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D E C I S I O N
of 18 September 1996

Case Number: T 0590/92 - 3.2.2

Application Number: 85905975.0

Publication Number: 0245250

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Language of the proceedings: EN

Title of invention:

Method of finishing paper utilizing substrata thermal molding

Patentee:

S. D. Warren

Opponent:

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SULZER-ESCHER WYSS GmbH
Kleinewefers GmbH

Headword:

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Relevant legal provisions:

EPC Art. 54

Keyword:

"Novelty - (no)"

Decisions cited:

T 0666/89

Catchword:

-



Case Number: T 0590/92 - 3.2.2

D E C I S I O N
of the Technical Board of Appeal 3.2.2
of 18 September 1996

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Decision under appeal:

Decision of the Opposition Division of the
European Patent Office posted 4 May 1992 revoking
European patent No. 0 245 250 pursuant to
Article 102(1) EPC.

Composition of the Board:

Chairman: H. Seidenschwarz
Members: M. Bidet
J. C. De Preter

Summary of Facts and Submissions

I. On 29 June 1992 an appeal was filed against the decision of the Opposition Division, issued on 4 May 1992 revoking the European patent No. 0 245 250 because of lack of novelty with regard to document:

"Das Papier", 39. Jahrgang, Heft 10A, 1985, pages V178 to V186, "Der Kompaktkalender - die Antwort auf die Herausforderung nach hohen Geschwindigkeiten bei der Glättung und Satinage" by J. Pav and P. Svenka (DXIV).

The appeal fee was paid on the same day and the statement of grounds of appeal was received on 3 September 1992.

II. Oral proceedings were held on 9 July 1996.

(i) During this oral proceedings, in addition to document DXIV, reference was made to :

- DXI: B. Krenkel: "Research and Mill Experience with Gloss Calender", Symposium on calendering and supercalendering of paper at University of Manchester Institute of Science & Technology, Manchester, England, on 1st and 2nd September 1975.

- DXIa: B. Krenkel: "Labor- und Praxiserfahrungen mit dem Heißglättwerk (gloss calender)", Wochenblatt für Papierfabrikation, 4.1976

- DI: US-A-3 124 480

- (ii) The appellant (patentee) filed during the oral proceedings a set of Claims 1 to 20 together with amended description as main request and a Claim 1 as auxiliary request.

Claim 1 according to the main request reads as follows:

A process for producing gloss and smoothness on the surface of a paper web, comprising the steps of

- A. providing a finishing apparatus comprising a smooth metal finishing drum and a resilient backing roll pressed against the drum at a force up to 700 kN/m (4000 pounds per lineal inch) to form a nip with pressure against the paper of at least 13,780 kN/m² (2000 pounds per square inch);
- B. advancing a web of paper making fibers having a moisture content of from 3% to 5% of the bone dry weight of the fibers through the nip at a speed which results in the web dwelling in the nip from 0.3 milliseconds to 12 milliseconds; and
- C. simultaneously with step B, heating the drum to a surface temperature having a value not less than the Ts value determined by the following formula:

$$T_s = [T_i \times 0.357t^{-0.479} - 234.2e^{-0.131m}] / [0.357t^{-0.479} - 1]$$

where:

- Ts = surface temperature of the heated drum in °C;

- T_i = the initial temperature of the web just prior to entering the nip, in °C;
- t = dwell time of the web in the nip, in milliseconds
- e = the base of the natural logarithm; and
- m = moisture content of the fibers in the web in weight percent of the bone dry fiber weight.

Claim 1 according to the auxiliary request includes all the features of Claim 1 and in which the definition of the parameter t has been completed by the wording:

"the nip width being determined in accordance with the Hertzian equation as follows:

$$C_H = [4 FR(1-\delta^2)/(\eta E)]^{1/2}$$

where:

C_H = one-half the nip width;

F = force per unit length of the nip

R = the equivalent radius determined by the radii of the heated drum (R_1) and the Resilient roll (R_2), [$R = R_1/R_2(R_1+R_2)$]

δ = the Poisson ratio for the resilient roll cover; and

E = Young modulus for the resilient cover of the roll;"

- (iii) The appellant argued that document DI did not anticipate the claimed combination of parameters mentioned in the Claims 1 according to both requests. It mentioned only very wide parameters and particularly the moisture content "m" was always above 5%, without any suggestion to proceed below the end of the lowest range, i.e. document DI disclosed only a very wide range of operating conditions.

