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D E C I S I O N
of 20 July 1995

Case Number: T 0800/91 - 3.3.4

Application Number: 84307492.3

Publication Number: 0140711

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Language of the proceedings: EN

Title of invention:
Heat-shrinkable laminate film

Patentee:
KUREHA KAGAKU KOGYO KABUSHIKI KAISHA

Opponent:
W. R. Grace & Co.

Headword:
Heat-shrinkable film/KUREHA

Relevant legal provisions:
EPC Art. 56, 83, 84, 123

Keyword:
"Inventive step (yes)"

Decisions cited:
T 0002/80, T 0119/82, T 0155/85, T 0419/93, G 0009/91

Catchword:
-



Case Number: T 0800/91 - 3.3.4

D E C I S I O N
of the Technical Board of Appeal 3.3.4
of 20 July 1995

Appellant:
(Proprietor of the patent)

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Decision under appeal:

**Decision of the Opposition Division of the
European Patent Office dated 8 August 1991
revoking European patent No. 0 140 711 pursuant to
Article 102(1) EPC.**

Composition of the Board:

Chairman: U. M. Kinkeldey
Members: D. D. Harkness
S. C. Perryman

Summary of Facts and Submissions

- I. European patent No. 0 140 711 relating to a heat shrinkable laminate film was granted on the basis of 5 claims contained in European patent application No. 84 307 492.3. Claim 1 (the only independent claim) and claim 4 read as follows:

"1. A heat-shrinkable laminate film comprising outer layers of a polyolefin, a gas-barrier layer of a copolymer of vinylidene chloride, at least one intermediate layer of an ionomer and adhesive layers disposed between any of the above layers, the total thickness of the intermediate layer(s) of an ionomer being 5 to 20% of the total thickness of the heat-shrinkable film, and wherein at least one of the outer layers is a copolymer of ethylene and vinyl acetate of a crystal melting point in a range from 80 to 103°C.

4. A heat-shrinkable laminate film according to any one of the preceding claims, wherein the total thickness of the heat-shrinkable laminate film is in the range of from 20 to 120 micrometers, the thickness of the gas-barrier layer is more than 2µm and not more than 30% of the total thickness of the heat-shrinkable laminate film, the thickness of the outer layers is in the range of 35 to 92% of the total thickness of the heat-shrinkable laminate film, the thickness of the intermediate layer(s) of ionomer is in the range of 5 to 20% of the total thickness of the heat-shrinkable laminate film, and the thickness of each of the adhesive layers is 0.5 to 3.0µm."

- II. An opposition was filed against the granted patent on the ground under Article 100(a) EPC that its subject-matter was not inventive as required by Article 56 EPC.

III. The patent was revoked by the Opposition Division by a decision given at oral proceedings on 9 July 1991, the written reasons for which were posted on 8 August 1991.

The Opposition Division considered that none of the cited documents disclosed a laminate film as claimed.

The Opposition Division found that the invention lacked inventive step over document

(2) EP-B-0 032 027,

on the basis that the only claimed features which distinguished the claimed subject-matter from the disclosure of document (2), namely the thickness of the ionomer resin layer, and that at least one outer polyolefin layer consisted of ethylene and vinyl acetate copolymer (EVA) of crystal melting point 80 to 103°C, were nevertheless obviously derivable from document (2). The Opposition Division stated that it had calculated that the ionomer resin layer of the prior art document (2) should amount to 5 to 40% of the total thickness of the laminate and this overlapped with the 5 to 20% range of the patent in suit. Further it stated that as document (2) taught that the outer polyolefin layer might consist of up to 80% of an EVA copolymer of crystal melting point 80 to 110°C, this range overlapped with the melting points of the EVA according to the patent in suit.

