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D E C I S I O N
of 2 March 1994

Case Number: T 0376/91 - 3.3.2

Application Number: 81300818.2

Publication Number: 0059274

IPC: B32B 27/18

Language of the proceedings: EN

Title of invention:

A multi-layer polymeric structure having a moisture sensitive polymeric layer

Patentee:

American National Can Company

Opponent:

Ikeda, Eiji

Headword:

Laminate/AMERICAN CAN

Relevant legal norms:

EPC Art. 56, 83, 123

Keyword:

"Extension of scope of subject-matter claimed - main request (yes)"

"Sufficiency of disclosure - auxiliary request (yes)"

"Inventive step (yes) - variety of solutions available"

Decisions cited:

T 0014/83

Catchword:

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Case Number: T 0376/91 - 3.3.2

D E C I S I O N
of the Technical Board of Appeal 3.3.2
of 2 March 1994

Appellant: Ikeda, Eiji
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Respondent: American National Can Company
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Decision under appeal: Interlocutory decision of the Opposition Division
of the European Patent Office dated 12 March 1991
concerning maintenance of European patent
No. 0 059 274 in amended form.

Composition of the Board:

Chairman: A.J. Nuss
Members: I.A. Holliday
S.C. Perryman

Summary of Facts and Submissions

- I. European patent No. 0 059 274 was granted on the basis of 12 claims contained in European patent application No. 81 300 812.2.
- II. The Appellant filed an opposition against the granted patent citing *inter alia* the following documents:
- (5) JP-A-55-71730
 - (8) US-A-4 182 457
 - (10) US-A-4 425 410
 - (12) GB-A-1 384 791.
- III. The Opposition Division maintained the patent in amended form on the basis of the second auxiliary request. In the opinion of the Opposition Division, the closest prior art was represented by document (12), which also relates to a laminate for packaging. According to (12), a film of polyvinyl alcohol (PVOH), which acts as an oxygen barrier layer, is entrapped between two films acting as moisture barriers by means of a polyurethane primer on both sides of the barrier layer. It is known that PVOH and ethylene-vinyl alcohol copolymers (EVOH), used in accordance with the patent in suit, begin to lose their oxygen barrier properties above a certain moisture content. The purpose of the polyurethane used in (12) was not only as an adhesive but to absorb moisture.

The Opposition Division took the view that there was nothing in the prior art which might induce one skilled in the art to add a water soluble water absorbing agent to such a multi-layer laminate and so arrive at a laminate in accordance with the patent in suit.

IV. The Appellant lodged an appeal against the decision of the Opposition Division. Oral proceedings took place on 2 March 1994.

V. The arguments of the Appellant both in the written procedure and at the oral proceedings may be summarised as follows.

The Appellant raised four objections under Article 100(c) EPC:

- (i) as to whether there was support for the permeability value of 0.35 ml per day per 645 cm² at all times after retorting;
- (ii) that there was no basis for limiting the subject-matter claimed to water soluble drying agents and reference was made to decision T 151/84; no preference for such agents was expressed in the application as originally filed;
- (iii) that there was no support in the original disclosure for the drying agent to be in any layer (i.e. including the barrier layer) of the structure as now claimed in Claim 11;
- (iv) in the granted Claim 1 the multilayer laminate structure was qualified by "for packaging"; This expression had been omitted in Claim 1 of the auxiliary request allowed by the Opposition Division and which was now the Respondent's main request.

In respect of Claim 11 the Appellant also objected under Article 100(b) EPC that the patent in suit does not disclose the invention in a manner sufficiently clear

for it to be carried out by one skilled in the art, in particular there were no instructions as to how the drying agent might be incorporated in the EVOH layer.

Concerning inventive step, the Appellant argued that document (8), which related to a laminate used for packaging food and drink, should be regarded as the closest prior art. The Appellant also referred to reference (4), Ind. and Eng. Chem., 38, No. 8, pp. 788-791 (1946) which in Figure 2 indicated a ten-fold increase in moisture permeability of polymeric films as the temperature rose from 10° to 60°C. In the Appellant's opinion, it was well known at the priority date that substantially anhydrous conditions were necessary to maintain the oxygen barrier properties of EVOH. It was also generally known that water vapour passed through polyethylene films, especially at the higher temperatures used in retorting (reference 4). The Appellant argued that it would have been obvious to include a drying agent, e.g. CaCl₂, within the laminate to protect the EVOH from moisture, referring in particular to document (5).

VI. The Respondent argued during the written procedure and in the oral proceedings essentially as follows.

Points (i) to (iii) noted above with respect to Article 100(c) EPC were all supported by the original disclosure. Whilst the Respondent argued that the omission of "for packaging" had not extended the scope of the claimed subject-matter, an auxiliary request was filed to meet point (iv).

