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Datasheet for the decision of 11 January 2008

Case Number: T 1528/05 - 3.4.02

Application Number: 99972444.6

Publication Number: 1232405

IPC: G02B 5/08

Language of the proceedings: EN

Title of invention:
Multilayer optical bodies

Applicant:
3M Innovative Properties Company

Opponent:
-

Headword:
-

Relevant legal provisions:
EPC Art. 84, 56

Relevant legal provisions (EPC 1973):
-

Keyword:
"Support in description (yes)"
"Inventive step (yes - amended claims)"

Decisions cited:
-

Catchword:
-

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 1528/05 - 3.4.02

D E C I S I O N
of the Technical Board of Appeal 3.4.02
of 11 January 2008

Appellant: 3M Innovative Properties Company
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Decision under appeal: **Decision of the Examining Division of the European Patent Office posted 13 July 2005 refusing European application No. 99972444.6 pursuant to Article 97(1) EPC.**

Composition of the Board:

Chairman: A. G. Klein
Members: F. J. Narganes-Quijano
M. Vogel

Summary of Facts and Submissions

I. The appellant (applicant) lodged an appeal against the decision of the examining division to refuse European patent application No. 99972444.6, filed as International application No. PCT/US99/31139 and published under the International publication No. WO 01/38907.

In the decision under appeal the examining division referred to documents

D1: US-A-5882774
D2: WO-A-9936813
D3: US-A-5278694
D4: WO-A-9936257

and held that the subject-matter of claim 1 then on file did not involve an inventive step (Articles 52(1) and 56 EPC). The examining division also noted that the subject-matter of claim 1 then on file was not supported by the description (Article 84 EPC, second sentence).

II. With the statement setting out the grounds of appeal the appellant submitted sets of claims amended according to a main and a series of auxiliary requests and requested that the decision under appeal be set aside and that a patent be granted on the basis of one of the sets of amended claims.

III. In response to a telephone consultation with the rapporteur, the appellant submitted with its letter dated 2 July 2007 an amended set of claims 1 to 8 and

amended pages 1 to 41 of the description replacing the corresponding application documents on file as its sole request and subsequently, in response to a further telephone consultation with the rapporteur, the appellant submitted with its letter dated 13 November 2007 amended pages 7, 9 to 11, 21, 23 and 24 of the description replacing the corresponding pages previously filed.

Claim 1 amended according to the present request of the appellant reads as follows:

"An optical body (10), comprising:

a plurality of first optical layers (12), each first optical layer being oriented and comprising a polyester having terephthalate comonomer units and ethylene glycol comonomer units; and

a plurality of second optical layers (14) disposed in a repeating sequence with the plurality of first optical layers (12), each second optical layer (14) comprising a copolymer of polymethyl methacrylate that contains comonomer units that depress a glass transition temperature of the copolymer below a glass transition temperature of polymethyl methacrylate, wherein the glass transition temperature of the second optical layers (14) is less than the glass transition temperature of the first optical layers (12); and

the optical body (10) being configured and arranged to reflect at least a portion of light over at least one wavelength region."

Dependent claims 2 to 8 all refer back to claim 1.

IV. The arguments submitted by the appellant in support of its requests can be summarised as follows:

The examining division ignored the objective technical problem underlying the application and followed an approach based on hindsight. The inventors started with the known system PEN/PMMA and their goal was to replace PEN with a less expensive and more UV-stable polymer; however, the polymer of their choice, PET, cannot easily be suitably oriented with PMMA due to the difference in glass transition temperature of the materials. This problem is solved by the claimed features. None of the documents offer any information which would suggest the claimed solution.