IV. The appellant filed an appeal against the decision of the Opposition Division, paid the appeal fees and submitted a Statement of Grounds for the Appeal with an amended set of claims and comparative data. Claim 1 had been amended by addition of a feature (the addition being shown in italics) compared to claim 1 as granted to read:

"1. A heat-shrinkable laminate film comprising outer layers of a polyolefin, a gas-barrier layer of a copolymer of vinylidene chloride, at least one intermediate layer of an ionomer and adhesive layers disposed between any of the above layers, the total thickness of the intermediate layer(s) of an ionomer being 5 to 20% of the total thickness of the heat-shrinkable film, *the thickness of the outer layers being in the range of 35 to 92% of the total thickness of the heat-shrinkable laminate film*, and wherein at least one of the outer layers is a copolymer of ethylene and vinyl acetate of a crystal melting point in a range from 80 to 103°C."

New claim 4 no longer referred to the feature which had been introduced into the amended claim 1.

V. Oral proceedings took place on 20 July 1995. During the course of these first and second auxiliary requests were filed.

VI. The respondent raised an objection under Articles 83 and 84 EPC to the admissibility of the amended claims including those of the auxiliary requests for the first time during the oral proceedings. It was submitted that the introduction into the main claim of the limitation that the thickness of the outer layers is 35 to 92% of the total thickness of the laminate rendered the claims unclear and provided conditions under which the patent was not technically operable as the claim required at least an ionomer layer of thickness minimum 5% of the total thickness and this coupled with the maximum value of 92% for the outer layers left only an unrealistic 1,8µm thickness available for all adhesive layers and the core. From document (2) column 6 line 12 the respondent showed that in a laminate of 60µm thickness a minimum core thickness of 4µm was normal.

In support of the lack of clarity objection the respondent cited Appeal Board Decision T 0002/80 (OJ EPO 1981, 431).

The respondent also referred to the auxiliary requests as being late filed and objected that the amendments in claim 4 of the first auxiliary request and claim 3 of the second auxiliary request could not be considered as a reaction to the Opposition Division's decision.

- VII. In reply to these admissibility objections the appellant stated that the skilled person would be able to work within the ranges for thickness of the layers specified in the main claims of each request and that the evidence brought forward did not constitute a real ground of attack. Variations of laminate and layer thicknesses could be exercised within the terms of the main claim of each request.

With regard to the objection to the fourth claim of the first auxiliary request and third claim of the second auxiliary request the appellant withdrew said claims and resubmitted the requests.

- VI. The appellant argued that the subject-matter of the patent in suit was inventive essentially for the following reasons:

Document (2) represented a development of the EVA/VDC/EVA sandwich laminate disclosed in document

(3) JP-A-97057/1978

Since the inventor of document (2) wished to improve the heat and oil resistance properties of the EVA/VDC/EVA laminate the two outer EVA layers were replaced by poly- α -olefin layers of crystalline melting point (MP) not

lower than 110°C or blends thereof with other poly- α -olefins of MP 80 to 110°C. Further to this an intermediate layer of thermoplastic polymer of MP 70 to 100°C, which may be an ionomer, was introduced to improve the stretchability of the laminate and to stop the delamination which occurs between polyolefin and vinylidene chloride polymer layers, the sum of the thicknesses of the α -olefin layers being one fifth to one half of the total thickness of the α -olefin plus the thermoplastic layers. There was no explanation as to why an ionomer layer in particular was used and there was no reference to rigidity or any problem concerned with it. Document (2) produced a laminate having thin outer layers and thick inner layers which is contrary to the arrangement of the laminate in the patent in suit.

A further document

(5) US-A-4,226,822

already referred to in the introduction of the patent in suit, did not refer to or solve the problem of rigidity as this could only be done with hindsight as the true purpose of the ionomer layer was to stabilise the stretching of the laminate, and in the light of this disclosure the reference in the patent in suit to improving the rigidity of the laminate was inaccurate. The appellant further expressed the view that an amendment be made to the description of the patent in suit in order to remove any suggestion that document (5) referred to improvements in rigidity of a laminate.

The appellant's invention was to be seen in modifying the EVA/VDC/EVA laminate in such a way that there exists a special stretchability-rigidity relationship only achieved by the specific polymer layers and the arrangement of thick outer and thin inner layers. The

comparison example filed with the appeal showed that advantageous results with regard to document (2), ie., better stretchability-rigidity values for the desired purposes and improved flex test results were obtained.

