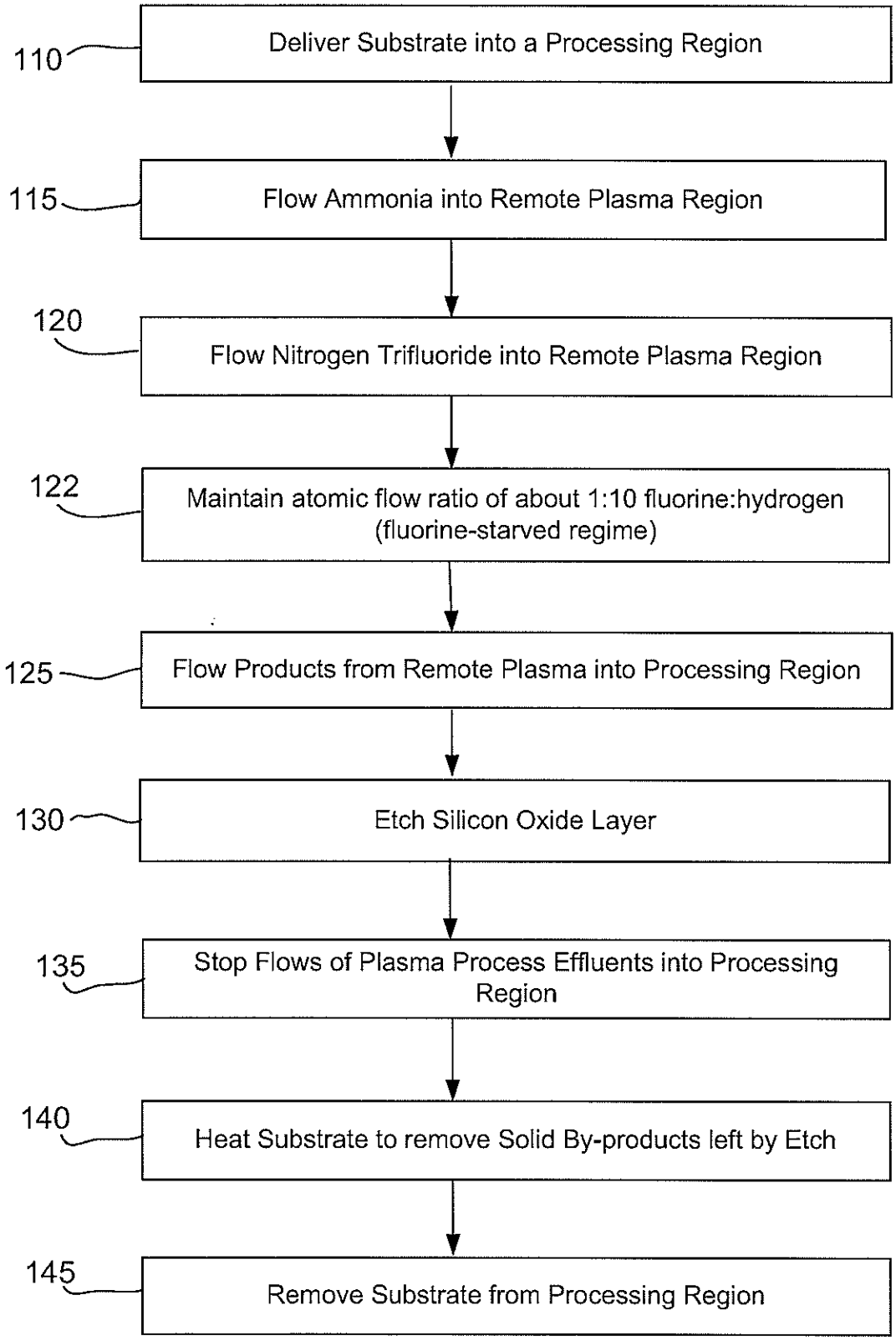

110
Deliver Substrate into a Processing Region
115
Flow Ammonia into Remote Plasma Region
120
Flow Nitrogen Trifluoride into Remote Plasma Region
122
Maintain atomic flow ratio of about 1:10 fluorine:hydrogen (fluorine-starved regime)
125
Flow Products from Remote Plasma into Processing Region
130
Etch Silicon Oxide Layer
135
Stop Flows of Plasma Process Effluents into Processing Region
140
Heat Substrate to remove Solid By-products left by Etch
145
Remove Substrate from Processing Region

