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Carpentier

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(54) **FLEXIBLE HEART VALVE LEAFLETS**

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Related U.S. Application Data

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(51) **Int. Cl.⁷** **A61F 2/06**; A61F 9/00

(52) **U.S. Cl.** **623/2.13**; 623/212; 623/904

(58) **Field of Search** 623/1.26, 2.1, 623/2.12, 2.13, 2.14, 2.17, 2.18, 904, 910, 929

(56) **References Cited**

U.S. PATENT DOCUMENTS

- 4,291,420 A 9/1981 Reul
- 4,451,936 A 6/1984 Carpentier et al.
- 5,147,391 A 9/1992 Lane
- 5,258,023 A * 11/1993 Reger 623/2.18

- 5,449,384 A 9/1995 Johnson
- 5,489,297 A 2/1996 Duran
- 5,702,368 A * 12/1997 Stevens et al. 604/170.03 X
- 5,861,028 A 1/1999 Angell
- 5,964,770 A * 10/1999 Flomenblit et al. 606/78
- 5,895,420 A 4/2000 Mirsch, II et al.
- 6,074,419 A 6/2000 Healy et al.

FOREIGN PATENT DOCUMENTS

WO WO 00/00107 1/2000

* cited by examiner

Primary Examiner—Bruce Snow

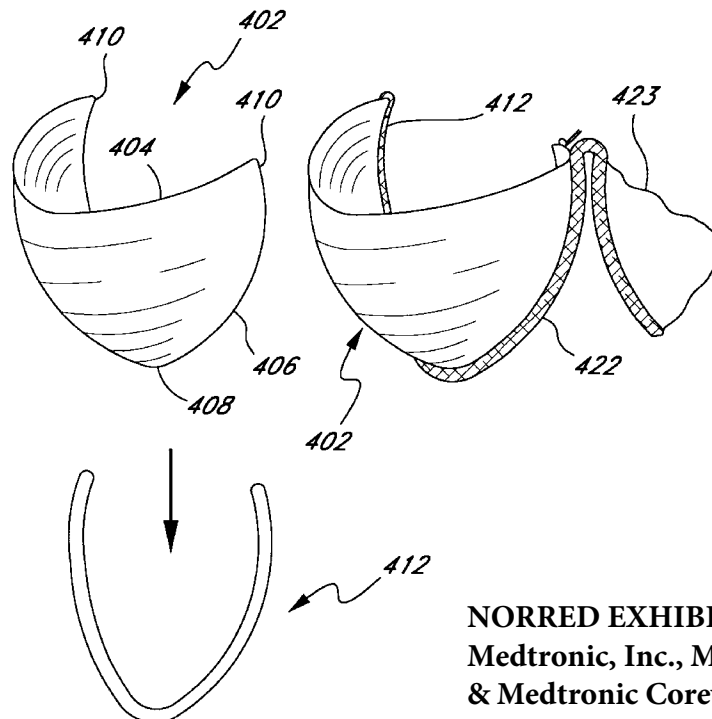
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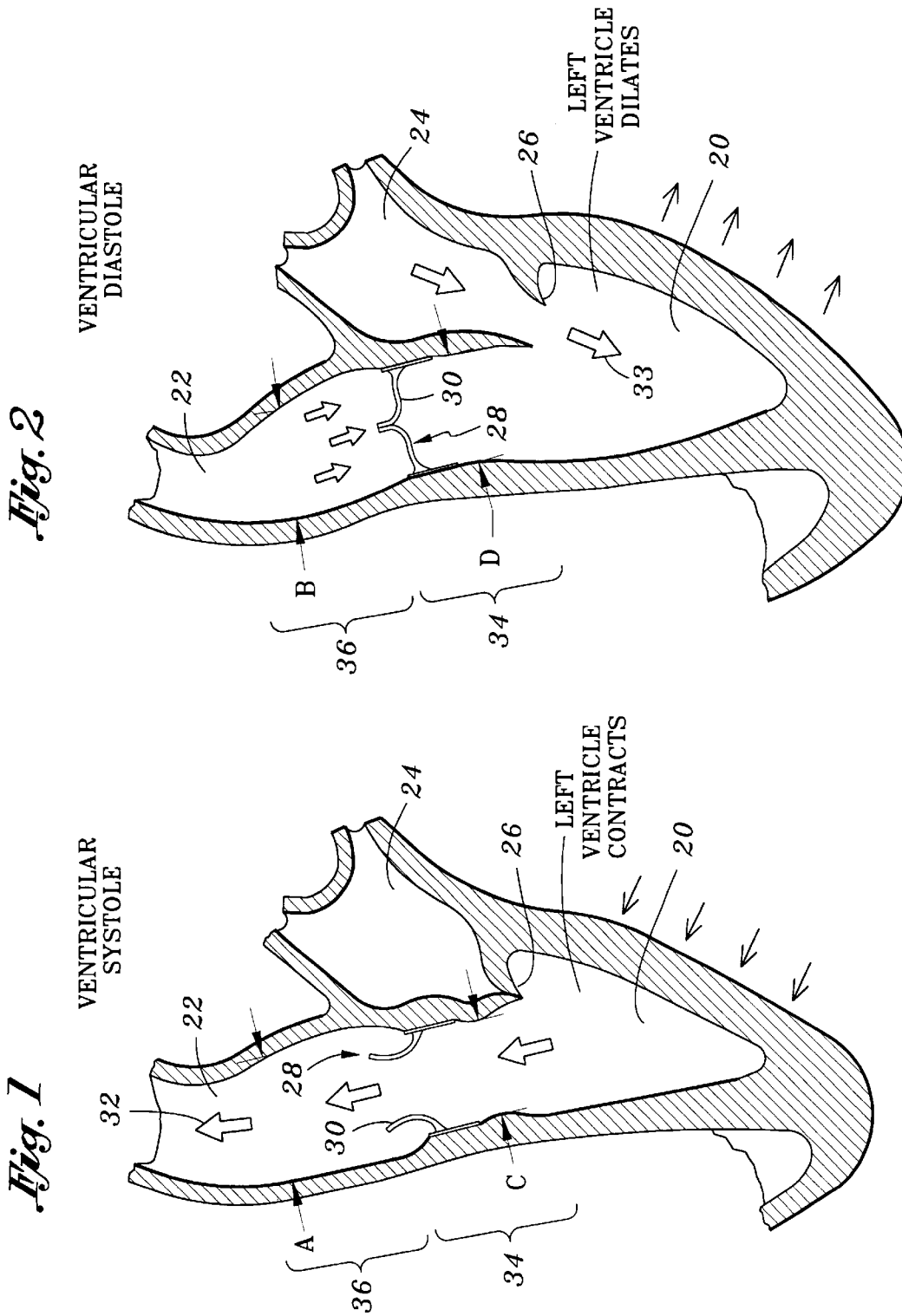
(57) **ABSTRACT**