The Opposition Division's decision included the result of an unexplained calculation in respect of the layer thicknesses disclosed in document (2), which calculation was inaccurate. An EVA outer layer was not suitable for the laminates of document (2) as this did not impart the necessary heat and oil resistance which document (2) required, however such a feature is obligatory for the laminate of the patent in suit. When considering the formulation of a laminate the choice of layers is always dependent upon the use for which the laminate is intended, this determines the composition, layer thicknesses and their order within the laminate.

IX. The respondent submitted essentially that the disclosure of document (2) was very close to that of the patent in suit and the tables of figures submitted in the written proceedings showed what the content of this prior art was, but he admitted that the figures themselves were not important to the arguments. There was no example on which to base a novelty objection, however document (2) did teach the most essential features of the revoked patent which in his view related to a laminate intended for the wrapping of meat and cheese.

The disclosure of document (2) was regarded as the starting point for an objection to inventive step as this represented the closest prior art structure to that of the laminates of the patent in suit. The problem posed was to improve the stretchability and rigidity properties of the laminate whilst accepting heat and oil resistant characteristics which were inferior to those of the prior art.

A solution to this problem was obvious since it was known from document (2) that ionomer layers had good stretchability and from document (1) that an ionomer layer could be used to optimise rigidity. Further to this document (2) indicated that laminates may be of thickness 20 to 100µm and that a minimum thermoplastic (ionomer) layer thickness was 5µm, thus below a figure of 5% ionomer thickness for a laminate of 100µm thickness, the stretchability-rigidity characteristics would not be adequate and above 20% ionomer thickness every expert would know that too much rigidity would result. Accordingly the selection of a range 5 to 20% thickness of ionomer layer was obvious. It was known from document (2) that EVA had good stretchability but poor heat and oil resistance and that given the ratio of the thickness of the layers (B) to (B) plus (C) it was a matter of simple subtraction to arrive at the 35 to 92% thickness for the outer layers based on the total thickness of the laminate. An inventive step could not be based upon the choice of EVA layer as the EVA layers defined by melting point constituted all those normally considered to be useful in this art. In this regard Table 1 on page 7 of document (2) disclosed the same range of EVA products as did Table 1 on page 4 of the patent in suit.

Table 4 on page 10 of document (2) showed that the stretchability of all the polyolefin and EVA layers was good, thus a change from polyolefin to EVA did not indicate any advantage, however there was a loss in heat and oil resistant properties. A known combination from document (2) page 2 column 2 line 20 showed an EVA/VDC/ionomer layer construction which possessed good stretchability and it was obvious to reduce the ionomer layer thickness to lower rigidity, see document (1), column 4, line 52, whilst a further outer layer of polyolefin or EVA would produce the desired

stretchability. The respondent doubted that any specific relationship existed in terms of stretchability and rigidity, thus vis-à-vis document (2) the only change was a loss in oil and heat resistance consequent upon the use of an EVA outer layer instead of the known polyolefin layer. In the respondent's view once it was known to use an ionomer layer to influence stretchability and rigidity then it was obvious to employ this layer as an intermediate layer, this being suggested in document (2). Contrary to the appellant's view of document (1) the respondent regarded this citation as disclosure indicating the use of an ionomer layer as a rigidity controlling layer.

There being no advantage to be derived from the patent the respondent relied upon Appeal Board Decisions (a) T 0119/82 (OJ EPO 1984, 217) and (b) T 0155/85 (OJ EPO 1988, 087) which essentially conclude that (a) an inventive step may not be recognised where the inventor has chosen an odd way to proceed knowing that a disadvantage may result, (b) there can be no invention in worsening the prior art especially when such consequence can be foreseen.

