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DECISION
of 19 December 2002

Case Number:	T 0922/97 - 3.3.7
Application Number:	89304291.1
Publication Number:	0340982
IPC:	D01F 8/04
Language of the proceedings:	EN

Title of invention:
Melt-bondable fibers for use in nonwoven web

Patentee:
MINNESOTA MINING AND MANUFACTURING COMPANY

Opponent:
Akzo Nobel N.V.
Trevira GmbH

Headword:
-

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step (yes) - closest prior art, problem and solution"
"Transfer of opposition (yes)"

Decisions cited:
-

Catchword:
-

Case Number: T 0922/97 - 3.3.7

DECISION
of the Technical Board of Appeal 3.3.7 of 19 December 2002

Appellant:
(Proprietor of the patent)

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Decision under appeal: **Decision of the Opposition Division of the European Patent Office posted 24 July 1997 revoking European patent No. 0 340 982 pursuant to Article 102(1) EPC.**

Composition of the Board:

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

Summary of Facts of Submissions

I. The mention of the grant of European patent 0 340 982, in respect of European patent application 89 304 291.1, filed on 28 April 1989 and claiming a priority in the USA of 6 May 1988 (US 191043), was published on 14 September 1994. The patent as granted comprised 12 claims, independent claims 1 and 11 reading as follows:

"1. A bicomponent fiber comprising:
(a) a first component comprising an oriented, crimpable, at least partially crystalline polymer, and adhering to the surface of said first component,
(b) a second component, which comprises a compatible blend of polymers, comprising:
(1) at least one amorphous polymer, and
(2) at least one at least partially crystalline polymer,
the melting temperature of said second component being at least 30°C lower than the melting temperature of said first component, but at least equal to or in excess of 130°C, the weight ratio of said amorphous polymer of said second component to said at least partially crystalline polymer of said second component being in the range from 15:85 to 90:10, the concentration of said amorphous polymer of said second component being sufficiently high to reduce the melt flow rate of said at least partially crystalline polymer of said second component, but not so high as to prevent said bicomponent fiber from bonding to a like bicomponent fiber, provided that if the bicomponent fiber is spun in a sheath-core configuration, said first component is the core and said second component is the sheath."

"11. A nonwoven web comprising a multiplicity of fibers of any preceding claim."

Dependent claims 2 to 10 and 12 concerned preferred embodiments of the bicomponent fibre of claim 1 and of the nonwoven web of claim 11, respectively.

II. Two notices of opposition were received on 12 June 1995 (opponent 1) and on 14 June 1995 (opponent 2), respectively.

Opponents 1 and 2 requested revocation of the patent on the grounds of Article 100(a) EPC, that the claimed-subject matter lacked novelty and inventive step having regard to the following documents, *inter alia*:

D2: JP-A-57 167 418 (English translation)

D3: DE-A-3 323 467

Opponent 2 also requested revocation of the patent on the ground of Article 100(b) EPC.

III. By a decision of the Opposition Division, posted on 24 July 1997, the patent was revoked. That decision was based on the claims as granted.

In its decision, the Opposition Division held that:

(a) The patent in suit was in compliance with Article 83 EPC;

(b) The claimed subject-matter was novel, since none of the cited documents disclosed all the claimed features in combination;

(c) The closest prior art document was D3 rather than D2. The technical problem to be solved on the basis of D3 was the further reduction of fibre and web shrinkage and agglomeration during melt-bonding. The features distinguishing the claimed subject-matter from D3, however, amounted to arbitrary variations within the known art. Therefore, the claimed subject-matter lacked an inventive step.

(d) Since no further request was on file, the patent had to be revoked.

IV. The proprietor lodged an appeal against that decision, which was received on 29 August 1997, the prescribed fee being paid on the same day. With the statement of the grounds of appeal, which was received on 2 December 1997, the appellant enclosed two amended sets of claims, identified as auxiliary requests I and II, and referred to a further document.

V. By a letter dated 27 February 1998, respondent 01 (opponent 1) stated that they refrained from submitting any comments on the appeal, whereas respondent 02 (opponent 2), in a letter dated 10 June 1998, maintained that the claimed subject-matter lacked an inventive step over D3.

