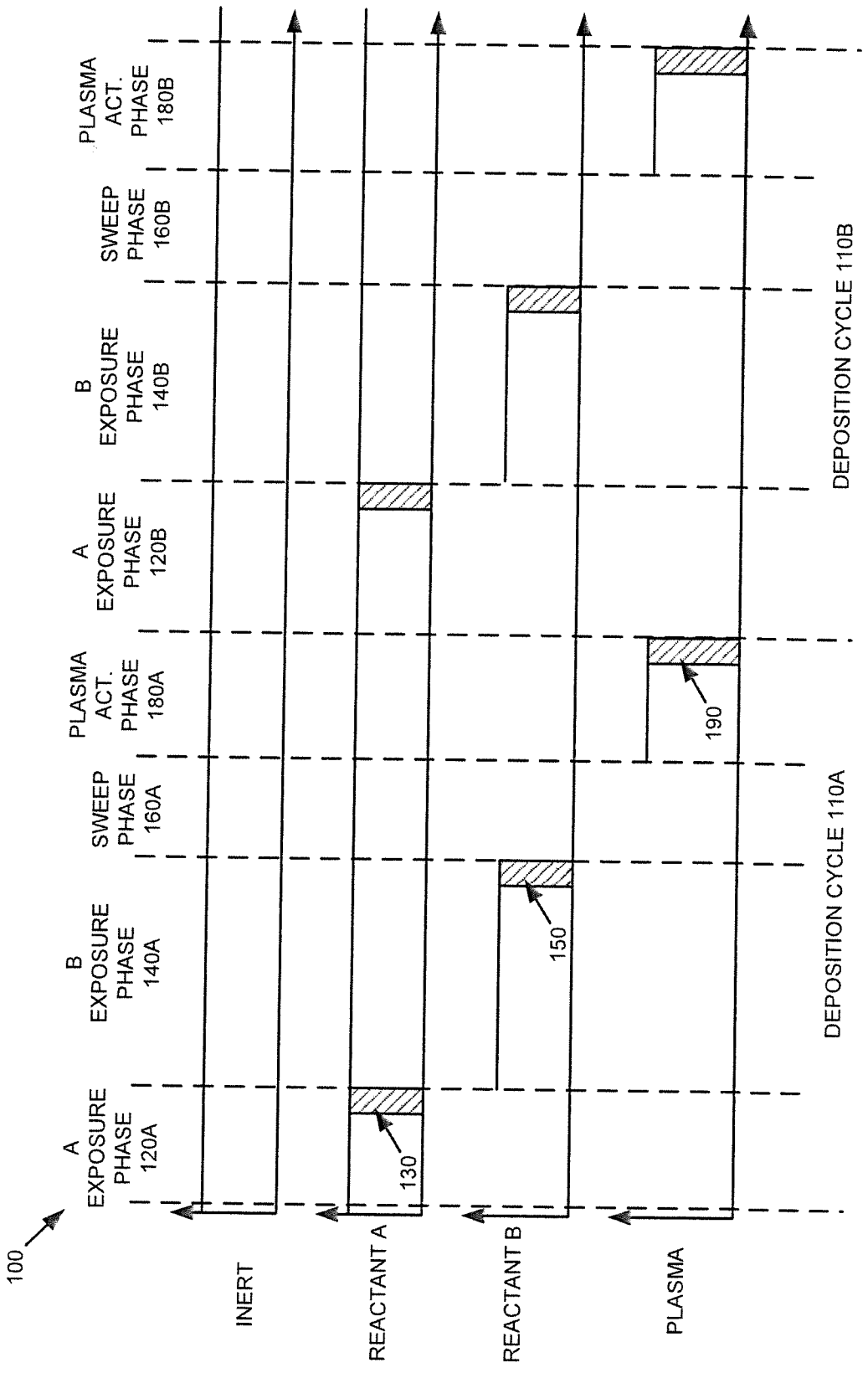

100
A EXPOSURE PHASE 120A
B EXPOSURE PHASE 140A
SWEEP PHASE 160A
PLASMA ACT. PHASE 180A
A EXPOSURE PHASE 120B
B EXPOSURE PHASE 140B
SWEEP PHASE 160B
PLASMA ACT. PHASE 180B
INERT
REACTANT A
REACTANT B
PLASMA
130
150
190
DEPOSITION CYCLE 110A
DEPOSITION CYCLE 110B
TIME

