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D E C I S I O N
of 13 March 1997

Case Number: T 0923/93 - 3.3.3

Application Number: 88307794.3

Publication Number: 0309095

IPC: C08L 77/00

Language of the proceedings: EN

Title of invention:
Barrier blends based on amorphous polyamide and on ethylene/vinyl alcohol copolymer

Patentee:
E. I. DU PONT DE NEMOURS AND COMPANY

Opponent:
-

Headword:
-

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step - (yes)"

Decisions cited:
-

Catchword:
-

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0923/93 - 3.3.3

D E C I S I O N
of the Technical Board of Appeal 3.3.3
of 13 March 1997

Appellant: E. I. DU PONT DE NEMOURS AND COMPANY
1007 Market Street
Wilmington, Delaware 19898 (US)

Representative: Jones, Alan John
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Decision under appeal: Decision of the Examining Division of the European Patent Office posted 19 July 1993 refusing European patent application No. 88 307 794.3 pursuant to Article 97(1) EPC.

Composition of the Board:

Chairman: C. Gerardin
Members: H. H. Fessel
J. A. Stephens-Ofner

Summary of Facts and Submissions

I. European patent application No. 88 307 794.3, filed on 23 August 1988 and published on 29 March 1989 with the publication number 0 309 095 (Bulletin 89/13) was refused by a decision of the Examining Division 2.1.15.014 of the European Patent Office dated 19 July 1993.

That decision was based on a set of 20 claims of which independent Claim 1, filed on 9 September 1992, read as follows:

"A blend comprising 50 to about 95 weight percent of an amorphous polyamide having a glass transition temperature of 90°C to 200°C and lacking in crystallinity as shown by the lack of an endotherm crystalline melting peak in Differential Scanning Calorimeter (DSC) test (ASTM D-3417); and 5 to 50 weight percent of a vinyl alcohol polymer having a copolymerized ethylene content of 0 to 60 mole percent and a degree of saponification of at least 90%, the percentages of the polyamide and vinyl alcohol polymers being based on the total weight of polymers in the blend."

Dependent Claims 2 to 13 related to preferred embodiments of the blends claimed in Claim 1.

Independent Claims 14, 15, 18 and 19 concerned films, laminates and a container, respectively.

Dependent Claims 16 and 17 related to preferred laminates of those claimed in Claim 15. The subject-matter of Claim 20 was a laminate comprising at least one layer made from a blend as defined in Claims 1 to 14.

II. The only reason for the decision was that the subject-matter as claimed lacked inventive step within the terms of Article 52(1) and 56 EPC. with respect to

D1 EP-A-0 044 484, and
D2 Saechtling, Kunststoff-Taschenbuch, Hanser Verlag, München 1983, page 289.

It stated that in view of the evidence provided in the application the problem to be solved was to provide barrier materials which showed less change in oxygen permeation rate with environmental humidity than polyamide/EVOH-blends according to D1. To solve that problem the polyamide component selected was an amorphous polyamide with the specified Tg. In view of the teaching given by D2 the selection of an amorphous polyamide was regarded as a mere routine variation of the state of the art not requiring any inventive capacity.

III. On 8 September 1993 a Notice of Appeal was filed against that decision together with payment of the prescribed fee. The Statement of Grounds of Appeal was submitted on 22 November 1993. In that Statement the Appellant disputed the findings of the Examining Division.

IV. In a communication the Rapporteur informed the Appellant of its preliminary view that novelty vis-à-vis D1 could in fact not be accepted, since a person with ordinary skill, i.e. one being aware of D2, or

D3 Elias/Vohwinkel, Neue polymere Werkstoffe für die industrielle Anwendung, 2nd edition (Hanser 1983), pp. 220-8,

would immediately realize that polyamides such as Trogamid T, Ultramid K 1297/2 or Grillamid TR 55 specified in D2 as being amorphous were comprised by Claim 1 of D1.

V. Three days before oral proceedings, i.e. on 10 March 1997 the Appellant filed a fax and submitted therewith one Main and six Auxiliary Requests.