The subject matter of Claims 1 according to both requests was novel with respect not only to the disclosure of document DI, but also to that of document DXIV, the disclosed moisture content m being about 6%, with an example at $m = 5,5\%$.

Additionally, the nip width according to document DI was not determined by the Hertzian's formula (according to the auxiliary request), the measured values of the nip width set out in the description of document DI had therefore to be reduced in order to be validly compared with the related dwell time of the parameters. The Hertzian value of the nip width was of such an importance, when comparing the surface temperature of the finishing drum according to document DI with the minimum surface temperature value T_s according to the equation set out in Claim 1 of the auxiliary request, that the surface temperatures known from document DI would be lower than the minimum value T_s .

He further denied that the document DI gave any suggestion to proceed under high pressure according to the claimed invention.

As to the inventivity of the invention as claimed, the appellant contented that there was not the slightest hint that the teachings of document DXIV should be combined with that of document DXI, to arrive at the

claimed parameters combination for solving the problem of manufacturing a paper which had a higher gloss and smoothness than the paper obtained by the process as it was described in document DXIV.

(iv) The respondents (opponents) contested these submissions and maintained their argumentation that the subject matter of both Claims 1 according to the main and auxiliary requests was not novel with respect to the disclosure of either document DI or document DXIV and at least did not involve an inventive step over the disclosure of documents DXIV and DXI.

(v) The appellant requested that the decision under appeal be set aside and that the patent be maintained on the basis of Claims 1 to 20 and pages 3, 4, 9, 10 and Figure 8 of the description filed during the oral proceedings together with pages 2, 5, 6, 7, 8, 11, 12 and 13 and Figures 1 to 7 and 9 of the patent as granted (main request) or on the same basis with Claim 1 as filed during the oral proceedings (auxiliary request).

The respondents requested that the appeal be dismissed.

Reasons for the Decision

1. The appeal is admissible.
2. *Admissibility of amendments*

2.1 Claims 1 according to the main and auxiliary requests are limited to a web moisture content range of 5% to 3%. The application as filed specifies a range of 7% to 3%, (see page 20, lines 8 to page 21, lines 8), and the

mention of values of 7%, 5% and 3% in the figures specified in above mentioned parts of the description, which corresponds to page 9, line 15 to page 10, line 15 of the patent in suit, shows that the range defined by the minimum value from the originally disclosed range of $m = 3\%$ and by the maximum value of $m = 5\%$ is supported by the originally filed application.

- 2.2 Claim 1 according to the auxiliary request contains the additional feature that the width of the nip is a theoretical value obtained by a formula which means that width is not measured. According to the description of the application as filed, page 25, lines 15 to 25, the determination of the nip pressure is complex and the nip width is difficult to measure. This statement is immediately followed by the indication that the equation now incorporated in Claim 1 of the auxiliary request is widely accepted and believed to provide a satisfactory approximation of nip width for many common installations (see also the patent in suit, page 11, lines 45 to 60). In the board's view, this statement supports the amendment made by the mention of the Hertzian equation in Claim 1 according to the auxiliary request.

On the basis of this statement, it is within the practice to consider that any indication in the prior art documents of a nip width - if not otherwise specified - refers to an Hertzian value.

Since both Claims 1 additionally result from the combination of the features of Claims 1, 3 and 18 of the patent as granted, the scope of the protection has been restricted. The requirements of Articles 123(2) and (3) EPC are met.

3. Novelty

3.1 Document DI concerns a hot pressure finishing apparatus for web materials and is more particularly concerned with improved methods and means for glossing paper and related web materials. The finishing apparatus comprises a smooth metal finishing drum and a resilient backing roll pressed against the drum at a force of 400 pli (lbs per linear inch) to form a nip width pressure against the paper from 250 to about 2400 psi (lbs per square inch), (see column 1, lines 10 to 13, column 2, lines 7 to 10; column 3, lines 6 to 11 and 39, 40, 44; Claim 3).

