



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification⁶ : A61M 37/00</p>	<p>A3</p>	<p>(11) International Publication Number: WO 95/04556 (43) International Publication Date: 16 February 1995 (16.02.95)</p>
<p>(21) International Application Number: PCT/US94/08456 (22) International Filing Date: 28 July 1994 (28.07.94) (30) Priority Data: 08/098,205 28 July 1993 (28.07.93) US (60) Parent Application or Grant (63) Related by Continuation US 08/098,205 (CON) Filed on 28 July 1993 (28.07.93) (71) Applicant (for all designated States except US): ACTIVE CONTROL EXPERTS, INC. [US/US]; 215 First Street, Cambridge, MA 02142 (US). (72) Inventors; and (75) Inventors/Applicants (for US only): LAZARUS, Kenneth, B. [US/US]; 197 Beacon Street #2F, Boston, MA 02116 (US). CRAWLEY, Edward, F. [US/US]; 49B Dana Street, Cambridge, MA 02138 (US). FISH, Richard, David [US/US]; 6349 Vanderbilt Avenue, Houston, TX 77005 (US). (74) Agents: FALKOFF, Michael, I. et al.; Lahive & Cockfield, 60 State Street, Boston, MA 02109 (US).</p>		<p>(81) Designated States: AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, ES, FI, GB, GE, HU, JP, KE, KG, KP, KR, KZ, LK, LT, LU, LV, MD, MG, MN, MW, NL, NO, NZ, PL, PT, RO, RU, SD, SE, SI, SK, TJ, TT, UA, US, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG), ARIPO patent (KE, MW, SD). Published <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i> (88) Date of publication of the international search report: 20 April 1995 (20.04.95)</p>
<p>(54) Title: REMOTELY STEERED CATHETERIZATION DEVICE</p>		
<p>(57) Abstract</p> <p>A remotely steerable guide wire, catheter or insertable active implement (10) is disclosed. A steerable guide wire or a catheter for coronary and peripheral catheterizations is illustrated, using electro-strictive or piezoelectric material for controlling its motions inside the body via control inputs (18) applied from outside the body. A steerable portion of the device, which may be either an active flexible tip (16) or an active region (14) along the length of the implement, controls the tip position or modifies stiffness along a region of the tip. In one embodiment, manipulation of electrical control inputs permits deflection of the steerable region through a range of motion about the axis of the implement in a single plane. In further embodiments the tip may deflect in multiple planes about its longitudinal axis, or the device may be selectively stiffened to assume an arc shape or to firmly lodge the tip in position in a vessel.</p>		

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US94/08456

A. CLASSIFICATION OF SUBJECT MATTER
 IPC(6) :A61M 37/00
 US CL :604/95
 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)
 U.S. : 29/29.34; 128/657, 772; 310/311/ 361/225; 604/53, 95, 281

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
 NONE

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
 APS
 Searched: catheter, guide wire, piezoelectric, electrical conductor, strain element, steering, actuator, polymer.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X, P	US, A, 5,281,213 (MILDER ET AL.) 25 January 1994. Note line 56 of column 4 through line 15 of column 5.	1-3, 6, 11, 12, 15, 17-19
X --- Y	US, A, 4,799,474 (UEDA) 24 January 1989. Note the strain element means (44A) and (44B) that are connected to the electrical conduction means (32)(34).	1-3, 11, 13-15, 18, 19 ----- 20-23
X --- Y	US, A, 4,944,727 (MCCOY) 31 July 1990. Note the strain element means (20) that are connected to the electrical conduction means (40).	1-3, 11, 13-15, 17, 19 ----- 20-23

Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:	"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
"A" document defining the general state of the art which is not considered to be part of particular relevance	"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
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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&" document member of the same patent family
"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	

Date of the actual completion of the international search 07 MARCH 1995	Date of mailing of the international search report 20 MAR 1995
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Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer <i>Stacia Simcik</i> BRYAN L. TSOSIE Telephone No. (703) 308-3175
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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US94/08456

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, A, 4,984,581 (STICE) 15 January 1991. Note strain element means (12) and electrical conduction means (30).	1-3, 11, 15, 17, 19

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US94/08456

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

This international 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:

Please See Extra 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.:

Remark on Protest

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

No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US94/08456

BOX II. OBSERVATIONS WHERE UNITY OF INVENTION WAS LACKING

This ISA found multiple inventions as follows:

Group I, claims 1-19, drawn to an apparatus.

Group II, claims 20-23, drawn to a method of making a component of the apparatus.

Groups I and II do not relate to a single inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reason:

Group I, the component of this group could be made by any known method, and it is clearly not limited to the method of Group II.