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D E C I S I O N
of 31 May 2000

Case Number: T 0605/97 - 3.4.2

Application Number: 88303653.5

Publication Number: 0288304

IPC: G02F 1/133

Language of the proceedings: EN

Title of invention:
Liquid crystal display device

Patentee:
SHARP KABUSHIKI KAISHA

Opponent:
Canon Kabushiki Kaisha
Koninklijke Philips Electronics N.V.

Headword:
Liquid crystal display device/SHARP

Relevant legal provisions:
EPC Art. 56, 83, 114(2), 123(2)

Keyword:
"Inventive step - main request and first to third auxiliary requests (no): obvious selection of known features"
"Meaning of "substantially equal""

Decisions cited:
-

Catchword:
As a rule, "technical equality" has the meaning of "identity within inevitable measurement errors or manufacturing tolerances". Hence, for a technical expert it goes without saying that those errors or tolerances are included if equality is stipulated in a technical sense The addition of "substantially" to "equal" only illustrates the technical facts for a layman or - in other words - translates those technical facts into daily language without changing their meaning. That is why "substantially" is frequently added as a matter of precaution in the patent field so as to avoid any misunderstanding by less technical readers. Technically speaking, the addition normally does not make any difference (see Reasons for the Decision, 6.2).

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Case Number: T 0605/97 - 3.4.2

D E C I S I O N
of the Technical Board of Appeal 3.4.2
of 31 May 2000

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Decision under appeal: **Decision of the Opposition Division of the European Patent Office posted 24 March 1997 revoking European patent No. 0 288 304 pursuant to Article 102(1) EPC.**

Composition of the Board:

Chairman: E. Turrini
Members: S. V. Steinbrener
V. Di Cerbo

Summary of Facts and Submissions

I. The appellant (= proprietor of the patent) lodged an appeal against the decision of the Opposition Division revoking European patent No. 0 288 304.

II. Two oppositions against the patent as a whole had been filed by respondents 01 and 02 (= opponents 01 and 02, respectively) and based on the grounds of lack of inventive step (Article 100(a) EPC), insufficiency of disclosure (Article 100(b) EPC) and inadmissible amendments (Article 100(c) EPC).

III. The oppositions *inter alia* referred to the following documents (using the numbering of the opposition proceedings):

D1: Patent Abstracts of Japan, vol. 6, No. 152 (P-134)[1030], 12 August 1982 & JP-A-57 70522

D2: Patent Abstracts of Japan, vol. 8, No. 147 (P-285)[1584], 10 July 1984 & JP-A-59 46629

D5: EP-A-0 258 848

D6: EP-A-0 226 218

D7: US-A-4 470 667

D9: US-A-4 632 514

D11: US-A-4 283 119

D15: Proceedings of the 1985 International Display Research Conference, IEEE 1985, pages 18 to 23

D16: JP-A-62 85202 (and English translation thereof furnished by opponent 01)

R1: International Handbook of Liquid Crystal Displays 1975 - 76, 2nd edition, parts 7.1, 7.2 and 7.3

R2: Society for Information Display, Seminar Lecture Notes, San Francisco, California, 4 and 8 June 1984, vol. II, pages 7.1-2 to 7.1-33

R4: JP-A-63 41827 (and English translation thereof furnished by the patent proprietor), and

R12: Patent Abstracts of Japan, No. 105 (P-458), 23 May 1986 & JP-A-60 260022 (and partial English translation thereof furnished by opponent 02).

IV. Additional evidence (Graph A, Table B) was filed by the appellant in the present proceedings with the statement of grounds of appeal.

V. In its revocation of the patent in suit, the Opposition Division held that the subject matter of claim 1 as amended in accordance with the main and auxiliary requests of the patent proprietor met the requirements of Article 123(2) EPC. Furthermore, the ground for opposition according to Article 100(b) EPC was not considered justified. However, although in the Division's opinion the claimed subject matter of both requests was novel with respect to the available prior art, it was found to lack the inventive step required by Article 56 EPC in view of the disclosure of document R4 and the further prior art relating to the parameter values in the claims.

