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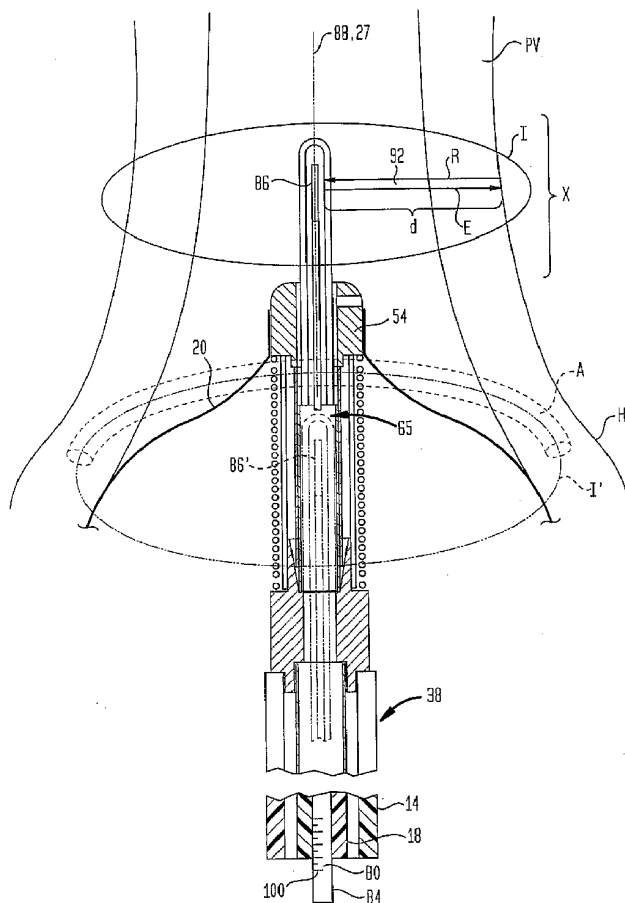
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(54) Title: ABLATION DEVICES AND METHODS WITH ULTRASONIC IMAGING



(57) Abstract: Ablation apparatus such as a catheter (10) carrying an ultrasonic ablation device (20) including an ablation transducer (42) and a balloon reflector structure (22, 24) for directing ultrasonic energy from the ablation transducer into a ring-like ablation region (A) is provided with an imaging ultrasonic transducer (86) mounted on an imaging probe (80) which may be inserted into or through a passageway (18, 65) extending through the catheter and into or through the ablation device to image the ablation region or neighboring regions. Alternatively, the imaging transducer (102, 202) may be mounted within the balloon reflector structure or distal to this structure.



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ABLATION DEVICES AND METHODS WITH ULTRASONIC IMAGING  
CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] The present application claims the benefit of the filing date of U.S. Provisional Patent Application No. 60/618,944, filed October 14, 2004, the disclosure of which is hereby incorporated by reference herein.

BACKGROUND OF THE INVENTION

[0002] The present invention relates to ablation apparatus and methods, including those used in cardiac ablation.

[0003] Contraction or "beating" of the heart is controlled by electrical impulses generated at nodes within the heart and transmitted along conductive pathways extending within the wall of the heart. Certain diseases of the heart known as cardiac arrhythmias involve abnormal generation or conduction of the electrical impulses. One such arrhythmia is atrial fibrillation or "AF." Certain cardiac arrhythmias can be treated by deliberately damaging the tissue along a path crossing a route of abnormal conduction, either by surgically cutting the tissue or applying energy or chemicals to the tissue, so as to form scar. The scar blocks the abnormal conduction. For example, in treatment of AF it has been proposed to ablate tissue in a partial or complete loop around a pulmonary vein within the vein itself near the ostium of the vein; within the ostium; or within the wall of the heart surrounding the ostium. It would be desirable to perform such ablation using a catheter-based device which can be advanced into the heart through the patient's circulatory system.

[0004] As described in certain embodiments of U.S. Patent 6,635,034, the disclosure of which is hereby incorporated by reference herein, an expansible structure mounted at or near the distal end of a catheter is used as a reflector for directing and focusing ultrasonic waves from an ultrasonic transducer into a region of tissue to be ablated. Certain embodiments according to the '034 patent include an expansible

