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**D E C I S I O N**  
of 15 December 1995

**Case Number:** T 0292/94 - 3.2.1

**Application Number:** 87301665.3

**Publication Number:** 0245921

**IPC:** B65D 5/00, B23B 27/10

**Language of the proceedings:** EN

**Title of invention:**  
Heat sealable barrier material for improved juice packaging

**Patentee:**  
International Paper Company

**Opponent:**  
(01) Enzo-Gutzeit Oy  
(02) AB Tetra Pak  
(03) PKL Verpackungssysteme GmbH

**Headword:**  
-

**Relevant legal provisions:**  
EPC Art. 56, 100(b)

**Keyword:**  
"Sufficiency of disclosure (yes)"  
"Inventive step (yes)"

**Decisions cited:**  
-

**Catchword:**  
-



Case Number: T 0292/94 - 3.2.1

**D E C I S I O N**  
of the Technical Board of Appeal 3.2.1  
of 15 December 1995

**Appellant:**  
(Opponent 02)

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**Representative:** Perry, Robert Edward  
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**Decision under appeal:** Interlocutory decision of the Opposition Division  
of the European Patent Office posted 8 February  
1994 concerning maintenance of European patent  
No. 0 245 921 in amended form.

**Composition of the Board:**

**Chairman:** F. Gumbel  
**Members:** S. Crane  
B. Schachenmann

### Summary of Facts and Submissions

- I. European patent No. 0 245 921 was granted on 8 May 1991 on the basis of European patent application No. 87 301 665.3.
- II. Oppositions against the granted patent were filed by opponents 01 to 03 on the grounds that the subject-matter of the patent lacked inventive step (Article 100(a) EPC) and that there was insufficiency of disclosure (Article 100(b) EPC). They requested that the patent be revoked in its entirety.

In the course of the opposition proceedings the opponents relied upon a total of 32 citations of which only the following have played any significant role in the appeal proceedings:

- (D1) US-A-4 513 036,
- (D5) Takahashi, World Packaging Congress, Paris, November 12-13, 1984, "High Gas Barrier Material EVAL",
- (D6) Foster, Coex' 1984 Proceedings (September 19-21, 1984), pages 163-183,
- (D16) Kuraray EVAL Resin, 1984,
- (D18) TAPPI Proceedings, 1982 Paper Synthetics Conference, pages 339-346, Iwanami et al., "Ethylene vinyl alcohol resins for gas barriers packaging material",
- (D20) Packaging, September 1984, pages 55-60,

(D21) Imballagio, vol. 36, No. 361, March 1986,  
pages 43-49,

(D22) US-A-4 082 854.

III. With its interlocutory decision given at oral proceedings on 25 January 1994 and issued in writing on 8 February 1994 the Opposition Division held that the patent was to be maintained in amended form on the basis of Claims 1 to 21 filed on 29 September 1992.

Independent Claims 1, 6 and 19 of this set of claims read as follows:

1. "A container for liquids containing essential oils and/or flavours, said container being constructed from a laminate comprising:

a) a paperboard substrate having an outer surface and an inner surface;

b) an outer layer of a heat-sealable low density polyethylene polymer coated on said outer surface of said paperboard substrate;

c) an inner layer of a heat-sealable low density polyethylene polymer coated on said inner surface of said paperboard substrate; and

d) a liquid-contact layer of gas barrier ethylene vinyl alcohol copolymer heat-sealable with the outer layer of low density polyethylene on conventional equipment at temperatures ranging from 121°C - 260°C (250°F - 500°F), extrusion coated on the surface of said inner layer of said polyethylene polymer remote from the

paperboard substrate, and acting as a barrier to the transit of oxygen and essential oils and flavours therethrough."

