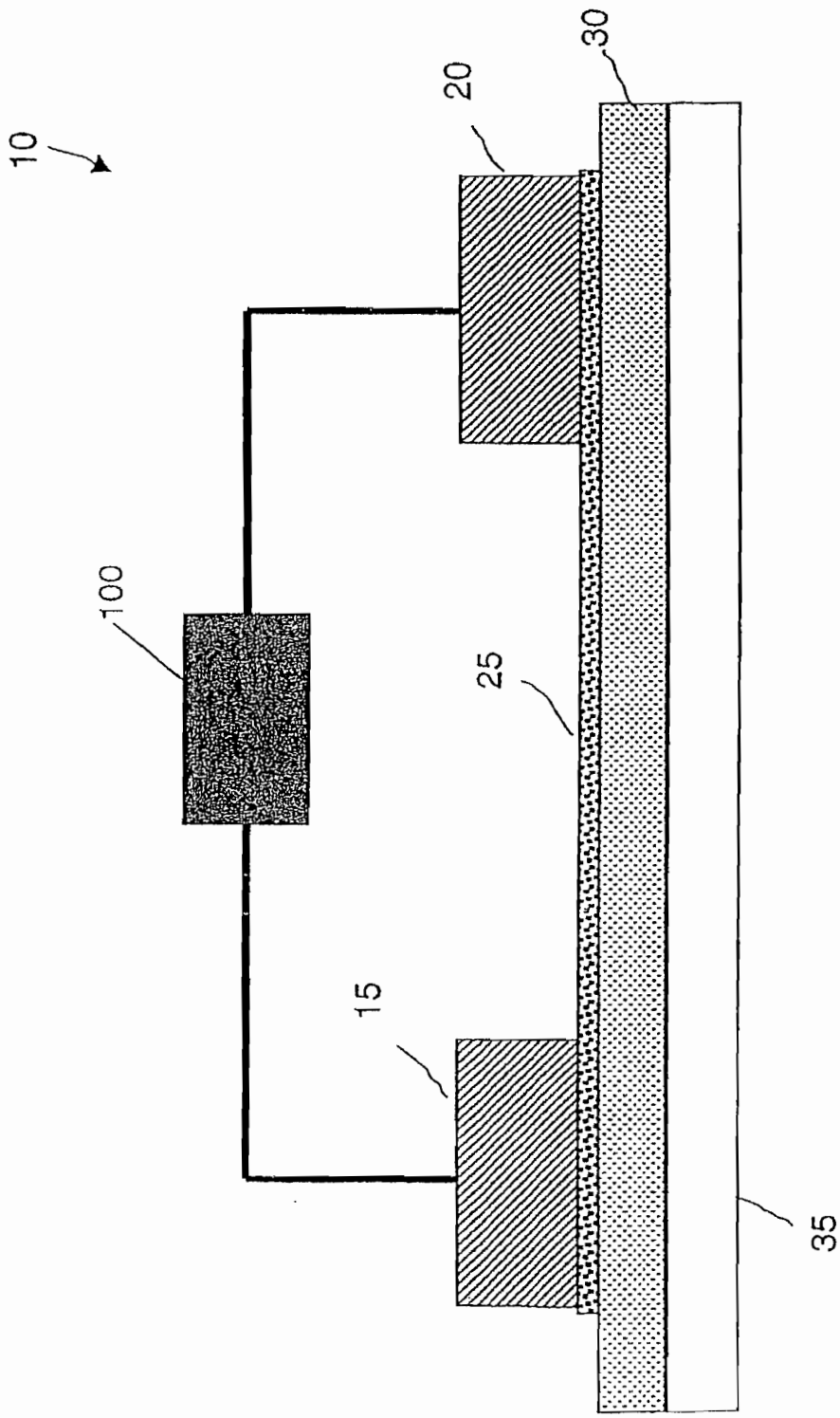


Figure 1A

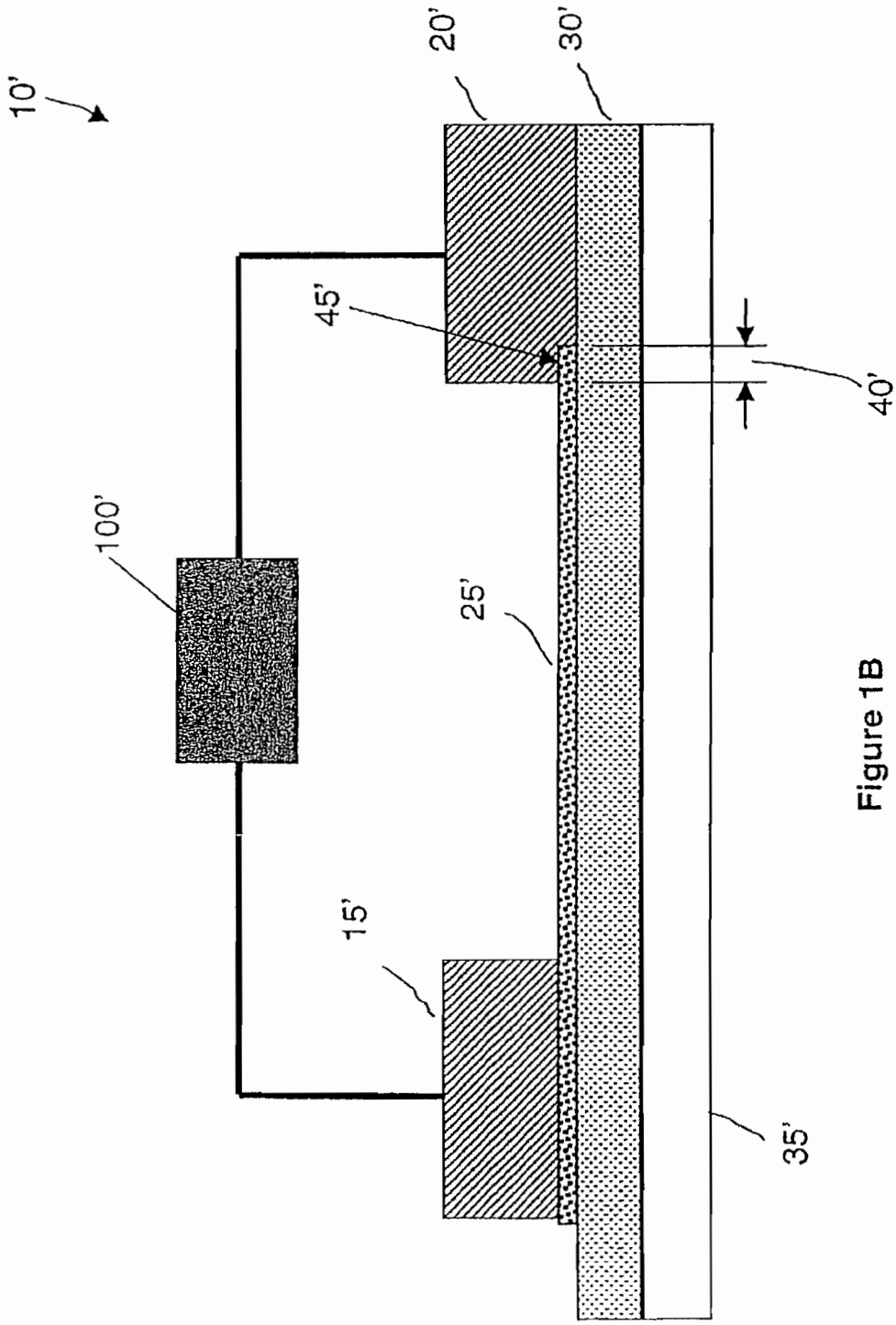


Figure 1B

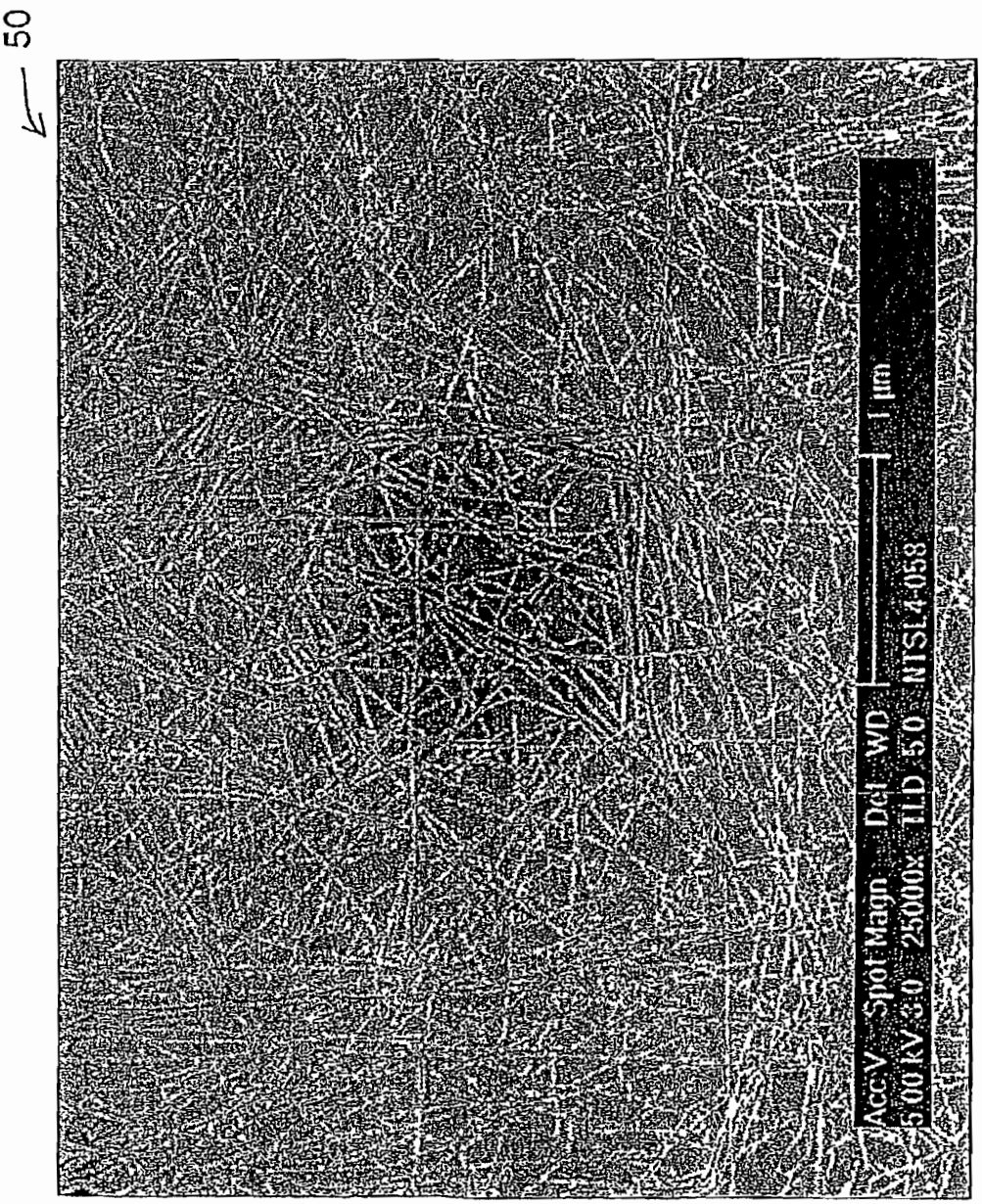


Figure 2A

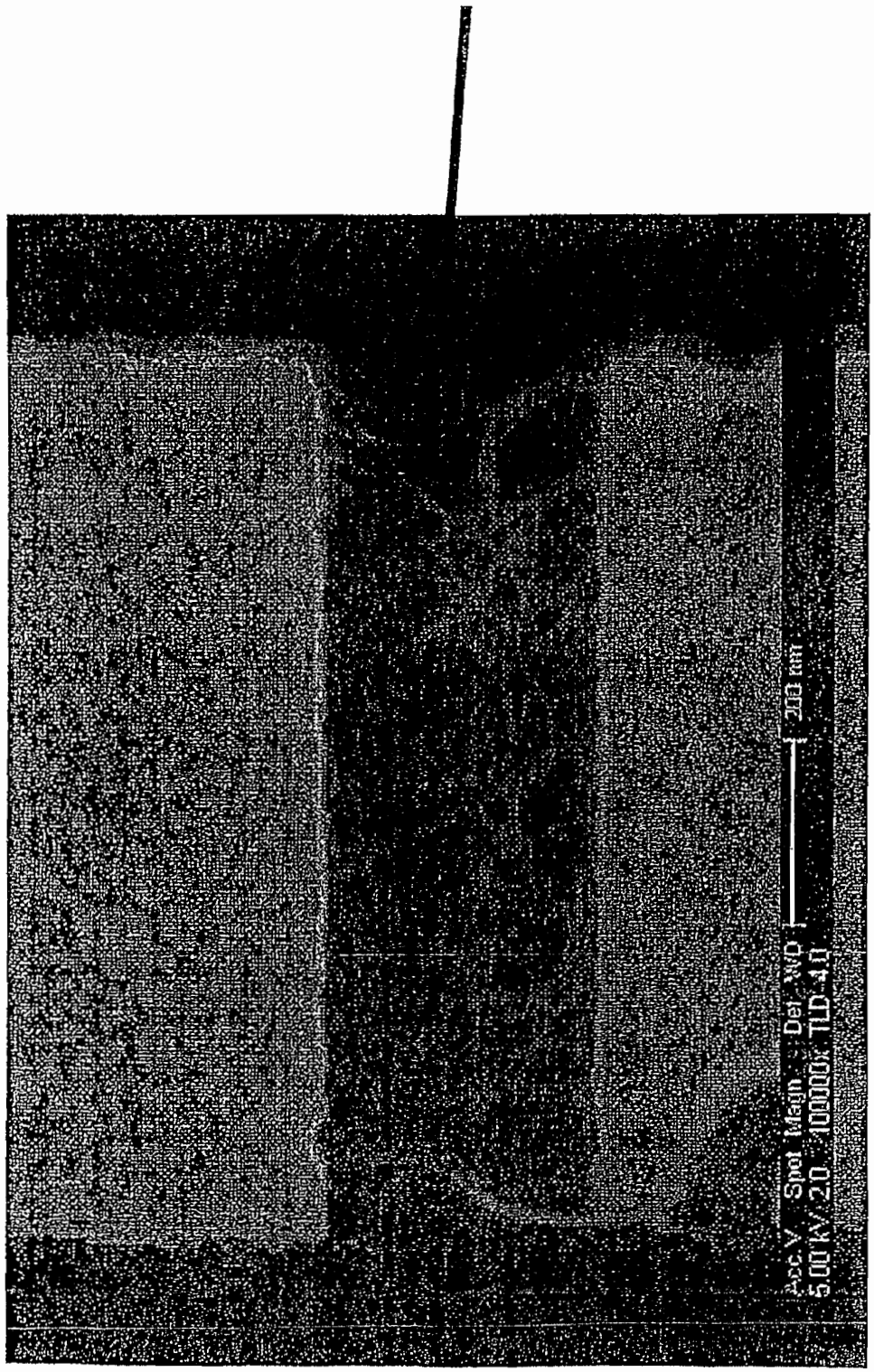


Figure 2B

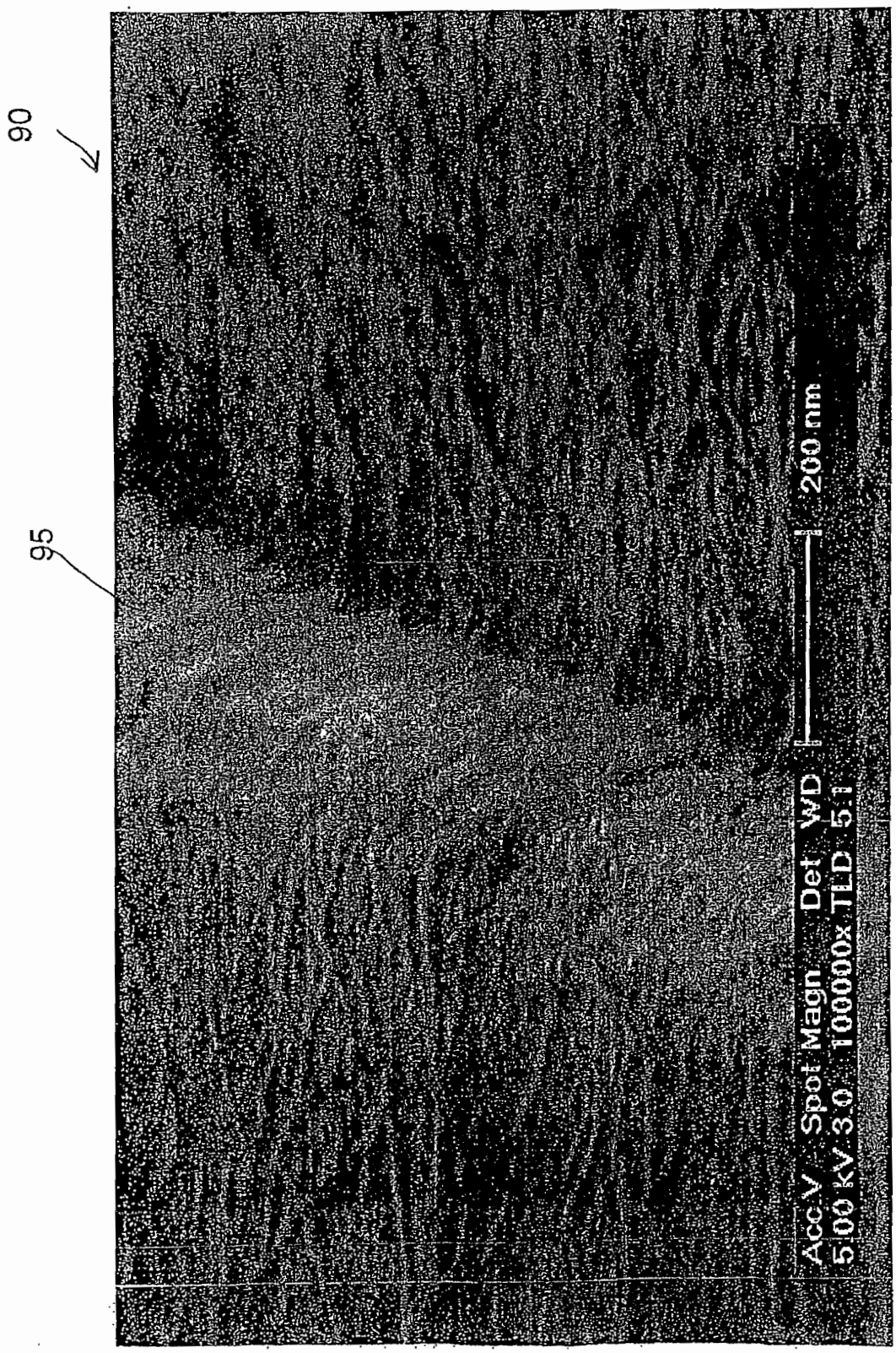


Figure 2C

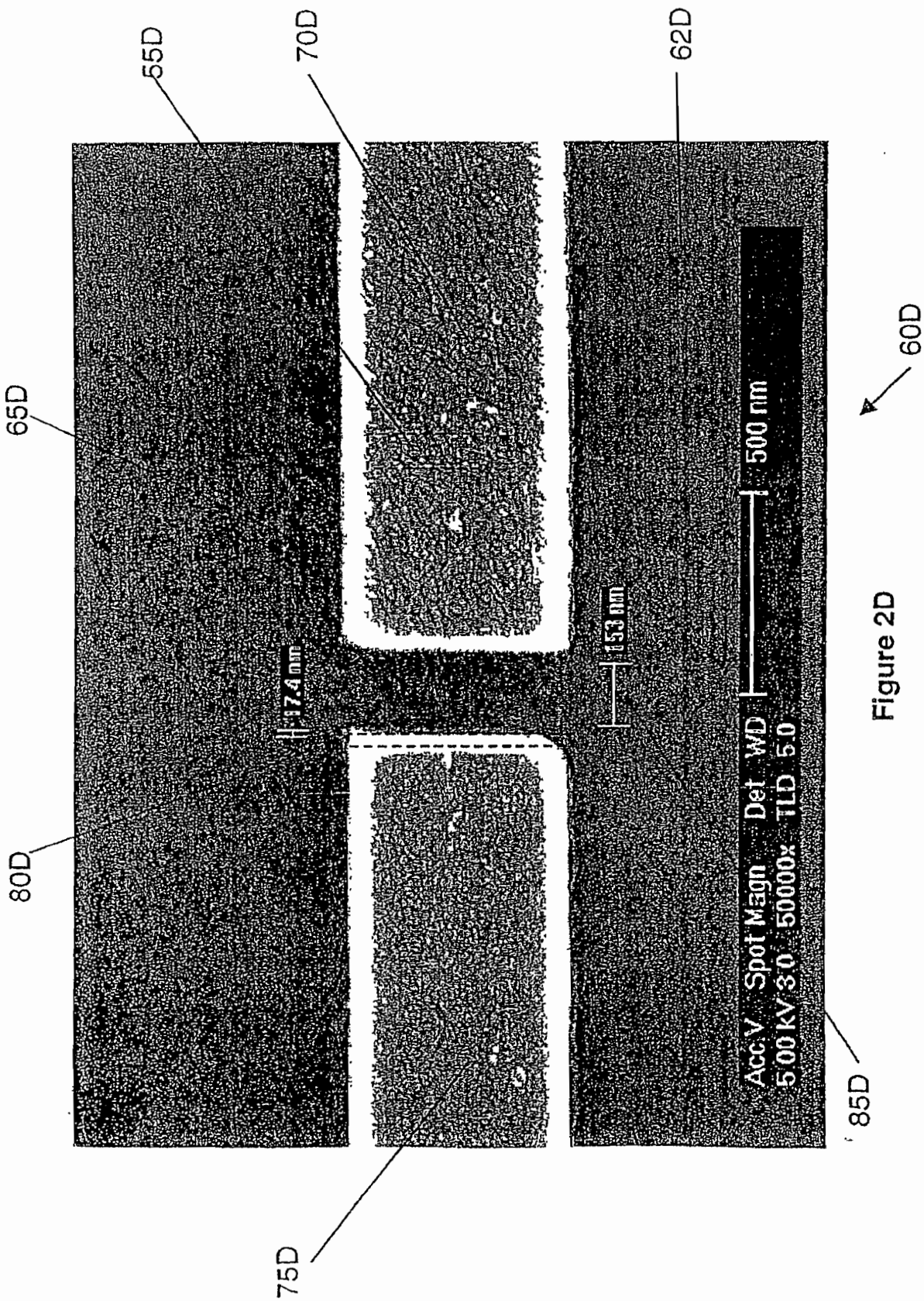

55D
70D
62D
65D
60D
80D
75D
85D
17.4 nm
153 nm
500 nm
Acc.V Spot Magn Det WD
5.00 kV 3.0 50000x TLD 5.0

