FIG. 1

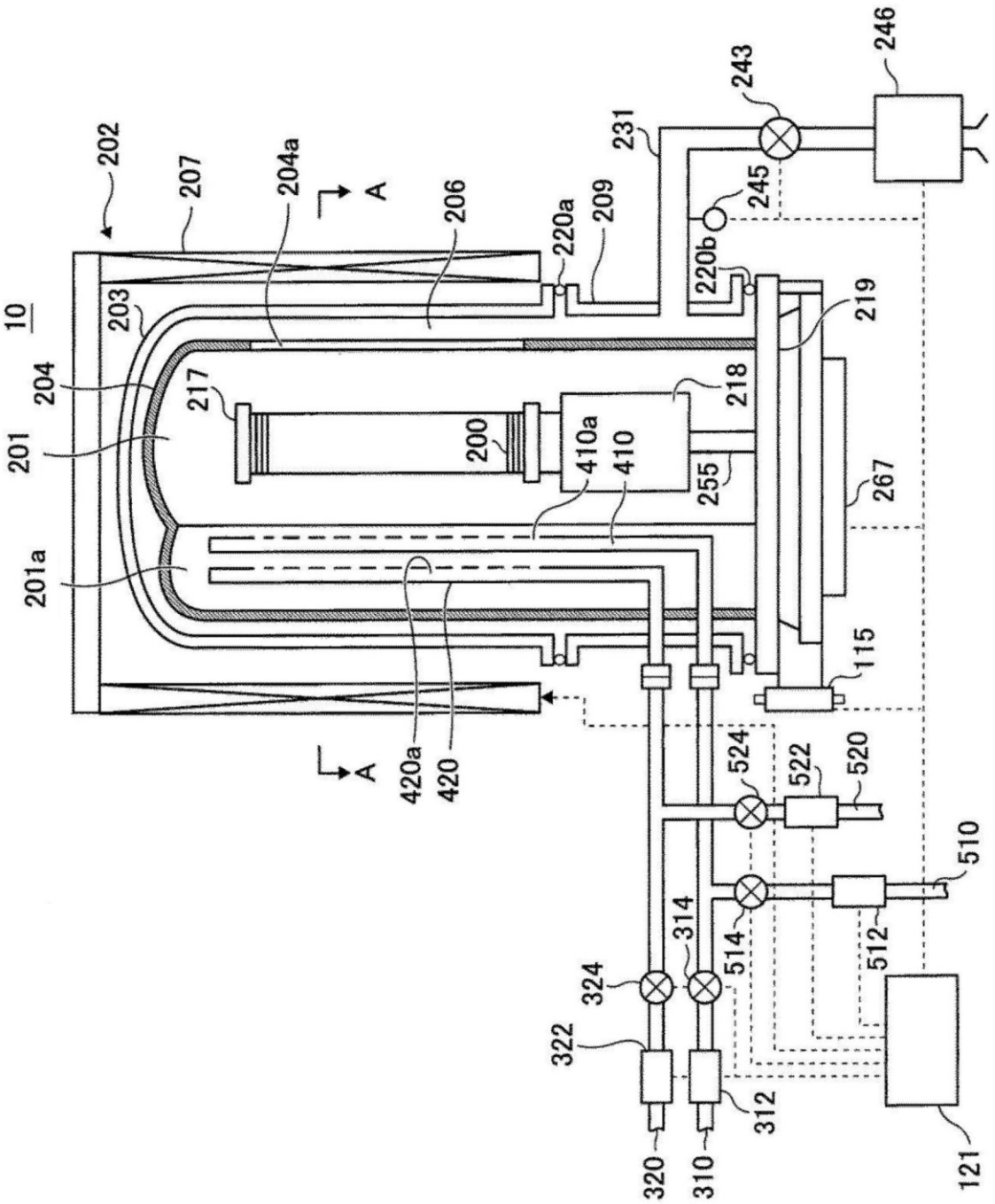

10
201
201a
202
203
204
204a
206
207
209
217
218
219
220a
220b
231
243
245
246
255
267
115
200
410
410a
420
420a
A
A
524
522
520
510
514
512
314
324
322
312
320
310
121

