Trial Decision

Invalidation No. 2016-800057

Appellant	JNC CORPORATION
Attorney	FUKAI, Toshiyuki
Attorney	SUEYOSHI, Tsuyoshi
Demandee	Merck Patent GmbH
Patent Attorney	KUZUWA, Kiyoshi
Patent Attorney	SHIOZAKI, Susumu
Patent Attorney	ODAGIRI, Misa
Patent Attorney	MATSUURA, Ryoko

The case of a trial for invalidation regarding Japanese Patent No. 4623924, entitled "Liquid-Crystalline Medium" between the above parties has resulted in the following trial decision:

Conclusion

The correction in the scope of claims of Japanese Patent No. 4623924 shall be approved as described in the corrected scope of claims attached to the written correction request, as for Claims 1, 2, 3, [4-6, 9-12], 7, 8, and 13.

The patent for the inventions according to Claims 1, 2, 7, and 8 of Japanese Patent No. 4623924 shall be invalidated.

The request for a trial regarding the inventions according to Claims 3 and 13 of Japanese Patent No. 4623924 is dismissed.

The costs in connection with the trial shall be divided between the parties: two-sixths shall be borne by the Defendant and four-sixths shall be borne by Demandee.

Reason

No. 1 History of the procedures

1. The patent in question

The patentee of Japanese Patent No. 4623924 in question (hereinafter, referred to as "the Patent") is Merck Patent Gesellschaft mit beschraenkter Haftung. The application for the Patent was filed on October 15, 2002 (priority claim under the Paris Convention: October 12, 2001 Federal Republic of Germany (DE)), and the establishment of patent right was registered on November 12, 2010 (the title of the Invention: "Liquid-Crystalline Medium" and the number of claims: 8).

2. History of the procedures in the invalidation trial of the case

The trial for invalidation of the case was demanded by JNC CORPORATION (Demandant), and the history of the procedures (documents submitted by the parties) is as follows:

May 18, 2016 Written demand of the trial (Demandant)

June 1, 2016 Order of amendment as to formalities

July 1, 2016 Written amendment (Demandant)

October 6, 2016 Written reply to the demand of the trial and Written request for correction (Demandee)

November 18, 2016 Written refutation of the trial case (Demandant) (hereinafter, referred to as the "first written refutation.")

July 17, 2017 Notification of matters to be examined

April 13, 2017 Oral proceedings statement brief (Demandant)

April 13, 2017 Oral proceedings statement brief (Demandee)

April 27, 2017 Written statement (Demandee)

April 27, 2017 Written statement (Demandant)

April 27, 2017 Oral proceeding

June 1, 2017 Written statement (Demandee)

June 22, 2017 Written statement (Demandant)

September 4, 2017 Advance notice of trial decision

December 13, 2017 Written statement and Written correction request (Demandee)

February 2, 2018 Written refutation of the trial case (Demandant) (hereinafter, referred to as the "second written refutation.")

February 15, 2018 Written statement (Demandee) (Original Evidence No. 6 submitted)

No. 2 Overview of the parties' allegations and means of proof

1. Allegations of the parties

(1) Object of the demand

Demandant demands a trial decision as follows: "The patent for the inventions according to Claims 1 to 3, 7, and 8 of Patent No. 4623924 shall be invalidated. The costs in connection with the trial shall be borne by Demandee."

(2) Object of the reply

Demandee demands a trial decision as follows: "The demand for the invalidation trial of the case was groundless. The costs in connection with the trial shall be borne by Demandant."

2. Means of proof

Means of proof submitted by the parties are as follows (hereinafter, for each piece of evidence, Evidence A No. 1, for example, will be abbreviated as "A1"):

(1) Evidences submitted by Demandant.

A1: Japanese Unexamined Patent Application Publication No. 2001-19965
A2: Japanese Unexamined Patent Application Publication No. H11-140447
A3: Japanese Unexamined Patent Application Publication No. 2001-31972
A4: Japanese Unexamined Patent Application Publication No. 2001-115161
A5: Japanese Unexamined Patent Application Publication No. H10-298127
A6: Japanese Unexamined Patent Application Publication No. 2000-53602
A7: Japanese Unexamined Patent Application Publication No. 2001-114722
A8: International Publication No. WO99/52871
A9: Japanese Unexamined Patent Application Publication No. H10-287875
A10: Japanese Unexamined Patent Application Publication No. H10-287874

A11: International Publication No. WO99/21816

A12: German Patent No. 10107544

A13: Japanese Unexamined Patent Application Publication No. 2001-316669 (translation of A12)

A14: Japanese Unexamined Patent Application Publication No. H8-104869

A15: Japanese Unexamined Patent Application Publication No. 2001-192657

A16: Japanese Unexamined Patent Application Publication No. 2000-96055

A17: Japanese Unexamined Patent Application Publication No. 2000-38585

A18: Japanese Unexamined Patent Application Publication No. H2-184642

A19: Japanese Unexamined Patent Application Publication No. H1-175947

A20: M. Schadt, et.al., Liquid Crystals, Vol. 7, No. 4, pp. 519-536 (1990)

A21: K.Kitano, et. al., Mol. Cryst. Liq. Cryst. Vol. 191, pp. 205-209 (1990)

A22: Japanese Unexamined Patent Application Publication No. S60-51135

A23: Certificate of Analysis submitted by Mr. Shigeru Kibe, dated February 18, 2016

A24: Japanese Patent No. 4623924 (the patent publication of the Patent)

(the above-described pieces of evidence were submitted attached to the Written Demand for Trial)

A25: Shohei Naemura, "HAJIMETE NO EKISHO DISPREI GIJUTU (First liquid crystal display technology)" (Kogyo Chosakai Publishing Co., Ltd. April 20, 2004) pp. 45 to 46)

A26: Japanese Unexamined Patent Application Publication No. 2000-104072

A27: International Publication No. WO96/22261

A28: Japanese Unexamined Patent Application Publication No. 2000-96065

A29: German Patent No. 10111142

A30: Japanese Unexamined Patent Application Publication No. 2002-12869 (translation of A29)

A31: Japanese Unexamined Patent Application Publication No. 2000-351972

A32: Japanese Unexamined Patent Application Publication No. H9-291282

A33: Japanese Unexamined Patent Application Publication No. 2001-34197

A34: Japanese Unexamined Patent Application Publication No. H9-124529

A35: Japanese Unexamined Patent Application Publication No. H9-12569

A36: International Publication No. WO91/16321

A37: International Publication No. WO01/46336

A38: National Publication of International Patent Application No. 2003-518154 (translation of A37)

(the above-described pieces of evidence were submitted attached to the First Written Refutation)

A39: Japanese Unexamined Patent Application Publication No. S56-36568

A40: Japanese Unexamined Patent Application Publication No. H9-328443

A41: M. Schadt et. al., IEEE Transactions on Electron Devices, Vol. Ed-25, No. 9 pp. 1125-1137 (1978)

(the above-described pieces of evidence were submitted attached to the Oral Proceedings Statement Brief)

A42: Technical briefing material for oral proceeding for invalidation trial

A43: Martin Schadt, Annu. Rev. Mater. Sci., No. 27, p. 305, p. 346 (1997)

A44: Hironori Iwata, PhD thesis entitled "Study on transient response of nematic liquid crystal with negative dielectric anisotropy" submitted to Osaka Prefecture University (2008), pp. 15-16

A45: Keiya Iwaya and 4 others, Proceedings of Japanese Liquid Crystal Conference 2010, PA44

A46: Masaru Inoue and 5 others, Proceedings of Japanese Liquid Crystal Conference 2003, 3A07

A47: Masahiko Okamura, EKISHO Volume 6, Number 4, pp. 390 to 395 (2002)

A48: Japanese Unexamined Patent Application Publication No. H9-12485

A49: Japanese Unexamined Patent Application Publication No. H9-30995

A50: "Liquid crystal device handbook" edited by the 142nd Committee in Japan Society for the Promotion of Science (Nikkan Kogyo Shimbun, Ltd., 1989), pp. 71 to 77

A51: Haruyoshi Takatsu, Polymers, vol. 55, August, pp. 587 to 590 (2006)

A52: Certificate of Analysis submitted by Mr. Shigeru Kibe, dated June 22, 2017

(the above-described pieces of evidence were submitted attached to the Written Statement submitted on June 22, 2017)

A53: Certificate of Analysis submitted by Mr. Shigeru Kibe, dated February 2, 2018

Document 1: "Japan Electronics and Information Technology Industries Association standard JEITA ED-2521B, Measuring Methods for Liquid Crystal Display Panels and Constructive Materials" prepared by Display Device Standardization Committee (revised on March 2009) Japan Electronics and Information Technology Industries Association (JEITA)

Document 2: "Liquid crystal device handbook" edited by the 142nd Committee in Japan Society for the Promotion of Science (Nikkan Kogyo Shimbun, Ltd., 1989), pp. 70 to 77

(the above-described pieces of evidence were submitted attached to the Second Written Refutation)

(2) Evidences submitted by Demandee

B1: Report of the experiment conducted by Herald Hirschmann on April 7, 2017 (attached to the Oral Proceedings Statement Brief)

B2: Technical briefing material for oral proceeding for invalidation trial (attached to the Written Statement submitted on April 27, 2017)

B3: Masahito Oh-e, Katsumi Kondo, Appl. Phys. Lett., Vol. 67, No. 26, December 25, 1995 pp. 3895 to 3897

B4: Court decision on case No. 2007 (Gyo-Ke) 10380, a request to revoke the trial decision

(the above-described pieces of evidence were submitted attached to the Written Statement submitted on June 1, 2017)

B5: Birendra Bahadur, LIQUID CRYSTALS APPLICATIONS AND USES, Vol. 1, World Scientific, 1990, pp. 165 to 167

(Demandant added partial translation in the second written refutation)

B6: Report of the experiment conducted by Dr. Herald Hirschmann on November 23, 2017 (the original was submitted as an attachment to the Written Statement submitted on February 15, 2018)

(the above-described pieces of evidence were submitted attached to the Written Statement submitted on December 23, 2017)

No. 3 Regarding whether or not the corrections according to the written correction request dated December 13, 2017 (hereinafter, referred to as "the Correction") are approved.

The corrections are demanded for a group of claims (Claims 1 to 8) in accordance with Article 134-2(3) of the Patent Act. The body judges that the demand of the corrections should be admitted.

The reasons are as follows.

1. Matters of corrections

The corrections were divided into parts when appropriate.

(1) Correction A

In Claim 1 in the Scope of Claims before the Correction,
"the formula
[Chemical 2]
in which ring A1, ring A2, and ring A3 (note by the body: The structural formula of the ring, such as A1, in the general formula I is described as "ring A1" as required) are

a) a 1,4-cyclohexenylene or 1,4-cyclohexylene radical, in which one or two non-adjacent CH2 groups are optionally replaced by −O− or −S−,

b) a 1,4-phenylene radical, in which one or two CH groups are optionally replaced by N, and

c) a radical selected from the group consisting of ...,

where the radicals a), b), and c) are optionally monosubstituted or polysubstituted by halogen atoms,
[Chemical 3]
ring A4 is
[Chemical 4]
...,
x, y, and z are each, independently of one another, 0, 1 or 2,
Z1 and Z2 are each, independently of one another, ... or a single bond,
Z3 is ... or a single bond,
X is F, Cl, CN, SF5, NCS, a halogenated or unsubstituted alkyl radical having 1 to 8 carbon atoms, in which one or two or more CH2 groups are optionally replaced by −O− or −CH=CH− in such a way that O atoms are not linked directly to one another,
a is 0, 1, or 2,
b is 0, 1, or 2, and
c is 0, 1, or 2,
where a + b + c is from 1 to 3" is corrected to read
"in which
[Chemical 2]
ring A1, ring A2, and ring A3 are 1,4-phenylene radicals,
[Chemical 3]
ring A4 is

[Chemical 4]
1,4-phenylene radical is ... (note by the body: it is described in the form of a structural formula in the correction in the Scope of Claims),
Z1, Z2, and Z3 are single bonds,
X is n-C3H7,
a is 0,
b is 0, and
c is 1."

(2) Correction B

A Claim 2, which cites Claim 1 in the Scope of Claims, is rewritten in an independent form that does not depend from Claim 1.

B In Claim 2, which refers to the following formula of Claim 1 in the Scope of Claims before the Correction,
"the formula
[Chemical 2]
in which ring A1, ring A2, and ring A3 are

a) a 1,4-cyclohexenylene or 1,4-cyclohexylene radical, in which one or two non-adjacent CH2 groups are optionally replaced by –O– or –S–,

b) a 1,4-phenylene radical, in which one or two CH groups are optionally replaced by N, and

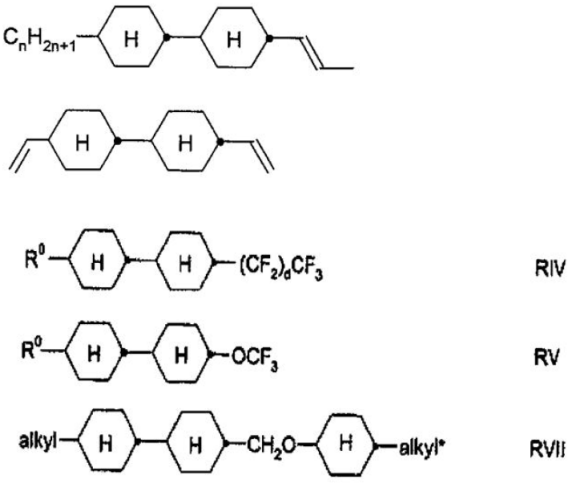
c) a radical selected from the group consisting of ...,

where the radicals a), b), and c) are optionally monosubstituted or polysubstituted by halogen atoms,
[Chemical 3]
ring A4 is
[Chemical 4]
...
x, y, and z are ...,
Z1 and Z2 are each, independently of one another, ... or a single bond,
Z3 is ... or a single bond,
X is
[Chemical 6]

F, C1, CN, NCS, CF3, C2F5, n-C3F7, SF5, CF2H, OCF3, OCF2H, OCFHCF3, OCFHCFH2, OCFHCF2H, OCF2CH3, OCF2CFH2, OCF2CF2H, OCF2CF2CF2H, OCF2CF2CFH2, OCFHCF2CF3, OCFHCF2CF2H, OCF2CF2CF3, CF2CHFCF3, CF2CH2CF3, OCH2CF2CHFCF3, OCF2CHFCF3, OCClFCF2CF3, CH3, C2H5, or n-C3H7
a is 0, 1, or 2,
b is 0, 1, or 2, and
c is 0, 1, or 2,
where a + b + c is from 1 to 3" is corrected to read
"the formula
[Chemical 7]
in which ring A1 and ring A2 are 1,4-phenylene radicals,
[Chemical 8]
ring A3 is a 1,4-cyclohexylene radical,
[Chemical 9]
ring A4 is
[Chemical 10]
1,4-cyclohexylene radical, (note by the body: it is described in the form of a structural formula in the correction in the Scope of Claims),
Z1, Z2, and Z3 are single bonds,
X is n-C3H7,
a is 0,
b is 1, and
c is 1."

C In Claim 2, which refers to the following compounds of Claim 1 in the Scope of Claims before the Correction,
"compounds of the following formulae RII, RIV, RV, RVII, RVIII, RXI, RXII, and RXIV: ...
in which
R0 is an n-alkyl, oxaalkyl, fluoroalkyl, alkenyloxy, or alkenyl, each having 2 to 8 carbon atoms,
d is 0, 1, or 2,
alkyl and alkyl* are each, independently of one another, a straight-chain or branched alkyl radical having 2 to 8 carbon atoms, and

alkenyl is a straight-chain or branched alkenyl radical having 2 to 8 carbon atoms" is corrected to read
"compounds of the following formulae:
[Chemical 11]



in which
R0 is an n-alkyl, oxaalkyl, fluoroalkyl, alkenyloxy, or alkenyl, each having 2 to 8 carbon atoms,
d is 0, 1, or 2,
alkyl and alkyl* are each, independently of one another, a straight-chain or branched alkyl radical having 2 to 8 carbon atoms, and
n is an integer from 2 to 8."

(3) Correction C

A Regarding Claim 3 according to the liquid-crystalline medium of Claim 1 or 2 in the Scope of Claims, Claim 3 depending from Claim 1 is rewritten in an independent form that does not depend from Claim 1.

B In Claim 3, which refers to the following medium of Claim 1 in the Scope of Claims before the Correction, "a liquid-crystalline medium based on a mixture of polar compounds of positive or negative dielectric anisotropy" is corrected to read "a liquid-crystalline medium based on a mixture of polar compounds of positive dielectric anisotropy."

C In Claim 3 in the Scope of Claims before the Correction, "formulae I1 to 30: ..." is corrected to read "the following formulae: ...," the formulae I3, I12, I13, I14, I15, I17, I18, I19, I21, I22, and I30 are deleted, and "X is as defined in Claim 1" is corrected to read "X is F or OXF3,"
the description "'alkyl' is a straight-chain or branched alkyl radical" is deleted, and
"L1 to L6 are each, independently of one another, H or F" is corrected to read "L1 to L6 are H."

(4) Correction D

A Regarding Claim 3 according Claim 1 or 2 in the Scope of Claims, Claim 3 depending from Claim 2 is rewritten as a new Claim 13 in an independent form that does not depend from any of the other claims.

B In Claim 13, which refers to the following medium of Claim 1 in the Scope of Claims before the Correction, "a liquid-crystalline medium based on a mixture of polar compounds of positive or negative dielectric anisotropy" in Claim 1 from which Claim 3 in the Scope of Claims before the Correction depends is corrected to read "liquid-crystalline medium based on a mixture of polar compounds of positive dielectric anisotropy."

C In Claim 13, which refers to the following formulae of Claim 3 in the Scope of Claims before the Correction, "formulae I1 to 30: ..." is corrected to read "the following formulae: ...," and the formulae I3, I12, I13, I14, I15, I17, I18, I19, I21, I22, and I30 are deleted.

In Claim 13, which refers to the following definition of Claim 2 cited by Claim 3 in the Scope of Claims before the Correction, "X is F, C1, CN, NCS, CF3, C2F5, n-C3F7, SF5, CF2H, OCF3, OCF2H, OCFHCF3, OCFHCFH2, OCFHCF2H, OCF2CH3, OCF2CFH2, OCF2CF2H, OCF2CF2CF2H, OCF2CF2CFH2, OCFHCF2CF3, OCFHCF2CF2H, OCF2CF2CF3, CF2CHFCF3, CF2CH2CF3, OCH2CF2CHFCF3, OCF2CHFCF3, OCClFCF2CF3, CH3, C2H5, or n-C3H7" is corrected to read "X is F, C1, CN, NCS, CF3, C2F5, n-C3F7, SF5, CF2H, OCF3, OCF2H, OCFHCF3, OCFHCFH2, OCFHCF2H, OCF2CH3, OCF2CFH2, OCF2CF2H, OCF2CF2CF2H, OCF2CF2CFH2, OCFHCF2CF3, OCFHCF2CF2H, OCF2CF2CF3, CF2CHFCF3, CF2CH2CF3, OCH2CF2CHFCF3, OCF2CHFCF3, or OCClFCF2CF3."
In other words, CH3, C2H5, and n-C3H7 are deleted from X,

the description "'alkyl' is a straight-chain or branched alkyl radical" is deleted, and "L1 to L6 are each, independently of one another, H or F" is corrected to read "L1 to L6 are H."

(5) Correction E

Regarding Claim 4 depending from any one of Claims 1 to 3 in the Scope of Claims, Claim 4 depending from Claim 1 is rewritten in an independent form, which does not depend from other claims.

(6) Correction F

Regarding Claim 4 depending from any one of Claims 1 to 3 in the Scope of Claims, Claim 4 depending from Claim 2 and Claim 4 depending from Claim 3 (depending from Claim 1 or Claim 2) are respectively rewritten to Claim 9 and Claim 10 in an independent form, which do not depend from other claims.

(7) Correction G

Regarding Claims 5 and 6 in the Scope of Claims, which depend from Claim 4 that depends from Claim 2 or Claim 3 (depending from Claim 1 or Claim 2) are respectively rewritten to new Claims 11 and 12 citing Claims 9 and 10 corrected in accordance with Correction F.

(8) Correction H

A Claim 7 depending from Claim 1 in the Scope of Claims is rewritten in an independent form that does not depend from other claims.

B In Claim 7, which refers to the following formula of Claim 1 in the Scope of Claims before the Correction, "the formula
[Chemical 2]
in which ring A1, ring A2, and ring A3 are
a) a 1,4-cyclohexenylene or 1,4-cyclohexylene radical, in which one or two non-adjacent CH2 groups are optionally replaced by –O– or –S–,

b) a 1,4-phenylene radical, in which one or two CH groups are optionally replaced by N, and

c) a radical selected from the group consisting of ...,

where the radicals a), b), and c) are optionally monosubstituted or polysubstituted by halogen atoms,

[Chemical 3]

ring A4 is

[Chemical 4]

...,

x, y, and z are ...,

Z1 and Z2 are each, independently of one another, ... or a single bond,

Z3 is ... or a single bond,

X is F, Cl, CN, SF5, NCS, a halogenated or unsubstituted alkyl radical having 1 to 8 carbon atoms, in which one or two or more CH2 groups are optionally replaced by –O– or –CH=CH– in such a way that O atoms are not linked directly to one another,

a is 0, 1, or 2,

b is 0, 1, or 2, and

c is 0, 1, or 2,

where a + b + c is from 1 to 3" is corrected to read

"the formula

[Chemical 27]

in which ring A1 and ring A2 are 1,4-phenylene radicals,

[Chemical 28]

ring A3 is

[Chemical 29]

ring A4 is

[Chemical 30]

1,4-cyclohexylene radical (note by the body: it is described in the form of a structural formula in the correction in the Scope of Claims),

Z1, Z2, and Z3 are single bonds,

X is n-C3H or a vinyl group,

a is 0,

b is 1, and

c is 1."

C In Claim 7, which refers to the following compounds of Claim 1 in the Scope of Claims,

"compounds of the following formulae RII, RIV, RV, RVII, RVIII, RXI, RXII, and RXIV: ...

in which

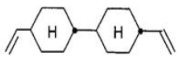
R0 is an n-alkyl, oxaalkyl, fluoroalkyl, alkenyloxy, or alkenyl, each having 2 to 8 carbon atoms,

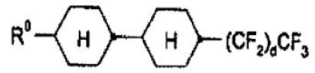
d is 0, 1, or 2,

alkyl and alkyl* are each, independently of one another, a straight-chain or branched alkyl radical having 2 to 8 carbon atoms, and

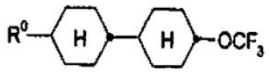
alkenyl is a straight-chain or branched alkenyl radical having 2 to 8 carbon atoms" is corrected to read

[Chemical 31]

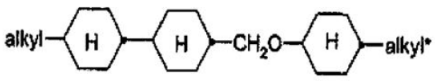




RIV



RV



RVII

in which

R0 is an n-alkyl, oxaalkyl, fluoroalkyl, alkenyloxy, or alkenyl, each having 2 to 8 carbon atoms,

d is 0, 1, or 2,

alkyl and alkyl* are each, independently of one another, a straight-chain or branched alkyl radical having 2 to 8 carbon atoms."

(9) Correction I

A Claim 8 depending from Claim 1 in the Scope of Claims is rewritten in an independent form that does not depend from other claims.

B In Claim 8, which refers to the following formula of Claim 1 in the Scope of Claims, "the formula [Chemical 2]

in which ring A1, ring A2, and ring A3 are

a) a 1,4-cyclohexenylene or 1,4-cyclohexylene radical, in which one or two non-adjacent CH2 groups are optionally replaced by −O− or −S−,

b) a 1,4-phenylene radical, in which one or two CH groups are optionally replaced by N, and

c) a radical selected from the group consisting of ...,

where the radicals a), b), and c) are optionally monosubstituted or polysubstituted by halogen atoms,

[Chemical 3]

ring A4 is

[Chemical 4]

x, y, and z are ...,

Z1 and Z2 are each, independently of one another, ... or a single bond,

Z3 is ... or a single bond,

X is F, Cl, CN, SF5, NCS, a halogenated or unsubstituted alkyl radical having no more than 8 carbon atoms, in which one or two or more CH2 groups are optionally replaced by −O− or −CH=CH− in such a way that O atoms are not linked directly to one another,

a is 0, 1, or 2,

b is 0, 1, or 2, and

c is 0, 1, or 2,

where a + b + c is from 1 to 3" is corrected to read

"the formula

[Chemical 33]

in which ring A1 and ring A2 are 1,4-phenylene radicals,

[Chemical 34]

ring A3 is a 1,4-cyclohexylene radical,

[Chemical 35]

ring A4 is

[Chemical 36]

1,4-cyclohexylene radical (note by the body: it is described in the form of a structural formula in the correction in the Scope of Claims)

Z1, Z2, and Z3 are single bonds,

X is n-C3H7 or a vinyl group,

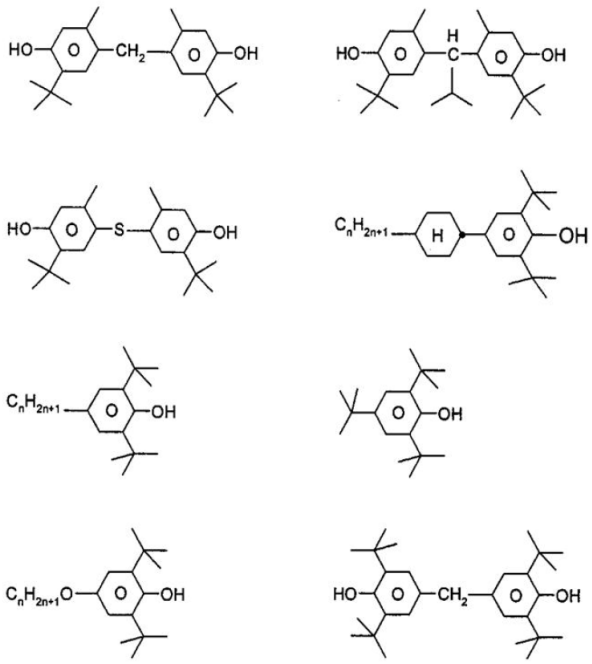
a is 0,

b is 1, and

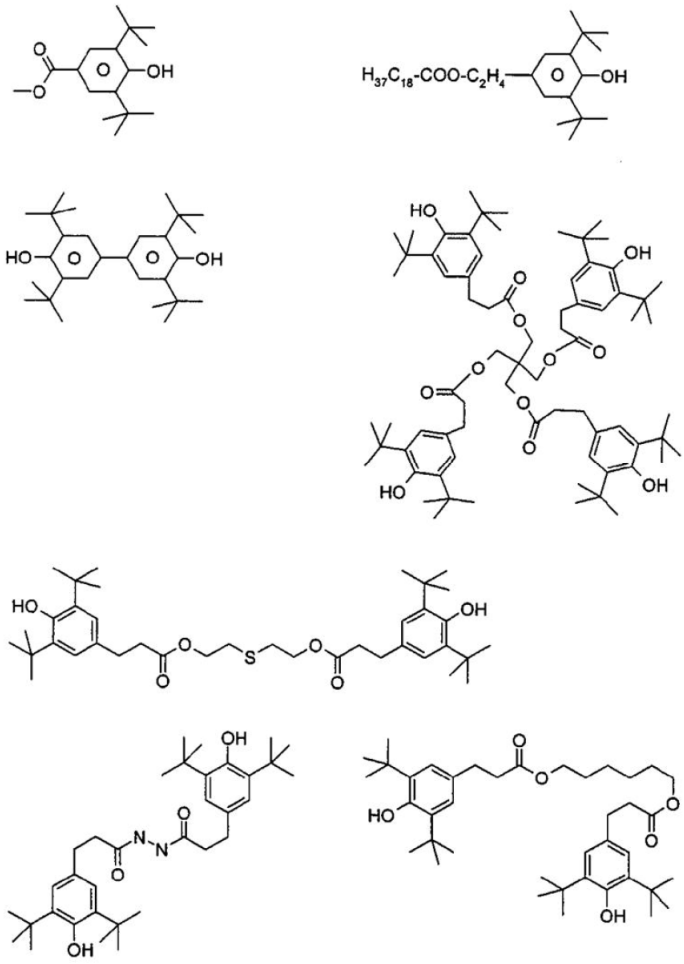
c is 1."

C In Claim 8, which refers to the following formulae of Claim 1 in the Scope of Claims before the Correction, "a compound represented by one of formulae RII, RIV, RV, RVII, RVIII, RXI, RXII, and RXIV: ...
in which
R0 is an n-alkyl, oxaalkyl, fluoroalkyl, alkenyloxy, or alkenyl, each having 2 to 8 carbon atoms,
d is 0, 1, or 2,
alkyl and alkyl* are each, independently of one another, a straight-chain or branched alkyl radical having 2 to 8 carbon atoms, and
alkenyl is a straight-chain or branched alkenyl radical having 2 to 8 carbon atoms" is corrected to read "compounds of the following formulae:
[Chemical 37] (omitted) (note by the body: it is identical to [Chemical 11] of Claim 2)
in which
R0 is an n-alkyl, oxaalkyl, fluoroalkyl, alkenyloxy, or alkenyl, each having 2 to 8 carbon atoms,
d is 0, 1, or 2,
alkyl and alkyl* are each, independently of one another, a straight-chain or branched alkyl radical having 2 to 8 carbon atoms, and
n is an integer from 2 to 8.

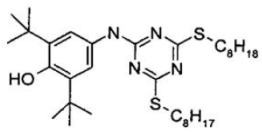
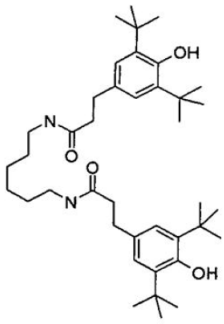
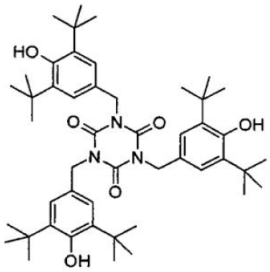
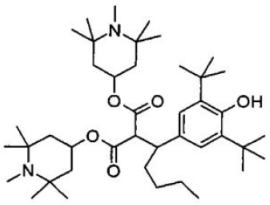
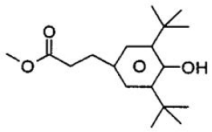
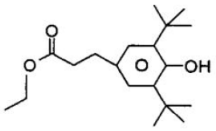
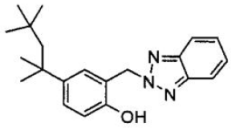
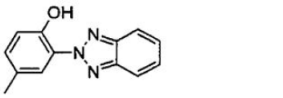
D The definition of the liquid-crystalline medium is corrected to read "further comprises at least one stabilizer selected from the group consisting of the following formulae:
[Chemical 38]



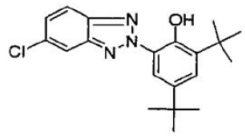
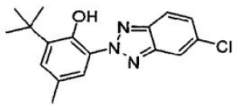
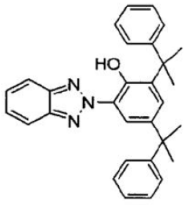
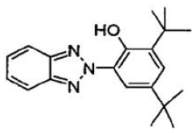
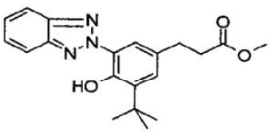
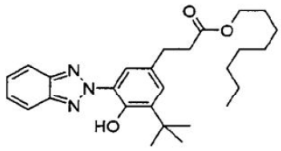
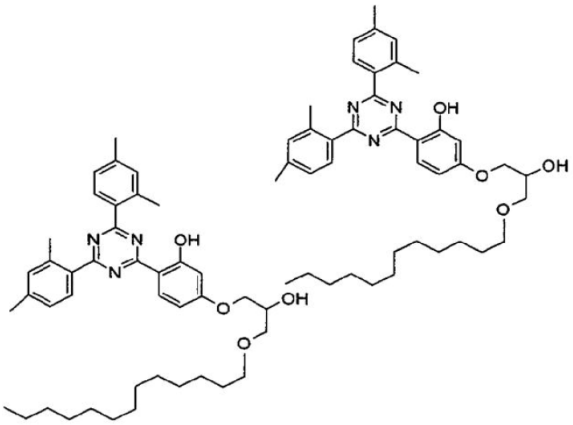
[Chemical 39]



[Chemical 40]

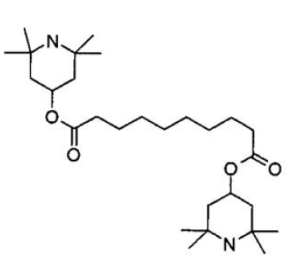
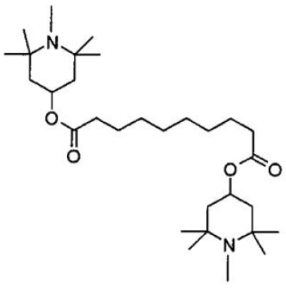









[Chemical 41]

and

[Chemical 42]

in which, n is 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, or 15 independently of each other.

2 Judgement on an aim of the correction, existence of new matters, and existence of enlargement or alternation of the Scope of Claims

(1) Correction A

Correction A limits ring A1, ring A2, and ring A3 to the 1,4-phenylene radical of b) among the aspects of a), b), and c) before the Correction, limits ring A4 to the 1,4-phenylene radical (note by the body: it is described in the form of a structural formula in the correction in the Scope of Claims) among the options of [Chemical 4] before the Correction, while deleting the description "x, y, and z are each, independently of one another, 0, 1, or 2" specifying the options deleted due to the limitation, limits the aspects of Z1, Z2, and Z3 to "a single bond" among the options before the Correction, limits X to "n-C3H7" included in "... unsubstituted alkyl radical having ... up to 8 carbon atoms," and limits the possible cases of a, b, and c included in the description "a is 0, 1 or 2, b is 0, 1, or 2, and c is 0, 1, or 2, where a + b + c is from 1 to 3" to the aspect in which a is "0," b is "0,", and c is "1." Thus, the correction is recognized to be aimed at the restriction in the Scope of Claims prescribed in item (i) of the proviso to Article 134-2(1) of the Patent Act.

In addition, the correction of limiting X to "n-C3H7" in Correction A is based on the descriptions "X in the compounds of the formula I is preferably
[Chemical 22] ... n-C3H7 ..." and "[Chemical 23] ... in particular ... n-C3H7" respectively in paragraphs [0023] and [0024] of the Specification of the Patent. Other corrections in Correction A delete some of the accepted options. It cannot be said that these corrections introduce new technical matters. Thus, Correction A complies with the provision of Article 126(5) of the Patent Act as applied mutatis mutandis under Article 134-2(9) of the Patent Act.

Furthermore, the correction of limiting X to "n-C3H7" in Correction A definitely restricts X before the Correction. Other corrections in Correction A delete some of the accepted options and do not enlarge or alter the scope of claims. Thus, Correction A complies with the provision of Article 126(6) of the Patent Act as applied mutatis mutandis under Article 134-2(9) of the Patent Act.

(2) Correction B

The matter A in Correction B is intended for dissolving a citation relation between claims and rewriting Claim 2 before the Correction, which depends from Claim

1, to an independent claim that does not depend from Claim 1. Thus, it is a correction aimed "to change the description of claims dependent on other claims into claims which are not dependent on other claims" as prescribed in item (iv) of the proviso to Article 134-2(1) of the Patent Act.

The matter B in Correction B limits rings A1 and A2 in the compounds of general formula I in Claim 1 from which Claim 2 before the Correction depends to the 1,4-phenylene radical in b) among the aspects of a), b), and c) before the Correction, limits ring A3 to the 1,4-cyclohexylene radical in a) among the aspects of a), b), and c) before the Correction, and limits ring A4 to the 1,4-cyclohexylene radical among the options of [Chemical 4] before the Correction, while deleting the description "x, y, and z are each, independently of one another, 0, 1, or 2" specifying the options deleted due to the limitation, limits the aspects of Z1, Z2, and Z3 to "a single bond" among the options before the Correction, limits X to "n-C3H7" included in "... unsubstituted alkyl radical having ... up to 8 carbon atoms," limits the possible cases of a, b, and c included in the description "a is 0, 1, or 2, b is 0, 1, or 2, and c is 0, 1, or 2, where a + b + c is from 1 to 3" to the aspect in which a is "0," b is "1," and c is "1."

The matter C in Correction B deletes "formulae RVIII, RXI, RXII, and RXIV" from the "formulae RII, RIV, RV, RVII, RVIII, RXI, RXII, and RXIV," which are alternatively described in Claim 1 from which Claim 2 before the Correction depends, and limits the compounds of formula RII specified such that "alkenyl is a straight-chain or branched alkenyl radical having 2 to 8 carbon atoms" to compounds included in formula RII (R0 in formula RII also includes alkenyl) and represented by "CC-n-V1" and "CC-V-V" according to the notation in the Specification of the Patent, thereby limiting the aspects of the compound further claimed to be included in the liquid-crystalline medium in Claim 1 from which Claim 2 depends. The above-described matters B and C of Correction are recognized to be aimed at the restriction in the Scope of Claims prescribed in item (i) of the proviso to Article 134-2(1) of the Patent Act.

Here, "CnH2n+1" (n is an integer from 2 to 8) included in "CC-n-V1," which limits the compounds of formula RII should be included in R0 of formula II (R0 is an n-alkyl, oxaalkyl, fluoroalkyl, alkenyloxy, or alkenyl, each having 2 to 8 carbon atoms). Note that "CnH2n+1" can be literally interpreted to include not only an n-alkyl (straight chain alkyl) but also a branched alkyl. However, with respect to the radicals "CnH2n+1" and "CmH2m+1" of the specific liquid compounds described in the Specification of the Patent, it can be said that "CnH2n+1" of "CC-n-V1," which defines

the compound of the formula RII, means an n-alkyl (straight chain alkyl) in consideration of the following: It is technically general that the radical "CnH2n+1" in a liquid-crystal compound means a straight-chain alkyl radical (n-alkyl) unless otherwise specified as a branched alkyl or the like; paragraph [0085] of the Specification describes that "In the present application and in the examples below, the structures of the liquid-crystal compounds are indicated by means of acronyms, the transformation into chemical formulae taking place in accordance with Tables A and B below (Note by the body: omitted). All radicals CnH2n+1 and CmH2m+1 are straight-chain alkyl radicals having n and m carbon atoms respectively; n and m are in each case, independently of one another, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, or 15;" and, as described in paragraph [0069] of the Specification, "CC-n-V1" having "CnH2n+1" is referred to as "RIIb" and is a subordinate compound of the compound represented by formula RII.

The matter A in Correction B, which is intended for dissolving a citation relation between claims and rewriting Claim 2 to an independent claim, does not introduce a new technical matter. Correcting X to "n-C3H7" by the matter B of Correction B does not introduce a new technical matter. In the matter C in Correction B, Correcting the compounds of formula RII to "CC-n-V1" and "CC-V-V" in formula RII is based on the fact that these are respectively described as "RIIb" and "RIIIa" in paragraph [0069] of the Specification of the Patent, and thus does not introduce a new technical matter. Other corrections, which are the matters B and C of Correction B, are intended for deleting some of the accepted options and do not introduce any new technical matter. Thus, Correction B complies with the provision of Article 126(5) of the Patent Act as applied mutatis mutandis under Article 134-2(9) of the Patent Act.

Furthermore, Correction B is intended for dissolving a citation relation between claims and definitely restricting X and the compounds of formula RII. Other corrections in Correction B delete some of the accepted options and do not enlarge or alter the Scope of Claims. Thus, Correction B complies with the provision of Article 126(6) of the Patent Act as applied mutatis mutandis under Article 134-2(9) of the Patent Act.

(3) Correction C

Among variations of Claim 3 each depending from Claim 1 or 2 in the Scope of Claims before the Correction, the matter A in Correction C is intended for dissolving a

citation relation between claims and rewriting Claim 3 to an independent claim that does not depend from Claim 1. Thus, it is a correction aimed "to change the description of claims dependent on other claims into claims which are not dependent on other claims" as prescribed in proviso No. 4 to Article 134-2(1) of the Patent Act.

The matter B in Correction C limits the aspect of Claim 3, which is "a liquid-crystalline medium based on a mixture of polar compounds of positive or negative dielectric anisotropy" in Claim 1 from which Claim 3 before the Correction depends, to "a liquid-crystalline medium based on a mixture of polar compounds of positive dielectric anisotropy." The matter C in Correction C deletes "formulae I3, I12, I13, I14, I15, I17, I18, I19, I21, I22, and I30" from "formulae I1 to I30" described in an alternative manner in Claim 3 before the Correction and also deletes the description of "'alkyl' is a straight-chain or branched alkyl radical having 1 to 8 carbon atoms" regarding the compound to be deleted to limit the aspects of compounds of formula I included in Claim 3 before the Correction. The matter C in Correction C limits X to "F" among the options of X before the Correction "as defined in Claim 1 (before the Correction)" and "OCF3" among the options of X before the Correction included in those in which "a halogenated ... having up to 8 carbon atoms ... substituted alkyl radical ..., in which one or more CH2 groups may be replaced by –O– ... in such a way that O atoms are not linked directly to one another," and limits L1 to L6 to "H" among "H or F" before the Correction. The matters B and C in Correction C are recognized to be aimed at the restriction in the Scope of Claims prescribed in item (i) of the proviso to Article 134-2(1) of the Patent Act.

