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(54) **CURVED CANNULA SURGICAL SYSTEM**

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(63) Continuation-in-part of application No. 12/618,549, filed on Nov. 13, 2009, now abandoned.

*Primary Examiner* — Gary Jackson

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*Assistant Examiner* — Katrina Stransky

(51) **Int. Cl.**  
**A61B 19/00** (2006.01)

(52) **U.S. Cl.**  
USPC ..... **606/130**; 606/1; 600/184

(57) **ABSTRACT**

(58) **Field of Classification Search**  
USPC ..... 606/130, 1; 414/1; 600/184  
See application file for complete search history.

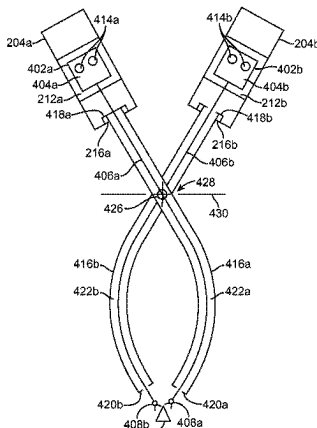
A robotic surgical system is configured with rigid, curved cannulas that extend through the same opening into a patient's body. Surgical instruments with passively flexible shafts extend through the curved cannulas. The cannulas are oriented to direct the instruments towards a surgical site. Various port features that support the curved cannulas within the single opening are disclosed. Cannula support fixtures that support the cannulas during insertion into the single opening and mounting to robotic manipulators are disclosed. A teleoperation control system that moves the curved cannulas and their associated instruments in a manner that allows a surgeon to experience intuitive control is disclosed.

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**26 Claims, 41 Drawing Sheets**



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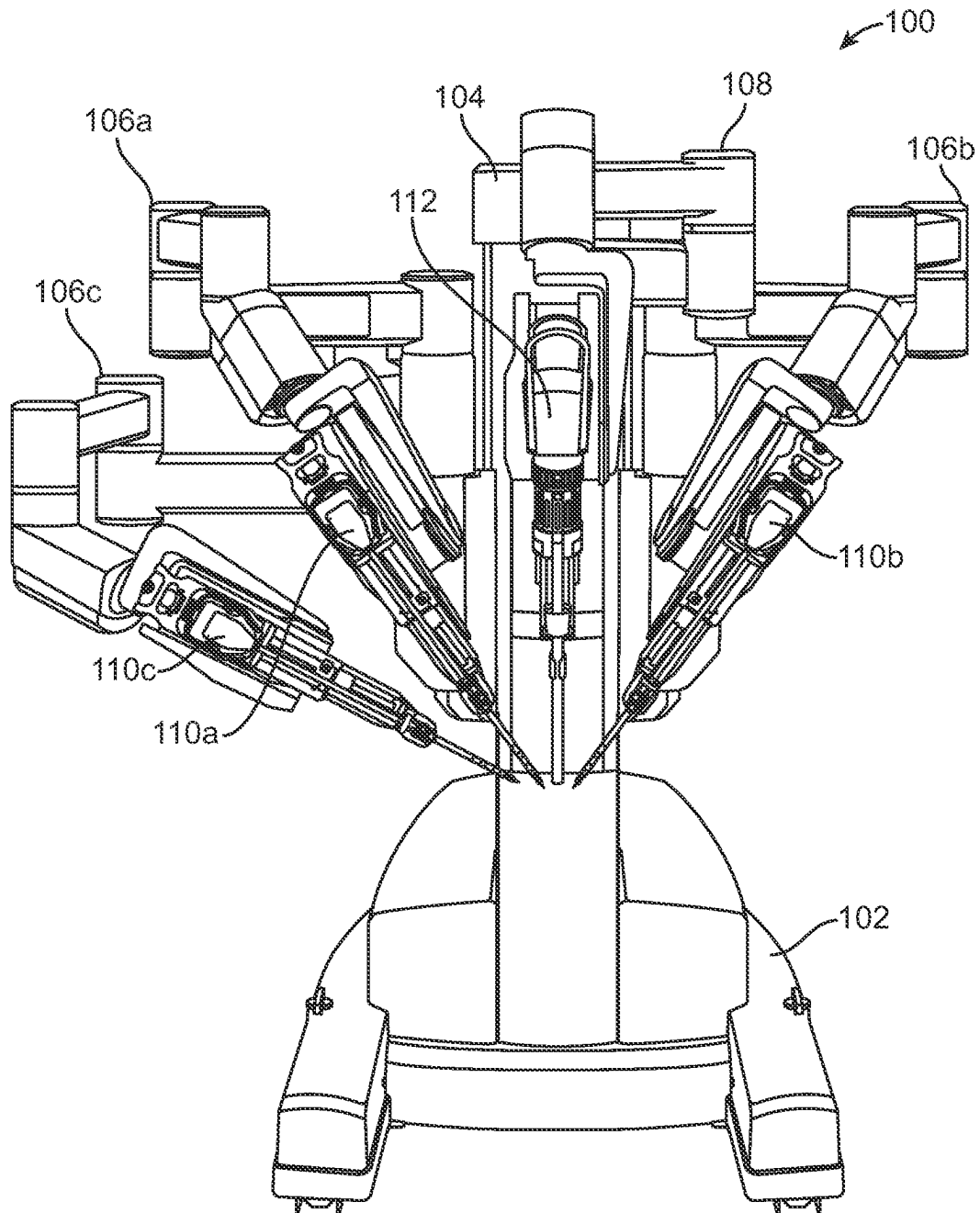


