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D E C I S I O N
of 24 October 2002

Case Number: T 0296/97 - 3.3.7

Application Number: 87301779.2

Publication Number: 0236099

IPC: B32B 27/08

Language of the proceedings: EN

Title of invention:
Oxygen barrier packaging film

Patentee:
Cryovac, Inc.

Opponents:
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02 WIHURI OY WIPAK
03 KREHALON SYNCLAIR PACKAGING BV

Headword:
-

Relevant legal provisions:
EPC Art. 54, 56, 123(2)

Keyword:
"Amendments - added subject-matter - (yes) - (main request)"
"Inventive step - (no) - (first to fourth auxiliary requests)"
"Inventive step - (yes) - (fifth auxiliary request)"

Decisions cited:
-

Catchword:
-

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Case Number: T 0296/97 - 3.3.7

D E C I S I O N
of the Technical Board of Appeal 3.3.7
of 24 October 2002

Appellant 01: (Opponent 03)
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Decision under appeal:
Interlocutory decision of the Opposition Division of the European Patent Office posted 15 January 1997 concerning maintenance of European patent No. 0236099 in amended form.

Composition of the Board:

Chairman: R. E. Teschemacher
Members: G. Santavicca
B. L. ter Laan

Summary of Facts and Submissions

1. The mention of the grant of European patent 0 236 099, in respect of European patent application 87 301 779.2, filed on 27 February 1987 and claiming a right of priority in the USA of 28 February 1986 (US 834694) and 21 March 1986 (US 842321 and US 842600), was published on 20 April 1994. The patent as granted comprised 9 claims, independent Claims 1 and 6 reading:

"1. A multilayer film comprising:
a) a core layer comprising an ethylene vinyl alcohol copolymer;
b) two outer layers each comprising a polymeric material or a blend of polymeric materials;
c) two layers each adhering to opposite respective surfaces of the core layer, and comprising a polyamide; and
d) two interior layers each comprising an adhesive polymeric material to bond the outer layers (b) to the intermediate polyamide-containing layers (c), said adhesive polymeric material comprising an acid- or acid anhydride-modified polyolefin."

"6. A method of making a multilayer film comprising the steps of:
a) coextruding a core layer comprising an ethylene vinyl alcohol copolymer, two outer layers each comprising a polymeric material or a blend of polymeric materials, two polyamide layers each adhering to opposite respective surfaces of the core layer and two interior layers each comprising an adhesive polymeric material to bond the outer layers to the intermediate polyamide-containing layers, said adhesive polymeric

material comprising an acid- or acid anhydride-modified polyolefin;
b) cooling the coextruded film; and
c) collapsing the cooled film."

Dependent Claims 2 to 5 and 7 to 9 concerned preferred embodiments of the film according to Claim 1 and the method according to Claim 6, respectively.

II. Three notices of opposition were filed on 20 January 1995, in which revocation of the patent was requested on the grounds of Article 100(a) that the claimed subject-matter lacked novelty and an inventive step having regard to, *inter alia*, the following documents:

A1: JP 60-27000 (published Japanese utility model, English translation filed by Opponent 03 with a letter dated 20 December 2001)

A4: DE-A-3 035 474 (= US-A-4 254 169)

A12: US-A-4 501 798

A15: EP-A-0 151 462

A18: EP-A-0 132 565, filed after the nine month - opposition period by opponent 03.

III. In reply, the proprietor submitted amended claims as auxiliary requests and referred to a new document A 19 (Whittington's Dictionary of Plastics, pages 192 and 449).

IV. By decision of the Opposition Division, posted on 15 January 1987, the patent was maintained in amended form. That decision was based on a combination of two auxiliary requests identified as "Oriented 2" and "Non-oriented 1", respectively, the combination being called "consolidated auxiliary request".

In its decision, the Opposition Division held that:

(a) Of the documents filed after the nine month - period for opposition, only A19 was admitted to the proceedings.

(b) The subject-matter of Claim 1 as granted, forming the main request, lacked novelty over A1.

(c) The subject-matter of Claim 1 according to auxiliary request 1, identified as "Oriented 1", did not involve an inventive step.

(d) The subject-matter of Claim 1 according to the auxiliary request identified as "Oriented 2" involved an inventive step. So did the subject-matter of independent Claim 6 of that set of claims.

(e) The subject-matter of Claim 1 according to the request identified as "Non-oriented 1" also involved an inventive step. So did the subject-matter of independent Claim 12 of that set of claims.

(f) Therefore, the combination of the two requests "Oriented 2" and "Non-oriented 1", identified as "consolidated auxiliary request" fulfilled the requirements of the EPC.

V. Opponent 03 and the proprietor both lodged appeals against that decision, which were received on 12 and 17 March 1997, respectively, the appeal fees being paid on the same respective days.

VI. With the statement of grounds of appeal, received on 15 May 1997, opponent 03 submitted further documents as well as test results. With a letter dated 20 December 2001, opponent 03 filed an English translation of A1, which, however, did not include the figure present in the original A1.

VII. In its statement of grounds of appeal, also received on 15 May 1997, the proprietor maintained that the subject-matter of granted Claim 1 was novel and inventive. With a letter dated 2 January 2002, the proprietor filed a great number of amended sets of claims, one of which, identified as "03 Appeal Main Request" formed the new main request containing ten claims. The independent claims read as follows:

"1. An oriented multilayer shrink film comprising:
a) a core layer comprising an ethylene vinyl alcohol copolymer;
b) two outer layers each comprising a polymeric material or a blend of polymeric materials;
c) two layers each adhering to opposite respective surfaces of the core layer, and comprising a polyamide; and

d) two interior layers each comprising an adhesive polymeric material to bond the outer layers (b) to the intermediate polyamide-containing layers (c), said adhesive polymeric material comprising an acid- or acid anhydride-modified polyolefin."

