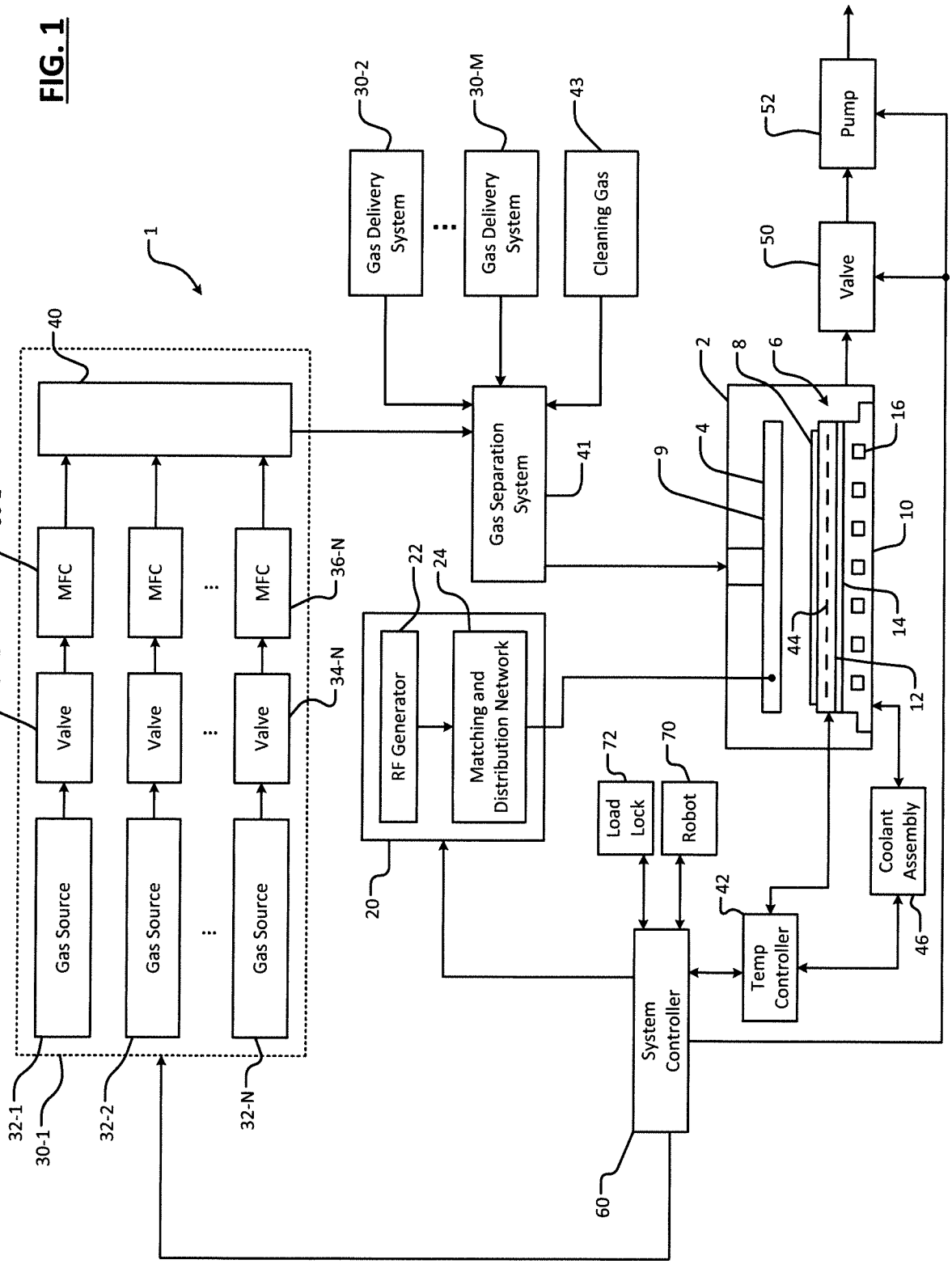
FIG. 1


1
40
36-1
34-1
32-1
30-1
Gas Source
Valve
MFC
32-2
Gas Source
Valve
MFC
32-N
Gas Source
Valve
MFC
36-N
34-N
30-2
Gas Delivery System
30-M
Gas Delivery System
43
Cleaning Gas
Gas Separation System
41
22
24
RF Generator
Matching and Distribution Network
20
72
Load Lock
70
Robot
60
System Controller
42
Temp Controller
46
Coolant Assembly
52
Pump
50
Valve
2
8
6
4
9
16
10
14
44
12

