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D E C I S I O N
of 2 February 1995

Case Number: T 0742/90 - 3.2.5

Application Number: 82306860.6

Publication Number: 0083495

IPC: B44F 9/00

Language of the proceedings: EN

Title of invention:

Lustrous satin appearing, opaque film compositions and method
of preparing same

Patentee:

Mobil Oil Corporation

Opponent:

- I. Bayer AG
II. Hoechst Aktiengesellschaft
III. Courtaulds Film & Packing (Holdings) Limited

Headword:

-

Relevant legal provisions:

EPC Art. 56

Keyword:

"Inventive step - yes"

Decisions cited:

-

Catchword:

-



Case Number: T 0742/90 - 3.2.5

D E C I S I O N
of the Technical Board of Appeal 3.2.5
of 2 February 1995

Appellant I:
(Opponent I)

Bayer AG
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Representative:

-

Appellant II:
(Opponent II)

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Representative:

-

Appellant III:
(Opponent III)

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Respondent:
(Proprietor of the patent)

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Decision under appeal: **Decision of the Examining Division of the European Patent Office given orally on 26 June 1990 and posted on 24 July 1990 rejecting the opposition filed against the European patent application No. 0 083 495 pursuant to Article 102(2) EPC.**

Composition of the Board:

Chairman: C. V. Payraudeau
Members: H. P. Ostertag
 M. H. M. Liscourt

Summary of Facts and Submissions

- I. The appellants (opponents I, II and III) lodged appeals against the decision of the Opposition Division, by which the oppositions against the European patent Nr. 0 083 495 had been rejected on the ground that the cited prior art did not prejudice the maintenance of the patent as granted.
- II. The documents US-A-4 303 708 (D1), DE-A-2 112 030 (D2), and US-A-3 637 906 (D4) referred to in the decision of the Opposition Division, and the documents "Kronos Leitfaden", Kronos Titanfabriken, 1967, pages 32-4 (D8) and "Lehrbuch der Lacke und Beschichtungen", Band II, H. Kittel, Verlag W.A. Colomb, Berlin-Oberschwandorf, 1974, pages 32-41 (D9) cited during the opposition proceedings, are also relevant to the present decision.
- III. Claims 1 and 10 of the patent as granted read as follows:

"1. An opaque, biaxially oriented polymeric film structure of lustrous satin appearance having a 45° gloss measurement greater than 100% comprising:

a core thermoplastic polymer matrix material within which is located a stratum of voids defining closed cells, the population of said voids being such as to cause a degree of opacity of less than 70% light transmission;

at least one spherical void-initiating solid particle positioned at least substantially within each of a substantial number of said voids, each solid particle being phase distinct and incompatible with the matrix material at least at the temperature of the biaxial orientation, and the void space occupied by each particle being substantially less than the volume of its

associated void, but with one generally cross-sectional dimension of the particle at least approximating a corresponding cross-sectional dimension of said void; and

a void-free, transparent, thermoplastic skin layer adhering to each surface of the core layer, the skin layers being of a thickness such that the outer surfaces thereof do not substantially manifest the surface irregularities of the core layer."

"10. A process for preparing a film structure according to Claim 1, comprising:

mixing a major proportion of a thermoplastic polymeric material with a minor proportion of a second material of a higher melting point or having a higher glass transition temperature than the thermoplastic polymeric material and being incompatible with the thermoplastic polymeric material at least at the temperature of subsequent biaxial orientation;

heating the mixture to a temperature of at least above the melting point of the thermoplastic polymeric material;

dispersing the second material in the form of microspheres uniformly throughout the molten thermoplastic polymeric material;

forming a biaxially oriented layer of the mixture at a temperature and to a degree to form within the mixture a stratum of pacifying closed cell voids within each of at least a substantial number of which there is located at least one microsphere of the second material and a minor dimension of which generally corresponds to the diameter of the microspheres,

the oriented layer having transparent thermoplastic skin films adhered thereto, the skin films being at least substantially void-free and of a thickness that will not manifest surface irregularities of the core layer."

