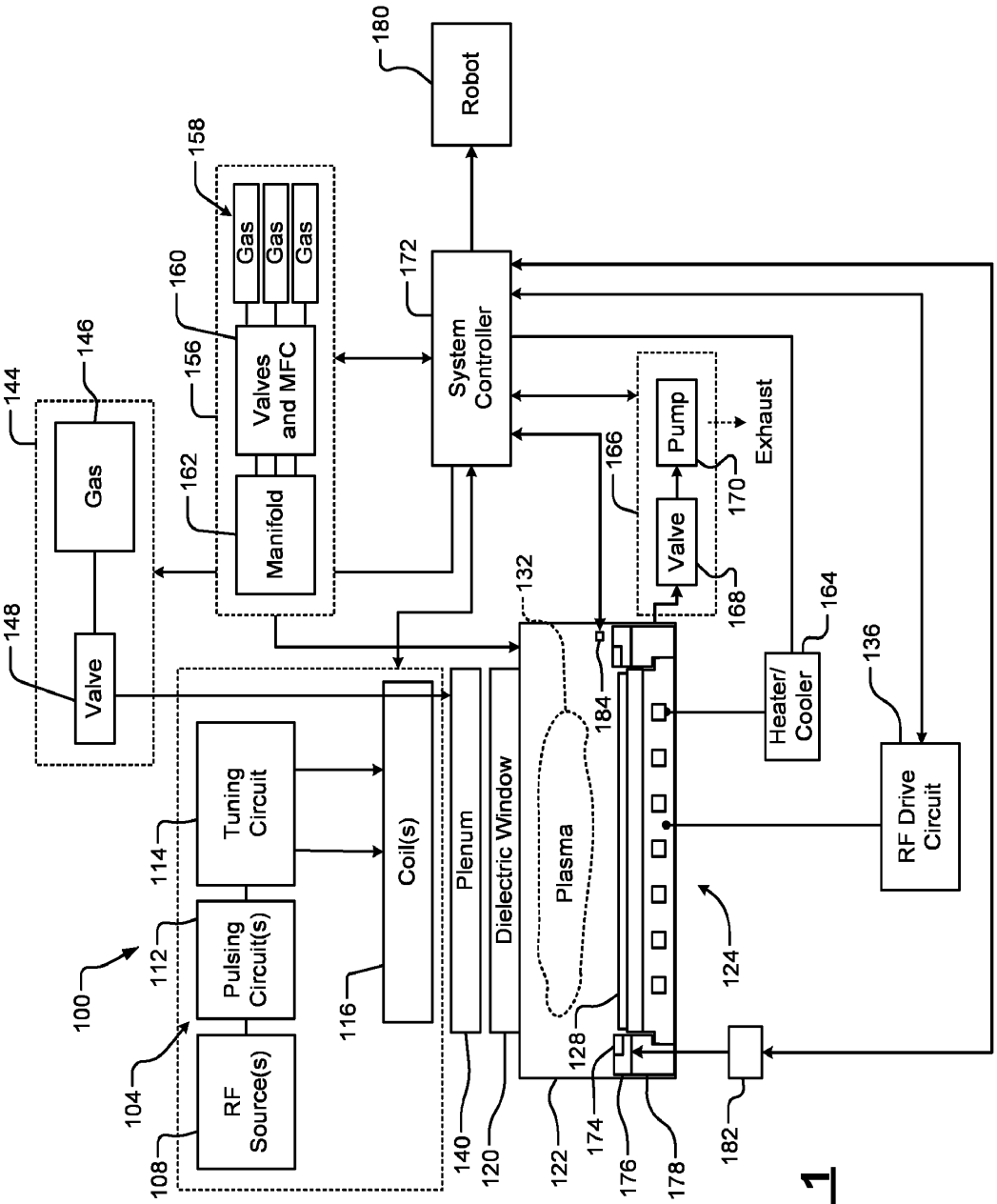

Robot
180
Gas
Gas
Gas
158
160
156
Valves and MFC
162
Manifold
System Controller
172
146
144
Gas
148
Valve
Pump
Exhaust
166
170
Valve
168
132
164
Heater/ Cooler
136
RF Drive Circuit
Tuning Circuit
114
Pulsing Circuit(s)
112
RF Source(s)
104
108
100
Coil(s)
116
Plenum
140
Dielectric Window
120
Plasma
184
128
122
174
176
178
124
182

