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**D E C I S I O N**  
**of 2 December 2005**

**Case Number:** T 1360/04 - 3.2.06

**Application Number:** 97120201.5

**Publication Number:** 0843036

**IPC:** D04H 3/04

**Language of the proceedings:** EN

**Title of invention:**

Longitudinally stretched nonwoven fabric and method for producing the same

**Patentee:**

NIPPON PETROCHEMICALS CO., LTD., et al

**Opponent:**

Reifenhäuser GmbH & Co. KG Maschinenfabrik

**Headword:**

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**Relevant legal provisions:**

EPC Art. 100(b), 54(2), 56

**Keyword:**

"Sufficiency of disclosure (yes)"  
"Novelty (yes)"  
"Inventive step (yes)"

**Decisions cited:**

-

**Catchword:**

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Case Number: T 1360/04 - 3.2.06

**DECISION**  
of the Technical Board of Appeal 3.2.06  
of 2 December 2005

**Appellant:** Reifenhäuser GmbH & Co. KG Maschinenfabrik  
(Opponent) Spicher Strasse 46-48  
D-53839 Troisdorf (DE)

**Representative:** Rohmann, Michael  
Patentanwälte  
Andrejewski, Honke & Sozien  
Theaterplatz 3  
D-45127 Essen (DE)

**Respondent:** NIPPON PETROCHEMICALS CO., LTD.  
(Proprietor of the patent) 3-1, Uchisaiwai-cho 1-chome  
Chiyoda-ku  
Tokyo 100 (JP)

**Representative:** Strehl Schübel-Hopf & Partner  
Maximilianstrasse 54  
D-80538 München (DE)

**Decision under appeal:** Decision of the Opposition Division of the  
European Patent Office posted 22 November 2004  
rejecting the opposition filed against European  
patent No. 0843036 pursuant to Article 102(2)  
EPC.

**Composition of the Board:**

**Chairman:** G. Kadner  
**Members:** G. Pricolo  
J. Van Moer

## Summary of Facts and Submissions

I. The appeal is from the decision of the Opposition Division posted on 22 November 2004 to reject the opposition filed against European patent No. 0 843 036, granted in respect of European patent application No. 97120201.5.

Claim 1 of the patent as granted reads as follows:

"A method for producing a longitudinally stretched nonwoven fabric (15) in which filaments (4) are made by extruding a melted polymer (2) downwardly with a spinning means having a plurality of fine nozzles (3) and taking up said filaments (4) at a high drafting ratio under the friction of a high speed fluid to accumulate them on a conveyer (7), which comprises the steps of:

- (1) maintaining said filaments (4) extruded from the nozzles in a melted state to be drafted;
- (2) then, cooling said filaments (4) with a cooling fluid;
- (3) guiding the flow of cooled filaments (4) onto a conveyer (7) while inclining the filaments (4) towards the transferring direction of the conveyer (7);
- (4) forming a web (9) by sucking said filaments (4) under a reduced pressure in a narrow linear mode in the transverse direction from the opposite side of the loading surface of said conveyer wherein the loading surface of said conveyer (7) is inclined in such a manner that said conveyer descends toward the transferring direction; and
- (5) subjecting said web to a short distance stretching in a longitudinal direction."

II. In coming to its decision the Opposition Division considered that the opponent's objection under Article 100(b) EPC, which was based upon the presence in claim 1 of the expression "narrow linear mode", was rather related to clarity than to sufficiency of disclosure. Furthermore, the Opposition Division held that the claimed subject-matter was novel and involved an inventive step over the relevant prior art represented in particular by documents:

D1: EP-A-0 674 891;

D3: EP-A-0 757 127;

D8: EP-A-0 379 763.

III. The appellant (opponent) lodged an appeal against this decision, received at the EPO on 27 November 2004, and simultaneously paid the appeal fee. The statement setting out the grounds of appeal was received at the EPO on 22 March 2005.

