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D E C I S I O N
of 12 June 2003

Case Number: T 0068/99 - 3.3.7

Application Number: 89110301.2

Publication Number: 0347646

IPC: B32B 27/20

Language of the proceedings: EN

Title of invention:
Biaxially oriented laminated film

Patentee:
TORAY INDUSTRIES, INC.

Opponent:
Teijin Limited

Headword:
-

Relevant legal provisions:
EPC Art. 54, 56, 84, 123(2)
EPC R. 57a

Keyword:
"Several independent claims replacing a single broader claim - admissible (yes)"
"Lower limit of range taken from examples - added subject-matter (no)"
"Change of dependencies of claims - added subject-matter (no)"
"Novelty (yes)"
"Inventive step (yes)"

Decisions cited:
T 0054/82, T 0201/83, T 0449/90

Catchword:
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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0068/99 - 3.3.7

D E C I S I O N
of the Technical Board of Appeal 3.3.7
of 12 June 2003

Appellant: (Opponent)
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Decision under appeal:
Interlocutory decision of the Opposition Division of the European Patent Office posted 25 November 1998 concerning maintenance of European patent No. 0347646 in amended form.

Composition of the Board:

Chairman: R. E. Teschemacher
Members: P. A. Gryczka
G. Santavicca

Summary of Facts and Submissions

I. The mention of the grant of European patent 0 347 646 in respect of European patent application No. 89110301.2, filed on 7 June 1989, was published on 7 February 1996.

II. Two notices of opposition were filed in which revocation of the patent in its entirety was requested. The first one was based on lack of novelty and inventive step (Article 100(a) EPC) and insufficiency of disclosure (Article 100(b) EPC, the second one only on lack of inventive step (Article 100(a) EPC). The second opposition was withdrawn in the proceedings before the Opposition Division.

Of the documents cited during the first instance proceedings the following remain relevant to the present decision:

A1: Partial English translation of the laid-open Japanese patent application Nr. Sho 62-290535

A3: A. J. Melveger, "Laser-Raman Study of Crystallinity Changes in Poly(Ethylene-Terephthalate)", Journal of Polymer Science, Part A-2, Volume 10, 1972, pages 317 to 322

A4: Partial English translation of Plastics, Volume 33, No. 5, 1982, page 54, Table 3.

III. In an interlocutory decision issued in writing on 25 November 1998, the Opposition Division found that the patent according to the proprietor's sole request filed at the oral proceedings held on 3 November 1998 met the requirements of the EPC. The request comprised 5 independent claims which read as follows:

"1. A biaxially oriented laminated film comprising: a first layer containing a first thermoplastic resin as a major constituent; and a second layer containing a second thermoplastic resin as a major constituent, which is formed on at least one surface of the first layer, the second layer containing inert particles with an average diameter of 0.5 to 5 times the thickness of the second layer, the content of the inert particles in the second layer being 0.5 - 50% by weight, the thickness of the second layer being 0.1 - 3 µm and wherein the second thermoplastic resin is a crystalline polyester and the crystallization index of attenuated total reflection Raman of the surface of the second thermoplastic resin is not more than 20 cm^{-1}."

"2. A biaxially oriented laminated film comprising: a first layer containing a first thermoplastic resin as a major constituent; and a second layer containing a second thermoplastic resin as a major constituent, which is formed on both surfaces of the first layer, the second layer containing inert particles with an average diameter of 0.5 to 5 times the thickness of the second layer, the content of the inert particles in the second layer being 0.5 - 50% by weight, the thickness of the

second layer being 0.005 - 3 µm and wherein the second thermoplastic resin is a crystalline polyester and the crystallization index of attenuated total reflection Raman of the surface of the second thermoplastic resin is not more than 20 cm^{-1}."

"3. A biaxially oriented laminated film comprising: a first layer containing a first thermoplastic resin as a major constituent; and a second layer containing a second thermoplastic resin as a major constituent, which is formed on at least one surface of the first layer, the first layer containing inert particles with an average diameter of 0.007 - 2 µm in the amount of 0.001 - 0.15% by weight with respect to the total weight of the first layer, the second layer containing inert particles with an average diameter of 0.5 to 5 times the thickness of the second layer, the content of the inert particles in the second layer being 0.5 - 50% by weight, the thickness of the second layer being 0.005 - 3 µm and wherein the second thermoplastic resin is a crystalline polyester and the crystallization index of attenuated total reflection Raman of the surface of the second thermoplastic resin is not more than 20 cm^{-1}."

"4. A biaxially oriented laminated film comprising: a first layer containing a first thermoplastic resin as a major constituent; and a second layer containing a second thermoplastic resin as a major constituent, which is formed on at least one surface of the first layer, the second layer

containing inert particles with an average diameter of 0.5 to 5 times the thickness of the second layer, the content of the inert particles in the second layer being 0.5 - 50% by weight, the thickness of the second layer being 0.005 - 3 μm, the average height of protrusions on the surface of the second layer being not smaller than 1/3 of the average particle size of the inert particles in the second layer, and wherein the second thermoplastic resin is a crystalline polyester and the crystallization index of attenuated total reflection Raman of the surface of the second thermoplastic resin is not more than 20 cm^{-1}."

