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D E C I S I O N
of 15 September 2004

Case Number: T 0217/98 - 3.3.7

Application Number: 88304075.0

Publication Number: 0293098

IPC: B32B 27/10

Language of the proceedings: EN

Title of invention:
Improved non-foil composite structures for packaging juice

Patentee:
INTERNATIONAL PAPER COMPANY

Opponents:
01. AB Tetra Pak
02. Elopak Systems AG
03. SIG Combibloc GmbH & Co. KG
04. Setsuko Iino

Headword:
-

Relevant legal provisions:
EPC Art. 123(2), (3), 84, 83, 54, 56

Keyword:
"Amendments - added subject-matter (yes)(main request) - (no)(first auxiliary request)"
"Amendments - broadening of claims (no)"
"Claims - clarity (yes) (first auxiliary request)"
"Disclosure - sufficiency (yes)"
"Novelty - (yes)"
"Inventive step - (no)"

Decisions cited:
T 0409/91, T 0273/92, T 0327/92, T 0328/87

Catchword:
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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0217/98 - 3.3.7

D E C I S I O N
of the Technical Board of Appeal 3.3.7
of 15 September 2004

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Decision under appeal:
Decision of the Opposition Division of the European Patent Office posted 9 February 1998 revoking European patent No. 0293098 pursuant to Article 102(1) EPC.

Composition of the Board:

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

Summary of Facts and Submissions

I. Mention of the grant of European patent No. 0 293 098 in respect of European patent application No. 88 304 075.0, filed on 5 May 1988, claiming priority from an earlier application in the USA (55629 of 29 May 1987), was published on 22 February 1995. The patent was granted on the basis of seventeen claims, the independent claims reading:

"1. A container for liquids containing essential oils and/or flavours **obtainable by**:
(a) flame treating a paperboard substrate on both sides;
(b) placing on one side of the thus treated paperboard substrate a layer of molten LDPE by extrusion coating;
(c) extruding or coextruding onto the uncoated side of the paperboard substrate a sandwich layer of EVOH surrounded by tie layers, or one tie layer and EVOH, or EVOH alone, and corona discharge treating or flame treating the newly placed layer;
(d) extruding onto the tie layer-EVOH-tie layer sandwich layer, or the tie layer-EVOH layer, or the EVOH layer thus treated a very thin layer of LDPE; and
(e) heat sealing the thus obtained laminate from front to back (LDPE to LDPE) at conventional temperatures of 122°C to 260°C (250°F to 500°F)."

"12. A process for forming a container according to claim 1 which comprises the steps of:
(a) flame treating a paperboard substrate on both sides;
(b) placing on one side of the thus treated paperboard substrate a layer of molten LDPE by extrusion coating;
(c) extruding or coextruding onto the uncoated side of the paperboard substrate a sandwich layer of EVOH

surrounded by tie layers, or one tie layer and EVOH, or EVOH alone, and corona discharge treating or flame treating the newly placed layer;
(d) extruding onto the tie layer-EVOH-tie layer sandwich layer, or the tie layer-EVOH layer, or the EVOH layer thus treated a very thin layer of LDPE; and
(e) heat sealing the thus obtained laminate from front to back (LDPE to LDPE) at conventional temperatures of 122 to 260°C (250°F to 500°F)."

II. Four Notices of Opposition against the granted patent were filed, in which the revocation of the patent in its entirety was requested on the grounds of lack of novelty (Opponents 01 and 02) and inventive step (all four Opponents) as well as insufficient disclosure (Opponent 01) and extension of the subject-matter beyond that originally filed (Opponents 02 and 03), as set out in Article 100, paragraphs (a), (b) and (c) EPC.

The opposition was, *inter alia*, supported by the following documents:

D1: JP-A-61-108549
(D1a: English translation filed by Opponent 01)
(D1b: English translation filed by Opponents 02 and 03)

D2: US-A-4 513 036

D4: P.W. Ackermann et al., "Shelf life of citrus juices. A comparison between different packages", International Federation of Fruit Juice Producers, The Hague 1986

D8: Conference paper "High performance multiply films", 13 November 1986

D11: Conference proceedings Aseptipak '84, "Barrier Coextrusion coating as a foil replacement in paperboard lamination", 4-8 April 1984

D15: District Court for the Eastern District of Virginia, Richmond Division, Judge Spencer's Order and Memorandum Opinion dated 5 November 1991 in Civil Action No. 3:90CV00601

D16: International Paper Company's Proposed Exhibit List in Civil Action No. 3:90CV00601

D24: Proceedings of the COEX '85, Fifth Annual International Coextrusion Conference and Exhibition, October 9-11, 1985, pp. 137-161, "EVOH Coextrusion Coating and Laminating"

D26: JP-A-52-24928 (English translation)

III. In a decision issued in writing on 9 February 1998, the Opposition Division revoked the patent for lack of an inventive step. In particular, it was held that the claimed containers differed from the containers exemplified in D1 at most in that they did not contain an anchor coating layer, the paperboard substrate had been flame treated on both sides and the EVOH or tie layer in contact with the very thin layer of LDPE had been corona or flame treated. The generic teaching of D1 made it clear that those possible differences did not contribute to the solution of another meaningful technical problem than providing a multilayer container

for fruit juice having sufficient interlayer adhesion and hence D1 rendered the claimed subject-matter obvious.