FIG. 2

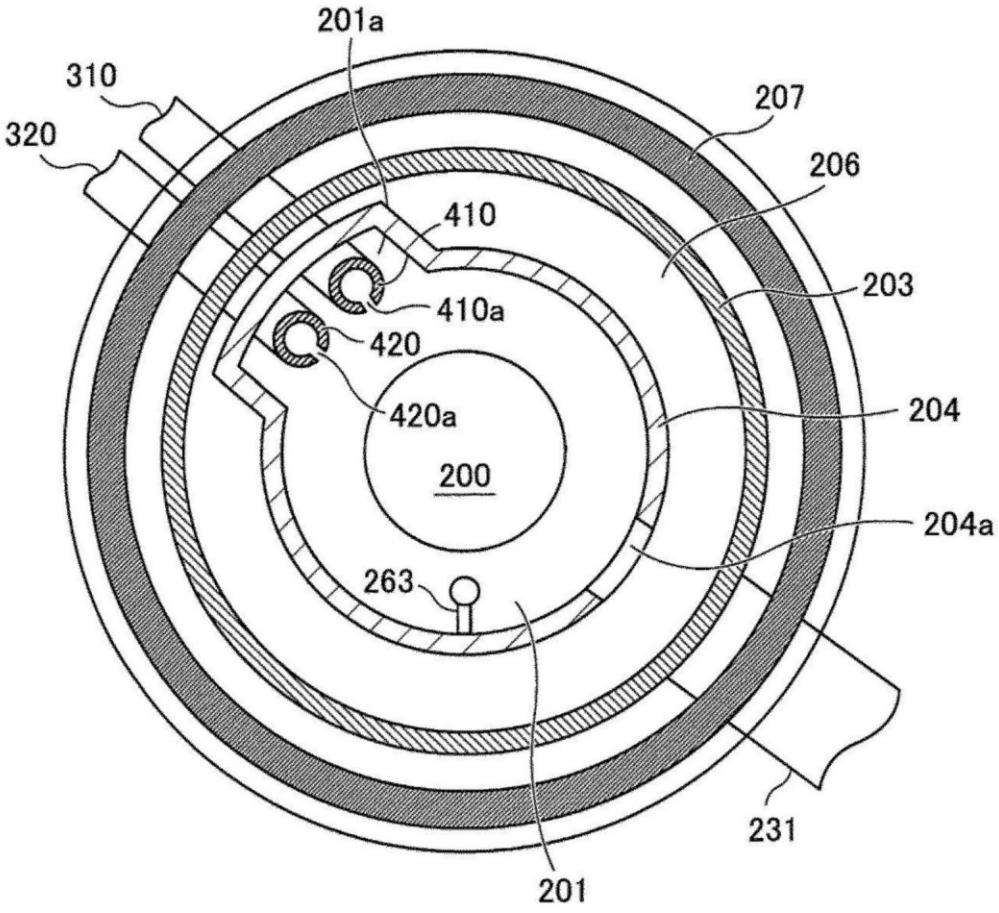

202
201a
310
320
207
206
410
410a
203
420
420a
204
200
204a
263
231
201

FIG. 3

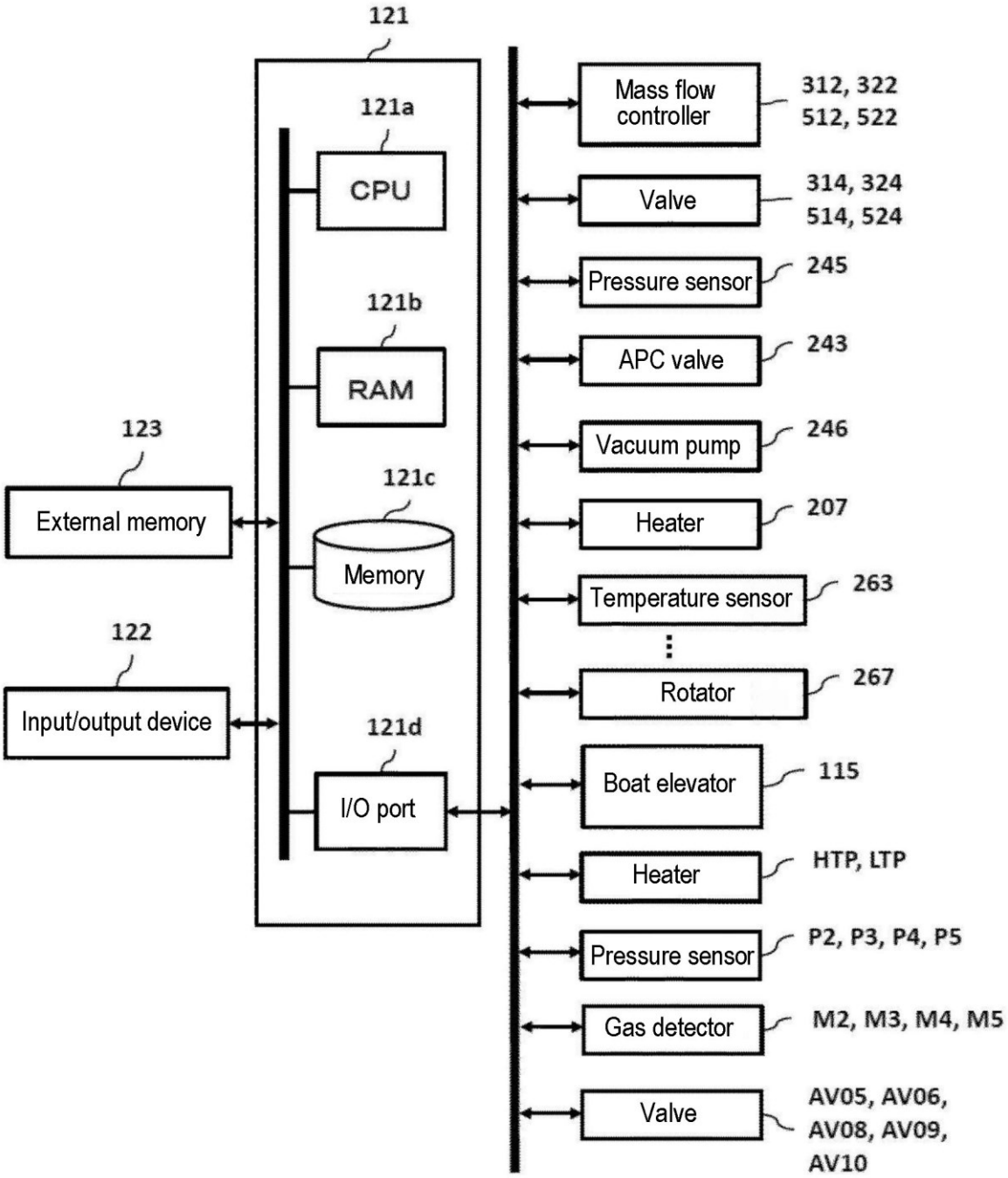

121
121a
CPU
121b
RAM
121c
Memory
121d
I/O port
123
External memory
122
Input/output device
Mass flow controller
312, 322
512, 522
Valve
314, 324
514, 524
Pressure sensor
245
APC valve
243
Vacuum pump
246
Heater
207
Temperature sensor
263
Rotator
267
Boat elevator
115
Heater
HTP, LTP
Pressure sensor
P2, P3, P4, P5
Gas detector
M2, M3, M4, M5
Valve
AV05, AV06,
AV08, AV09,
AV10