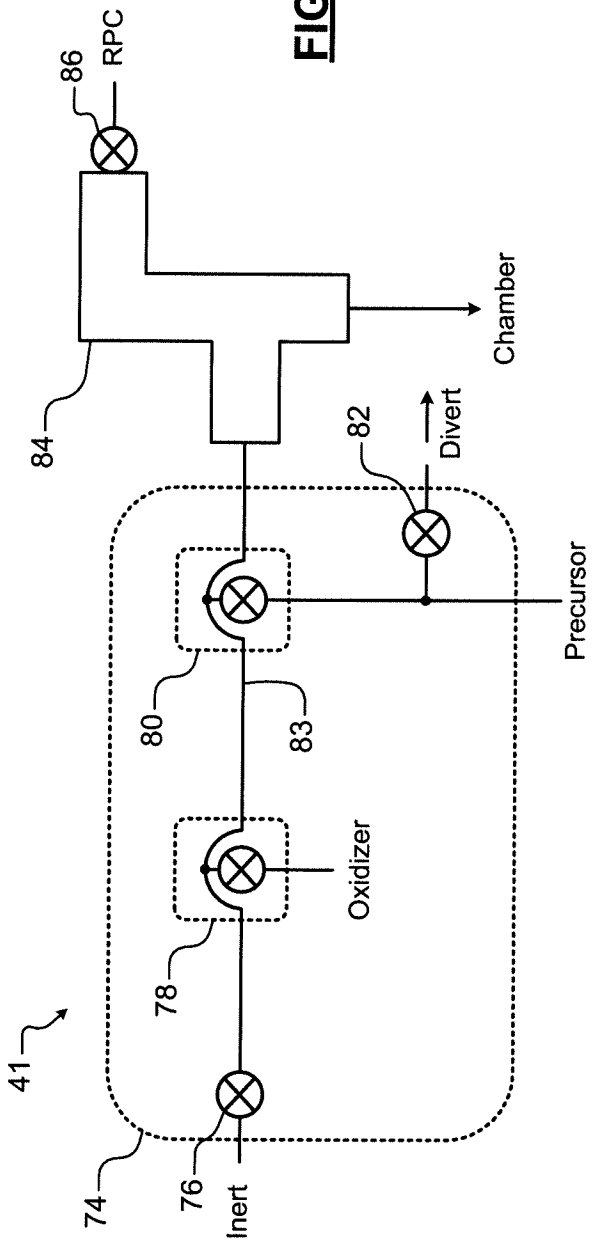

41
74
76
Inert
78
Oxidizer
80
83
82
Divert
Precursor
84
Chamber
86
RPC

FIG. 2

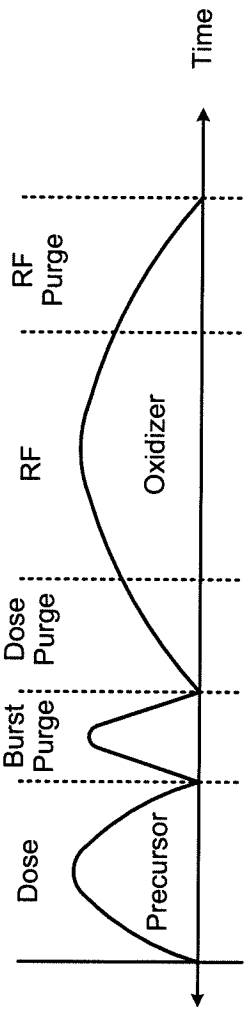

Time
Dose
Precursor
Burst Purge