FIG. 1

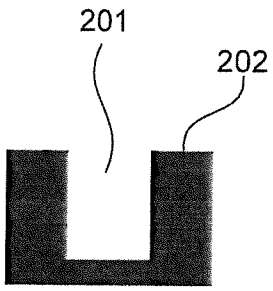


FIG. 2A

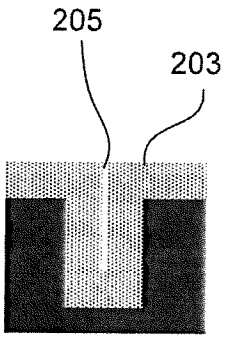


FIG. 2B

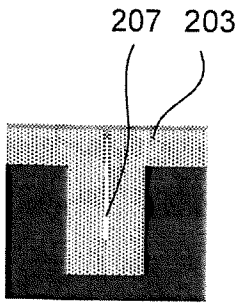


FIG. 2C

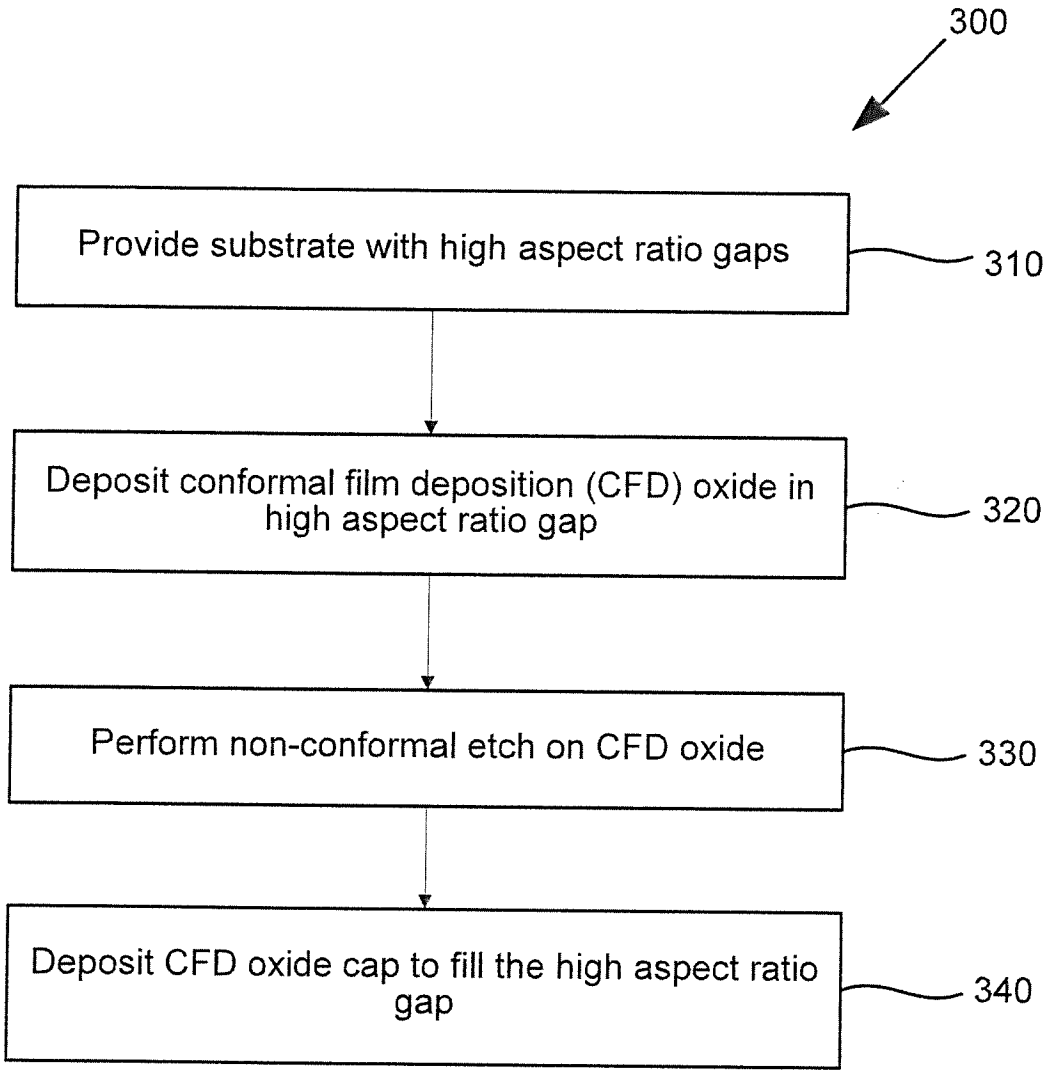

300
Provide substrate with high aspect ratio gaps
310
Deposit conformal film deposition (CFD) oxide in high aspect ratio gap
320
Perform non-conformal etch on CFD oxide
330
Deposit CFD oxide cap to fill the high aspect ratio gap
340

