

Internal distribution code:

- (A) [] Publication in OJ
(B) [] To Chairmen and Members
(C) [X] To Chairmen

D E C I S I O N
of 22 August 2000

Case Number: T 0028/97 - 3.2.2

Application Number: 91912350.5

Publication Number: 0535137

IPC: D21G 1/02

Language of the proceedings: EN

Title of invention:
Self-loading controlled deflection roll

Patentee:
BELOIT TECHNOLOGIES, INC.

Opponent:
VOITH SULZER PAPIERMASCHINEN GmbH Abt. pcp

Headword:

-

Relevant legal provisions:
EPC Art. 52(1), 56, 102(2),(3)

Keyword:
"Extension of subject-matter (no)"
"Extension of protection (no)"
"Inventive step (no)"

Decisions cited:

-

Catchword:

-



Case Number: T 0028/97 - 3.2.2

D E C I S I O N
of the Technical Board of Appeal 3.2.2
of 22 August 2000

Appellant: BELOIT TECHNOLOGIES, INC.
(Proprietor of the patent) Suite 512, 300 Delaware Avenue
Wilmington
Delaware 19801 (US)

Representative: Schmitz, Jean-Marie
OFFICE DENNEMEYER S.à.r.l.
55, rue des Bruyères
LU-1274 Howald (LU)

Respondent: VOITH SULZER PAPIERMASCHINEN GmbH
(Opponent) Abt. pcp
Postfach 1940
D-89509 Heidenheim (DE)

Representative: Finsterwald, Manfred, Dipl.-Ing., Dipl.-
Wirtsch.-Ing.
Manitz, Finsterwald & Partner
Robert-Koch-Strasse 1
D-80538 München (DE)

Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 6 November 1996
revoking European patent No. 0 535 137 pursuant
to Article 102(1) EPC.

Composition of the Board:

Chairman: W. D. Weiß
Members: S. S. Chowdhury
R. T. Menapace

Summary of Facts and Submissions

- I. The Appellant (patent proprietor: Beloit Technologies, Inc.) lodged an appeal against the decision of the Opposition Division to revoke European patent No. 0 535 137. The decision was dispatched on 6 November 1996.

The appeal and the fees for the appeal were received on 20 December 1996. The statement setting out the grounds of appeal were received on 14 March 1997.

The opposition was filed against the whole patent and based on Article 100(a) EPC (lack of novelty and inventive step).

The Opposition Division had found that the grounds of opposition mentioned above prejudiced the maintenance of the patent in amended form.

The following prior art documents among those regarded as relevant by the Opposition Division have been taken into account as relevant documents during the appeal proceedings:

D1: US-A-4 821 384

D5: US-A-4 328 744

- II. Oral proceedings before the Board took place on 22 August 2000, at the end of which the requests of the parties were as follows:

The Appellant requested that the decision under appeal be set aside and that the patent be maintained in amended form on the basis of claims 1 to 12 filed on 14 March 1997 with the statement setting out the grounds of appeal.

The Respondent (opponent-Voith Sulzer Papiermaschinen GmbH) requested that the appeal be dismissed.

III. Claim 1 of the Appellant's request reads as follows:

"A self-loading controlled deflection roll (10) for use in engaging an opposing support, such as another roll (4), along a nip line of contact (N) therewith, the roll (10) including a stationary roll shaft (12) having a longitudinal axis (16) extending along a nip plane (15), said shaft (12) including parallel planar guide surfaces (46, 48) on either side of the nip plane (15), a roll shell (14), having an inner (17) and outer cylindrical surfaces, disposed about the shaft (12) and defining, with the shaft (12), a space between the shaft (12) and the inner surface (17) of the shell (14),

support shoe means (22, 24) mounted on the shaft (12) and disposed in the space to supportingly engage the inner surface (17) of the shell (14), in fluid communication with support shoe hydraulic means (36, 26, 32, 28; 30a, 26a, 32a, 28a; 30b, 26b, 32b, 28b) to move the shell translationally relative to the shaft (12) in the nip plane (15) through the longitudinal axis (16) and nip into, and out of, nipping engagement with the opposing support,

guide shoe means (38, 40, 42, 44, 39, 41) for use in conjunction with the guide surfaces (46, 48) on both sides of the roll shaft (12), each guide shoe means