Furthermore, according to the Opposition Division, the meaning of the feature "very thin" regarding the LDPE layer of step (d) of claim 1 did not clearly exclude a thickness of 30 μm, which value was disclosed in D1, so that "very thin" did not form a distinguishing feature. However, even if "very thin" had been regarded as a further distinguishing feature, the decision would not have been any different.

The argument that a public prior disclosure had taken place was rejected, since it could not be established that such disclosure, for which the burden of proof lay with the opponent, had effectively occurred.

The auxiliary request filed by the patent proprietor during the oral proceedings was refused pursuant to Rule 71a(2) EPC.

As regards the objections regarding added subject matter, insufficient disclosure and novelty, no decision was given. Instead, reference was made to the provisional opinion expressed in the communication accompanying the summons to oral proceedings.

IV. On 4 March 1998, the Proprietor (Appellant) lodged an appeal against the above decision and paid the prescribed fee on the same day. The Statement setting out the Grounds of Appeal was filed on 19 June 1998. It contained a declaration by Dr Pucci and a video film indicated as Exhibit A as well as a main (the claims as

granted) and five auxiliary requests (amended sets of claims).

By letter dated 19 April 2000, the Appellant filed further arguments and declarations by Dr Bushman, with two film specimens A and B, and a declaration by Dr Hotchkiss with attachments indicated as Tab 1 to Tab 12. Reference was also made to

D36: Polymer News, 1986, Vol.11, pp.264-271, "EVAL Resins: Ethylene Vinyl Alcohol (EVOH) Barrier Resins for Barrier Packaging Applications".

By letter of 2 August 2004, the Appellant filed new claims as the main request (the claims as granted) and fifteen auxiliary requests (amended sets of claims). Four further documents were cited as well.

V. In reaction to the appeal, Respondent 01 gave his counterarguments by letter of 23 February 1999, referring to Articles 54, 56, 83 and 123(2) EPC and filed two new documents, a declaration by Mr L. Löfgren as well as a numbering scheme for the documents cited thus far. By letter of 13 August 2004, Respondent 01 gave further comments, citing a number of decisions of the Boards of Appeal in relation to insufficient disclosure (T 409/91, OJ EPO 1994, 653) and inventive step (T 273/92 of 18 August 1993, not published in OJ EPO, and T 327/92 of 22 April 1997, not published in OJ EPO). A second declaration by Mr L. Löfgren was enclosed, as well as a fresh numbering scheme for the citations used in this case.

Respondent 02 replied by letter dated 4 January 1999, invoking Articles 54, 56 and 123(2) EPC and citing four new documents. In a letter dated 16 August 2004, further arguments regarding added subject-matter, public prior use and inventive step were given and a declaration of Mr A. Flom was enclosed.

Respondent 03 gave his arguments by letters of 3 March 1999 and 16 August 2004, referring to Articles 56 and 123(2) EPC.

Respondent 04 replied to the appeal with a letter dated 14 December 1998, based upon Articles 56 and 123(2) EPC.

Oral proceedings before the Board were held on 15 September 2004. During the oral proceedings, after discussion of the main request, the Appellant filed a new first auxiliary request and stated that the fifteen auxiliary requests already on file should be amended and renumbered accordingly. The main request consisted of the claims as granted. In the amended independent claims 1 and 12 of the first auxiliary request filed during the oral proceedings, "(0.7 mil [0.018 mm])" was added after "very thin" in step d.

VI. The Appellant's arguments given in writing and during the oral proceedings can be summarised as follows:

(a) The amendments to the claims were based on the original description.

Regarding the term "very thin", in its statement of grounds for the appeal the Appellant had stated that its meaning referred to a thickness of not

greater than 20 μm. During the oral proceedings, the Appellant argued that although throughout the patent specification the term "very thin" was indicated between brackets as being 0.7 mil, it was clear from claim 2, where that value was specified, that claim 1 was meant to be broader than that. "Very thin" referred to a certain range. The 0.7 mil served merely as an example of what was meant. The skilled person would not identify "very thin" with the specific value of 0.7 mil. According to the patent specification, the term "thin" could mean 17 to 26 μm, which range included 0.7 mil (18 μm), so that the upper limit of the range for "very thin" could not be above 26 μm. Its lower limit was as thin as possible with the invention still being effective. This interpretation was supported by the application as originally filed.

(b) There was no evidence on file that the skilled person would not be able to carry out the invention, the burden of proof for which lay with the Opponent.

(c) Regarding novelty, the Appellant pointed to five differences between the claimed subject-matter and D1, one of which was the very thin LDPE layer, which was thinner than that described in D1. Also, D1 did not disclose corona discharge or flame treatment of the paperboard and the EVOH layer.

As to the alleged public prior use invoked by Opponent 02, it was contested that it had taken place and it was pointed out that no evidence

whatsoever had been filed to support the allegation.

(d) D1, D2 and D26 all came into consideration as a starting point for the assessment of inventive step. They each differed from the claimed subject-matter in several aspects.