VI. In a communication in preparation for the oral proceedings, the Board indicated the points to be discussed, *inter alia* that document US-A-4 234 655 (D12), acknowledged in the opposed patent, appeared to address a similar objective to the patent in suit and might be considered as a possible starting point for the discussion of inventive step.

In reply:

- Respondent 01 announced that they would not attend the oral proceedings and requested a decision on the basis of the written submissions made during the opposition proceedings (letter dated 18 April 2002);

- Respondent 02 elaborated further on the lack of inventive step of the subject-matter of the requests on file (letter dated 22 April 2002);

- The appellant filed a further set of claims, as the third auxiliary request, made reference to two further documents, declared that they would be prepared to include definitions of the terms "amorphous" and "partly crystalline" in the claims, if necessary for the sake of clarity, and addressed the relevance of D2, D3 and D12 as possible closest prior art (letter dated 23 April 2002).

VII. By a communication dated 23 July 2002, the Registrar of the Board drew the parties' attention to the fact that opposition 2 had been filed in the name of Hoechst Trevira GmbH & Co. KG, whereas the latest letters of respondent 02 were on behalf of Trevira GmbH, and invited respondent 02 to clarify the situation.

In reply, respondent 02 submitted that Trevira GmbH & Co. KG was the successor in law of Hoechst Trevira GmbH & Co. KG (opponent 2), and that the successor in law had thereafter changed its name to Trevira GmbH. However, no document showing that the transfer and the change of name had effectively taken place was produced.

VIII. Oral proceedings were held on 6 August 2002 in the absence of respondent 01, in compliance with Rule 71(2) EPC.

The representative of respondent 02 declared that he acted on behalf of Trevira GmbH but did not produce any evidence for the transfer to the successor in law of the assets in the interests of which the original opposition had been filed, nor did he prove the subsequent change of name of the successor in law.

Since he maintained that such evidence was available and could be produced promptly, he was allowed to act for Trevira GmbH, with the express agreement of the appellant and with the proviso that the necessary documents for establishing the transfer of the assets in the interests of which the opposition had been filed and the change of name would be produced within short notice after the oral proceedings.

After discussion of the case and deliberation by the Board, the Chairman closed the debate on the substantive questions and announced that the procedure would be continued in writing in order to give respondent 02 the opportunity to submit evidence establishing that the business assets of Hoechst Trevira GmbH & Co. KG, relating to the present case, had been transferred via Trevira GmbH & Co. KG to Trevira GmbH.

By letter dated 23 August 2002, respondent 02 submitted the promised evidence. The appellant did not make use of the opportunity to comment.

IX. The arguments of the appellant in support of the appeal can be summarised as follows:

(a) As to inventive step, the appellant submitted a feature analysis of the subject-matter of granted claim 1 and argued that D3, D2 and D12 all came into consideration as the closest prior art document.

(b) On the basis of D3, the problem to be solved was to provide bicomponent fibres having a higher processing temperature, which were suitable for the production of abrasive pads, with uniform small bonded points and without agglomeration of the fibres.

As exemplified in the patent in suit, that problem had been solved. In this respect, examples 2 and 3 fell within the scope of claim 1.

D3, which recommended the use of a bonding component made of a blend of polyethylenes, ie the use of crystalline polymers, taught away from the use of an amorphous polymer in the bonding component as required by the patent in suit.

D2, which taught to use a bonding component entirely made of an amorphous polymer, and D12, which aimed at a lower adhesive temperature than now being claimed, could not supplement the teaching of D3.

Hence, the claimed subject-matter was not obvious starting from D3.

(c) Taking D2 as the starting point, the problem to be solved was to provide fibres with reduced shrinkage and agglomeration and improved stability of the nonwoven webs made therefrom.

D2 exemplified the use of a crystalline polymer as the bonding component to show that it led to unacceptable bonding. Hence, it taught away from using crystalline polymers in the bonding component.

In view of the contents of D3 and D12, mentioned before, the teaching of D2 could not be supplemented by those documents.

