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Datasheet for the decision of 11 December 2020

Case Number: T 2429/17 - 3.4.02

Application Number: 13197983.3

Publication Number: 2752708

IPC: G02F1/1343, G02F1/13363

Language of the proceedings: EN

Title of invention:
Liquid crystal display device with wide-viewing angle

Applicant:
LG Display Co., Ltd.

Headword:

Relevant legal provisions:
EPC Art. 84
RPBA 2020 Art. 13(2), 13(1)

Keyword:
Claims - functional features (yes)
Claims - clarity - first auxiliary request (no)
Amendment after summons - exceptional circumstances (yes)
Amendment to appeal case - amendment gives rise to new objections (yes) - amendment overcomes issues raised (no)

Decisions cited:

Catchword:

Europäisches Patentamt
European Patent Office
Office européen des brevets

Beschwerdekammern

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Chambres de recours

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Case Number: T 2429/17 - 3.4.02

D E C I S I O N
of Technical Board of Appeal 3.4.02
of 11 December 2020

Appellant: (Applicant)	LG Display Co., Ltd. 128, Yeoui-daero Yeongdeungpo-gu Seoul 150-721 (KR)
Representative:	Viering, Jentschura & Partner mbB Patent- und Rechtsanwälte Am Brauhaus 8 01099 Dresden (DE)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 12 June 2017 refusing European patent application No. 13197983.3 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman	R. Bekkering
Members:	H. von Gronau
	G. Decker

Summary of Facts and Submissions

I. The appeal of the applicant is directed against the decision of the examining division to refuse European patent application No. 13197983.3. The examining division refused the application because the subject-matter of claim 1 of the main request did not involve an inventive step in view of document

D1: WO 2009/072815 A2

in combination with documents

D2: US 2009/0316093 A1 and
D3: US 2006/0172128 A1 and
D4: US 2005/0213012 A1,

the subject-matter of claim 1 of the first auxiliary request extended beyond the content of the application as filed, and the subject-matter of claim 1 of the second auxiliary request did not involve an inventive step.

II. With the statement setting out the grounds of appeal, the appellant requested that the decision under appeal be set aside and that the case be remitted to the examining division with the order to grant a patent on the basis of the main request, auxiliary request 1 or auxiliary request 2 underlying the decision under appeal:

The main request being based on the first set of amended claims 1 to 7 filed with the letter dated 7 November 2016,

the auxiliary request 1 being based on the second set of amended claims 1 to 7 filed as "Auxiliary Request" with the letter dated 27 April 2017,
the auxiliary request 2 being based on the third set of amended claims 1 to 7 filed as "2nd Auxiliary Request 12:47" at the oral proceedings before the examining division on 29 May 2017.

III. In a communication pursuant to Article 15(1) RPBA 2020 dated 3 June 2020 the board expressed its provisional opinion that *inter alia* the subject-matter of claim 1 of the main request did not involve an inventive step in view of document D1 as closest prior art document in combination with documents D2, D3 and D4, the subject-matter of claim 1 of auxiliary request 1 had no basis in the application documents as originally filed, and claim 1 of the auxiliary request 2 was not clear.

IV. With letter dated 6 November 2020 the appellant filed claims according to a new main request and the previous main request, auxiliary request 1 and auxiliary request 2 were renumbered to become new first auxiliary request, second auxiliary request and third auxiliary request, respectively. It also argued *inter alia* that the clarity issues in claim 1 of the previous auxiliary request 2 were removed in claim 1 of present new main request.

V. Oral proceedings took place on 11 December 2020. During the oral proceedings the appellant withdrew its first and second auxiliary request so that the third auxiliary request became the first auxiliary request, and it filed a new second auxiliary request. The appellant's final requests were as follows:

The appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of the claims of the main request, filed with the letter dated 6 November 2020, or of the first auxiliary request, filed as "2nd Auxiliary Request 12:47" at the oral proceedings before the examining division on 29 May 2017, or of the second auxiliary request, filed at the oral proceedings before the Board on 11 December 2020.

At the end of the oral proceedings the chairperson announced the board's decision.