D2 showed the smallest number of differences from the claimed subject-matter and also concerned the same problem as the patent in suit: the migration of essential oils and flavours, in particular in fruit juice, from the contents of the container into and through it. That problem had been solved by the claimed container, as demonstrated by the examples of Table 1 in the patent in suit, where a direct comparison with a laminate according to D2 showed an improvement of more than 50%. The presence or not of Plexar in the laminate did not contribute to the solution of the migration problem and it should be assumed that a tie layer had no effect in that respect.
D2 disclosed a laminate with a polypropylene layer instead of an EVOH layer without any hint to replace the polypropylene by EVOH, so that D2 did not render the claimed subject-matter obvious.

D1 referred to a different problem from the patent in suit. It also consistently mentioned the use of a much thicker LDPE inside layer than now claimed. Therefore, the skilled person would not have combined D1 with D2 in order to solve the migration problem. Moreover, D1 disclosed a long list of several different polymers that could

possibly be used and it could only be with hindsight that the skilled person would choose EVOH to replace polypropylene in the laminate of D2.

D26, which disclosed the use of two barrier layers in the form of two different types of EVOH layer, also contained no reference to the absorption properties of the laminate and hence to the problem the patent in suit sought to solve.

Hence, those documents contained no hint to replace the polypropylene layer in the laminate disclosed in D2 by EVOH, in order to resolve the problem described in the patent in suit: the loss of flavour and the migration of essential oils.

VII. The Respondents' arguments given in writing and during the oral proceedings can be summarized as follows:

(a) Regarding the amendments, the expression "very thin" was unclear by itself. In the patent specification it was used interchangeably with "thin". The value of 0.7 mil between brackets was consistently given after "very thin" in the patent specification. If that expression was meant to refer to a range, the limits of that range were not clear. The value between brackets served however to stipulate more precisely what was meant by "very thin", so that including "very thin" in the claims without the value of 0.7 mil between brackets contravened Article 123(2) EPC.

In addition, other amendments to the claims were not based on the application as originally filed, such as the combination of a tie layer in general with a flame or corona treatment. Such a treatment had only been disclosed for Plexar as the tie layer. Respondent 02 also objected to the deletion of a number of limitations that had been present in the original claims.

(b) As regards insufficient disclosure, Respondent 01 had stated in writing that the claims included containers in which the "very thin" LDPE layer was too thin to provide the benefits which the Appellant asserted. During the oral proceedings Respondent 01 referred to its written arguments. None of the other parties wished to express itself on this issue anymore, but the objection was maintained.

(c) Regarding novelty, depending on the interpretation of "very thin" or "very thin (0.7 mil)", the thickness of the LDPE layer might differ from the value of 30 μm given in the Examples of D1. Nevertheless, the skilled person would seriously contemplate to reduce the thickness of the inner LDPE layer to below 30 μm.

Respondent 02 maintained its allegation that a laminate according to present claim 1 had been the subject of public prior use, referring to D15 as evidence.

(d) As regards inventive step, any difference between the known process features and those of the

claimed subject matter needed only be taken into account in so far as it resulted in a different product.

D2, which aimed at replacing aluminium foil, referred to the same problem as the patent in suit but it did not mention EVOH as a possible barrier layer. However, it was a well-known phenomenon that new materials would be used when they became available and the desirable barrier properties of EVOH were known from several of the cited prior art documents. Therefore, in order to improve the barrier properties of the laminate, it was obvious to replace the PP layer of D2 by an EVOH layer, as now claimed.

D26 also concerned the migration of oils, or flavour, from the contents of the container and of gas into them. The laminate described in D26 was structurally close to that used for the claimed container; it only lacked an outer LDPE layer and described an EVA layer between the EVOH and inner LDPE layers. However, not only the number of differences was important, but also their relationship with the problem to be solved. The presence or absence of an outer LDPE layer contributed nothing to the migration problem concerning the contents of the container. Nor did a corona discharge or flame treatment, which rather referred to improving the adherence between layers. If the latter was seen as the problem to be solved, the skilled person would apply well-known measures such as surface treatment or the use of tie layers. EVA with its barrier function

also served as a tie layer. Therefore, the claimed subject-matter was also not inventive starting from D26 as the closest prior art.

D1 likewise concerned migration problems regarding oxygen, fruit juice and flavours. Starting from this document, the problem to be solved could be formulated as finding an alternative container. The container according to D1 differed from the claimed container in the thickness of the inner LDPE layer. However, the use of thinner layers was mentioned in D1 and was also known from D2. The application of surface treatments when necessary was nothing special. Therefore, D1 rendered the claimed subject matter obvious as well.

It was clear that on any basis no inventive step was present.

VIII. The Appellant (Proprietor) requested that the decision under appeal be set aside and that the patent be maintained as granted (main request) or, alternatively, on the basis of the first auxiliary request as submitted during the oral proceedings or on the basis of any of the fifteen auxiliary requests submitted with the letter dated 2 August 2004, with the proviso that the independent claims be modified in the same way as claims 1 and 12 of the first auxiliary request submitted during the oral proceedings.

