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**Datasheet for the decision
of 26 February 2021**

Case Number: T 1726/18 - 3.4.03

Application Number: 09014568.1

Publication Number: 2154733

IPC: H01L27/15

Language of the proceedings: EN

Title of invention:

Light emitting diode having light emitting cells with different size and light emitting device thereof

Applicant:

Seoul Viosys Co., Ltd

Headword:

Relevant legal provisions:

EPC Art. 52(1)
EPC 1973 Art. 56, 111(1)
EPC R. 103(1)(a)

Keyword:

Inventive step - (no)
Reimbursement of appeal fee - (no)

Decisions cited:

Catchword:



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Case Number: T 1726/18 - 3.4.03

D E C I S I O N
of Technical Board of Appeal 3.4.03
of 26 February 2021

Appellant: Seoul Viosys Co., Ltd
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Representative: Isarpatent
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Decision under appeal: **Decision of the Examining Division of the
European Patent Office posted on 28 March 2018
refusing European patent application No.
09014568.1 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman T. Häusser
Members: S. Ward
T. Bokor

Summary of Facts and Submissions

I. The appeal is against the decision of the Examining Division to refuse European patent application No. 09 014 568 on the grounds that none of the requests met the requirements of Articles 123(2) and 76(1) EPC, and in addition, that the subject-matter of the main and 2nd auxiliary requests did not involve an inventive step within the meaning of Article 56 EPC, and that the subject-matter of the 1st auxiliary request did not meet the requirements of Article 84 EPC.

II. The appellant requested in writing "that the Board of Appeal either (i) remit the matter to the Examining Division for revision of its Decision, or (ii) set aside the Decision dated March 28, 2018 to refuse this European patent application". A new main request was filed with the statement of grounds of appeal; the previous main request and 1st and 2nd auxiliary requests (filed on 19 January 2018) became the present 1st, 2nd and 3rd auxiliary requests respectively.

The appellant requested oral proceedings in the event that the Board was not inclined to grant the new main request.

The appellant also requested a refund of the appeal fee.

III. The following documents are referred to:

D1: US 2006/0163604 A1
D2: US 2002/0149938 A1
D3: WO 2006/095949 A1

D4: WO 2004/023568 A1

IV. Claim 1 of the main request reads as follows:

*"A light emitting device (100) operating under AC power, comprising:
a substrate (110);
a buffer layer (120) formed on the substrate (110);
a plurality of light emitting cells (100-1 - 100-16) formed on the buffer layer (120) and electrically isolated from one another;
the plurality of light emitting cells (100-1 - 100-16) being electrically connected in series through metal wires (100-1 - 100-6),
characterized in that
the plurality of light emitting cells (100-1, 100-2) have smaller and larger sizes and the plurality of light emitting cells are arranged so that adjacent ones of the light emitting cells connected have different sizes and are repeated,
wherein the light emitting cells with smaller sizes (100-1, 100-3, 100-5) have a lower turn-on voltage than light emitting cells with larger sizes (100-2, 100-4, 100-6)."*

Claim 1 of the 1st auxiliary request is identical to claim 1 of the main request, except that the feature "and electrically isolated from one another" is omitted.

Claim 1 of the 2nd auxiliary request is identical to claim 1 of the 1st auxiliary request, except:
- the feature "a plurality of light emitting cells" is replaced in line 4 by "six light emitting cells"; and

- the feature "the plurality of light emitting cells" is replaced in lines 6 and 9 by "the light emitting cells".

The 3rd auxiliary request is identical to the 1st auxiliary request except that the dependent claims have been omitted.

- V. The arguments of the appellant, insofar as they are relevant to the present decision, may be summarised as follows:

Claim 1 differed from D3 in the features of the characterising part, which had the technical effect of reducing the flicker phenomenon occurring under AC. Since the adjacent cells had different sizes and were repeated, the small and large cells were homogeneously distributed within the LED, which therefore emitted light uniformly when operated with AC power, as explained in paragraph [25] of the application as originally filed.

