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**Wallace et al.**

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(54) **PLATFORM LINK WRIST MECHANISM**

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**Related U.S. Application Data**

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(51) **Int. Cl.**<sup>7</sup> ..... **A61B 17/00**; A61B 19/00

(52) **U.S. Cl.** ..... **606/1**; 74/490.03; 74/490.06; 606/130

(58) **Field of Search** ..... 901/29; 606/1, 606/130, 205; 600/102, 141; 74/490.03, 490.06, 567; 414/735; 910/23, 19, 16

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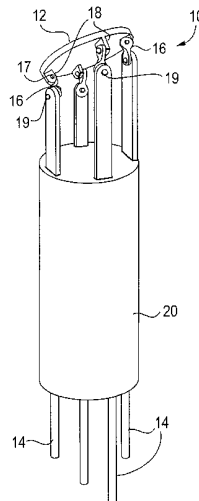
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(57) **ABSTRACT**

The present invention provides a robotic surgical tool for use in a robotic surgical system to perform a surgical operation. The robotic surgical tool includes a wrist mechanism disposed near the distal end of a shaft which connects with an end effector. The wrist mechanism includes a distal member configured to support the end effector, and a plurality of rods extending generally along an axial direction within the shaft and movable generally along this axial direction to adjust the orientation of the distal member with respect to the shaft. The distal member has a base to which the rods are rotatably connected by orthogonal linkage assemblies. Advancement or retraction of a first rod generally along the axial direction tips the base through a first angle so that the distal member faces a first articulated direction, such as to provide pitch. The addition of a second angle allows the distal member to direct the end effector in essentially a compound angle or in a second articulated direction in relation to the shaft of the surgical tool, such as to provide yaw. The robotic surgical tool may also include provisions for roll movement. Roll movement is achieved by rotating the plurality of rods around a longitudinal axis or the central axis of the shaft parallel to the axial direction. The robotic surgical tool includes a tool base disposed near the proximal end of the shaft.