The Respondents (Opponents) requested that the appeal be dismissed.

Reasons for the Decision

Admissibility of the appeal

1. The appeal is admissible.

Main request

Amendments

2. During the examination procedure the claims as filed underwent major changes. However, a number of unclarities present as from the beginning were not remedied and new serious unclarities (a "very thin" layer of LDPE) were even introduced. Since Article 84 EPC is not a ground for opposition, the examination phase is the only possible time at which its requirements can be seen to. It is the Examining Division's task to make sure that this requirement is observed in the public interest to have legal certainty regarding the scope of the claims. However, this is without prejudice to the Applicant's responsibility for the formulation of the subject-matter being claimed (Article 113(2) EPC). Therefore, if an Applicant chooses to use an unclear formulation, he should expect that its interpretation, usually on the basis of the description, may not always be to his advantage.

3. In the present case, a basis for the amended claims as they have been granted can be found on page 5, third to fifth paragraph, of the original application. Any formulation that is broader than in the original claims (such as the deletion of the words "thin" and "outer" in step b)), is supported by this passage, so that

Article 123(2) EPC is complied with in this respect. The replacement of the "Plexar layer" by the more general "tie layer" is supported by several passages in the original application (page 3, second paragraph; page 7, first paragraph; page 13, second full paragraph; original claims 2, 7, 12, 15, 16, 19) from which it appears that other materials than Plexar can also be used and that "Plexar layer" and "tie layer" are used interchangeably.

Article 123(3) EPC, which forbids the amendment of claims of the European patent in such a way as to extend the protection conferred, applies to amendments carried out after grant and is not applicable to amendments made during the examination phase of the application, so that the objections of Respondent 02 in that respect cannot be followed.

3.1 In the above-cited passages there is no indication of the thickness of the LDPE layer of step (d), the basis for which can be found on original page 7, last paragraph, where it says: "Provided is a very thin (0.7 mil) product-contact layer of LDPE …". Claim 1 as granted does not contain any reference to the value of 0.7 mil in relation to the term "very thin". Therefore, it has to be decided whether the introduction of the term "very thin" as such in claim 1, without any indication of the value of 0.7 mil, contravenes Article 123(2) EPC. To that end, the meaning of "very thin" has to be clarified.

3.2 An important part of the written as well as the oral discussion was about the meaning of the term "very thin". Various possible interpretations were offered by

the parties, showing that the expression was undeniably unclear.

From the wording of claim 1 as granted, no indication can be obtained as to the exact meaning of "very thin" in step d). However, claim 2 gives specific values for the thickness of the layer of molten LDPE (0.020 mm/0.8 mil), the EVOH layer (0.005 to 0.018 mm/0.2 to 0.7 mil) and the very thin layer of LDPE (0.018 mm/0.7 mil). Since claim 2 is appended to claim 1, it indicates preferred embodiments within the broader scope of claim 1. Therefore, the thickness of the "very thin" LDPE layer of claim 1 must be greater than the value of 0.7 mil indicated in claim 2. It remains to be seen if there is support for that amendment, thus interpreted, in the application as originally filed.

3.3 Throughout the original description, various indications of the thickness of layers can be found. On page 1, last sentence (page 2, line 17 of the patent specification), a liquid-contact LDPE layer of 1.5 mil is indicated as "thick". On page 7, last paragraph, last sentence (page 4, line 44 of the patent specification), a product-contact LDPE layer of 0.7 mil is named "very thin". A "very thin" LDPE layer of 0.8 mil is mentioned on page 12, lines 1 to 2 and in the second paragraph (page 5, lines 54/55 and page 6, line 6 of the patent specification), but that layer is not situated on the EVOH layer(s). Referring to Figure 6, on page 12, first paragraph, last sentence, (page 6, line 3 of the patent specification), a "very thin" LDPE layer extrusion coated on EVOH layer(s) of 0.7 mil at the interior of the laminate is described. Therefore, consistently throughout the patent

specification, the use of the term "very thin" is linked to a thickness of 0.7 mil for the LDPE layer situated on the EVOH layer(s), which is the inner or product-contact side of the container. Other values that have been mentioned refer to the outer LDPE layer which has a different function from the inner LDPE layer. Terms like "thin" and "thick" being relative, the same value can be "thin" for one purpose and "thick" for another, so that it is not appropriate to draw any conclusions regarding the inner LDPE layer based on thicknesses referring to the outer LDPE layer. In view of this, the Board comes to the conclusion that the term "very thin" is closely linked to a thickness of 0.7 mil.

3.4 In view of the above, there is no basis in the original application for leaving out "(0.7 mil)" when introducing the term "very thin" into claim 1, which introduction is based on original page 7, last paragraph. Therefore, the claims as granted do not comply with Article 123(2) EPC and the main request has to be refused.

First auxiliary request

Amendments

4. Compared with the claims as granted (main request), the first auxiliary request filed during the oral proceedings contains the value of 0.7 mil between brackets after "very thin", which is based upon original page 7, last paragraph. Therefore, the objection due to which the main request was not allowed

(point 3.1 to 3.4 above) does not apply and the requirements of Article 123(2) are fulfilled.

