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D E C I S I O N
of 28 November 1997

Case Number: T 0514/94 - 3.3.4

Application Number: 87307442.1

Publication Number: 0258020

IPC: B32B 27/20

Language of the proceedings: EN

Title of invention:
Improved opaque film composition

Applicant:
MOBIL OIL CORPORATION

Opponent:
-

Headword:
Opaque film/MOBIL OIL CORPORATION

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step (yes) "

Decisions cited:
T 0032/81, T 0176/84

Catchword:



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Boards of Appeal

Chambres de recours

Case Number: T 0514/94 - 3.3.4

D E C I S I O N
of the Technical Board of Appeal 3.3.4
of 28 November 1997

Appellant: MOBIL OIL CORPORATION
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Decision under appeal: Decision of the Examining Division of the
European Patent Office posted 28 January 1994
refusing European patent application
No. 87 307 442.1 pursuant to Article 97(1) EPC.

Composition of the Board:

Chairwoman: U. M. Kinkeldey
Members: D. D. Harkness
S. C. Perryman

Summary of Facts and Submissions

- I. European patent application No. 87 307 442.1 filed on 24 August 1987 was published with the No. 0 258 020 and refused by the Examining Division in a decision announced orally at oral proceedings on 2 December 1993, the written reasons being dispatched on 28 January 1994.

The decision was taken on the basis of claims 1 to 22 (auxiliary request adopted as main request) filed at oral proceedings.

Claim 1 of this request read as follows:

"1. An opaque, biaxially-oriented, polymeric film structure which comprises:

- (a) a voided core layer comprising a matrix of
 - (i) a thermoplastic polymeric material in which are dispersed
 - (ii) void-initiating solid particles which are phase-distinct from the thermoplastic polymeric material of the matrix and about which particles are located opacifying voids and
 - (iii) from 2 to 12 wt.% of a light absorbing pigment; and
- (b) at least one transparent skin layer adhering to the surface of the voided core layer comprising a thermoplastic polymeric material and being thick enough substantially to prevent the asperities of the core layer from being manifest; the light transmission of the structure being less than about 15%."

- II. The ground for refusal was that the subject-matter of the claims was not inventive and thus did not comply with the requirements of Article 56 EPC.

The lack of inventive step objection was based on the following documents:

- (1) US-A-4 377 616
- (2) EP-A-0 155 595
- (6) Dr H. Kittel: "Lehrbuch der Lacke und Beschichtungen" vol. 2, "Pigmente, Füllstoffe, Farbstoffe". Publisher W. A. Colomb, 1974, page 532.

The Examining Division considered that the nearest prior art was document (1) which related to a polymeric film laminate having a lustrous satin appearance and comprised, (a) a core layer containing voids and 1 to 3% by weight of titania, (Example 2 employed 2%), which was a light-reflecting pigment serving to improve the opacity of the laminate, and (b) void-free transparent thermoplastic skin layers adhering to the surfaces of the core layer.

Document (2) related to a polyolefin film having a core and skin layers but having a metallic appearance by virtue of containing both white pigment (light-reflecting) and coloured pigment (light absorbing) to produce this effect, the pigments being solid particles which are phase-distinct from the polymeric material of the core.

Document (6) was a standard work and described the connection between light absorption K , light scattering S , and the optical properties of a pigmented system, there being no reference to any particular polymeric film or laminate. This reference showed that hiding power increases with increasing K and the degree of transmission of light decreases with increasing K .

In order to increase opacity of the laminate disclosed in document (1) it was obvious to replace the light-reflecting titania by a coloured light-absorbing pigment in view of the teaching of document (6), document (2) serving to show that light-absorbing coloured pigments have been used in core layers. In support of this objection Board of Appeal decisions T 176/84, OJ EPO 1986, 50, and T 32/81, OJ EPO 1982, 225, were cited to establish that it was proper to combine documents (1) and (6).

III. The Appellant filed an appeal against this decision and paid the appeal fee. New claims 1 to 21 and amended pages 2 to 4, 7 to 10, and 12 were filed with the Statement of Grounds. New claim 1 reads as follows:

"1. An opaque, biaxially-oriented, polymeric film structure which comprises:

(a) a voided core layer comprising a matrix of (i) a thermoplastic polymeric material in which are dispersed (ii) void-initiating solid particles which are phase-distinct from the thermoplastic polymeric material of the matrix and about which particles are located opacifying voids and (iii) from 2 to 4.2 wt% of a light absorbing pigment; and

(b) at least one transparent skin layer adhering to the surface of the voided core layer comprising a thermoplastic polymeric material and being thick enough substantially to prevent the asperities of the core layer from being manifest, the light transmission of the structure being less than 13%."

