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Eberhardt

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(54) **STENTED BIOPROSTHETIC HEART VALVE**

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(*) Notice: This patent issued on a continued prosecution application filed under 37 CFR 1.53(d), and is subject to the twenty year patent term provisions of 35 U.S.C. 154(a)(2).

Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

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Related U.S. Application Data

(63) Continuation of application No. 08/231,603, filed on Apr. 22, 1994, now abandoned.

(51) **Int. Cl.⁷** **A61F 2/24**

(52) **U.S. Cl.** **623/2.13; 623/2.14**

(58) **Field of Search** **623/2, 900, 2.13, 623/2.14, 2.15, 2.16, 2.17, 2.18, 2.19**

(56) **References Cited**

U.S. PATENT DOCUMENTS

- 3,365,728 A * 1/1968 Edwards et al. 623/2
- 4,035,849 A * 7/1977 Angell et al. 623/2
- 4,106,129 A * 8/1978 Carpentier et al. 623/2
- 4,345,340 A * 8/1982 Rosen 623/2
- 4,451,936 A 6/1984 Carpenter
- 4,506,394 A * 3/1985 Bedard 623/2
- 4,626,255 A * 12/1986 Reichart et al. 623/2
- 4,629,459 A * 12/1986 Ionescu et al. 623/2
- 4,692,164 A * 9/1987 Dzemeshevich 623/900
- 4,816,029 A * 3/1989 Penny, III et al. 623/2
- 5,037,434 A 8/1991 Lane 623/2

- 5,163,955 A * 11/1992 Love et al. 623/2
- 5,258,021 A 11/1993 Duran 623/2
- 5,258,023 A * 11/1993 Reger 623/2
- 5,376,112 A * 12/1994 Duran 623/2

FOREIGN PATENT DOCUMENTS

- GB 2136533 * 9/1984
- WO WO90/117738 10/1990
- WO WO93/04643 3/1993

* cited by examiner

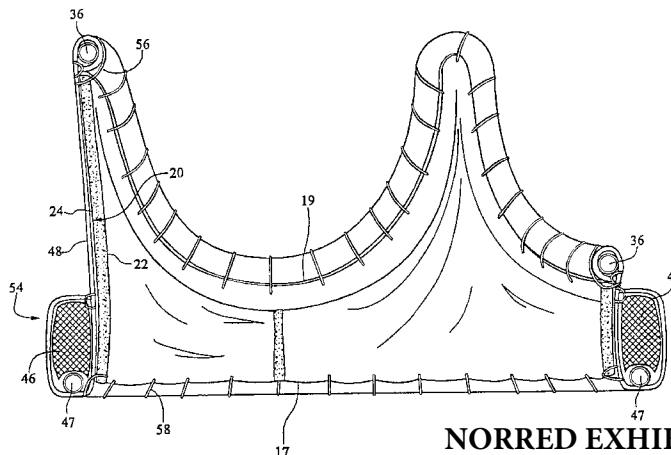
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(57) **ABSTRACT**

A supported bioprosthetic heart valve is provided. The valve includes a stent and a biological valve member. The stent has an annular frame defined by a support rail. The support rail is formed to define a triad of axially-projecting circumferentially-spaced commissure posts, each post having an inverted U-shaped configuration and a pair of legs. Each of the pair of legs has an upper end and a lower end. The lower end of each leg merges smoothly with the lower end of a leg of an adjacent commissure post. A sleeve having an inflow end and an outflow end is fitted around the annular frame. The biological valve member is defined by a tubular wall and three leaflets, the three leaflets being attached to the tubular wall and axially converging along three commissures. The biological valve member has a shape which fits the contour of the support rail and is disposed under the support rail. The biological valve member is sutured to the support rail and the outflow end of the sleeve. The bioprosthetic valve member also includes a suturing cuff which is not rigidly attached to the support rail allowing the valve to expand and contract in the lateral direction. The suturing cuff is formed by wrapping the inflow end of the sleeve around a ring-shaped cushion and suturing the sleeve to itself encapsulating thus the ring-shaped cushion. An inflow support ring may also be provided within the suturing cuff for added lateral support.

