

Internal distribution code:

- (A) Publication in OJ
(B) To Chairmen and Members
(C) To Chairmen
(D) No distribution

**Datasheet for the decision
of 14 March 2012**

Case Number: T 2332/08 - 3.3.05

Application Number: 02789120.9

Publication Number: 1474365

IPC: C02F 1/36, B01J 19/10

Language of the proceedings: EN

Title of invention:
Ultrasonic transducer system

Patent Proprietor:
Ufo AB

Opponent:
STORA ENSO OYJ

Headword:
Ultrasonic treatment/UFO

Relevant legal provisions:
EPC Art. 52(1), 54(2), 56, 100(b)

Keyword:
"Sufficiency of disclosure (yes)"
"Novelty (yes): no direct and unambiguous implicit disclosure"
"Inventive step (yes): claimed method not obvious in view of
the prior art"

Decisions cited:
G 0003/93, T 1621/09

Catchword:
-



Case Number: T 2332/08 - 3.3.05

D E C I S I O N
of the Technical Board of Appeal 3.3.05
of 14 March 2012

Appellant: STORA ENSO OYJ
(Opponent) Kanavaranta 1
FIN-00160 Helsinki (FI)

Representative: Detski, Siegfried
Detski, Frank & Nobbe
Patentanwälte
Tonhallenstraße 16
D-47051 Duisburg (DE)

Respondent: Ufo AB
(Patent Proprietor) Vide'um
S-351 96 Vaxjo (SE)

Representative: Söderman, Lisbeth Karin
BORENIUS & Co Oy Ab
Itämerenkatu 5
FIN-00180 Helsinki (FI)

Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 20 October 2008
rejecting the opposition filed against European
patent No. 1474365 pursuant to Article 101(2)
EPC.

Composition of the Board:

Chairman: G. Raths
Members: B. Czech
C. Vallet

Summary of Facts and Submissions

- I. The appeal is from the decision of the opposition division rejecting the opposition filed against European patent No. 1 474 365.
- II. The sole independent claim 1 of the patent as granted reads as follows:
- "1. A method of treating a liquid or a slurry with an ultrasonic energy comprising:
providing a movable endless member (102) being permeable to a liquid (156), a transverse foil (106) disposed below the member and extending across the member (102) and a transducer (108), in operative engagement with the foil (106);
moving the endless member (102) about rollers (104);
the transducer (108) generating pressure pulses into the foil (106) to form imploding bubbles (158) in the liquid (156) disposed above the member (102), the imploding bubbles (158) having a diameter d_1 forming a gap (155) defined between the member (102) and the foil (106), the gap (155) representing a distance d_2 the distance d_2 being less than the diameter d_1 of the bubbles (158) to prevent any bubbles (158) to grow to the diameter d_1 in the gap (155)."*
- III. In the contested decision, the opposition division concluded that the claimed method was sufficiently disclosed. More particularly, it held that the skilled person was not able to determine the value of d_1 . However, by observing whether or not some flocculation occurred, the skilled person could decide whether or not there was an unwanted formation of a cushion of

bubbles. Hence, the skilled person was able to decide whether or not a given gap width d_2 was sufficiently small.

The opposition division also found that the claimed method was novel and inventive over the disclosure of the prior art document invoked by the opponent in this respect, namely

D1: WO 98/41683 A1.

Document D1 merely described the positioning of the ultrasound transmitting elements "directly below the wire" but did not require "the gap between the movable member and the foil of the transducer below the member to have a distance d_2 being less than diameter d_1 of the imploding bubbles".

IV. In its statement of grounds of appeal, the appellant (opponent) maintained its earlier objections under Articles 100(a) and 100(b) EPC.

More particularly, it maintained that the skilled person was not able to determine the critical bubble size d_1 by calculation due to many unknown parameters. Moreover, since claim 1 was not limited to methods using high energy ultrasound, a detectable cushion of bubbles might not always occur. Hence the skilled person was not able to set the gap width d_2 as required by claim 1.

With regard to novelty and inventive step the appellant referred to an additional document, namely
D1a: US 2002/0050328 A1.

The figure of D1a, a US application corresponding to document D1, made it clear what "directly below the wire" was supposed to mean in context. Said expression implied that there was only a "very small" or "minor" gap between the transmitting elements and the wire, as could be seen in the enlargement in the figure of D1a. Said minor gap would evidently correspond to the distance d2 mentioned in claim 1. The claimed method differed from the disclosure of D1 merely in wording, but not in its technical teaching.

