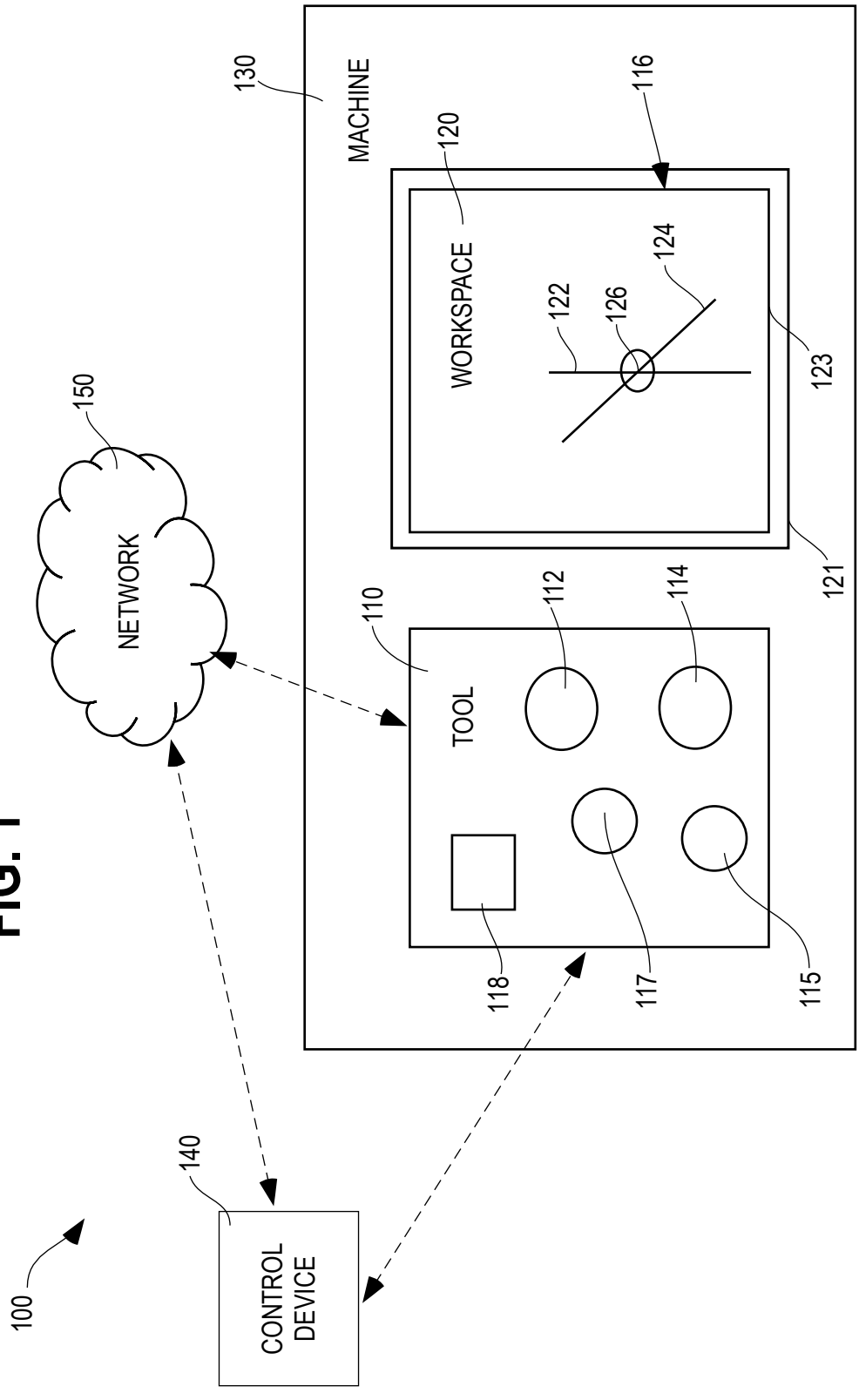
FIG. 1


100
CONTROL DEVICE
140
NETWORK
150
MACHINE
130