In this context, the requirement that the diameter difference between the two spacers is "substantially equal" to the thickness of the colour filter layer was not considered to constitute a meaningful definition because the thickness of the orientation/electrode layers could be within the range of typical manufacturing tolerances for spacers.

VI. In a communication pursuant to Article 11(2) of the Rules of Procedure of the Boards of Appeal, the Board on a provisional basis did not consider the patent specification to offend against Article 83 EPC by not disclosing any details with respect to the fabrication, availability and dimensional tolerances of the spacer means. However, the Board had serious doubts as to whether amended claim 1 according to the appellant's main and auxiliary requests submitted with the statement of grounds of appeal conformed with the requirements of Article 123(2) EPC.

The Board agreed with the parties on the fact that document R4 came closest to the subject matter of claim 1 according to the principal request if amended to overcome the objections under Article 123(2) EPC.

In the Board's provisional opinion, the technical problem solved by the differences with respect to the closest prior art could in substance be seen in putting the prior art liquid crystal device into practice.

At the scheduled oral proceedings, it should therefore be assessed whether or not a solution of said problem was obvious from the remaining prior art.

In this context, the Board *inter alia* made the following preliminary observations:

- the claimed numerical values for the thickness of the colour filter layer, the thickness of the first and second electrodes and the spreading density of the first spacer means seemed to be conventional;

- from the original disclosure of the patent in suit, it appeared questionable whether the specific technical significance of the diameter of the second spacer means referred to by the appellant could be relied upon to justify the existence of an inventive step;

- the spacer diameter distribution of Graph A was assumed to be typical and corresponded to the tolerance ranges reported in the prior art; and

- the appellant's interpretation of Table B did not appear to take account of the fact that the spacing data of Table B did not relate to the actual spacing variation of an individual LCD display, but were obtained by a double averaging procedure over various cell sites and specimens, respectively.

Finally, in the Board's view, the additional feature of claim 1 of the auxiliary request relating to the configuration of the electrodes and orientation films (insofar as it was admissible under Article 123(2) EPC) seemed to be conventional.

VII. The appellant reacted to the Board's communication by

submitting further arguments and amended principal and auxiliary requests with the letter dated 28 April 2000.

VIII. Oral proceedings requested by the appellant and respondent 01 on a subsidiary basis took place on 31 May 2000 in the absence of respondent 01 who had informed the Board by letter of 11 May 2000 that it would not be represented at the scheduled oral proceedings. At the end of the oral proceedings, the Board's decision was given.

IX. The appellant requested that the decision under appeal be set aside and that the patent be maintained on the basis of the main request or on the basis of the first, second and third auxiliary requests, respectively, all filed at the oral proceedings.

X. The respondents requested either at the oral proceedings (respondent 02) or in writing (respondent 01) that the appeal be dismissed.

XI. The wording of amended claim 1 according to the appellant's requests on file at the time of the present decision reads as follows:

Main request

"1. A colour liquid crystal device including a plurality of picture elements, comprising: a first substrate (1) having a first plurality of electrodes (9) and a first orientation film (4) disposed thereon; a second substrate (2), disposed opposite to said first substrate, having a second plurality of electrodes (9'), a second orientation film (4') and a colour filter layer (3) disposed thereon; first spacer means

(6), having a first diameter, disposed between the first and second substrates in a display region defined by said colour filter layer; and second spacer means (5) disposed between the first and second substrates in a region outside the display region, said second spacer means having a second diameter different to said first diameter; characterised in that: said colour filter layer (3) has a thickness of about 2 to 3 µm; said first (9) and second (9') electrodes have a thickness of about 0.1 to 0.15 µm; said first spacer means (6) have a spreading density in said display region corresponding to 1 to 3 spacers per picture element for a picture element size equal to about 150 µm x 150 µm; and said second diameter of the second spacer means (5) is substantially equal to the sum of said first diameter of the first spacer means (6) and the thickness of only said colour filter layer (3)."

First auxiliary request

Claim 1 of the first auxiliary request differs from claim 1 of the main request in that the word "substantially" before "equal to the sum of said first diameter of the first spacer means (6) and the thickness of only said colour filter layer (3)" has been deleted.