FIG. 4

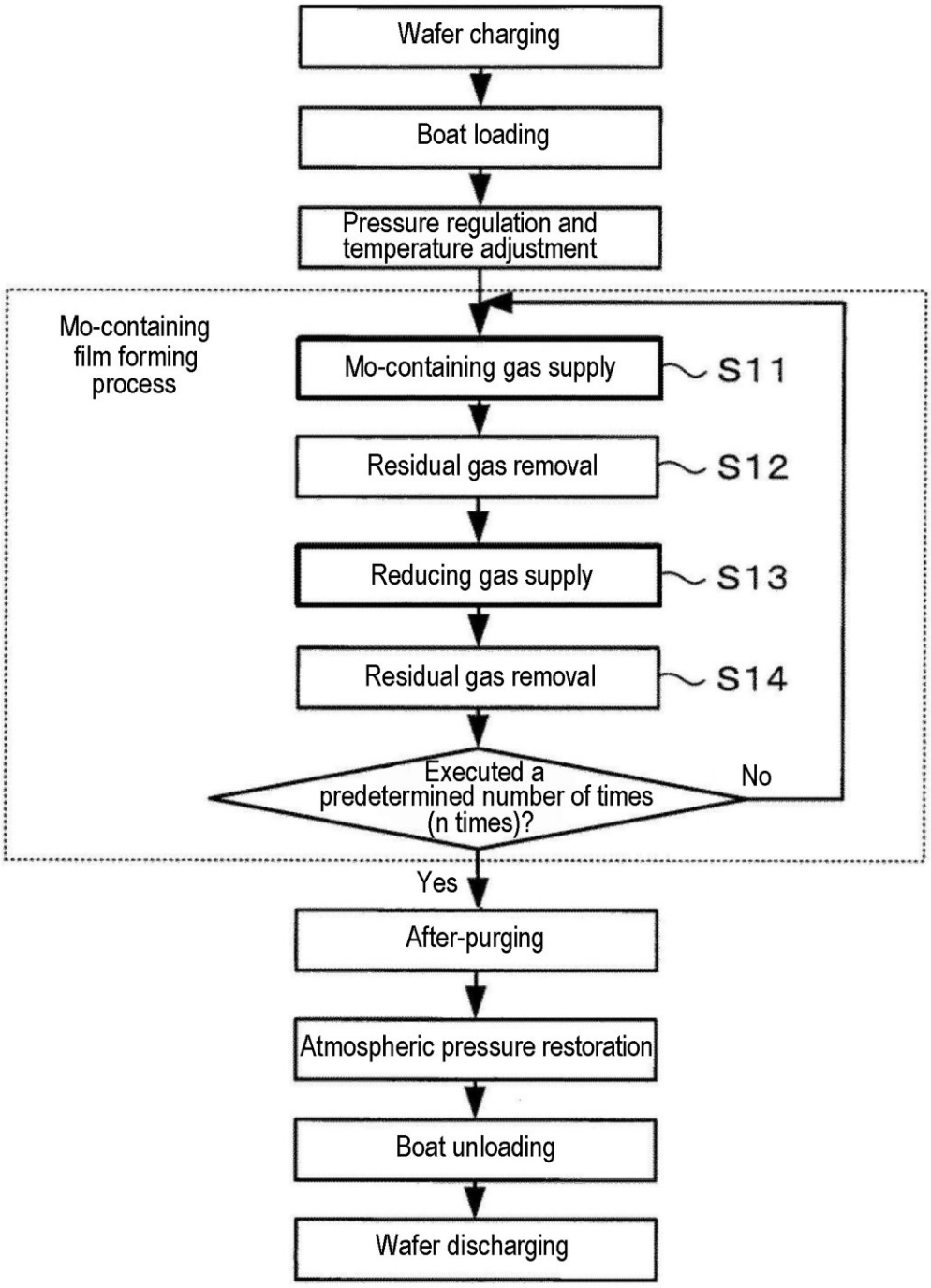

Wafer charging
Boat loading
Pressure regulation and temperature adjustment
Mo-containing film forming process
Mo-containing gas supply
S11
Residual gas removal
S12
Reducing gas supply
S13
Residual gas removal
S14
Executed a predetermined number of times (n times)?
No
Yes
After-purging
Atmospheric pressure restoration
Boat unloading
Wafer discharging

