FIG. 1A

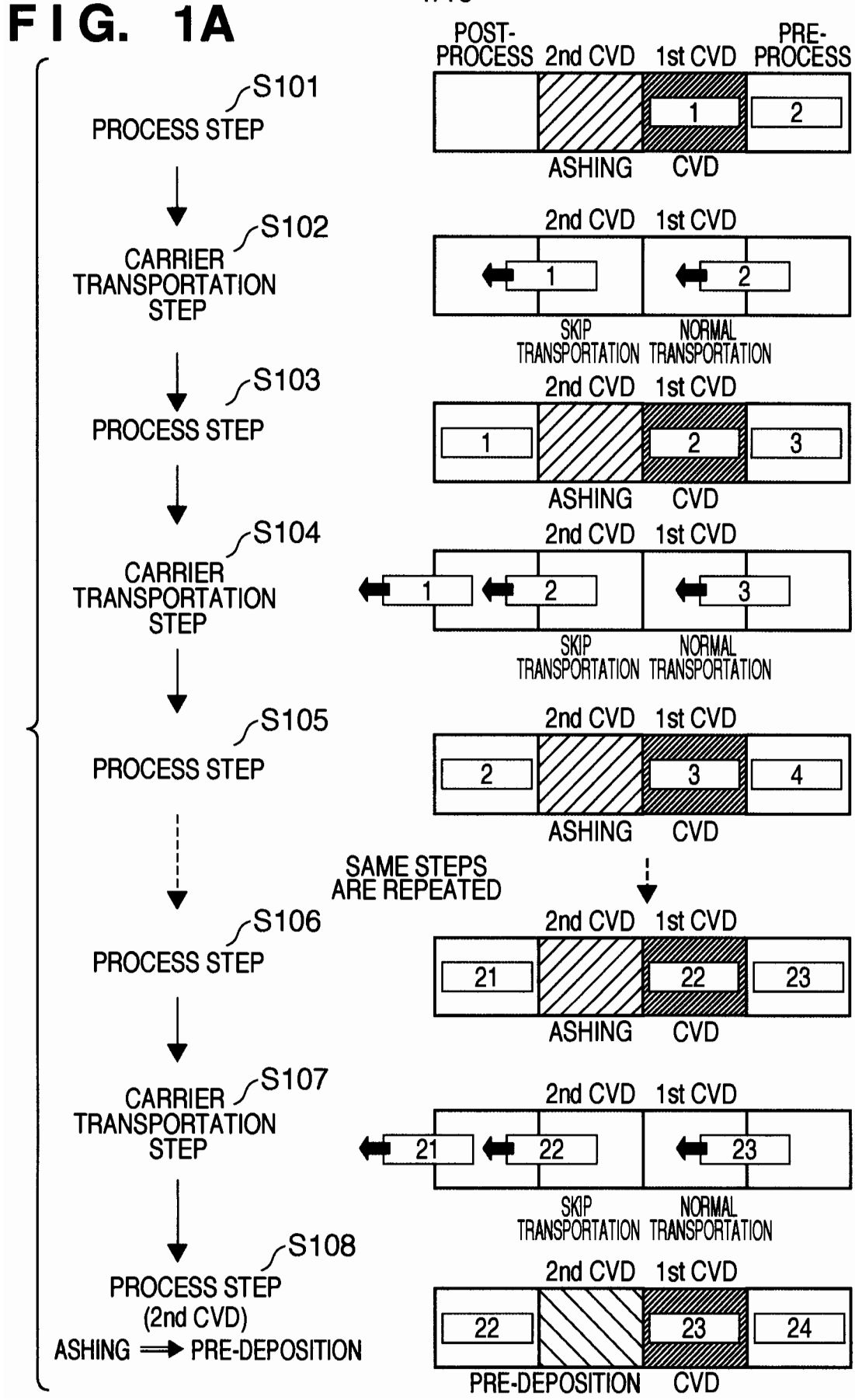

S101
PROCESS STEP
S102
CARRIER TRANSPORTATION STEP
S103
PROCESS STEP
S104
CARRIER TRANSPORTATION STEP
S105
PROCESS STEP
SAME STEPS ARE REPEATED
S106
PROCESS STEP
S107
CARRIER TRANSPORTATION STEP
S108
PROCESS STEP (2nd CVD)
ASHING ⟹ PRE-DEPOSITION
POST-PROCESS
2nd CVD
1st CVD
PRE-PROCESS
ASHING
CVD
SKIP TRANSPORTATION
NORMAL TRANSPORTATION
PRE-DEPOSITION