FIG. 1

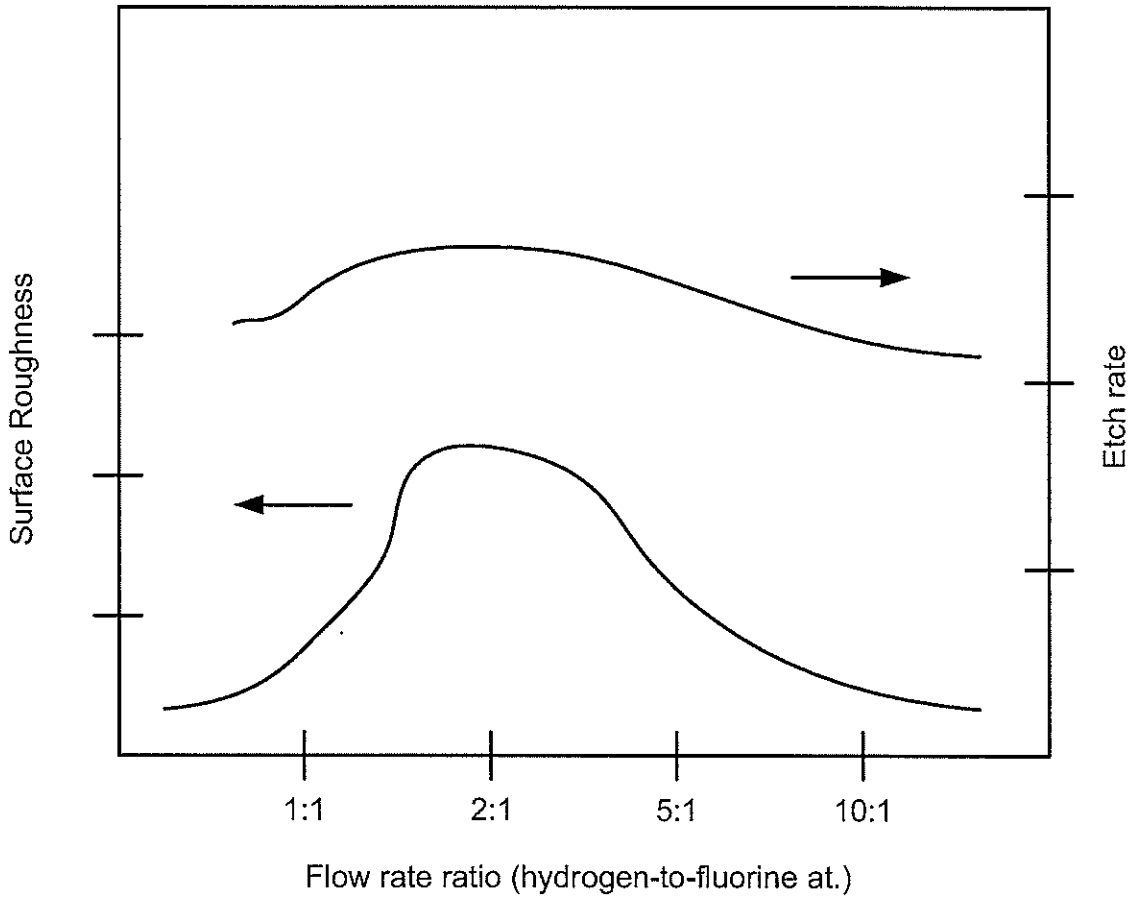

Surface Roughness
Etch rate
1:1
2:1
5:1
10:1
Flow rate ratio (hydrogen-to-fluorine at.)