The submissions of the Appellant are essentially as follows:

The amendments made were allowable under Article 123(2) EPC as basis for them was to be found in Example 6.

In respect of Article 56 EPC the Appellant argued that the inventors had found out that light-absorbing pigment was unusually effective at absorbing light when incorporated in a cavitated core and that light-reflecting pigment, e.g., titania was surprisingly less effective. Among various possibilities for improving opacity one had been chosen which was expected to cause disadvantages and therefore this involved an inventive step. The Appellant argued that the objection raised by the Examining Division was of an ex post facto nature and the decision merely asserted that it was obvious to include light-absorbing pigment in the core layer of a polymeric film structure without giving convincing reasons.

IV. On 24 April 1996 the board issued a communication pursuant to Article 12 of the rules of Procedure of the Boards of appeal expressing its provisional view. This communication was answered by the appellant with letter of 5 February 1997 accompanied by a new set of claims 1 to 9 to replace the earlier filed set of claims and an amended page 2 of the description. Claim 1 of this set of claims was, compared to claim 1 of the set of claims earlier on file, amended such that in item (a) (iii) the figure "from 2 to 4.2 wt%" now reads "from 1.4 to 4.2 wt%".

V. The Appellant requested in the letter of 5 February 1997 that the decision under appeal be set aside and a patent be granted on the basis of the set of claims 1 to 9 filed with letter of 5 February 1997 and as an auxiliary request that oral proceedings be appointed.

Reasons for the Decision

1. The appeal is admissible.
2. *Admissibility of amendments (Article 123(2) EPC)*

The Appellant has filed various minor amendments to the description and claims by way of limitation. With regard to claim 1, Table 3 on page 11 of the originally filed application provides basis for the pigment lower limit of 1.4 wt% and an upper limit of 4.2 wt% and also indicates a figure of 13% light transmission being the maximum measured value, the other measurements being lower. The new percentages quoted in claim 1 therefore find basis in the original specification and do not contravene Article 123(2) EPC. Other amendments made in the claims and description are consequential or of a clerical nature and do not contravene Article 123(2) EPC either.

3. *Novelty (Article 54 EPC)*

No objection to the novelty of the subject-matter arises as the laminates of claim 1 on file require a light transmission of less than 13%, whereas document (1) discloses a light transmission at the lowest level of about 16%. Document (2) does not disclose any figures of light transmission. Document (3) is a general textbook stating a relationship between light absorption, light scattering and optical features of pigmented systems and does not relate to laminates. Thus the subject-matter claimed is novel.

4. *Inventive step (Article 56 EPC)*

4.1 The closest prior art

In the opinion of the Board the closest prior art is document (1) which disclosed a laminate which was opaque and showed a light transmission "as low as about 16%" (column 6, line 5) and comprised a central polypropylene core layer having voids which cause the opaque effect by a light scattering effect and may contain spheres of different colour absorption or reflectance, preferably the light reflecting titania (see Examples 2, 4 and 5), the core layer having two polypropylene skin layers adhered to it. In column 5, lines 52 to 61 it is stated:

"Since statistically each void has approximately one sphere somewhere within the void, interesting and pleasing color and/or reflectance effects can be imparted to the overall layer structure by the use of spheres of different color absorption or reflectance. The light scattered in particular voids is additionally either absorbed or reflected by the void initiating sphere and a separate color contribution is made to the light scattering in each void."

4.2 The technical problem

Having regard to document (1) the problem to be solved by the present invention is to improve the opacity to less than 13% light transmission of this known type of laminate whilst at the same time maintaining the other desirable properties, eg, mechanical strength, of the laminate.

4.3 The proposed solution

According to the invention the problem has been solved by placing a light absorbing pigment in the core of the laminate in amounts of 1.4 to 4.2 wt%.

4.4 Assessment of inventive step

4.4.1 The relevant question for the assessment of inventive step is whether the skilled person would have considered the placement of a light-absorbing pigment as a solution to the stated problem.

4.4.2 Document (1) itself does not give any incentive for such an action, which was accepted by the Examiner (see decision, point 5.1). The statement of document (1) cited above in point 4.1 mentions indeed the use of light absorbing colours as spheres, however not in the context of what produces the opacity but rather as something that adds to the opaque effect a further "interesting and pleasing colour and/or reflectance effect". It is the voids as such which are said to cause the opaque effect (see column 5, lines 42 to 47). This is further illustrated by the fact that whenever any particular pigment is used in the examples it is the light **reflecting** titania (see Examples 2,4 and 5). Thus, if anything, an improvement of the opacity could be expected by including in the light scattering and opacity causing voids, just the opposite of a light absorbing pigment, which however, is the decisive feature of claim 1 to be examined.