A heart valve with a structural stent and radially moveable cusps and commissures. The stent may be of three separate elements, each having a cusp portion and two commissure portions. The commissures may be pivotally or flexibly coupled, and may separate into independent leaflets. A connecting band may be provided that follows the cusps and commissures and extend outwardly. The valve may be connected to the natural tissue along the undulating connecting band. A multi-legged holder having legs alternating between each cusp and commissure may be used for implantation. A method of implantation is also disclosed, as is a system for implanting independent valve leaflets in the native annulus.

25 Claims, 18 Drawing Sheets



NORRED EXHIBIT 2210 - Page 1
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& Medtronic Corevalve, LLC
v. Troy R. Norred, M.D.
Case IPR2014-00111



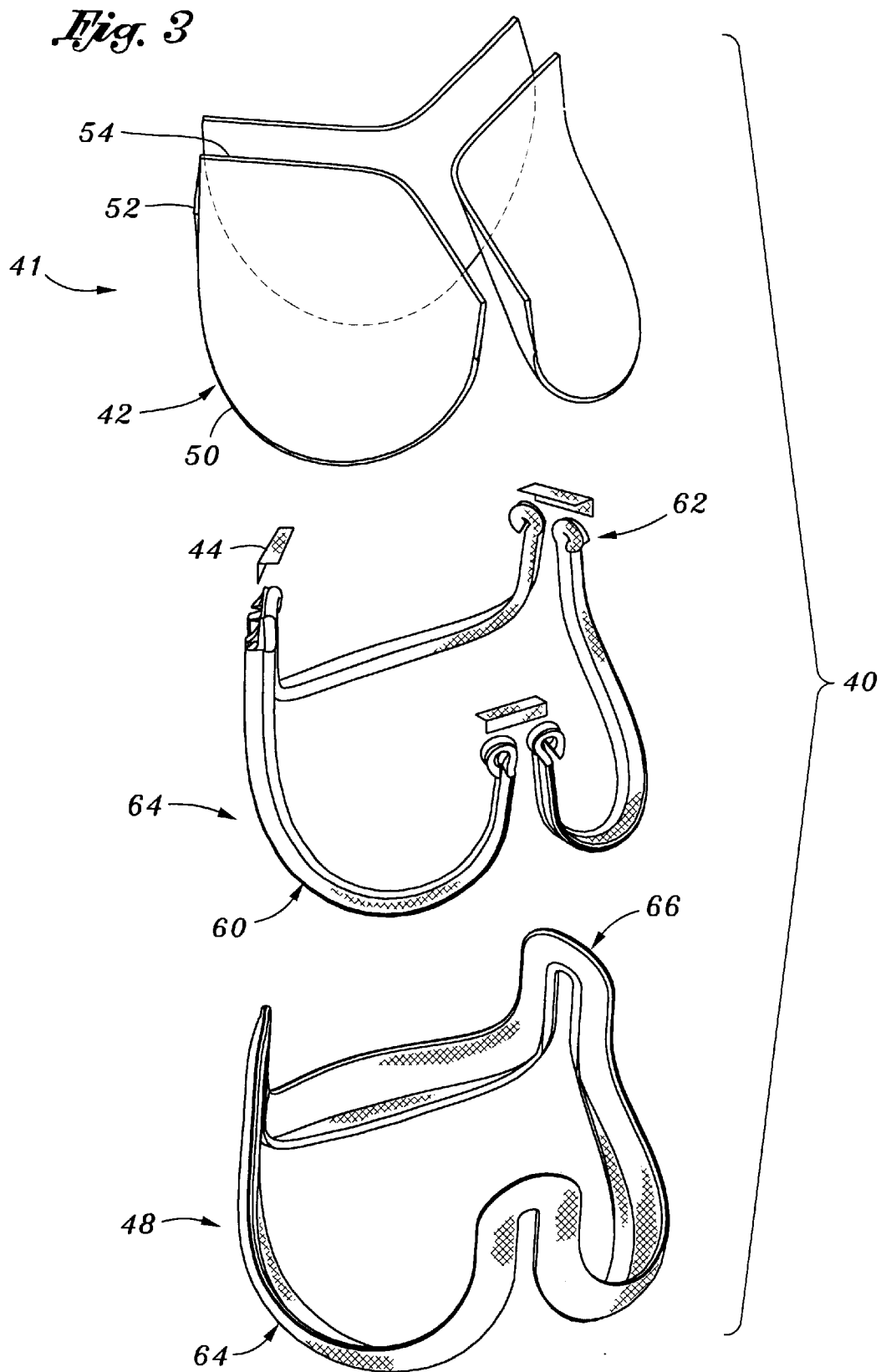


Fig. 4A

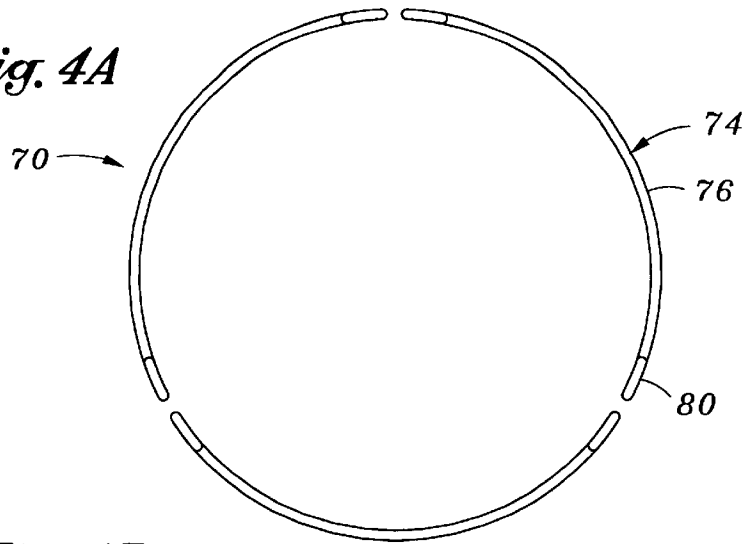


Fig. 4B

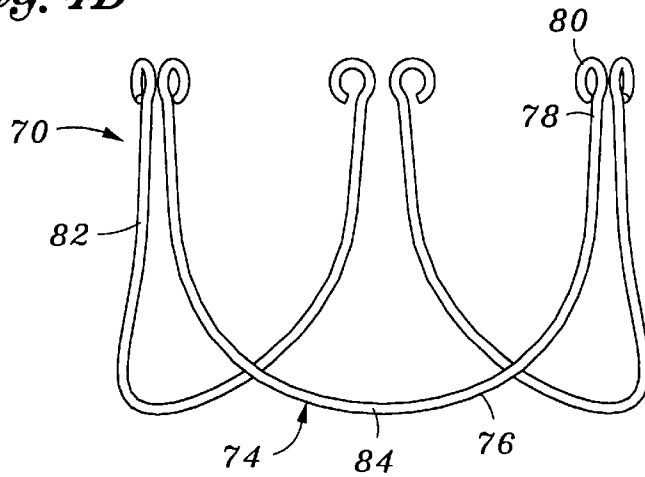


Fig. 5

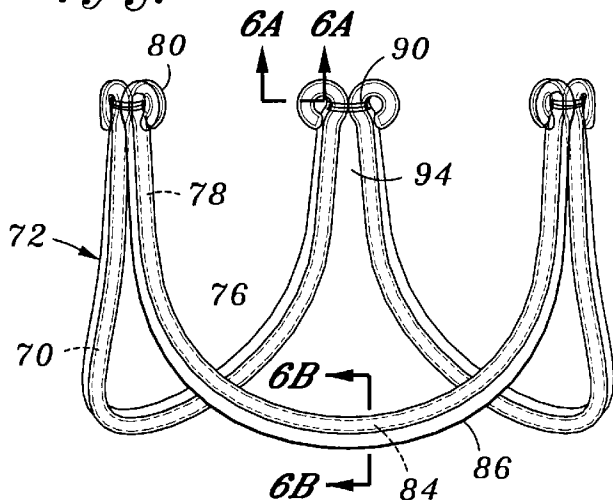


Fig. 6A

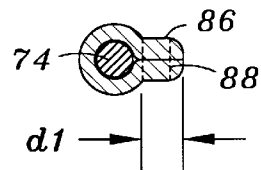


Fig. 6B

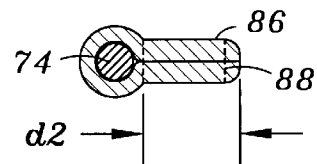


Fig. 7A

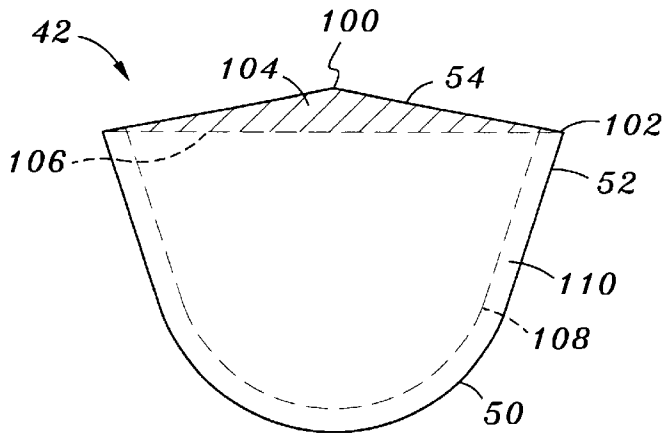


Fig. 7B

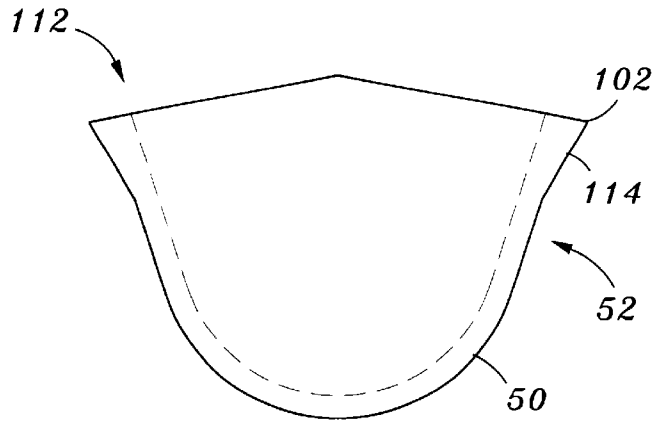
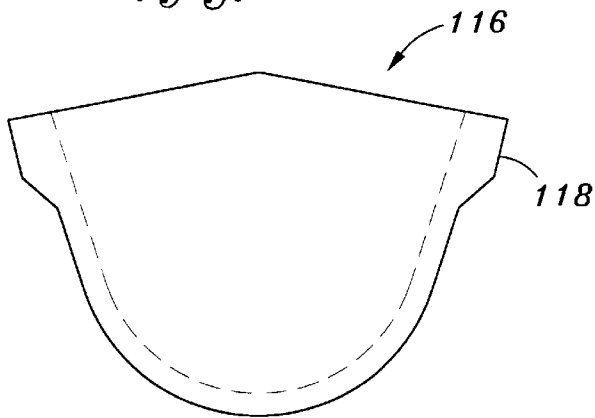


Fig. 7C



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