A calculation relating to a hypothetical laminate construction falling within the terms of document (2) and complying with the thickness requirements of the application was put forward by the respondent. However, in this hypothetical laminate layers of adhesive made up more than one third of the overall thickness, and in response to the Board's querying this, it was acknowledged on behalf of the respondent that such a laminate would not be technically acceptable nor would a skilled person think of making it.

- X. The appellant (patentee) requested that the decision under appeal be set aside and that the patent be maintained on the basis of the main request filed with the grounds of appeal on 18 December 1991, or on the basis of the first or second auxiliary request filed at oral proceedings on 20 July 1995.

The respondent (opponent) requested that the appeal be dismissed.

Reasons for the Decision

1. The appeal is admissible.

Main Request

2. *Admissibility of amendments, (Article 123 EPC)*

Claims 1 and 4 of this request have been amended (see section IV above). On page 6, lines 10 to 13, of the originally filed application, corresponding to page 3, lines 18 and 19 of the patent as granted, there appears the passage "Suitably, the total thickness of the layer(s) prepared by using the polyolefin is in a range of from 35 to 92% of the total thickness of the heat-shrinkable laminate film according to the present invention." The layers using the polyolefin are the outer layers referred to in claim 1 as granted. This limitation is not indicated as being dependent on any other limitation being made at the same time to other features. Accordingly this passage provides a basis for the amendment made in claim 1 of the main request. As

this feature is now part of claim 1, it is appropriate that it is no longer recited in dependent claim 4. The amendments to the claims thus meet the requirements of Article 123(2) EPC.

The amendment made to claim 1 of the main request restricts its scope compared to claim 1 as granted. Thus the requirements of Article 123(3) EPC are met.

3. *Clarity (Article 84 EPC)*

During oral proceedings the respondent put forward an argument that the amendment to claim 1 rendered the claim unclear and contrary to Article 84 EPC, because no embodiment was possible in which the thickness of the outer layers was 92%, one end of the range introduced into claim 1 by amendment. However, as pointed out by the Board, an embodiment was conceivable in which the total laminate thickness would be 120 micrometers, the outer layers would make up 92%, the ionomer layer would be 5%, the core layer would be 2.1 μ m and there would be three adhesive layers each of 0.5 μ m, and this embodiment would fulfil all the conditions which should be met according to the description of the patent in suit. Thus the amendment to refer to a range with one endpoint at 92% does not cause the claim to be directed to something which it is impossible to achieve within part of the range stated. It was this type of impossibility which was the case in decision T 0002/80 (see above).

The Board does not consider that in any other respect any lack of clarity arises from the amendment, and accordingly is of the opinion that the claims as amended comply with Article 84 EPC.

4. *Insufficiency (Articles 83 and 100(b) EPC)*

An objection that an embodiment in which the outer layers made up 92% of the thickness was not enabled by the description would be a conceivable objection under Articles 83 and 100(b) EPC, but there would need to be some evidence in support of such objection. But although the description and claim 4 as granted clearly indicated that such an embodiment was contemplated as being within the scope of the invention, no objection under Article 100(b) EPC was made on filing the opposition, nor was any evidence supporting such an objection filed at any stage. In these circumstances the Board is not prepared to consider such an objection raised for the first time during the oral proceedings on the appeal of the patentee, in agreement with the Enlarged Board of Appeal Decision G 9/91 (OJ EPO 1993, 408) that the power of a Board of Appeal to examine and decide on the maintenance of a European Patent depends on the extent to which the patent is opposed in the notice of opposition pursuant to Rule 55(c) EPC.

5. *Novelty (Article 54 EPC)*

The respondent has not raised an objection in respect of novelty of the subject-matter of the request and the Board after having reviewed the prior art is also of the opinion that none of the cited documents discloses the subject matter of any of the claims of the main request.