FIG. 5

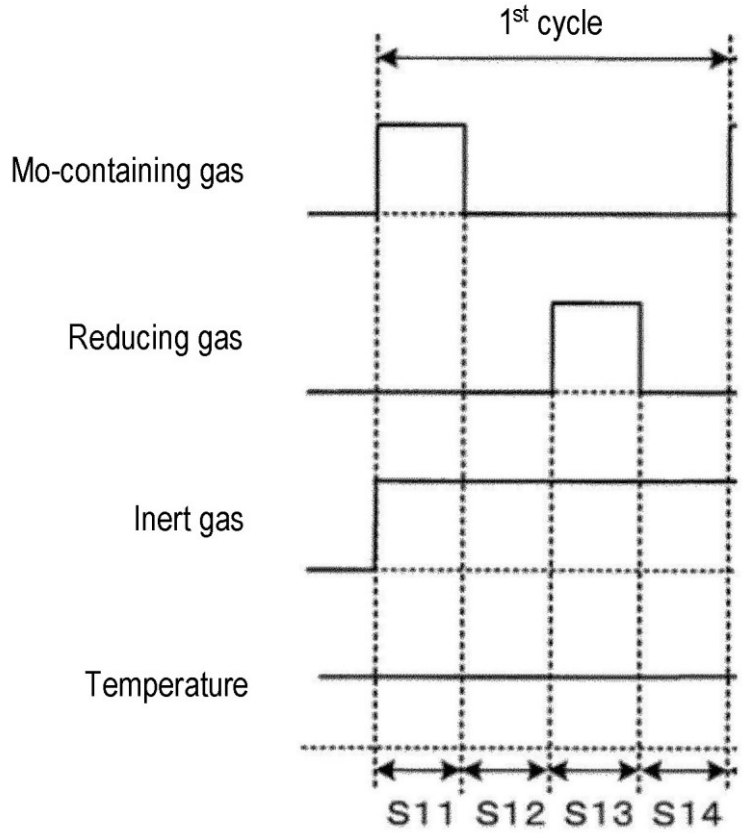

1st cycle
Mo-containing gas
Reducing gas
Inert gas
Temperature
S11
S12
S13
S14

FIG. 6

GSS

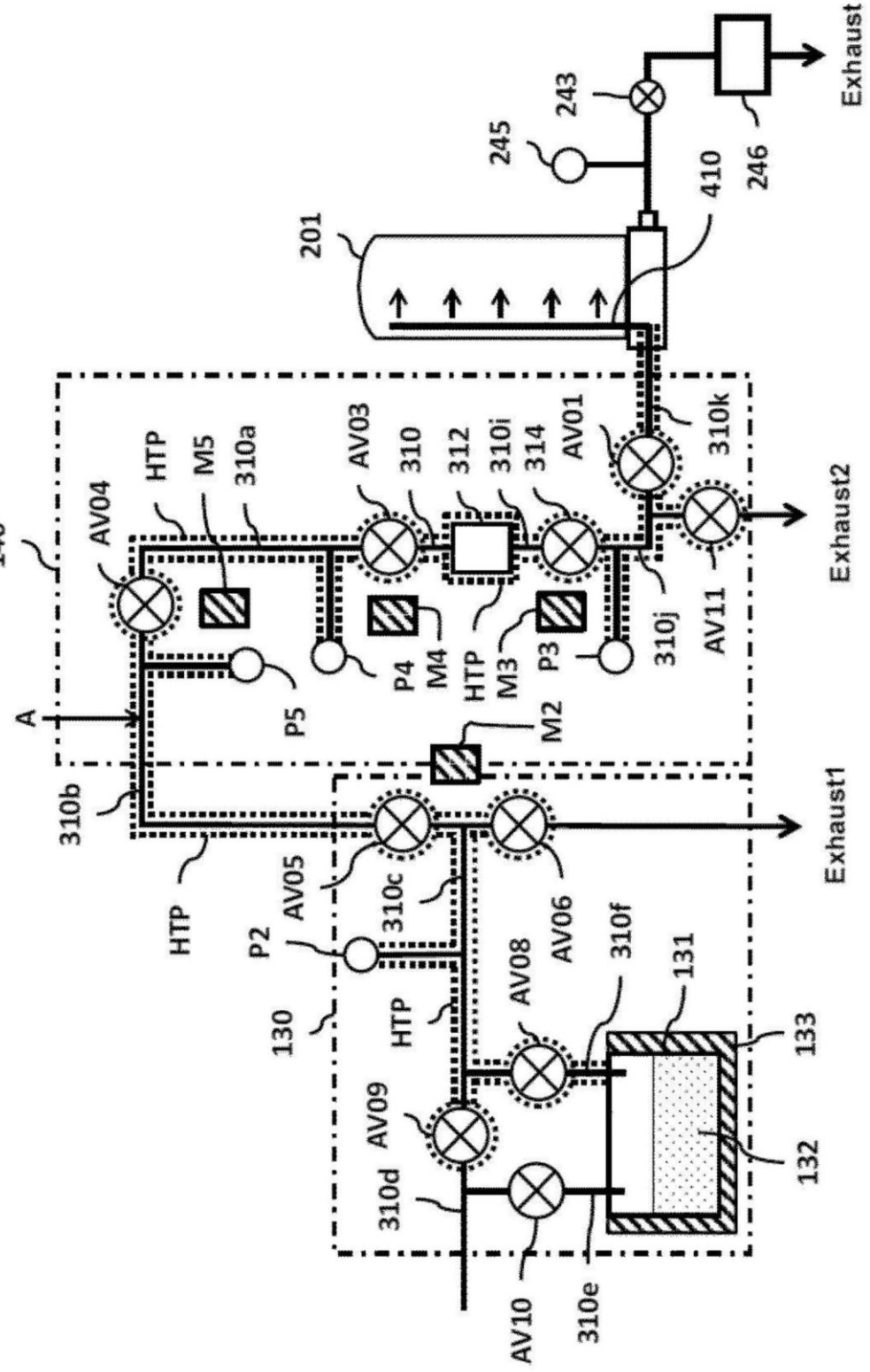

Exhaust
243
245
246
410
201
140
AV04
HTP
M5
310a
AV03
310
312
310i
314
AV01
310k
Exhaust2
AV11
310j
P4
M4
HTP
M3
P3
P5
A
M2
310b
Exhaust1
HTP
AV05
310c
AV06
310f
131
P2
130
HTP
AV08
133
AV09
310d
132
AV10
310e

