



(12) **United States Patent**  
**Garrison et al.**

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(54) **METHODS AND DEVICES FOR  
IMPLANTING CARDIAC VALVES**

\* cited by examiner

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(57) **ABSTRACT**

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

The valve implantation system has a valve displacer for  
displacing and holding the native valve leaflets open in a first  
aspect of the invention. A replacement valve may be  
attached to the valve displacer before or after introduction  
and may be positioned independent of the valve displacer. In  
another aspect of the invention, the valve displacer and valve  
are in a collapsed condition during introduction and are  
expanded to deploy the valve displacer and valve. The valve  
is a tissue valve mounted to an expandable support structure.  
The support structure may have protrusions for engaging the  
valve displacer or barbs for anchoring the valve displacer to  
the heart or blood vessel. A temporary valve mechanism may  
be used to provide temporary valve functions during and  
after deployment of the valve displacer.

(21) Appl. No.: **09/248,911**

(22) Filed: **Feb. 10, 1999**

(51) **Int. Cl.<sup>7</sup>** ..... **A61F 2/24**

(52) **U.S. Cl.** ..... **623/2.11; 623/1.26; 623/2.38;**  
623/904

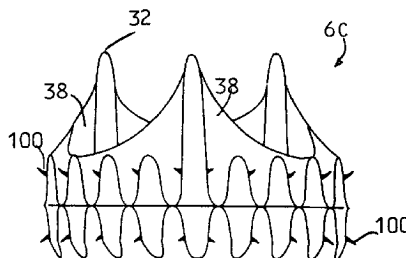
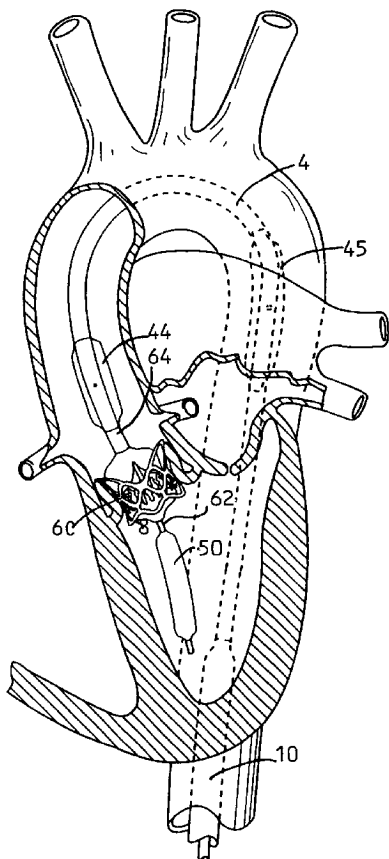
(58) **Field of Search** ..... 623/1.26, 1.24,  
623/2.11, 2.1, FOR 101, 2.12–2.19, 2.42,  
904, 2.38

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**16 Claims, 23 Drawing Sheets**



