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Datasheet for the decision of 3 March 2015

Case Number: T 2284/10 - 3.2.05

Application Number: 98901357.8

Publication Number: 1007343

IPC: B31C3/00

Language of the proceedings: EN

Title of invention:
A method of manufacturing a paperboard core made up of structural plies, and corresponding paperboard core

Patent Proprietor:
Sonoco-Alcore Oy

Opponent:
Corenso United Oy Ltd

Headword:

Relevant legal provisions:
EPC 1973 Art. 56

Keyword:
Inventive step - (yes)

Decisions cited:

Catchword:

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Case Number: T 2284/10 - 3.2.05

D E C I S I O N
of Technical Board of Appeal 3.2.05
of 3 March 2015

Appellant: (Patent proprietor)	Sonoco-Alcore Oy P.O.Box 100 48601 Karhula (FI)
Representative:	Hoffmann Eitle Patent- und Rechtsanwälte PartmbB Arabellastraße 30 81925 München (DE)
Respondent: (Opponent)	Corenso United Oy Ltd Hennalankatu 270 15700 Lahti (FI)
Representative:	Siegfried Demski Demski & Nobbe Patentanwälte Tonhallenstraße 16 47051 Duisburg (DE)
Decision under appeal:	**Decision of the opposition division of the European Patent Office posted on 9 September 2010 revoking European patent No. 1007343 pursuant to Article 101(3)(b) EPC.**

Composition of the Board:

Chairman	M. Poock
Members:	H. M. Schram
	M. J. Vogel
	O. Randl
	G. Weiss

Summary of Facts and Submissions

I. The appellant (patent proprietor) lodged on 9 November 2010 an appeal against the decision of the opposition division, posted on 9 September 2010, by which European patent No. 1 007 343 was revoked on the grounds that that the subject-matter of claim 1 of the main request (claim 1 as granted) and of the auxiliary requests 1 to 4 did not involve an inventive step, Article 56 EPC 1973. The statement setting out the grounds of appeal was filed on 10 January 2011.

II. The respondent (opponent) withdrew its opposition on 9 February 2015.

III. Oral proceedings were held before the board of appeal on 3 March 2015.

IV. The appellant (patent proprietor) requested that the decision under appeal be set aside and that the patent be maintained as granted (main request) or on the basis of auxiliary requests 1 to 4 as filed on 10 January 2011, or auxiliary requests 5 and 6 as filed with letter of 3 February 2015.

V. Claim 1 of the main request (claim 1 as granted) reads as follows:

"A method of manufacturing a spirally wound paperboard core, comprising the steps of:

- manufacturing structural plies at least one of which having an elasticity modulus in the machine direction (MD) of at least 7,800 MPa, preferably over 8,000 MPa, and
- spirally winding the structural plies to form the paperboard core,

characterized by

- manufacturing the at least one of the structural plies to have an elasticity modulus in the cross-machine direction (CD) of at least 4,500 MPa, preferably over 5,000 MPa, by means of a press-drying method, preferably the Condebelt method."

VI. The documents referred to in the appeal proceedings included the following:

D1 US 5,505,395;

K1.1 *Effect of press drying on paper properties*, Law KN and Koran Z, Appita Vol. 34, No. 5, pp. 387 to 390;

K1.3 *Conventional and press drying of high-yield paper birch for use in linerboard and corrugating medium*, Horn RA and Bormett DW, Tappi Journal 68(10), 1985, pp 97 to 101;

K1.13 *Effect of Condebelt press drying on sheet structure and properties*, Retulainen E, Merisalo N, Lehtinen J and Paulapuro H, CPPA 83rd Annual meeting, January 28-31, 1997, pp. A133-138.

VII. The arguments of the appellant, in writing and during the oral proceedings, can be summarized as follows:

Document D1 was not a suitable starting point for assessing inventive step. This document was directed to a completely different concept. Specifically, document Dl was directed to reducing the comedown of the inner diameter of a core using a multi-grade structure. This had nothing to do with the original problem and the

intended use as well as the effects obtained by the opposed patent. The characterizing feature of claim 1 of the main request allowed manufacturing cores having an increased bending stiffness and axial stiffness, making such cores suitable for meeting the strength requirements of cores set by the running parameters of new printing presses (see paragraph [0023] of the patent in suit), whereby strength requirements of the core meant stiffness requirements of the core, not stiffness / elastic modulus of the structural plies. Document D1 taught away from using stronger or stiffer paper and hence taught away from the invention. The person skilled in the art would not consider document K1.3 since it related to examining the strength properties of linerboard and corrugating medium (page 97, left column, ultimate paragraph) fabricated on a laboratory experimental machine. The linerboard disclosed in Table 1 of said document only had a thickness of about 0.22 mm (this resulted from the basis weight of 205 g/m^2 and the density of 929 kg/m^3), which was much too thin for manufacturing a core having eg a wall thickness of 10.2 mm as disclosed in column 6, line 6, of document D1.