FIG. 1B

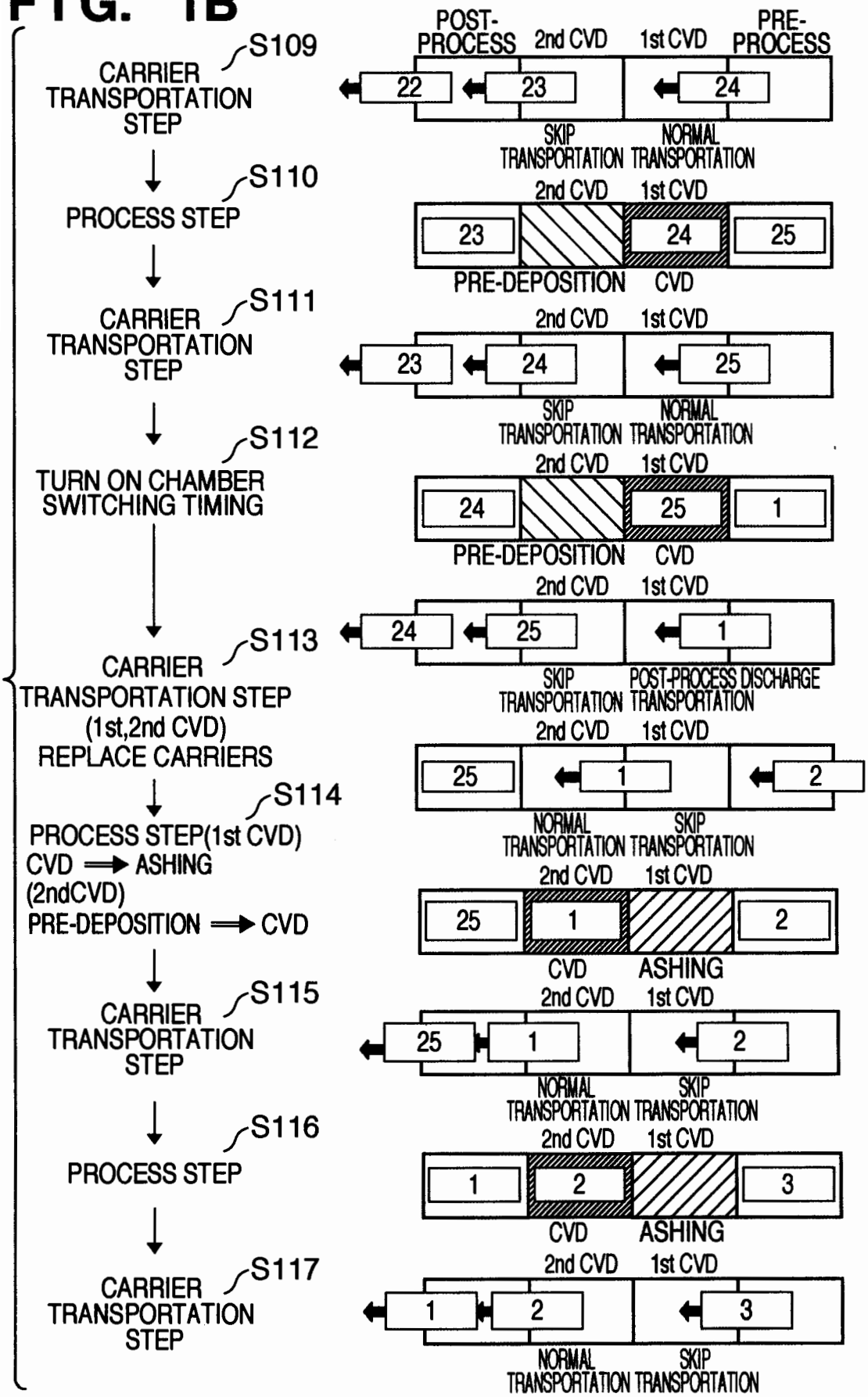
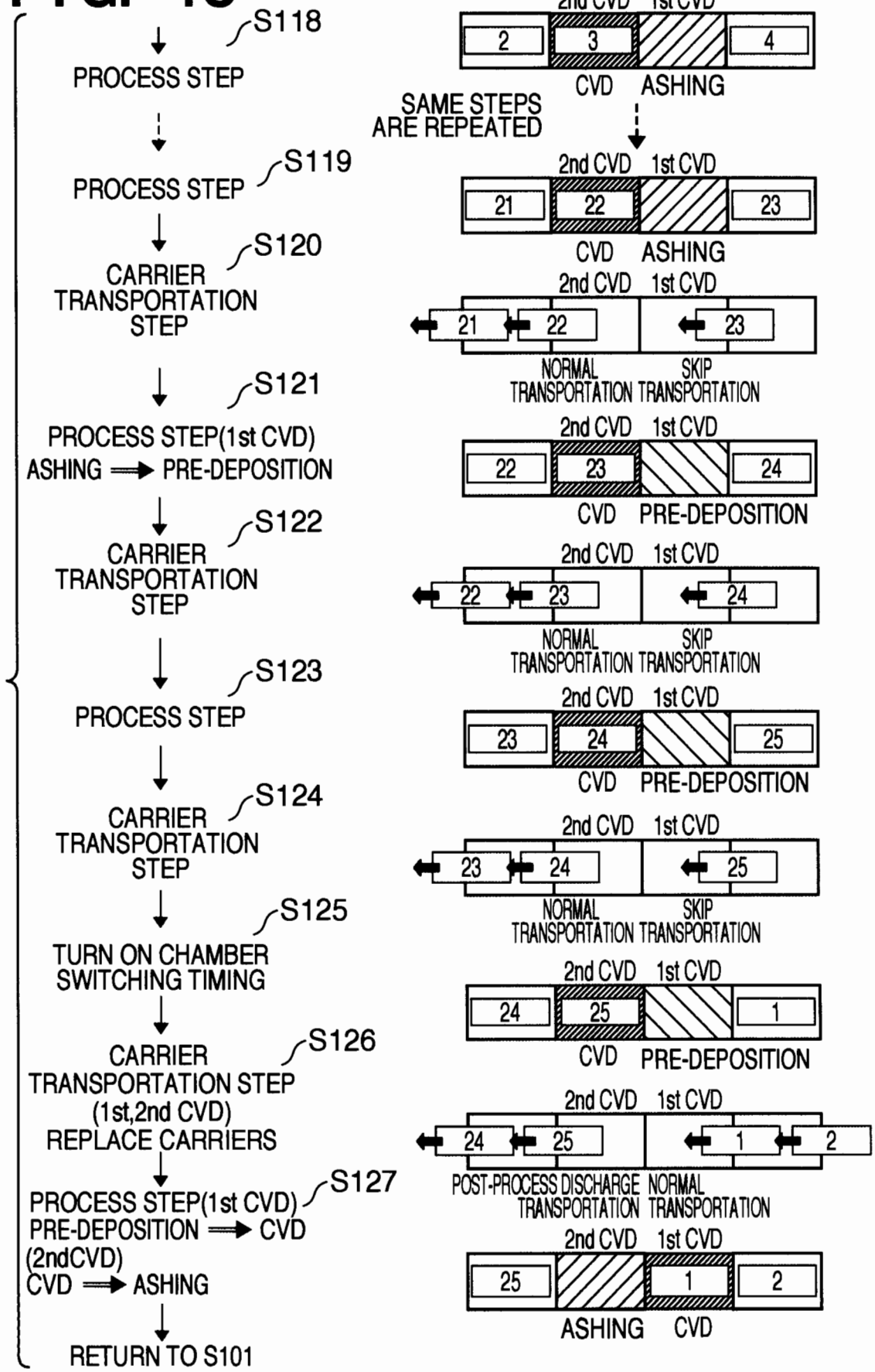