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

A liquid crystal display device, comprising:
a liquid crystal panel (110) comprising a liquid crystal layer (110);
a first polarizer (120) attached to a first surface of the liquid crystal panel (110) and including a first polarizing film (122), first and second optical compensation films (124, 125), a phase retardation film (127), a protective film (128), and a functional film (129) having anti-static and hard-coating functions, wherein the first and second optical compensation films (124, 125) are disposed on one surface of the first polarizing film (122), and the phase retardation film (127), the protective film (128) and the functional film (129) are disposed on another surface of the first polarizing film (122); and
a second polarizer (130) attached to a second surface of the liquid crystal panel (110) and including a second polarizing film (132), an inner protective film (134), and an outer protective film (136), wherein the inner protective film (134) is disposed on one surface of the second polarizing film (132), and the outer

protective film (136) is disposed on another surface of the second polarizing film (132),
wherein an absorption axis of the second polarizing film (132) is perpendicular to an absorption axis of the first polarizing film (122);
wherein the first polarizing film (122) is disposed between the phase retardation film (127) and the liquid crystal panel (110), and the phase retardation film (127) has a retardation value of λ/4,
wherein the second polarizer (130) further includes a brightness enhancement film (138) on an outer surface of the outer protective film (136),
wherein light emitted from the liquid crystal panel (110) sequentially passes the second optical compensation film (125), the first optical compensation film (124), the first polarizing film (122), the phase retardation film (127), the protective film (128) and the functional film (129), and the phase retardation film (127) is configured to convert linearly polarized light received from the first polarizing film (122) into circularly polarized light, and
wherein light passing through the second polarizer (130) is linearly polarized, and the polarization state of the light is disposed on a start point (SP) on the equator of a Poincare sphere, which represents polarization states of light on a spherical surface,
wherein the liquid crystal layer does not have a phase retardation,
wherein light passing through the second optical compensation film (125) has a changed polarization state by about 1/4 circle with the optical axis (C2) of the second optical compensation film (125) as the center while passing through the second optical compensation film (125), wherein the optical axis (C2) of the second optical compensation film (125) is disposed along a direction (C2) from a center (O) of

the Poincare sphere to the 0-degree linear polarization (S1), and the polarization state of the light passing through the second optical compensation film (125) moves from the start point (SP) to a first point (Pl) on the Poincare sphere, and
wherein light passing through the first optical compensation film (124) has a changed polarization state by about 1/4 circle with the optical axis (C1) of the first optical compensation film (124) as the center while passing through the first optical compensation film (124), and a polarization state of the light passing through the first optical compensation film (124) moves from the first point (P1) on the Poincare sphere to a second point (EP) on the equator of the Poincare sphere, which represents a linear polarization state and which coincides with the direction of the absorption axis of the first polarizing film (122).

Claim 1 of the first auxiliary request reads as follows:

A liquid crystal display device, comprising:
a liquid crystal panel (110) comprising a liquid crystal layer (110);
a first polarizer (120) attached to a first surface of the liquid crystal panel (110) and including a first polarizing film (122), first and second optical compensation films (124, 125), a phase retardation film (127), a protective film (128), and a functional film (129) having anti-static and hard-coating functions,
wherein the first and second optical compensation films (124, 125) are disposed on one surface of the first polarizing film (122), and the phase retardation film (127), the protective film (128) and the functional film (129) are disposed on another surface of the first polarizing film (122); and

a second polarizer (130) attached to a second surface of the liquid crystal panel (110) and including a second polarizing film (132), an inner protective film (134), and an outer protective film (136), wherein the inner protective film (134) is disposed on one surface of the second polarizing film (132), and the outer protective film (136) is disposed on another surface of the second polarizing film (132),
wherein an absorption axis of the second polarizing film (132) is perpendicular to an absorption axis of the first polarizing film (122); (par. 0068) [sic]
wherein the first polarizing film (122) is disposed between the phase retardation film (127) and the liquid crystal panel (110), and the phase retardation film (127) has a retardation value of λ/4,
wherein the second polarizer (130) further includes a brightness enhancement film (138) on an outer surface of the outer protective film (136),
wherein light emitted from the liquid crystal panel (110) sequentially passes the second optical compensation film (125), the first optical compensation film (124), the first polarizing film (122), the phase retardation film (127), the protective film (128) and the functional film (129), and the phase retardation film (127) is configured to convert linearly polarized light received from the first polarizing film (122) into circularly polarized light, and
wherein when the liquid crystal display device is viewed at a diagonal direction, light passing through the second polarizer (130) is linearly polarized, and the polarization state of the light is disposed on a start point (SP) on the equator of a Poincare sphere, which represents polarization states of light on a spherical surface,
if a phase retardation effect of the liquid crystal layer is disregarded,