"6. "A container for liquids containing essential oils and/or flavours, said container being constructed from a laminate comprising:

a) a paperboard substrate having an outer surface and an inner surface;

b) an outer layer of a heat-sealable low density polyethylene polymer coated on said outer surface of said paperboard substrate;

c) an inner layer of a heat-sealable low density polyethylene polymer coated on said inner surface of said paperboard substrate;

d) an oxygen barrier material layer coated on the surface of said inner layer of said polyethylene polymer remote from the paperboard substrate;

e) a tie layer coated on the surface of said oxygen barrier material remote from the inner layer of polyethylene polymer; and

f) a liquid-contact layer of gas barrier ethylene vinyl alcohol copolymer extrusion coated on the surface of said tie layer remote from oxygen barrier material layer, heat-sealable with the outer layer of low density polyethylene on conventional equipment at temperatures ranging from 121°C - 260°C (250°F - 500°F), and acting as a barrier to the transport of oxygen and essential oils and flavours therethrough."

"19. A container for liquids containing essential oils and/or flavours, said container being constructed from a laminate comprising:

a) a paperboard substrate having an inner surface and an outer surface;

b) an outer layer of a heat-sealable gas barrier ethylene vinyl alcohol copolymer low density polyethylene blend coated on said outer surface of said paperboard substrate;

c) an inner layer of a heat-sealable low density polyethylene polymer coated on said inner surface of said paperboard substrate; and

d) a liquid contact layer of a gas barrier ethylene vinyl alcohol copolymer coated on the surface of said inner layer of said polyethylene polymer remote from the paperboard substrate, heat sealable with the outer layer of low density polyethylene on conventional equipment at temperatures ranging from 121 to 260°C (250 - 500°F), and acting as a barrier to the transport of oxygen and essential oils and flavours therethrough."

Dependent Claims 2 to 5, 7 to 18 and 20 and 21 relate to preferred embodiments of the container defined in Claims 1, 6 and 19 respectively.

IV. Opponents 02 and 03 (henceforth first and second appellants) filed appeals against this decision on 7 April 1994 and 9 April 1994 respectively.

The respective appeal fees were paid at the same time as filing of the notices of appeal. The statement of grounds of appeal of the first appellants was received on 6 June 1994 and that of the second appellants on 10 June 1994.

In their statement of grounds the first appellants referred to two further prior art documents, viz:

(D36) JP-A-52/24948 (with translation into English);

(D37) The Condensed Chemical Dictionary, Tenth Edition, 1981, page 909.

The statement of grounds of the second appellants also referred to additional prior art documents, viz:

(D38) "Aroma quality of orange juice ...", P. Dürr et al., Alimenta 20, 1981, pages 91-93;

(D39) Proceedings of the 4th International Flavour Conference, 23-26 July 1985, "Factors impacting on the quality of stored citrus fruit beverages", M. Marshall et al.

(D40) "Verpackung sauerstoffempfindlicher Lebensmittel", R. Heiss et al, Gordian 75/12, pages 359-365.

Furthermore, the second appellants, in support of their objection of insufficiency, also submitted test results (document D41) showing the effect of temperature on loss of vitamin C.

- V. In a communication dated 27 April 1995 pursuant to Article 11(2) RPBA the Board indicated inter alia that since the documents D36 to D41 were of potential relevance to the questions of inventive step and sufficiency of disclosure it did not intend to make use of its discretion under Article 114(2) EPC to disregard them.
- VI. With a letter dated 14 November 1995 the first appellants cited three further prior art documents.
- VII. Oral proceedings before the Board were held on 15 December 1995. They were not attended by opponents 01 (other party to the proceedings according to Article 107 EPC).

The appellants requested that the decision under appeal be set aside and the patent revoked in its entirety.

The respondents (proprietors of the patent) submitted an amended page 1 of the description to replace the corresponding page of the documents on which the Opposition Division had made its decision. They requested that the patent be maintained in amended form on this basis.

The respondents also submitted a further certified English translation of document D36.

At the commencement of the oral proceedings the Board informed the parties that pursuant to Article 114(2) EPC it intended to disregard the late filed documents submitted by the first appellants with their letter dated 14 November 1995.

VIII. The submissions made by the appellants in support of their request can be summarised as follows:

The term gas barrier ethylene vinyl alcohol copolymer (EVOH) did not appear in the original application. Thus, the introduction of the term "gas barrier" into the patent specification as a qualification of the type of EVOH used was inadmissible under Article 123(2) EPC.