"2. An unoriented multilayer film comprising:

a) a core layer comprising an ethylene vinyl alcohol copolymer;

b) two outer layers each comprising a polymeric material or a blend of polymeric materials;

c) two layers each adhering to opposite respective surfaces of the core layer, and comprising a polyamide; and

d) two interior layers each comprising an adhesive polymeric material to bond the outer layers (b) to the intermediate polyamide-containing layers (c), said adhesive polymeric material comprising an acid- or acid anhydride-modified polyolefin wherein the outer layers (b) each comprise a linear low density polyethylene."

"7. A method of making an oriented multilayer shrink film comprising the steps of:

a) coextruding a core layer comprising an ethylene vinyl alcohol copolymer, two outer layers each comprising a polymeric material or a blend of polymeric materials, two polyamide layers each adhering to opposite respective surfaces of the core layer and two interior layers each comprising an adhesive polymeric material to bond the outer layers to the intermediate polyamide-containing layers, said adhesive polymeric material

comprising an acid- or acid anhydride-modified polyolefin;

b) cooling the coextruded film;

c) collapsing the cooled film; and

d) heating the collapsed film to its orientation temperature range, and stretching and orienting the heated film."

"8. A method of making an unoriented multilayer film comprising the steps of:

a) coextruding a core layer comprising an ethylene vinyl alcohol copolymer, two outer layers each comprising a polymeric material or a blend of polymeric materials wherein said outer layers each comprise a linear low density polyethylene, two polyamide layers each adhering to opposite respective surfaces of the core layer and two interior layers each comprising an adhesive polymeric material to bond the outer layers to the intermediate polyamide-containing layers, said adhesive polymeric material comprising an acid- or acid anhydride-modified polyolefin;

b) cooling the coextruded film; and

c) collapsing the cooled film."

Claims 3 and 6 concerned preferred embodiments of the oriented film of Claim 1; Claims 4 and 5 were directed to oriented films according to Claim 1 as well as unoriented films according to Claim 2; Claim 9 referred to the method of Claim 7 and Claim 10 to the method of Claim 9.

VIII. Oral proceedings were held on 24 October 2002, in the absence of opponents 01 and 02, who had been duly summoned, in compliance with Rule 71(2) EPC.

During the oral proceedings, the proprietor maintained the request identified as "03 Appeal Main Request" as the main request and, after discussion of the other requests then on file, submitted 5 new sets of amended claims as auxiliary requests 1 to 5, the independent claims of which read as follows:

(1) Auxiliary request 1 (six claims)

"1. A multilayer film comprising:
a) a core layer comprising an ethylene vinyl alcohol copolymer;
b) two outer layers each comprising a polymeric material or a blend of polymeric materials;
c) two layers each adhering to opposite respective surfaces of the core layer, and comprising a polyamide; and
d) two interior layers each comprising an adhesive polymeric material to bond the outer layers (b) to the intermediate polyamide-containing layers (c), said adhesive polymeric material comprising an acid- or acid anhydride-modified polyolefin wherein the outer layers (b) each comprise a linear low density polyethylene."

Claims 2 and 3 are directed to preferred embodiments of the film according to Claim 1.

"4. A method of making a multilayer film comprising the steps of:

a) coextruding a core layer comprising an ethylene vinyl alcohol copolymer, two outer layers each comprising a polymeric material or a blend of polymeric materials, two polyamide layers each adhering to opposite respective surfaces of the core layer and two interior layers each comprising an adhesive polymeric material to bond the outer layers to the intermediate polyamide-containing layers, said adhesive polymeric material comprising an acid- or acid anhydride-modified polyolefin;

b) cooling the coextruded film;

c) collapsing the cooled film; and

d) heating the collapsed film to its orientation temperature range, and stretching and orienting the heated film."

Claims 5 and 6 concern preferred embodiments of the method according to Claim 4.

(2) Auxiliary request 2 (six claims)

Claims 1 to 3 are identical to Claims 1 to 3 of auxiliary request 1.

Claim 4 differs form Claim 4 of auxiliary request 1 in that the following features are added: at the first line, "shrink", before "film"; at the end of step d), "at a racking ratio of between 3.0 and 5.0 times the original dimensions of the film in the longitudinal and transverse directions.".

The additional features of Claims 5 and 6 correspond to those of Claims 5 and 6 of auxiliary request 1.

(3) Auxiliary request 3 (three claims)

Claims 1 to 3 are identical to Claims 1 to 3 of auxiliary request 1. This request does not contain any method claim.

(4) Auxiliary request 4 (two claims)

"1. An unoriented coextruded multilayer film comprising:
a) a core layer comprising an ethylene vinyl alcohol copolymer;
b) two outer layers each comprising a polymeric material or a blend of polymeric materials;
c) two layers each adhering to opposite respective surfaces of the core layer, and comprising a polyamide; and
d) two interior layers each comprising an adhesive polymeric material to bond the outer layers (b) to the intermediate polyamide-containing layers (c), said adhesive polymeric material comprising an acid- or acid anhydride-modified polyolefin the outer layers (b) each having a linear low density polyethylene blended with an anti-blocking agent."

