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# D E C I S I O N
## of 28 October 1998

**Case Number:** T 0251/96 - 3.2.3

**Application Number:** 89907445.4

**Publication Number:** 0418317

**IPC:** D21F 5/04

**Language of the proceedings:** EN

**Title of invention:**
A process for the restrained drying of a paper web

**Patentee:**
Beloit Technologies, Inc.

**Opponent:**
Valmet Paper Machinery Inc.

**Headword:**
-

**Relevant legal provisions:**
EPC Art. 54, 56, 84, 123

**Keyword:**
"Novelty (recognised)"
"Inventive step (yes)"

**Decisions cited:**
-

**Catchword:**
-

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Beschwerdekammern | Boards of Appeal | Chambres de recours

**Case Number:** T 0251/96 - 3.2.3

**D E C I S I O N**
**of the Technical Board of Appeal 3.2.3**
**of 28 October 1998**

**Appellant:** (Proprietor of the patent)
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**Decision under appeal:** **Interlocutory decision of the Opposition Division of the European Patent Office posted 1 February 1996 concerning maintenance of European patent No. 0 418 317 in amended form.**

**Composition of the Board:**

**Chairman:** C. T. Wilson
**Members:** J. du Pouget de Nadaillac
M. K. S. Aúz Castro

## Summary of Facts and Submissions

I. The appeal of the patentee is directed against the interlocutory decision of 1 February 1996 of the Opposition Division of the European Patent Office, which maintained the European patent No. 0 418 317 in an amended form according to the first auxiliary request (Annex 3 of the decision). This European patent is based on the international patent application PCT/US 89/02230, published as WO 89/12138.

II. The appeal was filed on 13 March 1996 and the appeal fee paid at the same time. The Statement of Grounds was received on 31 May 1996, striving for the maintenance of the patent as granted and with the submission of a new claim as auxiliary request.

The opponent also lodged an appeal on 28 March 1996, paying the appeal fee at the same time. In his Statement of Grounds received on 11 June 1996 and in his reply dated 17 December 1996 to the patentee's statement, he claimed to lack of novelty and lack of inventive step of the single claim according to each request of the patentee. He relied essentially on the following prior art documents among those cited during the opposition proceedings:

D6: WO-88/06205 (EP-A-0 345 291; Prior art under Article 54(3) EPC).

D4: "Advances in dryer section runnability", G. L. Wedel et al., Tappi Journal, vol. 70, No. 9,

September 1987, pages 65 to 69.

Objections under Article 123(2) EPC were also raised.

III. In a communication dated 17 June 1997, the Board of Appeal expressed its provisional view that the decision under appeal was correct as to the patent in suit **as granted** and that the admissibility of the new claim submitted as first auxiliary request was doubtful with respect to Articles 123(2) and 84 EPC and to Rule 29(1) EPC.

On 21 August 1997, the patentee/appellant filed a new claim as main request, (a corrected version of a claim filed on 13 August 1997), maintaining moreover the claim submitted with the Statement of Grounds of Appeal as first auxiliary request and the patent documents as amended according to Annex 3 joined to the decision under appeal as second auxiliary request.

By a letter dated 27 August 1997 the opponent still argued on the claim according to the first auxiliary request, mentioning additional prior art documents as evidence of some of his arguments.

IV. The Board of Appeal in a further communication dated 1 December 1997 indicated that it had difficulty to follow the interpretation of the claims as put forward by the opponent and that the subject-matter of the claim according to the main request seems to be new and to imply on inventive step. The admissibility of two features of this claim however was doubtful (Article 123(2) EPC).

The opponent by a letter received on 18 December 1997 withdrew his opposition and appeal.

The patentee/appellant filed new pages of the description with a letter dated 30 July 1998 and forwarded further observations as to the interpretation and admissibility of the claim.