The examining division's approach starting with document D3 and considering the use of PMMA together with a comonomer and to only select PET as the polymer of choice for the first layers from the list in columns 11 and 12 does not do justice to a reasonable problem-solution approach because parts of the solution are assumed as given and the prior art is interpreted in a way which would never have been possible for the skilled person at the priority date. In particular, PET is merely listed in document D3 as one of several possibilities and the document does not teach or suggest the use of oriented first PET layers in combination with second layers as claimed. On the contrary, document D3 teaches second layers of PMMA/PVDF in combination with first layers including a polymer having a negative stress optical coefficient (column 7, lines 21 to 32), thus teaching away from the use of PET-based materials in the first layers. In addition, without the teaching of the present

application, the skilled person would not know from document D3 how to select the proportion of PMMA and PVDF so as to arrive at the claimed invention. Document D3 does not provide any teaching regarding the glass transition temperature of the first and second layers.

Document D1 discloses the use of PET second layers with PEN or co-PEN first optical layers; in contrast to the invention, in document D1 PET is not supposed to replace PEN, but both are used for the first and the second layers. The teaching of document D1 relating to the glass transition temperature relates to layers of PEN and it does not provide any information relating to PET layers.

Document D2 refers to conditions on the glass transition temperature of the layers in the context of coextrusion, and not in the context of orientation as it is the case in the present invention.

Thus, none of the documents describes or even suggests the inventive concept of the invention, namely to modify PMMA by copolymerization such that the glass transition temperature of the corresponding layers is below that of the polyester polymer layers. This way, the polyester polymer layers can be oriented with the PMMA copolymer layers and the resulting body exhibits the advantageous properties described in the application.

Reasons for the Decision

1. The appeal is admissible.

2. *Amendments*

The subject-matter of claim 1 according to the present request of the appellant is based on claims 1 and 12 together with the passage on page 16, lines 18 and 19 of the application as published. The feature of claim 1 as published according to which the polyester of the first optical layers has a glass transition temperature less than or equal to about 90°C has been omitted in the amended claim 1; this omission is derivable from the disclosure of the application as published which, first, allows for first layers having a glass transition temperature of at least 100° or 120°C (page 14, lines 13 to 15) and, second, makes clear that the relevant technical requirement is not the specific value of the glass transition temperature of the first layer itself, but the lower value of the glass transition temperature of the second optical layers with regard to that of the first optical layers as required by the amended claimed subject-matter (page 14, line 5 to page 15, line 4, page 16, lines 15 to 24, page 18, lines 16 to 29, page 20, lines 19 to 29, page 21, line 1 *et seq*., and page 24, lines 20 to 22).

Amended dependent claims 2 to 8 are respectively based on page 21, lines 1 to 5, page 27, lines 25 and 26 and page 28, lines 8 and 9, claims 4, 6, 7 and 9, and page 26, lines 26 to 28 of the application as published.

The description has been amended in several respects, and in particular it has been brought into conformity with the invention as now claimed (Article 84, second sentence and Rule 27(1)(c) EPC).

The Board is therefore satisfied that the application documents amended according to the present request of the appellant satisfy the formal requirements of the EPC and in particular those set forth in Article 123(2) EPC.

3. *Support in the description*

In its decision the examining division noted that the definition of the first optical layers in claim 1 then on file covered a large variety of materials and expressed the view that the subject-matter of claim 1 then on file was not supported by the description (Article 84 EPC) as its scope was broader than justified by the description.

In the Board's view, however, claim 1 as presently amended defines not only the features of the first layers but also technical requirements to be satisfied by the first and the second layers; in addition, these requirements reflect the essential features of the invention disclosed in the description of the application. Thus, the mere fact that the definition of the first layers would cover a large variety of materials does not justify *per se* an objection of lack of support by the description within the meaning of Article 84 EPC as the claimed subject-matter is not directed to the first layers, but to an optical body comprising first and second layers satisfying the

specific technical features mentioned above. Furthermore, the description as presently amended has been brought into conformity with the subject-matter defined in amended claim 1 and, in addition, contains a detailed disclosure and several examples of the claimed optical body. In these circumstances, the Board is satisfied that the claimed invention is supported by the description within the meaning of Article 84 EPC, second sentence.

4. *Inventive step*

4.1 In the decision under appeal the examining division held that the subject-matter of claim 1 then on file did not involve an inventive step in view of the disclosure of the closest state of the art represented by document D3 and the teaching of documents D1, D2 and D4 (Articles 52(1) and 56 EPC).

