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**D E C I S I O N**  
**of 26 September 2002**

**Case Number:** T 0373/00 - 3.4.2  
**Application Number:** 93103698.2  
**Publication Number:** 0548051  
**IPC:** G09G 3/28, G09G 3/20

**Language of the proceedings:** EN

**Title of invention:**

Method for sustaining cells and pixels of plasma panels,  
electroluminescent panels, LCD's or the like and a circuit for  
carrying out the method

**Patentee:**

The Board of Trustees of the University of Illinois

**Opponent:**

FUJITSU LIMITED

**Headword:**

-

**Relevant legal provisions:**

EPC Art. 54, 56, 114(2)

**Keyword:**

"Novelty (main request: no)"  
"Late filed requests inadmissible (first to third auxiliary  
requests)"  
"Inventive step (fourth to sixth auxiliary requests: no)"

**Decisions cited:**

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**Catchword:**

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Case Number: T 0373/00 - 3.4.2

**D E C I S I O N**  
**of the Technical Board of Appeal 3.4.2**  
**of 26 September 2002**

**Appellant:** The Board of Trustees of the University  
(Proprietor of the patent) of Illinois  
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**Representative:** Sunderland, James Harry  
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**Decision under appeal:** Decision of the Opposition Division of the  
European Patent Office posted 26 January 2000  
revoking European patent No. 0 548 051 pursuant  
to Article 102(1) EPC.

**Composition of the Board:**

**Chairman:** E. Turrini  
**Members:** A. G. Klein  
G. E. Weiss

## Summary of Facts and Submissions

- I. European patent No. 0 548 051 (application No. 93 103 698.2) was revoked by decision of the opposition division on the ground that the subject-matter of the claims as than on file lacked an inventive step within the meaning of Article 56 EPC in view of the contents of the following documents:
- D1: JP-B-58-53 344, an English translation of which will be referred to hereinafter as document D1a;
- D2: M. Higgins: "A Low-Power Drive Scheme for AC TFEL Displays", SID - Society of Information Display, International Symposium Digest of Technical Papers, Vol 16, 1985, pages 226 to 228, Los Angeles, US; and
- D18: L. Weber et al: "Independent Sustain and Address Technique for the ac Plasma Display Panel", SID - Society for Information Display, International Symposium Conference Record, pages 220 to 223, May 1986, San Diego, US.
- II. The appellant (proprietor of the patent) filed an appeal against the decision revoking its patent.
- III. Oral proceedings were held on 26 September 2002 at which the appellant as a main request requested that the decision under appel be set aside and that the patent be maintained on the basis of the patent as granted. Claim 1 of the set of claims as granted reads as follows:
- "1. A method for sustaining cells and pixels of plasma

panels, plasma display panels, electroluminescent panels, or LCDs having panel electrodes and corresponding panel capacitance in which the address cells an/or pixels are defined by the intersection of respective address electrodes in respective arrays of (X and Y dimension) address electrodes, said method employing an inductor (L) and

characterized by the steps of:

charging the panel capacitance ( $C_p$ ) through said inductor (L), initially while storing energy in said inductor (L) until the magnitude of the inductor current reaches a maximum, and secondly while removing the stored energy from said inductor until the inductor current reaches zero,

discharging the panel capacitance ( $C_p$ ) through said inductor (L), initially while storing energy in said inductor until the magnitude of the inductor current reaches a maximum, and secondly while removing the stored energy from said inductor until the inductor current reaches zero,

wherein said charging and/or discharging of the panel capacitance includes applying a forcing voltage ( $V_{ss}$ ) which is about one-half the magnitude of the voltage level ( $V_{cc}$ ) the panel capacitance reaches after charging."

As its first to third auxiliary requests the appellant requested that the patent be maintained as amended on

the basis of claims handed over at the oral proceedings.

Claim 1 in accordance with the first auxiliary request corresponds to claim 1 of the main request, with the expression "from a capacitor (C<sub>ss</sub>; C<sub>ss2</sub>)" being inserted in the last paragraph of the claim, after "applying a forcing voltage (V<sub>ss</sub>)".

Claim 1 in accordance with the second auxiliary request corresponds to claim 1 of the main request, with the expression "from a capacitor (C<sub>ss</sub>; C<sub>ss2</sub>)" being inserted in the second paragraph of the claim after "charging the panel capacitance (C<sub>p</sub>)" and the expression "to the capacitor (C<sub>ss</sub>; C<sub>ss2</sub>)" being inserted in the third paragraph of the claim after "discharging the panel capacitance (C<sub>p</sub>)".

Claim 1 of the third auxiliary request corresponds to claim 1 of the fourth auxiliary request as set out hereunder with the expression "from a capacitor (C<sub>ss</sub>; C<sub>ss2</sub>)" being added in the last paragraph of the claim after "applying a forcing voltage (V<sub>ss</sub>)".

