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# D E C I S I O N
# of 24 June 2004

**Case Number:** T 0332/00 - 3.4.2

**Application Number:** 96308527.9

**Publication Number:** 0782373

**IPC:** H05B 33/08

**Language of the proceedings**: EN

**Title of invention:**
Method and apparatus for driving capacitive light emitting device

**Applicant:**
PIONEER ELECTRONIC CORPORATION, et al

**Opponent:**
-

**Headword:**
-

**Relevant legal provisions:**
EPC Art. 84, 54, 56
EPC R. 27(1)(c)

**Keyword:**
"Missing essential feature (no)"
"Novelty and inventive step (yes)"

**Decisions cited:**
-

**Catchword:**
-

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**Case Number:** T 0332/00 - 3.4.2

# D E C I S I O N
**of the Technical Board of Appeal 3.4.2**
**of 24 June 2004**

**Appellant:** PIONEER ELECTRONIC CORPORATION
4-1, Meguro 1-chome
Meguro-ku
Tokyo (JP)

**Representative:** Klingseisen, Franz, Dipl.-Ing.
Patentanwälte
Dr. F. Zumstein
Dipl.-Ing. F. Klingseisen
Bräuhausstrasse 4
D-80331 München (DE)

**Decision under appeal:** **Decision of the Examining Division of the European Patent Office posted 4 November 1999 refusing European application No. 96308527.9 pursuant to Article 97(1) EPC.**

**Composition of the Board:**

**Chairman:** A. G. Klein
**Members:** M. A. Rayner
V. Di Cerbo

## Summary of Facts and Submissions

I. The applicant appealed against the decision of the examining division refusing European patent application number 96 308 527.9. The patent application relates to the field of capacitive light emitting devices.

II. Examination proceedings

During the examination proceedings the division cited documents including:

D1: US-A-5 463 283.

In its third communication, the examining division advanced, *inter alia*, the view that the subject matter of the then claim 1 differed over the prior art documents in that not only the means for keeping the accumulated voltage level at the "desired" voltage level, but likewise the inverter control means (13,16) are responsive to the detection signal. The division did not see any technical problem solved by this feature which it considered arbitrary and therefore not inventive.

III. Decision under appeal

In its decision, the examining division decided that the subject matter of claim 1 according to any of the requests before it lacked an essential feature for achieving accurate ageing compensation so that the requirements set forth in Article 84 EPC (first sentence) in combination with Rule 27(1)(c) EPC were not fulfilled. In this respect, the division drew

attention to the "increased" voltage $V_n$ deriving from capacitor $C_{pw}$, for accurately compensating for the "decreased" capacitance $C_{ELn}$ of the aged electroluminescent element in order to keep the injected charge constant, this voltage $V_n$ being reached in time $T_0$ (Figure 6), this time being essential. Accurate ageing compensation, which is presented throughout the application as the technical problem underlying the invention, cannot be effected if the time interval were to be changed or not controlled. The division also referred to document D1 in support of its position in the context of the only objective way of reformulating the technical problem in the light of document D1 being to acknowledge that the invention provides for an alternative solution with respect to document D1 for accurately compensating ageing of an electroluminescent element.

IV. *Case of the Appellant*

(a) *Requests*

Grant of a patent based on the documents specified in the letter of 5 August 2003. On an auxiliary basis, oral proceedings.

The independent claims upon which the request of the appellant is based are worded as follows:

"1. An apparatus for driving a capacitive light emitting device with a first electrode (A) and a second electrode (B) in accordance with a light-on instruction, comprising a voltage source (12),

a capacitor ($C_{pw}$) for accumulating and holding voltage corresponding to said light-on instruction,
voltage detecting means (14) for detecting the accumulated voltage level across said capacitor ($C_{pw}$) so as to produce a detection signal (Vs) when the accumulated voltage reaches a level in accordance with the light-on instruction,
means (L, Di, Q5, 13, 15) for keeping the accumulated voltage at the level in accordance with the light-on instruction,
control means (16) responsive to said detection signal (Vs) for alternately generating first and second control signals, and
switch means (Q1-Q4) for applying the voltage accumulated between successive said control signals to a portion across said first and second electrodes (A, B) in one direction (B—>A) in response to the first control signal and in another direction (A—>B) in response to the second control signal.

9. A driving method for turning on a capacitive light emitting device having a first electrode (A) and a second electrode (B) in accordance with a light-on instruction, comprising the steps of
providing a voltage source (12),
accumulating and holding voltage from said voltage source corresponding to said light-on instruction by means of a voltage accumulating means ($C_{pw}$), detecting the accumulated voltage of the voltage accumulating means ($C_{pw}$) and producing a detection signal (Vs) when the accumulated voltage reaches a level in accordance with the light-on instruction,
keeping the accumulated voltage at the level in accordance with the light-on instruction,

alternately generating first and second control signals by a control means (16) responsive to said detection signal (Vs), and
controlling switch means (Q1- Q4) for applying the voltage accumulated between successive said control signals to a portion across said first and second electrodes (A, B) in one direction (B—>A) in response to the first control signal and in another direction (A—>B) in response to the second control signal."