FIG. 1A

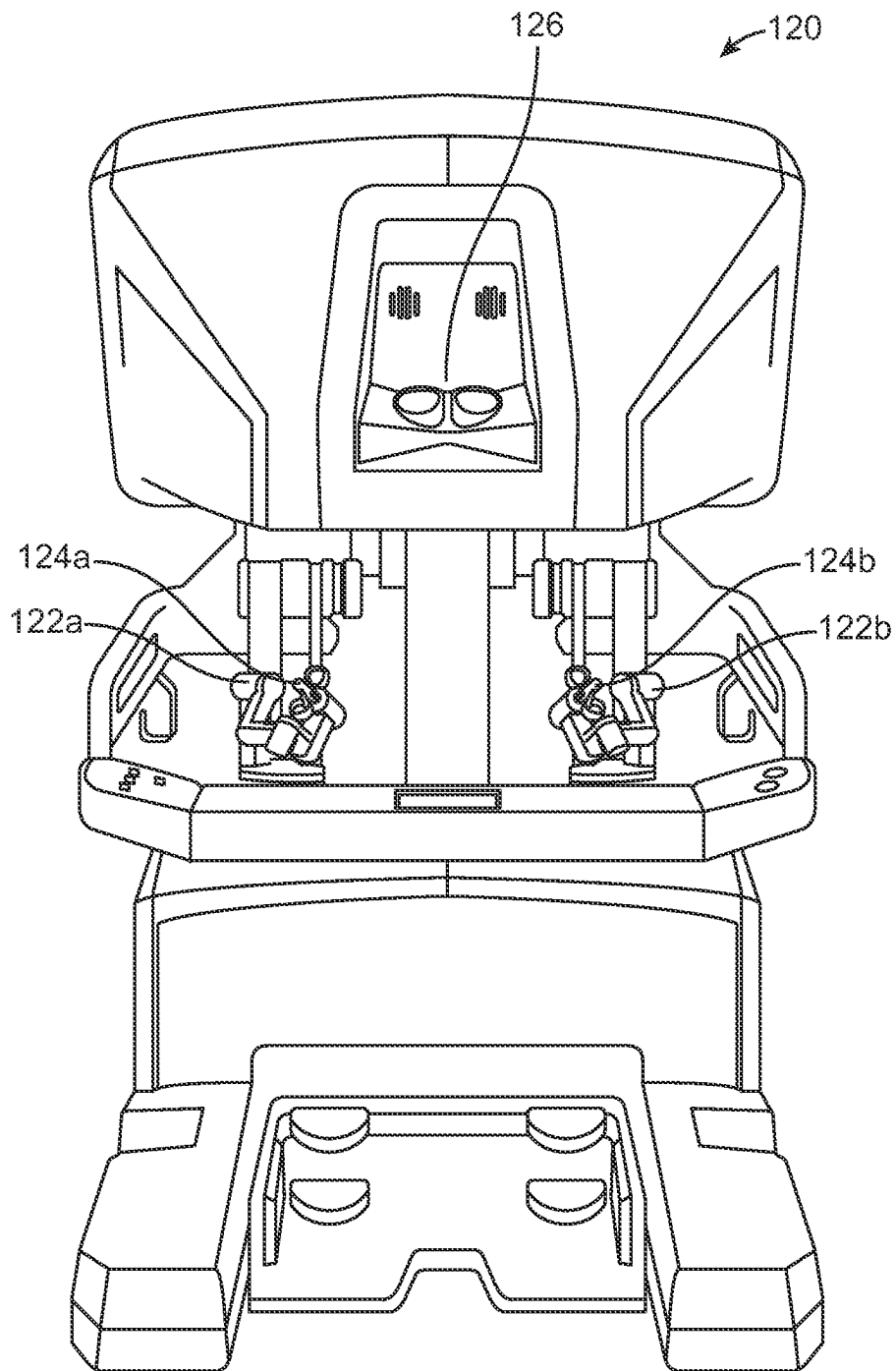


FIG. 1B

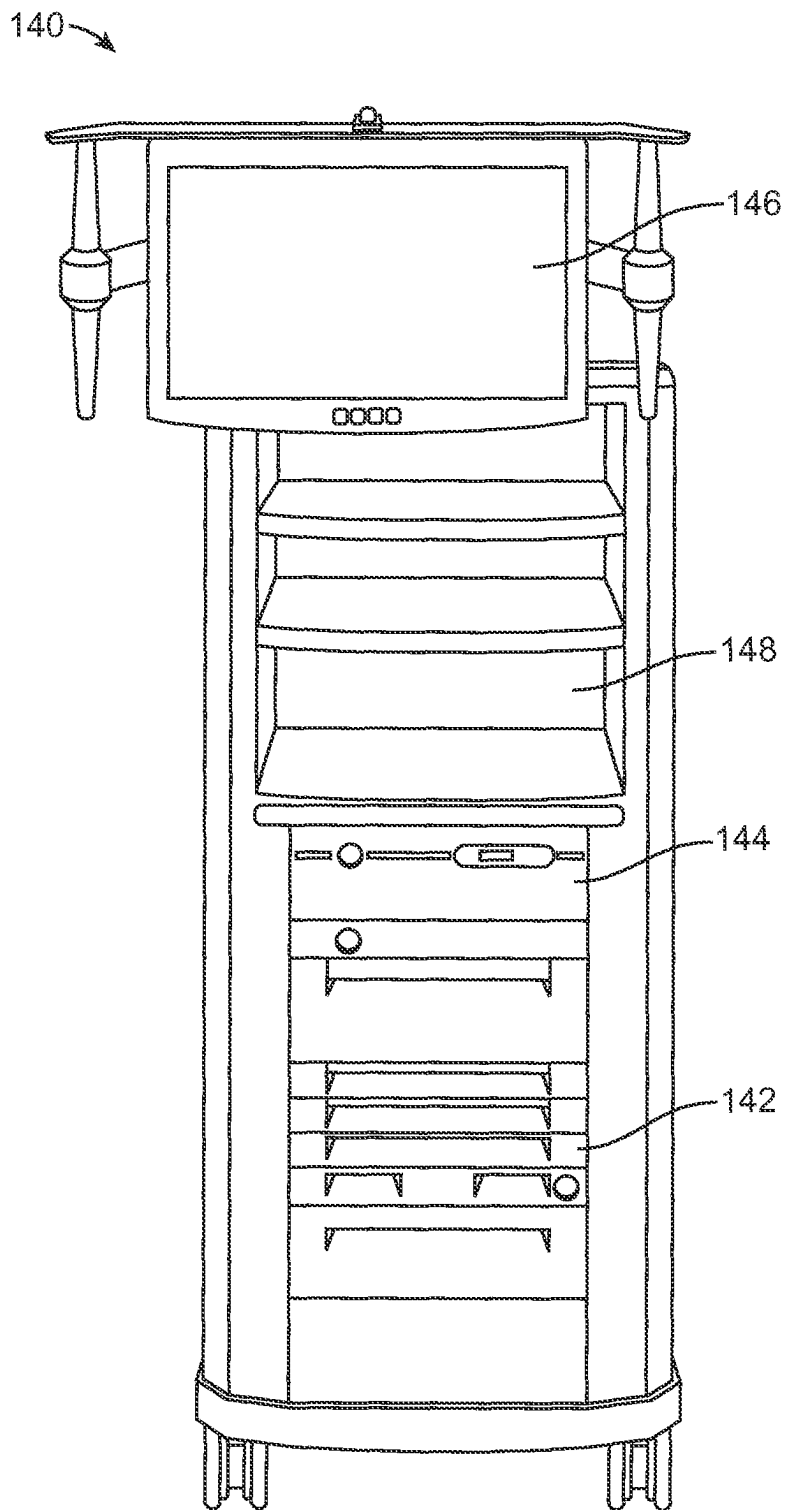


FIG. 1C

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