having a support surface (96, 96a, 96b, 98, 98a, 98b) and a stabilizing surface (56, 56a, 56b, 57, 57a, 57b) with the support surface (96, 96a, 96b, 98, 98a, 98b) positioned for sliding movement on the corresponding guide surface (46, 48) and the stabilizing surface (56, 57) positioned for sliding engagement with the inner surface (17) of the roll shell (14), said guide shoe means (38, 40, 42, 44, 39, 41) bearing directly on the roll shaft (12) and being operably movable independently of the support shoe means (22, 24) parallel to the nip plane, the support shoe means (22, 24) and the guide shoe means (38, 40, 42, 44, 39, 41) being structurally independent of each other, and guide shoe hydraulic means (54, 55, 55') for maintaining fluid communication between a source of pressurized hydraulic fluid and the guide shoe means (38, 40, 42, 44, 39, 41), characterized in that at least one of said guide shoe means (41, 41a, 41b) includes a compensating means (75, 75a, 75b, 118, 118a, 118b) for permitting relative reciprocal movement between its corresponding support surface (98, 98a, 98b) and stabilizing surface (57, 57a, 57b),

the compensating means (75, 75a, 75b, 118, 118a, 118b) including a guide shoe (40, 40a, 40b) having the stabilizing surface (57, 57a, 57b) and a compensating piston (75, 75a, 75b) having the support surface (98, 98a, 98b) slidably engaging the corresponding planar guide surface (48, 48a, 48b) on the shaft (12) to permit the at least one guide shoe means (41, 41a, 41b) to move parallel to the nip plane (15), the compensating means having an interface gap (118, 118a, 118b) between the guide shoe (40, 40a, 40b) and compensating piston (75, 75a, 75b) to permit relative movement therebetween, and

the at least one guide shoe means includes a

chamber (116, 116a, 116b) between the guide shoe (40, 40a, 40b) and compensating piston (75, 75a, 75b), the chamber (116, 116a, 116b) being in fluid communication with the guide shoe hydraulic means (55', 55a', 55b') to apply hydraulic pressure to the guide shoe (40, 40a, 40b) and thereby maintain substantially equal stabilizing forces at each of the interfaces between the stabilizing surfaces (56, 56a, 56b, 57, 57a, 57b) and inner surface (17) of the roll shell (14) relative to the roll shaft (12),

and the guide shoe hydraulic means (54, 54a, 54b) actuates the guide shoe means (38, 40, 42, 44, 39, 41) independently of the support shoe hydraulic means (30, 26, 32, 28), whereby the supporting engagement of the support shoe means and the stabilizing forces of the guide shoe means are controlled independently of each other."

IV. The Appellant presented the following arguments:

The fact that the guide shoes and the support shoes were structurally and functionally independent of each other was derivable from the description of the construction and operation of the apparatus.

The Document D5 related to a different problem to that of the opposed patent, and the manner of operation of the two apparatus was also different. The apparatus of the patent in suit counteracted internally generated lateral forces arising from manufacturing tolerances and temperature changes and, moreover, the guide shoe means and support shoe means were structurally and operationally independent of each other. The apparatus of Document D5, on the other hand, counteracted externally generated forces, particularly tangential

forces. The references to "other forces", for example in column 3, line 20, was not a reference to forces arising from manufacturing tolerances and temperature changes. Also, the guide shoe means and support shoe means were neither structurally nor operationally independent of each other.

Furthermore, the person skilled in the art would not have considered combining the teachings of Documents D1 and D5, owing to their respectively different technical problems, and owing to the fact that the axes of the guide shoes of the D5 apparatus must pass through the axis of the roll shell, whereas the axes of the guide shoes of the D1 apparatus must be vertically movable, so there would be a prejudice against this combination.

V. The Respondent presented the following arguments:

The disclosure of the patent in suit excluded any structural independence of the support shoes and the guide shoes since the guide shoes could not move parallel to the nip plane. Moreover, the expression "structurally independent" was unclear.

The Document D5 did indeed relate to the same problem as the opposed patent since the former dealt not only with counteracting tangential forces but also counteracting lateral forces, as explained in columns 2 and 3 and in the objects of the invention in columns 3 and 4.