6. *Inventive step (Article 56 EPC)*

Problem to be solved

As has already been stated in decision T 419/93 of 19 July 1995 (see reasons 4.6 to 4.9, not published in OJ EPO) where (a) the patentee has indicated particular

prior art as his starting point, and (b) the patentee has in the patent in suit formulated a problem to be solved relative to this starting point, and (c) the Board of Appeal is satisfied that the claimed solution solves this problem, then the Board should adopt this as the starting point and as the problem to be solved for the purpose of a problem/solution approach analysis, unless the Board is satisfied that there is closer prior art of greater technical relevance to the solution as claimed, or that some other problem, also solved by the claimed solution, is another, more obviously noticeable problem occurring in relation to the selected starting point in the prior art, for which other problem the skilled person would have also been seeking a solution. In any case the formulated problem should be one which the skilled person would wish to solve knowing only the prior art: the problem should not be tendentiously formulated in a way that unfairly directs development towards the claimed solution.

7. In the introduction to the specification the starting point in the prior art is defined relative to two publications, firstly document

(4) Japanese Patent Application Laying-Open
No. 58-128821 (1983)

which discloses a laminate film comprising outer layers of a copolymer of ethylene and vinyl acetate and a gas barrier layer of a VDC, which had already solved the problem of providing a gas barrier property, but whose rigidity was somewhat insufficient, so that it did not exhibit satisfactory operational processability in packaging foodstuffs, and secondly document (5), which discloses a five-layer laminate film of total thickness 35 to 90 μ m, which comprises at least one of the outer layers to be an ionomer of 20 to 50 μ m in thickness, a

central layer of VDC, and intermediate layers of an ethylene copolymer. This solved the rigidity problem of the laminate proposed in the Japanese document, but caused new problems in that the outer layer of ionomer is whitened by water used in a quenching step of packaging, deteriorating the appearance of the package and the foodstuffs, and any inner layer of ionomer tends to become rigid and to lose flexibility and accordingly the laminate is not suitable for a large amount of foodstuff.

The problem to be solved can thus be formulated as being to improve the rigidity of the three layer laminate of document (4), without whitening of the outer layer. The specification states that this problem has been solved, and the respondent has not challenged this. The Board accepts that this problem has been solved.

8. Document (5) states at column 4, lines 34 to 56 that:

"The ionomer used as the outermost (first) layer resin or the innermost (fifth) layer resin in the present invention is an ionic copolymer having an ionic linkage, which is produced by completely or partially neutralizing a copolymer of an α -olefin such as ethylene with an unsaturated organic acid into a salt with the cation of an alkali metal, zinc or the like. In the film of this invention, the ionomer is used for the purpose of stabilizing the stretching operation thereby giving rise to the required shrinkability and conferring upon the produced film the heat-sealing ability, cold resistance, oil resistance and, particularly seal strength in the presence of oil. The innermost layer serves as the surface of the film for direct contact with foodstuffs to be packaged with the film. When the thickness of the innermost layer is less than 25 μ , particularly 20 μ , the film is deficient in seal

strength. When the thickness exceeds 45 μ , particularly 50 μ , the film suffers from undesired rigidity, loss of flexibility and ability to be sealed by clipping. Because of such undesirable phenomena, the thickness of this layer is limited to the range of from 20 to 50 μ , preferably in the narrower range of from 25 to 45 μ ."

At column 7 lines 1 to 5 it states that "The total thickness of this biaxially stretched five-layer laminate film is limited to the range from 35 to 90 μ , preferably to the range from 40 to 80 μ , with due consideration to the strengths, handling property and economy of the film. Any deviation from this range may be detrimental."

Claim 1 of the main request requires that the total thickness of ionomer layers be 5 to 20% of the total film, that is for a total film thickness between 35 to 90 μ the ionomer films would be at most 18 μ , below the minimum for the one essential layer required by this prior art document. To get to claim 1 from this document the skilled person must first decide that (a) he wants to keep the ionomer layer, (b) that he wants to make it an interior layer, and (c) that it will be reduced in size compared to that suggested in the citation for stabilizing of stretching. The Board can see no reason why the skilled person would take any of these steps, let alone all of them. The ionomer is emphasised as much for its useful oil-resistant properties as an outer layer as for stabilizing stretching. In this field where the choice of layers, the choice of their thicknesses and the order in which they appear in a multilayer laminate are all clearly of importance, the Board does not consider it legitimate that one feature be picked out of context.

