BESCHWERDEKAMMERN DES EUROPÄISCHEN PATENTAMTS

BOARDS OF APPEAL OF THE EUROPEAN PATENT OFFICE

CHAMBRES DE RECOURS DE L'OFFICE EUROPEEN DES BREVETS

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File No.: T 0668/91 - 3.3.1

Application No.: 84 201 823.6

Publication No.: 0 184 596

Classification: D06M 21/04

Title of invention: A method of printing a substrate

D E C I S I O N
of 24 August 1993

Patentee: Lantor B.V.

Opponent: Pfersee Chemie GmbH
Stork Brabant B.V.

Headword: Foam printing/LANTOR B.V.

EPC: Art. 56

Keyword: "Inventive step (yes)"

Headnote
Catchwords

Case Number: T 0668/91 - 3.3.1

D E C I S I O N
of the Technical Board of Appeal 3.3.1
of 24 August 1993

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Decision under appeal: **Decision of the Opposition Division of the European Patent Office delivered orally on 6 June 1991, with written reasons posted on 19 June 1991 revoking European patent No. 0 184 596 pursuant to Article 102(1) EPC.**

Composition of the Board:

Chairman: K.J.A Jahn
Members: J.M. Jonk
J.A. Stephens-Ofner

Summary of Facts and Submissions

I. The grant of European patent No. 0 184 596 in respect of European patent application No. 84 201 823.6 was announced on 17 May 1989 (cf. Bulletin 89/20).

II. Notices of opposition were filed on 15 February 1990 by Chemische Fabrik Pfersee GmbH (now Pfersee Chemie GmbH) (Opponent 1) and on 16 February 1990 by Stork Brabant B.V. (Opponent 2), requesting the revocation of the patent on the grounds of lack of novelty and lack of inventive step. The oppositions were supported by seven documents, of which only

(1) EP-A-47 907,

(2) M.K. Saha, "Foam printing process - A positive approach to energy conservation, part I", Colourage (21 April 1983), pages 9 to 14, and

(4) T.F. Cooke, "Foam Wet Processing in the Textile Industry", Textile Chemist and Colourist, May 1983/Vol. 15, No. 5, pages 74/13 to 24/85

are relevant to this decision.

III. By a decision issued orally on 6 June 1991, with written reasons posted on 19 June 1991, the Opposition Division revoked the patent on the ground that the subject-matter of the claims did not involve an inventive step in the light of the disclosure of document (1) in combination with that of document (2). The decision was based on Claims 1 to 7 filed on 6 June 1991, Claim 1 reading as follows:

"A method of printing a non-woven fibrous web with a viscous mass in the form of a foam having metastable foam properties, which foam will exhibit no settled liquid after 24 hours of standing in a measuring cylinder, covered and at 20°C, whereby the structure of the foam and the pattern of the stencil are substantially maintained during transfer into the substrate and during subsequent drying."

Dependent Claims 2 to 6 concerned further embodiments of the process of Claim 1 and independent Claim 7 related to a printed substrate produced using any of the processes of Claims 1 to 6.

The Opposition Division held that the process according to Claim 1 only differed from that of document (1) in that the foam in the claimed process was "metastable" as defined in Claim (1) and did not collapse after its incorporation into the substrate. However, this feature did not involve an inventive step because the printing of textile substrates using a screen printing machine with a metastable foam as defined in Claim 1 having penetration ability was already known from document (2). If the penetration of uncollapsed foam into the substrate were desirable it would be obvious to the skilled person to choose a substrate having suitable interspaces and a foam having appropriate bubble size and stability properties.

IV. An appeal was lodged against this decision on 19 August 1991 by the Patentee, and the appeal fee was paid on the same date.

A Statement of Grounds of Appeal was submitted on 22 October 1991.

