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(54) Title: ROTATIONAL ATHERECTOMY DEVICE WITH DISTAL PROTECTION CAPABILITY AND METHOD OF USE

(57) Abstract: A rotational device for removing a stenotic lesion from within a vessel of a patient is disclosed. The device comprises a flexible hollow drive shaft having a distal end insertable into the vessel and an abrasive element located on the drive shaft proximal to the distal end of the drive shaft to abrade a stenotic lesion when the drive shaft rotates. The hollow drive shaft defines a lumen for fluid supplied into the drive shaft to flow in an antegrade direction along the lumen and into the vessel from the drive shaft distal to the abrasive element so that the fluid entering the vessel flows in a retrograde direction over the abrasive element and the drive shaft to entrain debris abraded by the abrasive element for removal of said debris from the patient.



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## INTERNATIONAL SEARCH REPORT

International application No

PCT/IB2006/001368

## A. CLASSIFICATION OF SUBJECT MATTER

INV. A61B17/22

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)

A61B A61M

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, WPI Data

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2002/099367 A1 (GUO ZIHONG [US] ET AL) 25 July 2002 (2002-07-25)	1-24, 36, 37
Y	paragraph [0020] - paragraph [0022] paragraph [0028] paragraph [0030]	25-35, 38
A		39
X	WO 98/50101 A (APPLIED MED RESOURCES [US]; HART CHARLES C [US]; CHI SING EDUARDO [US]) 12 November 1998 (1998-11-12) page 6, line 21 - line 26 page 13, line 17 - page 14, line 7	100-103, 107
Y	US 2002/007190 A1 (WULFMAN EDWARD I [US] ET AL WULFMAN EDWARD I [US] ET AL) 17 January 2002 (2002-01-17) paragraph [0081] paragraph [0106]	25-35, 38
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 Further documents are listed in the continuation of Box C. See patent family 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

\*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)

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\*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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\*&amp;\* document member of the same patent family

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2003/199889 A1 (KANZ BILL [US] ET AL) 23 October 2003 (2003-10-23) paragraph [0052] -----	44,108

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/IB2006/001368

## Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 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 No. III Observations where unity of invention is lacking (Continuation of item 3 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 allsearchable claims.
2.  As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
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.:  
  
1-50, 100-116
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 and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- 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: 1-38

A rotational atherectomy device directed to a fluid impervious membrane to prevent transmission of fluid out from the drive shaft.

2. claims: 39-43,100-107

A rotational atherectomy device directed to support elements for guiding the abrasive element.

3. claims: 44-50,108-116

A rotational atherectomy device directed to the geometry of the abrasive element for enhancing tissue removal.

4. claims: 51-55,80-87

A rotational atherectomy device directed to a bearing support housing for actuating and controlling the drive shaft.

5. claims: 56-79,88-93

A rotational atherectomy device directed to a flushing fluid supply tube for supplying the device with pressurised fluid.

6. claims: 94-99

A rotational atherectomy device directed to a non-circular cross-section of the drive-shaft for preventing rotation of the abrasive element relative to the drive shaft.

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2006/001368

Patent document cited in search report	A1	Publication date	Patent family member(s)	Publication date
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