Second auxiliary request

" A colour liquid crystal device including a plurality of picture elements, comprising: a first substrate (1) having a first plurality of electrodes (9) extending in a first direction and a first orientation film (4) disposed thereon; a second substrate (2), disposed opposite to said first substrate, having a second

plurality of electrodes (9') extending in a second direction so as to cross over the first plurality of electrodes, a second orientation film (4') and a colour filter layer (3) disposed thereon; first spacer means (6), having a first diameter, disposed between the first and second substrates in a display region defined by said colour filter layer; and second spacer means (5) disposed between the first and second substrates in a region outside the display region, said second spacer means having a second diameter different to said first diameter; characterised in that: said colour filter layer (3) has a thickness of about 2 to 3 µm; said first (9) and second (9') electrodes have a thickness of about 0.1 to 0.15 µm; said first spacer means (6) have a spreading density in said display region corresponding to 1 to 3 spacers per picture element for a picture element size equal to about 150 µm x 150 µm; and said second diameter of the second spacer means (5) is substantially equal to the sum of said first diameter of the first spacer means (6) and the thickness of only said colour filter layer (3), the first and second pluralities of electrodes and the first and second orientation films being provided on respective opposing surfaces of the first and second substrates in said display region, the first plurality of electrodes extending on the said opposing surface of the first substrate to said outside region on two sides of said first substrate and the second plurality of electrodes extending on the said opposing surface of the second substrate to said outside region on the other two sides of said second substrate."

Third auxiliary request

On the analogy of the first auxiliary request, the

principal claim of the third auxiliary request differs from that of the second auxiliary request by the deletion of "substantially".

XII. The appellant's arguments in support of its requests may be summarised as follows:

Having regard to the issue of admissibility, the finding of the Opposition Division in the impugned decision is agreed with. However, if this argument were not accepted, then the spacer density should be defined as proposed in the present requests in order to avoid a limitation to specific dimensions. Such definition is unambiguously derivable from the description.

The claims also meet the requirements of Article 84 EPC as "substantially equal" would be clearly interpreted by a skilled person to cover the manufacturing tolerances around the mean values of the spacers.

The impugned decision is wrong on two main points, i.e. in assuming that

(i) the last feature of claim 1 of the main request (= feature (d)) is not distinguishing; and

(ii) no meaningful relationship of that feature with the other features of the characterising portion (= features (a) to (c)) exists.

As may be seen from Graph A and Table B, spacers can actually be characterised by their nominal (average) diameter and the spread of this diameter. Whereas the claim refers to the nominal diameter, the spread is covered by "substantially equal". In practice, the

spacing of the assembled display is determined by the nominal spacer diameter, and the spacing error is considerably smaller than the manufacturing tolerance of the spacers so that it is possible to establish whether or not additional films have been taken into account for determining the spacer diameters.

Furthermore, the above-mentioned features (a) to (d) do interrelate in a technically meaningful way since the actual dimensions of features (a) and (b) illustrate that the electrode layers are indeed small with respect to the colour filter layer so that the benefit of feature (d), i.e. trapping of more spacers in the display region due to a diameter reduction of the second spacers, can be obtained. Normally, the plates will settle at the mean diameter of the spacers, whereby some spacers are squashed and some are free. In this context, it is not relevant whether the spacers are compressed by, or pressed in, the films and/or colour filter layer. The added advantage results from the fact that the mean spacer diameter of the first spacers is larger than the actual spacing of the plates so that many more spacers are compressed than in the prior art. A similar advantage is not achieved in the other embodiment originally disclosed, however now abandoned. Finally, a more uniform spacing is reached with the spacer density specified in feature (c).

As regards the existence of an inventive step over document R4 which comes closest to the claimed subject matter, this document clearly refers to taking the additional films into account. The whole remaining prior art also points in the opposite direction in that - even for devices without colour filters - explicitly or implicitly different first and second spacer

dimensions are disclosed, i.e. the additional thin films are not ignored. However, as has been pointed out above, a significant advantage with respect to spacing accuracy and stability is achieved by the contested patent in not taking account of the thin extra layers but limiting the diameter difference to the thickness of "only" the colour filter layer.