Still another aspect that needed to be taken into account when evaluating inventive step was the time factor. Document K1.3 was published 12 years before the priority date of the opposed patent, but no spiral wound core was ever manufactured using the press-dried linerboard of said document, although at that press drying had been known for a very long time, cf document K1.13, page A133, left column, penultimate paragraph: "*Intensive press drying research was conducted in the 70's and 80's, but the activity clearly dropped in the 90's*". Document K1.13 confirmed that the activity in this technical field had dropped in the 90's, ie at the

time when the present invention was made. Therefore, the present invention worked against a general trend in the industry. The time factor and the activity of the inventors against the general trend were clear and strong indicia for inventive step. It followed that the subject-matter of 1 of the main request involved an inventive step with respect to a combination of documents D1 and K1.3.

Reasons for the Decision

1. The appeal is admissible.

2. *Ground for opposition under Article 100(a) EPC 1973 in combination with Article 56 EPC 1973*

2.1 Document D1, which is cited in paragraph [0019] of the patent in suit, represents the closest state of the art. During the examination proceedings the two-part from of granted claim 1 was based on this document.

Document D1 discloses (column 1, lines 14 to 18, column 3, lines 13 to 24, and claim 1) a multi-grade paperboard winding core, having enhanced resistance to inside diameter (ID) reduction under compressive forces, a phenomenon also referred to as “ID comedown”. This document further discloses (see column 8, line 30, to column 9, line 27, Figure 3) a method for forming a multi-grade spirally wound paperboard winding core.

The paperboard core of document D1 comprises a plurality of structural paperboard plies or layers (column 3, lines 55 to 61). The gist of the invention according to document D1 is that, if a mix of high-and low-density plies is available for making a paperboard

core with a view to save natural resources (column 2, lines 5 to 13), the arrangement that increases the ID comedown resistance most is when at least one structural ply of high density is positioned as the innermost and outermost layer, respectively, whereas structural plies of low density form the interior, centrally positioned layers (see column 9, line 49, to column 10, line 53), as illustrated in Figure 4. Figure 4 is a composite graph that illustrates ID comedown based on computer modelling for multi-grade paperboard winding cores having five high density and ten low density paperboard plies (column 5, lines 15 to 21). The paperboard properties set forth in Table 1 are model parameters (cf column 9, line 64, to column 10, line 2), whereby the high density paperboard is assumed to have elasticity moduli 50% greater than the low density paperboard, and the elasticity moduli in the machine direction (E_{MD}) are three times greater than those in the cross-machine direction (E_{CD}), ie 1.58 Mpsi and 0.53 Mpsi, respectively (see Table 1, column 10, lines 4 to 16), which correspond to 10.900 MPa and 3.660 MPa in metric units. It may be noticed that the value of the elasticity modulus in the cross-machine direction, viz 3.660 MPa, is about 19% lower than the starting point of the range claimed in claim 1 of the main request, viz "at least 4,500 MPa". Document D1 is silent about the way the paperboard plies are manufactured.

2.2 The subject-matter of claim 1 of the main request differs from the method for forming a multi-grade spirally wound paperboard winding core known from document D1 in that it comprises the step of "manufacturing the at least one of the structural plies to have an elasticity modulus in the cross-machine direction (CD) of at least 4,500 MPa by means of a

press-drying method, preferably the Condebelt method", cf the charactering feature of claim 1 of the main request.

2.3 The board is satisfied that the first part of the distinguishing feature mentioned in point 2.2 above, viz "manufacturing the at least one of the structural plies to have an elasticity modulus in the cross-machine direction (CD) of at least 4,500 MPa", solves the problem the invention seeks to solve, namely "*to provide a spiral paperboard core comprising at least one structural ply and having improved strength properties*" and "*to provide a spiral paperboard core which meets e.g. the strength requirements of cores, set by the running parameters of new printing presses*", cf paragraphs [0022] and [0023] of the patent in suit, respectively. It is important to note that the strength properties and strength requirements of the core are mentioned, not those of the at least one structural ply making up the core.

2.4 The opposition division held that the subject-matter of claim 1 as granted did not involve an inventive step, Article 56 EPC 1973 (see point I above).