V. The single claim according to the main request reads as follows:

"A process for the restrained drying of a paper web extending successively through a wet end and a dry end of a dryer section of a papermaking machine, said dryer section comprising a single-tier drying section (203) for drying the web during movement of the web downstream relative to the wet end of the dryer section, said process comprising the steps of:

moving the paper web and a dryer felt contiguously to each other such that the web and felt wrap a portion of heated surfaces of a plurality of rotatable dryers (200, 201, 202) of said single-tier drying section (203) such that the web is disposed between the felt and the heated surfaces of said dryers;

guiding the web and felt contiguously to each other around a plurality of vacuum guide rolls (204, 205) of said single-tier drying section (203), each vacuum guide roll of said plurality of vacuum guide rolls being disposed between adjacent dryers of said plurality of dryers (200, 201, 202) such that the web

is supported by the felt during passage of the web between the dryers and the vacuum guide rolls, the arrangement being such that the felt is disposed between the web and the vacuum guide rolls when the web and felt wrap around a portion of the surface of the vacuum guide rolls; and

connecting the vacuum guide rolls (204, 205) to a source of vacuum such that a vacuum is applied to the web through the felt when the web and felt wrap around the vacuum guide rolls such that the web is drawn into close conformity with the felt when the web and felt wrap around the vacuum guide rolls; wherein a vacuum level of 1.49 to 1.99 kPa (6 to 8 inches WC) is applied in the vacuum guide rolls (204, 205) around which the web travels once it has reached a dryness of approximately 60% and until it is essentially dry so that cross-machine direction shrinkage of the web during drying of the web in the dry end of the dryer section is inhibited."

Since the present decision is based on this claim, there is no need to present the text of the claim according to each of the two auxiliary requests.

VI. The appellant (patentee), who now is the only party in the present proceedings, argued as follows:

The disclosure of D6, that a vacuum level is to be applied throughout the whole dryer section, cannot be considered as a disclosure of applying a **high** vacuum level **in the dry end** of said section. Moreover, the preferred vacuum level disclosed in D6 is 4 inches WC,

thus not within the claimed range. The novelty of the process according to the main request cannot be put into question.

Moreover, the present invention is the converse of the teaching of document D4. This prior art teaches that, because of the high vacuum (4 inches WC) which holds the web to the fabric around the vacuum rolls, a web tension is no longer required to maintain stability, and this even if the single-tier concept is extending throughout the whole dryer section. Apart from this extension, this document moreover discloses nothing else about the dry end of said section. Therefore, the person skilled in the art is not encouraged to apply a higher vacuum level at said end, contrary to the solution as claimed, which precisely does so for the purpose of applying web tension against the shrinkage forces.

VI. The appellant requested that the patent be maintained on the basis of:

(a) - the single claim filed on 21 August 1987,

- new page 2 including the two passages filed on separate pages and new pages 3, 6 and 7 of the description, all filed on 30 July 1998,

- pages 4 and 5 of the description, as granted, and

- the drawings (Figures 1 to 19) as granted;

(b) or on the basis of the single claim filed on 31 May 1996 (auxiliary request);

## Reasons for the Decision

1. The appeal is admissible.

2. *Admissibility of the single claim according to the main request (Article 84 and 123 EPC, Rule 29(1) EPC)*

2.1 According to this claim, the dryer section comprises a single-tier drying section for drying the web during movement of the web **downstream** relative to the wet end of the dryer section, and further a vacuum level of 1.49 to 1.99 kPa (6 to 8 inches WC) is applied in the vacuum rolls **once** it has reached a dryness of approximately 60%. This wording consequently leaves completely open which vacuum level is applied in the vacuum rolls arranged **upstream** of the 60% dry position and further, whether the single-tier drying section need to be applied to the entire dryer section. In particular, the expression "once it has reached..." can be understood to exclude that the claimed vacuum level range is applied in the vacuum rolls arranged upstream of the 60% dry position, so that a **different** vacuum level would be applied in these rolls. The essential teaching of the claim is that the 60% position is that position downstream of which the drying restraint **must** in any case be applied by means of the claimed range of vacuum levels.

2.2 Compared to the claim as granted, the new claim also requires that the vacuum level of 1.49 to 1.99 kPa is applied in **all** vacuum rolls arranged from the 60% dry position **to a position**, in which the web is essentially dry. In the description of the patent in suit, as originally filed, it is stated (page 18, lines 15 to 18):

"The drying restraint must also be applied continuously, **or at least in these sections** where the sheet is shrinking the most"

and it has been explained on page 9 that the paper web shrinks the most from the 60 percent dry position to the position in which it is essentially dry, so that the single-tier dryer section should be applied near the dry end of the machine (or, alternately, to the entire dryer section). It is also set out on page 19 that vacuum levels in the vacuum guide **rolls in** the claimed vacuum level range will continue the restraint..., whereas in page 8 this vacuum level is **disclosed** to be required for "positive sheet restraint".

