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**Datasheet for the decision
of 24 January 2022**

Case Number: T 2729/16 - 3.4.01

Application Number: 04801048.2

Publication Number: 1683398

IPC: H05B41/285, H05B41/298,
H05B41/392, H02H5/04

Language of the proceedings: EN

Title of invention:
THERMAL PROTECTION FOR LAMP BALLASTS

Patent Proprietor:
Lutron Technology Company LLC

Opponent:
Tridonic GmbH & Co KG

Headword:
Lamp Ballasts - LUTRON - TRIDONIC

Relevant legal provisions:
EPC Art. 123(2), 56

Keyword:
Inventive step - reformulation of the technical problem
Amendments - added subject-matter (no)

Decisions cited:

G 0001/19, T 0667/08, T 0072/95, T 0619/02



Beschwerdekammern

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Case Number: T 2729/16 - 3.4.01

D E C I S I O N
of Technical Board of Appeal 3.4.01
of 24 January 2022

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Decision under appeal: **Decision of the Opposition Division of the
European Patent Office posted on 2 November 2016
rejecting the opposition filed against European
patent No. 1683398 pursuant to Article 101(2)
EPC.**

Composition of the Board:

Chairman B. Noll
Members: P. Fontenay
R. Winkelhofer

Summary of Facts and Submissions

I. The appeal filed by the opponent (appellant) is against the decision of the Opposition Division to reject the opposition against European patent 1 683 398.

II. The opposition relied on the grounds of lack of inventive step of claims 1 and 18 (Article 100(a) EPC) and added subject-matter (Article 100(c) EPC).

III. In its decision, the Opposition Division held that the patent met the requirements of Articles 123(2) EPC, and that the subject-matter of claims 1 and 18 involved an inventive step in view of document

D1: US-B-6 621 239,

considered to disclose the closest prior art, and documents:

D10: WO-A-03/055281, or

D11: WO-A-00/69044.

The same conclusion applied, starting from document

D2: DE-A-100 13 041.

IV. The appellant requests that the decision be set aside and the patent be revoked.

V. In the reply to the appeal, the respondent (the patentee) requested that the appeal be dismissed. As an auxiliary request, maintenance of the patent based on the auxiliary request filed during Opposition proceedings on 17 December 2014 was requested. The auxiliary request differs from the main request in that claims 1 and 18 were amended to include the term "combination of" before the mention of "step and continuous functions".

VI. In their submissions, the parties reiterated their views with regard to added subject-matter and lack of inventive step. In the patentee's view, the reference in the characterising portion of claim 1 and 18 as granted (main request) to "step and continuous function" encompasses the possibility of the current being actually reduced according to a step function or, alternatively, according to a continuous function.

Moreover, an intermediate generalisation resulted from the absence in the independent claims of any indication that the continuous function lead to an imperceptible change of the light intensity.

The opponent further objected, for the first time, to the reference in the independent claims to the functions being defined over respective "temperature domains": a concept that was not defined in the original application documents. Its introduction in the claims wording constituted a further illustration that the claims contained subject-matter extending beyond the content of the application as filed.

With regard to inventive step, it was emphasised that it would have been obvious, in order to warn a user of

critical situations, to generate perceptible light changes, as, for example, disclosed in D10 or D11.

VII. In a communication setting out its provisional view, the Board indicated that it was not convinced by the various objections raised under Article 123(2) EPC.

It was noted, with regard to the feature in claims 1 and 18 according to which "the control circuitry is adapted to reduce the output current in the current limiting mode according to step and continuous functions defined over respective temperature domains", that the term "and" appeared to imply the existence of both step and continuous functions, contrary to the opponent's view. It was however acknowledged that this interpretation of the claims wording was at odds with some embodiments of the invention where the current was reduced according to a step function (figure 5b) or a continuous function (figure 5a) only.

With regard to the question of inventive step, the issue appeared to depend primarily on whether the claims wording excluded that the current be limited according to a step function or a continuous function only. If the current were defined by both functions, it appeared then questionable whether the skilled person would have considered D10, or D11, since both documents appeared to address a different problem, not resulting from excessive temperatures.

VIII. The patentee then filed two versions of an amended description, dubbed respectively, "Request A description" and "Request B description". Both versions of the description aimed at addressing the shortcomings

resulting from the contradictions between the claims wording and some embodiments of the invention.

The patentee further objected to the admission and consideration of the objection raised against the concept of "temperature domains". This aspect as to added subject-matter had not been addressed during the proceedings before the Opposition Division.