FIG. 3

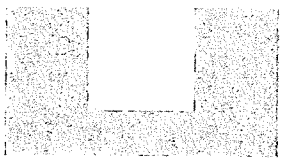


FIG. 4A

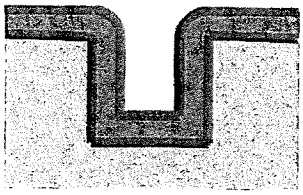


FIG. 4B

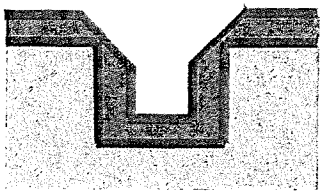


FIG. 4C

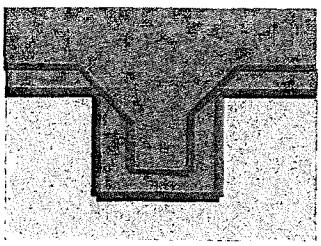


FIG. 4D

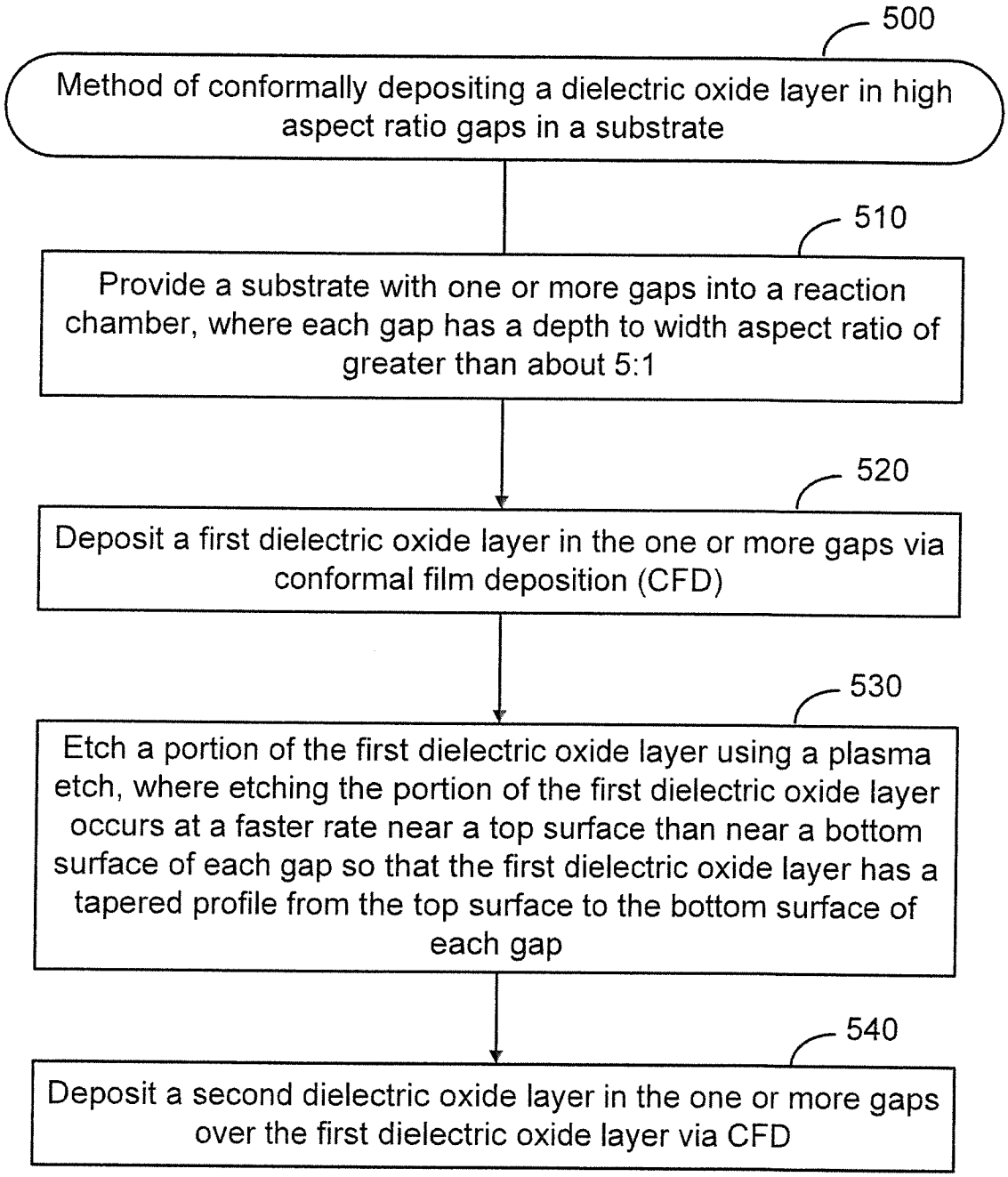

500
Method of conformally depositing a dielectric oxide layer in high aspect ratio gaps in a substrate
510
Provide a substrate with one or more gaps into a reaction chamber, where each gap has a depth to width aspect ratio of greater than about 5:1
520
Deposit a first dielectric oxide layer in the one or more gaps via conformal film deposition (CFD)
530
Etch a portion of the first dielectric oxide layer using a plasma etch, where etching the portion of the first dielectric oxide layer occurs at a faster rate near a top surface than near a bottom surface of each gap so that the first dielectric oxide layer has a tapered profile from the top surface to the bottom surface of each gap
540
Deposit a second dielectric oxide layer in the one or more gaps over the first dielectric oxide layer via CFD