V. During the oral proceedings held on 24 August 1993, the Appellant filed new Claims 1 to 7, Claim 1 reading as follows:

"A method of printing a non-woven fibrous web with a viscous mass in the form of a foam, using a screen printing machine, using a foam having metastable foam properties, which foam will exhibit no settled liquid after 24 hours of standing in a measuring cylinder, covered and at 20°C, and which foam has a dry content of at least 20%, whereby the structure of the foam and the pattern of the stencil are substantially maintained during transfer into the substrate and during subsequent drying."

The Appellant argued that the process according to Claim 1 lead to new products having various improved structural and decorative properties owing to the particular uniform distribution of the foam bubbles in the non-woven fibrous web and, consequently, of the materials present in the foam for enhancing the properties of the fibrous web, such as binders, dyes and fillers. In this connection he contended that the use of a non-woven fibrous web represented an essential feature of the claimed process because the applied foam would, otherwise, collapse during penetration into the substrate. He also relied upon a transparency which corresponded to a photograph filed on 6 May 1991. This transparency represented the top view of a sample of a treated non-woven fibrous web, of which the first half, obtained according to the process of the disputed patent, showed small foam sphericals uniformly distributed within the interspaces of the web, whereas the other half, obtained according to the prior art by liquifying the foam, only showed the irregular structure of the fibrous web. In addition, he offered to submit

additional evidence with respect to the penetration of the foam into the fibrous web.

Regarding document (1), the Appellant pointed out that this document either disclosed the incorporation of liquified foam into the substrate, or the application of a foam coating upon the surface thereof. Moreover, he submitted that the apparatus for the preparation of foam indicated in this document, namely the apparatus according to Figure 6, could not produce foams having the stability requirements as claimed in the disputed patent. With respect to document (2), he argued that this document only disclosed the use of a foam for printing of textiles, which exhibited no settled liquid after about 24 hours. However, the stability of the foam indicated in this document would not be sufficient for the process of the patent in suit. By referring to document (4), the Appellant also submitted that according to the prior art, if a stable foam were used, this foam would have to be liquified. Therefore, in the Appellant's submission, none of the cited documents suggested the incorporation of a foam having the claimed stability so that the structure of the foam was substantially maintained during the transfer into the substrate and during subsequent drying.

VI. The Respondents conceded during oral proceedings that the subject-matter of the claims was novel, because document (1) did not disclose the foam stability requirements as claimed.

Regarding inventive step, the Respondents argued that documents (2) and (4) gave a clear pointer to the skilled person that a stable foam could be introduced into the substrate and could be consolidated therein. Thus, having regard to the combined teaching of

documents (1), (2) and (4), the claimed process did not involve an inventive step.

VII. The Appellant (Patentee) requested that the decision under appeal be set aside, and that the patent be maintained on the basis of the claims and the description submitted in the course of oral proceedings.

The Respondents (Opponents) requested that the appeal be dismissed.

VIII. At the conclusion of the oral proceedings the Board's decision to maintain the patent as requested by the Appellant was announced.

Reasons for the decision

1. The appeal complies with Articles 106 to 108 and Rule 64 EPC and is, therefore, admissible.

2. *Amendments under Article 123 EPC*

Claim 1 as amended is based on granted Claims 1 and 3 in combination with page 3, lines 9 to 11 and 30 to 33 of the printed patent specification, and is also supported by Claims 1 and 2 in combination with page 4, lines 1 to 4 and 24 to 37, of the patent application as filed.

Present Claims 2 to 7 correspond to Claims 4 to 8 and 12 as granted, and are supported by Claims 3 to 7 and 12 of the originally filed patent application.

Thus, all claims filed during oral proceedings comply with the requirements of Article 123 EPC.

