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**Aklog et al.**

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(54) **SYSTEMS AND METHODS FOR REMOVING UNDESIRABLE MATERIAL WITHIN A CIRCULATORY SYSTEM**

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(51) **Int. Cl.**

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**A61M 29/00** (2006.01)  
**A61M 1/00** (2006.01)

(52) **U.S. Cl.** ..... **604/6.11**; 604/6.09; 604/5.01; 604/103.07; 604/319; 606/200

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See application file for complete search history.

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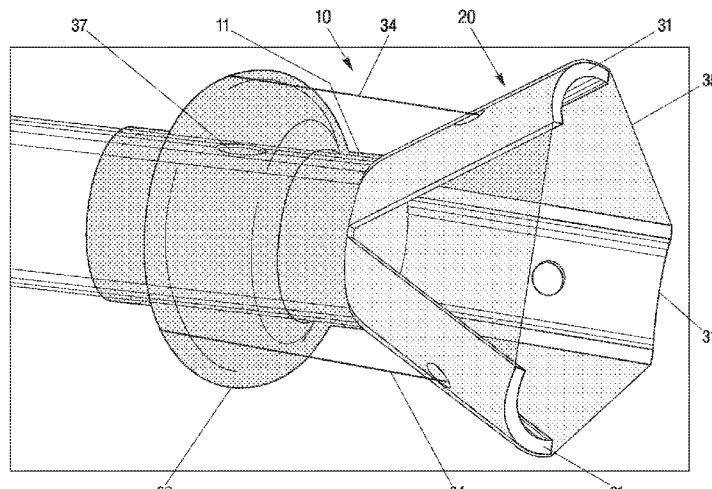
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(57) **ABSTRACT**

A system for removing undesirable material from vessels and from chambers within the heart is provided. The system includes a suction cannula for removing the undesirable material from a site of interest within a patient. A filter device may be provided for capturing the undesirable material and removing it from the fluid flow. The system also includes pump for generating the necessary suction force through the suction cannula to dislodge the undesirable material from the site of interest and for generating a sufficient driving force to direct the fluid flow downstream within the system. The system further includes a reinfusion cannula for introducing fluid removed from the site of interest back into a patient. A method for removing undesirable material from vessels and from heart chambers is also provided.

**67 Claims, 11 Drawing Sheets**



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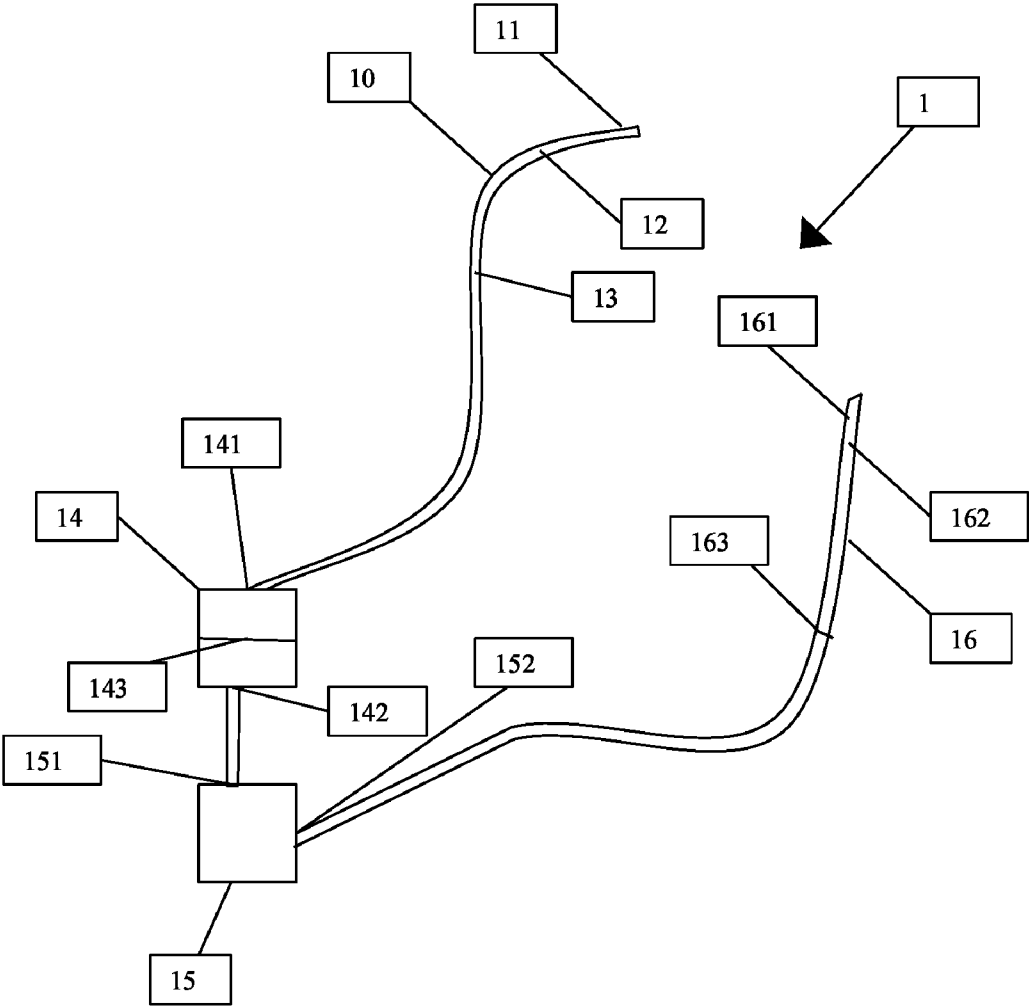