In claim 1 of the first auxiliary request, the expression "substantially" has been removed to make clear that the nominal spacer diameters are meant. Although "equal" may imply a variation as well, this variation will be different from that implied by "substantially equal".

With respect to the second and third auxiliary requests, there is very little to add since they only underline the fact that film thicknesses are significant by the specific arrangement of the electrodes in the outside region.

XIII. The respondents advanced the following counterarguments:

In its written answer to the notice of appeal, respondent 01 raised objections under Articles 56 and 123(2) EPC against the subject matter of the then main and auxiliary requests. Moreover, the admission of the evidence with reference to Graph A and Table B was objected to on the grounds that this evidence was late filed and not relevant. Finally, the disclosure of the European patent was considered insufficient because it did not indicate how to make or where to obtain the first and second spacer means or what range of dimensional tolerance can be accepted for these spacer

members. Respondent 01 did, however, not comment on the appellant's present requests.

Respondent 02 considered the spacer density as defined in the respective main claims not to be originally disclosed since according to this definition small pixels may not contain any spacers. Moreover, the meaning of "substantially equal" appeared to be unclear.

Having regard to inventive step, respondent 02 took the following view:

Although document R4, which is a translation from Japanese, may be slightly ambiguous, there is a clear indication at page 2 of this document that the spacer diameter has to be accommodated to the thickness of the colour filter layer already known from prior art. In fact, Figure 1 of the patent in suit corresponds to Figure 7 of R4. The expression "including" at the end of paragraph 2 of page 4 of R4 refers to "substrate interval" and thus only lists the films determining said interval without having any bearing on the diameter of the outer spacers.

The whole patent is related to a configuration where the film thicknesses may be ignored, i.e. fall within the normal tolerances of manufacture. The appellant's theory of trapping is not relevant since it is based on spacer thickness without taking account of the deformability of spacers and layers. The latter is not mentioned in the claims. Moreover, even if the appellant's theory were accepted, a large overlap between the smaller first spacers of the prior art and the larger first spacers obtained via present claim 1

exists within the manufacturing tolerances, as has been pointed out in the respondent's letter of 8 December 1997. All the remaining features of the claims are conventional.

Reasons for the Decision

1. *Admissibility of appeal*

The appeal complies with the provisions mentioned in Rule 65 EPC and is therefore admissible.

2. *Admissibility of amendments*

2.1 The subject matter of claim 1 of the main request is based on claim 1 as granted, with further specifications of the spreading density (by indicating the pixel size) and the diameter of the second spacer means (by specifying the diameter of the second spacer means to correspond to the sum of the diameter of the first spacer and the thickness of "only" the colour filter layer). Whereas the latter specification can be derived from column 4, lines 5 to 8 and 15 to 26 of the A-publication (which corresponds to page 3, lines 45 to 46 and 50 to 56 of the patent specification), the former specification is based on column 3, lines 25 to 27 of the A-publication (page 3, lines 17 to 18 of the patent specification) and has been objected to under Article 123(2) EPC by respondent 02.

Although the claimed spreading density has been generalised in that it is not restricted to the specific example given in the contested patent, but covers all spreading densities corresponding to that of

the specific example, the Board is convinced that such a generalised teaching could be directly and unambiguously derived from the explicit original disclosure since a skilled person is immediately aware of the fact that the spreading density is the relevant parameter which may be applied to different existing pixel sizes.

2.2 The main claims of the respective auxiliary requests differ from claim 1 of the main request in that "substantially equal" has been replaced by "equal" (first and third auxiliary requests) and the layout of the electrodes has been specified (second and third auxiliary requests). These amendments can be derived from column 4, lines 5 to 8 of the A-publication (page 3, lines 45 to 46 of the patent specification) and from column 3, lines 13 to 15 and column 5, lines 14 to 19 of the A-publication (page 3, line 11 and page 4, lines 28 to 30 of the patent specification), respectively, and are thus also admissible.