Dose Purge
RF
Oxidizer
RF Purge

FIG. 3

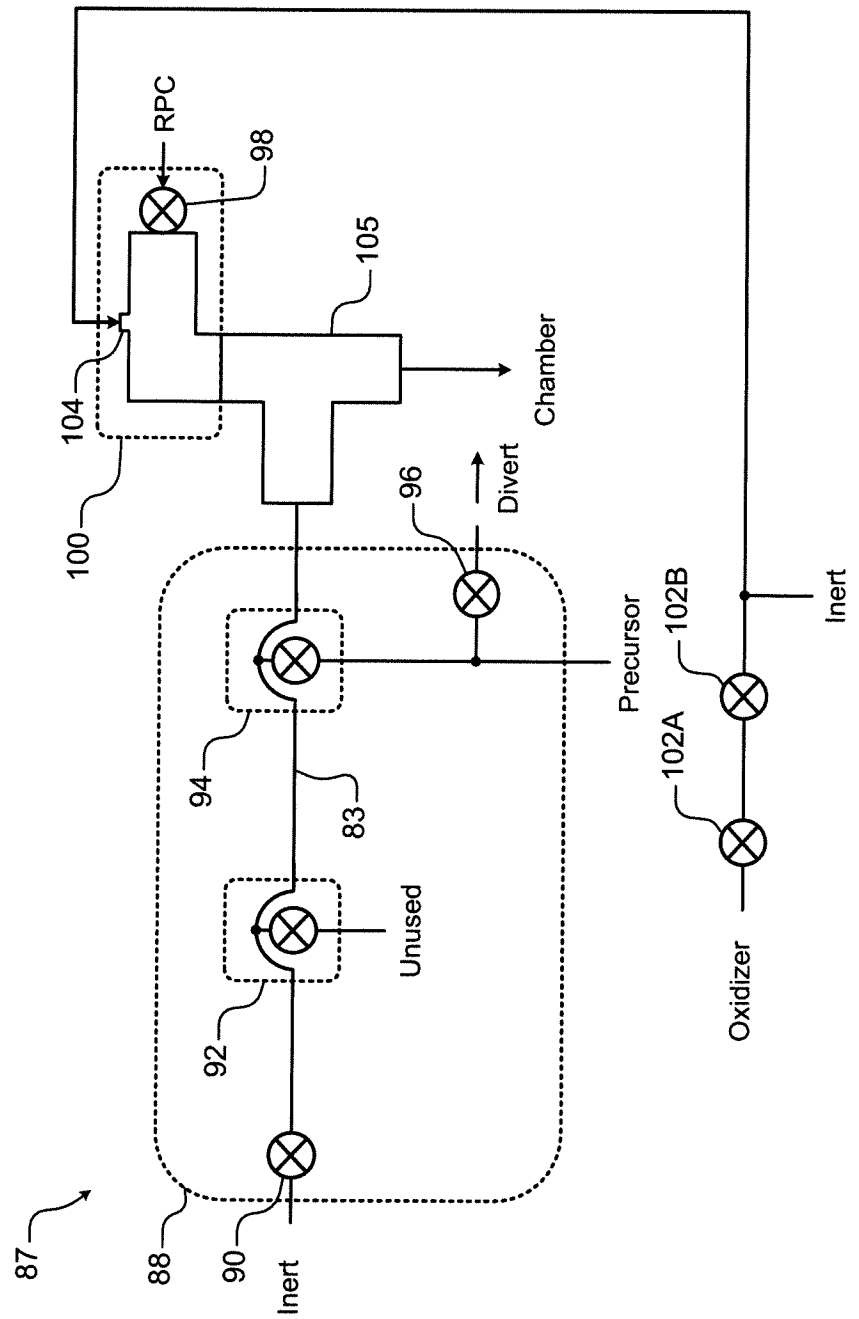

RPC
98
105
Chamber
104
100
Divert
96
Precursor
102B
Inert
94
83
102A
Unused
92
Oxidizer
87
88
90
Inert