IV. In an annex to the summons for oral proceedings pursuant to Article 11(1) Rules of Procedure of the boards of appeal the Board expressed the preliminary opinion that the expression of claim 1: "sucking said filaments under a reduced pressure in a narrow linear mode" referred to a narrow sucking line in the transversal direction of the conveyer, which prevented the filaments from scattering without impairing their alignment, and that the skilled person would not have difficulties in providing suitable means for obtaining such a narrow sucking line. Furthermore, it appeared

that the subject-matter of claim 1 was distinguished from the method of D1 only in that the sucking was made in a narrow linear mode and the stretching was a short distance stretching. This latter feature appeared to imply a stretching of the web between a set of two adjacent rolls. Finally, it appeared that the feature concerning the sucking in a narrow linear mode was not disclosed in any of the documents D1, D3 and D8 cited by the appellant.

V. Oral proceedings took place on 2 December 2005.

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

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

VI. The arguments of the appellant can be summarized as follows:

The skilled person did not know what was meant by the expression "narrow linear mode". Although this expression was used in the patent in suit to refer to a "narrow" zone of reduced pressure, there was no indication allowing to establish the limits within which the zone of reduced pressure could be regarded as narrow. Accordingly, the patent in suit did not disclose the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art.

D1 explicitly disclosed all the features of claim 1, except the features that the sucking was made in a

narrow linear mode and that the stretching was a short distance stretching. However, the disclosure in D1 that the vacuum source was placed where the filaments came into contact with the forming surface in order to reduce the dispersion and scattering of the filaments clearly implied for a skilled person that the reduced pressure should be provided in a narrow zone. Therefore, considering that the patent in suit did not disclose specific limits within which the zone of reduced pressure could be regarded as narrow, D1 disclosed that the sucking was made in a narrow linear mode. Furthermore, D1 disclosed a neck-stretching process in which a web was made to pass through a first roller arrangement, then over a series of heated rolls, and finally through a second roller arrangement. D1 further disclosed that the heated rolls could be controlled to have a series of linear speed that were intermediate of the speeds of the first and second roller arrangements. Therefore, a stretching of the web took place between adjacent intermediate rolls. Since a stretching between adjacent rolls was a short distance stretching, D1 also disclosed a short distance stretching step. Therefore, the subject-matter of claim 1 was not novel over D1.

In any case, the disclosure in D1 according to which the vacuum source was placed where the filaments came into contact with the forming surface in order to reduce the dispersion and scattering of the filaments was a clear hint for a skilled person to provide a reduced pressure in a narrow linear mode. Furthermore, both D3 and D8 disclosed that a short distance stretching step resulted in an increase the strength of the web. Therefore, the skilled person faced with the

problem underlying the patent in suit of improving the strength of the nonwoven fabric, would be suggested by D3 or D8 to provide a short distance stretching step in the method of D1. Accordingly, the subject-matter of claim 1 did not involve an inventive step.

VII. In support of its request the respondent relied essentially on the following submissions:

The appellant's objection concerning the expression "narrow linear mode" was an issue of clarity rather than insufficiency of disclosure. The patent in suit disclosed at least one way of carrying out the invention and the appellant did not provide any evidence that the invention did not work. Therefore, the invention of the patent in suit was sufficiently disclosed.

The figures of D1, which showed wide suction boxes, were indicative of wide suction areas. The presence of wide suction areas was confirmed by the reference in D1 to conventional fibre web forming processes, i.e. processes where the suction area was usually wide. Furthermore, D1 employed a neck-stretching process which was substantially different from a short distance stretching process. In fact, in a short distance stretching process the reduction in width of the web was small whilst in the neck-stretching process the width of the web was largely reduced. However, these were not the only features distinguishing the subject-matter of claim 1 from the method of D1. Indeed, D1 disclosed several alternatives for aligning the filaments, amongst which were the provision of a deflecting gas stream, of an inclined conveyer, and of

an inclined spinneret, yet it did not specifically disclose the combination of the feature of inclining the filaments towards the transferring direction of the conveyer with the feature of an inclined conveyer. Moreover, the deflecting gas stream according to D1 did not guide the filaments onto the conveyer since it was oriented parallel to conveyer.

