



(11) **EP 2 105 154 A2**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
30.09.2009 Bulletin 2009/40

(51) Int Cl.:
A61M 5/315 (2006.01)

(21) Application number: **09162409.8**

(22) Date of filing: **16.07.2003**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LI LU MC NL PT RO SE SI SK TR

(72) Inventor: **The designation of the inventor has not yet been filed**

(30) Priority: **16.07.2002 US 396302 P**

(74) Representative: **Vossius & Partner
Siebertstraße 4
81675 München (DE)**

(62) Document number(s) of the earlier application(s) in accordance with Art. 76 EPC:
03764695.7 / 1 521 555

Remarks:

This application was filed on 10-06-2009 as a divisional application to the application mentioned under INID code 62.

(71) Applicant: **MAGNETECS, INC
Inglewood, CA 90304 (US)**

(54) **Apparatus for catheter guidance control and imaging**

(57) A system whereby a magnetic tip attached to a surgical tool is detected, displayed and influenced positionally so as to allow diagnostic and therapeutic procedures to be performed rapidly, accurately, simply, and intuitively is described. The tools that can be so equipped include catheters, guidewires, and secondary tools such as lasers and balloons, in addition biopsy needles, endoscopy probes, and similar devices. The magnetic tip allows the position and orientation of the tip to be determined without the use of x-rays by analyzing a magnetic field. The magnetic tip further allows the tool tip to be pulled, pushed, turned, and forcefully held in the desired position by applying an appropriate magnetic field external to the patient's body. A Virtual Tip serves as an operator control. Movement of the operator control produces corresponding movement of the magnetic tip inside

the patient's body. Additionally, the control provides tactile feedback to the operator's hand in the appropriate axis or axes if the magnetic tip encounters an obstacle. The output of the control combined with the magnetic tip position and orientation feedback allows a servo system to control the external magnetic field by pulse width modulating the positioning electromagnet. Data concerning the dynamic position of a moving body part such as a beating heart offsets the servo systems response in such a way that the magnetic tip, and hence the secondary tool is caused to move in unison with the moving body part. The tip position and orientation information and the dynamic body part position information are also utilized to provide a display that allows three dimensional viewing of the magnetic tip position and orientation relative to the body part.

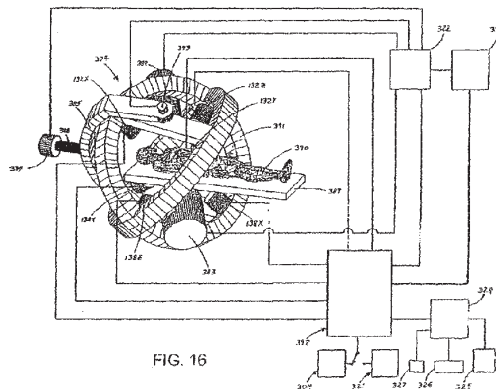


FIG. 16

EP 2 105 154 A2