(b) *Arguments*

*Article 84 EPC*

The independent claims comprise the following essential features:

- detecting accumulated voltage level on capacitor $C_{pw}$ so as to produce a detection signal $V_s$ when accumulated voltage reaches a level in accordance with the light-on instruction, and

- control means 16 responsive to said detection signal $V_s$ for generating control signals for controlling switch means Q1 - Q4.

These features mean that stored voltage is discharged from $C_{pw}$ to the capacitive light emitting device via switch means only when voltage detection means 14 has detected a stored voltage of desired level on capacitor $C_{pw}$. In other words discharging capacitor $C_{pw}$ and charging the capacitive light emitting device is dependent on whether capacitor $C_{pw}$ has a stored desired voltage level to be discharged to capacitive light

emitting device and this desired voltage level is detected. The features of claim 1 meet the object of the invention in preventing a reduction of light emission intensity due to ageing of the capacitive light emitting device because a voltage larger than the initial voltage drives the capacitive light emitting device due to decrease in equivalent capacitance as is described in connection with Figures 5 and 6 of the application. The features of the independent claims therefore solve the problem addressed by the application. As this subject matter is claimed, there is no need for a restriction to $T_0$.

The examining division seems to be of the opinion that "accurate" ageing compensation was the object of the invention. Naturally, even though the object of ageing compensation is solved by the features in claim 1, the compensation can be made "more accurately", but this is not the object to be solved. Furthermore, derived from the assumption of "accurate" ageing compensation, the contested decision assumes that a "constant charge" needs to be injected in the electroluminescent element to keep the brightness level thereof "constant during its whole lifetime". However, there is no reference to constant charge in the application or document D1, so this assumption is not valid. Therefore the opinion of the examining division offers no reason under the EPC for introducing a restriction to $T_0$.

*Substantive patentability*

There is a fundamental difference between subject matter of claim 1 and disclosure of document Dl in that charging the capacitive light emitting device is

dependent on detecting a desired voltage level of storage capacitor $C_{pw}$ according to invention and charging the capacitive light emitting device C is independent of the voltage level of storage capacitor $C_s$ according to document Dl. Therefore, the subject matter of claim 1 is new. Moreover no hint can be found in document Dl for one skilled in the art to deduce a dependency between detecting voltage level of storage capacitor and charging the capacitive light emitting device. Therefore, the subject matter of claim 1 involves an inventive step.

The new and inventive subject matter of claim 1 solves the problem of compensating ageing of the capacitive light emitting device. Document Dl also addresses this problem, but there is no requirement in the EPC that an invention has to solve a new problem. Notwithstanding the fact that this is not even required, it can nevertheless be seen that a new problem is solved by the features of claim 1. Due to the fact that voltage detection means 14 detects a desired voltage level on $C_{pw}$ capacitor and produces a detection signal Vs for controlling switch means to charge the capacitive light emitting device, ageing compensation can be made for bright (Vb) and dark (Vd) luminance control signals corresponding to different voltage levels of capacitor $C_{pw}$ to be detected by the voltage detection means 14 for producing detection signal Vs. Such an ageing compensation for bright and dark luminance control of the electroluminescent element is not possible by means of a device according to Dl as there is no detection means corresponding to the voltage detection means 14 and there is thus no correlation between desired

voltage level on $C_{pw}$ capacitor and switching of the electroluminescent element.

Therefore, claim 1 corresponds to the requirements of Article 52(1) as well as of Article 84 (first sentence) in combination with Rule 27(1)(c) EPC.

## Reasons for the Decision

1. The appeal complies with the provisions mentioned in Rule 65(1) EPC and is therefore admissible.

2. *Article 84 EPC*

The reason given by the examining division for rejecting the application is that it "does not meet the requirements of Article 84 EPC (first sentence) in combination with Rule 27(1)(c) EPC, because not all the features which are essential for solving the technical problem underlying the present invention have been defined in the independent apparatus claim".

The board cannot however see how combining the first sentence of Article 84 EPC, which merely states that the claims shall define the matter for which protection is sought, with Rule 27(1)(c) EPC, which addresses the description and requires it to disclose the invention as claimed in such terms that the technical problem and its solution can be understood and to state any advantageous effect with reference to the background art, can be considered to give rise to an obligation to define in the claims any feature arbitrarily considered to be "essential for solving the technical problem".

On the contrary, Rule 27(1)(c) - in particular when considered in conjunction with Rule 27(1)(b) concerning indication of the background art - makes it clear that the technical problem to which it refers shall be defined in consideration of the background art, i.e. from a comparison between the claimed subject-matter and the closest prior art as is common practice for instance in the context of the assessment of patentability following the "problem-solution approach".