D1 did not represent the closest prior art. In fact, the patent in suit related to a method of producing a nonwoven fabric in which high strength was required so that the fabric could be used e.g. for packaging tapes and ribbons. In contrast thereto, D1 related to absorbent articles, in particular diapers, which did not require high strength fabrics but principally fluffy fabrics. Anyway, even if document D1 were taken as the closest prior art, and although D3 suggested the provision of a short distance stretching, still neither D3 nor D8 gave any hint to suck the filaments under a reduced pressure in a narrow linear mode. Therefore, the claimed subject-matter involved an inventive step.

## **Reasons for the Decision**

1. The appeal is admissible.
2. *Sufficiency of disclosure (Article 100(b) EPC)*
  - 2.1 In its communication annexed to the summons for oral proceedings the Board already expressed a reasoned provisional opinion according to which the patent in suit disclosed the invention in a manner sufficiently clear and complete for it to be carried out by a person



skilled in the art. Since during the oral proceedings the appellant decided not to comment on the provisional opinion, the Board is justified in basing its decision on that opinion, which it sees no reason to change.

- 2.2 In accordance with the provisional opinion, the Board takes the view that the skilled person, on the basis of his common general knowledge, has no difficulties in providing a sucking device which provides a reduced pressure in a "narrow linear mode" in the sense intended by the patent in suit (cf. paragraph [0061]), i.e. a device with nozzles which extend over a short length in the longitudinal direction of the conveyer as compared to the extension of the sucking device in the transversal direction, such as to obtain essentially a narrow sucking line which allows to prevent the filaments from scattering without impairing their alignment (see page 5, lines 40 to 47 of the patent in suit).

### 3. *Novelty*

- 3.1 Using the wording of claim 1 of the patent in suit, D1 discloses (see Figure 2) a method for producing a longitudinally stretched nonwoven fabric in which filaments are made by extruding a melted polymer downwardly with a spinning means (26; page 5, lines 21, 22) having a plurality of fine nozzles and taking up said filaments at a high drafting ratio under the friction of a high speed fluid to accumulate them on a conveyer (page 5, lines 23 to 26), which comprises the steps of: (1) maintaining said filaments extruded from the nozzles in a melted state to be drafted (page 4, lines 46 to 49; when the filaments leave the nozzles

they are in a molten state; since the gas is heated the filaments are maintained in a molten state at least for a certain time); (2) then, cooling said filaments with a cooling fluid (page 5, lines 29, 30 and 53).

According to the teaching of D1, this cooling fluid is supplied by a gas supplying device (34) as a gas stream which deflects the path of the fibre stream (28), causing the fibres to be deposited at an acute angle onto the conveyer (30, see page 5, lines 29 to 36). The respondent submitted that this gas stream did not guide the flow of cooled filaments towards the transferring direction of the conveyer. This cannot be accepted, because by deflecting the path of the fibre stream and causing the fibres to be deposited at an acute angle onto the conveyer, the gas stream guides, i.e. directs, the fibre stream towards the transferring direction of the conveyer. Therefore, D1 also discloses the following step of the method of claim 1:

(3) guiding the flow of cooled filaments (28) onto a conveyer (30) while inclining the filaments towards the transferring direction of the conveyer (page 5, lines 30 to 32).

Moreover, D1 undisputedly disclose the step of forming a web by sucking said filaments under a reduced pressure in the transverse direction from the opposite side of the loading surface of said conveyer (page 5, lines 27 to 29).

