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D E C I S I O N
of 29 April 1998

Case Number: T 0732/95 - 3.3.3

Application Number: 89115113.6

Publication Number: 0358007

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Language of the proceedings: EN

Title of invention:

Two-stage heat resistant binders for nonwovens

Patentee:

National Starch and Chemical Investment Holding Corporation

Opponent:

Wacker-Chemie GmbH

Headword:

-

Relevant legal provisions:

EPC Art. 54, 56

Keyword:

"Novelty (no) - all features disclosed in combination (main request)"

"Inventive step (no) - obvious substitution of polymer component (third auxiliary request)"

Decisions cited:

T 0305/87

Catchword:

-



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Boards of Appeal

Chambres de recours

Case Number: T 0732/95 - 3.3.3

D E C I S I O N
of the Technical Board of Appeal 3.3.3
of 29 April 1998

Appellant:
(Opponent)

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Representative:

-

Respondent:
(Proprietor of the patent)

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Decision under appeal:

Interlocutory decision of the Opposition Division
of the European Patent Office posted 11 July 1995
concerning maintenance of European patent
No. 0 358 007 in amended form.

Composition of the Board:

Chairman: C. Gérardin
Members: P. Kitzmantel
J. A. Stephens-Ofner

Summary of Facts and Submissions

I. European patent application No. 89 115 113.6 in the name of NATIONAL STARCH AND CHEMICAL CORPORATION, which had been filed on 16 August 1989, claiming priority from a US application filed on 9 September 1988, resulted in the grant of European patent No. 358 007 on 8 July 1992 on the basis of 10 claims, independent Claims 1 and 10 reading as follows:

"1. A process for preparing a heat resistant nonwoven product comprising the steps of:

a) impregnating a nonwoven web with an emulsion polymer as a binder having a glass transition temperature (Tg) of +10 to +50°C, said polymer being prepared from a two stage polymerization procedure comprising as a first stage polymer an ethylene vinyl acetate polymer having a Tg within the range of -10 to +15°C, and a second stage polymer comprising an acrylate ester or styrene/acrylic monomers and having a Tg of +50 to +120°C, both of said first and second stage polymers containing pre-crosslinking and post-crosslinking monomers with the ratio of the first polymer to the second polymer varying within a range of 6 to 2 to 1; the polymerization being carried out at a pH between 2 and 7

b) removing excess binder;

c) drying and curing the web."

"10. A roofing membrane comprising a polyester mat impregnated with an emulsion polymer having a glass transition temperature (Tg) of +10 to +50°C, said polymer being prepared from a two stage

polymerisation procedure comprising as a first stage polymer an ethylene vinyl acetate polymer having a Tg within the range of -10 to +15°C, and a second stage polymer comprising an acrylate ester or styrene/acrylic monomers and having a Tg of +50 to +120°C, both the said first and second stage polymers containing pre-crosslinking and pre-crosslinking monomers with the ratio of the first stage polymer to the second stage polymer varying within a range of 6 to 1 to 2 to 1 the polymerization being carried out at a pH between 2 and 7 the impregnated mat being subsequent to removing excess binder and drying and curing the mat coated with asphalt."

Claims 2 to 9 were dependent on Claim 1.

II. Notice of Opposition was filed by WACKER CHEMIE GMBH on 1 April 1993 requesting revocation of the patent in its entirety, on the ground(s) that the claimed subject-matter lacked novelty and/or inventive step.

- (i) In the course of the opposition proceedings the Proprietor submitted a corrected version of the granted set of claims (substitution of the prefix "post-" for the prefix "pre-" at the end of line 6 of Claim 10 of the EP-B1-0 358 007) as Main Request and three additional sets of claims as First, Second and Third Auxiliary Requests.
- (ii) As compared to the version as granted, the definition of the two stage polymerization in Claims 1 and 10 of the First Auxiliary Request was restricted to the performance of the second step being "carried out as a slow addition

polymerization, wherein the second monomeric mixture is added gradually to the first polymer emulsion as the polymerization reaction proceeds".