FIG. 2

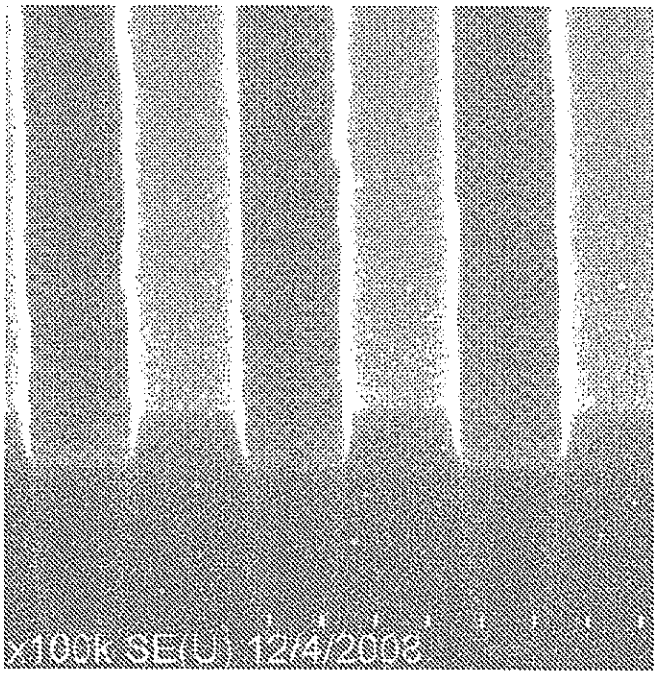


FIG. 3A

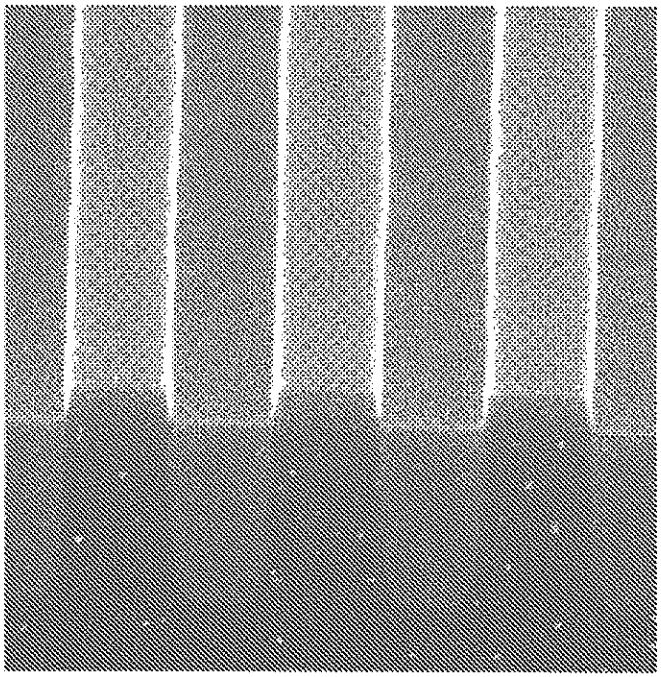


FIG. 3B

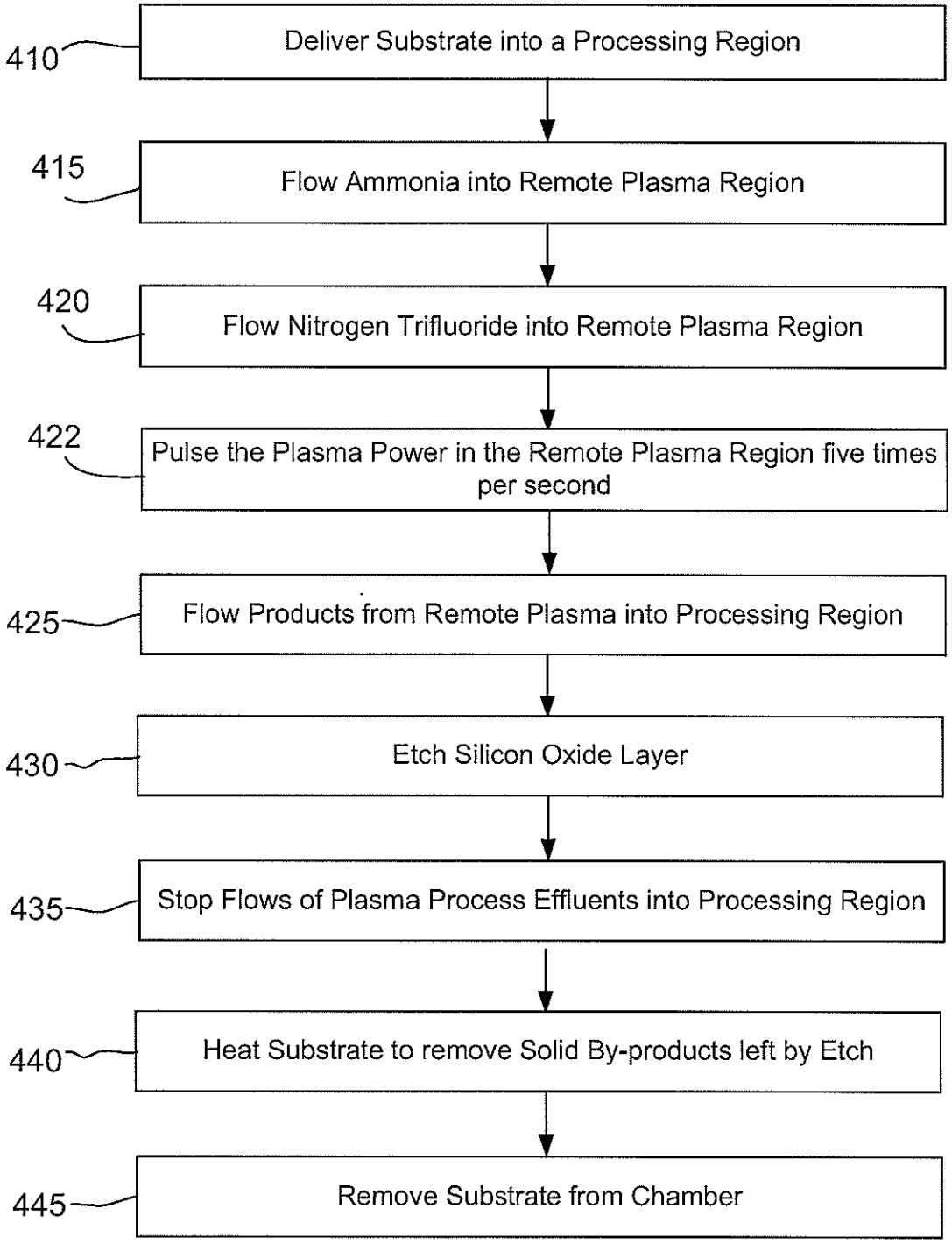

410
Deliver Substrate into a Processing Region
415
Flow Ammonia into Remote Plasma Region
420
Flow Nitrogen Trifluoride into Remote Plasma Region
422
Pulse the Plasma Power in the Remote Plasma Region five times per second
425
Flow Products from Remote Plasma into Processing Region
430
Etch Silicon Oxide Layer
435
Stop Flows of Plasma Process Effluents into Processing Region
440
Heat Substrate to remove Solid By-products left by Etch
445
Remove Substrate from Chamber