FIG. 1

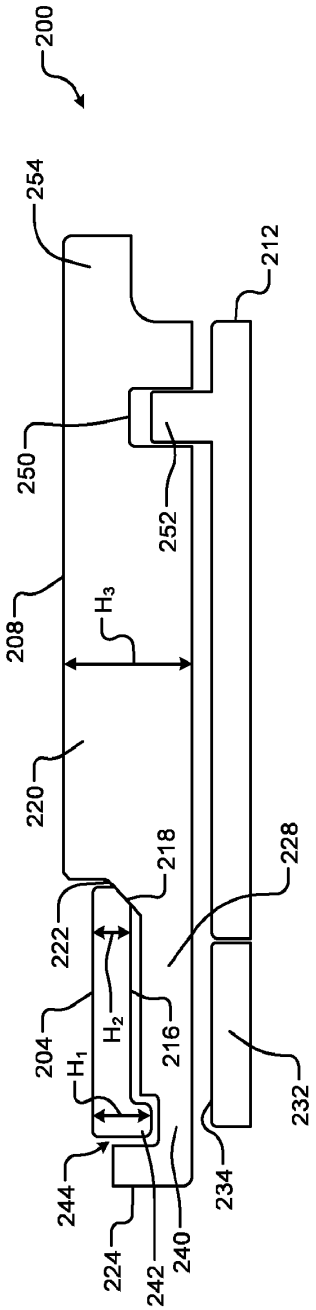


FIG. 2A

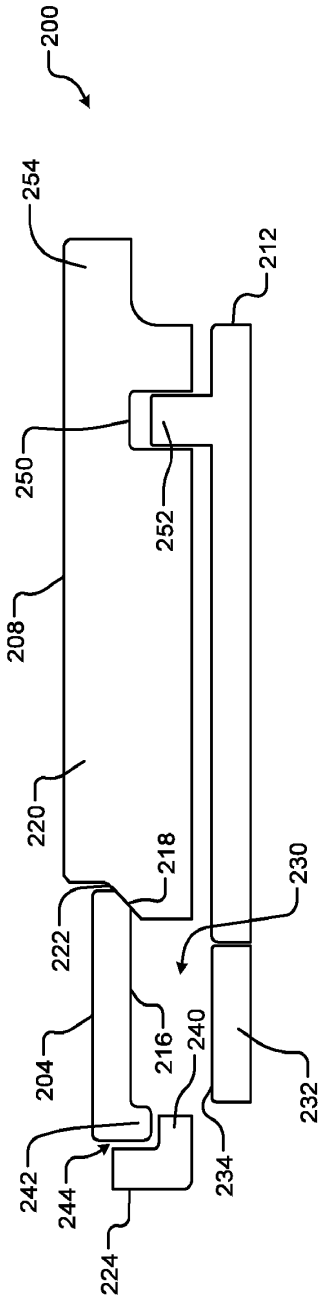


FIG. 2B

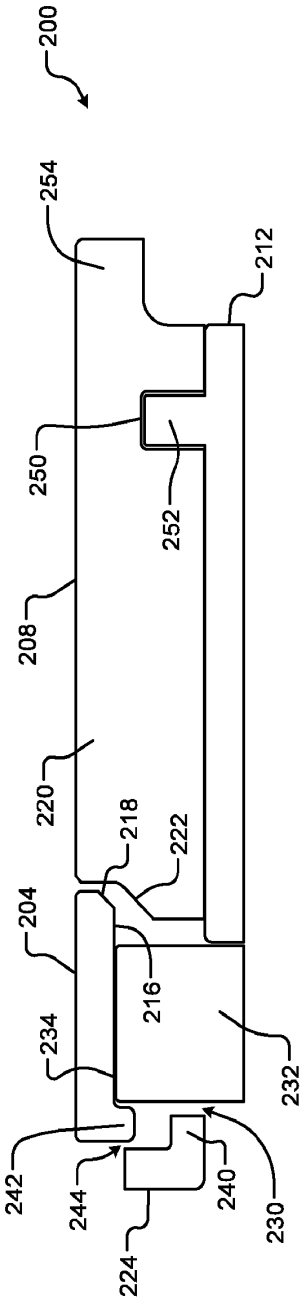


FIG. 2C

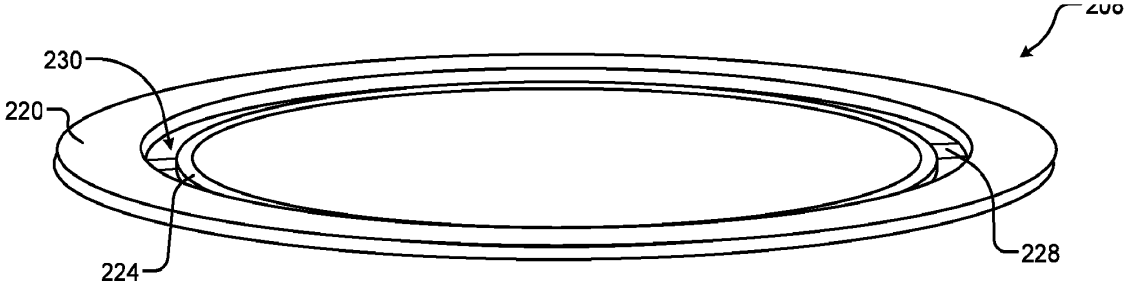


FIG. 2D

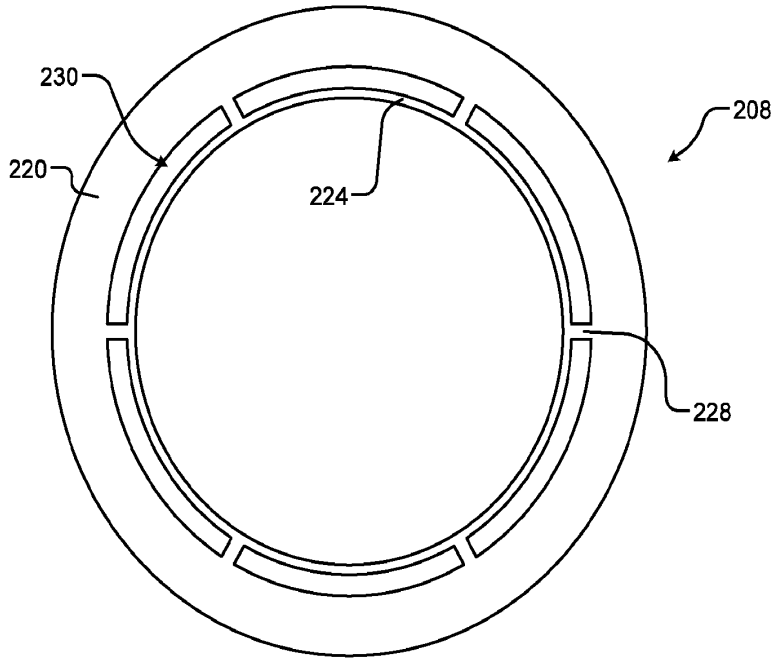


FIG. 2E

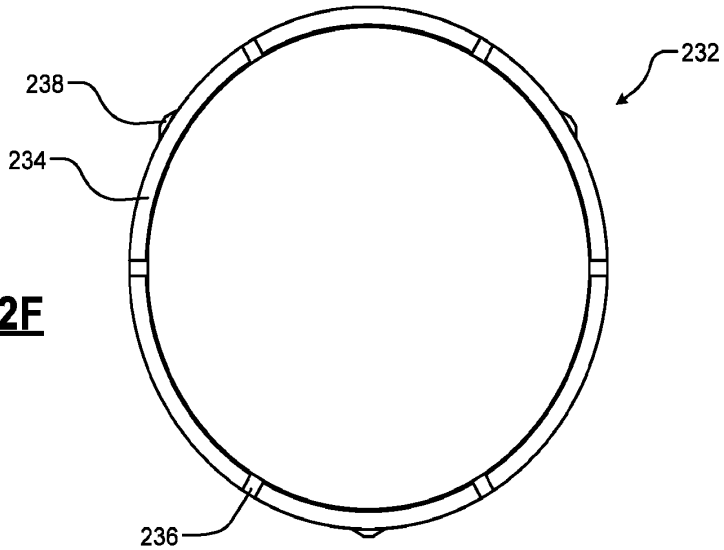


FIG. 2F