S109
CARRIER TRANSPORTATION STEP
POST-PROCESS
2nd CVD
1st CVD
PRE-PROCESS
22
23
24
SKIP TRANSPORTATION
NORMAL TRANSPORTATION
S110
PROCESS STEP
2nd CVD
1st CVD
23
24
25
PRE-DEPOSITION
CVD
S111
CARRIER TRANSPORTATION STEP
2nd CVD
1st CVD
23
24
25
SKIP TRANSPORTATION
NORMAL TRANSPORTATION
S112
TURN ON CHAMBER SWITCHING TIMING
2nd CVD
1st CVD
24
25
1
PRE-DEPOSITION
CVD
S113
CARRIER TRANSPORTATION STEP (1st,2nd CVD) REPLACE CARRIERS
2nd CVD
1st CVD
24
25
1
SKIP TRANSPORTATION
POST-PROCESS DISCHARGE TRANSPORTATION
S114
PROCESS STEP(1st CVD) CVD ⟹ ASHING (2ndCVD) PRE-DEPOSITION ⟹ CVD
2nd CVD
1st CVD
25
1
2
NORMAL TRANSPORTATION
SKIP TRANSPORTATION
2nd CVD
1st CVD
25
1
2
CVD
ASHING
S115
CARRIER TRANSPORTATION STEP
2nd CVD
1st CVD
25
1
2
NORMAL TRANSPORTATION
SKIP TRANSPORTATION
S116
PROCESS STEP
2nd CVD
1st CVD
1
2
3
CVD
ASHING
S117
CARRIER TRANSPORTATION STEP
2nd CVD
1st CVD
1
2
3
NORMAL TRANSPORTATION
SKIP TRANSPORTATION

FIG. 1C


S118
PROCESS STEP
S119
PROCESS STEP
S120
CARRIER TRANSPORTATION STEP
S121
PROCESS STEP(1st CVD)
ASHING ⟹ PRE-DEPOSITION
S122
CARRIER TRANSPORTATION STEP
S123
PROCESS STEP
S124
CARRIER TRANSPORTATION STEP
S125
TURN ON CHAMBER SWITCHING TIMING
S126
CARRIER TRANSPORTATION STEP
(1st,2nd CVD)
REPLACE CARRIERS
S127
PROCESS STEP(1st CVD)
PRE-DEPOSITION ⟹ CVD
(2ndCVD)
CVD ⟹ ASHING
RETURN TO S101
SAME STEPS ARE REPEATED
2nd CVD 1st CVD
2 3 4
CVD ASHING
21 22 23
CVD ASHING
NORMAL TRANSPORTATION
SKIP TRANSPORTATION
22 23 24
CVD PRE-DEPOSITION
23 24 25
CVD PRE-DEPOSITION
24 25 1
CVD PRE-DEPOSITION
POST-PROCESS DISCHARGE TRANSPORTATION
NORMAL TRANSPORTATION
25 1 2
ASHING CVD

