Art. 15(3), 15(5), 15(6)

Keyword:
Novelty - (yes)
Inventive step - (no)

Decisions cited:

Catchword:

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Boards of Appeal
Chambres de recours

European Patent Office
D-80298 MUNICH
GERMANY
Tel. +49 (0) 89 2399-0
Fax +49 (0) 89 2399-4465

Case Number: T 0682/09 - 3.4.03

D E C I S I O N
of Technical Board of Appeal 3.4.03
of 16 January 2014

Appellant: (Applicant)	Entropic Communications, Inc. 6290 Sequence Drive San Diego, CA 92121 (US)
Representative:	Epping - Hermann - Fischer Patentanwaltsgesellschaft mbH Postfach 20 07 34 80007 München (DE)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 19 November 2008 refusing European patent application No. 03753839.4 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman: G. Eliasson
Members: S. Ward
T. Karamanli

Summary of Facts and Submissions

I. The appeal is against the decision of the Examining Division refusing European patent application No. 03 753 839 on the ground that the claimed subject-matter was not new within the meaning of Article 54(1) and (2) EPC having regard to the following prior art:

D1: WO 01/54108 A2.

In the written procedure before the Examining Division the following documents were also introduced:

D2: GB 2 326 013 A
D3: JP 09 258 170 A.

A machine translation of paragraph [0031] of document D3 was cited in the annex to the summons to oral proceedings before the Examining Division.

II. In the notice of appeal the appellant requested "cancellation of the whole Decision". Together with the letter stating the grounds of appeal dated 3 March 2009 the appellant submitted "a new set of claims 1 to 7 to replace all the claims presently on file".

By these submissions the Board understands the request of the appellant to be that the decision under appeal be set aside and that a patent be granted on the basis of claims 1 to 7 filed with the statement setting out the grounds of appeal.

III. The Board sent a summons to oral proceedings together with a communication under Article 15(1) of the Rules of Procedure of the Boards of Appeal (RPBA) setting out its provisional view. In order that the contents of the

document D3 could be fully understood, the Board obtained a translation of the document into English from a (human) translator, a copy of which was annexed.

In the communication, the Board stated *inter alia* the following provisional opinions:

- the subject-matter of claim 1 did not appear to be anticipated by D1;
- the document D3 was considered to represent the closest prior art for evaluating inventive step;
- the subject-matter of claim 1 did not appear to involve an inventive step in the sense of Article 56 EPC 1973.

IV. The appellant filed a further letter dated 4 December 2013 stating only the following: "The request for oral proceedings filed with the submission dated March 3, 2009 is hereby withdrawn. We do not intend to participate in the oral proceedings scheduled for January 16, 2014."

V. Oral proceedings were held before the Board on the appointed date. As previously indicated, the appellant was not represented.

VI. Claim 1 according to the sole request filed with the letter stating the grounds for the appeal reads:

- "A display device with a plurality of pixels arranged in rows n and columns m, wherein the pixels of a row can be selected through control lines (6), and with a row driver circuit (4) for activating the n rows by means of a row voltage (V_{row}) and with a column driver circuit (3) for controlling the m columns with a column voltage (V_{col}), which column voltage corresponds to the

image data of the pixels (8) of the selected row to be displayed, characterized in that it is provided upon a transition from a selected row n to another row n+x that the row voltage (V_{row}) is connected to an intermediate voltage level (V_z) which is provided by a stored portion of the charge applied to the selected row n, and the remaining portion of charge applied to the selected row n is then discharged, at which time the row n+x is first connected to said intermediate voltage level (V_z)and subsequently is charged up to the required row voltage (V_{row})."

VII. In relation to the claims on which the contested decision was based, the Examining Division argued essentially as follows.

All features of claim 1 could be identified in document D1, and hence "the subject-matter of claim 1 is not new (Art. 54(1) and (2) EPC)." In addition, the "subject-matter of independent claim 7 corresponds in terms of method steps to the subject-matter of claim 1. Therefore, the objection for lack of novelty of claim 1 also applies, mutatis mutandis, to claim 7".

VIII. The Examining Division also commented on a previous set of claims (filed with the letter of 27 February 2008) which formed the basis for the communication annexed to the summons to oral proceedings. In this communication, an objection of lack of inventive step had been raised against claim 1.

Under point 2.4 of the Reasons of the contested decision, the Examining Division stated the following: "In the claim 1 filed on 27.02.2008, there was a timing relation between the discharging process of the

selected row and the charging process of the next row, in the sense that the remaining portion of charge of the selected row was discharged, after which the next row was connected to the intermediate voltage level. This feature of the timing relation was not present in the original claim 1, which lacked novelty over WO 01/54108. Since the new feature of the claim 1 filed on 27.02.2008 was not disclosed by WO 01/54108, the main objection in the Summons dated 25.07.2008 was that the subject-matter of claim 1 was lacking an inventive step. In the new claim 1 filed on 25.09.2008, the feature of the timing relation is not present anymore. Therefore, the Examining Division returned to the objection for lack of novelty over WO 01/54108 which was raised in the communication dated 05.11.2007."

