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**Datasheet for the decision
of 17 July 2012**

Case Number: T 0921/08 - 3.5.02

Application Number: 02253633.8

Publication Number: 1265461

IPC: H05B 41/285

Language of the proceedings: EN

Title of invention:

Electronic elimination of striations in linear lamps

Applicant:

GENERAL ELECTRIC COMPANY

Headword:

-

Relevant legal provisions:

EPC Art. 123(2)

Keyword:

"Added subject-matter - yes"

Decisions cited:

-

Catchword:

-



Case Number: T 0921/08 - 3.5.02

D E C I S I O N
of the Technical Board of Appeal 3.5.02
of 17 July 2012

Appellant:
(Applicant)

GENERAL ELECTRIC COMPANY
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Schenectady, NY 12345 (US)

Representative:

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Decision under appeal:

Decision of the Examining Division of the
European Patent Office posted 28 November 2007
refusing European patent application
No. 02253633.8 pursuant to Article 97(1) EPC
1973.

Composition of the Board:

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

Summary of Facts and Submissions

- I. The appellant (applicant) appealed against the decision of the examining division refusing European patent application No. 02 253 633.8.
- II. In the contested decision, the examining division found, *inter alia*, that the application did not meet the requirements of Article 123 (2) EPC, as several amendments in claims 1 and 9 introduced subject-matter which extended beyond the content of the application as filed. Even if claims 1 and 9 were amended so as to comply with Article 123 (2) EPC, their subject-matter would lack an inventive step with respect to the combination of the following documents:

D2: WO-A-86/06572

D3: US-A-4 705 991.

- III. With the statement of grounds of appeal dated 7 April 2008, the appellant filed new claims 1 to 10.
- IV. In a communication dated 22 February 2012 accompanying the summons to oral proceedings, the Board expressed the preliminary opinion that claim 1 and the corresponding method claim 9 of the appellant's request contained subject-matter which extended beyond the content of the application as originally filed (Article 123 (2) EPC). Furthermore, the Board introduced, *inter alia*, the following documents into the proceedings:

D5: WO-A-97/24017

D6: EP-A-0 765 107.

- V. With letter dated 7 June 2012, the appellant withdrew their previous request for oral proceedings and requested that a written decision be issued in accordance with the current state of the file.
- VI. Oral proceedings were held as scheduled on 17 July 2012 in the absence of the appellant.
- VII. The appellant requested in writing that the decision of the examining division be set aside and that a patent be granted on the basis of claims 1 to 10 filed with letter of 7 April 2008 (grounds of appeal).
- VIII. Claim 1 of the appellant's request reads as follows:

"A lighting system (20) powered by a system power source (22), the lighting system comprising:

 a ballast (26) in operative connection with the system power source (22), the ballast designed to generate a lamp input signal;

 a lamp input line (30) operatively connected to receive the lamp input signal;

 a gas discharge lamp (32) in operative connection to the lamp input line to receive the lamp input signal the gas discharge lamp comprising a linear fluorescent lamp; and characterized by:

 an amplitude modulation circuit (36) in operative connection to the lamp input line (30), the amplitude modulation circuit configured to periodically modulate the amplitude value of the lamp input signal prior to the lamp input signal being received by the gas discharge lamp so as to lower the amplitude value of a waveform of the peak input current of the lamp input

signal with respect to an adjacent waveform by injection of an amplitude modulation signal every full cycle of the input lamp current signal;

wherein the amplitude modulation circuit (36) maintains the same frequency of the lamp input signal;

wherein the variation in peak input current throughout the full cycle is less than 14mA such that the waveform of the lamp input signal stays substantially the same; and wherein

the periodic modulation of the peak values of the lamp input signal eliminates visual striations in the lamp (32)."

Claims 2 to 8 are dependent on claim 1.

Claim 9 reads as follows:

"A method of supplying signals to a gas discharge lamp (32) in a lamp lighting system (20) which eliminates visual striations from appearing in the lamp, the gas discharge lamp being a linear fluorescent lamp, the method comprising:

generating a lamp input signal by a ballast (26);

supplying the lamp input signal to the linear fluorescent lamp (32), via a lamp input line (30);

interjecting a periodic amplitude modulation signal from an amplitude modulation circuit (36) into the lamp input signal, whereby peak values of a portion of the lamp input signal are limited in order to remove the visual striations; characterised in that:

the amplitude modulation circuit configured to periodically modulate the value of the lamp input signal to lower the amplitude value of the peak input

current of a waveform to lower than that of an adjacent waveform;

interjecting a periodic amplitude modulation signal maintains the same frequency of the lamp input signal;

the variation in peak input current throughout the full cycle is less than 14mA such that the waveform of the lamp input signal stays substantially the same; and further in that:

the periodic modulation of the peak values of the lamp input signal eliminates visual striations in the lamp (32)."