The matter A in Correction B, which is intended for dissolving a citation relation between claims and rewriting Claim 3 to an independent claim, does not introduce a new technical matter. In the correction of X to "F or OCF3" in the matter C in Correction C, "F" is included in the options of X before the Correction, and the correction of limiting X to "OCF3" is based on the descriptions "X in the compounds of the formula I is preferably [Chemical 22] ... OCF3 ..." and "[Chemical 23] ... in particular ... OCF3" respectively in paragraphs [0023] and [0024] of the Specification of the Patent, and thus does not introduce a new technical matter. Other corrections, which are the matters B and C in Correction C, are intended for deleting some of the accepted options and do not introduce any new technical matter. Thus, Correction C complies with the provision of Article 126(5) of the Patent Act as applied mutatis mutandis under Article 134-2(9) of the Patent Act.

Furthermore, Correction C is intended for dissolving a citation relation between claims and definitely restricting X before the Correction. Other corrections in Correction C delete some of the accepted options and do not enlarge or alter the Scope of Claims. Thus, Correction C complies with the provision of Article 126(6) of the Patent Act as applied mutatis mutandis under Article 134-2(9) of the Patent Act.

(4) Correction D

Among variations of Claim 3 each depending from Claim 1 or 2 in the Scope of Claims before the Correction, the matter A in Correction D is intended for dissolving a citation relation between claims and Claim 3 depending from Claim 2 and rewriting Claim 3 to an independent claim that does not depend from any of the other claims. Thus, it is a correction aimed "to change the description of claims dependent on other claims into claims which are not dependent on other claims" as prescribed in item (iv) of the proviso to Article 134-2(1) of the Patent Act.

The matter B in Correction D limits the aspect of Claim 3, which is "a liquid-crystalline medium based on a mixture of polar compounds of positive or negative dielectric anisotropy" in Claim 1 from which Claim 3 before the Correction depends, to "a liquid-crystalline medium based on a mixture of polar compounds of positive dielectric anisotropy." The matter C in Correction D deletes "formulae I3, I12, I13, I14, I15, I17, I18, I19, I21, I22, and I30" from "formulae I1 to I30" described in an alternative manner in Claim 3 before the Correction and also deletes the description of "'alkyl' is a straight-chain or branched alkyl radical having 1 to 8 carbon atoms" to limit the aspects of compounds of formula I included in Claim 3 before the Correction, deletes CH3, C2H5, and n-C3H7 from the options of X to limit the aspects involved, and limits L1 to L6 to "H" among "H or F" before the Correction. The matters B and C in Correction D are recognized to be aimed at the restriction in the Scope of Claims prescribed in item (i) of the proviso to Article 134-2(1) of the Patent Act.

The matter A in Correction D, which is intended for dissolving a citation relation between claims and rewriting Claim 3 to an independent claim, does not introduce a new technical matter. The matters B and C in Correction D delete some of the accepted options. It cannot be said that these corrections introduce new technical matters. Therefore, Correction D complies with the provision of Article 126(5) of the Patent Act as applied mutatis mutandis under Article 134-2(9) of the Patent Act.

Furthermore, in addition to dissolving a citation relation between claims, other corrections in Correction D delete some of the accepted options. Correction D does not enlarge or alter the Scope of Claims. Thus, Correction D complies with the provision of Article 126(6) of the Patent Act as applied mutatis mutandis under Article 134-2(9) of the Patent Act.

(5) Correction E

Among variations of Claim 4 each depending from any one of Claims 1 to 3, Correction E is intended for dissolving a citation relation between claims and Claim 4 depending from Claim 1 and rewriting Claim 4 to an independent claim that does not depend from any of the other claims. Thus, it is a correction aimed "to change the description of claims dependent on other claims into claims which are not dependent on other claims" as prescribed in proviso No. 4 to Article 134-2(1) of the Patent Act.

Furthermore, Correction E dissolves a citation relation between claims. Thus, Correction E obviously complies with the provision of Article 126(5) of the Patent Act as applied mutatis mutandis under Article 134-2(9) of the Patent Act and does not enlarge or alter the Scope of Claims. Thus, Correction E complies with the provision of Article 126(6) of the Patent Act as applied mutatis mutandis under Article 134-2(9) of the Patent Act.

(6) Correction F

One of the matters in Correction F is that Correction E dissolves a citation relation between Claim 4 before the Correction, which depends from Claims 1 to 3, and Claims 1 to 3, and, along with rewriting Claim 4 after the Correction such that the content of Claim 4, which depends from Claim 1 before the Correction, is written to an independent claim, Claim 4, which further depends from Claim 2 depending from Claim 1 before the Correction, is written to Claim 9 after the Correction by making it depend from Claim 4 after the Correction and limiting it with the content of Claim 2 before the Correction.

Since Claim 4, which depends from Claim 1 before the Correction, is Claim 4 after the Correction, and Claim 4, which depends from Claim 2 depending from Claim 1 before the Correction, is Claim 9 after the Correction, one of the matters of Correction F is to rewrite Claim 4, which depends from Claim 3 (which depends from Claim 1 or

Claim 2) before the Correction, to Claim 10 after the Correction by making it depend from Claim 4 or 9 after the Correction and limited with the content of Claim 3 before the Correction. Thus, Correction F is a correction aimed "to change the description of claims dependent on other claims into claims which are not dependent on other claims" as prescribed in item (iv) of the proviso to Article 134-2(1) of the Patent Act.

Furthermore, Correction F rewrites the content of a claim having a specific citation relationship before the correction as a claim having the same content by changing the citation relationship of the claim. Thus, Correction F obviously complies with the provision of Article 126(5) of the Patent Act as applied mutatis mutandis under Article 134-2(9) of the Patent Act and does not enlarge or alter the Scope of Claims. Therefore, Correction F complies with the provision of Article 126(6) of the Patent Act as applied mutatis mutandis under Article 134-2(9) of the Patent Act.

(7) Correction G

As stated in the above (6), Claim 4, which depends from Claim 2 (which depends from Claim 1) before the Correction, is Claim 9 after the correction. Claim 4, which depends from Claim 3 depending from Claim 1 before the Correction, or Claim 4, which depends from Claim 3 depending from Claim 2, is Claim 10 after the Correction. Thus, one of the matters in Correction G rewrites Claim 5, which depends from Claim 4 depending from Claim 2 (which depends from Claim 1) or from Claim 3 (which depends from Claim 1 or 2) before the Correction, to depend from Claim 9 or 10 after the Correction to give Claim 11 after the Correction.

Similarly, another one of the matters in Correction G rewrites Claim 6, which depends from Claim 4 depending from Claim 3 (which depends from Claim 1 or 2) before the Correction, to depend from Claim 9 or 10 after the Correction to give Claim 12 after the Correction. Thus, Correction G is correction aimed "to change the description of claims dependent on other claims into claims which are not dependent on other claims" as prescribed in item (iv) of the proviso to Article 134-2(1) of the Patent Act.

Furthermore, Correction G rewrites the content of a claim having a specific citation relationship before the correction as a claim having the same content by changing the citation relationship of the claim. Thus, Correction G obviously complies with the provision of Article 126(5) of the Patent Act as applied mutatis mutandis under Article 134-2(9) of the Patent Act and does not enlarge or alter the Scope of Claims. Therefore, Correction G complies with the provision of Article

126(6) of the Patent Act as applied mutatis mutandis under Article 134-2(9) of the Patent Act.

Furthermore, Corrections E to G relate to Claims 4 to 6 before the Correction, which are not covered by the invalidation trial of the case, and are not intended to reduce the Scope of Claims or to correct typographical errors or incorrect translations. Thus, Corrections E to G do not comply with the provision of Article 126(7) of the Patent Act (Independent requirements for patentability) as applied mutatis mutandis under Article 134-2(9) of the Patent Act.

(8) Correction H

The matter A in Correction H is intended for dissolving a citation relation between claims and rewriting Claim 7 before the Correction, which depends from Claim 1 and rewriting Claim 7 to an independent claim that does not depend from claim 1. Thus, it is a correction aimed "to change the description of claims dependent on other claims into claims which are not dependent on other claims" as prescribed in item (iv) of the proviso to Article 134-2(1) of the Patent Act.

The matter B in Correction H limits rings A1 and A2 in the compounds of general formula I in Claim 1 from which Claim 7 before the Correction depends to the 1,4-phenylene radical in b) among the aspects of a), b), and c) before the Correction, limits ring A3 to the 1,4-cyclohexylene radical in a) among the aspects of a), b), and c) before the Correction, limits ring A4 to the 1,4-cyclohexylene radical among the options of [Chemical 4] before the Correction, while deleting the description "x, y, and z are each, independently of one another, 0, 1, or 2" specifying the options deleted due to the limitation, limits the aspects of Z1, Z2, and Z3 to "a single bond" among the options before the Correction, limits X to "n-C3H7" included in "... unsubstituted alkyl radical having ... up to 8 carbon atoms" and also limits to a "vinyl group" corresponding to the structure (-CH=CH-H) in which the "CH2" portion (CH2 group) in (CH2)-H of CH3 in "... unsubstituted alkyl radical having ... up to 8 carbon atoms" in the options before the Correction is substituted with "-CH=CH-," limits the possible cases of a, b, and c included in the description "a is 0, 1 or 2, b is 0, 1, or 2, and c is 0, 1, or 2, where a + b + c is from 1 to 3" to the aspect in which a is "0," b is "1,", and c is "1."

The correction matter C in Correction H deletes "formulae RVIII, RXI, RXII, and RXIV" from the "formulae RII, RIV, RV, RVII, RVIII, RXI, RXII, and RXIV," which are alternatively described in Claim 1 from which Claim 7 before the Correction

depends, and limits the compounds of formula RII specified such that "alkenyl is a straight-chain or branched alkenyl radical having 2 to 8 carbon atoms" to compounds of "CC-V-V" included in formula II, thereby limiting the aspects of the compound further claimed to be included in the liquid-crystalline medium in Claim 1 from which Claim 7 depends. The above-described matters of Corrections B and C are recognized to be aimed at the restriction in the scope of claims prescribed in the proviso No. 1 of Article 134-2(1) of the Patent Act.

The matter A in Correction H, which is intended for dissolving a citation relation between claims and rewriting Claim 7 to an independent claim, does not introduce a new technical matter. The correction of limiting X to "n-C3H7 or vinyl group" in the matter B in Correction H does not introduce a new technical matter, and in the matter C in Correction H, the correction of limiting the compounds represented by formula RII to "CC-V-V" included in formula II does not introduce a new technical matter. Other corrections, which are the matters B and C in Correction C, are intended for deleting some of the accepted options and do not introduce any new technical matter. Thus, Correction H complies with the provision of Article 126(5) of the Patent Act as applied mutatis mutandis under Article 134-2(9) of the Patent Act

Furthermore, Correction H is intended for dissolving a citation relation between claims and definitely restricting X and the compounds of formula RII. Other corrections in Correction H delete some of the accepted options and do not enlarge or alter the Scope of Claims. Thus, Correction H complies with the provision of Article 126(6) of the Patent Act as applied mutatis mutandis under Article 134-2(9) of the Patent Act.

(9) Correction I

The matter A in Correction I is intended for dissolving a citation relation between claims and Claim 8 before the Correction, which depends from Claim 1, and rewriting Claim 8 before the Correction to an independent claim that does not depend from claim 1. Thus, it is a correction aimed "to change the description of claims dependent on other claims into claims which are not dependent on other claims" as prescribed in item (iv) of the proviso to Article 134-2(1) of the Patent Act.

The content of the matter B in Correction I is the same as that of the matter B in Correction H. The content of the matter C in Correction I is the same as that of the

matter C in Correction B. As stated in the above (2) and (8), the matters B and C in Correction I are recognized to be aimed at the restriction in the Scope of Claims prescribed in item (i) of the proviso to Article 134-2(1) of the Patent Act.

The matter D in Correction I defines that the liquid-crystalline medium further comprises any of stabilizer represented by [Chemical 38] to [Chemical 42], and is thus recognized to be aimed at the restriction in the Scope of Claims prescribed in item (i) of the proviso to Article 134-2(1) of the Patent Act.

Furthermore, the matter A in Correction I, which is intended for dissolving a citation relation between claims and rewriting Claim 8 to an independent claim, does not introduce a new technical matter. The matters B and C in Correction I also do not introduce a new technical matter as in the case with Corrections B and H. Regarding the matter D in Correction I, paragraphs [0099] to [0103] in the Specification of the Patent describe stabilizers represented by [Chemical 38] to [Chemical 42] as those that can be added to the liquid-crystalline medium of the Invention. Regarding CnH2n+1 included in the structural formula [Chemical 38] of the stabilizer, the matter D in Correction I includes correcting to "n is 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, or 15 independently of each other." In paragraph [0085] of the Specification of the Patent, furthermore, there is described "In the present application and in the examples below, the structures of the liquid-crystal compounds are indicated by means of acronyms, the transformation into chemical formulae take place in accordance with Tables A and B below. All radicals CnH2n+1 and CmH2m+1 are straight-chain alkyl radicals having n and m carbon atoms respectively; n and m are in each case, independently of one another, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, or 15. The coding in Table B is self-evident." It is clear that this definition of "n" relates at least to the radical CnH2n+1 in Table 1, Table A, and Table B, following this description. Further, before and after the description of the stabilizers in the same paragraphs [0099] to [0103], there is no other provision regarding "n." It is natural to understand that "all" in "all radicals CnH2n+1" in paragraph [0085] also includes "CnH2n+1" found in the description of the stabilizers in paragraphs [0099] to [0103]. Therefore, Correction I complies with the provision of Article 126(5) of the Patent Act as applied mutatis mutandis under Article 134-2(9) of the Patent Act.

Furthermore, Correction I is intended for dissolving a citation relation between claims, definitely restricting X and the compounds of formula RII, and defining that the liquid-crystalline medium further comprises stabilizers represented by [Chemical 38] to

[Chemical 42] to reduce the Scope of Claims. Other corrections in Correction I delete some of the accepted options and do not enlarge or alter the Scope of Claims. Thus, Correction I complies with the provision of Article 126(6) of the Patent Act as applied mutatis mutandis under Article 134-2(9) of the Patent Act.

(10) Regarding Demandant's allegation to the Correction

A Demandant's allegation to the Correction

Demandant alleges in the second written refutation that the Correction violates the requirements for correction in the following points.

(A) "Correction A limits formula I to PP-13. However, as Demandee acknowledges, PP-13 is not specifically disclosed in the Specification of the Patent (Demandee's Written Statement, page 7). On the basis of the general concept of Formula I, the correction limiting the formula to PP-13, which is not specifically disclosed in the Specification introduces a new technical matter and should not be allowed." (Page 11, line 26 to Page 12, line 3)

(B) "Correction B (7 and 8) attempts to limit the second component (...) to specific structures of RII; CC-n-V and CC-V-V, RIV, RV, and RVII.

However, the specification of the Patent only mentions that 'preferably, it includes a compound selected from the group consisting of the following RI to RXIV ...' (...) and makes no mention of what particular technical significance each of RII, RIV, RV, RVII, RVIII, RXI, RXII, and RXIV has. There is no description that the specific structure of RII has a technical significance different from that of other structures. ... If Demandee alleges that Correction B (G and H) causes a new technical significance, the allegation is to add a new technical matter not found in the Specification of the Patent. Therefore, Correction B (G and H) falls under the addition of new matter." (page 13, lines 5 to 18, page 15, lines 4 to 6)

(C) "Correction C limits the terminal group X of formula I to F or OCF3, especially for formulas I1, I2, I4 to I11, I16, I20, I23 to I29 of formula I. However, as Demandee acknowledges, X=OCF3 is not specifically described in Claim 3 at the time of the establishment of patent right. Paragraphs [0023] and [0024] of the Specification of the Patent include a long list of terminal groups X ... the Specification of the Patent

does not disclose the specific combination in which formula I is limited to formulae I1, I2, I4 to I11, I16, I20, and I23 to I29, and the terminal group X of formula I is limited to F or OCF3." (page 13, lines 20 to page 14, line 5)

(D) "Corrections H and I limit formula I to CCP-V-1 or CCP-31. However, CCP-V-1 is not included in formula I. The V (vinyl group) position in CCP-V-1 corresponds to the X position in formula I. X extends to alkenyl groups having three or more carbon atoms, but does not include any alkenyl group having two carbon atoms (i.e., vinyl group). The detailed reasons are as follows.

X is an unsubstituted alkyl radical '... in which one or two or more CH2 groups are optionally replaced by −O− or −CH=CH−' (Claim 1) ... An unsubstituted alkyl radical having one carbon atom, or a -CH3 group, does not have a -CH2 group. ... Thus, X does not include any alkenyl group having two carbon atoms (i.e., vinyl group) ... Therefore, Corrections H and I are not intended to reduce the Scope of Claims. ... Furthermore, Corrections H and I are intended to incorporate compounds that are not disclosed in the Specification of the Patent, and therefore introduce new technical matters ..." (page 14, line 11 to page 15, line 2)

B Judgment by the body on Demandant's allegations

The judgments by the body on the above-described Demandant's allegations (A) to (D) are as follows. None of the allegations can be adopted.

(A) In formula 1 in Claim 1 before the Correction, if each matter specifying the Invention is selected according to the respective options and selectable ranges of ring A1 to ring A4, x to z, Z1 to Z3, X, and a to c, the "PP- 13" can be understood as stated in the above-described (1). The structure of "PP" itself is not an inconceivable combination. In addition, n-C3H7 as X is not an inconceivable structure either. Even if "PP-13" itself is not described in the Specification of the Patent as a specific compound of formula I, it cannot be said that limiting formula I to "PP-13" immediately introduces a new technical matter.

Considering the description of the Written Statement submitted by Demandee on December 13, 2017, Demandee alleges that a liquid-crystalline medium containing "PP-13" can solve the problems of the Invention as in the case of a liquid-crystalline medium containing "CCP-31" included in formula I (VII, page 8), but does not allege

that "PP-13" has a different technical meaning than the other compounds included in formula I.

Then, Correction A does not introduce any new technical matter.

(B) Even if taking into Consideration the description of the Written Statement submitted by Demandee on December 13, 2017, Demandee does not allege that "CC-n-V1" and "CC-V-V" of the RII which have specific structures described in the Specification of the Patent have a technical significance which is different from that of the compounds of the formulae RII, RIV, RV, RVII, RVIII, RXI, RXII, and RXIV (for example, pages 14 and 15) in Claim 1 before correction. Thus, it cannot be said that correcting RII with "CC-n-V1" and "CC-V-V" having specific structures introduce new technical matters.

Then, Corrections B, G, and H do not introduce any new technical matter.

(C) In the compounds of the formulae I1 to I30, X is present as a terminal group in the first place, and the compound of the formula I and X are not combined by the Correction. The compounds of the formulae I1, I2, I4 to I11, I16, I20, and I23 to I29 were selected from the compounds of I1 to I30 simply because the other compounds of formula I were deleted. Furthermore, even though there are many options for X, the terminal group "F or OCF3" is not an ordinarily unthinkable terminal group. Thus, in the compounds of the formulae I1, I2, I4 to I11, I16, I20, and I23 to I29, the selection of "F or OCF3" as X cannot be said to introduce any new technical matter.

Then, Correction C does not introduce any new technical matter.

(D) As stated in the above-described (8), the -CH3 group is included in the unsubstituted alkyl radicals that are allowed as X options. This -CH3 group can be regarded as consisting of -CH2 group and H. If this -CH2 group is replaced with "-CH=CH-", therefore, -CH=CH-H, or a vinyl group, is obtained.

Then, paragraph [0024] of the specification of the Patent describes "CH=CF2, CF=CF2 ... CH=CHF ... CF=CHF" as options of X. Considering that these structures are included in the options of X, it does not mean that X does not include a alkenyl group having 2 carbon atoms (vinyl group).

Therefore, Corrections H and I are not intended to reduce the Scope of Claims, nor to introduce any new technical matter.

3 Summary of the judgement on the Correction

As stated above, the Correction aims at matters prescribed in items (i) and (iv) of the proviso to Article 134-2(1) of the Patent Act and complies with the provision of Article 126(5) and(6) of the Patent Act as applied mutatis mutandis under Article 134-2(9) of the Patent Act.

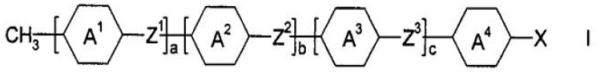
Therefore, the Correction of the case shall be approved.

The matters of correction for Claims 2, 3, 4 to 6, 7, 8, 9 to 12, and 13 after the Correction include corrections that fall under the dissolution of a citation relation between claims. Thus, these corrections are acceptable. There was a demand from Demandee for Claims 2, 3, 4 to 6, 7, 8, 9 to 12, and 13 to be treated as correction units separated from that of Claim 1 when they are accepted to be corrected. Thus, Claims 1, 2, 3, [4 to 6 and 9 to 12], 7, 8, and 13 after the Correction are allowed to be corrected as separate correction units.

No. 4 Description in the Scope of Claims of the Patent

As stated in the above-described "III", the demand of the Correction is legal and thus the corrected Claims 1 to 13 are as described below. The corrected Claims 4 to 6 and 9 to 12 correspond to Claims 4 to 6 that were not subject of the invalidation trial of the case. Therefore, only Claims 1 to 3, 7, 8, and 13 are subject to the demand for the invalidation trial of the case.

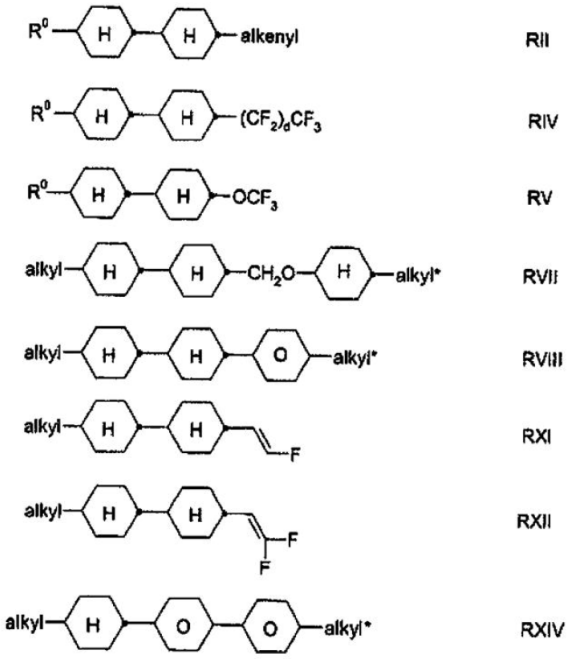
"[Claim 1] A liquid-crystalline medium based on a mixture of polar compounds of positive or negative dielectric anisotropy, comprising:
one or two or more compounds of formula I
[Chemical 1]



I

in which
[Chemical 2]
in which ring A1, ring A2, and ring A3 are 1,4-phenylene radicals,
[Chemical 3]
ring A4 is
[Chemical 4]

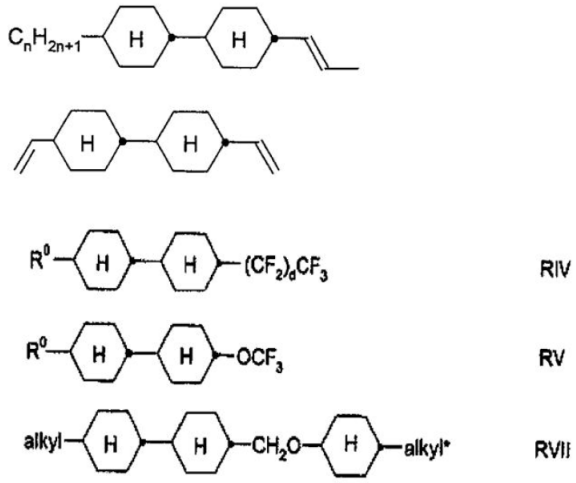
1,4-phenylene radical is ... (note by the body: it is described in the form of a structural formula in the correction in the Scope of Claims)
Z1, Z2, and Z3 are single bonds,
X is n-C3H7,
a is 0,
b is 0, and
c is 1,
wherein the liquid-crystalline medium further comprises one or two or more compounds selected from the group consisting of compounds of the following formulae RII, RIV, RV, RVII, RVIII, RXI, RXII, and RXIV:
[Chemical 5]



in which
R0 is an n-alkyl, oxaalkyl, fluoroalkyl, alkenyloxy, or alkenyl, each having 2 to 8 carbon atoms,
d is 0, 1, or 2,
alkyl and alkyl* are each, independently of one another, a straight-chain or branched alkyl radical having 2 to 8 carbon atoms, and
alkenyl is a straight-chain or branched alkenyl radical having 2 to 8 carbon atoms.

[Claim 2] A liquid-crystalline medium based on a mixture of polar compounds of positive or negative dielectric anisotropy, comprising:
one or two or more compounds of the formula I

[Chemical 6] (omitted)
in which
[Chemical 7]
in which ring A1 and ring A2 are 1,4-phenylene radicals,
[Chemical 8]
ring A3 is a 1,4-cyclohexylene radical,
[Chemical 9]
ring A4 is
[Chemical 10]
1,4-cyclohexylene radical (note by the body: it is described in the form of a structural formula in the correction in the Scope of Claims),
Z1, Z2, and Z3 are single bonds,
X is n-C3H7 or a vinyl group,
a is 0,
b is 1, and
c is 1,
wherein the liquid-crystalline medium further comprises one or two or more compounds selected from the group consisting of compounds of
[Chemical 11]

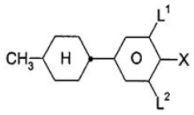


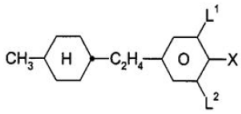
in which
R0 is an n-alkyl, oxaalkyl, fluoroalkyl, alkenyloxy, or alkenyl, each having 2 to 8 carbon atoms,
d is 0, 1, or 2,
alkyl and alkyl* are each, independently of one another, a straight-chain or branched alkyl radical having 2 to 8 carbon atoms, and

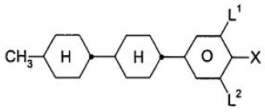
n is an integer from 2 to 8.

[Claim 3] A liquid-crystalline medium based on a mixture of polar compounds of positive dielectric anisotropy, at least one compound selected from the group consisting of compounds of the following formulae:

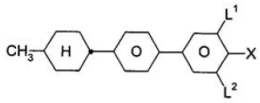
[Chemical 12]

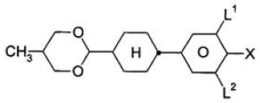

I1

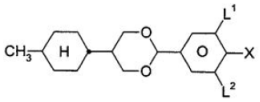

I2

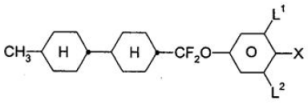

I4

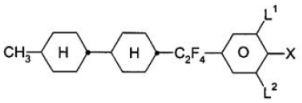
[Chemical 13]

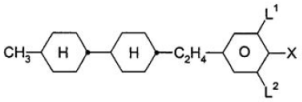

I5


I6


I7


I8


I9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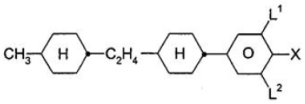
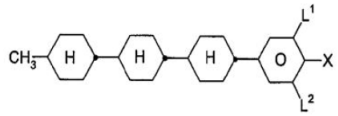
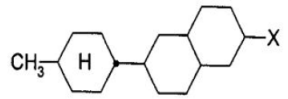

I11

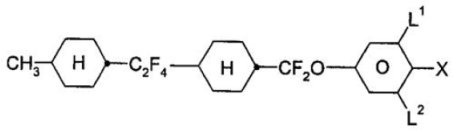
[Chemical 14]


I16

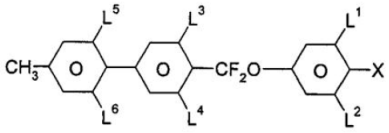
[Chemical 15]



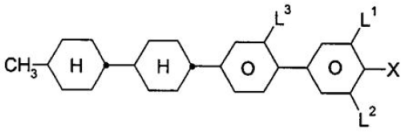
I20



I23



I24



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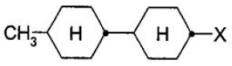
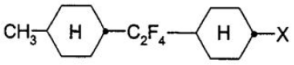
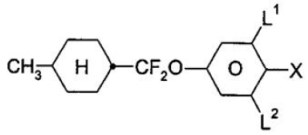


I26

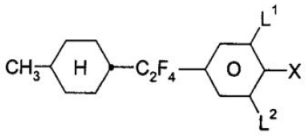


I27

[Chemical 16]



I28



I29

in which

X is F or OXF2, and L1 to L6 are H,

wherein the liquid-crystalline medium further comprises at least one compound selected from the group consisting of compounds of the following formula:

[Chemical 17] (omitted) (note by the body: it is identical with [Chemical 5] in Claim 1)

in which

R0 is an n-alkyl, oxaalkyl, fluoroalkyl, alkenyloxy, or alkenyl, each having 2 to 8 carbon atoms

d is 0, 1, or 2,

alkyl and alkyl* are each, independently of one another, a straight-chain or branched alkyl radical having 2 to 8 carbon atoms, and

alkenyl is a straight-chain or branched alkenyl radical having 2 to 8 carbon atoms.

[Claim 4] A liquid-crystalline medium based on a mixture of polar compounds of positive or negative dielectric anisotropy, comprising: one or more compounds of formula I

[Chemical 18] (omitted)

in which

[Chemical 19]

ring A1, ring A2, and ring A3 are

a) a 1,4-cyclohexenylene or 1,4-cyclohexylene radical, in which one or two non-adjacent CH2 groups are optionally replaced by −O− or −S−,

b) a 1,4-phenylene radical, in which one or two CH groups are optionally replaced by N, and

c) a radical selected from the group consisting of piperidine-1,4-diyl, 1,4-bicyclo[2.2.2]octylene, naphthalene-2,6-diyl, decahydronaphthalene-2,6-diyl, 1,2,3,4-tetrahydronaphthalene-2,6-diyl, phenanthrene-2,7-diyl, and fluorene-2,7-diyl,

where the radicals a), b) and c) are optionally monosubstituted or polysubstituted by halogen atoms,

[Chemical 20]

ring A4 is

[Chemical 21] (omitted)

x, y, and z are each, independently of one another, 0, 1, or 2,

Z1 and Z2 are each, independently of one another, -CO-O-, -O-CO-, -CF2O-, -OCF2-, -CH2O-, -OCH2-, -CH2CH2-, -(CH2)4-, C2F4-, -CH2CF2-, -CF2CH2-, -CF=CF-, -CH=CH-, -C≡C-, or a single bond, Z3 is -O-CO-, -CF2O-, -OCF2-, -CH2O-, -OCH2-, -CH2CH2-, -(CH2)4-, -C2F4-, -CH2CF2-, -CF2CH2-, -CF=CF-, -CH=CH-, -C≡C-, or a single bond,

X is F, Cl, CN, SF5, NCS, or a halogenated or unsubstituted alkyl radical having up to 8 carbon atoms, in which one or two or more CH2 groups are optionally replaced by −O− or −CH=CH− in such a way that O atoms are not linked directly to one another,

a is 0, 1, or 2,

b is 0, 1, or 2, and

c is 0, 1, or 2, where a + b + c is from 1 to 3,

wherein the liquid-crystalline medium further comprises one or two or more compounds selected from the group consisting of compounds of the following formulae RII, RIV, RV, RVII, RVIII, RXI, RXII, and RXIV:

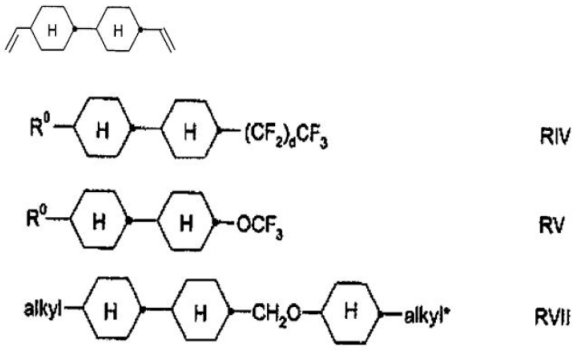
[Chemical 22] (omitted)
in which
R0 is an n-alkyl, oxaalkyl, fluoroalkyl, alkenyloxy, or alkenyl, each having 2 to 8 carbon atoms,
d is 0, 1, or 2,
alkyl and alkyl* are each, independently of one another, a straight-chain or branched alkyl radical having 2 to 8 carbon atoms,
alkenyl is a straight-chain or branched alkenyl radical having 2 to 8 carbon atoms;
optionally, further comprises one or two or more compounds selected from the group consisting of compounds of the general formulae II, III, IV, V, VI, VII, VIII, and X:
[Chemical 23] to [Chemical 25] (omitted)
in which the individual radicals have the following meanings:
R0 is an n-alkyl, oxaalkyl, fluoroalkyl, alkenyloxy, or alkenyl, each having 2 to 12 carbon atoms,
X0 is F, Cl, a halogenated alkyl, halogenated alkenyl, halogenated alkenyloxy, or halogenated alkoxy each having up to 8 carbon atoms,
Z0 is −CH=CH−, −CH2O−, −OCH2−, − (CH2)4−, −C2H4−, −C2F4−, −CF=CF−, −CF2O−, −OCF2−, or −COO−,
Y1, Y2, Y3, and Y4 are each, independently of one another, H or F, and
r is 0 or 1.

[Claim 5] The liquid-crystalline medium according to Claim 4, wherein the proportion of compounds each represented by one of the formulae I, II, III, IV, V, VI, VII, VIII, and X in the mixture as a whole is at least 50% by weight.

[Claim 6] The liquid-crystalline medium according to Claim 4, wherein X0 is F, OCHF2, or OCF3, and Y2 is H or F.

[Claim 7] A use of a liquid-crystalline medium for electro-optical purposes, the liquid-crystalline medium being based on a mixture of polar compounds of positive or negative dielectric anisotropy, comprising:
one or two or more compounds of formula I
[Chemical 26] (omitted)
in which
[Chemical 27]
in which ring A1 and ring A2 are 1,4-phenylene radicals,

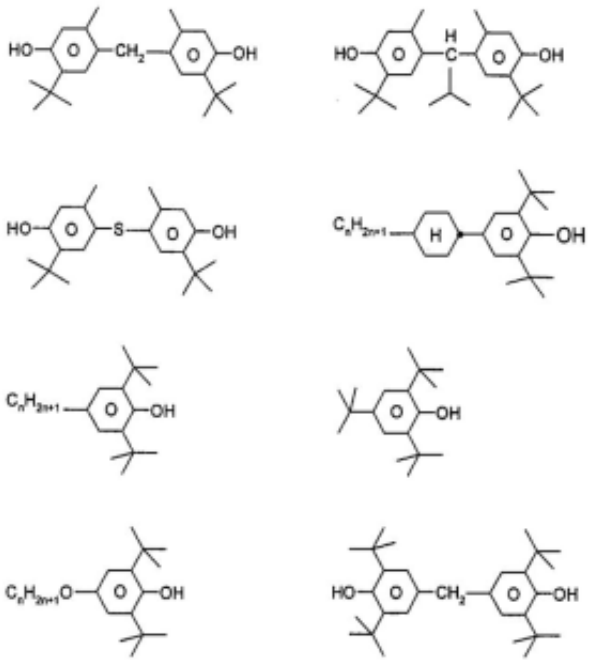
[Chemical 28]
ring A3 is a 1,4-cyclohexylene radical,
[Chemical 29]
ring A4 is
[Chemical 30]
1,4-cyclohexylene radical (note by the body: it is described in the form of a structural formula in the correction in the Scope of Claims),
Z1, Z2, and Z3 are single bonds,
X is n-C3H7 or a vinyl group,
a is 0,
b is 1, and
c is 1,
wherein the liquid-crystalline medium further comprises one or two or more compounds selected from the group consisting of compounds of the following formula:
[Chemical 31]



in which
R0 is an n-alkyl, oxaalkyl, fluoroalkyl, alkenyloxy, or alkenyl, each having 2 to 8 carbon atoms
d is 0, 1, or 2, and
alkyl and alkyl* are each, independently of one another, a straight-chain or branched alkyl radical having 2 to 8 carbon atoms.

[Claim 8] An electro-optical liquid-crystal display comprising a liquid-crystalline medium, the liquid-crystalline medium being based on a mixture of polar compounds of positive or negative dielectric anisotropy
[Chemical 32] (omitted)
in which
[Chemical 33]

in which ring A1 and ring A2 are phenylene radicals,
[Chemical 34]
ring A3 is a 1,4-cyclohexylene radical,
[Chemical 35]
ring A4 is
[Chemical 36]
1,4-cyclohexylene radical (note by the body: it is described in the form of a structural formula in the correction in the Scope of Claims),
Z1, Z2, and Z3 are single bonds,
X is n-C3H7 or a vinyl group,
a is 0,
b is 1, and
c is 1,
wherein the liquid-crystalline medium further comprises one or two or more compounds selected from the group consisting of compounds of the following formula:
[Chemical 37] (omitted) (note by the body: it is identical to [Chemical 11] of Claim 2)
in which
R0 is an n-alkyl, oxaalkyl, fluoroalkyl, alkenyloxy, or alkenyl, each having 2 to 8 carbon atoms,
d is 0, 1, or 2,
alkyl and alkyl* are each, independently of one another, a straight-chain or branched alkyl radical having 2 to 8 carbon atoms, and
n is an integer from 2 to 8,
wherein the liquid-crystalline medium further comprises at least one stabilizer selected from the group consisting of the following formulae:
[Chemical 38]



[Chemical 39] to [Chemical 42] (omitted)
in which, n is 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, or 15 independently of each other.

[Claim 9] The liquid-crystalline medium according to Claim 4, wherein
X in formula I is
[Chemical 43] (omitted).

[Claim 10] The liquid-crystalline medium according to Claim 4 or 9, comprising at least one compound selected from the group consisting of compounds of formulae I1 to I30:
[Chemical 44] to [Chemical 48] (omitted)
in which
X is as defined in Claim 4, "alkyl" is a straight-chain or branched alkyl radical having 1 to 8 carbon atoms, and L1 to L6 are each, independently of one another, H or F.

[Claim 11] The liquid-crystalline medium according to Claim 9 or Claim 10, wherein the proportion of compounds each represented by one of the formulae I, II, III, IV, V, VI, VII, VIII, and X in the mixture as a whole is at least 50% by weight.

[Claim 12] The liquid-crystalline medium according to Claim 9 or Claim 10, wherein X0 is F, OCHF2, or OCF3, and Y2 is H or F.

[Claim 13] A liquid-crystalline medium based on a mixture of polar compounds of positive dielectric anisotropy, at least one compound selected from the group consisting of compounds of the following formulae:
[Chemical 49] to [Chemical 53] (omitted) (note by the body: they are identical with [Chemical 12] to [Chemical 16] in Claim 1)
in which
X is
[Chemical 54]
F, C1, CN, NCS, CF3, C2F5, n-C3F7, SF5, CF2H, OCF3, OCF2H, OCFHCF3, OCFHCFH2, OCFHCF2H, OCF2CH3, OCF2CFH2, OCF2CF2H, OCF2CF2CF2H, OCF2CF2CFH2, OCFHCF2CF3, OCFHCF2CF2H, OCF2CF2CF3, CF2CHFCF3, CF2CH2CF3, OCH2CF2CHFCF3, OCF2CHFCF3, or OCClFCF2CF3,
and L1 to L6 are H,
wherein the liquid-crystalline medium further comprises one or two or more compounds selected from the group consisting of compounds of the following formula:
[Chemical 55] (omitted) (note by the body: it is identical to [Chemical 5] of Claim 1)
in which
R0 is an n-alkyl, oxaalkyl, fluoroalkyl, alkenyloxy, or alkenyl, each having 2 to 8 carbon atoms,
d is 0, 1, or 2,
alkyl and alkyl* are each, independently of one another, a straight-chain or branched alkyl radical having 2 to 8 carbon atoms, and
alkenyl is a straight-chain or branched alkenyl radical having 2 to 8 carbon atoms."
(Hereinafter, the inventions according to the above-described Claims 1 to 13 after the Correction are respectively referred to as "Invention 1" to "Invention 13" in order of claim numbers and these are collectively referred to as "the Invention").

No. 5 Reasons for invalidation alleged by Demandant

Reasons for invalidation alleged by Demandant are as follows:

Reasons for invalidation 1, 2, 3, and 4

First, according to the item "No. 4" of "Demandant" in the first oral proceeding record, it is confirmed that the reason for invalidation 2 is not subject to the trial when

the formulae I1 to I30 of Claim 3 before the Correction, I12, I15, I19, I21, I22, and I30 are deleted. According to the item "No. 4" of "Demandee," the item "No. 4" of "Demandant" is agreed.

Therefore, the Reasons for invalidation 1, 3, and 4 will be only judged. Considering the Correction, the Reasons for invalidation 1, 3, and 4 are recognized as follows.

Reason for invalidation 1 (1-1 to 1-3): The description in the Scope of Claims of the Patent after the Correction does not comply with the requirement under Article 36(6)(i) of the Patent Act. Thus, the patent for Inventions 1 to 3, 7, 8, and 13 is not patentable but was granted in breach of Article 36(6)(i) of the Patent Act. Therefore, the patent falls under Article 123(1)(iv) of the Act and should be invalidated.

Reason for invalidation 3: Inventions 1 to 3, 7, 8, and 13 are the invention disclosed in A1 Example 5 or A9 Example 10 or could be easily made by a person skilled in the art based on the invention disclosed in A1 Example 5 or A9 Example 10. In addition, Invention 2 is the invention disclosed in A12 Example 4 or could be easily made by a person skilled in the art based on the invention disclosed in A12 Example 4.

Therefore, Inventions 1 to 3, 7, 8, and 13 fall under the provision of Article 29(1)(iii) of the Patent Act or cannot be granted a patent under the provision of Article 29(2) of the Patent Act. Thus, the patent for Inventions 1 to 3, 7, 8, and 13 is not patentable but was granted in breach of Article 29(2) of the Patent Act. Therefore, Inventions 1 to 3, 7, 8, and 13 fall under the provision of Article 123(1)(ii) of the Patent Act and should be invalidated.