IV. Oral proceedings were held.

- (i) The appellants requested that the decision under appeal be set aside and that the patent be revoked.
- (ii) The respondent (patentee) made a main request that the appeal be dismissed and that the patent be maintained, and a auxiliary request that the decision under appeal be set aside and that the patent be maintained on the basis of the claims as amended during the oral proceedings, a description to be adapted accordingly and the drawings of the patent as granted.
- (iii) The appellants argued essentially as follows:

Appellant I referred to the decision of the Opposition Division which held that the subject-matter of claim 1 of the contested patent differed from the film structure according to document D1 in that:

- a) the voids are closed cells,
- b) the void-initiating particles are spherical and
- c) skin layers are of a thickness such that the outer surfaces thereof do not substantially manifest the surface irregularities of the core layer.

Appellant I argued that the voids obtained by the process according to document D1 would always be closed cells - although this was not explicitly stated as such in that document -

since otherwise the coherence of the film layer would be lost. Contrary to the opinion of the Opposition Division, document D1 would disclose titanium dioxide as a void initiating agent, a material whose particles were described in documents D9 and D8 as being practically spherical. The skin layers according to document D1 would already result in a smooth film with a glossy, pearlescent appearance having a 45° gloss measurement greater than 100%. It would be trivial for the person skilled in the art to choose a thickness for the skin layers according to feature (c) in order to further conceal, if necessary, any possible surface irregularity of the core layer, and/or to further enhance the gloss value.

Appellant II argued that the wording of claim 1, viz. "the film .. comprising.. at least one spherical void-initiating solid particle positioned at least substantially within each of a substantial number of said voids", would imply that there are voids that do not comprise a particle, so that these voids are open rather than closed. Example 34 of document D2 disclosed an opaque, biaxially oriented polymeric film structure of lustrous satin appearance with a core thermoplastic polymer matrix material and two skin layers, having a 45° gloss measurement of 115% and a light transmittance of 25%. The paper-like core layer had a rough surface with fine irregularities in a finely fibrillated state, which fibrillations would however not show at the surface when covered by skin layers as in Example 34, and would have nothing to do with the void structure. That the voids would be closed cells followed from the second

paragraph on page 9 of document D2, which contained the clear teaching that if the film is successively stretched in two dimensions the second stretching must be conducted in such a manner that the voids already formed during the first stretching are not destroyed and the film is not broken. Although the voiding agent in Example 34 was calcium carbonate, it would be obvious to employ titanium dioxide, which was also mentioned in document D2 as a void-initiating particle. In this respect it must be noted that the creation of, and the shape of the (disc-like) voids would not be sensitive to the precise shape of the void-initiating particles.

Appellant III referred to comparative data filed with his letter of 29 November 1990. The voiding agents in document D1 were not limited to inorganic materials, organic particles could also be employed. The nylon and chalk voided films designated C and D manufactured in accordance with the teaching of document D1 would fall under the scope of claim 1 of the opposed patent. Document D4 disclosed a method to produce an opaque, biaxially oriented polymeric film with nylon as a voiding agent (see Example II). The co-melted nylon having a higher melting point than and being incompatible with the thermoplastic core material would assume a dispersed phase of small particles as the temperature of the co-melted mix was reduced. The nylon droplets would solidify in situ into spherical particles as a result of the laws of physics, surface tension being the predominant force. The film layer according to this embodiment would be essentially the same as

the core layer according to Example I of the patent in suit. It would be obvious to provide this film layer with skin layers of adequate thickness in order to solve the problem posed, and thus to arrive at the subject-matter of the present invention.

(iv) The respondent argued essentially as follows:

Document D1 nowhere disclosed closed cells. The film according to document D1 was said to be excellently suitable for being printed due to the fact that the heat-sealable layers comprised elevations caused by the void-initiating particles in the core layer. In contrast, the skin layers according to the present invention were designed to prevent such a "strike through". The electron microscope pictures of titanium dioxide in both document D8 and document D9 would clearly show that the particles were not at all spherical. Decisive is not what the skilled person could have done when reworking the teaching of document D1, but what he would have done (cf. T 2/83, OJ EPO 1984, 265). In this respect the respondent quoted also decision T 396/89 (unpublished; see Reasons 4.4): "It may be easy, given a knowledge of a later invention, to select from the teachings of a prior art document certain conditions, and apply them to an example in that document, so as to produce an end result having all the features of the later claim. However, success in doing so does not prove that the result was **inevitable**." The respondent contested that the comparative data presented by appellant III were obtained under the precise conditions as disclosed in

document D1, cf. T 173/89 (unpublished; see Reasons 5.1). Since also documents D2 and D4 failed to disclose closed cells initiated by spherical particles and skin layers that concealed irregularities of the core layer, none of the cited document would suggest the subject-matter of the patent in suit.