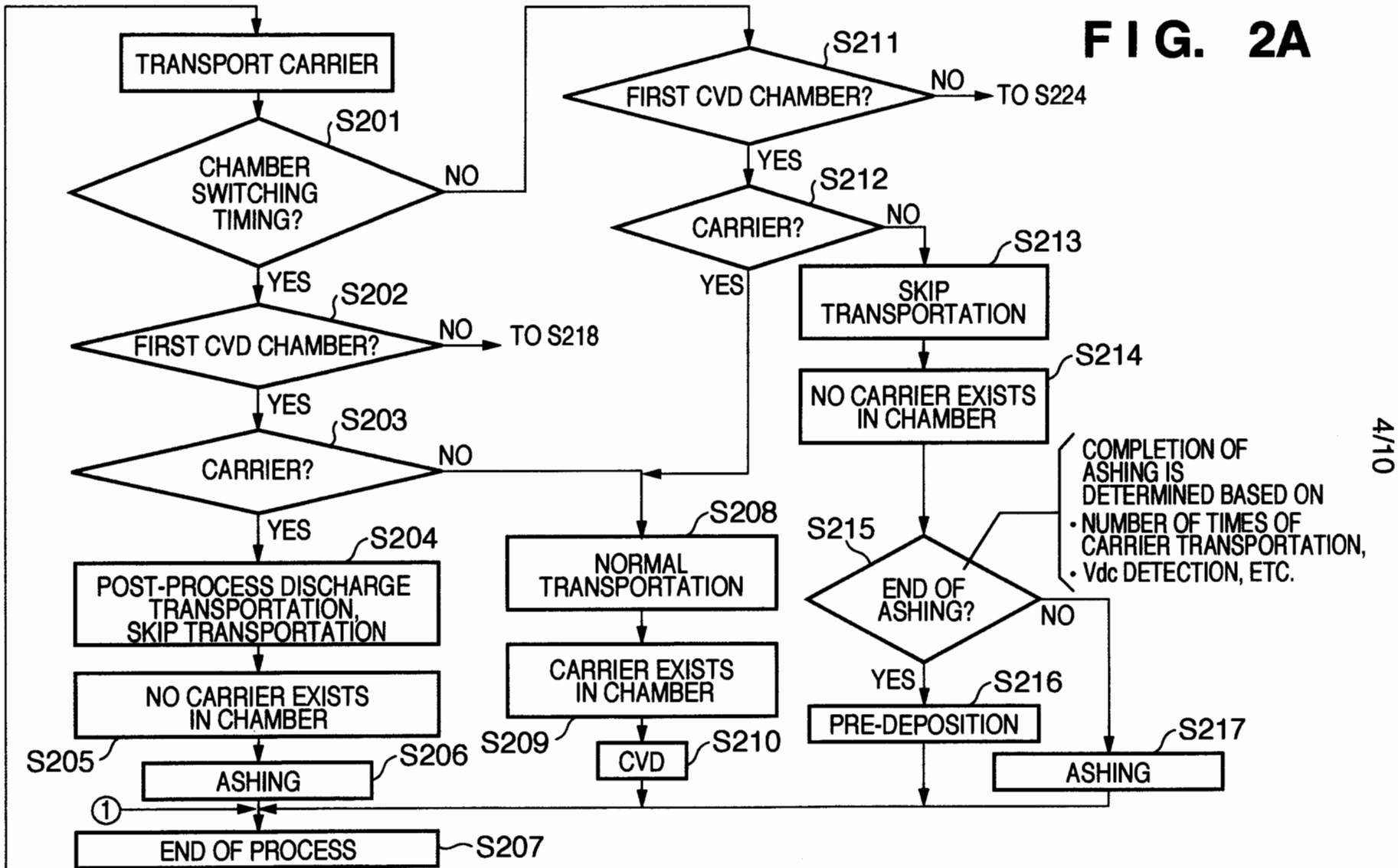

TRANSPORT CARRIER
S201
CHAMBER SWITCHING TIMING?
NO
YES
S202
FIRST CVD CHAMBER?
NO
TO S218
YES
S203
CARRIER?
NO
YES
S204
POST-PROCESS DISCHARGE TRANSPORTATION, SKIP TRANSPORTATION
NO CARRIER EXISTS IN CHAMBER
S205
S206
ASHING
①
END OF PROCESS
S207
S211
FIRST CVD CHAMBER?
NO
TO S224
YES
S212
CARRIER?
NO
YES
S213
SKIP TRANSPORTATION
S214
NO CARRIER EXISTS IN CHAMBER
S208
NORMAL TRANSPORTATION
CARRIER EXISTS IN CHAMBER
S209
CVD
S210
S215
END OF ASHING?
NO
YES
S216
PRE-DEPOSITION
S217
ASHING
COMPLETION OF ASHING IS DETERMINED BASED ON
• NUMBER OF TIMES OF CARRIER TRANSPORTATION,
• Vdc DETECTION, ETC.