Hereinafter, the case where A1 Example 5 is the main invention is referred to as "Reason for invalidation 3-1." The case where A9 Example 10 is the invention is referred to as "Reason for invalidation 3-2."

In the written demand for trial, pages 89 to 92 "Appendix 2," Demandant alleged the lack of novelty and inventive step of the Invention by describing "A1 Example 4," "A1 Example 5," "A3 Example 2," "A3 Example 3," "A3 Example 4," "A3 Example 6," "A3 Example 8," "A3 Example 10," "A4 Example 1," "A4 Example 2," "A4 Example 8," "A4 Example 9," "A4 Example 12," "A4 Example 13," "A5 Example 14," "A6 Example 18," "A7 Example 7," "A7 Example 10," "A8 Example 26," "A9 Example 10," "A9 Example 12," "A10 Example 10," "A10 Example 12," "A11 Example 10," and "A12 Example 4" and making a comparison therebetween while making correspondence with

the composition of Claim 1 before the Correction. Then, in order to make the points easier to understand, in the Written Amendment in response to the Written Demand for Trial dated July 1, 2016, Demandant considered the invention of "A1 Example 5" or "A9 Example 10" as the main cited invention to allege the lack of novelty and inventive step of the Invention. Upon the Correction, in the Written Refutation of the trial case dated November 18, 2016, Demandant also recognized the invention of "A12 Example 4" as the main cited invention and alleged the lack of novelty and inventive step of Invention 2 (pages 35 to 36).

Demandant also alleged the lack of novelty and inventive step of Invention 2 with the invention of "A12 Example 4" as the main cited invention. Thus, Demandant's allegation will be examined in the Reason for invalidation 4.

Reason for invalidation 4: Inventions 1 to 3, 7, 8, and 13 are the invention of A2 Example 1 or the like or the invention of A4 Example 16 or could be easily invented by a person skilled in the art based on the invention A2 Example 1 or the invention of A4 Example 16. Also, Invention 1 is the invention of A17 Example 1 or Example 2 or could be easily invented by a person skilled in the art based on the invention of A17 Example 1 or Example 2. Furthermore, Invention 2 is the invention of A12 Example 4 or could be easily invented by a person skilled in the art based on the invention of A12 Example 4.

Therefore, Inventions 1 to 3, 7, 8, and 13 fall under the provision of Article 29(1)(iii) of the Patent Act or cannot be granted a patent under the provision of Article 29(2) of the Patent Act. Thus, the patent for Inventions 1 to 3, 7, 8, and 13 is not patentable but was granted in breach of Article 29(2) of the Patent Act. Therefore, Inventions 1 to 3, 7, 8, and 13 fall under the provision of Article 123(1)(ii) of the Patent Act and should be invalidated.

Hereinafter, the case where A2 Example 1 or the like is the main invention is referred to as "Reason for invalidation 4-1," the case where A4 Example 2 is the main invention is referred to as "Reason for invalidation 4-2," the case where A17 Example 1 or Example 2 is the main invention is referred to as "Reason for invalidation 4-3," and the case where "A12 Example 4" is the main invention is referred to as "Reason for invalidation 4-4."

In the Written Demand for Trial, pages 93 to 96 "Appendix 3," Demandant alleged the lack of novelty and inventive step of the Invention by describing "A2

Example 1," "A2 Example 2," "A2 Example 3," "A2 Example 4," "A4 Example 11," "A4 Example 15," "A4 Example 16," "A5 Use Example 13," "A6 Example 17," "A7 Use Example 6," "A8 Example 25," "A11 Example 9," "A12 Example 1," "A12 Example 4," "A14 Example 4," "A14 Example 7," "A15 Example 1," "A16 Example 3," "A16 Example 4," "A16 Example 6," "A16 Example 7," "A17 Example 1," and "A17 Example 2" and making a comparison therebetween while making correspondence with the composition of Claim 1 before the Correction. Then, in order to make the points easier to understand, in the Written Amendment in response to the Written Demand for Trial dated July 1, 2016, Demandant considered the invention of "A2 Example 1" or "A4 Example 16" as the main cited invention to allege the lack of novelty and inventive step of the Invention. Upon the Correction, in the Written Refutation of the trial case dated November 18, 2016, Demandant also recognized the invention of "A17 Example 1 or Example 2" as the main cited invention to allege the lack of novelty and inventive step of Invention 1 and recognized the invention of "A12 Example 4" as the main cited invention to allege the lack of novelty and inventive step of Invention 2 (pages 53 to 54, and 58).

No. 6 Judgment by the body

The body judges as follows.

Since Reason for invalidation 1 regarding Inventions 1, 2, 7, and 8 has grounds, the patent of Inventions 1, 2, 7, and 8 should be invalidated. Reason for invalidation 3-1 and 3-2, Reason for invalidation 4-1, 4-2, 4-3, and 4-4 regarding Inventions 1 to 3, 7, 8, and 13, and Reason for invalidation 1 regarding Inventions 3 and 13 are groundless.

The patent of Inventions 3 and 13 has no reason for invalidation. Therefore, the case of a trial for invalidation regarding Inventions 3 and 13 is dismissed.

Hereinafter, details of the judgement will be provided.

1 Regarding Reason for invalidation 1

The Reason for invalidation 1 is that "Inventions 1 to 3, 7, 8, and 13 are beyond the scope that allows a person skilled in the art to recognize these inventions to solve the problems of the Invention described in the Detailed Description of the Invention of the Specification."

Here, there are the following three viewpoints in the argument.

(1) Common features between the compound represented by the general formula I of the Invention and "the liquid-crystalline compound which has a terminal polar radical and a terminal CH3 group" described in the Specification,

(2) Technical support for "the liquid-crystalline compound which has a terminal polar radical and a terminal CH3 group" described in paragraph [0017] of the Specification,

(3) Dielectric anisotropy of liquid-crystalline medium of the Invention.

The above item (1) is divided into the following two items:

(1-1) the terminal polar radical in "the liquid-crystalline compound which has a terminal polar radical and a terminal CH3 group;" and

(1-2) the compound represented by the general formula I of Invention 1.

Hereinafter, each of the points will be examined in turn.

(1) Correspondence between the compound represented by the general formula I of the Invention and "the liquid-crystalline compound which has a terminal polar radical and a terminal CH3 group" described in the Specification.

(1-1) Terminal polar radical in "the liquid-crystalline compound which has a terminal polar radical and a terminal CH3 group"

The reason for invalidation 1 concerns the scope that allows a person skilled in the art to recognize whether the problems of the Invention described in the Detailed Description of the Invention of the Specification can be solved. Prior to consideration, first, the described matters in the Specification of the Patent will be considered.

A Problems to be Solved by the Invention

Regarding the problems to be solved by the Invention, the Specification of the Patent describes as follows in paragraph [0016]: "The invention has an object of providing media, in particular for MLC, TN, or STN displays of this type, which do not have the above-mentioned disadvantages or only do so to a reduced extent, and preferably simultaneously have very high specific resistances and low threshold voltages. This object requires liquid-crystalline compounds which have a high clearing point and low rotational viscosity." In paragraph [0013] of the Specification, furthermore, there is further described "There thus continues to be a great demand for MLC displays having very high specific resistance at the same time as a large

working-temperature range, short response times even at low temperatures, and low threshold voltage which do not have these disadvantages, or only do so to a reduced extent." Here, both "the above-mentioned disadvantages" in paragraph [0016] and "these disadvantages" in paragraph [0013] are described without explicit notification. However, the contents described in the same paragraphs are recognized as being related to "the above-mentioned disadvantages" and "these disadvantages." Thus, it can be said that problems to be solved by the Invention is to provide in particular a medium for MLC, TN, or STN displays, which has no drawback or only a minor drawback of the prior art, particularly in four respects of "very high specific resistances," "a high clearing point or a large working-temperature range," "low rotational viscosity or short response times even at low temperatures," and "low threshold voltage." In paragraph [0017] of the Specification, furthermore, there is described "It has now been found that these objects can be achieved if use is made of the liquid-crystalline compound which has a terminal polar radical and a terminal CH3 group. The compounds of the formula I reduce the elastic constants, in particular K1, and result in mixtures having particularly low threshold voltages." In this description, the reduced elastic constants, especially the low threshold voltages caused by K1, are highlighted.

B Regarding means for solving the problem

As a means for solving the problem, the use of "the liquid-crystalline compound which has a terminal polar radical and a terminal CH3 group" is described in the above paragraph [0017]. There is no explanation of cause and effect regarding how the Invention can solve the above-described problems by adopting this means in the Specification of the Patent. According to the descriptions of the Specification of the Patent, it is not possible to objectively ascertain why the problems of the Invention described above can be solved if "the liquid-crystalline compound which has a terminal polar radical and a terminal CH3 group" exists in the liquid-crystalline medium.

In this regard, in the Oral Proceedings Statement Brief submitted on April 13, 2017, page 5, line 22 to page 6, line 6, Demandee makes clarification as follows: "In the Invention, attention has been paid to a liquid-crystalline compound having a methyl group as a terminal group, which has received little attention so far. As a result, it was found that the compound of the formula (I) having a methyl group reduces the elastic constant, especially K1, and the threshold voltage. On the priority date of this patent, there was no clear theory that allowed estimation of the magnitude of the elastic constants. It is difficult to predict the elastic constant from the structure of the

liquid-crystalline compound. Thus, the exact mechanism by which such an effect is obtained is unknown. However, it is presumed that each of the above factors related to the elastic modulus was within an appropriate range by introducing a methyl group and combining it with the other terminal polar radical.

Furthermore, an alkyl radical, having a longer chain length than that of a methyl group as a terminal group, is the most common substituent for a liquid-crystalline compound. Unlike the case where the ring structure or the like is changed, it is presumed that the change to a methyl group does not adversely affect other properties (clearing point, rotational viscosity, etc.)." This clarification is not concrete or a direct explain for the reason why the above-mentioned problems can be solved. Besides, it is not supported by objective grounds and therefore cannot be adopted.

In the Written Statement submitted on December 13, 2017, page 10, line 2 to page 11, line 7, another clarification is made as follows: "In general, a (rod-shaped) liquid-crystalline compound has a core portion represented by a ring structure and a flexible portion represented by a terminal alkyl radical having an appropriate length. Shortening the length of the terminal alkyl radical that a liquid-crystalline compound usually has to make it a typical terminal CH3 group is expected to cause the liquid-crystalline compound to somewhat reduce the liquid crystallinity of the liquid-crystalline medium containing it, or the degree of molecular orientation thereof, as compared with a liquid-crystalline compound having a terminal alkyl radical of a normal length. The degree of such molecular orientation is represented by the order parameter S in the technical field of liquid crystals. ... The above effects of the liquid-crystalline compound containing a terminal CH3 group on the molecular orientation of the liquid-crystalline medium can be reworded to read as 'a liquid-crystalline compound having a terminal CH3 group lowers the order parameter S of the liquid-crystalline medium containing it, as compared with the conventional liquid-crystalline compound.'

In the technical field of liquid crystals, furthermore, it is known that the following relationship holds between the order parameter S and the elastic constant Ki.

Ki to S2

K1 (spray mode) is the elastic constant to be noted in the Patent Invention after the correction this time and will be thus examined based on the following relational expression.

K1 to S2

From the above relational expression, considering the relationship between K1 and S, the effects of the liquid-crystalline compound having a terminal CH3 group on

K1 of the liquid-crystalline medium can be reworded to read as 'a liquid-crystalline compound having a terminal CH3 group lowers K1 of the liquid-crystalline medium containing it, as compared with the conventional liquid-crystalline compound.' Optimization of such order parameter S and reduction of K1 by introducing a terminal CH3 group is a more detailed explanation of 'by introducing a methyl group and combining it with the other terminal polar radical, each factor related to the elastic modulus was properly settled' as stated in the above Oral Proceedings Statement Brief (section 6-(3)).

The order parameter S does not depend on the positive or negative dielectric anisotropy of a liquid-crystalline compound and a liquid-crystalline medium containing it. It can be said that the above explanation that the liquid-crystalline compound having a terminal CH3 group lowers K1 of the liquid-crystalline medium containing the same holds for all aspects included in the Patent Invention after the correction of this time." However, no objective ground supports that "Shortening the length of the terminal alkyl radical that a liquid-crystalline compound usually has to make it a typical terminal CH3 group is expected to cause the liquid-crystalline compound to somewhat reduce the liquid crystallinity of the liquid-crystalline medium containing it, or the degree of molecular orientation thereof, as compared with a liquid-crystalline compound having a terminal alkyl radical of a normal length." Rather, as a matter of general technical knowledge, the shorter the length of the terminal alkyl radical, the smaller the contribution of the terminal alkyl radical to the liquid-crystalline compound, whereas the core portion represented by the ring structure having a high molecular orientation contributes more. Thus, it is presumed that the degree of molecular orientation of the liquid-crystalline compound having a terminal CH3 group is higher than that of the liquid-crystalline compound having a normal length terminal alkyl radical.

Then, it cannot be immediately recognized that a liquid-crystalline compound having a terminal CH3 group lowers the order parameter S of the liquid-crystalline medium containing it, as compared with the conventional liquid-crystalline compound. The explanation that the above explanation that the liquid-crystalline compound having a terminal CH3 group lowers K1 of the liquid-crystalline medium containing the same is based on this premise and cannot be adopted.

Therefore, even if considering the explanation of Demandee, it is not possible to understand on the basis of the description of the Specification of the Patent how the problems of the Invention described above can be solved, in particular how the reduced elastic constants and the low threshold voltages caused by K1 can be obtained if only

"the liquid-crystalline compound which has a terminal polar radical and a terminal CH3 group" exists in the liquid-crystalline medium in the Invention.

C Regarding the examples of the Invention

As stated above, it is not possible to objectively understand on the basis of the description of the Specification of the Patent how the problems of the Invention can be solved by including the "liquid-crystalline compound which has a terminal polar radical and a terminal CH3 group" in the liquid-crystalline medium. Then, on the basis of the examples of the Invention, the body examines compounds included in the general formula I of Claim 1 before the Correction (Claim 1 at the time of establishment of the patent right) used in the examples regarding the above problem to be solved by the Invention.

The compounds included in the general formula I, which are used in the examples are as follows

Example M1, Example M2: "CCP-10CF3.F"
Example M3: "CCP-10CF3. F", "CCP-V-1"
Example M4 to Example M7: "CCZU-1-F"
Example M8 to Example M10: "CGU-1-F"
Example M11 to Example M16, Example M23 to Example M28, Example M30, Example M31, Example M33 to Example M36, Example M39, Example M41, Example M42, Example M48: "CCP-1F. F. F"
Example M17, Example M19: "CGZP-1-OT", "CCP-V-1"
Example M18, Example M20 to Example M22: "CGZP-1-OT"
Example M29, Example M32, Example M37, Example M38, Example M40: "CCP-1F. F. F", "CCP-V-1"
Example M43, Example M47: "CWCQU-1-F"
Example M44 to Example M46: "CCP-1F. F. F", "CWCQU-1-F"
Example M49 to Example M51: "PUQU-1-F"
Example M52, Example M53: "CCP-1F. F. F", "PUQU-1-F", "CCP-V-1"
Example M54, Example M55: "CQU-1-F"
Example M56, Example M57: "CCP-1F. F. F", "CQU-1-F"
Example M58, Example M59, Example M61, Example M62: "CCQU-1-F"
Example M60: "CCP-1F. F. F", "CCQU-1-F", "CCP-V-1"
Example M63: "PUQU-1-F", "CCP-1F. F. F", "CCP-31"

Example M64: "CCZU-1-F", "PUQU-1-F", "CCP-1F. F. F", "CCP-31"
Example M65: "CPZU-1-F", "CCZU-1-F", "CCQU-1-F", "CCP-1F. F. F", "CCP-31"
Example M66: "BCH-1F. F. F", "CCP-1F. F", "CCP-31"
Example M67: "CCP-31", "CCP-1F. F. F", "CPZU-1-F", "CCZU-1-F"
Example M68, Example M69: "CCP-1F. F. F", "CCP-31", "CCZU-1-F"
Example M70: "CECG-1-F"
Example M71, Example M72: "CCGU-1-F"

Considering these examples, each of them includes, as compounds each represented by the general formula I, compounds each having a polar radical that produces a large dielectric anisotropy (positive dielectric anisotropy polar radical) in the major axis direction, which is the connecting direction of a plurality of rings, due to the large electronegativity of F atom such as "OCF3" or "F" (hereinafter, the polar radical is referred to as "positive dielectric anisotropy polar radical"). It can be recognized that each of these compounds falls into the category of "the liquid-crystalline compound which has a terminal polar radical and a terminal CH3 group" in paragraph [0017] of the Specification of the Patent.

All examples include compounds each represented by the general formula I having a "positive dielectric anisotropy polar radical." In Example M5, Example M10, Example M13, Example M21, Example M22, and Example M30, as compounds each represented by the general formula I, liquid-crystalline media include only compounds each represented by the general formula I having a "positive dielectric anisotropy polar radical." Their properties such as K1 at which the Invention aims are evaluated. Therefore, it can be recognized that the compound represented by the general formula I having a "positive dielectric anisotropy polar radical" is essentially provided as "the liquid-crystalline compound which has a terminal polar radical and a terminal CH3 group" as a means for solving the problems of the Invention.

On the other hand, some examples contain "CC-P-V-1" or "CCP-31," which is not a compound having a "positive dielectric anisotropy polar group" but corresponds to any of the compounds represented by the general formula I of Inventions 2, 7, and 8. The liquid-crystalline media including these compounds always contain the compounds represented by the general formula I having a "positive dielectric anisotropy polar radical." Then, with respect to the low threshold voltages caused by K1, which is emphasized as a problem of the Invention stated above, properties, such as "V10, 0, and 20," will be examined. As a compound represented by the compound represented by the general formula I, even if the properties, such as "V10, 0, and 20," of a

liquid-crystalline medium containing only the compound represented by the general formula I having a "positive dielectric anisotropy polar radical" are compared with the properties, such as "V10, 0, and 20," of a liquid-crystalline medium containing the compound represented by the general formula I having "CCP-V-1" or "CCP-31" and a "positive dielectric anisotropy polar radical," the latter does not show a tendency of improvement in properties. No improvement in properties can be found by allowing a liquid-crystalline medium to include "CCP-V-1" or "CCP-31."

Furthermore, it is obvious from the common general technical knowledge that the chemical properties of a compound differ depending on whether the compound's dielectric anisotropy is "positive" or not, what the polarity of the dielectric anisotropy of the liquid-crystalline medium is, and so on, as well as whether the a terminal polar radical of "the liquid-crystalline compound which has a terminal polar radical and a terminal CH3 group" becomes "OCF3" or "F" or becomes "V (vinyl group)" or "n-C3H7." In fact, from the Specification of the Patent, even if the common technical knowledge as of the priority date of the Invention is taken into consideration, it cannot be understood that properties equivalent to those of the "formula I compound having positive dielectric anisotropy" can be obtained and the problems of the Invention can be solved even in the case that a liquid-crystalline medium contains "CCP-V-1" or "CCP-31" (only) as a compound represented by the general formula I whose terminal group is "V (vinyl group)" or "n-C3H7."

Further, in "CCP-V-1" or "CCP-31," the group corresponding to the polar radical is "V (vinyl group)" or "n-C3H7." According to the description of A25, "(e) Polar radical Both ends of the bond are the same carbon atom in the hydrocarbon, and there is no bias of electrons on the orbits forming the bond" and the like, based on the fact that a vinyl group or alkyl radical, which is a hydrocarbon, cannot be regarded as a "polar radical," "CCP-V-1" or "CCP-31" having "V (vinyl group)" or "C3H7" as a terminal group cannot be recognized as a compound corresponding to "the liquid-crystalline compound which has a terminal polar radical," which is regarded as a solution to the Invention.

Then, as stated in "B" above, from the Specification of the Patent, the presence of "the liquid-crystalline compound which has a terminal polar radical and a terminal CH3 group" in the liquid-crystalline medium cannot solve the problems of the Invention. As stated in "C" above, from Examples, a liquid-crystalline medium that can solve the problems of the present invention is only one that contains a compound represented by the general formula I having a "positive dielectric anisotropy polar radical," such as

"OCF3" or "F" as a polar functional group. Therefore, from the description of the Specification of the Patent even if the common technical knowledge as of the priority date of the Invention is considered, it cannot be understood that the compound X represented by the general formula I of the present invention corresponding to "the liquid-crystalline compound having a terminal polar radical and a terminal CH3 group" is "V (vinyl group)" or "n-C3H7". In this case, the problems of the Invention can be solved by a liquid-crystalline medium containing this compound.

D Regarding the experimental report submitted by Demandee

In the Oral Proceedings Statement Brief submitted April 13, 2017, Demandee shows additional experimental results in "Experimental Report 1 (the medium containing the compound of formula I (note by the body: CCP-31 with the terminal group X C3H7) and having positive Δε)," "Experimental Report 2 (the medium containing the compound of formula I (note by the body: CCP-31 with the terminal group X C3H7) and having negative Δε)," "Experimental Report 3 (the medium containing the compound of formula I (note by the body: CCP-V-1 with the terminal group vinyl group) and having negative Δε)," "Experimental Report 4 (the medium containing the compound of formula I (note by the body: PP-13 with the terminal group C3H7) and having negative Δε)," and "Experimental Report 5 (the medium containing the compound of formula I (note by the body: CCP-31FF with the terminal group C3H7) and having negative Δε)."

Here, the terminal groups X of the respective compounds of formula I used in Experimental Reports 1, 2, 4, and 5 are all "n-C3H7," and the terminal group X of the compound of formula I used in Experimental Report 3 is a "vinyl group."

In the Written Statement submitted on December 13, 2017, furthermore, Demandee shows additional experimental results in "Experimental Report 6 (the medium containing the compound of formula I (note by the body: CCP-31 with the terminal group X C3H7) and having negativeΔε)."

However, in the first place, it is not possible to take into account results of additional experiments to supplement the so-called lacking parts of the original descriptions in the Specification as long as the Detailed Description of the Invention does not disclose a specific example to the extent that a person skilled in the art can recognize that the problems of the Invention can be solved even if the technical

common sense of the person skilled in the art on the priority date of the present case is taken into consideration.

Even if the results of each example are examined from the assumption that the experimental results can be taken into consideration, the same compound of formula I is included in all of experiments with the components M1p, M1p', and C1p in "Experimental Report 1," experiments with components M3 and C2 in "Experimental Report 3," experiments with components M4 and C3 in "Experimental Report 4," and experiments with components M5 and C5 in "Experimental Report 5." It is therefore not possible to compare the properties of the liquid crystal compositions due to the difference in the type of terminal group X of the compound of formula I.

Also, in "Experimental Report 2," the experiments with the components M1 and C1 include the same compound of formula I, whereas the experiment with the component C4 does not include the compound of formula I. It is therefore not possible to compare the properties of the liquid crystal compositions due to the difference in the type of terminal group X of the compound of formula I.

In addition, "Experimental Report 6" compares component M6 containing CCP-31 with component C6 containing no CCP-31 but containing CCP-36 instead of CCP-31, showing that the K1 and V0 of M6 are 14.6 and 2.26, respectively, while the K1 and V0 of C6 are 15 and 2.29, respectively, and CCP-31 containing component M6 exhibits a decrease in K1 and a decrease in threshold. However, since CCP-36 is obtained by replacing the CH3 group of CCP-31 with a C6H13 group, this comparison does not compare the properties of the liquid crystal compositions due to the difference in the type of the terminal group X. In "Experimental Report 6", CCP-36 is used as a comparison target. Also in the Invention, a compound having 6 or more carbon atoms as a terminal alkyl radical is used in, among 72 examples, only several examples: Example M19, Example M23, Example M26, Example M27, Example M43, Example M66, and Example M70 to Example M72. Thus, a liquid-crystalline compound whose terminal alkyl radical has 6 carbon atoms cannot be said to be the main liquid-crystalline compound in a liquid-crystalline medium. Hence, CCP-36, which is used in comparison in "Experimental Report 6", cannot be recognized as a liquid-crystalline compound that has been commonly used in the art. It cannot be understood that CCP-31 is a compound that can be employed by the Invention from the results regarding component M6 containing CCP-31 that is compared with CCP-36.

In addition, even if the properties of each liquid-crystalline medium containing the compound represented by the general formula I in which the terminal group X is C3H7 in the experimental report are compared with the properties of each

liquid-crystalline medium of the Invention containing the compound represented by the general formula I in which the terminal group X is "OCF3" or "F", these liquid-crystalline media differ in composition other than the compound represented by the general formula I and thus the effects of different types of the terminal group X on the properties of the liquid-crystalline medium cannot be understood from the comparison result.

E Summary

Combining the above matters, Inventions 1, 2, 7, and 8 in which the group corresponding to the terminal polar radical of "the liquid-crystalline compound which has a terminal polar radical and a terminal CH3 group," which is said to be a means for solving the problems of the Invention, is "n-C3H7" or "vinyl group," are beyond the scope that allows a person skilled in the art to recognize these inventions to solve the problems of the Invention described in the Detailed Description of the Invention of the Specification of the Patent.

On the other hand, in Invention 3, the terminal polar radical of the compound of each of formulae I1, I2, I4 to I11, I16, I20, and I23 to I29 limiting the compound represented by the general formula I is "F or OCF3." In Invention 13, the terminal polar radical of the compound of each of formulae I1, I2, I4 to I11, I16, I20, and I23 to I29 is a polar radical option that produces a large dielectric anisotropy in the major axis direction, which is the connecting direction of multiple rings including F or OCF3. It cannot be said that Inventions 3 and 13 are not beyond the scope that allows a person skilled in the art to recognize these inventions to solve the problems of the Invention described in the Detailed Description of the Invention of the specification of the Patent.

(1-2) Regarding compound (PP-13) represented by the general formula I of Invention 1

Even if each of the examples stated in (c) above is considered, most of the concretely disclosed examples of "the liquid-crystalline compound which has a terminal polar radical and a terminal CH3 group" are compounds having three or more rings. The bicyclic compound is "CQU-1-F" only. This "CQU-1-F" is a compound having positive dielectric anisotropy in which a 1,4-cyclohexylene radical and a fluorine-substituted 1,4-phenylene radical are bonded via "CF2O."

On the other hand, the compound represented by the general formula I of Invention 1 is "PP-13", which is a neutral compound, and differs from "CQU-1-F" in ring structure, terminal groups, and ring linking groups.

Then, the examples of the Invention do not specifically disclose the compound represented by the general formula I of Invention 1.

Then, as stated in (1-1) "B" above, the Specification of the Patent does not clarify the mechanism of action of "the liquid-crystalline compound which has a terminal polar radical and a terminal CH3 group" for solving the problems of the Invention. Therefore, from the descriptions in the Detailed Description of the Invention of the Specification of the Patent, even if the common technical knowledge as of the priority date of the Invention is considered, it cannot be understood that the problems of the Invention can be solved by a liquid-crystalline medium containing PP-13, just because PP-13 is contained in the compound represented by the general formula I of Invention 1 corresponding to "the liquid-crystalline compound which has a terminal polar radical and a terminal CH3 group."

On the other hand, as stated in (1-1) (E), regarding the case where "PP-13" is used as the compound represented by the general formula I, Demandee shows the results of "Experimental Report 4." For the same reason as stated in (1-1) "D" above, the results of the additional experiment to compensate the lacking part of descriptions in the Specification at the initial application cannot be taken into consideration.

Even if the results of each example are examined from the assumption that the experimental results can be taken into consideration, both the experiments with components M4 and C3 in "Experimental Report 4" include the same compound represented by the general formula I. Therefore, it is not possible to grasp what kind of change will occur in the properties related to the problems of the Invention in the liquid-crystalline medium due to the presence or absence of "PP-13" and the number of rings.

In the Written Statement submitted on December 13, 2017, furthermore, Demandee makes clarification as follows: "The problems of the Patent Invention can be solved by a terminal CH3 group or a specific combination of a terminal CH3 group and X in the compound represented by formula I of the Patent. The solution of the problems of the Patent Invention and the ring structure of the same formula are not directly related. Then, it is obvious that ... the liquid-crystalline medium containing 'CCP-31' as a compound represented by the formula I can solve the problems of the

Invention. Thus, like CCP-31, it is obvious that 'PP-13' in which a terminal CH3 group and X (C3H7 group) are added to the skeleton 'PP' can also solve the problem of the patented invention" (page 7, lines 18 to 27). As stated in (1-1) above, when the liquid-crystalline medium contains "CCP-31," it cannot be said that the problems of the Invention can be solved. As with CCP-31, Demandee's explanation that PP-13 provided with a terminal CH3 group and X (C3H7 group) can also solve the problems of the Patent Invention cannot be adopted.

Invention 1, which is the liquid-crystalline medium contains "PP-13," is beyond the scope that allows a person skilled in the art to recognize these inventions to solve the problems of the Invention described in the Detailed Description of the Invention of the Specification.

(2) Regarding technical evidence for "the liquid-crystalline compound which has a terminal polar radical and a terminal CH3 group" described in paragraph [0017] of the Specification of the Patent

The issue to be examined here is related to Reason for invalidation 1-2 that the Detailed Description of the Invention of the Specification of the Patent lacks a technical evidence for the description "It has now been found that these objects can be achieved if use is made of the liquid-crystalline compound which has a terminal polar radical and a terminal CH3 group. The compounds of the formula I reduce the elastic constants, in particular K1, and result in mixtures having particularly low threshold voltages." in paragraph [0017].

This point is correct in that, as described in (1-1) "B" above, the mechanism of action of the liquid-crystalline compound which has a terminal polar radical and a terminal CH3 group for solving the problems of the present invention is not clear. In determining the so-called support requirement, which has technical evidence in the Detailed Description of the Invention of the Specification of the Patent (described in the Scope of Claims), the Invention does not directly specify "the liquid-crystalline compound which has a terminal polar radical and a terminal CH3 group." Therefore, Reason for invalidation 1-2 lacks any concrete statement for explaining what point of the matter specifying the invention lacks any technical evidence in the Detailed Description of the Invention.

Furthermore, examining the description regarding the examples of the Invention, there is no comparison with the conventional technique (comparative example). In

fact, this fact makes it difficult to understand whether the liquid-crystalline medium of the Invention solves the above-described problems of the Invention. However, regarding the problems to be solved by the Invention as stated in the above described (1-1) "A," particularly four matters: "very high specific resistances, "a high clearing point or a large working-temperature range," "low rotational viscosity or short response times even at low temperatures," and "low threshold voltage," the evaluation of indexes "S→N," "clearing point," "Δn," "γ1," "V10, 0, and 20," "Δε," "K1," and so on is performed in not all but some examples, which do not have or are said to have only small disadvantages of the prior art. Furthermore, even if the technical knowledge about the mechanism of action for solving the problems of the Invention is not clear, as long as the examples and the like demonstrate that the problems of the Invention can be solved, it can be said that the problems of the Invention can be solved within the range understood from the examples. As stated above, in some of the embodiments of the present invention, characteristic values related to solving the problems of the Invention are disclosed. Furthermore, it cannot be said that these characteristic values are inferior in terms of properties in the liquid-crystalline medium so as not to solve the problems of the Invention. Therefore, regarding "the liquid-crystalline compound which has a terminal polar radical and a terminal CH3 group," the fact that the mechanism of action relating to solving the problems of the Invention is not clarified in the Detailed Description of the Invention of the Specification of the Patent hardly means that Inventions 1 to 3, 7, 8, and 13 are described in the Detailed Description of the Invention of the specification of the Patent.

Therefore, Reason for invalidation 1-2 cannot be adopted.

(3) Dielectric anisotropy of liquid-crystalline medium of the Invention

A Regarding the description of the Specification concerning dielectric anisotropy

First, the description of the Specification of the Patent will be confirmed from the viewpoint of the dielectric anisotropy of the liquid-crystalline medium of the Invention.

"[0004]

... such as the electrical conductivity, the dielectric anisotropy, and the optical anisotropy, have to satisfy various requirements depending on the cell type and area of

application. For example, materials for cells having a twisted nematic structure should have positive dielectric anisotropy and low electrical conductivity.

[0005]

For example, for matrix liquid-crystal displays with integrated non-linear elements for switching individual pixels (MLC displays), media having large positive dielectric anisotropy, broad nematic phases, relatively low birefringence, very high specific resistance, good UV and temperature stability, and low vapor pressure are desired. ... The term "active matrix" is then used, where a distinction can be made between two types:

1. MOS (metal oxide semiconductor) or other diodes on a silicon wafer as substrate.
2. Thin-film transistors (TFTs) on a glass plate as substrate.

[0006]

In the case of the more promising type 2, which is preferred, the electro-optical effect used is usually the TN effect.

...

[0012]

However, the principle can also be applied to high-quality, higher-resolution active matrix-addressed displays, such as, for example, TFT displays. Here, as already practiced in the transmissive TFT-TN displays which are generally conventional, the use of liquid crystals of low birefringence (Δn) is necessary in order to achieve low optical retardation ($d.\Delta\varepsilon n$).

...

[0013]

There thus continues to be a great demand for MLC displays having very high specific resistance at the same time as a large working-temperature range, short response times even at low temperatures, and low threshold voltage which do not have these disadvantages, or only do so to a reduced extent.

In TN (Schadt-Helfrich) cells, there are desired media which facilitate the following advantages in the cells:

...

[0014]

The media available from the prior art do not allow these advantages to be achieved while simultaneously retaining the other parameters.

In the case of supertwisted (STN) cells, there are desired media which enable greater multiplexability and/or lower threshold voltages and/or broader nematic phase ranges (in particular at low temperatures).

...

[0016]

[Problem to be solved by the Invention]

The invention has an object of providing media, in particular for MLC, TN, or STN displays of this type, which do not have the above-mentioned disadvantages or only do so to a reduced extent, and preferably simultaneously have very high specific resistances and low threshold voltages. This object requires liquid-crystalline compounds which have a high clearing point and low rotational viscosity.

[0017]

[Means for solving the problem]

It has now been found that these objects can be achieved if use is made of the liquid-crystalline compound which has a terminal polar radical and a terminal CH3 group. The compounds of the formula I reduce the elastic constants, in particular K1, and result in mixtures having particularly low threshold voltages." Considering the descriptions in these paragraphs, the Invention aims to provide media for MLC, TN, or STN displays, as described in paragraph [0016]. In paragraph [0005], the material of the MLC display of the Invention is preferably a "positive" dielectric anisotropy material. In the description of paragraph [0004], a material having a "twisted nematic structure" (TN structure) must have a "positive" dielectric anisotropy. Further, the Invention reduces "K1" to obtain a low threshold voltage, as described in paragraph [0017]. As shown in A50, page 75 (2.99), for example, K1 is associated with the threshold voltage when the dielectric anisotropy is a "positive" liquid-crystalline medium.

Also, considering the examples of the Invention, as stated in the above-described (1-1) "C," all of the examples show not only the "compounds each having a terminal CH2 group and 'OCF3' or 'F' as a terminal group" with "positive" dielectric anisotropy but also plural compounds with positive dielectric anisotropy. As a whole, only liquid-crystalline media showing positive dielectric anisotropy are exemplified.

Based on the above, from the description of the Specification of the Patent, only the liquid-crystalline medium having "positive" dielectric anisotropy can be recognized.

B Regarding correspondence between matters specifying the Invention and the description of the Specification concerning dielectric anisotropy of liquid-crystalline medium

On the other hand, each of Inventions 1, 2, 7, and 8 specifies "a liquid-crystalline medium based on a mixture of polar compounds of positive or negative dielectric anisotropy" and also includes cases where the liquid-crystalline medium exhibits a "negative" dielectric anisotropy.

Here, as stated in the above-described (1-1), from the description of the Specification of the Patent, the problems of the Invention are only solved by using a compound represented by the general formula I having a "positive dielectric anisotropy polar radical" as "the liquid-crystalline compound which has a terminal polar radical and a terminal CH3 group." In the light of common technical knowledge, it is normal that, if the compound is a liquid-crystalline compound having a "positive" dielectric anisotropy, a liquid-crystalline medium containing this and other components also has a "positive" dielectric anisotropy.

Then, as stated in the above-described (1-1) "B," the Specification of the Patent does not clarify the mechanism of action related to solving the problems of the Invention of "the liquid-crystalline compound which has a terminal polar radical and a terminal CH3 group." Despite the positive and negative dielectric anisotropy of liquid-crystalline medium, the fact that the problems of the Invention can be solved so long as "the liquid-crystalline compound which has a terminal polar radical and a terminal CH3 group" exists in the liquid-crystalline medium cannot be recognized from the description of the Specification of the Patent, even if the common technical knowledge as of the priority date of the Invention is added.

Then, when the liquid-crystalline medium containing "the liquid-crystalline compound which has a terminal polar radical and a terminal CH3 group" has a "negative" dielectric anisotropy, it cannot be recognized that the Invention can solve the problems of the Invention from the description of the Specification of the Patent.

Furthermore, in A23, Appendix 1, Table 1, in a liquid-crystalline media prepared by replacing "CCP-21FF" and "CCP-31FF" corresponding to the compound represented by the general formula I of the Invention of the liquid-crystalline medium (negative liquid-crystalline medium) of Example 2 of A2 with "CCP-22FF" and "CCP-32FF" (corresponding one in which the terminal CH3 group of formula I compound is replaced with C2H5 group), a value of K11 (K1) (unit omitted) related to the "low threshold voltage," which is the problems of the Invention, is "12.0." On the order hand, the liquid-crystalline medium of Example 2 of the above-described A2, which contains

CCP-21 and "CCP-31FF," has a K11(K1) value of "12.7." Thus, the results show that K11 (K1) is rather increased.

Furthermore, in A52, Appendix, Table 1, "Experimental Report 2" of B1 shows that component J1, which is prepared by replacing "CCP-31" corresponding to the compound represented by the general formula I of the Invention of component M1 (negative liquid-crystalline medium) with "CCP-33" (the compound represented by the general formula I in which a terminal CH3 group is replaced with a C3H7 group), has a K1 value (unit omitted) of "15.0," whereas component M1 containing "CCP-31" has a K1 value of "15.3."

In A52, Appendix, Table 3, "Experimental Report 4" of B1 shows that component J3, which is prepared by replacing "PP-13" corresponding to "the compound represented by the general formula I of the Invention of component M4" (negative liquid-crystalline medium) with "PP-23" (the compound represented by the general formula I in which a terminal CH3 group is replaced with a C2H5 group), has a K1 value (unit omitted) of "14.1," whereas component M4 containing "PP-13" has a K1 value of "14.6."

In A52, Appendix, Table 5, "Experimental Report 5" of B1 shows that the liquid-crystalline medium J5, which is prepared by replacing "CCP-31FF" corresponding to the compound represented by the general formula I of the Invention before the Correction of component M5 (negative liquid-crystalline medium) with "CCP-32FF" (the compound represented by the general formula I in which a terminal CH3 group is replaced with a C2H5 group), has a K1 value of "14.2," whereas component M5 has a K1 value of "15.3." In any of the results shown in Table 1, Table 3, and Table 5, the K1 values of the respective liquid-crystalline media each containing the compound represented by the general formula I are rather increased.

Even considering these results, there is no evidence that, when the liquid-crystalline medium containing "the liquid-crystalline compound which has a terminal polar radical and a terminal CH3 group" has a "negative" dielectric anisotropy, this liquid-crystalline medium has a decreased value of K1. Therefore, it cannot be said that the problems of the Invention can be solved.

C Regarding experimental reports submitted by Demandee

On the other hand, as stated in the above-described (1-1) "D," regarding the case where the dielectric anisotropy of the liquid-crystalline medium is negative, Demandee shows the results of "Experimental Report 2," "Experimental Report 3," "Experimental

Report 4," "Experimental Report 5," and "Experimental Report 6." However, due to the same reason as stated in the above (1-1) "C," the results of the additional experiment to compensate the lacking part of descriptions in the Specification at the initial application cannot be taken into consideration.

Even if the results of each example are examined from the assumption that the experimental results can be taken into consideration, component M3 of "Experimental Report 3," the experiment in C2, component M4 of "Experimental Report 3," the experiment in C3, component M5 of "Experimental Report 5," and the experiment in C5, which are stated above, cannot allow a person skilled in the art to recognize from the presence or absence of the compound represented by the general formula I what kind of changes will occur in the properties of the liquid-crystalline media related to the problems of the Invention from the results of the experiments. In addition, "Experimental Report 2" compares between component M1 containing the compound represented by the general formula I and component C4 containing no compound represented by the general formula I. Considering, in particular, K1 and threshold voltage VO, which relate to problems to be solved by the Invention, K1 takes a value of "14.6" in M1 but "14.8" in C4. The threshold voltage V0 takes "2.26" in M1 but "2.27" in C4. Although a slight decrease in K1 and threshold voltage V0 is observed in component M1, it is only a slight difference in the first place. Even if there is a difference, component C4 is not a compound in which "CCP-31" in component M1 is simply replaced with "CCP-33". For example, since the amount of "CCH-23" also decreases to a small extent, it is not clear whether the experimental conditions are optimal in making comparisons for K1 and threshold voltage V0. The difference between the values for K1 and the threshold voltage V0 cannot be "significant" enough to recognize that the problems of the Invention can be solved. Further, in "Experimental Report 6," component M6 containing the compound represented by the general formula I and component C6 not containing the compound represented by the general formula I are compared. The selection of "CCP-36" in component C6, which is the object of comparison in "Experimental Report 6," is not appropriate. It is thus not possible to recognize that the problems of the Invention can be solved by including "CCP-31" in component M6, as stated in the above-described (1-1) "D." Considering the resulting values of K1 and threshold voltage V0, K1 is "14.6" in M6 but "15" in C6 and threshold voltage V0 is "2.26" in M1 and "2.29" in C4. Although component M6 shows some decrease in K1 and threshold voltage V0, it is only a slight difference in the first place. Therefore, the differences in K1 and threshold voltage V0 cannot be "significant" enough to recognize that the problems of the Invention can be solved.