The properties of EVOH were dependent on the proportion of ethylene in the copolymer, which proportion could vary widely. The patent specification required the skilled person to use an EVOH which on the one hand acted as a barrier to the transit of oxygen and on the other was heat-sealable to low density polyethylene (LDPE), but did not instruct him as to what the composition of the EVOH should be. This imposed an unfair experimental burden on the skilled person. The reference in the patent specification to the product name of a commercially available EVOH resin did not help matters in this respect since it was well-known that manufacturers often changed the characteristics of products while retaining the same name.

Furthermore, the submitted experimental results showed that containers constructed according to the teachings of the patent specification only provided a sufficient barrier to oxygen transit at temperatures below 5°C. This was a result of the inherent properties of EVOH. Nothing was said about this in the patent specification.

The patent specification was also insufficient in that it taught the use of an "inside-to-outside" longitudinal seal. Oxygen could thus enter the container through the open cut edges of the laminate and undermine the barrier function of the EVOH layer.

Although EVOH had been known for a considerable time it had first entered the market in large quantities shortly before the relevant priority date of the contested patent. Its exceptional gas barrier properties were well known, as were its ability to retain fragrances and preserve aroma, see for example document D16. In view of this the skilled person had a clear incentive to use EVOH as a barrier layer in a paperboard-based laminate of the type generally known for the formation of containers for orange juice and the like. The logical position for a barrier layer was in direct contact with the product and as could be seen from section 15 of document 16 the United States Government Food and Drug Administration (FDA) has given permission for EVOH to be in direct contact with all foods except those containing more than eight percent alcohol. Thus in the light of this, and having regard to the fact that the skilled person was always striving to reduce the number of layers required, it would have been obvious, starting for example from the known LDPE/paperboard/LDPE/aluminium foil/LDPE laminate shown in Figure 2 of the patent specification, to replace the aluminium foil barrier layer and the inner LDPE cover layer by a single layer of EVOH.

The suitability of EVOH for use as the innermost layer of a container which was to be used for a water-based product containing essential oils and/or flavours was shown by the proposal in Table 18 of document D16 of a HDPE/EVOH bottle for tomato ketchup. Furthermore, the heat-sealability of EVOH was known from document D36 and on the respondents' own admission the commercially available EVOH resin mentioned in the patent specification was heat-sealable to LDPE. Thus the attempts of the respondents to establish technical prejudices in these respects failed.

IX. In reply the respondents argued substantially as follows:

Both at the relevant date and at present there were only two commercially available grades of EVOH resin. Thus the skilled person would have no difficulty in obtaining an appropriate material. It was common general knowledge that the rate of deterioration of package products depended on the temperature at which they were stored. The manufacturers of containers of the type in question tailored them to the nature of the product and the way that product was traditionally handled by wholesalers and retailers. The patent specification in no way suggested that a product which was normally refrigerated could be kept at 25°C in all containers according to the invention and not suffer deterioration. Furthermore, measures to reduce oxygen transit through the open cut ends of the laminate were well-known in the art so that it was not necessary for the patent specification to make reference to them.

The consistent teaching of the cited prior art documents was that the gas barrier properties of EVOH were seriously impaired by exposure to moisture and that accordingly in a laminated structure it should normally be protected from direct contact with the product. The FDA approval for direct contact with all foods merely meant that EVOH met lack of toxicity requirements and nothing more. Document D16 did not in fact clearly propose a bottle for tomato ketchup with a product contacting layer of EVOH but even if that were accepted it was clear that the structural differences between a co-extruded bottle and a container made of a paperboard-based laminate were so great that the skilled person would not contemplate transferring a teaching from one to the other.

Furthermore, the cited documents did not suggest that EVOH was heat-sealable, either to itself or to LDPE. The passages in document D36 relied upon in this respect by the appellants derived from an inaccurate translation, as could be seen from the translation provided by the respondents. It was the respondents who had, against all expectations, first recognised the heat-sealability of EVOH and this recognition was crucial to their proposal to use EVOH for the innermost layer of the laminate from which the claimed containers were formed.

#### **Reasons for the Decision**

1. The appeals comply with the requirements of Articles 106 to 108 and Rules 1(1) and 64 EPC. They are therefore admissible.
  