4.4.3 The Board observes that the claimed enhanced effect is explained by means of Figures 1 and 2 filed with letter of 7 June 1994 by the Appellant, Figure 1 showing that when light-reflecting pigment was present in the void of the core layer light was reflected through the void, whereas when light-absorbing pigment was used this was

not the case as absorption takes place. That this absorption enhances the opacity must be considered as a surprising result. The quantitative effect of this is demonstrated by the comparison of Examples 1 to 5 in the description of the patent application. Comparison Example 3 shows that an equivalent loading of light-absorbing pigment reduces the light transmission from 62% of Example 2 to 37%. Example 6, which is the example showing various levels of the light-absorbing coloured pigment added to the core, requires only 1.4 wt% of light-absorbing pigment in the cavitated core to reduce light transmission to 13% in comparison with Example 4 which uses 2 wt% of titania to give a figure of 26%.

- 4.4.4 The Board accepts that there was another possibility open to the skilled person to solve the problem of improved opacity of a polymeric film structure, namely the addition of light-reflecting pigment to the skin layers. The Examining Division has not taken properly into account the deleterious effects which may result from making changes to the known laminates, instead it asserted that all material improvements are a compromise and when action is taken to improve opacity other film properties may suffer. Opacity has to be considered alongside mechanical strength, which latter property is affected by the amount of pigment used and whether or not it was incorporated in the core or the skin layers of the laminate. Because the core layer contains voids the strength of that layer is considerably less than that of a layer without voids and since the addition of pigment to such a layer reduces strength even more, it would not be desirable to add pigment to this layer, the obvious conclusion would be to add pigment to the skin layer. According to Examples 1 to 3 of the patent application a large pigment loading is required to reduce light transmission to below the 16% value of document (1) and

this would lead to a loss in strength of the skin layer. Example 5 shows that even a loading of 2.8 wt% of pigment in the skin layer does not reduce light transmission to levels below that of document (1). A comparison of Example 5 with Example 6 demonstrates that the same quantity (4.2 wt%) of light-absorbing pigment used in the skin layer results in a light transmission of 11%, whereas the laminate containing the pigment in the cavitated core exhibits 3% light transmission. The small amount of light-absorbing pigment, 1.4 to 4.2 wt%, added to the cavitated core results in a smaller loss in strength of the laminate as a whole and is more effective as an opacifying agent than the titania of the prior art, see document (1) Example 2 "TiO₂ ...does not aid greatly in the measured opacity at lower levels of TiO₂".

- 4.4.5 The Board believes that document (2) as well is not relevant to the problem to be solved by the invention. The combination of both a light-reflecting and a light-absorbing pigment in a laminate polyolefin core in order to produce a metallic appearance does not give any direct information concerning the opacity of laminates having a core containing voids and pigment. It is expressly stated in document (2) that the light absorbing colours merely serve to provide the laminate with silver-, golden- or copper-metallic effects in cases of the use of black, red or yellow coloured particles respectively together with white particles (see page 4, lines 1 to 8). It is furthermore stressed in this document that the light reflecting colour titania has to be in excess to solve the problem of improving the metallic appearance (see page 2, lines 26 to 28) and that the voided structure of the polymer matrix in connection with the combination of white and coloured particles might be responsible for the metallic effect (see page 3, lines 12 to 15). In the Board's opinion this teaching is not suited to lead the

skilled person in an obvious manner to the solution of the problem to improve the opaque effect in a laminate as claimed.

- 4.4.6 Document (6) does not relate to opaque polymeric film structures but shows in general terms that the hiding power of a pigment increases with increasing light absorption K and the degree of transmission of light decreases with increasing K . Document (6) does not teach in any way as such that light absorbing pigments could be used to influence opacity.
- 4.4.7 It is highly questionable whether the skilled person would have even envisaged a combination of documents (1) and (6) in analogy to the ruling of decisions T 176/84 and T 32/81 (see above section II, last paragraph); but even if he did this would not alter the above finding on inventive step as none of the discussed documents indicate what would be done in order to solve the stated problem.
- 4.4.8 In the Board's opinion, because of the lack of any direct hint in the documents on file to the use of small amounts of a light absorbing pigment in the core layer to improve opacity the claimed solution is not obvious.

For these reasons the Board considers that the subject-matter of the claims now on file is inventive and complies with the requirements of Article 56 EPC.

5. Since the Board allows the request oral proceedings are not required to decide this case.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The application is remitted to the Examining Division with the order to grant a patent on the basis of claims 1 to 9 submitted with letter of 5 February 1997 and amended pages 3 and 4, 7 to 10, and 12 submitted with the Statement of Grounds for the appeal of 7 June 1994, page 2 as submitted with letter of 5 February 1997 and pages 1, 5, 6 and 11 as originally filed.

The Registrar:


D. Spigarelli

The Chairwoman:


U. Kinkeldey

 15.12.97

