



US005980486A

**United States Patent** [19]  
**Enger**

[11] **Patent Number:** **5,980,486**  
[45] **Date of Patent:** **Nov. 9, 1999**

- [54] **RAPIDLY EXCHANGEABLE CORONARY CATHETER**
- [75] Inventor: **Christine D. Enger**, Tenafly, N.J.
- [73] Assignee: **Arterial Vascular Engineering, Inc.**, Santa Rosa, Calif.
- [21] Appl. No.: **08/095,036**
- [22] Filed: **Jul. 20, 1993**

**Related U.S. Application Data**

- [63] Continuation of application No. 07/999,589, Dec. 30, 1992, abandoned, which is a continuation of application No. 07/759,107, Sep. 6, 1991, abandoned, which is a continuation of application No. 07/618,531, Nov. 26, 1990, abandoned, which is a continuation of application No. 07/303,803, Jan. 30, 1989, abandoned.
- [51] **Int. Cl.<sup>6</sup>** ..... **A61M 29/00**
- [52] **U.S. Cl.** ..... **604/102; 604/96; 606/194**
- [58] **Field of Search** ..... 604/96-103, 51, 604/54, 164, 171; 606/192, 194

**References Cited**

**U.S. PATENT DOCUMENTS**

- 871,474 11/1907 Buckner ..... 604/102
- 2,024,301 12/1935 Norwood ..... 128/344

(List continued on next page.)

**FOREIGN PATENT DOCUMENTS**

- 0274129A2 7/1988 European Pat. Off. .
- 0397357 11/1990 European Pat. Off. .
- 2340078 10/1977 France .
- WO 8603129 6/1986 WIPO .
- WO 8803422 5/1988 WIPO .

**OTHER PUBLICATIONS**

- Werns, "Review of Hardware for PTCA", *Journal of Interventional Cardiology*, vol. 1, No. 3, 1988, pp. 209-219.
- Thomas et al., "Efficacy of a New Angioplasty Catheter for Severely Narrowed Coronary Lesions", *Journal of the American College of Cardiology*, vol. 12, pp. 694-702.

- Meier, "Coronary Angioplasty", 1987, pp. 13-15.
- Myler et al., "The Balloon on a Wire Device: A New Ultra-Low-Profile Coronary Angioplasty System/Concept", *Catheterisation and Cardiovascular Diagnosis*, vol. 14, 1988, pp. 135-140.
- Brochure for Bard "Probe" PTCA Dilatation System, 1987.
- Brochure for SciMed "Ace" fixed-wire PTCA catheter, Dec. 1988.

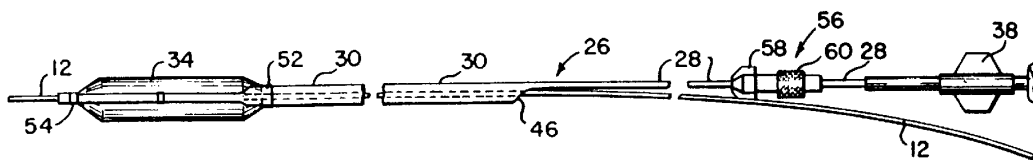
(List continued on next page.)

*Primary Examiner*—Corrine McDermott  
*Attorney, Agent, or Firm*—Richard L. Klein, Esq.

[57] **ABSTRACT**

A rapidly exchangeable catheter for use in the coronary arteries includes an elongate relatively stiff proximal segment that defines an inflation lumen, an intermediate, shorter segment formed from a more flexible plastic material and having two lumens, and a third, single lumen distal segment. A balloon or other instrumentality adapted to operate in a coronary artery is mounted to the distal region of the catheter. The intermediate and distal segments include a guidewire lumen by which the catheter may be advanced along a guidewire. The proximal segment may include an inflation lumen when the operating instrumentality at the distal end of the catheter is a balloon. The intermediate and distal segments of the catheter are of a length of between about 35 to 45 cm such that when the catheter is advanced into the most remote distal portions of the coronary anatomy, the flexible plastic intermediate and distal segments will extend over the aortic arch of the patient thereby containing the guidewire over the aortic arch and maintaining the juncture of the relatively stiff proximal segment and the more flexible intermediate segment proximally of the aortic arch. The relatively stiff proximal section thus extends generally along a straight line from the femoral artery into the descending aorta but not so far as into the aortic arch. Buckling of the catheter is avoided so that the catheter is more easily manipulated.