**55 Claims, 24 Drawing Sheets**



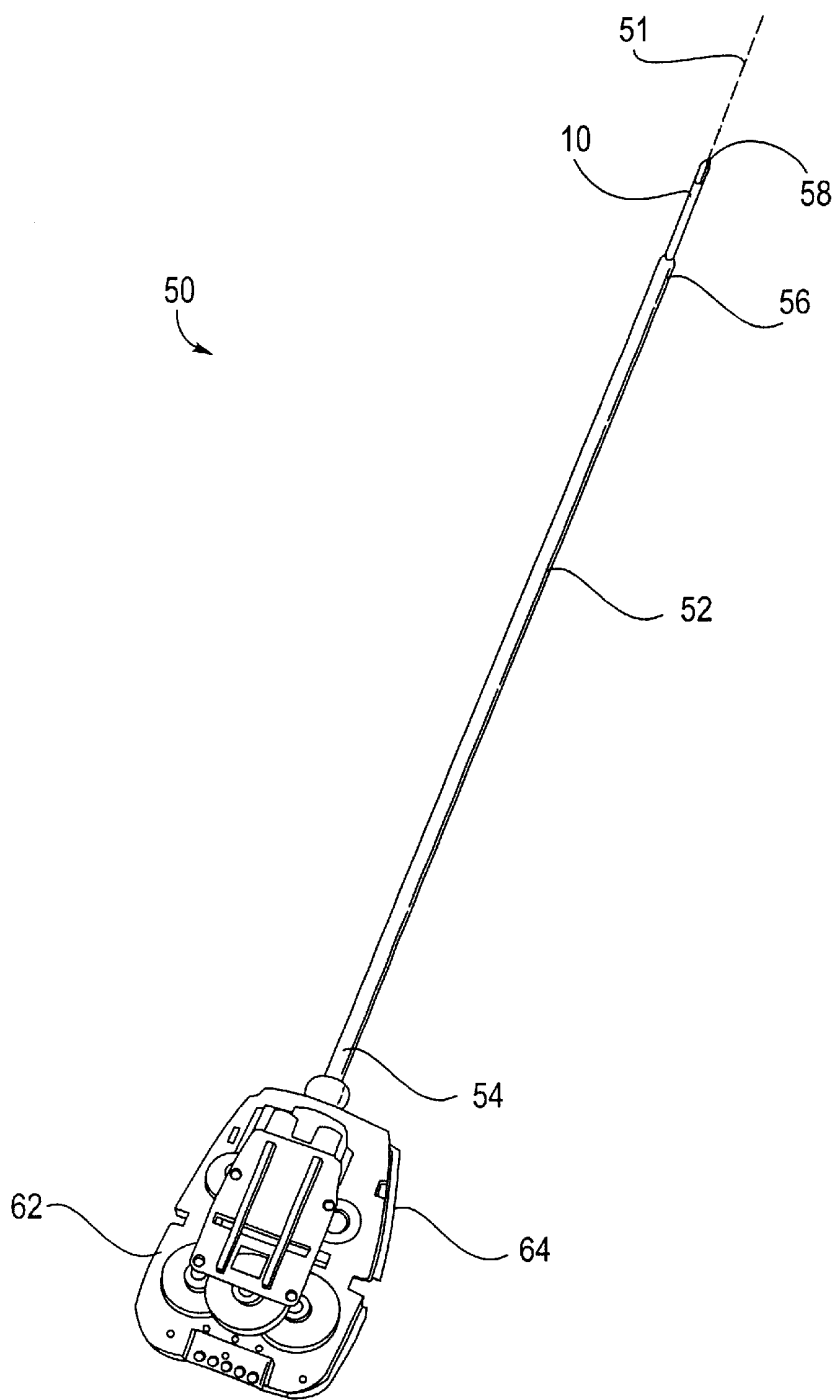


Fig. 1

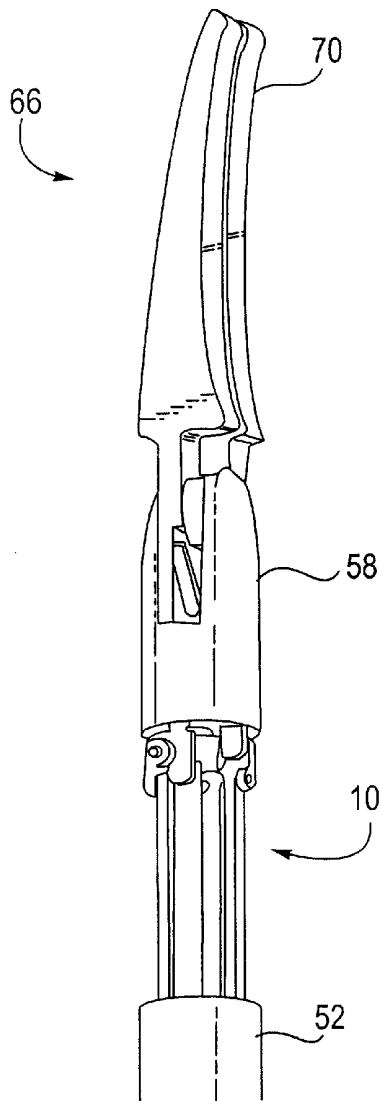


Fig. 2A

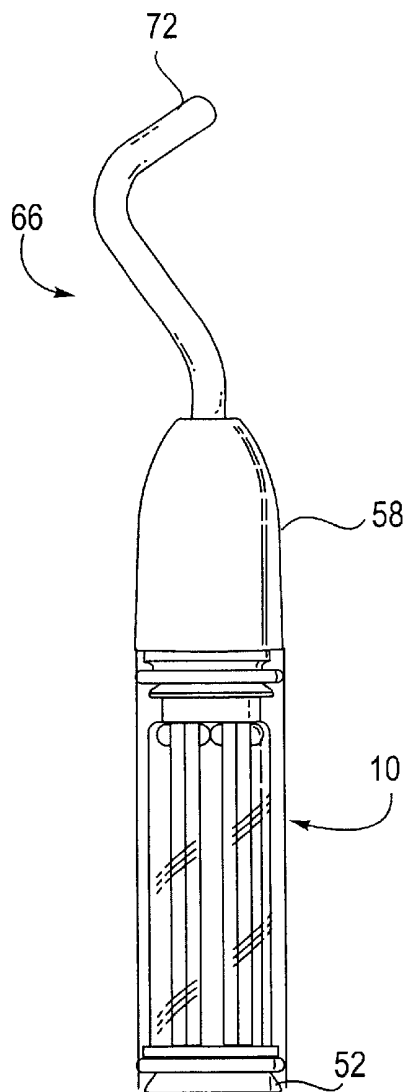


