BESCHWERDEKAMMERN DES EUROPÄISCHEN PATENTAMTS

BOARDS OF APPEAL OF THE EUROPEAN PATENT OFFICE

CHAMBRES DE RECOURS DE L'OFFICE EUROPEEN DES BREVETS

Internal distribution code:
(A) [ ] Publication in OJ
(B) [ ] To Chairmen and Members
(C) [X] To Chairmen
(D) [ ] No distribution

Datasheet for the decision of 10 May 2013

Case Number: T 1366/09 - 3.5.02

Application Number: 05257078.5

Publication Number: 1675440

IPC: H05B 33/08

Language of the proceedings: EN

Title of invention:
Illumination apparatus and image display apparatus

Applicant:
Sony Corporation

Headword:
-

Relevant legal provisions:
EPC Art. 56
RPBA Art. 12(4), 13(3), 15(3)

Relevant legal provisions (EPC 1973):
-

Keyword:
"Inventive step (no) - main request, first to third auxiliary requests"
"Admissibility of late-filed request (no) - fourth auxiliary request"

Decisions cited:
-

Catchword:
Admissibility of the fourth auxiliary request (see point 6.)

Europäisches Patentamt | European Patent Office | Office européen des brevets

Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 1366/09 - 3.5.02

D E C I S I O N
of the Technical Board of Appeal 3.5.02
of 10 May 2013

Appellant: (Applicant)
Sony Corporation
1-7-1 Konan
Minato-ku
Tokyo 108-0075 (JP)

Representative:
Haines, Miles John L.S.
D Young & Co LLP
120 Holborn
London EC1N 2DY (GB)

Decision under appeal:
Decision of the Examining Division of the European Patent Office posted 12 February 2009 refusing European patent application No. 05257078.5 pursuant to Article 97(2) EPC.

Composition of the Board:

Chairman: M. Ruggiu
Members: R. Lord
P. Mühlens

Summary of Facts and Submissions

I. This is an appeal of the applicant against the decision of the examining division to refuse European patent application No. 05 257 078.5. The reasons given for the refusal were *inter alia* that the subject-matter of the main request then on file lacked an inventive step according to Article 56 EPC.

II. The following document of the state of the art has been cited during the procedure before the first instance:

D1: DE 101 03 422 A1.

III. With the statement of grounds of appeal dated 5 June 2009 the appellant, in addition to maintaining the main and first auxiliary requests which were the subject of the decision under appeal, filed amended claims according to second and third auxiliary requests.

In a communication accompanying a summons to oral proceedings, dated 19 February 2013, the board informed the appellant of its preliminary opinion *inter alia* that claim 1 according to the main and third auxiliary requests as defined in the grounds of appeal might contravene Article 123(2) EPC, and that the subject-matter of claim 1 of the main request seemed not to involve an inventive step, as well as commenting on the issue of inventive step with respect to claim 1 of the third auxiliary request.

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 of the main request or on

the basis of the claims of one of the first to fourth auxiliary requests filed with letter dated 28 March 2013. These represent the appellant's current requests.

Oral proceedings before the board took place on 10 May 2013, at which the appellant was not represented, as previously indicated in his letter dated 30 April 2013. During these oral proceedings the board decided not to admit the fourth auxiliary request into the proceedings.

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

"An LCD panel display device having an illumination apparatus as a backlight, the illumination apparatus comprising:

a bridge rectification circuit (10) for receiving an AC voltage (VAC) as an input thereto and rectifying the AC voltage;

said bridge rectification circuit being formed from a bridge connection of light emitting diode elements (DL), the light emitting diode elements arranged as a plurality of unit series circuits (20-1, 20-2, 20-3, 20-4) each of which is formed from a series connection of a plurality of the light emitting diode elements, the light emitting diode elements comprising light emitting diode elements in a first group of unit series circuits which emit light within a period in which the AC voltage has a positive polarity and light emitting diode elements in a second group of unit series circuits which emit light within another period in which the AC voltage has a negative polarity."

Claim 1 of the appellant's first auxiliary request differs from that of the main request in that in the first paragraph of the claim the phrase "comprising a two-dimensional matrix of light emitting diode elements disposed behind an LCD panel" is inserted before "as a backlight".

Claim 1 of the appellant's second auxiliary request reads as follows:

"An LCD panel display device having an illumination apparatus as a backlight, the illumination apparatus comprising:

first, second and third bridge rectification circuits (10) for receiving an AC voltage (VAC) as an input thereto and rectifying the AC voltage;

said first bridge rectification circuit being formed from a bridge connection of red light emitting diode elements (DL), said second bridge rectification circuit being formed from a bridge connection of green light emitting diode elements, and said third bridge rectification circuit being formed from a bridge connection of blue light emitting diode elements, the light emitting diode elements of each bridge rectification circuit being arranged as a plurality of unit series circuits (20-1, 20-2, 20-3, 20-4) each of which is formed from a series connection of a plurality of the light emitting diode elements, the light emitting diode elements of each bridge rectification circuit comprising light emitting diode elements in a first group of unit series circuits which emit light within a period in which the AC voltage has a positive polarity and light emitting diode elements in a second group of unit series circuits which emit light within

another period in which the AC voltage has a negative polarity; and

first, second and third variable load resistors (RL) connected respectively to rectification outputs of said first, second and third bridge rectification circuits to control the rectification voltage of each bridge rectification circuit independently of the rectification voltage of the other bridge rectification circuits to perform light quantity adjustment independently for the first, second and third bridge rectification circuits."