"18. A biaxially oriented laminated film comprising: a first layer containing a first thermoplastic resin as a major constituent; and a second layer containing a second thermoplastic resin as a major constituent, which is formed on at least one surface of the first layer, the second layer containing inert particles with an average diameter of 0.5 to 5 times the thickness of the second layer, the content of the inert particles in the second layer being 0.5 - 50% by weight, the thickness of the second layer being 0.005 - 3 μm and wherein the second thermoplastic resin is a crystalline polyester and the crystallization index of attenuated total reflection Raman of the surface of the second thermoplastic resin is not more than 20 cm^{-1}, the laminated film having a Young's modulus in both the longitudinal and transverse directions not less than 350 kg/mm2."

In its decision the Opposition Division held that:

(a) The amendments to claim 1 did not infringe Article 123(2) EPC because the lower limit of the thickness of 0.1 µm did not represent a new teaching.

(b) The contested patent disclosed the invention in a manner sufficiently clear and complete for it to be carried out by a skilled person (Article 83 EPC).

(c) It could not be stated that the value of density of the polyester film "Diafoil" mentioned in A4 corresponded to the value of density of the crystalline polyester of the second layer according to claim 1 of the patent in suit. Consequently, the crystallization index of attenuated total reflection Raman of the surface of the second thermoplastic resin of A1 could not be taken from A4 in combination with A3. Hence, the subject matter of claims 1, 3, 4 and 18 was novel.

(d) A1 either alone or in combination with any other document submitted by the Opponent would not direct the skilled person to consider that the ratio of average diameter of the particles to the thickness of the layer as indicated in the claims of the patent in suit would result in a combination of excellent scratch resistance, friction coefficient and dubbing resistance. The claimed subject-matter involved therefore an inventive step.

IV. The Opponent (Appellant) filed a notice of appeal against the above decision. In its statement of the grounds of appeal the Appellant referred to the further document:

A13: Sen-I Gakkaishi, Volume 26, No. 9, 1970, pages 417 to 425

In the letters dated 9 and 16 May 2003 the Appellant referred *inter alia* to the further documents:

A14: English translation of the abstract of JP-A 61/278022

A16: English translation of "Saturated Polyester Resin Handbook, Nikkan Kogyo Shinbusha, 1989, pages 687 to 689".

V. By letter dated 6 September 2000, the Respondent (Proprietor) countered the arguments of the Appellant and submitted two figures. By letter dated 12 May 2003 he filed 13 auxiliary requests and an experimental report. By letter dated 2 June 2003, the Respondent requested not to admit late filed documents A14 to A16 and filed a full English translation of A14 and two experimental reports.

VI. Oral proceedings took place on 12 June 2003.

VII. The Appellant's arguments can be summarised as follows:

(a) The addition of independent claims was not necessary to overcome the opposition grounds and in view of the fall back positions in the granted claims it was neither necessary nor appropriate to include claim 18 which was based on a passage of the description. The amendments made to the patent as granted during the opposition procedure were thus not in accordance with Rule 57a EPC.

(b) The amendment of the lower limit of thickness in claim 1 of the main request and the change of dependencies of the claims were not in accordance with Article 123(2) EPC.

(c) The subject-matter of claim 18 of the main request was not illustrated by an example and was therefore not supported by the description (Article 84 EPC).

(d) The subject matter of the patent-in-suit lacked novelty over comparative example 5 of A1 and example 1 of A14.

(e) As regards inventive step, A14 could be taken as the closest prior art document. It was known that a good friction coefficient combined with high scratch resistance was difficult to achieve and it had not been shown that these effects were obtained with films having a high particle content combined with a low thickness. Consequently, the technical problem underlying the patent in suit was not solved for the entire scope of the claims.

VIII. The Respondent's arguments can be summarised as follows:

(a) Late filed documents A14 to A16 should not be admitted into the proceedings.

(b) The independent claims were filed in reply to the novelty attack and were thus allowable under Rule 57a EPC.

(c) The lowest limit of the thickness range introduced in claim 1 was supported by the examples of the originally filed application.

(d) The claimed subject-matter was novel over comparative example 5 of A1 and example 1 of A14 as these documents did not disclose a crystallization index within the claimed range. The subject-matter of claim 1 was also novel over comparative example 5 of A1 because the thickness of the second layer was outside the claimed range of 0.1 to 3 µm.

(e) As regards inventive step, the problem mentioned in the patent was to provide a biaxially oriented film which showed an excellent scratch resistance combined with excellent friction properties and dubbing resistance. The solution was a film in which the features of the claims had to be combined. A1 did not teach the combination of these features and the surprising results achieved thereby. The claimed subject-matter involved therefore an inventive step.

