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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte CHRISTOPHE SERBUTOVIEZ, JOHAN G. KLOOSTERBOER, AND
FREDERICUS J. TOUWSLAGER

Appeal No. 2006-0133
Application No. 09/877,312

ON BRIEF

Before SCHAFER, TIERNEY and MOORE, Administrative Patent Judges.

TIERNEY, Administrative Patent Judge.

Decision on Appeal

This is an appeal under 35 U.S.C. § 134 from the examiner's refusal to allow
claims 5 and 7-9.¹ We reverse the examiner's rejections.

Overview of Claimed Subject Matter and Rejections

Appellants' claim 5 is generally drawn to a polymerizable mixture that can be used in a
polymer-dispersed liquid crystal cell. The mixture comprises reactive monomers and a
photoinitiator. Of note, one of the monomers is (1a) an ethoxylated acrylate that is readily

¹The Brief on Appeal identifies appellant claims 1-4 as withdrawn and claim 6 as objected to as being
dependent upon a rejected base claim. (Brief, p. 2). The Examiner's Answer states that the Brief's statement regarding
the status of claims is correct. (Answer, p. 2).

miscible with a liquid crystalline material and (1b) a second monomer that is poorly miscible with the liquid crystalline material. Appellants' claims 7 and 8 depend from claim 5 and further define the proportions of monomers and liquid crystalline material.

Appellants' claim 9 is generally directed to a display device comprising a polymer-dispersed liquid crystal cell with a matrix of individually drivable rows and columns of electrodes. The cell is made from a mixture having a liquid crystalline material, two types of non-volatile, reactive monomers and a photoinitiator. The first monomer being an ethoxylated acrylate and readily miscible with the liquid crystalline material. The second monomer being poorly miscible with the liquid crystalline material.

The examiner has entered a single rejection against Serbutoviez's claimed subject matter. Specifically, the examiner has made the following rejection:

Claims 5, 7-9 are rejected under 35 U.S.C. §103(a) as unpatentable over Masayuki 01-1993, JP 05019240 (JPO Website Machine English Translation).

(Examiner's Answer, pages 2-3).

Generally, the rejection states that Masayuki describes a liquid crystal cell where the cell is manufactured from a mixture of liquid crystalline material, photoinitiator, an ethoxylated acrylate monomer that is poorly miscible with the liquid crystalline material and an acrylate oligomer that is miscible with the crystalline liquid material. (Examiner's Answer, pages 3-4). As to the use of monomers, the rejection states that "[a]n oligomer is a coupling of several identical monomers and thus qualifies as a homolog of the monomer." (Examiner's Answer, p. 4). For the guidance to employ a readily miscible ethoxylated acrylate with a poorly miscible second monomer, the rejection states that:

[A] mixture of an ethoxylated acrylate monomer, which is instead readily miscible with the liquid crystal, coupled with an acrylate monomer, which is instead poorly miscible with the liquid crystal is the result of routine experimentation by one of ordinary skill in the art at the time the invention was made, within the realm of the invention of Masayuki, because it follows the same principle of miscible/immiscible acrylate mixture which results in good control of the phase separation structure of the polymer dispersed liquid crystal.

(Examiner's Answer, p. 4).

Findings of Fact

1. The real party in interest in Serbutoviez, U.S. Application No. 09/877,312 is U.S. Philips Corporation. (Brief, p. 2).

2. The 09/877,312 application was filed on June 8, 2001.

3. The rejection of claims 5 and 7-9 are presently on appeal. (Brief, p. 2).

4. Claim 5 of Serbutoviez '312 reads as follows:

A polymerizable mixture which can suitably be used in a polymer-dispersed liquid crystal cell, which mixture comprises reactive monomers and a photoinitiator, characterized in that the mixture contains two types of non-volatile reactive monomers, the first type of monomer being an ethoxylated acrylate and readily miscible with a liquid crystalline material and the second type of monomer being poorly miscible with said liquid crystalline material.

5. Claim 7 of Serbutoviez '312 reads as follows:

A polymerizable mixture as claimed in claim 5, characterized in that the quantity of each of the two types of monomers is at least 20 % by weight, calculated with respect to the overall quantity of both types of monomers.