**28 Claims, 3 Drawing Sheets**



## U.S. PATENT DOCUMENTS

2,930,377	3/1960	Cowley .		4,846,174	7/1989	Willard et al. ....	128/344
3,769,981	11/1973	McWhortes .....	604/96	4,877,031	10/1989	Conway et al. ....	606/194
4,055,682	10/1977	Merrill .....	427/2	4,892,519	1/1990	Songer et al. .	
4,173,981	11/1979	Mortenson .....	604/282	4,943,278	7/1990	Euteneuer et al. .	
4,195,637	4/1980	Grüntzog et al. ....	128/348	4,988,356	1/1991	Crittenden .	
4,328,806	5/1982	Coopes .....	604/99	4,998,923	3/1991	Samson et al. ....	606/194
4,402,307	9/1983	Hanson et al. .		5,024,234	6/1991	Leary et al. .	
4,490,421	12/1984	Levy .		5,040,548	8/1991	Yock .	
4,545,390	10/1985	Leary .		5,046,503	9/1991	Schneiderman .	
4,581,017	4/1986	Sahota .....	604/101	5,061,273	10/1991	Yock .	
4,616,652	10/1986	Simpson .....	128/344	5,102,403	4/1992	Alt .	
4,616,653	10/1986	Samson et al. .		5,154,725	10/1992	Leopold .	
4,652,258	3/1987	Drach .....	604/53				
4,655,748	4/1987	Mushika .....	604/96				
4,748,982	6/1988	Horzewski et al. ....	128/344				
4,762,129	8/1988	Bojzel .....	128/344				
4,771,777	9/1988	Horzewski et al. ....	128/344				
4,775,371	10/1988	Mueller, Jr. ....	604/280				
4,798,193	1/1989	Giesy et al. ....	128/7				
4,813,930	3/1989	Elliot .....	604/53				
4,820,271	4/1989	Deutsch .....	604/99				
4,824,435	4/1989	Giesy et al. ....	604/49				
4,827,941	5/1989	Taylor et al. ....	128/657				

## OTHER PUBLICATIONS

Catalogue for Schneider–Shiley Monorail Bonzel Coronary Dilatation System, Oct. 1988.

Brochure for Schneider Monorail™–Plccolino catheter, Oct. 1988.

Finci et al., “Clinical Experience with the Monorail Balloon Catheter for Coronary Angioplasty”, *Catheterisation and Cardiovascular Diagnosis*, vol. 14, 1988 pp. 206–212.

Brochure for ACS Hartzler™ LPS© Dilatation catheter, 1985.

