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**United States Patent** [19]  
**Abrahamson**

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[54] **CATHETER WITH ELONGATED SIDE OPENINGS**  
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[73] Assignee: **Quinton Instrument Company**, Bothell, Wash.  
[\*] Notice: The term of this patent shall not extend beyond the expiration date of Pat. No. 5,403,291.  
[21] Appl. No.: **380,779**  
[22] Filed: **Jan. 30, 1995**

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**Related U.S. Application Data**

[63] Continuation-in-part of Ser. No. 101,520, Aug. 2, 1993, Pat. No. 5,403,291.  
[51] **Int. Cl.<sup>6</sup>** ..... **A61M 25/00**  
[52] **U.S. Cl.** ..... **604/280; 128/658**  
[58] **Field of Search** ..... **128/658; 604/43, 604/264, 280-282**

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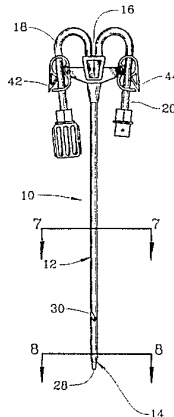
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*Attorney, Agent, or Firm*—Andrew J. Beck; Montgomery W. Smith; Richard D. Allison

[57] **ABSTRACT**

An elongate catheter having one or more lumens therein and at least one lumen in flow communication with a side opening in the sidewall of the catheter wherein the side opening includes at least a first side which is oriented diagonally with respect to the longitudinal axis of the catheter and the first side intersects the septum of the catheter to form a side opening wherein the size of the area of the opening is maximized.