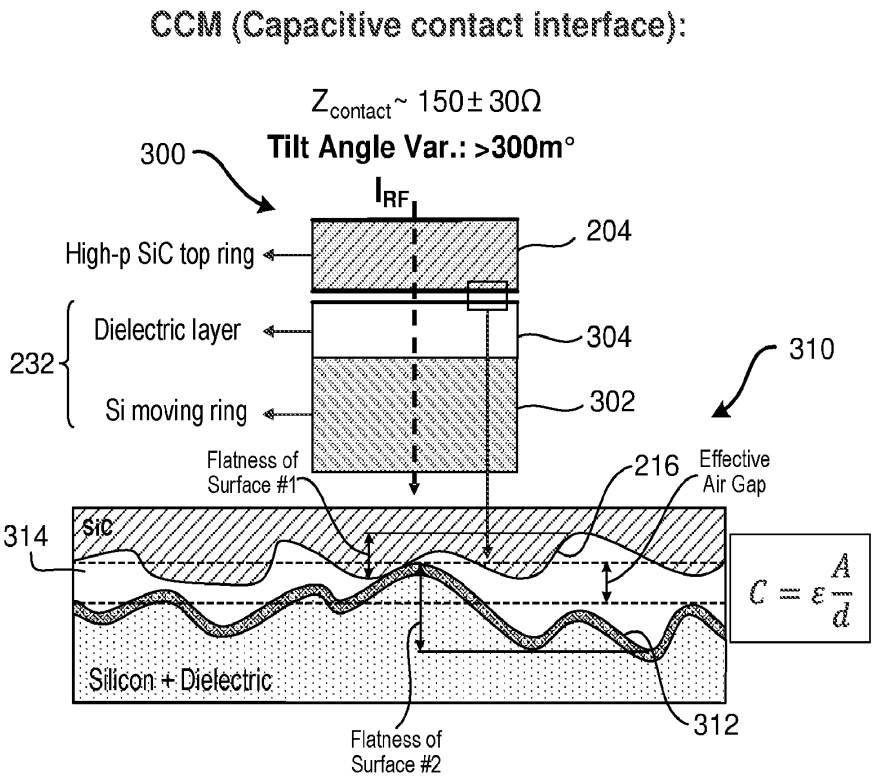

CCM (Capacitive contact interface):
$Z_{contact}$ ~ 150 ± 30Ω
Tilt Angle Var.: >300m°
300
I_{RF}
204
High-p SiC top ring
Dielectric layer
304
232
Si moving ring
302
310
Flatness of Surface #1
216
Effective Air Gap
314
SiC
$C = \varepsilon \frac{A}{d}$
Silicon + Dielectric