then light passing through the second optical compensation film (125) has a changed polarization state by about 1/4 circle with the optical axis (C2) of the second optical compensation film (125) as the center while passing through the second optical compensation film (125), wherein the optical axis (C2) of the second optical compensation film (125) is disposed along a direction (C2) from a center (O) of the Poincare sphere to the 0-degree linear polarization (S1), and the polarization state of the light passing through the second optical compensation film (125) moves from the start point (SP) to a first point (P1) on the Poincare sphere, which represents a left-handed elliptical polarization state,
then light passing through the first optical compensation film (124) has a changed polarization state by about 1/4 circle with the optical axis (Cl) of the first optical compensation film (124) as the center while passing through the first optical compensation film (124), and a polarization state of the light passing through the first optical compensation film (124) moves from the first point (Pl) on the Poincare sphere to a second point (EP) on the equator of the Poincare sphere, which represents a linear polarization state and which coincides with the direction of the absorption axis of the first polarizing film (122).

Claim 1 of the second auxiliary request reads as follows:

A liquid crystal display device, comprising:
a liquid crystal panel (110) comprising a liquid crystal layer (110);
a first polarizer (120) attached to a first surface of the liquid crystal panel (110) and including a first polarizing film (122), first and second optical

compensation films (124, 125), a phase retardation film (127), a protective film (128), and a functional film (129) having anti-static and hard-coating functions, wherein the first and second optical compensation films (124, 125) are disposed on one surface of the first polarizing film (122), and the phase retardation film (127), the protective film (128) and the functional film (129) are disposed on another surface of the first polarizing film (122); and

a second polarizer (130) attached to a second surface of the liquid crystal panel (110) and including a second polarizing film (132), an inner protective film (134), and an outer protective film (136), wherein the inner protective film (134) is disposed on one surface of the second polarizing film (132), and the outer protective film (136) is disposed on another surface of the second polarizing film (132),

wherein an absorption axis of the second polarizing film (132) is perpendicular to an absorption axis of the first polarizing film (122);

wherein the first polarizing film (122) is disposed between the phase retardation film (127) and the liquid crystal panel (110), and the phase retardation film (127) has a retardation value of λ/4,

wherein the second polarizer (130) further includes a brightness enhancement film (138) on an outer surface of the outer protective film (136),

wherein light emitted from the liquid crystal panel (110) sequentially passes the second optical compensation film (125), the first optical compensation film (124), the first polarizing film (122), the phase retardation film (127), the protective film (128) and the functional film (129), and the phase retardation film (127) is configured to convert linearly polarized light received from the first polarizing film (122) into circularly polarized light,

wherein the first optical compensation film (124) is a negative B plate, and the second optical compensation film (125) is a positive C plate, and
wherein when the liquid crystal display device is viewed at a diagonal direction, light passing through the second polarizer (130) along the diagonal direction is linearly polarized, and the polarization state of the light is disposed on a start point (SP) on the equator of a Poincare sphere, which represents polarization states of light on a spherical surface, if a phase retardation effect of the liquid crystal layer is disregarded,
then the light that has passed through the second polarizer (130) along the diagonal direction passes through the second optical compensation film (125) along the diagonal direction and has a changed polarization state by about 1/4 circle with the optical axis (C2) of the second optical compensation film (125) as the center while passing through the second optical compensation film (125), wherein the optical axis (C2) of the second optical compensation film (125) is disposed along a direction (C2) from a center (O) of the Poincare sphere to the 0-degree linear polarization (S1), and the polarization state of the light passing along the diagonal direction through the second optical compensation film (125) moves from the start point (SP) to a first point (Pl) on the Poincare sphere, which represents a left-handed elliptical polarization state, then the light that has passed through the second optical compensation film (125) along the diagonal direction passes through the first optical compensation film (124) along the diagonal direction and has a changed polarization state by about 1/4 circle with the optical axis (C1) of the first optical compensation film (124) as the center while passing through the first optical compensation film (124), and a

