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**Datasheet for the decision
of 31 July 2012**

Case Number: T 0050/08 - 3.5.02

Application Number: 97900125.2

Publication Number: 817542

IPC: H05B 41/288, H05B 41/24

Language of the proceedings: EN

Title of invention:
Discharge lamp lighting device

Patentee:
Ushio Denki Kabushiki Kaisha

Opponent:
Osram Gesellschaft mit beschränkter Haftung

Headword:
-

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step - (no) "

Decisions cited:
-

Catchword:
-



Case Number: T 0050/08 - 3.5.02

DECISION
of the Technical Board of Appeal 3.5.02
of 31 July 2012

Appellant:

(Patent Proprietor)

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Decision under appeal:

**Decision of the Opposition Division of the
European Patent Office posted 31 October 2007
revoking European patent No. 817542 pursuant to
Article 102(2),(3) EPC 1973.**

Composition of the Board:

Chairman: M. Ruggiu
Members: M. Léouffre
P. Mühlens

Summary of Facts and Submissions

- I. The appellant proprietor lodged an appeal, received on 2 January 2008, against the decision of the opposition division, dispatched on 31 October 2007, on the revocation of the European patent No. 817 542. The statement setting out the grounds of appeal was received on 10 March 2008.
- II. The opposition division held that claim 1 lacked an inventive step in the light of the combination of documents:
D1 = WO 94/23442 A and
D3 = EP 0 302 748 A.
- III. In a communication accompanying the summons to oral proceedings the Board referred further to the following documents:
D4 = "Technische Mitteilung" of Siemens AG,
Schaltnetzteile (SNT), Technik und Bauelemente,
1985, pages 4, 7, 9 and 10 and the last page
showing the publication code S3 d 3/85; and
D5 = P.Horowitz and W.Hill "The Art of Electronics",
Cambridge University Press, Cambridge 1980,
pages 213 to 215;
and expressed the preliminary opinion that claim 1
might not involve an inventive step in the light of D1
and common general knowledge.
- IV. By fax, the respondent opponent withdrew its opposition on 28 June 2012.

V. Oral proceedings before the board took place on 31 July 2012.

The appellant (patent proprietor) requested that the decision under appeal be set aside and that the patent be maintained unamended.

VI. Claim 1 of the patent in suit as granted reads as follows:

"Device for operating a fluorescent discharge lamp for document scanning illumination of an information processing device and for a background light device of a liquid crystal display, in which within a glass tube (3) at least one of the rare gases He, Ne, Ar, Kr or Xe is hermetically sealed in a stipulated amount, in which fluorescent material is applied to the inside of the glass tube (3), and in which in the axial direction on the outside of the glass tube (3) there are at least two strip-shaped electrodes (2) over the entire length of the glass tube (3), and with a lamp voltage with a cyclic voltage waveform, controlled by a driver circuit (7),

characterized in that

- the driver circuit (7) is of the fly-back type,
- in the cyclic voltage waveform the zero-level width W_0 of the waveform having the maximum peak voltage in one period is set to $2 W_0 < t$ with respect to the cycle period t , whereby a half-value width W is set to a predetermined value of a waveform in the range of $10 \mu s \leq t \leq 30 \mu s$,
- all electrodes (2) are arranged on the outside of the glass tube (3) and there are no inner electrodes (Fig 1)."

Claims 2 to 4 are dependent on claim 1.

VII. The appellant essentially argued as follows:

D1, which was considered as representing the closest prior art, disclosed a transformer comprising different windings at the primary and secondary sides (cf. figure 1) contrary to the transformer of the patent in suit. The primary winding was connected to a power amplifier 11. No information was given about this amplifier which appeared as a "black box" for a person of ordinary skill, who did not know how to implement it. In the patent in suit, the transformer together with the driver circuit constituted a "driver circuit (7) of the fly-back type". The subject-matter of claim 1 was therefore new. The fields of application of the fly-back circuits disclosed in D5 were televisions and cathode ray tubes. There was no mention of discharge lamps. Therefore it was not obvious for a person of ordinary skill to implement the amplifier of D1 together with its transformer as a fly-back circuit.

Nothing suggested to combine D3 with D1 either. The opposition division considered the underlying problem of D1 as "to increase the efficiency of the desired radiation of a barrier discharge lamp". This problem corresponded to the problem indicated in D1 with regard to the prior art cited in the introductory part of D1 (page 1, lines 19 to 29 of D1). The opposition division had mixed the prior art cited in D1 and the disclosure of D1 itself to define the problem of the invention, and concluded that the power amplifier and the high voltage transformer are the key issues to improve the

efficiency. However D1 itself was silent on any deficiencies of its own disclosure. Therefore D1 did not point to D3 and D3 could not make the invention obvious.