The web of paper making fibre is dried to a commercial or marketable moisture content (usually between 5 to 10% of bone dry). According to the description of the disclosed method, the coating layer of the web is dried to an atmospheric moisture content and the tolerable moisture contents are usually lessened with increases in either nip temperature or nip pressure. The web is advanced through the nip at the rates of 500 feet/minute (150 m/min) or 2000 feet/minute (600 m/min). The nip has a cross-sectional width, less than 1 inch (25,4 mm) and preferably about 1/2 inch (12,7 mm). Simultaneously to advancing the web, the drum is heated to a surface temperature of 300°F (148,8°C) or 345°F (173,8°C) required to plasticize the coating and coating surface of the web in the nip. In another example, the surface temperatures are preferably within the range from about 280°F to 360°F (138°C to 182°C) (see column 1, lines 71 to column 2, line 1; column 2, lines 14 to 17, 44 to 46, 64 to 69; column 3, lines 12 to 16, 35 to 44; column 4, lines 45 to 50; column 5, lines 43 to 46; column 6, lines 14 to 20 and 30 to 32).

- 3.2 The consistent case law of the Boards of Appeal concerning the determination of novelty, is that the evaluation of an earlier document is not limited to a comparison of the claimed subject-matter with only the examples of the document, but must extend to all information contained in it (see decision T 666/89, OJ EPO, 1993,495, paragraph 5). In particular, the skilled person may combine the technical teaching of an example with the general information disclosed elsewhere in the same document, provided that the example is indeed representative for the general teaching of that document.
- 3.3 Applying this principle, when deciding the question of novelty of the subject matter of Claim 1 according to both requests, the consideration of the whole content of document DI results in the following:
- 3.3.1 The forces used in the known apparatus for pressing the resilient backing roll against the drum at a force of 400 pli to form a nip with a pressure against the paper up to 2400 psi fall within the range of up to 4000 pli (700 kN/m) or overlap considerably the range of at least 2000 psi (13 780 kN/m²) in feature A of both Claims 1.
- 3.3.2 From the web speeds of 150 to 600 m/min and the preferred nip width of 12,7 mm, a dwell time t of the web in the nip of 5 ms and 1,25 ms respectively can be calculated. These figures fall within the range of 0.3 ms and 12 ms as claimed in feature B.
- 3.3.3 According to both Claims 1, the surface temperature T_s of the drum is not less than that determined by the formula given in both Claims 1, in which the surface temperature T_s depends on the initial temperature T_i of the web, the dwell time t and the moisture content m .

Therefore, it must be determined whether each of the known surface temperature values θ_s (173,8°C for $t=1,25$ ms and 148,8° for $t=5$ ms) anticipates the claimed temperature range. For this purpose, if each θ_s disclosed in document DI corresponds to a value which is not less than the minimum surface temperature T_{s_m} - determined by interpolating (as performed by respondent O1) or by calculating it with the formula as defined in both Claims 1, for a web having a moisture content m of 5%, being advanced at a speed which results in a dwell time of 1,25 ms to 5 ms and having initial temperature values T_i as indicated in the examples at the pages 9 and 10 of the European patent specification- then the known temperature falls within the claimed temperature range.

The following Table Ia gives the minimum surface temperatures values T_{s_m} determined by interpolation:

Table Ia

T_i (°C)	t (ms)	T_{s_m} (°C)
26,7	1,25	173
	5	141,8
48,9	1,25	160
	5	137,4
71,1	1,25	149
	5	132,8
93,3	1,25	137
	5	128,4

and Table Ib gives T_{s_m} determined by calculation:

Table Ib

Ti (°C)	t (ms)	Ts _m (°C)
26,7	1,25	166,5
	5	140
48,9	1,25	156
	5	136
71,7	1,25	145,5
	5	131,6
93,3	1,25	135
	5	127,2

Comparing the preferably employed surface temperature values θ_s (i.e 173,8°C for t=1,25 ms and 148,8°C for t=5 ms) of the drum in the apparatus according to document DI with the above determined values T_{s_m} , it is clear that said drum has always a surface temperature θ_s not less than the above minimum T_{s_m} values determined by the claimed formula in feature C (and also by interpolation) when the web to be treated has a moisture content m of 5% corresponding to the upper limit according to feature B of both Claims 1.