Reasons for the Decision

Main request

1. Novelty

1.1 Document D1

- 1.1.1 The board considers that document D1 represents the most relevant state of the art, as asserted in the impugned decision and accepted by the appellants I and III.

Although appellant II has based his arguments submitted during the oral proceedings mainly on document D2, he did not contest the conclusion of the Opposition Division that document D1 represents the most relevant state of the art.

- 1.1.2 Document D1 discloses (see column 1, line 40, to column 2, line 25, the Example and Figure 2) a biaxially oriented opaque film of thermoplastic organic material containing finely distributed solid particles, with void-free, transparent, thermoplastic heat-sealable layers applied to the core layer, having a 45° gloss measurement greater than 100% and a degree of opacity of less than 70% light transmission. The particles consist of the conventionally used,

preferably inorganic materials, such as titanium dioxide (column 3, line 45).

- 1.1.3 Although document D1 is silent about the creation of voids, the board accepts that the person skilled in the art would realize that the opacity of the film would stem from the formation of voids (see e.g. US-A-3 154 461, which was cited during the examination procedure of the patent in suit).

The board cannot accept however the arguments of the appellants that the voids would inevitably be closed cells. As explained in the patent in suit (see column 4, first paragraph) the voids are particularly vulnerable to destruction during sequential orientation if for example the stretching temperature is too low. In that case the stretching forces may cause internal shredding and void splitting.

- 1.1.4 Moreover, the argument that the void-initiating particles would be necessarily spherical when titanium dioxide is used, cannot be accepted, since the micrographs in documents D8 (see Figures 16 and 17) and D9 (see Figure 2g) of some of the titanium dioxide samples which are commercially available, clearly demonstrate that most of the particles of the shown materials are not at all spherical.

- 1.1.5 The embodiment according to the only Example of document D1 discloses a laminated film with a 33 μm thick core layer and 1 μm thick skin layers. The average particle size of the voiding agent, calcium carbonate, is 2.4 μm . It is not stated whether the surface irregularities of the core layer are concealed by the skin layers in this example.

However, in column 3, lines 19 to 27, it is stated that "The film according to the invention has the further advantage that it is excellently suitable for being printed by means of any of the conventional printing machines ... Due to its good slip, the film has excellent processing properties. This is thought to be due to the fact that the heat-sealable layer comprises elevations which are caused by the particles contained in the film surface under the heat-sealable layer."

Even if certain core layer/skin layer thickness ratios and particle size ranges can be constructed from the claims of document D1 that would fall within the scope of the contested patent, the use of such ratios would not be seriously contemplated by the person skilled in the art in view of the object of the invention according to document D1, which is to obtain improved printability (see column 1, lines 33 and 34).

1.1.6 The subject-matter of claim 1 according to the main request differs therefore from the film structure according to document D1 in that

- (a) a stratum of voids defining closed cells is located within the core layer,
- (b) the core layer comprises at least one spherical void-initiating solid particle positioned at least substantially within each of a substantial number of said voids, the void space occupied by each particle being substantially less than the volume of its associated void, but with one generally cross-sectional dimension of the particle at least approximating a corresponding cross-sectional dimension of said void, and

- (c) the skin layers are of a thickness such that the outer surfaces thereof do not substantially manifest the surface irregularities of the core layer.

1.2 Document D2

1.2.1 Document D2 discloses (see page 3, fourth paragraph, and Example 34) a voided biaxially oriented film structure, which may be provided with polymeric skin layers (see page 11, second paragraph). The problem this invention seeks to solve is to provide a paper-like polymeric film having a rough surface with fine irregularities in a finely fibrillated state (see paragraph bridging pages 2 and 3). As voiding agents inorganic substances are mentioned, such as e.g. calcium carbonate and titanium dioxide. On page 9, first paragraph, it is stated that sometimes the voids may be continuous, which implies that the film has open cells in that case. By providing the paper-like core layer with a biaxially oriented polypropylene layer, the 45°-reflectometer value of the film can be over 100% (see Example 34).

