FIG. 1

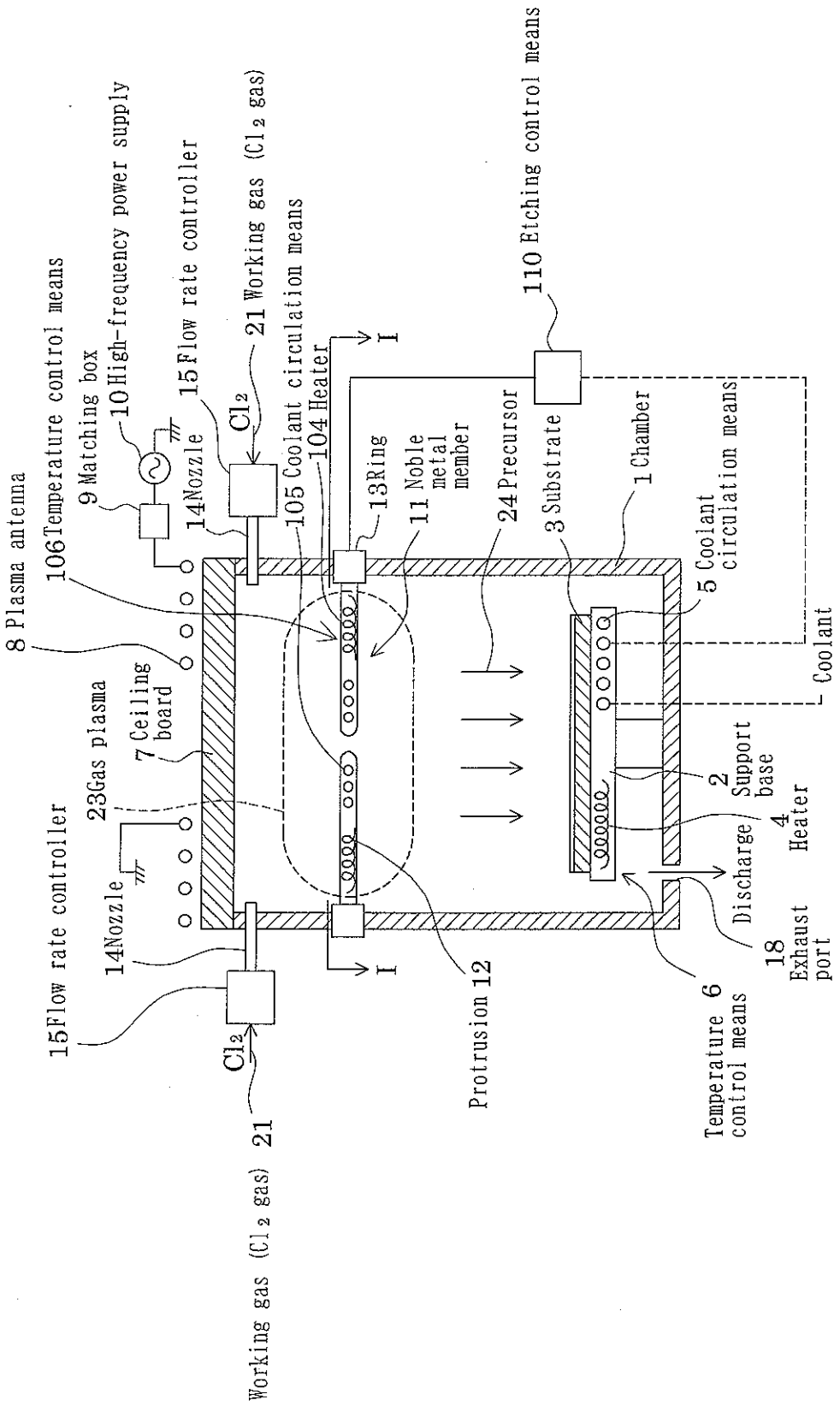

8 Plasma antenna
106 Temperature control means
9 Matching box
10 High-frequency power supply
15 Flow rate controller
14 Nozzle
Cl2
21 Working gas (Cl2 gas)
105 Coolant circulation means
104 Heater
I
110 Etching control means
13 Ring
11 Noble metal member
24 Precursor
3 Substrate
1 Chamber
5 Coolant circulation means
Coolant
7 Ceiling board
23 Gas plasma
2 Support base
4 Heater
Discharge
18 Exhaust port
Protrusion 12
Temperature control means 6
Working gas (Cl2 gas) 21
Cl2
15 Flow rate controller
14 Nozzle
I