"2. A method of making an unoriented multilayer film comprising the steps of:
a) coextruding a core layer comprising an ethylene vinyl alcohol copolymer, two outer layers each

comprising a polymeric material or a blend of polymeric materials said outer layers each having a linear low density polyethylene blended with an anti-blocking agent, two polyamide layers each adhering to opposite respective surfaces of the core layer and two interior layers each comprising an adhesive polymeric material to bond the outer layers to the intermediate polyamide-containing layers, said adhesive polymeric material comprising an acid- or acid anhydride-modified polyolefin;
b) cooling the coextruded film; and
c) collapsing the cooled film."

(5) Auxiliary request 5 (eight claims)

"1. A coextruded multilayer film comprising:
a) a core layer comprising an ethylene vinyl alcohol copolymer;
b) two outer layers each comprising a polymeric material or a blend of polymeric materials;
c) two layers each adhering to opposite respective surfaces of the core layer, and comprising a polyamide; and
d) two interior layers each comprising an adhesive polymeric material to bond the outer layers (b) to the intermediate polyamide-containing layers (c), said adhesive polymeric material comprising an acid- or acid anhydride-modified polyolefin.
wherein said film is a biaxially oriented shrink film having a thickness from 0.5 to 4 mils (0.013 to 0.1mm) after orientation and oriented by heating and stretching to realign the molecular configuration by a racking or blown bubble process

at a racking ratio of between 3.0 and 5.0 times the original dimensions of the film in the longitudinal and transverse directions."

Claims 2 to 5 are directed to preferred embodiments of the film according to Claim 1.

"6. A method of making an oriented multilayer shrink film having a thickness of from 0.5 to 4 mils (0.013 to 0.1mm) comprising the steps of:
a) coextruding a core layer comprising an ethylene vinyl alcohol copolymer, two outer layers each comprising a polymeric material or a blend of polymeric materials, two polyamide layers each adhering to opposite respective surfaces of the core layer and two interior layers each comprising an adhesive polymeric material to bond the outer layers to the intermediate polyamide-containing layers, said adhesive polymeric material comprising an acid- or acid anhydride-modified polyolefin;
b) cooling the coextruded film;
c) collapsing the cooled film; and
d) heating the collapsed film to its orientation temperature range, and stretching and orienting the heated film at a racking ratio of between 3.0 and 5.0 times the original dimensions of the film in the longitudinal and transverse directions."

Claims 7 and 8 concern preferred embodiments of the method according to Claim 6.

IX. The arguments of opponent 03 can be summarised as follows:

(1) *Main request*

Any modification to a claim should also include the elements connected to it according to the original disclosure. The use of linear low density polyethylene as such in the unoriented multilayer film of Claim 2 had no basis in the description as filed, which disclosed a combination of linear low density polyethylene and antiblocking agents and mentioned the necessity of the presence of the antiblocking agent. Therefore, the absence of an antiblocking agent in Claim 2 contravened the requirements of Article 123(2) EPC.

(2) *Auxiliary request 1*

(a1) No objections were raised against the novelty of product Claim 1.

(a2) Method Claim 4 concerned a normal coextrusion process with an additional step in which the multilayer film obtained orientation. A1 disclosed deep-drawing, which was a thermoforming process at elevated temperatures, involving stretching and orienting the heated film. A1 did not mention any thickness of the films but its disclosure was not restricted to thick sheets. In this regard, the term "sheet" was also mentioned in the patent in suit. The tests performed by opponent 03 showed that the films according to A1 possessed shrink properties and hence orientation, even though no

shrinkage was observed according to A1; the circumstances mentioned in A1 imposed however limitations on the possibility for oriented films to shrink. Therefore, the method of Claim 4 was not novel over the disclosure of A1.

(a3) A18 disclosed multilayer coextruded films having at least one layer of polyamide adjacent to at least one layer of ethylene vinyl alcohol copolymer as their basic structure. This structure could also include other polymeric film layers, such as polyolefins and polyolefin copolymers including ionic copolymers and adhesive layers including modified polyolefins normally containing acid groups, which could be present as further interior layers. According to A18, a balanced and symmetrical film structure was preferable. Process steps resulting in orientation of the film were also described in A18.

Therefore, A18 disclosed the seven layer structure as well as the nature of the adhesive layers according to the patent in suit and took away the novelty of the subject-matter of Claim 4.

(b1) As regards an inventive step for product Claim 1, the closest prior art document was A1, which disclosed the claimed structural features, apart from the material of the outer layers. The advantages of using linear low density polyethylene in the outer layers of a gas barrier multilayer packaging film were well-known, eg from A15. Therefore, the subject-matter of Claim 1 was obvious over the combination of A1 and A15.

(b2) A12 described balanced and unbalanced multiple layer coextruded films of up to seven layers, having a combination of an ethylene vinyl alcohol copolymer core layer with adjacent layers of polyamide and an outer layer that could contain linear low density polyethylene. The problem to be solved in view of A12 could be seen as to provide films having a simpler arrangement of layers in order to obtain more uniform properties. Therefore, starting from A12, also in the light of the disclosure of A15, the subject-matter of Claim 1 was obvious.

(b3) The conclusion would be the same if A12 or A15, in which a preference for balanced films was described and linear low density polyethylene was used as an outer layer, were combined with A18.