Figure 2D

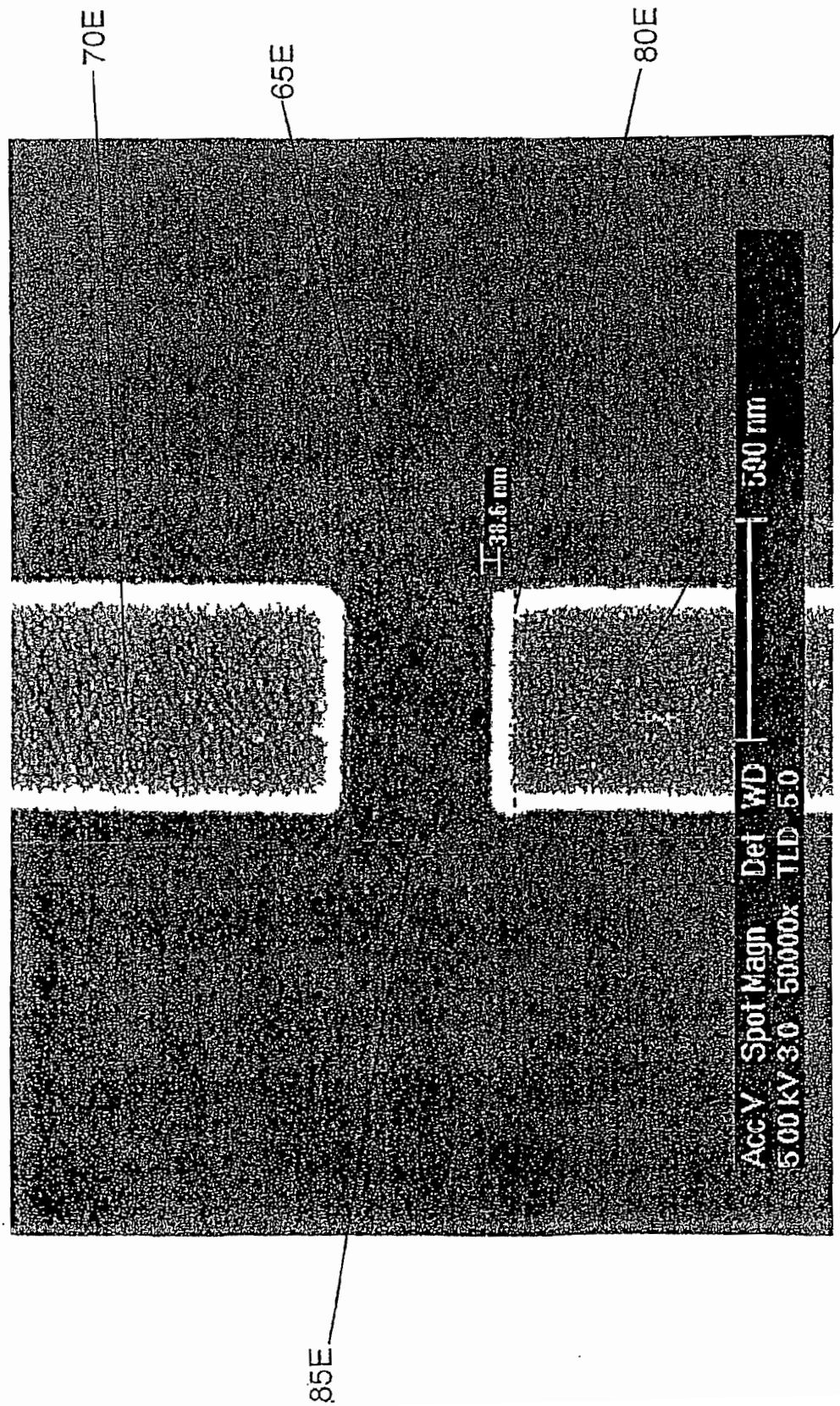

70E
65E
80E
75E
60E
85E
38.6 nm
500 nm
Acc.V Spot Magn Det WD
5.00 kV 3.0 50000x TLD 5.0

Figure 2E

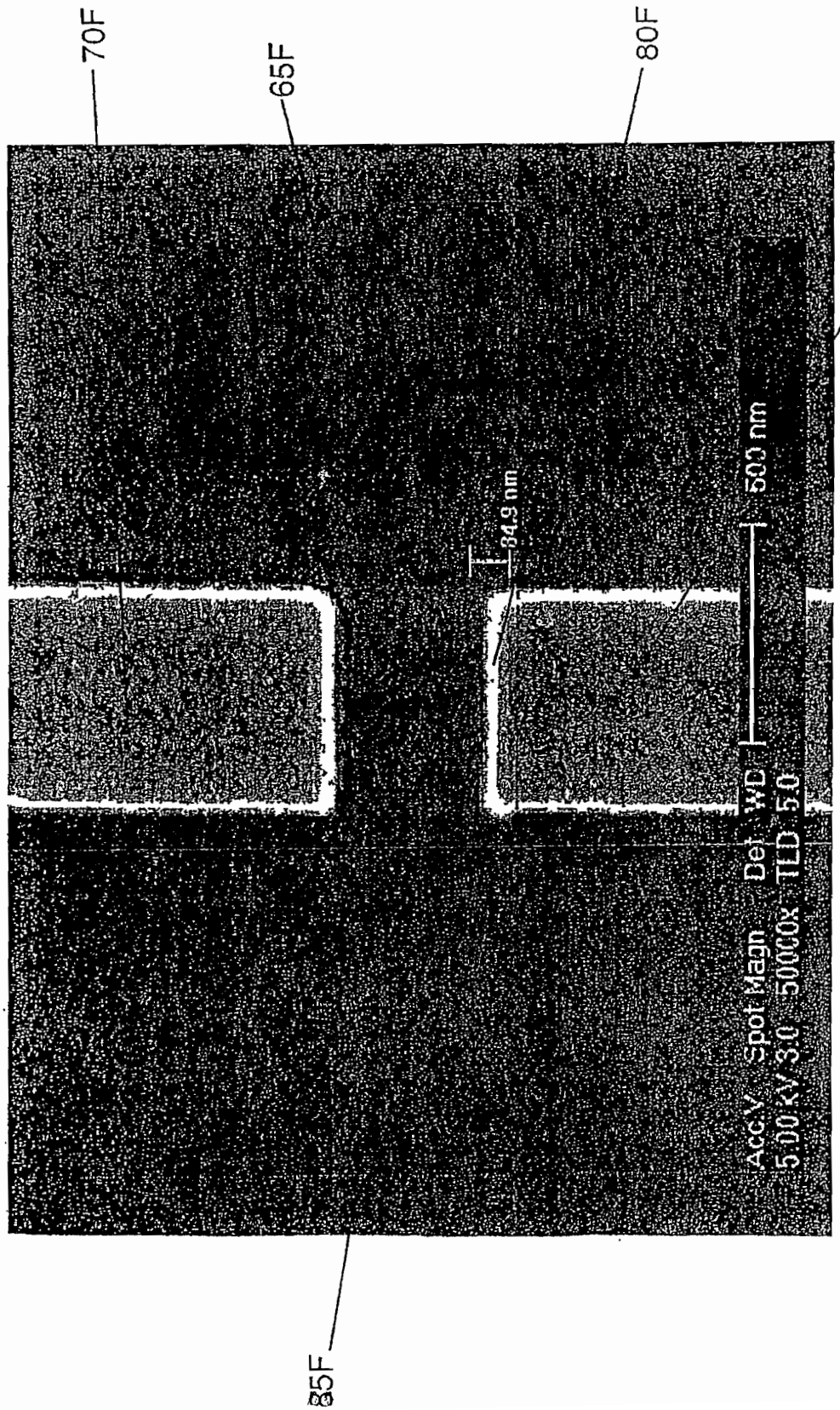

70F
65F
80F
75F
60F
85F
84.9 nm
500 nm
Acc.V Spot Magn Det WD
5.00 kV 3.0 50000x TLD 5.0

Figure 2F

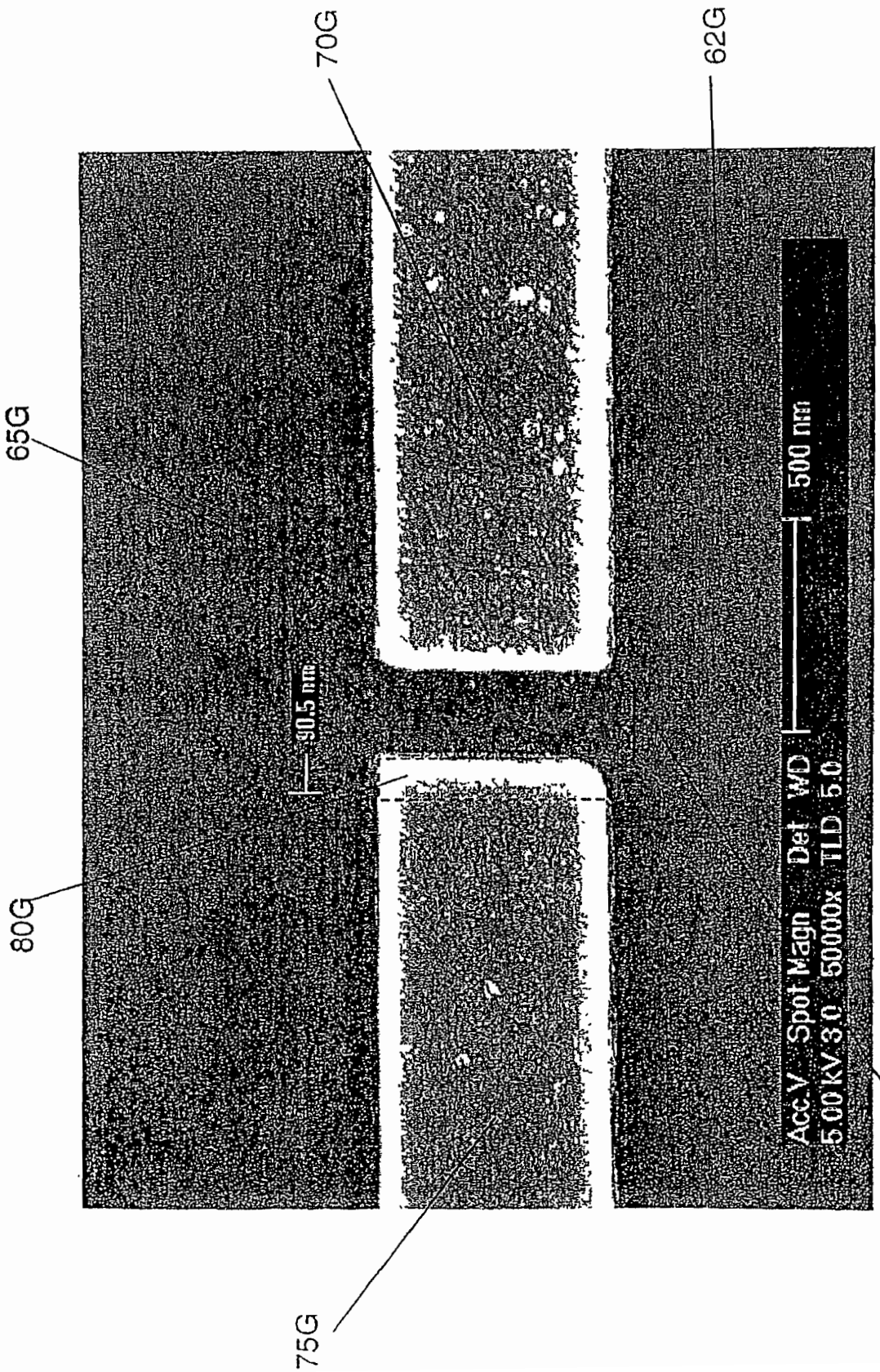

70G
62G
65G
60G
90.5 nm
500 nm
Acc.V Spot Magn Det WD
5.00 kV 3.0 50000x TLD 5.0
80G
85G
75G

Figure 2G

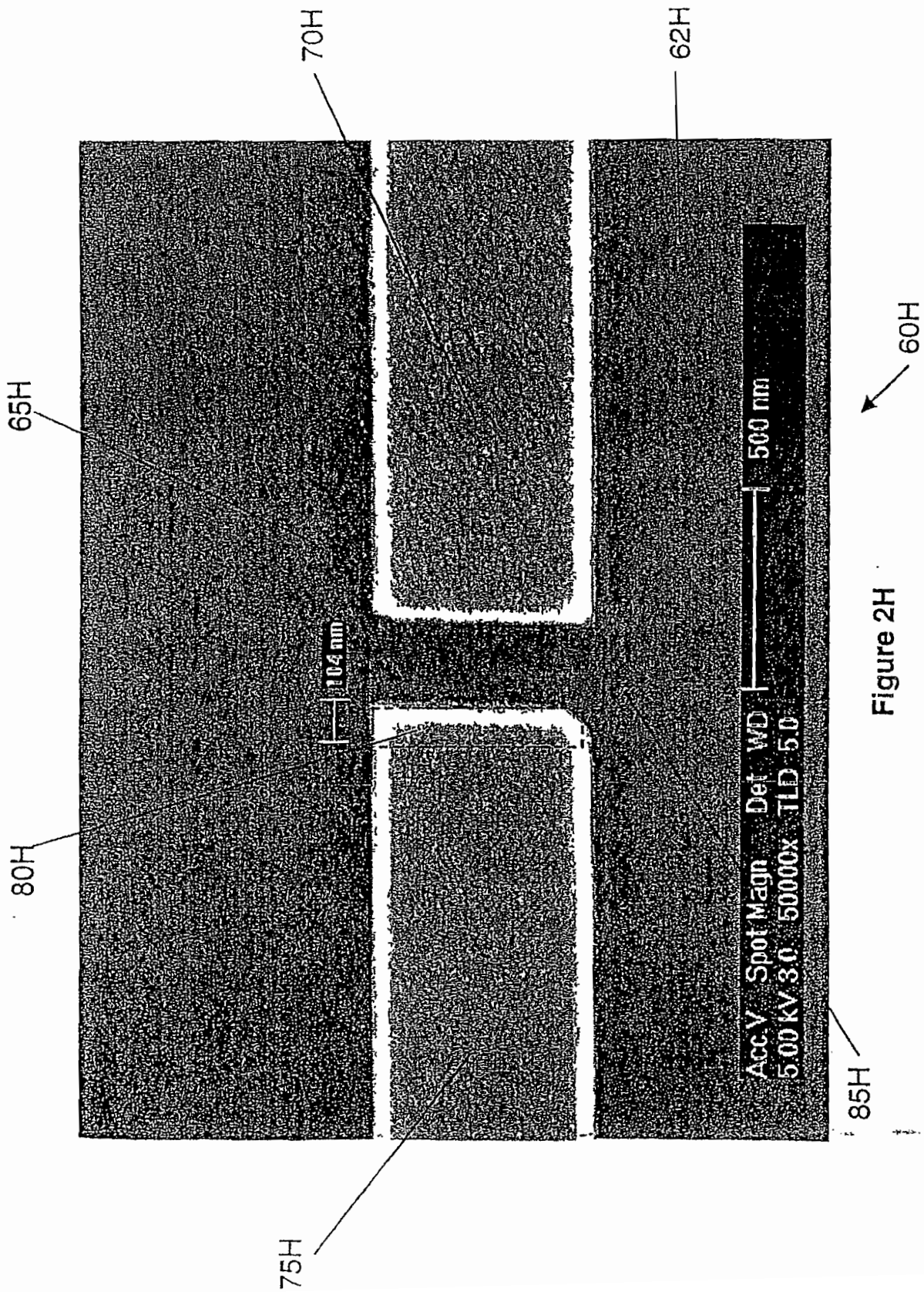

70H
62H
60H
65H
104 nm
500 nm
80H
Acc.V Spot Magn Det WD
5.00 kV 3.0 50000x TLD 5.0
85H
75H

Figure 2H

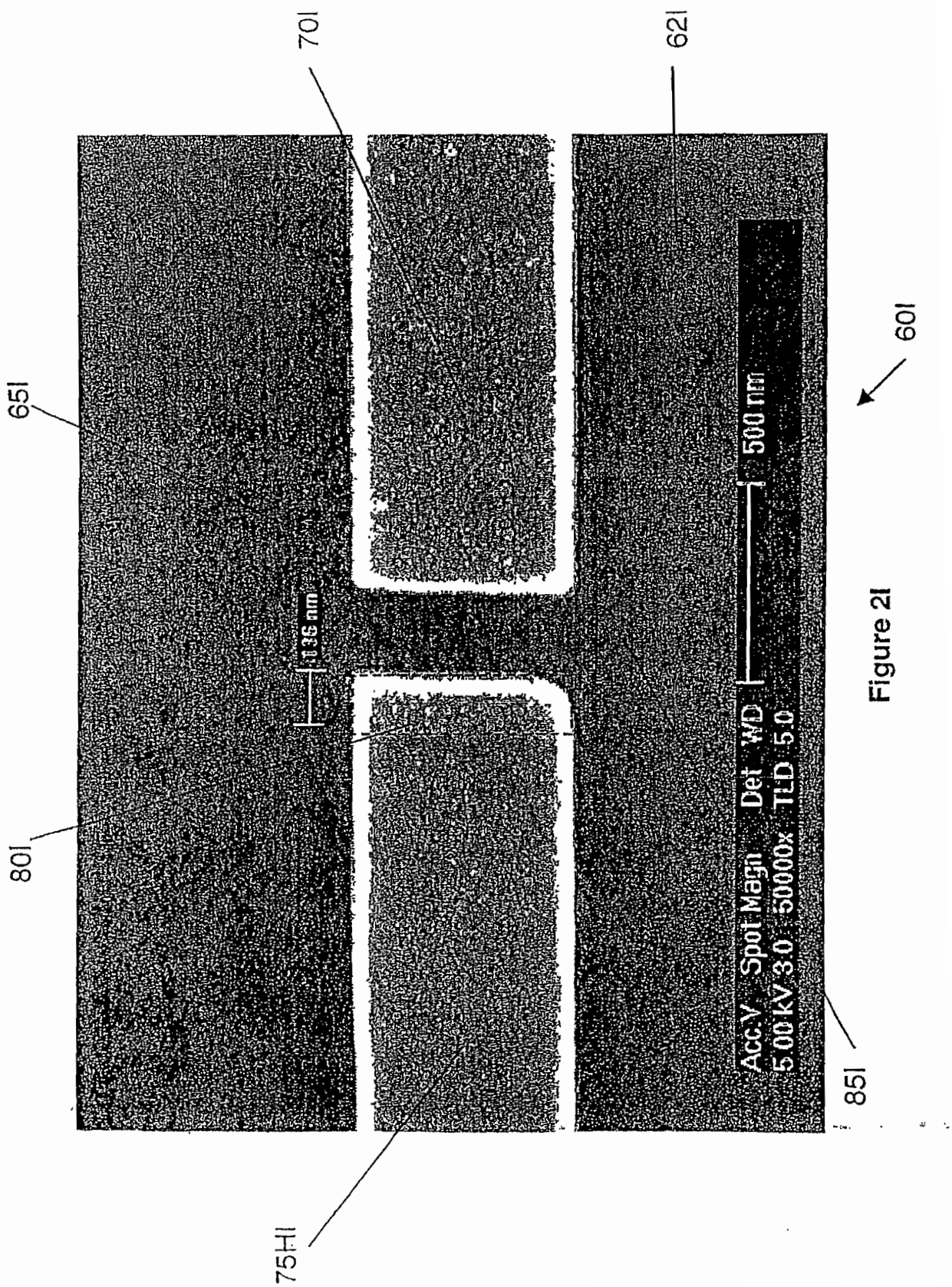

701
621
651
601
801
136 nm
500 nm
Acc.V Spot Magn Det WD
5.00 kV 3.0 50000x TLD 5.0
851
75HI