In fact, as shown in the results in Table 1 of the A52 Appendix above, when comparing the component M1 to the component J1, which is obtained by replacing "CCP-31" of component M1 with "CCP-33," the component M1 shows larger K1 and larger threshold voltage V0 values than the component J1. Also, as shown in the results in Table 2 of the A52 Appendix, even if component M1 is compared with component J1' prepared by replacing "CCP-31" of component M1 with "CCP-33" so as to match the clearing points of the liquid-crystalline media and slightly adjusting the amount of components between "CY-3-O2" and "CCY-3-O2," component M1 shows larger K1 and threshold voltage V0 values than does component J1'. After all, when adding a liquid-crystalline compound represented by the general formula I, such as "CCP-31," to a negative liquid-crystalline medium as stated in "Experimental Report 2," by slightly adjusting the components of the liquid-crystalline medium other than the liquid-crystalline compound represented by the general formula I, it can be said that the properties, such as K1 and threshold voltage V0, are slightly improved or deteriorated due to the presence or absence of the liquid-crystalline compound represented by the general formula I in the medium.

Furthermore, as shown in the results in Table 1 of the A53 Appendix above, when "CCP-31" of component M6 in "Experimental Report 6" of B6 is replaced with "CCP-32" and "CCP-33", respectively, instead of "CCP-36" of component C6, the amounts of components in "CY-3-O2" and "CCY-3-O2 are slightly adjusted so as to match the clearing points of the liquid-crystalline media. Then, component M6 is compared with component J7 and component J8. Component M6 shows larger K1 and threshold voltage V0 values and a lower K1 value than component J7, whereas it shows smaller K1 value than component J8 but an equal threshold voltage V0 value. Then, when "CCP-32" and "CCP-33," which are commonly used in liquid crystalline media, are included, it cannot be said that "Experimental Report 6" of B6 shows improved properties of K1, threshold voltage V0, and so on of component M6 in the liquid-crystalline medium, compared with those of "CCP-36" of component M6.

It cannot be said that "Experimental Report 2" and "Experimental Report 6" as well as "Experimental Report 3," "Experimental Report 4," and "Experimental Report 5" solve the problems of the Invention when the compound represented by the general formula I is added to the liquid-crystalline medium.

D Regarding Demandee's allegation

In the Written Statement dated December 13, 2017, Demandee alleges as follows: "A liquid-crystalline medium containing a compound represented by the formula I of the Patent (a compound having a terminal CH3 group) is compared with a liquid-crystalline medium containing a compound containing a terminal C2H5 group. Some erroneous considerations have been carried out as if the saliency of the effect shown by such a comparison experiment determines the success or failure of the support requirement of the Patent Invention. Such considerations should be carried out on the invention for solving the problem of 'providing a liquid-crystalline medium that exhibits remarkably superior properties than liquid-crystalline media each containing a conventional compound, particularly, a compound having a C2H5 group.' As stated above, the Patent Invention does not intend to solve such a problem. Thus, it can be said that the considerations are not appropriate because of being based on the incorrect recognition of the problems of the Patent Invention." (page 5, lines 10 to 20)

However, for allowing the Invention to solve the problems of the Invention, it will be apparent to a person skilled in the art that the properties (for example, K1 and threshold voltage) corresponding to the problems of the Invention stated in (1-1) "A" above are required to be shown to be superior to at least the properties of "conventional compounds." Then, even if all the examples of the Invention are examined, the number of carbon atoms of the alkyl terminal group of the liquid-crystalline compound is 2 or 3 in many cases. It can be said that a liquid-crystalline compound having an alkyl radical having 2 or 3 carbon atoms is a common liquid-crystalline compound among those having an alkyl radical as a terminal group.

Then, in the case of comparison with the above "conventional compounds," the conventional compounds, which are those to be compared with a compound having a "CH3 group" as a terminal group and represented by the general formula I of the Invention, have a "C2H5 group" having 2 carbon atoms or a "C3H7 group" having 3 carbon atoms. It cannot be said that it is not appropriate to contrast the properties of a liquid-crystalline medium containing a compound represented by the general formula I of the Invention (a compound having a terminal CH3 group) with the properties of a liquid-crystalline medium containing a compound having a terminal C2H5 group or a terminal C3H7 group.

E Summary

As stated above, Inventions 1, 2, 7, and 8 including the case in which a liquid-crystalline medium containing a compound represented by the general formula I

is a "mixture of polar compounds" are beyond the scope that allows a person skilled in the art to recognize these inventions as solving the problems of the Invention described in the Detailed Description of the Invention of the Specification of the Patent.

On the other hand, it cannot be said that Inventions 3 and 13 in which "a mixture of polar compounds having positive dielectric anisotropy" is used are not beyond the scope that allows a person skilled in the art to recognize these inventions as solving the problems of the Invention described in the Detailed Description of the Invention of the Specification of the Patent.

(4) Summary of Reason for invalidation 1

As stated above, with respect to the above issues (1) and (3), the statements of Claims 1, 2, 7, and 8 in the Scope of Claims do not fulfill the requirements in Article 36(4)(i) of the Patent Act. Thus, the patent for Inventions 1 2, 7, and 8 is not patentable but was granted in breach of Article 36(6)(i) of the Patent Act. Therefore, Inventions 1, 2, 7, and 8 fall under the provision of Article 123(1)(iv) of the Patent Act and should be invalidated.

On the other hand, it cannot be said that the statement in Claims 3 and 13 in the Scope of Claims do not fulfill the requirements in Article 36(6)(i) of the Patent Act. Thus, it cannot be said that the patent for Inventions 3 and 13 are not patentable but were granted in breach of Article 36(6)(i) of the Patent Act. It can be therefore said that the patent for Inventions 3 and 13 fall under the provision of Article 123(1)(iv) of the Patent Act and should be invalidated.

2 Regarding Reason for invalidation 3-1

(1) Publications

A1: Japanese Unexamined Patent Application Publication No. 2001-19965
A12: German Patent No. 10107544 (translation A13: Japanese Unexamined Patent Application Publication No. 2001-316669)
A26: Japanese Unexamined Patent Application Publication No. 2000-104072
A27: International Publication No. WO96/22261
A28: Japanese Unexamined Patent Application Publication No. 2000-96065
A29: German Patent No. 10111142 (translation A30: Japanese Unexamined Patent Application Publication No. 2002-12869)

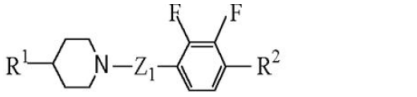
A31: Japanese Unexamined Patent Application Publication No. 2000-351972
A33: Japanese Unexamined Patent Application Publication No. 2001-34197
A37: International Publication No. WO01/46336 (translation A38: National Publication of International Patent Application No. 2003-518154)

(2) Matters described in publications

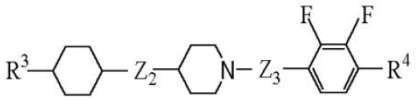
A Matters described in A1

(A1) "[Claim 1] A liquid composition comprising at least one compound selected from the group consisting of compounds represented by Formula (I) as a first component, at least one compound selected from the group consisting of compounds represented by Formula (II-1) or (II-2) as a second component, at least one compound selected from the group consisting of compounds selected from the group consisting of compounds represented by Formula (III-1), (III-2), (III-3), or (III-4) as a third component.

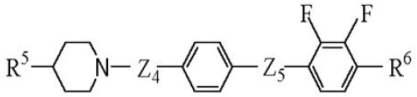
[Chemical 1]



(I)

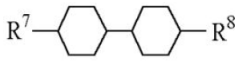


(II-1)

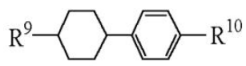


(II-2)

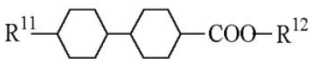
[Chemical 2]



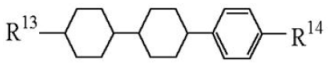
(III-1)



(III-2)



(III-3)



(III-4)

(wherein, R1, R3, R5, R7, R9, R11, and R13 each independently represent an alkyl radical having 1 to 10 carbon atoms or an alkenyl group having 2 to 10 carbon atoms, and R2, R4, R6, R8 , R10, R12, and R14 each independently represent an alkyl radical

having 1 to 10 carbon atoms, an alkoxy radical, or an alkenyl radical having 2 to 10 carbon atoms, and Z1 to Z5 each independently represent a single bond or -CH2CH2-.)"

(A2) "[0002]
[Conventional Art] A liquid crystal display (LCD) consumes less electric power, and can be downsized and save weight as compared with a cathode ray tube (CRT) display. Therefore, several kinds of LCD systems such as twisted nematic (TN), super twisted nematic (STN), and thin film transistor (TFT) modes have been put to practical use. Among them, an active matrix LCD (AM-LCD) has been the focus of interest as the flat display of greatest expectations because of its advanced colorization and higher definition.
[0003] A liquid crystal composition used in AM-LCD is required to have the following properties:
1) high voltage holding ratio (VHR) to maintain high contrast of the LCD,
2) broad nematic phase range to cope with various use environments,
3) suitable refractive anisotropy (Δn) in accordance with cell thickness, and
4) suitable threshold voltage in accordance with drive circuit. A drive system of AM-LCD has mainly been TN mode in which twist angle of alignment of liquid crystal molecules between upper and lower electrode substrates is 90 degrees. However, it has a difficulty in application for wide view displays because of the narrow view angle.
[0004] Some modes for improving view angle have been proposed as follows:
a) IPS display mode in which a liquid crystal display element shows homogeneous alignment when no voltage is applied and the molecules rotate at an angle of 45 to 90 degrees within the same plane when voltage is applied ... b) VA display mode in which a liquid crystal display element shows homeotropic alignment when no voltage is applied and then shows horizontal alignment in one direction when voltage is applied ... . These display systems have characteristics of quick response and high contrast in addition to the wide view angle. Further, they have a remarkable characteristic that they can comprise a liquid crystal composition having a negative dielectric anisotropy (Δε).
...
[0007]
[Problems to be Solved by the Invention] An object of the present invention is to provide a liquid crystal composition applicable for the display systems of the above a) and b), which can be realized by a wide view angle, a suitable Δn, a low viscosity, a

largely negative$\Delta\varepsilon$, and a broad range of nematic liquid crystal phase, while satisfying various properties required for a liquid crystal composition for the AM-LCD."

(A3) "[0016] Hereinafter, the compounds constituting the respective components of the present invention will be described. The compound represented by the general formula (I) as the first component has a refractive index anisotropy value (Δn) of about 0.08 to 0.12 and a dielectric anisotropy value ($\Delta\varepsilon$) of about -9 to -6. It is excellent in thermal stability and chemical stability, and plays a role of decreasing the threshold voltage and viscosity of a liquid crystal composition for TFT, which requires high reliability. However, since the clearing point (TC) is in the range of about -20 to 30°C, it is not preferable to adjust a composition having a negative $\Delta\varepsilon$ using only these compounds, as the clearing point (TC) of the composition becomes small.
[0017] The compound represented by the general formula (II-1) or (II-2) as the second component has a refractive index anisotropy value (Δn) of about 0.08 to 0.21, a dielectric anisotropy value ($\Delta\varepsilon$) of about -8 to -5, and a clearing point (Tc) of about 120 to 180°C. The compounds as the second component are excellent in thermal stability and chemical stability, and play a role of increasing Tc as well as decreasing the threshold voltage of a liquid crystal composition.
[0018] The compound represented by the general formula (III-1), (III-2), or (III-3) as the third composition has a clearing point (Tc) of about 10 to 80°C and a refractive index anisotropy value (Δn) of about 0.01 to 0.07. Thus, it plays a role of decreasing Δn of the composition. In addition, the composition represented by the general formula (III-1) or (III-3) particularly plays a role of decreasing the viscosity of the composition. The compound represented by the general formula (III-4) has a refractive index anisotropy value (Δn) of about 0.10 to 0.15 and a clearing point (Tc) of about 130 to 190°C, and thus particularly plays a role of increasing the clearing point (Tc). Therefore, the Δn, viscosity, and nematic liquid crystal phase of the composition can be adjusted by adding the third component to the composition. A liquid crystal composition for AM-LCD having a suitable Δn and particularly a largely negative dielectric anisotropy and a low viscosity, which is the object of the Invention, can be prepared by any combination of several kinds of compounds selected from the first to third components. In other words, obtained can be a liquid crystal composition having a clearing point (Tc) of about 60 to 120°C, a refractive index anisotropy value (Δn) of about 0.06 to 0.12, and a dielectric anisotropy value ($\Delta\varepsilon$) of about -7 to -1 and having a low viscosity and a broad nematic phase."

(A4) "[0027]

Example 1

3-NhB(2F,3F)-O1	7.0%	
3-NhB(2F,3F)-O2	7.0%	
5-NhB(2F,3F)-O1	9.0%	
5-NhB(2F,3F)-O2	9.0%	
3-HNhB(2F,3F)-O1	10.0%	
5-HNhB(2F,3F)-O1	10.0%	
5-HNhB(2F,3F)-O2	11.0%	
3-NhBB(2F,3F)-O2	6.0%	
5-NhBB(2F,3F)-O2	7.0%	
2-HH-3		4.0%
3-HH-4		6.0%
3-HH-O1	4.0%	
3-HH-O3	5.0%	
5-HH-O1	5.0%	

TC = 88.0 (°C)

TSN < -20°C

Δn = 0.092

Δε = -5.8

η20 = 26.3 (mPa•s)

It can be seen that the liquid crystal composition shown in Example 1 has a significantly large negative Δε as compared with Comparative Example 2 and also has a broad nematic liquid crystal phase of 10°C or more.

[0028]

Example 2

3-NhB(2F,3F)-O1	5.0%	
3-NhB(2F,3F)-O2	5.0%	
3-HNhB(2F,3F)-O1	9.0%	
3-HNhB(2F,3F)-O2	9.0%	
3-NhBB(2F,3F)-O2	11.0%	
5-NhBB(2F,3F)-O2	11.0%	
2-HH-3		5.0%
3-HH-4		12.0%
3-HB-O2	16.0%	
3-HB-O4	7.0%	

2-HH-EMe	4.0%
3-HH-EMe	6.0%

TC = 85.5 (°C)

TSN < -20°C

Δn = 0.091

Δε = -3.3

η20 = 17.8 (mPa•s)

Example 2 is a liquid crystal composition having TC and Δε that are almost the same as those of Comparative Example 1. It can be seen that Example 2 has a significantly lower viscosity than Comparative Example 1 and also has a broad nematic liquid crystal phase of 10°C or more.

[0029]

Example 3

3-NhB(2F,3F)-O2	5.0%
3-HNhB(2F,3F)-O1	10.0%
3-HNhB(2F,3F)-2	10.0%
5-HNhB(2F,3F)-O1	10.0%
5-HNhB(2F,3F)-O2	10.0%
3-NhBB(2F,3F)-O2	12.0%
5-NhBB(2F,3F)-O2	12.0%
2-HH-3	5.0%
3-HH-4	5.0%
3-HB-2	16.0%
3-HB-4	5.0%

TC = 113.9 (°C)

TSN < -20°C

Δn = 0.104

Δε = -4.8

η20 = 26.6 (mPa•s)

[0030]

Example 4

3-NhB(2F,3F)-O1	9.0%
3-NhB(2F,3F)-O2	9.0%
5-NhB(2F,3F)-O1	10.0%
5-NhB(2F,3F)-O2	10.0%
3-HNhB(2F,3F)-O1	5.0%

3-HH-4	5.0%
3-HB-2	12.0%
3-HB-4	5.0%
2-HH-EMe	5.0%
3-HH-EMe	10.0%
2-HHB-1	4.0%
3-HHB-1	6.0%
3-HHB-3	5.0%
3-HHB-O1	5.0%

TC = 62.7 (°C)

TSN < -20°C

Δn = 0.084

Δε = -2.2

η20 = 18.7 (mPa•s)

(A5) [0031]

Example 5

V-NhB(2F,3F)-O1	9.0%
3-NhB(2F,3F)-O2	9.0%
5-NhB(2F,3F)-O1	10.0%
5-NhB(2F,3F)-O2	10.0%
V-HNhB(2F,3F)-O1	5.0%
V-HH-3	5.0%
3-HB-2	12.0%
3-HB-4	5.0%
2-HH-EMe	5.0%
3-HH-EMe	10.0%
V-HHB-1	4.0%
3-HHB-1	6.0%
3-HHB-3	5.0%
3-HHB-O1	5.0%

TC = 59.4 (°C)

TSN < -20°C

Δn = 0.096

Δε = -1.9

η20 = 17.6 (mPa•s)

(A6) "[0032]

Example 6

3-NhB(2F,3F)-O1	9.0%	
3-NhB(2F,3F)-O2	9.0%	
5-NhB(2F,3F)-O1	10.0%	
5-NhB(2F,3F)-2		10.0%
3-HNhB(2F,3F)-O1	7.0%	
3-HNhB(2F,3F)-O2	7.0%	
5-HNhB(2F,3F)-O1	8.0%	
5-HNhB(2F,3F)-O2	9.0%	
3-NhBB(2F,3F)-O2	6.0%	
5-NhBB(2F,3F)-O2	7.0%	
2-HH-3		4.0%
3-HH-4		10.0%
3-HH-EMe	4.0%	

TC = 91.1 (°C)

TSN < -20°C

Δn = 0.096

Δε = -6.2

η20 = 30.2 (mPa•s)

[0033]

Example 7

3-NhB(2F,3F)-O1	5.0%	
3-NhB(2F,3F)-O2	5.0%	
5-NhB(2F,3F)-O1	4.0%	
5-NhB(2F,3F)-O2	4.0%	
3-HNhB(2F,3F)-O1	10.0%	
5-HNhB(2F,3F)-1	10.0%	
5-HNhB(2F,3F)-2	11.0%	
2-HH-3		4.0%
3-HH-4		10.0%
3-HH-O1	5.0%	
3-HH-O3	5.0%	
3-HB(2F,3F)-O2		7.0%
5-HB(2F,3F)-O2		7.0%

3-HBB(2F,3F)-O2	3.0%
3-HHB(2F,3F)-O2	10.0%

TC = 87.4 (°C)
TSN < -20°C
Δn = 0.086
Δε = -5.0
η20 = 27.2 (mPa•s)
[0034]
Example 8

3-NhB(2F,3F)-O1	5.0%
3-NhB(2F,3F)-O2	5.0%
5-NhB(2F,3F)-O1	4.0%
5-NhB(2F,3F)-O2	4.0%
V-HNhB(2F,3F)-O1	10.0%
5-HNhB(2F,3F)-1	10.0%
5-HNhB(2F,3F)-2	11.0%
2-HH-3	4.0%
3-HH-4	10.0%
3-HH-O1	5.0%
3-HH-O3	5.0%
3-HB(2F,3F)-O2	7.0%
V-HB(2F,3F)-O2	7.0%
V-HBB(2F,3F)-O2	6.0%
3-HHB(2F,3F)-O2	7.0%

TC = 82.5 (°C)
TSN < -20°C
Δn = 0.090
Δε = -4.6
η20 = 25.2 (mPa•s)

B Matters described in A12
(The Japanese translation of A12 is described below. The translation is transcribed from the corresponding Japanese Gazette A13 and the corresponding location in A12 is also described.)

(B1) "[Claim 1] A nematic liquid-crystal medium comprising:

a) one or two or more dielectrically negative compounds of formula I

[Chemical 1] (omitted)

in which

[Chemical 2] (omitted)

R11 is an alkoxy having 1 to 7 carbon atoms or an alkenyloxy having 2 to 7 carbon atoms,

and, in the case where

[Chemical 3] (omitted)

R11 is an alkyl having 1 to 7 carbon atoms; and

R12 is an alkyl having 1 to 7 carbon atoms, an alkoxy having 1 to 7 carbon atoms, or an alkenyloxy having 2 to 7 carbon atoms,

b) one or two or more dielectrically negative compounds of formula II

[Chemical 4] (omitted)

in which

R21 is an alkyl having 1 to 7 carbon atoms, an alkoxy having 1 to 7 carbon atoms, or an alkenyloxy having 2 to 7 carbon atoms,

R22 is an alkyl having 1 to 7 carbon atoms, an alkoxy having 1 to 7 carbon atoms, or an alkenyloxy having 2 to 7 carbon atoms,

Z21 and Z22 are, in each case, independently, −CH2−CH2-, −CH=CH−, −C≡C−, −COO− or a single bond,

[Chemical 5] (omitted)

are each, independently,

[Chemical 6] (omitted)

L21 and L22 are both C−F or one of the two is N and the other is C−F, and preferably the two are C-F, and

I is 0 or 1,

the compounds of the formulae I and III being excluded,

c) one or two or more dielectrically negative compounds of the formula III

[Chemical 7] (omitted)

in which

R31 and R32 are each, independently, an alkyl having 1 to 7 carbon atoms, an alkoxy having 1 to 7 carbon atoms, or an alkenyloxy having 2 to 7 carbon atoms, preferably an alkenyloxy having 2 to 4 carbon atoms,

Z31 is as defined as Z21 of the formula II as claimed in Claim 1,

L31 and L32 are both C−F or one of the two is N and the other is C−F, and

L33 and L34 are both C–F or one of the two is N and the other is C–F." (pages 28 to 29), Claim 1)

(B2) "[0075] Example 4
[Table 6]

化合物／略号	濃度／重量%	物性
PCH-304FF	20.0	透明点 (N,I) = 87.0 °C
PCH-504FF	20.0	n_e (20 °C, 589 nm) = 1.5834
CCP-302FF	14.0	Δn (20 °C, 589 nm) = 0.1020
CCP-31FF	6.0	$\varepsilon_\perp$ (20 °C, 1 kHz) = 8.7
CC-3-V1	11.0	Δε (20 °C, 1 kHz) = -4.9
CCP-V-1	3.0	
BCH-32	10.0	
CLY-3-O2	8.0	
CLY-5-O2	8.0	
Σ	100.0	

化合物 Compound
略号 abbreviation
濃度 Concentration
重量 weight
物性 Physical properties
透明点 Clearing point

As in Example 1, the liquid-crystal medium is introduced into a VA display with TFT addressing. This display has good contrast with low viewing-angle dependence." (page 26)

C Matters described in A26

(C1) "[0023]

The media according to the invention are based on a mixture of polar compounds. These are preferably not highly polar compounds such as the known nitriles, but instead medium-polarity compounds having a rod-like structure containing two, three, or four six-membered carbo- or heterocyclic rings which are linked to one another in the 1,4-position either directly or via divalent bridging members and are linked terminally to two terminal groups. One of these terminal groups is a nonpolar group such as, for

example, alkyl, alkoxy, oxaalkyl, dioxaalkyl, alkenyl, fluoroalkyl, or fluoroalkenyl, and the other terminal group is a halogenated medium-polarity group, such as, for example, fluorine, chlorine, difluoroalkyl, higher fluorinated alkyl, alkoxy, alkenyl, alkenyloxy, or alkanoyloxy."

D Matters described in A27

(D1) Claims
"1. A liquid crystalline compound having a non-conjugated alkadienyl group on the side chain."

(D2) Page 38, line 20 to page 39, line 15
" Composition Example 6
4'-(1,5-hexadienyl)-4-methylbicyclohexane 5%
4'-(1,5-hexadienyl)-4-ethylbicyclohexane 5%
4-(4-(1,5-hexadienyl)cyclohexyl)benzonitrile 10%
4-(4-(3-butenyl)cyclohexyl)benzonitrile 8%
4-(4-(3-pentenyl)cyclohexyl)benzonitrile 8%
4-(4-propylcyclohexyl)benzonitrile 8%
4-(4-pentylcyclohexyl)benzonitrile 8%
4-(4-methoxymethylcyclohexyl)benzonitrile 8%
4-(4-ethoxymethylcyclohexyl)benzonitrile 4%
4-(2-(4-ethylphenyl)ethynyl)methoxybenzene 2%
4-(2-(4-propylphenyl)ethynyl)methoxybenzene 2%
4-(2-(4-butylphenyl)ethynyl)methoxybenzene 2%
4-(2-(4-pentylphenyl)ethynyl)methoxybenzene 2%
4-(2-(4-butylphenyl)ethynyl)ethoxybenzene 2%
4'-propyl4-butylbicyclohexane 8%
4-(4-(4-ethylcyclohexyl)cyclohexyl)benzonitrile 4%
4-(4-(4-propylcyclohexyl)cyclohexyl)benzonitrile 4%
4-(4-(4-propylcyclohexyl)cyclohexyl)methylbenzene 5%
4-(4-(4-propylcyclohexyl)cyclohexyl)propylbenzene 5%"

E Matters described in A28

(E1) "[0023]

The media according to the invention are based on a mixture of polar compounds. These are preferably not highly polar compounds such as the known nitriles, but instead medium-polarity compounds having a rod-like structure containing two, three, or four six-membered carbo- or heterocyclic rings which are linked to one another in the 1,4-position either directly or via divalent bridging members and are linked terminally to two terminal groups. One of these terminal groups is a nonpolar group such as, for example, alkyl, alkoxy, oxaalkyl, dioxaalkyl, alkenyl, fluoroalkyl, or fluoroalkenyl, and the other terminal group is a halogenated medium-polarity group, such as, for example, fluorine, chlorine, difluoroalkyl, higher fluorinated alkyl, alkoxy, alkenyl, alkenyloxy, or alkanoyloxy."

F Matters described in A29

(The Japanese translation of A29 is described below. The translation is transcribed from the corresponding Japanese Gazette A30 and the corresponding location in A29 is also described.)

(F1) "[Claim 1] 1. An electro-optical liquid crystal display comprising a realignment layer whose electric field has an effective component parallel to the liquid crystal layer, said display also comprising a liquid crystalline medium of positive dielectric anisotropy,
wherein the medium comprises at least one compound of the formula I:
[Chemical 1] (omitted)
wherein
R1 is an alkyl or alkoxy group having 1 to 7 carbon atoms or an alkenyl, alkenyloxy, or alkoxyalkyl group having 2 to 7 carbon atoms, and
L is H or F.

(F2) "[0084]
Example 11
An IPS display in this example contains a nematic mixture consisting of the following components and has adequate contrast.
[Table 12]

化合物	c /重量%
CC-5-V	15.0
CCH-35	4.0
CC-3-V1	11.0
CCP-2F.F.F	6.0
CCP-3F.F.F	7.0
CCP-20CF3	6.0
CCP-30CF3	7.0
CCP-40CF3	6.0
PCH-3N.F.F	13.0
PCH-5N.F.F	4.0
CCZU-2-F	3.0
CCZU-3-F	14.0
UM-3-N	2.0
BCH-32	2.0
Σ	100.0

化合物 Compound
重量 weight

" (page 25, [0080])

(F3) "[0103]
Example 24

An IPS display in this example contains a nematic mixture consisting of the following components and has adequate contrast.
[Table 25]

化合物	c /重量%
CDU-2-F	9.0
CDU-3-F	8.0
CCP-2F.F.F	3.0
CCP-20CF3	7.0
CCP-30CF3	5.0
CP-30CF3	5.5
CP-50CF3	5.0
DU-3-N	13.5
UM-3-N	4.5
BCH-32	0.5
CCZU-2-F	4.0
CCZU-3-F	17.0
CCZU-5-F	4.0
CC-3V-1	10.0
CCH-35	4.0
Σ	100.0

化合物　　Compound
重量　weight

" (page 31, [0093])

G　Matters described in A31
(G1) "[Claim 1] An electro-optical liquid crystal display comprising: a realignment layer for realigning the liquid crystals, further comprising an electric field comprising an essential component parallel to a liquid crystal layer; and a liquid crystalline medium of positive dielectric anisotropy, wherein
the compound comprises one or two or more compounds represented by the formula I and one or two or more compounds selected from the group consisting of compounds represented by the formula II and formula III:
[Chemical 1] (omitted)
R1, R2, and R3 are each, independent of one another, an alkyl or alkoxy group having 1 to 7 carbon atoms or an alkenyl, alkenyloxy, or alkoxyalkyl group having 2 to 7 carbon atoms,
Y11, Y12, Y21, Y22, Y31, and Y32 are each, independent of one another, H or F,
[Chemical 2] (omitted)
and Q–X is F, Cl, –OCF2H, or –OCF3."

(G2) "[0055]
[Embodiments of the Invention] Examples
The examples below are intended to illustrate the invention without restricting its scope in any way.
Example 1
An IPS display in this example contains a nematic mixture having
Clearing point:　　70.0°C.
T(S,N):　　<–30°C.
Δn [589.3 nm, 20°C]:　　0.0824
Δε [1 kHz, 20°C]:　　11.7
t store [–30°C]:　　1000 h
and consisting of
[0056]
[Table 2]

化合物	濃度／重量%
CCP-3OCF3	6.0
CP-3OCF3	7.0
CC-3-V1	10.0
CC-5-V	20.0
PCH-3N.F.F	16.5
CCZU-2-F	4.0
CCZU-3-F	13.5
PCH-3O2	3.5
ME2N.F	2.0
ME3N.F	3.0
ME4N.F	3.0
CCP-V-1	11.5
Σ	100.0

化合物　Compound
濃度　Concentration
重量　weight

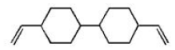
and which has good contrast."

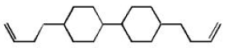
H　Matters described in A33

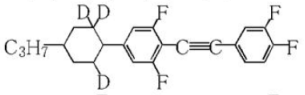
(H1) "[Claim 1] A nematic liquid crystal composition comprising: a liquid crystal component A consisting of one or two or more compounds represented by one or two or more general formulas selected from
[Chemical 1] (omitted)
(wherein one or two or more -CH2- groups existing in a decahydronaphthalene-2,6-diyl ring may be substituted ... (Omitted);
R1 and R2 can each independently represent an alkyl group having 1 to 10 carbon atoms, an alkoxy group or an alkenyl or alkenyloxy group having 2 to 10 carbon atoms, or alkenyloxy group; the alkyl group, the alkoxy group, the alkenyl group, or the alkenyloxy group has one or two or more of F, Cl, CN, CH3 or CF3 as an unsubstituted or substituted group; and/or one or two or more CH2 groups present in the alkyl group, the alkoxy group, the alkenyl group, or the alkenyloxy group may be substituted with O, CO, or COO in which O atoms are not directly bonded to each other;
K1 and K2 each independently represent a single bond ... (omitted);

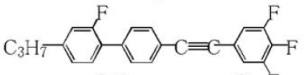
rings A1 to A2 each independently represent 1,4-phenylene ... (omitted) ... can be substituted;
one or two or more hydrogen atoms present in the decahydronaphthalene-2,6-diyl ring, side chain groups R1 and R2, linking groups K1 and K2, and ring A1 and A2 may be replaced with deuterium atoms; and
the atoms constituting the compounds of the general formulas (I-1) to (I-3) may be substituted with their isotope atoms), and comprising, as liquid crystal components except any of the compounds of the general formulas (I-1) to (I-3), 0 to 99.9% by weight of a liquid crystal component B composed of a compound having a dielectric anisotropy of +2 or more, and 0 to 98% by weight of a liquid crystal component C composed of a compound having a dielectric anisotropy of -10 to +2, wherein the sum of the liquid crystal component B and the liquid crystal component C is 0 to 99.9% by weight."

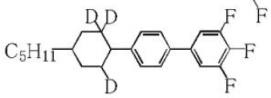
(H2) "[0299]
(Example 14)
[0300]
[Chemical 104]

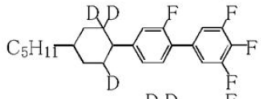
(3-1401)  10重量%

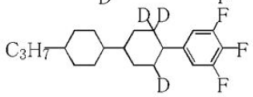
(3-1402)  10重量%

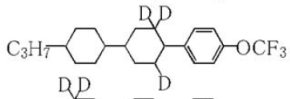
(3-1403)  15重量%

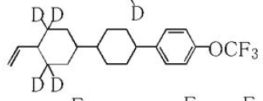
(3-1404)  10重量%

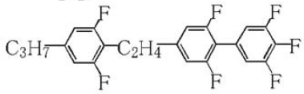
(3-1405)  10重量%

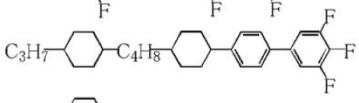
(3-1406)  5重量%

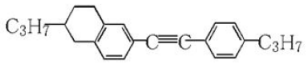
(3-1407)  5重量%

(3-1408)  10重量%

(3-1409)  10重量%

(3-1410)  3重量%

(3-1411)  5重量%

(3-1412)  7重量%

重量 weight

A nematic liquid crystal composition (3-14) consisting of the following compounds was prepared and various properties of this composition were measured. The results were as described below. The nematic liquid crystal composition had a high specific resistance and a high voltage-holding ratio after the heat acceleration test, and was stable to heat. In addition, a new nematic liquid crystal composition of the present invention was prepared using the composition as a basic component material, and then used to produce an active matrix liquid crystal display device. It was confirmed that the resulting device had a small leakage current and that no flicker occurred. In particular, since V1 is as low as 3 V or less, it is useful for a TFT-LCD that requires high definition and high contrast display, and is suitable for a TFT-LCD using polysilicon."

I Matters described in A37

(The Japanese translation of A37 is described below. The translation is transcribed from the corresponding Japanese Gazette A38 and the corresponding location in A37 is also described.)

(I-1) "A liquid-crystalline medium based on a mixture of polar compounds having positive dielectric anisotropy, characterized in that it comprises one or two or more alkenyl compounds of the formula I
[Chemical 1] (omitted)
and one or two or more compounds of the formula IA
[Chemical 2] (omitted)
in which the individual radicals have the following meanings:
R is a halogenated or unsubstituted alkyl or alkoxy radical having 1 to 15 carbon atoms, where one or two or more CH2 groups in these radicals may also, in each case independently of one another, be replaced by −C≡C−, −CH=CH−, −O−, −CO−O− or −O−CO− in such a way that O atoms are not linked directly to one another,
R1 is an alkenyl radical having 2 to 7 carbon atoms,
R2 is as defined for R or, if y is 1 or 2, is alternatively Q−Y,
Q is CF2, OCF2, CFH, OCFH, OCHFCF2, OCF2CHFCF2, or a single bond,
Y is F or Cl,
X is F, Cl, CN, a halogenated alkyl radical, a halogenated alkenyl radical, a halogenated alkoxy radical, or a halogenated alkenyloxy radical having up to 6 carbon atoms,
Z1 and Z2 are each, independently of one another, −CF2O−, OCF2− or a single bond, where, if z = 1, Z1 ≠ Z2,
[Chemical 3] (omitted)
y is 0, 1, or 2, and
z is 0 or 1, and
L1, L2, L3, and L4 are each, independently of one another, H or F." (pages 92 to 93, Claim 1)

(I2) "[0106]
Example 25
[Table 26]

CC-5-V	15.00 %	透明点 [°C]:	+79.5
CC-3-V1	9.00 %	Δn [589 nm, 20°C]:	+0.1042
CCZU-2-F	4.00 %	d· Δn [20°C]:	0.50
CCZU-3-F	4.00 %	ねじれ [°]:	90
PUQU-3-F	18.00 %	V_{10} [V]:	1.30
PGU-2-F	6.00 %		
CGZP-2-OT	11.00 %		
CGZP-3-OT	9.00 %		
CCP-20CF_3	8.00 %		
CCP-30CF_3	8.00 %		
CCG-V-F	4.00 %		
BCH-32	2.00 %		
CC-V-1	2.00 %		

透明点　　Clearing point
ねじれ　　Twist

"(page 51, lines 1 to 14)

(3) Invention disclosed in A1

[Claim 1] of A1 states "A liquid composition comprising at least one compound selected from the group consisting of compounds represented by Formula (I) as a first component, at least one compound selected from the group consisting of compounds represented by Formula (II-1) or (II-2) as a second component, and at least one compound selected from the group consisting of compounds selected from the group consisting of compounds represented by Formula (III-1), (III-2), (III-3), or (III-4) as a third component.

[Chemical 1] (omitted)

[Chemical 2] (omitted)

(wherein, R1, R3, R5, R7, R9, R11, and R13 each independently represent an alkyl radical having 1 to 10 carbon atoms or an alkenyl group having 2 to 10 carbon atoms, and R2, R4, R6, R8 , R10, R12, and R14 each independently represent an alkyl radical having 1 to 10 carbon atoms, an alkoxy group, or an alkenyl group having 2 to 10 carbon atoms, and Z1 to Z5 each independently represent a single bond or -CH2CH2-.)"

Among specific examples of the liquid crystal composition, it can be said that Example 5 in the above-described (A5) discloses a liquid crystal composition comprising:

9.0% of V-NhB(2F,3F)-O1, 9.0% of 3-NhB(2F,3F)-O2, 10.0% of 5-NhB(2F,3F)-O1, 10.0% of 5-NhB(2F,3F)-O2, 5.0% of V-HNhB(2F,3F)-O1, 5.0% of V-HH-3, 12.0% of 3-HB-2, 5.0% of 3-HB-4, 5.0% of 2-HH-EMe, 10.0% of 3-HH-EMe, 4.0% of V-HHB-1, 6.0% of 3-HHB-1, 5.0% of 3-HHB-3, and 5.0% of 3-HHB-O1, wherein TC = 59.4 (°C),

TSN < -20°C, Δn = 0.096, Δε = -1.9, η20 = 17.6 (mPa.s). (hereinafter, referred to as "Invention A-1").

Further, according to the description in paragraph [0002] of the above (A2) in A1, a liquid crystal display element using a liquid crystal composition is used for a "display," In A1, therefore, it can be said that
"use of the liquid crystal composition of A1 invention for a liquid crystal display" (hereinafter referred to as "A1-1 invention") and
"a liquid crystal display comprising the liquid crystal composition of A1 invention" (hereinafter, referred to as "A1-2 invention") are also described.

(4) Comparison / Examination

A Regarding Invention 1

A1 Invention is compared to Invention 1

• The "liquid crystal composition" of the A1 Invention corresponds to the "liquid crystal composition" of Invention 1.

• "V-NhB(2F,3F)-O1," "3-NhB(2F,3F)-O2," "5-NhB(2F,3F)-O1," and 5-NhB(2F,3F)-O2" of the A1 Invention are included in the compounds represented by general formula (I) of the liquid crystal composition recited in [Claim 1] of A1, whereas "V-HNhB(2F,3F)-O1" is included in the compounds represented by general formula (II-1) thereof. According to the descriptions in paragraphs [0016] and [0017] of the above (A3), the compounds represented by general formula (I) have a dielectric anisotropy value (Δε) of about -9 to -6 and the compounds represented by general formula (II-1) have a dielectric anisotropy value (Δε) of about -8 and -5. Thus, "V-NhB(2F,3F)-O1," "3-NhB(2F,3F)-O2," "5-NhB(2F,3F)-O1," "5-NhB(2F,3F)-O2," and "V-HNhB(2F,3F)-O1" of the A1 Invention are compounds having negative dielectric anisotropy. Then, it is evident that these compounds are "polar compounds." Therefore, it can be said that the A1 Invention containing these compounds is a "liquid crystal composition based on a mixture of polar compounds having negative dielectric anisotropy".

• "V-HH-3" of the A1 Invention corresponds to the case in which R0 is an n-alkyl having three carbon atoms and alkenyl is an alkenyl having two carbon atoms in Formula RI of Invention 1, whereas "3-HHB-3" of the A1 Invention corresponds to the case in which alkyl and alkyl* are respectively alkyl radicals each having three carbon atoms.

Accordingly, Invention 1 and the A1 Invention are identical in that each of them is "a liquid-crystalline medium based on a mixture of polar compounds having negative dielectric anisotropy, the liquid-crystalline medium comprising compounds of Formulae RII and RVIII," but differ in the following features.

<Different Feature 1-1>

Invention 1 contains one or two or more compounds represented by general formula I (PP-13), whereas the A1 Invention does not contain the compound (PP-13) represented by general formula I of Invention 1.

Regarding <Different Feature 1-1>

"V-HH-3," "3-HB-2," "3-HB-4," "2-HH-EMe," and "3-HH-EMe" in the liquid crystal composition of the A1 Invention are bicyclic in common with "PP-13" of Invention 1. "3-HHB-1" in the liquid crystal composition of the A1 Invention has an alkyl radical having 1 or 3 carbon atoms as a terminal group in common with "PP-13" of Invention 1.

Here, the liquid crystal composition of the A1 Invention serves as an example of the liquid crystal composition stated in the above (A1). However, neither (III-1) and (III-2) stated in the above (A1) including the above bicyclic compounds of the A1 Invention as specific compounds nor (III-4) stated in the above (A1) including "3-HHB-1" of the A1 Invention differs in ring structure. Thus, none of them includes "PP-13." In addition, "PP-13" is not used in examples other than Example 5; i.e., is not used in Examples 1 to 4 and 6 to 8 of the above (A4) and (A6). Thus, it cannot be said that "PP-13" is recognized in the liquid crystal composition of A1. It can be said that "PP-13" is a compound different from the above bicyclic compound and "3-HHB-1" of the A1 Invention.

