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**Datasheet for the decision  
of 6 July 2017**

**Case Number:** T 1149/14 - 3.4.02

**Application Number:** 07115145.0

**Publication Number:** 1903357

**IPC:** G02B5/04

**Language of the proceedings:** EN

**Title of invention:**

Optical film

**Applicant:**

Eternal Materials Co., Ltd

**Headword:**

**Relevant legal provisions:**

EPC 1973 Art. 54, 56

**Keyword:**

Novelty - main request, second and fourth auxiliary requests  
(no)

Inventive step - first, third and fifth auxiliary requests (no)

**Decisions cited:**

**Catchword:**



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European Patent Office  
D-80298 MUNICH  
GERMANY  
Tel. +49 (0) 89 2399-0  
Fax +49 (0) 89 2399-4465

Case Number: T 1149/14 - 3.4.02

**D E C I S I O N**  
**of Technical Board of Appeal 3.4.02**  
**of 6 July 2017**

**Appellant:** Eternal Materials Co., Ltd  
(Applicant) No. 578, Chien Kung Rd.  
Kaohsiung  
Taiwan (TW)

**Representative:** Reitstötter Kinzebach  
Patentanwälte  
Sternwartstrasse 4  
81679 München (DE)

**Decision under appeal:** Decision of the Examining Division of the  
European Patent Office posted on 4 December 2013  
refusing European patent application No.  
07115145.0 pursuant to Article 97(2) EPC.

**Composition of the Board:**

**Chairman** R. Bekkering  
**Members:** A. Hornung  
T. Karamanli

## Summary of Facts and Submissions

- I. The applicant (appellant) appealed against the decision of the examining division refusing European patent application No. 07115145.0 on the basis of Article 97(2) EPC because the requirements of Article 54(1) and (2) EPC (main request and first auxiliary request then on file) and Article 56 EPC (second auxiliary request then on file) were not fulfilled.
- II. The appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of the claims according to the main request filed with the statement setting out the grounds of appeal, or as an auxiliary measure, according to one of the first to fifth auxiliary requests, filed as auxiliary requests I, IIa, IIb, IIIa and IIIb with the statement setting out the grounds of appeal.
- III. Oral proceedings were held on 6 July 2017.
- IV. The present decision refers to the following document:  
  
D4: US2003/0214728 A.
- V. Claims of the requests
- (a) Independent claim 1 according to the main request reads as follows:
- "An optical film, comprising:
- a substrate (12, 14, 16, 18), and
- a structured surface layer, positioned on one side of the substrate,

wherein the structured surface layer comprises a plurality of non-parallel, adjacent columnar structures, wherein the plurality of non-parallel, adjacent columnar structures comprise a set of two non-parallel, crossed columnar structures (7, 8, 9)."

(b) Independent claim 1 according to the first auxiliary request differs from claim 1 of the main request in that it comprises the following additional feature:

"... wherein the columnar structures comprise a combination of prism columns (19) and arc columns (20)."

(c) Independent claim 1 according to the second auxiliary request differs from claim 1 of the main request in that it comprises the following additional feature:

"... and wherein the structured surface layer comprises a set of two non-parallel, uncrossed columnar structures (10)."

(d) Independent claim 1 according to the third auxiliary request differs from claim 1 of the main request in that it comprises the two features which are recited above in points (b) and (c) that have been added to claim 1 of the first and the second auxiliary request, respectively.

(e) Independent claim 1 according to the fourth auxiliary request differs from claim 1 of the second auxiliary request in that it comprises the following additional feature:

"... and further comprises a set of two columnar structures (11) parallel to each other."

(f) Independent claim 1 according to the fifth auxiliary request differs from claim 1 of the main request in that it comprises the three features which are recited above in points (b), (c) and (e) that have been added to claim 1 of the first, second and fourth auxiliary request, respectively.