FIG. 2

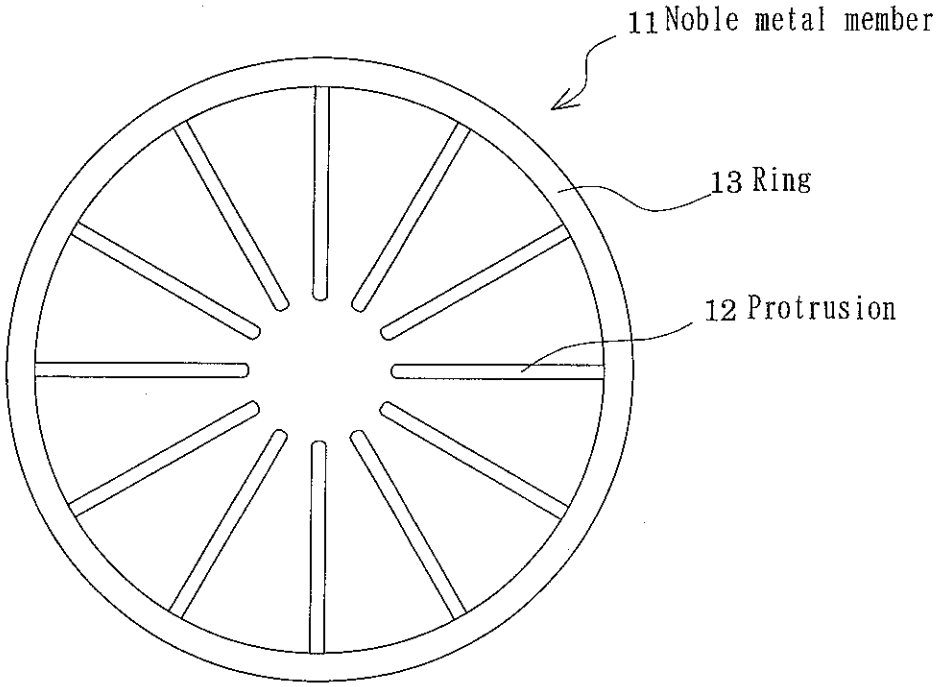

11 Noble metal member
13 Ring
12 Protrusion

FIG. 3

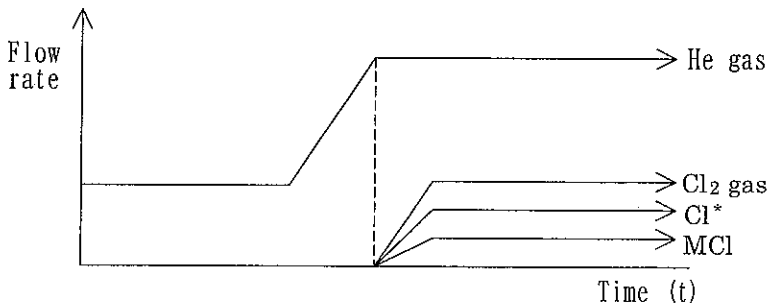

Flow rate
He gas
Cl_2 gas
Cl*
MCl
Time (t)