As argued by the appellant, the above-mentioned statement on page 18 about two possible embodiments implies that the vacuum level applied upstream of the 60% dry position could be **different** from the claimed level applied downstream of said position. Moreover, the feature of the claim, that the claimed vacuum level is applied until the sheet is essentially dry, follows from the indications that the sheet is shrinking the most between the 60% dry position and the position at

which it is essentially dry (page 9 and page 18, lines 25 to 27) and that drying restraint must be applied **in those sections** where the sheet is shrinking the most (page 9, and page 18, lines 16 to 18), a position sheet restraint being linked to the claimed range of vacuum levels.

Therefore, the new features of the claim, including the various possibilities they imply, are supported by the originally filed documents of the patent in suit (Articles 84 and 123(2) EPC). Since further the claim has not been amended in such a way as to extend the protection conferred by the patent as granted, this claim complies with Article 123(3) EPC. The text of the description has been adapted to this claim and is therefore also allowable under Article 123 EPC.

2.3 Document D6 is regarded as the closest state of the art. Since this document (date of priority: 13 February 1987; publication: 25 August 1988; designated Contracting States: all also mentioned in the patent in suit) is prior art within the meaning of Article 54(3) EPC, a two-part form of the claim according to Rule 29(1) EPC is not appropriate.

3. *Novelty*

3.1 The opponent has argued that the solution claimed in the patent in suit has already been disclosed in document D6. In his opinion, the process is described in this prior art in more general terms than the process as claimed, since the vacuum level and the dry solids content at the end portion of the dryer section

are not explicitly disclosed. Nevertheless, they are included within the disclosure of D6: for a skilled person, it is well known that the purpose of a dryer section is to increase the dry solids content of a paper web from about 40% to over 90%, so that necessarily the 60% dry position is passed. Since, moreover, this prior art teaches to extend a single-tier drying section throughout the whole dryer section and to apply a vacuum level within the range of 1 to 10 inches WC in the vacuum rolls of said section for restraining the paper web against cross-machine direction shrinkage, the person skilled in the art is enabled by this document to select and apply any of the vacuum levels between 1 to 10 inches WC. The selected sub-range of the patent in suit does not bring superior effects and can be considered as an arbitrary choice inside the disclosed broad range of D6. Therefore, the subject-matter of the claim cannot be considered as new.

3.2 The Board agrees that one teaching of document D6 is that the vacuum applied in the vacuum guide rolls of the single-tier drying section restrains the web against cross-machine directional shrinkage and that, according to the embodiment disclosed in Figures 1 to 9 of this prior art, the single-tier drying section extends throughout the entire dryer section, thus downstream as well as upstream of the 60% dry position and to a position at which the web is essentially dry. A range of vacuum levels between 1 to 10 inches WC is disclosed.

However, the preferred vacuum level given in this state

of the art is 4 inches WC, thus lower than the claimed range. Further, no mention of the 60% dry position can be found in this citation, which also does not suggest considering the end portion of the dryer section more particularly. Therefore, even if the claimed range of vacuum levels is a sub-range of the range disclosed in D6, there is no specific disclosure in this prior art that, in the section portion downstream of the 60% dry position, a vacuum level of 1.49 to 1.99 kPa (6 to 8 inches WC) must be applied.

3.3 Therefore, the subject-matter of the single claim according to the main request cannot be regarded as being anticipated by the content of D6. None of the other cited documents discloses all the features of this claim, so that its subject-matter is considered to be new.

4. *Inventive step*

4.1 The objection of lack of inventive step raised by the opponent was essentially based on a single document, namely D4, which is an article dated September 1987 - thus nine months before the priority date of the patent in suit - written by one inventor of said patent.

This article relates to the "advances in dryer section runnability" and explains that one of the major problems with the increasing runnability of the paper web and fabrics within the dryer section is the web support, and that an important solution to this problem has been the introduction of the single-felted dryer section through which the web is directly supported

without open draws. A vacuum of 1 kPa (4 inches WC) is produced by the vacuum guide rolls and "web tension is no longer required to maintain web stability" (page 67, left column). In a further passage at the end of this article, future improvements are envisaged and, among them, the extension of the single-tier concept through the entire dryer section.

