(54)   ESTIMATION OF A POSITION AND ORIENTATION OF A FRAME USED IN CONTROLLING
         MOVEMENT OF A TOOL

(57)   A robotic system includes a camera having an image frame whose position and orientation relative to a fixed frame is determinable through one or more image frame transforms, a tool disposed within a field of view of the camera and having a tool frame whose position and orientation relative to the fixed frame is determinable through one or more tool frame transforms, and at least one processor programmed to identify pose indicating points of the tool from one or more camera captured images, determine an estimated transform for an unknown one of the image and tool frame transforms using the identified pose indicating points and known ones of the image and tool frame transforms, update a master-to-tool transform using the estimated and known ones of the image and tool frame transforms, and command movement of the tool in response to movement of a master using the updated master-to-tool transform.
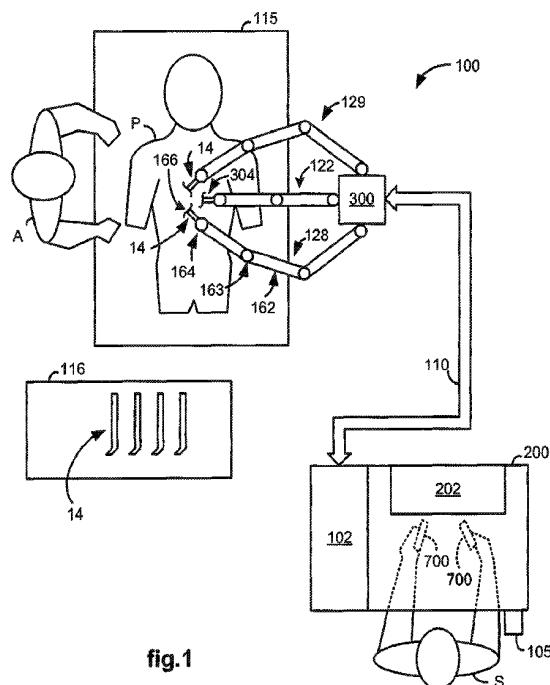
fig.1

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