Hence, also starting from D2, the claimed subject-matter was not obvious.

(d) The same conclusion was reached when starting from D12 as the closest document.

The problem solved on that basis was to produce bicomponent fibres suitable for nonwoven webs having not only a higher temperature workability without agglomeration of the fibres but also a better uniformity. In particular, the patent in suit aimed at a low shrinkage of the webs as well as at keeping the bonding points as small as possible.

Neither D3 nor D2 could supplement the teaching of D12 with respect to the presence of an amorphous polymer in the bonding component within the ratio as defined and a melting point of at least 130°C for that bonding component.

(e) Therefore, the subject-matter as granted was inventive.

X. The respondents argued in essence as follows:

(a) The objections in respect of the requirements of novelty and sufficiency of disclosure were no longer argued.

(b) As to inventive step, the problem of the patent in suit was to provide bicomponent fibres suitable for nonwoven webs which were stable and had little shrinkage. The bonding component of the fibre should not have too high a melt flow rate.

(c) According to the data provided in the patent in suit, however, that problem had not been solved, since the reduction of the melt flow rate was accompanied by an increasing shrinkage, which was worse than that of the comparative prior art.

(d1) D2 disclosed bicomponent fibres having a shrinkage as low as 8% or 3% with an amorphous bonding component. D2 taught that to obtain such bicomponent fibres having low shrinkage, no splitting of the component elements and a fine denier, a substantially non-crystalline polymer had to be used as the bonding component of the fibre. Therefore, D2 provided no incentive to use a bonding component entirely made of a crystalline polymer.

However, replacement of a non-crystalline bonding component by a blend of amorphous and partly-crystalline polymers was a trivial measure for the person skilled in the art, who would have assumed that both materials would behave in the same way where the relevant properties were concerned.

(d2) D3 indirectly disclosed that the nonwoven webs made from the bicomponent fibres did not shrink, since the bicomponent fibres were to be combined with other fibres which should not shrink on forming the webs. Also, as to the bonding component, it comprised a blend of crystalline and less crystalline components.

(d3) D12 was more relevant than D3, since it aimed at a bicomponent fibre having substantially no curliness, whose bonding component comprised a blend of amorphous and crystalline polymers. The melting point of the bonding component of the fibre could be as high as 130 to 135°C for polyethylene, and the ratio between amorphous and crystalline polymers, as could be seen in the examples of D12, was within the claimed range.

(e) Hence, the subject-matter of granted claim 1 was obvious.

XI. The appellant requested that the decision under appeal be set aside and that the patent be maintained as granted or, alternatively, on the basis of one of the three auxiliary requests filed with the statement of grounds of appeal and with the letter dated 23 April 2002 (third auxiliary request).

XII. The respondents requested that the appeal be dismissed.

Reasons for the Decision

1. The appeal is admissible.

2. *Procedural issues (Identity of opponent 2)*

2.1 The contracts submitted by respondent 02, by letter dated 23 August 2002, establish to the satisfaction of the Board that the business assets in the interests of which the opposition had been filed were transferred from the original opponent to Trevira GmbH & Co KG, which thereafter changed its name to Trevira GmbH, as shown by copies from the commercial register.

2.2 Therefore, Trevira GmbH is a party to the proceedings (for the transfer of the opposition, see Case Law of the Boards of Appeal of the EPO, 4th edition 2001, VII.C.5).

Main request

3. *Sufficiency of disclosure and novelty*

The objections related to the above requirements were no longer argued during the appeal proceedings. The Board has no reason to take up the matter of its own motion.

4. *Closest prior art*

4.1 The patent in suit relates to melt-bondable fibres for use in nonwoven webs, in particular to bicomponent melt-bondable fibres suitable for nonwoven webs (page 2, lines 7 to 8).

4.2 Such fibres are known from D3, which the Opposition Division considered to be the closest prior art document, as well as from D2 and D12, which were indicated as other possible starting points by the appellant and the Board.