(iii) The amendment in Claim 1 of the Second Auxiliary Request concerned the restriction of the claimed process to "preparing a roofing membrane" including the final step "d) coating the web with asphalt".

(iv) Claim 1 of the Third Auxiliary Request combined these two amendments and read as follows:

"1. A process for preparing a nonwoven polyester roofing membrane comprising the steps of:

a) impregnating a nonwoven web with an emulsion polymer as a binder having a glass transition temperature (Tg) of +10 to +50°C, said polymer being prepared from a two stage polymerization procedure, the second step of which is carried out as a slow addition polymerization, wherein the second monomeric mixture is added gradually to the first polymer emulsion as the polymerization reaction proceeds, comprising as a first stage polymer an ethylene vinyl acetate polymer having a Tg within the range of -10 to +15°C, and a second stage polymer comprising an acrylate ester or styrene/acrylic monomers and having a Tg of +50 to +120°C, both of said first and second stage polymers containing pre-crosslinking and post-crosslinking monomers with the ratio of the first polymer to the second polymer varying within a range of 6 to 2 to 1; the polymerization being carried out at a pH between 2 and 7

- b) removing excess binder;
- c) drying and curing the material;
- d) coating the web with asphalt."

Claims 2 to 9 which had not been amended corresponded to the granted version of these claims.

III. By its interlocutory decision issued in writing on 11 July 1995 the Opposition Division held that the grounds of opposition did not prejudice the maintenance of the patent in amended form on the basis of the Third Auxiliary Request.

The decision under appeal held that the subject-matter of the Claim 1 of the Third Auxiliary Request was novel over document

D3: US-A-4 683 165,

because it was restricted (i) to the use of a two-stage emulsion polymer, whose second stage was carried out according to the slow addition polymerization technique, and (ii) to a final coating step with asphalt. Said subject-matter also involved an inventive step because the prior art, particularly D3, would not suggest the use of the so prepared polymers for the manufacture of heat resistant, dimension stable non-woven polyester roofing membranes.

The Proprietor's lower ranking requests were held to be not novel over D3, either - in the case of Claim 1 of the Main Request - because D3 disclosed the use of the same two stage polymers, or because the slow addition polymerization feature amounted to a product-by-process characterization that could not distinguish the polymers used according to product Claim 10 of the

First Auxiliary Request from those of D3, or because the restriction of Claim 1 of the Second Auxiliary Request to the preparation of roofing membranes which were coated with asphalt was insufficient, in that this feature was also disclosed in D3.

- IV. Notice of Appeal against the above decision, with simultaneous paying of the appeal fee, was filed by both the Proprietor on 29 August 1995 and the Opponent on 19 September 1995. Statements of Grounds of Appeal were respectively submitted by the Proprietor on 27 October 1995 and by the Opponent on 17 November 1995.

Further written submissions dated from 28 March 1996 (Proprietor) and from 20 December 1995 (Opponent).

Oral proceedings were held on 29 April 1998.

- V. In his written and oral submissions the Proprietor relied on five alternative set of claims constituting his Main Request and four Auxiliary Requests. The Main Request as well as the First and the Third Auxiliary Request were identical to the same requests operative during the first instance opposition proceedings. The Second and Fourth Auxiliary Requests, while largely corresponding, respectively, to the First and Third Auxiliary Requests, differed from these latter requests by the same amendment, i.e. the splitting of feature a) of Claim 1 into the following features a) and b):

"a) preparing an emulsion polymer as a binder having a glass transition temperature (T_g) of +10 to +50°C from a two stage polymerization procedure, the second step of which is carried out as a slow

addition polymerization, wherein the second monomeric mixture is added gradually to the first polymer emulsion as the polymerization reaction proceeds, comprising ...

b) impregnating a nonwoven web with the binder, "

the subsequent steps, unchanged in substance, being now c) and d) respectively c) to e).

The written and oral submissions of the Proprietor may be summarized as follows:

(i) The subject-matter of Claim 1 of the Main Request was novel over D3, because this document did not disclose **heat-resistant** nonwovens which were impregnated with a two-stage emulsion polymer comprising as a first stage polymer an ethylene vinyl acetate polymer. The only reference in D3 to **heat resistant** nonwovens, i.e. to nonwovens which could withstand the temperatures occurring during asphalt coating, was in Example 12, according to which, however, the first stage emulsion polymer was polyvinylacetate. Moreover, D3 was silent about step b) of Claim 1, i.e. the removal of excess binder.