17 Claims, 5 Drawing Sheets



NORRED EXHIBIT 2313 - Page 1

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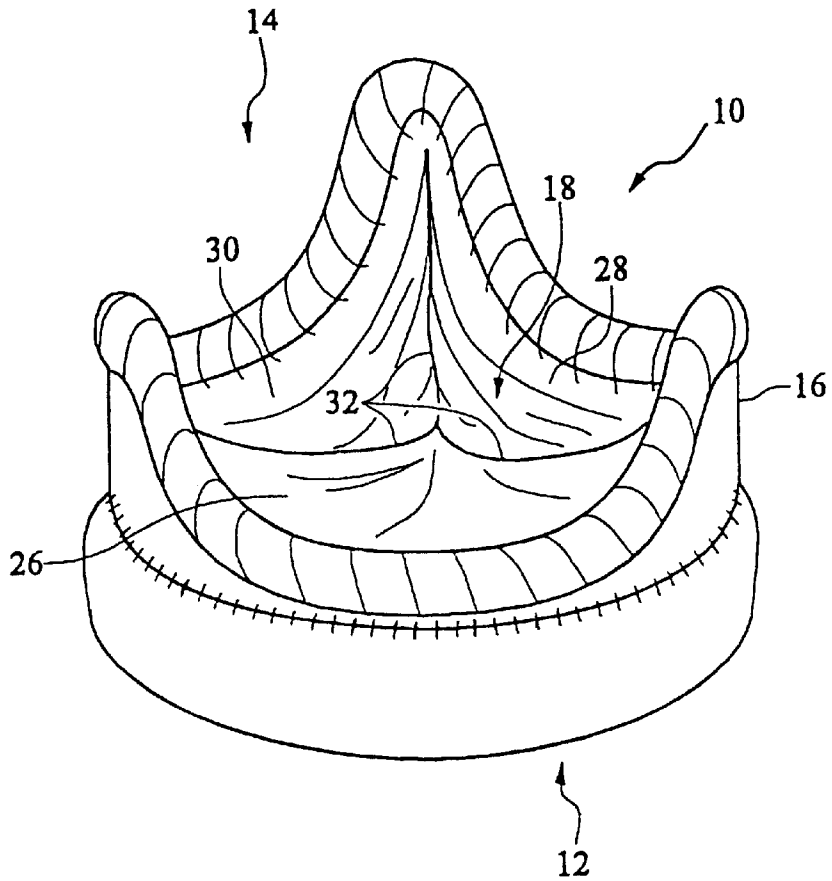