3. *Clarity of the claims under Article 84 EPC*

3.1 The Board has also no objections to the present claims under Article 84 EPC.

3.2 In the Board's judgment, in line with the established jurisprudence of the Board (cf. T 68/85, OJ EPO 1987, 228, particularly under the sections 8.4.2 and 8.4.3, and T 139/85 of 23 December 1986, reported in EPOR 1987, 229), it is permissible to define the foam in Claim 1 in functional terms. Furthermore, in the Board's judgment, a precise definition of the foam without the risk of undue restriction of the scope of the invention would be difficult, if not impossible, since the stability of foams depends on a large number of parameters including the surface tension of the liquid, the viscosity of the film separating the foam bubbles, the physical properties of the film, the addition of electrolytes, the size of the bubbles and the temperature (cf. for instance, document (4) page 84/23, last but one paragraph under "Conclusions"). Moreover, in the absence of any evidence to the contrary, the Board is satisfied that the instructions provided by the patent in suit (cf. page 3, lines 6 to 11, page 4, lines 3 and 4, and the examples) enables the skilled person, having regard to his common general knowledge, to produce foams which fulfil the requirements of the claims. In addition, as has been pointed out by the Appellant and not disputed by the Respondents, the results of the present process can easily be verified by microphotographs.

3.3 The Board also finds the expression "substantially" in present Claim 1 sufficiently clear in the light of the description indicating that only a small proportion of the foam, generally not in excess of 10 to 15%, will be lost (cf. page 2, lines 25 to 28).

4. *Novelty*

After examination of the cited prior art, the Board has reached the conclusion that the subject-matter as defined in all claims is novel. Since this issue is no longer in dispute, it is not necessary to give detailed reasons for this finding.

5. *Inventive step*

5.1 Closest state of the art

The Board considers that document (1) represents the closest state of the art. It discloses a process for uniformly distributing a small amount of liquid into or on to a substrate, using a screen printing machine, whereby the liquid contains materials for enhancing the properties of the substrate, by converting the liquid into a foam and passing the foam through the screen of the printing machine, whereby the foam is liquified by the screen and/or collapses upon the substrate, the formed liquid penetrates into the substrate and the components of the liquid are incorporated therein (cf. page 4, lines 1 to 32; page 1, lines 8 to 15; and page 6, lines 8 to 21). Suitable substrates are, for instance, fibrous materials like paper, textiles and fleeces (cf. page 1, lines 8 to 15; and page 5, lines 19 to 31). Materials which can be present in the liquid for enhancing the properties of the substrates are, for instance, binders, dyes and textile finishing compounds (cf. page 1, lines 8 to 15; page 5, lines 19 to 31; and page 6, lines 19 to 21).

5.2 The problem and its solution

5.2.1 The Appellant argued that this prior art process for the incorporation of materials, such as binders, dyes and textile finishing compounds, into a non-woven fibrous web to enhance its properties leads to products in which the materials are disposed upon the fibres of the fibrous web in the form of a coating (cf. also page 2, lines 9 to 12, of the disputed patent) so that, due to the irregular and open structure of the fibrous web, a relatively non-uniform distribution of the materials is obtained and the improvements aimed at are not satisfactorily achieved.

5.2.2 Therefore, in the Board's judgment, the technical problem underlying the disputed patent, in the light of the closest state of the art as represented by document (1), is the provision of a method of printing of a non-woven fibrous web with a foam containing material for enhancing the properties of the fibrous web, using a screen printing machine, whereby these materials are more uniformly distributed into the fibrous web. As the consequence of their more uniform distribution various improved effects are obtained such as a sharply defined pattern, a higher yield strength, a finer capillary structure and a more uniform electrical resistance (cf. also page 2, lines 9 to 12 and lines 32 to 57, particularly 41 to 44, and page 3, lines 42 to 65, particularly 49 to 52, of the disputed patent; and page 1, second paragraph to page 2, second paragraph, of the Statement of Grounds of Appeal filed on 22 October 1991).

5.2.3 According to Claim 1 (as amended) of the patent in suit, this technical problem is solved by using a foam having metastable foam properties, which foam will exhibit no settled liquid after 24 hours of standing in a measuring cylinder, covered and at 20°C, and which foam has a dry content of at least 20%, whereby the structure of the foam and the pattern of the stencil are substantially maintained during transfer into the substrate and during subsequent drying.