(ii) The novelty of the subject-matter of Claim 1 of all Auxiliary Requests was to be recognized for the additional reason that the further restriction therein, namely that the second step of the two stage emulsion polymers was carried out according to the slow addition polymerization method, was undisclosed in document D3. At least in the form as a separate process step within the process of Claim 1 according to the Second and Fourth Auxiliary

Requests this process step was a further distinguishing feature. It would also contribute to the inventivity of the claimed subject-matter, because, as demonstrated by Example I of the patent in suit, the slow addition polymerization method, in a surprising manner, was less time consuming than the equilibration method, which latter method was the only one used according to D3. This effect was not suggested by the disclosure of document

D8: US-A-3 732 184 (cited in the Opponent's cross-appeal),

which put these two methods on a par.

- (iii) The restriction in Claim 1 of the Third and Fourth Auxiliary Requests to a process for preparing a nonwoven polyester roofing membrane, which in a final step is coated with asphalt, made the difference between the invention and document D3, particularly Example 12, even more conspicuous.

VI. The arguments of the Opponent may be summarized as follows:

- (i) The polymer applications considered in document D3, including "fiberfill" and roofing materials, all required the same heat resistance. This conclusion was particularly supported by the curing temperature of 150°C used according to Example 10, which was not essentially different from the liquifying temperature, and thus coating temperature of asphalt of between 150 and 180°C.

- (ii) The Opponent contested the Proprietor's (and Opposition Division's) conclusion that the use of the slow addition polymerization method for the second step of the preparation of the two stage emulsion polymer was a feature able to distinguish the process according to the First and Third Auxiliary Requests from that of D3, because the so prepared emulsion polymers were not different from those prepared by the equilibration process used according to D3.

- (iii) Moreover, since according to document D8 the slow addition polymerization was a known alternative to the equilibration process this feature could not contribute to an inventive step of the subject-matter of Claim 1 of the Second and Fourth Auxiliary Requests. In the Opponent's view, the Proprietor's assertion was wrong that the slow addition polymerization necessarily was less time consuming than the equilibration polymerization process.

VII. The Proprietor requested that the appeal be dismissed and the patent be maintained on the basis of the Main Request, the First, the Second, the Third or the Fourth Auxiliary Requests submitted as follows:

Main Request and First Auxiliary Request filed with the Proprietor's Notice of Appeal, Third Auxiliary Request filed as Second Auxiliary Request on 1 April 1996, and Second and Fourth Auxiliary Requests filed during the oral proceedings.

The Opponent requested that the decision under appeal be set aside and the European patent No. 358 007 be revoked.

Reasons for the Decision

1. The appeal is admissible.
2. *Articles 123(2) and (3) EPC*

In view of the outcome of this case, namely the revocation of the patent under appeal for the reason that none of the Proprietor's requests meets the requirements of Articles 54 and/or 56 EPC, there is no need to discuss in detail whether these requests comply with the provisions of Articles 123(2) and (3) EPC, which was not disputed by the Opponents and, in the Board's opinion, is in any case not questionable.

Main request

3. *Novelty (Article 54 EPC)*
- 3.1 Document D3

This citation (cf. Claim 1) relates to a nonwoven product comprising a fiber or fabric bound by a binder comprising an aqueous polymer emulsion containing a first polymer network containing an active crosslinking agent which is intertwined on a molecular scale with a second polymer network (i.e. forming an interpenetrating network).

- 3.1.1 According to Claim 6 the polymer of the first polymer network is selected from polyvinyl acetate and vinylacetate-ethylene copolymer and the second polymer network is selected from polystyrene and polymethyl methacrylate.