IX. The respondent/patentee's final requests are thus:
As a main request, that the patent be maintained according to the claims and drawings as granted and the description as submitted on 7 December 2021 as "Request A description". As an alternative, maintenance of the patent on the basis of the claims and drawings as granted and the description as submitted on 7 December 2021 as "Request B description" is requested. As further auxiliary requests, maintenance of the patent on the basis of the claims filed with the statement of grounds as first auxiliary request, with the description according to request A, or request B, of 7 December 2021 is requested.

X. Claim 1 of the main request, i.e. of the patent as granted reads:

A circuit for controlling the output current from a ballast to a lamp (108), the circuit comprising:

a) a temperature sensing circuit (300) adapted to be thermally coupled to the ballast and to provide a temperature signal (305) having a magnitude indicative of the ballast temperature T_b ; and,

b) control circuitry (218', 220', 222) adapted to cause the ballast to enter a current limiting mode, while continuing to operate the ballast, by reducing the output current when the magnitude of the temperature signal (305) indicates that T_b has exceeded a predetermined maximum desired ballast temperature, T_1 ,

characterised in that

the control circuitry is adapted to reduce the output current in the current limiting mode according to step and continuous functions defined over respective temperature domains, wherein the step-wise current reductions are so abrupt so as to result in light intensity changes that are perceptible to humans, thus alerting persons that an overtemperature condition has been encountered.

Claim 18 of the main request, i.e. of the patent as granted reads:

A method of controlling the output current from a ballast to a lamp, the method comprising the steps of:

- a) measuring the ballast temperature, T_b ;*
- b) comparing T_b to a first reference, T_1 , indicative of a predetermined maximum desired ballast temperature, and providing an indication of the difference between T_b and T_1 ,*
- c) causing the ballast to enter a current limiting mode, while continuing to operate the ballast, by reducing the output current when T_b has exceeded T_1 , characterised by*
- d) reducing the output current in the current limiting mode according to step and continuous functions defined over respective temperature*

domains, wherein the step-wise current reductions are so abrupt so as to result in light intensity changes that are perceptible to humans, thus alerting persons that an overtemperature condition has been encountered.

Reasons for the Decision

Main request - Added subject-matter (Article 100(c) EPC)

1. In the opponent's view the feature in claim 1 that "the control circuitry is adapted to reduce the output current in the current limiting mode according to step and continuous functions defined over respective temperature domains" was not limited to a reduction of the output current according to the combination of both step and continuous functions, but also covered the case of a current reduction according to a step or current function. In the absence of any basis in the original disclosure for the second branch of the alternative, the claim's wording extended beyond the content of the application as filed.
2. Claims 1 and 33 of the original application (WO-A-2005/048660) include a reference to two alternative current output functions. One of said functions is defined as a "combination of step **and** continuous functions".
3. Despite the absence of the term "combination", in both granted claims 1 and 18, the conjunction "and" must be given its normal meaning, thus implying the presence of both functions. In this respect, the description according to the "Request A Description" has been

amended with regard to the granted version of the description so that figures 5a and 5b, which show current output functions consisting of a continuous and step function only, are no longer presented as embodiments of the invention.

4. In the absence of any such contradictions between the claims and the description, the claims wording is to be given its normal meaning, i.e. under the present circumstances, as implying that the current output function results from the combined presence of a step and continuous function. While the description still contains indications that the current may be reduced according to continuous or step functions only (cf. e.g. paragraph 0042 or Figure 8), said comments of a general nature simply illustrate alternative examples and are not meant as embodiments of the invention.
5. According to an alternative line of argumentation developed by the opponent, claim 1 could also be construed as referring to consecutive current reduction cycles. The current would be reduced in the course of a first cycle according to a step function. After the temperature had returned to its normal level, it would then be reduced during the next temperature increase period according to a continuous function, or vice-versa.
6. This claim interpretation is not convincing.
7. It is not consistent with the wording of the independent claims. Claims 1 and 18 refer explicitly in their preamble to a current limiting mode. The step and continuous functions, referred to in the characterising portion when referring to the output current in said current limiting mode, have thus to be construed as

referring to the function associating said current to the temperature over the whole temperature range. In other terms, said current limiting function incorporates two different functions over said temperature range.