4.2.1 D3 describes a non-woven fabric of melt-adhesive composite fibres having a small weight per unit area of 8 to 30 g/m^2 characterised in that it is obtained by forming a fibre aggregate consisting of only melt-adhesive composite fibres of 4 deniers or less, composed of as a first component a polyethylene resin composition (C) consisting of (A) 50 to 100% by weight of a straight chain low density polyethylene and (B) 50 to 0% by weight of another kind of polyethylene, said first component having a density of 0.91 to 0.94 g/cm^3 and a ratio of its melt index after spinning to that before spinning of 0.75 or higher, and as a second component a fibre-formable polymer having a melt point higher than those of either polyethylenes (A) or (B) by 30°C or more, the first component constituting at least a part of the fibre surface of the composite fibres continuously in the longitudinal direction thereof, or by forming an aggregate of fibres having an average of 4 deniers or less composed of a mixture of the composite fibres set forth above and other fibres of 6 deniers or less, said mixture containing at least 25% by weight of the composite fibres based on the total weight of composite and other fibres, and by subjecting any of the fibre aggregate to heat treatment at a temperature equal to or higher than the melt point of the first component of the composite fibres but lower than the melting point of the second component thereof to stabilize the shape by hot melt adhesion (claim 1).

In the examples, the second component is polypropylene (examples 1 to 5 and 7 to 10) and the first component is L-LDPE (example 1), a mixture of 55% L-LDPE and 45% MDPE (examples 2 and 3), a mixture of 85% L-LDPE and 15% HDPE (example 4) or a mixture of 60% L-LDPE and 40% MDPE (example 5).

According to Table 1, the melting point of L-LDPE is 123 to 124°C and 110 to 132°C for LDPE, MDPE and HDPE. HDPE is used in an amount of 15 or 25%.

The general teaching of D3 is to form a soft bonding component from blends comprising a major proportion of linear low density polyethylene with a minor proportion of low, medium or high density polyethylenes and to select a core component whose melting point is higher than the melting point of the bonding component by at least 30°C, to prevent that the bicomponent fibres might cause heat shrinkage under the process conditions for forming the fibres into nonwoven webs,(page 10, lines 1 to 23).

4.2.2 D2 discloses an undrawn conjugate spun fibre comprising a fibre-forming polybutylene terephthalate-type (PBT) polymer A, 80 mol% of whose repeating units are butylene terephthalate, and a polyethylene terephthalate-type (PET) polymer B, which exhibits thermal fusion at a temperature lower than the melting point of said polymer A, which is a thermal-bonding conjugate spun fibre characterized in that polymer A is substantially in an oriented crystallized state, polymer B is substantially in a non-oriented non-crystalline state and occupies at least part of an external surface of said conjugate spun fibre, the conjugation ratio of polymer A to polymer B is A/B = 20/80 to 80/20 (weight ratio), elongation at rupture is less than 250°C, and dry-heat shrinkage percentage at 150-210°C is less than 8% (claim 1).

Preferably, the thermal-bonding conjugate spun fibre is of core-and-heath type cross-sectional structure in which polymer A is the core and polymer B is the sheath (claim 2).

The aim of D2 is to offer a thermal-bonding conjugate spun fibre with excellent thermal bonding ability and stable processability when manufacturing a dry-type or a wet-type nonwoven fabric (page 2, lines 10 to 15).

The fibres according to D2 render the heat shrinkage at the thermal bonding temperature very low, and therefore good shape stability is realized in a nonwoven fibre aggregate, ie the PET nonwoven fabric suffers hardly any shape alteration when thermal bonding is performed (page 8, lines 10 to 12). The dry-heat shrinkage percentage is preferably 5%, more preferably 3% or less (page 7, last sentence of the second paragraph), eg 1.3% (example 1).

Hence, in order to reduce heat shrinkage at the thermal bonding, D2 teaches to use a bicomponent fibre having a core made of a substantially oriented and crystalline polymer such as PBT and a bonding component made of a substantially non-oriented and non-crystalline polymer such as PET.