(b4) As regards an inventive step for method Claim 4, the closest prior art document was A18, which mentioned the difficulty of orienting a polyamide/ethylene vinyl alcohol copolymer barrier layer structure. The problem underlying the patent in suit over A18 was the coextrusion and orientation of multilayer films. A18 contained a clear incentive to coextrude symmetrical films having ethylene vinyl alcohol copolymer as the core layer and polyamide on each side and to add further layers using modified polyolefins as an adhesive, which films were subsequently oriented with a draw ratio of from 1.5:1 to 4:1. Since the method of Claim 4 only referred to orientation, not to shrink, any alleged improvement of shrink

properties was irrelevant. Therefore, the disclosure in A18 led the skilled person to the method of Claim 4.

(b5) A18 could also be combined with A1, which aimed at good oxygen barrier properties and the prevention of voids and which disclosed the basic film structure now being claimed. Upon consideration of A18 and A1 the skilled person would have arrived at the features of Claim 4, the subject-matter of which, consequently, was not inventive.

(b6) Therefore, the subject-matter of Claims 1 and 4 did not involve an inventive step.

(3) *Auxiliary requests 2 and 3*

Each of auxiliary requests 2 and 3 contained an independent Claim 1 identical to that of auxiliary request 1. Therefore, these requests were not allowable for the same reasons as mentioned above.

(4) *Auxiliary request 4*

The features "unoriented" and "blend of linear low density polyethylene and antiblocking agent in the outer layers" did not justify the presence of an inventive step since on the one hand every film was unoriented before orientation had taken place and on the other hand it was known from eg A12 to blend linear low density polyethylene with an antiblocking agent. Therefore, the claimed combination was obvious.

(5) *Auxiliary request 5*

A18 disclosed a film extension with a factor of less than 4, which could be effected in one or in two film directions, as was also described in A12. Since stretching a film was a well-known process and several types of extension belonged to the common general knowledge of the skilled person, there was no invention in choosing a higher extension ratio in order to obtain more shrink.

(6) For these reasons, the patent in suit should be revoked.

X. The proprietor argued essentially as follows:

(1) *Main request*

The use of linear low density polyethylene as such in the outer layers of the film, without any antiblocking agent being necessary, would be understood, by the skilled person, as a general feature of the invention. Hence, the presence of linear low density polyethylene in the outer layers without any antiblocking agents did not contravene Article 123(2) EPC.

(2) *Auxiliary request 1*

(a1) A1 disclosed a film for deep-draw moulding and made no reference to shrinking. A1 dealt with "sheets", which had a greater thickness than the claimed "films". Stretching sheets would not automatically result in orientation or shrinkability; the opponent's experiments, showing

shrink, were carried out under particular circumstances that could not be generalized. The deep-drawn, three-dimensional article described in A1 could not be regarded as a film. Hence, there was no direct and unambiguous disclosure in A1 of how to obtain an oriented film as in present Claim 4.

(a2) A18 disclosed an oriented structure with a base layer of ethylene vinyl alcohol copolymer and polyamide. Symmetrical structures were mentioned but not preferred. A18 did not disclose the claimed seven-layer structure. Hence, it did not disclose the subject-matter of Claim 4.

(b) As regards inventive step, the patent in suit sought to solve the difficulties met when orienting ethylene vinyl alcohol copolymer layers. It had been found that polyamide layers helped orienting ethylene vinyl alcohol copolymer layers and permitted to obtain oriented films more easily at higher stretch ratios. Such orientation not only resulted in the presence of shrink properties, but also in the improvement of other properties.

(b1) Regarding product Claim 1, A1 concerned a three-dimensional asymmetrical structure in which linear low density polyethylene was not suggested as an outer layer. A1 did not qualify as the closest prior art document. The skilled person would see no reason to replace the outer layer material of the structures of A1 by linear low density polyethylene.

A15, which disclosed the use of linear low density polyethylene as outer film layers, concerned a different type of film so that that document would not be combined with A1.

(b2) A12 disclosed a film having specific inner layers, one of the outer layers being made of nylon. Although symmetrical structures were mentioned, its general teaching was directed to an asymmetrical film structure. The problem underlying the patent in suit over A12 was the production of a simpler arrangement to be put into practice for more uniform properties.

Since A15 dealt with a different type of film, it would not be combined with A12, so that Claim 1 was not rendered obvious.

(b3) As to method Claim 4, A18 described films with less extension and not having the present seven-layer structure. Therefore, A18 did not hint at producing the specific structure of product Claim 1.

A1 was not directed to oriented films so that the skilled person would not combine A18 with A1, nor would such a combination lead to the claimed method.

(b4) Therefore, the claimed subject-matter was inventive.

(3) *Auxiliary requests 2 and 3*

The arguments brought forward in respect of the first auxiliary request also applied to the second and third auxiliary requests, the subject-matter of which, as a consequence, was also inventive.

(4) *Auxiliary request 4*

Since product Claim 1 referred to an unoriented film and A12 concerned unbalanced oriented films, that document was not the most appropriate starting point. A15 described different structures for different applications, in which polyamide, as required by the patent in suit, was not present. Therefore, these teachings taken separately and in combination would not lead the skilled person to the claimed subject-matter.

(5) *Auxiliary request 5*

This request differed from the previous ones in the extent of orientation of the film. A18 disclosed that the area should not be stretched more than 4 times the original area, whereas the patent dealt with 9 to 25 times the original area. Hence, not only the structure was distinct, but also the higher orientation and hence the shrink properties were improved.