8. The view, that the claim's wording would also define an intermediate generalisation of the originally disclosed embodiments because of the omission in claim 1 of the imperceptibility of the light changes resulting from continuous current changes, is also not persuasive.
9. The application, as a whole, puts emphasis on the fact that the light intensity changes resulting from step-wise reductions must be perceptible to humans. This aspect defines a key element of the invention in order to warn a user of excessive and possibly damaging temperatures. This very finding supports the absence of details regarding the perceptibility or not of changes in light intensity resulting from a continuous current reduction. It thus supports the view that light intensity changes resulting from continuous current changes may also be perceptible. This understanding is confirmed by the very wording of the description which specifies that "the linear adjustment of the output current may be such that the resulting change in intensity is relatively imperceptible" (paragraphs [0044], [0047] of the patent specification), thus suggesting *a contrario* that it may be perceptible.
10. Independently of the question of its admission, the objection raised against the terms "temperature domains" in claim 1 is not persuasive in its substance.
11. It is a general principle that a literal support is not required for an amendment to be allowable under

Article 123(2) EPC (T 667/08, point 4.1.4). Although deprived of any literal basis in the original application, the terms "temperature domains" appear to reflect the teaching of the patent application according to which the step or continuous functions are defined over respective temperature ranges. In this respect, the claimed wording illustrates the mathematical principle that a function may be defined by different equations for different parameter ranges. In the present situation, it reflects the teaching of the patent application that the current is adapted differently depending on the temperature domains considered.

12. In conclusion, the claimed subject-matter does not extend beyond the content of the application as filed. It meets the requirements of Article 123(2) EPC.

Main request - Inventive step (Article 56 EPC)

13. Document D1 discloses a circuit for controlling the power supplied to a lamp when a particular temperature is exceeded. According to a preferred embodiment, the power reduction is achieved by reducing the current (column 9, lines 24-39).

The circuit of D1 comprises a temperature sensing circuit thermally coupled to the ballast which provides a temperature signal indicative of the ballast temperature (column 5, lines 23-57; column 6, lines 55-65).

It further incorporates a control circuitry adapted to cause the ballast to enter a current limiting mode, while continuing to operate the ballast, by reducing

the output current when the magnitude of the temperature signal indicates that a reference temperature has been exceeded (column 6, line 65 - column 7, line 12; column 9, lines 53-64).

14. Document D1 discloses the features of the preamble of claim 1 in combination.
15. The control circuit of D1 is further adapted to reduce the output current in the current limiting mode according to a step function. Concretely, the control circuit of D1 incrementally lowers the power applied to the lamp when the temperature increases. The increments may correspond to predetermined fixed amounts or, alternatively, to variable amounts (column 9, lines 62-64).
16. The claimed circuit thus differs from the circuit of D1, first, in that, in the current limiting mode, the output current is limited differently depending on the temperature. In addition to the step-wise limitation that applies in a certain temperature domain, the current is reduced according to a continuous function on another temperature domain. The reference in D1 to a linear or nonlinear power control of the lamp (column 9, lines 56-66) is to be construed, in the context of D1, as small step-wise adjustments whose amplitudes may depend linearly or non-linearly on the temperature.

The claimed circuit differs, secondly, from the circuit of D1 in that the step-wise current reductions are so abrupt so as to result in light intensity changes that are perceptible to humans. The indication in D1 that the current is limited according to fixed or variable amounts is, in this respect, not sufficient to assess whether said changes are perceptible to humans or not.

17. The continuous function permits, by increasing temperatures, to both limit said temperature increase while still maintaining a certain amount of light being provided.
18. None of these effects defines a technical contribution over D1 on the basis of which an inventive step may be acknowledged, since both effects are achieved by the step-wise (incremental) control provided in D1.
19. In the absence of any further indication in independent claims 1 and 18 as to the definition and profile of the continuous function, no technical contribution in terms of a technical effect may be derived from the reference to a continuous function. Although technical per se, the feature does not contribute to any inventive step (cf. G 1/19, point 33, with reference to T 619/02 (OJ EPO 2007, 63), points 2.2, 2.6.2 and T 72/95, point 5.4).
20. The abrupt step-wise reductions of current are designed so that the change in light intensity be perceptible to humans. D1 is silent as to whether the changes in light intensities obtained by way of increments are perceptible or not. The latter effect defines thus a technical contribution of the claimed arrangement over D1.
21. The claimed circuit permits to alert people that an overtemperature condition, which might damage the circuit or the lamp, has been encountered.
22. Both D10 and D11 disclose warning systems intended at warning users of critical conditions: the warning being achieved by fluctuations in the light intensities

(flicker) produced by the lamps. The changes are such as to be noticeable by humans. The circuits of D10 or D11 are designed to identify excessive voltages as may result from wrong connections.