As its fourth to sixth auxiliary requests the appellant requested that the patent be maintained on the basis of the claims filed as main request and first to second auxiliary requests with its letter dated 22 August 2002.

Claim 1 of the fourth auxiliary request reads as follows:

"1. A method for sustaining cells and pixels of plasma panels or plasma display panels having address

electrodes, sustain electrodes connected through a bus and an inherent panel capacitance (3) corresponding to the sustain electrodes, where the address cells are defined by the intersection of respective address electrodes in respective arrays (X and Y dimension) of address electrodes and an alternating sustain voltage is simultaneously applied to all of the sustain electrodes after said pixels are selectively addressed, said method employing an inductor (L) coupled to the sustain electrodes to form a series resonant circuit together with the panel capacitance through the bus, said method comprising:

in a 1<sup>st</sup> step

generating wall charges by selective addressing of the address electrodes to form "ON" pixels, without gas discharge;

in a 2<sup>nd</sup> step independently of and after said 1<sup>st</sup> step

charging the panel capacitance (Cp) through the inductor (L) by resonance between the inductor and the panel capacitance, initially while storing energy in said inductor (L) until the magnitude of the inductor current reaches a maximum, and secondly while removing the stored energy from said inductor until the inductor current reaches zero, without gas discharge;

supplying discharge current to "ON" pixels for evoking gas discharge within said "ON" pixels by applying sustain voltage via the sustain electrodes in the period from the end of reaching said inductor current being zero to the beginning of the next discharging of the panel capacitance;

discharging the panel capacitance ( $C_p$ ) through said inductor ( $L$ ) by resonance between the inductor and the panel capacitance, initially while storing energy in said inductor until the magnitude of the inductor current reaches a maximum, and secondly while removing the stored energy from said inductor until the inductor current reaches zero, without gas discharge;

wherein said charging and/or discharging of the panel capacitance includes applying a forcing voltage ( $V_{ss}$ ) which is about one-half the magnitude of the voltage level ( $V_{cc}$ ) the panel capacitance reaches after charging."

Claim 1 of the fifth auxiliary request corresponds to claim 1 of the fourth auxiliary request with the expression "and further including the steps of after charging/discharging the panel capacitance, maintaining the panel capacitance in a charged/discharged state prior to again discharging/charging the panel capacitance ( $C_p$ )" being added at its end.

Claim 1 of the sixth auxiliary request corresponds to claim 1 of the fifth auxiliary request with the expression "and wherein the step of maintaining the panel capacitance in a charged state includes clamping the voltage level of the panel capacitance ( $C_p$ ) upon the inductor current reaching zero, and wherein the step of maintaining the panel capacitance ( $C_p$ ) in a discharged state prior to again charging includes clamping the voltage level of the panel capacitance upon the inductor current reaching zero" being added at its end.

The respondent (opponent) for its part requested that



the appeal be dismissed.

- IV. The appellant in support of its main request submitted that document D1 neither disclosed nor hinted at the step of claim 1 as granted consisting in applying a forcing voltage which is about one-half the magnitude of the voltage level the panel capacitance reaches after charging. In particular, since the voltage source in the circuit of Figure 5 comprises two sources at +E and -E Volts respectively, the voltage level the panel capacitance reaches after charging is substantially equal to the forcing voltage, and not twice as high as is set out in claim 1.

The claims of the first to third auxiliary requests by referring to the capacitor (C<sub>ss</sub>; C<sub>ss2</sub>) more clearly set out how the forcing voltage is produced and the panel capacitance charged or discharged, which is an essential feature of the claimed invention. This feature was already implicit from the claims as granted, and the merely clarified versions of the claims should therefore be admitted into the procedure, albeit they have been filed only during the oral proceedings. The more so since the contribution of this feature in overcoming the need for a regulated power supply to apply a forcing voltage is explicitly pointed out on page 5, lines 45 and 46 of the patent specification and in the corresponding passage of the patent application as originally filed.

In respect of its fourth to sixth auxiliary requests the appellant stressed that the independent claims were limited to the sustaining of cells and pixels in plasma panel and plasma display panels. In contrast, document D1 was in effect dedicated only to the sustaining of

cells and pixels in electroluminescent displays, i.e. to an entirely different technical field which the skilled person striving at improving plasma display devices would not have seriously contemplated. The reference in documents D1 to plasma display devices only at the very end of the first paragraph of the description was to be regarded, in the absence of any further disclosure, as a mere precaution taken by a patent attorney in an attempt to broaden the scope of the claims, to which the skilled reader would not have attributed any technical significance.