The problem underlying the patent in suit was to obtain multilayer films having a higher orientation. That problem was solved by the claimed solution, as shown by Example 5, in which the shrink properties of films according to the invention were compared with those of less oriented films.

Therefore, the claimed subject-matter involved an inventive step.

XI. Opponent 03 requested that the decision under appeal be set aside and that the patent be revoked.

The Proprietor requested that the appeal be dismissed and that the patent be maintained on the basis of the request submitted with the letter dated 2 January 2002 ("03 Appeal Main Request") as the main request, or, alternatively, on the basis of any of the five auxiliary requests submitted during the oral proceedings.

The parties as of right abstained from filing a request during the appeal proceedings.

Reasons for the Decision

1. The appeals are admissible.

2. *Main request*

Amendments

Claim 2 now contains the requirement that the outer layers of the claimed unoriented multilayer film should each comprise a linear low density polyethylene. A similar requirement occurs in method Claim 8.

According to the application as filed, the unoriented film preferably includes outer layers having a linear low density polyethylene blended with an anti-blocking agent (page 18, lines 5 to 7). No further statement can be found in the application as filed regarding the use of linear low density polyethylene in the outer layers of an unoriented multilayer film. Hence, the use of linear low density polyethylene without the presence of anti-blocking agents has no basis in the application as filed, so that Claims 2 and 8 do not satisfy the requirements of Article 123(2) EPC and the request is not allowable.

In view of the above, it is not necessary to decide on the other amendments.

3. A*uxiliary request 1*

3.1 Amendments

No formal objections were raised against the amendments in the claims and the Board sees no reason to take a different position. In particular, the present claims are all based on the claims as originally filed, so that Article 123(2) EPC is complied with.

3.2 Novelty

3.2.1 A1 discloses a multilayer composite film for deep draw moulding, which is laminated in the order of a resin layer with sealing property, a polyolefin resin adhesive layer, a polyamide resin layer, a saponified copolymer layer of ethylene vinyl acetate, a polyamide resin layer, a polyolefin resin adhesive layer, a

polypropylene resin layer, which has such characteristics as excellent mouldability and barrier function, as well as being resistant to boiling sterilization, and is suitable for use as a packaging material which is not susceptible to curling, and does not cause wrinkling on the package surface after boiling sterilization (Claim).

The resin layer with sealing property is a layer of ethylene-vinyl acetate copolymer resin, polyethylene resin or ionomer resin. The polyolefin resin adhesive layers adhere to the polyamide resin layer and may be formed out of polypropylene or polyethylene modified with a carboxylic acid (page 4, last 12 lines).

Although A1 discloses a film that, prior to the deep-drawing step, comprises a seven-layer structure with a core of polyamide/saponified copolymer of ethylene vinyl acetate/polyamide and adhesive layers of acid-modified polyolefins adjacent to both polyamide layers, this document does not disclose that both outer layers comprise linear low density polyethylene resins. According to A1, one of the outer layers must be made of polypropylene resin.

Furthermore, A1 does not disclose the step of heating the collapsed film to its orientation temperature range, and stretching and orienting the heated film to obtain an oriented multilayer film.

3.2.2 A18 discloses a film laminate comprising a polyamide layer and a layer of ethylene vinyl alcohol copolymer wherein the laminate is expanded to an area of up to less than 4 times the original area (Claim 1).

A18 also discloses a method for improving the barrier properties of a film laminate comprising at least one layer of polyamide and at least one layer of ethylene vinyl alcohol copolymer comprising the step of laminating at least one layer of polyamide and at least one layer of ethylene vinyl alcohol copolymer, comprising drawing the laminate up to a draw ratio of from 1.5:1 to 4:1 in at least one direction (Claim 10). The film laminate can be biaxially oriented (page 2, lines 23 to 25).

The preferred structure is balanced or symmetrical, to prevent curling of the film (page 3, lines 3 to 5). The laminates can include other polymeric film layers and adhesives (page 3, lines 13 to 15), the former being specified as polyolefins and polyolefin copolymers including ionic copolymers, the latter as modified polyolefins (page 5, lines 25 to 28). In this respect, reference is *inter alia* made to US-A-4 254 169, which corresponds to A4 and mentions the use of acid-modified polyolefin layers adjacent to the ethylene vinyl alcohol copolymer layer (Table 1).

However, A18 does not unambiguously and directly disclose a seven-layer structure with internal adhesive layers including acid- or acid anhydride-modified polyolefins.

Even if A18 would be read in combination with A4, there is no disclosure that adhesives are used in seven-layer structures as now defined in product Claim 1 or produced in accordance with method Claim 4.

3.2.3 The other documents on file are not more relevant than A1 and A18. Therefore, the claimed subject-matter is novel.

3.3 Inventive step

3.3.1 The present claims relate to multilayer oxygen barrier packaging films.

3.3.2 Opponent 03 saw A1 as the closest prior art, whereas the proprietor found A18 a more appropriate starting point. During the oral proceedings, A12, acknowledged in the patent in suit, was also discussed.