FIG. 7

GSSr

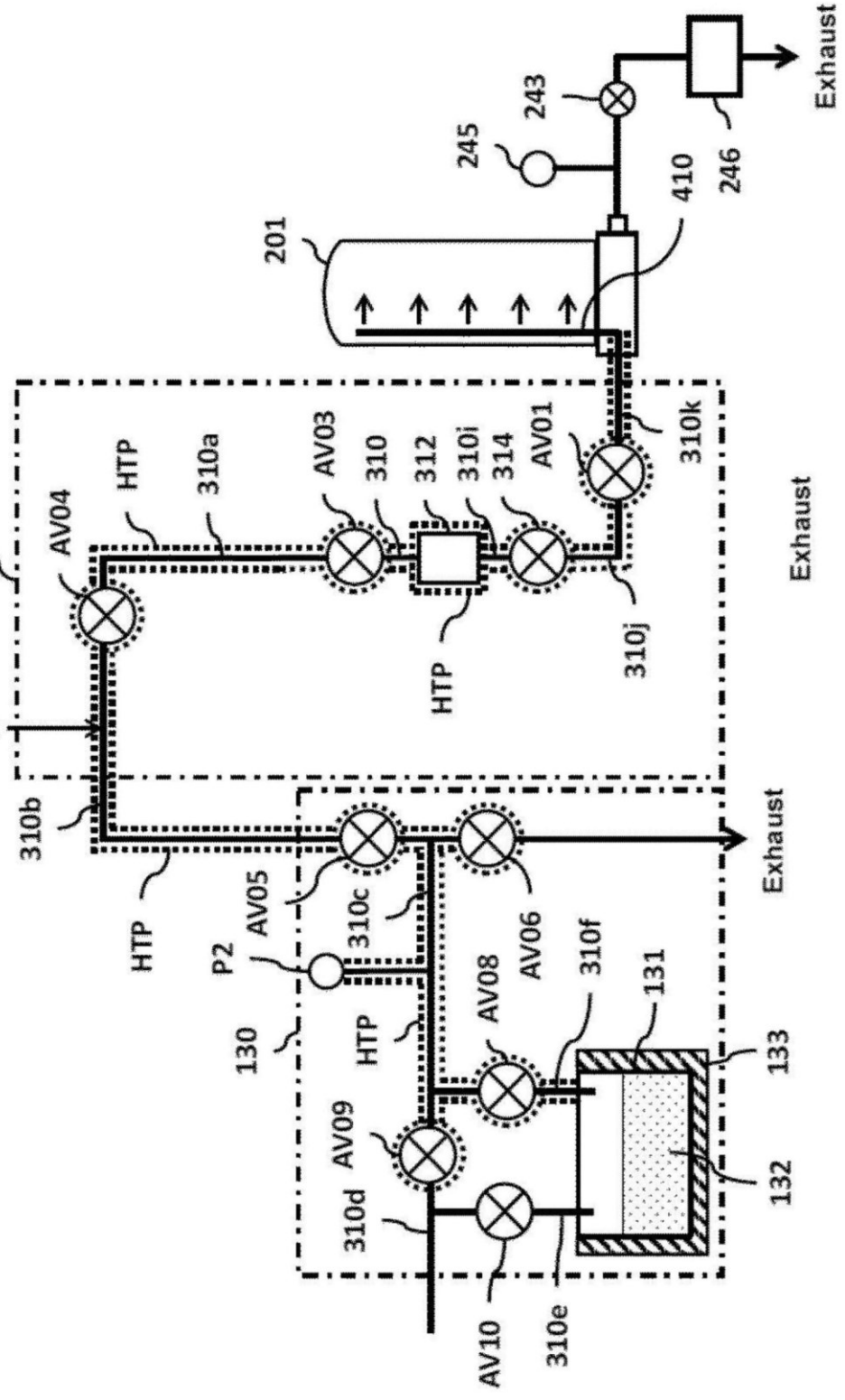

140
A
310b
HTP
AV04
HTP
310a
AV03
310
312
310i
314
AV01
310k
310j
HTP
Exhaust
Exhaust
201
410
245
243
246
Exhaust
AV05
310c
AV06
P2
130
HTP
AV08
310f
131
133
AV09
310d
132
AV10
310e

FIG. 8

Blockage level	Response program	Program outline
1	PA	Alarm notification
2	PB	Supply pipe heating
3	PC	Supply pipe replacement preparation