Figure 2I

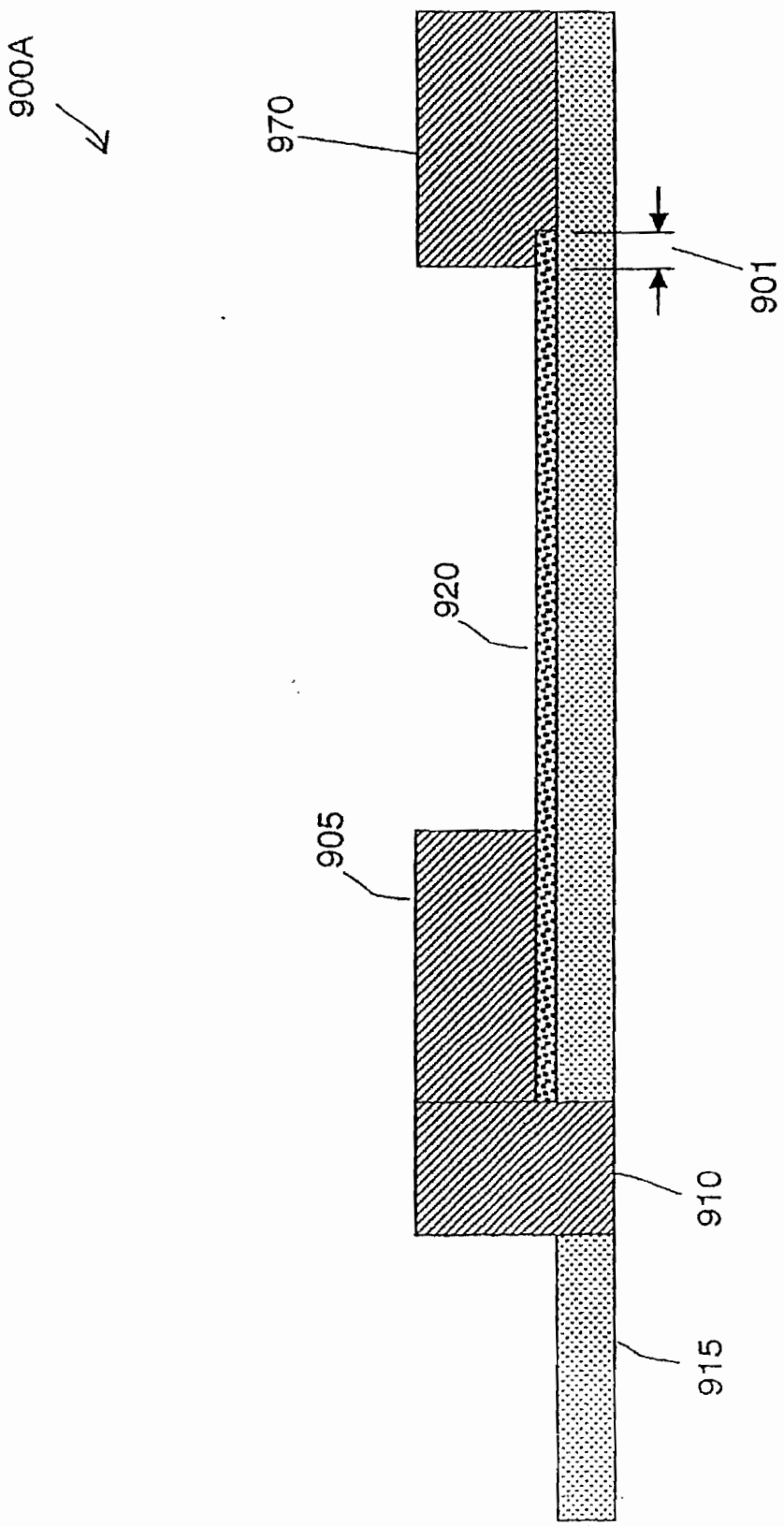


Figure 3A

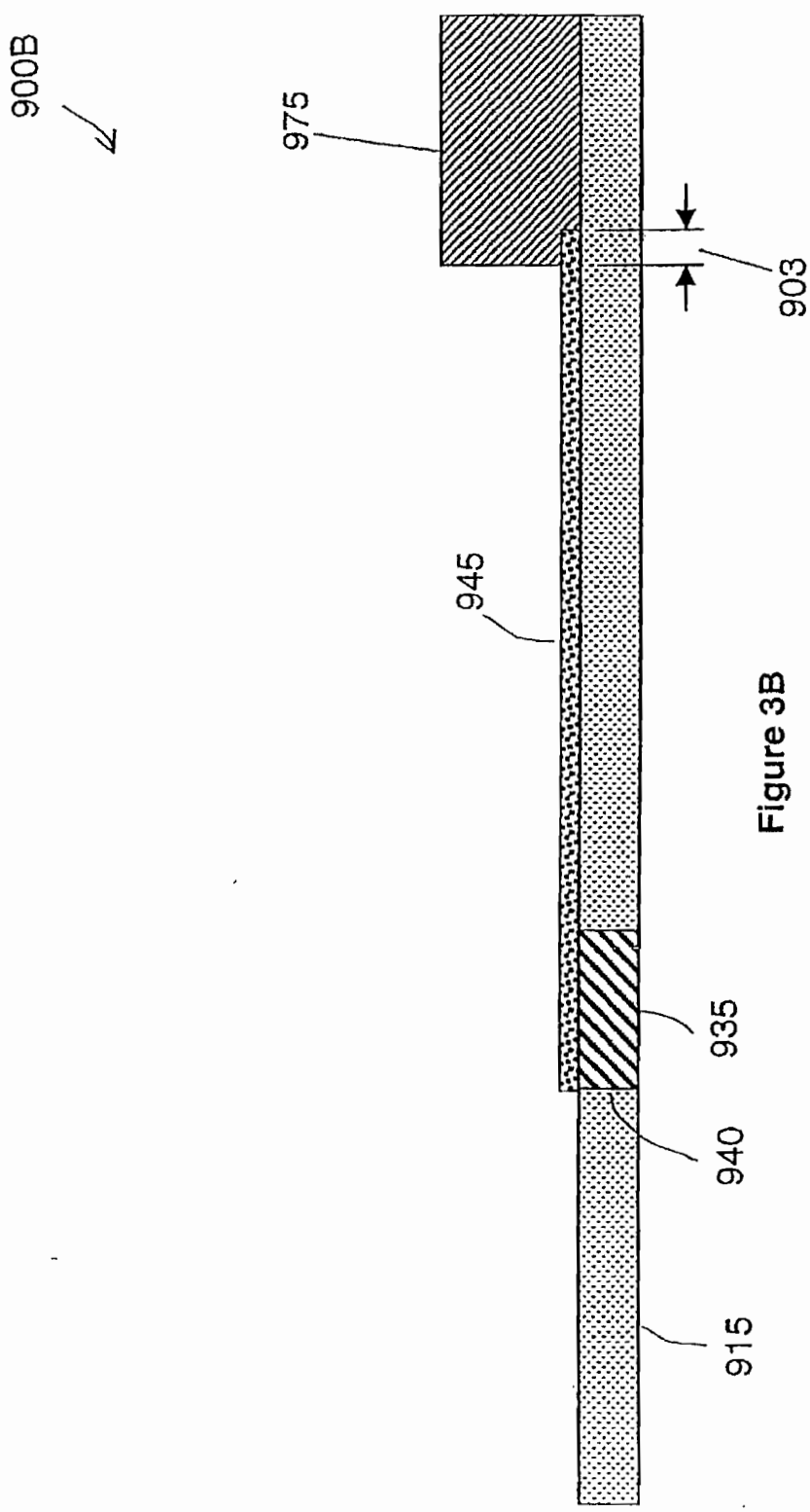


Figure 3B

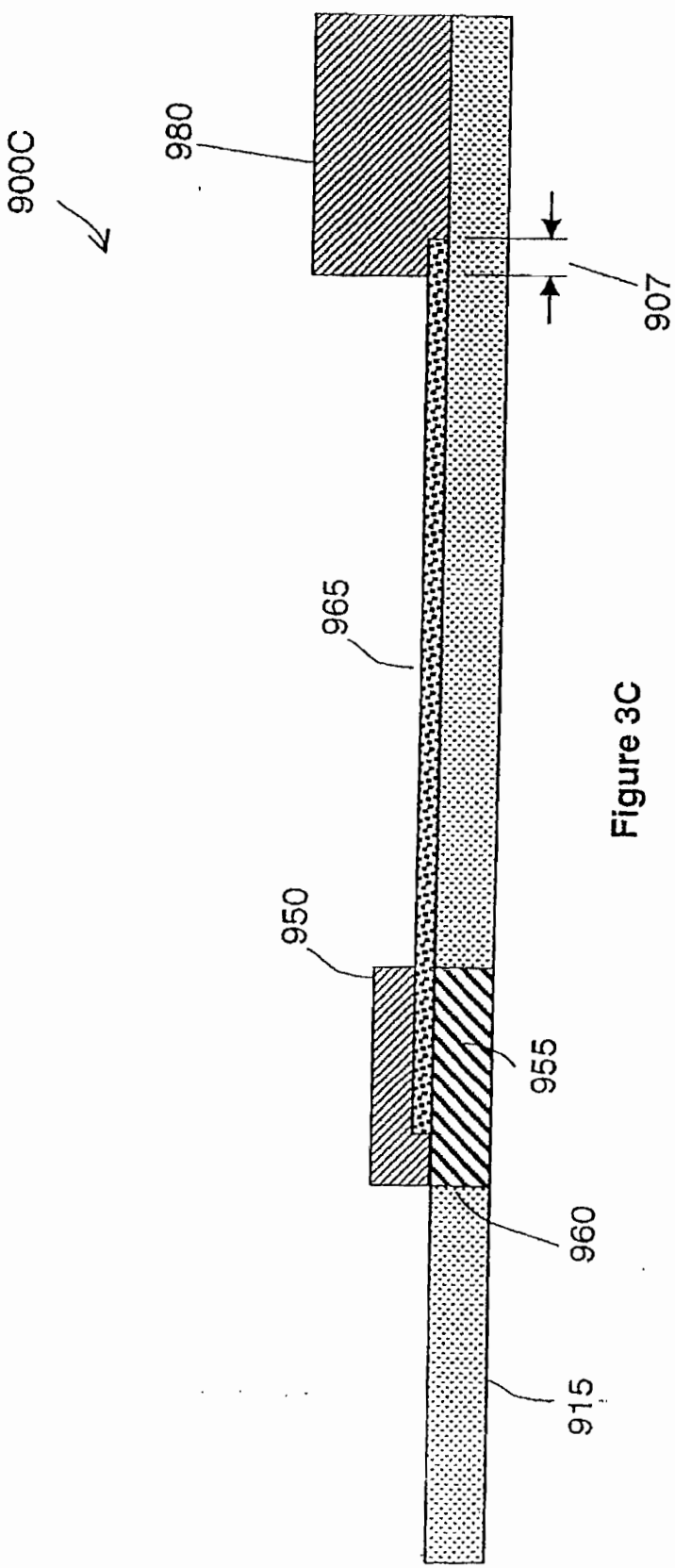


Figure 3C

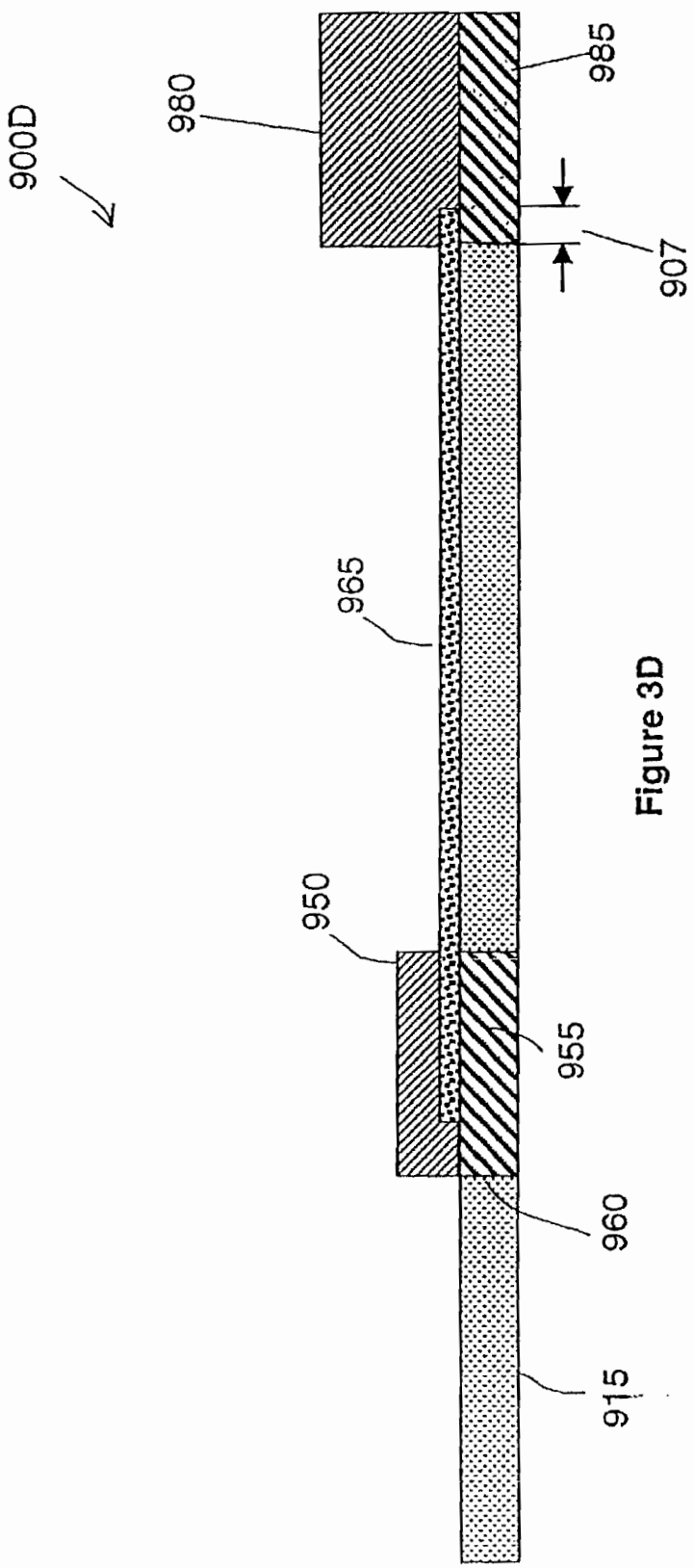


Figure 3D

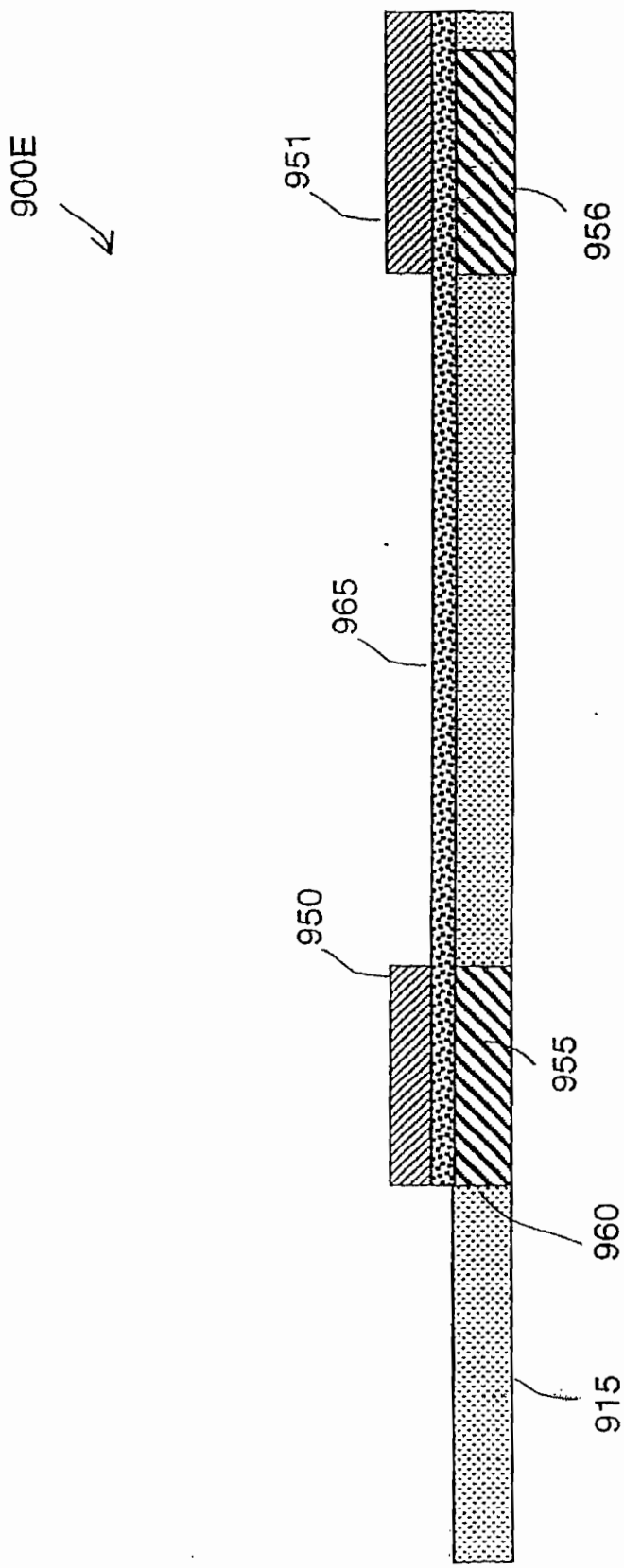


Figure 3E

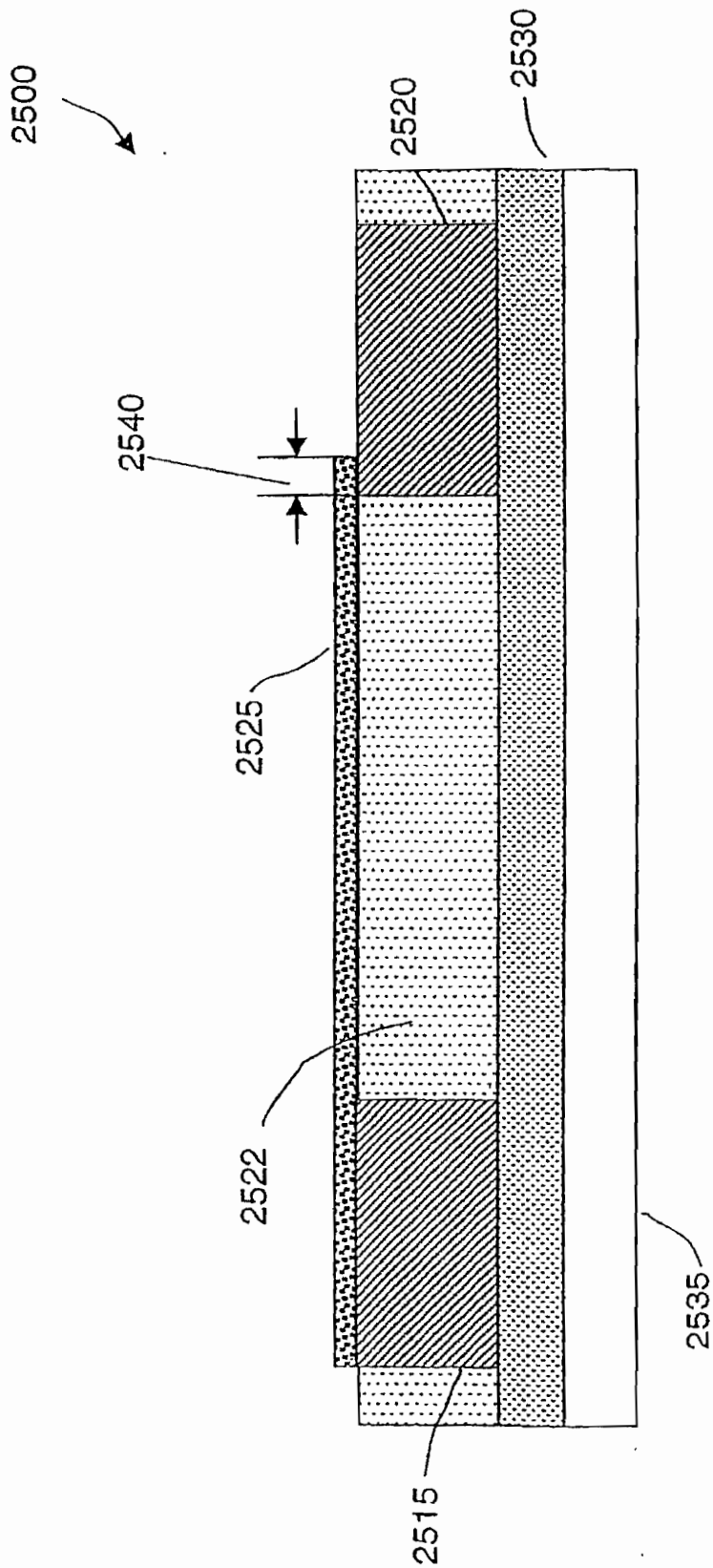


Figure 4

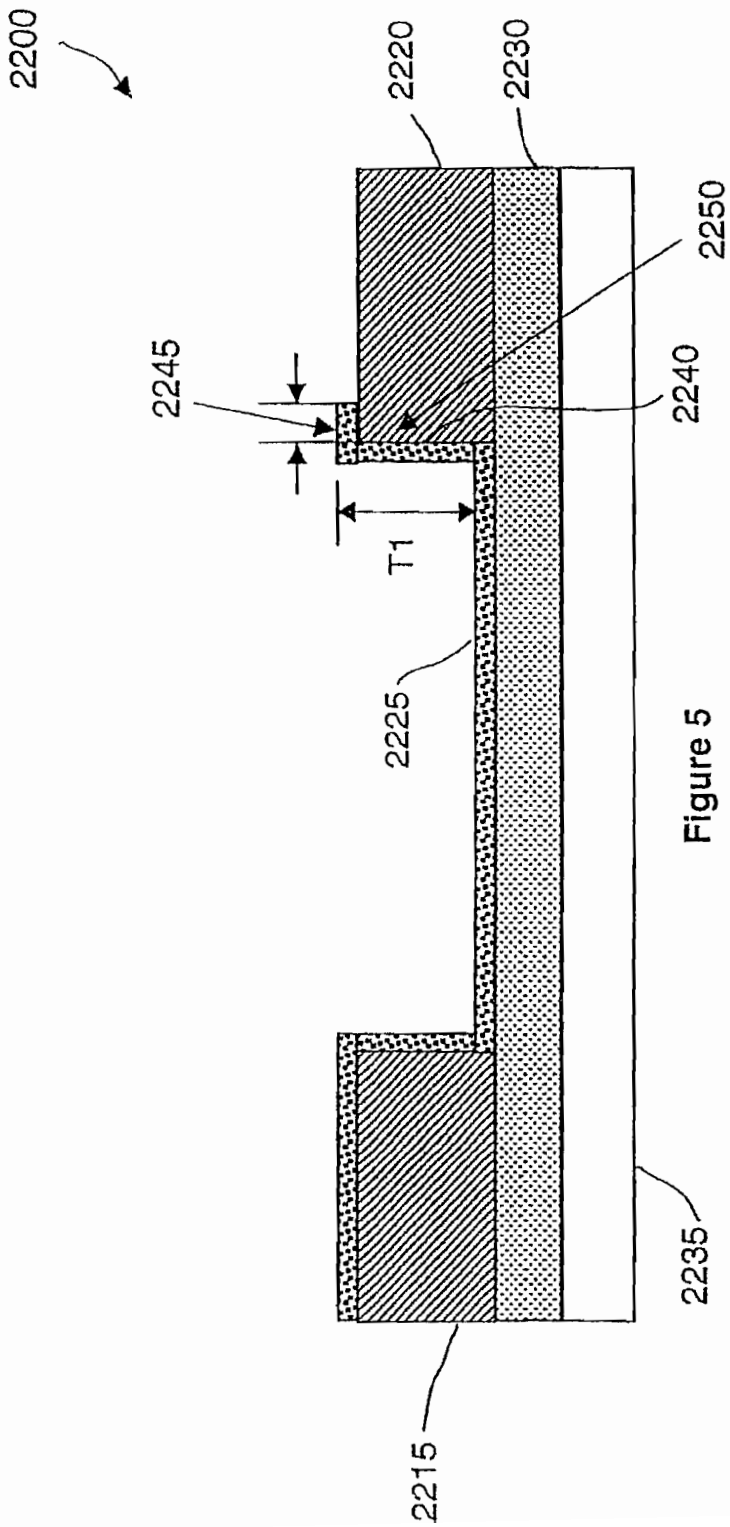


Figure 5

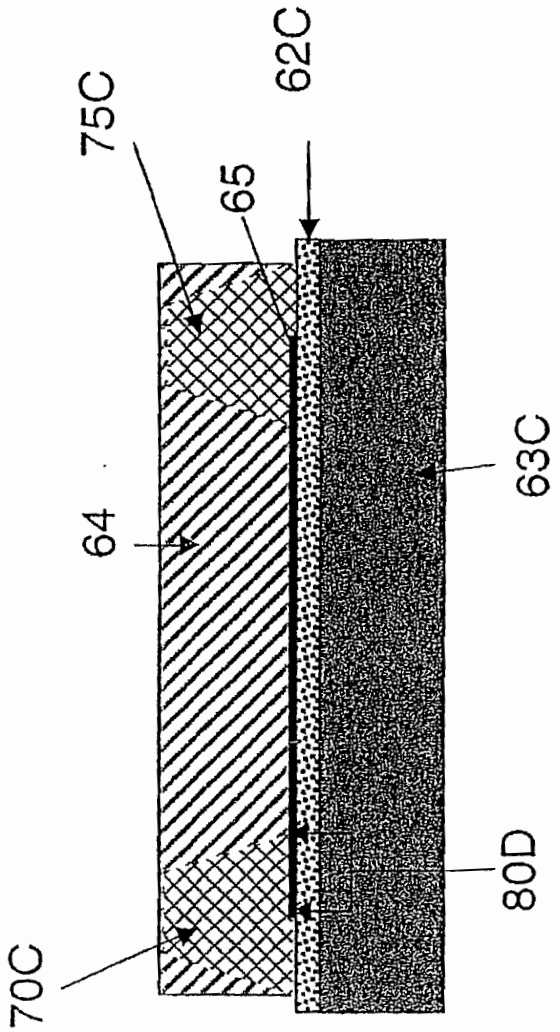


Figure 6

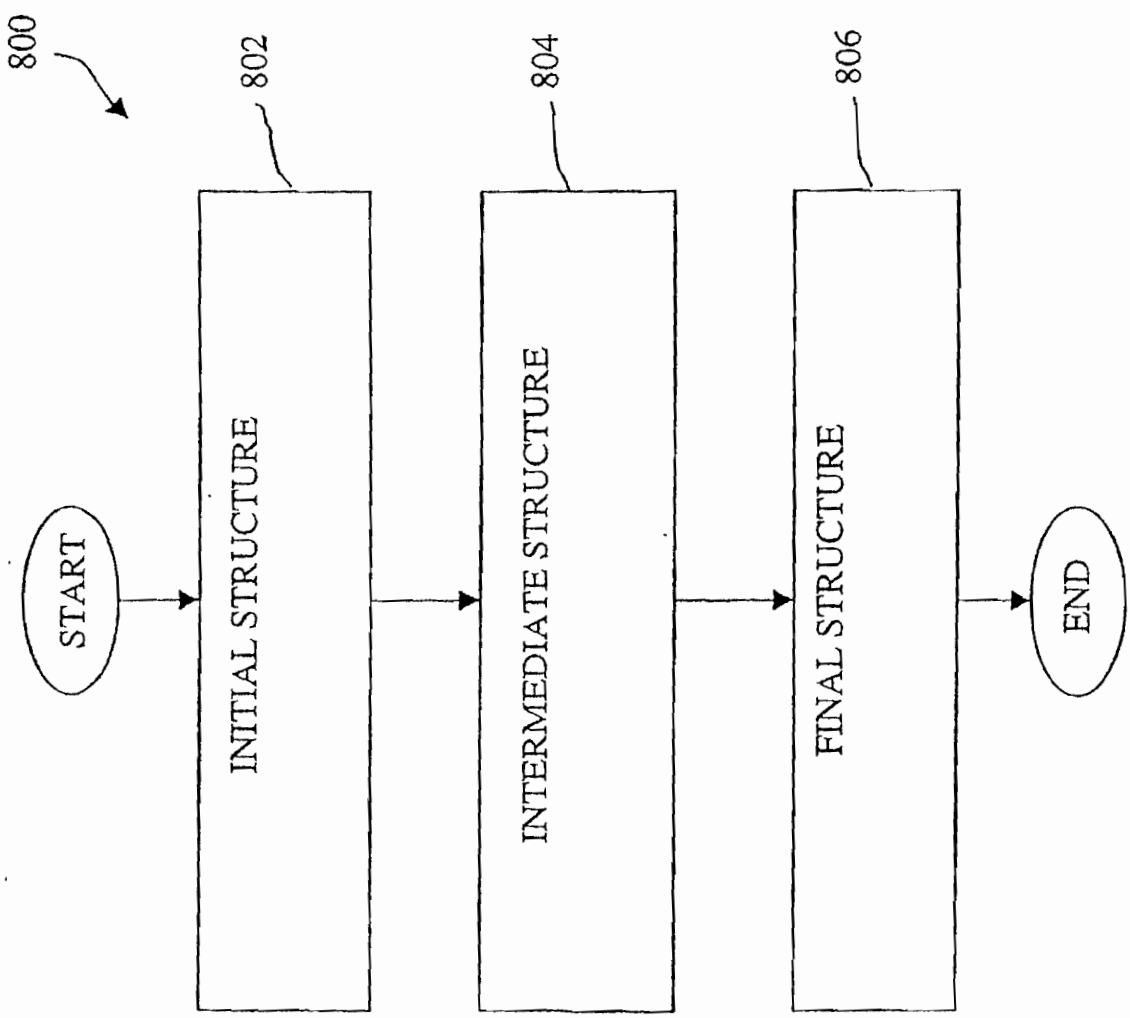

800
802
804
806
START
INITIAL STRUCTURE