As far as the Article 100(b) objection was concerned, the Respondent argued that it would present no difficulty to include the drying agent in the EVOH layer which was only marginally thinner than the adhesive

layer. It was also argued that the oxygen permeability values would inevitably be obtained if the skilled person carried out the instructions on page 4 of the patent.

Concerning inventive step, the Respondent cited a report published by Dr. Mitsutani in 1983, i.e. two years after the priority date of the patent in suit, which indicated that the loss of oxygen barrier properties in EVOH containing laminates remained a problem. The Respondent argued that a variety of other solutions were available to solve this problem. Addition of a drying agent was by no means obvious.

VII. Claims 1 and 11 according to the main request read as follows:

"1. A multi-layer laminate structure, comprising an ethylene-vinyl alcohol copolymer layer the oxygen permeability of which increases substantially upon moisture entering the polymer, characterised in that the barrier polymer layer is an interior layer of the structure and a water soluble water absorbing agent is dispersed in another polymeric layer of the structure, which agent, after retorting a package made from the structure for at least two hours at 250°F (121°C), maintains an oxygen permeability of the barrier polymer layer of no more than 0.35 ml per day per 100 sq. inches (645 cm²) when the pressure gradient is one atmosphere of oxygen per mil (0.025 mm) of thickness of said barrier polymer layer."

"11. A multi-layer laminate structure, comprising an ethylene-vinyl alcohol copolymer layer the oxygen permeability of which increases substantially upon moisture entering the polymer, characterised in that the barrier polymer layer is an interior layer of the

structure and a water soluble water absorbing agent is incorporated in a layer of the structure, which agent, after retorting a package made from the structure for at least two hours at 250°F (121°C), maintains an oxygen permeability of the barrier polymer layer of no more than 0.35 ml per day per 100 sq. inches (645 cm²) when the pressure gradient is one atmosphere of oxygen per mil (0.025 mm) of thickness of said barrier polymer layer."

According to the auxiliary request, the words "for retortable packaging" were inserted after the word "structure" in line 1 of each of Claims 1 and 11.

VIII. The Appellant requested that the decision of the Opposition Division be set aside and that the patent be revoked.

The Respondent requested that the patent be maintained in accordance with the main request and as an auxiliary request that the decision under appeal be set aside and that the patent be maintained on the basis of Claims 1 and 11 and insert A submitted at the oral proceedings on 2 March 1994 and the other claims and the rest of the description in accordance with the second auxiliary request submitted at the oral proceedings on 18 October 1990.

Reasons for the Decision

1. The appeal is admissible.

The main request

2. The Board has no reason to question the findings of the Opposition Division concerning Article 123 EPC except the omission of the expression "for packaging" which was present in Claims 1 and 12 as granted.
 - 2.1 It is conceivable that by omission of the said feature, certain laminates might be included which were excluded by the granted form of claim. There is, for example, no limitation on the thickness of the claimed laminates. Beyond a certain thickness, such laminates would clearly be unsuitable for use as a packaging film. In other words, deletion of the said feature would be likely to lead to an extension of the claimed subject-matter. The main request is accordingly refused for failure to comply with Article 123(3) EPC.

The auxiliary request

3. Inclusion of the expression "for retortable packaging" in Claims 1 and 11 of the auxiliary request first of all restores the limitation to films suitable for packaging. It is clear from the granted patent (e.g. page 3, lines 35 ff., page 6, lines 10 ff. as originally filed) that the laminates of the invention are intended for use in retorting processes. Inclusion of the word "retortable" in Claims 1 and 11 also amounts to a limitation of the subject-matter claimed since laminates incapable of withstanding the rigorous conditions of retorting would be excluded. It is also to be noted that

inclusion of this limitation met the approval of the Appellant at the oral proceedings.

- 3.1 Accordingly, the Board is satisfied that, in this respect, Claims 1 and 11 of the auxiliary request satisfy the requirements of Article 123(2) and (3) EPC.
- 3.2 The Board is also convinced that the other objections raised by the Appellant under Article 123 EPC (see point V above) are met by the claims of the auxiliary request.
- 3.2.1 Limitation of the oxygen permeability to 0.35 mol per day per 645 cm² of surface is supported by the value for KNO₃, appearing in Table II on page 6, of the patent (page 12 as originally filed). Although based on a single value, it serves to limit the subject-matter to the more effective agents exemplified. It is not of significance for the purposes of Article 123(2) EPC that these agents were not stated to be preferred in the application as originally filed. The less effective drying agents mentioned in Table II become comparative examples by the amendment adding annotations on page 6 of the patent in suit before the Opposition Division. It is also a restriction in relation to the figure of 1.35 ml per day referred to in the granted claims.
- 3.2.2 Although the expression "water soluble water absorbing agent" may not be mentioned *expressis verbis* in the original document, there is ample support for such a limitation. It is apparent that the absorbing agents set out in Table I, each of which is water soluble, together with KNO₃, mentioned in Table II, give significantly better oxygen permeability values than the water insoluble drying agents which also feature in Table II. The Decision T 151/84 dated 28 August 1987 (not published in OJ EPO) is not relevant to the present case

