FIG. 1

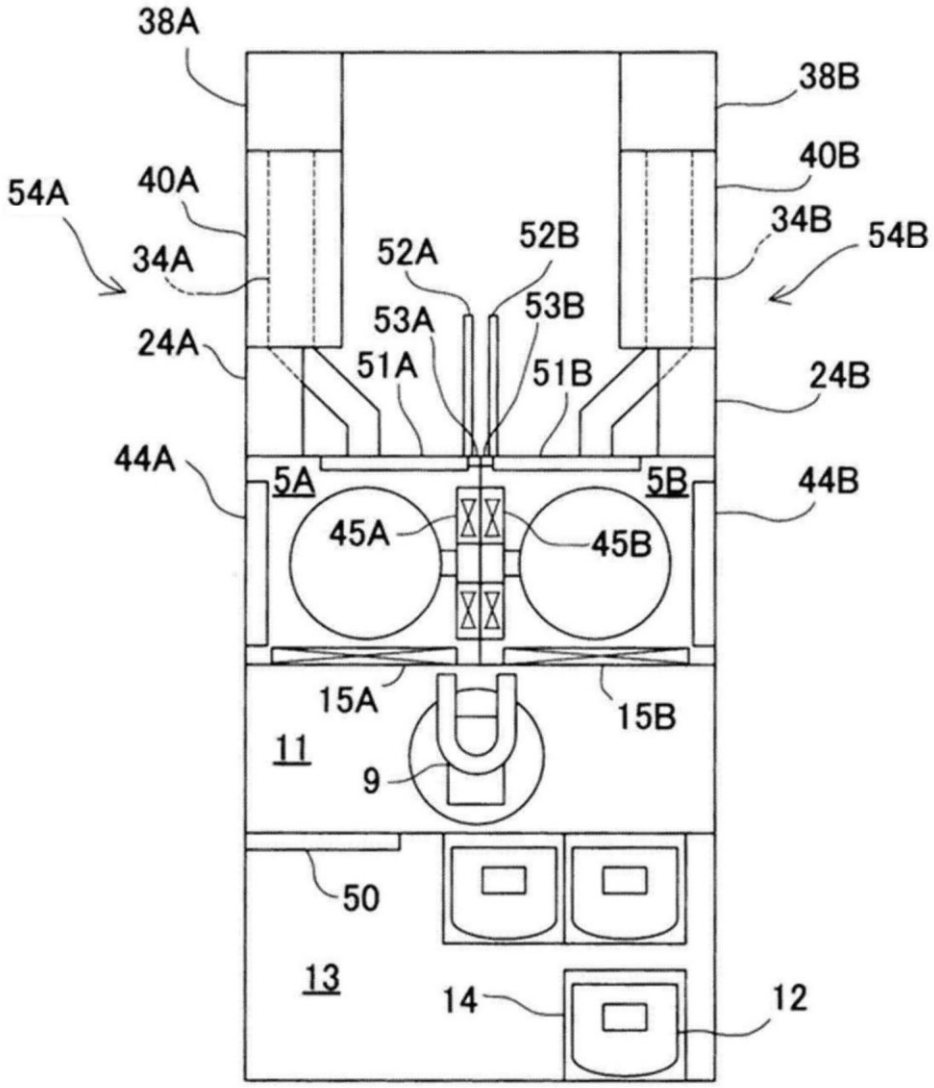

38A
38B
40B
54A
40A
34B
54B
52A
52B
34A
53A
53B
24A
51A
51B
24B
44A
5A
5B
44B
45A
45B
15A
15B
11
9
50
13
14
12

FIG. 2

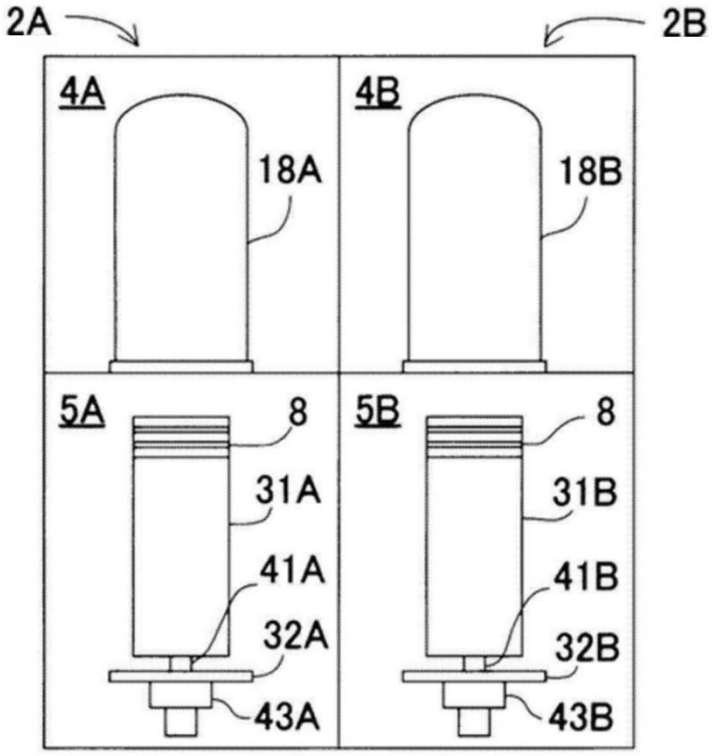


FIG. 3A

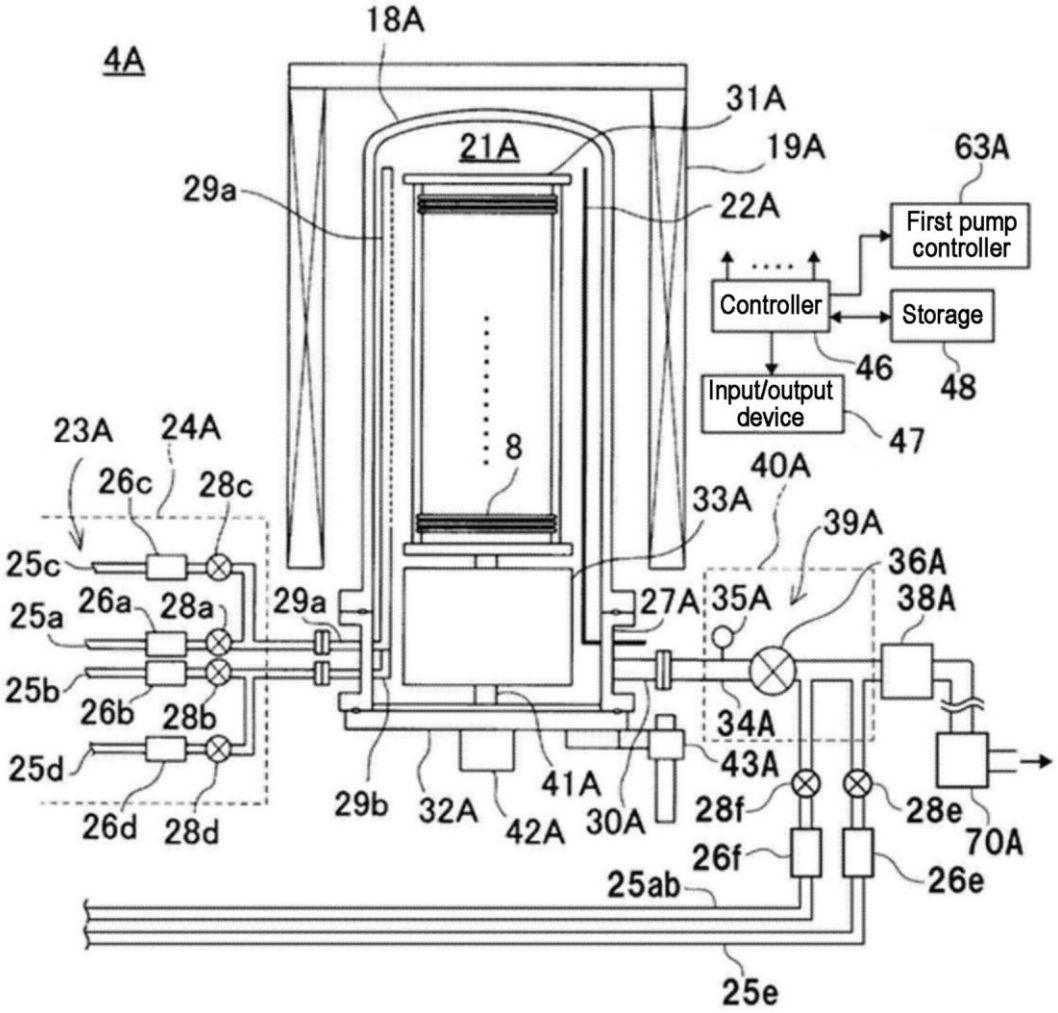

4A
18A
31A
21A
19A
63A
29a
22A
First pump controller
Controller
Storage
46
48
Input/output device
47
8
23A
24A
26c
28c
40A
33A
39A
25c
36A
25a
26a
28a
29a
27A
35A
38A
25b
26b
28b
34A
25d
43A
41A
29b
32A
42A
30A
28f
28e
70A
26d
28d
26f
26e
25ab
25e