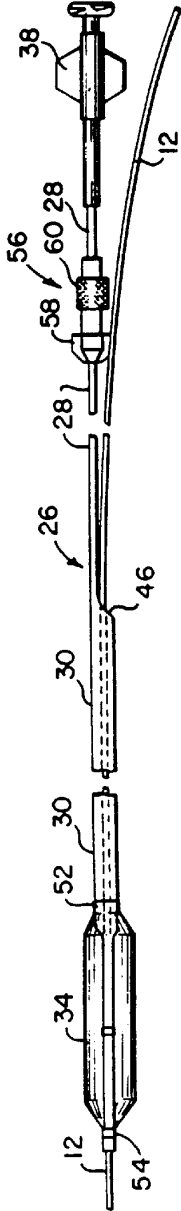


Fig. 1

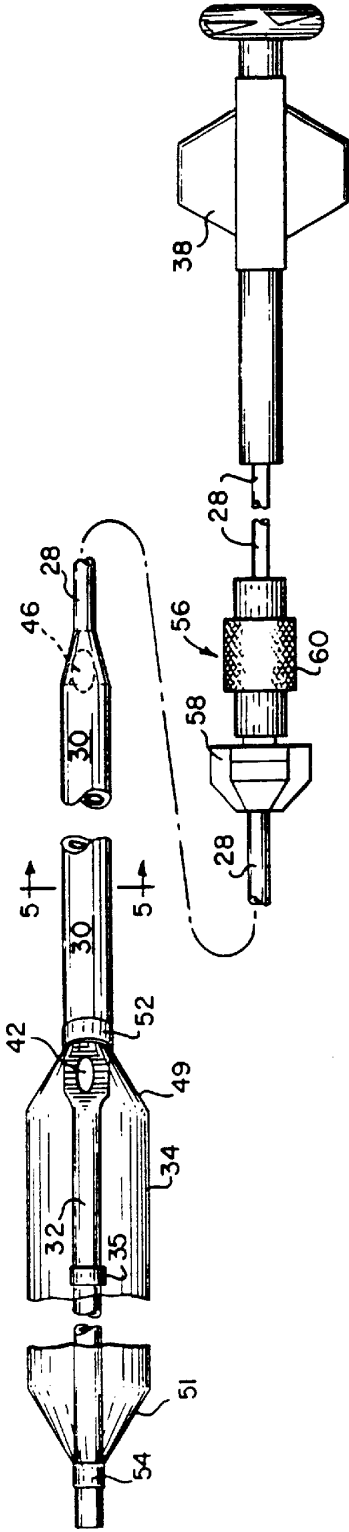


Fig. 2

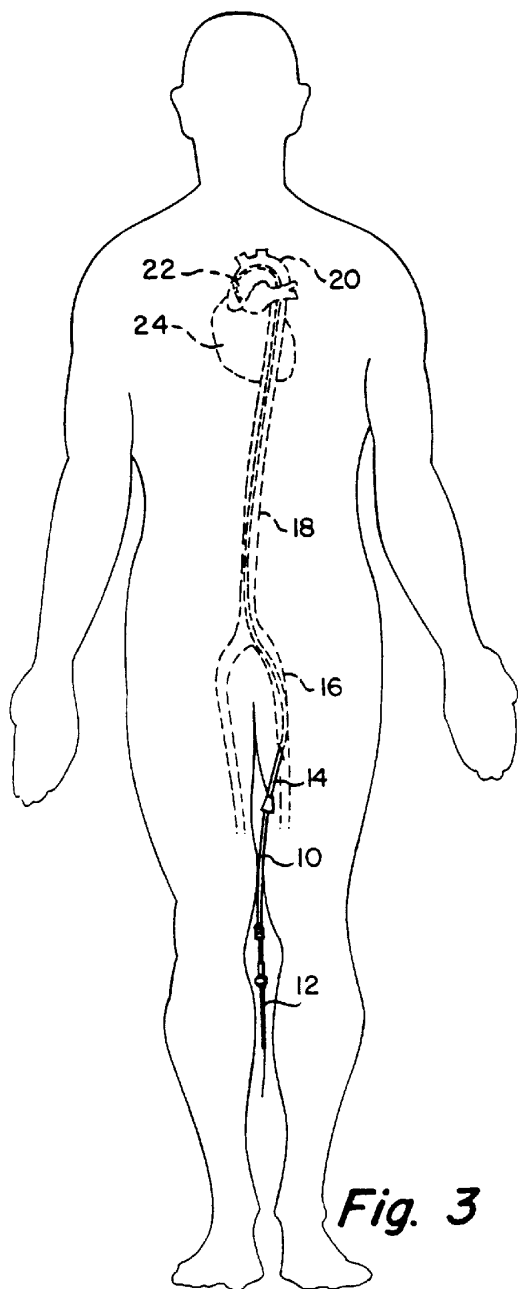


Fig. 3

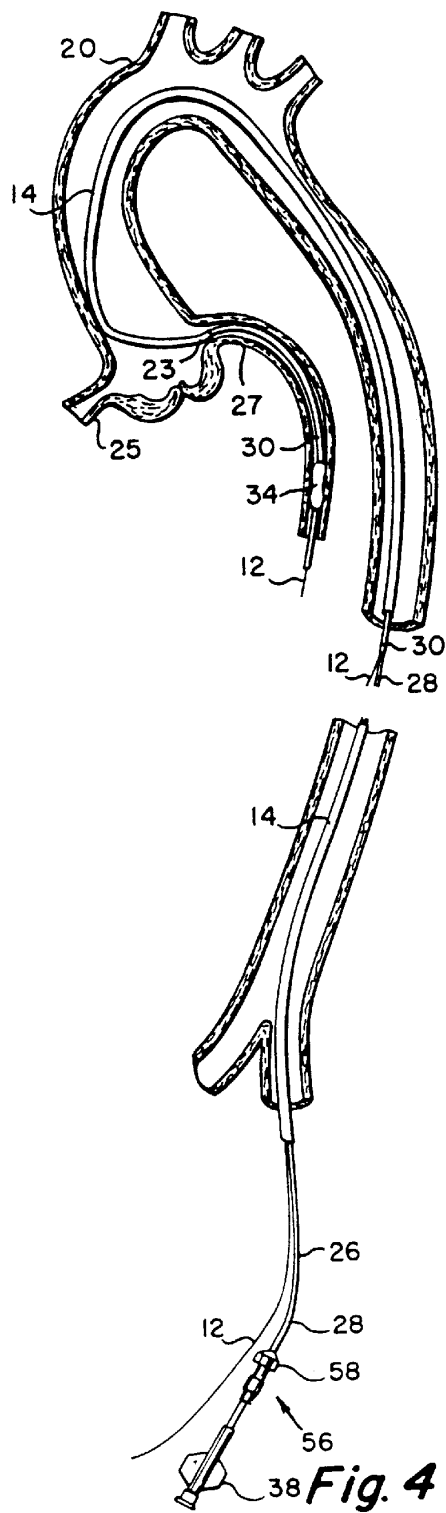


Fig. 4

