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Prisco et al.

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(54) **CURVED CANNULA SURGICAL SYSTEM**

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(75) Inventors: **Giuseppe Maria Prisco**, Mountain View, CA (US); **Craig R. Gerbi**, Half Moon Bay, CA (US); **Theodore W. Rogers**, Alameda, CA (US); **John Ryan Steger**, Sunnyvale, CA (US)

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(73) Assignee: **Intuitive Surgical Operations, Inc.**, Sunnyvale, CA (US)

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(65) **Prior Publication Data**

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Related U.S. Application Data

Primary Examiner — Gary Jackson

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Assistant Examiner — Katrina Stransky

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(57) **ABSTRACT**

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

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.

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

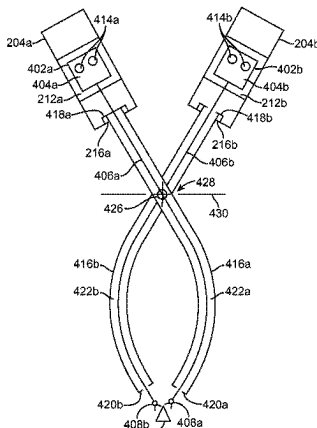
(58) **Field of Classification Search**
USPC 606/130, 1; 414/1; 600/184
See application file for complete search history.

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26 Claims, 41 Drawing Sheets



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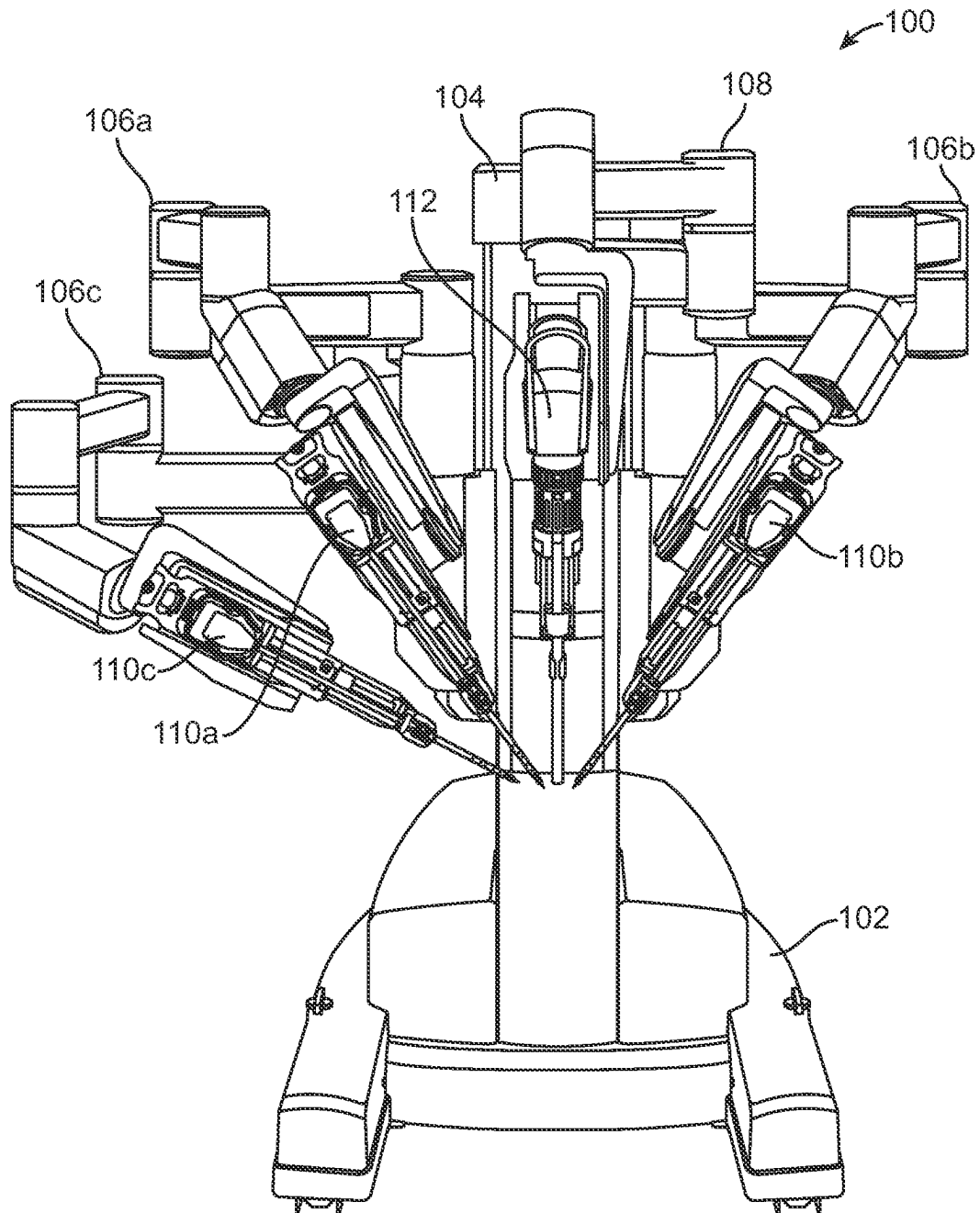