as there the Board allowed deletion of a feature from the claims which was not regarded as an essential feature of the invention.

- 3.2.3 The Board is also satisfied that Claim 11 has adequate support in the originally filed specification. The original Claim 1 merely refers to "the incorporation of a drying agent in the structure" without any reference to its position. Only in Claim 2 is reference made to its position "in a layer proximate to the moisture sensitive layer". Correspondingly the description on the original page 2 refers generally to the presence of a drying agent (lines 11 to 13) and only later indicates (lines 14 to 17) its advantageous presence in the adhesive layers. There is thus support for its presence in any layer of the structure.

4. *Clarity (Article 84 EPC)*

In the written procedure, the Appellant raised an objection of lack of clarity insofar as the claims failed to specify how the oxygen permeability values were measured after retorting. During the opposition procedure, the Respondent indicated that these were measured in accordance with a modification of ASTM D1434 at a temperature of 22.8°C (73°F) (letter received on 7 September 1989). The Board sees no reason to differ from the opinion of the Opposition Division that the requirements of Article 84 EPC are satisfied.

5. *Sufficiency of disclosure (Article 83 EPC)*

- 5.1 The Appellant has argued that the patent in suit does not give adequate instruction as to how a drying agent might be incorporated in the barrier layer. In the description on page 4 (lines 15 to 18) instructions are given for incorporating a drying agent in an adhesive

layer. According to Table I the thickness of the adhesive layer varies in the range 0.058 to 0.076 mm whilst that of the EVOH layer varies between 0.043 and 0.048 mm. The Board is convinced that the skilled person with a rudimentary knowledge of plastics processing would be able to adapt the method to include the drying agent in the EVOH layer. Although document (10), an American continuation-in-part of the application forming the priority of the patent in suit, was published after the priority date, it does demonstrate that a drying agent **can** be incorporated in an EVOH barrier layer (see Claim 1 and description column 6, lines 62 ff.). The disclosure of (10) could also be regarded as late-filed experiments which show that, when the drying agent is incorporated in the EVOH layer, oxygen permeability values appreciably less than 0.35 can be attained (cf. column 7, lines 13 to 28).

5.2 In respect of Article 83 EPC, the Appellant has failed to show that any area falling within the ambit of the claims cannot be carried out. The Appellant has limited his attack to the claims. According to the jurisprudence of the Boards (e.g. T 14/83, OJ EPO 1984, 105), the disclosure of an invention should be considered by interpreting the claims in conjunction with the description. As indicated, the Board considers that the description contains sufficient information to enable one skilled in the art to carry it out.

6. *Novelty (Article 54 EPC)*

None of the documents cited during the proceedings discloses laminates fulfilling all the features of Claims 1 and 11 of the patent in suit. Since novelty is no longer in dispute, it is not necessary to provide further reasoning.

7. *Problem and solution*

7.1 In the opinion of the Board the closest prior art is document (8) which is also concerned with multilayer laminates useful in the packaging of food and drink (e.g. column 9, lines 29 to 66; column 14, lines 17 to 57). These include five layer structures similar to those illustrated in Figure 2 of the patent in suit. Structures described in Examples 1 and 2 of (8) have polyolefin outer layers (e.g. polypropylene or ethylene-propylene random copolymer), intermediate adhesive layers of unsaturated carboxylic acid-modified polypropylene and, as the innermost oxygen barrier layer, EVOH.

7.2 In relation to (8), the problem to be solved is to develop a laminate for use in retortable packaging which retains its oxygen barrier properties after exposure to moisture at elevated temperature.

7.3 The problem is solved by including a water soluble drying agent in a layer of the structure in accordance with Claims 1 and 11 of the patent in suit. Having regard to the experimental results which appear in Tables I and II of the patent in suit, the Board is satisfied that the problem has been solved in a plausible manner.