3.3.4 The extent to which the examples known from document DI are able to anticipate both the claimed temperature range T_{s_m} and the claimed moisture content range of 5 to 3% feature B of both Claims 1 is evaluated as follows:

Taking, the surface temperatures θ_s of 173,8°C and 148,8°C as minimum values and the dwell times of 1,25 and 5 m/s derivable from document DI together with the initial temperatures values T_i of the examples given in the European patent specification, the following values for the moisture content m are obtained:

Table II

Ti (°C)	Ts (°C)	t (ms)	m%
26,7	173,8	1,25	4,69
	148,8	5	4,57
48,9	173,8	1,25	4,28
	148,8	5	4,35
71,7	173,8	1,25	3,88
	148,8	5	4,15
93,3	173,8	1,25	3,5
	148,8	5	3,9

The above calculated values for the moisture content show that the temperature surface Ts according to Table II is greater than the temperature surface Ts_m of Table Ia or Table Ib (compare Ts_m value of a line of Table Ia or the same line of Table Ib with the same line of Ts_m of Table II), and the calculated moisture content of the web, which may be used, is less than the moisture content of 5% according to Tables Ia and Ib). Consequently with an increase of the surface temperature, the moisture content is always lessened as already indicated in document DI (see column 6, lines 30 and 31).

This also corresponds to the principle disclosed in the examples on pages 9 and 10 of the European patent application, according to which - e.g. at a dwell time of 5 ms - the moisture content m decreases from 5% to 3% whereas the surface temperature Ts increases :

at Ti = 26,7 °C: from 141,8 °C to 184,9 °C
 at Ti = 48,9 °C: from 137,4 °C to 180,4 °C
 at Ti = 71,1 °C: from 132,8 °C to 176,3 °C
 at Ti = 93,3 °C from 128,4 °C to 171,4 °C

The range of moisture content being defined by its highest value of $m=5\%$ according to Tables Ia and Ib and its lowest end values of m of the Table II, varies therefore from the lowest range of $5\%-4,69\%$ to the greatest value of $5\%-3,5\%$; the greatest range covering then up to 75% of the claimed moisture content range of 5 to 3%.

Therefore the values of the moisture content calculated on the basis of the information given in document DI do not only lie at the upper limit but mostly inside the range specified in feature B of both Claims 1.

3.3.5 The conclusion regarding the values presented in the above points 3.3.1 to 3.3.4 is that, when considering the whole content of document DI, its express and implicit technical information make the subject matter of both Claims 1 available to the skilled person in the form of a technical teaching, i.e. document DI discloses a process wherein the given and calculable conditions satisfy the moisture content and surface temperature requirements of the patent in suit.

3.3.6 As regards the specification for determining the nip width in accordance with an Hertzian equation in Claim 1 of the auxiliary request, the following has to be considered.

There is no indication in document DI of the manner the nip width is determined. However, taking account of the widely accepted formula as cited in the description of the patent in suit (see above point 2.2) that a nip width value -when not otherwise specified- is calculated on the basis of the Hertzian equation, the nip width disclosed in document DI and therefore the directly calculated dwell time are values derivable from the Hertzian formula. Consequently, the corresponding T_s and m values cited in the Tables Ia,

Ib and II above derive also from the consideration of nip widths according to the Hertzian formula. Claim 1 according to the main request implicitly includes the specification now mentioned in Claim 1 according to the auxiliary request. There is therefore no difference between the subject-matter of both Claims 1.

3.3.7 As to the argument of the appellant, that document DI contains a very wide range of operating conditions, reference is made to the description of the patent in suit, page 10, lines 37 to 52. According to this description, there are components involved in the formula - as defined in both Claims 1 - which can only be estimated or which need not be known precisely to develop a useful formula. Furthermore, it is not known nor important to know which component or components have been estimated incorrectly. This of course also applies to the components obtainable from the disclosure of document DI which permits the determination of the conditions for the starting and ending points of the process for producing the wanted gloss and smoothness on the surface of a paper web. The correlation between the values of the examples given in the description of the document DI and those obtained by the above calculations is evidence of this.

3.4 Consequently, the subject-matter of Claims 1 according to both requests cannot be considered to be novel within the meaning of Article 54 EPC.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:



S. Fabiani

The Chairman:



H. Seidenschwarz