- V. The respondent submitted that the subject-matter of claim 1 of the appellant's main request was entirely anticipated by the contents of document D1. Since this document also recommended the use of the driving circuit disclosed there also in devices other than the electroluminescent displays, such as in particular in plasma display devices, and since in all the circuits shown in the figures the display was merely represented by a capacitance, without any further distinction, the general teaching of this document clearly applied as well to the plasma display devices specified in the claims of the appellant's fourth auxiliary request, which therefore lacked an inventive step.

So did the subject-matter of the independent claims of the appellant's fifth and sixth auxiliary requests, since the additional features they recited were all known either from document D1 or from document D2.

Concerning the appellant's first to third auxiliary requests, the respondent submitted that they shall not be admitted into the procedure for having been filed only during the oral proceedings. The reference in the

independent claims of these requests to a capacitor (Css; Css2) was not supported by the application documents as originally filed, the embodiments of which did not all comprise such capacitor. This reference therefore constituted an unallowable intermediate generalisation of a feature disclosed only in relation to certain embodiments. In addition, capacitors cannot alone operate as voltage sources; in the absence of any further explanation the claims thus failed to define any actually working method or circuit. In addition providing voltage sources with output capacitors was absolutely trivial per se.

### **Reasons for the Decision**

1. The appeal is admissible.
2. *Appellant's main request*
  - 2.1 Appellant's main request was filed only during the oral proceedings held before the board of appeal. This request is based on the claims as granted, against which the respondent originally directed an objection of lack of novelty in its notice of opposition. In addition, the scope of these claims is clearly broader than the scope of the claims considered earlier in the appeal procedure, so that the objections raised by the respondent against the latter claims still apply to the claims as granted. Therefore, and in view of the fact that the respondent did not contest its admissibility, the appellant's late-filed main request is admitted into the procedure.
  - 2.2 Claim 1 of the appellant's main request is directed

*inter alia* to a method for sustaining cells and pixels of electroluminescent panels. Document D1 undisputedly discloses such a sustaining method as applied to an electroluminescent panel display device. Like the method set out in claim 1, the method of document D1 comprises charging the panel capacitance  $C$  through an inductor ( $L$ ), initially while storing energy in said inductor until the magnitude of the inductor current reaches a maximum and secondly while removing the stored energy from said inductor until the inductor current reaches zero (see Figure 9 and step a in Figure 10, and the penultimate paragraph of page 9 of document D1a).

The method of document D1 further comprises discharging the panel capacitance through said inductor, initially while storing energy in said inductor until the magnitude of the inductor current reaches a maximum, and secondly while removing the stored energy from said inductor until the inductor current reaches zero (see step c on Figure 10 and the paragraph bridging pages 9 and 10 of document D1a). In this known method, charging/discharging of the panel capacitance includes applying a forcing voltage  $E$  which is about one-half the magnitude of the voltage level of  $2E$  the panel capacitance reaches after charging, as is shown in Figure 10(b) and confirmed in the second paragraph of page 10 of document D1a.

The board cannot in this respect endorse the appellant's argument that in the embodiment of document D1 the forcing voltage is equal to the panel capacitance reached after charging, as a result of the charging voltage being provided either by a  $+E$  or a  $-E$  voltage source as shown in Figure 5 of document D1. The

circuit embodiment of Figure 9 which as explained above actually operates in accordance with present claim 1 does not use such particular voltage source.

For this reasons, the subject-matter of claim 1 of the appellant's main request is not novel within the meaning of Article 54 EPC. The appellant's main request cannot be allowed, accordingly.

3. *Appellant's first to third auxiliary requests*

Appellant's first to third auxiliary requests were filed only during the oral proceedings.

As compared to the independent claims of the main request filed by the appellant with letter of 22 August 2002 in preparation for the oral proceedings (now the fourth auxiliary request) the independent claims of the first to third auxiliary requests where supplemented with indications that the forcing voltage is applied from a capacitor, or that the panel capacitance is charged from or discharged to that capacitor.

The board concurs with the respondent's view that these amendments raise new issues as to their support by the application documents as originally filed and to the clarity of the amended claims. The same holds true for the question of inventive step, the corresponding features not having been present in any of the independent or dependent claims so far on file.

The appellant's first to third auxiliary requests having been filed only during the oral proceedings before the board, this board and the respondent could not reasonably be expected to deal properly with all

the new issues raised, within the frame of the oral proceedings. The appellant also had ample opportunity to file such requests already before the opposition division, thus warranting that the issues be decided by two instances. Accordingly, the board in the exercise of the discretion conferred upon it by Article 114(2) EPC decided to disregard appellant's late filed first to third auxiliary requests.