Fig. 2B

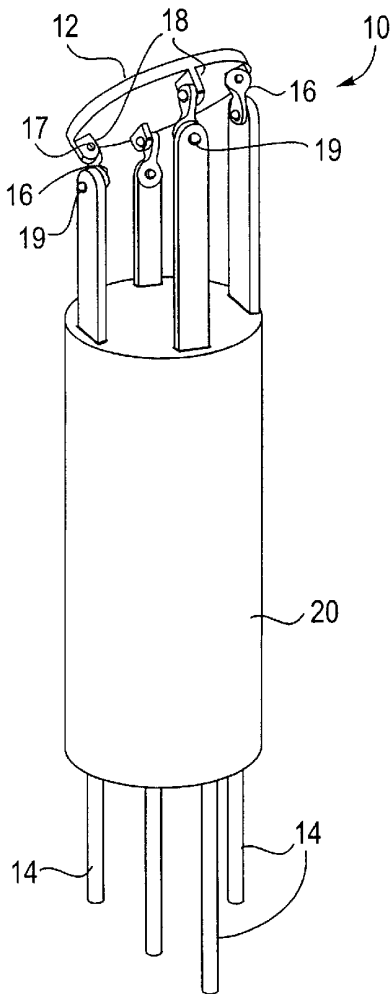


Fig. 3

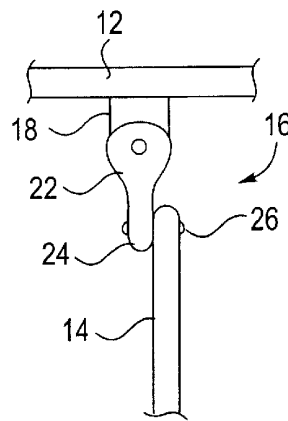


Fig. 3C

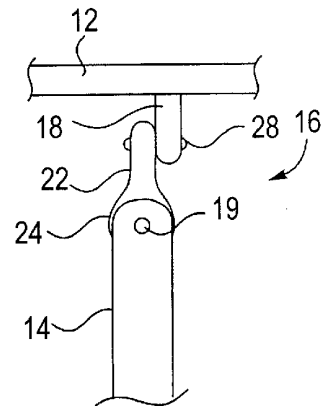


Fig. 3D

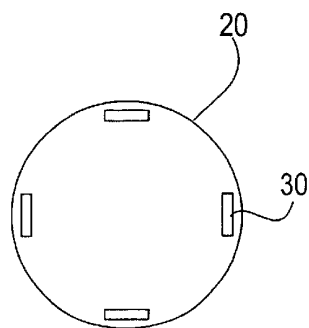