INTERMEDIATE STRUCTURE
FINAL STRUCTURE
END

Figure 7

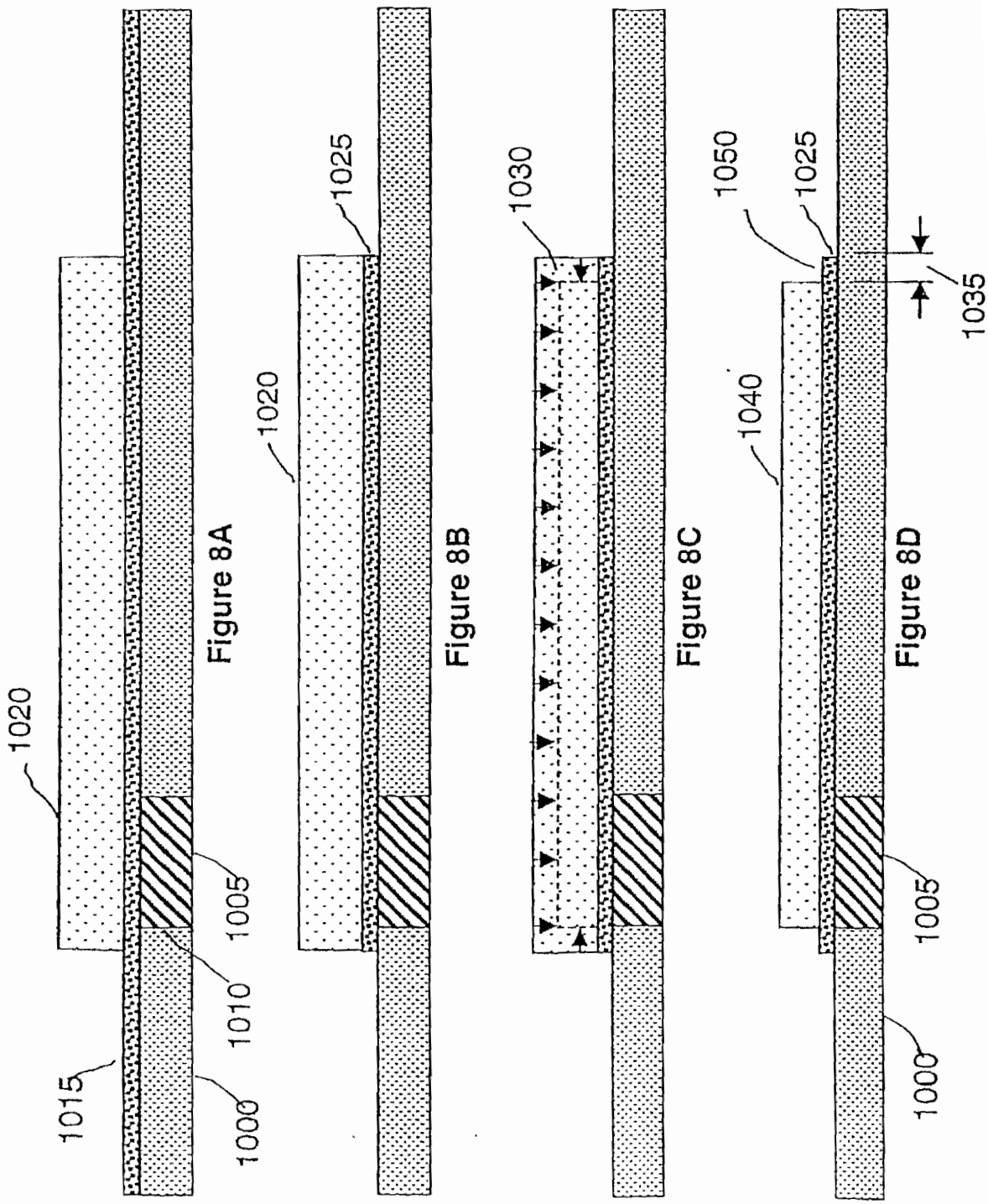


Figure 8A

Figure 8B

Figure 8C

Figure 8D

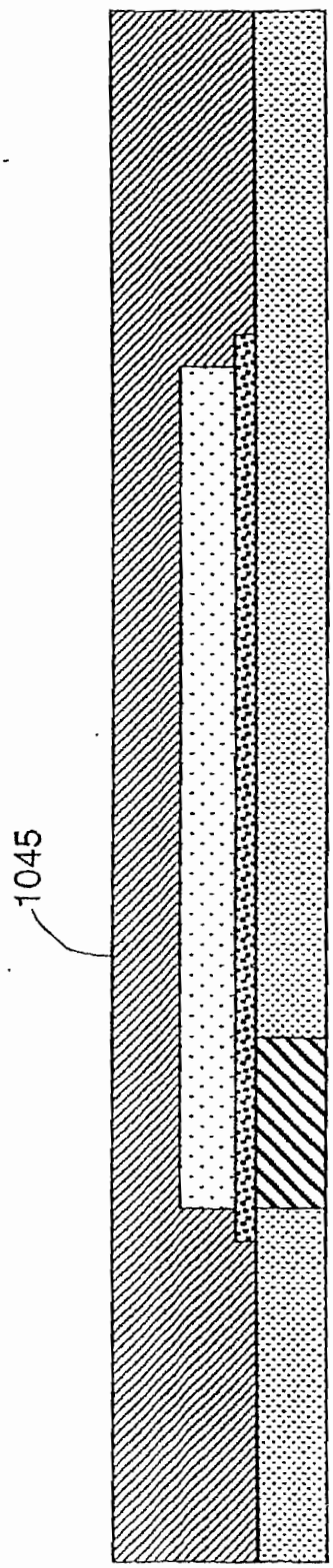


Figure 8E

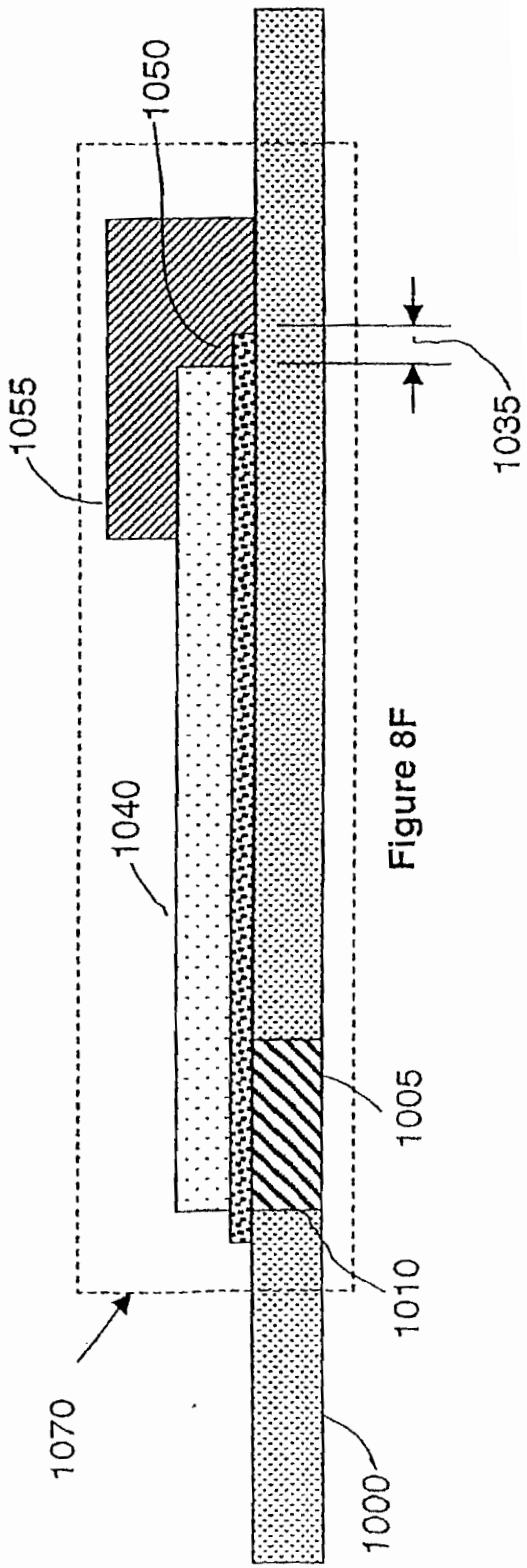


Figure 8F

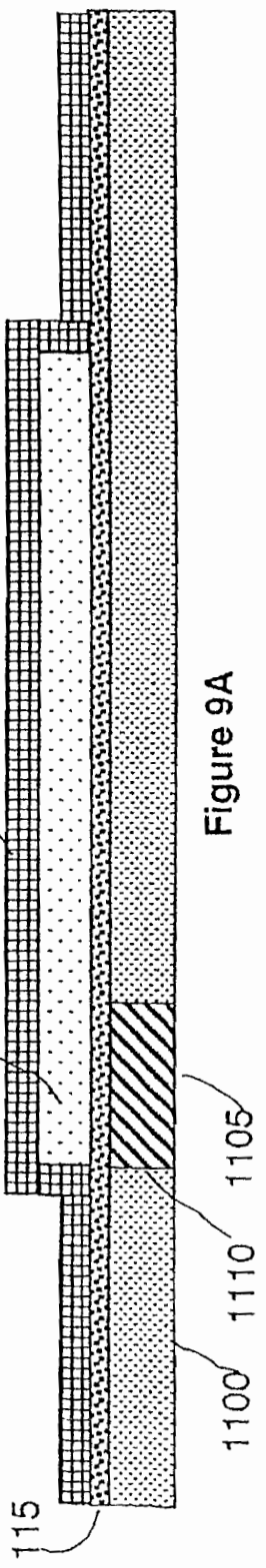


Figure 9A

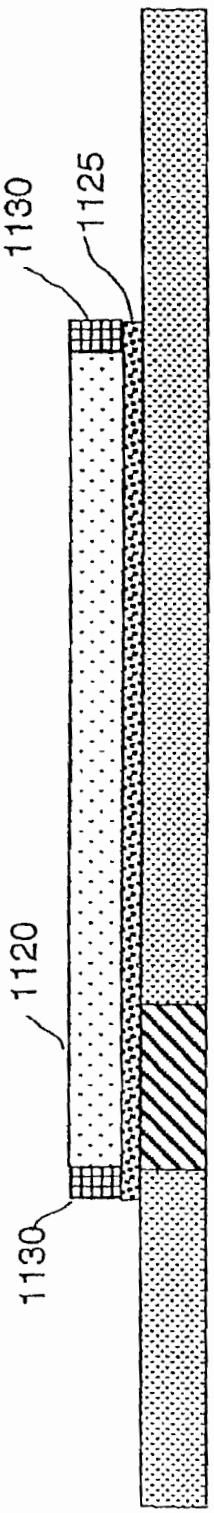


Figure 9B

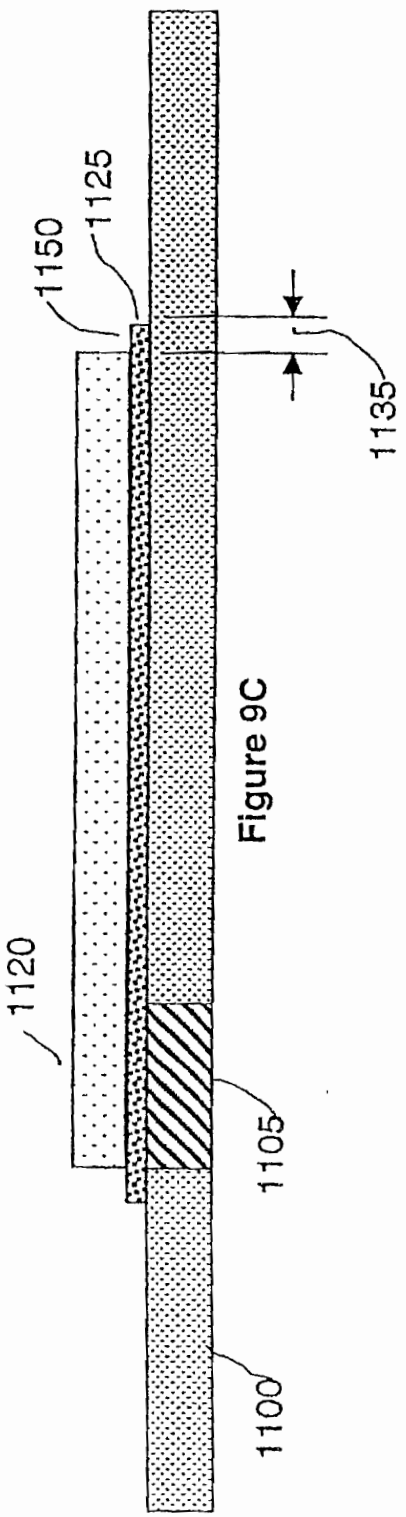


Figure 9C

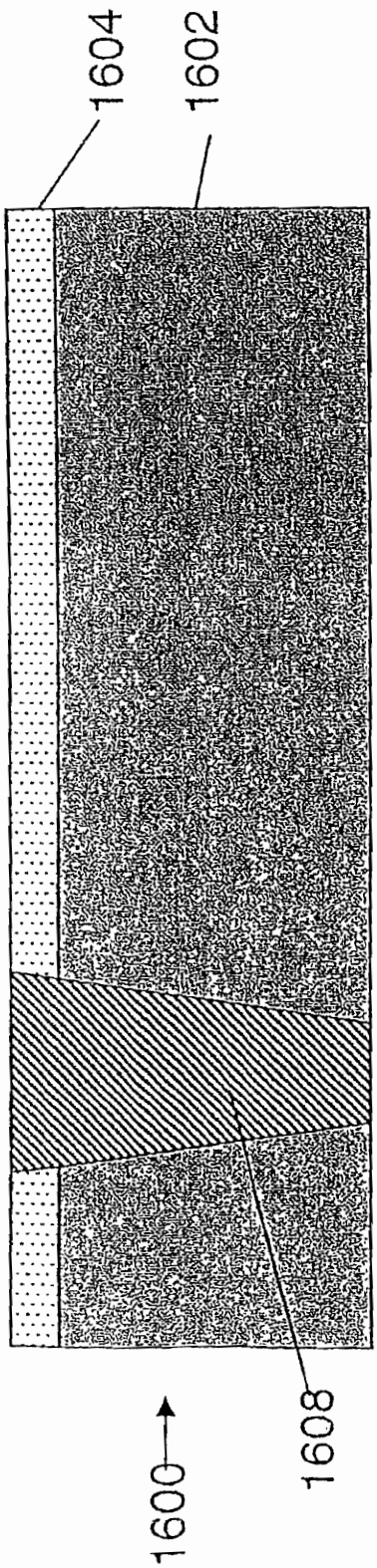


Figure 10A

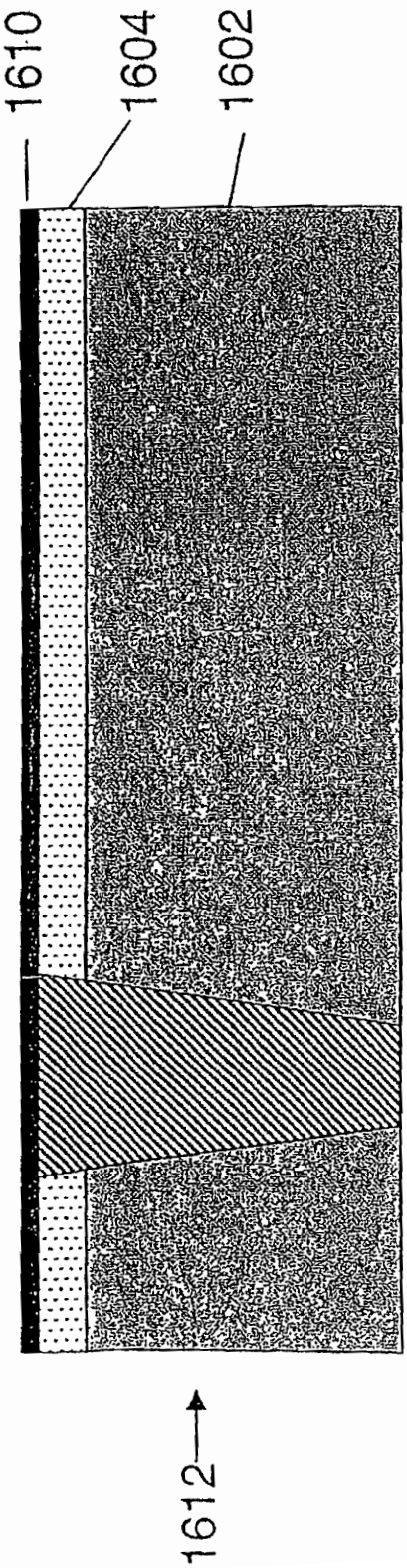


Figure 10B