Then, according to the descriptions in paragraph [0018] of the above (A3), these (III-1), (III-2), and (III-4) are used to adjust Δn, viscosity, and nematic liquid crystal phase. It cannot be said that there is a motivation to substitute "PP-13" for the above bicyclic compound or "3-HHB-1" in the A1 Invention, which are used to adjust Δn,

viscosity, and nematic liquid crystal phase contained in these (III-1), (III-2), and (III-4). It cannot be said that there is a motivation to add "PP-3" to the A1 Invention changing the amount of each liquid-crystalline compound of the A1 Invention, either.

Furthermore, in the second written refutation, there is no allegation with an additional Evidence A. On pages 30 to 31 in the First Written Refutation, A27 (above (D2)), A29 (above (F2) and (F3)), and A37 (above (I2)) are cited, and it is alleged that combining HH or HB at the terminal CH3 is a matter of common general knowledge.

However, compounds described in A27, 29, and 37 have HH or HB at the terminal CH3, and they differ from "PP-13." Thus, even considering A27, 29, and 37, it cannot be said that a person skilled in the art could easily conceive of adding "PP-13" to the liquid crystal composition of the A1 Invention.

Hence, Different Feature 1-1 is a substantial different feature and thus even a person skilled in the art could not easily conceive of the configuration of Different Feature 1-1 in the A1 Invention.

Therefore, Invention 1 does not correspond to the A1 Invention and could not be easily made even by a person skilled in the art based on the A1 Invention.

B Regarding Invention 2

A1 Invention is compared to Invention 2

• The "liquid crystal composition" of the A1 Invention corresponds to the "liquid crystal composition" of Invention 2.

• As stated in the above "A", it can be said that the A1 Invention is a "liquid crystal composition based on a mixture of polar compounds having negative dielectric anisotropy."

• "3-HHB-1" of the A1 Invention is a compound represented by general formula I of Invention 2 in which a is 0, the structures of rings A2 to A4 are a 1,4-phenylene radical, a single bond, a 1,4-cyclohexylene radical, a single bond, and a 1,4-cyclohexylene radical, and X is n-C3H7. Therefore, "3-HHB-1" of the A1 Invention corresponds to the compound represented by general formula I of Invention 2.

According to the above statement, Invention 2 and the A1 Invention are identical in that each of them is a "liquid-crystalline medium based on a mixture of polar compounds having negative dielectric anisotropy, the medium comprising a compound represented by general formula I," but differ in the following feature.

<Different Feature 1-2>

Invention 2 contains "CC-n-V1," "CC-V-V," and compounds represented by formulae RIV, RV, and RVII, whereas the A1 Invention does not include such compounds.

Regarding <Different Feature 1-2>

"V-HH-3," "2-HH-EMe," and "3-HH-EMe" of the A1 Invention are included in the compounds represented by general formula (III-1), which are selected from the compounds represented by the above general formulae (III-1) to (III-4), in the liquid crystal composition stated in the above (A1). The compound represented by general formula (III-1) is disclosed such that R7 represents an alkyl radical having 1 to 10 carbon atoms or an alkenyl group having 2 to 10 carbon atoms and R8 represents an alkyl radical having 1 to 10 carbon atoms, an alkoxy group, or an alkenyl group having 2 to 10 carbon atoms. Thus, formally, if one of R7 and R8 is n(CnH2n+1) or V and the other is V1 or V (hereinafter, such a compound is referred to as "the compound" in this section), "the compound" corresponds to "CC-n-V1" or "CC-V-V" of the Invention.

However, "the compound" is one of many possible forms. In addition, A1 includes no description of recommending that one of R7 or R8 be n(CnH2n+1) or V and the other be V1 or V. Moreover, "the compound" is not used as a specific compound corresponding to one represented by general formula (III-1) even when considering Examples 1 to 4 and 6 to 8 of the above (A4) and (A6), which are examples other than Example 5.

Then, in A1, at least seemingly, "CC-n-V1" or "CC-V-V" is included in the compounds represented by formula (III-1). In addition, even if the liquid crystal composition of the A1 Invention contains each of "V-HH-3," "2-HH-EMe," and "3-HH-EMe" as a specific compound corresponding to one represented by general formula (III-1), it cannot be said that A1 "substantially" describes "the compound" as a compound represented by general formula (III-1) sufficiently to enable a person skilled in the art to work the invention to easily conceive of including "CC-n-V1" or "CC-V-V" in place of or in addition to each of them.

In the First Written Refutation (page 34) cited by the Second Written Refutation (page 32), as described in the above (B2) of A12, the above (F2) and (F3) of A29, the above (G2) of A31, and the above (H2) of A33, "CC-n-V1" or "CC-V-V" is considered a compound already known in the art. Even though these compounds are described in A12, A29, A31, and A33, any of these compounds described in each item of Evidence A is nothing more than a component optionally used within each exemplified individual liquid crystal composition or medium of each item of Evidence A. No item of Evidence A describes a recommendation of adding "CC-n-V1" or "CC-V-V" to the liquid crystal composition of the A1 Invention.

On the other hand, it cannot be said that there is any technical requirement to add "CC-n-V1" or "CC-V-V" to the liquid crystal composition of the A1 Invention, which already contains the compounds "V-HH-3," "2-HH-EMe," and "3-HH-EMe" each having a bicyclic structure represented by "CC." Even if "CC-n-V1" or "CC-VV" is a compound already known in the art, it cannot be said that a person skilled in the art could easily conceive of adding each of these compounds to the liquid crystal composition of the A1 Invention.

Hence, Different Feature 1-2 is a substantial different feature and thus even a person skilled in the art could not easily conceive of the configuration of Different Feature 1-2 in the A1 Invention.

Therefore, Invention 2 does not correspond to the A1 Invention and could not be easily made even by a person skilled in the art based on the A1 Invention.

C Regarding Invention 3

A1 Invention is compared to Invention 3

• The "liquid crystal composition" of the A1 Invention corresponds to the "liquid crystal composition" of Invention 3.

• As stated in the above "A", it can be said that the A1 Invention is a "liquid crystal composition based on a mixture of polar compounds having negative dielectric anisotropy." Thus, the A1 Invention is in common with the "liquid-crystalline medium based on a mixture of polar compounds of positive dielectric anisotropy" of Invention 3 in that each of them is the "liquid-crystalline medium based on a mixture of polar compounds having dielectric anisotropy."

• As stated in the above "A", "V-HH-3" and "3-HHB-3" of the A1 Invention correspond to the compound of formula RII and the compound of formula RVIII of Invention 3, respectively.

According to the above statement, Invention 3 and the A1 Invention are identical in that each of them is "a liquid-crystalline medium based on a mixture of polar compounds having dielectric anisotropy, the liquid-crystalline medium comprising compounds of Formulae RII and RVIII," but differ in the following feature.

<Different Feature 1-3>

Regarding a liquid-crystalline medium, Invention 3 is a liquid-crystalline medium based on a mixture of polar compounds of positive dielectric anisotropy, comprising at least one compound selected from the group of compounds each represented by any one of formulae I1, I2, I4 to I11, I16, I20, and I23 to I29, whereas the A1 Invention is a liquid crystal composition based on a mixture of polar compounds having negative dielectric anisotropy, comprising no compound represented by any one of formulas I1, I2, I4 to I11, I16, I20, and I23 to I29.

Regarding <Different Feature 1-3>

As stated in the above "A," the A1 Invention is a "liquid crystal composition based on a mixture of polar compounds having negative dielectric anisotropy," the composition comprising polar compounds having negative dielectric anisotropy, such as "V-NhB(2F,3F)-O1," "3-NhB(2F,3F)-O2," "5-NhB(2F,3F)-O1," "5-NhB(2F,3F)-O2," and "V-HNhB(2F,3F)-O1." In addition, according to the descriptions in paragraph [0007] of the above (A3), the problems of the invention of the A1 Invention are "to provide a liquid crystal composition having a suitable Δn so as to achieve the display systems of the above a) and b), which can realize a wide view angle, a low viscosity, a largely negative Δε, and a broad range of nematic liquid crystal phase, while satisfying various properties required for a liquid crystal composition for the AM-LCD."

Then, in order to solve the problems of the invention of the A1 Invention, the composition needs to be at least a "liquid crystal composition based on a mixture of polar compounds having negative dielectric anisotropy." In other words, the above polar compounds having negative dielectric anisotropy are the main components of the A1 Invention and each of them must be changed to a polar compound having positive dielectric anisotropy to make the A1 Invention "a liquid-crystalline medium based on a

mixture of polar compounds of positive dielectric anisotropy." However, there should be disincentives to these matters.

In each of the compounds represented by formulas I1, I2, I4 to I11, I16, I20, and I23 to I29, X in the terminal group is "F or OCF3." Such a compound is "a polar compound having positive dielectric anisotropy" in which dielectric anisotropy is caused in the axial direction of the liquid crystal molecule.

Then, as stated above, there is a disincentive against adding "a polar compound having positive dielectric anisotropy" to the A1 Invention. Therefore, it should be said that adding the compounds represented by formulas I1, I2, I4 to I11, I16, I20, and I23 to I29, each of which is "a polar compound having positive dielectric anisotropy," to the A1 Invention, is disincentive either.

Regarding <effects of Invention 3>

As stated in the above, "1. Regarding Reasons for invalidation 1," (1) (1-1) "A", it can be said that problems to be solved by the invention have no or only a minor degree of drawbacks of the prior art, particularly in four respects of "very high specific resistances," "a high clearing point or a large working-temperature range," "low rotational viscosity or short response times even at low temperatures," and "low threshold voltage." The reduced elastic constants, especially the low threshold voltages caused by K1, are emphasized. As stated in "Regarding Reasons for invalidation 1," (4), it can be said that Invention 3 solves the problems of the Invention and then the result of solving the problems serve as the effects of Invention 3.

The liquid-crystalline medium of Invention 3 corresponds to a liquid-crystalline medium described in the examples, in that the liquid-crystalline medium of the Invention 3 is a liquid-crystalline medium based on a mixture of polar compounds of positive dielectric anisotropy, in which the compounds have positive dielectric anisotropy and are specifically represented by formula I. Considering the disclosure of the examples carrying out the evaluation of indexes "S→N," "clearing point," "Δn," "γ1," "V10, 0, and 20," "Δε," "K1," and so on, which correspond to the problems to be solved by the Invention; i.e., "very high specific resistances, "a high clearing point or a large working-temperature range," "low rotational viscosity or short response times even at low temperatures," and "low threshold voltage," the liquid-crystalline medium of Invention 3 shows good properties for these indicators. Therefore, it can be said that the present invention exerts a specific effect in solving the above problems of the invention.

Hence, Different Feature 1-3 is a substantial different feature and thus even a person skilled in the art could not easily conceive of the configuration of Different Feature 1-3 in the A1 Invention.

Therefore, Invention 3 does not correspond to the A1 Invention and could not be easily made even by a person skilled in the art based on the A1 Invention.

D Regarding Invention 7

A1-1 Invention is compared to Invention 7

• As stated in the above "A", it can be said that the "liquid crystal composition" of the A1-1 Invention corresponds to the "liquid-crystalline medium" of Invention 7 and thus the "liquid crystal composition" of the A1-1 Invention is a "liquid crystal composition based on a mixture of polar compounds having negative dielectric anisotropy."

• As stated in the above "B", "3-HHB-1" in the liquid crystal composition of the A1-1 Invention corresponds to the compound represented by general formula I of Invention 7. "V-HHB-1" in the liquid crystal composition of the A1-1 Invention corresponds to the compound represented by general formula 1 of Invention 7 in which a is 0, the structures of rings A2 to A4 are a 1,4-phenylene radical, a single bond, a 1,4-cyclohexylene radical, a single bond, and a 1,4-cyclohexylene radical, and X is a vinyl group.

• According to the descriptions in paragraph [0002] of the Specification of the Patent, it can be said that the "liquid display" of the A1-1 Invention is one that has been known as an "electro-optical device" and thus "use for a liquid crystal display" of the A1-1 Invention corresponds to "use for electro-optical purposes " in Invention 7.

According to the above statement, Invention 7 and the A1-1 Invention are identical in that each of them is "Use for electro-optical purposes of a liquid crystal medium based on a mixture of polar compounds having negative dielectric anisotropy, the liquid-crystalline medium comprising a compound represented by general formula I," but differ in the following features.

<Different Feature 1-4>

The liquid-crystalline medium of Invention 7 contains "CC-V-V," and compounds represented by formulae RIV, RV, and RVII, whereas the liquid crystal composition of the A1-1 Invention does not contain such compounds of Invention 7.

Regarding <Different Feature 1-4>

The matter specifying the invention of Invention 7 responsible for Different Feature 1-4 is one further limited by deleting "CC-n-V1" from the matter specifying the invention of Invention 2 responsible for Different Feature 1-2 in the above "B".

As stated in the above "B", furthermore, the above Different Feature 1-2 is a substantial different feature in the A1 Invention (the liquid crystal composition of the A1-1 Invention) and thus even a person skilled in the art could not easily conceive of the configuration of Different Feature 1-2 in the A1 Invention. Therefore, the above Different Feature 1-4 is also a substantial different feature and thus even a person skilled in the art could not easily conceive of the configuration of Different Feature 1-4 in the A1-1 Invention.

Therefore, Invention 7 is not the A1-1 Invention and could not be easily made even by a person skilled in the art based on the A1-1 Invention.

Here, in the First Written Refutation, page 38, regarding X in the compound represented by general formula I, A26 (the above (C1)) and A28 (the above (E1)), which show that replacing the terminal group of the liquid-crystalline compound with a halogenated alkyl radical. However, A26 and A28 do not relate to Invention 7 in which X in the compound represented by general formula I is n-C3H7 or a vinyl group.

E Regarding Invention 8

Invention A1-2 Invention is compared to Invention 8

• As stated in the above "A", it can be said that the "liquid crystal composition" of the A1-2 Invention corresponds to the "liquid-crystalline medium" of Invention 8 and thus the "liquid crystal composition" of the A1-2 Invention is a "liquid crystal composition based on a mixture of polar compounds having negative dielectric anisotropy."

• As stated in the above "D", "3-HHB-1" and "V-HHB-1" in the liquid crystal composition of the A1-2 Invention correspond to the compounds of general formula I of Invention 8, respectively.

• The "liquid display" of the A1-2 Invention corresponds to the "electro-optical liquid-crystal display" of Invention 8.

According to the above statement, Invention 8 and the A1-2 Invention are identical in that each of them is "a liquid-crystalline medium based on a mixture of polar compounds having negative dielectric anisotropy, the liquid-crystalline medium comprising a compound represented by general formula I," but differ in the following features.

<Different Feature 1-5>

The liquid-crystalline medium of Invention 8 contains "CC-n-V1," "CC-V-V," and compounds represented by formulae RIV, RV, and RVII, whereas the liquid crystal composition of the A1-2 Invention does not contain such compounds of Invention 8.

<Different Feature 1-6>

The liquid-crystalline medium of Invention 8 contains at least one stabilizer selected from the group of compounds represented by [Chemical 38] to [Chemical 42] (omitted), whereas the liquid crystal composition of the A1-2 Invention does not contain any of such compounds.

Regarding <Different Feature 1-5>

The matter specifying the invention of Invention 8 responsible for Different Feature 1-5 is identical with the matter specifying the invention of Invention 2 responsible for Different Feature 1-2 in the above "B."

As stated in the above "B," furthermore, the above Different Feature 1-2 is a substantial different feature in the A1 Invention (the liquid crystal composition of the A1-2 Invention) and thus even a person skilled in the art could not easily conceive of the configuration of Different Feature 1-2 in the A1 Invention. Therefore, the above Different Feature 1-5 is also a substantial different feature and thus even a person skilled in the art could not easily conceive of the configuration of Different Feature 1-5 in the A1-2 Invention.

Therefore, Invention 8 does not correspond to the A1-2 Invention without needing to consider the above Different Feature 1-6 and could not be easily made even by a person skilled in the art based on the A1-2 Invention.

F Regarding Invention 13

A1 Invention is compared to Invention 13

• As stated in the above "C," the "liquid crystal composition" of the A1 Invention corresponds to the "liquid-crystalline medium" of Invention 13. "V-HH-3" and "3-HHB-3" of the A1 Invention correspond to the compound of formula RII and the compound of formula RVIII of Invention 13, respectively.

• As stated in the above "C," it can be said that the A1 Invention is a "liquid crystal composition based on a mixture of polar compounds having negative dielectric anisotropy." Thus, the A1 Invention is in common with the "liquid-crystalline medium based on a mixture of polar compounds of positive dielectric anisotropy" of Invention 13 in that each of them is the "liquid-crystalline medium based on a mixture of polar compounds having dielectric anisotropy."

According to the above statement, Invention 13 and the A1 Invention are identical in that each of them is "a liquid-crystalline medium based on a mixture of polar compounds having dielectric anisotropy, the liquid-crystalline medium comprising compounds of Formulae RII and RVIII," but differ in the following features.

<Different Feature 1-7>

Regarding a liquid-crystalline medium, Invention 13 is a liquid-crystalline medium based on a mixture of polar compounds of positive dielectric anisotropy, comprising at least one compound selected from the group of compounds each represented by any one of formulae I1, I2, I4 to I11, I16, I20, and I23 to I29, whereas the A1 Invention is a liquid crystal composition based on a mixture of polar compounds having negative dielectric anisotropy, comprising no compound represented by any one of formulas I1, I2, I4 to I11, I16, I20, and I23 to I29.

Regarding <Different Feature 1-7>

As stated in the above "C," there is a disincentive against making the A1 Invention "a liquid-crystalline medium based on a mixture of polar compounds of positive dielectric anisotropy."

Furthermore, in each of the compounds represented by formulas I1, I2, I4 to I11, I16, I20, and I23 to I29, X in the terminal group is [Chemical 54] "F ... OCF3 ... or OCClFCF2CF3" and is "a polar compound having positive dielectric anisotropy" just like the case where the terminal group X of the same formula in Invention 3 includes "F or OCF3."

Then, just as stated in the above "C," it should be said that there is a disincentive against adding the compounds represented by formulas I1, I2, I4 to I11, I16, I20, and I23 to I29 of Invention 13, each of which is "a polar compound having positive dielectric anisotropy," to the A1 Invention.

Furthermore, Invention 13 is in common with Invention 3 in that the liquid-crystalline medium of Invention 13 is a liquid-crystalline medium based on a mixture of polar compounds of positive dielectric anisotropy, in which the compounds have positive dielectric anisotropy and are specifically represented by formula I. Thus, just as with Invention 3, it can be said that Invention 13 exerts a specific effect stated in the above "C" "Regarding <Effects of Invention 3>".

Hence, Different Feature 1-7 is a substantial different feature and thus even a person skilled in the art could not easily conceive of the configuration of Different Feature 1-7 in the A1 Invention.

Therefore, Invention 13 does not correspond to the A1 Invention and could not be easily made even by a person skilled in the art based on the A1 Invention.

(5) Summary of examination on the reason for invalidation 3-1

As stated above, none of Inventions 1 to 3, 7, 8, and 13 is the invention disclosed in A1 and none of them could have been easily made by a person skilled in the art based on the invention disclosed in A1. Thus, these inventions do not fall under the provision of Article 29(1)(iii) of the Patent Act or are not the inventions that cannot be granted a patent under the provision of Article 29(2) of the Patent Act. Therefore, none of Inventions 1 to 3, 7, 8, and 13 falls under Article 123(1)(ii) of the Act and none should be invalidated.

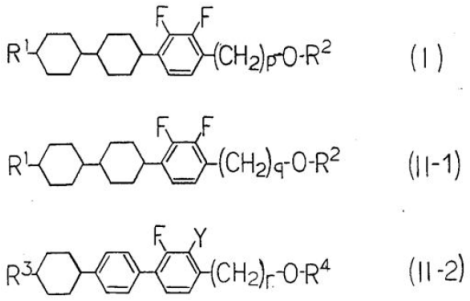
3. Regarding the reason for invalidation 3-2

(1) Publication

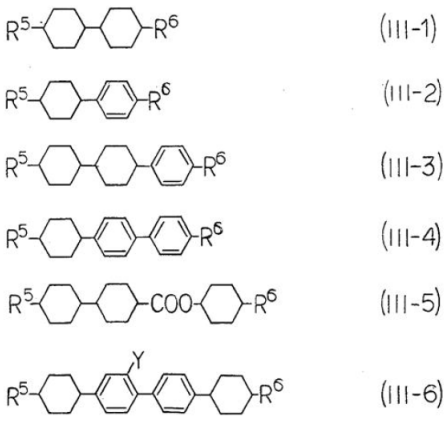
A9: Japanese Unexamined Patent Application Publication No. H10-287875

(2) Matters described in publication (A9)

(A1) "[Claim 1] A liquid composition comprising at least one compound selected from the group of compounds represented by Formula (I) as a first component, and at least one compound selected from the group of compounds represented by Formula (II-1) or (II-2) as a second component.
[Chemical 1]



(wherein R1, R2, R3, and R4 each independently represent an alkyl radical having 1 to 10 carbon atoms, Y represents H or F, p, q, and r each independently represent an integer of 1 to 5, and each atom constituting these compounds may be substituted with its isotope.)
[Claim 2] The liquid crystal composition according to Claim (1), wherein, based on the total weight of the liquid crystal composition, the first component is 3 to 25% by weight and the second component is 3 to 70% by weight.
[Claim 3] The liquid crystal composition according to one of Claim (1) or (2), comprising at least one compound selected from the group of compounds represented by Formula (I) as a first component, at least one compound selected from the group of compounds represented by Formula (II-1) or (II-2) as a second component, and at least one compound selected from the group of compounds represented by Formulae (III-1) to (III-6) as a third component.
[Chemical 2]



(wherein, R5 and R6 each independently represent an alkyl radical having 1 to 10 carbon atoms, provided that any non-adjacent methylene group (CH2) in the alkyl radical may be replaced by an oxygen atom (O), and Y represents H or F, and each of atoms constituting these compounds may be substituted with its isotope.)

(A2) "[0002]

[Background Art] Liquid crystal display elements (LCDs) have lower power consumption and are smaller in size and lighter in weight than CRTs (cathode ray tubes), and have been put to practical use as various LCDs, such as those of twisted nematic (TN), super twisted nematic (STN), and thin film transistor (TFT) systems. Among them, the active matrix LCDs (AM-LCDs) of the (TFT) system have been attracting attention as a favorite of flat displays due to the progress of colorization and high definition. The properties required for the liquid crystal composition for AM-LCD are as follows:

1) a high voltage holding ratio (VHR) to maintain high contrast of LCD;

2) a large nematic liquid crystal phase range depending on the usage environment;

3) appropriate refractive index anisotropy (Δn) that can be chosen according to the thickness of a cell; and

4) an appropriate threshold voltage that can be chosen according to a drive circuit.

As the operation method of AM-LCD, a TN display method in which the orientation of liquid crystal molecules between the upper and lower electrode substrates is twisted by 90° has been the mainstream. However, it has a drawback of being difficult to apply to a large screen due to its narrow viewing angle. Therefore, as modes for improving the viewing angle, for example, the following modes have been proposed:

a) an IPS display system in which a liquid crystal phase shows a homogeneous alignment state under no applied voltage and liquid crystal molecules rotate 45 to 90° in the plane when a voltage is applied ... ; and
b) a display system in which a liquid crystal phase shows a homeotropic alignment state under no applied voltage and the orientation of liquid crystal molecules changes to a single horizontal direction (Japanese Unexamined Patent Application Publication No. H2-176625).
...
[0003]
[Problems to be Solved by the Invention] An object of the present invention is to provide a liquid crystal composition having a relatively small value of Δn and negative dielectric anisotropy, which allow the liquid crystal composition to be applied to the above display methods (a) and (b) that can substantialize a wide viewing angle, while having various properties required for the liquid crystal composition for AM-LCD."

(A3) "[0009] Hereinafter, the compounds constituting the liquid crystal composition of the present invention will be described. The compounds represented by general formula (I) have a dielectric anisotropy (Δε) in a range of approximately -4 to -1 and a clearing point (Tc) of approximately 60 to 80°C, and are excellent in thermal and chemical stability. Thus, in particular, the compounds play the role of reducing the threshold voltage and the viscosity of the liquid crystal composition for TFT, which requires particularly high reliability. However, since the refractive index anisotropy (Δn) is in the range of approximately 0.05 to 0.07, it is not preferred that Δn of the composition is slightly reduced when the composition is prepared with only these compounds. On the other hand, the compounds represented by general formulae (II-1) and (II-2) have a dielectric anisotropy (Δn) in the range of approximately -6 to -1 and a clearing point (Tc) in the range of approximately 70 to 140°C, and have excellent thermal and chemical stabilities. Thus, the compounds play the role of further reducing the threshold voltage of the liquid crystal composition. However, since the refractive index anisotropy (Δn) is in the range of approximately 0.08 to 0.18, it is not preferred that Δn of the composition is slightly increased when the composition is prepared with only these compounds. By appropriately combining several compounds represented by general formula (I) with several compounds represented by general formulae (II-1) and (II-2), in particular, the liquid crystal composition for AM-LCD having a suitable value of Δn depending on the cell thickness and also having a negative dielectric anisotropy, which is the object of the present invention, can be prepared.

[0010] ... The compounds represented by general formulae (III-1) and (III-2) are responsible for lowering the viscosity of the liquid crystal composition. However, the use of excessive amounts of these compounds may lead to increased threshold voltage and excessively lowered clearing point of the liquid crystal composition. The compounds represented by general formulae (III-3) to (III-6) particularly play a role in increasing the clearing point. However, if used in a large amount, the compatibility of the liquid crystal composition at low temperatures may deteriorate."

(A4) "[0016]

Example 1

3-HB(2F,3F)-1O1	9.0%	
5-HB(2F,3F)-1O1	9.0%	
3-HHB(2F,3F)-1O1		12.0%
5-HHB(2F,3F)-1O1		14.0%
3-HBB(2F,3F)-1O1	10.0%	
5-HBB(2F,3F)-1O1	5.0%	
3-HH-4	10.0%	
3-HH-2	5.0%	
3-HH-O1	5.0%	
3-HH-O3	6.0%	
5-HH-O1	5.0%	

TNI = 66.1 (°C)

TSN < -30°C

Δn = 0.076

Δε = -3.6

η20 = 22.6 (mPa•s)

VHR (25°C) = 99.0%

This liquid crystal composition had a suitable value of Δn and a high voltage-holding ratio at 25°C.

[0017]

Example 2

3-HB(2F,3F)-1O1	12.0%	
5-HB(2F,3F)-1O1	11.0%	
3-HHB(2F,3F)-1O1		14.0%
5-HHB(2F,3F)-1O1		15.0%
3-HBB(2F,3F)-1O1	6.0%	

5-HBB(2F,3F)-1O1	6.0%
3-HBB(2F)-1O1	6.0%
5-HBB(2F)-1O1	6.0%
3-HH-4	6.0%
3-HH-2	5.0%
3-HH-O1	4.0%
3-HH-O3	5.0%
5-HH-O1	4.0%

TNI = 69.0 (°C)
TNI = -30 (°C)
Δn = 0.081
Δε = -3.4
η20 = 25.2 (mPa•s)
VHR (25°C) = 99.1%

This liquid crystal composition had a suitable value of Δn and a high voltage-holding ratio at 25°C.

[0018]

Example 3

3-HB(2F,3F)-1O1	4.0%	
5-HB(2F,3F)-1O1	4.0%	
3-HHB(2F,3F)-1O1		12.0%
5-HHB(2F,3F)-1O1		13.0%
3-HBB(2F,3F)-1O1	10.0%	
5-HBB(2F,3F)-1O1	10.0%	
3-HHEH-3	5.0%	
3-HHEH-5	5.0%	
4-HHEH-3	5.0%	
3-HH-4	5.0%	
3-HH-5	5.0%	
3-HH-O1	6.0%	
3-HH-O3	6.0%	
3-HB-O1	5.0%	
3-HB-O2	5.0%	

TNI = 61.5 (°C)
TSN < -20°C
Δn = 0.066

Δε = -2.3

η20 = 26.5 (mPa•s)

VHR=98.5%

This liquid crystal composition had a suitable value of Δn and a high voltage-holding ratio at 25°C.

[0019]

Example 4

3-HB(2F,3F)-1O1	12.0%	
5-HB(2F,3F)-1O1	11.0%	
3-HHB(2F,3F)-1O1		14.0%
5-HHB(2F,3F)-1O1		15.0%
3-HBB(2F,3F)-1O1	14.0%	
5-HBB(2F,3F)-1O1	10.0%	
3-HH-4	6.0%	
3-HH-5	5.0%	
3-HH-O1	4.0%	
3-HH-O3	5.0%	
5-HH-O1	4.0%	

TNI = 67.3 (°C)

TSN < -20°C

Δn = 0.080

Δε = -3.6

η20 = 24.7 (mPa•s)

VHR = 99.3%

This liquid crystal composition had a suitable value of Δn and a high voltage-holding ratio at 25°C.

[0020]

Example 5

3-HB(2F,3F)-1O1	7.0%	
5-HB(2F,3F)-1O1	7.0%	
3-HHB(2F,3F)-1O1		14.0%
5-HHB(2F,3F)-1O1		15.0%
3-HBB(2F,3F)-1O1	12.0%	
5-HBB(2F,3F)-1O1	11.0%	
3-HBB(2F)-1O1	5.0%	
5-HBB(2F)-1O1	5.0%	

3-HH-4	6.0%
3-HH-5	5.0%
3-HH-O1	4.0%
3-HH-O3	5.0%
5-HH-O1	4.0%

TNI = 77.2 (°C)
TSN < -30°C
Δn = 0.090
Δε = -3.4
η20 = 29.5 (mPa•s)
VHR = 99.0%

This liquid crystal composition had a suitable value of Δn and a high voltage-holding ratio at 25°C.

[0021]

Example 6

3-HB(2F,3F)-1O1	5.0%	
5-HB(2F,3F)-1O1	5.0%	
3-HHB(2F,3F)-1O1		12.0%
5-HHB(2F,3F)-1O1		8.0%
3-HBB(2F,3F)-1O1	10.0%	
5-HBB(2F,3F)-1O1	8.0%	
3-HHB-O2	10.0%	
3-HBB-2	11.0%	
5-HB-3	13.0%	
3-HB-O2	10.0%	
3-HB(F)BH-3		4.0%
5-HB(F)BH-3		4.0%

TNI = 91.6 (°C)
TSN < -20°C
Δn = 0.109
Δε = -2.7
η20 = 23.9 (mPa•s)
VHR = 99.3%

This liquid crystal composition had a suitable value of Δn and a high voltage-holding ratio at 25°C.

[0022]

Example 7

3-HB(2F,3F)-1O1	4.0%	
3-HHB(2F,3F)-1O1		12.0%
5-HHB(2F,3F)-1O1		13.0%
3-HBB(2F,3F)-1O1	10.0%	
5-HBB(2F,3F)-1O1	10.0%	
3-HBB(2F)-1O1	4.0%	
3-HHEH-3	5.0%	
3-HHEH-5	5.0%	
3-HHB-1	5.0%	
3-HH-4	5.0%	
3-HH-5	5.0%	
3-HH-O1	6.0%	
3-HH-O3	6.0%	
3-HB-O1	5.0%	
3-HB-O2	5.0%	

TNI = 65.1 (°C)

TSN < -20°C

Δn = 0.076

Δε = -2.2

η20 = 26.6 (mPa•s)

VHR = 98.5%

This liquid crystal composition had a suitable value of Δn and a high voltage-holding ratio at 25°C.

[0023]

Example 8

3-HB(2F,3F)-1O1	5.0%	
3-HHB(2F,3F)-1O1		12.0%
5-HHB(2F,3F)-1O1		8.0%
3-HBB(2F,3F)-1O1	10.0%	
5-HBB(2F,3F)-1O1	8.0%	
5-HBB(2F)-1O1	5.0%	
3-HHB-O2	10.0%	
3-HBB-2	11.0%	
5-HB-3	13.0%	
3-HB-O2	10.0%	

3-HB(F)BH-3	4.0%
1O1-HBBH-5	4.0%

vTNI = 97.6 (°C)
TSN < -20°C
Δn = 0.115
Δε = -2.2
η20 = 26.1 (mPa•s)
VHR = 99.3%

This liquid crystal composition had a suitable value of Δn and a high voltage-holding ratio at 25°C.

[0024]

Example 9

5-HB(2F,3F)-1O1	5.0%
3-HHB(2F,3F)-1O1	3.0%
3-HBB(2F)-1O1	3.0%
3-HH-2	6.0%
3-HH-4	6.0%
5-HH-O1	5.0%
3-HB-O2	10.0%
3-HB-O4	10.0%
3-HHB-3	6.0%
3-HHB-O1	8.0%
3-HHB-O2	8.0%
3-HBB-2	10.0%
3-HHEH-3	5.0%
3-HHEH-5	5.0%
4-HHEH-3	5.0%
3-HB(F)BH-3	4.0%
5-HB(F)BH-3	4.0%

TNI = 80.9 (°C)
TSN < -20°C
Δn = 0.081
Δε = -0.4
η20 = 14.4 (mPa•s)
VHR = 98.8%

This liquid crystal composition had a suitable value of Δn and a high voltage-holding ratio at 25°C."

(A5) "[0025]
Example 10

5-HB(2F,3F)-1O1	5.0%
3-HBB(2F,3F)-1O1	3.0%
3-HH-2	5.0%
3-HH-4	10.0%
3-HH-O1	5.0%
3-HH-O3	6.0%
5-HH-O1	5.0%
3-HB-O4	10.0%
5-HB-3	12.0%
3-HHB-1	8.0%
3-HHB-3	5.0%
3-HHB-O2	5.0%
3-HBB-2	2.0%
3-HHEH-3	5.0%
3-HHEH-5	5.0%
3-HB(F)BH-3	5.0%
1O1-HBBH-5	4.0%

TNI = 65.8 (°C)
TSN < -20°C
Δn = 0.066
Δε = -0.3
η20 =11.3 (mPa•s)
VHR = 99.0%

This liquid crystal composition had a suitable value of Δn and a high voltage-holding ratio at 25°C."

(A6) "[0026]
Example 11

3-HB(2F,3F)-1O1	9.0%
5-HB(2F,3F)-1O1	9.0%
3-HHB(2F,3F)-1O1	12.0%

5-HHB(2F,3F)-1O1	14.0%
3-HBB(2F)-1O1	15.0%
5-HBB(2F)-1O1	10.0%
3-HH-4	5.0%
3-HH-5	10.0%
3-HB-O4	5.0%
3-HHB-1	5.0%
3-HHB-O1	6.0%

TNI = 82.7 (°C)
TSN < -20°C
Δn = 0.112
Δε = -3.0
η20 = 26.1 (mPa•s)
VHR=99.3%

This liquid crystal composition had a suitable value of Δn and a high voltage-holding ratio at 25°C.

[0027]

Example 12

3-HB(2F,3F)-1O1	10.0%
5-HB(2F,3F)-1O1	8.0%
3-HHB(2F,3F)-1O1	12.0%
3-HBB(2F,3F)-1O1	8.0%
3-HBB(2F)-1O1	5.0%
5-HBB(2F)-1O1	5.0%
3-HH-4	5.0%
3-HH-O3	5.0%
5-HB-3	13.0%
3-HHB-1	10.0%
3-HHB-3	11.0%
3-HB(F)BH-3	4.0%
5-HB(F)BH-3	4.0%

TNI = 86.4 (°C)
TSN < -20°C
Δn = 0.081
Δε = -2.5
η20 =19.1 (mPa•s)

VHR = 99.1%

This liquid crystal composition had a suitable value of Δn and a high voltage-holding ratio at 25°C."

(3) Invention disclosed in A9

[Claim 3] of A9, which depends from [Claim 1], recites "a liquid crystal composition comprising at least one compound selected from the group of compounds represented by Formula (I) (omitted) as a first component, at least one compound selected from the group of compounds represented by Formula (II-1) or (II-2) (omitted) as a second component, and at least one compound selected from the group of compounds represented by Formulae (III-1) to (III-6) as a third component.
[Chemical 2] ((III-1) to (IIII-6) omitted)
(wherein, R5 and R6 each independently represent an alkyl radical having 1 to 10 carbon atoms, provided that any non-adjacent methylene group (CH2) in the alkyl radical may be replaced by an oxygen atom (O), and Y represents H or F, and each of atoms constituting these compounds may be substituted with its isotope.)." It can be said that, among the specific examples of this liquid crystal composition, the above (A5) describes Example 10 as follows:
"A liquid crystal composition comprising 5.0% of 5-HB (2F,3F)-1O1, 3.0% of 3-HBB (2F,3F)-1O1, 5.0% of 3-HH-2, 10.0% of 3-HH-4, 5.0% of 3-HH-O1, 6.0% of 3-HH-O3, 5.0% of 5-HH-O1, 10.0% of 3-HB-O4, 12.0% of 5-HB-3, 8.0% of 3-HHB-1, 5.0% of 3-HHB-3, 5.0% of 3-HHB-O2, 2.0% of 3-HBB-2, 5.0% of 3-HHEH-3, 5.0% of 3-HHEH-5, 5.0% of 3-HB(F)BH-3, and 4.0% of 1O1-HBBH-5, wherein TNI = 65.8 (°C), TSN < -20°C, Δn = 0.066, Δε = -0.3, η20 = 11.3 (mPa.s), and VHR = 99.0% (hereinafter, referred to as the "A9 Invention").

Further, according to the description of the above (A2) in A9, a liquid crystal display element using a liquid crystal composition is used for a "display," In A9, therefore, it can be said that "use of the liquid crystal composition of the A9 Invention for a liquid crystal display" (hereinafter referred to as the "A9-1 invention") and
"a liquid crystal display comprising the liquid crystal composition of the A9 Invention" (hereinafter, referred to as the "A9-2 invention") are also described.

(4) Comparison / examination

A Regarding Invention 1

A9 Invention is compared to Invention 1

• The "liquid crystal composition" of the A9 Invention corresponds to the "liquid crystal composition" of Invention 1.

• Both "5-HB(2F,3F)-1O1" and "3-HBB(2F,3F)-1O1" in the A9 Invention include benzene rings on which F having a high electronegativity is bonded to each of the second and third positions and are polarized in the direction perpendicular to the long axis of the liquid crystal molecule. Thus, it is clear that this compound is a compound having a negative dielectric anisotropy value, and it is also clear that such a compound is a "polar compound". It is evident that these compounds having negative dielectric anisotropy values are "polar compounds." Therefore, it can be said that the A9 Invention containing these compounds is a "liquid crystal composition based on a mixture of polar compounds having negative dielectric anisotropy".

• "3-HHB-3" of the A9 Invention corresponds to the case in which alkyl and alkyl* are respectively alkyl radicals each having three carbon atoms in Formula RVIII of Invention 1, whereas "3-HBB-2" corresponds to the case in which alkyl and alkyl* are respectively alkyl radicals respectively having three and two carbon atoms in Formula RXIV of Invention 1

According to the above statement, Invention 1 and the A9 Invention are identical in that each of them is "a liquid-crystalline medium based on a mixture of polar compounds having negative dielectric anisotropy, the liquid-crystalline medium comprising compounds of Formulae RIII and RXIV," but differ in the following features.

<Different Feature 2-1>

Invention 1 contains one or two or more compounds represented by general formula I (PP-13), whereas the A9 Invention does not contain the compound (PP-13) represented by general formula I of Invention 1.

Regarding <Different Feature 2-1>

"3-HH-2," "3-HH-4," "3-HH-O1," "3-HH-O3," "5-HH-O1," "3-HB-O4," and "5-HB-3" in the liquid crystal composition of the A9 Invention are bicyclic in common with "PP-13" of Invention 1. "3-HHB-1" in the liquid crystal composition of the A9 Invention has an alkyl radical having 1 or 3 carbon atoms as a terminal group in common with "PP-13" of Invention 1.

Here, the liquid crystal composition of the A9 Invention serves as an example of the liquid crystal composition stated in the above (A1). However, neither (III-1) and (III-2) stated in the above (A1) including the above bicyclic compounds of the A9 Invention as specific compounds nor (III-3) stated in the above (A1) including "3-HHB-1" of the A9 Invention differs in ring structure. Thus, none of them includes "PP-13." In addition, "PP-13" is not used in examples other than Example 10; i.e., is not used in Examples 1 to 9, 11, and 12 of the above (A4) and (A6). Thus, it cannot be said that "PP-13" is recognized in the liquid crystal composition of A9. It can be said that "PP-13" is a compound different from the above bicyclic compound and "3-HHB-1" of the A9 Invention.

According to the descriptions in paragraph [0010] of the above (A3), these compounds (III-1) and (III-2) are used for attaining the desired object of increasing a clearing point. Thus, it can be said that the A9 Invention has no motivation to substitute the above bicyclic compound of the A9 Invention, which is included in each of (III-1), (III-2), and (III-3) and used for attaining the desired object of lowering the viscosity or increasing the clearing point, or "3-HHB-1" with "PP-13," or to carry out additional addition of "PP-13" to the A9 Invention even by changing the compounding amount of each liquid-crystalline compound in the A9 Invention.

Furthermore, just as stated in the above "2 Regarding Reason for invalidation 3-1" (3) "A," even considering A27, 29, and 37, which indicate that HH or HB at the terminal CH3 is already known, it cannot be said that a person skilled in the art could easily conceive of adding "PP-13" to the liquid crystal composition of the A1 Invention.

Hence, Different Feature 2-1 is a substantial different feature and thus even a person skilled in the art could not easily conceive of the configuration of Different Feature 2-1 in the A9 Invention.

Therefore, Invention 1 does not correspond to the A9 Invention and could not be easily made even by a person skilled in the art based on the A9 Invention.

B Regarding Invention 2

A9 Invention is compared to Invention 2

• The "liquid crystal composition" of the A9 Invention corresponds to the "liquid crystal composition" of Invention 2.