4.2.3 D12 discloses heat-adhesive composite fibres having a denier within the range of 1-20, and comprising

(a) a first component of crystalline polypropylene, and

(b) a second component selected from the group consisting of

  (1) an ethylene-vinyl acetate copolymer,

  (2) a saponification product thereof,

  (3) a polymer mixture of an ethylene-vinyl acetate copolymer with polyethylene, and

  (4) a polymer mixture of a saponification product of an ethylene-vinyl acetate copolymer with polyethylene,

  said copolymer containing 0.5-18 mol % of vinyl acetate units based upon the total of vinyl acetate units and ethylene units,

  said saponification product containing 0.5-18 mol % of vinyl monomer units consisting of vinyl alcohol units and vinyl acetate units based upon the total of vinyl alcohol units, vinyl acetate units and ethylene units,

  said polymer mixtures consisting of 70% by weight or less of said copolymer or said saponification product and 30% by weight or more of said polyethylene, said polymer mixtures containing 0.5-18 mol % of vinyl monomer units consisting of vinyl alcohol units and/or vinyl acetate units based upon the total of vinyl acetate units, vinyl alcohol units and ethylene units of the said polymer mixtures,

the composite ratio of said first component to said second component being in the range of 40:60 to 70:30,

said first and second components being joined together along an axially extending interface, and

said second component forming at least 50% of the exterior surface of the composite fibres continuously in the longitudinal direction of the fibres so as to give the composite fibres heat-adhesive properties (claim 1).

In the heat adhesive composite fibres the components can be arranged in either a side-by-side or a sheath-and-core manner (claim 2).

Preferably, the second component consists of a saponified ethylene vinyl acetate copolymer having a saponification degree of not smaller than 30%, or of 70% by weight or less of a saponification product of ethylene-vinyl acetate copolymer having a saponification value of smaller than 30% and 30% by weight or more of polyethylene (claims 4 and 5).

Preferably, the specific density of said second component is not greater than 0.93 (claim 6).

The melt-flow rate of said second component can be 1 to 6 times that of said first component, preferably 1.5 to 5 times (claims 8 and 9).

Some examples show fibres exhibiting a very low shrinkage at 145°C (examples 5 and 7; Table 4).

An objective of D12 is to provide heat adhesive fine composite fibres of polypropylene which, without the drawbacks of the prior art, have not only good low-temperature heat adhesiveness as well as good adhesiveness to foreign materials, but also have substantially no curliness (column 2, lines 12 to 22).

Thus, in order to have bicomponent fibres with good adhesiveness and substantially no curliness as well as dimensional stability when formed into webs, D12 teaches to use a copolymer of ethylene-vinyl-acetate (EVA) or a saponification product thereof, alone or in a mixture with polyethylene, to form the bonding component, whereby that bonding component may have various densities and melting points as a function of the vinyl content of the EVA copolymer and the type of polyethylene (low, medium or high density) used, if any. The lower the density of the bonding component, the lower the crimpability of the composite fibre and the higher the dimensional stability of the nonwoven webs formed therefrom (column 3, lines 1 to 37; column 4, lines 18 to 36).

4.3 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, a 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).

According to the patent in suit, the known bicomponent fibres required heat stabilization in order to minimize shrinkage (page 3, lines 2 to 3), in particular web shrinkage, and they were not suitable for preparing the desired webs suitable for making nonwoven abrasive articles, eg buffing pads, without collapsing and without resulting in nonwoven abrasive webs of inferior quality (page 4, lines 31 to 35).

The aim of the patent in suit was to provide melt-bondable fibres having not only a reduced level of shrinkage under conventional processing conditions for making nonwoven webs, but also showing a reduction in curling and agglomeration of the individual bicomponent fibres, such that nonwoven abrasive articles which will not mar smooth surfaces could be obtained therefrom (page 3, lines 33 to 36).

None of D2, D3 and D12 addresses the production of nonwoven abrasive articles and the problems related thereto.

Although D3 mentions the problem of thermal stability under the conventional processing conditions of the fibres into the web, the reduction in latent curliness and agglomeration of the fibres as such is not addressed.