(i) During oral proceedings held on 13 March 1997 the Appellant first defended its case on the basis of the Main and Auxiliary Requests 1 to 4, all slightly amended, in that "comprising" in the definition of the blends was replaced by "essentially consisting of", and discussed the English translation of

D4 JP-A-53-49050,

acknowledged as prior art on p. 2, l. 11 of the present application.

This was followed by intermediate deliberations on novelty of the subject-matter as claimed in the decision under appeal (Main Request) and admissibility of the late filed Auxiliary Requests 1 to 4.

(ii) After having been informed that the subject-matter of Claim 1 of the Main Request was considered to lack novelty and late filed Auxiliary Requests 1 to 4 were not to be clearly allowable, the Appellant filed as his sole request a new set of 15 claims entitled "Auxiliary Request 5". The independent Claim 1 of that set of claims reads as follows:

"A blend consisting essentially of 50 to 95 weight percent of an amorphous polyamide having a glass transition temperature of 90°C to 200°C and lacking in crystallinity as shown by the lack of an endotherm crystalline melting peak in a Differential Scanning Calorimeter (DSC) test (ASTM D-3417); and 5 to 50 weight percent of a vinyl alcohol polymer having a copolymerized ethylene content of 0 to 60 mole percent and a degree of saponification of at least 90 percent, the percentages of the polyamide and vinyl alcohol polymers being based on the total weight of polymers in the blend, said blend including up to 23 percent of a laminar filler having particles at least 95 percent of which are less than 74 micrometers in diameters, and which have a platelet-like shape with an aspect ratio of about 10 to about 150."

Claims 2 to 12 are dependent claims which relate to preferred embodiments of the blend claimed in Claim 1.

Further independent Claims 13, 14 and 15 relate to films, containers and laminates made from the blends as claimed in Claim 1.

VI. The Appellant requested that the decision under appeal be set aside and a patent be granted on the basis of Claims 1 to 15, entitled "Auxiliary Request 5", submitted during oral proceedings and a description to be adapted.

Reasons for the Decision

1. The appeal is admissible.

2. No objection under Article 123(2) EPC arises as to the amendments of the claims now on file.

Claim 1 was disclosed in Claim 12 in conjunction with Claim 1 and p. 3, ll. 28 to 32 of the original files (Claims 1 and 12 in conjunction with p. 3, ll. 6-8 of the published application). Claims 2 to 15 correspond to Claims 2 to 11, 13, 14, 18 and 20 after, where necessary, appropriate renumbering and adjustment of their appendancy.

3. The claimed subject-matter is considered to be new since a blend of the 3 components specified in Claim 1 was not disclosed in the cited prior art.

4. The present application relates to barrier blends consisting essentially of an amorphous polyamide (hereinafter PA), an ethylene/vinyl alcohol (hereinafter EVOH) copolymer and up to 23 percent of a laminar filler as well as films, containers and laminated structures which comprise these blends and are suitable for use as packaging materials. An essential requirement for packaging applications is that these barriers inhibit the passage of atmospheric oxygen and that these oxygen barrier properties are relatively independent of humidity (application p. 2, ll. 5 to 10).

4.1 D1 concerns packaging materials of blends of PA and saponified ethylene/vinyl acetate (EVOH) copolymers, but is silent as to any effect of humidity on oxygen permeability values (OPV).

D4 relates also to blends of EVOH and PA, but containing only 5 to 40 weight percent of PA (p. 2, claim), as well as gas barrier films and laminates made therefrom (p. 9, first full paragraph). In addition to a desirable combination of properties, such composite films are said not to suffer any decline of gas barrier performance even in a highly humid atmosphere (p. 10, ll. 9 to 13).

The Board thus considers D4 to represent the most relevant prior art.

4.2 In the absence of an appropriate comparative example in the application in suit, wherein the blend would contain 5 to 40 weight percent of PA, the technical problem may be seen in providing further PA/EVOH blends, which when formed into a film possess gas barrier performances not declining in highly humid atmosphere.