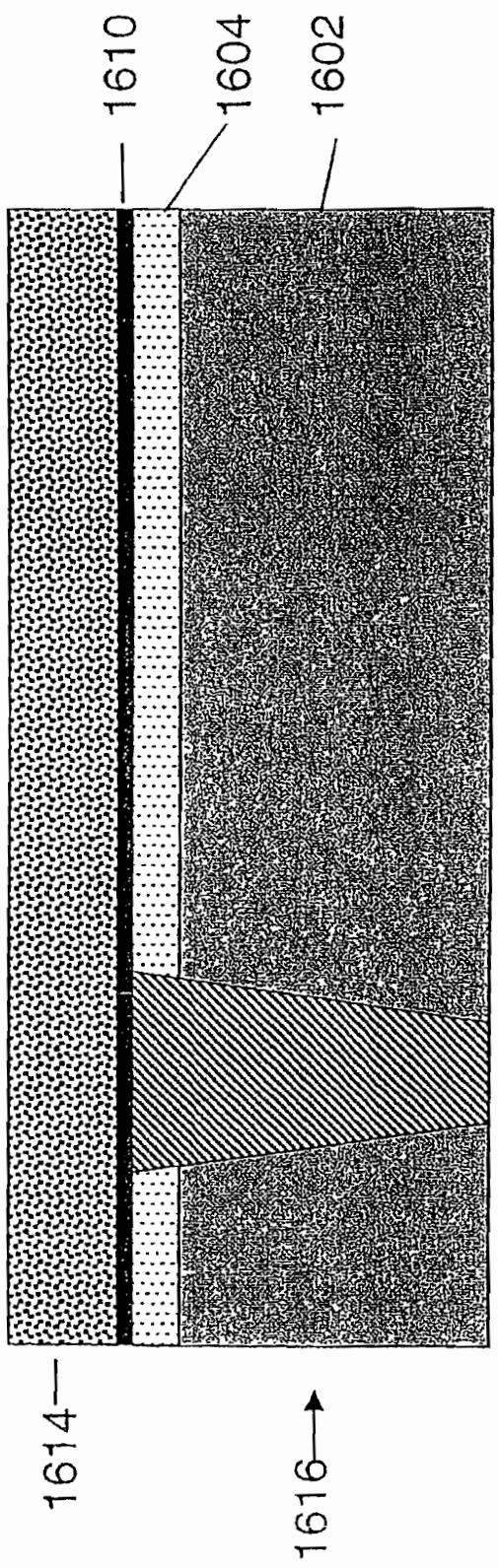


Figure 10C

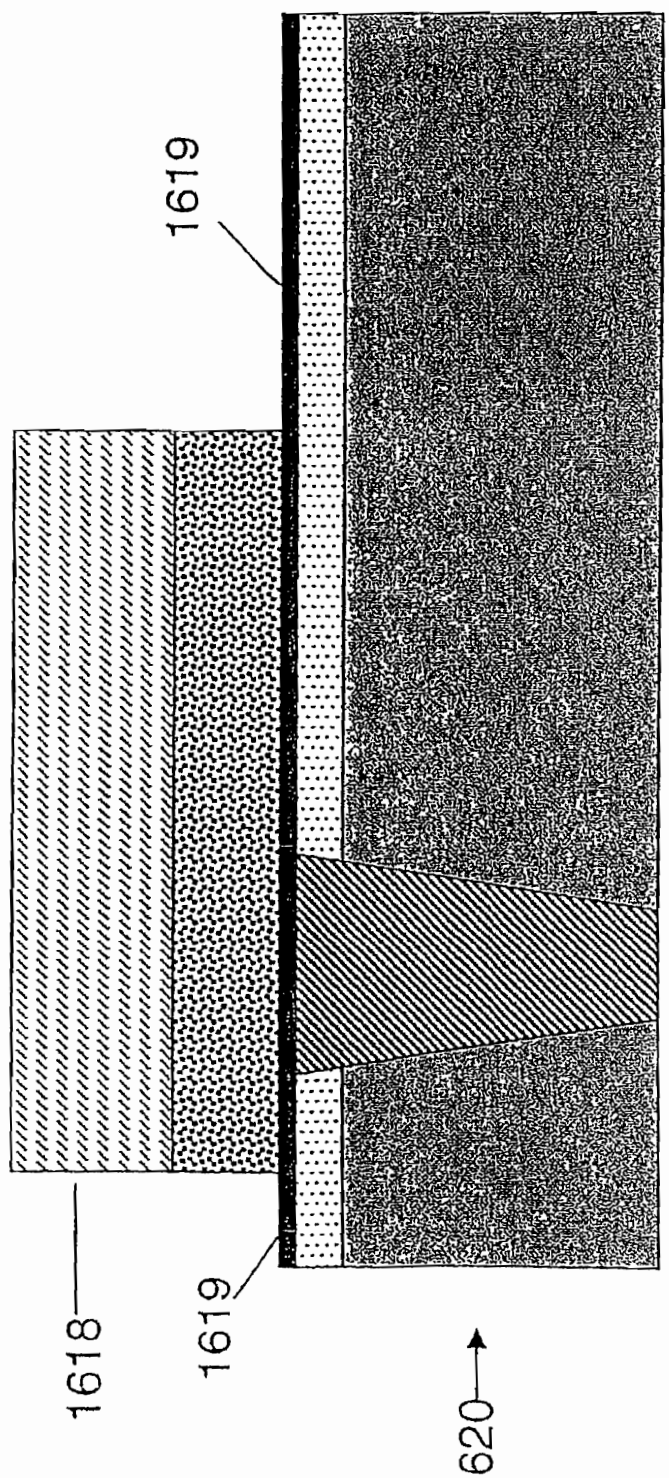


Figure 10D

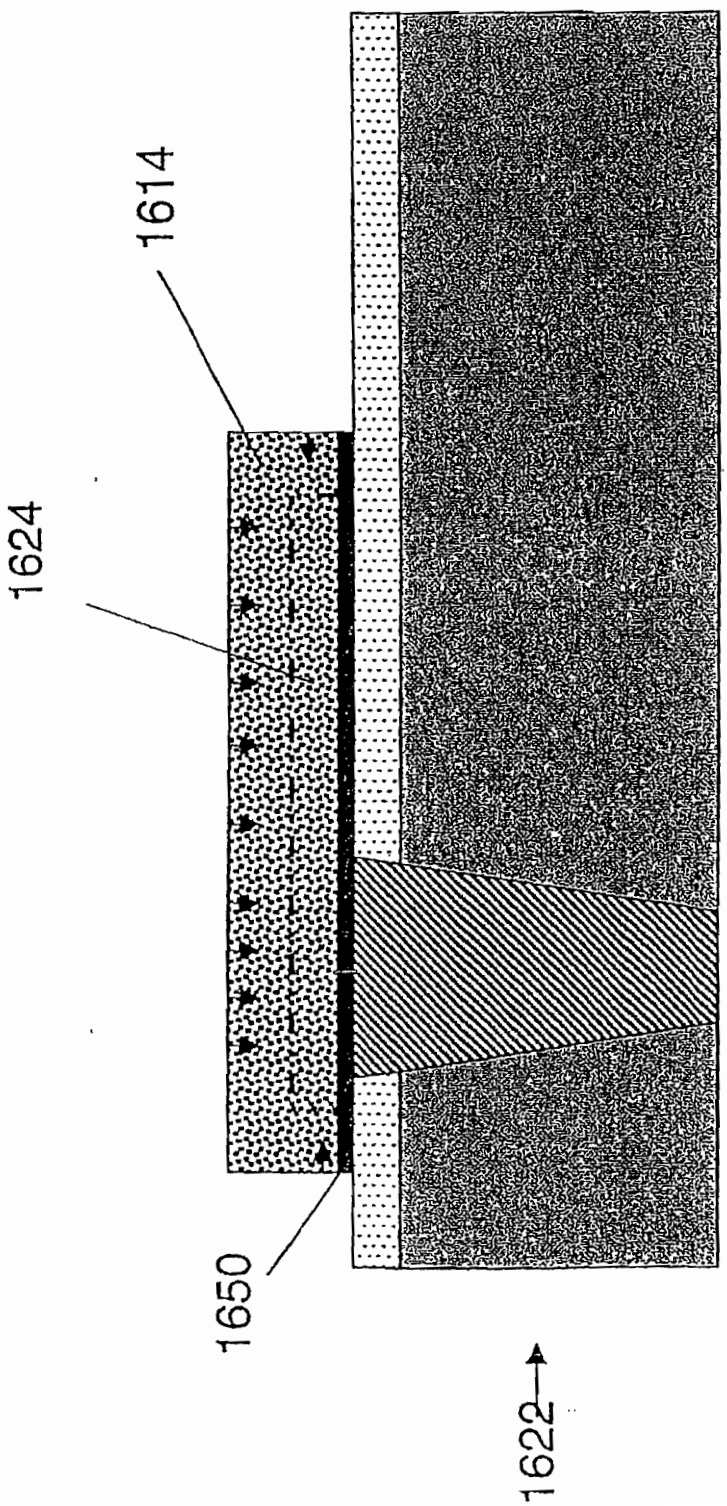


Figure 10E

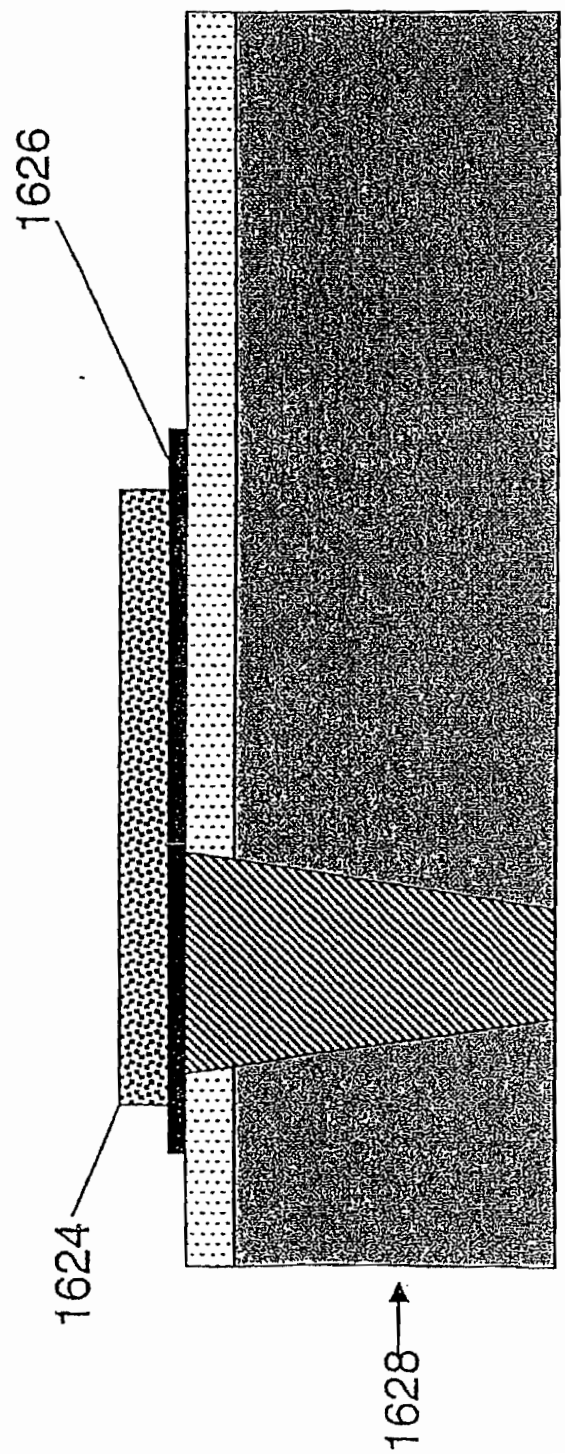


Figure 10F

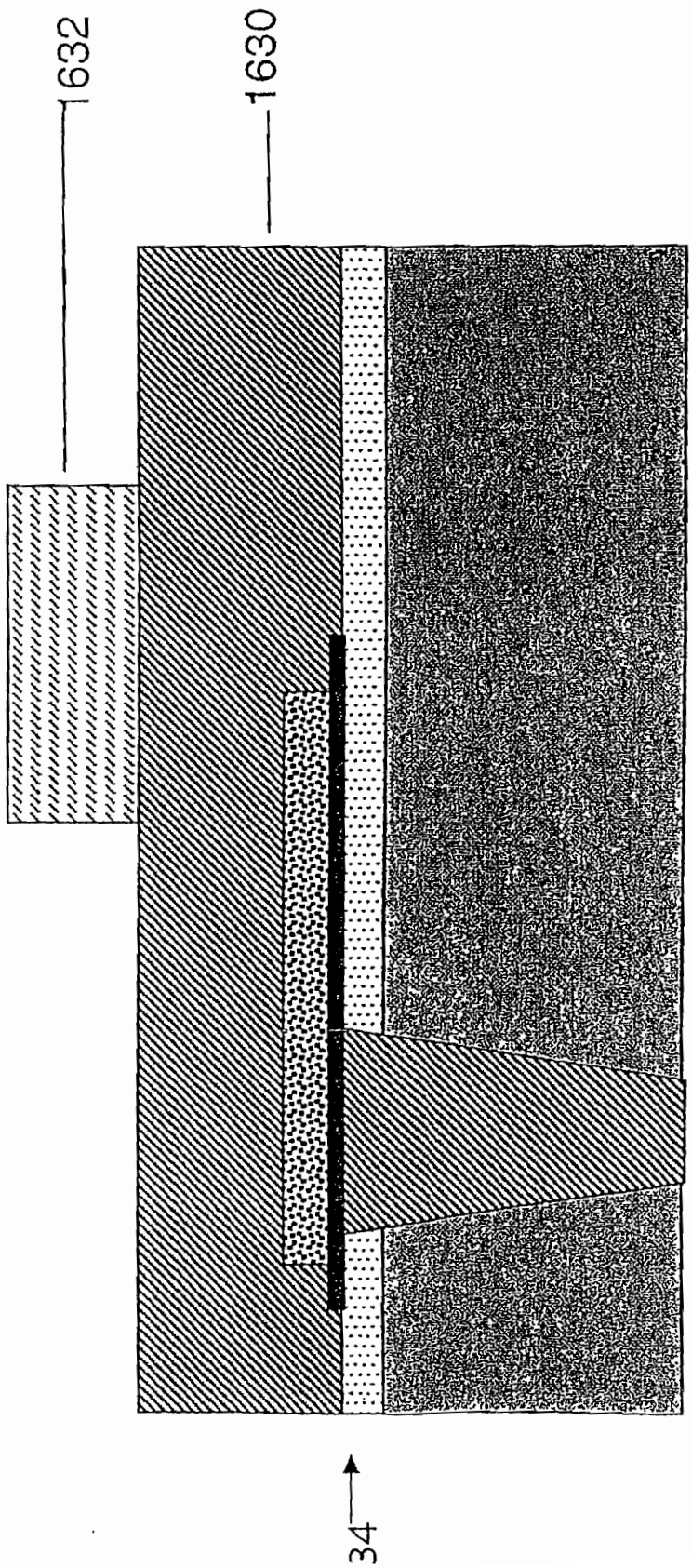


Figure 10G

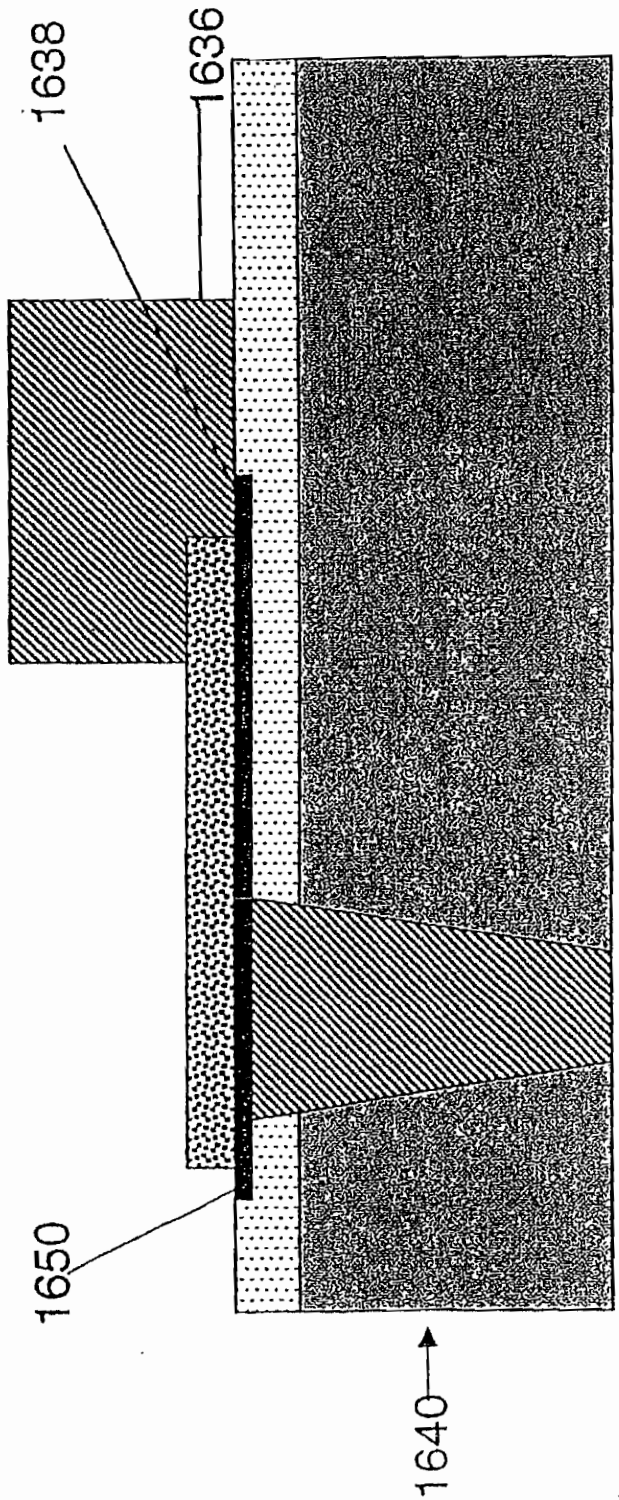


Figure 10H

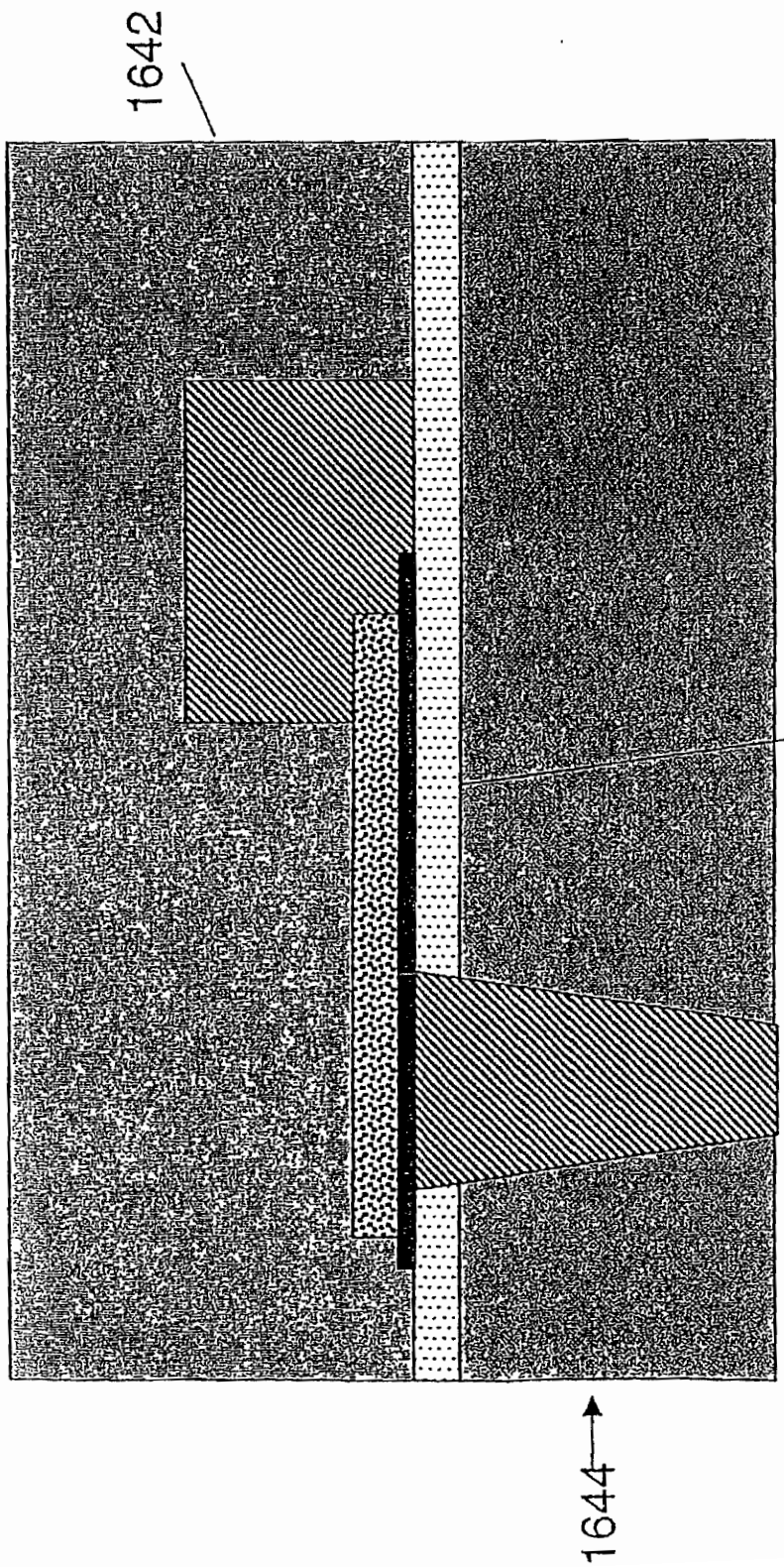


Figure 10I

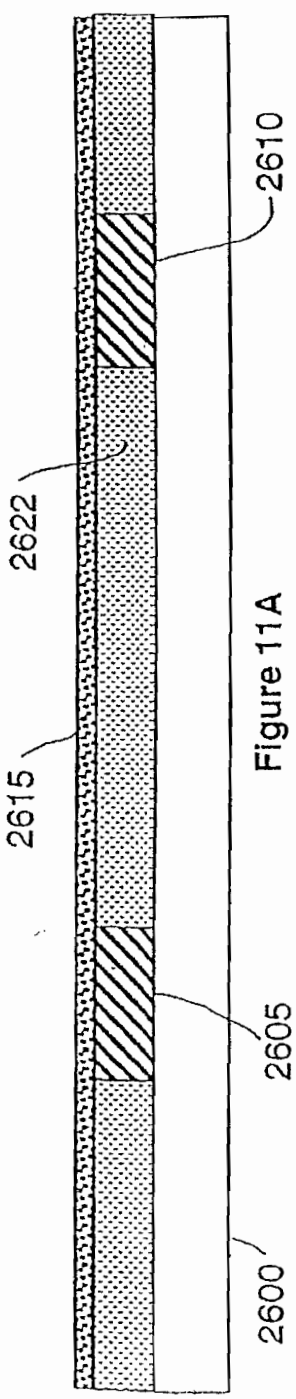


Figure 11A

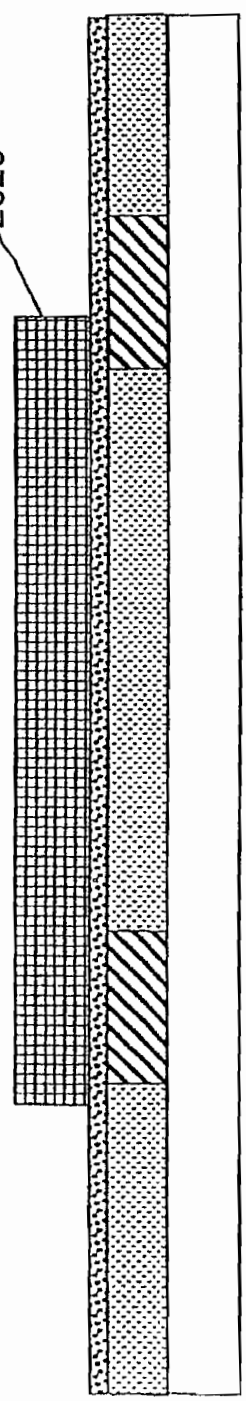


Figure 11B

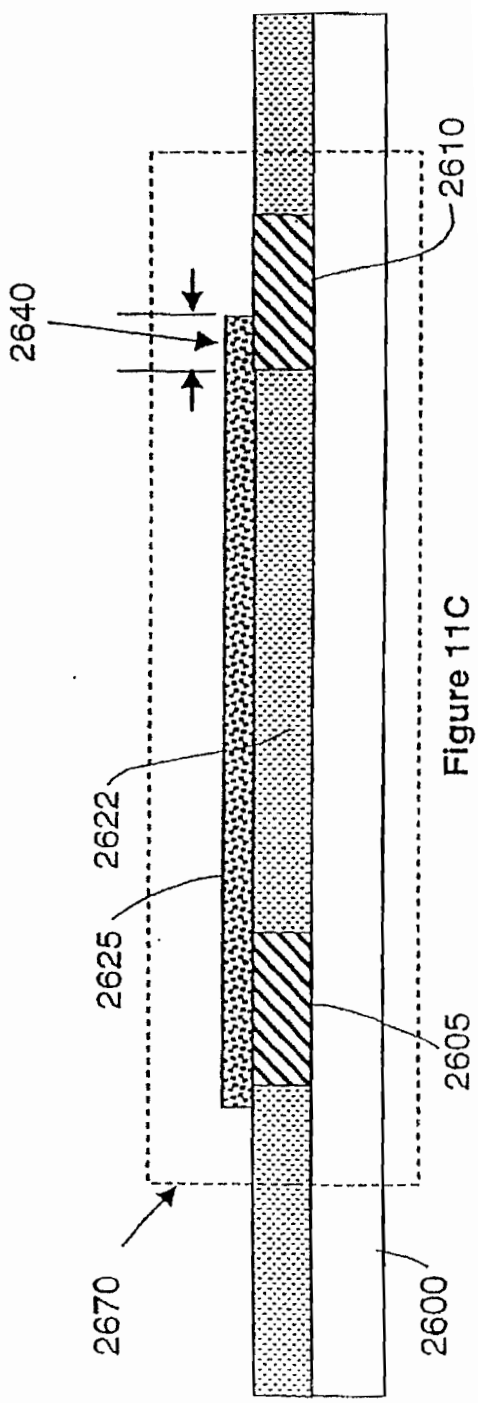


Figure 11C

