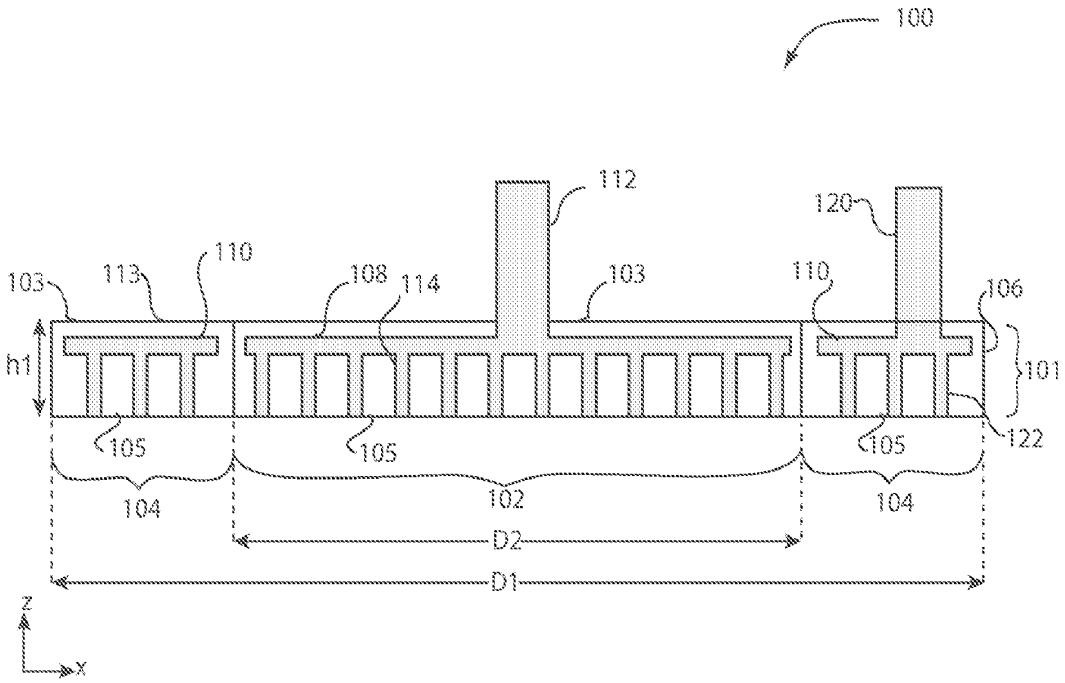

100
112
120
103
113
110
108
114
103
110
106
h1
101
105
105
105
122
104
102
104
D2
D1
z
x

FIG. 1A

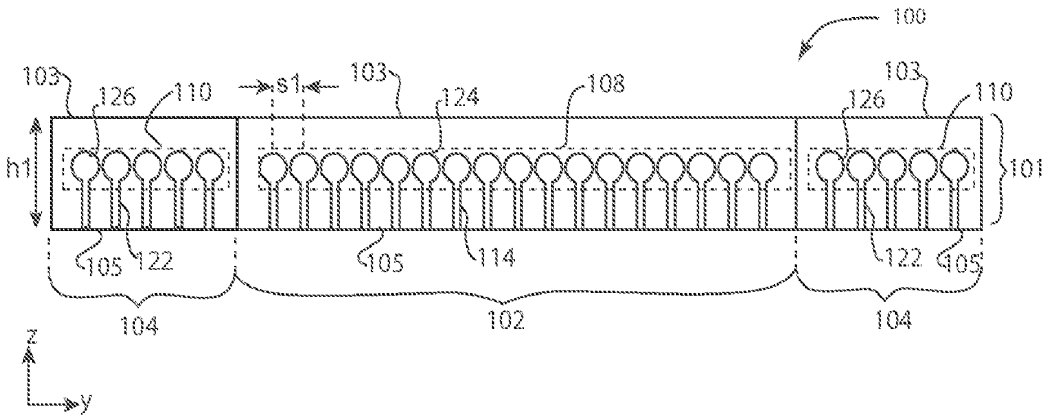

100
103
126
110
s1
103
124
108
103
126
110
h1
101
105
122
105
114
122
105
104
102
104
z
y