Clarity

5. As a consequence of the introduction of "(0.7 mil)" after "very thin", claim 1 has become as clear as the original description allows. In line with the standard practice at the EPO to indicate a precise value that may however vary somewhat e.g. due to tolerances or measuring errors, "very thin (0.7 mil)" should be understood as "about 0.7 mil". Hence, the Board considers Article 84 EPC to be complied with.

Sufficiency of disclosure

6. The question whether the claimed subject-matter is disclosed in a way sufficient to enable the skilled person to carry it out (Article 83 EPC) should be considered in the light of what is claimed. This is in conformity with Decision T 409/91 *supra*, which says (Reasons, point 2) that "in order to fulfil the requirement of Article 83 EPC, the application as filed must contain sufficient information to allow a person skilled in the art, using his common general knowledge, to carry out the invention within the whole area that is **claimed**." (emphasis added). In the present case, it has not been contested that the claimed container can be produced. The objection rather refers to the possibility that the very thin LDPE product-contact layer is too thin for the benefits which the Appellant asserts to be achieved.

The definition of the container in claim 1 does not contain any specification of benefits to be realised by it, which are indicated in the description. Therefore, any advantages of the claimed container do not form part of the definition of the claimed subject-matter but rather refer to the effectiveness of the solution of the problem that the patent seeks to solve. That question however arises under Article 56 EPC, not under Article 83 EPC. Since there is no indication that the skilled person could not prepare containers according to claim 1, the Board considers the requirements of Article 83 EPC to be fulfilled.

Novelty

Public prior use

7. In support of its argument of public prior use, Respondent 02 relied on two documents (D15 and D16) resulting from a "civil action" that had taken place in the United States. D15 is an order given by a District Court, D16 a list of exhibits. Respondent 02 argued that the Board should follow the court order. However, each court has to decide the case before it on the basis of the facts and evidence on file and has to come to a conclusion independently. In the case of the validity of patents, this is particularly expressed in the principle of the mutual independence of patents obtained for the same invention in various countries, as embodied in Article 4^{bis} of the Paris Convention. Therefore, for this reason already it is not acceptable to expect the Board to follow D15 blindly. In addition, the US court order has been given in an entirely different legal environment and was based upon claims

that are not known to the Board and that may differ from the present claims in more or less essential features.

In order to form an autonomous judgement, the Board needs the facts and evidence that could support the alleged public prior use (See Decision T 328/87, OJ EPO 1992, 701, Reasons point 3.3). However, no such facts and evidence have been presented. D16 only lists a number of exhibits that are not available to the Board and from which it is not even clear what exactly had been, allegedly, made available to the public and when that would have been the case. Therefore, the Board considers the argument of public prior use unfounded.

Documents

8. D1b discloses a laminate prepared by coextrusion moulding a gas-barrier resin having an oxygen permeation rate of 50 cc/m^2.24hr.atm or below at 23°C under dry conditions and a substantially odourless polyolefin resin at 140 to 290°C and laminating said gas-barrier resin layer to a substrate, said gas-barrier resin layer having a thickness of 1 to 30 μ, said polyolefin resin layer having a thickness of 10 to 200 μm (claim). In Example 2 a laminate is specified that, from the outside to the inside, is composed as follows: LDPE (15μm)/paper/LDPE (15μm)/anchor coating agent/EVOH (15μm)/modified polyethylene (15μm)/LDPE (30μm). Although in claim 1 and on page 4, first paragraph, a possible thickness of the inner LDPE layer of 10 to 200 μ is mentioned and corona treatment is referred to on page 2, last paragraph, the specific combination of features of the container of present

claim 1 is not disclosed (see point 15 below). Therefore, D1b does not prejudice the novelty of the claimed subject-matter.

Since none of the other documents on file discloses a container as now being claimed either, the claimed subject-matter according to the auxiliary request is novel.

Inventive step

9. The patent in suit concerns improved non-foil composite structures for packaging juice. It aims at an improvement of containers for liquids containing essential oils and/or flavours, in particular at improving the retention of essential or flavour oils in citrus and other juices as well as the barrier resistance to oxygen which causes the juice to lose vitamin C (page 2, lines 3 to 8, 40 to 54; page 3, lines 23 to 25 and 41 to 43; page 5, lines 2 to 13).

10. Both D1b and D2 refer to containers made from such non-foil composite structures. D26 describes a laminate for forming paper cups.

10.1 D1b (point 8 above) seeks to solve the problem of odour or taste migration from the laminate forming the container into the contents of the container, such as fruit juice (page 3, first two full paragraphs).