According to the disclosure of D1 (see page 5, lines 3 to 5 and 10 to 12), suitable processes for effecting fibre alignment during formation of the web include an airknife orientation process corresponding to step (3)

of claim 1 of the patent in suit and shown in Figure 2 of D1 (see page 5, lines 10 to 18 and 29 to 32), and an acute-angle deposition process, such as shown in Figure 3 of D1. In this latter process, the loading surface of the conveyer (42) is inclined in such a manner that said conveyer descends toward the transferring direction. Alternatively, according to D1 the same result can be obtained by acute-angle deposition process wherein the spinneret is rotated in the direction of advancement of the forming surface so that the fibre stream and the forming surface form an acute angle (see page 6, lines 6, 7). Furthermore, D1 discloses a neck-stretching process as an alternative embodiment for providing the alignment of the fibres (see page 6, lines 21 to 32). The neck-stretching process (see Figure 5) comprises the step of subjecting the formed web to a stretching in a longitudinal direction (page 6, lines 29, 30 and 57, 58).

D1 further discloses that "two or more of the above-described fibre alignment process can be applied in combination" (page 7, lines 8, 9), for example an acute-angle depositing process can be combined with a neck-stretching process (page 7, lines 11, 12). Considering that there are three groups of alignment processes disclosed by D1 (airknife, acute-angle and neck-stretching), the combination of an airknife orientation process and an acute-angle depositing process is clearly disclosed by the mention "or more" in line 8 of page 7 of D1. Since in D1 the alternative embodiments of the acute-angle depositing process are described as providing the same result (page 6, line 6: "same result"), it is clear for the skilled person that any of these embodiments can be combined with the

airknife orientation process. Therefore D1 discloses, in the step of forming a web by sucking the filaments from the opposite side of the loading surface of the conveyer, and in combination with the above-mentioned steps (1) to (3), that the loading surface of said conveyer is inclined in such a manner that said conveyer descends toward the transferring direction.

- 3.2 It thus remains to assess whether D1 discloses that the sucking is in a narrow linear mode and that the stretching is a short distance stretching.

As pointed out by the appellant, the expression "reduced pressure in a narrow linear mode" does not have a generally recognized meaning in the art. In the Board's view, the meaning of this expression can however be derived from the description of the patent in suit (see point 2.2 above), as referring to a zone of reduced pressure having a short length in the longitudinal direction of the conveyer as compared to the width in the transversal direction, such as to obtain essentially a narrow sucking line which allows to prevent the filaments from scattering without impairing their alignment.

D1 discloses (page 5, lines 27 to 29) that a reduced pressure is applied to the conveyer by means of a vacuum source (36) disposed "where the stream of gas-borne fibres comes into contact with the forming surface", i.e. the loading surface of said conveyer, thereby further reducing the dispersion and scattering of the fibres. The appellant submitted that it was clear from this disclosure that the zone of reduced pressure must be a narrow line. This cannot be

accepted. Firstly, the disclosure that the vacuum source should be disposed where the stream of gas-borne fibres comes into contact with the forming surface does not per se imply that the zone of reduced pressure is narrow in longitudinal direction, even when taken in combination with the effect to be achieved of further reducing the dispersion and scattering of the fibres. In fact, this disclosure is simply indicative of the location where the vacuum source must be effective but does not exclude that the vacuum source is effective also over a wider zone along the longitudinal direction of the conveyer. Secondly, in absence of any indications to the contrary, the text of D1 referred to by the appellant (page 5, lines 27 to 29), must be seen in combination with the disclosure of the corresponding drawing of Figure 2, which shows, as vacuum sources, vacuum boxes having a substantial extension in the longitudinal direction of the conveyer.

Finally, D1 discloses a neck-stretching process (see page 6, line 44 to page 7, line 5; Figure 5) in which a nonwoven web (62) is supplied from a supply roll to the nip (64) of a first roller arrangement (66) formed by two stack rollers (67 and 68). From the first roller arrangement, the web passes over a series of heated rolls in a series of reverse S-loops to heat the web to the softening temperature. The heated web is then passed through the nip (76) of a second roller arrangement (78) formed by two stack rollers (80 and 82). The peripheral linear speed of the first roller arrangement is controlled to be less than the peripheral linear speed of the second roller arrangement so as to apply a neck-stretching tension. Therefore, in D1 the web is stretched between the two

roller arrangements whilst passing over the intermediate rolls. It follows that this stretching does not correspond to a short distance stretching in the sense of the patent in suit (see paragraph [0039]), according to which the web is stretched between a set of two adjacent rolls.