312
Flatness of Surface #2

FIG. 3A

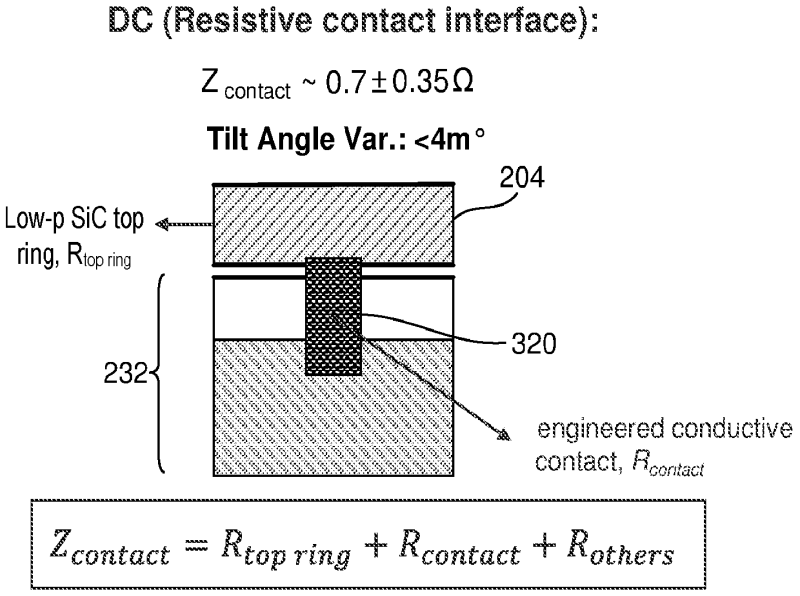

DC (Resistive contact interface):
$Z_{contact}$ ~ 0.7 ± 0.35Ω
Tilt Angle Var.: <4m°
204
Low-p SiC top ring, $R_{top\ ring}$
320
232
engineered conductive contact, $R_{contact}$
$Z_{contact} = R_{top\ ring} + R_{contact} + R_{others}$