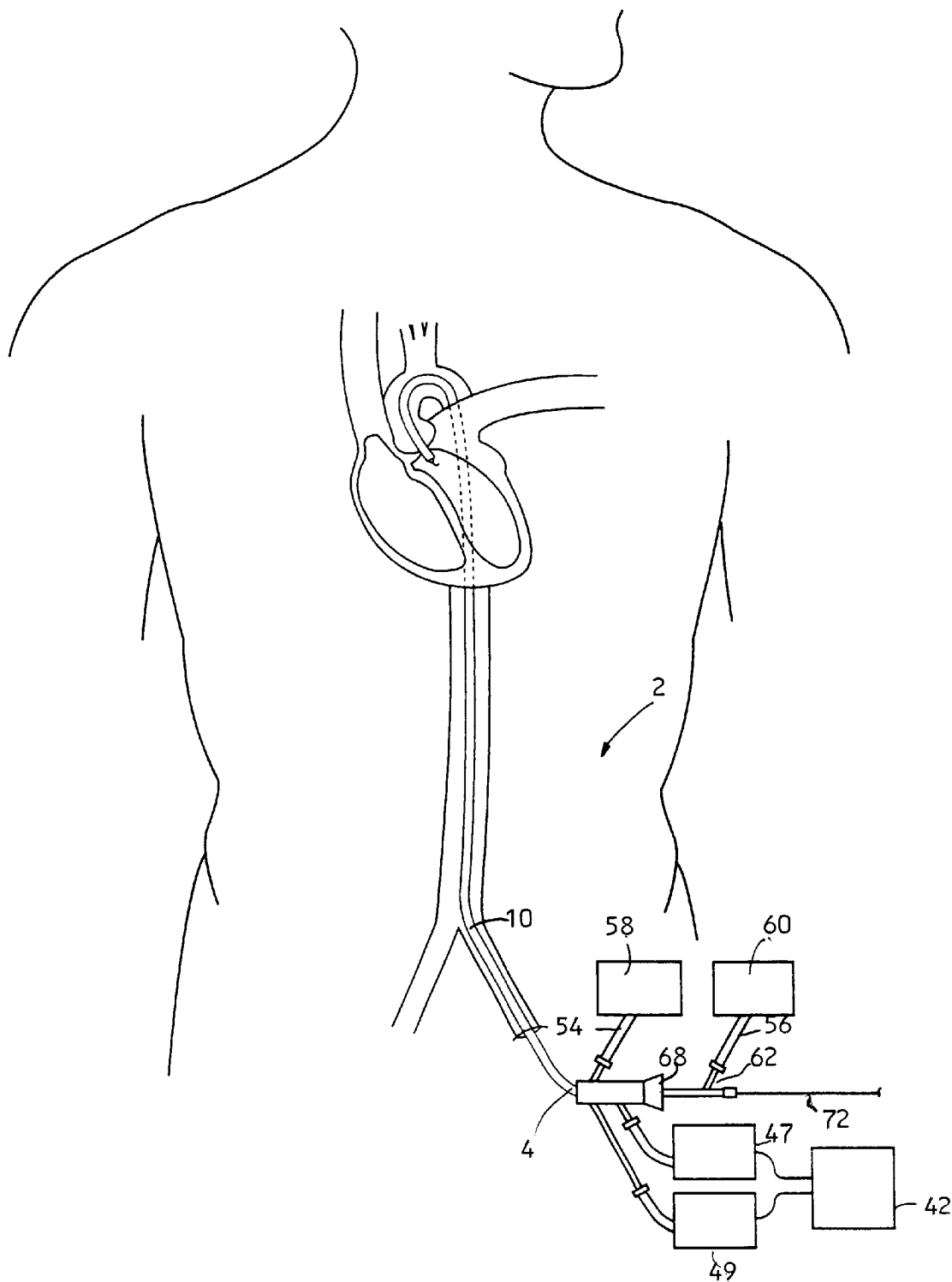


FIG. 1A

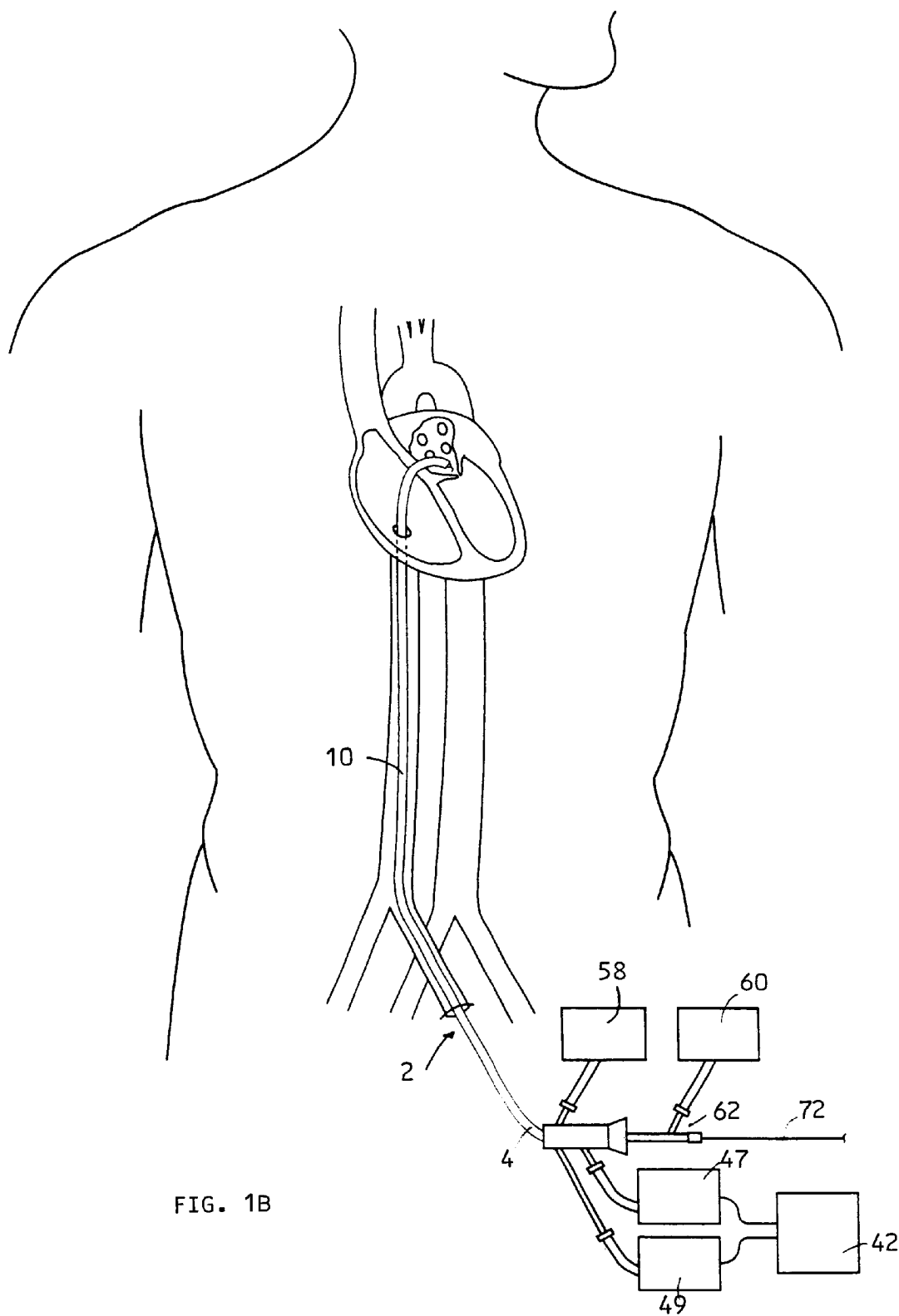


