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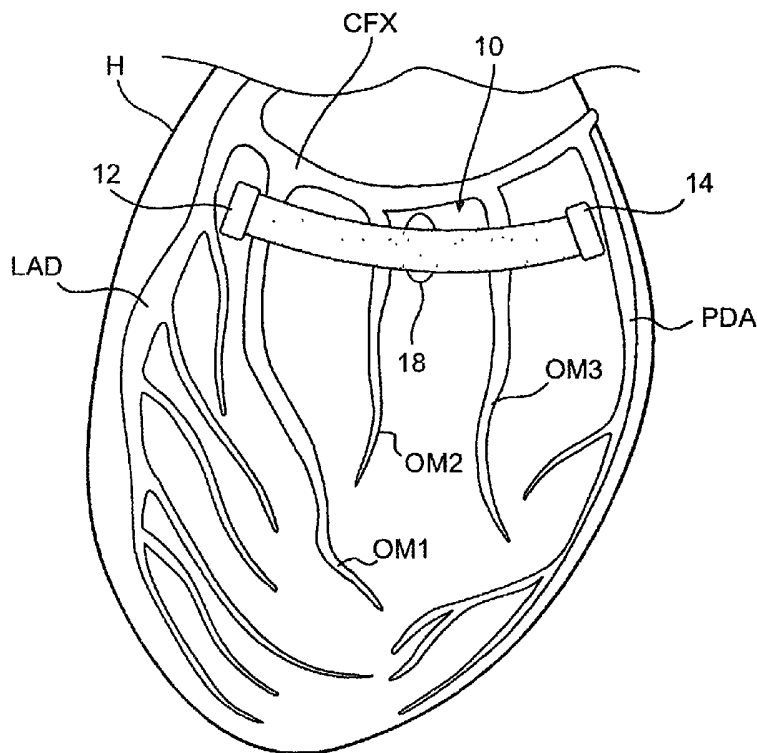
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[Continued on next page]

(54) Title: DEVICES AND METHODS FOR HEART VALVE TREATMENT



(57) Abstract: Devices and methods for improving the function of a valve (e.g., mitral valve) by positioning an implantable device outside and adjacent the heart wall such that the device alters the shape of the heart wall acting on the valve. The implantable device may alter the shape of the heart wall acting on the valve by applying an inward force and/or by circumferential shortening (cinching). The shape change of the heart wall acting on the valve is sufficient to change the function of the valve, and may increase coaptation of the leaflets, for example, to reduce regurgitation.



(81) **Designated States (national):** AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

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SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 03/35037

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A61B17/00 A61B17/04

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 A61B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 02/30292 A (SCHROEDER RICHARD F ;SCHWEICH CYRIL J JR (US); MORTIER TODD J (US)) 18 April 2002 (2002-04-18)	1-8, 10-30, 35,38, 39,42, 47-58, 71-73, 90,92-97
A	page 19, line 18 - page 21, line 21 figures 5A,5B ----- -/--	9,31-34, 37,59, 74-85

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier document but published on or after the international filing date
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"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
"&" document member of the same patent family

Date of the actual completion of the international search

5 March 2004

Date of mailing of the international search report

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INTERNATIONAL SEARCH REPORT

International Application No.
PCT/US 03/35037

C. (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 406 420 B1 (SCHWEICH JR CYRIL J ET AL) 18 June 2002 (2002-06-18)	1-8, 10-30, 35,38, 39,42, 47-58, 71-73, 90,92-97
A	column 24, line 47 - line 65 column 26, line 4 - line 27 figures 45,48A,48B	9,31-34, 37,59, 74-85
X	----- US 2002/161275 A1 (MORTIER TODD J ET AL) 31 October 2002 (2002-10-31)	1-8, 10-30, 35,38, 39,42, 47-58, 71-73, 90,92-97
A	page 6, paragraph 83 - paragraph 85 page 6, paragraph 92 - paragraph 93 page 8, paragraph 113 - paragraph 114 figures 10,11,16,17,33,34	9,31-34, 37,59, 74-85
A	----- US 6 183 411 B1 (SCHWEICH JR CYRIL J ET AL) 6 February 2001 (2001-02-06) column 6, line 65 - column 7, line 52 figures 11-16 -----	1-35, 37-39, 42, 47-59, 71-85, 90-97

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 03/35037

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-35, 37-39, 42, 47-59, 71-85, 90-97

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-35,37-39,42,47-59,71-85,90-97

Device to be placed on the outer wall of the heart to alter heart valve function, the device having a first and second anchor, said anchors being linked by an interconnecting member, said interconnecting member having a protrusion to exert an inward force on the heart wall. The protrusion being expandable so that the amount of inward force applied can be varied.

2. claims: 23,36,40,41,71,86-89

Device to be placed on the outer wall of the heart to alter heart valve function, the device having a first and second anchor, said anchors being linked by an interconnecting member, said interconnecting member having a plurality of protrusions to exert an inward force on the heart wall. The number of protrusions being changeable and the protrusions being movable so that the force can be applied at several previce locations on the heart wall.

3. claims: 23,43-46

Device to be placed on the outer wall of the heart to alter heart valve function, the device having a first and second anchor, said anchors being linked by an interconnecting member, said interconnecting member having a protrusion to exert an inward force on the heart wall. The protrusion being rotatable from a low profile configuration to a larger profile deployed configuration so that the device can be easily delivery by catheter.

4. claims: 60-62

Pin with an associated multifilament material, said pin being barbed such that it cannot be withdrawn once inserted in tissue.

5. claims: 63-66,114,115

Delivery catheter for delivering an implant into the body.

6. claim: 67

Tensioning device to tension an elongated member.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

7. claims: 68-70

Device for accessing the pericardial space.

8. claims: 98-101,116,117

Device to exert inward force on the external wall of the heart.

9. claims: 102-113,118

Device comprising an elongated member with means to anchor said elongated member to the wall of the heart.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 03/35037

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