23. In the opponent's view, the skilled person would have recognised the advantage of a perceptible flicker, as it is obtained by a repeated increase/decrease of the current intensity flowing through the lamp. Whether the light changes are the result of excessive voltages, as resulting from wrong connections, or from high temperatures, was not essential, when the objective problem to be solved merely consisted in warning a user. The skilled person would have recognised the benefits of the warning circuits disclosed in D10 or D11 and would have adapted the circuit of D1 by selecting increments whose amplitudes would have led to perceptible light changes, thus arriving at the claimed invention in an obvious manner.
24. These arguments are not persuasive.
25. The situations which might lead to damages of the ballasts or lamps may be the result of improper matching of the ballast to the lamps, improper heat sinking, or inadequate ventilation of the lighting fixture (paragraph [0003] of the patent specification).
26. While the various situations envisaged in paragraph [0003] somehow suggest that the perceptible light change is actually intended to warn of various kinds of disruptions, thus supporting the opponent's view, all disruptions identified in the patent specification have in common increasing the temperature of the circuit and lamp which thus exceeds its normal operating range. Paragraph [0003] in the specification explicitly refers

to an over-temperature condition as the source of damage or destruction of the ballast and/or lamps.

27. The definition of the problem to be solved put forward by the opponent is therefore too abstract in that it does not take into account this very aspect. The claimed invention is namely limited to a certain category of disorders, namely those leading to excessive temperatures. The objective problem to be solved is thus to be reformulated in a less general manner taking due account of this teaching.
28. The objective problem solved by the invention consists thus, concretely, in warning a human user of situations leading to over-temperature conditions.
29. The skilled person would have therefore limited their search to documents addressing this very aspect. Since neither D10 nor D11 address problems associated with temperatures drifting above critical thresholds or, even more generally, with problems associated with temperature fluctuations, there would have been no enticement for the skilled person to consider them in the first place.
30. While the above analysis is sufficient as such to conclude the existence of an inventive step starting from D1, in view of D10, or D11, a further argument for the existence of an inventive step results from the fact that the claimed solution aims at both reducing the temperature and warning a user, while a light flickering, as suggested in the prior art, would necessitate to increase the current and thus contribute to a momentaneous temperature increase.

31. The same analysis and conclusion applies when starting from document D2 as closest prior art. D2 also fails to disclose the characterising features of claim 1. The passage in column 1, lines 42-49, referred to by the opponent merely suggests that the load may be adapted when a temperature threshold is reached by adapting the load in a step-wise or somehow continuous manner.
32. There is no indication in D2 that step-wise and continuous functions would be used in combination to control the current, depending on the temperature domains considered. For the reasons developed above, the skilled person looking for a solution to the problem of excessive temperatures (while warning the user of this critical situation) had no hint to consider either D10 or D11 whose purpose is primarily to identify erroneous connections.
33. The subject-matter of independent claims 1 and 18 does not derive in an obvious manner from the prior art. The claimed subject-matter is thus inventive in the sense of Article 56 EPC.
34. The view that the embodiments of Figures 5c and 5d would not fall under the claimed definitions cannot be shared. The opponent's view relies on the observation that the functions disclosed in relation with both figures, define a sequence of step functions (the edges) separated by constant functions. The opponent argues that the constant portions thus defined would not contribute to a reduction of the current.
35. The Board does not agree. The functions illustrated in Figures 5c and 5d include a succession of edges (steps) separated by constant segments. They also contain sections with a continuous reduction of current with

temperature (Figure 5c: between T4 and T5, Figure 5d: between T9 and T10). It is noted, in this respect, that the functions of Figures 5c and 5d are indeed adapted to meet the claimed requirements.

36. Independently of the fact that the opponent's interpretation does not reflect the normal mathematical meaning associated to the concept of step function, which implies a succession of steps and adjoining continuous (here: constant) segments, the question to be answered is just whether the embodiments of Figures 5c and 5d reflect the claim's wording.

Order

For these reasons it is decided that:

1. The decision is set aside.
2. The case is remitted to the opposition division with the order to maintain the patent on the basis of the claims and drawings as granted, and the description as submitted on 7 December 2021 as "Request A Description".

The Registrar:

The Chair:



H. Jenney

B. Noll

Decision electronically authenticated