FIG. 1B

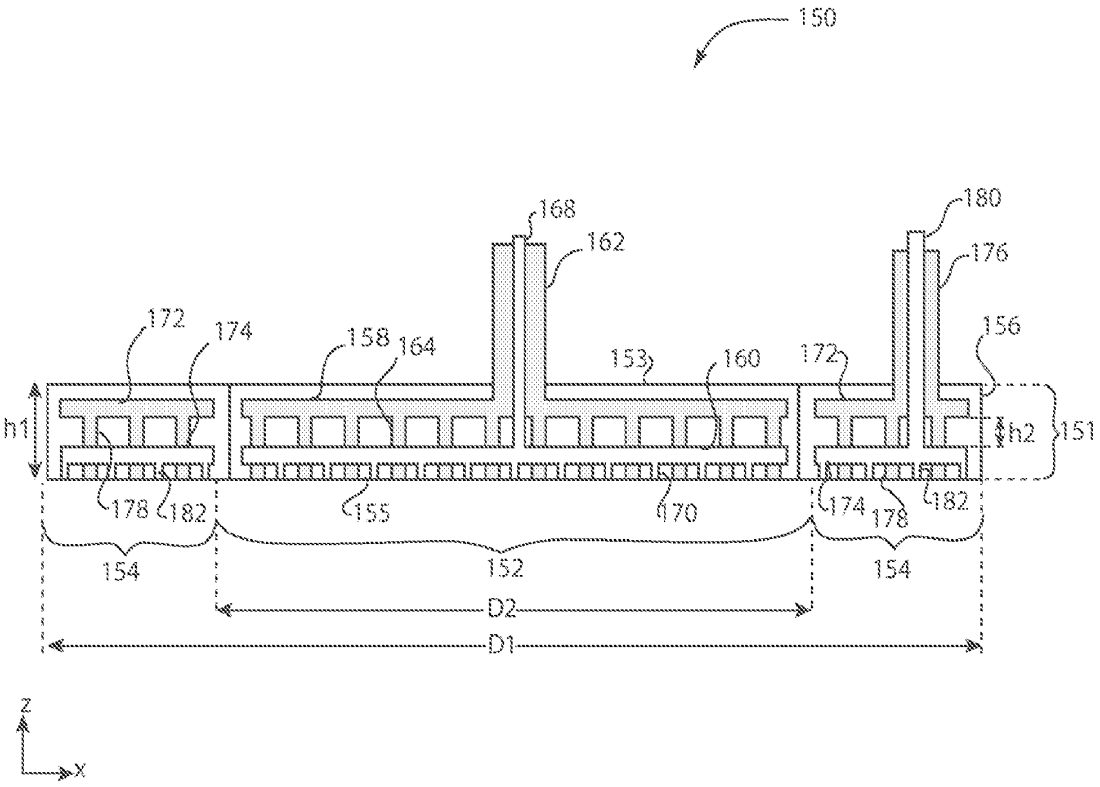

150
168
162
180
176
172
174
158
164
153
160
172
156
h1
h2
151
178
182
155
170
174
178
182
154
152
154
D2
D1
z
x

