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D E C I S I O N
of 29 May 2002

Case Number: T 0117/01 - 3.2.2

Application Number: 93904699.1

Publication Number: 0627897

IPC: A61B 17/22

Language of the proceedings: EN

Title of invention:
ULTRASONIC TRANSMISSION APPARATUS

Applicant:
ANGIOSONICS INC.

Opponent:

-

Headword:

-

Relevant legal provisions:
EPC Art. 52(1), 54, 56, 84

Keyword:
"Novelty (yes)"
"Inventive step (no)"
"Clarity (yes)"

Decisions cited:

-

Catchword:

-



Case Number: T 0117/01 - 3.2.2

D E C I S I O N
of the Technical Board of Appeal 3.2.2
of 29 May 2002

Appellant: ANGIOSONICS INC.
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Representative: VOSSIUS & PARTNER
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Decision under appeal: Decision of the Examining Division of the
European Patent Office posted 23 August 2000
refusing European patent application
No. 93 904 699.1 pursuant to Article 97(1) EPC.

Composition of the Board:

Chairman: W. D. Weiß
Members: S. S. Chowdhury
U. J. Tronser

Summary of Facts and Submissions

I. This appeal is against the decision of the examining division dated 23 August 2000 to refuse European patent application No. 93 904 699.1.

The ground of refusal was that there was no version approved by the applicant in the sense of Article 113(2) EPC, on which a patent could be granted.

During the examination procedure the examining division had cited the following documents under Article 52(1) EPC.

D1: WO-A-9211815

D2: DE-A-2 606 997

D3: WO-A-9308750

Documents D1 and D3 were cited under Article 54(3) EPC as novelty destroying for some claims.

The Board has also considered the following document:

D0: US-A-4 870 953

II. On 2 November 2000 the appellant (applicant) lodged an appeal against the decision and paid the prescribed fee. On 2 January 2001 a statement of grounds of appeal was filed.

III. Oral proceedings were held on 29 May 2002, at the end of which the appellant requested that the decision under appeal be set aside and that a patent be granted

on the basis of claims 1 to 11 submitted at the oral proceedings.

IV. Independent claim 1 reads as follows:

"An ultrasonic angioplasty tip (18) for causing cavitation in a fluid upon application of ultrasound energy from an ultrasonic transmission apparatus driven for longitudinal, reciprocating displacement, comprising a proximal portion (68) connectable to an ultrasonic transmitter, a distal portion (66) and an intermediate portion (70) connecting said proximal and distal portions, the proximal and distal portions having respective diameters, and the intermediate portion (70) having a thickness smaller than the diameter of each of said proximal and distal portions (68 and 66, respectively), said proximal, distal and intermediate portions having a common longitudinal axis (102), wherein a first and a second cavitation-inducing surface (72 and 78, respectively) are formed at the intersection of the intermediate portion (70) with each of the proximal (68) and distal (66) portions, respectively, said first (72) and second (78) cavitation-inducing surfaces being perpendicular to the longitudinal axis (102), and facing each other."

V. The appellant argued as follows:

The claimed ultrasonic angioplasty tip was novel since none of documents D1 to D3 taught increasing the surface area of the tip to induce greater cavitation, using surfaces perpendicular to the longitudinal axis of the tip.

The claimed tip also involved an inventive step since

the facing cavitation-inducing surfaces as defined in claim 1 vibrated longitudinally to generate a suction force in the radial direction, that caused a thrombus to be drawn towards the tip. This effect was not known in the prior art.

Reasons for the Decision

1. The appeal is admissible since it complies with the provisions mentioned in Rule 65(1) EPC.

2. *Amendments*

2.1 The amendments to the claims are such that they are allowable under Article 123(2) EPC since they are supported by the application as originally filed. In particular claim 1 is based on claim 51 of the application as originally filed, and has further features that specify that the claimed tip is for treating angioplasty by causing cavitation, and constructional details of the tip, all of which were disclosed in the original application.

3. *Clarity*

The examining division had objected to the use of the expressions "mushroom-shaped" and "reverse mushroom-shaped", but these no longer feature in the claims. Similarly, the expression "cavity-inducing surface" was considered by the examining division as being objectionable since it appeared to be a definition by result.

In fact, the cavitation is achieved by propagating an ultrasonic wave of appropriate frequency and amplitude down

a transmitter 14 to the tip 18, so that the expression cavity-inducing surface simply describes what the surface causes when appropriately energised. The configuration of the surfaces 72 and 78 as defined in claim 1 is responsible for achieving an effect described below (see point 4.3) and, all in all, the claim clearly defines constructional features necessary for attaining the desired effects, and is clear in this respect.

4. *Novelty*

Claim 1 specifies that the tip has first and second cavitation-inducing surfaces that are perpendicular to the longitudinal axis of the tip and facing each other. These features are not found in either of documents D1 or D3. The tips shown in Figures 14 to 14b of document D1 have a rounded end subdivided into proximal and distal portions by a groove, but the groove does not have facing surfaces perpendicular to the longitudinal axis of the tip. The tip 22 shown in Figures 2 to 5 of document D3 has a rounded, conical, or frustro-conical depression 41 that separates proximal and distal portions of the tip, but again the depression does not have facing surfaces perpendicular to the longitudinal axis of the tip.

Document D2 describes an ultrasonic velocity transformer which comprises a stepped concentrator having a tip that has proximal and distal portions connected together by a reduced diameter portion. However this is not an ultrasonic angioplasty tip, which term has implications regarding the diameter of the device and its material, which must be biocompatible. The transformer of document D2 is for industrial processes such as cleaning, homogenising, welding, dispersion, etc. (see the paragraph linking pages 3 and 4) and not for medical use, nor is it said to

be small enough for use in angioplasty.

5. *Inventive step*

5.1 The closest prior art is document D0 which describes apparatus for treating atherosclerotic plaque, including a solid wire probe having a rounded tip that is ultrasonically excited to break up plaque by both a chipping or beating action as well as by cavitation (see column 5, line 67 to column 6, line 6).

5.2 A problem with such a device is that the plaque may break away from the wall of the blood vessel and then become free to cause an obstruction at another point of the vascular system.

5.3 The solution to this problem lies in the configuration of the claimed tip, whereby the first and second cavitation-inducing surfaces are perpendicular to the longitudinal axis of the tip and face each other.

As the appellant's representative explained at the oral proceedings, the mechanism that is exploited to solve the problem is that the facing surfaces not only induce cavitation to destroy a thrombus, but their longitudinal vibration causes a suction force to be generated in the radial direction to draw the thrombus towards the tip, as reported in the application on page 32, for example. The thrombus is then confined by the tip and is not free to cause problems elsewhere.

5.4 None of the prior art documents on file discloses either the above problem, or the tip configuration claimed. In particular not only is the apparatus of document D2 not for medical use, but also does not actively exploit the

cavitation effect, nor does it deal with the problem of loose thrombus or other debris.

5.5 Therefore, the tip of claim 1 involves an inventive step.

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 grant a patent with claims 1 to 11 in the form submitted at the oral proceedings and the description and figures still to be adapted.

The Registrar:

The Chairman:

V. Commare

W. D. Weiß