WORKSPACE
120
116
122
126
124
123
121
TOOL
110
112
114
118
117
115

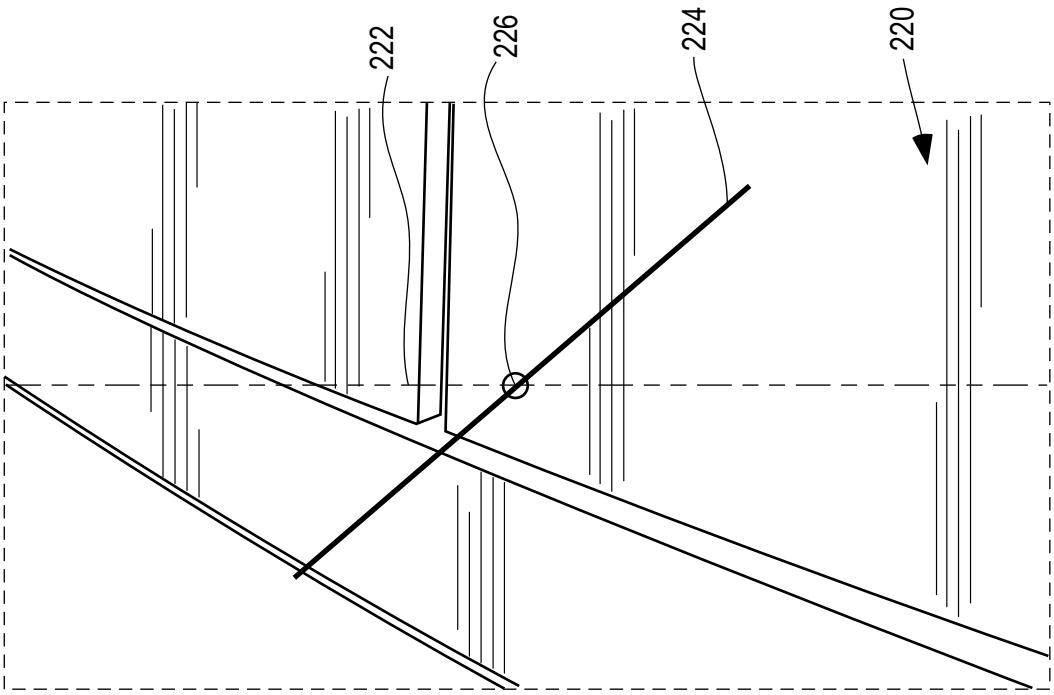