• As stated in the above "A," it can be said that the A9 Invention containing these compounds is a "liquid crystal composition based on a mixture of polar compounds having negative dielectric anisotropy."

• The above "2 Regarding Reason for invalidation 3-1" As stated in the above "A," "3-HHB-1" of the A9 Invention corresponds to the compound of general formula I of Invention 2.

According to the above statement, Invention 2 and the A9 Invention are identical in that each of them is "a liquid-crystalline medium based on a mixture of polar compounds having negative dielectric anisotropy, the liquid-crystalline medium comprising a compound represented by general formula I," but differ in the following features.

<Different Feature 2-2>

Invention 2 contains "CC-n-V1," "CC-V-V," and compounds represented by formulae RIV, RV, and RVII, whereas the A9 Invention does not contain such compounds of Invention 2.

Regarding <Different Feature 2-2>

"3-HH-2," "3-HH-4," "3-HH-O1," "3-HH-O3," and "5-HH-O1" in the A9 Invention are included in the compounds represented by general formula (III-1), which are selected from the compounds represented by the above general formulae (III-1) to (IIII-6) among the liquid crystal compounds described in (A1) above. R5 and R6 of the compounds represented by general formula (III-1) indicate alkyl radicals with 1 to 10 carbon atoms (any non-adjacent methylene group (CH2) in the alkyl radical may be replaced by an oxygen atom (O)). Thus, "CC-n-V1" or "CC-V-V" containing an alkenyl group as the terminal group of HH is not included in general formula (III-1).

Further, there is no description in A9 that motivates a person skilled in the art to make R5 or R6 of the compound represented by general formula (III-1) an alkenyl group having a specific structure. Just as stated in the above "2. Regarding Reason for

invalidation 3-1" (4) "B," even if "CC-n-V1" or "CC-V-V" is a compound already known in the art, it cannot be said that a person skilled in the art could easily conceive of adding such a compound to the liquid crystal composition of the A9 Invention.

Hence, Different Feature 2-2 is a substantial different feature and thus even a person skilled in the art could not easily conceive of the configuration of Different Feature 2-2 in the A9 Invention.

Therefore, Invention 2 does not correspond to the A9 Invention and could not be easily made even by a person skilled in the art based on the A9 Invention.

C Regarding Invention 3

A9 Invention is compared to Invention 3

• The "liquid crystal composition" of the A9 Invention corresponds to the "liquid crystal composition" of Invention 3.

• As stated in the above "A," it can be said that the A9 Invention is a "liquid crystal composition based on a mixture of polar compounds having negative dielectric anisotropy." Thus, the A9 Invention is in common with the "liquid-crystalline medium based on a mixture of polar compounds of positive dielectric anisotropy" of Invention 3 in that each of them is the "liquid-crystalline medium based on a mixture of polar compounds having dielectric anisotropy."

• As stated in the above "A," "3-HHB-3" and "3-HBB-2" of the A9 Invention correspond to the compound of formula RVIII and the compound of formula RXIV of Invention 3.

According to the above statement, Invention 3 and the A9 Invention are identical in that each of them is "a liquid-crystalline medium based on a mixture of polar compounds having dielectric anisotropy, the liquid-crystalline medium comprising compounds of Formulae RVIII and RXIV," but differ in the following features.

<Different Feature 2-3>

Regarding a liquid-crystalline medium, Invention 3 is a liquid-crystalline medium based on a mixture of polar compounds of positive dielectric anisotropy,

comprising at least one compound selected from the group consisting of compounds each represented by any one of formulae I1, I2, I4 to I11, I16, I20, and I23 to I29, whereas the A9 Invention is a liquid crystal composition based on a mixture of polar compounds having negative dielectric anisotropy, comprising no compound represented by any one of formulas I1, I2, I4 to I11, I16, I20, and I23 to I29.

Regarding <Different Feature 2-3>

As stated in the above "A," the A9 Invention is a "liquid crystal composition based on a mixture of polar compounds having negative dielectric anisotropy," the composition comprising polar compounds having negative dielectric anisotropy, such as "5-HB(2F,3F)-1O1" and "3-HBB(2F,3F)-1O1." In addition, according to the descriptions in paragraph [0003] of the above (A2), the problems of the invention of the A9 Invention are to " provide a liquid crystal composition having a relatively small value of Δn and negative dielectric anisotropy, which allow liquid crystal composition to be applied to the above display methods a) and b) that can substantialize a wide viewing angle, while having various properties required for the liquid crystal composition for AM-LCD."

Then, in order to solve the problems of the invention of the A9 Invention, the composition needs to be at least a "liquid crystal composition based on a mixture of polar compounds having negative dielectric anisotropy." In other words, the above polar compounds having negative dielectric anisotropy are the main components of the A9 Invention, and each of them must be changed to a polar compound having positive dielectric anisotropy to make the A9 Invention "a liquid-crystalline medium based on a mixture of polar compounds of positive dielectric anisotropy." However, there should be disincentives to these matters.

In each of the compounds represented by formulas I1, I2, I4 to I11, I16, I20, and I23 to I29, X in the terminal group is "F or OCF3." Such a compound is "a polar compound having positive dielectric anisotropy" in which dielectric anisotropy is caused in the axial direction of the liquid crystal molecule.

Then, as stated above, there is a disincentive against adding "a polar compound having positive dielectric anisotropy" to the A9 Invention. Therefore, it should be said that there is a disincentive against adding the compounds represented by formulas I1, I2, I4 to I11, I16, I20, and I23 to I29, each of which is "a polar compound having positive dielectric anisotropy," to the A9 Invention.

As stated in "2 Regarding Reasons for invalidation 3-1" (4) "C" "Regarding <Effects of Invention 3>," Invention 3 exerts a specific effect.

Hence, Different Feature 2-3 is a substantial different feature, and thus even a person skilled in the art could not easily conceive of the configuration of Different Feature 2-3 in the A9 Invention.

Therefore, Invention 3 does not correspond to the A9 Invention and could not be easily made even by a person skilled in the art based on the A9 Invention.

D Regarding Invention 7

A9-1 Invention is compared to Invention 7

• As stated in the above "A," it can be said the "liquid crystal composition" of the A9-1 Invention corresponds to the "liquid-crystalline medium" of Invention 7, and thus the liquid crystal composition of the A9-1 Invention is a "liquid crystal composition based on a mixture of polar compounds having negative dielectric anisotropy."

• As stated in the above "B," "3-HHB-1" of the A9-1 Invention corresponds to the compound of general formula I of Invention 7.

• As stated in the above "2 Regarding Reason for invalidation 3-1" (4) "D," it can be said that the "use for a liquid crystal display" of the A9-1 Invention corresponds to "use for electro-optical purposes" in Invention 7.

According to the above statement, Invention 7 and the A9-1 Invention are identical in that each of them is "Use for a liquid crystal display of a liquid-crystalline medium based on a mixture of polar compounds having negative dielectric anisotropy, the liquid-crystalline medium comprising a compound represented by general formula I," but differ in the following features.

<Different Feature 2-4>

The liquid-crystalline medium of Invention 7 contains "CC-V-V," and compounds represented by formulae RIV, RV, and RVII, whereas the liquid crystal composition of the A9-1 Invention does not contain such compounds of Invention 7.

Regarding <Different Feature 2-4>

The matter specifying the invention of Invention 7 responsible for Different Feature 2-4 is one further limited by deleting "CC-n-V1" from the matter specifying the invention of Invention 2 responsible for Different Feature 2-2 in the above "B."

As stated in the above "B," furthermore, the above Different Feature 2-2 is a substantial different feature in the A9 Invention (the liquid crystal composition of the A9-1 Invention) and thus even a person skilled in the art could not easily conceive of the configuration of Different Feature 2-2 in the A9 Invention. Thus, the above Different Feature 2-4 is also a substantial different feature and thus even a person skilled in the art could not easily conceive of the configuration of Different Feature 2-4 in the A9-1 Invention.

Therefore, Invention 7 does not correspond to the A9-1 Invention and could not be easily made even by a person skilled in the art based on the A9-1 Invention.

E Regarding Invention 8

A9-2 Invention is compared to Invention 8

• As stated in the above "A," it can be said that the "liquid crystal composition" of the A9-2 Invention corresponds to the "liquid-crystalline medium" of Invention 8 and thus the "liquid crystal composition" of the A9-2 Invention is a "liquid crystal composition based on a mixture of polar compounds having negative dielectric anisotropy."

• As stated in the above "B," "3-HHB-1" of the liquid crystal composition of the A9-2 Invention corresponds to the compound of general formula I of Invention 8.

• The "liquid display" of the A9-2 Invention corresponds to the "electro-optical liquid-crystal display" of Invention 8.

According to the above statement, Invention 8 and the A9-2 Invention are identical in that each of them is "an electro-optical liquid-crystal display comprising a liquid-crystalline medium based on a mixture of polar compounds having negative dielectric anisotropy, the liquid-crystalline medium comprising a compound represented by general formula I," but differ in the following features.

<Different Feature 2-5>

The liquid-crystalline medium of Invention 8 contains "CC-n-V1," "CC-V-V," and compounds represented by formulae RIV, RV, and RVII, whereas the liquid crystal composition of the A9-2 Invention does not contain such compounds of Invention 8.

<Different Feature 2-6>

The liquid-crystalline medium of Invention 8 contains at least one stabilizer selected from the group of compounds represented by [Chemical 38] to [Chemical 42] (omitted), whereas the liquid crystal composition of the A9-2 Invention does not contain any of such compounds.

Regarding <Different Feature 2-5>

The matter specifying the invention of Invention 8 responsible for Different Feature 2-5 is identical with the matter specifying the invention of Invention 2 responsible for <Different Feature 2-2> in the above "B."

As stated in the above "B," furthermore, the above Different Feature 2-2 is a substantial different feature in the A9 Invention (the liquid crystal composition of the A9-2 Invention) and thus even a person skilled in the art could not easily conceive of the configuration of Different Feature 2-2 in the A9 Invention. Therefore, the above Different Feature 2-5 is also a substantial different feature and thus even a person skilled in the art could not easily conceive of the configuration of Different Feature 2-5 in the A9-2 Invention.

Therefore, Invention 8 does not correspond to the A9-2 Invention, without needing to consider the above Different Feature 2-6, and could not be easily made even by a person skilled in the art based on the A9-2 Invention.

F Regarding Invention 13

A9 Invention is compared to Invention 13

• As stated in the above "C," the "liquid crystal composition" of the A9 Invention corresponds to the "liquid-crystalline medium" of Invention 13, and "3-HHB-3" and "3-HBB-2" of the A9 Invention correspond to the compounds of formulae RVIII and RXIV of Invention 3.

• As stated in the above "C," it can be said that the A9 Invention is a "liquid crystal composition based on a mixture of polar compounds having negative dielectric

anisotropy." Thus, the A9 Invention is in common with the "liquid-crystalline medium based on a mixture of polar compounds of positive dielectric anisotropy" of Invention 13 in that each of them is the "liquid-crystalline medium based on a mixture of polar compounds having dielectric anisotropy."

According to the above statement, Invention 13 and the A9 Invention are identical in that each of them is "a liquid-crystalline medium based on a mixture of polar compounds having dielectric anisotropy, the liquid-crystalline medium comprising compounds of Formulae RVIII and RXIV," but differ in the following features.

<Different Feature 2-7>

Regarding a liquid-crystalline medium, Invention 13 is a liquid-crystalline medium based on a mixture of polar compounds of positive dielectric anisotropy, comprising at least one compound selected from the group consisting of compounds each represented by any one of formulae I1, I2, I4 to I11, I16, I20, and I23 to I29, whereas the A9 Invention is a liquid crystal composition based on a mixture of polar compounds having negative dielectric anisotropy, comprising no compound represented by any one of formulas I1, I2, I4 to I11, I16, I20, and I23 to I29.

Regarding <Different Feature 2-7>

As stated in the above "C," there is a disincentive against making the A9 Invention "a liquid-crystalline medium based on a mixture of polar compounds of positive dielectric anisotropy."

Furthermore, in each of the compounds represented by formulas I1, I2, I4 to I11, I16, I20, and I23 to I29, X in the terminal group is [Chemical 54] "F ... OCF3 ... or OCClFCF2CF3" and is "a polar compound having positive dielectric anisotropy" just as in the case where the terminal group X of the same formula in Invention 3 includes "F or OCF3."

Then, just as stated above in the above "C," it should be said that there is a disincentive against adding the compounds represented by formulas I1, I2, I4 to I11, I16, I20, and I23 to I29 of Invention 13, each of which is "a polar compound having positive dielectric anisotropy," to the A9 Invention.

As stated in "2 Regarding Reasons for invalidation 3-1" (4) "C" "Regarding <Effects of Invention 3>" and "F," Invention 13 exerts a specific effect.

Hence, Different Feature 2-7 is a substantial different feature, and thus even a person skilled in the art could not easily conceive of the configuration of Different Feature 2-7 in the A9 Invention.

Therefore, Invention 13 does not correspond to the A9 Invention and could not be easily made even by a person skilled in the art based on the A9 Invention.

(5) Summary of examination on the reason for invalidation 3-2

As stated above, none of Inventions 1 to 3, 7, 8, and 13 is the invention disclosed in A9, and none of them could be easily made by a person skilled in the art based on the invention disclosed in A9. Thus, these inventions do not fall under the provision of Article 29(1)(iii) of the Patent Act or are not the inventions that cannot be granted a patent under the provision of Article 29(2) of the Patent Act. Therefore, none of Inventions 1 to 3, 7, 8, and 13 falls under Article 123(1)(ii) of the Act and none should be invalidated.

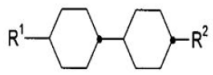
4 Regarding Reason for invalidation 4-1

(1) Publication

A2: Japanese Unexamined Patent Application Publication No. H11-140447

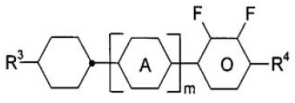
(2) Matters described in Publication (A2)

(A1) "[Claim 1] A liquid-crystalline medium based on a mixture of polar compounds having negative dielectric anisotropy, comprising at least one compound of formula I:
[Chemical 1]



I

and at least one compound of formula II:
[Chemical 2]

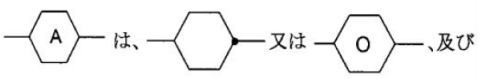


II

"

(wherein R1 is an alkyl or alkoxy with 1 to 8 carbon atoms or an alkenyl radical with 2 to 7 carbon atoms, R2 is an alkenyl radical with 2 to 7 carbon atoms, and R3 and R4 are each independently an alkyl or alkoxy with 1 to 8 carbon atoms,

[Chemical 3]



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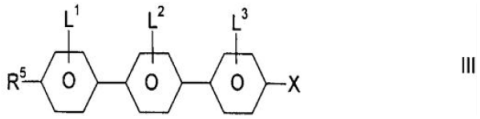
and m is 0 or 1).

[Claim 2] The medium according to Claim 1, further comprising at least one compound of formula III:

[Chemical 4]

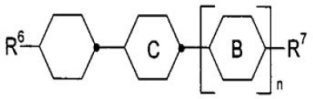


III

(in which R5 has the meaning given for R3 or R4 in formula II, L1 to L3 are each independently H, F or Cl, and X is F or Cl).

[Claim 3] The medium according to Claim 1 or 2, further comprising one or two or more compounds of formula IV:

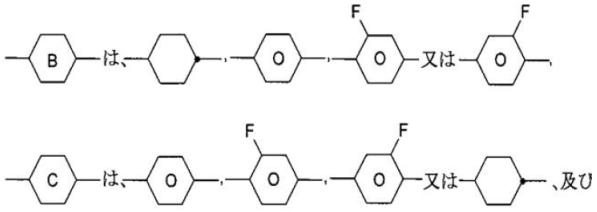
[Chemical 5]



IV

(in which R6 and R7 are each independently an alkyl or alkoxy radical with 1 to 8 carbon atoms,

[Chemical 6]



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and n is 0 or 1).

[Claim 4] The medium according to at least any one of Claims 1 to 3, essentially comprising four or five or more compounds selected from formulae I and II.

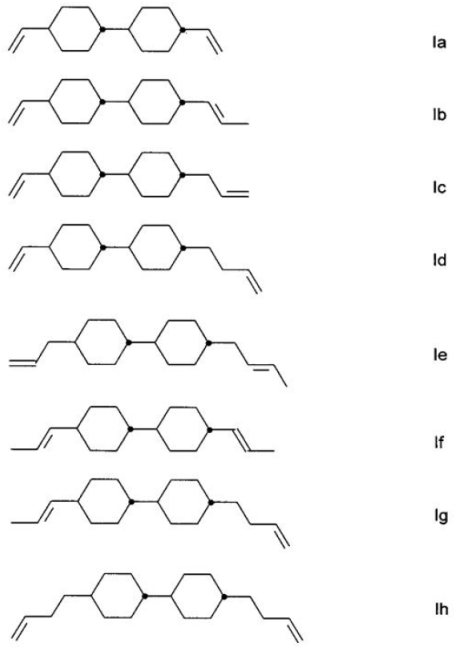
[Claim 5] The medium according to Claim 4, further comprising at least three compounds of formula IV.

[Claim 6] The medium according to at least one of Claims 4 and 5, additionally comprising at least one compound of formula III.

[Claim 7] The medium according to any one of Claims 1 to 5, comprising at least one compound I wherein R1 and/or R2 is vinyl or 1E-propenyl.

[Claim 8] The liquid-crystalline medium according to any one of Claims 1 to 7, comprising at least one compound selected from formulae 1a to 1h:

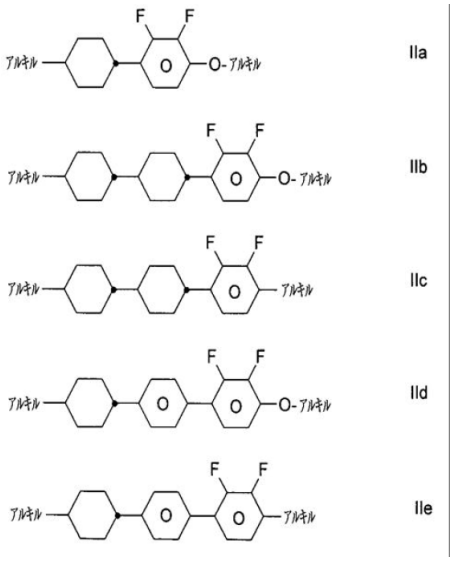
[Chemical 7]



[Claim 9] The medium according to any one of Claims 1 to 5, comprising a compound of formula I wherein R2 is vinyl or 1E-propenyl.

[Claim 10] The liquid-crystalline medium according to any one of Claims 1 to 6, comprising at least one compound selected from the group consisting of compounds represented by at least three of formulae IIa to IIe:

[Chemical 8]



(in which alkyl is a C1-6 -alkyl radical).

(A2) "[0001]

[Field of the Invention] The present invention relates to a liquid-crystalline medium based on a mixture of polar compounds with a negative dielectric anisotropy. Further, the present invention relates to an electro-optic projection display having an active matrix addressing based on the ECB effect, which is characterized by comprising the liquid-crystalline medium as a dielectric body.

(A3) [0015] Thus, there continues to be a great demand for matrix liquid crystal displays having very high resistivity, at the same time, a wide operating temperature range, short response times, and low threshold voltage, with the aid of which various grey shades can be produced.

[0016]

[Problem to be Solved by the Invention] The invention has an object of providing matrix liquid crystal displays, in particular projection displays, based on the ECB effect which do not have the above-mentioned disadvantages, or do so only to a reduced extent, and at the same time have very high resistivities; and also providing a liquid-crystalline medium useful therefor.

[0017]

[Means for Solving the Problem] It has now been found that this object can be achieved if nematic liquid-crystal mixtures containing at least one compound of formula I and at least one compound of formula II are used in these display elements.

The invention thus relates to a liquid-crystalline medium based on a mixture of polar compounds having negative dielectric anisotropy, which contains at least one compound of formula I;
[Chemical 11] (omitted)
and at least one compound of formula II;
[0018]
[Chemical 12] (omitted)
(wherein R1 is an alkyl or alkoxy with 1 to 8 carbon atoms or an alkenyl radical with 2 to 7 carbon atoms, R2 is an alkenyl radical with 2 to 7 carbon atoms, and R3 and R4 are each independently an alkyl or alkoxy radical with 1 to 8 carbon atoms,
[Chemical 13] (omitted)
and m is 0 or 1)."

(A4) "[0040] The liquid-crystal mixture preferably has a nematic phase range of at least 80 (°C), a clearing point above 60°C, in particular above 70°C, and a maximum flow viscosity of ≤ 60 mm2 s-1, preferably of 20 mm2 s-1 to 60 mm2 s-1 at 20°C and a rotational viscosity of ≤ 180 mPa.s, and in particular 85 mPa.s to 160 mPa.s at 20°C.
[0041] The liquid-crystal mixture according to the invention has a Δε of from about -1.5 to -5, in particular from about -1.8 to -4, where Δε denotes the dielectric anisotropy.
[0042] The birefringence Δn of the liquid-crystal mixture is generally between 0.07 and 0.14, preferably between 0.08 and 0.13, and/or the dielectric constant ε// is greater than 3, preferably from 3.2 to 4.5.
[0043] The capacitive threshold voltage V0 at a frequency of 1 kHz is 2.5 V or less, preferably 2.4 V or less, and most preferably 1.9 V to 2.3 V."

(A5) "[0059]
[Examples] Example 1
A mixture is prepared which comprises
[Table 1]

CC-5-V	5.00	%	透明点	84 °C
CCP-21FF	6.50	%	Δn	0.1121
CCP-31FF	6.50	%	n_e	1.5991
CCP-302FF	14.00	%	Δε	-3.7
CCP-502FF	9.50	%	$\varepsilon_{\perp}$	3.8
PCH-302FF	14.50	%		
PCH-502FF	14.50	%		
T-3FCIF	3.00	%		
T-5FCIF	3.00	%		
BCH-32	5.00	%		
BCH-52	3.00	%		
BCH-32F	4.00	%		
BCH-52F	3.50	%		
PCH-32	2.00	%		
PCH-301	2.00	%		
PCH-302	2.00	%		
PCH-304	2.00	%		

透明点 Clearing point

[0060] Example 2

A liquid-crystalline phase is prepared which comprises

[Table 2]

CC-5-V	9.00	%	透明点	71 °C
BCH-52FF	4.00	%	Δn	0.085
CCP-21FF	10.00	%	Δε	-3.6
CCP-31FF	4.00	%		
CCP-302FF	13.00	%		
CCP-502FF	12.00	%		
PCH-302FF	14.00	%		
PCH-502FF	13.00	%		
CCH-34	9.00	%		
PCH-53	9.00	%		
PCH-301	3.00	%		

透明点 Clearing point

[0061] Example 3

A liquid crystal mixture is prepared which comprises

[Table 3]

CC-5-V	10.0	%	透明点	70 °C
PCH-302FF	14.0	%	Δn	0.0832
PCH-502FF	13.0	%	n_e	1.5622
CCP-302 FF	11.5	%	Δε	-3.6
CCP-502 FF	9.0	%	ε_{II}	3.7
CCP-21FF	9.0	%		
CCP-31FF	14.0	%		

透明点 Clearing point

[0062] Example 4

A mixture is prepared which comprises

[Table 4]

CC-V-V1	24.0	%	透明点	88.5 °C
PCH-302FF	12.0	%	S, N	< -20 °C
PCH-502FF	12.0	%	γ_1 [mPa·s; 20 °C]:	156
CCP-302FF	14.0	%	Δn [589 nm; 20 °C]:	+0.0896
CCP-502FF	13.0	%	n_e [589 nm; 20 °C]:	1.5678
CCP-21FF	13.0	%	$\Delta\varepsilon$ [1 kHz; 20 °C]:	-4.0
CCP-31FF	12.0	%	$\varepsilon_{\|\|}$ [1 kHz; 20 °C]:	3.6
			V_o	2,31 V [Cap.]

透明点　　Clearing point

"

(3) Invention disclosed in A2

In the advance notice of trial decision dated September 4, 2017, the compound of Formula II having negative dielectric anisotropy in which F is bonded to a ring structure of [Claim 1] of (A1) above described in A2 is made to correspond to the compound represented by general formula I of the Invention. In the Correction, the compound represented by general formula I is corrected to "PP-13" in Invention 1, to "CCP-31" in Invention 2, and to "CCP-31 or CCP-3V" in Inventions 7 and 8. These compounds are compounds with neutral dielectric anisotropy in which F is not bonded to the ring structure. Thus, the liquid-crystalline medium containing the compound of formula IV of [Claim 3] in the above (A1), which is a liquid-crystalline compound of A2 with neutral dielectric anisotropy in which F is not bound to the ring structure as with the above compound, is found as the A2A invention.

Furthermore, finding of the A2B invention is carried out based on A2 Example 1.

Demandant alleges that the A2 Example 1 Invention and the A2 Claim 3 Invention in A2 are disclosed in the Second Written Refutation, page 47, lines 1 to 4. Then, Demandant makes a comparison between the A2 Claim 3 Invention and the Invention in the Second Written Refutation, pages 46 to 57.

A　A2A Invention to A2A-2 Invention

In A2, [Claim 7], which depends from [Claim 3] depending from [Claim 1] of the above (A1), recites "The liquid-crystalline medium comprising a liquid-crystalline medium based on a mixture of polar compounds having negative dielectric anisotropy, the medium comprising at least one compound of formula I;
[Chemical 1] (omitted)

at least one compound of formula II;
[Chemical 2] (omitted)
(wherein R1 is an alkyl or alkoxy with 1 to 8 carbon atoms or an alkenyl radical with 2 to 7 carbon atoms, R2 is an alkenyl radical with 2 to 7 carbon atoms, R1 and/or R2 is vinyl or 1E-propenyl, and R3 and R4 are each independently an alkyl or alkoxy radical with 1 to 8 carbon atoms,
[Chemical 3] (omitted)
and m is 0 or 1) and
one or two or more compounds of Formula IV;
[Chemical 5] (omitted)
(in which R6 and R7 are each independently an alkyl or alkoxy radical with 1 to 8 carbon atoms,
[Chemical 6] (omitted)
and n is 0 or 1) (hereinafter, referred to as the "A2A Invention").

According to the descriptions in the above (A2) in A2, the liquid-crystalline medium of the A2A Invention is used in "an electro-optic projection display." Thus, the A2 invention also recites
"Use of the liquid-crystalline medium of the A2A Invention for an electro-optic projection display" (hereinafter, referred to as the "A2A-1 Invention") and
"An electro-optic projection display comprising the liquid-crystalline medium of the A2A Invention" (hereinafter, referred to as the "A2A-2 Invention).

B A2B Invention to A2B-2 Invention

It can be said that, among specific examples of the A2A Invention, A2 describes as Example 1 of the above (A5) as follows:
"A liquid-crystalline medium based on a mixture of polar compounds having negative dielectric anisotropy
5.00% of CC-5-V, CCP-21FF, 6.50% of CCP-21FF, 6.50% of CCP-31FF, 14.00% of CCP-3O2FF, 9.50% of CCP-5O2FF, 14.50% of PCH-3O2FF, 14.50% of PCH-5O2FF, 3.00% of T-3FClF, 3.00% of T-5FClF, 5.00% of BCH-32, 3.00% of BCH-52, 4.00% of BCH-32F, 3.50% of BCH-52F, 2.00% of PCH-32, 2.00% of PCH-3O1, 2.00% of PCH-3O2, and 2.00% of PCH-3O4, wherein a clearing point is 84°C, Δn is 0.1121, ne is 1.5991, Δε is -3.7 and ε// is 3.8." (hereinafter, referred to as the "A2B Invention").

Furthermore, according the descriptions in the above (A2) in A2, the liquid-crystalline medium is used in "an electro-optic projection display." Thus, the A2 invention also recites

"Use of the liquid-crystalline medium of the A2A Invention for an electro-optic projection display" (hereinafter, referred to as the "A2B-1 Invention") and

"An electro-optic projection display comprising the liquid-crystalline medium of the A2A Invention" (hereinafter, referred to as the "A2B-2 Invention").

(4) Comparison / examination

A Regarding Invention 1

(A) Comparison with A2A Invention and examination

A2A Invention is compared to Invention 1

• "A liquid-crystalline medium based on a mixture of polar compounds having negative dielectric anisotropy" of the A2 Invention corresponds to "a liquid-crystalline medium based on a mixture of polar compounds having negative dielectric anisotropy" of Invention 1.

• In the compound of Formula I in which "R1 and/or R2 is vinyl or 1E-propenyl," if "R1 and R2 are vinyl or 1E-propenyl", the compound corresponds to a compound represented by Formula II in which alkenyl is a straight or branched alkenyl group having 2 to 8 carbon atoms and R0 is an alkenyl having 2 to 8 carbon atoms.

According to the above statement, Invention 1 and the A2A Invention are identical in that each of them is "a liquid-crystalline medium based on a mixture of polar compounds having negative dielectric anisotropy, the liquid-crystalline medium comprising a compound represented by Formula RII," but differ in the following features.

<Different Feature 3-1>

Invention 1 contains one or two or more compounds represented by general formula I (PP-13), whereas the A2A Invention does not contain the compound (PP-13) represented by general formula I of Invention 1.

Regarding <Different Feature 3-1>

The compound of Formula IV in the A2A Invention is a bicyclic compound when n is 0, and is common to "PP-13" of Invention 1 in that these compounds are bicyclic compounds. One of two rings in the compound of Formula IV in the A2A Invention is a 1,4-cyclohexylene radical and is thus different from "PP-13." Furthermore, "PP-1-3" of Invention 1 is specified as one in which the terminal groups are alkyl radicals having 1 and 3 carbon atoms, whereas two terminal groups of the compound of Formula IV in the A2A Invention are only specified as those that "are each independently an alkyl or alkoxy radical with 1 to 8 carbon atoms." Even considering examples 1 to 4, which are all of the examples described in the above (A5), there is no use of any compound of Formula IV having alkyl radicals with one and three carbon atoms at the terminal groups. Even if the compound of Formula IV in the A2A Invention formally includes a case where the terminal groups are alkyl radicals having 1 and 3 carbon atoms, it cannot be said that it "substantially" includes a case where the terminal groups are alkyl radicals having 1 and 3 carbon atoms. In this respect as well, it can be said that the compound of Formula IV in the A2A Invention is a compound different from "PP-13" of Invention 1.

Addressing that "there continues to be a great demand for matrix liquid crystal displays having very high resistivity, at the same time, a wide operating temperature range, short response times, and low threshold voltage, with the aid of which various grey shades can be produced" as described in paragraph [0015] of the above (A3), A2A Invention intends to provide matrix liquid crystal displays having no disadvantage in these matters, being based on the ECB effect, and at the same time having very high resistivities. For achieving this object, in (A5) above, specific liquid-crystalline media useful therefor are described in Examples 1 to 4. Here, as the compounds of Formula IV in the A2A Invention, "BCH-32", "BCH-52", "PCH-32", "PCH-3O1", "PCH-3O2," and "PCH-3O4" are used in Example 1 and "CCH-34", "PCH-52," and "PCH-3O1" are used in Example 2. Thus, it can be said that each of the compounds of Formula IV in the A2A Invention is a compound that makes a corresponding contribution to solve the problems of the invention of the A2A Invention. In addition, there is no mention in A2 of use of the liquid-crystalline compound having a ring structure of "PP" in the liquid-crystalline medium of A2. Thus, it cannot be said that the invention of A2A makes a person skilled in the art have motivation to add "PP-13" to the A2A Invention or substitute "PP-13" for the compound of Formula IV in the A2A Invention, which makes a corresponding contribution to solve the problems of the invention of the A2A

invention by changing the compounding amount of each liquid-crystalline compound in the A2A Invention.

Hence, Different Feature 3-1 is a substantial different feature, and thus even a person skilled in the art could not easily conceive of the configuration of Different Feature 3-1 in the A2A Invention.

(B) Comparison with A2B Invention and examination

Comparing Invention 1 and the A2B Invention, "CC-5-V", "BCH-32, and BCH-52" of the A2B Invention correspond to RII and RXIV of Invention 1, respectively. Thus, Invention 1 and the A2B Invention are identical in that each of them is "a liquid-crystalline medium based on a mixture of polar compounds having negative dielectric anisotropy, the liquid-crystalline medium comprising a compound represented by Formulae RII and RXIV," but differ in the same feature as the above Different Feature 3-1 (hereinafter, referred to as "Different Feature 3-1'")

Here, "PCH-32," "PCH-3O1", "PCH-3O2", and "PCH-3O4" of the A2B Invention are bicyclic compounds (neutral compounds with no fluorine atom in the ring) in common with "PP-13" of Invention 1. However, these compounds include a 1,4-cyclohexylene radical as at least one of two rings and are thus different from "PP-13." Moreover, "PP-13" of Invention 1 has a terminal group specified as C1 and C3 alkyl radicals. However, these compounds in the A2B Invention have two end groups that are not C1 and C3 alkyl radicals. In this respect as well, it can be said that these compounds are different compounds from "PP-13" of Invention 1.

Then, just as stated in "Regarding <Different Feature 3-1>," it can be said that these compounds of the A2B Invention are compounds making a corresponding contribution to solve the problems of the invention of the A2B Invention. A2 includes no description of using a liquid-crystalline compound having the ring structure of "PP" in the liquid-crystalline medium of A2. Thus, it cannot be said that the A2B invention makes a person skilled in the art have motivation to newly add "PP-13" to the A2B Invention even by replacing any of these compounds, which make a corresponding contribution to solve the problems of the invention of the A2B Invention or even by changing the compounding amount of each liquid-crystalline compound in the A2B Invention.

Hence, Different Feature 3-1' is a substantial different feature, and thus even a person skilled in the art could not easily conceive of the configuration of Different Feature 3-1' in the A2B Invention.

(C) Summary

Invention 1 does not correspond to the A2A Invention or the A2B Invention and could not be easily made even by a person skilled in the art based on the A2A Invention or the A2B Invention.

B Regarding Invention 2

(A) Comparison with A2A Invention and examination

A2A Invention is compared to Invention 2

• "A liquid-crystalline medium based on a mixture of polar compounds having negative dielectric anisotropy" of the A2A Invention corresponds to "a liquid-crystalline medium based on a mixture of polar compounds having negative dielectric anisotropy" of Invention 2.

• In the compounds of Formula I in the A2A Invention in which "R1 and/or R2 is vinyl or 1E-propenyl," those in which "R1 and R2 are vinyl" correspond to "CC-V-V" of Invention 2 in which the opposite terminal ends are vinyl groups.

According to the above statement, Invention 2 and the A2A Invention are identical in that each of them is "a liquid-crystalline medium based on a mixture of polar compounds having negative dielectric anisotropy, the liquid-crystalline medium comprising CC-V-V," but differ in the following features.

<Different Feature 3-2>

Invention 2 contains one or two or more compounds represented by general formula I (omitted), whereas the A2A Invention does not contain the compound (CCP-31) represented by general formula I of Invention 2.

Regarding <Different Feature 3-2>

R6 and R7 in the compound of Formula IV in the A2A Invention, are each independently an alkyl or alkoxy radical with 1 to 8 carbon atoms. If the compound is modified such that n is 1, ring B is a 1,4-phenyl radical, and ring C is a 1,4-cyclohexylene radical and then R6 is an alkyl radical having three carbon atoms and R7 is an alkyl radical having one carbon atom (hereinafter, such a compound is referred to as "the compound" in this section), "the compound" may correspond to "CCP-31" of Invention 2.

However, "the compound" is one of possible compounds formally defined by Formula IV. In addition, considering the examples of the A2A invention, no specific compound having the ring structure of "CCP" is used as the compound of formula IV and no terminal group having 1 or 3 carbon atoms is used. Furthermore, A2 does not include any description recommending modifying the compound such that n is 1, ring B is a 1,4-phenyl radical, and ring C is a 1,4-cyclohexylene radical, and then R6 is an alkyl radical having three carbon atoms and R7 is an alkyl radical having one carbon atom.

Then, formally the compounds of Formula IV in the A2A Invention may include "the compound." However, it cannot be said that the A2A Invention "substantially" recites "the compound" as one included in the compounds of Formula IV as clearly as a person skilled in the art can recognized. In addition, it cannot be said that the A2A invention makes a person skilled in the art have motivation to use "the compound" as a compound of Formula IV and to newly add "the compound" to the liquid-crystalline medium of the A2A Invention.

Hence, Different Feature 3-2 is a substantial different feature, and thus even a person skilled in the art could not easily conceive of the configuration of Different Feature 3-2 in the A2A Invention.

(B) Comparison with A2B Invention and judgment

Comparing Invention 2 and the A2B Invention, the components of the liquid-crystalline medium of the A2B Invention do not correspond to one or two or more compounds (CCP-31) represented by general formula I of Invention 2, and also none of them corresponds to any of "CC-n-V1," "CC-V-V," and compounds represented by formulae RIV, RV, and RVII of Invention 2. Thus, Invention 2 and the A2B Invention are only identical in that each of them is "a liquid-crystalline medium based on a mixture of polar compounds having negative dielectric anisotropy," but differ in

the same feature as the above Different Feature 3-2 (hereinafter, referred to as "Different Feature 3-2") and in that the A2B Invention does not contain "CC-n-V1," "CC-V-V," and compounds represented by formulae RIV, RV, and RVII of Invention 2.

Here, "BCH-32" and "BCH-52" of the A2B Invention are common to "CCP-31" of Invention 2 in that tricyclic compounds in which the opposite rings of the three rings are 1,4-cyclohexylene radical and 1,4-phenylene radical (neutral compound with no fluorine atom in the ring), but are different compounds from "CCP-31" in that the center ring of the three rings is a 1,4-phenylene radical in the former invention and a 1,4-cyclohexylene radical in the latter invention. Moreover, "CCP-31" of Invention 2 has its terminal groups specified as alkyl radicals having 1 and 3 carbon atoms. However, the terminal groups of "BCH-32" and "BCH-52" of the Invention A2B are not alkyl radicals having 1 and 3 carbon atoms. In this respect, these compounds can also be said to be different compounds from "CCP-31" of Invention 2.

Furthermore, these compounds of the A2B invention are specific compounds included in the compounds of Formula IV in the A2A Invention. As stated in the above (A), the compounds of Formula IV formally include "CCP-31" of Invention 2. However, it cannot be said that the A2B Invention "substantially" recites "CCP-31" sufficiently to allow a person skilled in the art to recognize that "CCP-31" is included in the compounds of Formula IV. Even considering the compounds of Formula IV, which include "BCH-32" and "BCH-52" of the A2B Invention, it cannot be said that a person skilled in the art could be motivated to replace "BCH-32" and "BCH-52" of the A2B Invention with "CCP-31" and to newly add "CCP-31" to the liquid-crystalline medium of the A2B Invention.

Hence, Different Feature 3-2' is a substantial different feature and thus even a person skilled in the art could not easily conceive of the configuration of Different Feature 3-2' in the A2B Invention.

(C) Summary

Invention 2 is not the A2A Invention and could not be easily invented by a person skilled in the art based on the A2A Invention.

Furthermore, at least the above Different Feature 3-2' is a substantial different feature and could not be easily conceived by a person skilled in the art. Therefore,

Invention 2 is not the A2B Invention and could not be easily invented by a person skilled in the art based on the A2B Invention.

C Regarding Invention 3

(A) Comparison with A2A Invention and judgment

A2A Invention is compared to Invention 3

• "The liquid-crystalline medium based on a mixture of polar compounds having negative dielectric anisotropy" in the A2A Invention and "the liquid-crystalline medium based on a mixture of polar compounds of positive dielectric anisotropy" in Invention 3 are identical in that each of them is "a liquid-crystalline medium based on a mixture of polar compounds having dielectric anisotropy."

• As stated in the above "A," the compound of Formula I in the A2A Invention corresponds to the compound represented by formula RII in Invention 1.

According to the above statement, Invention 3 and the A2A Invention are identical in that each of them is "a liquid-crystalline medium based on a mixture of polar compounds having dielectric anisotropy, the liquid-crystalline medium comprising compounds of Formula RII," but differ in the following features.

<Different Feature 3-3>

Regarding the liquid-crystalline medium, Invention 3 is a liquid-crystalline medium based on a mixture of polar compounds of positive dielectric anisotropy, comprising at least one compound selected from the group consisting of compounds each represented by any one of formulae I1, I2, I4 to I11, I16, I20, and I23 to I29, whereas the A2A Invention is a liquid-crystalline medium based on a mixture of polar compounds having negative dielectric anisotropy without containing a compound represented by any of formulas I1, I2, I4 to I11, I16, I20, and I23 to I29.

Regarding <Different Feature 3-3>

According to the descriptions in paragraph [0016] of the above (A3), the A2A Invention is to attain the object of "providing matrix liquid crystal displays, in particular projection displays, based on the ECB effect and at the same time have very high

resistivities; and also providing a liquid-crystalline medium useful therefor." According to the descriptions in paragraph [0017] of the above (A3), it is described that this object can be achieved if nematic liquid-crystal mixtures containing at least one compound of formula I and at least one compound of formula II are used in these display elements. Here, the compound of Formula II is a polar compound having a negative dielectric anisotropy. As described in paragraph [0018] of the above (A3), it can be said that the liquid-crystalline medium of the A2A Invention is "a liquid-crystalline medium based on a mixture of polar compounds having negative dielectric anisotropy."

Then, in order to solve the problems of the invention of the A2A Invention, the composition needs to be at least "a liquid crystal composition based on a mixture including the compound of Formula II, which is a polar compound having negative dielectric anisotropy." Thus, a person skilled in the art is discouraged to replace the compound of Formula II having negative dielectric anisotropy, which is an essential component in the A2A Invention, with a polar compound having positive dielectric anisotropy to make the A2A Invention "a liquid-crystalline medium based on a mixture of polar compounds of positive dielectric anisotropy."