3. *Admissibility of late-filed evidence*

The evidence (Graph A, Table B) filed by the appellant with the statement of grounds of appeal is admitted to the proceedings because it must be considered to be a reaction to the finding of the Opposition Division in the impugned decision that the definition of the diameter of the second spacer is not distinguishing. Moreover, as can be seen from the discussion of inventive step below, this evidence illustrates some of the points at issue and thus is not totally irrelevant.

4. *Sufficiency of disclosure*

As has already been pointed out in the annex to the summons to oral proceedings, the Board holds the view that details with respect to the fabrication, availability and dimensional tolerances of the spacers seem to be widely known and can be derived by a skilled person from the existing prior art without undue burden (see e.g. documents R2, D5 and D11). Therefore, the objection raised by respondent 01 under Article 83 EPC in this context is not considered justified.

5. *Novelty*

The Board is convinced that the prior art identified does not anticipate the claimed subject matter. In fact, novelty has not been contested in the present appeal proceedings.

6. *Inventive step*

6.1 Main request

6.1.1 There has been consent among the parties that document R4 comes closest to the subject matter of claim 1. This prior art discloses a colour liquid crystal device including necessarily a plurality of picture elements, comprising first and second substrates 12, 11 (see Figure 1 of R4 and associated text) having first and second electrodes 15, 14 and orientation films 17, 16 disposed thereon, and a colour filter layer 13 disposed on the second substrate 11. Furthermore, the prior art device includes first and second spacer means 19, 20 having different diameters and being disposed in a display region defined by the colour filter layer and outside said display region, respectively.

6.1.2 In consequence, the subject matter of claim 1 differs from the closest prior art by the features of the characterising portion, i.e. in that

(a) the colour filter layer has a thickness of about 2 to 3 µm;

(b) the first and second electrodes have a thickness of about 0.1 to 0.15 µm;

(c) the spreading density of the first spacers corresponds to 1 to 3 spacers per picture element for a pixel size equal to about 150 µm x 150 µm; and

(d) the diameter of the second spacers is substantially equal to the sum of the diameter of the first spacers and the thickness of only said colour filter layer.

Document R4 does not disclose any of the parameter values of features (a) to (c) and in the Board's view also does not impart a clear explicit teaching concerning feature (d), although this has been contested by respondent 02. The point will be addressed in more detail below.

6.1.3 The parameter values of features (a) and (b) are typical (having regard to feature (a): see the patent in suit, page 2, lines 6 to 16; D2, last two lines of abstract; D7, column 18, lines 13 to 16; D9, column 9, line 66 to column 10, line 2; D16, page 14 of the English translation, penultimate paragraph; having regard to feature (b): see D6, page 12, line 42; D15, page 18, right-hand column, last paragraph; R1,

page 37, second paragraph). A spacer density according to feature (c) is in substance known from document R12 (see the partial English translation thereof, disclosing a density of 30 to 150 spacers/mm^2 whereas the density according to feature (c) corresponds to 44 to 133 spacers/mm^2). These features do not seem to produce a specific synergetic effect, nor has such an effect been originally disclosed.

Having regard to feature (d), the original disclosure gives the impression that the diameter of the second spacers should be selected in accordance with the relative thickness of the additional films, i.e. whether or not the thicknesses of the electrodes and orientation films may be ignored in view of the thickness of the colour filter layer (see column 4, lines 15 to 34 of the A-publication). The original application documents are silent on any specific technical effect obtained by the claimed second spacer dimensions, nor is there in the Board's opinion any additional effect apparent, which might result from a combination of features (a) to (d).

Since the original problem of achieving a uniform cell thickness over the entire area of a liquid crystal cell comprising a relatively thick colour filter layer (see column 1, lines 41 to 54 of the A-publication) must be considered to be already solved by the closest prior art which already proposes different spacer diameters to this purpose, the objective technical problem associated with the above differences may be seen in putting the prior art liquid crystal device into practice by filling the gaps in the disclosure of document R4.