- 3.1.2 The aqueous polymer emulsion is prepared by a two step process, wherein the first polymer emulsion is mixed with the second monomer emulsion and then the emulsion mixture is allowed to equilibrate (cf. column 4, lines 8 to 12; page 8, lines 62 to 66).
- 3.1.3 Examples 6 to 9 of D3 (cf. column 16, line 45 to column 17, line 29) disclose the preparation of an interpenetrating network of a first stage ethylene vinyl acetate copolymer (which was prepared according to Example 5) with polystyrene as the second stage polymer, wherein both polymerization steps were carried out in the presence of pre- and post-crosslinking monomers (first step: triallyl cyanurate and N-methylol acrylamide: table in column 15, lines 31 to 39; second step: divinyl benzene and N-methylol acrylamide: table in column 16, lines 56 to 68). According to Example 10 (column 17, line 31 to column 18, line 7) a nonwoven (Whatman filter paper) was treated, dried and cured at 150°C for 5 minutes with the emulsions prepared according to Examples 7 and 9.

Similarly, according to Example 11 of D3 a polyester staple fiber sheet was impregnated with emulsions prepared according to Examples 8 and 9.

- 3.1.4 Among the applications for these impregnated nonwovens are "fiberfill" and roofing materials (cf. column 3, lines 33 to 43; column 9, lines 4 to 16).
- 3.2 The issue of novelty of the subject-matter of Claim 1 of the Main Request over D3 turns on the question whether this document discloses

- **heat resistant** impregnated nonwovens, where

- the first step polymer of the two step emulsion polymer is an ethylene vinyl acetate polymer and
- the second step polymer comprises an acrylate ester or styrene/acrylic monomers.

There was agreement between the parties that the other features of Claim 1 of the Main Request were anticipated by D3.

3.3 For the reasons to follow, the disclosure of D3, particularly that of the worked examples referred to in point 3.1.3 supra, anticipates the subject-matter of Claim 1 of the present Main Request.

3.3.1 Pursuant to page 2, lines 3 to 5 the "heat resistance" required by impregnated nonwovens prepared according to the patent in suit is that necessary for i.a. roofing, flooring and filtering materials. Apparently these different applications may have quite different heat resistance requirements and the patent in suit does not explicitly specify what the **common** heat resistance requirements of these different applications are. It may be inferred from the test conditions used according to Example III (page 6, lines 44 to 52) and the results ("L VALUES") reported in Table I on page 7 that the heat resistance is to be considered satisfactory when, up to a temperature of 200°C, the dimensional changes of the binder are more or less within the range indicated for the tested samples. A further hint at the kind of "heat resistance" envisaged by the patent in suit is the statement on page 2, lines 10 to 11 of the patent specification, i.e. that "... the polyester web will shrink when coated at temperatures of 150-250°C with the asphalt".

Since according to Example 10 of D3 the curing is carried out at 150°C (cf. point 3.1.3 supra), the heat resistance of the so prepared impregnated nonwoven must be sufficient to withstand this temperature at least for the indicated curing time of 5 minutes. However, these temperature and time conditions disclosed in D3 are not essentially different from the temperature and time conditions of an asphalt coating step, which latter treatment, according to the Proprietor, was the decisive criterion for the interpretation of the term "heat resistant" in Claim 1 of the Main Request. Indeed, the curing temperature of 150°C used according to Example 10 of D3 is not critically different from the heat resistance requirements of an asphalt coating step, which latter, according to Example 12 of D3 is carried out at a temperature of the asphalt bath of 350°F (177°C) (column 18, line 44). Also the duration of the heat treatment carried out according to Example 10 of D3 (curing time of 5 minutes) is not essentially different from the duration of an asphalt coating process, which - according to the Opponent and not contested by the Proprietor - is also a matter of minutes (e.g. 15 minutes).

It follows that the "heat resistance" required by Claim 1 of the patent in suit is not different from the one peculiar to the impregnated nonwovens, be they "fiberfill" or roofing materials, disclosed in document D3.

3.3.2 That the emulsion polymers prepared according to Examples 6 to 9 of D3 and used to impregnate the nonwovens of Example 10 and 11 (cf. point 2.3 supra), which use ethylene vinyl acetate polymer as a first step polymer, comprise, as a second step polymer, polystyrene, is likewise not a feature that distinguishes this specific disclosure of D3 from the

subject-matter of Claim 1 of the Main Request, because polystyrene is within the definition of the second step polymers of that claim: "comprising an acrylate ester or styrene/acrylic monomers".