In each of the compounds represented by formulas I1, I2, I4 to I11, I16, I20, and I23 to I29, X in the terminal group is "F or OCF3." Such a compound is "a polar compound having positive dielectric anisotropy" in which dielectric anisotropy is caused in the axial direction of the liquid crystal molecule.

Then, as stated above, there is a disincentive against adding "a polar compound having positive dielectric anisotropy" to the A2A Invention. Therefore, it should be said that there is also a disincentive against adding the compounds represented by formulas I1, I2, I4 to I11, I16, I20, and I23 to I29, each of which is "a polar compound having positive dielectric anisotropy," to the A2A Invention.

As stated in "2 Regarding reasons for invalidation 3-1" (4) "C" "Regarding <Effects of Invention 3>," Invention 3 exerts a specific effect.

Hence, Different Feature 3-3 is a substantial different feature and thus even a person skilled in the art could not easily conceive of the configuration of Different Feature 3-3 in the A2A Invention.

(B) Comparison with A2B Invention and judgment

Comparing Invention 3 and the A2B Invention, which is "a liquid-crystalline medium based on a mixture of polar compounds having negative dielectric anisotropy," as in the A2A Invention, "CC-5-V" and "BCH-32 and BCH-52" of the A2B Invention correspond to RII and RXIV of Invention 1, respectively. Thus, Invention 3 and the A2B Invention are identical in that each of them is "a liquid-crystalline medium based on a mixture of polar compounds having dielectric anisotropy, the liquid-crystalline medium comprising compounds represented by Formulae RII and RXIV," but differ in the same feature as the above Different Feature 3-3 (hereinafter, referred to as "Different Feature 3-3'").

Then, the A2B Invention corresponds to a specific example of the A2A Invention. Thus, as stated in the above (A), there are disincentives against making the liquid-crystalline medium of the A2A Invention "a liquid-crystalline medium based on a mixture of polar compounds of positive dielectric anisotropy" and in adding "a polar compound having positive dielectric anisotropy" to the liquid crystalline medium of the A2A Invention. As in the case with the A2A Invention, it should be said that there are disincentives against making the liquid-crystalline medium of the A2B Invention "a liquid-crystalline medium based on a mixture of polar compounds of positive dielectric anisotropy" and adding "a polar compound having positive dielectric anisotropy" to the liquid-crystalline medium of the A2B Invention.

As stated in "2 Regarding Reasons for invalidation 3-1" (4) "C" "Regarding <Effects of Invention 3>," Invention 3 exerts a specific effect.

Hence, Different Feature 3-3' is a substantial different feature and thus even a person skilled in the art could not easily conceive of the configuration of Different Feature 3-3' in the A2B Invention.

(C) Summary

Invention 3 does not correspond to the A2A Invention or the A2B Invention and could not be easily made even by a person skilled in the art based on the A2A Invention or the A2B Invention.

D Regarding Invention 7

(A) Comparison with A2A-1 Invention and judgment

A2A-1 Invention is compared to Invention 7

• "A liquid-crystalline medium based on a mixture of polar compounds having negative dielectric anisotropy" as a liquid-crystalline medium of the A2A-1 Invention (A2A Invention) corresponds to "the liquid-crystalline medium based on a mixture of polar compounds having negative dielectric anisotropy" of Invention 7.

• As stated in the above "B," the compound of Formula I in the liquid-crystalline medium of the A2A-1 Invention (A2A Invention) corresponds to "CC-V-V" of Invention 7.

• It can be said that the "use for an electro-optic projection display" of the A2A-1 Invention corresponds to "use for electro-optical purposes" in Invention 7.

According to the above statement, Invention 7 and the A2A-1 Invention are identical in that each of them is "a use of a liquid-crystalline medium for electro-optical purposes, the liquid-crystalline medium being based on a mixture of polar compounds having negative dielectric anisotropy and comprising CC-V-V," but differ in the following features.

<Different Feature 3-4>

Invention 7 contains one or two or more compounds represented by general formula I (CCP-31 or CCP-V-1), whereas the liquid-crystalline medium of the A2A-1 Invention does not contain the compound (CCP-31 or CCP-V-1) represented by general formula I of Invention 7.

Regarding <Different Feature 3-4>

The matter specifying the invention of Invention 7 responsible for Different Feature 3-4 is identical with the matter specifying the invention of Invention 2 responsible for Different Feature 3-2 stated in the above "B" (A) when "CCP-31" is "CCP-31 or CCP-V-1."

As stated in the above "B" (A), the liquid-crystalline medium of the A2A-1 Invention (A2A Invention) does not "substantially" contain "CCP-31." It cannot be said that a person skilled in the art could easily conceive of the use of "CCP-31" in the liquid-crystalline medium of the A2A1 Invention.

R6 and R7 in the compound of Formula IV of the liquid crystalline medium in the A2A-1 Invention (A2A Invention) are each independently an alkyl or alkoxy radical with 1 to 8 carbon atoms. This means that there is no case in which the terminal group is a vinyl group. Thus, the compounds of Formula IV in the A2A Invention do not include "CCP-V-1" even in a formal manner. Then, even if all the examples of the above (A5) are examined, "CCP-V-1" is not used as a specific compound of the compound of Formula IV of the liquid-crystalline medium in the A2A1 Invention. Furthermore, A2 does not include any description recommending the use of "CCP-V-1" in the liquid-crystalline medium of the A2A-1 Invention.

Then, it cannot be said that a person skilled in the art could be motivated by the A2A-1 Invention to use "CCP-V-1" in the liquid-crystalline medium of the A2A-1 Invention.

Hence, Different Feature 3-4 is a substantial different feature and thus even a person skilled in the art could not easily conceive of the configuration of Different Feature 3-4 in the A2A-1 Invention.

(B) Comparison with A2B-1 Invention and judgment

Comparing Invention 7 and the A2B-1 Invention, the components of the liquid-crystalline medium of the A2B-1 Invention do not correspond to one or two or more compounds represented by general formula I (omitted) of Invention 7 ("CCP-31 or CCP-V-1"), and also none of them corresponds to any of "CC-V-V," and compounds represented by formulae RIV, RV, and RVII of Invention 7. Thus, Invention 7 and the A2B-1 invention are only identical in that each of them is "a use of a liquid-crystalline medium for electro-optical purposes, the liquid-crystalline medium being based on a mixture of polar compounds having negative dielectric anisotropy," but differ in the same feature as the above Different feature 3-4 (hereinafter, referred to as "Different Feature 3-4'") and in that the liquid-crystalline medium of the A2B-1 Invention does not contain "CC-V-V" and compounds represented by formulae RIV, RV, and RVII of Invention 7.

Here, as stated in the above "B" (B), it cannot be said that a person skilled in the art could easily conceive of the use of "CCP-31" in the liquid-crystalline medium of the A2B-1 Invention (A2B Invention).

As stated in the above "B" (B), furthermore, each of "BCH-32" and "BCH-52" in the liquid-crystalline medium of the A2B-1 Invention is a tricyclic compound in common with "CCP-V-1" of Invention 7. However, it can be said that these compounds are different compounds from "CCP-V-1" of Invention 7 in ring structures and opposite terminal groups.

Then, these compounds in the liquid-crystalline medium of the A2B-1 Invention are specific compounds included in the compounds of Formula IV of the liquid-crystalline medium of the A2A1 Invention. However, as stated in the above (A), the compounds of Formula IV do not include "CCP-V-1" of Invention 7 even in a formal manner.

Then, it cannot be said that the A2B-1 invention makes a person skilled in the art have motivation to replace "BCH-32" and "BCH-52" of liquid-crystalline medium in the A2B-1 Invention with "CCP-V-1" and to newly add "CCP-V-1" to the liquid-crystalline medium of the A2B-1 Invention.

Hence, Different Feature 3-4' is a substantial different feature and thus even a person skilled in the art could not easily conceive of the configuration of Different Feature 3-4' in the A2B-1 Invention.

(C) Summary

Invention 7 does not correspond to the A2A-1 Invention and could not be easily made even by a person skilled in the art based on the A2A-1 Invention.

Furthermore, at least the above Different Feature 3-4' is a substantial different feature and could not be easily conceived by a person skilled in the art. Therefore, Invention 7 does not correspond to the A2B-1 Invention and could not be easily invented by a person skilled in the art based on the A2B-1 Invention.

E Regarding Invention 8

(A) Comparison with A2A-2 Invention and judgment

A2A-1 Invention is compared to Invention 8

• "A liquid-crystalline medium based on a mixture of polar compounds having negative dielectric anisotropy" as a liquid-crystalline medium of the A2A-2 Invention (A2A

Invention) corresponds to "the liquid-crystalline medium based on a mixture of polar compounds having negative dielectric anisotropy" of Invention 8.

• As stated in the above "A," the compound of Formula I in the liquid-crystalline medium of the A2A-2 Invention (A2A Invention) corresponds to "CC-V-V" of Invention 8.

• The " electro-optical projection liquid display" of the A2A-2 Invention corresponds to the "electro-optical liquid-crystal display" of Invention 8.

According to the above statement, Invention 8 and the A2A-2 Invention are identical in that each of them is "an electro-optical liquid-crystal display comprising a liquid-crystalline medium, the liquid-crystalline medium being based on a mixture of polar compounds having negative dielectric anisotropy and comprising CC-V-V," but differ in the following features.

<Different Feature 3-5>

Invention 8 contains one or two or more compounds represented by general formula I (CCP-31 or CCP-V-1), whereas the liquid-crystalline medium of the A2A-2 Invention does not contain the compound (CCP-31 or CCP-V-1) represented by general formula I of Invention 8.

<Different Feature 3-6>

The liquid-crystalline medium of Invention 8 contains at least one stabilizer selected from the group consisting of the compounds represented by [Chemical 38] to [Chemical 42] (omitted), whereas the liquid crystal composition of the A2A-2 Invention does not contain any of such compounds.

Regarding <Different Feature 3-5>

The matter specifying the invention of Invention 8 responsible for Different Feature 3-5 is identical with the matter specifying the invention of Invention 7 responsible for Different Feature 3-4 in the above "D."

As stated in the above "D" (A), furthermore, the above Different Feature 3-4 is a substantial different feature in the liquid-crystalline medium of the A2A-1 Invention (the liquid-crystalline medium of A2A-2 Invention) and thus even a person skilled in the art could not easily conceive of the configuration of Different Feature 3-4 in the

A2-1 Invention. Therefore, the above Different Feature 3-5 is also a substantial different feature and thus even a person skilled in the art could not easily conceive of the configuration of Different Feature 3-5 in the A2-2 Invention.

(B) Comparison with A2B-2 Invention and judgment

Comparing Invention 8 and the A2B-2 Invention in consideration of the matters stated in the above "D" (B), Invention 8 and the A2B-2 Invention are only identical in that each of them is "an electro-optical liquid-crystal display comprising a liquid-crystalline medium based on a mixture of polar compounds having negative dielectric anisotropy," but differ in the same feature as the above Different Feature 3-5 (referred to as "Different feature 3-5'"), the same feature as the above Different Feature 3-6, and the feature that the liquid-crystalline medium of the A2B-2 Invention does not contain "CC-n-V1," "CC-V-V," and compounds represented by formulae RIV, RV, and RVII of Invention 8.

Here, the matter specifying the invention of Invention 8 responsible for Different Feature 3-5' is identical with the matter specifying the invention of Invention 7 responsible for Different Feature 3-4' in the above "D."

As stated in the above "D" (B), furthermore, the above Different Feature 3-4' is a substantial different feature in the liquid-crystalline medium of the A2B-1 Invention (the liquid-crystalline medium of A2B-2 Invention) and thus even a person skilled in the art could not easily conceive of the configuration of Different Feature 3-4' in the A2B-1 Invention. Therefore, the above Different Feature 3-5' is also a substantial different feature and thus even a person skilled in the art could not easily conceive of the configuration of Different Feature 3-5' in the A2B-2 Invention.

(C) Summary

Furthermore, at least the above Different Features 3-5 and 3-5' are substantial different features and could not be easily conceived by a person skilled in the art. Therefore, Invention 8 does not correspond to the A2A-2 or A2B-2 Invention without needing to consider the above other different features (Different Feature 3-6, etc.) and could not be easily made even by a person skilled in the art based on the A2A-1 Invention or the A2B-1 Invention.

F Regarding Invention 13

(A) Comparison with A2A Invention and judgment

A2A Invention is compared to Invention 13

• "The liquid-crystalline medium based on a mixture of polar compounds having negative dielectric anisotropy" in the A2A Invention and "the liquid-crystalline medium based on a mixture of polar compounds of positive dielectric anisotropy" in Invention 3 are identical in that each of them is "a liquid-crystalline medium based on a mixture of polar compounds having dielectric anisotropy."

• As stated in the above "A," the compound of Formula I in the A2A Invention corresponds to the compound represented by formula RII in Invention 1.

According to the above statement, Invention 13 and the A2A Invention are identical in that each of them is "a liquid-crystalline medium based on a mixture of polar compounds having dielectric anisotropy, the liquid-crystalline medium comprising compounds of Formula RII," but differ in the following features.

<Different Feature 3-7>

Regarding a liquid-crystalline medium, Invention 13 is a liquid-crystalline medium based on a mixture of polar compounds of positive dielectric anisotropy, comprising at least one compound selected from the group consisting of compounds each represented by any one of formulae I1, I2, I4 to I11, I16, I20, and I23 to I29, whereas the A2A Invention is a liquid crystal composition based on a mixture of polar compounds having negative dielectric anisotropy, comprising no compound represented by any one of formulas I1, I2, I4 to I11, I16, I20, and I23 to I29.

Regarding <Different Feature 3-7>

As stated in the above "C" (A), there is a disincentive against making the A2A Invention "a liquid-crystalline medium based on a mixture of polar compounds of positive dielectric anisotropy."

Furthermore, in each of the compounds represented by formulas I1, I2, I4 to I11, I16, I20, and I23 to I29, X in the terminal group is [Chemical 54] "F ... OCF3 ... or OCClFCF2CF3" and is "a polar compound having positive dielectric anisotropy" just as

in the case that the terminal group X of the same formula in Invention 3 includes "F or OCF3."

Then, as stated in the above "C" (A), it should be said that there is a disincentive against adding the compounds represented by formulas I1, I2, I4 to I11, I16, I20, and I23 to I29 of Invention 13, each of which is "a polar compound having positive dielectric anisotropy," to the A2A Invention.

As stated in "2 Regarding Reasons for invalidation 3-1" (4) "C" "Regarding <Effects of Invention 3>" and "F," Invention 13 exerts a specific effect.

Hence, Different Feature 3-7 is a substantial different feature and thus even a person skilled in the art could not easily conceive of the configuration of Different Feature 3-7 in the A2A Invention.

(B) Comparison with A2B Invention and judgment

Comparing Invention 13 and the A2B Invention in consideration of the matters stated in the above "C" (B), Invention 13 and the A2B Invention are identical in that each of them is "a liquid-crystalline medium based on a mixture of polar compounds having dielectric anisotropy, the liquid-crystalline medium comprising a compound represented by Formulae RII and RXIV," but differ in the same feature as the above Different Feature 3-7 (hereinafter, referred to as "Different Feature 3-7'").

As stated in the above "C" (B), there is a disincentive against making the A2B Invention "a liquid-crystalline medium based on a mixture of polar compounds of positive dielectric anisotropy."

Then, just as stated in the above "C" (B), it should be said that there is a disincentive against adding the compounds represented by formulas I1, I2, I4 to I11, I16, I20, and I23 to I29 of Invention 13, each of which is "a polar compound having positive dielectric anisotropy."

As stated in "2 Regarding Reasons for invalidation 3-1" (4) "C" "Regarding <Effects of Invention 3>" and "F," Invention 13 exerts a specific effect.

Hence, Different Feature 3-7' is a substantial different feature and thus even a person skilled in the art could not easily conceive of the configuration of Different Feature 3-7' in the A2B Invention.

(C) Summary

Invention 13 does not correspond to the A2A Invention or the A2B Invention and could not be easily made even by a person skilled in the art based on the A2A Invention or the A2B Invention.

(5) Summary of Reason for invalidation 4-1

As stated above, none of Inventions 1 to 3, 7, 8, and 13 is the invention disclosed in A2 and none could be easily invented by a person skilled in the art based on the invention disclosed in A2. Thus, these inventions do not fall under the provision of Article 29(1)(iii) of the Patent Act or are not inventions that cannot be granted a patent under the provision of Article 29(2) of the Patent Act. Therefore, none of Inventions 1 to 3, 7, 8, and 13 falls under Article 123(1)(ii) of the Act and none should be invalidated.

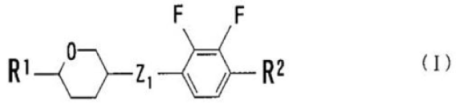
5. Regarding Reason for invalidation 4-2

(1) Publication

A4: Japanese Unexamined Patent Application Publication No. 2001-115161

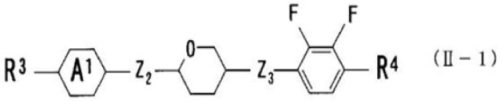
(2) Matters described in Publication (A4)

(A1) "[Claim 1] A liquid crystal composition comprising as a first component, at least one compound selected from the compounds represented by general formula (I) and as a second component, at least one compound selected from the compounds represented by general formula (II-1) or (II-2).
[Chemical 1]



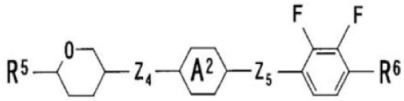
(I)

[Chemical 2]



(II－1)

[Chemical 3]



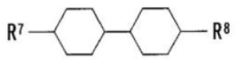
(Ⅱ－2)

(wherein R1, R3, and R5 each independently represent an alkyl group having 1 to 10 carbon atoms or an alkenyl group having 2 to 10 carbon atoms; R2, R4, and R6 each independently represent an alkyl group or an alkoxy group having 1 to 10 carbon atoms, or an alkenyl group having 2 to 10 carbon atoms; Z1 to Z5 each independently represent a single bond or –CH2CH2–; rings A1 and A2 each independently represent a 1,4-phenylene group or a trans-1,4-cyclohexylene group; and in the case that the ring A2 is the 1,4-phenylene group, at least one hydrogen atom at a lateral position of the ring may be substituted by a fluorine atom.)

[Claim 2] The liquid crystal composition according to Claim 1, wherein the amounts of the first component and the second component are 3 to 40% by weight and 3 to 70% by weight based on the total weight of the liquid crystal composition, respectively.

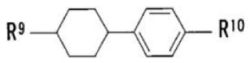
[Claim 3] The liquid crystal composition according to Claim 1 or 2, wherein the liquid crystal composition further comprises, as a third component, at least one compound selected from the compounds expressed by general formulas (III-1), (III-2), (III-3), (III-4), (III-5), and (III-6):

[Chemical 4]



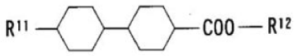
(Ⅲ－1)

[Chemical 5]



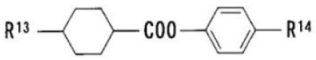
(Ⅲ－2)

[Chemical 6]



(Ⅲ－3)

[Chemical 7]

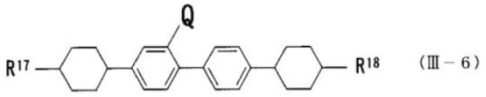


(Ⅲ－4)

[Chemical 8]

(Ⅲ－5)

[Chemical 9]



(wherein R7, R9, R11, R13, R15, and R17 each independently represent an alkyl group having 1 to 10 carbon atoms or an alkenyl group having 2 to 10 carbon atoms; R8, R10, R12, R14, and R16 each independently represent an alkyl group or an alkoxy group having 1 to 10 carbon atoms, or an alkenyl group having 2 to 10 carbon atoms; R18 represents an alkyl group having 1 to 10 carbon atoms in which one –CH2– may be replaced by –O–, or an alkenyl group having 2 to 10 carbon atoms; and Q represents a hydrogen atom or a fluorine atom).

(A2) "[0002]
[Background] In liquid crystal display devices (LCD), such advantages as low consumption of electric power, miniaturization, and weight reduction can be obtained in contrast to a CRT (Braun tube-type display), and the LCD has been practically used in various modes such as twisted nematic (TN) mode, super-twisted nematic (STN) mode, and thin film transistor (TFT) mode. Above all, an active matrix LCD (AM-LCD) such as TFT has been noticed as a prospective winner among flat displays along with the progress of colorization and high definition.
[0003] For this AM-LCD liquid crystal composition, the following characteristics are required:
1) A high voltage-holding ratio (VHR) which can maintain high contrast of the LCD,
2) A wide range of nematic liquid crystal phase which can comply with the change of its use environment,
3) Being able to exhibit suitable optical anisotropy (Δn) in accordance with a cell thickness, and
4) Being able to exhibit suitable threshold voltage in accordance with a drive circuit.
[0004] As an operating mode of the AM-LCD, there has been mainly used TN display mode wherein alignment of liquid crystal molecules between upper and lower electrode substrates is twisted by 90°, but since the view angle of the mode is narrow, the mode has a drawback in that the application thereof to a large screen display has been difficult. Accordingly, the following techniques have been proposed for the modes to improve the view angle:

a) IPS display mode wherein liquid crystal display devices exhibit a homogeneous alignment state when voltage is not applied, and a liquid crystal molecule rotates by 45 to 90° in a plane when the voltage its applied ... , and
b) VA display mode wherein a liquid crystal display devices exhibit a homeotropic alignment state when voltage is not applied, and changes into an alignment state in one horizontal direction when the voltage is applied ....
...
[0006]
[Problem to be Solved by the Invention] An object of the present invention is to provide a liquid crystal composition having a suitable value of Δn applicable to the above-mentioned display modes a) and b), a low viscosity, a large negative value of Δε, a broad view angle, and a wide nematic liquid crystal phase range, and thus having a high voltage-holding ratio and other various properties required for the above AM-LCD liquid crystal composition.

(A3) "[0022]
[Embodiments of the Invention]
In a liquid crystal composition of the present invention, compounds which are the first components expressed by general formula (1) have a value of Δn in a range of about 0.05 to 0.12 and a value of Δε in a range of about −8 to −4, and are excellent in thermal stability, chemical stability, and compatibility. Therefore, they play roles in reducing threshold voltage and viscosity of the liquid crystal composition for TFT in which high reliability is required. However, clearing point (TC) thereof ranges from about −30 to 20°C, and hence, preparation of the composition having a negative value of Δε from these compounds alone is not preferable, because the TC of the resultant composition remains too low. Among the second component, the compounds expressed by general formulas (II-1) and (II-2) can overcome the drawback as above when used together with the first component. That is, the second component has a value of Δn in a range of about 0.09 to 0.18, a value of Δε in a range of about −8 to −4, and a value of TC in a range of 90 to 150°C, and is excellent in thermal stability, chemical stability, and compatibility. Therefore, it plays a role in increasing the value of negative Δε and raising the value of TC of the liquid crystal composition.
...
[0029] The liquid crystal composition for AM-LCD having the ability to achieve the above-mentioned object of the present invention can be prepared optionally by

combining at least one of the compounds of the first component and at least one of the compounds of the second component.

[0030] Among the third component, the compounds expressed by any one of formulae (III-1), (III-2), (III-3), and (III-4) have a value of Tc in a range of about 10 to 80°C, a value of Δε of about zero, and a value of Δn in a range of about 0.01 to 0.08, and therefore, they play a role mainly in reducing the Δn of the composition. Among them, the compounds expressed by formulas (III-1) and (III-2) also play a role in reducing the viscosity of the composition. Furthermore, the compounds expressed by formulas (III-5) and (III-6) have a value of Δn in a range of about 0.10 to 0.20, a value of Δε of about zero, and a value of Tc in a range of about 130 to 260°C, and therefore, they play in particular a role in raising the Tc of the composition. As mentioned above, Δn, viscosity, and nematic liquid crystal phase range of the composition can be adjusted by adding the third component to the composition comprising the first component and the second component in accordance with the object of the present invention. There can be prepared the liquid crystal composition which is particularly suitable as the liquid crystal composition for AM-LCD, by having a value of Tc in a range of about 60 to 100°C, a value of Δn in a range of 0.06 to 0.12, and a value of Δε in a range of −6 to −1, and by having low viscosity and a wide nematic liquid crystal phase range.

(A4) "[0040]

Example 1

A liquid crystal composition comprising the following components in the amounts below was prepared:

First component	
5-DhB(2F,3F)-O1	7.0%
3-DhB(2F,3F)-O2	8.0%
5-DhB(2F,3F)-O2	8.0%
Second component	
3-HDhB(2F,3F)-O1	12.0%
3-HDhB(2F,3F)-O2	13.0%
5-HDhB(2F,3F)-O1	13.0%
5-HDhB(2F,3F)-O2	13.0%
5-BDhB(2F,3F)-O2	3.0%
Third component	
3-HH-4	6.0%
3-HB-2	6.0%

3-HHB-	4.0%
3-HHB-3	3.0%
3-HHB-O1	4.0%

Characteristics of this composition were determined to be as follows:

TC = 86.3 (°C)

TL < −20°C

Δn = 0.095

Δε = −5.0

η20 = 39.9 (mPa•s)

VHR (25°C) = 98.7

VHR (80°C) = 98.0

It is found that this composition has particularly a negative and large absolute value of Δε and a very high voltage-holding ratio (VHR), as compared with those of Comparative Examples 1 and 2. Accordingly, the composition is suitable for display systems of the above-described modes a) and b).

[0041]

Example 2

A liquid crystal composition comprising the following components in the amounts below was prepared:

First component	
3-DhB(2F,3F)-O2	5.0%
5-DhB(2F,3F)-O2	5.0%
Second component	
3-HDhB(2F,3F)-O1	9.0%
5-HDhB(2F,3F)-O1	10.0%
3-HDhB(2F,3F)-O2	9.0%
5-HDhB(2F,3F)-O2	10.0%
Third component	
2-HH-3	4.0%
3-HH-4	10.0%
3-HB-2	16.0%
3-HB-4	4.0%
3-HHB-1	5.0%
3-HHB-3	9.0%
3-HHB-O1	4.0%

Characteristics of this composition were determined to be as follows:

TC = 85.9 (°C)

TL < −20°C

Δn = 0.085

Δε = −3.1

η20 = 24.0 (mPa•s)

VHR (25°C) = 98.9

VHR (80°C) = 98.3

It is found that this composition has a negative and large value of Δε, a low viscosity, and an extremely high value of voltage-holding ratio.

... (omitted) ...

[0054]

Example 15

A liquid crystal composition comprising the following components in the amounts below was prepared:

First component	
3-DhB(2F,3F)-O1	5.0%
5-DhB(2F,3F)-O1	5.0%
3-DhB(2F,3F)-O2	5.0%
5-DhB(2F,3F)-O2	5.0%
Second component	
5-HDhB(2F,3F)-1	3.0%
3-HDhB(2F,3F)-O1	10.0%
5-HDhB(2F,3F)-O1	10.0%
3-HDhB(2F,3F)-O2	10.0%
5-HDhB(2F,3F)-O2	10.0%
3-DhHB(2F,3F)-O2	3.0%
Third component	
3-HH-4	8.0%
3-HB-O2	6.0%
3-HB-O4	6.0%
3-HH-EMe	6.0%
3-HHB-3	8.0%

Characteristics of this composition were determined to be as follows:

TC = 73.8 (°C)

TL < −20°C

Δn = 0.084

$\Delta\varepsilon = -4.3$

$\eta 20 = 35.4$ (mPa•s)

(A5) "[0055]

Example 16

A liquid crystal composition comprising the following components in the amounts below was prepared:

First component	
3-DhB(2F,3F)-O1	4.0%
5-DhB(2F,3F)-O1	4.0%
3-DhB(2F,3F)-O2	4.0%
5-DhB(2F,3F)-O2	4.0%
V2-DhB(2F,3F)-O3	4.0%
Second component	
5-HDhB(2F,3F)-1	3.0%
3-HDhB(2F,3F)-O1	8.0%
5-HDhB(2F,3F)-O1	8.0%
3-HDhB(2F,3F)-O2	8.0%
5-HDhB(2F,3F)-O2	9.0%
V2-HDhB(2F,3F)-O2	4.0%
3-H2DhB(2F,3F)-1	3.0%
3-DhBB(2F,3F)-O2	3.0%
Third component	
3-HH-4	4.0%
V2-HH-4	4.0%
3-HB-O2	6.0%
3-HB-O4	6.0%
3-HH-EMe	6.0%
3-HHB-3	4.0%
V2-HHB-3	4.0%

Characteristics of this composition were determined to be as follows:

TC = 73.6 (°C)

TL < −20°C

$\Delta n = 0.086$

$\Delta\varepsilon = -4.2$

$\eta 20 = 34.7$ (mPa•s)

(A6) "[0056]

Example 17

A liquid crystal composition comprising the following components in the amounts below was prepared:

First component	
3-DhB(2F,3F)-O1	8.0%
5-DhB(2F,3F)-O1	8.0%
3-DhB(2F,3F)-O2	8.0%
5-DhB(2F,3F)-O2	8.0%
Second component	
3-HDhB(2F,3F)-1	5.0%
3-HDhB(2F,3F)-3	5.0%
3-HDhB(2F,3F)-O1	12.0%
5-HDhB(2F,3F)-O1	12.0%
3-HDhB(2F,3F)-O2	12.0%
5-HDhB(2F,3F)-O2	12.0%
3-DhHB(2F,3F)-O3	4.0%
Third component	
3-HB-O2	3.0%
3-HH-EMe	3.0%

Characteristics of this composition were determined to be as follows:

TC = 70.0 (°C)

TL < −20°C

Δn = 0.092

Δε = −6.2

η20 = 48.4 (mPa•s)

... (omitted) ...

[0058]

Example 19

A liquid crystal composition comprising the following components in the amounts below was prepared:

First component	
3-DhB(2F,3F)-O2	6.0%
5-DhB(2F,3F)-O2	6.0%
Second component	

5-HDhB(2F,3F)-O1	7.0%
3-HDhB(2F,3F)-O2	7.0%
5-HDhB(2F,3F)-O2	8.0%
Third component	
2-HH-3	5.0%
3-HH-4	5.0%
3-HB-O2	10.0%
3-HB-O4	4.0%
3-HH-EMe	6.0%
3-HHB-3	7.0%
Fourth component	
V2-HB(2F,3F)-O2	5.0%
5-HB(2F,3F)-O2	5.0%
3-HHB(2F,3F)-O2	4.0%
V2-HHB(2F,3F)-O2	3.0%
5-HHB(2F,3F)-O2	6.0%
3-HBB(2F,3F)-O2	3.0%
V2-HBB(2F,3F)-O2	3.0%

Characteristics of this composition were determined to be as follows:
TC = 78.8 (°C)
TL < −20°C
Δn = 0.089
Δε = −63.5
η20 =27.0(mPa•s)"

(3) Invention disclosed in A4

In A4, [Claim 3], which depends from [Claim 1] of the above (A1), recites "a liquid crystal composition comprising, as a first component, at least one compound selected from the compounds expressed by general formula (I) (omitted), and, as a second component, at least one compound selected from the compounds expressed by general formulas (II-1) and (II-2) (omitted): and further comprising, as a third component, at least one compound selected from the compounds expressed by general formulas (III-1), (III-2), (III-3), (III-4), (III-5), and (III-6):
[Chemical 4] to [Chemical 9](omitted)

(wherein R7, R9, R11, R13, R15, and R17 each independently represent an alkyl group having 1 to 10 carbon atoms or an alkenyl group having 2 to 10 carbon atoms; R8, R10, R12, R14, and R16 each independently represent an alkyl group or an alkoxy group having 1 to 10 carbon atoms, or an alkenyl group having 2 to 10 carbon atoms; R18 represents an alkyl group having 1 to 10 carbon atoms in which one −CH2− may be replaced by −O−, or an alkenyl group having 2 to 10 carbon atoms; and Q represents a hydrogen atom or a fluorine atom)." It can be said that, among specific examples of the liquid crystal composition, A4 describes as Example 16 of the above (A5),
"a liquid crystal composition comprising,
as a first component,
4.0% of 3-DhB(2F,3F)-O1, 4.0% of 5-DhB(2F,3F)-O1, 4.0% of 3-DhB(2F,3F)-O2, 4.0% of 5-DhB(2F,3F)-O2, and 4.0% of V2-DhB(2F,3F)-O3;
as a second component,
3.0% of 5-HDhB(2F,3F)-1, 8.0% of 3-HDhB(2F,3F)-O1, 8.0% of 5-HDhB(2F,3F)-O1, 8.0% of 3-HDhB(2F,3F)-O2, 9.0% of 5-HDhB(2F,3F)-O2, 4.0% of V2-HDhB(2F,3F)-O2, 3.0% of 3-H2DhB(2F,3F)-1, and 3.0% of 3-DhBB(2F,3F)-O2;
and, as a third component,
4.0% of 3-HH-4, 4.0% of V2-HH-4, 6.0% of 3-HB-O2, 6.0% of 3-HB-O4, 6.0% of 3-HH-EMe, 4.0% of 3-HHB-3, and 4.0% of V2-HHB-3, wherein TC = 73.6 (°C), TL < −20°C, Δn = 0.086, Δε = −4.2, and η20 = 34.7 (mPa.s)." (hereinafter, referred to as the "A4 Invention").

Further, according to the description of the above (A2) in A4, a liquid crystal display element using a liquid crystal composition is used for a "display," In A4, therefore, it can be said that "use of the liquid crystal composition of the A4 Invention for a liquid crystal display" (hereinafter referred to as the "A4-1 Invention") and "a liquid crystal display comprising the liquid crystal composition of the A4 Invention" (hereinafter, referred to as the "A4-2 invention") are also described.

(4) Comparison / examination

A Regarding Invention 1

A4 Invention is compared to Invention 1

• The "liquid crystal composition" of the A4 Invention corresponds to the "liquid-crystalline medium" of Invention 1.

• The first component of the Invention A4 is a specific compound of the compound represented by general formula (I), which is the first component of the above (A1). According to the description in the above (A3), the compound represented by general formula (I) is a compound of negative dielectric anisotropy (Δε). Similarly, the second component of the Invention A4 is the compound represented by general formula (II-1) or (II-2), which is the second component of the above (A1). According to the descriptions in the above (A3), the compound represented by general formula (II-1) or (II-2) is also a compound in which dielectric anisotropy (Δε) is negative.

It is also clear that such compounds are "polar compounds." Therefore, it can be said that the A4 Invention containing such a compound is "a liquid crystal composition based on a mixture of polar compounds having negative dielectric anisotropy."

• " V2-HH-4" of the A4 Invention corresponds to the case in which R0 and alkenyl are respectively an alkyl radical having four carbon atoms and an alkenyl group having four carbon atoms in Formula RII of Invention 1, whereas "3-HBB-3" corresponds to the case in which alkyl and alkyl* are respectively alkyl radicals each having three carbon atoms in Formula RVIII of Invention 1.

According to the above statement, Invention 1 is in common with the A4 Invention in that each of them is "a liquid-crystalline medium based on a mixture of polar compounds having negative dielectric anisotropy, the liquid-crystalline medium comprising compounds of Formulae RII and RVIII," but differ in the following features.

<Different Feature 4-1>

Invention 1 contains one or two or more compounds represented by general formula I (PP-13), whereas the A4 Invention does not contain the compound (PP-13) represented by general formula I of Invention 1.

Regarding <Different Feature 4-1>

"3-HH-4," " V2-HH-4," "3-HB-O2," "3-HB-O4," and "3-HH-EMe" in the liquid crystal composition of the A4 Invention are dicyclic in common with "PP-13" of Invention 1.

Here, the liquid crystal composition of the A4 Invention serves as an example of the liquid crystal composition stated in the above (A1). However, any of (III-1) to (III-3) stated in the above (A1) including the above dicyclic compounds of Invention A1 as specific compounds differs in ring structure. Thus, each of them does not include "PP-13." In addition, "PP-13" is not used in examples other than Example 16; i.e., Examples 1 to 15 and 17 to 19 of the above (A4) and (A6). Thus, it cannot be said that "PP-13" is recognized in the liquid crystal composition of A4. It can be said that "PP-13" is a different compound from the above dicyclic compound of the A4 Invention. Moreover, "PP-13" of Invention 1 has a terminal group specified as an alkyl radical having 1 or 3 carbon atoms. The terminal groups of the dicyclic compounds in the A4 Invention are not alkyl radicals having 1 and 3 carbon atoms. In this respect, it can also be said that these compounds are different compounds from "PP-13" of Invention 1.

Then, according to the descriptions in paragraph [0030] of the above (A3), these (III-1) to (III-3) are used to achieve the intended purpose of adjusting Δn and viscosity. It cannot be said that the motivation for newly adding "PP-13" to the A4 Invention lies in the A4 Invention even by replacing the above dicyclic compound of the A4 Invention, which is contained in these (III-1) and (III-3) and used for achieving the intended purpose of adjusting Δn, viscosity, and so on, with "PP-13" or changing the compounding amount of each liquid-crystalline compound of the A4 Invention.

Hence, Different Feature 4-1 is a substantial different feature and thus even a person skilled in the art could not easily conceive of the configuration of Different Feature 4-1 in the A4 Invention.

Therefore, Invention 1 does not correspond to the A4 Invention and could not be easily made even by a person skilled in the art based on the A4 Invention.

B Regarding Invention 2

Contrasting Invention 2 with A4 Invention

• The "liquid crystal composition" of the A4 Invention corresponds to the "liquid crystal composition" of Invention 2.

• As stated in the above "A," it can be said that the A4 Invention containing such a compound is "a liquid crystal composition based on a mixture of polar compounds having negative dielectric anisotropy."

According to the above statement, Invention 2 and the A4 Invention are identical in that each of them is "a liquid-crystalline medium based on a mixture of polar compounds having negative dielectric anisotropy," but differ in the following features.

<Different Feature 4-2>

Invention 2 contains one or two or more compounds represented by general formula I (CCP-31), whereas the A4 Invention does not contain the compound (CCP-31) represented by general formula I of Invention 2.

<Different Feature 4-3>

Invention 2 contains "CC-n-V1," "CC-V-V," and compounds represented by formulae RIV, RV, and RVII, whereas the A4 Invention does not contain such compounds of Invention 2.

Taking this case into consideration, <Different Feature 4-3> will be examined.

Regarding <Different Feature 4-3>

"3-HH-4," "V2-HH-4," and "3-HH-EMe" in the A4 Invention are common with "CC-n-V1" and "CC-V-V" in Invention 2, in that each of them is a dicyclic compound in which two 1,4-cyclohexylene radicals are linked together. Then, "3-HH-4," "V2-HH-4," and "3-HH-EMe" in the A4 Invention are included in the compounds represented by general formula (III-1), which are selected from the compounds represented by the above general formulae (III-1) to (III-6), in the liquid crystal composition stated in the above (A1). The compound represented by general formula (III-1) is disclosed such that R7 represents an alkyl radical having 1 to 10 carbon atoms or an alkenyl group having 2 to 10 carbon atoms and R8 represents an alkyl or alkoxy group having 1 to 10 carbon atoms or an alkenyl group having 2 to 10 carbon atoms. Formally, therefore, if one of R7 and R8 is n(CnH2n+1) or V and the other is V1 or V (hereinafter, such a compound is referred to as "the compound" in this section), "the compound" corresponds to "CC-n-V1" or "CC-V-V" of Invention 2.

However, the compound is one of many possible forms. In addition, A4 includes no description of recommending that one of R7 and R8 be n(CnH2n+1) or V

and the other be V1 or V. Moreover, "the compound" is not used as a specific compound corresponding to one represented by general formula (III-1) even considering Examples 1 to 15 and 17 to 19 of the above (A4) and (A6), which are examples other than Example 16.

Then, in A4, at least formally, "CC-n-V1" or "CC-V-V" is included in the compounds represented by formula (III-1). In addition, even if the liquid crystal composition of the A4 Invention contains each of "3-HH-4," "V2-HH-4," and "3-HH-EMe" as a specific compound corresponding to one represented by general formula (III-1), it cannot be said that A4 "substantially" describes "the compound" as a compound represented by general formula (III-1) sufficiently to enable a person skilled in the art to easily conceive of adding "the compound" in place of or in addition to those compounds.

Just as stated in the above "2 Regarding Reasons for invalidation 3-1" (4) "B," it cannot be said that there is any technical requirement to add "CC-n-V1" or "CC-V-V" to the liquid crystal composition of the A4 Invention, which already contains the compounds "3-HH-4," "V2-HH-4," and "3-HH-EMe" each having a dicyclic structure represented by "CC." Even if "CC-n-V1" or "CC-V-V" is a compound already known in the art, it cannot be said that a person skilled in the art could easily conceive of adding each of these compounds to the liquid crystal composition of the A4 Invention.

Hence, in the A4 Invention, Different Feature 4-3 is a substantial different feature and thus even a person skilled in the art could not easily conceive of the configuration of Different Feature 4-3.

Without needing to consider the above Different Feature 4-2, therefore, Invention 2 does not correspond to the A4 Invention and could not be easily made even by a person skilled in the art based on the A4 Invention.

C Regarding Invention 3

Contrasting Invention 3 with A4 Invention

• The "liquid crystal composition" of the A4 Invention corresponds to the "liquid crystal composition" of Invention 3.

• As stated in the above "A," it can be said that the A4 Invention is a "liquid crystal composition based on a mixture of polar compounds having negative dielectric anisotropy." Thus, the A1 Invention is in common with the "liquid-crystalline medium based on a mixture of polar compounds of positive dielectric anisotropy" of Invention 3 in that each of them is the "liquid-crystalline medium based on a mixture of polar compounds having dielectric anisotropy."