FIG. 2A

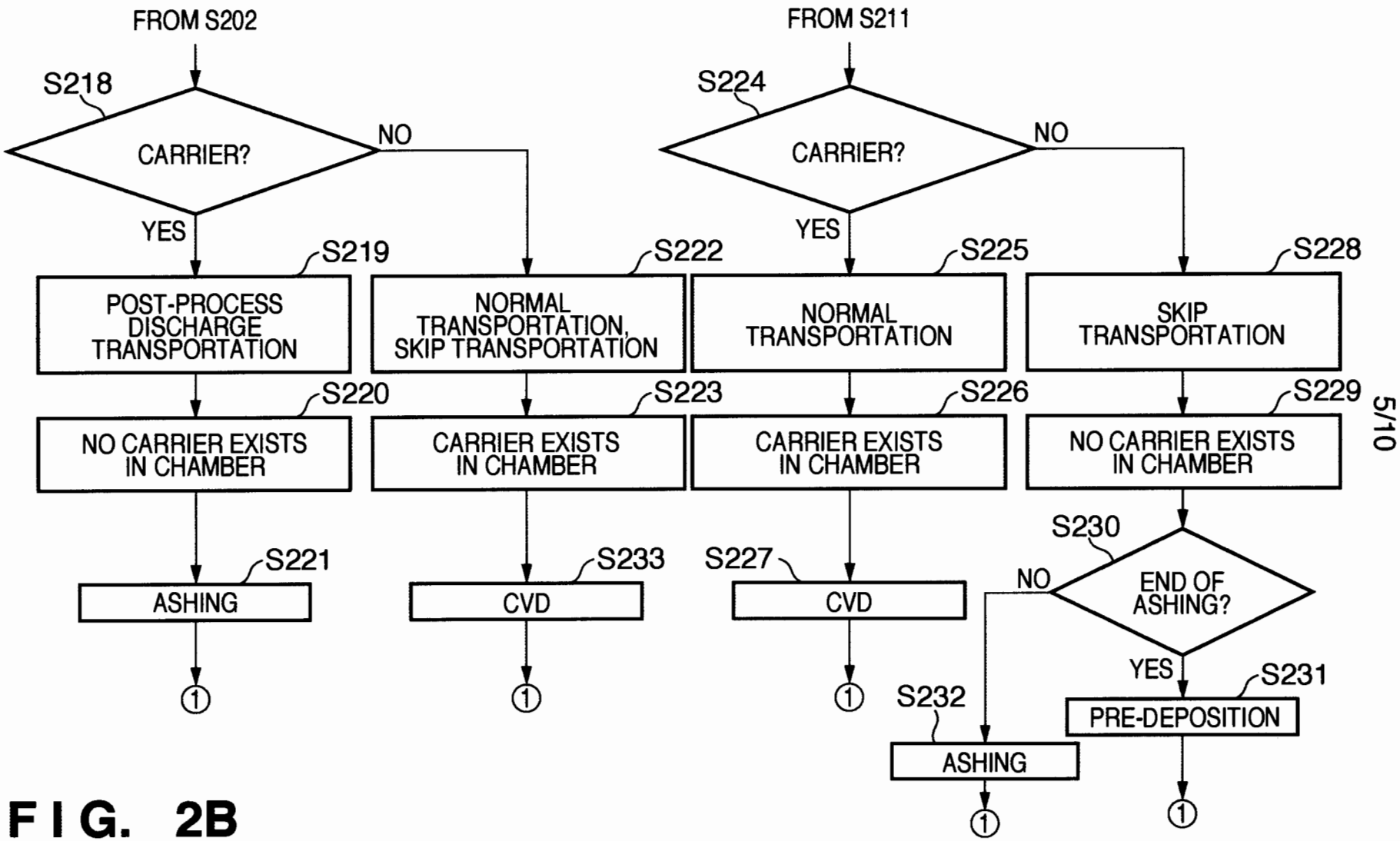

FROM S202
S218
CARRIER?
NO
YES
S219
POST-PROCESS DISCHARGE TRANSPORTATION
S220
NO CARRIER EXISTS IN CHAMBER
S221
ASHING
①
S222
NORMAL TRANSPORTATION, SKIP TRANSPORTATION
S223
CARRIER EXISTS IN CHAMBER
S233
CVD
①
FROM S211
S224
CARRIER?
NO
YES
S225
NORMAL TRANSPORTATION
S226
CARRIER EXISTS IN CHAMBER
S227
CVD
①
S228
SKIP TRANSPORTATION
S229
NO CARRIER EXISTS IN CHAMBER
S230
END OF ASHING?
NO
YES
S231
PRE-DEPOSITION
①
S232
ASHING
①

