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**Datasheet for the decision
of 28 August 2008**

Case Number: T 0026/06 - 3.4.03

Application Number: 00917356.8

Publication Number: 1139700

IPC: H05B 41/288

Language of the proceedings: EN

Title of invention:
Feeding device for discharge lamp

Applicant:
USHIO DENKI KABUSHIKI KAISHA

Opponent:
-

Headword:
-

Relevant legal provisions:
-

Relevant legal provisions (EPC 1973):
EPC Art. 56, 83, 84

Keyword:
"Clarity, sufficiency of disclosure (yes)"
"Inventive step (no)"

Decisions cited:
-

Catchword:
-



Case Number: T 0026/06 - 3.4.03

D E C I S I O N
of the Technical Board of Appeal 3.4.03
of 28 August 2008

Appellant:

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Decision under appeal:

Decision of the Examining Division of the
European Patent Office posted 16 June 2005
refusing European application No. 00917356.8
pursuant to Article 97(1) EPC.

Composition of the Board:

Chairman: R. G. O'Connell
Members: R. Q. Bekkering
J. Van Moer

Summary of Facts and Submissions

I. This is an appeal against the refusal of application 00 917 356 for lack of clarity, Article 84 EPC 1973.

II. At oral proceedings before the board, the appellant applicant requested that the decision under appeal be set aside and that a patent be granted on the basis of the application documents as refused.

III. Claim 1 reads as follows:

"1. A power supply device for electric discharge lamps that lights high pressure mercury vapor lamps in which a cathode and anode are disposed in a discharge space enclosed by an inclusion body and in which noble gas as well as 0.15 mg or more of mercury per 1 mm³ of said discharge space are sealed, said power supply device, when it is connected to a test device having a simulated arc discharge resistor and a simulated glow discharge resistor, said arc discharge resistor being virtually equal to the arc discharge resistance during arc discharge of said high pressure mercury vapor lamp and said simulated glow discharge resistor being virtually equal to 1/7 of the glow discharge resistance during glow discharge of said high pressure mercury vapor lamp, having a continuous period (Td) while said simulated glow discharge resistor current being less than 30% of said simulated arc discharge resistor current is less than 10 μ s, and a recovery period (Tr) of said simulated glow discharge resistor current to at least 70% of said simulated arc discharge current is less than 100 μ s, when said power supply device is switched

from the state of flow of said simulated arc discharge resistor current to said simulated glow discharge resistor current."

Further independent claims are directed to a power supply device, a control circuit and a test device.

IV. Reference is made to the following prior art document:

D1: JP A 10 116 590

V. The appellant applicant argued as follows:

The subject-matter of claim 1 was sufficiently clear and detailed to put an expert in the field in a position to work the invention. The relevant expert knew which components were generally included in power supply circuits and knew how to configure them in order to generate the desired power output. Moreover, in his education the expert had learned how to produce and evaluate output current diagrams as a characteristic of a power supply device. The invention provided the expert with such an output current diagram. The person skilled in the art, thus, would have no difficulty in constructing a power supply meeting the conditions in terms of output current and timing specified in claim 1, once these conditions were provided to him.

The invention resided rather in the identification of the conditions to be met by the power supply and in the use of a test circuit, which simulated the specific characteristics of the lamp in question.

Although admittedly the discharge processes in the lamp were well known to the person skilled in the art and it would have been obvious to the person skilled in the art that the extinction of the lamp was caused by the power supply failing to adjust sufficiently rapidly to the increase in impedance at the transition from arc to glow discharge, so as to deliver a current sufficiently large so as to prevent the lamp from extinguishing, it was not obvious to use a test circuit as specified in claim 1 and to identify a set of conditions to be fulfilled by the power supply as claimed.

Accordingly, the subject-matter of claim 1 was new and involved an inventive step.

Reasons for the Decision

1. The appeal is admissible.

2. *Clarity, sufficiency of disclosure*

The appellant applicant argued that the person skilled in the art would have no difficulty in constructing a power supply meeting the conditions in terms of output current and timing specified in claim 1, once these conditions were specified for them.

The power supply in question was of the conventional type used for discharge lamps, having only a very limited number of standard components whose effects were completely clear and predictable.

The board accepts the appellant's assertion that at the filing date of the application the output current and timing requirements specified in claim 1 were realisable in a power supply by the person skilled in the art.

Hence, in the board's judgement claim 1 meets the requirements of clarity, Article 84 EPC 1973, and the application meets the requirements of sufficiency of disclosure, Article 83 EPC 1973 in this respect.

3. *Novelty*

As none of the available prior art involves a test circuit or output current and timing conditions as specified in claim 1, the subject-matter of claim 1 is new (Article 52 EPC 2000 and 54(1) and (2) EPC 1973).

4. *Inventive step*

4.1 The provision of a test circuit on the one hand and the specification of output current and timing conditions on the other hand as claimed in claim 1, do not produce any technical effect in combination but rather address partial problems which require separate consideration.