FIG. 4

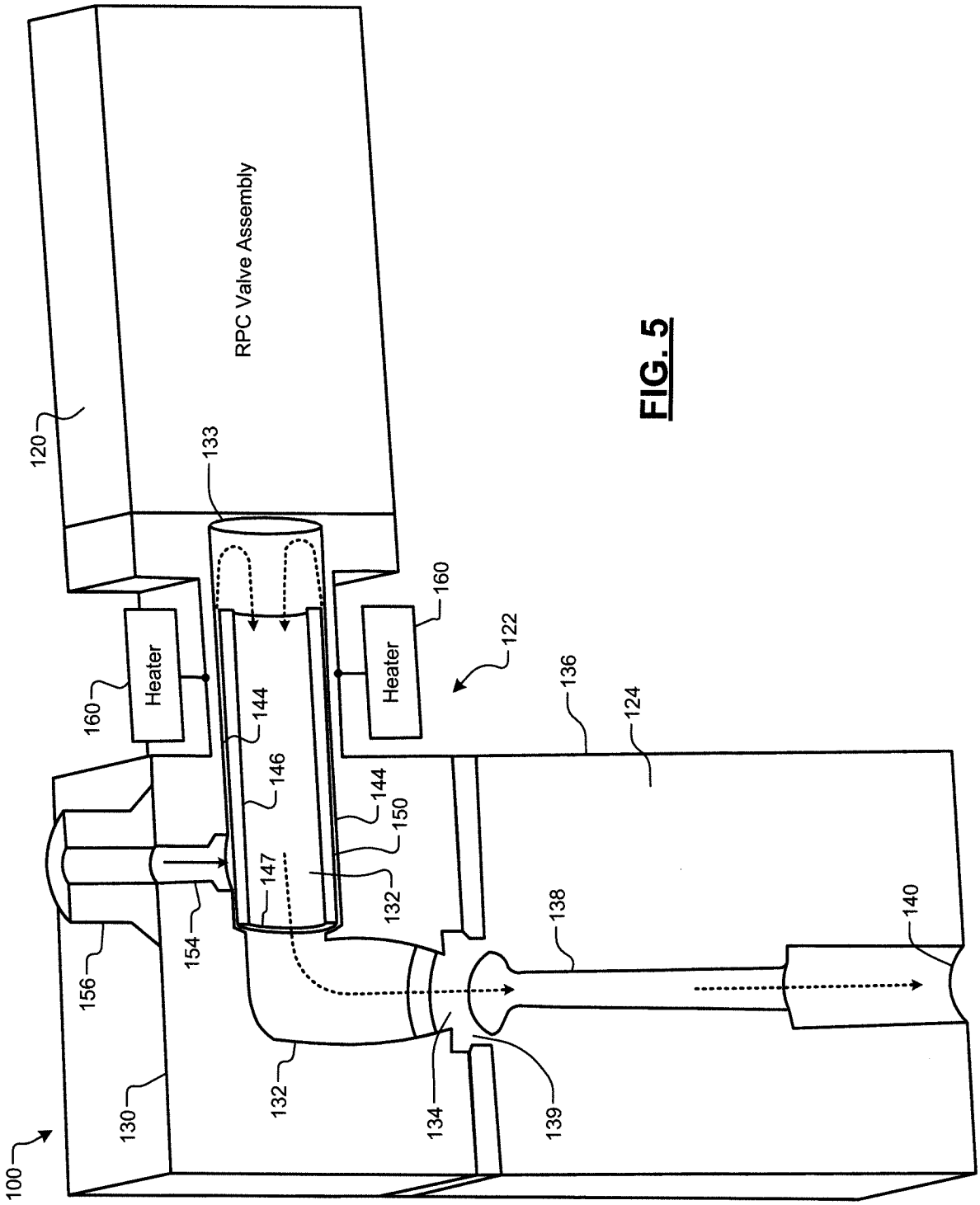

RPC Valve Assembly
120
133
160
Heater
160
Heater
122
136
124
144
146
144
150
147
132
154
156
138
140
132
134
139
130
100