The appellant submitted that since in D1 the heated rolls can be controlled to have a linear speed or a series of linear speeds that are intermediate of the speeds of the two roller arrangements, a stretching of the web necessarily took place between two adjacent rolls. However, the different speeds of the intermediate rolls do not necessarily have as a result that the web is stretched only between adjacent rolls, since it cannot be excluded that a stretching takes place also along the periphery of the intermediate heated rolls. This is in contrast to the short distance stretching, where the web is stretched between a set of two adjacent rolls and thus the stretching points are essentially fixed (see paragraph [0042] of the patent in suit).

3.3 Therefore, the subject-matter of claim 1 is distinguished from the method of D1 in that the sucking is in a narrow linear mode and the stretching is a short distance stretching.

3.4 Novelty over the other available documents was not in dispute. Nor does the Board see any reason to take a different view. In particular, neither D3 nor D8 disclose the feature of claim 1 of the patent in suit, that the filaments are sucked under a reduced pressure in a narrow linear mode in the transverse direction

from the opposite side of the loading surface of the conveyer.

Therefore, the subject-matter of claim 1 is novel (Article 54(2) EPC).

4. *Inventive step*

4.1 The problem underlying the patent in suit is to produce a longitudinally stretched nonwoven fabric having improved strength and dimensional stability (see paragraphs [0001], [0009] and [0010]).

4.2 Contrary to the respondent's view, document D1 represents the closest prior art. It is true that D1 specifically relates to a liquid distribution layer for absorbent articles, in particular diapers (see page 2, lines 1, 2). However, claim 1 is not restricted to a particular kind of fabric, nor does it include features which implicitly restricts the scope of protection to nonwoven fabrics which are not suited for absorbent articles. Furthermore, D1 as the patent in suit is concerned with the problem of strength and dimensional stability of the nonwoven fabric (see page 2, lines 42 and 50).

4.3 Starting from the method known from D1, the above-mentioned problem is effectively solved by the distinguishing features (see point 3.2 above) that the sucking is in a narrow linear mode and the stretching is a short distance stretching. Indeed the sucking in a narrow linear mode improves the alignment of filaments, prevents the filaments from scattering on the conveyer, and enhances the stretching properties of filaments

(see page 5, lines 45 to 51, of the patent in suit). Thus, the strength of the fabric can be effectively improved with the subsequent short distance stretching step (see paragraph [0078] of the patent in suit).

- 4.4 The Board agrees with the appellant that both D3 (see page 14, lines 10 to 14 and page 13, last line to page 13, line 3) and D8 (see column 9, lines 17 to 21 and 45 to 52) disclose a short distance stretching in a longitudinal direction, and that at least in D3 (page 14, line 13) it is explicitly stated that this has the effect of improving the strength of the fabric. However, the prior art does not give any hint that the strength and the dimensional stability of the fabric are improved by combining the feature of sucking the filaments under a reduced pressure in a narrow linear mode onto the conveyer with a step of stretching the fabric over a short distance. In particular, as explained above (point 3.2), the disclosure of D1 referred to by the appellant on page 5, lines 27 to 29, according to which a reduced pressure is applied to the conveyer by means of a vacuum source (36) disposed "where the stream of gas-borne fibres comes into contact with the forming surface", cannot be regarded as a hint to provide a narrow suction area, but simply as an instruction to provide a suction area which includes the location where the filaments come into contact with the conveyer. Moreover, since D1 only discloses the provision of vacuum boxes which are wide in the longitudinal direction of the conveyer, it only suggests a wide suction area, not a narrow one.



4.5 For these reasons the subject-matter of claim 1 is not obvious to a skilled person. Accordingly, the subject-matter of claim 1, and of dependent claims 2 to 10, involves an inventive step (Article 56 EPC).

## **Order**

**For these reasons it is decided that:**

The appeal is dismissed.

The Registrar:

The Chairman:

M. Patin

G. Kadner