FIG. 3B

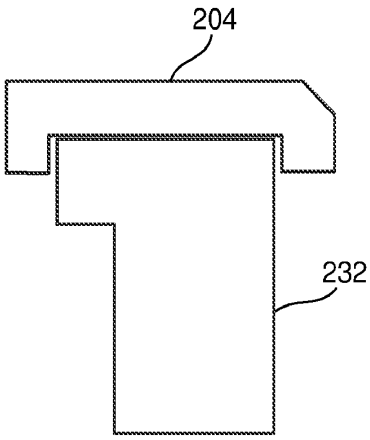


FIG. 4A

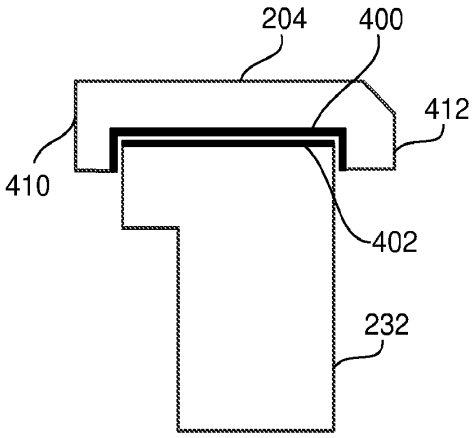


FIG. 4B

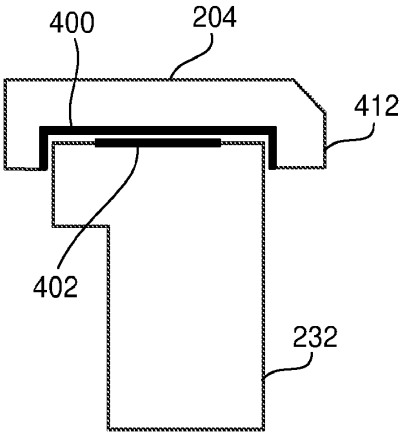


FIG. 4C

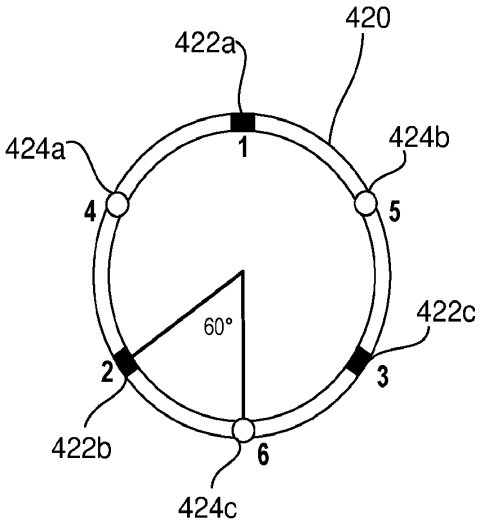


FIG. 4D

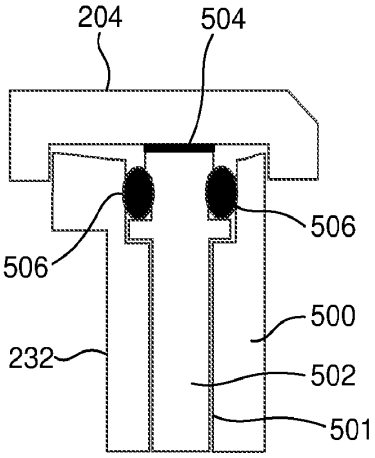