6.1.4 In view of the conventional nature of features (a) to (c) (see the documents cited above), no inventive merit can be seen in the independent selections of the claimed numerical values. When attempting to realise a liquid crystal cell in accordance with document R4, a skilled person would be obliged to make those selections from the remaining prior art and - by selecting typical values - would arrive at features (a) to (c), whereby some trial-and-error may be involved with respect to feature (c).

The Board cannot see that these selections are somehow related, although this was asserted by the appellant. In particular, the thicknesses of the electrodes and the colour filter layer are governed by the respective electrical and optical functions of these elements, whereas the spreading density relates to a uniform cell spacing as does feature (d).

6.1.5 As regards feature (d), the passage at page 2, second paragraph of document R4 seems to imply that the second spacers basically have to be accommodated to the thickness of the colour filter layer recently included in the cell design. Other passages of R4 (see in particular page 4, second paragraph and page 6, second paragraph) seem to suggest that the thicknesses of the additional films should also be taken into account for the second spacer dimensions. This would be in line with the drawings of R4 (see in particular Figure 1) showing second spacers, the diameter of which appears to be equal to the sum of the diameter of the first spacers and the thicknesses of all films of the display region.

6.1.6 However, according to the wording of claim 1 it is not

excluded that the additional electrode and orientation films also exist outside the display region which is defined by the colour filter layer. In this case, the configuration of feature (d) is obtainable by an obvious analogous application of the spacer design provided in Figure 1 of R4 in that the electrode and orientation films are taken into account wherever they exist.

6.1.7 In any case, whether or not the electrode and orientation films extend beyond the display region, claim 1 stipulates that the diameter of the second spacers is substantially equal to the sum of the diameter of the first spacers and the thickness of only said colour filter layer. According to the appellant, "substantially equal" means identity within normal manufacturing tolerances.

From the appellant's Graph A, it may be seen that the manufacturing tolerance of spacers is about 0.7 µm or about ± 10% which corresponds to prior art data (see e.g. documents D5, column 1, lines 39 to 44; D6, page 6, lines 8 to 10; D11, column 1, lines 26 to 44 and column 3, lines 43 to 46; R2, page 7.1-8, third paragraph). This means that for the example of a first spacer diameter of 4.5 µm given in the patent in suit (see the table at page 3 of the specification), a manufacturing tolerance of at least about ± 0.45 µm has to be assumed. Since the electrode and orientation films are relatively thin (0.1 to 0.15 µm for the electrodes (see claim 1) and 0.06 µm for the orientation films (see the table at page 3 of the patent specification)), their combined thickness (at most 0.42 µm) would fall within the above manufacturing tolerance of the first spacers and thus comply with the

requirement of feature (d), whereby the additional manufacturing tolerance of the colour filter layer has been totally ignored. From this fact, it must be concluded that feature (d) is obvious from R4 irrespective of whether or not the thicknesses of the additional electrode and orientation films are taken into account for determining the diameter of the second spacers, as long as these film thicknesses are within the tolerance range of the first spacer means which is typically the case.

6.1.8 The appellant's counterargument based on an enhanced trapping effect for the first spacers, the thickness of which is to be larger by the additional film thicknesses than required, cannot be considered persuasive.

Firstly, such an effect could only be achieved on the assumption that the electrode and orientation films do not exist outside the display region, which, however, is not specified in the claim.

Secondly, what happens microscopically in the claimed device depends strongly on the elastic properties of the materials involved, none of which being, however, disclosed in the contested patent. Even if the additional films, or at least some of them, do not extend beyond the display region, the alleged trapping effect only occurs if the films are more or less rigid and the spacers are compressible. If, on the other hand, the films deform plastically and are very soft, their presence would hardly be noticeable in case of rigid spacers which would simply be pressed through the films (see in this respect page 3, first paragraph of R4). In this case, there would be no such trapping

effect at all.

Moreover, on a microscopic scale further manufacturing tolerances would have to be considered, in particular the thickness variations of the thin films and the colour filter layer and the surface evenness of the substrates. All of these parameters which may influence the actual spacing variation within the cell are not disclosed in the contested patent.