• As stated in the above "A," V2-HH-4" and "3-HHB-3" of the A4 Invention correspond to the compound of formula RII and the compound of formula RVIII of Invention 3, respectively.

According to the above statement, Invention 3 is in common with the A4 Invention in that each of them is "a liquid-crystalline medium based on a mixture of polar compounds having dielectric anisotropy, the liquid-crystalline medium comprising compounds of Formulae RII and RVIII," but differ in the following features.

<Different Feature 4-4>

Regarding a liquid-crystalline medium, Invention 3 is a liquid-crystalline medium based on a mixture of polar compounds of positive dielectric anisotropy, comprising at least one compound selected from the group consisting of the compounds each represented by any one of formulae I1, I2, I4 to I11, I16, I20, and I23 to I29, whereas the A4 Invention is a liquid crystal composition based on a mixture of polar compounds having negative dielectric anisotropy, comprising no compound represented by any one of formulas I1, I2, I4 to I11, I16, I20, and I23 to I29.

Regarding <Different Feature 4-4>

As stated in the above "A," the A4 Invention is a "liquid crystal composition based on a mixture of polar compounds having negative dielectric anisotropy, the composition comprising polar compounds having negative dielectric anisotropy, such as the first component and the second component." In addition, according to the descriptions in paragraph [0006] of the above (A2), the problems of the invention of the A4 Invention are "to provide a liquid crystal composition applicable for the display systems of the above a) and b), which can realize a wide view angle, having a suitable Δn, a low viscosity, a large negative $\Delta\varepsilon$, and a broad range of nematic liquid crystal phase, while satisfying a high voltage-holding ration and various properties required for a liquid crystal composition for the AM-LCD."

Then, in order to solve the problems of the invention of the A4 Invention, the composition needs to be at least "a liquid crystal composition based on a mixture of polar compounds having negative dielectric anisotropy." In other words, there should be a disincentive for a person skilled in the art to replace the compound having negative dielectric anisotropy, which is an essential component in the A4 Invention, with a polar compound having positive dielectric anisotropy to make the A4 Invention "a liquid-crystalline medium based on a mixture of polar compounds of positive dielectric anisotropy."

In each of the compounds represented by formulas I1, I2, I4 to I11, I16, I20, and I23 to I29, X in the terminal group is "F or OCF3." Such a compound is "a polar compound having positive dielectric anisotropy" in which dielectric anisotropy is caused in the axial direction of the liquid crystal molecule.

Then, as stated above, there is a disincentive against adding "a polar compound having positive dielectric anisotropy" to the A4 Invention. Therefore, it should be said that there is also a disincentive against adding the compounds represented by formulas I1, I2, I4 to I11, I16, I20, and I23 to I29, each of which is "a polar compound having positive dielectric anisotropy," to the A4 Invention.

As stated in "2 Regarding Reasons for invalidation 3-1" (4) "C" "Regarding <Effects of Invention 3>," Invention 3 exerts a specific effect.

Hence, Different Feature 4-4 is a substantial different feature and thus even a person skilled in the art could not easily conceive of the configuration of Different Feature 4-4 in the A4 Invention.

Therefore, Invention 3 does not correspond to the A4 Invention and could not be easily made even by a person skilled in the art based on the A4 Invention.

D Regarding Invention 7

Contrasting Invention 7 with A4-1 Invention

• As stated in the above "A," it can be said that the "liquid crystal composition" of the A4 Invention corresponds to the "liquid-crystalline medium" of Invention 7 and thus the liquid crystal composition of the A4 Invention is a "liquid crystal composition based on a mixture of polar compounds having negative dielectric anisotropy."

• According to the descriptions in paragraph [0002] of the Specification of the Patent, it can be said that the "liquid crystal display" of the A4-1 Invention is one that has been known as an electro-optical device and thus "use for a liquid crystal display" of the A4-1 Invention corresponds to "use for electro-optical purposes" in Invention 7.

According to the above statement, Invention 7 and the A4 Invention are identical in that each of them is "a use of a liquid-crystalline medium for electro-optical purposes, the liquid-crystalline medium being based on a mixture of polar compounds having negative dielectric anisotropy," but differ in the following features.

<Different Feature 4-5>

Invention 7 contains one or two or more compounds represented by general formula I (CCP-31 or CCP-V-1), whereas the A4-1 Invention does not contain the compound (CCP-31 or CCP-V-1) represented by general formula I of Invention 7.

<Different Feature 4-6>

Invention 7 contains "CC-V-V" and compounds represented by formulae RIV, RV, and RVII, whereas the A4-1 Invention does not contain such compounds of Invention 7.

Taking this case into consideration, <Different Feature 4-6> will be examined.

Regarding <Different Feature 4-6>

The matter specifying the invention of Invention 7 responsible for Different Feature 4-6 is one further limited by deleting "CC-n-V1" from the matter specifying the invention of Invention 2 responsible for Different Feature 4-3 in the above "B."

As stated in the above "B," furthermore, the above Different Feature 4-3 is a substantial different feature in the A4 Invention (the liquid crystal composition of the A4-1 Invention) and thus even a person skilled in the art could not easily conceive of the configuration of Different Feature 4-3 in the A4 Invention. Therefore, the above Different Feature 4-6 is also a substantial different feature and thus even a person skilled in the art could not easily conceive of the configuration of Different Feature 4-6 in the A4-1 Invention.

Therefore, Invention 7 does not correspond to the A4 Invention, without needing to consider the above Different Feature 4-5, and could not be easily made even by a person skilled in the art based on the A4 Invention.

E Regarding Invention 8

Contrasting Invention 8 with A4-2 Invention

• As stated in the above "A," it can be said that the "liquid crystal composition" of the A4-2 Invention corresponds to the "liquid-crystalline medium" of Invention 8 and thus the "liquid crystal composition" of the A4-2 Invention is a "liquid crystal composition based on a mixture of polar compounds having negative dielectric anisotropy."

• The "liquid crystal display" of the A4-2 Invention corresponds to the "electro-optical liquid-crystal display" of Invention 8.

According to the above statement, Invention 8 and the A4 Invention are identical in that each of them is "an electro-optical liquid-crystal display comprising a liquid-crystalline medium based on a mixture of polar compounds having negative dielectric anisotropy," but differ in the following features.

<Different Feature 4-7>

Invention 8 contains one or two or more compounds represented by general formula I (CCP-31 or CCP-V-1), whereas the liquid-crystalline medium of the A4-2 Invention does not contain the compound (CCP-31 or CCP-V-1) represented by general formula I of Invention 8.

<Different Feature 4-8>

Invention 8 contains "CC-n-V1," "CC-V-V," and compounds represented by formulae RIV, RV, and RVII, whereas the liquid crystal composition of the A4-2 Invention does not contain such compounds of Invention 8.

<Different Feature 4-9>

The liquid-crystalline medium of Invention 8 contains at least one stabilizer selected from the group consisting of the compounds represented by [Chemical 38] to [Chemical 42] (omitted), whereas the liquid crystal composition of the A4-2 Invention does not contain any of such compounds.

Taking this case into consideration, <Different Feature 4-8> will be examined.

Regarding <Different Feature 4-8>

The matter specifying the invention of Invention 8 responsible for Different Feature 4-8 is identical with the matter specifying the invention of Invention 2 responsible for Different Feature 4-3 in the above "B."

As stated in the above "B," furthermore, the above Different Feature 4-3 is a substantial different feature in the A4 Invention (the liquid crystal composition of the A4-2 Invention) and thus even a person skilled in the art could not easily conceive of the configuration of Different Feature 4-3 in the A4 Invention. Therefore, the above Different Feature 4-8 is also a substantial different feature and thus even a person skilled in the art could not easily conceive of the configuration of Different Feature 4-8 in the A4-2 Invention.

Therefore, Invention 8 does not correspond to the A4-2 Invention, without needing to consider the above Different Features 4-7 and 4-9, and could not be easily made even by a person skilled in the art based on the A4-2 Invention.

F Regarding Invention 13

• As stated in the above "C," the "liquid crystal composition" of the A4 Invention corresponds to the "liquid-crystalline medium" of Invention 13.

• As stated in the above "A," it can be said that the A4 Invention is a "liquid crystal composition based on a mixture of polar compounds having negative dielectric anisotropy." Thus, the A4 Invention is in common with the "liquid-crystalline medium based on a mixture of polar compounds of positive dielectric anisotropy" of Invention 13 in that each of them is the "liquid-crystalline medium based on a mixture of polar compounds having dielectric anisotropy."

• As stated in the above "A," V2-HH-4" and "3-HHB-3" of the A4 Invention correspond to the compound of formula RII and the compound of formula RVIII of Invention 13, respectively.

According to the above statement, the A13 Invention is in common with the A4 Invention in that each of them is the "a liquid-crystalline medium based on a mixture of polar compounds having dielectric anisotropy, the liquid-crystalline medium comprising compounds of Formulae RII and RVIII," but differ in the following features.

<Different Feature 4-10>

Regarding a liquid-crystalline medium, Invention 13 is a liquid-crystalline medium based on a mixture of polar compounds of positive dielectric anisotropy, comprising at least one compound selected from the group consisting of the compounds each represented by any one of formulae I1, I2, I4 to I11, I16, I20, and I23 to I29, whereas the A4 Invention is a liquid crystal composition based on a mixture of polar compounds having negative dielectric anisotropy, comprising no compound represented by any one of formulas I1, I2, I4 to I11, I16, I20, and I23 to I29.

Regarding <Different Feature 4-10>

As stated in the above "C," there is a disincentive against making the A4 Invention "a liquid-crystalline medium based on a mixture of polar compounds of positive dielectric anisotropy."

Furthermore, in each of the compounds represented by formulas I1, I2, I4 to I11, I16, I20, and I23 to I29, X in the terminal group is [Chemical 54] "F ... OCF3 ... or OCClFCF2CF3" and is "a polar compound having positive dielectric anisotropy" just as in the case that the terminal group X of the same formula in Invention 3 includes "F or OCF3."

Then, just as stated in the above "C," it should be said that there is a disincentive against adding the compounds represented by formulas I1, I2, I4 to I11, I16, I20, and I23 to I29 in Invention 13, each of which is "a polar compound having positive dielectric anisotropy," to the A4 Invention.

As stated in "2 Regarding Reasons for invalidation 3-1" (4) "C" "Regarding <Effects of Invention 3>" and "F," Invention 13 exerts a specific effect.

Hence, Different Feature 4-10 is a substantial different feature and thus even a person skilled in the art could not easily conceive of the configuration of Different Feature 4-10 in the A4 Invention.

Therefore, Invention 13 does not correspond to the A4 Invention and could not be easily made even by a person skilled in the art based on the A4 Invention.

(4) Summary of Reasons for invalidation 4-2

As stated above, none of Inventions 1 to 3, 7, 8, and 13 is the invention disclosed in A4 and none could be easily invented by a person skilled in the art based on the

invention disclosed in A4. Thus, these inventions do not fall under the provision of Article 29(1)(iii) of the Patent Act or are not inventions that cannot be granted a patent under the provision of Article 29(2) of the Patent Act. Therefore, none of Inventions 1 to 3, 7, 8, and 13 falls under Article 123(1)(ii) of the Act and none should be invalidated.

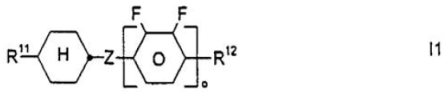
6. Regarding Reasons for invalidation 4-3

(1) Publication

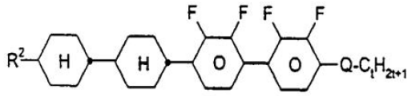
A17: Japanese Unexamined Patent Application Publication No. 2000-38585

(2) Matters described in Publication (A17)

(A1) "[Claim 1] A liquid-crystalline medium based on a mixture of polar compounds having negative dielectric anisotropy, comprising: at least one compound of Formula I1 and/or Formula I2;
[Chemical 1]

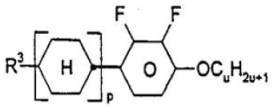


I1



I2

and at least one compound of Formula I3;
[Chemical 2]

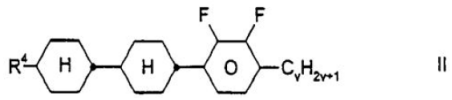


I3

(wherein R11, R2, and R3 are each, independently of one another, an unsubstituted alkyl or alkenyl group having up to 12 carbon atoms, where one or two or more non-adjacent CH2 groups may be replaced by a group selected from the group consisting of -O-, -S-, and -C≡C-; R12 is CSH2S+1, -O-C(CH3)=CH2, or -O-(CH2)bCH=CH2; Q is -O- or a single bond; Z is -C2H4-, -CH=CH-, or a single bond; s, t, and u are each, independently of one another, 1 to 6; o and p are each, independently of one another, 1 or 2; and b is 0, 1, 2, or 3).

[Claim 2] The medium according to Claim 1, further comprising one or two or more compounds of Formula II;

[Chemical 3]

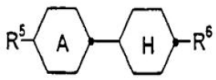


II

(wherein R4 is as defined for R11 and R2 and v is 1 to 6).

[Claim 3] The medium according to Claim 1 or 2, comprising, in a conventional manner, one or two or more compounds of Formula III;

[Chemical 4]

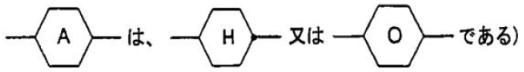


III

(wherein R5 and R6 are each independently defined for R11 and R2 in Claim 1)

and

[Chemical 5]



は、 is

又は or

).

(A2) "[0001]

[Field of the Invention] The invention relates to a liquid-crystalline medium based on a mixture of polar compounds having negative dielectric anisotropy, which contains at least one compound of Formula I1 and/or Formula I2;

...

and at least one compound of Formula I3

... .

[0002] Such a medium is particularly suitable for electro-optical displays with active matrix addressing based on the ECB effect."

(A3) "[0016] Thus, there continues to be a great demand for MLC displays having very high resistivity, at the same time, a wide operating temperature range, short response times, and low threshold voltage, with the aid of which various grey shades can be produced."

[0017]

[Problem to be Solved by the Invention] The invention has the object of providing MLC displays based on the ECB effect which do not have the above-mentioned disadvantages, or do so only to a reduced extent, and at the same time have very high resistivities.

[0018]

[Means for Solving the Problem] It has now been found that this object can be achieved if nematic liquid-crystal mixtures containing at least one compound of formula I1 and/or formula I2 and formula I3 are used in these display elements.

[0019] The invention thus relates to a liquid-crystalline medium based on a mixture of polar compounds having negative dielectric anisotropy, comprising: at least one compound of Formula I1 and/or Formula I2;

[Chemical 10] (omitted)

and at least one compound of Formula I3;

[Chemical 11] (omitted)

(wherein ...).

[0020] The invention also relates to the medium further comprising one or two or more compounds of Formula II;

[Chemical 12] (omitted)

(wherein ...).

The invention further relates to the medium further comprising one or two or more compounds of Formula III;

[Chemical 13] (omitted)

(wherein ...).

(A4) "[0059]

Further abbreviations have the following meanings.

V(0,0)	threshold voltage[V]	0% transmission viewing-angle 0°
V(10,0)	threshold voltage[V]	10% transmission viewing-angle 0°
V(90,0)	threshold voltage[V]	90% transmission viewing-angle 0°

Δn optical anisotropy measured at 20°C and 589 nm

Δε dielectric anisotropy at 20°C and 1 kHz

c.p. clearing point [°C]

γl rotational viscosity measured at 20°C [mPa.s]

S steepness of characteristic curve

$$S = \frac{V(90.0)}{\quad} - 1 \cdot 100$$

V(10.0)

HR(20) voltage holding ratio [%] at 20°C

HR(100) voltage holding ratio [%] at 100°C

HR(UV) voltage holding ratio [%] after UV exposure

[0060]

The display used to measure the threshold voltage has two plane-parallel outer plates at a separation of 5 μm and electrode layers covered by lecithin alignment layers on the inside of the outer plates, which produce a homeotropic alignment of the liquid crystal molecules.

[0061]

[Examples]

[Chemical 30]

例 1

CC-5-V	8.0%	S → N	< -30.0°C
PCH-53	9.0%	透明点	+74.5°C
CY-5-1	14.0%	Δn	+0.0861
PCH-502FF	14.0%	$\varepsilon_{//}$	3.7
CCP-202FF	13.0%	Δε	-4.0
CCP-302FF	14.0%	K_3/K_1	1.09
CCP-502FF	5.0%	γ_1	168
CCP-21FF	12.0%	V_o	2.05 V
CCP-31FF	11.0%	HR(20)	81.8%

例 1 Example 1

透明点 Clearing point

[0062]

[Chemical 31]

例　2

CC-5-V	6.0%	S → N	< -30.0°C
PCH-53	12.0%	透明点	+71.0°C
CY-5-1	14.0%	Δn	+0.0859
PCH-502FF	14.0%	$\varepsilon_{//}$	3.8
CCP-202FF	15.0%	Δε	-4.0
CCP-302FF	15.0%	K_3/K_1	1.09
CCP-502FF	6.0%	V_o	1.97 V
CCP-21FF	14.0%	HR(20)	85.5%
CCP-31FF	4.0%		

例　3

PCH-53	20.0%	透明点	+107.5°C
PCH-502FF	12.0%	Δn	+0.01023
CCP-302FF	14.0%		
CCP-502FF	14.0%		
CCP-21FF	14.0%		
CCP-31FF	12.0%		
CPYC-2-3	4.0%		
CYYC-2-3	4.0%		
CCYY-2-02	4.0%		
CCYY-3-1	4.0%		

例２　Example 2

透明点　　Clearing point

例３　Example 3

[0063]

[Chemical 32]

例　4

PCH-53	8.0%	S → N	< -30.0°C
CY-3-1	5.0%	透明点	+71.5°C
CY-5-1	5.0%	Δn	+0.0928
PCH-304FF	8.0%	$\varepsilon_{//}$	4.1
PCH-502FF	12.0%	Δε	-5.2
PCH-702FF	10.0%	V_o	1.76V
CCP-202EF	13.0%		
CPP-302FF	15.0%		
CCP-502FF	13.0%		
CCP-21FF	6.0%		
BCH-32F	5.0%		

例　5

CEY-V-1	5.0%	透明点	+53.5°C
CVY-V-1	12.0%	Δn	+0.0905
CY-V-02	5.0%	$\varepsilon_{//}$	4.9
CY-3-0V	5.0%	Δε	-5.3
CY-5-01V	12.0%	V_o	1.55V
CY-3-0-C(CH_3)=CH_2	5.0%		
PCH-502FF	12.0%		
CCP-302FF	14.0%		
CCP-502FF	14.0%		
CCP-21FF	6.0%		
CCP-31FF	10.0%		

例４　Example 4

例５　Example 5
透明点　　Clearing point

"

(3) Invention disclosed in A17

In [Claim 3], which depends from [Claim 1] of the above (A1) of A17, recites "the liquid crystalline medium based on a mixture of polar compounds having negative dielectric anisotropy, comprising: at least one compound of Formula I1 and/or Formula I2 (omitted), at least one compound of Formula I3 (omitted), and at least one compound of Formula III (omitted)." In the above (A4), as specific examples of this liquid crystal composition, the liquid-crystalline media of Examples 1 and 2 are described. Here, since Examples 1 and 2 contain the same components in their respective liquid-crystalline media, Example 1 will be described below. Furthermore, since the liquid-crystalline medium of Example 1 is the specific liquid-crystalline medium of the above (A1), it is "a medium based on a mixture of polar compounds having negative dielectric anisotropy" as recited in [Claim 1] of the above (A1).

Then, it can be said A17 describes as example 1

"A liquid-crystalline medium based on a mixture of polar compounds having negative dielectric anisotropy, the medium comprising 8.0% of CC-5-V, 9.0% of PCH-53, 14.0% of CY-5-1, 14.0% of PCH-502FF, 13.0% of CCP-202FF, 14.0% of CCP-302FF, 5.0% of CCP-502FF, 12.0% of CCP-21FF, and 11.0% of CCP-31FF, wherein S→N < -30.0°C, a clearing point is +74.5°C, Δn is +0.0861, ε‖3.7, Δε is -4.0, K3/K is 11.09, γ1 is 168, V0 is 2.05 V, and HR (20) is 81.8%" (hereinafter, referred to as the "A17 Invention").

(4) Comparison with Invention 1 and examination

A17 Invention is compared to Invention 1

• The "liquid-crystalline medium based on a mixture of polar compounds having negative dielectric anisotropy" of the A17 Invention corresponds to the "liquid-crystalline medium based on a mixture of polar compounds having negative dielectric anisotropy" of Invention 1.

• "CC-5-V" in the A17 Invention corresponds to a compound represented by Formula RII of Invention 1 in which R0 is an n-alkyl having 5 carbon atoms and alkenyl is a straight alkenyl group having 2 carbon atoms.

According to the above statement, the A17 Invention is in common with Invention 1 in that each of them is "a liquid-crystalline medium based on a mixture of polar compounds having negative dielectric anisotropy, comprising a compound of Formula RII," but differ in the following features.

<Different Feature 5-1>

Invention 1 contains one or two or more compounds represented by general formula I (PP-1-3), whereas the A17 Invention does not contain the compound (PP-1-3) represented by general formula I of Invention 1.

Regarding <Different Feature 5-1>

"PCH-53" in the liquid-crystalline medium of the A17 Invention is dicyclic in common with "PP-13" of Invention 1.

Here, the liquid crystal composition of the A17 Invention serves as an example of the liquid crystal composition stated in the above (A1). However, any of compounds of Formula III stated in the above (A1) including the above dicyclic compounds of A17 Invention as specific compounds differs in ring structure. Thus, each of them does not include "PP-13." In addition, "PP-13" is not used in examples other than Example 1; i.e., Examples 2 to 5 of the above (A4). Thus, it cannot be said that "PP-13" is recognized in the liquid crystal composition of A17. It can be said that "PP-13" is a different compound from the above " PCH-53" of the A17 Invention. Moreover, "PP-13" of Invention 1 has a terminal group specified as an alkyl radical having 1 or 3 carbon atoms. The terminal groups of "PCH-53" in the A17 Invention are not alkyl radicals having 1 or 3 carbon atoms. In this respect, it can also be said that the compound is a different compound from "PP-13" of Invention 1.

Addressing that "there continues to be a great demand for MLC displays having very high resistivity, at the same time, a wide operating temperature range, short response times, and low threshold voltage, with the aid of which various grey shades can be produced" as described in paragraph [0016] of the above (A3), the A17 Invention intends to provide MLC displays having no disadvantage in these matters, being based on the ECB effect, and at the same time having very high specific resistance, as described in paragraph [0017] of the above (A3). For achieving this

object, it can be said that the liquid-crystalline medium used in paragraph [0019] contains the compound of Formula I1 and/or the compound of Formula I2, the compound of Formula I3, the compound of Formula II, and the compound of formula III. Then, it can be said that "PCH-53" of the A17 Invention used as a specific compound of the compound of Formula III contributes to solving the above problems of the invention of the A17 Invention. In addition, there is no mention at all in A17 of suggesting the use of a liquid-crystalline compound having a ring structure of "PP" in the liquid-crystalline medium of A17. Thus, it cannot be said that the A17 Invention makes a person skilled in the art have motivation to newly add "PP-13" to the A17 Invention even by replacing "PCH-53," which makes a corresponding contribution to solving the problems of the invention of the A17 invention, with "PP-13" or even by changing the compounding amount of each liquid-crystalline compound in the A17 Invention.

Hence, Different Feature 5-1 is a substantial different feature and thus even a person skilled in the art could not easily conceive of the configuration of Different Feature 5-1 in the A17 Invention.

Therefore, Invention 1 does not correspond to the A17 Invention and could not be easily made even by a person skilled in the art based on the A17 Invention.

(5) Summary of Reason for invalidation 4-3

As stated above, Invention 1 is not the invention disclosed in A17 and could not be easily invented by a person skilled in the art based on the invention disclosed in A17. Thus, Invention 1 does not fall under the provision of Article 29(1)(iii) of the Patent Act or is not an invention that cannot be granted a patent under the provision of Article 29(2) of the Patent Act. Therefore, Invention 1 does not fall under Article 123(1)(ii) of the Act and should not be invalidated.

7. Regarding reason for invalidation 4-4

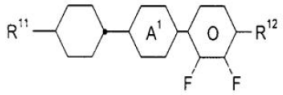
(1) Publication

A12: German Patent No. 10107544 (translation A13: Japanese Unexamined Patent Application Publication No. 2001-316669)

(2) Matters described in Publication (A12)

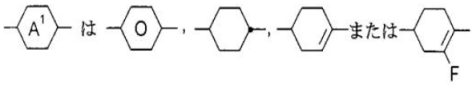
(The Japanese translation of A12 is described below. The translation is transcribed from the corresponding Japanese Gazette A13 and the corresponding location in A12 is also described.)

(A1) "[Claim 1] A nematic liquid-crystal medium comprising:
a) one or two or more dielectrically negative compound(s) of formula I
[Chemical 1]



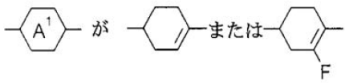
I

in which
[Chemical 2]



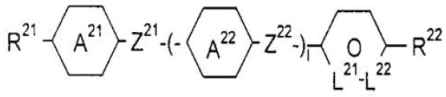
は　is
または　or

R11 is an alkoxy having 1 to 7 carbon atoms or an alkenyloxy having 2 to 7 carbon atoms,
and, in the case where
[Chemical 3]



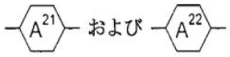
が　is
または　or

R11 can also be alkyl having 1 to 7 carbon atoms; and R12 is an alkyl having 1 to 7 carbon atoms, an alkoxy having 1 to 7 carbon atoms, or an alkenyloxy having 2 to 7 carbon atoms,
b) one or two or more dielectrically negative compound(s) of formula II
[Chemical 4]



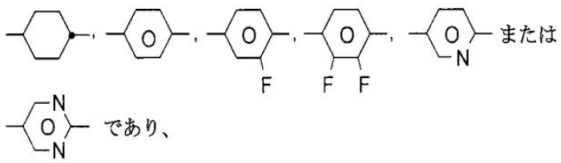
II

in which
R21 is an alkyl having 1 to 7 carbon atoms, an alkoxy having 1 to 7 carbon atoms, or an alkenyloxy having 2 to 7 carbon atoms, R22 is an alkyl having 1 to 7 carbon atoms, an alkoxy having 1 to 7 carbon atoms, or an alkenyloxy having 2 to 7 carbon atoms, Z21 and Z22 are, in each case, independently, –CH2–CH2-, –CH=CH–, –C≡C–, –COO– or a single bond,
[Chemical 5]



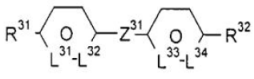
および and

are, in each case, independently,
[Chemical 6]



または or

one or two or more dielectrically negative compounds in which L21 and L22 are both C–F or one of the two is N and the other is C–F, and preferably both are C-F, and I is 0 or 1, and the compounds of the formulae I and III are excluded, and
c) optionally one or more dielectrically negative compounds of formula III
[Chemical 7]



III

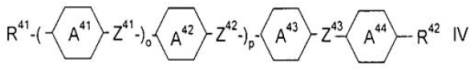
in which
R31 and R32 are each, independently, an alkyl having 1 to 7 carbon atoms, an alkoxy having 1 to 7 carbon atoms, or an alkenyloxy having 2 to 7 carbon atoms or preferably 2 to 4 carbon atoms, Z31 is as defined as Z21 of Formula II as claimed in Claim 1, L31

and L32 are both C–F or one of the two is N and the other is C–F, and L33 and L34 are both C–F or one of the two is N and the other is C–F.

...

[Claim 6] The liquid-crystal medium according to any one of Claims 1 to 5, further comprising one or two or more dielectrically neutral compounds of formula IV

[Chemical 11]

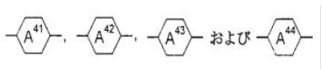


IV

in which

R41 and R42 are each, independently of one another, a compound as defined as claimed in Claim 1 for R21 in Formula II, and Z41, Z42, and Z43 are each, independently of one another, –CH2CH2–, –CH=CH–, –COO– or a single bond,

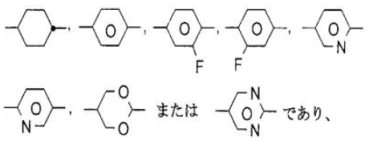
[Chemical 12]



および　　and

are each, independently of one another,

[Chemical 13]



または　　or

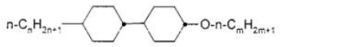
,

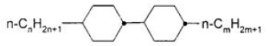
o and p, independently of one another, are 0 or 1." (Pages 28, 29, and 31, Claims 1 and 6)

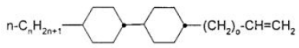
(A2) "[0032] The liquid-crystal medium particularly preferably comprises one or more compounds selected from the group consisting of the compounds of formulae IV1a to IV1d, IV2a to IV2e, IV3a to IV3c, and IV4a.

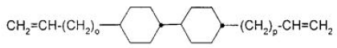
[0033]

[Chemical 41]


IV1a

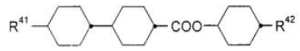

IV1b

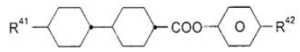

IV1c

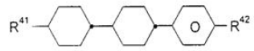

IV1d

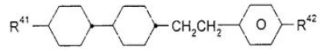
in which n and m are each, independently of one another, from 1 to 5 and o and p are each, both independently thereof and independently of one another, from 0 to 3,
[00334]

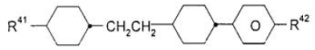
[Chemical 42]

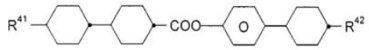

IV2a

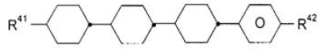

IV2b

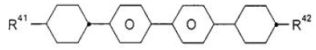

IV2c

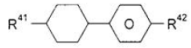

IV2d


IV2e


IV3a


IV3b


IV3c


IV4a

[0035] R41 and R42 are each as defined above under formula IVl, and the phenyl rings may optionally be fluorinated, but not in such a way that the compounds are identical to those of formula II and their subformulae. R41 is preferably an n-alkyl having 1 to 5 carbon atoms, particularly preferably having 1 to 3 carbon atoms, and R42 is preferably an n-alkyl or n-alkoxy having 1 to 5 carbon atoms or an alkenyl having 2 to 5 carbon atoms. Of these, particular preference is given to compounds of formulae IV1a to IV1d." (Pages 9 and 10).

(A3) "[0071] Examples

The examples below are intended to illustrate the invention without representing a limitation. Above and below, percentages are percent by weight. All temperatures are given in degrees Celsius. Δn is the optical anisotropy (589 nm, 20°C), Δε the dielectric anisotropy (1 kHz, 20°C), H.R. is the voltage holding ratio (at 100°C, after 5 minutes in an oven, 1 V), and V 10, V50, and V90 are the threshold voltage, mid-grey voltage, and saturation voltage respectively determined at 20°C.

[0072] Example 1

[Table 3]

化合物／略号	濃度／重量%	物性
CC-5-V	5.0	透明点 (N,I) = 101.5 °C
PCH-304FF	9.0	n_e(20 °C, 589 nm) = 1.5788
PCH-504FF	9.0	Δn (20 °C, 589 nm) = 0.0998
CCP-202FF	9.0	$\varepsilon_\perp$ (20 °C, 1 kHz) = 12.0
CCP-302FF	10.0	Δε (20 °C, 1 kHz) = - 7.7
CCP-502FF	9.0	k_1 (20 °C) = 16.7 pN
CCP-21FF	11.0	k_3/k_1 = 1.11
CCP-31FF	10.0	V_0 (20 °C) = 1.64 V
CCY-3O-O2	10.0	
CCY-V1O-O2	10.0	
YY-3O-O2	8.0	
Σ	100.0	

化合物 Compound
略号 abbreviation
濃度 Concentration
重量 weight
物性 Physical properties
透明点 Cleaning point

The liquid-crystal medium is introduced into a VA display with TFT addressing. This display has good contrast with low viewing-angle dependence.

...

[0075] Example 4

[Table 6]

化合物／略号	濃度／重量%	物性
PCH-304FF	20.0	透明点 (N,I) = 87.0 °C
PCH-504FF	20.0	n_e (20 °C, 589 nm) = 1.5834
CCP-302FF	14.0	Δn (20 °C, 589 nm) = 0.1020
CCP-31FF	6.0	$\varepsilon_\perp$ (20 °C, 1 kHz) = 8.7
CC-3-V1	11.0	Δε (20 °C, 1 kHz) = -4.9
CCP-V-1	3.0	
BCH-32	10.0	
CLY-3-O2	8.0	
CLY-5-O2	8.0	
Σ	100.0	

化合物 Compound
略号 abbreviation
濃度 Concentration
重量 weight
物性 Physical properties
透明点 Cleaning point

As in Example 1, the liquid-crystal medium is introduced into a VA display with TFT addressing. This display has good contrast with low viewing-angle dependence.
...
[0077] Example 5

[Table 8]

化合物／略号	濃度／重量%	物性
CCY-V1O-O2	20.0	透明点 (N,I) = 93.3 °C
PCH-302	8.0	Δn (20 °C, 589 nm) = 0.0783
CCH-301	26.4	Δε (20 °C, 1 kHz) = -3.1
CCN-47	8.8	
CCN-55	8.0	
PCH-301	8.0	
CBC-33	4.0	
CBC-53	4.8	
CBC-33F	4.0	
CBC-53F	4.0	
CBC-55F	4.0	
Σ	100.0	

化合物　Compound
略号　abbreviation
濃度　Concentration
重量　weight
物性　Physical properties
透明点　Cleaning point

As in Example 1, the liquid-crystal medium is introduced into a VA display with TFT addressing. This display has good contrast with low viewing-angle dependence." (Pages 25 to 28)

(3) Invention disclosed in A12

In A12, [Claim 6], which depends from [Claim 1] of the above (A1), recites "a nematic liquid-crystal medium comprising:
a) one or two or more dielectrically negative compound(s) of formula I (omitted),
b) one or two or more dielectrically negative compound(s) of formula II (omitted), one or two or more dielectrically neutral compound(s) of formula IV (omitted), and optionally c), and one or two or more dielectrically negative compound(s) of formula III (omitted)." Among the specific examples of the liquid-crystal medium, Example 4 is described in (A2) above. The liquid-crystal medium of Example 4 is the specific liquid-crystal medium of (A1) and can be a liquid-crystal medium composed of a mixture of dielectrically negative compounds. Furthermore, it is also clear that the dielectrically negative compound is a polar compound. Based on these matters, it can be said that Example 4 of A12 describes
"a liquid-crystalline medium composed of a mixture of dielectrically negative compounds, comprising 20.0 weight% of PCH-3O4FF, 20.0 weight% of PCH-5O4FF, 14.0 weight% of CCP-3O2FF, 6.0 weight% of CCP-31FF, 11.0 weight% of CC-3-V1, 3.0 weight% of CCP-V-1, 10.0 weight% of BCH-32, 8.0 weight% of CLY-3-O2, and 8.0 weight% of CLY-5-O2, wherein clearing point (N,I) = 87.0°C, ne (20°C,589 nm) = 1.5834, Δn (20°C, 589 nm) = 0.1020, ε⊥(20°C, 1 kHz) = 8.7, and Δε (20°C, 1 kHz) = -4.9." (hereinafter, referred to as the "A12 Invention").

(4) Comparison with Invention 2 and examination

A12 Invention is compared to Invention 2

• The "liquid-crystalline medium composed of a mixture of dielectrically negative compounds" of the A12 Invention corresponds to the "liquid-crystalline medium based on a mixture of polar compounds having negative dielectric anisotropy" of Invention 2.

• The " CC-3-V1" of the A12 Invention corresponds to the " CC-n-V1" of Invention 2.

According to the above statement, the A12 Invention is common with Invention 2 in that each of them is "a liquid-crystalline medium based on a mixture of polar compounds having negative dielectric anisotropy, comprising CC-n-V1," but differ in the following features.

<Different Feature 6-1>

Invention 2 contains one or two or more compounds represented by the general formula I (CCP-31), whereas the A12 Invention does not contain the compound (CCP-31) represented by general formula I of Invention 2.

Regarding <Different Feature 6-1>

"CCP-V-1" of the A12 Invention is included in the compounds represented by general formula IV in the liquid crystal composition stated in the above (A1) and is also included in IV2c selected from IV1a to IV1d and IV2a to IV4a stated in the above (A2) among the compounds represented by general formula IV. Then, according to the description in paragraph [0035] of the above (A2), R41 of the compound of formula IV2c is preferably an n-alkyl having 1 to 5 carbon atoms, particularly preferably 1 to 3 carbon atoms, and R42 is preferably an n-alkyl or n-alkoxy having 1 to 5 carbon atoms or an alkenyl having 2 to 5 carbon atoms. Formally, therefore, if R41 is an n-alkyl having 3 carbon atoms and R42 is an alkyl having one carbon atom (hereinafter, such a compound is referred to as "the compound" in this section), "the compound" corresponds to "CCP-31" of Invention 2.

However, "the compound" is one of many possible forms. In addition, as described as "of these, particular preference is given to compounds of formulae IV1 a to IV1d" in paragraph [0035] of the above (A2), among the compounds represented by general formula IV, dicyclic compounds composed of two 1,4-cyclohexylene radicals are recommended rather than IV2a to IV4a. Furthermore, A12 includes no description for recommending that R41 is an n-alkyl having 3 carbon atoms and R42 is an alkyl having one carbon atom in IV2c selected from IV1a to IV1d and IV2a to IV4a.

Moreover, even considering Examples 1 to 3 and 5 of the above (A3), which are examples other than Example 4, "the compound" is not used as a specific compound of the compounds represented by general formula IV.

Then, in A12, at least formally, "CCP-31" is included in the compounds represented by general formula IV. In addition, even if the liquid crystal composition of the A12 Invention contains "CCP-V-1" as a specific compound corresponding to one represented by the general formula IV, it cannot be said that, in place of or in addition to such a compound, A12 "substantially" describes "the compound" as a compound represented by general formula IV sufficiently to enable a person skilled in the art to easily conceive of adding "the compound."

Further, as described on page 70 of the Second Written Refutation, even if a technique of compounding a compound having unsubstituted alkyl or alkenyl group at both ends of phenylbicyclohexane as a backbone is well-known in the art, and for example, even if consideration is given to "(chemical formula, omitted) (III-4)
(wherein, ... R13 ... an alkyl radical having 1 to 10 carbon atoms or an alkenyl group having 2 to 10 carbon atoms, ... R14 ... represents an alkyl radical having 1 to 10 carbon atoms, an alkoxy group, or an alkenyl group having 2 to 10 carbon atoms, ...)" in Claim 1 of A1 cited as an example, it only shows that unsubstituted alkyl or alkenyl group or the like can be groups at both ends of a compound having phenylbicyclohexane as a backbone. In addition, it does not recommend that unsubstituted alkyls are provided as the groups at both ends of the compound, the phenylene radical side is a methyl group, and the cyclohexylene radical side is an n-propyl group. As stated above, the A12 Invention does not allow a person skilled in the art to be motivated to use "the compound." Thus, even if a technique of simply blending a compound having unsubstituted alkyl or alkenyl groups at both ends of phenylbicyclohexane as a backbone is well known in the art, it cannot be said that a person skilled in the art could easily conceive of replacing CCP-V-1 with "the compound" or adding "the compound" to the liquid crystal composition of the A12 Invention.

Hence, Different Feature 6-1 is a substantial different feature and thus even a person skilled in the art could not easily conceive of the configuration of Different Feature 6-1 in the A12 Invention.

(5) Regarding Demandant's allegation in the Second Written Refutation on reason for Invalidation 4-4

Demandant alleges in the Second Written Refutation that Inventions 7 and 8 lack inventive step (Second Written Refutation, pages 69 and 71 to 74) in addition to the allegation in the First Written Refutation that Invention 2 lacks inventive step and novelty because "an invention using the liquid crystal composition of the A12 Invention for a liquid crystal display" and "an invention of a liquid crystal display comprising the liquid crystal composition of the A12 Invention" are described in A12 (First Written Refutation, page 58).

However, the above Demandant's allegation cannot be adopted for the reasons separately described in the decision of approval or disapproval of amendment.

(6) Reason for invalidation 4-4

As stated above, Invention 2 is not the invention disclosed in A12 and could not be easily invented by a person skilled in the art based on the invention disclosed in A12. Thus, Invention 2 does not fall under the provision of Article 29(1)(iii) of the Patent Act or is not an invention that cannot be granted a patent under the provision of Article 29(2) of the Patent Act. Therefore, Invention 2 does not fall under Article 123(1)(ii) of the Act and should not be invalidated.

No. 7 Closing

As stated above, the patent for the inventions according to Claims 1, 2, 7, 8 after the Correction should be invalidated.

On the other hand, the reasons for invalidation alleged and means of proof submitted by Demandant cannot invalidate the Patent for the inventions of Claims 3 and 13. There is no other reason that the Patent should be invalidated

The costs in connection with the trial shall be divided into six, of which two shall be borne by Demandant and the remainder shall be borne by the Plaintiff under the provisions of Article 61 and 64 of the Code of Civil Procedure which is applied mutatis mutandis in the provisions of Article 169(2) of the Patent Act.

Therefore, the trial decision shall be made as described in the conclusion.

May 7, 2018

Chief administrative judge: FUJI, Yoshihiro
Administrative judge: SASAKI, Hidetsugu
Administrative judge: HARA, Kenichi