Nevertheless, under the heading "OBITER DICTUM", the Examining Division concluded that "Even if the timing relation mentioned in paragraph 2.4 above would still have been present in the claim, the objection for lack of inventive step set out in the Summons for Oral Proceedings dated 25.07.2008 would still be kept, in spite of the arguments given by the Applicant given in the letter dated 25.09.2008." The reasons for this conclusion were also set out.

IX. The appellant's arguments may be briefly summarised as follows.

The claims filed with the grounds of appeal were, apart from one difference, the same as those filed on 27 February 2008 (a "timing relation" having being re-instated). The one difference was that in claims 1 and 7 the phrase "after which the row n+x is first connected..." had been changed to "at which time the row n+x is first connected...". Consequently "the

alleged Article 52(1) EPC objections against the claims that were then later filed, as form the basis of the appealed decision, are no longer relevant".

Moreover, the objections raised in the summons to oral proceedings before the Examining Division against the claims filed on 27 February 2008 were not valid.

The present invention provided a display device in which a defined sequence of steps takes place "providing reduced energy consumption by virtue of the recited charge sharing, whilst at the same time avoiding interference between rows in the active matrix display device". Such a "sequence of steps is not disclosed or suggested by the prior art".

Documents D1 and D2 disclosed devices operating differently to those of the claimed invention.

The Examining Division's argument that a skilled person would adapt the arrangement of D1 by incorporating elements of the system of D3 in order to reduce crosstalk could not be accepted. Such a measure would be inconsistent with "the fundamental reason for the whole disclosure of Dl" and would return the arrangement of D1 to a completely conventional device. By such a measure the skilled person "would not arrive at the subject matter of the presently amended claims".

Reasons for the Decision

1. The appeal is admissible.

2. As announced in advance, the duly summoned appellant did not attend the oral proceedings. According to Rule 71(2) EPC 1973, the proceedings could however continue without the appellant. In accordance with Article 15(3) RPBA, the board relied for its decision only on the appellant's written submissions. The board was in a position to decide at the conclusion of the oral proceedings, since the case was ready for decision (Article 15(5) and (6) RPBA), and the voluntary absence of the appellant was not a reason for delaying a decision (Article 15(3) RPBA).

3. Novelty

3.1 Novelty in relation to document D1

3.1.1 The appellant does not challenge the finding of the Examining Division that all features of claim 1 on which the decision was based were disclosed in document D1, and the Board also sees no reason to do so.

3.1.2 The Board furthermore sees no reason to deviate from the conclusion of the Examining Division (point 2.4 of the Reasons) that what has been referred to above as the "timing relation" was not disclosed in document D1.

In claims 1 and 7 filed with the statement setting out the grounds of appeal, a timing relation has been re-instated. The one difference between the the version of the timing relation discussed by the Examining Division and that comprised in the present claims is that the phrase "after which the row n+x is..." has been amended to "at which time the row n+x is...". This does not affect the above conclusion, as no timing relation corresponding to either of these formulations is disclosed in document D1.

Hence, the subject-matter of claim 1 is not anticipated by the disclosure of document D1.

3.2 Novelty in relation to document D3

3.2.1 Having regard to the (human) translation of document D3 into English obtained by the Board, together with the original document itself, it is clear that the document D3 discloses all features of the preamble of claim 1.

In detail, document D3 discloses:

- a display device (figure 13; paragraphs [0003], [0005]) with a plurality of pixels (1309) arranged in rows n and columns m, wherein the pixels of a row can be selected through control lines (1308), and with a row driver circuit (1305) for activating the n rows by means of a row voltage and with a column driver circuit (1304) for controlling the m columns with a column voltage, which column voltage corresponds to the image data of the pixels of the selected row to be displayed.

3.2.2 Document D3 also discloses (see figures 1 and 3 and paragraphs [0029]-[0036]) that at time point t5, row 1 is connected via switch SW21 to charge holding capacitor C_D, thereby transferring charge from row 1 (i.e. from gate line capacitance C1) to the charge holding capacitor C_D, where it is held.

In other words, in the terminology of claim 1, document D3 discloses that:

- it is provided upon a transition from a selected row n (i.e. row 1, connected to output node D1) to another row n+x (i.e. row 2, connected to output node D2) that the row voltage (of row 1) is

connected (at time point t5) to an intermediate voltage level which is provided by a stored portion of the charge applied to the selected row n (i.e. row 1 is connected to capacitor C_D which stores charge which had been applied to row 1).

Document D3 further discloses (see figure 2, time point t7 onwards) that:

- the remaining portion of charge applied to the selected row n is then discharged.

Finally, it is disclosed in document D3 that:

- the row n+x (row 2) is first connected (at time point t6) to said intermediate voltage level (i.e. connected to capacitor C_D - see paragraph [0033]) and subsequently is charged up to the required row voltage (i.e. V_1 - see paragraph [0034]).