IX. The Appellant requested that the decision under appeal be set aside and that the patent be revoked.

X. The Respondent requested that the appeal be dismissed and that the patent be maintained on the basis of the set of claims underlying the decision under appeal (main request) or on the basis of one of the auxiliary requests filed with the letter dated 12 May 2003.

Reasons for the Decision

1. The appeal is admissible.

Late filed documents

2. Late filed documents A14 and A16 are admitted into the proceedings as they are, as explained in detail below, *prima facie* relevant.

Main request

3. *Amendments*

3.1 Rule 57a EPC

3.1.1 The present set of claims contains five independent claims 1 to 4 and 18, which relate to biaxially oriented films as such, whereas only one independent claim of broader scope relating to that subject-matter was included in the patent as granted.

To delimit the claimed subject matter from the opposed prior art, in particular from A1 cited against the novelty of the granted patent, the Respondent filed, directly in response to the grounds for opposition, five independent claims which are based on the granted claim 1 and different amendments aimed to establish differences between the claimed subject-matter and the prior art. Consequently, the filing of these claims was occasioned by the grounds of opposition.

That the Respondent adopted different ways for delimiting the granted subject-matter from the opposed prior art in order to guarantee a protection as wide as possible of his invention is not in contradiction with the requirements of Rule 57a EPC, as each of the independent claims is intended to overcome the grounds for opposition differently and relates only to a restricted version of the subject-matter already claimed in the granted patent.

3.1.2 The Young's modulus specified in claim 18 was described in the original description at page 11, lines 9 to 11, as a preferred feature of the claimed laminated films. The restriction of claimed subject-matter on the basis of preferred features described in the originally filed application is not in contradiction to Rule 57a EPC.

3.2 Article 123(2) and (3) EPC

3.2.1 Claim 1 is based on the combination of claims 1 and 9 as originally filed with the additional amendment of the lowest limit of the thickness range of the second layer of the claimed films from originally 0.005 µm to 0.1 µm in present claim 1. This amendment was

objected to by the Appellant who argued with reference to the decision T 201/83 (OJ EPO 1984, 481), that in the examples the thickness of 0.1 µm was only disclosed in combination with other specific characteristics of the laminated films.

The lower limit of 0.1 µm corresponds to the thickness mentioned in the originally filed examples 6, 9, 10, 13 and 20 and restricts the previously claimed range of 0.005 to 3 µm to 0.1 to 3 µm. The question to be answered with respect to this amendment is whether or not the thickness that is taken from specific examples can be isolated from the other technical characteristics of these examples, or whether this specific thickness is closely associated with the other features of the examples such that it cannot be isolated from the context of the examples.

The originally filed patent application mentions that the thickness of the film must be adapted to the particle size in order to achieve the effects of the invention and defines in this respect that the inert particles have an average diameter of 0.1 to 10 times, preferably 0.5 to 5 times the thickness of layer A (claim 1; page 5, lines 12 to 22). There is no reference in the original patent application of other features that must be adapted to the thickness of the second layer in order to achieve the desired effects. Consequently, according to the teaching of the patent application, once a precise thickness of the second layer is defined, the size of the particles must be adapted to this specific thickness. All other features are independent of the thickness and can therefore be chosen within the limits which are defined in the

originally filed description and claims. In amended claim 1, the link between the thickness of the second layer and the particle size is defined as in the original claim 1 by the indication that the inert particles of the second layer have an average diameter of 0.5 to 5 times the thickness of the second layer. Consequently, the thickness can be taken from the examples to modify the thickness range in claim 1 since it is linked there to the average diameter of the particle size as required by the application as filed.

The present case cannot be compared to the case in decision T 201/83 *(supra)*: the skilled person would have recognised that the particle size is closely associated with the thickness of the film to determine the effects of the invention, whereas in the cited decision such a dependency between technical features was not present. However, the sole dependency taught by the application as filed is not lost in the amended claim. All other features of the examples are, as required by said decision, not closely associated with the thickness to achieve the effects of the invention.

Furthermore, the range defined in the amended claim is fully consistent with the preferred ranges specified in the application as filed, i.e. 0.01 to 1 and 0.03 to 0.5 µm, and does not incorporate values smaller than those indicated in these preferred ranges, which were described as generating a degradation of the properties of the films (page 8, lines 16 to 22).

Consequently, the change of the lower limit for the thickness from 0.005 to 0.1 µm does not result in any new information going beyond the application as filed, nor does this amendment introduce any unclarities or inconsistencies with the original disclosure of the invention.

3.2.2 The Appellant argued that the dependencies between the different claims were not the same as in the originally filed application and that new combinations of features going beyond the original disclosure were claimed through this.

Whereas it is correct that combinations of features may generate new subject-matter, in the present case the Board cannot agree with the opinion of the Appellant for the following reasons.