The apparatus claimed in the patent in suit differed from the apparatus of Document D1 only by the feature that the claimed self-loading controlled deflection roll had guide shoe means including a compensating

means for permitting relative reciprocal movement between its corresponding support surface and stabilising surface so as to counteract lateral forces. Such compensating means were also disclosed in Document D5 (the embodiments described with respect to Figures 9 and 11), and the solution thereof was the same solution used in the opposed patent, i.e. providing a two-part guide shoe with an interface gap therebetween. The claimed apparatus lacked an inventive step, accordingly.

Reasons for the Decision

1. The appeal is admissible.

2. *Amendments*

All the amendments to claim 1 are supported by the original disclosure and they have the effect of narrowing the scope of the claim and meet the requirements of Article 123(2) and (3) EPC, accordingly.

The expression "the support shoe means and the guide shoe means being structurally independent of each other" was inserted in order to make a distinction from the apparatus of Document D5, where the support shoe means and the guide shoe means are both mounted on a single arm and are, therefore, constrained to always move together in the vertical direction. The above expression is the correct way of expressing this difference and is clear. Moreover, although this feature is not explicitly supported by the description it is deducible from the drawing and the description of

the construction and manner of operation of the apparatus. Furthermore, it merely reinforces the feature already in claim 1 as granted, that the guide shoe means bear directly on the roll shaft, are in slidable engagement therewith, and are operably movable independently of the support shoe means. This feature is, therefore, adequately supported by the original disclosure.

3. *Novelty*

None of the cited document discloses the combination of features of claim 1, so that the claimed apparatus is novel. This was not disputed by the Respondent at the oral proceedings before the Board.

4. *Inventive step*

4.1. The closest prior art

The opposed patent is concerned with a controlled deflection roll for use in the press and calender sections of a papermaking machine, wherein the roll shell is rotatably and positionably supported by vertically movable and hydraulically actuated support shoes on a stationary shaft, and by lateral guide shoes to stabilise the roll shell. The support shoes slide on parallel planar surfaces of a stationary roll shaft, and the support shoes and guide shoes are structurally independent of each other and have respective hydraulic means, whereby the supporting engagement of the support shoe means and the stabilizing forces of the guide shoe means are controlled independently of each other.

Document D1 discloses such a deflection roll and is the

closest prior art, which was agreed by all parties.

4.2. The technical problem

This is set out in column 2, lines 6 to 28 of the opposed patent, and may be summarised as follows: The prior self-loading type of controlled deflection rolls cannot accommodate dimensional variations between the roll shell and stationary shaft due to manufacturing tolerances and temperature changes which affect different components in different degrees depending on the coefficient of thermal expansion of their materials. In some prior designs of self-loading rolls, the pressurized hydraulic fluid could escape more quickly from one stabilizing shoe, or at the interface of a stabilizing shoe and the supporting roll shaft at one location than at another. This could cause variations in the stabilizing pressures provided between the shaft and inner surface of the roll shell and thus permit the roll shell to shift its radial position laterally of the plane of the nip, or even to oscillate relative to the shaft.

4.3. The solution

The above technical problem is solved by the features of the characterising part of claim 1, which defines details of compensating means. This comprises a two-part guide shoe means including a guide shoe with a stabilising surface contacting the roll shell, and a compensating piston having a support surface slidably engaging the corresponding planar guide surface of the stationary roll shaft. A chamber between the guide shoe and compensating piston is in fluid communication with the guide shoe hydraulic means to apply hydraulic

pressure to the guide shoe. This arrangement permits relative reciprocal movement between the support surface and the stabilizing surface of the guide shoe means to compensate for the dimensional variations between the roll shell and stationary shaft due to manufacturing tolerances and temperature changes.

- 4.4. However, the same solution is used in the apparatus of Document D5 for solving the same technical problem.

This Document is concerned with the problem of counteracting different forces acting on a roll shell. The passage commencing in column 2, at line 3 discusses the origin of these forces and refers to tangential forces (for example, column 2, lines 3 to 8), transverse forces (for example, column 2, lines 20 to 22), and tilting forces (for example column 2, lines 48 to 51). The description goes on to describe the effects of these forces, which is to deform the median portion of the roll shell if it has end bearings, and to shift the roll shell laterally if it has no end bearings. These forces may cause a bearing element within the roll shell to shift laterally or to tilt, see also column 8, lines 9 to 62. Starting at the bottom of column 2 prior art efforts to counteract the various forces are described and their drawbacks mentioned.