FIG. 5A

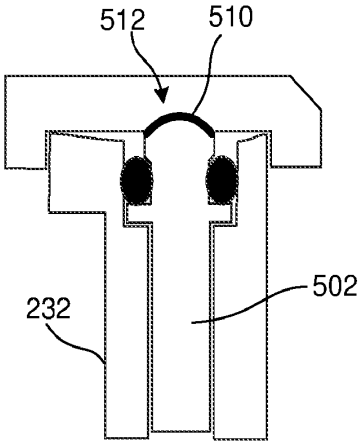


FIG. 5B

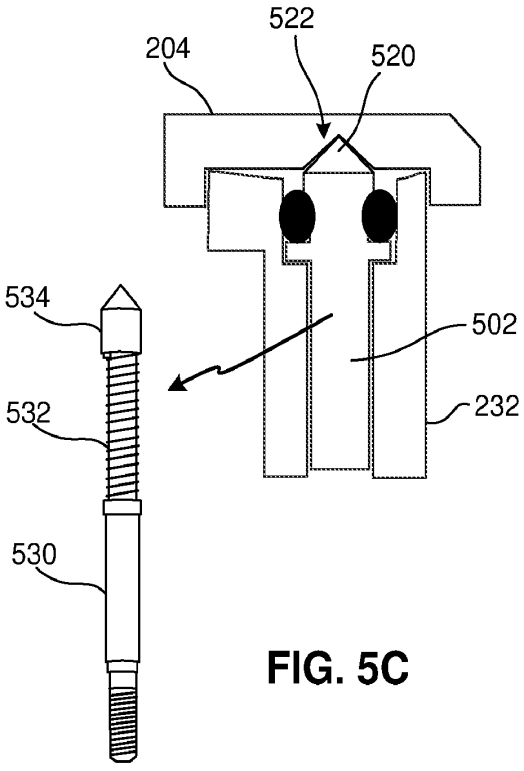


FIG. 5C

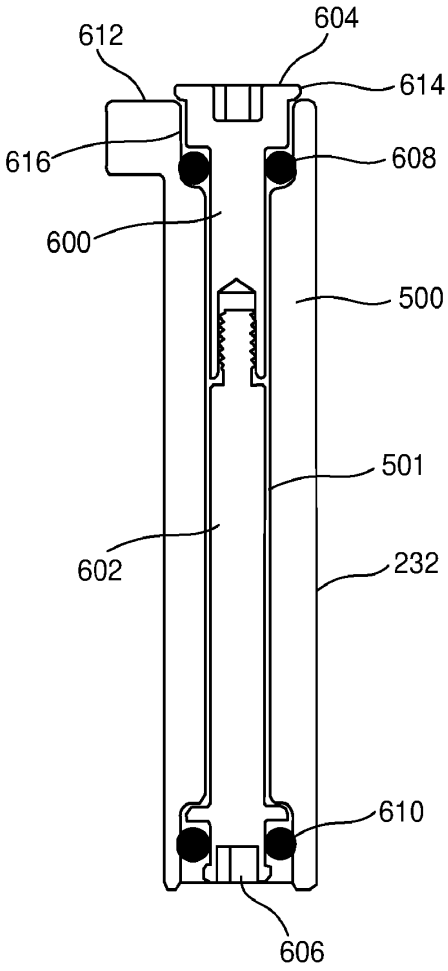


FIG. 6

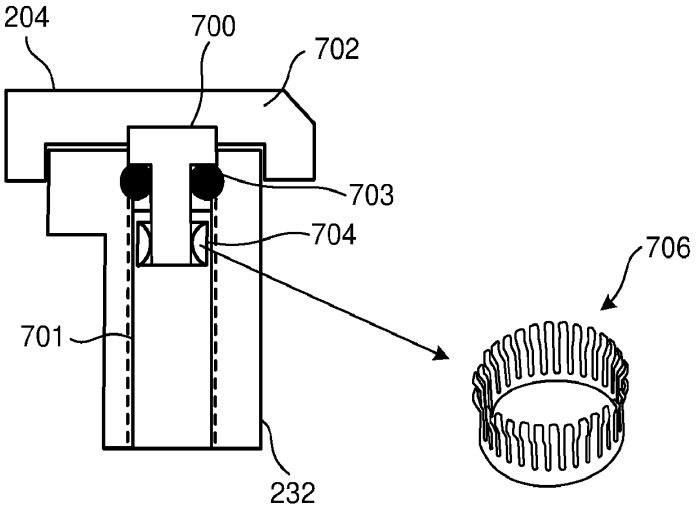


FIG. 7A

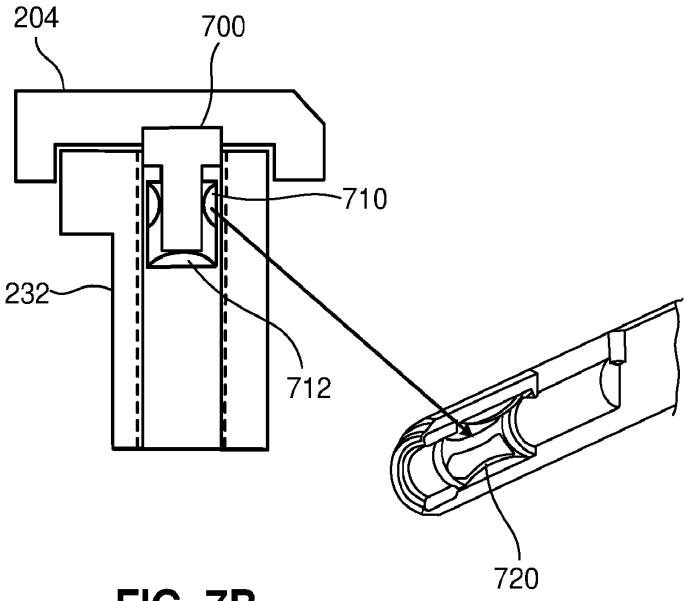