Fig. 1

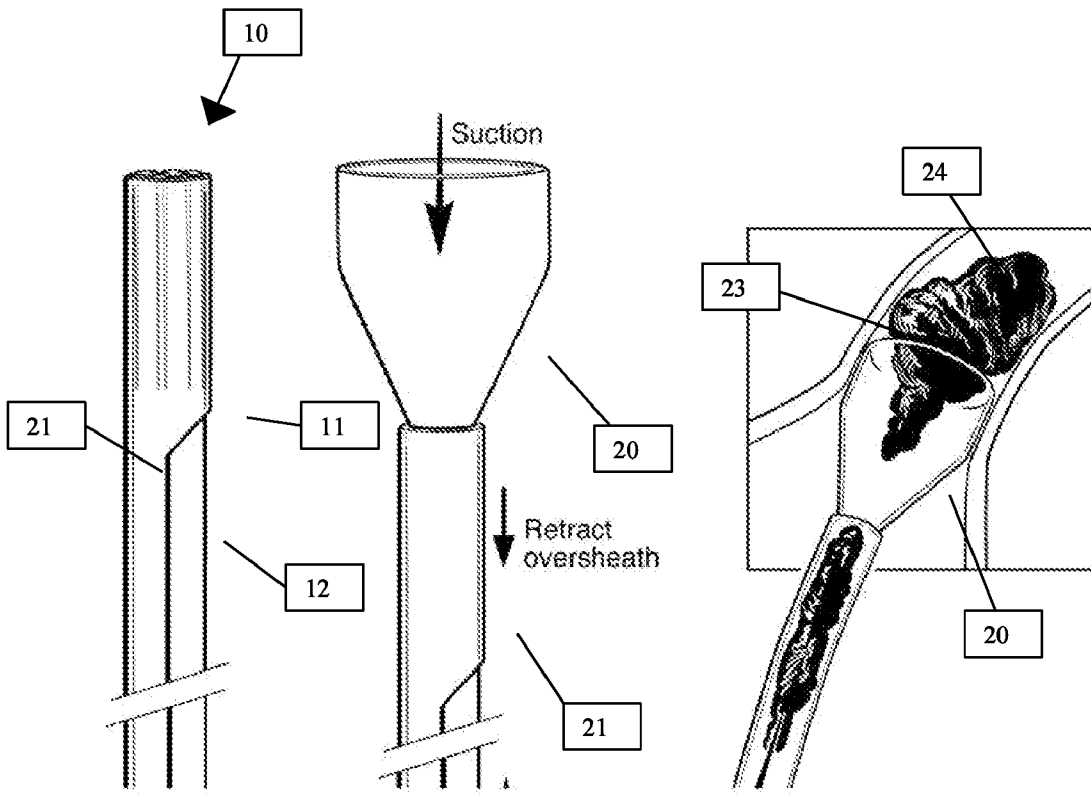


Fig. 2A

Fig. 2B

Fig. 2C

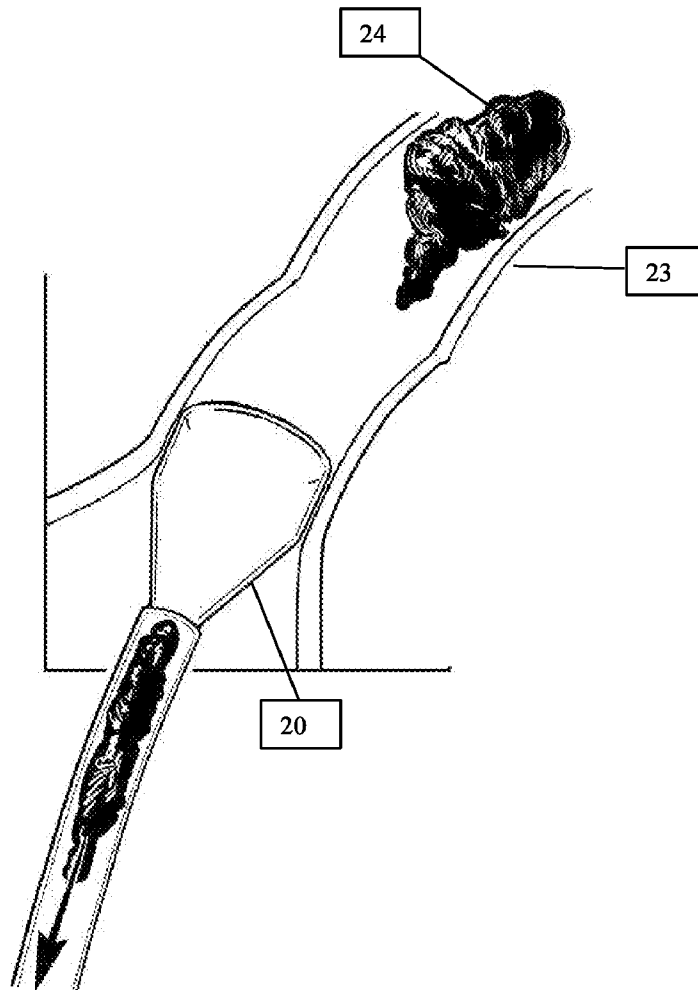


Fig. 2D

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