FIG. 1C

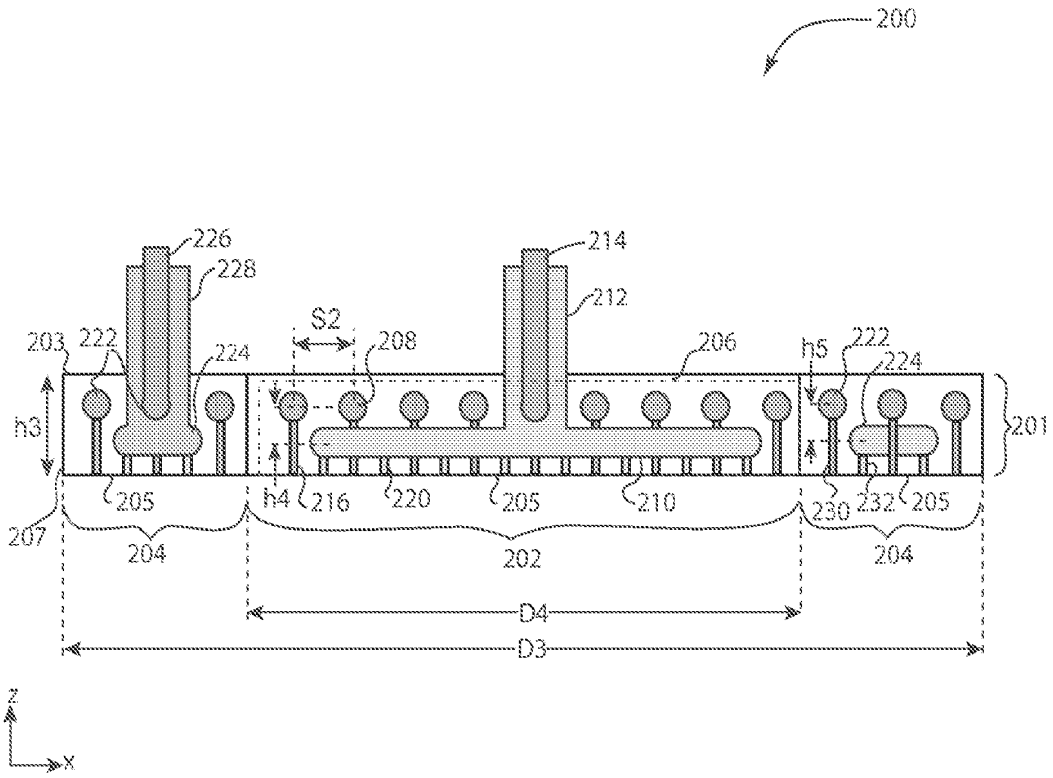

200
226
228
214
212
S2
208
203
222
224
206
h5
222
224
h3
201
205
h4
216
220
205
210
230
232
205
207
204
202
204
D4
D3
z
x