2. *Articles 123(2) and (3) EPC*

The three independent claims of the granted patent, Claims 1, 6 and 19, have been amended by the introduction of the term "gas barrier" to qualify the nature of the EVOH used. The purpose of the amendment is to eliminate those materials with a high ethylene content which do not have effective barrier properties and which are used as adhesive (see for example document D18, page 340, left-hand column).

It is apparent that the introduction of the term "gas barrier" restricts rather than extends the scope of the claims and therefore conforms with Article 123(3) EPC.

The appellants argue however that it offends against Article 123(2) EPC since no equivalent term can be found in the original application. This is true in a literal sense. It is however clear from a reading of the application as a whole that the innermost EVOH layer must act as a gas (in particular oxygen) barrier since in the embodiments of Figures 5 and 7 it is the only material in the laminate which is capable of exercising this function. This objection under Article 123(2) EPC does not therefore succeed.

The amendments made to the dependent claims and to the description are of a minor nature and do not go beyond those necessary to render these consistent with the terms of the independent claims.

3. *Sufficiency of disclosure (Article 100(b) EPC)*

The appellants have not submitted any evidence that it would not have been possible, using an EVOH material of gas barrier grade commercially available at the time the application was filed, to make containers falling within the scope of the present claims. In particular, the appellants have not attempted to show that this EVOH material would not, using conventional surface treatment techniques for facilitating adhesion, such as corona discharge or flame treatment mentioned in the patent application, have been heat-sealable to LDPE. Indeed, it can be seen from the experimental results submitted by the second appellants that they succeeded in manufacturing the containers concerned without there being any indication of any technical difficulties associated therewith.

However, the objections of the appellants under the ground of insufficiency of disclosure go beyond the mere question of whether it was possible to make the container. What they are also saying is that if the container is made according to the teachings of the patent specification then it is deficient in its qualities as an oxygen barrier and that therefore the skilled person is not told how to achieve the stated goals of the invention, or in the words of Article 100(b) EPC how to carry it out.

The Board is not convinced that this line of attack on the patent is one which properly falls to be considered under the ground of insufficiency of disclosure. The subject-matter of the patent is a simple article of manufacture, a container for liquid products, the basic form of which is very well known. For the reasons given above the Board is satisfied that containers as defined in the claims can be successfully made without any difficulty and that such containers will exhibit the primary utility of being capable of holding the liquid with which they are filled. There would therefore be a good argument for saying that the requirements of sufficiency are clearly met and that the investigation should stop there. In any case, in the opinion of the Board, the attack of the appellants is based on a misconception of what the goals of the invention are. In particular, the patent specification clearly does not indicate that it is a goal to provide an oxygen barrier superior to that of the prior art. For example, it can be seen from Table I that the embodiment of the invention according to Figure 5 is inferior in its oxygen barrier properties to a container with an aluminium foil barrier layer. Nor is it anywhere indicated in the patent specification that it is a goal of the invention to provide a container in which fresh orange juice can be stored for extended periods of time

at 25°C. The experimental results submitted by the second appellants purporting to demonstrate that this is not possible are therefore of no significance. What the primary goal of the invention is concerned with, page 2, lines 25, 26 and 34, 35 is to avoid the absorption or transmission of flavour or odour ingredients of citrus and other juices. There has been no suggestion on the part of the appellants that this goal is in fact not achieved by the claimed containers.

As for the last specific complaint of the appellants, that the patent specification teaches a longitudinal seal of the type enabling oxygen to enter the container through the open cut ends of the laminate, the Board notes that measures to cope with this problem are well known in the art and can be applied by the skilled person as he thinks fit.

The Board therefore comes to the conclusion that the ground of opposition under Article 100(b) EPC does not prejudice the maintenance of the patent in the requested amended form.

4. *Novelty*

The state of the art does not disclose a container formed from a paperboard-based laminate with a product-contacting layer of gas barrier EVOH. The subject-matter of the claims is therefore novel. Since this has not been in dispute in the course of the proceedings further detailed elucidations on this point are unnecessary.