Finally, it has to be noted that the data of appellant's Table B do not relate to said actual spacing variation within a particular cell specimen but result from averaging procedures over various cell sites and specimens. Therefore, these data do not appear to be significant. Furthermore, whether the actual spacing error of a cell is smaller than the manufacturing tolerances of the spacers is not relevant in the present context since feature (d) solely refers to the manufacturing tolerances.

6.1.9 For the above reasons, starting from document R4 the subject matter of claim 1 of the main request results from an obvious selection of conventional parameter values, and claim 1 is accordingly not allowable (Article 56 EPC).

6.2 First auxiliary request

6.2.1 In claim 1 of the First Auxiliary Request, the word "substantially" has been deleted in feature (d) so that the second spacer means now "is equal to the sum of said first diameter of the first spacer means and the thickness of only said colour filter layer". In the appellant's view, an objection based on the argument of

"not distinguishing subject matter within the manufacturing tolerances" (see point 6.1.7 above) cannot be raised against the claimed subject matter because - although there may still be some variation included in the definition "equal" - this variation is much smaller than the manufacturing tolerances included in "substantially equal".

6.2.2 However, although there is agreement on the meaning of "substantially equal", the Board cannot accept the appellant's argument with respect to the meaning of "equal" if due consideration is given to a skilled person's understanding.

A technical expert, in the present case presumably an electrical or optical engineer or a physicist, is fully aware of the fact that "equality" in technical matters must not be interpretated in a strictly mathematical sense, i.e. in the sense of "identity without any deviations". As a rule, "technical equality" has the meaning of "identity within inevitable measurement errors or manufacturing tolerances". Hence, for a technical reader it goes without saying that those errors or tolerances are included if equality is stipulated in a technical sense.

In the Board's view, this fundamental fact is not qualified by the addition of "substantially" to "equal". If according to a skilled person's interpretation "equal" already implies the error or tolerance range, "substantially equal" simply has the same technical meaning. The addition of "substantially" thus only illustrates the technical facts for a layman or - in other words - translates those technical facts into daily language without changing their meaning.

That is why "substantially" is frequently added as a matter of precaution in the patent field so as to avoid any misunderstanding by less technical readers. Technically speaking, the addition normally does not make any difference.

6.2.3 Hence, claim 1 of the first auxiliary request is not allowable for reasons analogous to those given above for claim 1 of the main request (Article 56 EPC).

6.3 Second auxiliary request

6.3.1 Claim 1 of the second auxiliary request differs from that of the main request in that the electrode layout has been specified.

6.3.2 The claimed electrode pattern is, however, standard practice in the prior art (see e.g. documents D5, Figures 3 and 5 and associated text; D6, Figure 4 and associated text; document R2, slide 16) and does not appear to imply a specific combination effect with the remaining features of the claim.

The fact that the electrodes extend on their respective substrates beyond the display region on different sides thereof so that only one set of electrodes exists in the cell spacing outside the display region, does not change anything in the above considerations with respect to the manufacturing tolerances (see point 6.1.7) since the combined film thickness becomes even smaller (0.27 µm as compared to 0.42 µm in the above-mentioned example).

Moreover, since the electrodes are not continuous but patterned into discrete parallel stripes there should

be portions in the outside region where the second spacers are directly pressed between the substrates without intervening films as respondent 02 has rightly pointed out. Thus, also in the appellant's cell version according to the second auxiliary request further thickness variations of about 0.15 µm are accepted, which clearly underlines the fact that variations being small as compared to the thickness of the colour filter layer and falling within the manufacturing tolerances of the spacers may be ignored.

6.3.3 Hence, claim 1 of the second auxiliary request is not allowable (Article 56 EPC).

6.4 Third auxiliary request

6.4.1 The main claim of the third auxiliary request corresponds to the main claim of the second auxiliary request apart from the deletion of "substantially" analogous to that effected in the first auxiliary request.

6.4.2 Taking account of the arguments given above with respect to claim 1 of the first and second auxiliary requests, claim 1 of the third auxiliary request is also not allowable (Article 56 EPC).

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

P. Martorana E. Turrini