4.3 According to the application in suit this problem is to be solved by using blends of EVOH and PA which contain an amorphous PA as the major component and up to 23 weight percent of a laminar filler, as specified in Claim 1.

4.4 The Board is in the light of the description, especially of the results of Examples 22 to 49 reported in Tab. III, satisfied that said problem is effectively solved with the blends consisting essentially of the three components specified in Claim 1.

5. It remains to be decided whether the claimed subject-matter would be obvious to a person skilled in the art having regard to the state of the art.

5.1 D4 discloses a barrier film consisting of an ethylene-vinyl acetate copolymer saponification product (EVOH) containing 5 to 40 wt.% of a polyamide with distinct indices of refractions in different directions. Especially useful polyamides are said to be nylon 6 and poly(hexamethylene isophthalamide/terephthalamide) (cf. p. 6, l. 6). As further specified in the second paragraph of p. 6 and bridging pages 6/7, a content of polyamide of less than 5 wt.% or over 40 wt.% results in a deterioration of drawability and gas barrier performance.

This also appears from the properties of blends 1 to 4 of Application Example 1, which contain respectively 10, 20, 30 and 40 weight percent of PA; the films obtained by extrusion are said to show after stretching, in addition to good drawability properties, both a low oxygen permeability and a good gas barrier performance. By contrast, films obtained from blends containing less than 10 weight percent (specimens 5 and 6) would not withstand transverse drawing, and those containing more than 40 weight percent (specimen 7) had insufficient gas barrier properties.

For a skilled person looking for blends having similar properties, there would thus be no incentive to operate outside the teaching of D4, in particular no incentive to consider amounts of PA higher than 50 weight percent, let alone a hint that the deterioration of properties resulting from such large amounts could be compensated by incorporating a specific laminar filler. It follows that D4 alone cannot lead a skilled person to the solution as defined in Claim 1.

5.2 D1 relates to packaging materials of blends of 40 - 80 weight % of EVOH and 20 - 60 weight % of a polyamide having a reduced gas permeability with regard to the respective PA's (Claim 2 in conjunction with p. 3, ll. 10-16), either in the from of films (p. 4,

ll. 18-22) or in the form of laminates (p. 9, ll. 8-11). On page 5, line 4 aliphatic/aromatic and cycloaliphatic/aromatic polyamides and copolyamides are mentioned as suitable PA's.

Even if the properties of the blends may be adjusted by incorporation of various unspecified additives (page 9, lines 4 to 7), this vague statement cannot point at a specific filler, as now required, let alone at a combination thereof with an amorphous polyamide as specified in Claim 1 of the application in suit. For this reason D1 cannot by itself render obvious the combination of features required in Claim 1.

5.3 Even a combination of these two teachings would not correspond to the solution as now claimed, since both citations failed to recognize the criticality of the lamellar filler for the carrier properties of the film.

In fact, it is even doubtful whether a skilled person would contemplate such a combination, since the effect of humidity on OPV, which is one of the two aspects of the above-defined technical problem, is not considered in D1.

5.4 It follows that the claimed subject-matter does not derive in an obvious manner from the state of the art and, therefore, it involves an inventive step.

6. Even if starting with D1 as most relevant prior art the result would be the same.

The problem vis-à-vis D1 may be seen in the provision of barrier materials which show good OPV's being not deteriorated under humid conditions.

This problem was said to be solved with the blend consisting essentially of the three components claimed in Claim 1.

In view of the experimental data the Board is satisfied that said problem is effectively solved with the indicated means.

Since no hint is given in the cited documents to such a three component composition the Board considers the subject-matter of Claim 1 to involve an inventive step.

7. The subject-matter of further independent claims 13 to 15 are films, containers and laminates made from or containing such blends. Their patentability is thus directly supported by that of the blends. The same applies to the subject-matter of dependent product claims 2 to 12.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the Examining Division with the order to grant a patent on the basis of the claims submitted during oral proceedings as auxiliary request 5 and after consequential amendments of the description.

The Registrar: The Chairman:

E. Görgmaier C. Gérardin