FIG. 4

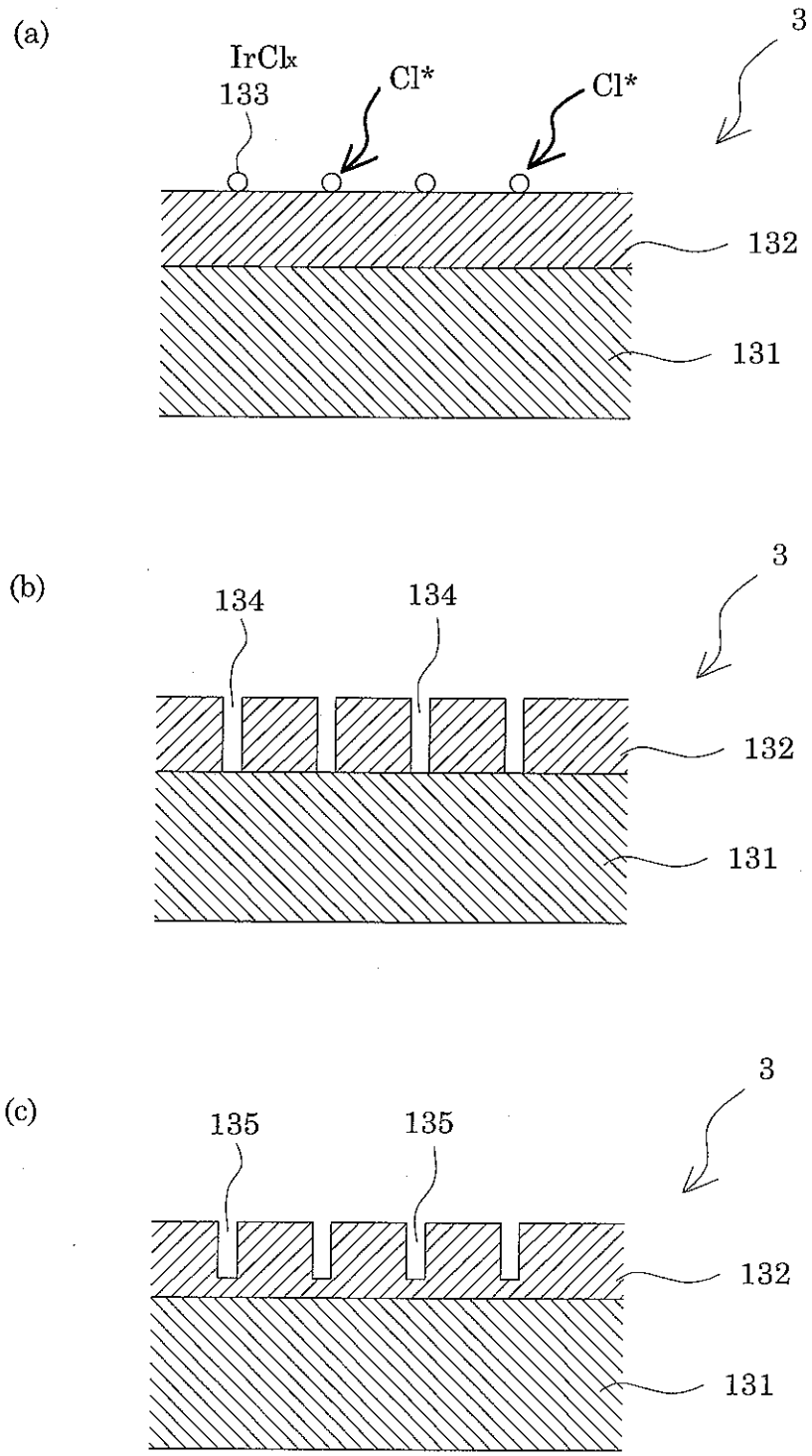


FIG. 5

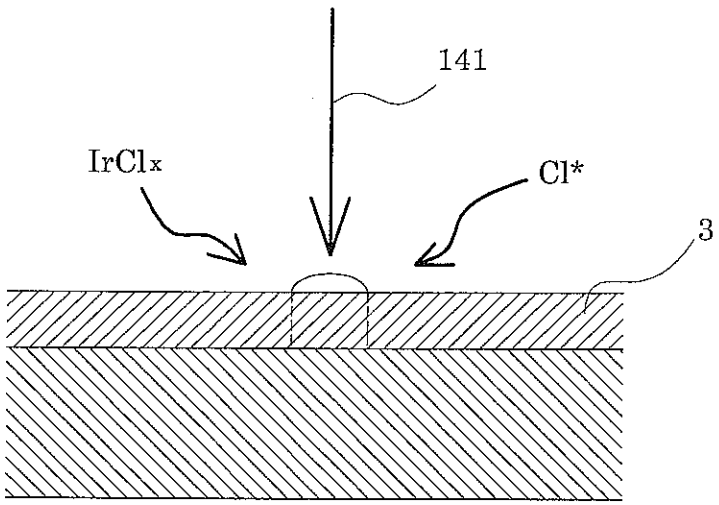


FIG. 6

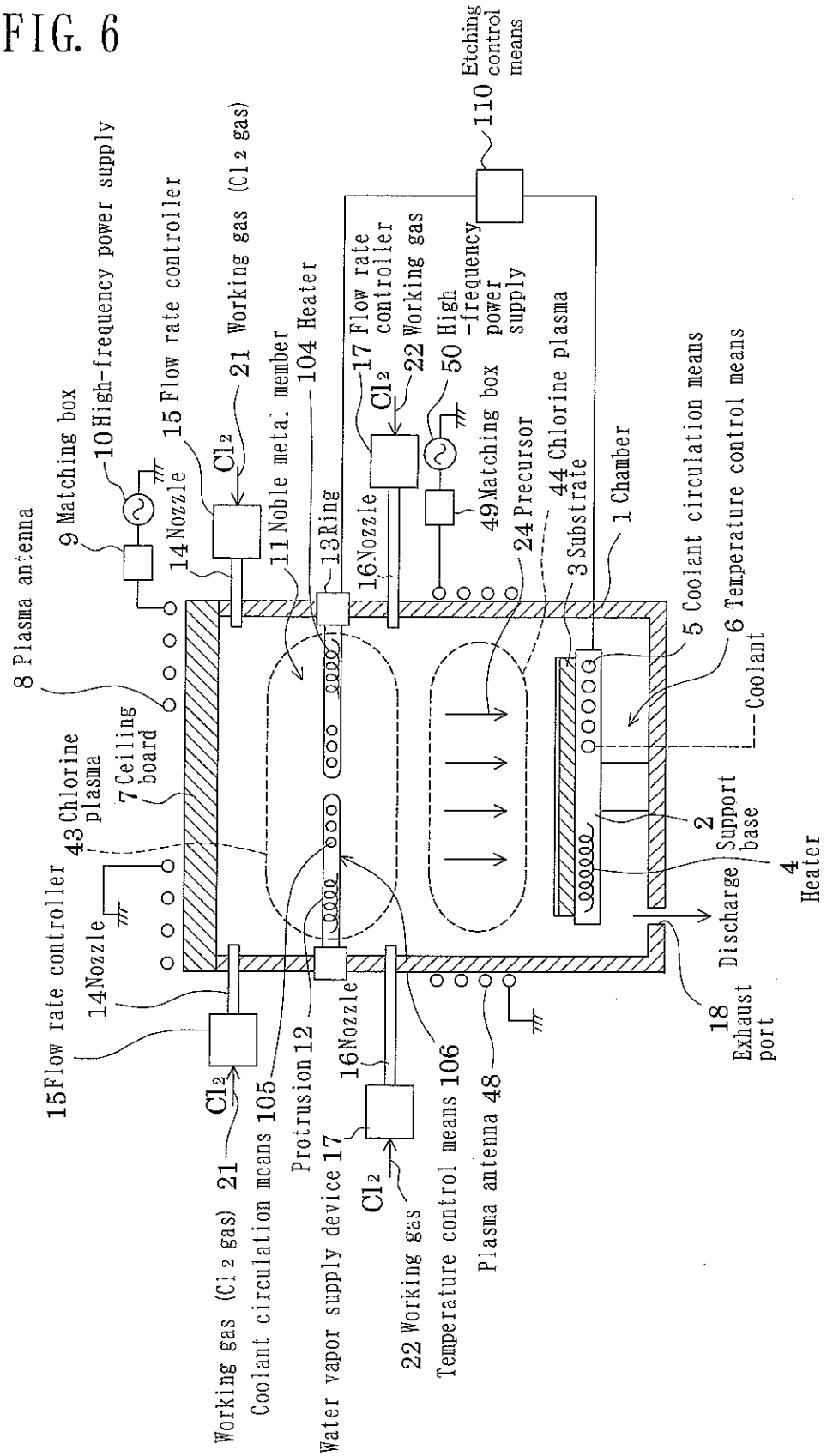

8 Plasma antenna
9 Matching box
10 High-frequency power supply
15 Flow rate controller
14 Nozzle
21 Working gas (Cl2 gas)
Cl2
11 Noble metal member
104 Heater
13 Ring
16 Nozzle
17 Flow rate controller
22 Working gas
50 High-frequency power supply
49 Matching box
24 Precursor
44 Chlorine plasma
3 Substrate
1 Chamber
110 Etching control means
5 Coolant circulation means
6 Temperature control means
Coolant
2 Support base
4 Heater
18 Exhaust port
Discharge
43 Chlorine plasma
7 Ceiling board
Working gas (Cl2 gas) 21
Coolant circulation means 105
Protrusion 12
Water vapor supply device 17
22 Working gas
Temperature control means 106
Plasma antenna 48