3.3.3 A12 discloses an unbalanced multiple layer polymeric film having two outer surfaces, and wherein the interfacial adhesion at each layer interface is at least 50 grams per inch width, the layers comprising, in order through the film:

(a) a first molecularly oriented layer of nylon;

(b) a second molecularly oriented layer whose composition is selected from the group consisting of nylon, ethylene vinyl alcohol copolymer, and blends of nylon and ethylene vinyl alcohol copolymer;

(c) a third molecularly oriented layer of nylon;

(d) a fourth molecularly oriented polymeric adhesive layer having carboxy moieties in the polymeric structure;

(e) a fifth molecularly oriented layer comprising a polyethylene or a blend of ethylene polymers;

(f) a sixth molecularly oriented polymeric adhesive layer having carboxy moieties in the polymeric structure; and

(g) a seventh heat sealant layer;

orientation of said film having been accomplished by applying heat directly to each of said outer surfaces in different amounts, thus creating a temperature differential between said surfaces, and effecting said orientation during the existence of said temperature differential (Claim 1).

The first layer should exhibit thermal stability under heat sealing conditions, and may contain surface modifying additives, such as slip and anti-block agents (column 5, lines 30 to 43).

The compositions of the polymers in the fourth and sixth layers preferably comprise medium density polyethylene (Claim 4), the fifth layer preferably contains high density polyethylene (Claim 5), alternative materials being medium density polyethylene, low density polyethylene, linear low density polyethylene and blends of linear low density polyethylene with medium density polyethylene or high density polyethylene and blends of medium density polyethylene with high density poylethylene (column 5, lines 58 to 64). The composition of the sealant layer can be chosen from the group consisting of ionomer, linear low density polyethylene, low density

polyethylene and ethylene vinyl acetate copolymer having up to 18 weight percent vinyl acetate (Claim 6).

In producing the oriented films of A12, the selected polymers are first coextruded as a seven-layer film, then cooled to yield an unoriented base film. In the coextrusion of the base film as a seven-layer film, the first to third layers and the fourth to sixth layers are combined to form two subcombination melt streams, which permits separate control of the thermal environment of each subcombination. The seventh layer as a single stream is the third subcombination. The subcombinations are finally joined to form the seven layer film just before exiting the die. Then, the film is cooled. While the cooled seven layer film may be immediately oriented in an in-line operation, it is entirely acceptable to wind up the film for subsequent orientation in a separate process. Uniaxial orientation in the machine direction is generally preferred (column 6, line 46 to column 7, line 8). Satisfactory orientation ratios are normally between 2.5/1 and 4/1, the preferred ratio being 3/1 (column 7, lines 52 to 59).

The general teaching of A12 is that certain unbalanced multiple layer polymeric films can be molecularly oriented by proper choices of layer structuring and processing conditions such that heat sealable, high barrier oriented films can be achieved (column 2, lines 43 to 47). The layers which are primarily responsible for the physical properties of the film are the first, second, fifth and seventh layers. The third, fourth and sixth layers, on the other hand, serve primarily the functions of facilitating processing and

providing interlayer adhesion. To meet the specific needs of a particular packaging use, the proportions of the layers can be adjusted somewhat and usually the final structure is a compromise of properties which best meets the needs of the use while keeping the film cost competitive (column 8, lines 44 to 53). By applying heat to each surface separately and at a temperature selected to be compatible with the orientation of the composition of that layer and all the interior layers, and by applying that heat to each surface for a moderate period of time, the multiple layer films may be oriented. That way, an unbalanced film having up to seven layers, wherein the several layers need not be derived from the same polymer family, can be molecularly oriented without necessarily incurring splitting, pin-holing, or softening of any one layer (column 7, lines 13 to 24).

3.3.4 The patent in suit aims at a coextruded thermoplastic multilayer film useful in the packaging of food products, having good oxygen barrier properties and good optical properties as well as toughness and abrasion resistance. The film should be free of voids in the barrier material and have good heat seal properties. In particular, it should be sealable at relatively low temperatures (patent in suit, page 2, lines 1 to 21; page 4, lines 5 to 11) and it should be suitable for use in vertical form-fill-seal application (page 2, lines 35 to 58).

3.3.5 As can be seen from the above (point 3.2.1), the films of A1 are thermoformed in three-dimensional structures belonging to a different technical field to the films of the patent in suit. A18 and A12 both refer to films

suitable for a purpose similar to that of the patent in suit and both documents describe multilayer films having a number of features in common with the subject-matter now being claimed. Although according to A18 a symmetrical film structure is preferred, such a structure is also mentioned in A12, which specifically mentions a seven-layer film, as well as an outer layer made of linear low density polyethylene.

Since a document serving as the starting point for evaluating the inventive merits of an invention should not only relate to the same or a similar use and to the same or a similar technical problem as the patent in suit, but should also require the minimum of structural and functional modifications (cf. Case Law of the Boards of Appeal of the European Patent Office, I.D.3.1), the Board considers A12, acknowledged in the patent in suit, to be the most appropriate starting point for the subject-matter of present Claim 1. This choice was not contested by the parties during the oral proceedings.

3.3.6 Since the unbalanced multilayer films according to A12 have good interfacial adhesion, a high gas barrier and good tear strength as well as high gloss, transparency and stiffness and are suitable for packaging a variety of products (A12, column 2, lines 23 to 39), the problem underlying the patent in suit may be seen as to provide a coextruded multilayer film of a simpler arrangement than that preferred by A12, to be put into practice for more uniform properties, as stated by the proprietor (point X.(b3), *supra*).

3.3.7 From the examples in the patent in suit it appears that that problem has been effectively solved by the features of Claim 1.

3.3.8 It remains to be decided whether the claimed subject-matter is obvious having regard to the documents on file.

Throughout A12 the films are described as being preferably unbalanced or asymmetrical (column 2, lines 31 to 32).