3.2.3 However, what has been referred to as the "timing relation", that is to say the feature of claim 1 appearing in bold type in the following (emphasis added by the Board) is not disclosed in document D3:

- the remaining portion of charge applied to the selected row n is then discharged, **at which time** the row n+x is **first** connected to said intermediate voltage level.

Hence, the subject-matter of claim 1 is not anticipated by the disclosure of document D3.

3.3 The Board therefore concludes that the subject-matter of claim 1 is novel within the meaning of Article 54(1) EPC 1973 over the cited prior art. This conclusion also applies to the subject-matter of claim 7 for the same reasons *mutatis mutandis*.

4. Inventive Step

4.1 Document D3 is considered to represent the closest prior art for evaluating inventive step. The distinguishing feature of claim 1 over the closest prior art is therefore as set out under point 3.2.3, *supra*.

4.2 From the timing relationships depicted in figure 3 of document D3, it may be seen that:

- row 2 is first connected to capacitor C_D at the time point t6 (see also paragraph [0033] of the translation of D3); and
- row 1 is fully discharged only at time point t7 (>t6).

Row 1 is therefore not fully discharged when row 2 is first connected to capacitor C_D ("the intermediate voltage level" in the terminology of the present application).

By contrast, according to claim 1 of the present application, the row n+x is first connected to the intermediate voltage level only at the time when all of the charge applied to the row n has been discharged.

4.3 According to the application (page 2, final paragraph) the problem is to avoid crosstalk. It is explained (with reference to figure 3) that the problem of crosstalk may arise as a result of a charge sharing scheme in which two adjoining rows are simultaneously activated, so that a signal voltage intended to be applied to one row would activate the pixels of both rows in each relevant column.

Document D3 also addresses the problem of avoiding crosstalk (see e.g. paragraph [0031]: "in order to avoid crosstalk...").

In its provisional opinion, the Board set out its view that the arrangement of document D3 and that of the present application both appeared to represent equally effective possibilities for avoiding crosstalk, and that no additional technical effect could be seen to arise in the case of the claimed solution (other than introducing an apparently unnecessary delay). This being the case, the technical problem solved by the distinguishing feature of claim 1 could only be seen as providing an *alternative* means of avoiding crosstalk.

The appellant was invited, in the event that it disagreed with the provisional position of the Board, to explain why. In particular, it was suggested that if the appellant considered that the distinguishing feature of claim 1 would lead either to *improved* crosstalk prevention or to some additional technical effect, then this should be fully and convincingly explained. The appellant, however, made no further written submissions of a substantive nature and elected not to be represented at oral proceedings before the Board. Having reviewed the case, the Board sees no reason to deviate from its previously stated position.

The technical problem is therefore to provide an alternative means of avoiding crosstalk.

4.4 The manner in which crosstalk is avoided according to document D3 is set out at the end of paragraph [0031], where it is stated that:

- "in order to avoid crosstalk of the write data to the pixel that was connected with the first gate

line and the write data to the pixel that was connected with the second gate line, it is important that the potential of the output D1 of the output node D1 during the period from the time point t5 to the time point t6 should drop at at least a certain rate".

As further explained in paragraph [0032]:

- "At the time point t6, most of the charge Q1 accumulated on the gate line capacitance C1 is transferred, and the potential of the output D1 of the output node D1 becomes V2' (V2'≥0V)".

At this time point t6, the switch SW22 is turned on and the charge accumulated on the charge holding capacitor C_D begins to be transferred to row 2 (paragraph [0033]).

Hence, crosstalk is avoided according to document D3 by ensuring that by the time point t6 the potential of row 1 has fallen to a sufficiently low level (V2') that crosstalk does not arise. This clearly implies that the voltage V2' must be low enough that it is insufficient to activate the pixels of row 1. As a result, at time point t6 row 2 may be connected to charge holding capacitor C_D with no risk of crosstalk.

By contrast, the solution of claim 1 of the present application requires that row n (corresponding to row 1 in the context of document D3) should be discharged (i.e. have fallen to zero potential) at the time when the subsequent row (row n+x, corresponding to row 2 in the context of document D3) is connected to the intermediate voltage level.

4.5 However, having derived from document D3 that crosstalk may be avoided by commencing activation of row 2 when

row 1 has fallen to a potential V2' which is not high enough to activate the pixels of row 1, it would be obvious to a skilled person that the same result would be achieved if the activation of row 2 were to commence when row 1 is at *any potential lower than V2'*. As this is the case for all time points after t6 (see document D3, figure 3), it would be obvious that an arrangement in which the charging of row 2 commences at any time point after t6 would represent an equally effective alternative possibility for avoiding crosstalk.

One such obvious solution would be an arrangement in which the charging of row 2 commences at time point t7, the point at which the potential on row 1 falls to zero (i.e. at which row 1 becomes fully discharged), which corresponds to the arrangement of claim 1 of the present application.

For this reason, the Board judges that the subject-matter of claim 1 does not involve an inventive step within the meaning of Article 56 EPC 1973. This conclusion also applies to the subject-matter of claim 7 for the same reasons *mutatis mutandis*.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

S. Sánchez Chiquero G. Eliasson

Decision electronically authenticated