6. Claim 8 of Serbutoviez '312 reads as follows:

A polymerizable mixture as claimed in claim 5, characterized in that a quantity of 70-90% by weight of a liquid crystalline material is added to the mixture.

7. Claim 9 of Serbutoviez '312 reads as follows:

A display device comprising: a polymer-dispersed liquid crystal cell with a matrix of individually drivable rows and columns of electrodes as well as means for driving these electrodes, characterized in that a cell is manufactured from a mixture, which predominantly comprises a liquid crystalline material as well as two types of non-volatile, reactive monomers, the first type of monomer being an ethoxylated acrylate and readily miscible with the liquid crystalline material and the second type of monomer being poorly miscible with said liquid crystalline material and a photoinitiator, wherein the mixture is sandwiched between two substrates, which are provided with an electrode layer, and whereafter the mixture is polymerized under the influence of radiation.

The Prior Art

8. The examiner has rejected the claims on appeal over Masayuki 01-1993, JP 05019240 ("Masayuki").

9. The examiner relies on a computer translation of the Japanese language Masayuki reference.

10. Masayuki is available as prior art against Serbutoviez '312 under 35 U.S.C. §102(b).

11. The Examiner's Answer cites and relies upon four (4) specific numbered paragraphs contained in the computer translation: 13, 15, 16, and 21.

12. The paragraphs cited and relied upon by the examiner are reproduced below:

(0013)

The monomer of ultraviolet-rays hardenability, oligomer, and by irradiating ultraviolet rays, a mixed solution is further enclosed in a cell from a nematic liquid crystal, and the radical polymerization of a monomer and the oligomer is carried out, and the liquid crystal display element by this invention fixes the phase separation of a liquid crystal layer and a macromolecule layer, and is obtained. The size of a liquid crystal layer is controlled by the temperature at the time of a polymerization, and optical irradiation intensity at this time. As a monomer material, the single organic-functions acrylate monomer expressed with a general formula 1 [a nonyl-phenol EO acrylate having 3 to 9 ethylene oxide units] from the interaction in an interface being weak and low-batterization being achieved is desirable after that compatibility with the liquid crystal before hardening is good, and hardening. Moreover, only by the single organic-functions acrylate monomer, since hardenability is bad and control of phase separation structure is difficult, PDLC suitable for the display device is formed by using together the good acrylic ester oligomer of compatibility with liquid crystal. In order to demonstrate both function in addition especially, as for monomer material, it is desirable that it is 20 - 70 % of the weight to a macromolecule matrix. (brackets added)

(0015)

(Example) Drawing 1 is the cross section of the liquid crystal display element by this invention. The inside of drawing and 1 are the macromolecule matrices in which an MIM element and 5 were formed in of the nematic liquid crystal, and 6 was formed [PDLC and 2 / a glass substrate and 3] for a transparent electrode (ITO) and 4 of the radical polymerization. In the state of no voltage impressing, PDLC is in a light-scattering state and changes to a light-transmission state by impressing voltage. (brackets in original)

(0016)

(Example 1) PDLC by this invention was created using the following composition.

- Nonyl-phenol EO denaturation acrylate 12wt% (SN[by Sannopuko, Inc.]- 5 X-1626, n= 4)
- Acrylic acrylic oligomer 12wt% (the Toagosei chemical-industry company make —6200)
- Photopolymerization initiator 1wt% (2, 4-diethyl thioxan ton)
- Nematic liquid crystal 75wt% (MJ90657 by Merck Co.)

the above-mentioned composition – **** -- the temperature up of the mixed solution was carried out to 100 degrees C, and it was made into the compatible state the cell by which ITO electrode formation was carried out in this solution --

thick -- vacuum enclosure was carried out at the 12-micrometer cell (20x20mm of viewing areas) Then, using the black light, by irradiating for 120 seconds by the irradiation intensity of 15 mW/cm², a monomer and oligomer were hardened (radical polymerization), 2 phase separation of macromolecule matrices was considered as liquid crystal, and the PDLC element was created. The given energy is equivalent to 1800 mJ/cm². The obtained element showed the good dispersion state in the state where voltage is not impressed. (brackets in original).