FIG. 1

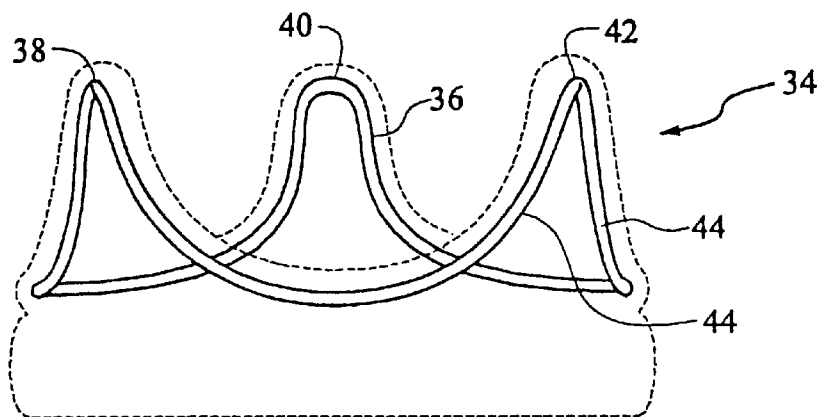


FIG. 2

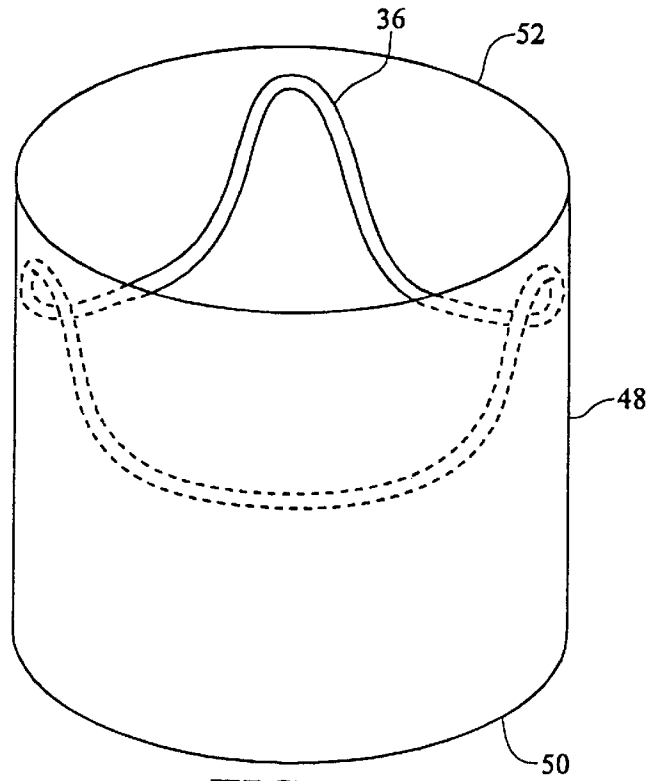


FIG. 3

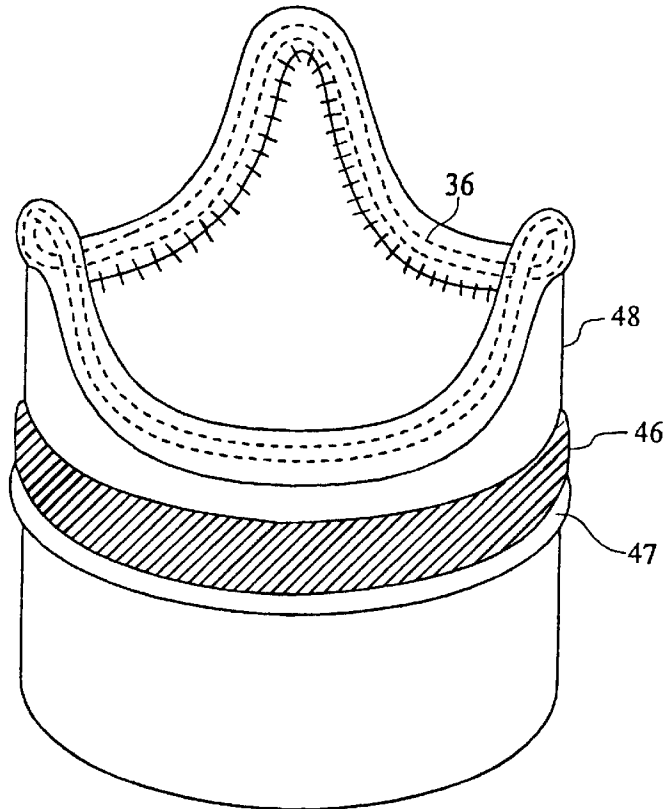


FIG. 4

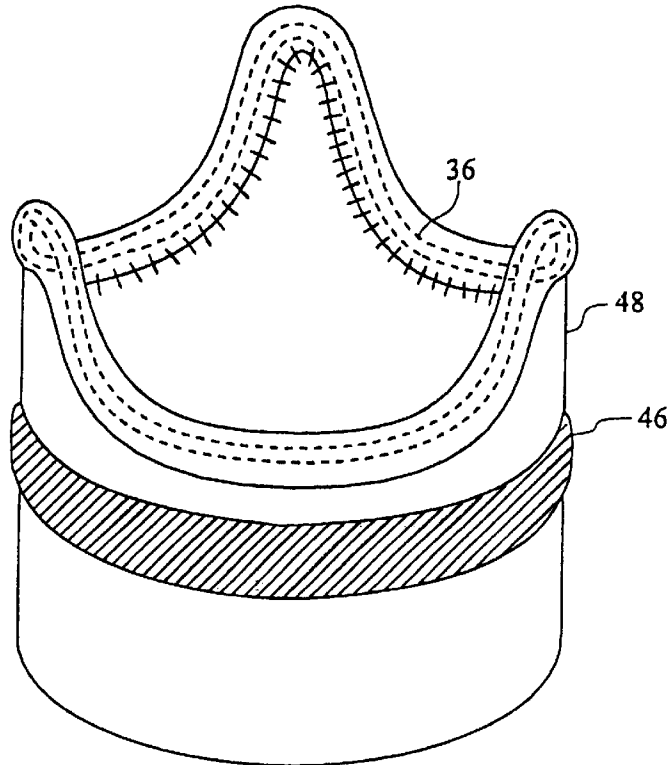


FIG. 4A