With regard to inventive step, the appellant held that even if the feature $d2 < d1$ were to be considered to impart novelty, the claimed method was obvious. D1 taught to position the transmitting elements such that the best effect was achieved in terms of the ultrasound energy transmitted per mass unit of the stock. Decreasing the gap between the transducer and the member was an obvious measure for the person skilled in the art.

V. In its reply, the respondent (proprietor of the patent) rebutted the objections raised by the appellant. With regard to sufficiency of disclosure, the respondent referred additionally to two further documents labelled "Appendix A" and "Appendix B", namely

D. Fuster et al., "Parametric Analysis for a Single Collapsing Bubble"; Flow Turbulence Combust, 2009, 82, pages 25 to 46; and

A project report by F. MacKay, titled "Applications of Ultrasound to Dough Processing - Literature Review", dated February 1998 and marked as "confidential".

The respondent held that the claimed invention was novel over both D1 and D1a. The expression "directly below" used in these documents did not constitute a disclosure of a distance d2 which was inferior to the diameter d1 of the imploding bubbles.

D1 did not address the issue of bubble cushion formation and paid no attention to the value of d1 and d2. Hence, this document did not suggest setting d2 to a value of less than d1, in order to avoid the undesirable formation of a bubble cushion.

- VI. In the annex to the summons to oral proceedings, the board drew the parties' attention to points likely to be addressed at the oral proceedings, including questions relating to the sufficiency of disclosure, the relevance of the late filed evidence (appendices A and B), the direct and unambiguous disclosure of D1, and the obviousness of the claimed method.
- VII. By letter dated 19 December 2011, the respondent indicated that it would not attend the oral proceedings.
- VIII. In its letter dated 16 January 2012, the appellant pointed out *inter alia* that Appendix A was published after the priority date of the patent in suit and Appendix B was marked confidential. These two documents thus confirmed the position that the patent did not meet the requirement of Article 83 EPC.
- IX. In a further fax communication sent on 12 March 2012, the board drew the parties' attention to the fact that document D1a was published after the filing date of the US application from which the patent in suit claims the

priority, and that the question may arise whether said claim to priority was valid.

- X. Oral proceedings were held on 14 March 2012 in the absence of the respondent.

At the oral proceedings the appellant maintained its objection under Article 100(b) EPC. However, it expressly no longer maintained that the diameter d_1 of the imploding bubbles could not be determined using available experimental and mathematical methods. Instead, it argued for the first time that a controlled gap width d_2 could not be maintained by the skilled person in view of the oscillations of the wire occurring in paper machines operating at the high speeds (2000 m/min) mentioned in the patent in suit.

As regards novelty, the appellant argued that according to documents D1 and D1a the criterion $d_2 < d_1$ was implicitly met since d_2 was close to almost 0. In this context, it also submitted that D1 (claims 11 and 16) disclosed a "direct contact" between the wire and an energy transmitting "foil" extending across the wire. The claimed method was only giving a more precise, theoretical explanation of what was occurring when operating in accordance with D1.

Like the patent in suit, document D1 also addressed the problem of avoiding re-flocculation in fibre stock on the wire, and the issue of optimizing energy input through the wire and into the stock. D1 taught the skilled person to bring the energy transmitting foil and the wire in very close contact. By proceeding in this obvious manner, a good dispersion of the stock

would be achieved without the formation of a bubble cushion leading to cavitation damage.

XI. The appellant requested that the decision under appeal be set aside and that the patent be revoked in its entirety.

The respondent requested in writing that the appeal be dismissed.

Reasons for the Decision

Admissibility of evidence filed in the appeal proceedings

1. Document D1a

1.1 Document D1a is a published national US patent application claiming priority from the international application (filing number PCT/SE97/00466) that was published as document D1.

1.2 Document D1a was filed by the appellant under cover of its statement of grounds of appeal in order to illustrate the appellant's understanding of the expression "directly below" appearing in document D1. The two documents have essentially the same content, but document D1a comprises an additional drawing sheet illustrating the disclosure.

1.3 The filing of document D1a can be considered as a response to the position adopted by the opposition division in the contested decision, which was taken without holding oral proceedings. The respondent did

not object to the filing of this document and took position on its content.

- 1.4 The board decided to admit document D1a to the proceedings pursuant to Article 12(4) RPBA.
2. The documents labelled "Appendix A" and "Appendix B" were filed by the respondent in support of its argumentation regarding sufficiency of disclosure, and more particularly concerning the enablement of the skilled person to determine the diameter d_1 of the imploding bubbles.