10.2 The aim of D2 is to reduce the diffusion of essential oils and flavours contained in fruit juices through the inner coating into the paperboard layer without the use of a metal foil (column 1, lines 6 to 31). To that end

it discloses a container for liquids containing essential oils and/or flavours constructed from a laminate comprising an outer paperboard layer, a layer of propylene polymer coated on an inner surface of said paperboard layer, a propylene polymer layer having an inner surface which has been treated to enhance adhesion, and a heat sealable layer of an olefin polymer coated on said treated inner surface of said propylene polymer layer (claim 1). The polypropylene surface can be treated by corona discharge or flame treatment (claims 2 and 3). Alternatively, for better adhesion an adhesive layer such as one made of ethylene methacrylate copolymer, can be present between the polypropylene and the olefin layer (claims 4 and 5). The polyethylene layer overlaying the polypropylene layer is preferably heat-sealable and, more in particular, a low density polyethylene (column 3, lines 42 to 48). Another layer of low density polyethylene may be applied to the other side of the cardboard paper layer in order to impart heat-sealability and gloss (column 3, lines 56 to 65). A container prepared from a laminate comprising from the outside to the inside 7.8 pounds per ream polyethylene, 0.024 milk carton stock, 10 pounds per ream of extrusion coating grade polypropylene and 10 pounds per ream low density polyethylene, is mentioned in column 4, line 66 to column 5, line 4; its barrier properties are given in Table I (column 5).

10.3 D26 describes a four-layered laminate film for forming paper cups, comprising a laminate of four layers consisting of paper for forming paper cups, a layer of highly saponified ethylene-vinyl acetate copolymer having an ethylene content of 20 to 50 mole% and a

saponification degree of 90% or more, a layer of partially saponified ethylene-vinyl acetate copolymer having an ethylene content of 40 to 90 mole% and a saponification degree of less than 90%, and a polyolefin resin film (claim). D26 aims at paper cups having high various mechanical strengths, good barrier properties and good thermal and mechanical characteristics (page 2, fifth full paragraph). In Example 2 a cup is specified formed of a laminate of a corona discharge treated raw paper, coated with an EVOH layer of 20 μm. An LDPE film was also corona discharge treated and that side was in contract with an EVA layer of 15 μm. In Example 2 the inner polyethylene resin layer has a thickness of 10 μm.

10.4 Although the problem described in D1 is somewhat similar to the patent in suit, it refers to the migration of ingredients from the container into its contents whereas D2, like the patent in suit, addresses the problem of flavour loss due to migration from the contents into and through the container. D26 on the other hand does not directly refer to migration problems regarding fruit juice flavours. Furthermore, the patent in suit does not contain any comparative examples regarding D1 or D26 whereas D2 is represented in the laminate of Figure 4 (patent in suit, Table 1 and Figure 4), which is an indication that D2 was used as a starting point to arrive at the claimed subject-matter rather than D1. Therefore, the Board considers D2 to be the closest prior art for assessing the presence of an inventive step (see also Case Law of the Boards of Appeal of the European Patent Office, 4th edition, 2001, I.D.3.1 and 2).

11. The examples of the patent in suit (Table 1) show that a laminate as claimed (the last one in the table) has superior properties as regards loss of essential oil and of vitamin C as compared to other laminates, in particular that of D2 (one before last) and a reduced loss of essential oil compared to a laminate containing a metal foil (second in the table). Therefore, it can be concluded that the above-defined problem, to improve containers for liquids containing essential oils and/or flavours, in particular the retention of essential or flavour oils in citrus and other juices as well as the barrier resistance to oxygen which causes the juice to lose vitamin C, has been effectively solved by the laminate specified in Table 1, which contains an EVOH layer positioned between two Plexar layers. Since there is no evidence that the same effect cannot also be achieved with other embodiments encompassed by the claims (e.g. with other material as adhesive layers or with only one adhesive layer or without any adhesive layer at all), and in the light of the statement by the Appellant that the presence of Plexar does not contribute to the solution of the migration problem, the Board accepts that the above-defined problem is effectively solved within the whole scope of the claims.

12. It remains to be decided if the claimed solution was obvious in the light of the documents on file.

12.1 D2 solves the problem of diffusion of essential oils and flavour through a container without using a metal foil layer by a container made of a laminate which, in a preferred embodiment, has the order LDPE/cardboard/PP/LDPE (Table I). The laminate forming the present container, in one of its possible

embodiments, has the order LDPE/cardboard/EVOH/LDPE (Figure 7). The thickness of the inner LDPE layer of D2 is indicated to be 10 pounds/ream (column 5, lines 3 and 4). This corresponds to the thickness indicated in original claims 12 and 16, page 6, last line, and page 11, second paragraph, last line, as well as in the patent in suit on page 5, lines 44 to 52, in particular line 52, where a thickness of "4.5 kg (10 lbs.)" is disclosed for the inner LDPE layer. Claims 8 and 13 and page 4, line 31, as granted also mention a thickness of 10 lbs. for the inner LDPE layer (the reference to 3.7 kg, which was added during the examination phase, is obviously wrong). Therefore, the only structural difference between the patent in suit and D2 is the use of EVOH instead of PP, so that the question to be answered is if, in the light of the prior art, it was obvious for the skilled person to replace the polypropylene of D2 by EVOH in order improve the laminate properties as regards loss of essential oils and of vitamin C.

12.2 The barrier properties of EVOH have been known for some time before the priority date of the patent in suit and are described in several of the documents on file.

12.3 In D1b, Example 2, a layer of EVOH is present on the inside of the laminate, separated from the contents of the container by an LDPE layer. The gas-barrier properties of EVOH and some other polymers are described on page 4, second and third full paragraphs, in relation to oxygen.