The dependent claims were already present in the application as originally filed. It is true, in view in particular of the different number of independent claims, that the dependencies between the claims have been amended. The subject-matter of each dependent claim is, however, also mentioned in the part relating to the preferred embodiments of the invention in the originally filed description (claim 5: page 9, line 15; claim 6: page 9, lines 9 to 19; claim 7: page 13, lines 8 to 14; claim 8: page 8, lines 6 to 15; claim 9, page 6, lines 1 to 4; claim 10: page 6, lines 8 to 12; claim 11: page 12, lines 8 to 16; claim 12: page 13, lines 15 to 21; claim 13: page 13, lines 22 to 26; claim 14: page 14, lines 9 to 12). In the description, these features are not associated with other specific features but are simply mentioned as preferred

embodiments of the invention and are unambiguously correlated to the subject-matter originally claimed. There is no indication that these preferred features should not be combined. On the contrary, the skilled person would more likely consider the preferred embodiments in combination, because the combination of the preferred features is obviously the best way for achieving the technical effects that the invention aims to provide. The combinations of the preferred features of the laminated films can therefore be derived from the whole content of the original disclosure. These combinations now explicitly claimed do therefore not relate to new subject-matter going beyond the application as originally filed (Article 123(2) EPC). This view concurs with that already expressed in decisions T 54/82 (OJ EPO 1983, 446) and T 449/90 ([1993] EPOR, 54) of the Boards of Appeal.

3.2.3 The other amendments to the patent were not objected to by the Appellant or the Opposition Division on the basis of Article 123 EPC. The Board does not see any reason to take a different position. In fact the amended claims are all based on the originally filed claims, with the exception of claim 18 which incorporates the Young's modulus as specified in the original description at page 11, lines 9 to 11.

The claims are restricted in scope when compared to the claims as granted (Article 123(3) EPC).

3.3 Article 84 EPC

Claim 18 requires that the laminated films have a Young's modulus of not less than 350 kg/mm^2 in both the longitudinal and transverse directions. However, the examples do not mention the value of the Young's modulus. The Appellant argued therefore that claim 18 was not supported by the description as required by Article 84 EPC.

Article 84 EPC does not require that any claimed subject-matter be necessarily illustrated by an example. Furthermore, the fact that the Young's modulus is not mentioned in the examples, does not imply that the exemplified films have Young's modulus outside the range specified in claim 18.

The description clearly mentions that the Young's modulus of the claimed laminated films is preferably within the range indicated in claim 18 (originally filed description page 11, lines 4 to 12). Consequently, the subject-matter of claim 18 is supported by the description (Article 84 EPC).

Novelty

4. The Appellant argued that the claimed films were not novel having regard to comparative example 5 in A1 and example 1 of A14.

4.1 A1 discloses a polyester film for a magnetic recording medium, which is a composite stretched laminate film comprising a layer of a polyester A and a layer of a polyester B containing fine particles, wherein surface

projections having an average height of 50 Å or more but 200 Å or less, and the maximum height 1.1 times or more but 1.5 times or less the average height, are formed, due to the presence of fine particles on the outer surface of the layer of the polyester B in the number of 10^3 projections per mm^2 or more but 10^7 projections per mm^2 or less (claim 1).

The polyester film for a magnetic recording medium is produced by a method comprising the steps of separately melting a polyester A and a polyester B containing 0.001 to 1 weight% of fine particles, coextruding the molten polyesters from a die having a slit into a sheet, cooling and solidifying the sheet on a moving cooling body at 5 to 40°C to produce an unstretched laminate sheet formed of the polyesters A and B, stretching the sheet biaxially, re-stretching the stretched sheet as required and heat-treating the stretched sheet, wherein the diameter of the fine particles before addition to the polyester ranges from 10 to 300 mμ, the thickness of the polyester B layer of the unstretched sheet is 5 times or more but 100 times or less the particle diameter of the added fine particles, and the film is stretched in a stretch ratio of 2 to 4 at 70 to 150°C in one direction and in a stretched ratio of 3 to 5 at 70 to 150°C in a direction perpendicular to the above direction (claim 2).

4.2 The examples of A1 were carried out with a fine particles content in layer B of 0.02 weight%, which is below the content required by the claims of the patent in suit (0.5 to 50 weight%). However, in comparative example 5 of A1 the particles content is 2 weight% and falls consequently within the range required by the

present claims (Table 1 in A1). This comparative example could therefore be prejudicial to the novelty of the presently claimed subject-matter.

4.3 According to comparative example 5 an amorphous polyethylene terephthalate starting material (A) which contains as little as possible of residual particles from a residual polymerisation catalyst, and a starting material (B) obtained by mixing the starting material (A) with 2 weight% of SiO_2 particles having a particle diameter of 110 mμ (1 mμ = 1 nm) (see Table 1) were used for preparing a film and subsequently a magnetic tape. The starting materials were molten and coextruded such that the thickness of the layer of the starting material (B) became 1 μm and that of the layer of starting material (A) became 137 μm. The resulting sheet was cooled, solidified and stretched to 3.4 times at 100°C in the machine direction. Then an aqueous coating emulsion was applied onto the surface of the layer of starting material (A). Thereafter the sheet was dried, preheated and stretched to 3.4 times in the transverse direction. The sheet was heated at 200°C for 1 second to obtain a 12 μm thick biaxially stretched polyester laminated film consisting of a layer B having 3.0×10^4 surface projections per mm^2, having an average diameter of 0.2 μm, an average height of 150 Å and the maximum height of 180 Å. This film was then modified in order to prepare a magnetic tape.