(0021)

(Effect of the Invention) As explained above, the luminosity of projected type display of this invention is improving sharply by use of unnecessary PDLC of a polarizing plate. When it applies to projected type display while driver voltage fell sharply, consequently the drive of PDLC furthermore used for this invention with TFT or an MIM element was attained, it is bright and the clear high image display of a contrast ratio is possible for it.

Opinion

During examination, the Office bears the initial burden of establishing a *prima facie* case of obviousness. *In re Bell*, 991 F.2d 781, 783, 26 USPQ2d 1529, 1530 (Fed. Cir. 1993). Thus, the Office must establish that the one of ordinary skill in the art would have selected the appropriate materials from the prior art and combine them in the manner claimed by Serbutoviez.

Serbutoviez's claim 5 is directed to a polymerizable mixture whereas claim 9 is directed to a display device having a cell manufactured from a polymerizable mixture. The polymerizable mixtures recited in Serbutoviez's claims 5 and 9 are said to contain:

two types of non-volatile reactive monomers, the first type of monomer being an ethoxylated acrylate and readily miscible with a liquid crystalline material and the second type of monomer being poorly miscible with said liquid crystalline material.

(Brief, Claims Appendix, Claims 5 and 9).

According to the rejection, Masayuki teaches a liquid crystal display manufactured from a mixture containing two types of compounds: 1a) an ethoxylated acrylate monomer, specifically identified by the examiner as a nonyl-phenol EO acrylate; and 1b) an acrylate oligomer. (Examiner's Answer, p. 3). Relying upon the Masayuki paragraph 13, the rejection states that the ethoxylated acrylate of Masayuki is poorly miscible with the liquid crystalline material and that the oligomer is readily miscible. (Examiner's Answer, p. 4). The rejection holds that "the ethoxylated acrylate used by Masayuki is a species of the ethoxylated acrylate genus recited by Appellant in independent claims 5, 9." (Examiner's Answer, p. 7).

On the other hand, we observe that the computer translation of Masayuki is difficult to understand. For example, Masayuki paragraph 13 provides the following statement regarding the miscibility of the monomer and oligomer:

As a monomer material, the single organic-functions acrylate monomer expressed with a general formula 1 [a nonyl-phenol EO acrylate having 3 to 9 ethylene oxide units] from the interaction in an interface being weak and low-battery-ization being achieved is desirable after that compatibility with the liquid crystal before hardening is good, and hardening. Moreover, only by the single organic-functions acrylate monomer, since hardenability is bad and control of phase separation structure is difficult, PDLC suitable for the display device is formed by using together the good acrylic ester oligomer of compatibility with liquid crystal.

(Masayuki, paragraph 13, brackets added). For purposes of our review, we will assume that the examiner's statement regarding the miscibility of the monomer and the immiscibility of the oligomer in Masayuki is correct.

A comparison between the mixture of Serbutoviez's claims 5 and 9 the mixture of Masayuki is provided below with the differences highlighted in bold:

SERBUTOVIEZ'S CLAIM 5 AND 9	MASAYUKI
Ethoxylated Acrylate Monomer - Miscible in a Liquid Crystalline Material	Ethoxylated Acrylate Monomer - Immiscible in a Liquid Crystalline Material
Monomer - Immiscible in a Liquid Crystalline Material	Oligomer - Miscible in a Liquid Crystalline Material

The rejection recognizes that Masayuki fails to teach a mixture of a miscible ethoxylated acrylate monomer with an immiscible monomer. The rejection states that one skilled in the art would have been motivated to arrive at the claimed subject matter as:

Masayuki teaches that the advantage of the mixture of acrylates; one readily miscible (of good compatibility) and one poorly miscible (weak interaction) with the liquid crystal is that it allows for good control of phase separation structure of the polymer dispersed liquid crystal (PDLC)(section [0013]). Therefore a mixture of an ethoxylated acrylate monomer, which is instead readily miscible with the liquid crystal, coupled with an acrylate monomer, which is instead poorly miscible with the liquid crystal, is the result of routine experimentation by one of ordinary skill in the art at the time the invention was made, within the realm of invention of Masayuki, because it follows the same principle of a miscible/immiscible acrylate mixture which results in good control of the phase separation structure of the polymer dispersed liquid crystal.