Even if there were small differences in the sizes of the light emitting cells of D3 due to manufacturing tolerances, these differences would be arbitrarily distributed, and a skilled person would have no motivation to provide adjacent light emitting cells having different sizes in a repeating arrangement.

The subject-matter of claim 1 therefore involved an inventive step over D3, either taken alone, or combined with D1 or D2.

- VI. Following a summons to oral proceedings, the Board sent the appellant a communication under Article 15(1) RPBA 2020 setting out its provisional views. The Board

expressed doubts whether the features of claim 1 of the main request would actually solve the purported technical problem of reducing the flicker phenomenon. The same conclusion appeared to apply to the auxiliary requests, and the Examining Division's objections under Article 76(1) and 123(2) EPC against these requests also appeared to be well founded.

VII. In a letter dated 28 January 2021 the appellant stated the following:

"The request for Oral Proceedings is herewith withdrawn.

"Thus, the appellant's representative will not attend the Oral Proceedings."

The Board therefore cancelled the oral proceedings.

Reasons for the Decision

1. The appeal is admissible.
2. *Main Request: Inventive Step*
 - 2.1 In paragraph [5] of the description of the present application, the document referred to above as D4 is cited, and the LED arrangement disclosed therein is briefly described. According to paragraph [6] of the description, Fig. 1 represents "an arrangement of light emitting cells in a conventional LED". The LED arrangements of Fig. 2 of D4 and Fig. 1 of the present application are essentially identical and represent the starting point for the explanation in the description of the advantages of the present invention.

2.2 In the contested decision, the assessment of inventive step started from D3, a document which was introduced during the examination procedure. While D3 discloses similar subject-matter to D4 (see e.g. Fig. 6 of D3), and would represent a plausible starting point for the discussion of inventive step, the Board sees no reason to regard D3 as representing closer prior art than that cited in the present application, nor was this argued in the contested decision.

2.3 The Board therefore takes Fig. 2 of D4 (or equivalently Fig. 1 of the present application) as the closest prior art. Claim 1 differs from the closest prior art in the features of the characterising part.

2.4 The description of the present application sets out the background to the invention, identifies the problem solved by the distinguishing features of claim 1, and explains the manner in which the distinguishing features solve this problem. The Board's summary is as follows:

2.5 An LED would only emit light under forward bias conditions, so that when a single LED was directly connected to an AC power source, it would not emit light during the half cycle in which the LED was in reverse bias. Hence, "when the LED is directly connected to an AC power source, the LED may not continuously emit light and may be easily damaged due to reverse current" (description of the present application, paragraph [3]).

The arrangement of Fig. 1 of the present application represented a known solution to this problem, whereby two LED arrays were provided on a single substrate, and

were connected to each other in a reverse parallel arrangement (paragraph [5]), so that under an applied AC voltage "current flows into the first row in positive voltage intervals such that the light emitting cells 11 in the first row emit light, and current flows into the second row in negative voltage intervals such that the light emitting cells 11 in the second row emit light" (paragraph [9]).

- 2.6 Nevertheless, a problem remained in that the prior art light emitting cells had the same size, and hence essentially the same turn-on voltages, and so all the light emitting cells 11 were turned on and off at the same time "which causes a flicker phenomenon to occur" (paragraphs [12]-[15]).

The present invention therefore aimed to solve the problem of "reducing the flicker phenomenon" (paragraph [16]).

- 2.7 According to the present invention, the solution to this problem was provided by an arrangement such as that shown in Fig. 3, in which adjacent cells had different sizes, "and thus have different turn-on voltages when light is emitted under AC power, so that times when the respective light emitting cells start emitting light are different to thereby effectively reduce a flicker phenomenon" (paragraph [25]).

- 2.8 While this analysis appears to be technically plausible, whether it can serve as the problem-solution analysis for the present application depends on whether the proposed problem is actually solved by the invention *as claimed*.

2.9 Claim 1 of the main request defines, *inter alia*, a plurality of electrically isolated light emitting cells which are electrically connected in series through metal wires. Adjacent cells have different (smaller and larger) sizes in a repeating arrangement, wherein the light emitting cells with smaller sizes have a lower turn-on voltage than light emitting cells with larger sizes.