**12 Claims, 6 Drawing Sheets**



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FIG. 1

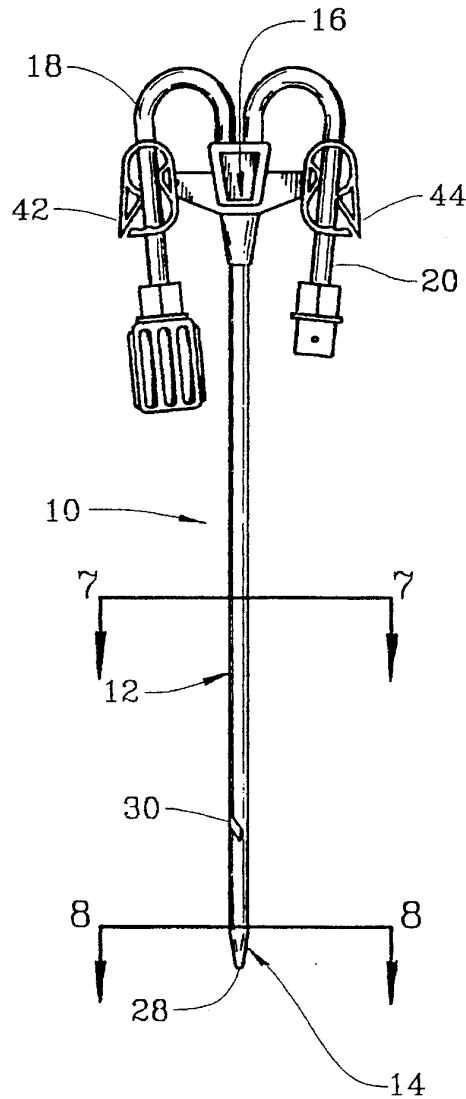


FIG. 4

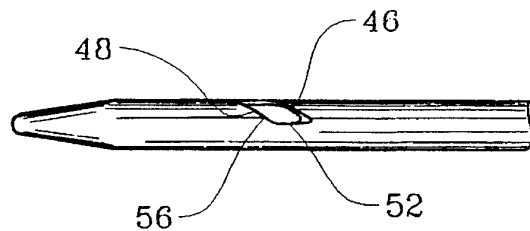


FIG. 2A

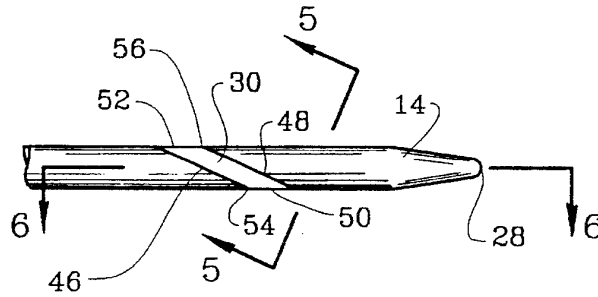


FIG. 7

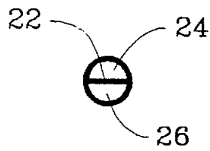


FIG. 3

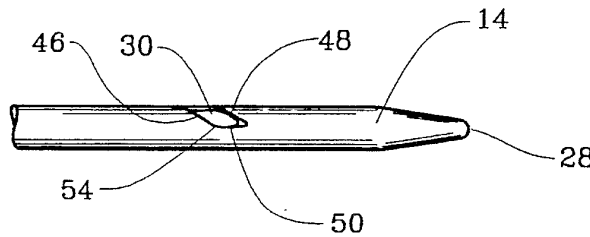


FIG. 8

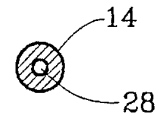


FIG. 5

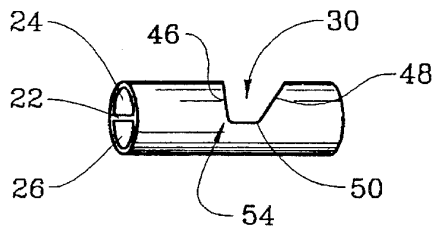


FIG. 6

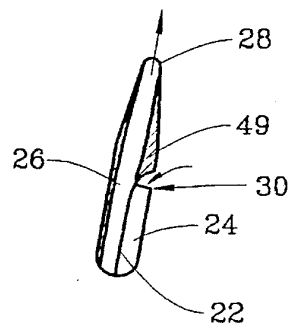


FIG. 9

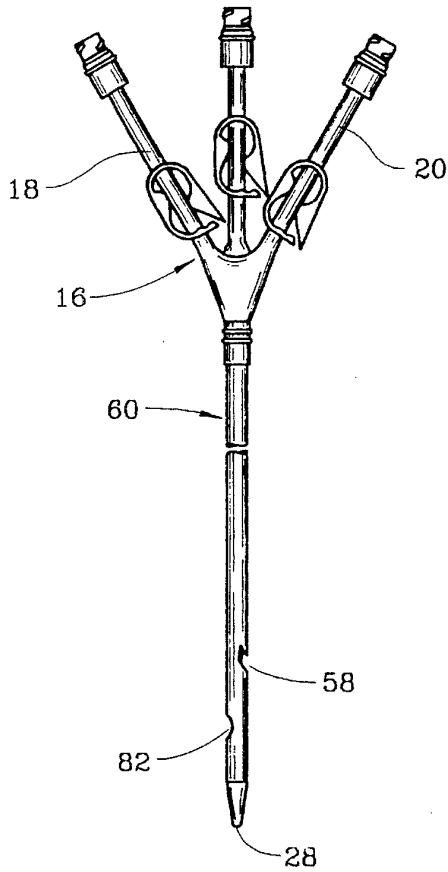


FIG. 11

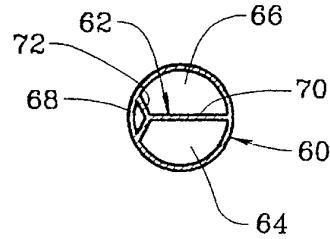


FIG. 10

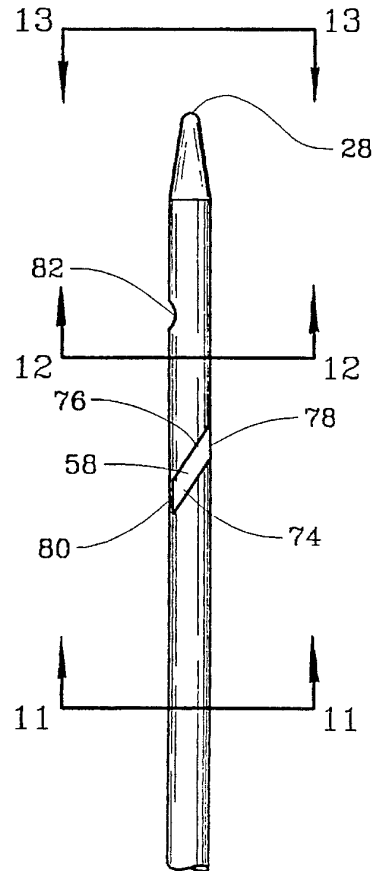
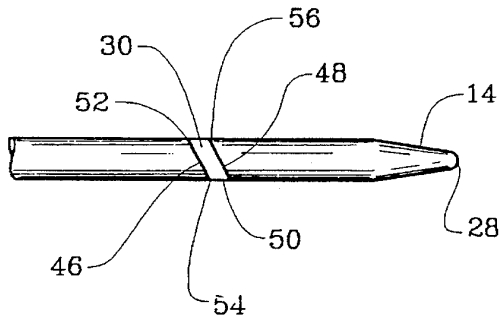


FIG. 2B



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