Reasons for the Decision

1. The appeal is admissible.
2. The opposition division together with the parties agree to consider D1 as representing the closest prior art.
 - 2.1 D1 discloses:

a device for operating a fluorescent discharge lamp (acknowledged by the applicant in section [0002] of the patent in suit) for document scanning illumination of an information processing device (cf. D1, page 16, lines 19 to 21). Fluorescent material is applied to the inside of the glass tube 2 (cf. D1, page 15, line 4 and page 18, lines 3 and 4) which is filled with a Xenon gas (cf. D1, page 13, lines 26, 27). Two strip-shaped electrodes 4a, 4b may be applied over the entire length of the glass tube and in the axial direction on the outside of the glass tube 2, whereby the inner electrode shown in Figure 1 can be omitted (cf. D1, page 7, lines 25 to 30, page 14, lines 23 to 26, figures 1 and 2a and page 16, lines 21 to 23).

The lamp voltage is controlled by a driver circuit producing a cyclic voltage waveform (cf. D1, figures 1 and 8). The period of the waveform can be $2\mu\text{s} + 27\mu\text{s} = 27\mu\text{s}$ (cf. page 14, line 28 to page 15, line 2) or $1,5\mu\text{s} + 27\mu\text{s} = 28,5\mu\text{s}$ (cf. page 15, lines 17 to 20), thus in the range of $10\mu\text{s} \leq t \leq 30\mu\text{s}$ with the half-

value width W set to a predetermined value (cf. sentence bridging pages 14 and 15). The zero-level width W_0 of the waveform having the maximum peak voltage in one period is clearly set to $2 W_0 < t$ with respect to the cycle period t (cf. D1, figure 8).

Document D1 does not explicitly disclose a fly-back circuit. Thus, the board agrees with the findings of the parties and the opposition division that the subject-matter of claim 1 could be seen as differing from D1 in that "the driver circuit (7) is of the fly-back type" whereby, as acknowledged by Board of Appeal 3.4.03 in its decision T 0146/05, the reference sign "7" should not be construed as limiting the claim (Rule 29 EPC) and the driver circuit should be understood as the assembly of the driver circuit referenced with number 7 in figures 1 and 2 together with the switching device 8 and the transformer 9. This assembly constitutes the driver circuit of the fluorescent lamp 1 and might differ from the driver circuit represented by the amplifier 11 and the transformer 12 of D1 in that it is of the "fly-back type". The subject-matter of claim 1 could therefore be considered as novel (Article 54 EPC).

2.2 A discharge lamp according to claim 1, which is of the outer electrode type, is also called a dielectric barrier discharge lamp (DBD lamp) because the vessel constitutes the dielectric of capacitors. These capacitors lead to a need for higher control voltages (cf. published patent, section [0013]). To generate this higher control voltage, the transformer of the contested patent, which is supplied with 24 volts (cf. figure 4), is used as step-up voltage generator to

output a voltage in the range of 1400 Volts (cf. section [0046] of the published patent). The voltage transformer 12 shown in figure 1 of D1 delivers comparable output voltages (cf. page 15, line 1).

- 2.3 It is generally known that fly-back circuits are able to produce high peak voltage values. For this purpose, the equivalent energy is usually stored in coreless transformers or transformers with cores of ferrite material, possibly having an air gap to increase the reluctance of their magnetic circuits (cf. D4, page 9, section 3.3). The high voltage transformer of D1 is schematically shown as a coreless transformer and therefore appears to be particularly adapted to be operated as a fly-back transformer in a fly-back circuit.
- 2.4 The shape of the pulses delivered by the high voltage transformer 12 of D1 is similar to the shape of the pulses delivered by the device of the patent in suit. The periodic waveform of these pulses present a steep rise and as acknowledged by the appellant (then applicant) in his letter dated 29 November 2000, fly-back driver circuits are known for providing "steep rises of the voltage waveform". It would thus be obvious to implement the amplifier 11 of D1 together with the high voltage transformer 12 of D1 as a fly-back circuit and arrive at the device of the present application without exercising an inventive skill (Article 56 EPC).

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

U. Bultmann

M. Ruggiu