FIG. 5

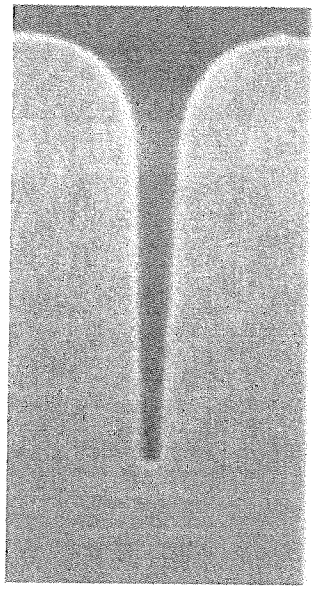


FIG. 6A

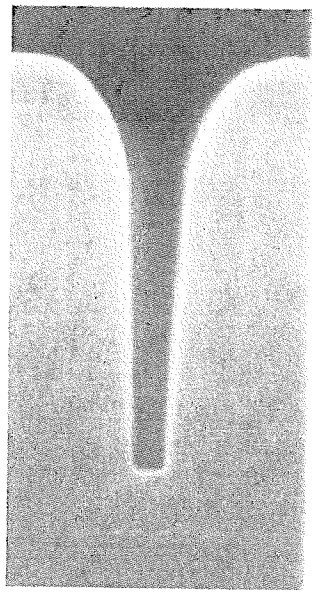


FIG. 6B

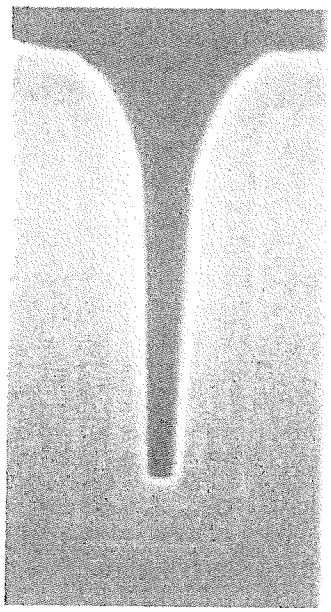


FIG. 6C