FIG. 1A

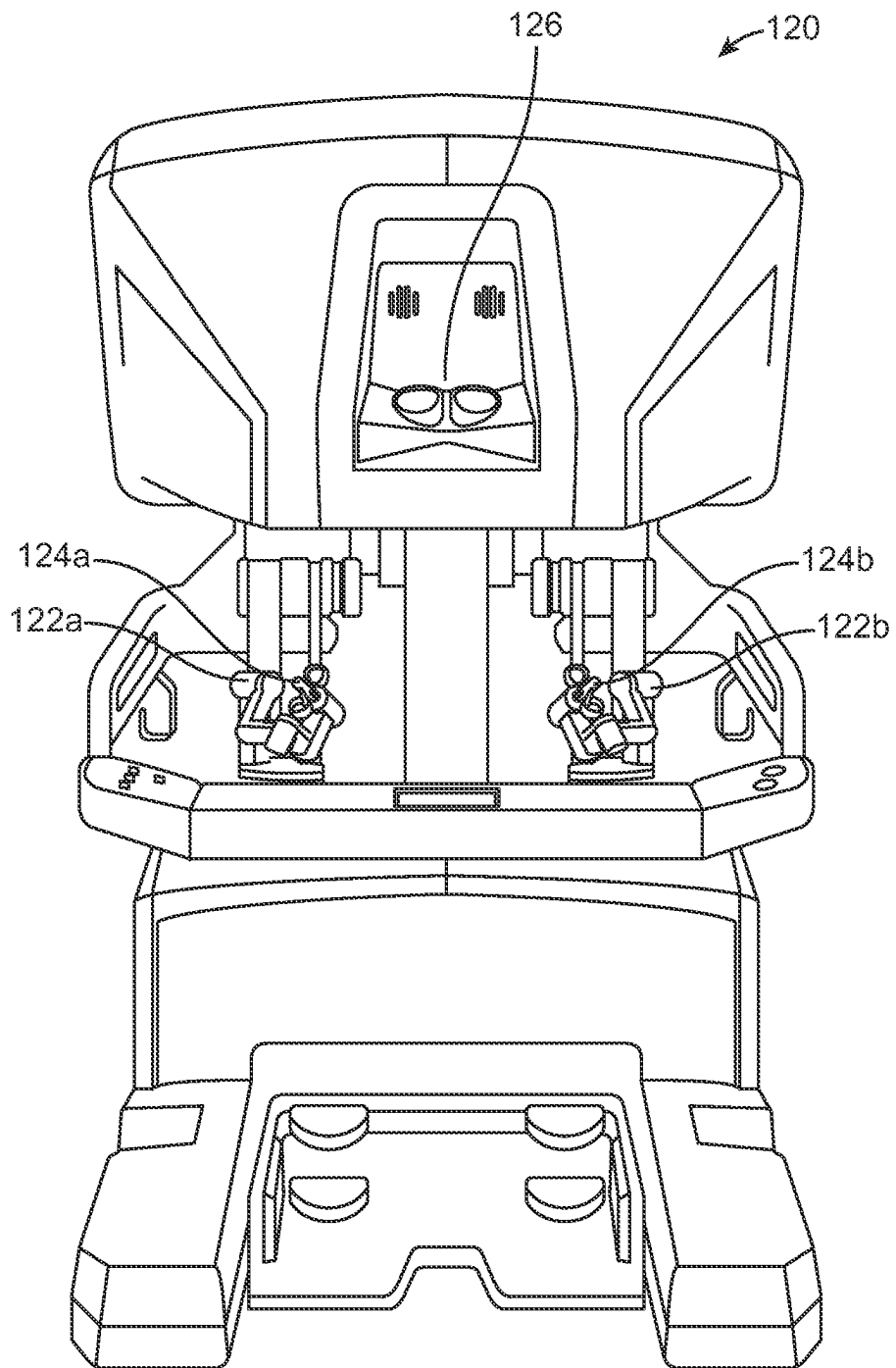


FIG. 1B

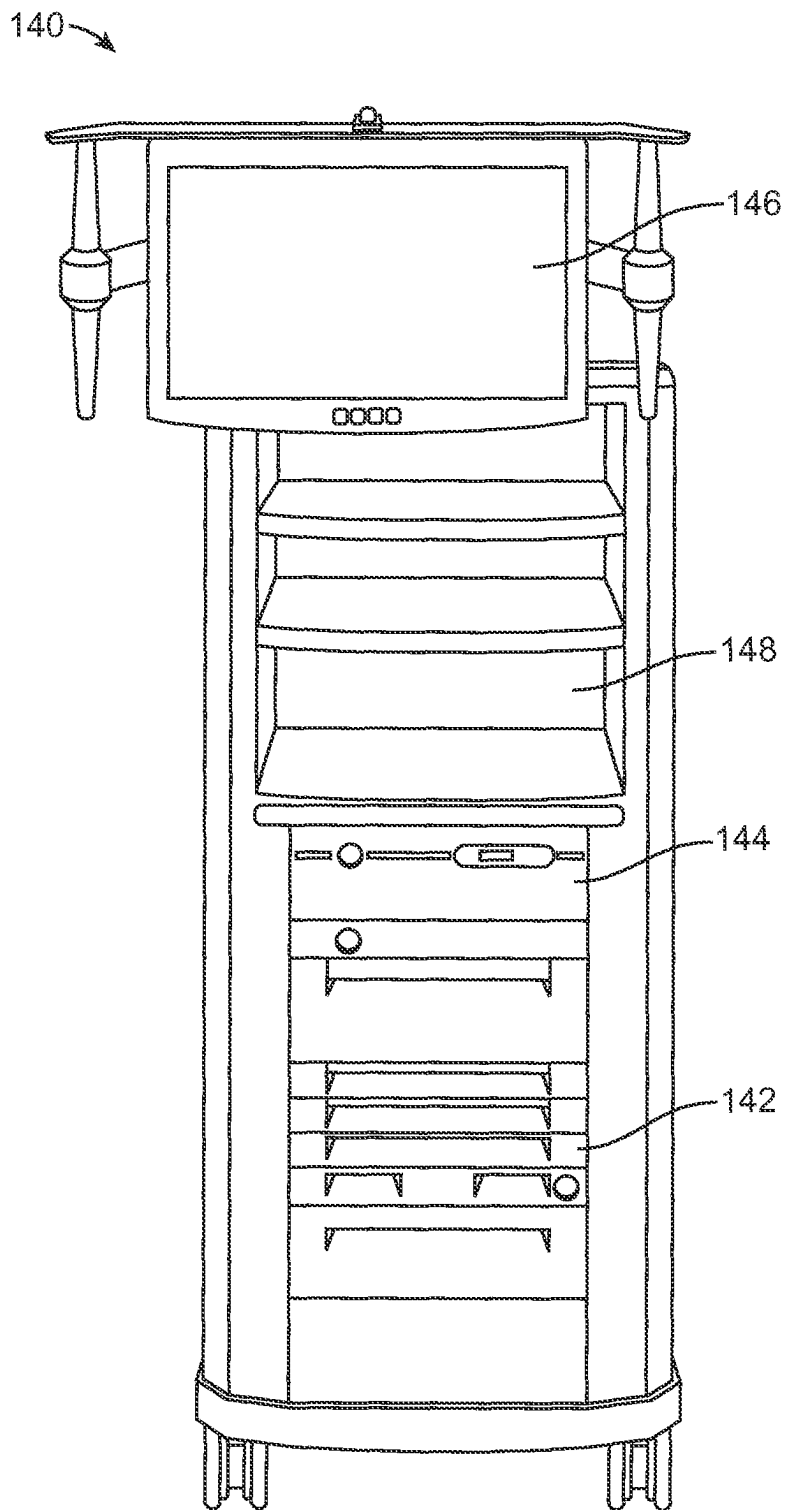


FIG. 1C

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