5. *Inventive step*

Containers of the basic type to which the present claims relate are very well known. They are formed from a laminate comprising a paperboard substrate and a number of other layers having various functions. Figures 1 to 4 of the patent specification show four examples of known laminates. The simple structure of Figure 1 comprises a paperboard substrate sandwiched between two LDPE layers. LDPE is a reasonably cheap material which provides good heat-sealability and is substantially impermeable to moisture. It does however have very poor resistance to the transmission of oxygen and acts only to a limited extent as a barrier to prevent loss of essential oils and aroma. Entry of oxygen into the container can lead to rapid deterioration of the liquid product, especially, in the case of citrus juices, to unacceptable loss of ascorbic acid (vitamin C). This defect is remedied in the structure shown in Figure 2 by the addition of a barrier layer of aluminium foil. Since the foil cannot be in direct contact with the product, and to allow front-to-back heat-sealing, it is also necessary to incorporate a third LDPE layer, giving a five-layer structure. Although the structure of Figure 2 has excellent oxygen barrier properties it is expensive to produce. The structures of Figures 3 and 4 (known from document D1) have therefore been proposed as alternatives. These inexpensive four-layer structures comprise a barrier layer of HDPE or polypropylene with the paperboard substrate and the barrier layer being sandwiched between two layers of LDPE. The structures of Figures 3 and 4 are superior to those of Figure 1 with respect to oxygen transmission and loss of essential oils and aromas but cannot compare in performance with the structure of Figure 2. However, even in this structure, although the aluminium foil is substantially

impermeable to the essential oils and aromas, they are still lost by a mechanism known as "scalping" i.e. by absorption into the liquid-contacting LDPE layer.

Against this background the technical problem with which the invention is concerned is to provide a container for liquids which is inexpensive and easy to fabricate, exhibits acceptable resistance to the transmission of oxygen and minimises the loss of essential oils and aromas from the liquid product held.

Independent Claims 1, 6 and 19 set out three alternatives for the solution of this problem. The essential distinguishing feature of all of these claimed containers is that they are constructed from a laminate which has a liquid-contact layer of gas barrier EVOH. This layer of EVOH is stated in the claims to be heat-sealable with the outer layer of the laminate which in the context, and in the light of the description, is to be understood as meaning that in the constructed container the inner layer of EVOH is in fact heat-sealed to that outer layer. The containers defined in Claims 1 and 19 are very similar, differing only in the composition of the outer layer. According to Claim 1 that layer is of LDPE whereas according to Claim 19 it is of a blend of LDPE and EVOH. Claim 6 differs from Claim 1 in that it requires an oxygen barrier layer and a tie layer to be disposed between the inner LDPE layer and the EVOH layer. These differences have an impact on the appreciation of inventive step, as will be explained below.

Turning now specifically to Claim 1 the best starting point for the evaluation of inventive step is, as argued by the appellants, the known laminated structure shown in Figure 2 of the patent specification. The laminate used in the container of Claim 1 differs therefrom in

that the aluminium foil and the inner liquid-contact layer of LDPE have been replaced by a layer of gas barrier EVOH.

The battle lines between the parties are clearly drawn. The appellants say that the known excellent properties of EVOH as an oxygen barrier and its known impermeability to essential oils and aromas would have led the skilled person to have used it in the way indicated above to solve the stated technical problem. The respondents say that the skilled person would have been deterred from doing this by the known sensitivity of EVOH to moisture and by the fact that he would not expect it to be heat-sealable either with itself or with LDPE.

The respondents have the weight of the evidence on their side. The adverse effects of moisture on the oxygen barrier properties of EVOH are clearly stated in documents D16 (the main citation relied upon by the appellants), D18, D20, D21 and D22. The general tenor of the advice given is to use the EVOH as an intermediate layer with a product-contact layer of a polyolefin with low permeability to moisture, see for example section 6 of document D16 and column 7, lines 38 to 48 of document D22. In the wealth of literature cited by the appellants there are only two indications which might point in a different direction. The first is in point 4.4. of document D5 where it is stated in the context of sterilized food products that the fear of the loss of gas barrier properties due to moisture absorption by EVOH has been proved to be unfounded. The literature reference cited here, document D6, makes it clear however that in the packaging film involved the EVOH is in fact used as an intermediate layer. The second is in Table 18 of document D16. The appellants argue that this discloses a container for tomato ketchup

constructed from a laminate of HDPE and a product-contact layer EVOH. Now, that combination of product and laminate structure can only be derived by selecting tomato ketchup from a list of possible applications and HDPE/EVOH from a list of structures, so that it is indeed questionable whether the combination has been disclosed as such. In any case the container involved is a co-extruded bottle which as regards its structure, in particular the thicknesses of the layers involved and the absence of any requirement of heat-sealing, is very different to the types of container to which the invention relates. Thus the skilled person would be unlikely to see any teaching here which would be of relevance to him in the present case.