5.2.4 With respect to the solution of the defined technical problem, the Respondents contended that the transparency of the photograph, which has been demonstrated by the Appellant during oral proceedings, does not show the impregnation of the foam into the fibrous web because it represents only the top view of the treated fibrous web and, therefore, only shows a uniform distribution of the foam bubbles in the interspaces of the web at its upper surface.

5.2.5 However, in the Board's judgment, even disregarding this transparency, it is likely that by using a foam having an appropriate stability and bubble size (cf. also page 3, lines 17 to 20, of the disputed patent) an adequate penetration of the foam bubbles into the relatively large interspaces of the non-woven fibrous web can be achieved and that, by consolidating the penetrated small foam bubbles, compared with the prior art products in which - as indicated above - the fibres of the fibrous web are coated with the components of liquified foam and the irregular open structure of the web is left behind, a more uniform distribution of the components of the foam in the fibrous web can be achieved. Moreover, in the Board's opinion, the achievement of a more uniform distribution of the components of the foam in the web structure is also likely in the light of the undisputed improvements of

the properties of the treated non-woven fibrous webs indicated above under section 5.2.2.

5.2.6 Thus, in these circumstances, the Board is satisfied that the technical problem as defined above has been solved.

5.3 Inventiveness of the solution of the technical problem

5.3.1 As indicated above, document (1) representing the closest state of the art discloses all the technical features of the claimed process, save the transfer of a foam as defined in present Claim 1 into a fibrous web and its consolidation therein. Thus, the question is whether, in the light of the prior art, these distinguishing features involve an inventive step.

5.3.2 Document (1) - as mentioned in section 5.1 above - discloses a process for a uniform application of a small amount of liquid into or on to a substrate, in which process the liquid is converted into a foam and the foam is applied on to the surface of the substrate by passing it through the screen of a screen printing machine, whereby the foam liquifies at the screen or collapses upon the substrate and the formed liquid, which contains components for enhancing the properties of the substrate, penetrates into the substrate (cf. also page 4, lines 1 to 18).

Moreover, it discloses that this process involves three possibilities: firstly, the foam is completely destroyed by the screen and the substrate is only covered with liquid; secondly, the foam is only partly destroyed by the screen so that the substrate is also covered with foam, which may either collapse or may be consolidated **upon** the substrate; and, thirdly, the foam is substantially not destroyed and may collapse or be

consolidated as indicated with respect to the second possibility (cf. page 4, lines 18 to 36).

In the Board's judgment, this third possibility, in its proper context, i.e. particularly by way of reference to the second possibility in which the optional **coating** of a substrate with foam is indicated and in the light of the disclosure of page 4, lines 1 to 14 and page 6, lines 1 to 5 and 19 to 21, only teaches that, if the foam were not destroyed by the screen of the printing machine, the foam may collapse upon the substrate effecting the penetration or covering of its components into or on to the substrate or, alternatively, may be maintained and consolidated to form a foam coating **upon** the substrate.

5.3.3 The Respondents contended that the following passages in document (1) (emphasis added): "Dieser **Eintrag** oder Auftrag erfolgt gleichmäßig über die gesamte Arbeitsbreite." (page 4, lines 18 and 19) and "Somit ist es möglich ..... das **Auftragsmedium**, vorzugsweise **Schaum**, so zuzuführen, daß ..... **vom Medium durchdrungen** wird" (page 7, lines 3 to 8), would give a clear incentive to the skilled person that the substrate could be impregnated by the foam.

However, the first passage - by way of the term "Dieser" - unambiguously refers to the preceding sentence in which it is indicated that the obtained **liquid** is distributed on to or into the substrate (cf. page 4, lines 16 to 18), and the second passage clearly describes that the medium, preferably foam, can be applied in such a way that a sufficient amount of **liquid** is taken up by the substrate (cf. page 7, lines 4 to 6).