(Examiner's Answer, p. 4, bracketed citation in original). The rejection further states that the selection of Serbutoviez's claimed liquid crystalline material is obvious as:

Appellant is respectfully apprised that when the ethoxylated acrylate monomer/other monomer mixture, wherein the ethoxylated acrylate monomer is immiscible with the other monomer, remains the same, then changing the liquid crystal in order to obtain an improvement in other optical properties, is within the scope of routine experimentation. The liquid crystal may not have the same miscibility properties as the liquid crystal in the example of Masayuki (MJ90657 by Merck) but can be made to have the same miscibility properties of the ethoxylated acrylate of Masayuki, in order to take advantage of the principle of using a miscible monomer/immiscible monomer mixture wherein the ratio of

miscible monomer/immiscible monomer can be varied in order to provide the desired phase separation of the liquid crystal upon polymerization of the monomers to form the matrix.

(Examiner's Answer, p. 9).

As apparent from the above, the rejection views Masayuki and routine experimentation as providing one of ordinary skill in the art with the ability to obtain a polymerizable material having a liquid crystalline material, (1a) a non-volatile, reactive monomeric ethoxylated acrylate that is miscible with the liquid crystalline material and (1b) a non-volatile, reactive monomer that is poorly miscible with the liquid crystalline material.

Regarding obviousness, the Federal Circuit has stated that:

[S]ection 103 requires assessment of the invention as a whole. This "as a whole" assessment of the invention requires a showing that an artisan of ordinary skill in the art at the time of invention, confronted by the same problems as the inventor and with no knowledge of the claimed invention, would have selected the various elements from the prior art and combined them in the claimed manner. In other words, section 103 requires some suggestion or motivation, before the invention itself, to make the new combination. (citations omitted).

Princeton Biochemicals, Inc. v. Beckman Coulter Inc., 411 F.3d 1332, 1337, 75 USPQ2d 1051, 1054 (Fed. Cir. 2005). The Federal Circuit also stated that unless the invention is analyzed as a whole,

[A]n obviousness assessment might successfully break an invention into its component parts, then find a prior art reference corresponding to each component. This line of reasoning would import hindsight into the obviousness determination by using the invention as a roadmap to find its prior art components. Further, this improper method would discount the value of combining various existing features or principles in a new way to achieve a new result - often the essence of invention. (citations omitted).

Id.

The prior art reference Masayuki does not provide the motivation to arrive at the claimed subject matter. According to the rejection, Masayuki teaches using an ethoxylated acrylate monomer that is poorly miscible with a chosen liquid crystalline material and because of this has a phase separation problem that is controlled by the addition of a miscible oligomer mixture. However, we observe that Masayuki does not mention, let alone suggest, selecting a liquid crystalline material and an ethoxylated acrylate monomer that is miscible with the selected liquid crystalline material.

We are not persuaded that a potential phase separation problem between a monomer and a liquid crystalline material leads one of ordinary skill in the art to select a liquid crystalline material and an ethoxylated acrylate monomer that is miscible with the selected crystalline material. Even if we accept the fact that routine experimentation would allow a person of ordinary skill in the art to obtain such a mixture, this does not explain why one of ordinary skill in the art would desire such a mixture or be guided toward such a mixture. Specifically, while routine experimentation on a known set of components may be obvious, we do not see where Masayuki or the prior art in general directs one of ordinary skill in the art to select appellants' particular materials, i.e., a liquid crystalline material and an ethoxylated acrylate monomer that are miscible with each other.

The Office has the burden of establishing a *prima facie* case of obviousness. Based upon the record presented, we are unable to conclude that one of ordinary skill in the art would have been motivated to select the appropriate liquid crystalline material and (1a) an ethoxylated

acrylate monomer that is miscible with the crystalline material and (1b) a second monomer that is poorly miscible with the crystalline material. Accordingly, the rejection is reversed.

REVERSED

/ss/ Richard E. Schafer)
RICHARD E. SCHAFER)
Administrative Patent Judge)

/ss/ Michael P. Tierney)
MICHAEL P. TIERNEY)
Administrative Patent Judge)

/ss/ James T. Moore)
JAMES T. MOORE)
Administrative Patent Judge)

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cc: Philips Intellectual Property & Standards
P.O. Box 3001
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