## **Reasons for the Decision**

1. Main request

1.1 The subject-matter of claim 1 is anticipated by the disclosure of D4 (Article 54(1) and (2) EPC 1973).

D4 discloses, with reference to figures 18 and 26, an optical film comprising:

a substrate (*see e.g. claim 16 of D4*),

a structured surface layer positioned on the substrate (*see e.g. claim 16 of D4 specifying a first surface structure of the substrate; see e.g. figure 26 of D4 showing a top view of a structured surface layer*),

wherein the structured surface layer comprises a plurality of non-parallel, crossed, adjacent columnar structures (*see the non-parallel, crossed, adjacent columnar structures shown in the embodiment of figure 26, corresponding to the regular and straight prism array of figure 18, [0065], which has been modulated as explained in [0070]; full cycle randomization, e.g. larger than 100% of the initial prism pitch, and superimposition of a series of waveforms "results in bifurcating (or splitting) and merging structures or*

*elements" (see [0070]); a three-dimensional surface is generated that "contains superimposed waveforms that cross over each other" (see [0075])).*

In the absence of any characterizing feature of the "columnar structure" in claim 1, the scope of the expression "columnar structure" is so broad that the "bifurcating and merging structures" and the "superimposed waveforms crossing over each other" of figure 26 of D4 fall under the scope of the "non-parallel, crossed columnar structures" of claim 1. Indeed, the expression "columnar structure" has no other limiting effect on the claimed subject-matter than to define any kind of item structuring the structured surface layer of the claimed optical film.

It follows that that the modulated prism array of D4 (figure 26) anticipates the optical film of claim 1.

1.2 The appellant argued that the skilled person would understand that the expression "columnar structures" of claim 1 meant "structural elements having a prism or arc profile extending in the plane of the optical film". The skilled person would also understand that the length of the "columnar structures" of claim 1 was adapted to avoid Moiré interferences and was compatible with efficient illumination of a pixel in a LCD array. Claim 1 had to be interpreted as defining "columnar structures extending over the whole length of the optical film".

The appellant further referred to paragraph [0004] of D4, disclosing that the optical film of D4 was defined by a first surface structure function modulated by a second, random or pseudo-random function. The pseudo-random function modulated any combination of the frequency, height, peak angle or phase of the first surface structure function so that a complete disintegration of the original structure

occurred. Such disintegration was not compatible with the columnar structures of the invention, extending over the whole length of the optical film. The appellant further referred to figures 14 to 16 of D4 showing structured items with interruptions in between. This was contrary to the "columnar structures" of claim 1 because in claim 1 the original structure was maintained. It was only with hindsight that sub-arrays with crossed columnar structures were identified in figure 26 of D4.

- 1.3 The board is not convinced by these arguments. From the wording of the expression "columnar structure" only some undefined structural item can be inferred. From the wording of claim 1, no reference to Moiré interference or to pixels of an LCD array can be inferred either. Figure 26 of D4 does not show disintegrated but continuous surface structures. Claim 1 is silent about any length aspect of the "columnar structure". Therefore, the expression "columnar structure" must be given the broad meaning as explained above in point 1.1.

Figures 14 to 16 explain one of the methods by which the substrate of D4 is randomized. In the present case, however, the exact method used to randomize the substrate is not relevant because claim 1 does not define a method for manufacturing an optical film but the optical film itself. Since claim 1 does not specify the length of the "columnar structures", any argument in favour of novelty based thereon is baseless anyway. For the discussion of novelty, the board refers to figures 18 and 26 of D4. The optical film of figure 26 is based on the optical film of figure 18 which has been modified via a "full cycle randomization along with superimposed phase modulated prism wave forms" (see [0070] of D4). Since the optical film of figure 26 of D4 comprises non-parallel, crossed sections, it anticipates the claimed optical film.



2. First auxiliary request

2.1 The subject-matter of claim 1 lacks an inventive step in view of the disclosure of D4 (Article 56 EPC 1973).

With respect to claim 1 of the main request, present claim 1 comprises the additional feature "wherein the columnar structures comprise a combination of prism columns and arc columns."

