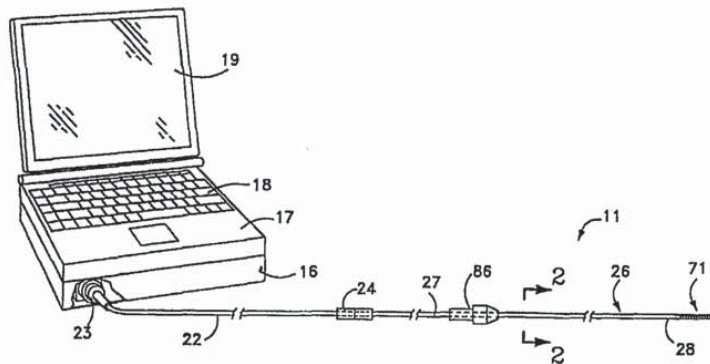




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification ⁶ : A61B 8/00</p>	<p>A1</p>	<p>(11) International Publication Number: WO 00/35349 (43) International Publication Date: 22 June 2000 (22.06.00)</p>
<p>(21) International Application Number: PCT/US99/30126 (22) International Filing Date: 16 December 1999 (16.12.99) (30) Priority Data: 09/216,628 16 December 1998 (16.12.98) US (71) Applicant: FOX HOLLOW TECHNOLOGIES, INC. [US/US]; 3355 Edison Way, Menlo Park, CA 94025 (US). (72) Inventors: ORMSBY, Theodore, C.; 2357 Dubois Street, Milpitas, CA 95035 (US). VAN BLADEL, Kevin, H.; 1407 Carlisle Drive, San Mateo, CA 94402 (US). IMRAN, Mir, A.; 26641 Laurel Lane, Los Altos, CA 94025 (US). (74) Agents: HOHBACH, Harold, C. et al.; Flehr, Hohbach, Test, Albritton & Herbert LLP, 4 Embarcadero Center, Suite 3400, San Francisco, CA 94111-4187 (US).</p>	<p>(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, 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, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).</p> <p>Published <i>With international search report.</i></p>	

(54) Title: GUIDEWIRE HAVING SIDEWISE LOOKING IMAGING CAPABILITIES AND METHOD



(57) Abstract

This invention is a guidewire (11) having sidewise ultrasonic imaging capabilities for deployment across a complex lesion in a vessel formed by a wall comprising of flexible elongate tubular member (26) having proximal, distal extremities, and having a lumen (29) extending from the proximal extremity (27) to the distal extremity (28). The proximal extremity (27) of the flexible elongate tubular member (26) is adapted to be grasped by the human hand for rotating the flexible elongate tubular member (26). A sidewise looking ultrasonic transducer (46) is carried by the distal extremity (28) of the flexible elongate tubular member (26), and is mounted therein for rotational movement as the proximal extremity (27) of the flexible elongate tubular member (26) is rotated. Electrical conductors (56) are connected to the ultrasonic transducer (46), and extend to the proximal extremity (27). A flexible coil is secured to the distal extremity (28) of the flexible elongate tubular member (26) to provide a floppy tip (71).

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece	ML	Mali	TR	Turkey
BG	Bulgaria	HU	Hungary	MN	Mongolia	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MR	Mauritania	UA	Ukraine
BR	Brazil	IL	Israel	MW	Malawi	UG	Uganda
BY	Belarus	IS	Iceland	MX	Mexico	US	United States of America
CA	Canada	IT	Italy	NE	Niger	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NL	Netherlands	VN	Viet Nam
CG	Congo	KE	Kenya	NO	Norway	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NZ	New Zealand	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	PL	Poland		
CM	Cameroon	KR	Republic of Korea	PT	Portugal		
CN	China	KZ	Kazakstan	RO	Romania		
CU	Cuba	LC	Saint Lucia	RU	Russian Federation		
CZ	Czech Republic	LI	Liechtenstein	SD	Sudan		
DE	Germany	LK	Sri Lanka	SE	Sweden		
DK	Denmark	LR	Liberia	SG	Singapore		
EE	Estonia						

GUIDEWIRE HAVING SIDEWISE LOOKING
IMAGING CAPABILITIES AND METHOD

Inventors: Theodore C. Ormsby
Kevin H. Van Bladel
Mir A. Imran

This invention relates to a guidewire having sidewise looking imaging capabilities with over the wire catheters.