12.4 D4 discusses the possible interactions between food and packaging material: migration from the packaging

material into the food, permeation through the packaging material and absorption from the food into the packaging material (page 145, Figure 2). It also mentions the relationship between oxygen permeation and the oxidative degradation of orange juice components, the loss of vitamin C being an indicator of that (page 147, point 3.2, first paragraph).

12.5 D8 describes high performance multiply plastic films, in particular coextruded films of EVOH, which material is described as a high barrier material (Chapter 2 of the part of Dr Suggate). In Table 1 its oxygen barrier properties are specified and in the second full paragraph below Table 1, its excellent barrier properties to other gases, aromas, flavours and many chemicals including hydrocarbons, ethers, benzene derivatives and many other organic derivatives are mentioned. The EVOH layer can be used in combination with LLDPE layers to which it is adhered by means of tie layers (page 13, point 3).

12.6 D11, page 126, third full paragraph, mentions EVOH as a core layer (non food contact) in container thicknesses greater than 5 mils. On page 127 the oxygen and water vapour permeability of EVOH are specified (Table 3).

12.7 In D24, EVOH is mentioned as the premier high gas-barrier resin in film, sheet and bottle coextrusion. It may be coextruded with LDPE and then laminated onto oriented nylon film (page 139, first and third full paragraphs). Coextrusion coating and laminating with EVOH adds high gas-barrier to the combined characteristics given by conventional extrusion coating and laminating. Compared with other polymers, this

composite has higher gas-barrier and better flavour retention (page 140, first full paragraph). In the conclusion (page 148, point 7) it is stated that the technology will be developed not only for foods, but also for other packaging applications.

12.8 D36 discusses the properties of various grades of EVOH resins, e.g. their gas permeability (page 267, Table II). On page 268, under "Fragrance and Odor Protection" it is stated that "packaging structures containing EVOH resins as barrier layer are highly effective in retaining fragrances and preserving the aroma of the package contents." Packaging structures with and without EVOH layer are compared in Table VI (page 268), as regards their aroma retention of various components. Figure 4 shows a number of structures in which EVOH is combined with various other polymers, amongst which PP and PE; Table VII lists a number of applications, amongst which the packaging of juices is mentioned.

12.9 Since it was known that oxygen permeation is an important reason for the loss of vitamin C (D4; patent in suit, page 5, lines 10 to 11) and also that EVOH provided an excellent barrier against oxygen (D1b, D8, D11, D24, D26, D36) as well as being effective in retaining flavours and aromas (D8, D24, D36), it was obvious for the skilled person, when confronted with the problem of improving the laminate properties as regards loss of essential oils and vitamin C, to replace the PP in the laminate of D2 by EVOH.

13. The other differences between the claimed container and D2 refer to process features rather than structural

features, in particular to the flame treatment of both sides of the paperboard layer and the corona discharge or flame treatment of the EVOH layer. However, surface treatment does not directly contribute to the solution of the above-defined problem, it rather serves the improvement of adhesiveness between the laminate layers. Moreover, the enhancement of adhesiveness between laminate layers by means of surface treatment or of an intermediary layer of a suitable material (e.g. ethyl methacrylic acid copolymer) is mentioned in D2 (column 4, lines 3 to 29) as well as in D1b (page 2, last paragraph; paragraph bridging pages 6 and 7; examples) and in D26 (page 2, last full paragraph). Therefore, those features cannot render the claimed subject-matter inventive.

The same is valid for the sealing step (e), which does not contribute to the solution of the above-identified problem, nor does it present any special features that were not previously known (e.g. D2, column 1, line 47 to column 2, line 6; column 3, line 41 to column 4, line 2; D1b, page 14: "Evaluation"; D26, page 7, second last paragraph).

14. For the above reasons, the claimed subject-matter is not inventive.

15. Although it is not necessary to give a second reasoning when the Board arrives at a negative conclusion as regards inventive step, it is nevertheless observed that no other result would have been obtained had the Board followed the Appellant's line of argument and started from D1b as the closest document.

In that case, an important difference from the laminate described in D1b, Example 2, would have been the use of an LDPE layer of 0.7 mil (18 μm) instead of 30 μm. Since no advantage or surprising effect has been demonstrated due to the use of such a thin inner LDPE layer, the problem to be solved would have been to provide an alternative laminate suitable for use in fruit juice containers. Although the Appellant has argued that a prejudice existed against the use of such thin LDPE layers, D1b itself mentions the use of layers as thin as 10 μm, with a preferred range of 15 to 100 μm (page 6, first paragraph). D26, too, discloses an inner LDPE layer of 10 μm (Example 2). Therefore, this argument is not convincing. Regarding the surface treatment and sealing steps, the same is valid as above (point 13), so that also following this reasoning, no inventive step can be attributed to the claimed subject-matter either.

Auxiliary requests filed with letter dated 2 August 2004, with amendments indicated during the oral proceedings

Amendments

16. The first claims of the first to seventh auxiliary requests filed with letter dated 2 August 2004, in which "(0.7 mil [0.018 mm])" was introduced along the lines of the first auxiliary request filed during the oral proceedings, are product-by process claims.