FIG. 9

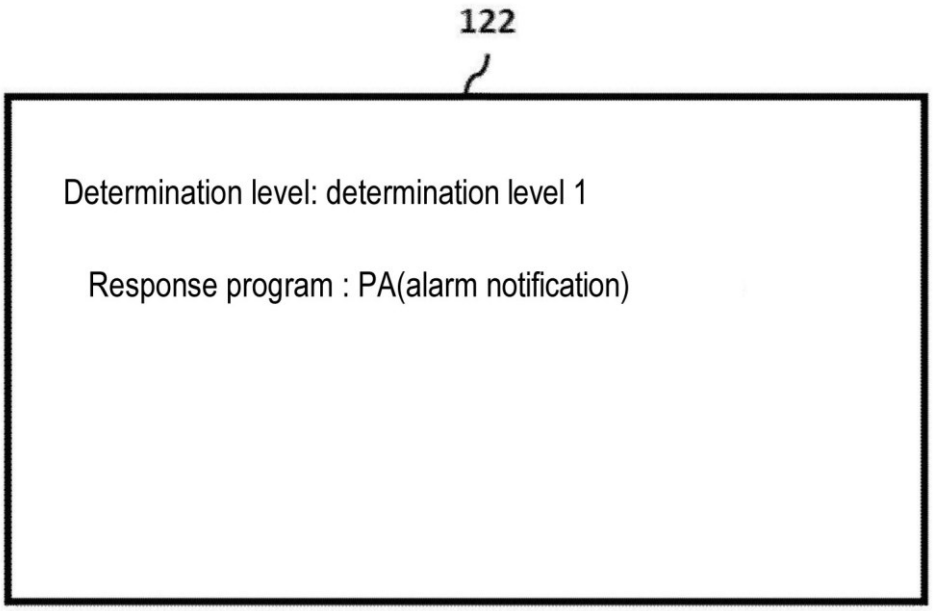


FIG. 10

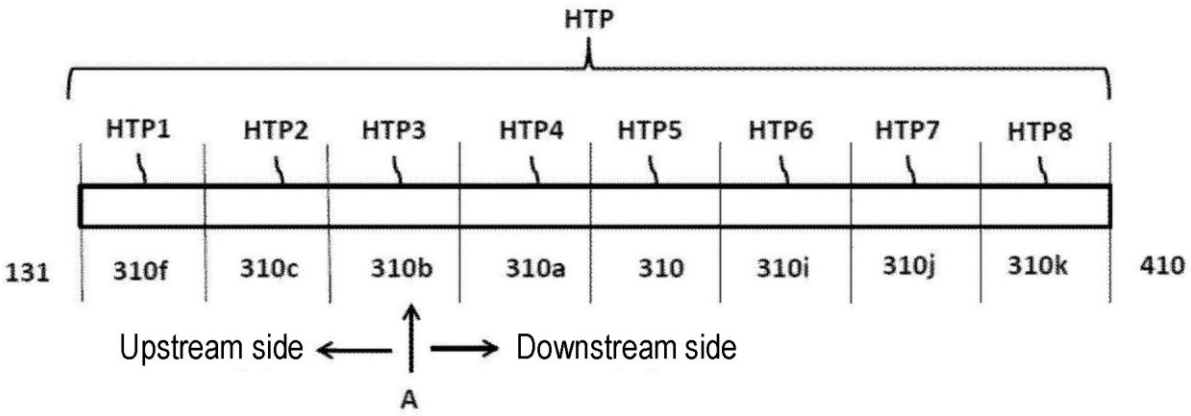


FIG. 11

HTPi (i= 1∼8)

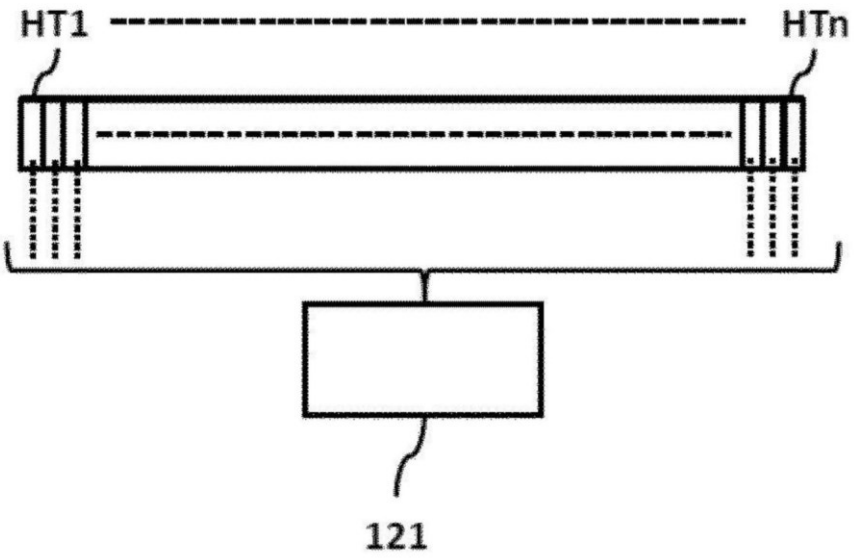


FIG. 12

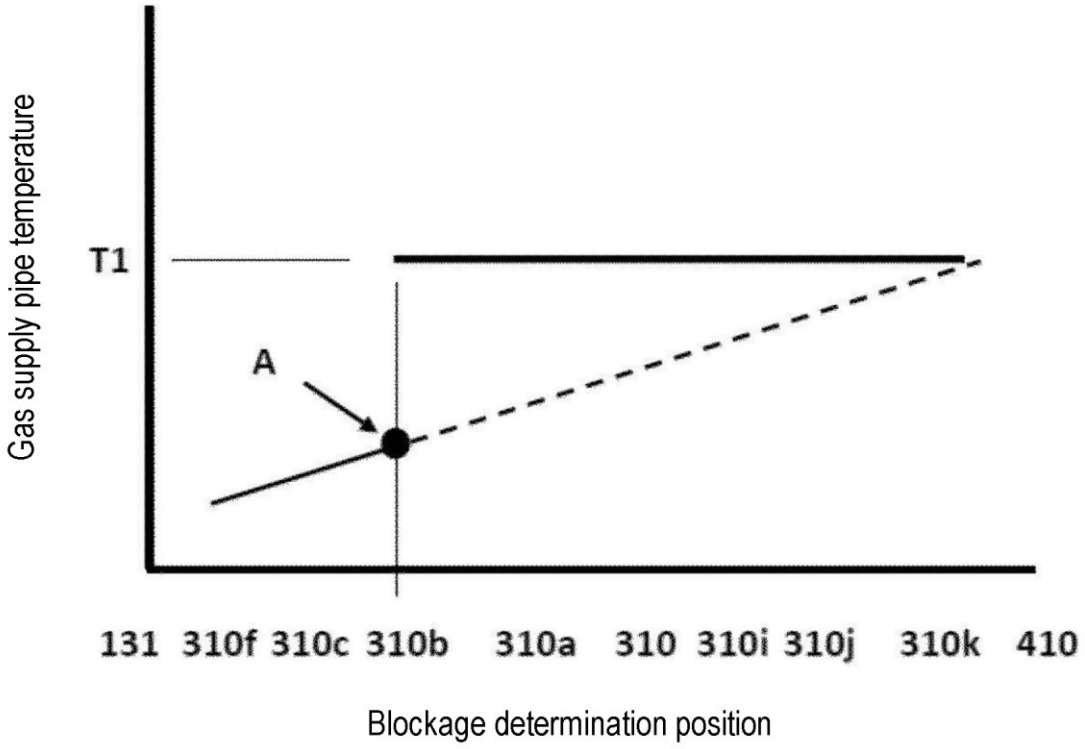

Gas supply pipe temperature
T1
A
131 310f 310c 310b 310a 310 310i 310j 310k 410
Blockage determination position