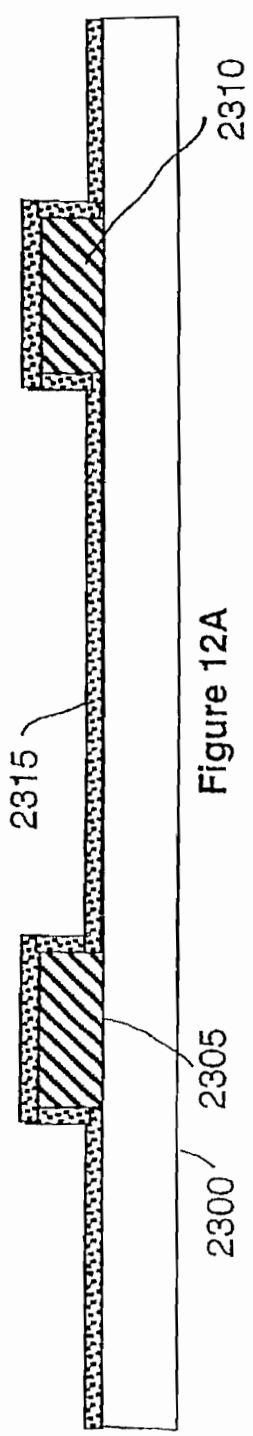


Figure 12A

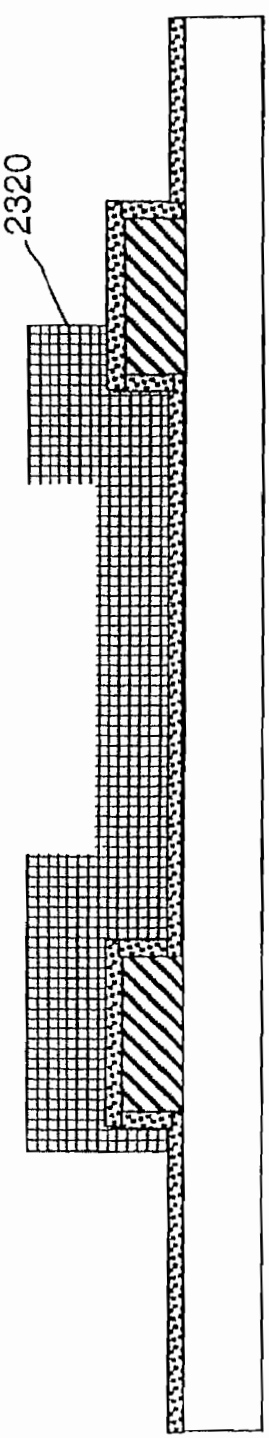


Figure 12B

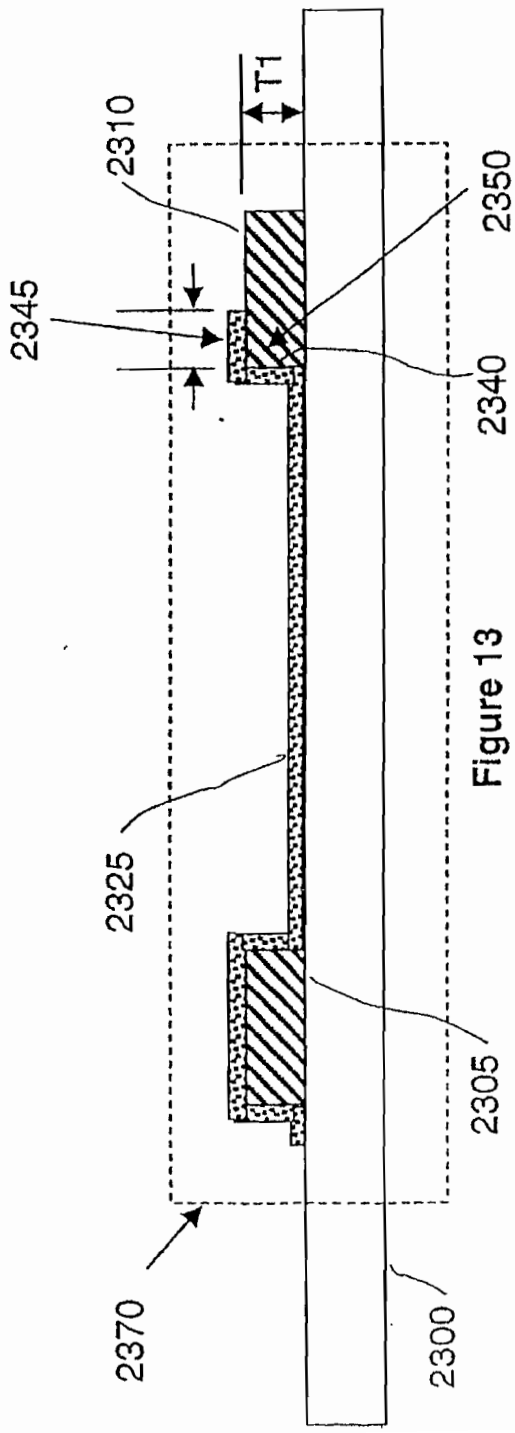


Figure 13

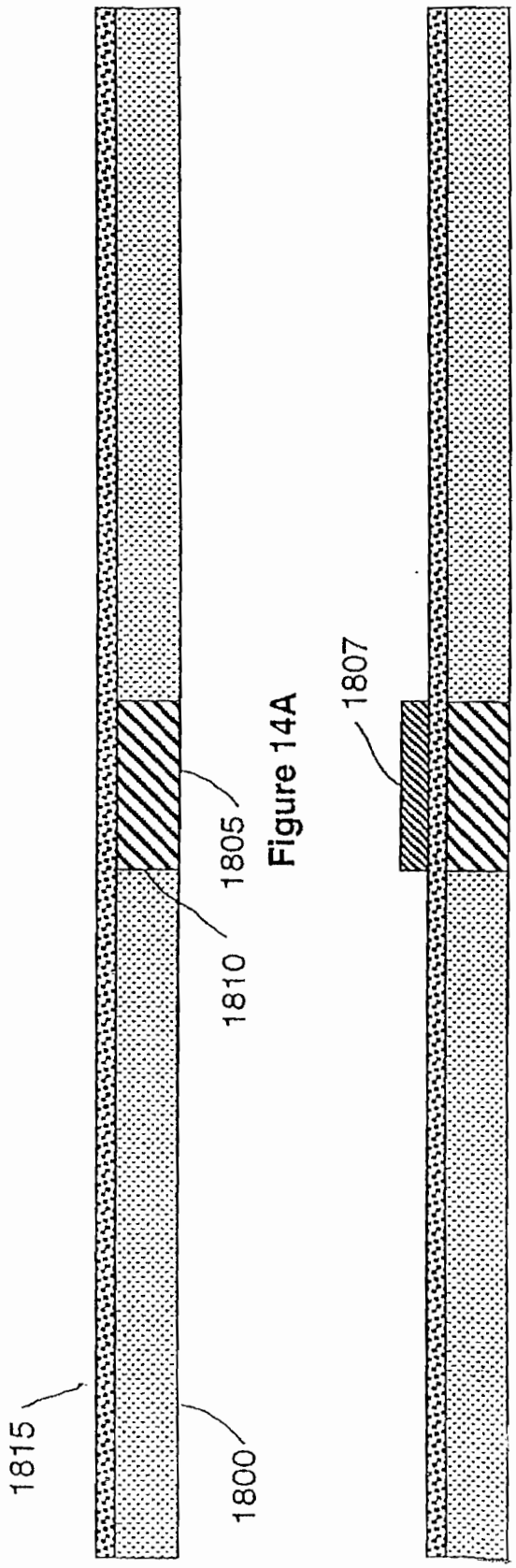


Figure 14A

Figure 14B

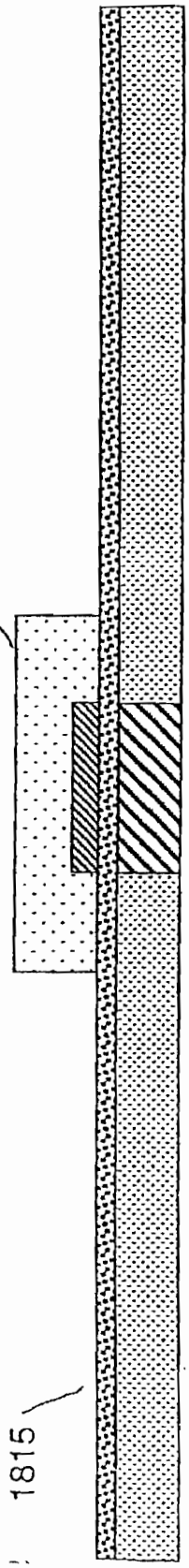


Figure 14C

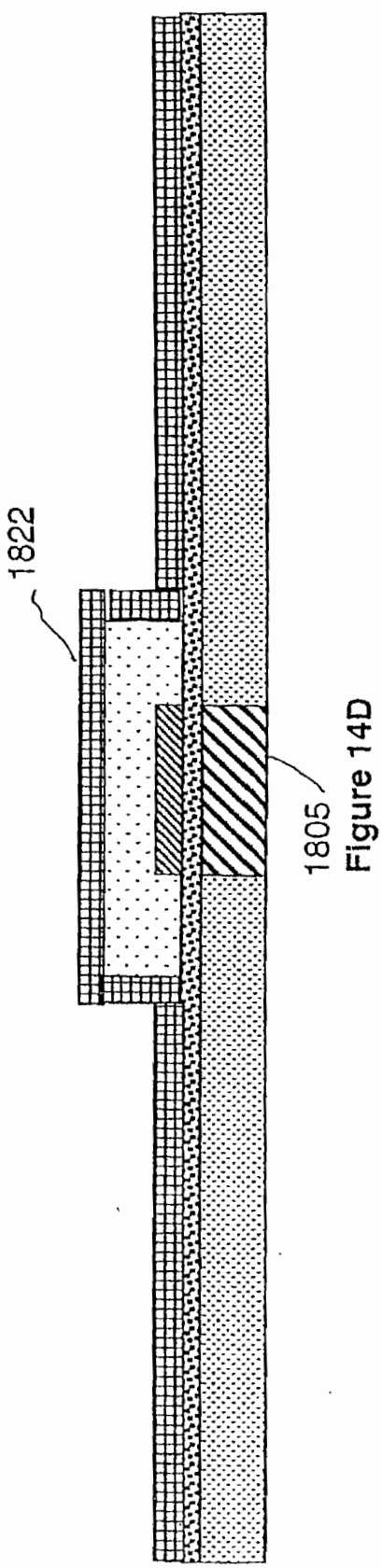


Figure 14D

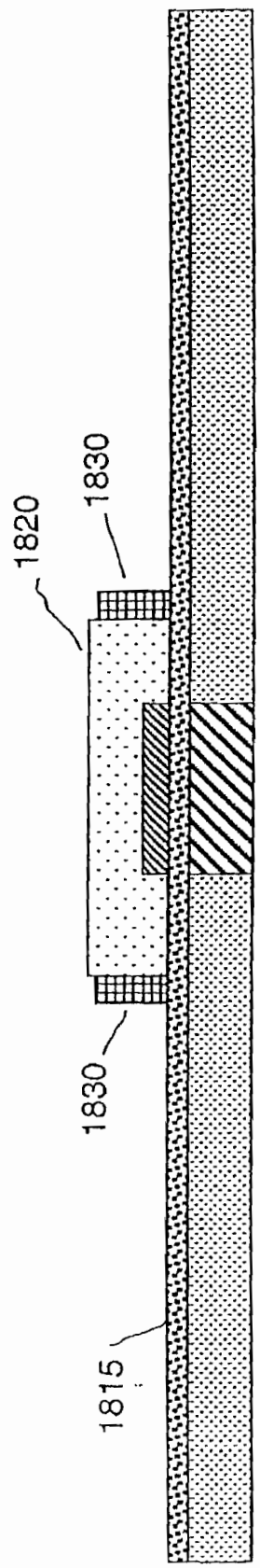


Figure 14E

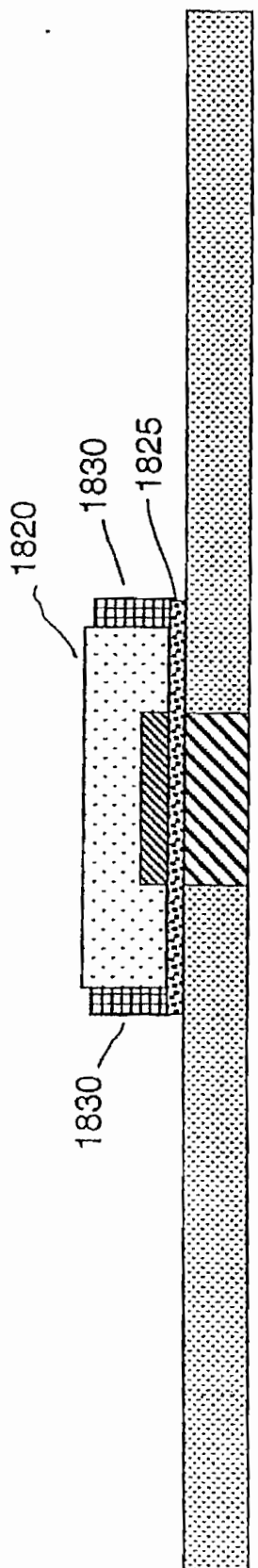


Figure 14F

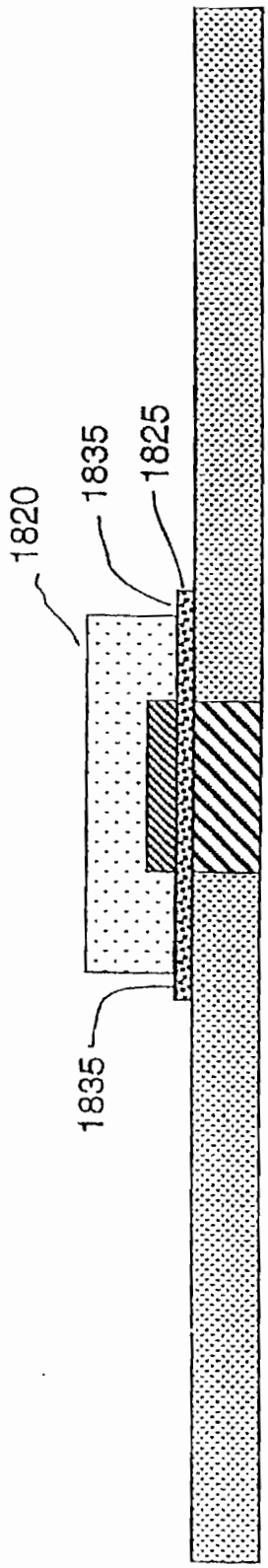


Figure 14G