16.1 The first of the fifteen auxiliary requests of 2 August 2004 differs from the first auxiliary request filed during the oral proceedings in that the words "thin outer" have been added before the LDPE layer of

step (b). Since the meaning of "thin" has not been specified, that amendment renders the claim unclear and hence unallowable already for that reason (Article 84 EPC). Moreover, "thin" does not contribute anything to the solution of any of the above-defined problems (points 9 and 15 above) (Article 56 EPC). Hence, that request is not allowable.

16.2 Claim 1 of the second auxiliary request of 2 August 2004 differs from that of the first auxiliary request filed during the oral proceedings in that the EVOH layer should now always be surrounded by tie layers. There is no experimental evidence that the obligatory presence of tie layers surrounding the EVOH layer would contribute to the solution of the above-defined problem to be solved. Indeed, according to the Appellant, the presence of Plexar layers in the laminate did not contribute to the results regarding the loss of vitamin C and essential oils and tie layers were assumed not to have any effect regarding vitamin C and essential oil retention. This is in conformity with the information given in D26, in which a combination of the highly saponified ethylene vinyl acetate copolymer as a gas barrier layer and a partially saponified ethylene vinyl acetate copolymer as an adhesive layer is used, and in which it is stated (page 3, first full paragraph) that a saponification degree of less than 90% leads to a poor gas barrier property. Therefore, the Board concludes that the tie layers merely serve to improve adherence between the layers, so that the reasoning given regarding the features discussed in point 13, first paragraph, above, also apply in this case (Article 56 EPC).

16.3 Claim 1 of the third auxiliary request of 2 August 2004 differs from the previous request in that the words "thin outer" have been added before the outer LDPE layer of step (b), so that the reasons given under point 16.1 and point 16.2 apply here as well (Articles 84 and 56 EPC).

16.4 Claim 1 of the fourth auxiliary request of 2 August 2004 has been rearranged in a way that casts doubt on its clarity. It has also been restricted in that the container should now "consist" of the layer structure LDPE/paperboard substrate/tie-EVOH-tie or tie-EVOH or EVOH/very thin (0.7 mil [0.018 mm]) LDPE. However, such a restriction does not change the reasons given above (points 12 and 13) for refusing the first auxiliary request filed during the oral proceedings. Therefore, apart from the clarity issue, this request lacks an inventive step (Articles 84 and 56 EPC).

16.5 Claim 1 of the fifth auxiliary request of 2 August 2004 has the same wording as the fourth auxiliary request with the words "thin outer" before the outer LDPE layer of step (b), so that the arguments regarding the fourth and the first auxiliary request of 2 August 2004 are also valid for this set of claims (points 16.1 and 16.4 above) (Articles 84 and 56 EPC).

16.6 Claim 1 of the sixth auxiliary request of 2 August 2004 differs from that of the fourth auxiliary request in that the EVOH layer should now always be surrounded by tie layers. Therefore, the arguments regarding the second auxiliary request of 2 August 2004 apply as well (points 16.2 and 16.4 above) (Articles 84 and 56 EPC).

16.7 Claim 1 of the seventh auxiliary request of 2 August 2004 has the same wording as the sixth auxiliary request with the words "thin outer" before the LDPE layer of step (b), so that the same arguments apply as those concerning the sixth and the first auxiliary requests of 2 August 2004 (points 16.6 and 16.1 above) (Articles 84 and 56 EPC).

17. The first claims of the eighth to fifteenth auxiliary requests of 2 August 2004 are process claims which correspond to the first claims of the previous auxiliary requests which are product-by-process claims. However, in spite of the fact that the claims now do not refer to products anymore, considering that the process features in the product-by-process claims and in the process claims are the same, the arguments given with regard to the product-by-process claims are still valid.

In particular, the arguments regarding a lack of inventive step given for the first auxiliary request, also apply to the eighth auxiliary request (Article 56 EPC; points 9 to 15 above).

The ninth and eleventh auxiliary requests, like the first auxiliary request of 2 August 2004, contain the unclear term "thin outer" (Article 84 EPC; point 16.1 above).

The subject-matter of the tenth auxiliary request of 2 August 2004 is not inventive for the same reasons as given for the second auxiliary request of 2 August 2004 (Article 56; point 16.2 above).

The subject-matter of the twelfth and fourteenth auxiliary requests of 2 August 2004, like the fourth auxiliary request, is unclear and lacks an inventive step (Articles 84 and 56 EPC; point 16.4 above).

The thirteenth and fifteenth auxiliary requests of 2 August 2004 differ from the twelfth and fourteenth auxiliary requests of 2 August 2004, respectively, in that the word "thin" has been added before the LDPE layer first mentioned in the structure. Since the meaning of "thin" has not been specified, that amendment renders the claimed subject-matter unclear (Article 84 EPC). Moreover, it does not contribute anything to the solution of any of the above-defined problems (point 16.4 above) (Articles 84 and 56 EPC). Hence, those requests are also not allowable.

18. In view of the above, the Board comes to the conclusion that none of the requests on file is allowable.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

C. Eickhoff R. E. Teschemacher