8. *Inventive step (Article 56 EPC)*

8.1 Two facts concerning laminates of the type described in document (8) and the patent in suit were well known at the priority date. It had long been known, e.g. from reference (4) which was published in 1946, that the water vapour permeability of polyolefin films increased considerably with increasing temperature (cf. point V above). It was also well known, as acknowledged in the

opening paragraphs of the patent in suit, that EVOH polymers are moisture sensitive, i.e. that they lose their ability to act as oxygen barriers. These facts were not disputed by the parties at the oral proceedings. As indicated above, the patent in suit solves the problem of the sensitivity of the EVOH layer to moisture which passes through the polyolefin outer layers at elevated temperatures.

- 8.2 The essential difference between the five-layer laminate of document (8) and that of the patent in suit is that, in the case of the latter, a water soluble drying agent is present within the laminates, preferably in each of the adhesive layers.

The disclosure of (8) is much concerned with the problems of extruding such multilayer laminates and the fabrication of containers therefrom. There is not the slightest hint in (8) of the problem underlying the patent in suit nor of its solution.

- 8.3 The Appellant has argued that document (5) points to the solution chosen in the patent in suit. The Board cannot accept this argument. Document (5) relates to mouldable resin compositions useful in making storage vessels for moisture sensitive materials. In the past, small sieve-like containers, e.g. of silica gel or CaCl_2 , were placed in such storage vessels to absorb moisture. According to (5), the drying agent is incorporated into the plastics material used to fabricate the storage vessel. As the walls of the resultant vessel contain particles of drying agent, it is unnecessary to employ a separate container of drying agent. This is an entirely different problem to that underlying the patent in suit.

- 8.4 Document (12) also relates to a multi-layer laminate for use in flexible packaging material which may consist of

five layers. The inner layer is polyvinyl alcohol (PVOH) which acts as an oxygen barrier providing it is maintained in a substantially anhydrous state (page 1, lines 22 to 26). The said PVOH layer is laminated to two outer layers having low permeability to moisture (e.g. polyvinylidene chloride or a polyolefin; page 1, lines 61 to 93) by means of a polyurethane primer. According to (12), the polyurethane acts not only as a primer or adhesive to bond the PVOH to the outer layers but also to remove "the small amounts of water" contained in the PVOH (page 2, lines 49 to 53). It also states on page 2, lines 64 to 67 that it is important that once the barrier layer has been rendered anhydrous, it should be prevented from absorbing moisture.

8.4.1 The Appellant has argued that this is a similar problem to that encountered in the patent in suit and that the polyurethane acts not only as an adhesive but also as a drying agent within the meaning of the patent in suit. It is, however, to be noted that the polyurethane is stated to absorb merely the small amounts of water contained in the PVOH. The resultant PVOH is protected from further exposure to moisture only by the outer layer forming a moisture proof barrier (cf. page 2, lines 99 to 108). The laminate described in Example 1 is tested "at ambient conditions" (page 3, lines 86 to 92). There is no hint that such a laminate might retain its oxygen barrier properties under the rigorous conditions encountered during retorting.

8.5 The Respondent filed a report of Dr. Mitsutani, Monthly Report No. 53 dated November 1983, stating that such reports, available on subscription, circulated widely in the packaging industry. Even more than two years after the priority date of the patent in suit, Dr. Mitsutani was suggesting other solutions to solve the moisture sensitivity problem of EVOH polymer films. These

included biaxial orientation of the EVOH film and surface treatment thereof (e.g. acetylation) to render the film more hydrophobic. Another solution proposed by Northern Petroleum Co. involved drying a multilayer structure which included an EVOH layer in an oven after retorting. A more radical possibility might be to replace the EVOH with another oxygen barrier film.

- 8.6 Whilst it might seem *prima facie* obvious to solve a problem involving moisture by employing a drying agent, it is clear from the preceding that a variety of alternative solutions to the problem underlying the patent in suit were also available. Since the prior art gives no hint of the solution proposed by the Respondent, an inventive step in respect of Claims 1 and 11 of the auxiliary request must be recognised. The remaining claims derive their patentability therefrom.

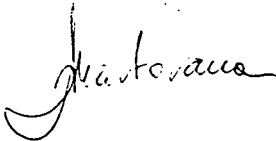
Order

For these reasons, it is decided that:

1. The decision under appeal is set aside.

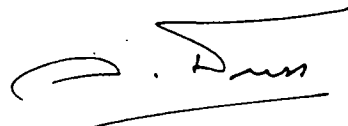
2. The case is remitted to the first instance with an order to maintain the patent on the basis of Claims 1 and 11 and insert A as submitted in the auxiliary request on 2 March 1994 and the other claims and the rest of the description in accordance with the second auxiliary request submitted at the oral proceedings on 18 October 1990.

The Registrar:



P. Martorana

The Chairman:



A.J. Nuss