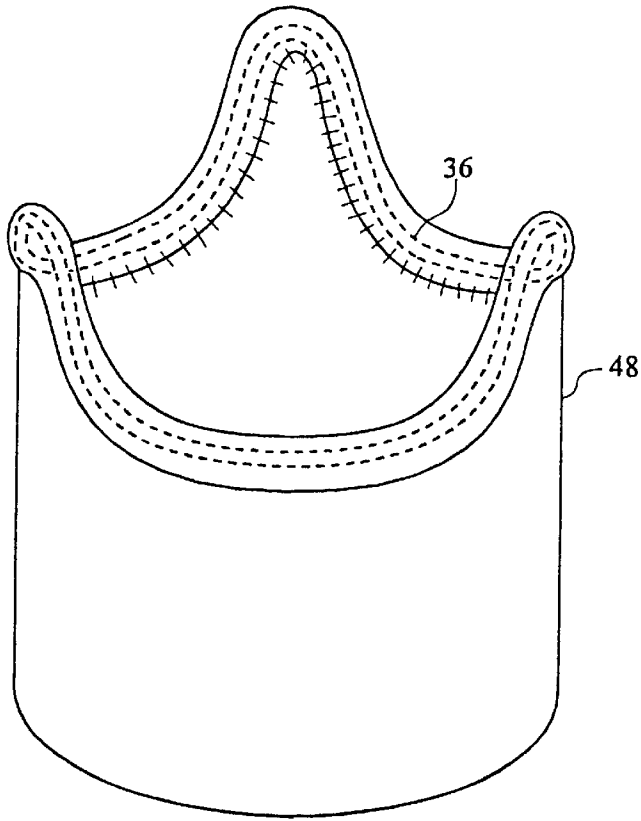


FIG. 4B

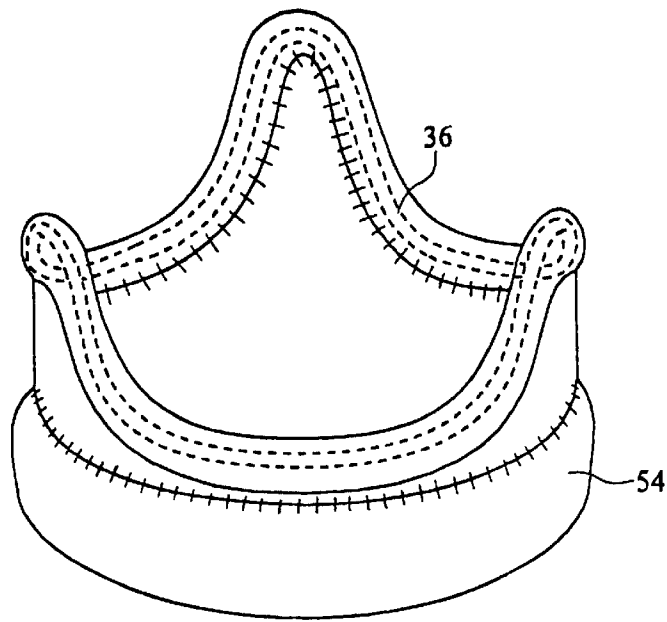


FIG. 5

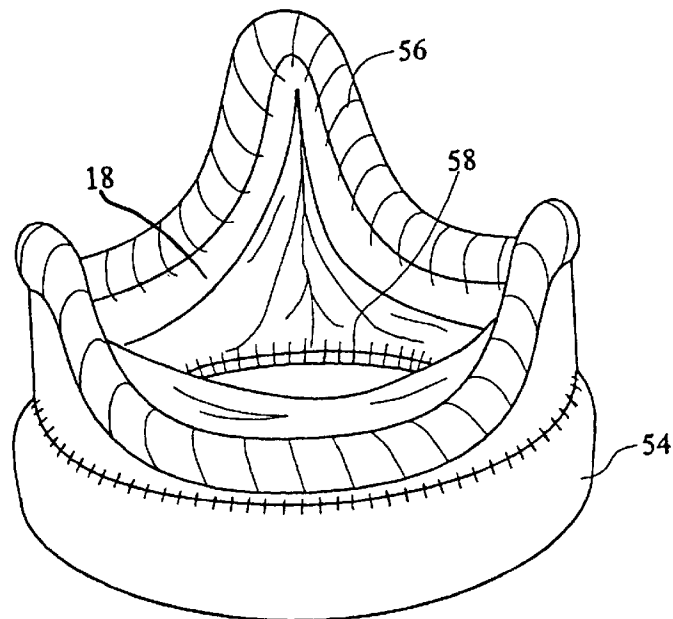


FIG. 6

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