D2 mentions shrinkage reduction of bicomponent fibres resulting in stability during thermal bonding of the webs, eg in order to produce wet-type webs such as paper. Any further reduction of curliness and agglomeration of the individual fibres in the web, such that they are suitable for nonwoven abrasive webs, is however not mentioned. The bonding component is made entirely of a non-crystalline polymer.

D12 addresses the problem of latent curling of the bicomponent fibres in relation to the stability of dry-type webs, and although the problem of reduced agglomeration of the fibres during web processing under conditions for making nonwoven abrasive webs is not mentioned either, the bonding component may comprise a blend of polymers, whereby the type and relative quantities thereof are selected to control the melting point and the density of the bonding component, ie the thermal behaviour when the fibres are formed into webs.

Therefore, D12 rather than D3 or D2 qualifies as the closest prior art document.

5. *Problem and solution*

5.1 Although in D12 thermal stability is controlled by using a blend of polymers as the fibre bonding component, the second component has a melting point in the range of from 50°C (in case of EVA containing 40% of vinyl acetate component) to about 135°C (in case of high density polyethylene) (column 4, lines 45 to 50).

Therefore, that bonding component softens at temperatures of 130°C or higher, as stated in the patent in suit (page 4, lines 29 to 31).

In the process of making nonwoven abrasive articles, such as buffing pads, nonwoven webs are coated with an adhesive at temperatures greater than 130°C, prior to introducing abrasive particles into the web. Exposure of a web made with the fibres of D12 to these elevated temperatures would thus cause that web to collapse, thereby resulting in nonwoven abrasive webs of inferior quality (patent in suit, page 4, lines 29 to 35).

Hence, the problem underlying the patent in suit may be seen as to provide a bicomponent fibre such that nonwoven webs prepared from these fibres have a reduced level of shrinkage under conventional processing conditions, together with a reduction in curling and agglomerating of the individual bicomponent fibres, even under conditions for making nonwoven abrasive articles such as buffing pads, thereby providing a nonwoven web that will not mar smooth surfaces (in line with the patent in suit: page 3, lines 2 to 3 and 15 to 36; page 4, lines 29 to 35).

5.2 That problem is solved by a bicomponent fibre comprising the features defined in claim 1.

The examples concern nonwoven webs made from conventional polyester fibres, thermally bonded by a bicomponent fibre having a core made of polyethylene terephthalate and a sheath comprising a semicrystalline copolyester having a melting point of 130°C and an amorphous copolyester.

Table I in conjunction with examples 1 to 3 shows the relation between the melt flow rate of the sheath component (g/10min) and the content of amorphous polymer in the sheath component. Table II summarises the physical properties of some bicomponent fibres (tenacity and shrinkage) and of the nonwoven webs made therefrom (shrinkage and strength) and shows a comparison with a commercially available melt-bondable 15 denier per filament sheath-core polyester fibre ("Melty" type 4080, Unitika, Ltd., Japan).

Regarding the constitution of that comparative fibre, according to annex 3 of the minutes of the oral proceedings before the Opposition Division, it has a PET core surrounded by a copolyester bonding component, whereby both core and bonding component as combined are said to be at least partially crystalline.

From the examples in the patent in suit, it is apparent that:

- as the concentration of the amorphous polymer in the bonding component increases, the melt flow rate of that bonding component decreases, the fibre and web shrinkages increase and the web strength decreases.

- the fibre of example 1 shows equivalent fibre shrinkage to the comparative fibre but less web shrinkage (6% instead of 9%) and higher web strength (3550 instead of 2540 g/50 mm, ie an increase of approximately 40%).

In Figures 1 and 2 portions of a web comprising the bicomponent fibres of the patent in suit are compared with a web comprising bicomponent fibres of the prior art. The bicomponent fibres of the patent in suit (Figure 1) show little curl and agglomeration, contrary to the significant curl and agglomeration seen in Figure 2 for the prior art fibres. Hence, fewer abrasive particles will settle near the junction points of the fibres according to the patent in suit than will settle near the junction points of fibres of Figure 2. Such settling of abrasive grains is a major cause of marring of flat surfaces by nonwoven abrasive pads (patent in suit, page 8, lines 1 to 8).