FIG. 1B

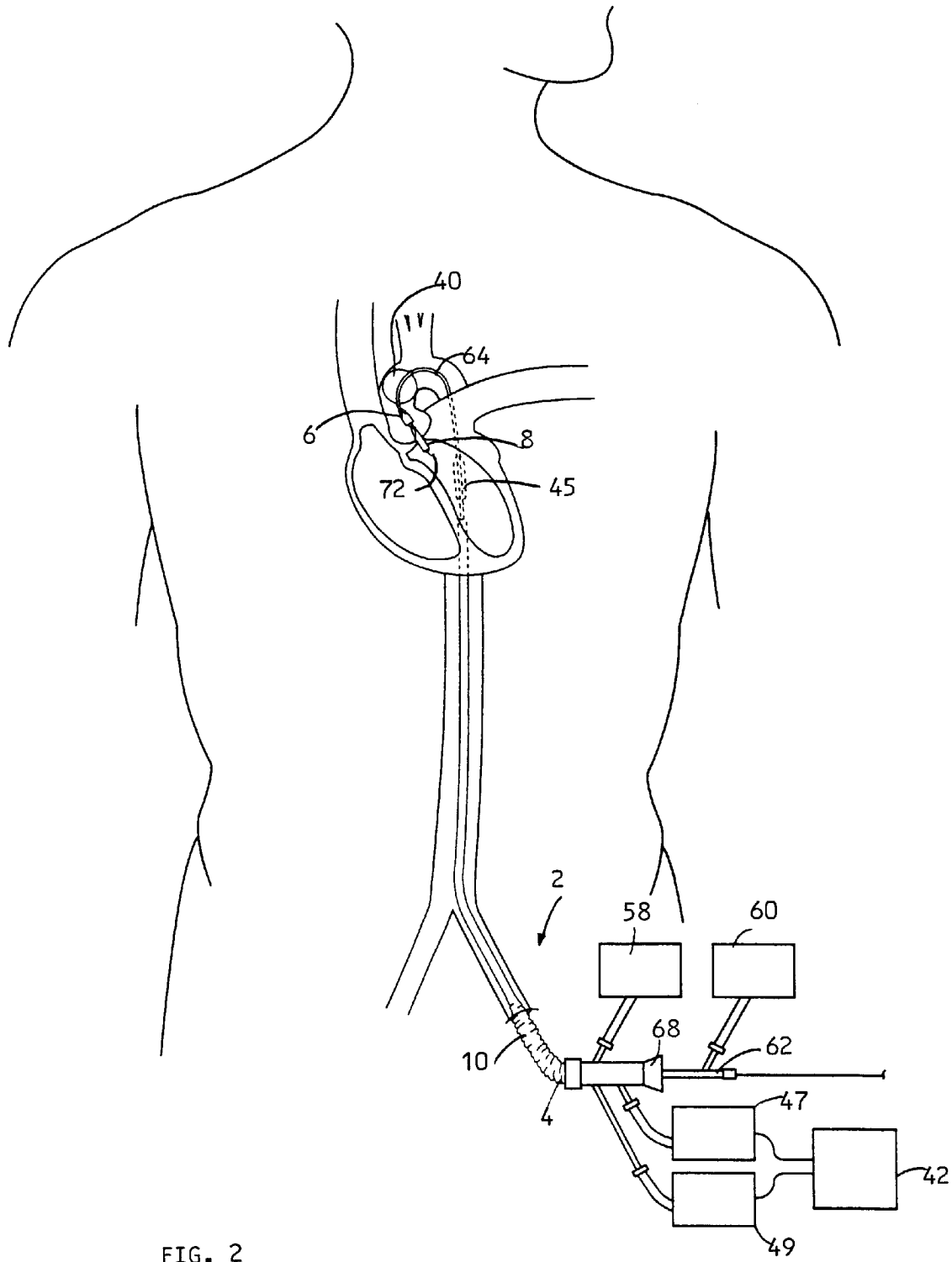
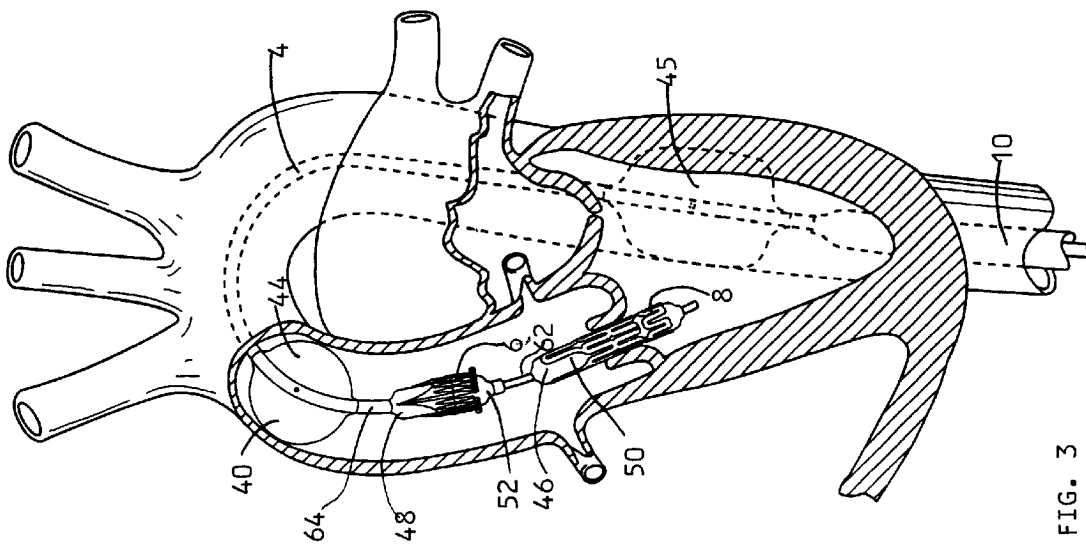
