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Datasheet for the decision of 7 June 2006

Case Number: T 0466/02 - 3.3.09

Application Number: 96944354.8

Publication Number: 0874733

IPC: B32B 27/08

Language of the proceedings: EN

Title of invention:
Synthetic laminate structure and method for making same

Applicant:
EASTMAN CHEMICAL COMPANY

Opponent:
-

Headword:
-

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step - yes (after amendments)"

Decisions cited:
-

Catchword:
-

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Case Number: T 0466/02 - 3.3.09

D E C I S I O N
of the Technical Board of Appeal 3.3.09
of 7 June 2006

Appellant: EASTMAN CHEMICAL COMPANY
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Representative: Wibbelmann, Jobst
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Decision under appeal: **Decision of the Examining Division of the European Patent Office posted 3 December 2001 refusing European application No. 96944354.8 pursuant to Article 97(1) EPC.**

Composition of the Board:

Chairman: P. Kitzmantel
Members: A. T. Liu
M. Tardo-Dino

Summary of Facts and Submissions

I. By decision despatched on 3 December 2001, the examining division refused the European patent application No. 96 944 354.8 on the grounds of lack of inventive step. In addition, it was remarked that some of the claims lacked clarity.

II. Of the five prior art documents cited during the examining proceedings, reference will expressly be made to the following in the present decision:

D1: EP-A-O 587 353
D2: Encyclopedia of Polymer Science and Engineering, vol. 12 (1988), pages 15 and 214.

III. A notice of appeal was lodged by the applicant on 28 January 2002. With the Statement of grounds of appeal of 27 March 2002, the appellant also filed a new set of Claims 1 to 15.

IV. In an annex to the summons to oral proceedings dated 9 February 2006, the Board essentially indicated that the wording of Claims 1, 7 and 8 would appear to lack clarity. In consequence, the board only made cursory remarks concerning the patentability of the claims then on file.

V. By letter of 11 May 2006, the appellant submitted a new set of Claims 1 to 14, to replace the claims previously filed. These were later superseded by a set of Claims 1 to 10, presented at the oral proceedings on 7 June 2006.

VI. The operative independent claims read as follows:

"1. An article shaped and formed by thermoforming a synthetic laminate structure which comprises:

(A) an outer layer having a thickness of 0.13 mm to 12.7 mm (0.005 to 0.5 inch) comprising a substantially transparent PETG copolyester having an inherent viscosity of from 0.5 to 1.2 dL/g as measured at 25°C using 0.50 grams of polymer per 100 ml of a solvent consisting of 60% by weight phenol and 40% by weight tetrachloroethane, wherein the copolyester comprises:

(1) a dicarboxylic acid component comprising repeat units from at least 80 mole % of terephthalic acid or dimethylterephthalate; and

(2) a diol component comprising repeat units from 98 to 1 mole % ethylene glycol and 2 to 99 mole % cyclohexanedimethanol, based on 100 mole % dicarboxylic acid and 100 mole % diol;

(B) a printed or colored polymeric film layer having opposed surfaces wherein at least one of the surfaces is colored or has an image printed thereon, and wherein the ink used in printing the image is a solvent-based ink;

(C) a backing layer comprising a PETG copolyester and having a thickness of 0.127 mm to 24.1 mm disposed adjacent the film layer;

(D) a laminating enhancer layer comprising a polyurethane disposed between the outer layer and the

film layer providing a bond between the layers which exhibits a substantial absence of visible air pockets or adhesion discontinuities; and

(E) a second laminating enhancer layer disposed between the backing layer and the printed or colored film layer.

6. A method for making an article according to claim 1 from a synthetic laminate structure which comprises:

I. disposing a laminating enhancer comprising a polyurethane in a random or uniform pattern between a first surface of an outer layer comprising a substantially transparent PETG copolyester having an inherent viscosity of from 0.5 to 1.2 dL/g as measured at 25°C using 0.50 grams of polymer per 100 ml of a solvent consisting of 60% by weight phenol and 40% by weight tetrachloroethane, wherein the copolyester comprises:

(1) a dicarboxylic acid component comprising repeat units from at least 80 mole % of terephthalic acid or dimethylterephthalate; and
(2) a diol component comprising repeat units from 98 to 1 mole % ethylene glycol and 2 to 99 mole % cyclohexanedimethanol, based on 100 mole % dicarboxylic acid and 100 mole % diol;

and a first surface of a printed or colored polymeric film layer so that a substantially discontinuous layer of the laminating enhancer is sandwiched between the

first surface of the outer layer and the first surface of the film layer;

II. disposing a backing layer comprising a PETG copolyester adjacent a second surface of the film layer so that the outer layer and film layer with the laminating enhancer sandwiched therebetween and the backing layer are in superposed relation; and wherein a second laminating enhancer layer is disposed between the backing layer and said second surface of the film layer;

III. applying sufficient heat and pressure to the superposed outer layer, film layer and backing layer to cause the laminating enhancer to flow and spread between the outer layer and film layer into a substantially continuous layer providing a bond between the outer layer and film layer which exhibits a substantial absence of visible air pockets or adhesion discontinuities; and

IV. forming and shaping said article by thermoforming."

VII. The appellant's arguments may be summarised as follows:

– The only relevant document on file was D1.