FIG. 13

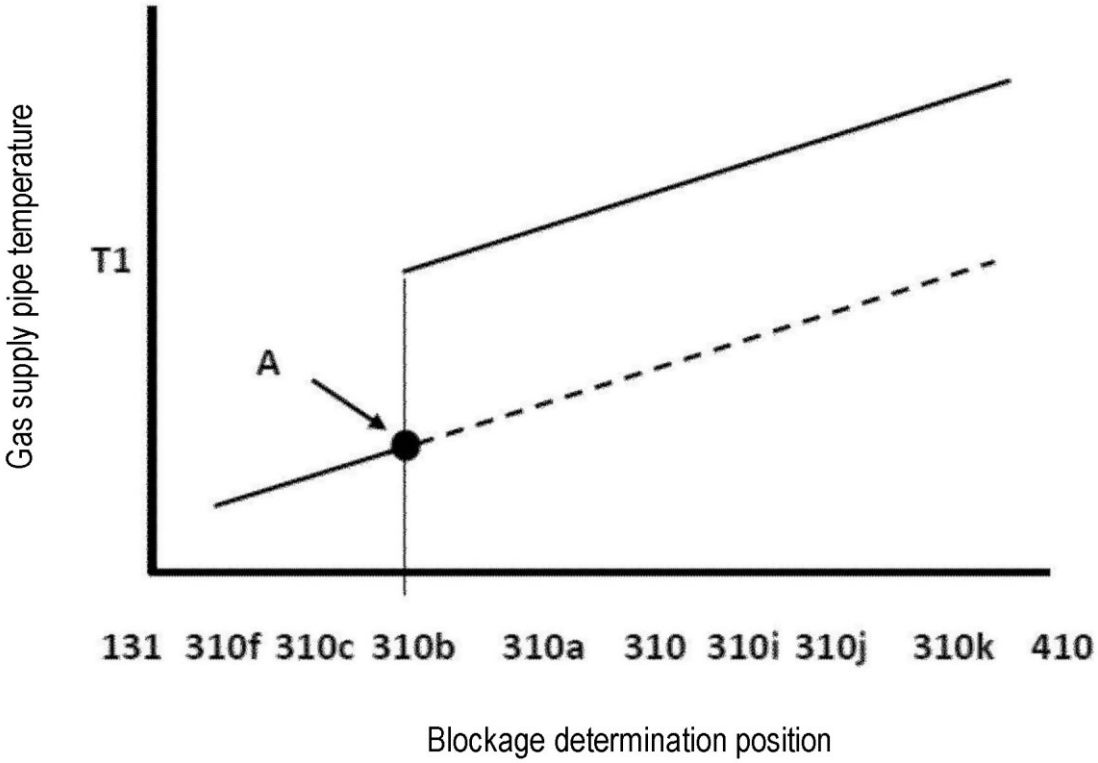

Gas supply pipe temperature
T1
A
131 310f 310c 310b 310a 310 310i 310j 310k 410
Blockage determination position

FIG. 14

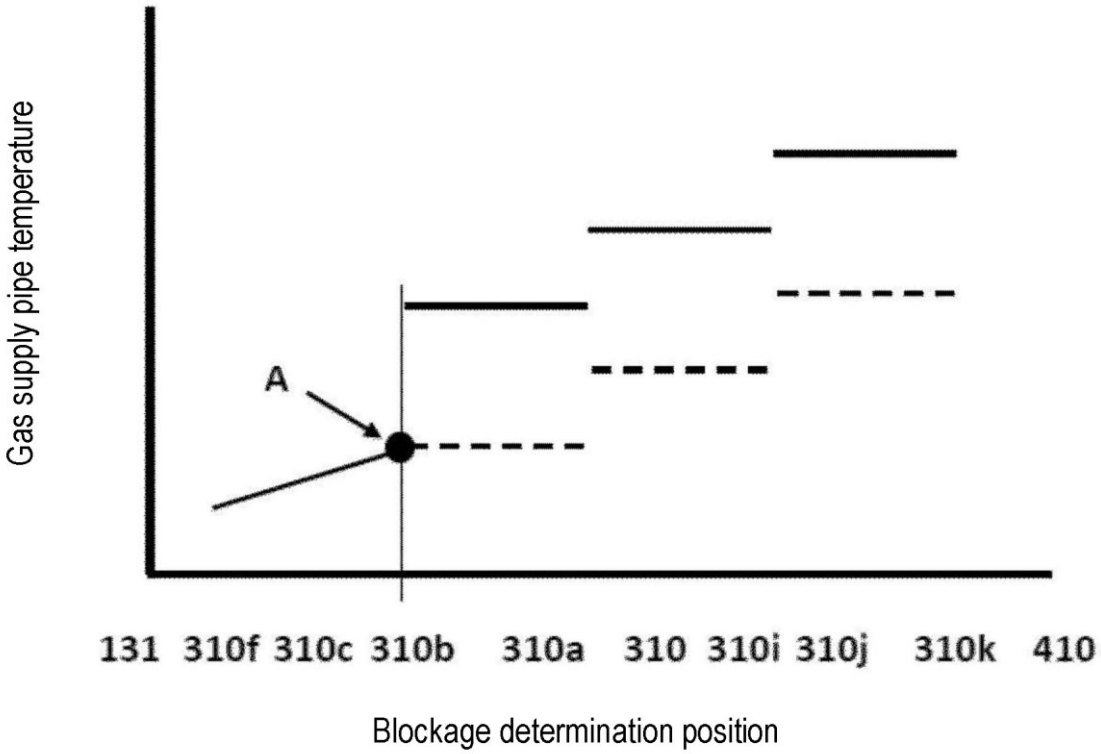

Gas supply pipe temperature
A
131 310f 310c 310b 310a 310 310i 310j 310k 410
Blockage determination position