Claim 1 of the appellant's third auxiliary request differs from that of the second auxiliary request by the same insertion as in the first auxiliary request.

Claim 1 of the appellant's fourth auxiliary request differs from that of the main request by the addition at the end of the claim of the words "and a fluorescent material"

V. The appellant essentially argued as follows:

The skilled person would not have considered the document D1 to be relevant for inventive step with respect to any of the requests, because "lamp-type backlights are not considered to be appropriate for LCD panels", and because D1 only relates to retro-fitting of lamp bulbs. The skilled person would also not have considered the bridge rectification circuit of D1 to be suitable for LCD backlights, because according to paragraph [0010] of that document the AC drive gave rise to flicker, which would be undesirable in a display, and because the document taught in paragraph

[0016] that this problem could be overcome only by the use of DC drive. The invention on the other hand was based on the recognition that this effect would not be noticeable "given the relative proximity of the different groups of LEDs".

Concerning the second auxiliary request, D1 taught away from the invention, because it disclosed only the provision of the different colour LEDs in a single bridge circuit, either distributed throughout the circuit, or separated between its arms.

The first and third auxiliary requests defined subject-matter involving an inventive step for the same reasons as the main and second auxiliary requests respectively, since they had been amended only so as to address the objection under Article 123(2) EPC raised in the communication accompanying the summons to oral proceedings.

The basis for the amendment introduced in the fourth auxiliary request was to be found at page 28, lines 8 to 11 of the application as originally filed. The technical effect of this feature was to mask the flickering effect, and this represented a solution to the flicker problem which was not obvious.

Reasons for the Decision

1. The appeal is admissible.

2. *Main Request*

2.1 The claims of the appellant's main request are unchanged with respect to the main request which was the subject of the decision under appeal. It is not disputed that for these claims the most appropriate starting point for the assessment of inventive step is the known type of light emitting diode (LED) backlight for liquid crystal displays (LCDs) described in the introductory part of the application with reference to Figs. 18 to 20. The device according to claim 1 of the appellant's main request differs from this known device in the manner in which the LEDs are driven, specifically in that the driving circuits of the known device are replaced by an arrangement in which the LEDs are connected in the form of a bridge rectification circuit which is driven directly from an AC power supply, such that the series-connected LEDs in some parts of the bridge are switched on when the AC voltage is positive and the others are switched on when it is negative.

2.2 The technical problem addressed by the claimed device can be seen in reducing the need for additional circuitry for driving the LEDs, in order to reduce the size, weight and cost of the backlight. In the light of this problem, the board considers that the skilled person would recognise the relevance of the teaching of document D1, since this is concerned with the general technical field of AC-powered LED illumination devices, and since it describes a number of embodiments in which an LED illumination device can be driven directly from an AC power supply with very little additional circuitry. In each of the embodiments described there

with reference to Figs. 3 to 5, the LEDs are series-connected in the arms of a bridge rectification circuit, such that half of the LEDs are switched on when the AC voltage is positive and the other half are switched on when it is negative. The skilled person would recognise that this circuit arrangement provides a solution to the technical problem identified above, and by applying this teaching to the backlight of the known LCD he would thus arrive in an obvious manner at a display according to claim 1 of the present main request.

2.3 The board is not convinced by the appellant's argument that the skilled person would not consider D1 to be relevant to LCD panels because "lamp-type backlights" are not appropriate for LCD panels. On the contrary, the board understands that, although parts of D1 relate to replacements for conventional incandescent light bulbs, other parts relate to other types of lighting such as fluorescent lamps. The board notes moreover that conventional LCDs also make use of fluorescent lamps (specifically, cold cathode fluorescent lamps) for backlighting.

2.4 The board is also not convinced by the appellant's argument that the skilled person would have considered the bridge rectification circuit of D1 not to be appropriate for LCD backlighting on the grounds that paragraph [0010] of that document taught that this type of drive leads to undesirable flickering which can be avoided only by use of the DC driving described in paragraph [0016]. The board understands that paragraph [0010] describes that such flickering can arise when using the circuit described there, but that it also describes that this is related to the mechanical

separation between the different LEDs, and can therefore be suppressed. The board therefore considers that D1 does not teach that DC drive is the only solution to the problem of flickering. On the basis of this teaching, the board concludes that the skilled person would recognise that the bridge rectification type of LED drive circuit described in D1 would be suitable for driving an LED backlight, but that care needs to be taken with the physical layout of the LEDs to minimise flicker. Concerning the last of these points, the board also considers that, at least in general terms, this corresponds to the teaching of the present application. The board notes furthermore, that the present claim 1 does not contain any technical features relating to the physical layout of the LEDs, so does not specify those features which, according to the appellant's arguments, are necessary to reduce or suppress flickering.