FIG. 3B

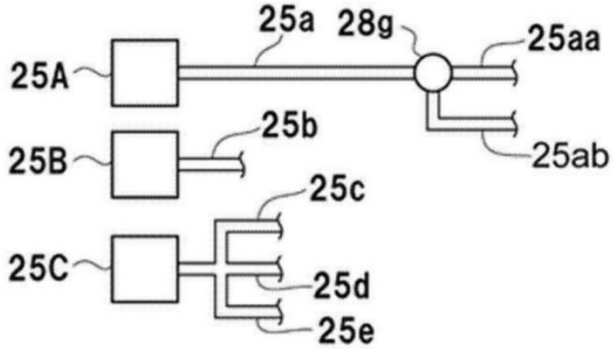

25a
28g
25aa
25A
25b
25B
25ab
25c
25C
25d
25e

FIG. 4

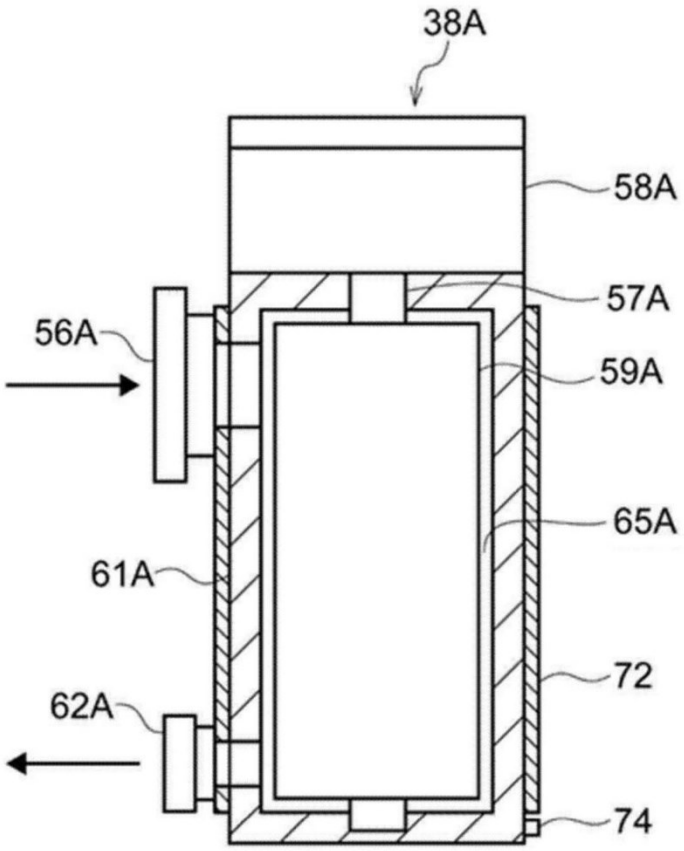


FIG. 5

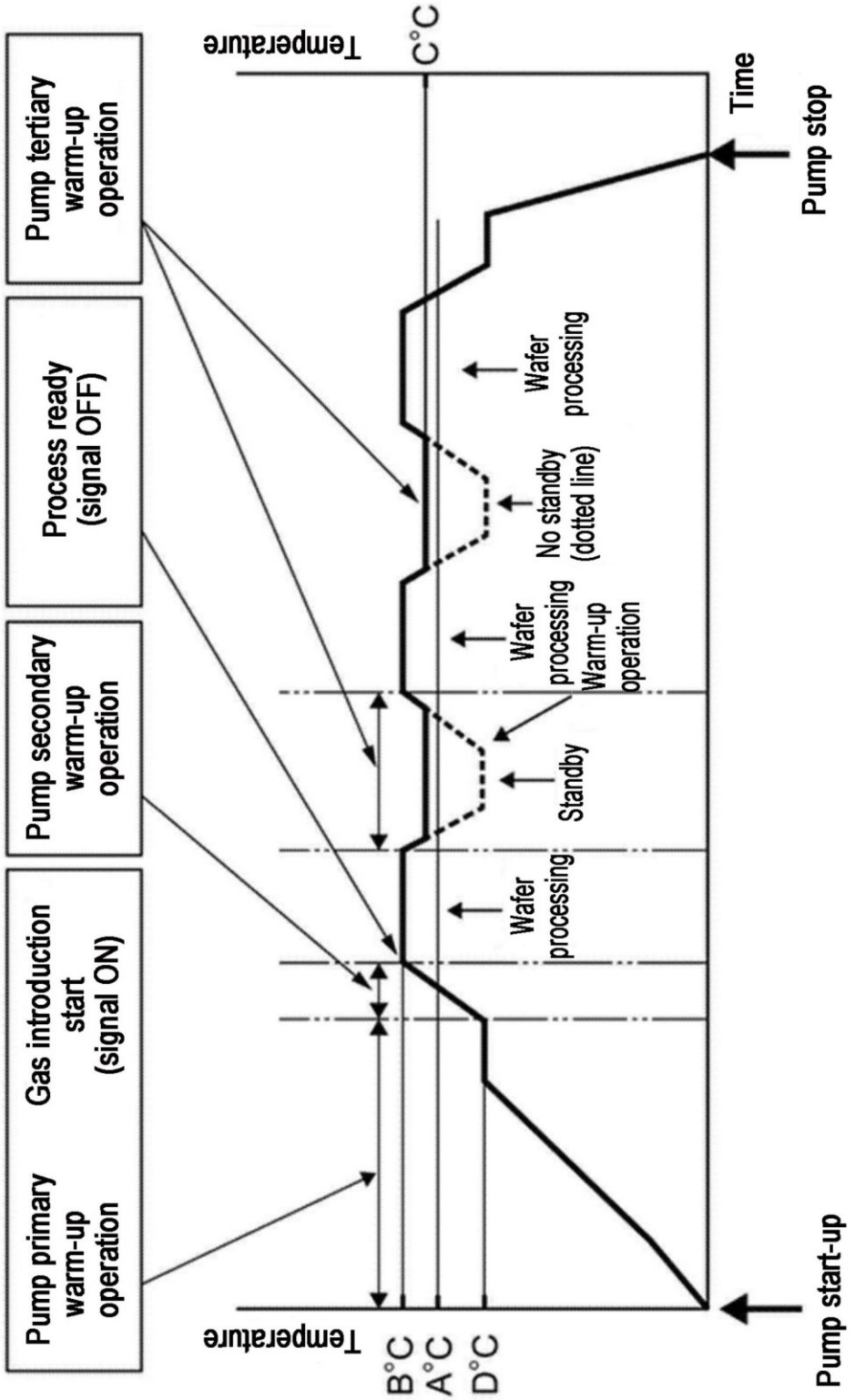
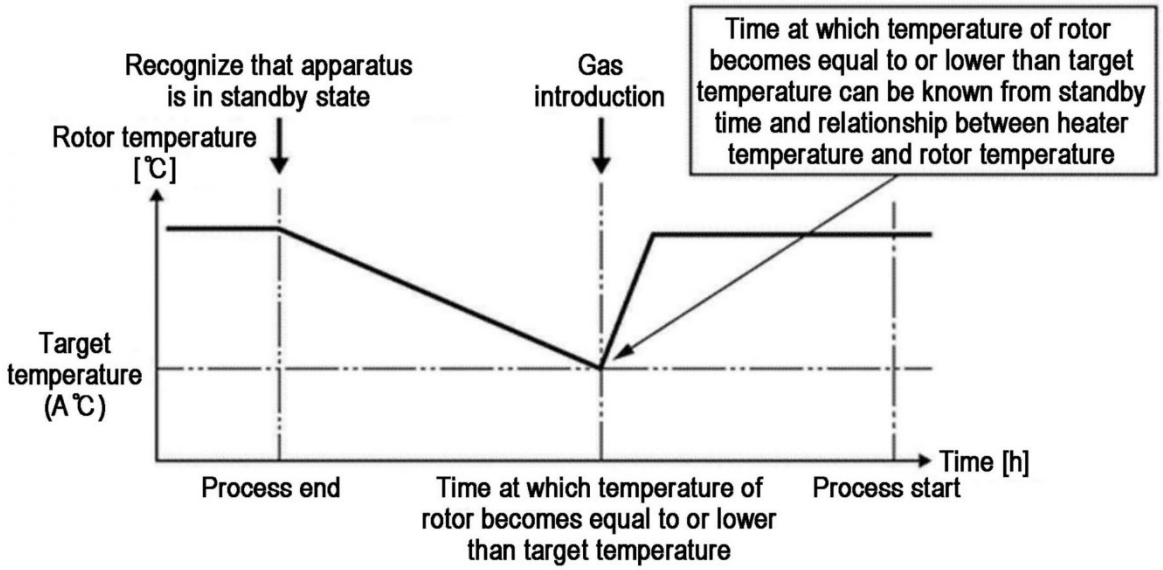