– With respect to this prior art document, the technical problem to be solved was the provision of laminate structures which could be shaped and formed by thermoforming without delamination.

– The technical problem was solved by the choice of the materials constituting the laminate structure, as stipulated in Claim 1.

– D1 was directed to providing a flexible coating and dealt with an entirely different technical problem. Hence, it did not give the skilled person any incentive, let alone suggest a solution, for making laminates that could be thermoformed.

VIII. The appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of Claims 1 to 10 of the new main request filed during the oral proceedings.

Reasons for the Decision

1. *Amendments, Article 123(2) EPC*

Present Claim 1 is a combination of Claims 1, 2, 4 and 5 as originally filed. In addition, it contains features taken from the description: page 5, line 12 and lines 19 to 21; paragraph bridging pages 6 and 7; page 8, line 1; page 10, lines 27 to 31; and page 16, lines 13 to 15, as originally filed.

The subject-matter of independent Claim 9 is fairly based on original Claim 16 and includes corresponding amendments.

The dependent Claims 2 to 5 and 7 to 10 respectively correspond to Claims 3, 6, 8, 10 (in combination with 12) and 17, 18, 20 and 21, as originally filed.

In consequence, the amended claims are in conformity with the requirements of Article 123(2) EPC.

2. *Clarity, Article 84 EPC.*

The board notes that the examining division raised the objection of lack of clarity in respect of the expression "hard coat" in the impugned decision (item 2, paragraph bridging pages 7 and 8). Since the contentious feature is now defined in present Claim 5 by the chemical substances from which the "hard coat" can be made, this objection is no longer valid.

3. *Inventive step, Article 56 EPC*

Claim 1 is now directed to an article shaped and formed by thermoforming a synthetic laminate with a structure as defined (see item VI above).

3.1 Closest prior art

The board concurs with the appellant that, of the available prior art documents on file, D1 is the only one which discloses a laminated sheet of a similar structure as the laminate of Claim 1. These laminate sheets comprise an adhesive layer of polyurethane (2) disposed between a semi-rigid coloured or patterned thermoplastic resin (for example PVC) film (1) and a transparent polyester film (3) having a hard UV-cured surface coating layer (4). The prior art laminated sheets are used as an outside material, pasted to a woody base material such as an MDF (middle-density fibre board); see Abstract; description page 4, lines 3

to 5; page 5, lines 5 to 6; Examples 1 and 4; and Figure 1.

3.2 Problem - Solution

The board also accepts the appellant's submission that, with respect to D1, the technical problem to be solved is to provide articles from thermoformed laminates without the risk of delamination of the layers (see original description page 2, first paragraph).

The solution to this technical problem, as proposed in Claim 1, is essentially characterised in:

(i) the choice of a defined PETG copolyester as material for the outer layer,
(ii) the incorporation of a backing layer of the same PETG material as for the outer layer, and
(iii) the use of solvent-based ink for printing the image in the film layer.

The board considers it plausible that the choice of PETG copolymer for both the outer and the backing layers is essential for improving the thermoformability of the laminate. Also, the board has no reason to query the statement that the use of solvent-based ink contributes to making the laminate structure resistant to delamination (see page 9, lines 28 to 31 and page 10, lines 15 to 31). In consequence, the board accepts that the present technical problem is effectively solved by an article thermoformed from synthetic laminates according to Claim 1.

3.3 Obviousness

3.3.1 The board concurs with the appellant in that D1 is directed to providing a decorative laminated sheet destined to be coated on a supporting substrate and whose flexibility is such as to make it appropriate for an improved V-cut processability (page 2, lines 28 to 44; page 3, lines 19 to 24 and page 5, lines 7 to 9). Laminates suitable to be thermoformed are not envisaged in D1. Thus, the present technical problem is not tackled in D1, nor for that matter in any other prior art document on file. Nor can the proposed solution be inferred from any of these documents in an obvious way.

3.3.2 In the decision under appeal, it was observed that copolyesters were known for their improved plasticity as compared to homopolymers, as well as for their suitability for vacuum forming (see page 7, second full paragraph and D2 cited therein, page 15, last full paragraph and page 214, first paragraph). In the board's judgment, this characteristic might be taken as a pointer to replace homopolymers by certain copolymers if the latters' formability should be found to be inadequate for some purpose. However, it cannot be understood as an invitation to solve the present technical problem by using a defined PETG copolyester for the outer layer, let alone using this same material for a backing layer which is not even foreshadowed in D1. Moreover, as pointed out by the appellant, D2, in the same paragraph at page 214, also indicates that the lower softening temperature of the copolymers limits their use mainly to packaging. In the board's view, this statement would militate against the use of the laminates for forming articles as stipulated in Claim 1.

3.3.3 Under these circumstances, the board concludes that the subject-matter of Claim 1 involves an inventive step in view of the available prior art.

3.4 Claim 6 is directed to a method for making an article according to Claim 1. Dependent Claims 2 to 5 relate to preferred embodiments of an article according to Claim 1, and Claims 7 to 10 to preferred embodiments of a method according to Claim 6. Their subject-matter is therefore also new and inventive for the same reasons as for the subject-matter of Claim 1.

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 on the basis of Claims 1 to 10 as filed during the oral proceedings, and the description and figures to be adapted accordingly.

The Registrar The Chairman

G. Nachtigall P. Kitzmantel