2.5 In the light of the above, the board concludes that the subject-matter of claim 1 of the appellant's main request does not involve an inventive step according to Article 56 EPC.

3. *First Auxiliary Request*

Claim 1 according to the appellant's first auxiliary request defines, in addition to the features of claim 1 of the main request as discussed above, only the two-dimensional matrix arrangement of the LEDs. Since this is the arrangement in the acknowledged prior art as depicted in Figs. 18 to 20 of the application, the above conclusion concerning inventive step applies correspondingly to this claim.

4. *Second Auxiliary Request*

4.1 The claims according to the appellant's second auxiliary request are identical to those of the third auxiliary request filed with the grounds of appeal (letter dated 5 June 2009). Claim 1 according to this request differs in substance from that of the main request in that it additionally defines that there are LEDs of three different colours (red, green and blue), that the LEDs of these three different colours are arranged in three separate bridge rectification circuits, and that each of these bridge rectification circuits is connected to a corresponding variable load resistor for independently controlling the rectification voltage, so that the light quantity can be adjusted independently for the three colours.

4.2 Both D1 and the prior art acknowledged in the present application disclose the use of LEDs of the three different colours. The prior art acknowledged in the application also includes the feature that the LEDs of the three different colours should be driven independently so that the light quantities for the three different colours can be adjusted (see column 2, lines 4 to 8 of the published application). Additionally, D1 discloses (separately) control of the rectification voltage and hence of the light quantity using an adjustable load resistor (see the embodiment of Fig. 4), and the individual control of the colour levels (see Fig. 5 and paragraph [0011]).

4.3 The board notes moreover that, since the claimed invention relates to AC-powered LCDs, it is implicit

that the claimed displays are large ones such as flat-screen televisions, and therefore that the number of LEDs required would be sufficiently large that they could not all be driven by a single bridge rectification circuit. In the light of this and the prior art teaching described in the previous paragraph, the board concludes that the skilled person would consider it obvious, when implementing such a backlight with multiple bridge rectification circuits, to do so by separating the different colour LEDs between the individual bridge rectification circuits, and including the individual variable load resistor for each bridge rectification circuit. He would thereby arrive in an obvious manner at a display device according to claim 1 of the appellant's second auxiliary request.

4.4 The appellant has argued that D1 teaches away from this development, since it consistently discloses that all of the different colour LEDs are part of the same bridge rectification circuit. The board does not find this argument convincing, because D1 does not concern any arrangements requiring more that one bridge rectification circuit, so that the question as to how to distribute the LEDs between different bridge rectification circuits does not arise there.

4.5 The board therefore concludes that the subject-matter of claim 1 of the appellant's second auxiliary request does not involve an inventive step according to Article 56 EPC.

5. *Third Auxiliary Request*

Claim 1 according to the appellant's third auxiliary request defines, in addition to the features of claim 1 of the second auxiliary request as discussed above, only the two-dimensional matrix arrangement of the LEDs. Since this is the arrangement in the acknowledged prior art as depicted in Figs. 18 to 20 of the application, the above conclusion concerning inventive step applies correspondingly to this claim.

6. *Fourth Auxiliary Request*

6.1 Claim 1 according to the appellant's fourth auxiliary request, as filed with his letter dated 28 March 2013, differs from that of the main request in that it defines additionally that the illumination apparatus also comprises a fluorescent material. The basis for this amendment, as indicated by the appellant, is to be found in the last sentence of paragraph [0067] of the published application.

6.2 The board observes that this amendment was filed only about six weeks before the oral proceedings appointed before the board, that its sole basis is in the single sentence indicated above in a lengthy description (147 paragraphs), and that ten days before the date appointed, the appellant indicated that he would not be represented at the oral proceedings. Moreover, the added feature has apparently not been the subject of a search, nor has it been discussed at all during the substantive examination of the application. It would therefore not have been possible for the board to address the question as to whether the subject-matter

of this request involves an inventive step without either itself carrying out an additional search or alternatively remitting the case to the department of first instance in order for such a search to be carried out. In this context the board notes also that, although the technical problem of flicker suppression was discussed at considerable length at several stages during the procedure before the examining division, the appellant did not file any request containing the added feature of fluorescent material, which according to the appellant relates to that problem, at that stage in the procedure. In the light of these circumstances, the board considers it to be appropriate to exercise its discretion under Article 13(3) of the Rules of Procedure of the Boards of Appeal, taking into account also Articles 12(4) and 15(3) of those Rules, to not admit this request into the procedure.

7. In the light of the above conclusions, the question relating to Article 123(2) EPC raised in the communication accompanying the summons to oral proceedings can be left open.

8. Since, for the reasons indicated above, the independent claims of all of the requests which have been admitted into the procedure define subject-matter which does not involve an inventive step according to Article 56 EPC, the appeal has to be dismissed.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

D. Meyfarth M. Ruggiu