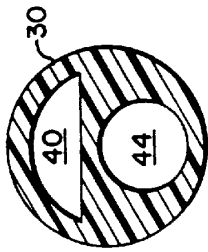


Fig. 5

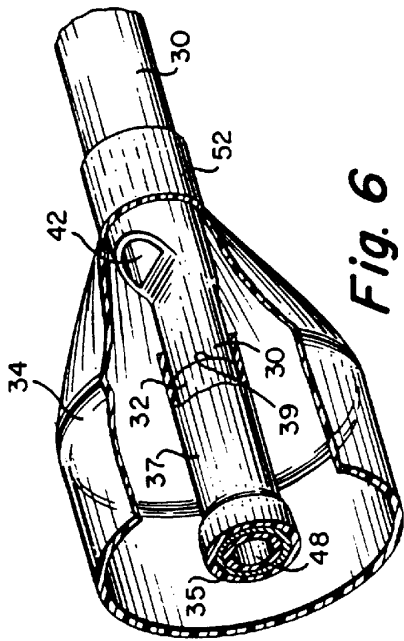


Fig. 6

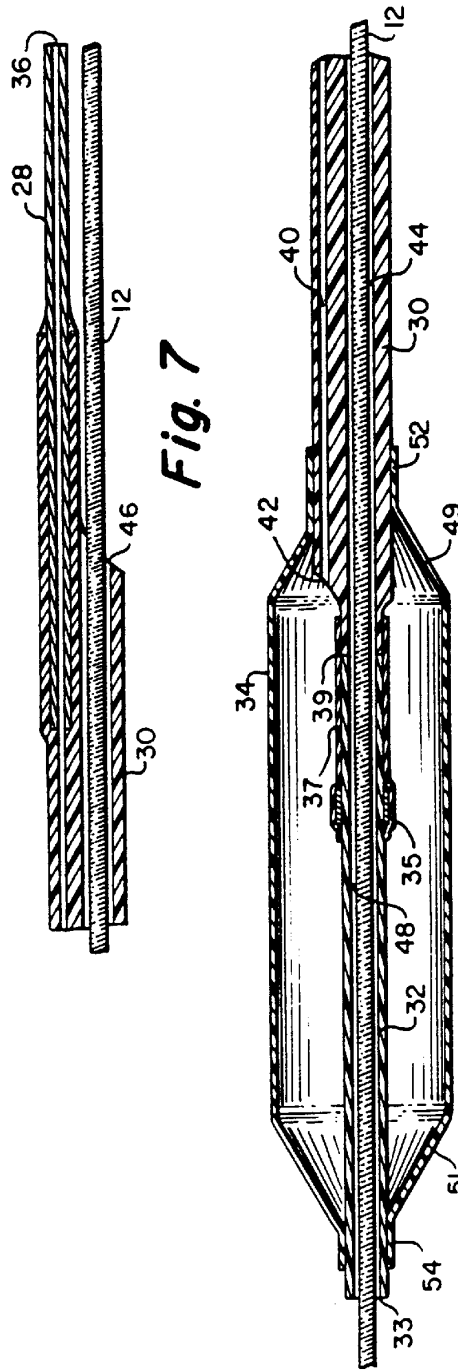


Fig. 7

Fig. 8

# 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.