2.10 Claim 1 does not define groups of light emitting cells in a reverse parallel arrangement, or in any other arrangement which would provide continuous emission under an applied AC voltage.

For example, claim 1 would include an embodiment similar to that of Fig. 3, but having only the top row of cells (100-1 to 100-6), and not the bottom row of cells (100-11 to 100-16), or *vice versa*. Such an arrangement would effectively mean going right back to square one, with light from the LEDs being emitted for only one half of the AC cycle (in fact less than half, due to the turn on/off delay as shown in Fig. 2). This would result in a much worse flicker phenomenon than that of the arrangements of Fig. 1 or of D4.

2.11 To put it another way, the prior art invention (of Fig. 1 and D4) provided a means for obtaining essentially continuous operation of an LED device under AC power, and the present invention is intended to represent a further refinement of that prior art. However, present claim 1 defines only the refinement, while omitting the features which define the context (continuous LED emission under AC power) in which the refinement makes technical sense.

2.12 Hence, for the reasons set out above, the problem of reducing the flicker phenomenon would not be solved by the features of claim 1 of the main request. In fact, the claim encompasses embodiments in which the problem would be a great deal worse than in the closest prior art. Nor is any other technical problem apparent from the description which would be plausibly solved over the breadth of claim 1 of the main request.

2.13 Hence, on the basis of the invention as claimed, the problem can only be seen as finding an alternative arrangement of LEDs. In the light of such a general requirement, essentially any routine modification of the closest prior art would represent an obvious solution to the skilled person, including that of claim 1 of the main request.

2.14 The Board therefore judges that the subject-matter of claim 1 of the main request does not involve an inventive step within the meaning of Article 52(1) EPC and Article 56 EPC 1973.

3. *Auxiliary Requests*

3.1 Claim 1 of the 1st auxiliary request and claim 1 of the 3rd auxiliary request are both identical to claim 1 of the main request, except that the feature "and electrically isolated from one another" is omitted in the auxiliary requests.

This omission places no limitation on the claimed subject-matter (in fact it enlarges it), so that the non-inventive embodiments which caused the rejection of claim 1 of the main request remain within the ambit of claim 1 of both the 1st and 3rd auxiliary requests. These requests must therefore also be rejected.

3.2 Claim 1 of the 2nd auxiliary request comprises the same amendment, but also incorporates the limitation that the plurality of light emitting cells is now restricted to "six light emitting cells".

No explanation is given in the statement of grounds of appeal (or in the submissions made in examination) why providing precisely six cells should be regarded as an inventive choice, nor can the Board see any reason for regarding it as such.

3.3 The Board therefore judges that the subject-matter of claim 1 of each of the 1st, 2nd and 3rd auxiliary requests does not involve an inventive step within the meaning of Article 52(1) EPC and Article 56 EPC 1973. Hence, the other objections against these requests mentioned in the Board's communication under Article 15(1) RPBA 2020 need not be examined.

4. In the light of the above conclusions, the request to "remit the matter to the Examining Division for revision of its Decision" and the request to "set aside the Decision dated March 28, 2018 to refuse this European patent application" must be refused.

5. *Request for a refund of the appeal fee*

5.1 Under point 1.3 of both the notice of appeal and the statement of grounds of appeal the appellant requested a "refund of the official fee for this appeal". Although the appellant cites neither any reason for such a refund nor any provision of the EPC under which this refund is claimed, the Board presumes that the appellant requests a refund under Rule 103(1) (a) EPC, according to which:

"The appeal fee shall be reimbursed in full ... in the event of interlocutory revision or where the Board of Appeal deems an appeal to be allowable, if such reimbursement is equitable by reason of a substantial procedural violation ..."

5.2 The Board does not deem the present appeal to be allowable, and hence an essential prerequisite for such a reimbursement has not been met. The appellant's request for a refund of the appeal fee is therefore rejected.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:



S. Sánchez Chiquero

T. Häusser

Decision electronically authenticated