In the present instance independent claims 1 and 9 define in undisputedly clear terms a series of features distinguishing their subject-matter from the closest prior art disclosed in document D1, and these features also undisputedly provide an alternative driving technique for a capacitive light emitting device, which allows not only for ageing compensation but also for dealing with different, i.e. bright and dark, luminance signals (see points 3 and 4 hereafter).

The examining division - based apparently on the description - considered that these features had to be supplemented with further features warranting "accurate" ageing compensation, which in its view was "presented throughout the application as the technical problem underlying the present invention". However, if the features already present in the independent claims do not on their own achieve "accurate" ageing compensation, then "accurate ageing compensation" can simply not be considered to be the technical problem solved by the invention, and the description should be corrected accordingly, if necessary. The board observes in this context that "accurate" compensation is not

referred to in the generic statements of the objects of the invention referred to by the examining division in its decision in support of its view concerning definition of the technical problem solved by the invention, but only in a passage describing a specific embodiment of the invention (see page 5, lines 54 to 58 of the published application).

Therefore, the board considers the claims do define the matter for which protection is sought (cf. Article 84, first sentence) and does not consider it essential in the context of Article 84 to recite in the independent claims the feature "maintaining constant the time interval T0 during which the switching means are operated", which the examining division found to be lacking.

The board is satisfied that the independent claims also meet the further requirements of Article 84 EPC.

3. *Document D1*

With reference to Figure 1, there is disclosed a driver control 12 to which an oscillator signal is fed and which is used in regulating boost type DC to DC converter operation by controlling an on and off time of a transistor, the driver control producing, via a diode D1, a voltage $V_{pp}$ at node 2. Node 2 is connected to system ground through a capacitor $C_s$ and the voltage $V_{pp}$ is also fed back to the driver control 12 which senses its magnitude. When the magnitude falls below about 90 VDC, the transistor is turned on and when it falls below 90 VDC the transistor is turned off. $V_{pp}$ is thus regulated at about 100VDC.

Control block 18 controls a bridge and accepts a low frequency signal for driving the halves of the bridge. The bridge circuit converts $V_{pp}$ into the equivalent of an AC voltage by applying reverse polarity signals to electroluminescent element lamp 14. The lamp continues to charge to a peak voltage determined by the value of voltage $V_{pp}$ or until the charge current is removed (see Figure 3). The resultant waveform comprises a linear up ramp followed by an exponential capacitance discharge down ramp to a linear down ramp followed by an exponential capacitance up ramp and so on.

Compensation due to ageing is accomplished because equivalent capacitance reduces and equivalent parallel resistance increases in value causing the slew rate to increase, thus causing the peak voltage to increase and/or the RMS voltage to increase if the peak voltage is at $V_{pp}$. The electroluminescent element lamp then "sees" a higher voltage thereby tending to maintain the brightness level constant.

4. *Novelty*

The board sees no reason in the present *ex parte* proceedings to disagree with the unchallenged position of the examining division that that subject matter pertaining to the inverter control means being responsive to the detection signal differs from the prior art documents. Such a feature is contained in present claims 1 and 9 in the respective formulations "control means (16) responsive to said detection signal (Vs) for alternately generating first and second control signals," and "alternately generating first and

second control signals by a control means (16) responsive to said detection signal (Vs)."

Therefore the board is satisfied that the subject matter of the independent claims can be considered novel at least by virtue of features involving this subject matter and that therefore Article 54 EPC can be considered satisfied.

*Inventive step*

4.1 Of the available documents, none come closer than document D1 to the presently claimed subject matter.

The board shares the view of the appellant, as summarised in section IV(b) above), that, consequent to accumulated voltage according with the light on signal and alternately generating first and second control signals by a control means (16) responsive to detection thereof, the invention provides an alternative driving technique allowing for ageing compensation and also for the possibility of dealing with different, i.e. bright and dark, luminance signals. Document D1 does not provide any hint towards the claimed solution, which involves charging the capacitive light emitting device dependent on detecting a desired voltage level of capacitor $C_{pw}$.

The remaining documents in the file have no more relevance to inventive step of the subject matter discussed in the foregoing than does document D1 and therefore detailed analysis of their content is not necessary in the context of this decision.

Therefore the board is satisfied that the subject matter of the independent claims can be considered to involve an inventive step within the meaning of Article 56 EPC.

5. The board having satisfied itself that the application and the invention to which it relates meet the requirements of the Convention, grant of a patent can be envisaged (Article 97(2) EPC).

6. *Oral proceedings*

Since oral proceedings were requested only on an auxiliary basis, the for the appellant positive outcome of the appeal renders such proceedings unnecessary.

## Order

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

1. The decision under appeal is set aside.

2. The case is remitted to the first instance with the order to grant a patent on the basis of the following documents:

claims, 1 to 14 filed with the letter dated 5 August 2003;
description, pages 1,1a and 2 to 6 filed with the letter of 27 October 2000;
drawings, Figures 1 to 6, as originally filed.

The Registrar The Chairman

P Martorana A G Klein