However, A12 also contains a description of balanced or symmetrical films (column 4, lines 39 to 57). In particular, the similar properties of the outer layers of the film are mentioned (column 4, lines 46 to 51). The outer sealing layers can be linear low density polyethylene (Claim 6; column 5, line 67 to column 6, line 3).

In the light of this disclosure, the balanced film having linear low density polyethylene outer layers according to Claim 1, is within the scope of the possibilities mentioned in A12, and hence, without any technical merit over the unbalanced films preferred in A12 having been demonstrated, forms an obvious alternative to the films according to A12.

3.3.9 For the above reasons, the subject-matter of Claim 1 lacks an inventive step.

3.3.10 In order to refuse a set of claims as not satisfying the requirements of the EPC, it is sufficient that only one claim is not allowable; in this case Claim 1.

However, considering the interest expressed by the parties in an answer to this question, the allowability of method Claim 4 will also be discussed.

Claim 4 relates to a method for the manufacture of an oriented balanced multilayer film, for which A18, which refers to oriented films, was considered as a proper starting point by the parties as well as by the Board. The problem to be solved was seen as to provide an alternative method of making a coextruded oriented multilayer film with at least seven layers.

The general teaching of A18 is that for improving the barrier properties of a coextruded film laminate comprising at least one layer of polyamide and at least one adjacent layer of ethylene vinyl alcohol copolymer, the area of the laminate is to be expanded up to less than four times the original area; in particular, the laminate is to be drawn to a draw ratio of from 1.5:1 to 4:1 in at least one direction (paragraph bridging pages 1 and 2; page 2, lines 30 to 32).

According to the example of A18, the film is coextruded and cooled, then preheated, stretched, heat-set and finally cooled. Therefore, A18 discloses all the method steps of Claim 4.

The balanced or symmetrical structures of A18 include a layer of ethylene vinyl alcohol copolymer sandwiched between outer layers of polyamide and can include other polymeric film layers and adhesives (page 3, lines 3 to 7 and 14 to 16) such as polyolefins and polyolefin copolymers and modified polyolefins (page 5, lines 26 to 33). Although A18 does not mention acid-modified

polyolefins as adhesives, reference is made to A4, which does mention the use of acid- or acid anhydride-modified polyolefin layers.

Therefore, the method defined in Claim 4 in suit is obvious for the skilled person looking for an alternative.

3.3.11 Consequently, the present request is not allowable.

4. *Auxiliary requests 2 and 3*

Each of the auxiliary requests 2 and 3 contain an independent Claim 1 which is identical to Claim 1 of auxiliary request 1. As a consequence, the same arguments apply, so that the subject-matter of each of these Claims 1 does not involve an inventive step. Therefore, auxiliary requests 2 and 3 are not allowable either.

5. *Auxiliary request 4*

5.1 Amendments

5.1.1 In addition to the amendments to Claim 1 of auxiliary request 1, present Claim 1 now contains the further terms: "unoriented coextruded" (first line) and "blended with an anti-blocking agent" (last line).

5.1.2 These amendments have a basis in the application as filed (page 18, lines 5 to 7) and, consequently, do not contravene Article 123(2) EPC.

5.2 Novelty

The claims of auxiliary request 4 are more restricted than those of auxiliary request 1; therefore, their subject-matter is also novel.

5.3 Inventive step

5.3.1 The presence of ever more detailed limitations is not necessarily sufficient to render a claim inventive.

5.3.2 The requirements that the film should now be unoriented and that the outer layers should have a blend of linear low density polyethylene and anti-blocking agent do not result in any unexpected effect. Consequently, these limitations cannot change the problem to be solved as defined above (point 3.3.6), starting form A12 as the closest prior art document.

5.3.3 The films according to A12 can, after manufacture, subsequently be oriented or not, as desired (column 6, lines 46 to 49; column 7 lines 3 to 7). Similarly, in A18, the multilayer film from the cooling roll is unoriented and becomes oriented after a subsequent treatment (page 9, lines 1 to 11). It is clear that an "unoriented" multilayer film is only an intermediate product in the manufacture of an oriented film.

5.3.4 A12 refers to linear low density polyethylene as a sealing layer, and also the common use of anti-blocking agents is mentioned (column 6, lines 9 to 11).

5.3.5 Therefore, without any technical effect of the claimed combination of features having been demonstrated, it forms an obvious alternative to the films according to A12.

5.3.6 Hence, Claim 1 does not involve an inventive step, so that auxiliary request 4 is not allowable.

6. *Auxiliary request 5*

No formal objections against auxiliary request 5 have been raised and the Board has no reason to take a different position.

6.1 Amendments

6.1.1 Compared to Claim 1 as granted, Claim 1 of auxiliary request 5 contains the terms: "coextruded" (line 1); and "wherein said film is a biaxially oriented shrink film having a thickness from 0.5 to 4 mils (0.013 to 0.1mm) after orientation and oriented by heating and stretching to realign the molecular configuration by a racking or blown bubble process at a racking ratio of between 3.0 and 5.0 times the original dimensions of the film in the longitudinal and transverse directions" (last 8 lines).

The term "coextruded", as applied to a multilayer film, has a basis in step a) of Claim 6 as filed as well as in the description, eg page 8, lines 16 to 24.

The additional features defined in the last 8 lines of Claim 1 have a basis in the application as filed on page 24, lines 2 to 4 (thickness of oriented films);

page 10, lines 9 to 16 and page 11, lines 1 to 4 (orientation); page 23, lines 12 to 16 (racking ratio).