The results of the examples, however, only concern a preferred embodiment of the fibres of the patent in suit: both the at least partially crystalline and the amorphous polymers are made of polyesters. The patent in suit does not show whether any other bicomponent fibre within the scope of claim 1 will also be capable of exhibiting a reduced level of shrinkage under conventional processing conditions. Nor has any further evidence been submitted that the problem stated above has been successfully solved over the whole scope of claim 1, which encompasses many more combinations of polymers than the exemplified polyesters.

Hence, the problem has to be reformulated on a less ambitious basis, namely to provide a bicomponent fibre alternative to that provided by D12.

From the above analysis of the examples in the patent in suit it appears that the reformulated problem has been effectively solved.

6. *Inventive step*

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

6.1.1 According to D12, lower melting low and medium density polyethylenes are preferred over higher melting high density polyethylene in the blend of polymers of the bonding component (column 3, lines 39 to 46). Also, if the density of the EVA copolymer present in the bonding component is 0.93 or lower, the fibres show low crimpability as well as a high dimensional stability (column 4, lines 18 to 24).

The preference for low and medium density polyethylenes does not hint at a bonding component having a melting point of at least 130°C.

Nor is it apparent that a reduction of the vinyl acetate content to 10% or below would result in an amorphous copolymer, since a vinyl acetate content of 10% results in a density of the ethylene-vinyl-acetate copolymer of 0.93, the density of the copolymer increases with the vinyl acetate content (column 4, lines 26 to 36) and polyethylene is an at least partially crystalline polymer.

In this respect, the statement in the patent in suit, that the bonding component of the fibre disclosed by D12 comprises both an amorphous polymer and a crystalline polymer is to be contrasted with the fact that the presence of an amorphous polymer has later been contested by the appellant (letter dated 23 April 2002, page 4, first paragraph, last two lines). It is a fact that D12 is silent on this point, and no further evidence whatsoever is available to the Board to show unambiguously that the bonding component of the fibre disclosed by D12 also comprises an amorphous polymer. Therefore, no convincing conclusion can be drawn that the bonding component of the fibre comprises a blend of amorphous and crystalline polymers.

Consequently, D12 neither suggests that the bonding component should have a melting point of at least 130°C, nor to use a blend of an amorphous and a crystalline polymer as the bonding component of the fibre. Added to this, D12 does not suggest that any amorphous component, if present, should have such a ratio to the crystalline polymer so as to reduce the melt flow rate of the bonding component.

It results from the above that D12 does not suggest the claimed subject-matter.

6.1.2 According to D2, the bicomponent fibre should have a core of crystalline PBT and a bonding component entirely made of amorphous PET. The use of a bonding component entirely made of crystalline PET is not recommended, since it would prevent the formation of thermal bonding points (comparative example). No suggestion whatsoever to use a blend of amorphous and crystalline polymers in the bonding component is therefore derivable from D2, let alone any suggestion that the ratio of any such amorphous to crystalline polymers should be selected so as to decrease the melt flow rate of the bonding component.

Therefore, D2 does not supplement the information lacking in D12 to arrive at the claimed subject-matter.

6.1.3 According to D3, the core component should have a melting point which is higher than the melting point of the bonding component by at least 30°C. Concerning the constitution of the bonding component, it is recommended that it be made of a blend of low and medium densities polyethylenes, ie of at least partially crystalline materials.

Therefore, D3 does not supplement either the teaching of D12 to arrive at the claimed subject-matter.

6.1.4 The other documents have no longer been relied upon by the parties, and the Board has no reason to consider them more relevant than the documents dealt with above.

6.2 Consequently, the claimed subject-matter involves an inventive step.

7. Since the main request is allowable, there is no need for the Board to decide on the auxiliary requests.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent is maintained unamended.

The Registrar:

C. Eickhoff

The Chairman:

R. Teschemacher

BESCHWERDEKAMMERN DES EUROPÄISCHEN PATENTAMTS ★ BOARDS OF APPEAL OF THE EUROPEAN PATENT OFFICE ★ CHAMBRES DE RECOURS DE L'OFFICE EUROPÉEN DES BREVETS

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