4.4 As all independent claims of the patent-in-suit require that the second thermoplastic resin be a crystalline polyester and that the crystallization index of attenuated total reflection Raman (in abbreviated form "crystallization index") of the surface of the second

thermoplastic resin be not more than 20 cm^{-1}, it should first be determined whether this feature is disclosed in A1. A1 does not mention *expressis verbis* the crystallization index. The Appellant argued however that it was widely known that a stretched polyethylene terephthalate (PET) film, as disclosed in comparative example 5 of A1, had inherently a crystallization index of attenuated total reflection Raman of 20 cm^{-1} or less. In this respect, the Appellant referred to A3, which showed the correlation between the crystallization index and the density of PET and from which it could be deducted that if the density was above approximately 1.37 the index was lower than 20 cm^{-1}. As it was known from A4 that biaxially stretched PET foils (DIAFOIL) had a density between 1.38 and 1.40, it could be concluded that the PET layer in comparative example 5 of A1 had a crystallisation index according to the present claims. This was also confirmed by document A13 which gave in Table 3 densities for PET films stretched 4 x 4 times or 3 x 3 times of respectively 1.384 and 1.381. This argumentation was contested by the Respondent who argued that there was no direct correlation between density and stretching ratio. Furthermore, in A3 and in A13 the characteristics of the entire film was considered whereas the present claims defined the crystallisation index of the surface of the film. It could therefore not be concluded that the film according to comparative example 5 inherently had the crystallization index required by the present claims.

4.5 The argumentation of the Appellant is firstly based on the assumption that the density of the PET film of A1 can be deducted from A4 or can be determined by the correlation given in A13 between the stretching ratio and the density.

4.6 A4 discloses the characteristic properties of Diafoil which is a biaxially stretched polyester film. The density of the film disclosed there is between 1.38 and 1.40 (Table 3). In order to make any comparison between Diafoil films and the film of A1, at least the preparation of the films in both documents should be similar as it has never been contested that the process conditions, in particular the stretching conditions, influence the properties of the stretched film. However, A4 does not mention the conditions of preparation of Diafoil films. Therefore, the assumption that the density of the film of comparative example 5 of A1 is the same as the density of Diafoil films disclosed in A4 is not founded.

4.7 The film of comparative example 5 of A1 has been stretched at 100°C, 3.4 times in the machine direction and thereafter 3.4 times at 115°C in the transverse direction (A1, page 12 in connection with page 11). This method corresponds to the so-called "two-way successively biaxially stretched" method of A13 (Table 3). A13 mentions in Table 3 the density of PET films stretched by this method in silicon oil at 100°C in function of the stretching ratio. However, the ratio used in A13 in connection with this particular stretching method, namely 4.0 x 2.0 or 4.0 x 4.0 does not correspond to the ratio of 3.4 x 3.4 used in A1. The determination of the density would therefore

require that the correlation between the stretching ratio and the density be well known. Such a correlation is however not mentioned in A13 nor can it be deduced from the data presented in A13. The densities observed for the ratios 4.0 x 2.0 and 4.0 x 4.0 are, 1.366 and 1.391, respectively. Although it may be expected that the density obtained with a stretching ratio of 3.4 x 3.4 would be between these values, it cannot be assumed unambiguously that the density would be sufficient to observe a crystallization index according to the present invention. Furthermore, in addition to the stretching ratio other parameters influence the density of the stretched films. For example, Figure 3 of A13 clearly shows that the heat-set time and temperature considerably influence the density of PET films. Whereas at 100°C the density of the film remains constant with time, at 110°C considerable variations occur after approximately 10 minutes of heat-setting. This is also confirmed by A16 which mentions the relationship between heat treatment temperature of PET films and their density (page 1, first paragraph; Figure 13.17). This shows that the conditions of preparation of the films have to be the same, if a comparison has to be made. In the present case, these conditions were not the same. For example, A13 mentions that the stretching was performed in silicon oil whereas such a medium is not indicated in A1 which mentions also a drying step at 115°C through a stenter and a heating step at 200°C which are not indicated in A13 (A1 example 1, page 11 on which example 1 is based and A13, Table 3).

Consequently, the density of the PET film of comparative example 5 of A1 cannot be directly and unambiguously derived from the data presented in A3.

4.8 Even if the density of the film of comparative example 5 of A1 could be derived from the densities of the films disclosed in A3, the crystallization index cannot directly and unambiguously be derived from the correlation between density and crystallization index mentioned in Figure 4 of A3.