In the decision under appeal (see point 5.1, page 7, lines 1 to 13) the following is stated: "*The skilled person knows that the overall strength of paperboard tubes can be increased by increasing tube wall thickness and/ or by employing stronger paper strips for the plies of the tube. This is stated so in D1, col. 1, lines 62-65. Moreover, it is further indicated in D1 that the tensile elasticity modulus (Young's modulus) is an important indicator of strength, see Table 1. So even considering that D1 already offers a solution to the problem of "inside diameter comedown"*

it will be clear to the skilled person that further improvement is possible by employing stronger paper strips. The skilled person, being faced with the stated problem, would thus, as a matter of normal design practise, consider the use of, in the sense of D1, stronger paper qualities. The claimed press drying method is indeed generally known for producing relatively strong paper. This is supported by the documents K1.1 to K1.5 cited by the opponent, cf. K1.1 ..., page 389, right column; ...".

The board assumes that the opposition division intended to refer specifically to the paragraph below Figure 4 on page 389 of document K1.1, the first paragraph reading: "[The] *modulus of elasticity is the property most significantly improved by press drying. According to Figure 4, there is a 68 per cent increase in modulus of elasticity in CD. Increase in modulus of elasticity means a higher sheet stiffness as a result of increased sheet density, fibre bonding area and improved stress distribution*"), and document K1.3. According to the opposition division the latter document disclosed (see point 5.1, page 7, lines 15 to 18) "*that the Condebelt process, a press-drying method, is known for improving the elasticity modulus in the cross machine direction (see table 1: compare lines 1, 2 and 3, 4, Modulus of Elasticity, CD)*". On page 9, first paragraph, it is stated that "[The] opposition division *therefore concludes that in order to solve the above mentioned problem, the skilled person would consider the general prior art represented for example by document K1.3 and would arrive to the claimed subject matter. Hence, the subject matter of claim 1 lacks inventive step over the combination of documents D1 and K1.3*".

It may be noticed that document K1.3 discloses (see Table I on page 98, lines 3 and 4 below the subtitle "Linerboard") press-dried linerboards having pulp yields of 60% and 69%, MD moduli of elasticity ("tensile strength") of 9.4 GPa and 7.3 GPA, and CD moduli of elasticity of 5.0 GPa and 5.2 GPa, respectively. The first mentioned liner board has moduli of elasticity falling in the claimed ranges.

In the judgment of the board, the arguments of the opposition division are based on hindsight, ie in knowledge of the invention, for the following reasons.

2.5 The paragraph bridging columns 1 and 2 of document D1 (partly cited in point 2.4 above) reads as follows: "*It is generally understood that the overall strength of paperboard tubes can be increased by increasing tube wall thickness and/or by employing stronger paper strips for the plies of the tube. In this regard, paper is available in a wide variety of strengths. Paper strength is improved by increasing the mechanical refining of paperboard pulps and by compressing the paperboard during manufacture. Further, paperboard strength is influenced by fiber type and quality. As a general rule, stronger paperboard sheets have a higher density than low strength paperboard sheets*" (emphasis added by the board).

Whilst document D1 teaches that employing high density paper strips for the plies of a paperboard core, which strips are generally stronger than low density paper strips, will increase the overall strength of paperboard cores, this document is silent about whether increasing the elasticity modulus in the *cross-machine direction* of the plies leads to stronger cores.

The board has doubts whether the person skilled in the art would consider documents K1.1 and K1.3 in the context of the problem mentioned above (see point 2.3) , since they are not concerned with methods of manufacturing a spirally wound paperboard core and do not appear to be suitable for them. Consequently, these documents are silent about the importance of using plies having an E_{CD} of at least 4500 MPa for manufacturing a spirally wound paperboard core.

In the judgement of the board, the invention according to claim 1 of the main request is based on the insight that using "structural plies to have an elasticity modulus in the cross-machine direction (CD) of at least 4,500 MPa" in a method of manufacturing a spirally wound paperboard core leads to a sufficiently strong core, cf column 5, lines 9 to 16, and column 7, lines 8 to 13, of the patent in suit.

2.6 It follows from the above that the first part of the distinguishing feature was not obvious to the person skilled in the art. The subject-matter of claim 1 of the main request therefore involves an inventive step. This reasoning applies to claim 3, which is directed to a paperboard core obtainable by the claimed method, and to claim 5, which is directed to the use of the claimed paperboard core. Hence, there is no need to examine whether the second part of the distinguishing feature mentioned in point 2.2 above, viz "by means of a press-drying method, preferably the Condebelt method", taken alone, was obvious to the person skilled in the art or not.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent is maintained as granted.

The Registrar: The Chairman:

D. Meyfarth M. Poock

Decision electronically authenticated