4.2 The arguments of the opponent are the same as for document D6 with respect to the 60% dry position. He has further argued that, even though document D4 does not explicitly mention that holding the web to the felt around the vacuum guide rolls by means of vacuum of 1 kPa affects the cross-directional shrinkage, the application of this vacuum necessarily inhibits said shrinkage, as recognised by the appellant in the introductory part of the description of the patent in suit. The web tensions, which are no longer required, are the web tensions in the open draws, i.e. web tensions only **in the machine direction**. Since the vacuum level given in this article is the vacuum **produced** by the vacuum rolls, the only difference between the process known from D4 and the subject-matter of the claim consists in the claimed vacuum level of 6 to 8 inches (1,4 to 1,99 kPa) **in** the vacuum rolls. This different and higher vacuum level is nothing but the result of the application of the well-known principle that, if an increased effect is wished, in this case an increased restraint, then the cause, here the vacuum level, should be increased. Therefore, according to the opponent, the process according to the claim of the patent in suit is obvious.

4.3 According to the description of the patent in suit as granted, column 1, lines 44 to 46, the problem to be solved is to restrain the web positively against cross-machine directional shrinkage during drying of the web (the last sentence portion, which follows in said passage of the description, namely "in the dry end of the dryer section", is not mentioned by the Board, since it constitutes a part of the solution as claimed and should therefore not appear in the formulation of the problem to be solved).

4.4 This problem is not dealt with in document D4, which constitutes the closest prior art as far as inventive step is concerned. The fact that the application of the high vacuum mentioned in this citation necessarily inhibits the shrinkage of the web in the cross-machine direction is not a disclosure of this effect, even if the patentee a posteriori recognises this effect. Therefore, there is no good reason why the skilled person confronted with the above-mentioned problem would consider the teaching of document D4.

Supposing nevertheless that it would do so and, furthermore, that it was aware that by applying the high vacuum given in this prior art, drying restraint against the cross-machine directional shrinkage is achieved, this skilled person would not be induced, at least by the sentence "Web tension is no longer required to maintain web stability", to increase the vacuum level in the way indicated in the patent in suit. It cannot be argued that the web tension in question in this sentence is that in the machine direction, on the one hand, and, on the other hand,

that a drying restraint, that is to say also a web tension, affects the cross-directional shrinkage. The web tension or sheet vacuum restraint caused by the high vacuum in the guide rolls acts in both directions, see in this respect column 9, lines 17 to 24, of the patent in suit. Thus, document D4 at least cannot be read as suggesting a higher vacuum level than 1 kPa, let alone as suggesting a vacuum level as specified in the single claim of the patent in suit in order to solve the indicated problem.

4.5 Moreover, this prior art is quite silent on the 60% dry position, so that the feature according to the claim, that the given vacuum level is applied in the vacuum guide rolls, **once** the web reaches 60% dry, is not disclosed or even suggested. The suggestion that the single-tier concept may be **in the future** used through the entire dryer section, therefore also at the dry end of said section, is made in order to eliminate all open draws and to provide a complete web support, so that the runnability of the papermachine can be further increased. Even by extending the single-tier concept as suggested and increasing the vacuum levels, the person skilled in the art would not reach the solution as claimed. Without any hint in D4 about the 60% dry position, the skilled person had no reason for adopting a particular vacuum level specifically in the dry end portion of the dryer section.

4.6 Further evidence, in the form of patent literature (D3: US-A-4 359 827), testimonies on prior uses or pages of books, were provided by the opponent in order to show that, at the priority date of the patent in suit, it

was known respectively:

(i) that vacuum levels up to 10.5 inches WC had already been applied in the vacuum guide rolls of a single-tier drying section;

(ii) that, during drying, the paper web shrinks most in the dry matter content range of 60 to 80%, and that shrinkage can be prevented by restraining the sheet during the course of drying.

The fact that these teachings (i) and (ii) may be considered as belonging to the common general knowledge of the person skilled in the art in the concerned technical field is however not sufficient to render the claimed process obvious. Evidence that, before the present invention, a person skilled in the art had made a link between these two teachings, is lacking.

5. For all these reasons, the process of the single claim according to the main request of the appellant implies an inventive step. Under these circumstances, there is no need to examine the auxiliary request.

## 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 following documents:

- the single claim filed on 21 August 1997;

- Description:
  - page 2 filed on 30 July 1998, including the two texts given on respective separate pages and to be inserted as indicated;
  - pages 3, 6 and 7, also filed on 30 July 1998;
  - pages 4 and 5, as granted.

- Drawings, as granted.

The Registrar: The Chairman:

N. Maslin C. T. Wilson