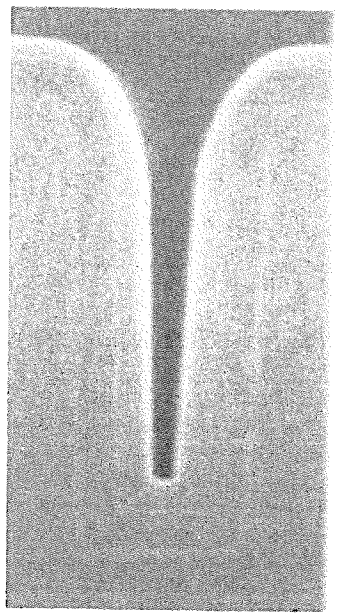


FIG. 6D

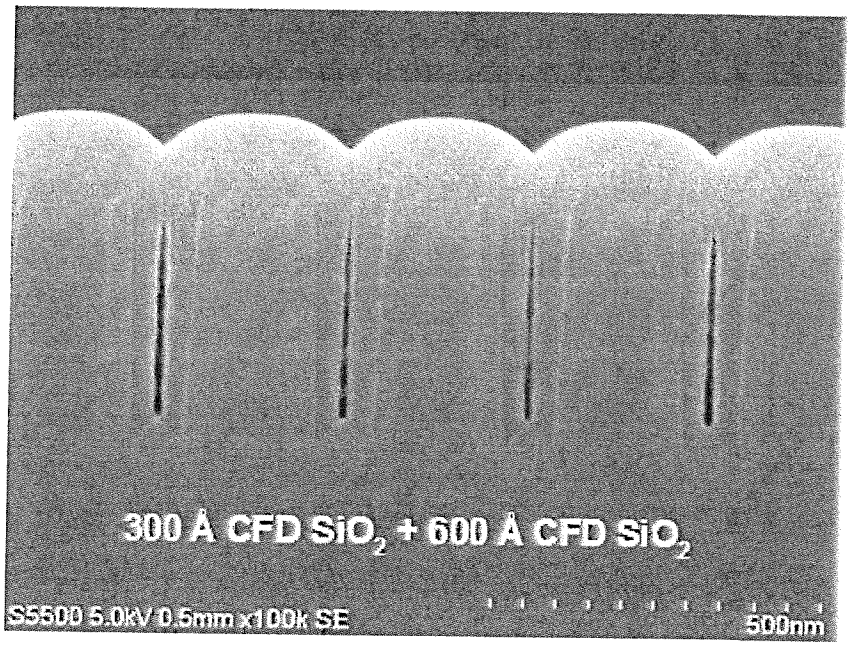

300 Å CFD SiO_2 + 600 Å CFD SiO_2
S5500 5.0kV 0.5mm x100k SE
500nm