Guidewires with imaging capabilities have heretofore been provided as for example in U.S. Patent No. 5,558,093. Such
5 guidewires have utilized an ultrasonic transducer assembly, at least a part of which must be rotated independent of rotation of the guidewire. The provision of such independent rotational capabilities has made it difficult to provide guidewires which have a sufficiently small diameter so that they can be readily
10 used in small vessels as for example arterial vessels in the heart. There is therefore a need for a new and improved guidewire which overcomes these deficiencies.

In general, it is an object of the present invention to provide a guidewire having sidewise looking capabilities which
15 can be utilized in manufacture of small diameter guidewires to permit use of the same in a method for treatment of stenoses in small vessels with over-the-wire catheters.

Another object of the invention is to provide a guidewire of the above character which has a small profile in cross-
20 section from the proximal extremity to the distal extremity.

Another object of the invention is to provide a guidewire of the above character which has a flexible tip which can function in the same manner as the flexible tip of conventional guidewires and which can have the same feel as the flexible tips
25 of conventional guidewires.

Another object of the invention is to provide a guidewire of the above character which can be economically manufactured.

Another object of the invention is to provide a guidewire of the above character which has good torque transmission while
30 retaining flexibility and kink resistance.

Another object of the invention is to provide a guidewire of the above character in which more than one ultrasonic transducer is utilized.

Another object of the invention is to provide a guidewire
5 of the above character in which a plurality of ultrasonic transducers are provided which are spaced apart circumferentially.

Another object of the invention is to provide a guidewire of the above character in which the transducers are spaced apart
10 longitudinally.

Another object of the invention is to provide a guidewire of the above character in which the provision of the ultrasonic transducer in the guidewire does not substantially interfere with the flexibility and feel of the flexible tip of the
15 guidewire.

Additional objects and features of the invention will appear from the following description in which the preferred embodiments are set forth in detail in conjunction with the accompanying drawings.

Figure 1 is a side elevational view of a guidewire incorporating the present invention coupled into a conventional computer and ultrasonic power supply and receiver.

Figure 2 is a cross-sectional view taken along a line 2-2 of Figure 1.

Figure 3 is an enlarged cross-sectional view of the distal extremity of the guidewire shown in Figure 1.

Figure 4 is a cross-sectional view of the distal extremity of another embodiment of a guidewire incorporating the present invention.

Figure 5 is a cross-sectional view of the distal extremity of still another embodiment of a guidewire of the present invention.

Figure 6 is a cross-sectional view taken along the line 6-6 of Figure 5.

Figure 7 is a cross-sectional view taken along the line 7-7 of Figure 5.

In general, a guidewire is provided which has sidewise ultrasonic imaging capabilities for deployment across a complex lesion in a vessel formed by a wall and normally having a lumen extending therethrough and for use with over-the-wire catheters. A flexible elongate tubular member is provided which has proximal and distal extremities and has a lumen extending from the proximal extremity to the distal extremity. Means is carried by the proximal extremity of the flexible elongate tubular member adapted to be grasped by the human hand for rotating the flexible elongate tubular member. A sidewise looking ultrasonic transducer is carried by the distal extremity of the flexible elongate tubular member and is mounted thereon for rotational movement therewith as the guidewire is rotated. Electrical conductors are provided within the lumen of the flexible elongate tubular member and are utilized for supplying electrical energy to the ultrasonic transducer and for receiving electrical energy from the ultrasonic transducer. A flexible coil is secured to the distal extremity of the flexible elongate tubular member.

More in particular as shown in Figure 1 of the drawings, the sidewise looking ultrasonic imaging guidewire 11 of the present invention is coupled to an ultrasonic power supply 16 which has associated therewith a notebook or laptop computer 17 of a conventional type which is provided with a keyboard 18 and a screen 19 in the form of an LCD panel. The proximal extremity of the guidewire 11 is coupled into the ultrasonic power supply 16 and the computer 17 through a coupling assembly 21 through an electrical cable 22 to a conventional shaft encoder 23 mounted in the ultrasonic power supply 16 and the computer 17.

The guidewire 11 consists of a flexible elongate tubular member 26 having proximal and distal extremities 27 and 28 and having a lumen 29 extending therethrough from the proximal

Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.