FIG. 2A

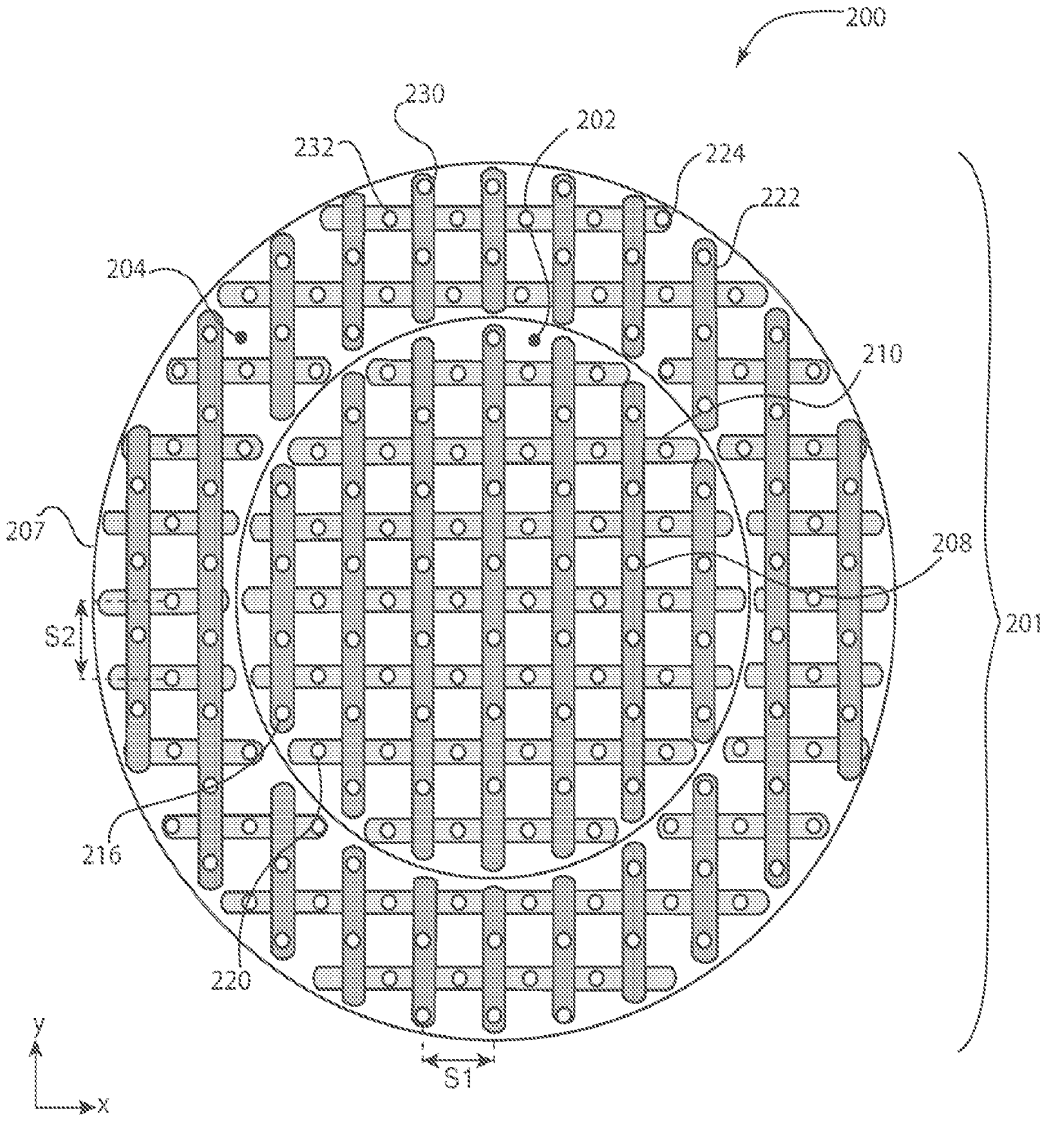


FIG. 2B

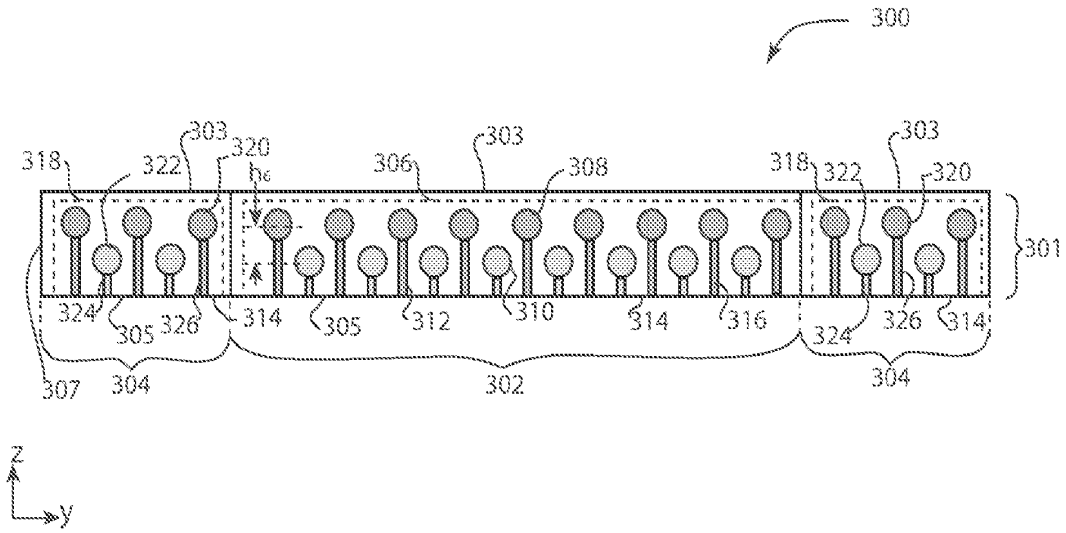

300
303
320
318
322
306
303
308
318
322
303
320
301
324
305
326
314
305
312
310
314
316
324
326
314
307
304
302
304
z
y