9. Document (2) describes a heat-shrinkable laminate film with high heat resistance and oil resistance and comprises a core layer of VDC, two outer layers (B) of poly- α -olefin and an intermediate layer (C) of a thermoplastic resin which may be an ionomer polymer, the sum of the thicknesses of the two outer layers (B) being one fifth to one half of the total thickness of the layers (B) plus (C). This laminate is a development from laminates comprising VDC as core layer sandwiched between two layers of ethylene-vinyl acetate (EVA) which are not suitable for packaging fatty foods because of poor heat and oil resistance properties. The teaching of this citation is to replace EVA by polyolefin to improve heat and oil resistance and to include an intermediate thermoplastic layer to improve stretchability of the laminate, there is no reference at all to rigidity or any factors which may influence this property.

This document (2) was suggested by the respondent as the appropriate starting point, but the Board cannot see it as such. The respondent suggested no problem in relation to this art, which would make the skilled person develop it in a way to arrive at what is claimed in claim 1. What is suggested in document (2) may be an alternative solution to the problem above posed, but what is suggested is incompatible with the requirements of claim 1. The Opposition Division concluded that document (2) allowed the ionomer resin to make up 5 to 40% of the total thickness of the film. The Board is unable to follow how the Division arrived at this value, and the respondent too was unable to indicate how this conclusion was arrived at. Given the information in document (2), suggesting that the layer (A), makes up some 20% of the total thickness, then even if one assumed an embodiment in which (A) made up 40%, to get the ionomer down to 20% would need the assumption that adhesive made up 30% of the total thickness. As the

respondent's expert very fairly remarked at the oral proceedings, this would not be a teaching that the skilled person could read into document (2), and this is the Board's view too. Thus, the Board considers that document (2) refers to a laminate in which the ionomer layer makes up 50% or more of the total thickness. To arrive at claim 1 starting from document (2) would be to go against the specific teaching of document (2) for no clear reason.

Document (3) relates to a laminate of satisfactory mechanical properties but low rigidity and comprises three layers EVA/VDC/EVA derived from a single VDC layer by addition of the EVA layers which provide improved mechanical performance for the resultant laminate, and was not relied on to found any separate attack on inventive step.

Even if the Board were to follow the respondent's approach of combining the teachings of documents (2) and (5), the invention as claimed cannot be derived in any obvious fashion, as even if the skilled person might consider using ionomer, and making it an internal layer, the skilled person would arrive at a much greater thickness of ionomer according to the teaching of both these documents, than the thickness required by the claims of the patent in suit.

The respondent argued that the disclosure of the patent in suit represents only a retrograde step in that the laminates claimed by virtue of the EVA outer layer would have poorer heat and oil resistance than the prior art laminates used for packaging fatty foods, and that this could not amount to an invention. Yet this does not

suggest obviousness either. At least certain problems of the prior art have been solved in a novel way, so that this is not a case of something being claimed that is only worse than the prior art.

The Board is of the opinion that the subject-matter of claim 1 is inventive and meets the requirements of Article 56 EPC. The other claims are dependent on claim 1, and restrict its scope so that no separate consideration of inventive step is necessary for them. The main request is thus allowable.

10. The amendment sought by the appellant to remove the reference in the description (see page 2 line 19) that US Patent 4,226,822 (document (5)) suggested using ionomer for improving the rigidity of the laminate of is not allowed as no ground for a correction can be seen. Such use is disclosed, and the appellant seems merely concerned that his short reference might be taken out of context. The meaning of this document however depends on its own wording, not on what the appellant may have said about it at a later date.

Order

For these reasons it is decided that:

1. The decision of the first instance is set aside.
2. The case is referred back to the first instance with the order to maintain the patent on the basis of the main request filed with the grounds of appeal on 18 December 1991.

The Registrar


L. McGarry

The Chairwoman:


U. Kinkeldey