FIG. 7A

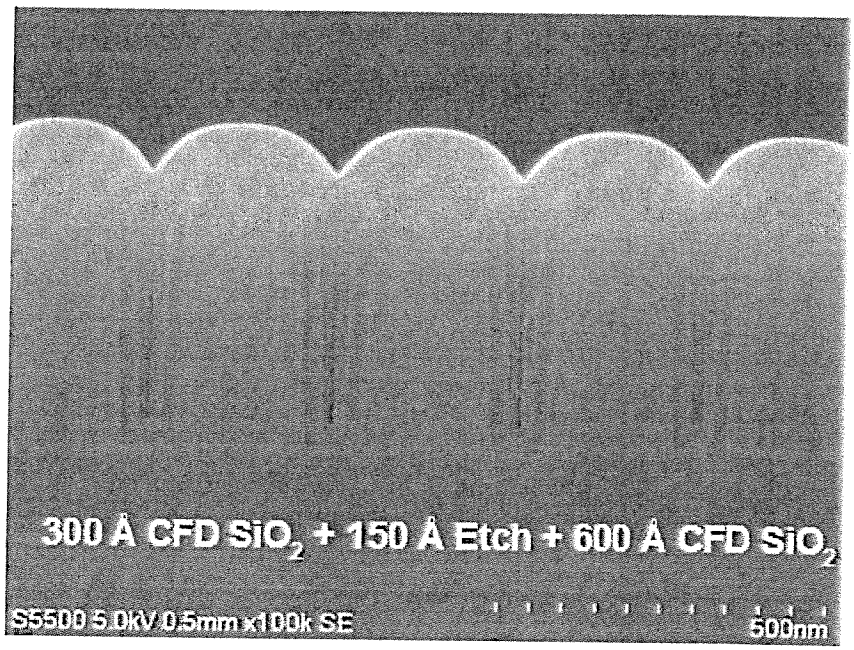

300 Å CFD SiO_2 + 150 Å Etch + 600 Å CFD SiO_2
S5500 5.0kV 0.5mm x100k SE
500nm

FIG. 7B