Similarly to the expression "columnar structures" (see point 1.1 above), the word "columns" in the expressions "prism columns" and "arc columns" does not have a sufficiently precise meaning for implying any concrete limitation of the claimed subject-matter going beyond that of the word "item" or "element". Nevertheless, neither the embodiment of figure 26 of D4, nor any other embodiment of D4 shows a combination of prism columns and arc columns.

Therefore, the optical film of claim 1 is novel over the disclosure of D4. It differs from the optical film of figure 26 of D4 in that it comprises a combination of prism columns and arc columns.

In agreement with the original disclosure of the patent application in paragraph [00020], the technical effect of the distinguishing feature consists essentially in the combined effect of diffusing light (due to the arc columns) while maintaining brightness enhancement (due to the prism columns) and the objective technical problem solved by the distinguishing feature is to reduce Moiré interference while maintaining a satisfactory brightness enhancing property.

D4 is concerned with the same technical problem of reducing the Moiré effect due to the brightness enhancement

substrates in the backlight illumination of liquid crystal displays. See, for instance, paragraphs [0004], [0058] to [00060], of D4.

In D4, the problem is solved by modulating a regular prism structure with a pseudo-random function which "modulates any combination of the frequency, height, peak angle or phase" of the prism structure (see e.g. paragraph [0004] of D4). Depending on the exact type of the modulating function, the resulting columnar structure will comprise columnar structures of various shapes, such as prismatic, arc, crossed, uncrossed, parallel, non-parallel or a mixture thereof. For instance, the embodiment shown in figures 3 and 4 of D4 comprises a combination of prism columns and arc columns. However, the specific shape of the columnar structures plays no role for solving the problem of reducing the Moiré interference as long as the two following conditions are fulfilled: (i) the regularity of the conventional prismatic columnar structures is avoided and light is sufficiently diffused in all directions and (ii) an efficient backlight illumination due to the original regular prism structure is maintained despite the diffusing effect generated by the modulation of the prismatic structures. Therefore, in view of the disclosure in D4 of various irregular, pseudo-random shapes of columnar structures, all solving the above objective technical problem, specific prism or arc shapes of columnar structures, such as defined in present claim 1, are considered to be obvious possibilities for the shapes of columnar structures on which no inventive step can be based.

It follows that the optical film of claim 1 lacks an inventive step in view of the embodiments of figures 4 and 26 of D4.

2.2 The patentee argued that "columns" in the sense of claim 1 mean columns extending across the whole optical film as shown, for instance, in figures 9 and 11 of the patent application. This was different from the optical film shown in figure 4 of D4. In figure 4 of D4, the structures with more or less rounded tips had varying widths, which was not compatible with "columns" which had a constant "width" as shown, for instance, in figures 4, 9 or 11 of the patent application. Moreover, figure 4 showed only a small portion of the optical film of D4, which meant that the structures of figure 4 of D4 were not extending over the whole optical film.

The general teaching of D4 was about randomization of a prismatic structure and the figures of D4 corresponded merely to an accidental disclosure of the features of claim 1. There was no explicit teaching in D4 to have a combination of prism and arc structures or a combination of crossed, non-parallel structures, contrary to the specific teaching defined in claim 1.

2.3 Contrary to the appellant's view, present claim 1 does neither require that the columns extend over a certain minimum length across the optical film, nor that the width of the columns remains constant over the whole length of the columns. Therefore, the board is of the opinion that figure 4 of D4 shows surface structures having rounded tips which fall under the broad wording of "arc columns" of claim 1.

The board agrees that the specific surface structure shown in figure 4 of D4 is the result of a randomization process and that D4 does not explicitly teach a specific combination of prism columns and arc columns. However, the board is of the view that no such explicit teaching is necessary in D4 since the claimed combination of shapes is merely an obvious possibility among other combinations of shapes which result

from the randomization process of D4, all combinations of shapes being equally obvious and solving the above objective technical problem.