However, the content of these documents is unrelated to the objection under Article 100(b) EPC as maintained by the appellant at the oral proceedings (see point 5 below). The board found the claimed method to be sufficiently disclosed even without taking said two documents into consideration.

Sufficiency of disclosure

3. According to the appellant, the patent in suit did not provide enough information to enable the skilled person to provide a gap meeting the condition recited in claim 1 ($d_2 < d_1$) between the underside of the movable liquid permeable member and the foil which is in operative engagement with the transducer.
4. At the oral proceedings, the appellant expressly no longer maintained its earlier objection, according to which the skilled person was unable to determine the value of d_1 by experimental and/or mathematical methods available to him and, consequently, was unable to

determine the required value of d_2 , i.e. the maximum gap width to be set.

For the board, the earlier objections raised by the appellant under Article 100(b) EPC are not convincing. Since this was no longer in dispute, detailed reasons need not be given.

5. Instead, along a radically different line of argument, the appellant alleged for the first time at the oral proceedings that there was a lack of guidance in the patent in suit insofar as the skilled person would not know how to set and maintain and/or control the required gap width when trying to carry out the claimed method, e.g. when operating a paper machine.

5.1 More particularly, it submitted that a paper machine wire as described in the patent in suit (paragraph [0013] and Figure 7), moving at a speed of 2000 meters per minute around rollers (paragraph [0013] in Figure 7 of the patent) would inevitably oscillate in a direction transverse to the plane of the wire, due to the latter's considerable extension in both horizontal directions. Referring to paragraph [0020] and figures 5, 5A and 5B of the patent in suit, it argued that the gap width between the oscillating wire and the vibrating would generally tend to be close to zero, but could not be set and maintained at a controlled value.

5.2 However, the description of the patent in suit provides guidance as regards the practical implementation of the claimed method. In paragraph [0020], cited by the appellant, several determining factors are mentioned, such as the tension of the wire and the geometry of the

"foil" element, which are responsible for achieving the required gap width. Moreover, in column 4, lines 39 to 42, it is explained that "*when the member 102 is moving over the foil surface 116 a speed dependant under-pressure is created that will force down the member 102 against the foil surface 116*". Hence, the "*permeable medium bears or is pressed against the top surface 116 of the member 122*" (column 5, lines 25 to 25). Examples of suitable designs of the transducer/foil systems are shown in figures 4 to 6.

5.3 Questioned by the board, the appellant's representative could not indicate frequencies and/or amplitudes of said oscillations of the paper machine wires he had in mind. The appellant's objection appears to be based on the assumption that the relative arrangement of the moving wire and the transducer/foil arrangement, as well as the latter's construction, would always and necessarily have to be that unconstrained oscillations of the wire occurred in the region where the wire passes over the foil.

5.4 The above-mentioned allegations of the appellant were not corroborated by any kind of evidence and raised technical questions which were left unanswered. Therefore, assuming purely for the sake of argument and in favour of the appellant that in the present case this new line of argument objection was actually admissible despite its late submission at the oral proceedings without any convincing reason and despite the absence of the respondent (see e.g. decision T 1621/09, points 39 to 45), the board concludes that *prima facie* the appellant has not convincingly shown, although the burden of proof lay on him, that the

skilled person armed with the common general knowledge in the technical field concerned and following instructions given in the patent in suit, was not able to control the gap width d_2 such that it remained smaller than the previously determined diameter of the imploding bubbles d_1 when carrying out a method as claimed.

6. The board thus concludes that the invention as defined in the claims at issue is disclosed in the patent in suit in a manner sufficiently clear and complete to be carried out by a person skilled in the art (Article 100(b) EPC).

Novelty

7. Document D1
 - 7.1 Document D1 discloses (see claims 1 and 2; page 2, lines 12 to 30) the application of ultrasonic energy to the stock of cellulosic fibres moving on the wire of a paper machine, in order to disperse existing flocks and to counteract the re-formation of flocks in the stock on the wire. Ultrasonic energy is transmitted to the stock on the wire in at least one section of the wire, the section being cross-directional to the transport direction of the stock on the wire, by elements which can "transmit energy from one or more generators" at frequencies of preferably 15 to 75 kHz. More particularly, "in order to achieve the best effect", the elements are positioned "directly below the wire..." in proximity of the inlet box of the paper machine, and such that an "optimal ultrasound energy per mass unit of the stock is achieved".