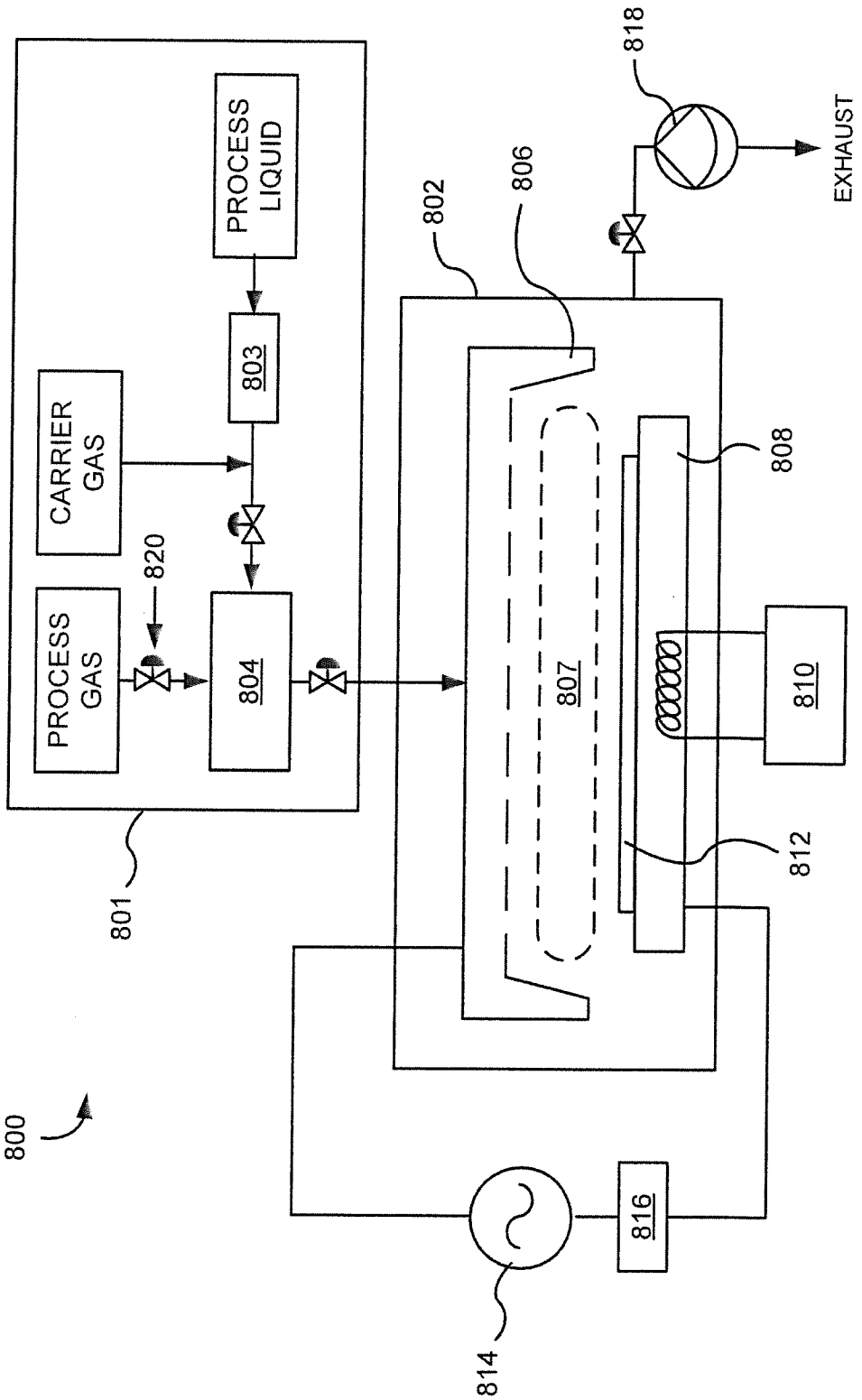

800
801
PROCESS GAS
CARRIER GAS
PROCESS LIQUID
803
820
804
802
806
807
808
810
812
814
816
818
EXHAUST

FIG. 8

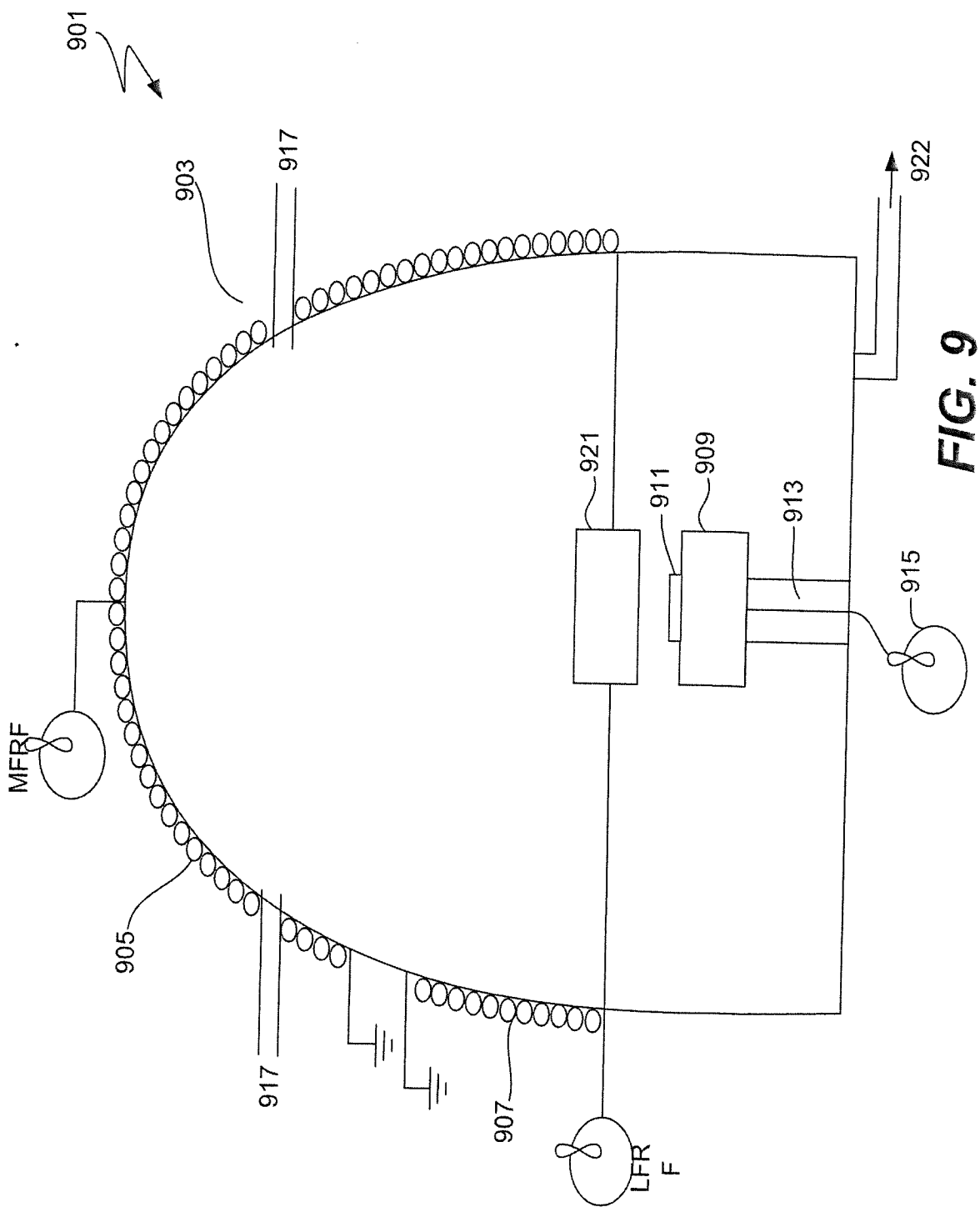