1.2.2 It is clear that the teaching of document D2 does not come closer to the subject-matter according to claim 1 of the patent in suit than the disclosure of document D1. Document D2 is silent about the characteristics of the skin layers, does not disclose closed cells (rather, the cells may sometimes be open) and does not disclose spherical void-initiating particles. Moreover, the whole thrust of document D2 is directed to a paper-like film having a rough surface.

1.3 Document D4

1.3.1 Document D4 discloses (see column 2, line 26, to column 4, line 72) a biaxially stretched opaque film layer possessing an opalescent effect, which is produced by stretching a mixture of two thermoplastic polymers having different crystalline melting points.

Document D4 is silent about skin layers, silent about the characteristics of the voids, and silent about the shape of the additive thermoplastic polymer in situ.

1.3.2 The film structure according to document D4 thus likewise fails to disclose the features (a), (b) and (c) as recited in Point 1.1.6 above. There is no need for further substantiation of this matter.

1.4 The other cited documents are still further away from the claimed subject-matter and have no longer been relied upon during the oral proceedings by the appellants. It is thus not necessary to substantiate this any further.

1.5 The subject-matter of claim 1 according to the patent as granted is therefore new within the meaning of Article 54 EPC. This is likewise the case for the subject-matter of claim 10, which relates to a process for preparing a film structure according to claim 1.

2. *Inventive step*

2.1 The closest prior art, i.e. document D1, is discussed in Section 1.1.2 above.

Starting from this prior art, the problem the present invention seeks to solve is to provide a film structure of lustrous satin appearance and of enhanced opacity.

This problem is solved by the biaxially oriented polymeric film structure according to claim 1, in particular by the above-mentioned distinguishing features (a), (b) and (c) (see Point 1.1.6).

2.2 With respect to features (a) and (c), it is noted that neither of the documents D2 and D4 disclose a film structure with void-free, transparent, thermoplastic skin layers adhering to each surface of a core layer having a stratum of voids defining closed cells, the skin layers being of a thickness such that the outer surfaces thereof do not substantially manifest the surface irregularities of the core layer.

2.3 With respect to distinguishing feature (b), it is noted that document D2 does not disclose void-initiating particles that are spherical.

Document D4 is silent about the shape of the voiding agent. Appellant III has argued that the voiding agent nylon as employed in Example II of document D4 would inevitably assume a spherical shape in situ.

The board is willing to accept that a mixture of a major proportion of a thermoplastic polymeric material with a minor proportion of a second material of a higher melting point or having a higher glass transition temperature than the thermoplastic polymeric material and being incompatible with the thermoplastic polymeric material at the orientation temperature, could, under appropriate process conditions when heated above the melting temperature of the thermoplastic polymeric material, give rise to a dispersed phase of small spherical particles of the second material within the molten thermoplastic polymeric material. It is however by no means inevitable that in Example II of

document D4 microspheres are formed, let alone that these microspheres initiate closed cells.

2.4 Even if it may be obvious to give the skin layers a sufficient thickness if it is desired to render the surface of the film smooth in view of the irregularities of the core layer, the person skilled in the art finds in the prior art no incentive to do so in order to improve the appearance of the film, the document D1 teaching on the contrary away from the invention. The person skilled in the art will also not find any incentive to combine the teaching of document D1 with the teaching of document D4 applied in such a way that the void-initiating particles are spherical and the voids are closed cells in view of giving to the film structure an improved appearance and opacity.

2.5 The person skilled in the art, starting from the film structure according to document D1, will therefore not arrive at the subject-matter according to claim 1, either by his expert knowledge alone, or in combination with any other teaching of the cited prior art.

2.6 Hence the subject-matter of claim 1 according to the main request involves an inventive step within the meaning of Article 56 EPC.

This applies likewise to the subject-matter of claim 10, which relates to a process for preparing a film structure according to claim 1.

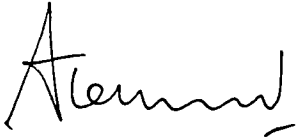
3. In view of the above, the patent can be maintained as granted. There is therefore no need to examine the auxiliary request of the respondent.

Order

For these reasons it is decided that:

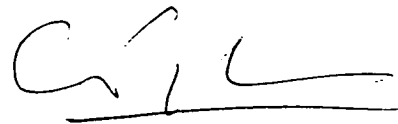
The appeals are dismissed.

The Registrar:



A. Townend

The Chairman:



C. Payraudeau