polarization state of the light passing along the diagonal direction through the first optical compensation film (124) moves from the first point (Pl) on the Poincare sphere to a second point (EP) on the equator of the Poincare sphere, which represents a linear polarization state and which coincides with the direction of the absorption axis of the first polarizing film (122) for light exiting the liquid crystal display device along the diagonal direction.

Reasons for the Decision

1. The appeal is admissible.

2. Main request - admission (Article 13(1) and (2) RPBA 2020)

2.1 The claims of the present main request have been filed after notification of the summons to oral proceedings.

2.2 Article 13(2) RPBA 2020 gives the board discretion not to admit requests after notification of a summons to oral proceedings. The basic principle of the so-called "third level of the convergent approach" is that, at this stage of the appeal proceedings, amendments to a party's appeal case are not to be taken into consideration. However, a limited exception is provided for: it requires a party to present compelling reasons which justify clearly why the circumstances leading to the amendment are indeed exceptional in the particular appeal ("cogent reasons"). For example, if a party submits that the board raised an objection for the first time in a communication, it must explain precisely why this objection is new and does not fall

under objections previously raised by the board or a party. The board may decide to admit the amendment in the exercise of its discretion.

At the third level of the convergent approach, the board may also rely on criteria applicable at the second and first level of the convergent approach, i.e. as set out in paragraph 1 of Article 13 and Article 12, paragraphs 4 to 6 RPBA 2020. These criteria also include the complexity of the amendment, whether an amendment to a patent application overcomes the objections raised and whether the amendment, *prima facie*, does not give rise to new objections (see Rules of procedure of the Boards of Appeal 2020, Supplementary publication 2, Official Journal EPO 2020, explanatory remarks on Article 13(2) and (1) RPBA 2020).

2.3 The appellant argued that with its communication pursuant to Article 15(1) RPBA 2020 the board had raised objections under Article 84 and 123(2) EPC against claim 1 of the previous second auxiliary request. In its decision to refuse the present application, the examining division did not raise any objections under Articles 84 or 123(2) EPC against claim 1 of said second auxiliary request (see item 5 and following in the decision). Therefore, the objections under Articles 84 and 123(2) EPC raised by the board were new objections, and the amendments filed with this letter were necessitated by these new objections. Therefore, the amendments were admissible under Article 13(2) RBPA 2020.

The amendments in the present main request solved the issues under Articles 84 and 123(2) EPC raised by the board. The appellant put forward that it was clear from

the description in paragraphs 0081 to 0084 how the IPS-LCD worked so that an excellent black image could be viewed at the diagonal direction. The appellant admitted that a liquid crystal layer that did not have a phase retardation under any circumstances would not be realistic.

2.4 The board took note that claim 1 had been filed to address issues raised for the first time by the board. Therefore, the board recognised "exceptional circumstances" within the meaning of Article 13(2) RPBA 2020 that could lead the board to consider the proposed amendments.

The board noted in the oral proceedings that the clarity and added subject-matter issues raised with respect to claim 1 of previous second auxiliary request had been addressed by filing claim 1 of present main request. However, the appellant had introduced also amendments that appeared not to be suitable to remedy the clarity objections raised, but to create new clarity objections. In particular, it was *prima facie* not clear how a liquid crystal layer in a liquid crystal display device could be implemented not having a phase retardation. Furthermore, the feature that the liquid crystal layer did not have a phase retardation had been newly introduced from the description. In the previous second auxiliary request it was only stated that a phase retardation effect of the liquid crystal layer was disregarded, meaning that the liquid crystal layer did have a phase retardation effect.

2.5 It follows that in claim 1 of the present main request a new feature from the description has been introduced which, *prima facie*, is not clear.

2.6 Therefore, the board, exercising its discretion under Article 13(2) RPBA 2020 in combination with the criteria set out in Article 13(1) RPBA 2020, did not admit the new main request into the appeal proceedings.