FIG. 7

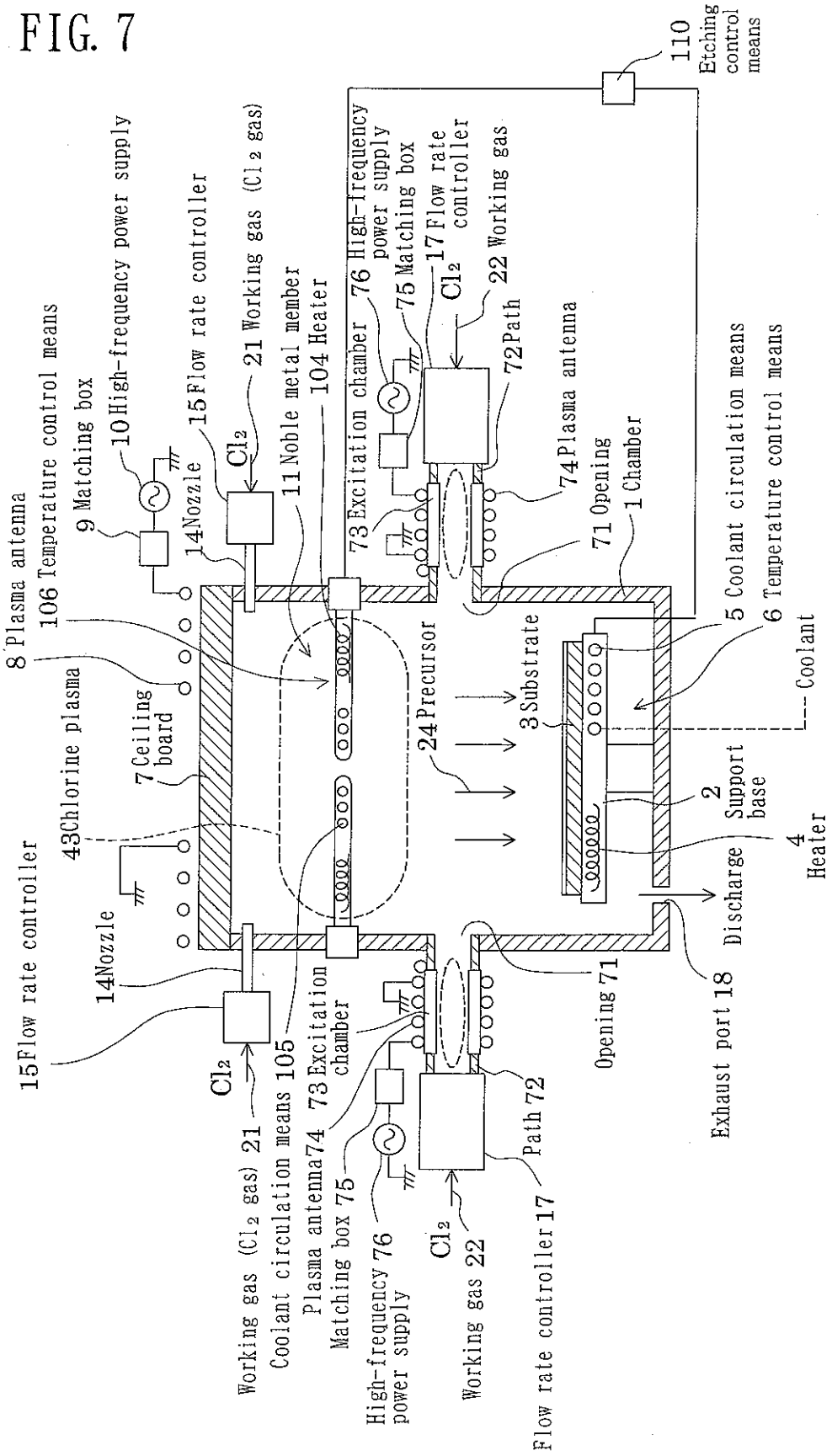

110 Etching control means
8 Plasma antenna
106 Temperature control means
9 Matching box
10 High-frequency power supply
15 Flow rate controller
14 Nozzle
Cl2
21 Working gas (Cl2 gas)
11 Noble metal member
104 Heater
73 Excitation chamber
76 High-frequency power supply
75 Matching box
17 Flow rate controller
Cl2
22 Working gas
72 Path
74 Plasma antenna
71 Opening
1 Chamber
5 Coolant circulation means
6 Temperature control means
Coolant
3 Substrate
24 Precursor
2 Support base
4 Heater
Discharge
Exhaust port 18
Opening 71
Path 72
Working gas 22
Cl2
Flow rate controller 17
High-frequency power supply
Matching box 75
Plasma antenna 74
Excitation chamber 73
Coolant circulation means 105
Working gas (Cl2 gas) 21
Cl2
15 Flow rate controller
14 Nozzle
43 Chlorine plasma
7 Ceiling board