FIG. 5

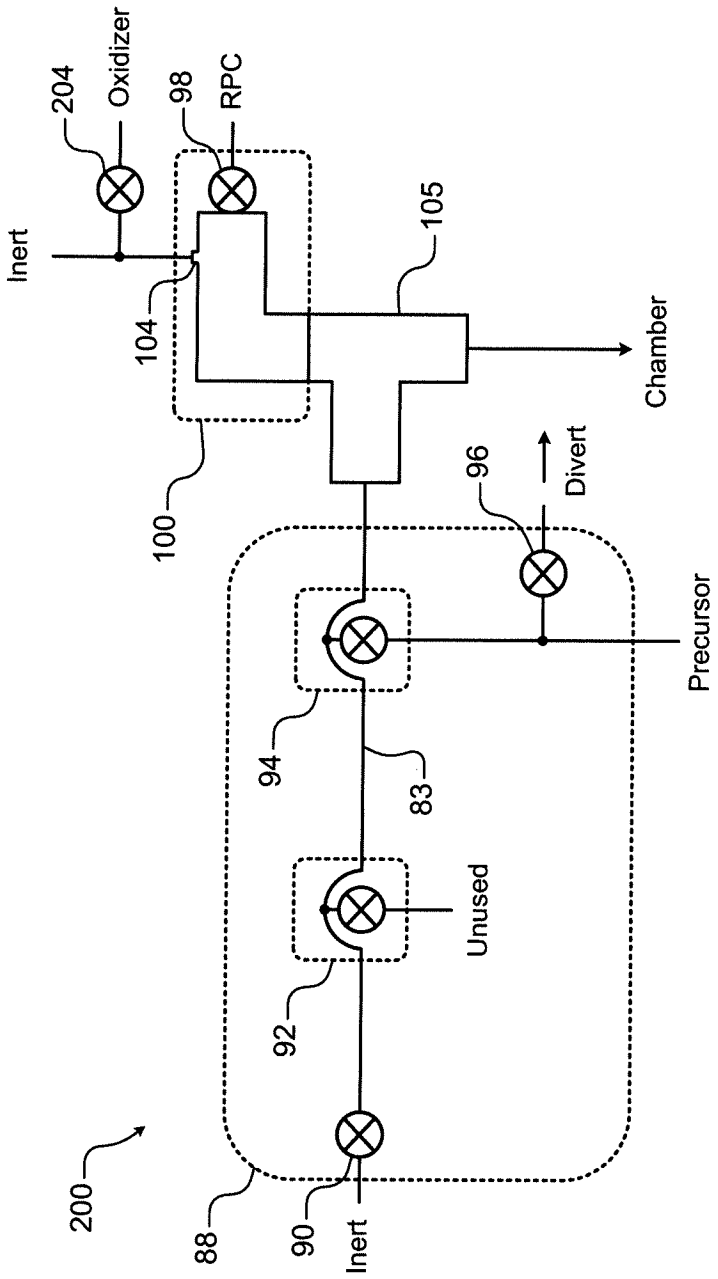

200
88
90
Inert
92
Unused
94
83
96
Divert
Precursor
100
104
105
Chamber
Inert
204
Oxidizer
98
RPC