7.2 At the oral proceedings, the appellant additionally pointed out that claim 11 of document D1 refers to a device for carrying out the method according to claim 1 and comprises "ultrasound elements" arranged such as to be "in contact with the inside of the wire loop ... and thus also in contact with the liquid in the stock via the wire and via the mesh interspaces in the wire for transmission of the stock via the wire and directly to the liquid phase via the mesh interspaces". Moreover, according to claim 16 of D11, the "ultrasound elements" may be "integrated with one or some dewatering elements of the type which include formation tables, **foils**, and suction boxes" (emphasis added).

7.3 However, claim 1 at issue expressly requires "*forming a gap defined between the member (102) and the foil (106)*".

7.3.1 In the context of the patent in suit, this feature expresses that a gap is deliberately formed by suitable means, which gap contains liquid for transmitting the ultrasound energy across the medium 102 and into the liquid above the medium. This understanding is in conformity with the description of the patent in suit (see column 4, lines 34 to 39), which illustrates that the liquid filled gap may be formed by designing the front-end of the foil such as to split the liquid under the permeable member into a part going down and "*a minor part is going between the top side of the foil and member 102*", i.e. into said "gap".

7.3.2 At the oral proceedings, the appellant argued that the consecutive features "*imploding bubbles (158) having a diameter d1*" and "*forming a gap*", when read together,

could be understood to mean that a cushion of bubbles was to be achieved. The board does not, however, accept this view, since such an understanding of claim 1 would be in total contradiction with the very teaching of the patent in suit, which aims at avoiding a cushion of bubbles.

7.3.3 As a corollary to the above, the board does not accept, on the one hand, that claim 1 of D1 - when read in combination with claim 11 of D1 requiring "contact", i.e. an interstice having a **width of zero**, between the wire and the ultrasound emitting element, which may be integrated with a "foil" according to claim 16 of D1 - discloses the **formation** of a gap in the sense of claim 1, i.e. having a width which is not zero.

7.3.4 If, on the other hand, it is assumed that a gap having a width close to but not equal to zero will implicitly be formed when putting the teaching of D1 in practice, as the appellant argued in writing, then this document does not disclose the feature according to which the gap width d_2 must be "*less than the diameter d_1 of the bubbles*". D1 neither addresses the formation of a cushion of bubbles on the surface of the ultrasound emitting surface nor a relationship between the gap width and the diameter of the imploding bubbles. Furthermore, D1 does not disclose constructional details permitting to conclude that the condition $d_2 < d_1$ will inevitably be met implicitly by the relative arrangement of the wire and the ultrasound energy emitting element. Under these circumstances, the expression "directly below" is not precise enough either.

8. Document D1a

8.1 Prior art status of document D1a

8.1.1 US patent application D1a was published on 2 May 2002, i.e. after the priority date claimed by the patent in suit (11.12.2001).

8.1.2 However, said claim to priority is not valid, at least because the US application No. 60/339,380 filed 11 December 2001 ("prior US application" hereinafter) does not mention the condition concerning the gap width d_2 as recited in present claim 1, i.e. that the distance d_2 must be "*less than the diameter d_1 of the bubbles*".

More particularly, when referring to the gap between the foil 106 and the medium 102, the prior US application (see page 9, lines 10 to 13) merely identifies the width of the gap as an "important feature" and indicates that said gap must be "less than one half of the critical bubble diameter".

8.1.3 Whereas according to the prior US application the value of the gap width is restricted to "less than one half of the bubble diameter", claim 1 of the patent in suit allows for gap widths up to "less than the bubble diameter d_1 ". The patent in suit thus covers methods wherein said gap width may be greater than one half of the diameter d_1 up to almost the value of d_2 , i.e. methods not disclosed in the prior US application.

Since the prior US application and the patent in suit do not concern the same invention in the sense of

opinion G 0003/93, OJ 1-2/05, 18 (see point 2 of the Conclusion), the board concludes that the priority is not validly claimed.

- 8.1.4 The claim to priority being invalid, the national patent application D1a, published before the effective filing date of the patent in suit 28.11.2002, pertains to the state of the art pursuant to Article 54(2) EPC and can thus be relied upon in the assessment of both novelty and inventive step (see G 0003/93, point 1 of the Conclusion).
- 8.2 Disclosure of document D1a
- 8.2.1 Document D1a (see claims 1, 2, 10 and 15; paragraph [0007] of the description), is very similar in content to document D1, but additionally contains a figure.
- 8.2.2 This figure, including the encircled enlargement, is, however, only schematic in nature and does not show any details regarding the relative arrangement and shape of an energy emitting "foil" and the underside of the wire.
- 8.2.3 Hence, for the board, document D1a including the figure does not provide a more precise disclosure than document D1 with regard to the meaning of the expressions "directly below the wire", "in contact with the inside of the wire" and "in contact with the liquid in the stock via the wire" (see D1a: page 1, right-hand column, line 16; claim 10). The textual content of document D1a is also silent as to the diameter of the collapsing bubbles and the width of the gap upon operation of the paper machine.