3.3.2.1 The latter definition is in itself unclear as the slash between "styrene" and "acrylic" does not allow an unambiguous interpretation: it could stand for "and" as well as for "or". The explanation of this term on page 3, lines 8 to 17 of the patent specification is of no avail, as it only exemplifies the term "acrylate esters" and does not specifically refer to examples of the unclear term "styrene/acrylic". Where this passage refers to "comonomers" (lines 14 to 17), it is, specifically or in context, to copolymers of (meth)acrylates, not acrylic monomers: "relative proportions of comonomers will vary depending on the Tg of the specific acrylate(s) or methacrylate employed", "other comonomers, such as styrene or acrylonitrile ... may also be present in conventional amounts and at levels consistent with the desired Tg range".

3.3.2.2 Thus, the only basis for an interpretation of the term "styrene/acrylic" is Table I on page 7 of the patent specification. There, beside Polymer Numbers 9 and 10 which are copolymers derived from styrene and butyl acrylate, Polymer Number 15 is reported to comprise styrene as the sole monomer constituting the second stage polymer (iBMA = isobutoxy methylacrylamide is a post-crosslinking monomer; TAC = triallyl cyanurate is a pre-crosslinking monomer). Thus, in the light of the compositional features of the polymers used to illustrate the process as claimed, the term "second stage polymer" must be regarded as encompassing not only copolymers of styrene, but also homopolymers thereof.

The Proprietor has argued that because of the high "L Value" at 200°C of this polymer (0.804 mm) it would be obvious to the skilled person that this Polymer Number 15 ab initio was not considered to be within the scope of the claimed invention. However, this argument is inconclusive, since the "L Value" at 200°C of Polymer Number 6, a polymer which admittedly fell within the claimed scope, is much worse (1.190 mm).

Ethylene vinyl acetate/polystyrene two stage emulsion copolymers are therefore within the definition of the polymers to be used as binders for the impregnated nonwovens to be prepared according to Claim 1 of the Main Request.

Since it was agreed between the parties, and since the Board is also satisfied, that the ethylene vinyl acetate/polystyrene two stage emulsion copolymers according to Examples 6 to 9 of D3, used as impregnating resins for nonwovens in Examples 10 and 11, comply with the further requirements set out for the binder polymer in point a) of Claim 1 (Tg, range of relative amounts, pH), these copolymers satisfy all conditions specified in that claim for the binder polymers to be used.

The Proprietor's reference to decision T 305/87 (OJ EPO 1991, 0429), according to which it was not permissible to draw from a reservoir features pertaining to separate embodiments in order to create artificially a particular embodiment, is thus clearly beyond the point (cf. point 5.3 of the Reasons), because D3 expressly discloses the decisive combination of polymers of the two stage emulsion polymer binder to be used in the process according to the patent in suit.

3.3.3 Step b) of Claim 1 of the Main Request, i.e. removal of excess binder after impregnation, is also not a feature able to distinguish the disclosure of D3 from that of the patent in suit. This results from a comparison of the steps taken after the impregnation of the nonwoven in the two processes: according to page 5, lines 6 to 8 of the patent specification excess binder is removed "under vacuum or pressure of nip/print roll"; similarly, according to Example 12, column 18, lines 54 to 56 of D3 "After padding on a Butterworth 2 roll padder, 1 dip-1 nip, the fabrics were dried ...". Since therefore in both cases removal of excess impregnating polymer may be carried out by mangling, the respective feature in Claim 1 of the Main Request is met by the disclosure of D3.

3.4 Since the subject-matter of Claim 1 of the Main Request is thus not novel over document D3, this requests fails as a whole.

First and Third Auxiliary Requests

4. *Novelty*

As compared with Claim 1 of the Main Request, Claim 1 of these requests comprises the requirement that the second step of the emulsion polymerization for preparing the binder polymer was "carried out as a slow addition polymerization, wherein the second monomeric mixture is added gradually to the first polymer emulsion as the polymerization reaction proceeds".