FIG. 9

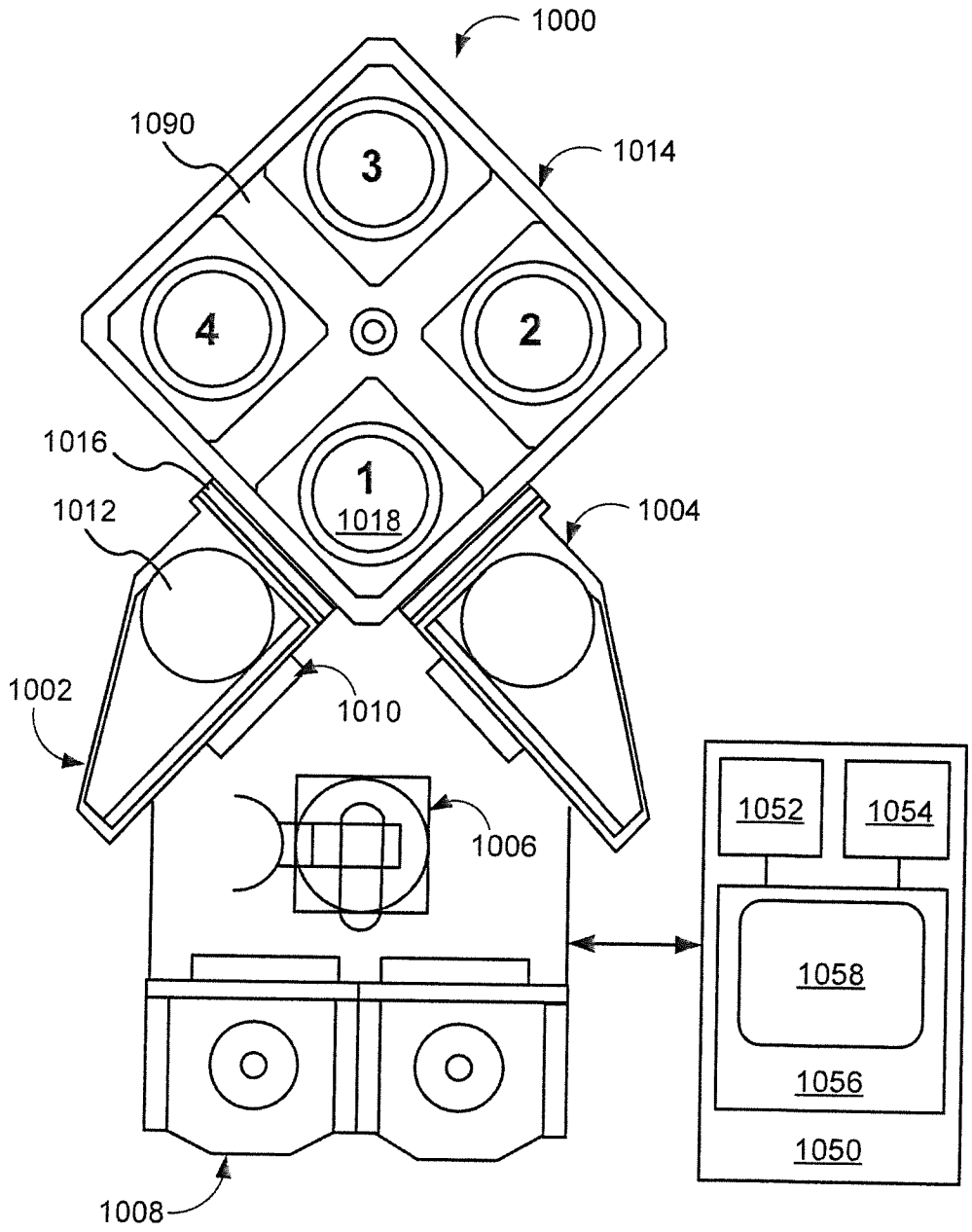

1000
1090
1014
3
4
2
1016
1
1018
1012
1004
1002
1010
1006
1052
1054
1058
1056
1050
1008

FIG. 10