FIG. 8

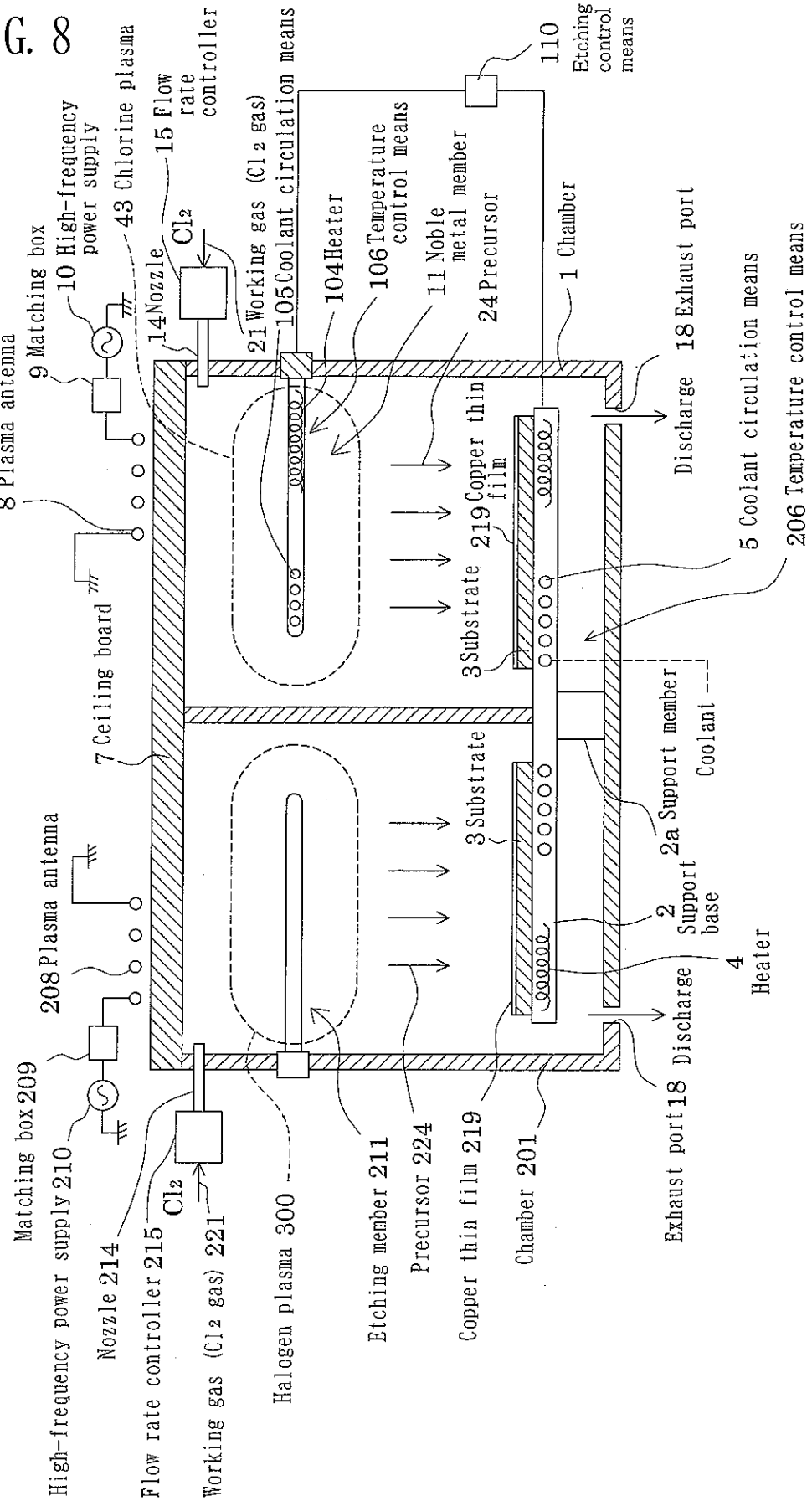
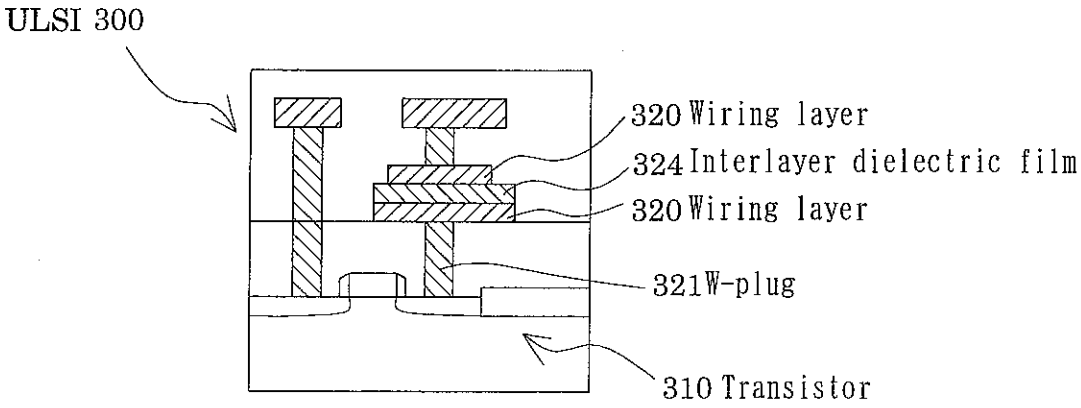

8 Plasma antenna
9 Matching box
10 High-frequency power supply
43 Chlorine plasma
15 Flow rate controller
14 Nozzle
Cl2
21 Working gas (Cl2 gas)
105 Coolant circulation means
104 Heater
106 Temperature control means
11 Noble metal member
24 Precursor
110 Etching control means
1 Chamber
18 Exhaust port
Discharge
219 Copper thin film
3 Substrate
5 Coolant circulation means
206 Temperature control means
7 Ceiling board
208 Plasma antenna
Matching box 209
High-frequency power supply 210
Nozzle 214
Flow rate controller 215
Working gas (Cl2 gas) 221
Halogen plasma 300
Etching member 211
Precursor 224
Copper thin film 219
Chamber 201
Exhaust port 18
Discharge
2a Support member
Coolant
2 Support base
4 Heater

FIG. 9


ULSI 300
320 Wiring layer
324 Interlayer dielectric film
320 Wiring layer
321 W-plug
310 Transistor