Since it was agreed between the parties (even expressly confirmed by the Proprietor during the oral proceedings) that the use of the slow addition method for the second step polymerization does not cause the

resulting polymer to be different from one prepared according to the equilibration process used according to D3, all other features being identical, this feature - being a mere "product-by-process" characterization - cannot distinguish the subject-matter of Claim 1 of the First and Third Auxiliary Requests from that of document D3.

4.1 As the afore-mentioned "slow addition polymerization" feature is the only amendment in Claim 1 of the First Auxiliary Request over Claim 1 of the Main Request, the same novelty conclusions apply. Thus, the subject-matter of this claim is not novel for the reasons set out in point 3.3 supra.

4.2 In addition to the afore-discussed "slow addition polymerization" feature Claim 1 of the Third Auxiliary Request contains the following restrictions over Claim 1 of the Main Request:

(i) it is directed to a process for preparing a "nonwoven polyester roofing membrane", and

(ii) it contains, a final step d) "coating the web with asphalt".

4.2.1 The disclosure in D3, which is most relevant to this embodiment, is that of Example 12 (column 18, line 36 to column 19, line 22), which describes polymer treated polyester nonwovens which may be coated with asphalt (column 18, lines 38 to 47), which are treated by impregnation ("saturated") with various binder polymers ("latexes") (column 18, lines 52 to 54), among these the polymer according to Example 2 (column 19, table, lines 12 to 19). The latter emulsion polymer comprises a first step polyvinyl acetate and a second step polymethyl methacrylate (column 11, line 65 to column 13, line 59) and is

thus different from the binder polymer according to Claim 1 of the patent in suit by not using an ethylene vinyl acetate copolymer as first step polymer. The subject-matter of Claim 1 of the Third Auxiliary Request is thus novel over document D3.

5. *Inventive step/Third Auxiliary Request*

This issue hinges on the question whether it would have been obvious to replace in the two step emulsion binder used according to Example 12 of D3 for the preparation of a polyester roofing membrane the first step vinyl acetate polymer by an ethylene vinyl acetate copolymer.

5.1 In the absence of comparative evidence able to establish that the use of an ethylene vinyl acetate copolymer provides any unexpected effects over the use of polyvinyl acetate as first step polymer, the **problem to be solved** by the present inventors, when starting from the teaching of D3, was just the development of an alternative method for the manufacture of nonwoven polyester roofing membranes, characterized by the use of an alternative binder.

5.1.1 As set out in point 3.3.1 supra, the "fiberfill" products and the asphalt coated roofing materials envisaged in D3 meet the same heat resistance requirements. Hence the Proprietor's contention that, because of allegedly different heat resistance requirements, different polymer binders are to be used for "fiberfill" and for asphalt coated roofing materials, is inconclusive .

5.1.2 It follows that the preferred polymer combinations contained in Claims 6, 7, 15 and 16 of D3 refer to both these applications. Claims 5 and 15 offer four

combinations of the first and second step polymer being selected on the one hand from polyvinyl acetate and an ethylene vinyl acetate copolymer and on the other hand from polystyrene and polymethyl methacrylate. From these four possibilities the combinations polyvinyl acetate/ polystyrene (cf. Example 1), polyvinyl acetate/polymethyl methacrylate (cf. Examples 2 and 12) and ethylene vinyl acetate copolymer/polystyrene (cf. Examples 6 to 9), are even exemplified in D3.

5.1.3 Since, with respect to heat resistance, these preferred polymer combinations are equivalent, it was obvious to the skilled person to use, for the purpose of manufacturing roofing membranes, binder polymers whose first step polymer consists of an ethylene vinyl acetate copolymer and whose second step polymer is selected from polystyrene and polymethyl methacrylate.

5.1.3.1 Since a binder polymer comprising ethylene vinyl acetate copolymer and polystyrene, which is within the scope of Claim 1 of the patent in suit, is exemplified in D3 (cf. point 5.1.2 supra), there is no room for the Proprietor's argument of a "selection invention".