FIG. 15

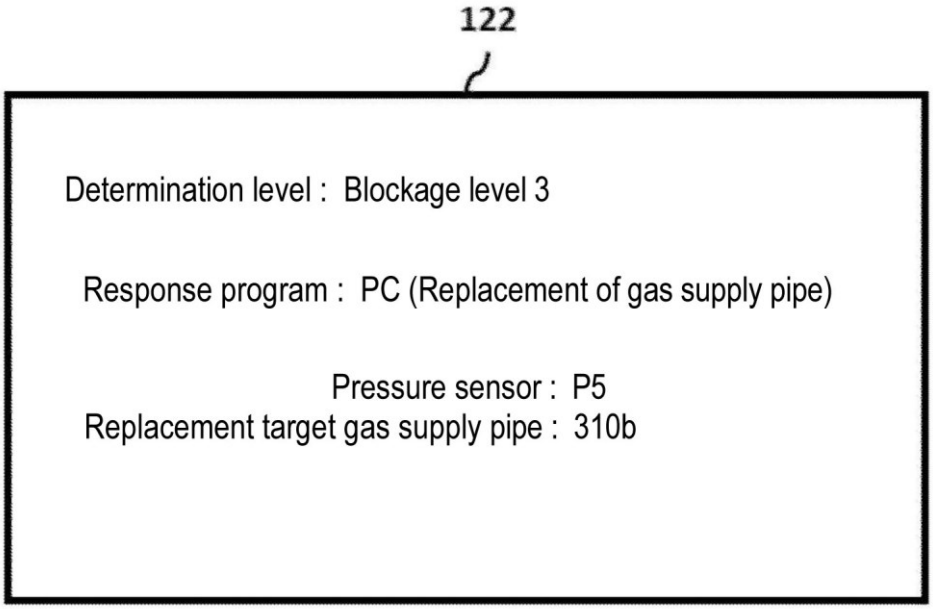
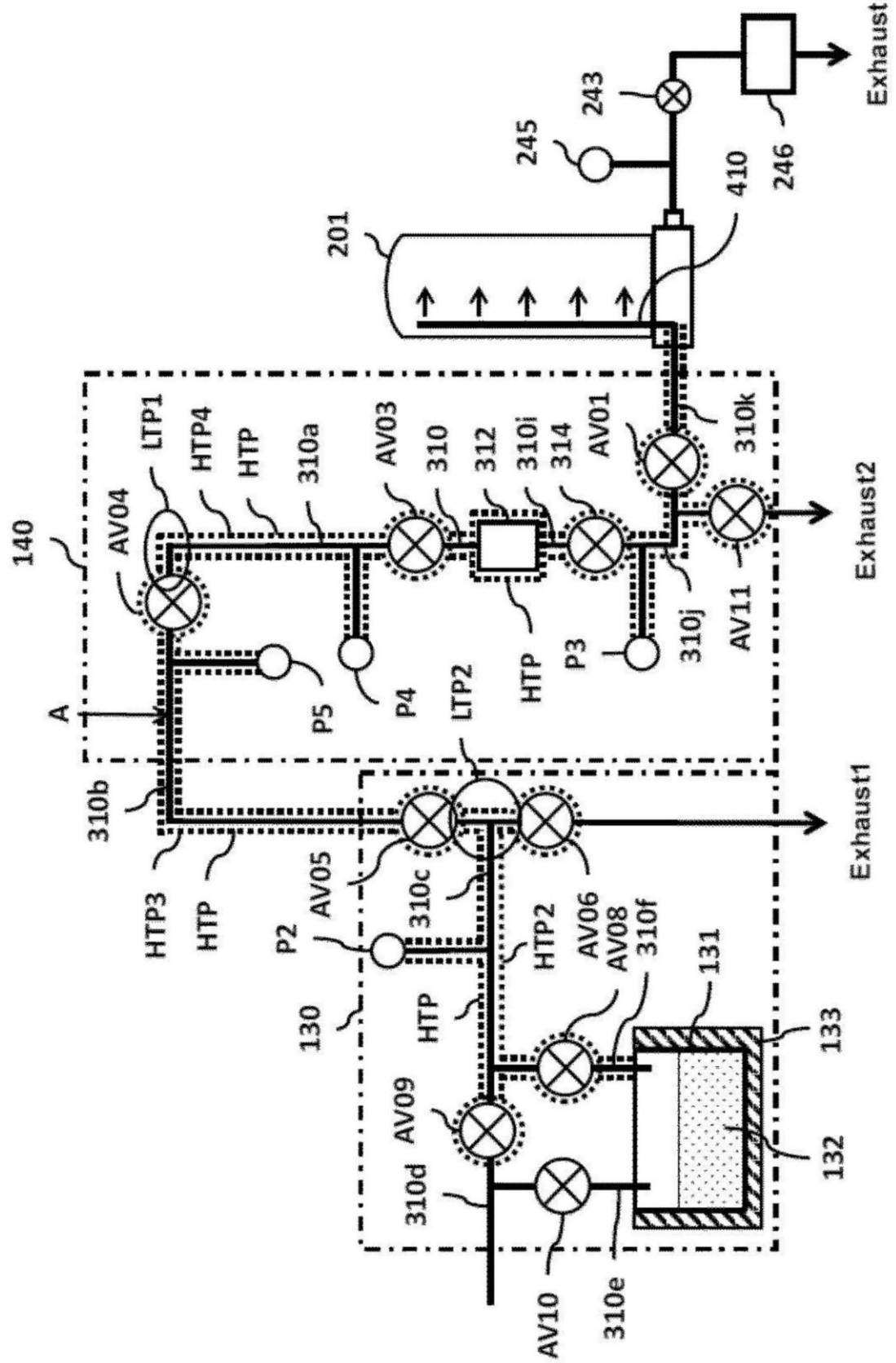

122
Determination level : Blockage level 3
Response program : PC (Replacement of gas supply pipe)
Pressure sensor : P5
Replacement target gas supply pipe : 310b

FIG. 16


Exhaust
243
245
246
410
201
140
LTP1
HTP4
HTP
310a
AV03
310
312
310i
314
AV01
310k
AV04
A
P5
P4
LTP2
HTP
P3
310j
AV11
Exhaust2
310b
HTP3
HTP
P2
AV05
310c
HTP2
AV06
AV08
310f
131
130
HTP
AV09
310d
133
132
AV10
310e
Exhaust1