FIG. 2

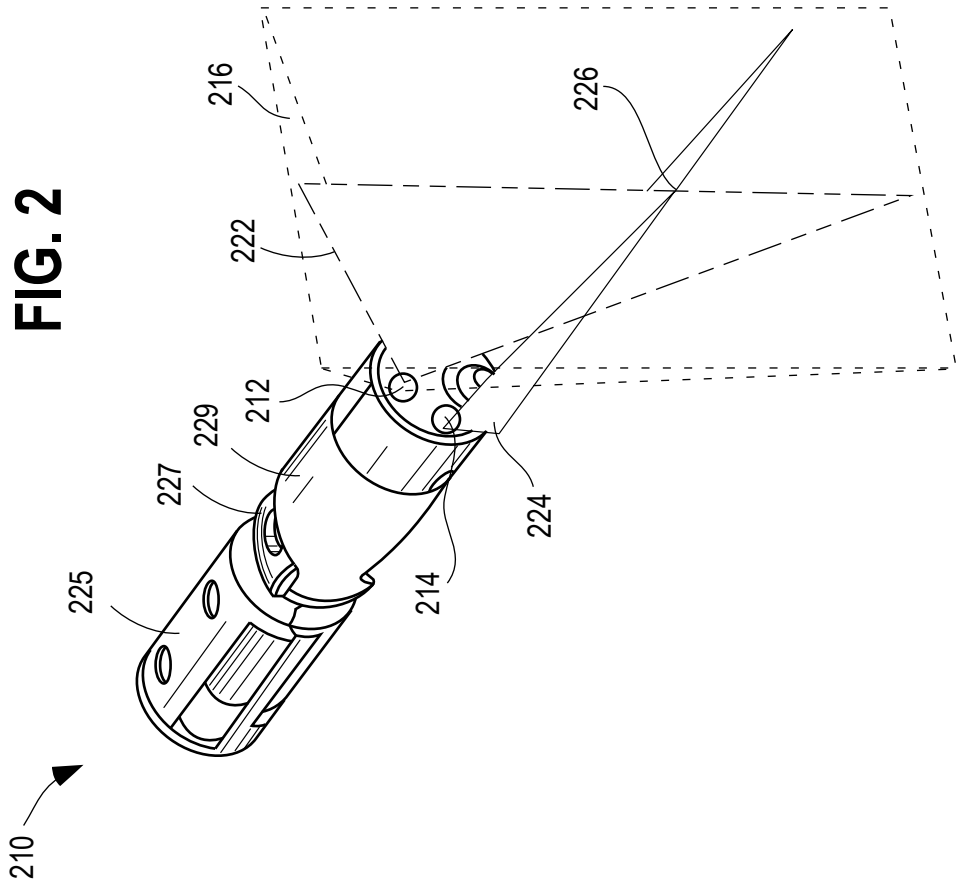
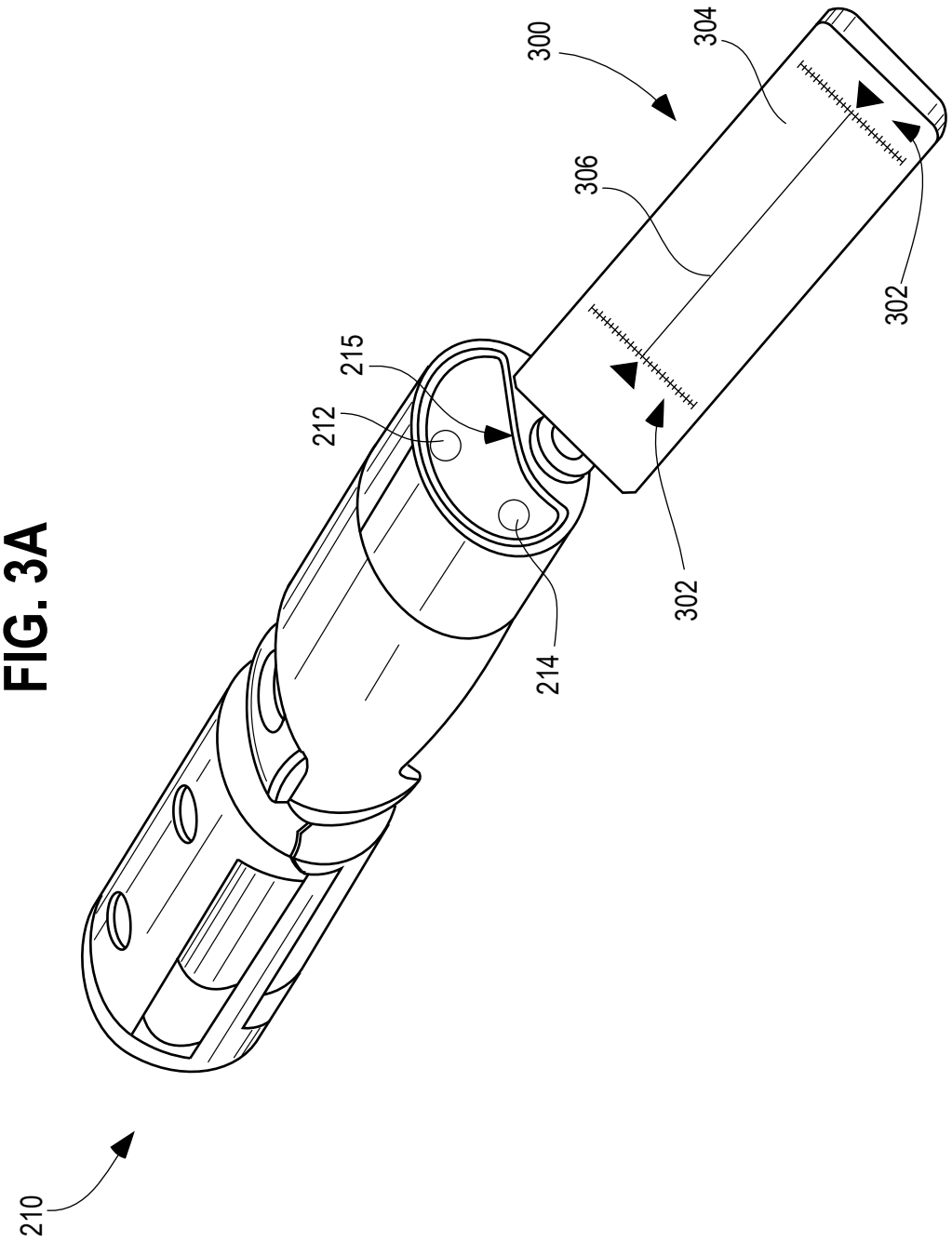