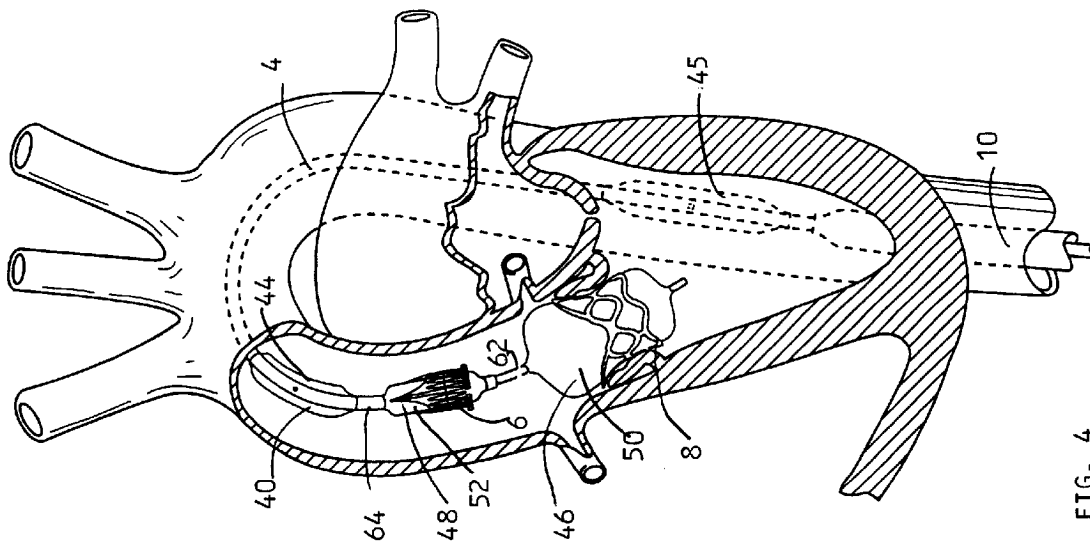


FIG. 2



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