Claim 10 is dependent on Claim 9.

- IX. The appellant has submitted in writing that the claims had been amended for further clarity with respect to the documents cited in the contested decision. In particular, the claims had been amended to recite that the amplitude modulation circuit was configured to modulate the amplitude value of a lamp input signal to lower the amplitude value of the peak input current of a waveform to be lower than that of an adjacent waveform. Additionally, the claims had been amended for further clarity to recite that the variation in peak input current throughout the full cycle was less than 14mA such that the waveform of the lamp input signal stayed substantially the same. By means of a system and method in accordance with the amended claims, in which periodical amplitude modulation was provided, visual striations could be substantially eliminated.

None of the documents cited in the contested decisions disclosed or suggested a method or a system according to the present request.

Reasons for the Decision

1. The appeal is admissible.

2. Claim 1 of the appellant's request relates to a "*lighting system*" powered by a system power source and comprising the following features:
 - (a) a ballast in operative connection with the system power source, the ballast designed to generate a lamp input signal;

 - (b) a lamp input line operatively connected to receive the lamp input signal;

 - (c) a gas discharge lamp in operative connection to the lamp input line to receive the lamp input signal;

 - (c₁) the gas discharge lamp comprising a linear fluorescent lamp;

 - (d) an amplitude modulation circuit in operative connection to the lamp input line;

 - (d₁) the amplitude modulation circuit configured to periodically modulate the amplitude value of the lamp input signal prior to the lamp input signal being received by the gas discharge lamp so as to

lower the amplitude value of a waveform of the peak input current of the lamp input signal with respect to an adjacent waveform by injection of an amplitude modulation signal every full cycle of the input lamp current signal;

(d₂) wherein the amplitude modulation circuit maintains the same frequency of the lamp input signal;

(e) wherein the variation in peak input current throughout the full cycle is less than 14mA such that the waveform of the lamp input signal stays substantially the same; and

(f) wherein the periodic modulation of the peak values of the lamp input signal eliminates visual striations in the lamp.

Article 123 (2) EPC

3.1 Features (a), (b), (c), (d) and (f) of claim 1 are essentially recited in claim 1 as originally filed. Feature (c₁) is supported by the description (e.g. first sentence of the description of the published application).

Feature (d₁) differs from the corresponding feature of the original claim 1 in that it further specifies the following:

(i) [periodically modulate the amplitude ...] "so as to lower the amplitude value of a waveform of the peak input current of the lamp input signal with respect to an adjacent waveform",

(ii) [by injection of an amplitude modulation signal]
"every full cycle of the input current signal".

Features (i), (ii), (d₂) and (e) are not recited in any of the claims as originally filed.

3.2 According to the contested decision feature (ii) and feature (d₂) constituted added subject-matter (see items 1.1 and 1.3 of the contested decision).

4.1 As to features (i) and (ii), the application as originally filed shows in Figure 4 a standard input current for a fluorescent lamp, whereas Figure 5 depicts a lamp input current according to the present application.

In particular, Figure 4 shows that *"the peaks of the input signal 38 are all substantially equal. Implementation of amplitude modulation circuit, and as shown in FIGURE 5, permits the selective and periodic altering of the lamp input current signal 42, whereby the value of the input signal or portions of the input signal are modulated in a controlled manner. For example, as shown in FIGURE 5, whereas peak 44 and peak 46 are substantially at equal values, the value of peak 48 has been modulated to a lower value. More specifically, in this embodiment, the values of 44 and 46 are approximately 214 mA, whereas the modulated value for peak 48 is approximately 200 mA. Therefore, there is a differential of substantially 14 mA. This differential is sufficient to remove the visual striations from an operating lamp, caused by the*

repeating resonance signals" (paragraph [0013] of the published application).

"It is also to be noted that modulation is made to the value of the input lamp current, and not to its frequency. Particularly, the time periods T1, T2 and T3 in FIGURE 5 are not altered from FIGURE 4 or from each other" (paragraph [0014]).