5.1.3.2 That, as argued by the Proprietor, binder polymers comprising an ethylene vinyl acetate copolymer are cheaper than the ones disclosed in D3 (Example 12) which instead comprise polyvinyl acetate, would rather be an incentive to the skilled person for their use.

5.1.3.3 Thus, the subject-matter of Claim 1 of the Third Auxiliary Request does not comply with the requirement of Article 56 EPC and the request cannot therefore be allowed as a whole.

Second and Fourth Auxiliary Request

6. *Novelty*

- 6.1 Claim 1 of the Second Auxiliary Request originated from the same claim of the First Auxiliary Request and Claim 1 of the Fourth Auxiliary Request originated from the same claim of the Third Auxiliary Request. With respect to their precursor claims Claim 1 of the Second and Fourth Auxiliary Requests contain the same amendments.

These amendments consist in the rewording of step a) of Claim 1 as quoted in point V supra, the essence of which is the conversion of the "product-by-process" definition of the binder polymer into a genuine process feature.

- 6.2 By virtue of this reformulation the performance of the second step polymerization as slow addition polymerization becomes a feature which distinguishes the claimed process from that disclosed in D3, because according to this document the second step polymerization is always carried out according to the equilibration method (cf. column 4, lines 8 to 18; column 8, lines 62 to 66; Example 1, column 10, line 42; Example 2, column 13, line 10; Examples 6 to 9, column 17, lines 1 to 3).

- 6.3 Accordingly, by the restriction of Claim 1 of the Second as well as the Fourth Auxiliary Requests to the preparation of the second step emulsion polymer according to the "slow addition polymerization" method, the subject-matter of both these claims is novel over document D3.

7. *Inventive step/Second Auxiliary Request*

7.1 The problem underlying the subject-matter of Claim 1 of the Second Auxiliary Request, as compared to the closest prior art set out in D3, was the development of an alternative process for the production of heat resistant nonwoven products, where in a first step an impregnating binder is prepared by two step polymerization.

As set out below (point 7.2.4.3), the more ambitious problem of the development of a quicker production method did not exist.

Pursuant to Claim 1 of the Second Auxiliary Request the existing technical problem is solved by carrying out the second step of the two step preparation of the binder by the slow addition polymerization method.

It is established by the evidence in the patent in suit (Example 1, Polymer B, method A; Example III, Polymer Numbers 10, 11, 13; 14, 16 to 23) that by this measure the existing problem was effectively solved.

7.2 However, the solution of this technical problem by the use of the slow addition polymerization method was obvious over document D3, in combination with document D8. As set out in point 7.2.4.2 below, document D8 is admitted into the appeal under the provisions of Article 114(1) EPC.

7.2.1 Document D8 relates to the preparation of polymer latices containing thermosetting polymers of monethylenically unsaturated monomers by a two stage emulsion polymerization method, wherein a first

polymer emulsion is formed to which after cooling the balance of the monomers is added and the polymerization carried to completion (Abstract; Claim 1). Among the preferred monomers are acrylate and methacrylate esters, acrylonitrile, styrene and vinyl acetate (column 2, lines 29 to 46). In order to confer on the polymers the desired thermosetting characteristics, N-methylol amides or other N-methylol group containing monomers are copolymerized (column 2, lines 58 to 62; column 3, lines 24 to 26), monomers which according to the patent in suit are used as "post-crosslinking monomers".

According to column 1, lines 51 to 58 (particularly line 54) the second step addition of the monomers may be done "either all at once or in several additions".

There was agreement between the parties that the addition of the balance of the monomers "all at once" amounts to an equilibration polymerization method, whereas the admixture in "several additions" corresponds to a "slow addition polymerization" method.

- 7.2.2 Document D8 thus shows that these two methods have been considered as equivalent in the preparation of emulsion polymers having a chemical constitution which is similar to those used according to D3 and according to the patent in suit.
- 7.2.3 The replacement of the one method (here equilibration polymerization) by the other one (here slow addition polymerization) was therefore a mere workshop routine, which does not involve an inventive step.