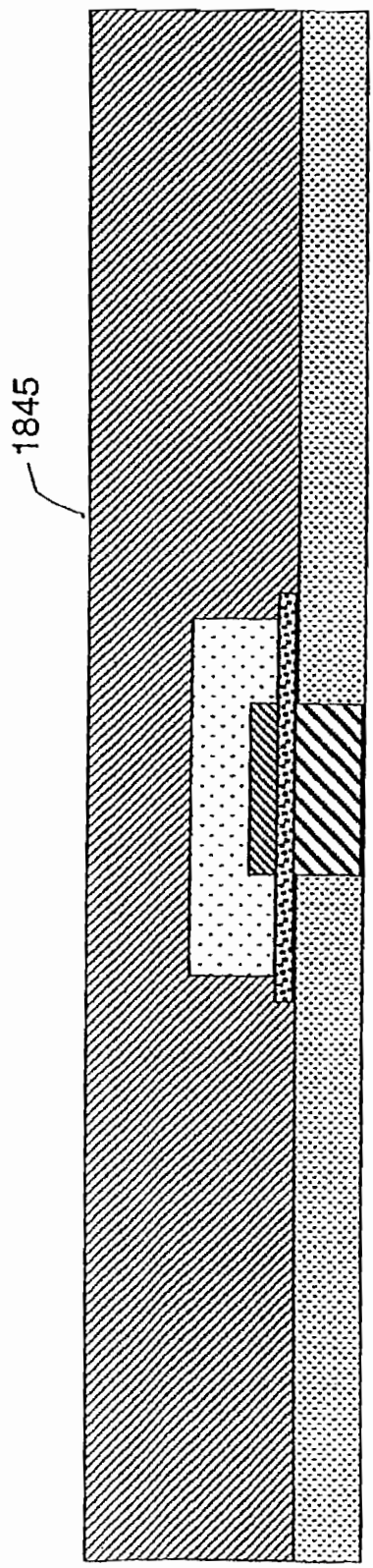


Figure 14H

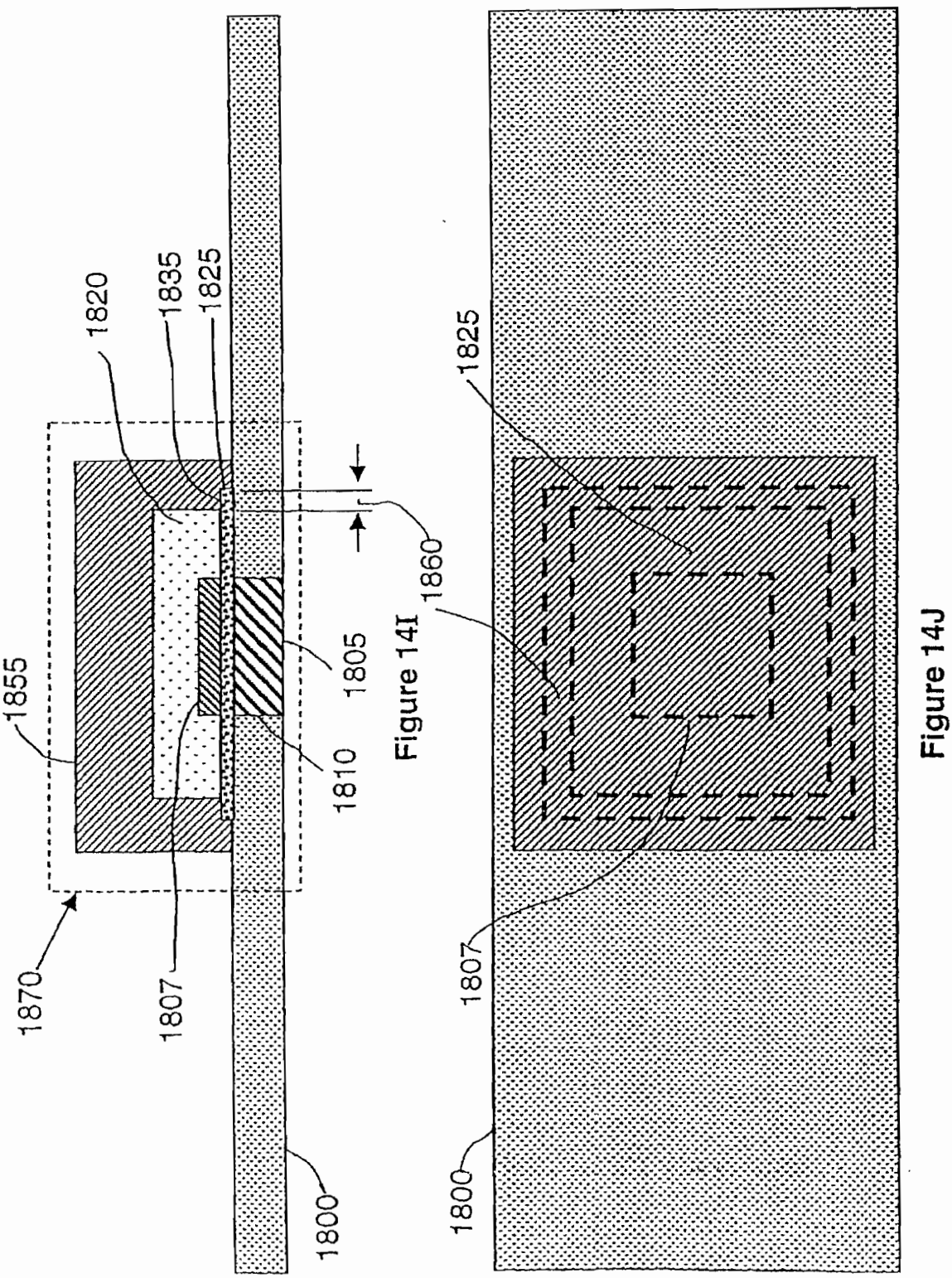


Figure 14I

Figure 14J

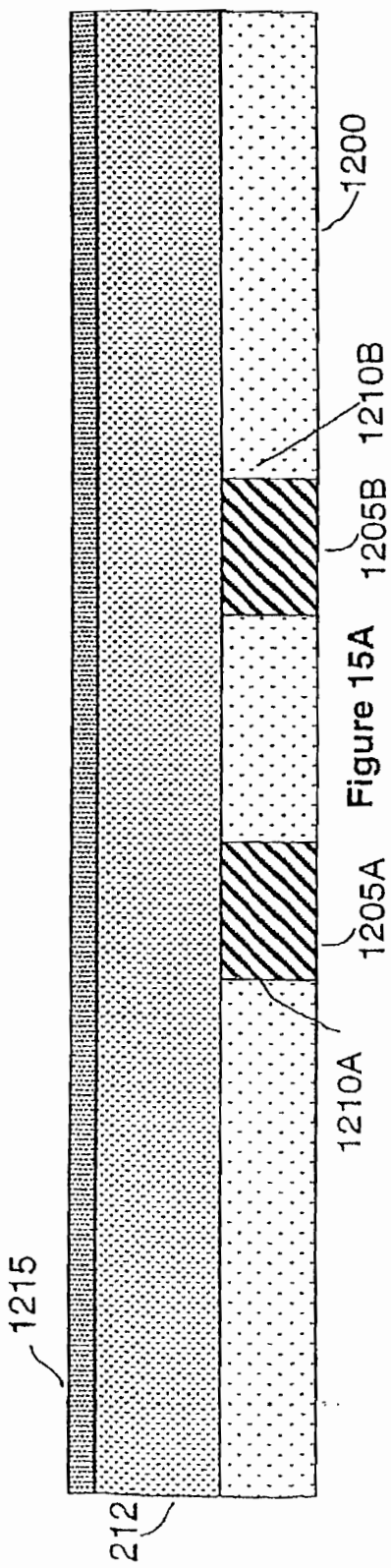


Figure 15A

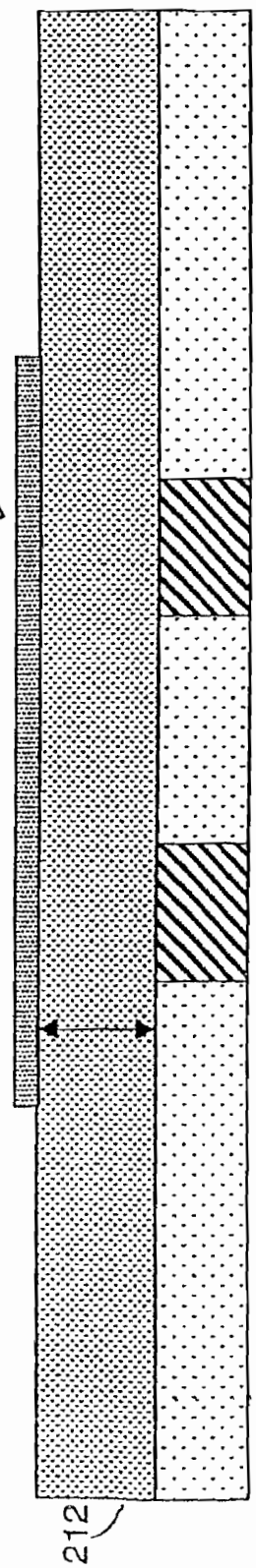


Figure 15B

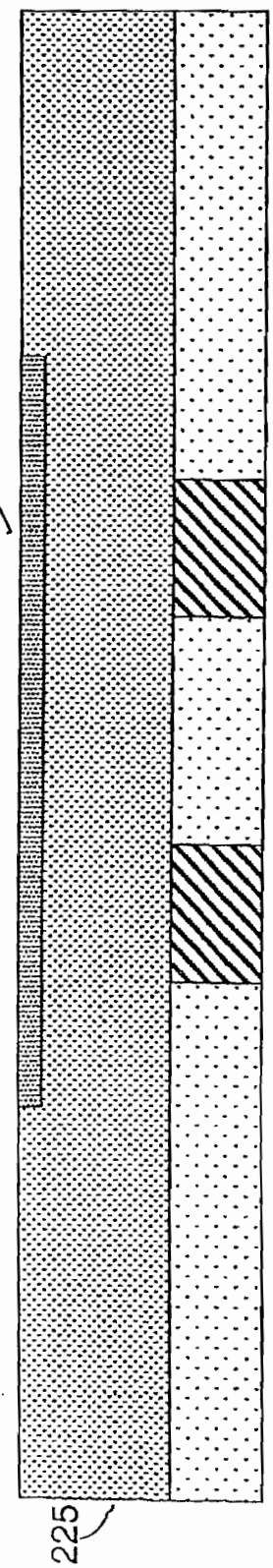


Figure 15C

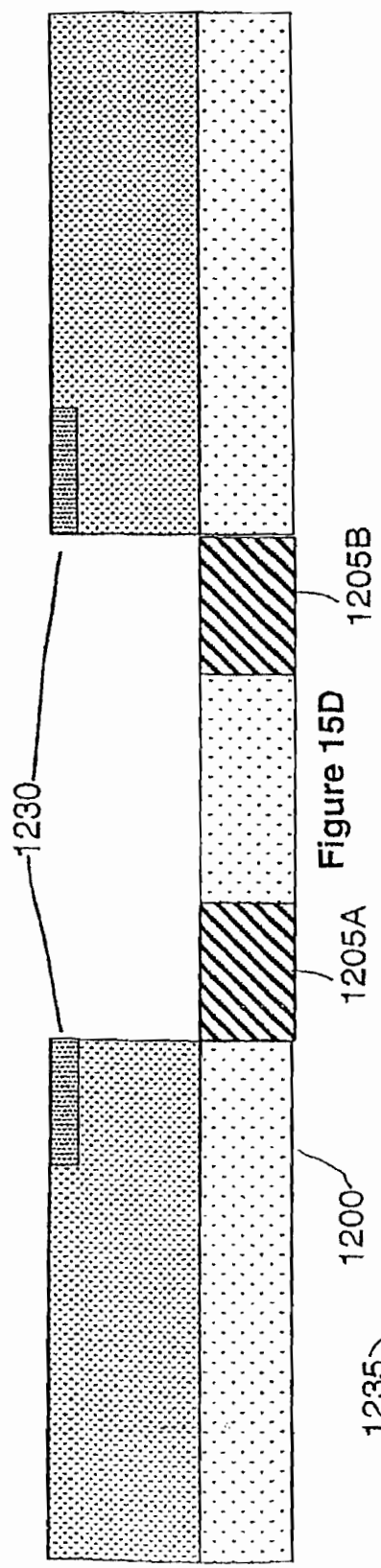


Figure 15D

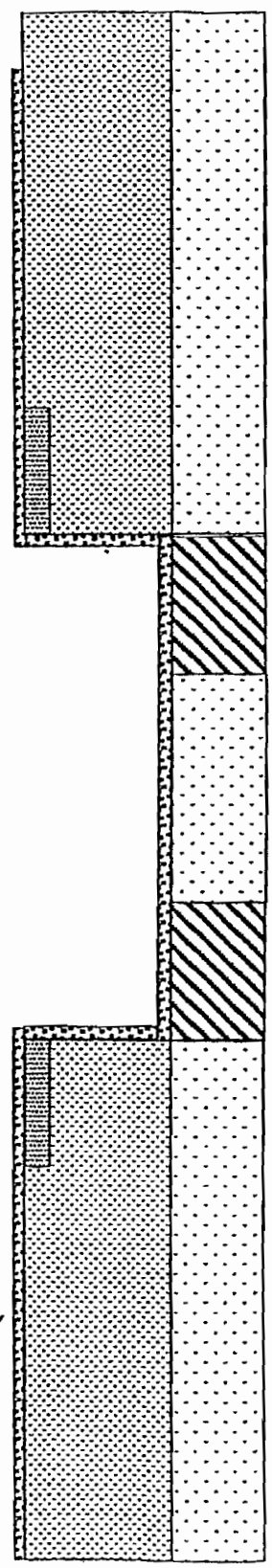


Figure 15E

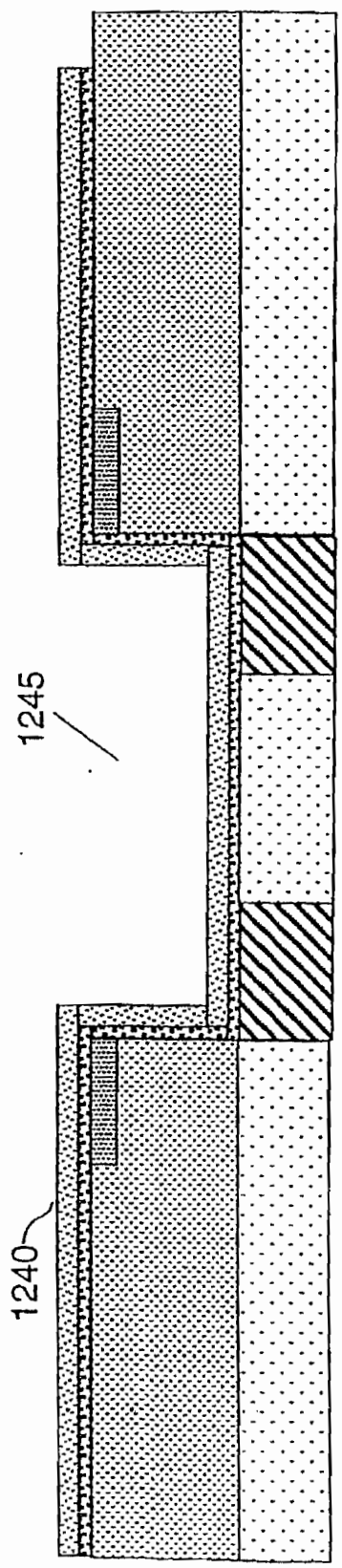


Figure 15F

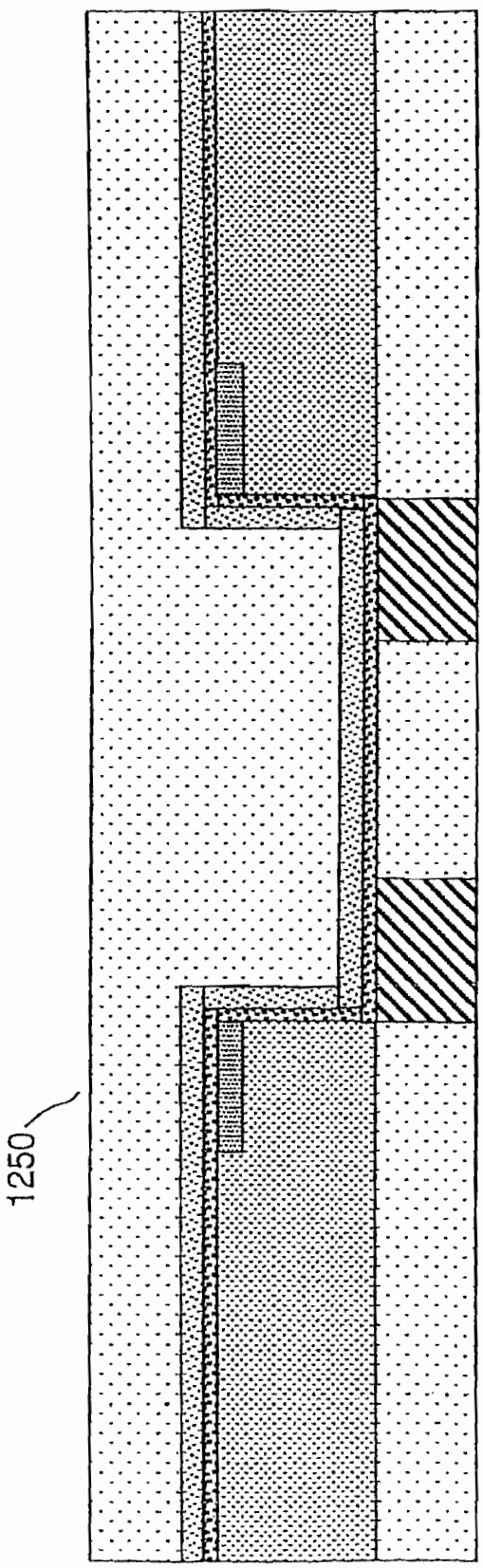


Figure 15G

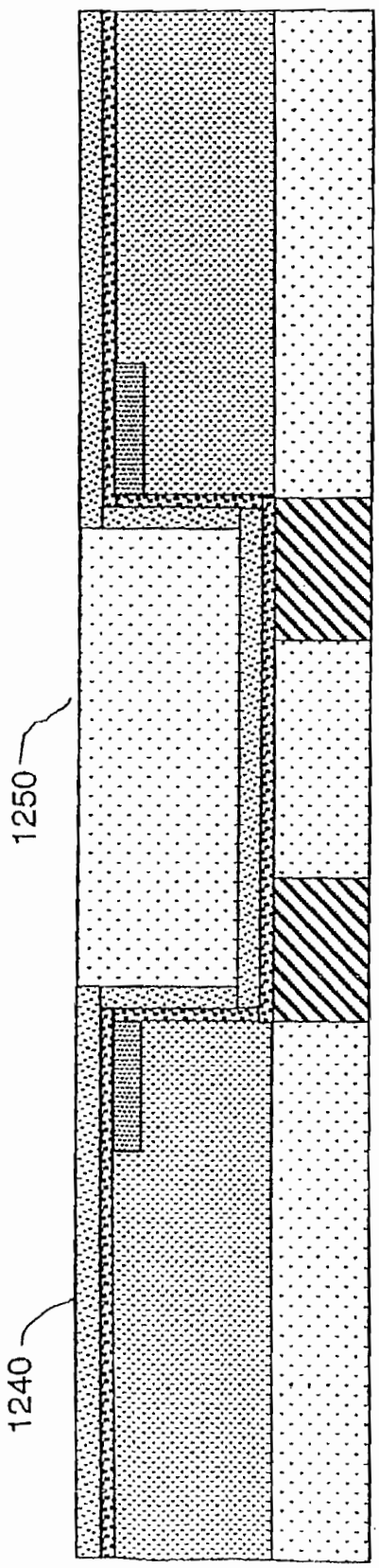