FIG. 2B

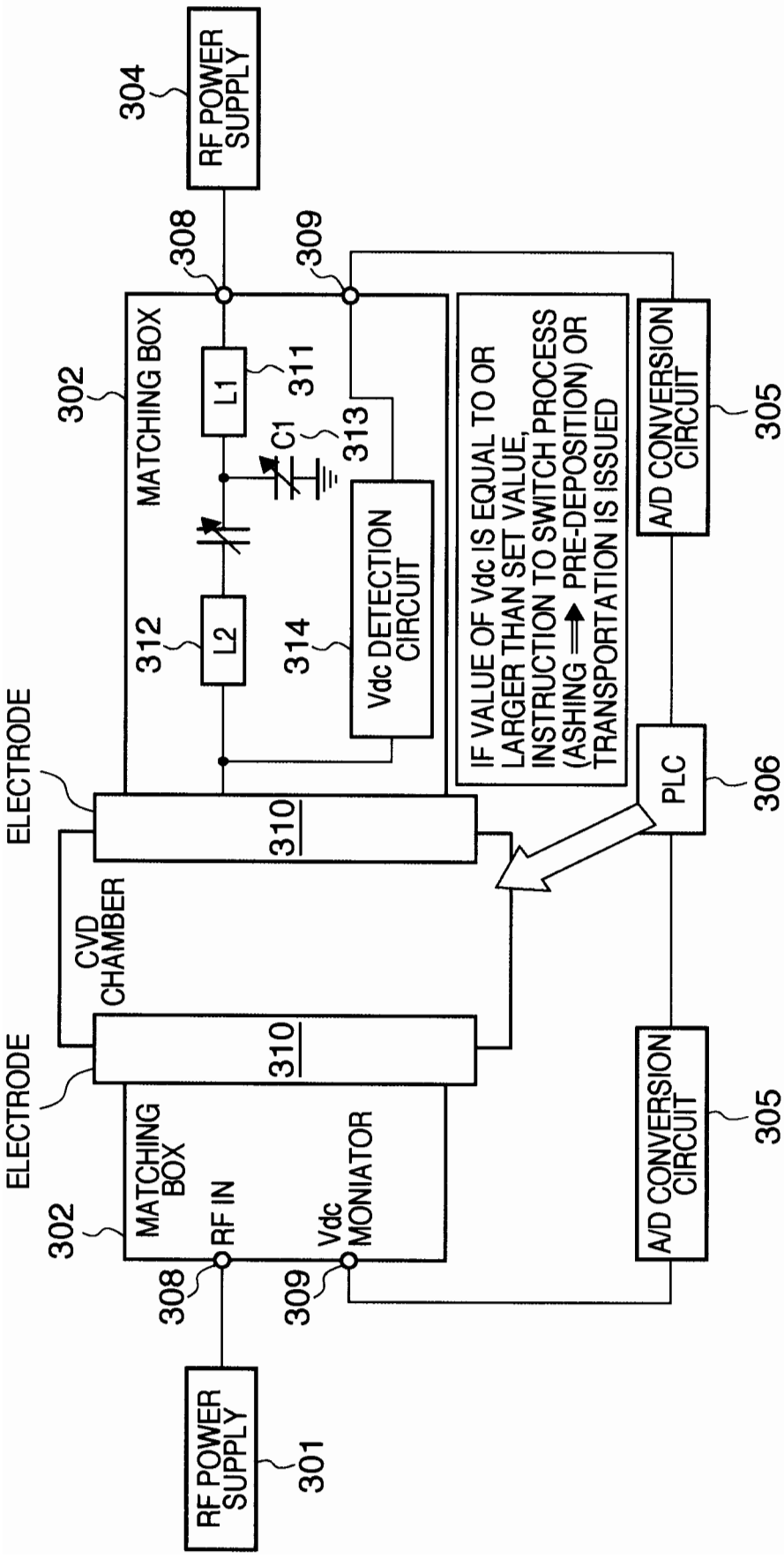

RF POWER SUPPLY
304
308
309
302
MATCHING BOX
L1
311
C1
313
312
L2
314
Vdc DETECTION CIRCUIT
IF VALUE OF Vdc IS EQUAL TO OR LARGER THAN SET VALUE, INSTRUCTION TO SWITCH PROCESS (ASHING ⟹ PRE-DEPOSITION) OR TRANSPORTATION IS ISSUED
A/D CONVERSION CIRCUIT
305
ELECTRODE
310
CVD CHAMBER
PLC
306
ELECTRODE
310
302
MATCHING BOX
RF IN
Vdc MONIATOR
308
309
A/D CONVERSION CIRCUIT
305
RF POWER SUPPLY
301

FIG. 3

FIG. 4

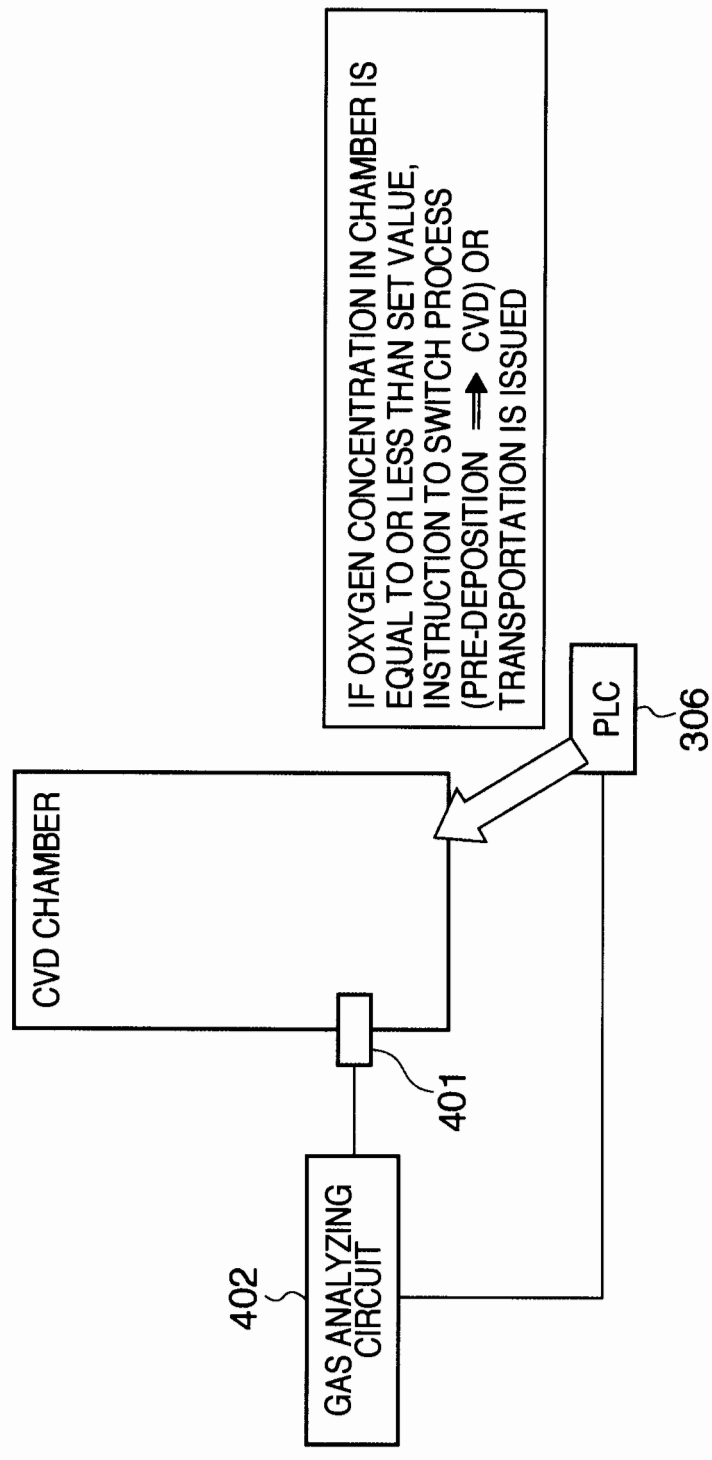

IF OXYGEN CONCENTRATION IN CHAMBER IS EQUAL TO OR LESS THAN SET VALUE, INSTRUCTION TO SWITCH PROCESS (PRE-DEPOSITION ⟹ CVD) OR TRANSPORTATION IS ISSUED
PLC
306
CVD CHAMBER
401
GAS ANALYZING CIRCUIT
402