In other words, the example of Figure 5 indicates that the amplitude modulation signal is injected during the time period T2 so as to lower the peak current 48, whereas during the time periods T1 and T3 the lamp input current signal 42 reaches its "normal" peak values 44 and 46, respectively. Thus, feature (ii) does not correspond to the teaching that the skilled person derives from Figure 5 and from paragraphs [0013] and [0014] of the application (cf. item 1.1 of the contested decision).

4.2 As to feature (d₂), the Board agrees with the examining division that the present application shows an amplitude modulation circuit which has no impact on the frequency of the lamp input current signal. However, it does not disclose an amplitude modulation circuit which actually *"maintains the same frequency"*.

4.3 As to feature (e), the embodiment of Figure 5 shows that a lamp input current with a peak value of 214 mA is modulated to a peak value of approximately 200 mA during the time interval T2 (cf. published application, paragraph [0013]). *"Therefore, there is a differential of substantially 14 mA. This differential is sufficient to remove the visual striations from an operating lamp,*

caused by the repeating resonance signals" (ibid. paragraph [0013], last sentence). In other words, the application as filed shows that in the example of Figure 5 a differential of substantially 14mA is sufficient to remove visual striations. However, this does not imply that a variation of "less than 14mA" would always eliminate visual striations in a fluorescent lamp or be such that the "the waveform of the lamp input signal stays substantially the same" (feature (e)).

4.4 In summary, the Board considers that claim 1 of the appellant's request contain subject-matter which extends beyond the content of the application as originally filed (Article 123 (2) EPC).

4.5 The same applies *mutatis mutandis* to claim 9 which relates to a method comprising steps which essentially reflect the features recited in claim 1.

Article 54 EPC

5. For the sake of completeness, the Board wishes to point out that the subject-matter of claims 1 and 9 which is actually supported by the original application documents is anticipated by D5 and D6.

6.1 D5 shows in Figure 2 a dimmable fluorescent lamp system comprising a parallel impedance Z_p "connected across the lamp 12 to provide a path for diverting a small current during one-half of each high-frequency cycle, thereby causing a small dc current to be in the lamp. The dc current prevents the development of striations

as the light output is dimmed" (D5, page 3, last paragraph - underlining added).

- 6.2 As explained in the second paragraph of page 4 of D5, *"during the positive half-cycle of the ac current i_{ac} from the ballast, the current i_{ac} flows only through the lamp due to the orientation of the diode in the illustrated circuit of FIG. 2. However, during the negative half-cycle of the current i_{ac} a portion of the current is diverted through the parallel impedance Z_p . As a result, a small dc current is present in the lamp and hence striations are avoided"*.

Thus, the effect achieved by the parallel impedance Z_p on the input lamp current signal is to lower the amplitude of a current half-wave as shown in the time period T2 of Figure 5 of the present application, although the circuit component used to achieve such result may be substantially different.

- 6.3 Hence, the lighting system known from D5 comprises features (a), (b), (c), (c1), (d), (d₁), (d₂) and (f) recited in claim 1 of the appellant's request.
- 7.1 D6 relates, *inter alia*, to a lighting system comprising *"asymmetry means for rendering an amplitude A1 of the high-frequency AC component of the lamp current in the polarization direction of the DC component of the lamp current unequal to an amplitude A2 of the high-frequency AC component of which the polarization direction is opposed to that of the DC component. The fact that amplitude A1 and amplitude A2 are rendered unequal is found to contribute further to the suppression of striations. It was found to be possible*

in practice to set the luminous flux of a discharge lamp operated on the circuit arrangement for a lower value, without striations being visible, than was possible with the use of a circuit arrangement without asymmetry means" (D6, column 3, line 56 to column 4, line 11 - underlining added).

- 7.2 As explained in column 6, lines 30 to 41, the "asymmetry means" render "an amplitude A1 of the high-frequency AC component of the lamp current in the polarization direction of the DC component of the lamp current unequal to an amplitude A2 of the high-frequency AC component whose polarization direction is opposed to that of the DC component, amplitude A1 being greater than amplitude A2. The asymmetry means are provided with means for rendering the period of conduction of the first switching element S1 unequal to the period of conduction of the second switching element S2" (underlining added).

In fact, the asymmetry means appear to be functionally the same as the "amplitude modulation circuit" according to feature (d) of claim 1.

- 7.3 As to features (a), (b), (c), (c₁), (d₁), (d₂) and (f), they are either explicitly disclosed in D6 or necessarily implied by its teaching.
8. In the result, the Board comes to the conclusion that the appellant's request does not provide a basis for allowable claims. Consequently, the appeal has to be dismissed.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

U. Bultmann

M. Ruggiu