Fig. 3A

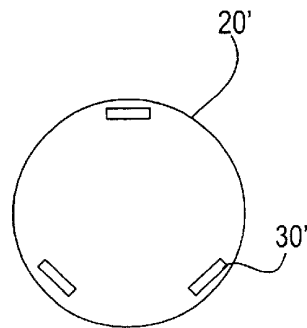


Fig. 3B

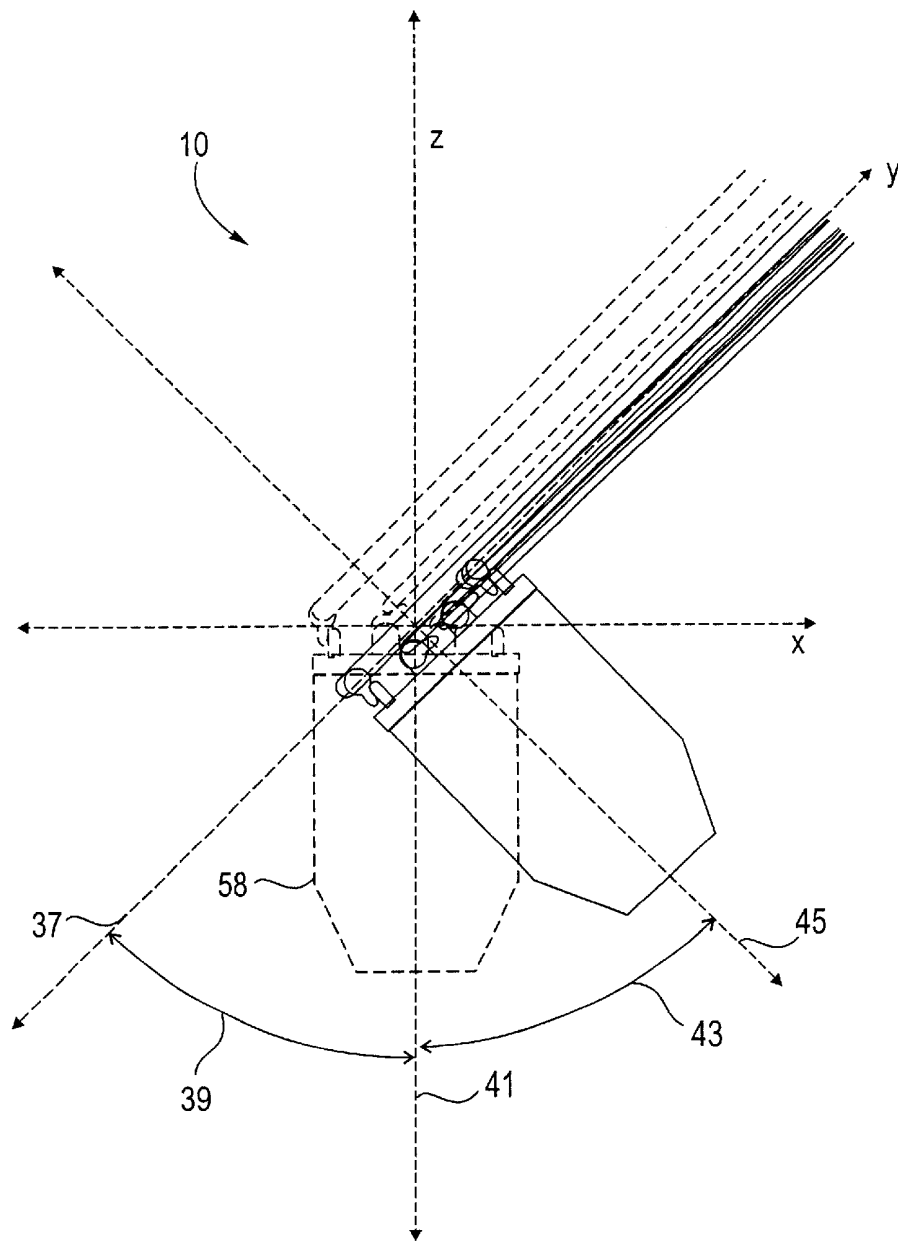


Fig. 4

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