Moreover, the Respondents argued that the person skilled in the art would understand from the disclosure in document (1) in which the substrate is covered with foam and the applied foam is consolidated (cf. page 6, lines 1 to 5), taking into account that a certain penetration of the foam could not be avoided, that it would be possible to incorporate a foam into a substrate and to stabilise it therein.

Apart from the fact that this particular disclosure in document (1) is explicitly restricted to the possibility of the production of a Latex-**coating**, e.g. **upon** textiles (cf. page 6, lines 1 and 2), this submission **presupposes** the use of a foam having such a stability that its structure is substantially maintained during its transfer into the substrate and subsequent drying. However, document (1) - as indicated above - neither suggests the use of such a foam, nor discloses - as submitted by the Appellant and conceded by the Respondents with respect to the apparatus of Figure 6 - any means for its production.

In these circumstances the Board cannot accept the Respondents' submissions on these issues.

5.3.4 Thus, in the Board's judgment, document (1) does not give any pointer to the skilled person to use a foam which is able to maintain its structure during transfer into a fibrous web and during subsequent drying, let alone to the solution of the technical problem as defined above.

5.3.5 Document (2) relates to a foam printing process for the printing of textiles, particularly pigment printing (cf. page 9, under "Abstract"). It states that conventional foam technology in pigment printing has not been very successful, owing to the inherent problems

associated with this process, such as inadequate foam stability (cf. page 9, last paragraph under "Introduction"). Moreover, it indicates that these problems are solved by the development of a product known as "Ecoprint" (cf. page 9, under "Calico's foam printing process"). The foam which is used in the process of this document is stable up to about 24 hours without any liquid separation (cf. page 12, under "Foam stability at room temperature").

Although, in the Board's judgment, it could be derived from the disclosure of this document that an adequate foam stability is necessary for pigment printing, there is no indication that the foam keeps its structure after its application. Thus this document does not hold out any prospect to the skilled person for the solution of the existing technical problem.

In addition, this document does not give any hint to the skilled person to the use of a non-woven fibrous web as a substrate. This feature is mandatory for the claimed process, since any foam would immediately be destroyed by its penetration into woven textiles as submitted by the Appellant.

5.3.6 Document (4) relates to foam wet processing in the textile industry (cf. the abstract on page 74/13). It discloses that the stability of the foams is of great importance in textile applications and that sufficient stability is required for uniform application, but that the particular degree of stability must be adjusted to suit each process (cf. page 74/13, first paragraph under "Foam Stability"). The FFT (Foam Finishing Technology) process involves the use of semistable foams which collapses as it contacts the fabric under the shear forces encountered as the fabric passes over the applicator (cf. page 82/21, the paragraph bridging the

left and the middle column). It further indicates that relatively stable foams may be used for dying applications (cf. page 22/83, left column, third whole paragraph to page 84/23, line 5). However, such stable foams require an additional process such as squeezing and/or suction to collapse the foam and to distribute it uniformly through the fabric (cf. page 84/23, second paragraph under "Conclusions"). Therefore, in the Board's judgment, document (4) is unrelated to the technical problem with which the patent in suit is concerned and indeed leads away from the process of the patent in suit in which - as indicated above - the foam must be so stable that it maintains it structure during transfer into the substrate and during subsequent drying.

5.3.7 In conclusion, the Board finds that the process according to Claim 1 involves an inventive step, because it would not have been obvious to the skilled person to solve the above defined technical problem by the transfer of a stable foam as defined in Claim 1 into the non-woven fibrous web and its consolidation therein.

5.3.8 Dependent Claims 2 to 6, which relate to the preferred embodiments of the compositions claimed in Claim 1, are also allowable for the reasons stated above.

Since the process claims derive their patentability from the properties of the products of such process, the independent Claim 7 which relates to a printed substrate produced according to any of Claims 1 to 6 defines the same inventive idea in terms of a different patent category.

Order

For these reasons, it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the first instance with the order to maintain the patent on the basis of the request submitted during oral proceedings.

The Registrar: The Chairman:

E. Görgmaier K.J.A. Jahn