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**Datasheet for the decision
of 14 October 2013**

Case Number: T 1953/09 - 3.5.02

Application Number: 05774835.2

Publication Number: 1785011

IPC: H05B 33/08, F21K 7/00,
F21S 8/06, F21V 8/00

Language of the proceedings: EN

Title of invention:
LED control utilizing dynamic resistance of LEDS

Applicant:
Remco Solid State Lighting Inc.

Headword:
-

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step - after amendment (no)"

Decisions cited:
-

Catchword:
-



Case Number: T 1953/09 - 3.5.02

D E C I S I O N
of the Technical Board of Appeal 3.5.02
of 14 October 2013

Appellant: Remco Solid State Lighting Inc.
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Representative: Brooks, Nigel Samuel
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Decision under appeal: Decision of the Examining Division of the
European Patent Office posted 13 February 2009
refusing European patent application
No. 05774835.2 pursuant to Article 97(2) EPC.

Composition of the Board:

Chairman: M. Ruggiu
Members: M. Léouffre
W. Ungler

Summary of Facts and Submissions

- I. The applicant appealed against the decision of the examining division, posted on 13 February 2009, on the refusal of the European application No. 05 774 835.2.
- II. The examining division held that the subject-matter of claim 1 filed with telefax dated 22 July 2008 was not supported by the description contrary to Article 84 EPC and introduced subject-matter which extended beyond the content of the application as filed, contrary to the requirements following from Article 123(2) EPC. The examining division held further that the following documents were relevant for the assessment of the inventive step:
D1 = FR 2 763 203 A, and
D3 = US 2007/0195527 A.
- III. With the statement of grounds of appeal, dated and received on 12 June 2009, the appellant filed a new set of claims 1 to 13.
- IV. In an annex to the summons to oral proceedings the board expressed the preliminary opinion that the present invention lacked an inventive step having regard to D1.
- V. By fax dated 11 October 2013 the appellant informed the board that he would not attend the oral proceedings, scheduled for the 14 October 2013. The oral proceedings took place in his absence.
- VI. The appellant requested in writing that the decision under appeal be set aside and that a patent be granted

on the basis of the claims 1 to 13 filed with letter dated 12 June 2009.

VII. Claim 1 reads as follows:

"An LED light fixture comprising an LED array, an interface for connecting the fixture to a source of electrical power and providing power to the LED array producing a light of a suitable intensity and color, a power control section for controlling power in the LED array and a light diffuser for diffusing the light from the LED array, the power control section comprising an active bootstrap circuit connected to a low voltage side of the LED array, the active bootstrap circuit comprising a means for sensing current in the LED array and providing the sensed current, which varies as a function of the dynamic resistance of the LED array, to a current regulator means to adjust the current in the LED array to maintain the current at the desired level."

Claims 2 to 13 are dependent on claim 1.

VIII. The appellant essentially argued in writing as follows:

The prior art solutions for control of LED arrays generally relied on control of the current being fed into the array by utilizing a control function between the power source and the LED array, such as switching circuits. The citation, D1, taught the use of a constant current power supply to the LED without regulation of the current based on a feedback loop. The current regulation of D1 was connected to the high side of the single LED, that is between the power supply and

the LED. This was different from the present application in which the power control section, which included the current regulation function, was connected to the low side of the LED array and regulated the current in the LED array utilizing an active bootstrap circuit with the LED array providing the feedback function. The advantages of the present invention were the high efficiency in terms of the amount of power being utilized to produce the level of light. Thus the claims were novel and inventive over the prior art.

Reasons for the Decision

1. *Novelty (Articles 54 EPC)*

D1 discloses a LED light fixture (cf. page 1, lines 28 and 29) comprising a LED 10, an interface 13 for connecting the fixture to a source of electrical power and for providing power to the LED, clearly for producing a light of a suitable intensity and color. The LED 10 is supplied over a power control section comprising a current source 11 that comprises means R1 for sensing current in the LED and for providing the sensed current, which varies as a function of the dynamic resistance of the LED, to a current regulator means T4 to adjust the current in the LED to maintain the current at the desired level (cf. page 2, lines 17 to 21).

- 1.1 The power control section 11, 12 shown in figure 1 of D1 is connected to the high voltage side of the LED. However it may also be connected "after" the diode 10,

i.e. to the low voltage side of the LED (cf. page 2, lines 4 to 6).

- 1.2 A bootstrap circuit defines a circuit which is self-sufficient e.g. self-starting, like for example a circuit using its output to bias its input to run up or boot up. The circuit of D1 is self-sufficient and is run up by first biasing the transistor T1 of the current source 11 with the help of the current generator 12, and then regulating the current in resistor R1 and LED 10 by the feedback provided over transistor T4. The circuit of figure 1 of D1 is therefore considered as an active bootstrap circuit.

For completeness, a power control circuit as shown in figure 1 of D1 is very similar to the circuit shown in figure 25 of D3, which is a preferred embodiment of the circuit shown diagrammatically in figure 24 of D3, which is itself identical to the diagram shown in figure 24 of the present application. The present appellant, who is the assignee of the related application D3, appears to consider the circuit of figure 25 of D3 as a bootstrap circuit (cf. section [0087] of D3). It should thus be concluded that the circuit of figure 1 of D1 is indeed a bootstrap circuit.

- 1.3 The subject-matter of claim 1 differs from D1 in that the LED is a LED array in a LED light fixture comprising a light diffuser. The subject-matter of claim 1 is therefore new (Article 54 EPC).

2. *Inventive step (Article 56 EPC)*

A person skilled in the art would however immediately recognise that a power control section according to D1 can be loaded with a LED array in order to obtain more light, and that it is a usual measure to mount a LED array in a light fixture provided with a light diffuser. The features mentioned under item 1.4 above are therefore obvious and the subject-matter of claim 1 is not considered as involving an inventive step (Article 56 EPC).

3. The appellant is of the opinion that the prior art solutions for control of LED arrays generally rely on control of the current being fed into the array by utilizing a control function between the power source and the LED array, such as switching circuits. According to the appellant, these solutions would not regulate the current based on a feedback loop, and the efficiency in terms of the amount of power being utilized to produce the level of light would be lower.

But it is known from D1 that a power control section inserted between the LED and the low side of the power source may be an active bootstrap circuit similar to the power control section of the present invention, i.e. a circuit comprising a current regulation based on a feedback loop and connected to the low voltage side of the LED, and the appellant has not demonstrated that the efficiency in terms of the amount of power being utilized to produce the level of light would be substantially different when connecting an active bootstrap circuit to the low voltage side rather than to the high voltage side of a LED (array).

Finally the appellant is of the opinion that the LED array would provide a feedback function. But, on the one hand, a feedback function based on the LED current is implemented in the circuit of D1 (cf. item 1.1. above), and on the other hand, a feedback function based on the LED voltage (cf. published application at page 16, paragraph 3) and applied to the current regulator is neither detailed nor claimed.

The requirements following from Article 56 EPC are therefore not met.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar

The Chairman

U. Bultmann

M. Ruggiu