One of the objects of the invention is to resist these forces, see particularly the objects in column 3, lines 64 to 68 and column 4, lines 1 to 4 and 47 to 55, and the latter also mentions forces which "tend to shift portions of or the entire shell in a direction transversely of the direction of forces which urge the roll against the cooperating complementary roll". Thus one object is to counteract forces that tend to move

the bearing element laterally and/or to tilt it.

Although the Document D5 does not mention that manufacturing tolerances and temperature changes may cause problems, these latter causes have, in fact, the same effect as the lateral forces in the apparatus of Document D5, viz. they may cause a lateral bending or displacement of the roll shell. The person skilled in the art, upon use of the apparatus of Document D1, would notice any such lateral bending or displacement of the roll shell, and would turn to Document D5 for a solution since this also treats the same lateral bending or displacement effect.

The problems of counteracting forces that deform the shell or tilt it are separate problems in Document D5, and one is not subordinate to the other. In particular, these problems are defined as separate objects in column 4, lines 1 to 4 and lines 25 to 28, respectively and are given equal importance in this document, and they may be solved independently of each other. The Appellant's argument that this document deals exclusively with problems caused by tangential forces is not valid, accordingly.

- 4.5 Document D5 discloses a deflection roll for use in engaging an opposing support, the roll including a stationary roll shaft 100 (Figure 9), support shoe means 101a mounted on the shaft, and guide shoe means 108, 109 for sliding movement on the corresponding guide surfaces of the roll shaft. The apparatus includes means for counteracting tilting forces acting on the roll shell, including the devices 108 and 109 mounted on arms 105 and 106, respectively, and convex portions 120, 121 on the roll shaft 100 that enable the

arms to tilt.

Further compensating means for counteracting lateral forces acting on the roll shell permit relative reciprocal movement between the support surface of the roll shaft 100 and a stabilizing surface 117. These means are provided in the devices 108 and 109 and include a guide shoe 115 having the stabilizing surface 117 and a compensating piston 106 having the support surface slidably engaging the corresponding guide surface on the shaft 100 to permit the guide shoe means to move parallel to the nip plane. An interface gap between the guide shoe 115 and compensating piston 106 permits relative movement therebetween, and a chamber 111 between the guide shoe 115 and compensating piston 106 is in fluid communication with the guide shoe hydraulic means 124 to apply hydraulic pressure to the guide shoe 115.

This further compensating means is effectively the same solution as used in the patent in suit for counteracting the lateral forces.

- 4.6 In the apparatus of Document D5, however, the support shoe means and the guide shoe means are not structurally independent of each other since they are both mounted on a single arm. The reason for this is that this prior art apparatus is built to counteract both tilting forces as well as lateral forces tending to shift the shell, as stated in column 15, lines 44 to 52.

However, were the person skilled in the art only interested in the latter problem, as in the patent in suit, then he would build an apparatus that included

only those features relevant to this problem. In the apparatus of Document D5 the features relevant to counteracting the tilting forces are the concave surfaces 120 and 121 and the mounting of the support shoe means 102 and the guide shoe means 108 and 109 on a single arm, which arrangement allows the whole structure to tilt and to counteract the applied tilting force. If only the roll shifting forces are important the features relevant to tilting could be dispensed with. The support shoe means and the guide shoe means would then not be mounted on a single arm so as to tilt, i.e they would become structurally independent of each other and the sliding surfaces would be truly parallel and in contact with each other, as in the Document D1.

This situation would follow automatically upon discarding the unwanted features relating to tilting forces, without any other modification of the apparatus, and is not the consequence of inventive activity.

- 4.7 The person skilled in the art, faced with the problem of counteracting only the lateral forces on a roll shell would, therefore, apply the solution given in Document D5 to the apparatus of Document D1, modified to ignore tilting forces, and would arrive at the claimed apparatus as an obvious development. Therefore, the deflection roll of claim 1 does not involve an inventive step.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar

The Chairman

V. Commare

W. D. Weiß