In the Appellant's argumentation the film according to A1 has a density of approximately 1.37. According to Figure 4 of A3, this density is correlated to a crystallization index, called Raman bandwidth at half maximum intensity in A3, of not more than 20 cm^{-1} as required in the presently claimed laminated films. As the density derived by the Appellant from A13 represents approximately the limit of density to which corresponds according to A3 a crystallization index of not more than 20 cm^{-1}, the correlation given there must be reliable. In fact only a small modification of the line illustrating the correlation in Figure 4 would have as consequence that a density of 1.37 would not necessarily correspond to an index of not more than 20 cm^{-1}, and could in these circumstances be outside the range specified in the claims of the patent-in-suit. However, from the different points illustrated in Figure 4, said points representing the measurements which were made to establish the correlation, different lines and thus a different correlation could have been envisaged. The correlation was established on the basis of measurements performed on various PET materials, shaped as high-pressure crystallised rod (points

marked 1 in the figure), filaments heat-crystallised (points 2), drawn yarn (points 3), undrawn yarn (points 4), heat crystallised filaments (points 5), powder ground in liquid (points 6) and amorphous filament (points 7). The line which has been drawn between the different points represents a correlation, which for some of the materials, in particular for the heat-crystallised filaments (points 5) is reliable, but for other materials , in particular for the high-pressure crystallised rod (points 1) and drawn yarn (points 3), is not in accordance with the data provided for them. For example, the measurements made for pressure-crystallised rod (points 1) appear to show that the crystallization index be almost independent of the density. For the drawn yarn (points 3) a completely different line could have been drawn, corresponding to a much lower variation of crystallization index with density. It appears, therefore, from the data presented in A3 that the correlation depends, to a certain extent, from the materials considered and their shape. In this respect, the study reported in A3 does not relate to the laminated films forming the subject of the disputed patent. Therefore, although A3 mentions a correlation between the density of PET materials and their crystallization index, the correlation is not sufficiently precise to establish without doubt that the crystallization index of the film of comparative example 5 of A1 is not more than 20 cm^{-1}.

4.9 In conclusion, the two extrapolations made by the Appellant, namely the determination of the density from the stretching ratio on the basis of A13, followed by the determination of the crystallization index from the density on the basis of A3, are uncertain and do not

allow to conclude beyond all reasonable doubt that the laminated film of comparative example 5 of A1 has a crystallization index of not more than 20 cm^{-1}.

Under such circumstances, the disputed question of the thickness of the second layer in this example, as well as the disputed issue relating to the fact that the "total Raman" and the "surface Raman" can be considered in relation with the crystallization index, can be left unanswered as regards the question of novelty.

4.10 The Appellant also raised a novelty objection on the basis of example 1 of A14. This example was cited, in particular, because it fulfils the requirements of the present claims in terms of thickness of the second layer, whereas the other examples of A14 illustrate films in which the thickness is well above the limit imposed by the present claims.

The polyester film corresponding to the second layer of the presently claimed films is in this document a poly-1,4-cyclohexylene dimethylene terephthalate film which has been stretched 3.6 times at 105°C in the longitudinal direction and 3.8 times at 115°C in the transverse direction, and maintained under heating at 220°C for 30 seconds (see examples pages 13 to 14 and example 1 on Table 1 at page 16). The crystallization index is not mentioned in the example and the Appellant has also argued that the film of the example 1 of A14 had inherently a crystallization index of not more than 20 cm^{-1}.

As the material of the second layer of the film according to example 1 of A14 is not PET, the extrapolation of its crystallization index from the data given for PET materials in A13 and A3 is even less reliable than for comparative example 5 of A1, as it has never been contested that the nature of polymer has an impact on the physical characteristics of the film.

Furthermore, the fact that the conditions of preparation of the film according to A14 fall mostly under the conditions disclosed in the patent-in-suit for preparing the claimed laminated films does not imply, as argued by the Appellant, that the film of A14 necessarily has a crystallization index of not more than 20 cm^{-1}. The conditions disclosed in the patent (page 6, lines 5 to 27) encompass a wide range of possibilities for the longitudinal stretch ratio (from 3.0 to 6.5), for the longitudinal stretch temperature (from 50 to 130°C), for the transverse stretch ratio (from 3.0 to 5.0), for the transverse stretch temperature (from 80 to 160°C) and for the heat-set temperature and time (from 170 to 200°C and from 0.5 to 60 seconds). In view of the influence of each of these parameters on the characteristics of the film, there is no doubt that an adjustment of these conditions, namely with regard to the chemical nature of the polymers used, is required and that not each combination of possible process conditions, independently of the polymer used, will result in the claimed laminated films. This is also demonstrated by the patent in suit itself, where the films according to comparative examples 8 to 12, 14 and 15 show a crystallization index above 20 cm^{-1} despite the fact that they have been stretched under the same conditions

as the film of examples 15 to 18 which have a crystallization index of not more than 20 cm^{-1} (Table 3, page 18).