7.2.4 The above conclusion is not invalidated by the Proprietor's arguments,

- (i) that document D8 should not be admitted because of its belated submission,
- (ii) that in view of its age (publication date 8 May 1973) document D8 should be disregarded, and
- (iii) that, in a surprising manner, the adoption of the slow addition polymerization method caused the whole process to be quicker, thus more economical, and was therefore inventive.

7.2.4.1 Document D8 was submitted by the Opponent with his Statement of Grounds of Appeal dated 16 November 1995 (page 3, line 10 from foot) in reaction to the finding in point 2 of the Reasons of the decision under appeal, that the adoption of the slow addition polymerization was non-obvious over the state of the art disclosed in D3, which, for the preparation of the same type of polymers, used the equilibration polymerization.

Considering this sequence of events, the submission of document D8 was not belated but represents a proper and timely defence. D8 is therefore considered in this appeal under the provisions of Article 114(1) EPC.

7.2.4.2 The time lapse between a prior art document and an invention belongs to the **secondary indicia** in determining inventive step which cannot supplant a proper technical assessment. In the present case the Board sees no reason, and no technical argument was submitted by the Proprietor to support his allegation, to conclude that the skilled addressee would not have considered D8 in the technical context

of D3 (filed 15 years after D8). With respect to the performance of the two step emulsion polymerization of ethylenically unsaturated monomers, the technical subject-matter of the two documents is clearly related and the Board is not aware of any feature in the 15 years old teaching of D8 which might impair the validity of that disclosure. This conclusion is supported by the fact that one of the documents referred to by the Proprietor with respect to the two step polymerization (paragraph bridging pages 2 and 3 of the patent specification) has an even earlier publication number than D8 (US-A-3 671 610).

- 7.2.4.3 Pursuant to Example I of the patent in suit the polymer preparation according to the slow addition polymerization is carried out 1 hour and 45 minutes quicker than according to the equilibration polymerization (page 5, line 47 to page 6, line 6: 2 hours 15 minutes [1 ½ h + 45 min] as compared with 4 hours [15 min + 1 ¼ h equilibration time + 1 ½ h + 45 min]). According to D3 the equilibration takes 10 to 60 minutes (column 8, lines 62 to 63) and was 30 minutes in Examples 1 and 2, respectively 15 minutes in Examples 6 to 9 (column 10, line 42; column 13, line 10; column 17, line 2). The much shorter equilibration actually used according to D3 shows that the duration of this process step is not a fixed time limit, but depends on a variety of parameters (monomers, monomer concentration, temperature, emulgators, stirring conditions, etc.), which the skilled person may choose according to existing requirements he has to meet.

Therefrom it results that a general rule, that, given the same monomer compositions, a second step polymerization carried out according to the slow addition polymerization method **must** be less time consuming than according to the equilibration

polymerization method, cannot exist. Thus the choice of the one or other method was, as shown by D8, a matter of convenience, not dictated by time considerations.

This is amply underlined by the fact that according to the application of the patent in suit as filed both methods have been used without discrimination (cf. Table I, page 7 of the patent application). Moreover, in the paragraph bridging pages 2 and 3 of the patent specification it is stated without indicating any specific preference that the "two stage polymerization utilized therein may be carried out using a variety of specific modifications ...".

7.3 The subject-matter of Claim 1 of the Second Auxiliary Request does not, therefore, comply with the requirement of inventive step stipulated in Article 56 EPC.

8. *Inventive step/Fourth Auxiliary Request*

Claim 1 of the Fourth Auxiliary Request is a combination of Claim 1 of the Second and the Third Auxiliary Requests. Since, with respect to the problem to be solved over the closest prior art disclosed in D3 the subject-matter of both these requests was held obvious in the preceding points 5 and 7, no other conclusion can result for the subject-matter of Claim 1 of this Fourth Auxiliary Request.

Consequently, the subject-matter of Claim 1 of the Fourth Auxiliary Request does also not comply with the requirements of Article 56 EPC.

9. Since none of the Proprietor's requests is allowable, the Opponent's appeal is successful.

Order


For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The patent is revoked.

The Registrar:


E. Görgmaier

The Chairman:


C. Gérardin