6.1.2 Claims 2 to 5 correspond to Claim 2 to 5 as granted, which are identical to Claims 2 to 5 as filed.

6.1.3 Compared to Claim 6 as granted, Claim 6 of the present request contains the following features: "oriented multilayer shrink film having a thickness of from 0.5 to 4 mils (0.013 to 0.1mm)" (lines 1 to 3); and the further step " and d) heating the collapsed film to its orientation temperature range, and stretching and orienting the heated film at a racking ratio of between 3.0 and 5.0 times the original dimensions of the film in the longitudinal and transverse directions" (last five lines).

These amendments have a basis in the application as filed: page 10, lines 9 to 16; page 11, lines 1 to 4; page 23, line 12 to page 24, line 4.

6.1.4 Claims 7 and 8 correspond to Claims 8 and 9 as granted, which are identical to Claims 8 and 9 as filed.

6.1.5 Consequently, this request complies with Article 123(2) EPC.

6.2 Novelty

The novelty of the subject-matter of any of Claims 1 and 6 is not contested. The Board has no reason to take a different position.

6.3 Inventive step

6.3.1 The patent in suit now relates to oxygen barrier packaging films having a shrink feature imparted by orienting the film in machine and transverse directions at a specified racking ratio (page 2, lines 22 to 30).

6.3.2 Neither A12 nor A18 disclose shrink films. The processes of manufacture described in these documents foresee an annealing step (A12, column 3, lines 26 and 27; A18, Example, "heat set roll at 129°C", page 9, line 8), which, according to the patent in suit (page 2, lines 31 to 34), substantially relieves the shrinkability imparted by orientation, albeit retaining much of the advantages of the latter. The correctness of this statement was confirmed during the oral proceedings.

The films of A1, which should not show curling and wrinkling on the package surface, cannot represent the closest prior art disclosure of a shrink film either.

6.3.3 Since A18 addresses the problems related to orienting balanced multilayer films comprising a gas barrier core of ethylene vinyl alcohol copolymer sandwiched between layers of polyamide and suggests the use of biaxially stretching the film to improve its gas barrier properties, although it does not refer to shrink film, it may be seen as the closest prior art document for assessing the presence of an inventive step of the claimed subject-matter.

6.3.4 The problem underlying the patent in suit may now be seen as to provide a coextruded biaxially-stretched thermoplastic multilayer film having, in addition to the usually required properties, good shrinkability without the formation of voids in the barrier material, and which may be sealed at relatively low temperatures on both outer layers, in line with the patent specification (page 4, lines 5 to 11).

6.3.5 According to the patent in suit that problem is solved by a multilayer film comprising the features as defined in Claim 1.

From Examples 5 and 6 it appears that the films oriented at the claimed racking ratio exhibit good shrink properties, toughness, and optical properties as well as high oxygen barrier characteristics (page 10, lines 48 and 49). Moreover, the films are particularly useful in applications requiring good impact resistance and resistance to tear propagation. Their interply bond strengths are greater than the strengths of the plies themselves and the films also have useful odour barrier properties (page 11, lines 10 to 14). In this respect, the opponent has neither contested nor established that the problem stated above has not been successfully solved over the whole scope of Claim 1 in suit. Therefore, the above-defined problem is considered as having effectively been solved.

6.3.6 It remains to be decided whether the claimed subject-matter is obvious having regard to the documents on file.

A18 teaches that in order to improve the gas barrier properties of a coextruded film laminate, comprising at least a layer of polyamide and at least a layer of ethylene vinyl alcohol copolymer, the area of the laminate should be expanded not more than four times the original area. Moreover, A18 proposes to heat set the oriented film, which reduces or removes the shrinkability.

Hence, A18 does not hint at expanding the area of the laminate to 9 to 25 times the original area, as now claimed, nor does it suggest to impart shrink properties to the film laminate. Therefore, the claimed subject-matter is not obvious over A18 alone.

6.3.7 A1 and A12 cannot supplement the disclosure of A18 so as to arrive at the claimed subject-matter.

A1 aims at producing a three-dimensional object, which should shrink as little as possible. No biaxial stretching within the claimed ratio is disclosed in that document.

A12 prefers unbalanced oriented and heat set films. The stretching ratio, which preferably relates to uniaxial orientation (column 7, lines 7 and 8) does not go beyond that taught by A18, ie between 2.5/1 and 4/1, preferably 3/1 (A12, column 7, lines 54 and 55). Moreover, A12 suggests to use low stretching ratios for films having core layers made of ethylene vinyl alcohol copolymer (column 7, lines 55 to 59) and it teaches away from using higher stretch ratios in order not to lose adhesiveness between the layers (column 7, lines 44 to 46).

6.3.8 The other documents on file are less relevant; they have no longer been relied upon by the parties during the oral proceedings.

6.3.9 Therefore, the claimed subject-matter is not obvious.

6.3.10 This conclusion applies mutatis mutandis to the subject-matter of Claim 6, which concerns the manufacture of the film of Claim 1.

7. For the above-mentioned reasons, the subject-matter of auxiliary request 5 meets the requirements of the 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 maintain the patent with the set of Claims 1 to 8 indicated as auxiliary request 5 submitted during the oral proceedings and a description yet to be adapted.

The Registrar: The Chairman:

C. Eickhoff R. Teschemacher