FIG. 3A



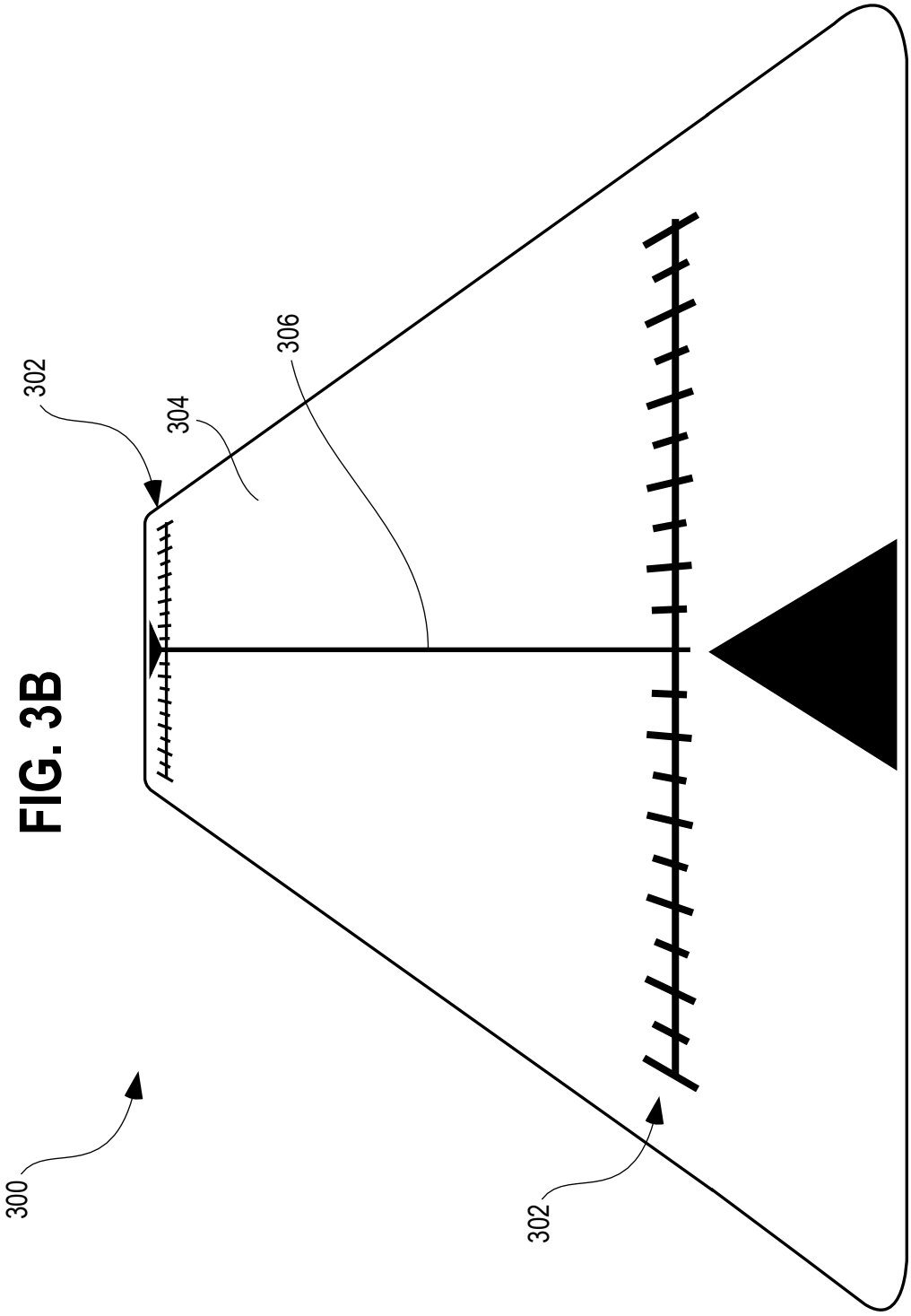


FIG. 3B

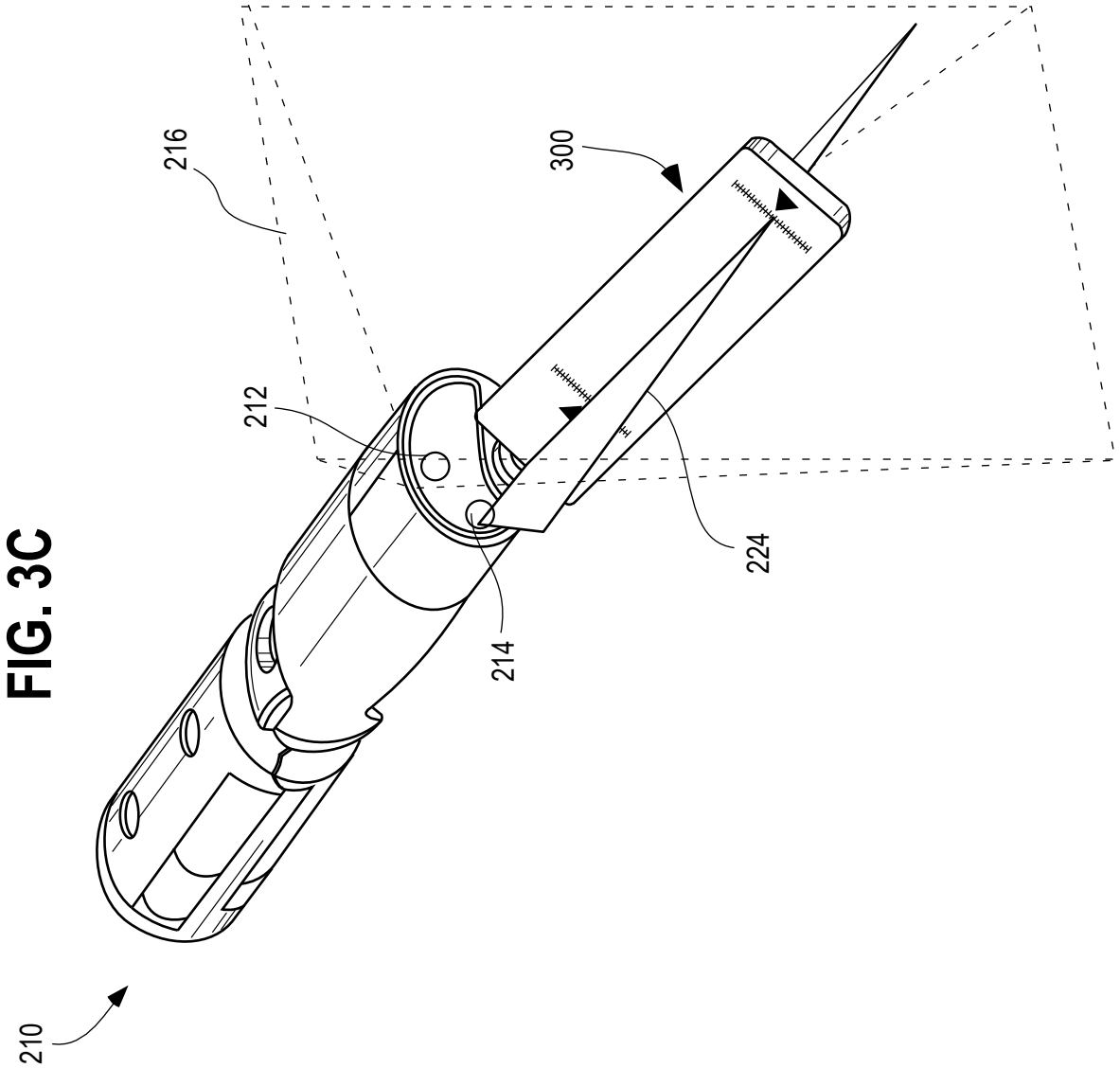


FIG. 3C

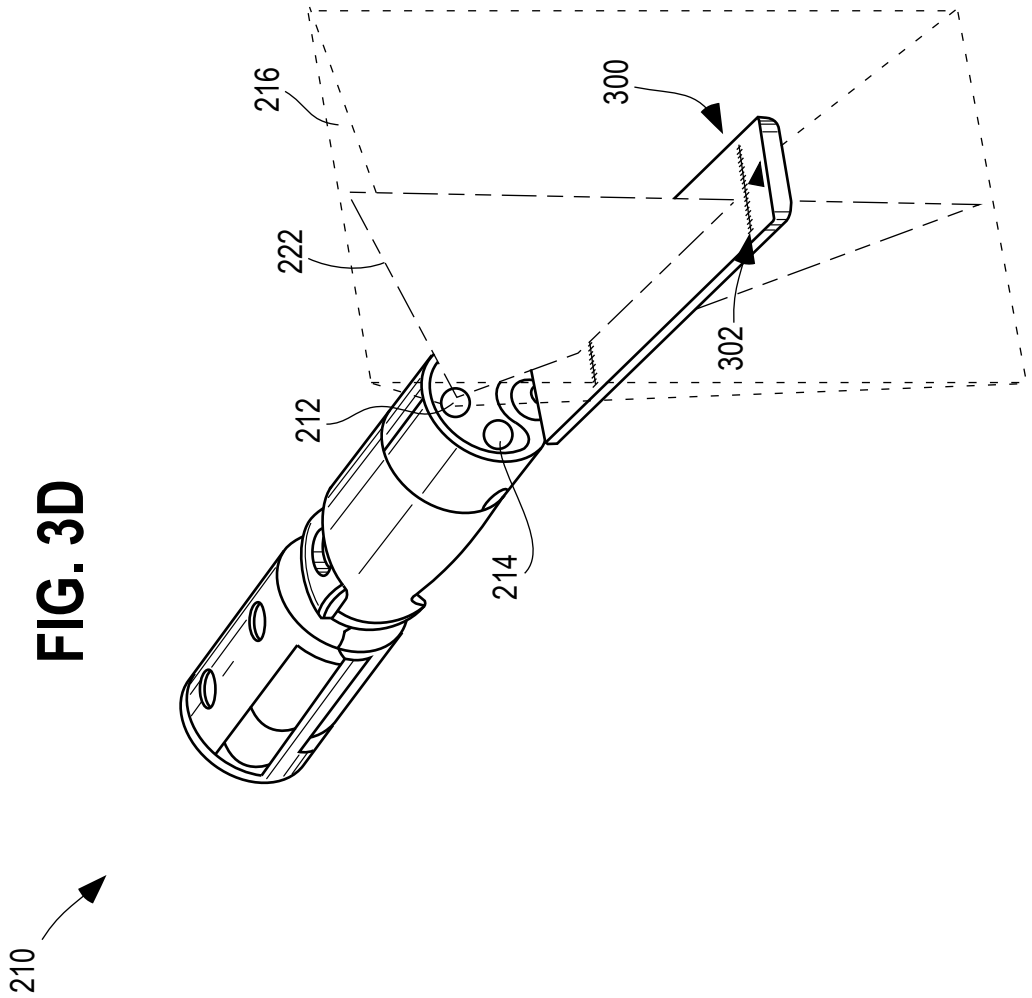


FIG. 3D

FIG. 4

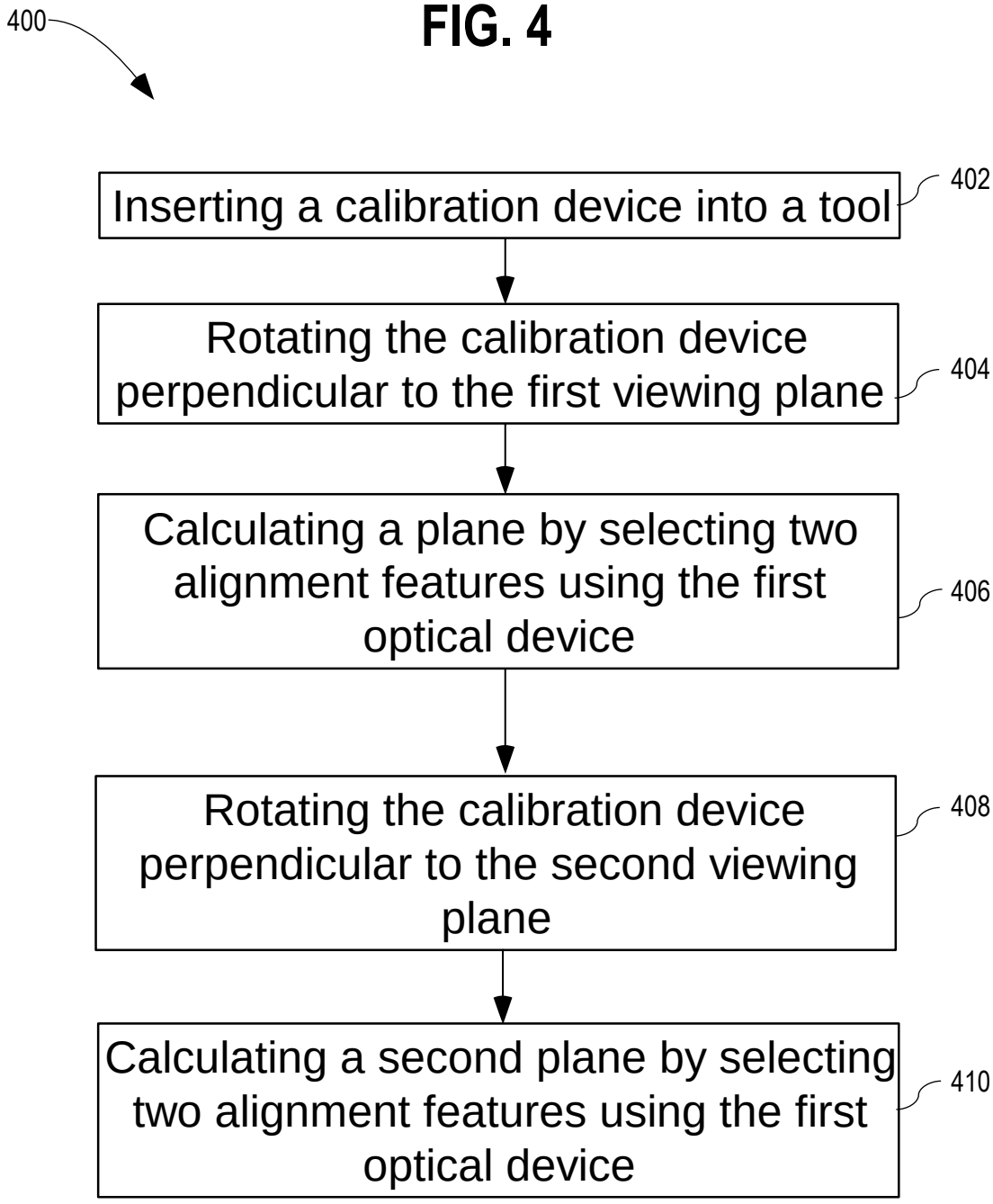

400
Inserting a calibration device into a tool
402
Rotating the calibration device perpendicular to the first viewing plane
404
Calculating a plane by selecting two alignment features using the first optical device
406
Rotating the calibration device perpendicular to the second viewing plane
408
Calculating a second plane by selecting two alignment features using the first optical device
410