4.11 Therefore, the particle containing layer of the laminated film disclosed in example 1 of A14 does not unambiguously present a crystallization index of not more than 20 cm^{-1}.

4.12 As all the claims of the patent-in-suit require that the surface of the second thermoplastic layer has a crystallization index of not more than 20 cm^{-1}, the state of the art cited by the Appellant does not prejudice the novelty of the claimed laminated films (Article 54 EPC).

5. *Inventive step*

5.1 Closest prior art.

The patent in suit concerns biaxially oriented laminated films suitable as base films of magnetic recording media.

The Respondent and the Opposition Division considered A1 as the closest prior art document. The Appellant also referred to A14 in this respect.

In selecting the closest prior art, the first consideration is that it should be directed to the same purpose or effect and that it should relate to the same or a similar problem, or at least to the same or a closely related technical field as the patent in suit

(Case Law of the Boards of Appeal of the European Patent Office, 4th edition 2001, I.D.3.1).

According to the patent in suit, the known laminated films suitable as a base film of magnetic recording media have several drawbacks. The base films are likely to be scratched during the preparation steps of the final recording media, their friction coefficient is increased during handling at high temperature and humidity and, when used for recording media such as video tapes, the dubbing resistance is not satisfactory (page 2, lines 13 to 25).

The aim of the patent in suit was consequently to provide a biaxially laminated film of which the surface is hardly scratched, which has a small friction coefficient even under high temperature and humidity and has excellent dubbing resistance (S/N ratio) when the film is used as the base film of magnetic recording media (page 2, lines 29 to 32).

A14 relates to magnetic recording flexible disks comprising a biaxially oriented polyester film substrate provided with a magnetic layer thereon (page 1, claim) and mentions that the poor durability of this kind of product is due to delamination of the magnetic layer from the polyester film. A14 addresses the problem of improving the durability of said disks (page 3, first paragraph; page 4, last paragraph). This document concerns consequently a problem different to that of the patent in suit.

A1 relates to polyester films for magnetic recording medium and addresses the problems of head clogging and deterioration in tape performance (S/N ratio) due to scratching by long time repetition under severe conditions such as high temperature and humidity (page 3, paragraphs 1 to 3).

The problems addressed in A1 come consequently closer to those underlying the patent in suit. Therefore, A1 rather than A14 qualifies as the closest prior art. Although comparative example 5 of A1 represents in terms of technical features the closest example to the presently claimed film, the skilled person would not restrict that document to the examples and certainly not to a comparative example, which by its nature is not representative of the solutions proposed in A1. Rather the skilled person would consider the general teaching of A1 as a whole.

5.2 *Problem and solution*

5.2.1 The properties of the magnetic tapes prepared with the base films according to A1 were evaluated by measuring the electromagnetic conversion characteristics (S/N ratio and drop-out), the number of repetitions until start of head clogging of a video tape recorder and the scratch resistance. According to the results summarised in Table 1 of A1, the tapes according to examples 1 and 2 show no scratches after 100 times travelling and induce a head clogging only after about 50 repetitions. The recording properties are illustrated by S/N ratios of +5 and +6 dB and a drop-out of 25 times/minute. The films according to comparative examples 3 and 5 show better mechanical characteristics (no scratches and

respectively 100 and 120 repetitions until start of head clogging) than the films of examples 1 and 2 but their recording properties are bad (S/N ratio of respectively -1 and 0 dB, drop out of respectively 250 and 100 times/minute). On the other hand, the films according to comparative examples 1, 2 and 4, albeit their recording properties are similar to those of the films according to the examples 1 and 2, show bad mechanical properties.

From these results it can be gathered that the films prepared according to A1 are characterised by a compromise between the electromagnetic characteristics on the one hand and the mechanical characteristics, namely head clogging and scratch resistance, on the other, the best possible results on both aspects being not achieved simultaneously.

Hence, the problem underlying the patent in suit may be seen as to provide a biaxially oriented film having excellent scratch resistance and a low friction coefficient, and simultaneously excellent electromagnetic characteristics when the film is used as the base film of magnetic recording media. This technical problem is in line with the technical problem defined in the patent in suit (page 2, lines 29 to 32).

5.2.2 The solution to that technical problem is a biaxially oriented film according to any of independent claims 1 to 4 and 18.

5.2.3 The examples of the patent in suit show that the claimed biaxially oriented films have good to excellent friction coefficient and scratch resistance and that the magnetic recording tapes prepared with the claimed films show good to excellent dubbing resistance, which illustrates the electromagnetic recording properties (examples 1 to 10, Table 1, page 13; examples 11 to 15, Table 2, page 15; examples 15 to 18, Table 3, pages 17 and 18).