FIG. 7B

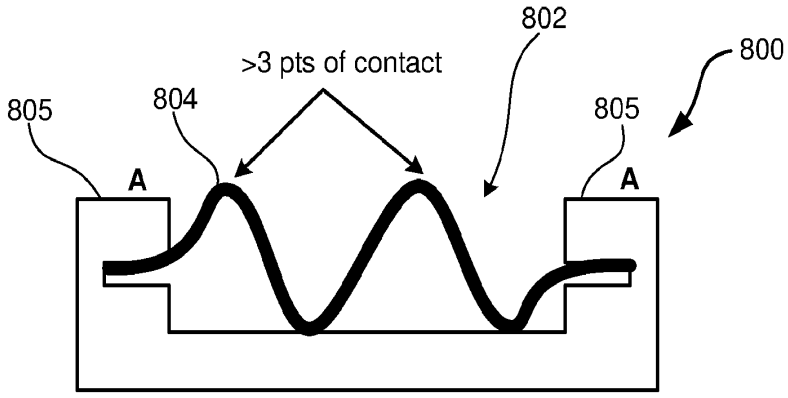

802
800
>3 pts of contact
805
804
805
A
A

FIG. 8A

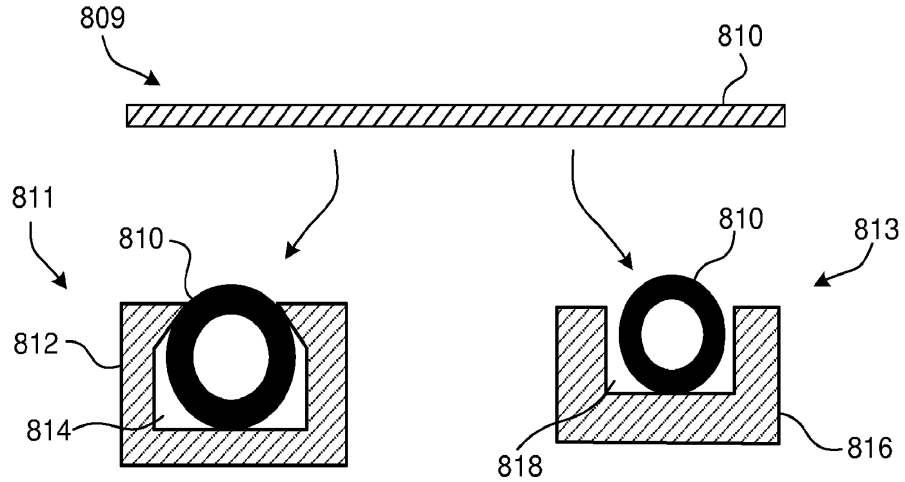

809
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811
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FIG. 8B