FIG. 5

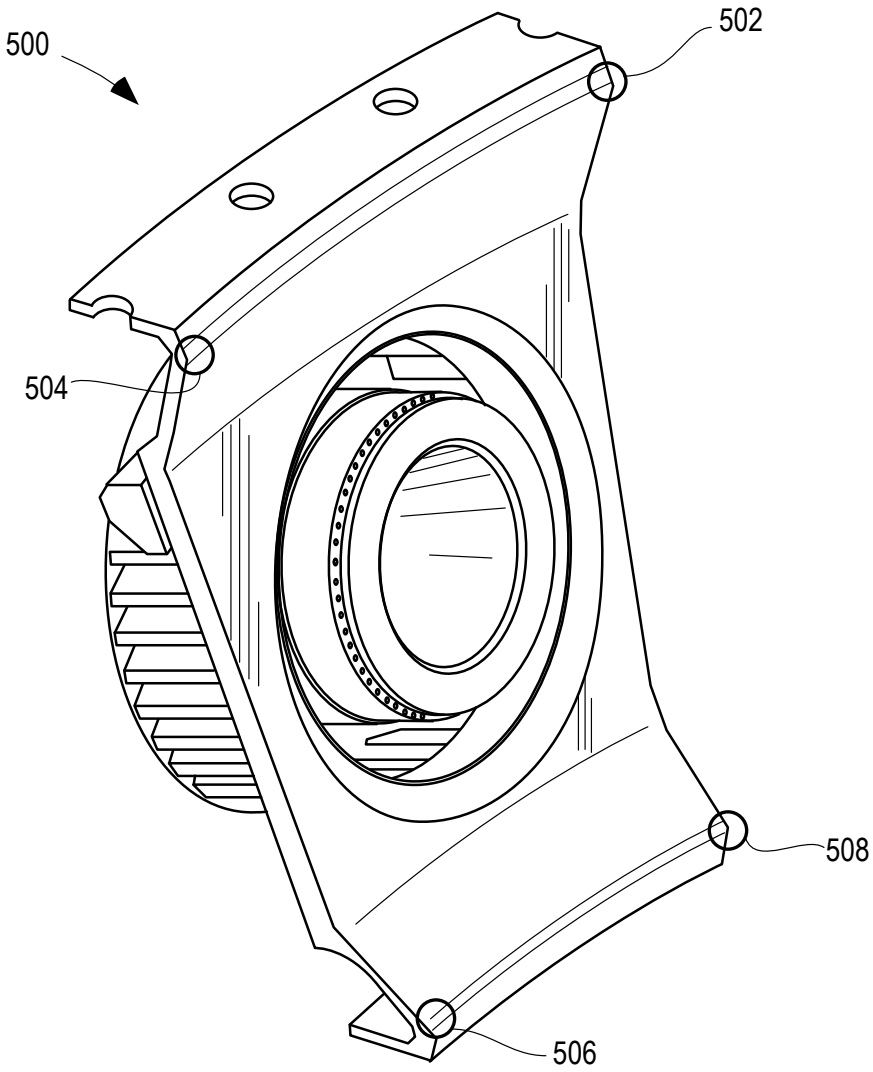
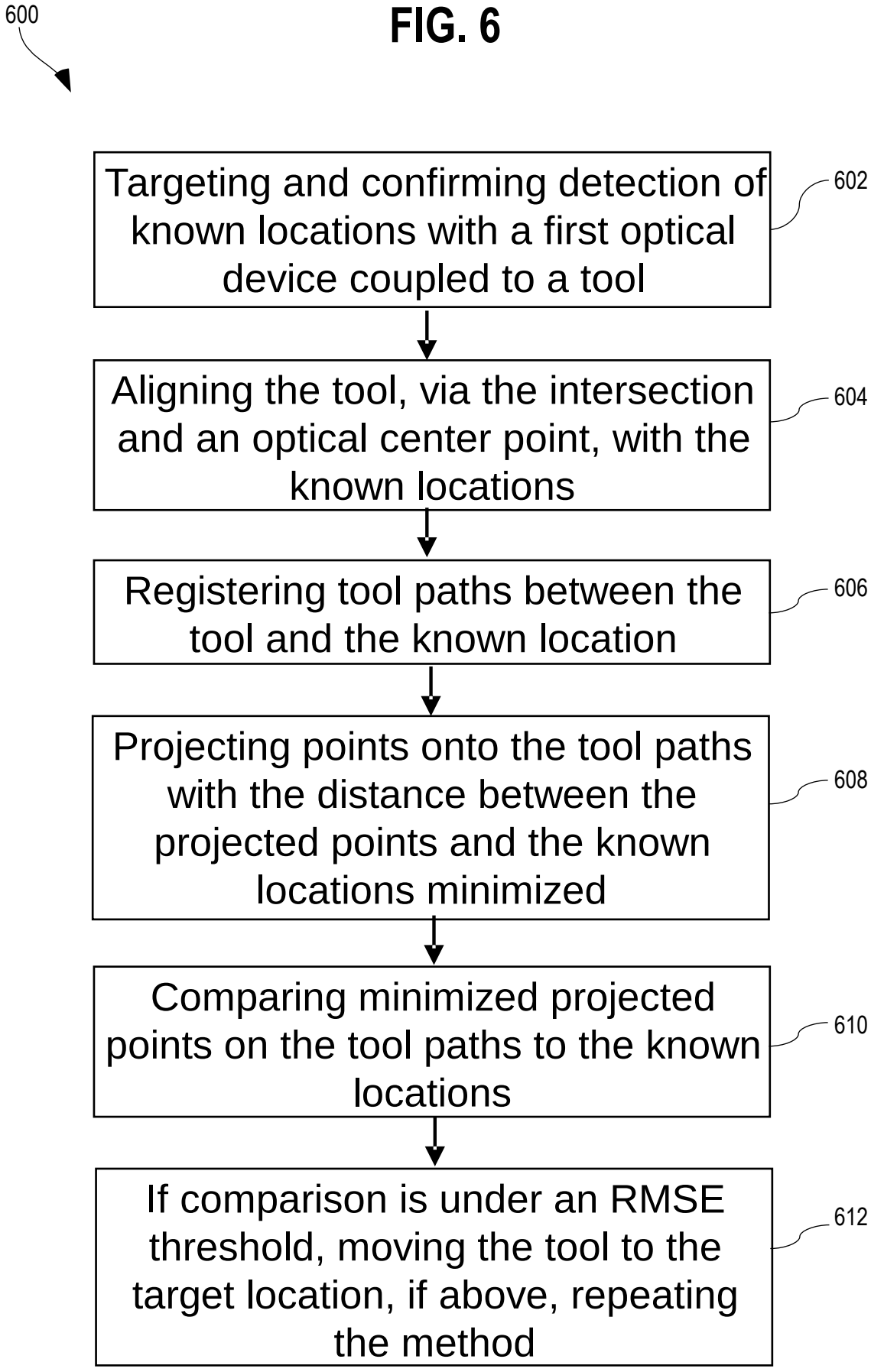


FIG. 6


600
Targeting and confirming detection of known locations with a first optical device coupled to a tool
602
Aligning the tool, via the intersection and an optical center point, with the known locations
604
Registering tool paths between the tool and the known location
606
Projecting points onto the tool paths with the distance between the projected points and the known locations minimized
608
Comparing minimized projected points on the tool paths to the known locations
610
If comparison is under an RMSE threshold, moving the tool to the target location, if above, repeating the method
612