4.2 Document D3 discloses a multilayered reflective body comprising alternating first and second polymeric layers (abstract and column 2, line 66 to column 3, line 9), the layers being oriented after subjecting the body to stretching (column 6, line 64 to column 7, line 35 and column 14, lines 6 to 24). The document discloses numerous alternative materials for each of the first and the second layers and also numerous specific combinations of materials for the first and the second layers (column 3, line 48 to column 5, line 13 together with column 11, line 15 to column 12, line 13 and the examples).

According to some preferred embodiments, the second layers are of a copolymer of polymethyl methacrylate

(PMMA) (column 4, lines 1 to 22 and lines 52 to 65, column 6, lines 23 to 28 and lines 57 to 63, column 11, lines 28 and 29) and, according to some specific embodiments (column 4, lines 1 to 4 and 54 to 65, column 6, lines 23 to 28 and 57 to 63), the copolymer includes comonomers of polyvinylidene fluoride (PVDF). According to the present application as published (page 18, lines 27 to 29), blending PVDF with PMMA depresses the glass transition temperature of PMMA. It would therefore appear that the copolymer of PMMA and PVDF disclosed in document D3 would be such that the PVDF units depress, at least to some extent, the glass transition temperature of the PMMA comonomer units. However, contrary to the finding of the examining division in the decision under appeal, there is no evidence that the relative amount of PVDF units would be sufficient to depress the glass transition temperature of the PMMA comonomer units to an extent sufficient to conclude that the glass transition temperature of the layers would be less than that of the first layers.

As regards the first layers, the document lists numerous different alternative materials (column 11, line 15 to column 12, line 13) to be selected according to specific conditions (column 11, lines 1 to 9 and 15 to 18, and column 12, lines 14 to 51), the list including polyethylene terephthalate (PET) and polyethylene terephthalate glycol (column 12, lines 8 and 9). However, as submitted by the appellant, none of the specific alternative embodiments and examples disclosed in the document and including second layers of a copolymer of PMMA comprises first layers of a polyester having terephthalate and ethylene glycol

comonomer units. In addition, there is no express or implied indication in the disclosure of the document towards such a specific combination of materials for the first and the second layers.

Furthermore, the document specifies that the polymers should be compatible in extrusion processing temperatures (column 12, lines 22 to 24), but is silent as to the glass transition temperatures or any specific relationship between the glass transition temperatures of the first and second layers. Thus, although it cannot be excluded that in some of the numerous specific embodiments and examples disclosed in document D3 the glass transition temperature of the second layers is inherently lower than that of the first layers, as already noted above there is no evidence that that would be the case in the embodiments involving second layers of a copolymer of PMMA and PVDF.

In view of the above, the claimed optical body differs from the optical bodies disclosed in document D3 and referred to above in that

– the first layers comprise a polyester having terephthalate and ethylene glycol comonomers units, and

– the comonomer units of PVDF depress the glass transition temperature of the copolymer of PMMA to an extent such that the glass transition temperature of the second optical layers is less than that of the first optical layers.

4.3 According to the disclosure of the invention, the claimed subject-matter and in particular the distinguishing features identified in point 4.2 above alleviate the problems of strain hardening and reduction of refractive index change associated with the process of orientation of alternate layers of PMMA and of the relatively cheap PET (page 2, lines 1 to 6, page 16, lines 19 to 26 and page 20, lines 19 to 24 together with page 13, lines 3 to 5), thus leading to a less strict control of the processing conditions in the formation of the optical body while still achieving the desired performance (page 5, lines 3 to 6 and page 19, lines 15 to 21).

There is, however, no evidence or technical argument that would allow the conclusion that the optical bodies disclosed in document D3 and referred to above would not achieve the technical effects mentioned above at least to the extent achieved by all variants encompassed by the claimed subject-matter. In these circumstances, the objective problem solved by the claimed invention over the disclosure of document D3 can be seen in the provision of alternative relatively cheap optical bodies having good processing conditions and optical performance.