FIG. 4

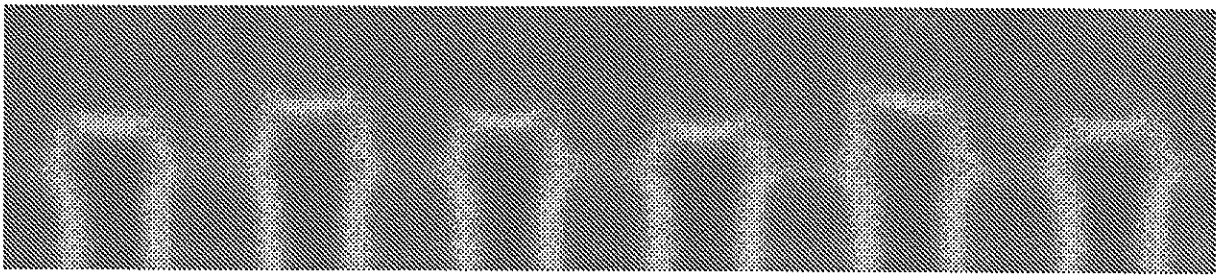


FIG. 5A

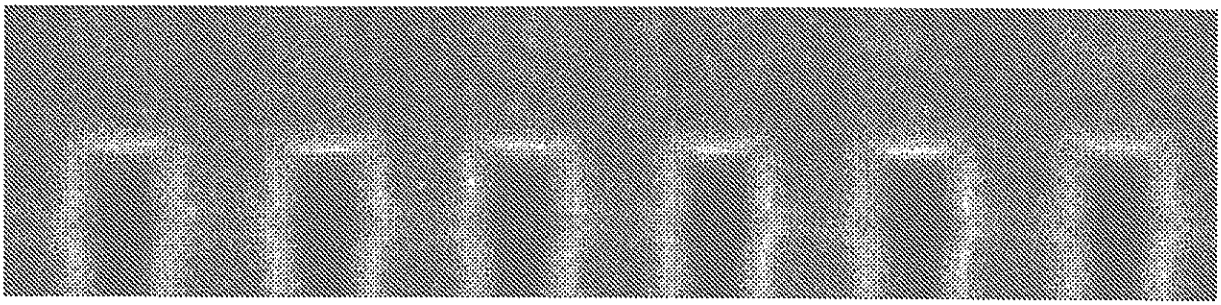


FIG. 5B

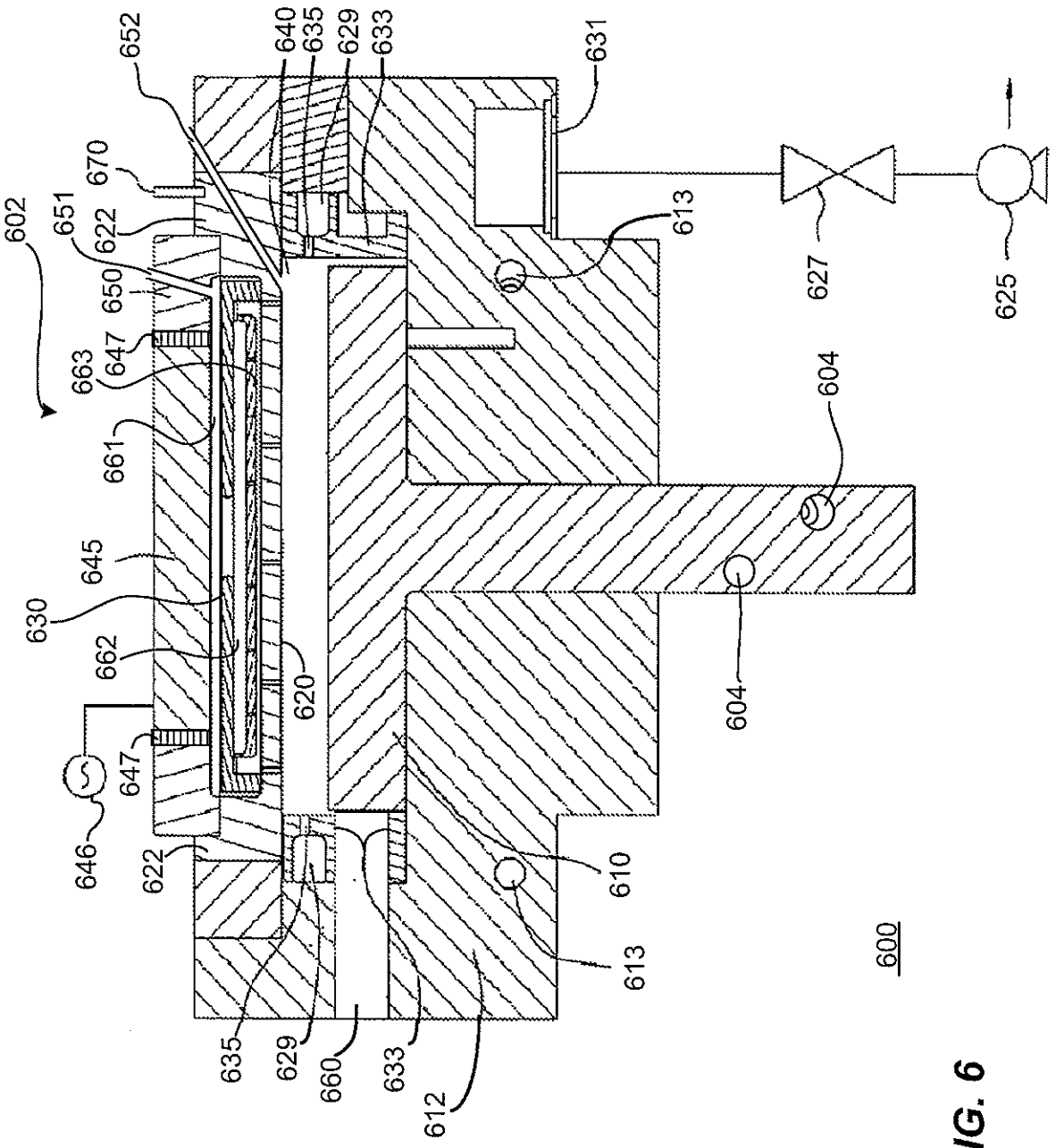

652
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600