9. From the above, the board concludes that none of the two documents relied upon by the appellant discloses, expressly or implicitly, a method with all the features of claim 1 in a direct and unambiguous manner.
10. The subject-matter of claim 1 and, consequently, of claims 2 to 7 dependent thereon, is thus novel (Articles 52(1) and 54(2) EPC).

Inventive step

11. The patent in suit (see e.g. section [0008] of the description and claim 1) relates to a method for applying ultrasonic energy to a liquid or slurry moving by on top of a liquid permeable endless member.

Said method is, for instance, applicable to the treatment of fibre stock on the forming wire in paper manufacturing of a paper machine, in order to reduce flocculation of the stock on the wire (see column 3, line 46; paragraph [0016]; column 4, lines 53 to 55).

12. The board accepts that document D1 can be considered to represent the closest prior art, as submitted by the appellant, since it relates to the treatment of fibre stock moving by on top of a wire loop of a paper machine, using an ultrasound energy emitting element positioned directly below the permeable member. Moreover, document D1 also addresses the deflocculation of the fibre stock as the purpose for the treatment with ultrasound energy.
13. Starting from document D1 or document D1a, the technical problem to be solved by the present invention

can be seen in providing a method of treating a liquid moving by on top of an endless permeable member across ultrasound energy transmitting element arranged below the member whereby the ultrasound energy transportation into the liquid above the member is undisturbed and does not cause cavitation damage to the energy transmitting foil (see e.g. paragraph [0007] of the patent in suit and section IV of the respondent's reply to the statement of grounds of appeal).

14. As a solution to this problem, the patent in suit proposes a method for treating liquid or slurry on an endless, liquid permeable member moved about rollers with ultrasonic energy, which according to claim 1 is characterised in particular in that

*"a transverse foil (106) [is] disposed below the member and extending across the member (102) and a transducer (108), in operative engagement with the foil (106);
...;*

the transducer (108) generating pressure pulses into the foil (106) to form imploding bubbles (158) in the liquid (156) disposed above the member (102), the imploding bubbles (158) having a diameter d_1 forming a gap (155) defined between the member (102) and the foil (106), the gap (155) representing a distance d_2 the distance d_2 being less than the diameter d_1 of the bubbles (158) to prevent any bubbles (158) to grow to the diameter d_1 in the gap (155)."

15. It was not disputed and it is plausible that by adopting these measures, the formation of a cushion of gas bubbles on the surface of the energy transmitting foil and the resulting cavitation damage and poor

transmission of energy across the permeable member can reliably be avoided even in case ultrasound of very high energy has to be generated in order to form imploding bubbles in the liquid moving at high speed.

16. Hence, it remains to be assessed whether or not the claimed solution to the stated technical problem is obvious in the light of the prior art.

17. As pointed out by the appellant, D1 (page 2, lines 20 to 27) recommends positioning the ultrasound energy transmitting elements "directly below the wire" in order to "achieve the best effect" or an "optimal effect, i.e. optimal ultrasound energy per mass unit of stock (suspension of fibres/fillers)". Moreover, D1 (see claim 11) also discloses that the "elements which transmit the ultrasound energy to the stock are arranged in a wire loop in contact with the inside of the wire in the loop in the area of the distribution of the stock and thus also in contact with the liquid in the stock via the wire and via the mesh interspaces in the wire for transmission of the ultrasound energy to the stock via the wire and directly to the liquid phase via the mesh interspaces".
 - 17.1 However, as already mentioned under point 7.3.4 above, document D1 does not pay any particular attention to what phenomena are occurring in the interstice between the surface of the ultrasound transmitting element and the side of the wire facing it.

 - 17.2 Without the benefit of hindsight, the skilled person aiming to solve the stated technical problem, was not induced by either document D1 or document D1a to have a

closer look at said phenomena and thus had no particular reason to adopt measures for avoiding the formation of a cushion of bubbles on the surface of the energy emitting foil, let alone to set a gap width d_2 of less than the diameter of the imploding bubbles.

18. The board concludes that the subject-matter of claim 1 and, consequently, of claims 2 to 7 dependent thereon, also involves an inventive step (Articles 52(1) and 56 EPC).

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar

The Chairman

C. Vodz

G. Raths