3. First auxiliary request - clarity (Article 84 EPC)

3.1 The appellant was of the opinion that the definition of the liquid crystal display device with functional features defining the result to be achieved by the liquid crystal display device under certain conditions was sufficiently clear. These functional features were the only way to define the claimed subject-matter and it would be difficult to define it differently. For the person skilled in the art it was clear that the diagonal direction under which the liquid crystal device was viewed was not a view perpendicular to the surface of the device but was at a 45° azimuth angle under a certain polar angle. The starting point SP in Figure 6 depended on the polar viewing angle. When the device was viewed perpendicularly to its surface the starting point SP in Figure 6 would coincide with point S1 on axis C2 so that light passing the second optical compensation film would not change polarisation state.

3.2 According to established case law, functional features defining a technical result are permissible in a claim

(i) if, from an objective viewpoint, such features cannot otherwise be defined more precisely without restricting the scope of the invention, and

(ii) if these features provide instructions which are sufficiently clear for the expert to reduce them to practice without undue burden, if necessary with reasonable experiments.

The effort to define a feature in functional terms has to stop short where it jeopardises the clarity of a claim (see Case Law of the Boards of Appeal of the European Patent Office, Ninth Edition, July 2019, II.A. 3.4).

3.3 In the present case the board noted in the oral proceedings that it would have been possible and appropriate to define the optical compensation films by structural features and that the result to be achieved was not defined in a manner that clearly and without undue burden allowed the person skilled in the art to realise the device. It was not clear how light passing the second polarizer under an unspecified diagonal direction and passing the second and first compensation films with their given optical axis always resulted in a linear polarisation which coincides with the direction of the absorption axis of the first polarising film. If for example the starting polarisation point SP in Figure 6 lay on axis C2 then the polarisation point P1 would also be positioned on axis C2 because the second optical compensation film changed the polarisation state by about ¼ circle with the optical axis C2. Then, light passing through the first optical compensation film had a changed polarisation state by about ¼ circle with the optical axis C1 as the center which would result in a polarisation state EP that lies in the elliptical area of the Poincaré sphere.

3.4 From the above considerations the board comes to the conclusion that the claim does not provide sufficiently clear and complete instructions which allowed the person skilled in the art to reduce them to practice without undue burden.

Claim 1 is therefore not clear.

4. Second auxiliary request - admission (Article 13(2) RPBA 2020)

4.1 According to the appellant claim 1 of the new second auxiliary request was based on the previous second auxiliary request and the compensation films were now defined with structural features from dependent claim 2, i.e. that the first optical compensation film (124) is a negative B plate and the second optical compensation film (125) is a positive C plate. The expressions "A plate", "B plate" and "C plate" were standard expressions in the art and document D1, e.g. paragraphs 41 and 42, disclosed the definitions of these plates. It was clear from the application that the diagonal direction is an azimuth direction of 45° under a certain polar angle, and that in the last feature of the claim the absorption axis of the first polarizing film shifts with the polar angle.

4.2 The board noted in the oral proceedings that the expressions "negative B plate" and "positive C plate" were not defined in the application, the claim did not define explicitly that "diagonal direction" meant 45° in azimuth direction under a polar angle and the expression "diagonal direction" as such was *prima facie* not clear without a definition of how the expression "diagonal" was to be understood, i.e. which exact direction was meant. As for the first auxiliary

request, also here it was not clear how light passing the second polarizer under an unspecified diagonal direction and passing the second and first compensation films with their given optical axis always resulted in a linear polarisation which coincided with the direction of the absorption axis of the first polarising film. Although structural features have been added to claim 1 the liquid crystal display device was still defined by functional features defining the result to be achieved and not by structural features which would be appropriate in the present case. The clarity issues raised for claim 1 of the first auxiliary request were therefore not solved by the amendments to claim 1 of the second auxiliary request.

4.3 In view of the above the board, exercising its discretion under Article 13(2) and (1) RPBA 2020, did not admit the second auxiliary request into the proceedings.

5. As the sole request admitted is not allowable the board has to dismiss the appeal.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

L. Gabor R. Bekkering

Decision electronically authenticated