4.4 Document D1 discloses reflective oriented optical bodies comprising alternating first and second layers, the first layers being of naphthalene dicarboxilic acid polyester such as polyethylene naphthalate (PEN) or a copolymer of ethylene glycol, naphthalene dicarboxilic acid and terephthalate (co-PEN) and the second layers being of PET or co-PEN (column 1, lines 34 to 52). The document also discloses various alternative materials

for the layers (column 16, line 58 to column 17, line 42), including PMMA (column 16, lines 64 to 67), as well as alternative combinations of materials for the first and the second layers (column 17, lines 43 to 57 and the examples). In addition, the document teaches that, in order to avoid adverse effects associated to the stretching process of the body, the glass transition temperature of the second layers is lower than that of the PEN layers (paragraph bridging columns 3 and 4).

Thus, although document D1 teaches a specific relationship between the glass transition temperatures of the layers that would prompt the skilled person to apply the corresponding teaching to the optical body disclosed in document D3 and the document also teaches the use, among other materials, of PMMA and of a polyester having terephthalate and ethylene glycol comonomer units, the document gives no hint towards the combined use of these two specific materials for the first and the second layers, respectively, let alone towards the modification of the glass transition temperature of PMMA as claimed.

Document D2 discloses multilayer bodies of alternate first and second layers, the first layers comprising, among other possibilities, PET or co-PEN (page 41, lines 6 to 20) and the second layers comprising, among a variety of possibilities, PMMA (page 15, lines 15 to 19), the document requiring that the glass transition temperature of the second layers is less than that of the first layers (page 20, lines 10 to 17). However, the document is silent as to the specific combined use of PET and PMMA for the first and the second layers and

also silent as to the modification of the glass transition temperature of PMMA as specified in claim 1.

Document D4 also discloses multilayer reflective bodies of alternate first and second layers (abstract), the bodies being biaxially oriented according to some of the embodiments (page 15, lines 16 and 17). Among the numerous alternative materials for the layers, the document refers specifically to first and second layers of PET and PMMA, respectively (page 14, lines 8 and 9). The document also refers to the use of vinyl copolymers of acrylates and methacrylates (page 11, lines 13 to 15) and contains comments on the glass transition temperature of the materials (page 11, lines 3 to 7, and page 25, lines 1 to 5 and 32 to 34). However, the document fails to specifically address any relationship between the glass transition temperature of the first and the second layers, still less suggests the possibility of including comonomer units in the PMMA to depress the glass transition temperature in such a way that the resulting layers exhibit a glass transition temperature lower than that of the PET layers.

Thus, none of the documents considered by the examining division in the decision under appeal suggests solving the problem formulated in point 4.3 above in terms of the distinguishing features of the claimed optical body identified in point 4.2 above.

The remaining documents on file are less relevant.

4.5 Accordingly, the claimed subject-matter involves an inventive step over the disclosure of document D3 as closest prior art. The Board is also satisfied that no

other conclusion would be drawn when starting from document D1, D2 or D4 as the closest state of the art.

Having regard to the above considerations, the Board concludes that the available prior art does not render obvious the subject-matter of claim 1 as presently amended (Articles 52(1) and 56 EPC). The same conclusion applies to dependent claims 2 to 8 by virtue of their dependence on claim 1.

5. The Board is also satisfied that the application documents amended according to the present request of the appellant and the invention to which they relate meet the remaining requirements of the EPC within the meaning of Article 97(2) EPC.

In these circumstances, the Board concludes that the decision under appeal is to be set aside and a patent be granted on the basis of the application documents amended according to the present request of the appellant (Articles 97(2) and 111(1) EPC).

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the department of first instance with the order to grant a patent in the following version:

   - claims 1 to 8 as filed with the letter dated 2 July 2007,

   - description pages 1 to 6, 8, 12 to 20, 22 and 25 to 41 as filed with the letter dated 2 July 2007 and pages 7, 9 to 11, 21, 23 and 24 as filed with the letter dated 13 November 2007, and

   - drawing sheets 1/23 to 23/23 as published.

The Registrar: The Chairman:

M. Kiehl A. G. Klein