FIG. 5

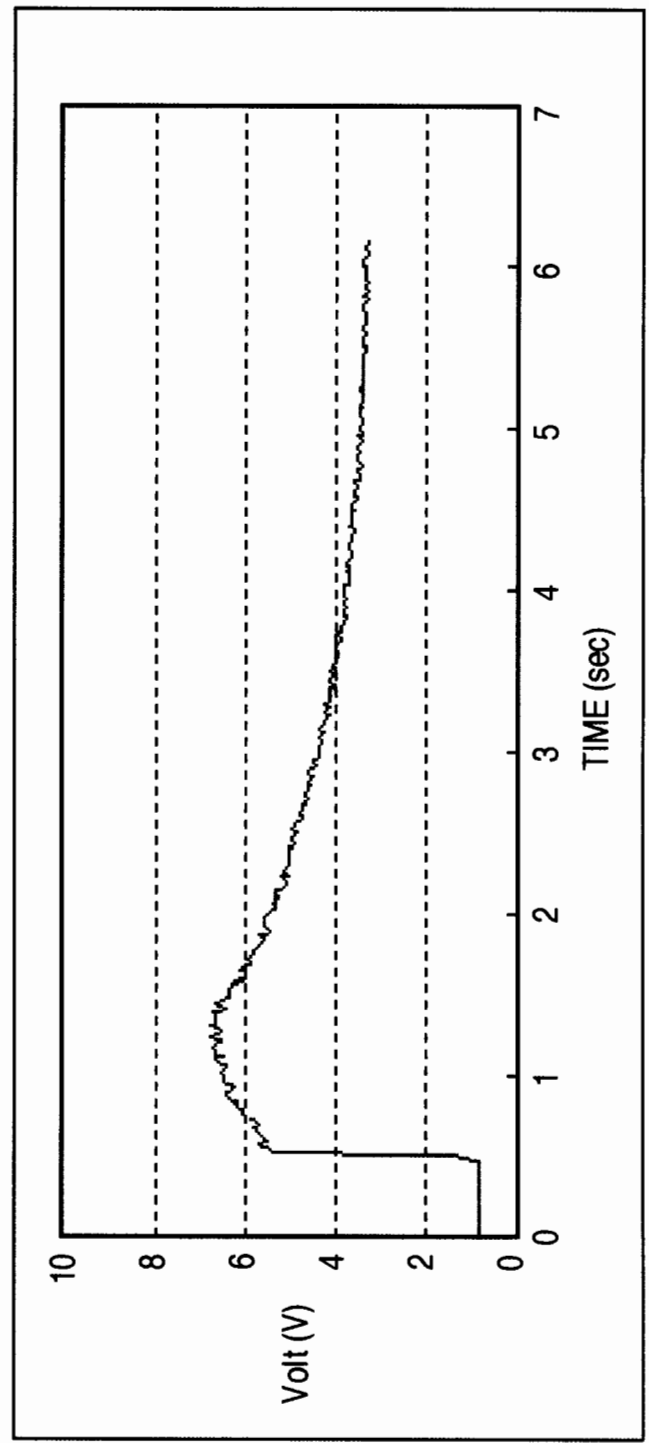


FIG. 6

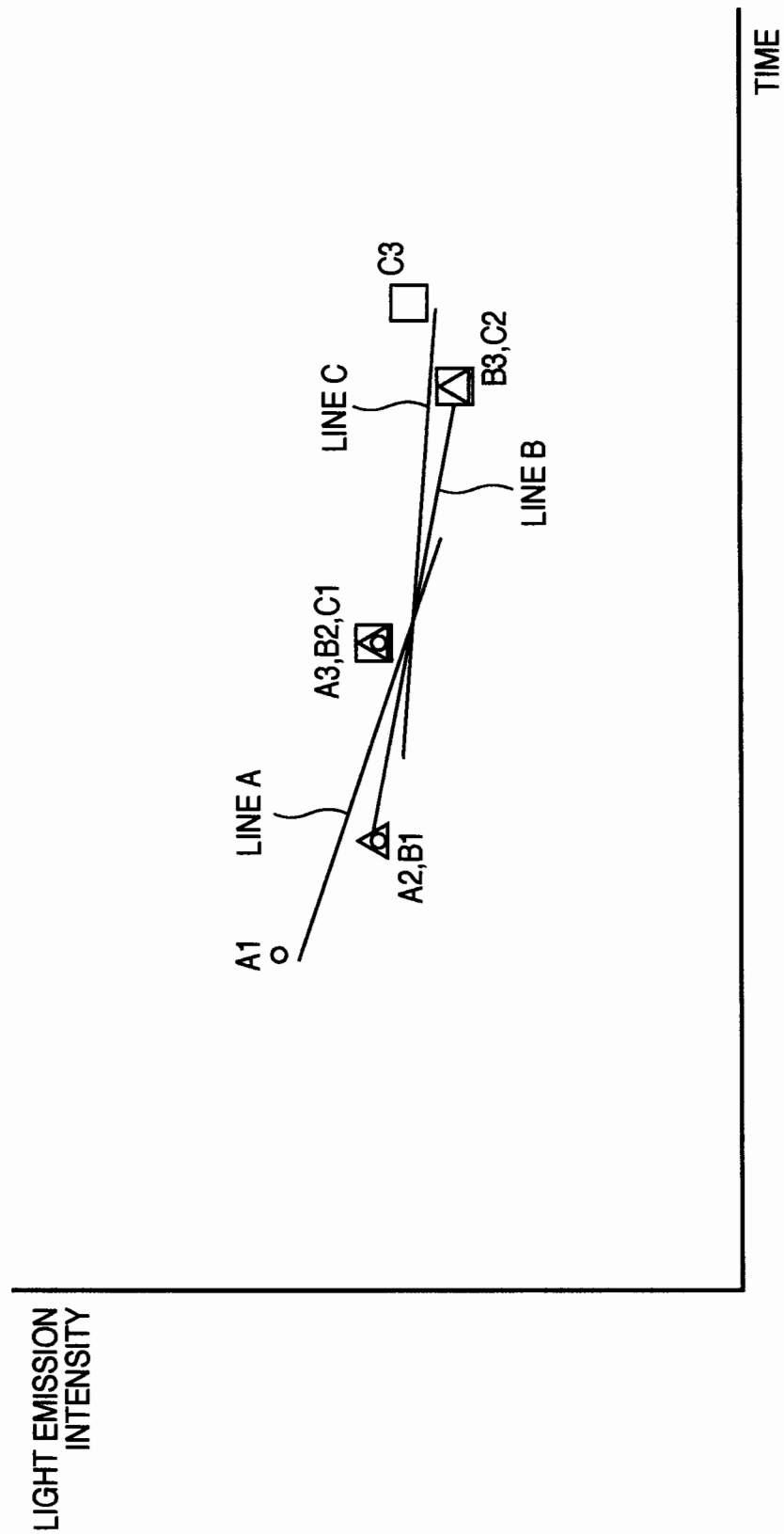
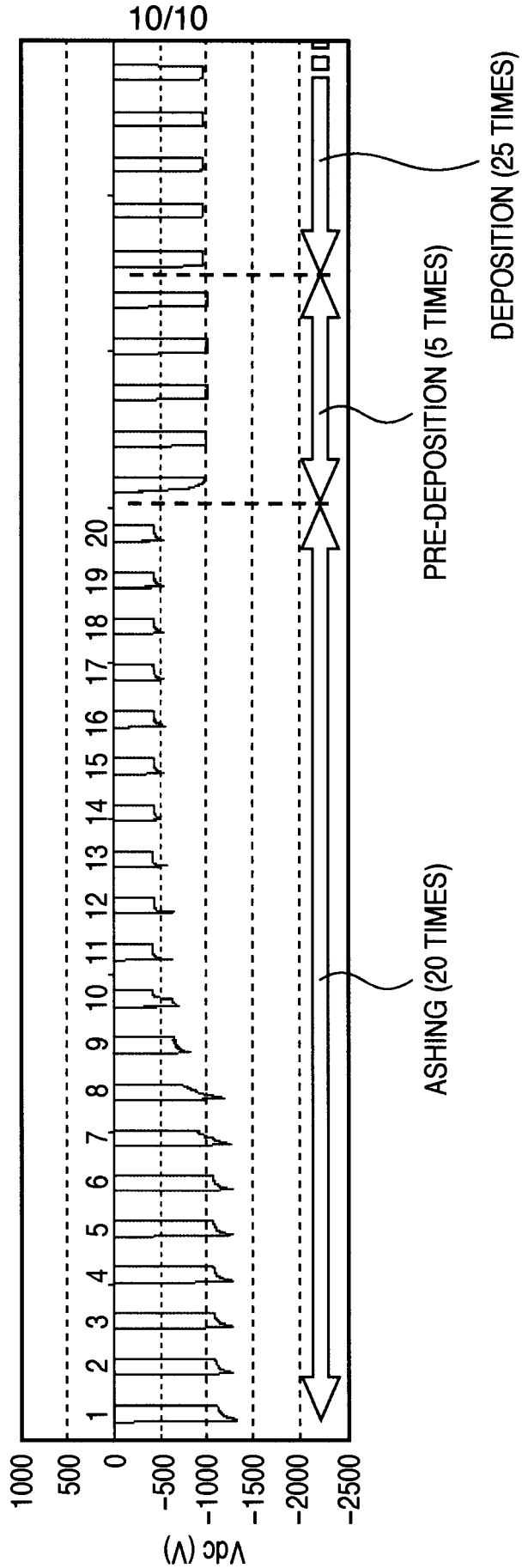

LIGHT EMISSION INTENSITY
TIME
A1
LINE A
A2,B1
A3,B2,C1
LINE C
LINE B
B3,C2
C3

FIG. 7


1000
500
0
-500
-1000
-1500
-2000
-2500
Vdc (V)
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
ASHING (20 TIMES)
PRE-DEPOSITION (5 TIMES)
DEPOSITION (25 TIMES)