FIG. 6

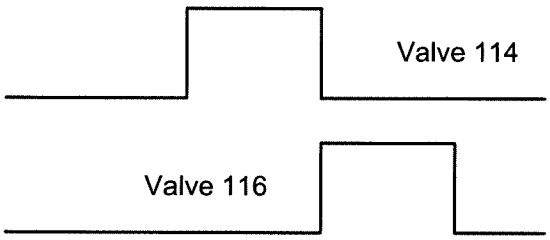


FIG. 7

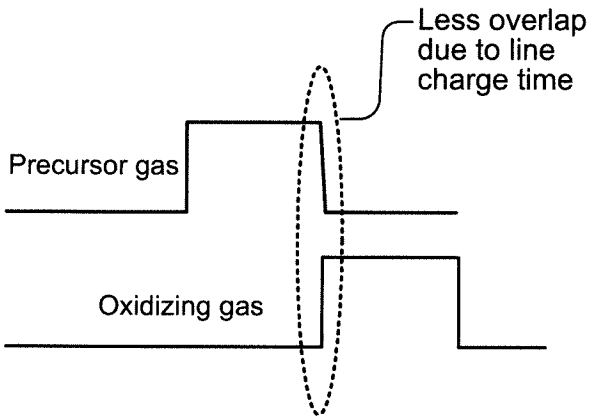


FIG. 8

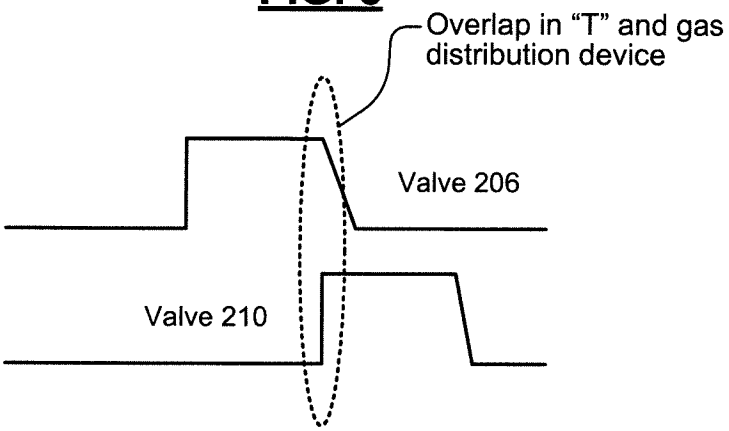


FIG. 9

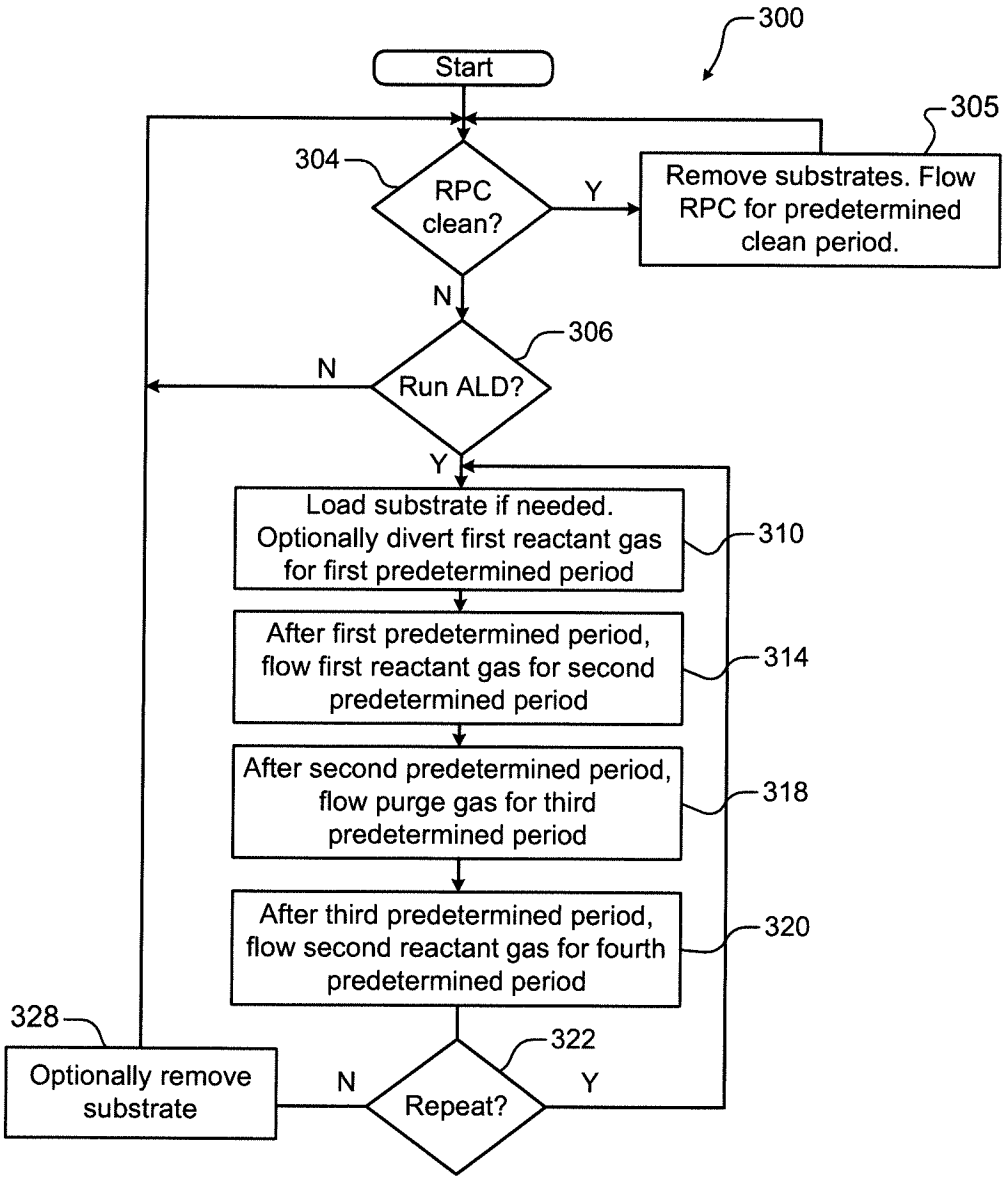

300
Start
305
304
RPC clean?
Y
Remove substrates. Flow RPC for predetermined clean period.
N
306
N
Run ALD?
Y
Load substrate if needed. Optionally divert first reactant gas for first predetermined period
310
After first predetermined period, flow first reactant gas for second predetermined period
314
After second predetermined period, flow purge gas for third predetermined period
318
After third predetermined period, flow second reactant gas for fourth predetermined period
320
328
322
Optionally remove substrate
N
Repeat?
Y

FIG. 10