5.2.4 The Appellant argued that it was well known that a good friction coefficient combined with high scratch resistance was difficult to achieve and that the Respondent had not shown that these effects were obtained with films having a high particles content combined with a low thickness. The technical problem would therefore not be solved for the entire scope of the claims. The Appellant did not file any evidence in support to its allegation. However, the examples of the patent show that even near to the end limits of the ranges for thickness and particles content, a good friction coefficient combined with good scratch resistance can still be obtained. This is illustrated by example 14 which combines a high particle content of 30 weight%, with a low thickness of 0.06 µm and is still rated as good for the coefficient of friction and the scratch resistance (Table 2, pages 14 and 15).

5.2.5 Consequently, the Board is satisfied that the technical problem as defined herein above (paragraph 5.2.1) has effectively been solved.

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

5.4 The biaxially oriented laminated film according to the different independent claims of the patent in suit have all in common in particular the following technical features:

(a) the thickness of the second layer is not more than 3 µm,

(b) the second layer contains inert particles with an average diameter of 0.5 to 5 times the thickness of the second layer (d/t ratio),

(c) the content of the inert particles in the second layer is 0.5 to 50% by weight and,

(d) the crystallization index of attenuated total reflection Raman of the surface of the second thermoplastic resin is not more than 20 cm^{-1}.

The Respondent has filed evidence to demonstrate that each of these features has a positive effect on the characteristics of the laminated film. For example, the Figures 1 to 4 submitted in the letter dated 28 October 1998, and Figure 6 filed with the letter dated 6 September 2000 show that:

(i) the scratch resistance and the friction coefficient depend of the d/t ratio and are rated respectively excellent and good when the ratio is within the range 0.5 to 5 as specified in the claims of the patent in suit (Figures 1 and 2),

(ii) the dubbing resistance and scratch resistance vary with the thickness of the layer and are rated excellent within the thickness ranges according to the patent in suit (Figure 3),

(iii) the content of particles in the second layer influences the scratch resistance which is good or excellent when the content of particles is as claimed (Figure 4) and,

(iv) a good to excellent scratch resistance can only be achieved when the crystallisation index is not more than 20 cm^{-1} (Figure 6).

From examples 1 to 10 and comparative examples 1 to 7 it is apparent that as soon as at least the thickness, the d/t ratio or the content of particles is not in accordance with the claims, the three sought-after effects of the invention, namely good to excellent scratch resistance, friction and dubbing coefficient, cannot be obtained simultaneously (Table 1, page 12 and 13). From examples 15 to 18 and comparative examples 8 to 15 it is furthermore apparent that a good friction coefficient is only combined with a good scratch resistance when the thickness, the d/t ratio, the content of particles and the crystallisation index are simultaneously within the claimed ranges (Table 3, pages 17 and 18).

The documents on file do not suggest the claimed combination of features.

A1 primarily concerns the influence of the number, average and maximum height of the surface projections due to the presence of fine particles in the outer layer of the polyester film, on the characteristics of the magnetic recording media prepared with such a film. In this respect, A1 teaches in particular that electromagnetic conversion properties deteriorate if the average height of projection is not adapted to their maximum height or if the number of projections is above a given limit. According to A1, these parameters have also an influence on head clogging and generation of scratches (paragraph bridging pages 5 and 6; page 9, first paragraph).

In connection with particle diameters and film thickness, A1 mentions that the particle diameter ranges from 10 to 300 µm, before addition to the polymer and that the thickness of the unstretched polymer layer is between 5 and 100 times the particle diameter (claims, paragraph (2) at page 2; paragraph bridging pages 4 and 5; page 7, third paragraph). A1 is however silent on the d/t ratio of the stretched film and does not mention that this ratio could have an influence on the properties of the film. The crystallisation index of the surface of the polyester layer is not even mentioned in A1 so that its effect on the properties of the film can obviously not be suggested by that document.

Furthermore, the second layer of the presently claimed films contains from 0.5 to 50% by weight of inert particles whereas A1 mentions a particle content of 0.001 to 1% by weight (claim 2, page 1). In comparative example 5 of A1, where 2 weight% of particles were

used, bad drop-out and S/N ratios were achieved, whereas according to examples 1 and 2, an amount of fine particles as low as 0.02 weight% results in better recording characteristics. Although, there is a small overlap between the particle amounts envisaged in the patent-in-suit and in A1, the general teaching of A1 in this respect is thus to incorporate in the second layer an amount of particles which is below the amount required by the present claims.

It results from the above that A1 did not suggest that the technical problem as defined above could be solved by the presently claimed subject matter.

As already explained above (paragraph 5.1), A14 is not related to the technical problem underlying the patent-in-suit and does consequently not give any teaching in relation with the improvement of friction coefficient, scratch and dubbing resistance by the adjustment of features such as the d/t ratio, the thickness of the film or the crystallisation index.

The Board arrives therefore at the conclusion that the claimed subject matter according to the main request involves an inventive step. This conclusion applies to all independent claims, as they all include the combination of technical features on the basis of which an inventive step is recognised.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

C. Eickhoff

R. E. Teschemacher

PG 23.10.2003

24/10/2003