Pump tertiary warm-up operation
Process ready (signal OFF)
Pump secondary warm-up operation
Gas introduction start (signal ON)
Pump primary warm-up operation
Temperature
C°C
Time
Pump stop
Pump start-up
Wafer processing
No standby (dotted line)
Wafer processing Warm-up operation
Standby
Wafer processing
B°C
A°C
D°C

FIG. 6



Schematic view of temperature control operation

FIG. 7

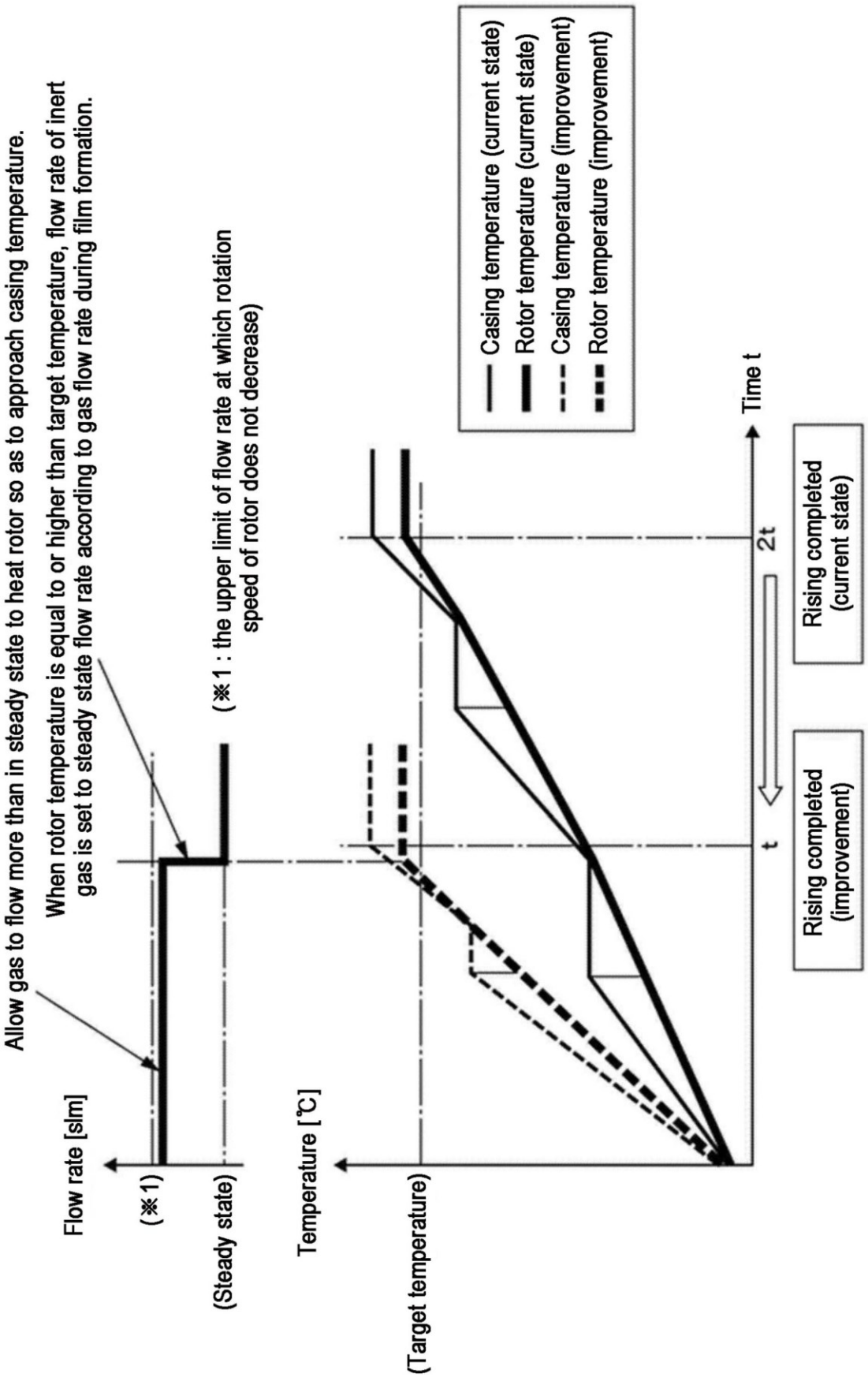
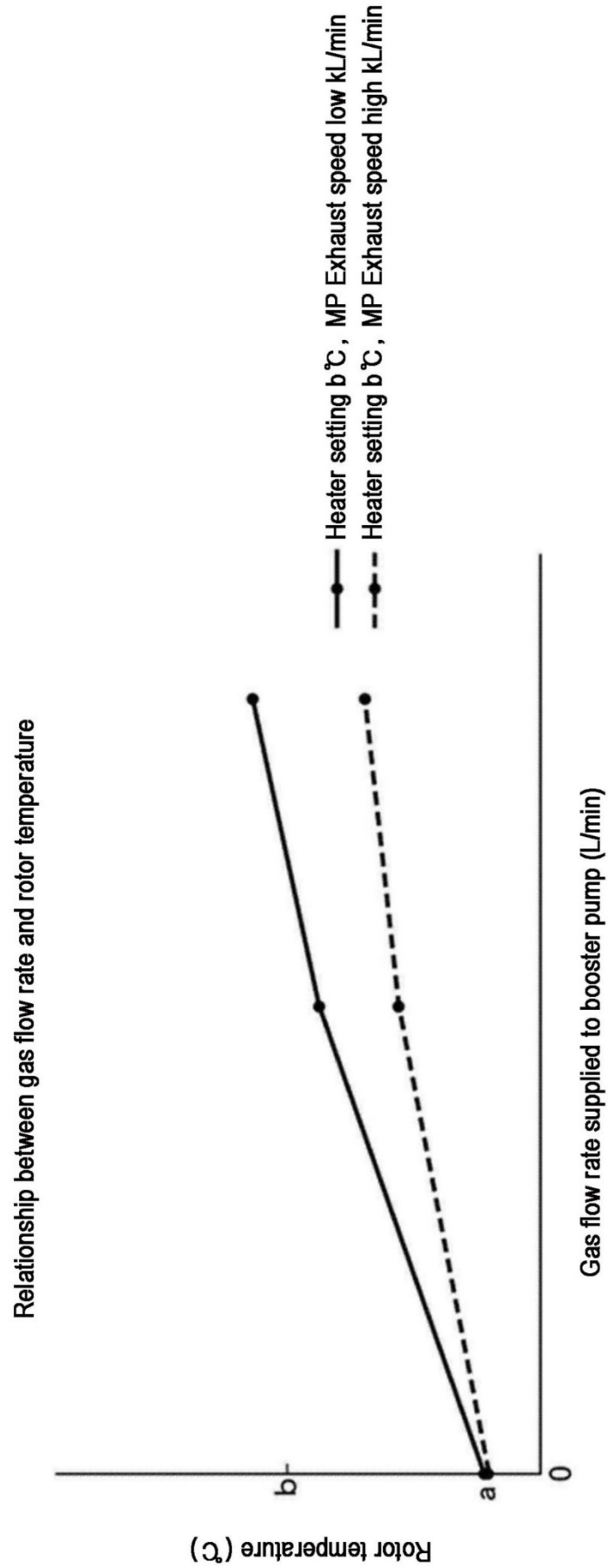

Allow gas to flow more than in steady state to heat rotor so as to approach casing temperature.
When rotor temperature is equal to or higher than target temperature, flow rate of inert gas is set to steady state flow rate according to gas flow rate during film formation.
(※1 : the upper limit of flow rate at which rotation speed of rotor does not decrease)
Flow rate [slm]
(※1)
(Steady state)
Temperature [℃]
(Target temperature)
Casing temperature (current state)
Rotor temperature (current state)
Casing temperature (improvement)
Rotor temperature (improvement)
Time t
t
2t
Rising completed (improvement)
Rising completed (current state)

FIG. 8


Relationship between gas flow rate and rotor temperature
Heater setting b℃, MP Exhaust speed low kL/min
Heater setting b℃, MP Exhaust speed high kL/min
Rotor temperature (℃)
b
a
0
Gas flow rate supplied to booster pump (L/min)