4.1.1 The test circuit as specified in claim 1 involves "a *simulated arc discharge resistor and a simulated glow discharge resistor, said arc discharge resistor being virtually equal to the arc discharge resistance during arc discharge of said high pressure mercury vapor lamp and said simulated glow discharge resistor being virtually equal to 1/7 of the glow discharge resistance*

during glow discharge of said high pressure mercury vapor lamp".

It thus simulates the behaviour of a particular type of high pressure mercury vapor lamp and allows for a controlled transition from a simulated arc discharge mode to a simulated glow discharge mode, facilitating the testing of a power supply device for such a lamp.

The objective problem to be solved relative to the closest prior art, eg document D1 discussed in the application as filed (description page 3, lines 1 to 9) disclosing a power supply device for high pressure mercury vapor lamps, is to facilitate power supply device testing.

The problem *per se* is well known in engineering where test devices in general and test circuits in particular are commonly used for facilitating testing the response of apparatuses to predetermined conditions. The problem *per se* would thus be obvious to the person skilled in the art.

As such, the appellant applicant acknowledged that the use of test circuits simulating the electrical behaviour of a particular device or system was common practice.

In the board's judgement, however, the claimed solution lacks an inventive step. The use of a test circuit having a simulated arc discharge resistor and a simulated glow discharge resistor, simulating the behaviour of the specific discharge lamp at issue would be obvious to the person skilled in the art.

Furthermore, contrary to the appellant's contention, in the board's judgment it would be obvious to the person skilled in the art to select the characteristics of the test circuit, ie the resistance values, to reflect the specific characteristics of the lamp of relevance.

The question remains whether the particular selection of the simulated glow discharge resistor to be virtually equal to 1/7 of the glow discharge resistance during glow discharge of the lamp can support inventive step.

In this context, it is noted that the application is silent about why 1/7 of the glow discharge resistance is selected. In particular, there is no theoretical explanation or empirical comparative data supporting the significance of this particular resistor value compared to other possible values. In fact, according to the third embodiment of the invention (see description pages 18, 19 and claim 5) the second resistor should be about equal to the glow discharge resistance during glow discharge of the lamp. Accordingly, the particular selection in claim 1 of the simulated glow discharge resistor being virtually equal to 1/7 of the glow discharge resistance during glow discharge of the lamp must be considered arbitrary and, thus, not inventive.

4.1.2 Turning to the second partial problem, the specification of output current and timing conditions in claim 1, on the other hand, has the technical effect of preventing the lamp from extinguishing at the transition of the lamp from arc discharge to glow discharge.

According to the application, "the problem arises of a lamp extinguishing over the course of several seconds to dozens of seconds even after successful initiation by an igniter when a lamp is turned on as the amount of mercury sealed in lamps increases" (description page 121 to 23). As explained, "This phenomenon can be briefly explained by stating that electrons are readily released from liquid mercury, as is well known, with the result being that arc release becomes possible at extremely low operation voltage of 15 volts to 20 volts, for example, when liquid mercury is present on a cathode. If discharge should commence while liquid mercury sticks to a cathode, arc discharge would appear first, and mercury on a cathode would rapidly evaporate. At that time, as mercury on the cathode first evaporates at those sections opposing the cathode, the discharge site gradually would shift toward the base of the cathode. Once mercury has completely evaporated from the cathode, including the base of the cathode, said arc discharge at low operation voltage terminates and it shifts to glow discharge" (description page 1, line 30 to page 2, line 9)". "The impedance between electrodes is low during arc discharge, but since it rises during glow discharge, comparatively high operation voltage must be supplied to maintain glow discharge. However, if the voltage output from a power supply device cannot accommodate the operation voltage that rapidly rises, the lamp extinguishes at the moment of shift to glow discharge" (description page 2, lines 11 to 15).

The objective problem to be solved here is to prevent the lamp from extinguishing at the transition of the lamp from arc discharge to glow discharge.

The formulation of the problem *per se* would be obvious as the failure is directly observable.

Moreover, as conceded by the appellant applicant, the discharge processes in such lamp are well known to the person skilled in the art and it would be understood by the person skilled in the art that the extinction of the lamp was caused by the power supply failing to sufficiently rapidly adjust to the increase in impedance at the transition from arc to glow discharge, and deliver a current sufficiently large to prevent the lamp from extinguishing.

In consequence, only the empirical discovery remains that the power supply device, when connected to the test device, has *"a continuous period (T_d) while said simulated glow discharge resistor current being less than 30% of said simulated arc discharge resistor current is less than 10 μ s, and a recovery period (T_r) of said simulated glow discharge resistor current to at least 70% of said simulated arc discharge current is less than 100 μ s, when said power supply device is switched from the state of flow of said simulated arc discharge resistor current to said simulated glow discharge resistor current."*

The person skilled in the art, however, would inevitably arrive at these output current and timing conditions by straightforward trial and error experiments, falling within his routine competence.

4.2 Accordingly, the subject-matter of claim 1 is not to be considered as involving an inventive step within the meaning of Article 56 EPC 1973.

4.3 In view of the above finding on claim 1 consideration of the other independent claims would be otiose.

Order

For these reasons it is decided that:

The appeal is dismissed.

Registrar

Chair

G. Rauh

R. G. O'Connell