As regards the heat-sealability of EVOH it would indeed, as argued by the respondents, be very surprising if this very useful property had been generally known before the relevant date of their patent application and simply not mentioned in for example document D16, which is an information brochure produced by the manufacturer of EVOH and which would normally be expected to contain information of this sort. The first appellants have sought to rely on document D36 as showing that the heat-sealability of EVOH was in fact known. The respondents on the other hand question the accuracy of the English translation of document D36 submitted by the first appellants and have filed their own translation. The Board of course is not in a position to decide which translation is better, but it does not need to. It is in fact clear from the translation submitted by the first appellants, see page 6, last paragraph and page 7, first and second paragraphs, that gas barrier EVOH was considered as having poor heat-sealability and that in the laminate structure to which document D36 relates a polyolefin layer is provided to permit easy heat-sealing.

Having regard to the above considerations the Board has come to the conclusion that the state of the art would much rather deter than encourage the skilled person to use gas barrier EVOH as the liquid-contact layer in the four-layer laminate defined in present Claim 1 and that accordingly this was not an obvious measure for him to adopt. The subject-matter of Claim 1 therefore involves an inventive step (Article 56 EPC).

The above finding does not extend automatically to the subject-matter of Claim 6 so that it is necessary to consider this individually.

An important aspect of the container according to Claim 6 is that it contains an additional oxygen barrier layer. This being the case it can be argued that the skilled person would not therefore be concerned by the loss of oxygen barrier properties of the liquid-contact layer of EVOH and would be happy to use this material in this context merely to avoid "scalping" of essential oils and aromas. However the skilled person was still faced by the requirement that the liquid-contact layer should be heat-sealable to the outer LDPE layer and had no reason to suspect that EVOH would fulfil this requirement. Furthermore, he would in any case be deterred from using EVOH as the liquid-contact layer through concern that its moisture absorption could lead to other unwanted effects.

The situation with regard to Claim 19 is not so critical. The container defined there differs from that of Claim 1 solely in the composition of the outer heat-sealable layer which is a blend of EVOH and LDPE instead of LDPE alone. The purpose of this difference is to facilitate "front-to-back" heat-sealing between the inner and outer layers. Thus to some extent the heat-sealability aspect loses its force as an argument for

inventive step since it can generally be expected that like will better heat-seal to like. Nevertheless, there is no indication in the state of the art that EVOH could be heat-sealed even to itself and in any case the moisture dependency aspect still carries its full weight.

Thus the Board also comes to the conclusion that the subject-matter of Claims 6 and 19 involves an inventive step.

**Order**

**For these reasons it is decided that:**

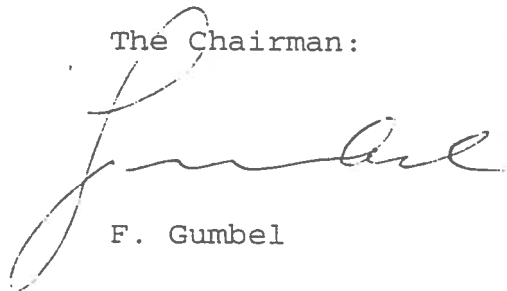
1. The decision under appeal is set aside.
2. The case is remitted to the first instance with the order to maintain the patent in amended form on the basis of Claims 1 to 21 filed on 29 September 1992, page 1 of the description filed at the oral proceedings, pages 2 to 6 of the patent specification with the amendments to pages 2 to 4 requested by the respondent with letter dated 23 November 1992, and the drawings as granted.

The Registrar:



S. Fabiani

The Chairman:



F. Gumbel