FIG. 3A

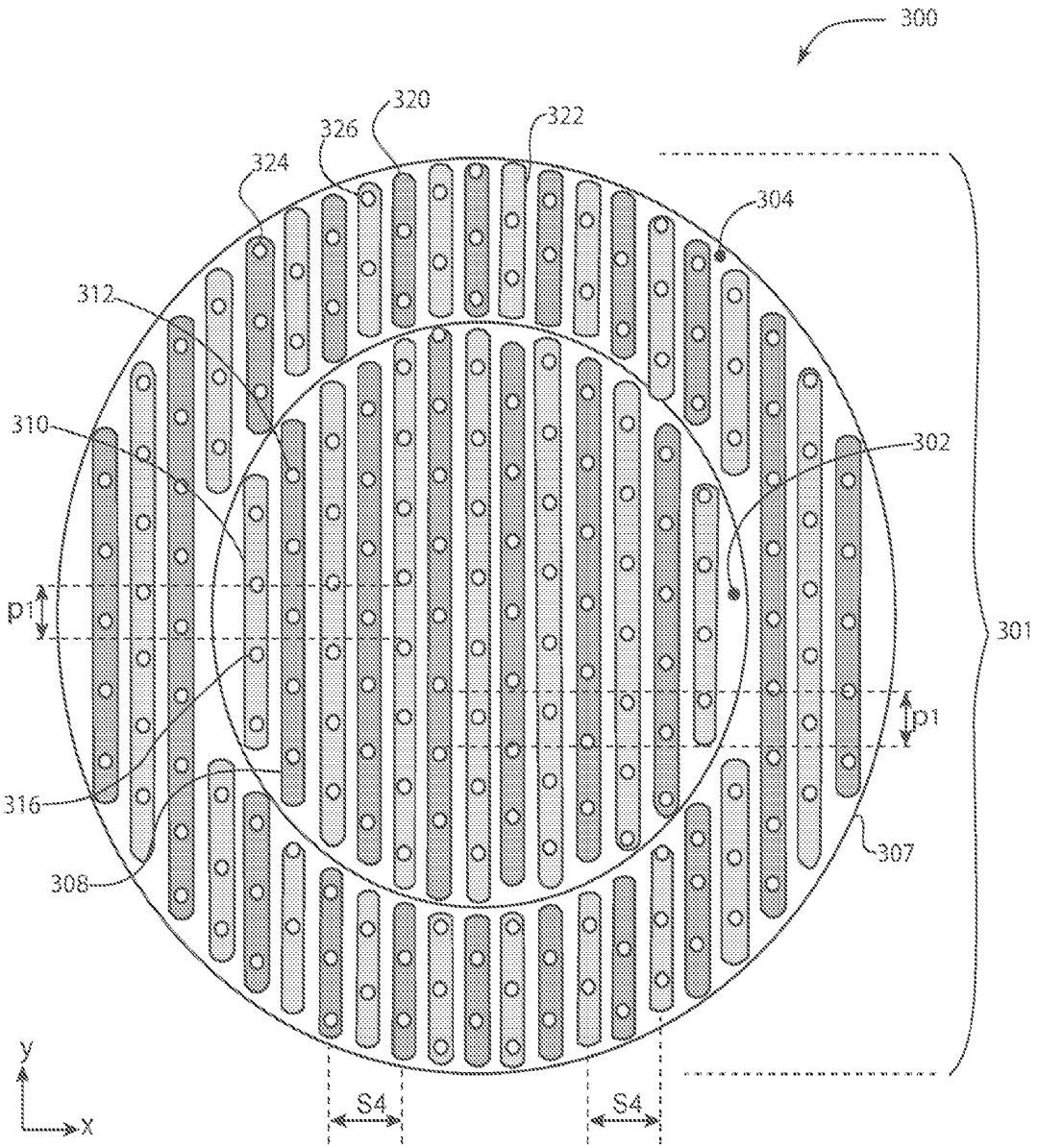


FIG. 3B

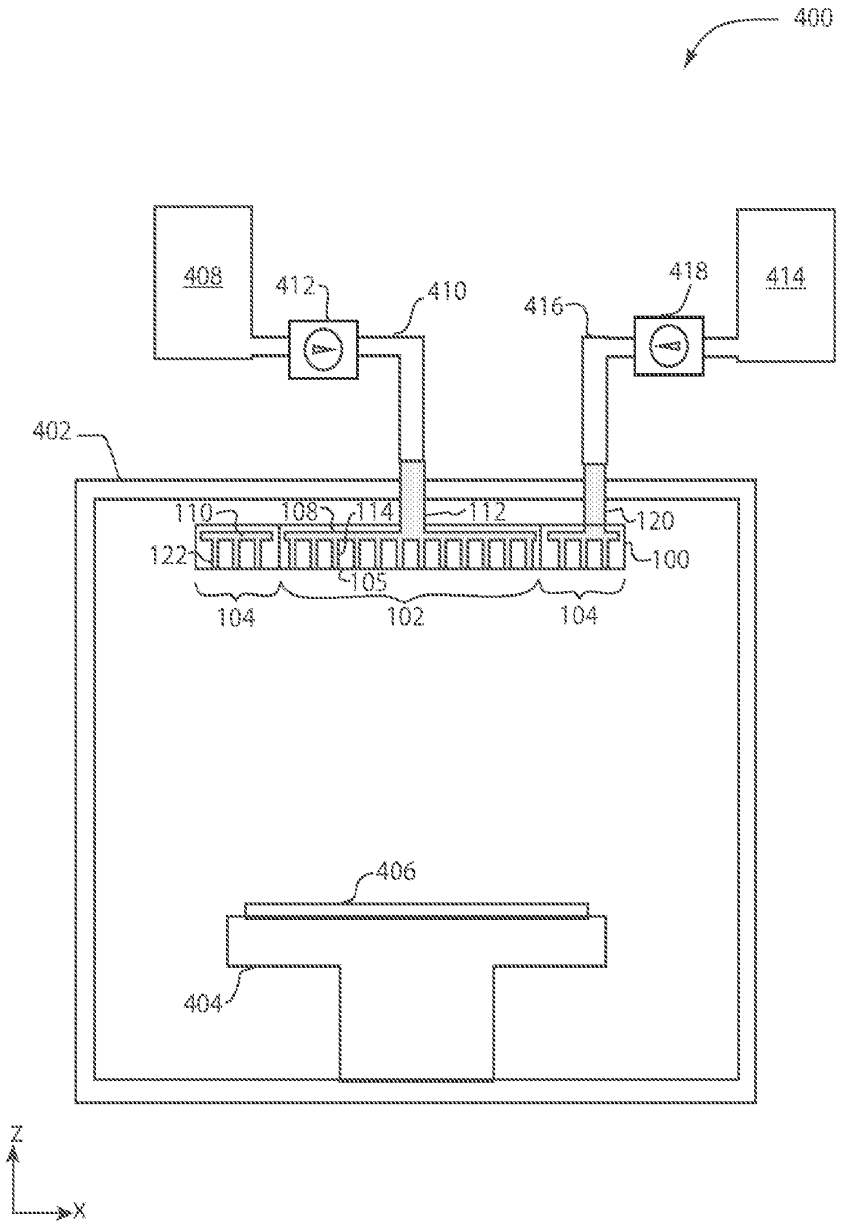

400
408
412
410
418
416
414
402
110
108
114
112
120
122
100
105
104
102
104
406
404
Z
X

FIG. 4

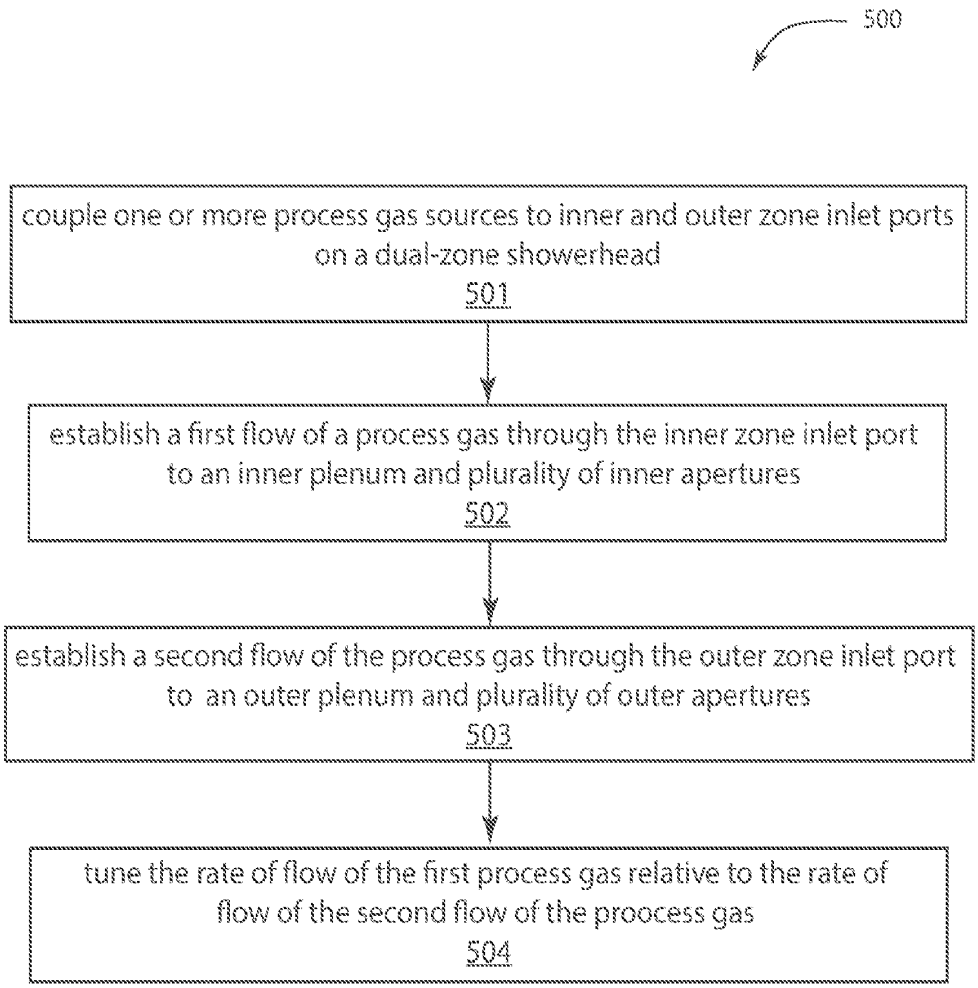

500
couple one or more process gas sources to inner and outer zone inlet ports on a dual-zone showerhead
501
establish a first flow of a process gas through the inner zone inlet port to an inner plenum and plurality of inner apertures
502
establish a second flow of the process gas through the outer zone inlet port to an outer plenum and plurality of outer apertures
503
tune the rate of flow of the first process gas relative to the rate of flow of the second flow of the proocess gas
504

FIG. 5