FIG. 6

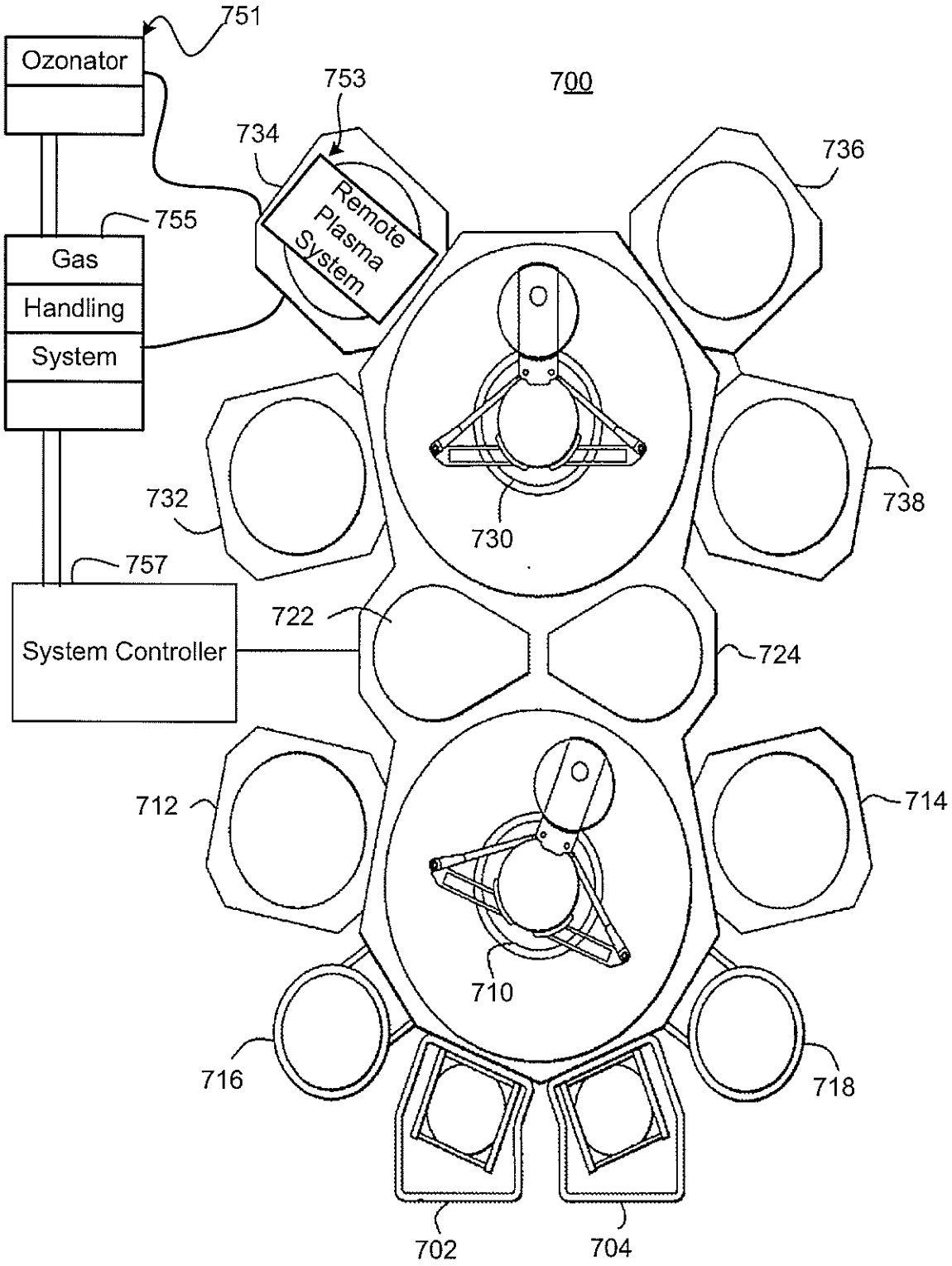

751
Ozonator
753
700
734
736
Remote Plasma System
755
Gas Handling System
732
730
738
757
722
System Controller
724
712
714
710
716
718
702
704

FIG. 7