4. *Appellant's fourth auxiliary request*

4.1 Novelty

Novelty of the subject matter of claim 1 of the appellant's fourth auxiliary request was not disputed by the respondent. As a matter of fact, claim 1 is restricted to a sustaining method as applied to cells and pixels of plasma panels or plasma display panels, whilst documents D1 and D2 disclose specific embodiments of sustaining methods only in conjunction with electroluminescent panels.

4.2 Inventive step

Document D18 which the opposition division in the board's view rightly considered to represent the starting point for the method of present claim 1 and is referred to also in the introductory portion of the present patent specification, discloses a method for the independent sustaining and addressing of cells and pixels of plasma panels, comprising:

- in a first step generating wall charges by selective addressing of the address electrodes to form "ON" pixels without gas discharge;

- in a second step independently of and after this first step supplying discharge current to "ON" pixels for evoking gas discharge within said "ON" pixels by applying sustained voltage via the sustain electrodes (see page 220, the paragraphs "Introduction" and "ISA Plasma Panel Design" and compare Figure 2 of D18 and Figure 2 of the patent in suit).

Thus the subject-matter of the method of claim 1 is distinguished from the method disclosed in document D18 in that it employs an inductor coupled to the sustain electrodes to form a series resonant circuit together with the panel capacitance through the bus, the charging and discharging of the panel capacitance through the inductor being performed as set out in details in the claim.

This distinguishing feature allows reduction of the amount of energy normally lost in charging and discharging the capacitance of the plasma panel. Accordingly, the technical problem solved by the invention can be seen in reducing the circuit and operational costs of the associated electronics (see page 2, lines 44 to 48 of the specification of the patent in suit).

The board cannot endorse the appellant's view that the skilled person faced with the technical problem of reducing the circuit and operational costs of the electronics associated with plasma display panels would not consider prior art solutions developed in relation to other types of display devices having large inter-electrode capacitance such as electroluminescent or liquid crystal display devices. The fact that the

skilled person at the date of the invention considered plasma, electroluminescent or liquid crystal devices as posing substantially similar problems in terms of power losses due to inter-electrode capacitance is evidenced not only by the first paragraph of document D1a, which explicitly states that the invention disclosed there relates to driving circuit for any of these devices. The very specification of the present patent also shows that the invention disclosed there undistinctively applies to any of these devices (see page 2, lines 21 to 4 and 46 to 48) and so does the designation of the method and circuit defined in independent claims 1 and 4 as granted.

The appellant in its statement of the grounds of appeal dated 5 June 2000 pointed out that in electroluminescent panels the capacitance varied considerably more than in plasma displays and that the loss factor due to internal resistance was much greater (see page 3, the penultimate paragraph to the end of page 4). As convincingly submitted by the respondent in its response of 18 October 2000 (see page 2, lines 21 to 30) such differences in fact render plasma panels even better candidates for the application of the driving technique disclosed in documents D1 or D2 than the electroluminescent panels.

Therefore the skilled person in the board's view would have envisaged providing the plasma display control method of document D18 with the panel capacitance charging and discharging steps disclosed in document D1 without the exercise of inventive ingenuity. Since for the reasons set out above in connection with the assessment of novelty of the subject-matter of claim 1 of the appellant's main request these steps are all



known from document D1, the subject-matter of claim 1 of the appellant's fourth auxiliary request does not involve an inventive step within the meaning of Article 56 EPC.

5. *Appellant's fifth and sixth auxiliary requests*

The board concurs with the respondent's view that the additional steps of after charging/discharging the panel capacitance, maintaining the panel capacitance in a charged/discharged state prior to again discharging/charging the panel capacitance as set out additionally at the end of claim 1 of the fifth auxiliary request are known also from document D1 (see Figure 10, steps b) and d) respectively) and that the maintaining of the panel capacitance in a charged or discharged state by clamping the voltage level of the panel capacitance as is set out additionally at the end of claim 1 of the sixth auxiliary request is both implicit from the description of the circuit of Figure 9 of document D1 and explicitly disclosed in document D2 which describes a similar low-power drive scheme for electroluminescent displays (see the abstract and steps 2 and 4 in the left-hand column of page 227).

The appellant did not contest this point of view, stressing at the oral proceedings that the inventive step involved by the subject-matter of the claims of its fifth and sixth auxiliary requests derived essentially from the features already defined in the independent claims of its fourth auxiliary request.

For these reasons, the subject-matter of claims 1 of the appellant's fifth and sixth auxiliary requests does

not involve an inventive step within the meaning of Article 56 EPC either.

Accordingly, none of the appellant's requests can be allowed and the appeal must therefore be dismissed.

**Order**

**For these reasons it is decided that:**

The appeal is dismissed.

The Registrar:

The Chairman:

P. Martorana

E. Turrini