3. Second auxiliary request

The subject-matter of claim 1 is anticipated by the disclosure of D4 (Article 54(1) and (2) EPC 1973).

The embodiment of figure 26 of D4 discloses, in addition, to non-parallel, crossed columnar structures, also non-parallel, uncrossed columnar structures. The remaining features of claim 1 of the second auxiliary request are anticipated for the same reasons as those related to claim 1 of the main request.

According to the appellant, it had nothing to add with respect to its arguments provided in favour of novelty of claim 1 of the main request.

4. Third auxiliary request

The subject-matter of claim 1 lacks an inventive step in view of the disclosure of D4 (Article 56 EPC 1973) for reasons corresponding to those related to claim 1 of the main request, claim 1 of the first auxiliary request and claim 1 of the second auxiliary request.

Indeed, claim 1 of the third auxiliary request consists of the features of claim 1 of the three higher ranking requests.

According to the appellant, it had nothing to add with respect to its arguments already presented for the higher ranking requests.

5. Fourth auxiliary request

The subject-matter of claim 1 is anticipated by the disclosure of D4 (Article 54(1) and (2) EPC 1973).

5.1 The embodiment of figure 26 of D4 discloses at least two columnar structures having parallel portions with respect to each other. Further evidence for the existence of parallel portions in the embodiment of figure 26 of D4 is provided by the Moiré map of figure 28 showing that some amount of parallelism originating from the regular reference prism array of figure 18 is still present despite the randomization process. These local portions of the columnar structures of figure 26, parallel to each other, fall under the wording of claim 1. The remaining features of claim 1 of the fourth auxiliary request are anticipated for the same reasons as those related to claim 1 of the main request and of claim 1 of the second auxiliary request.

5.2 The appellant argued that due to the randomization process, it was not possible to maintain parallel columnar structures. It doubted that parallel columnar structures extending over the whole length of the optical film could be deduced from figure 28 of D4.

5.3 The board is not convinced by these arguments. Depending on the strength and type of randomization of the initial, regular and parallel prism array of figure 18, the resulting surface structure after randomization comprises portions of prism structures which are more or less parallel to each other, as shown in figure 26 of D4. Since claim 1 does not specify any length of the parallel columnar structures, the appellant's argument that figure 28 does not demonstrate the existence of parallel columnar structures extending over the whole length of the optical film is irrelevant.

6. Fifth auxiliary request

6.1 The subject-matter of claim 1 lacks an inventive step in view of the disclosure of D4 (Article 56 EPC 1973) for reasons corresponding to those related to claim 1 of the main request, claim 1 of the first auxiliary request, claim 1 of the second auxiliary request and claim 1 of the fourth auxiliary request.

Indeed, claim 1 of the fifth auxiliary request consists of the features of claim 1 of the four higher ranking requests mentioned above.

6.2 The appellant argued as follows: if admittedly the randomization of the parallel prism array of figure 18 provided columnar structures having some portions being parallel with respect to each other, the additional randomization carried out to provide arc columns of figure 4 would necessarily destroy this initial parallelism.

6.3 The board cannot see why the presence of parallel surface structures would exclude the presence of arc columns. The appellant did also not provide any technical explanation of its point of view. As already explained in point 2.1 above, D4 teaches to modulate a parallel prism array by a pseudo-random function which modulates any combination of the frequency, height, peak angle or phase of the parallel prism array. The resulting surface structure merely needs to fulfil the double objective to retain the light turning characteristics for brightness enhancement and to diffuse light for reducing Moiré artefacts (see [0004] of D4). Depending on whether the frequency, height, peak angle and/or phase of the parallel prism array is modulated and on the amount of modulation, any combination of shapes of the surface structure (for instance arc columns and prism columns) can be obtained.

**Order**

**For these reasons it is decided that:**

The appeal is dismissed.

The Registrar:

The Chairman:



M. Kiehl

R. Bekkering

Decision electronically authenticated