Figure 15H

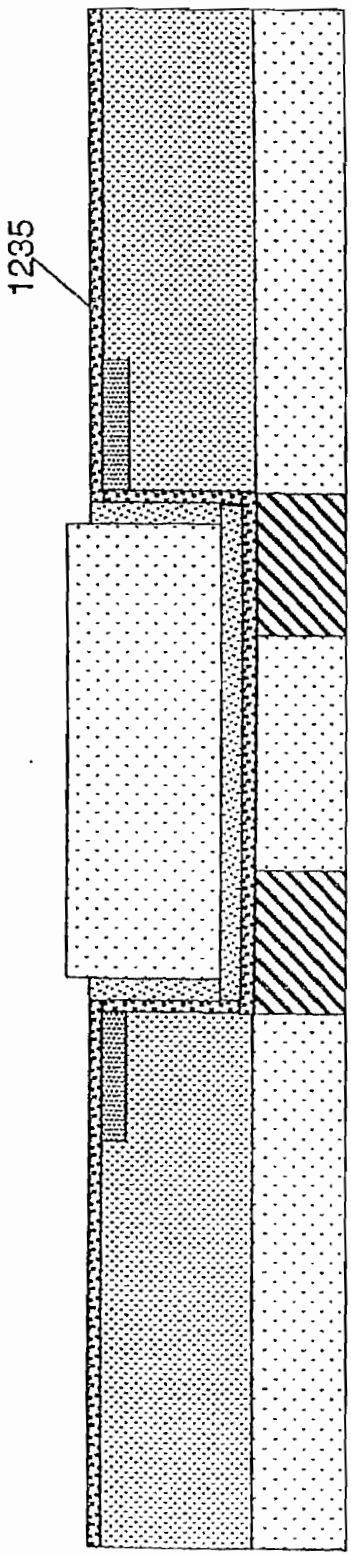


Figure 15I

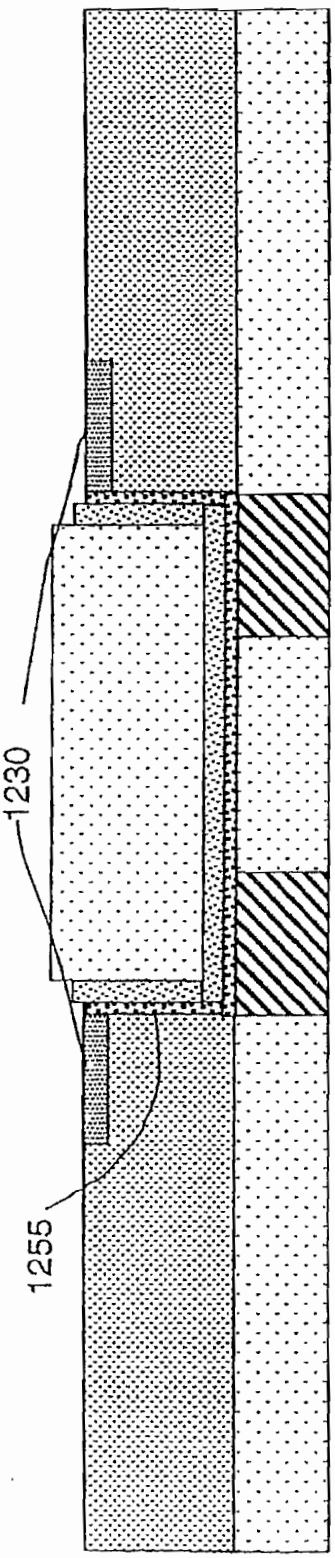


Figure 15J

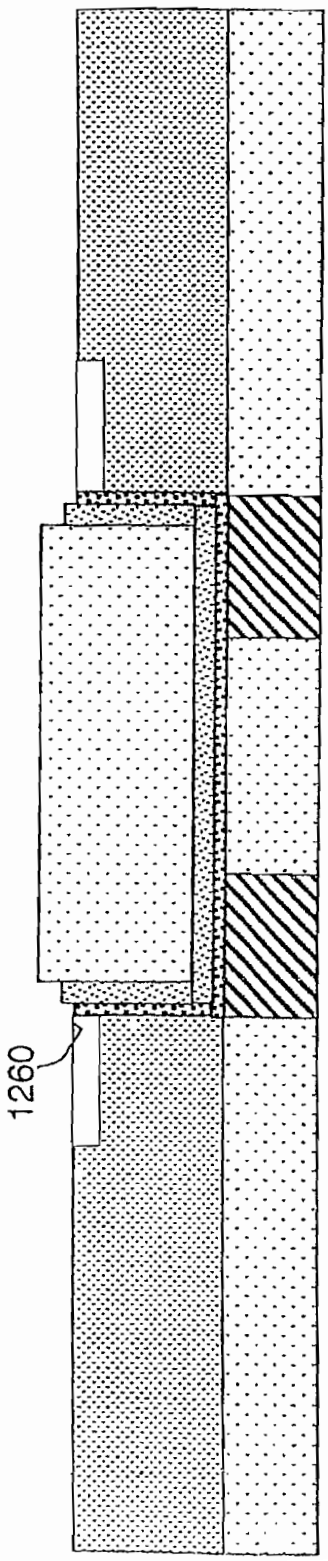


Figure 15K

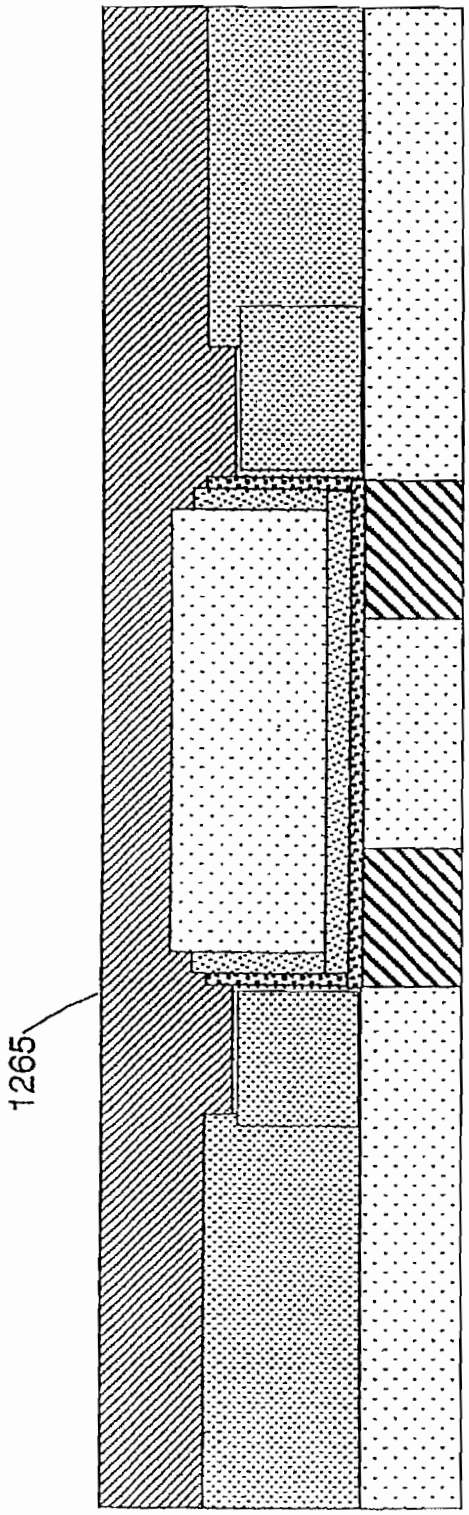


Figure 15L

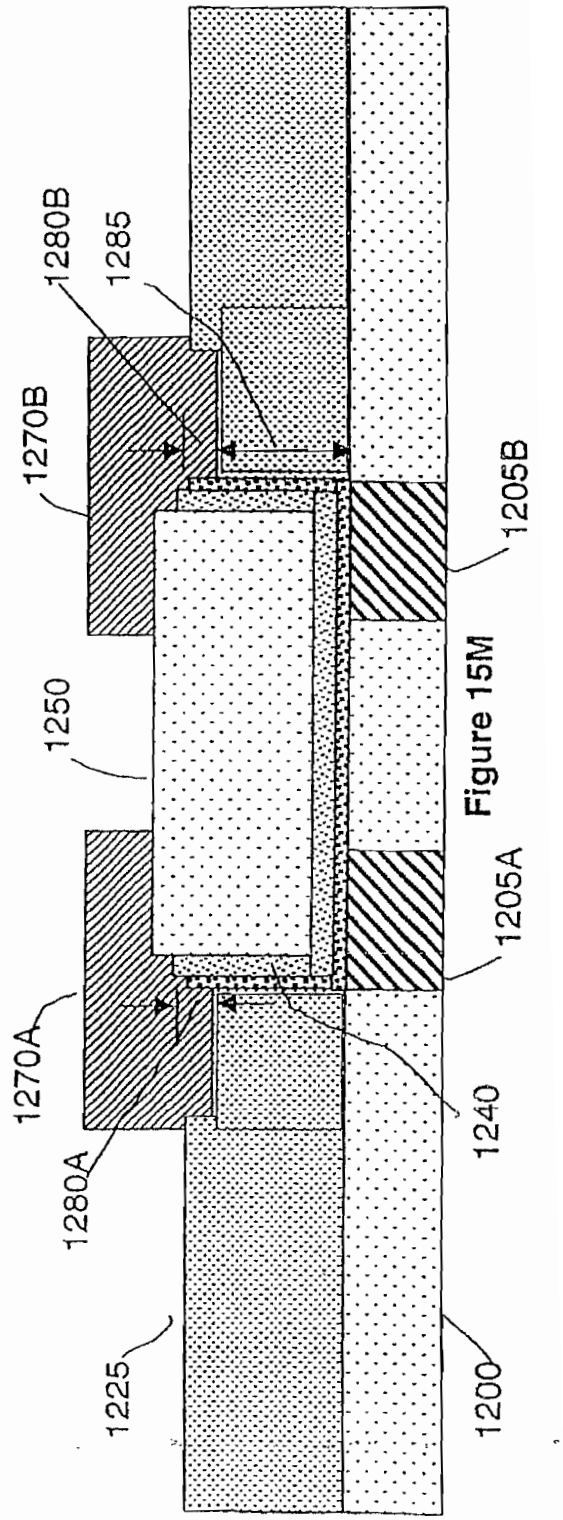


Figure 15M

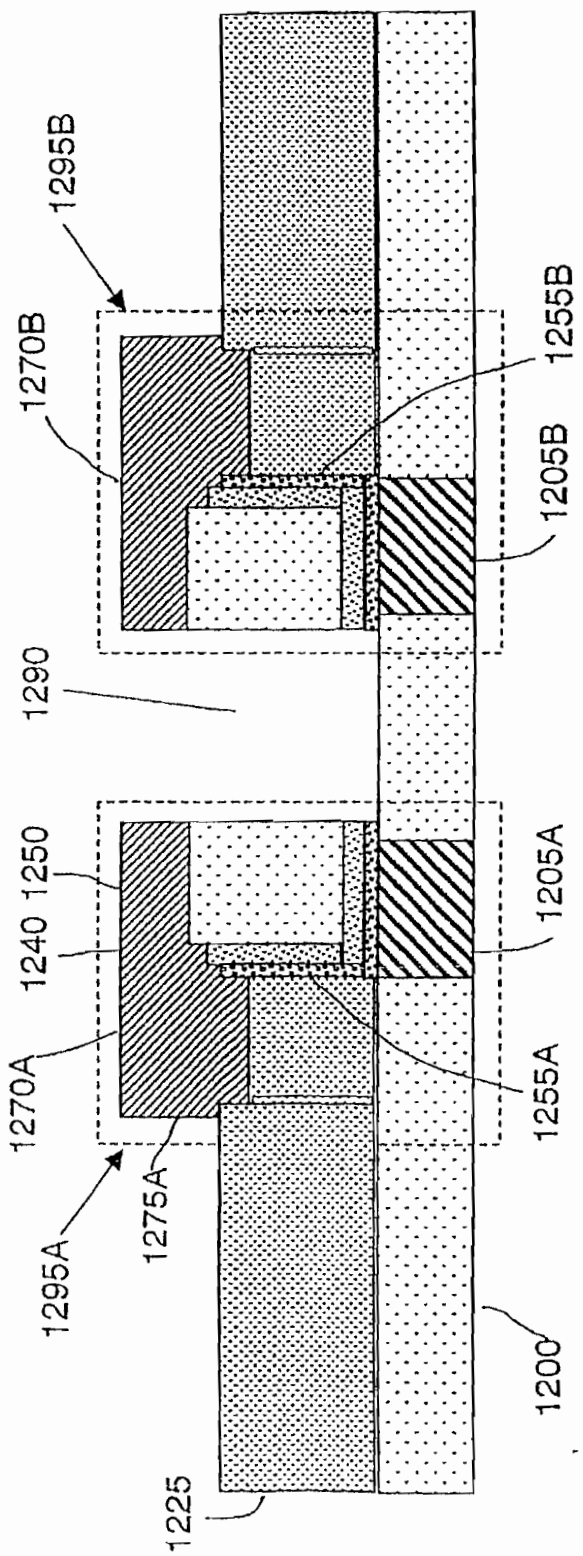

1295B
1270B
1255B
1205B
1290
1250
1240
1205A
1270A
1255A
1275A
1295A
1200
1225

Figure 15N

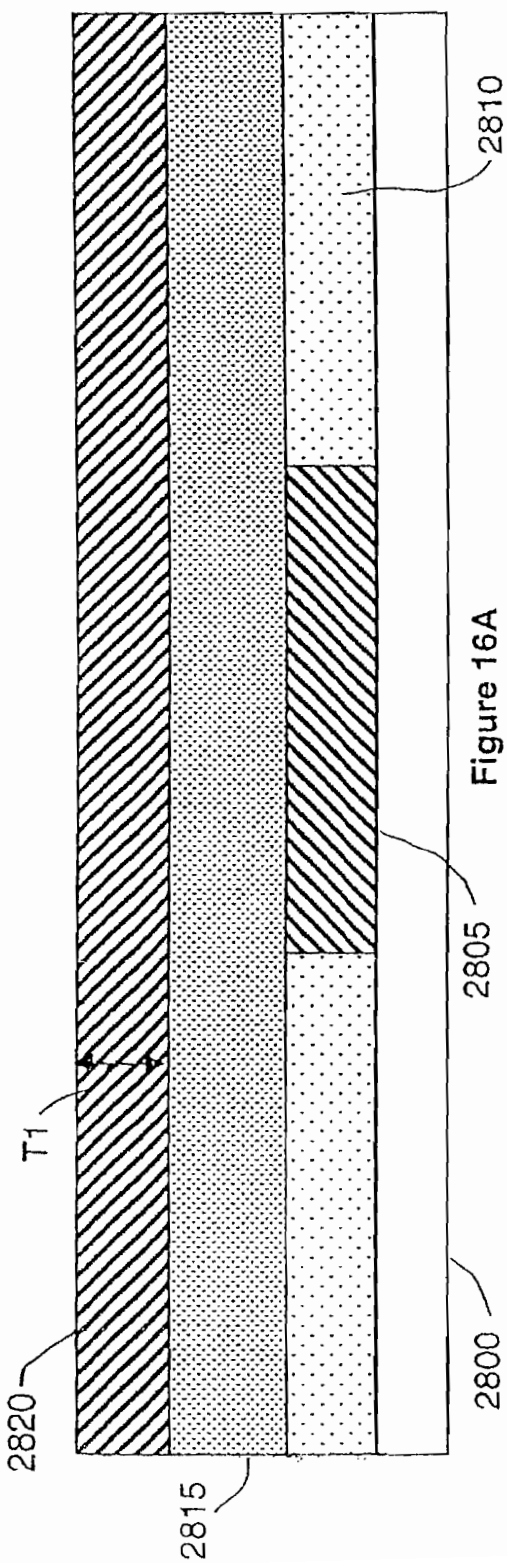


Figure 16A

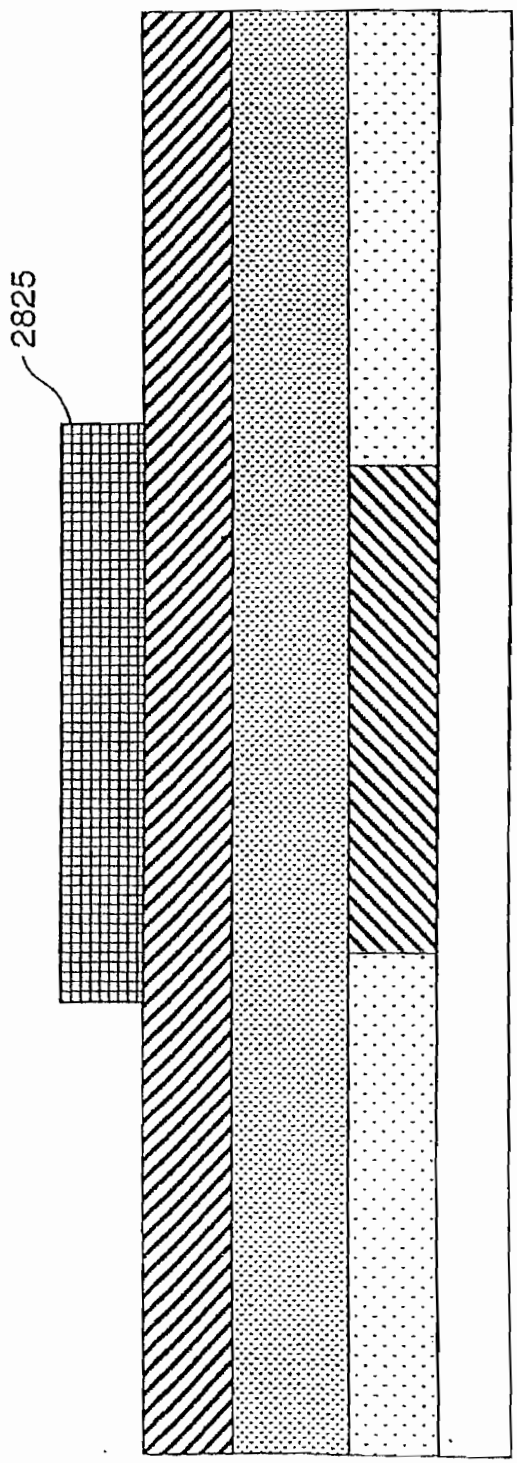


Figure 16B

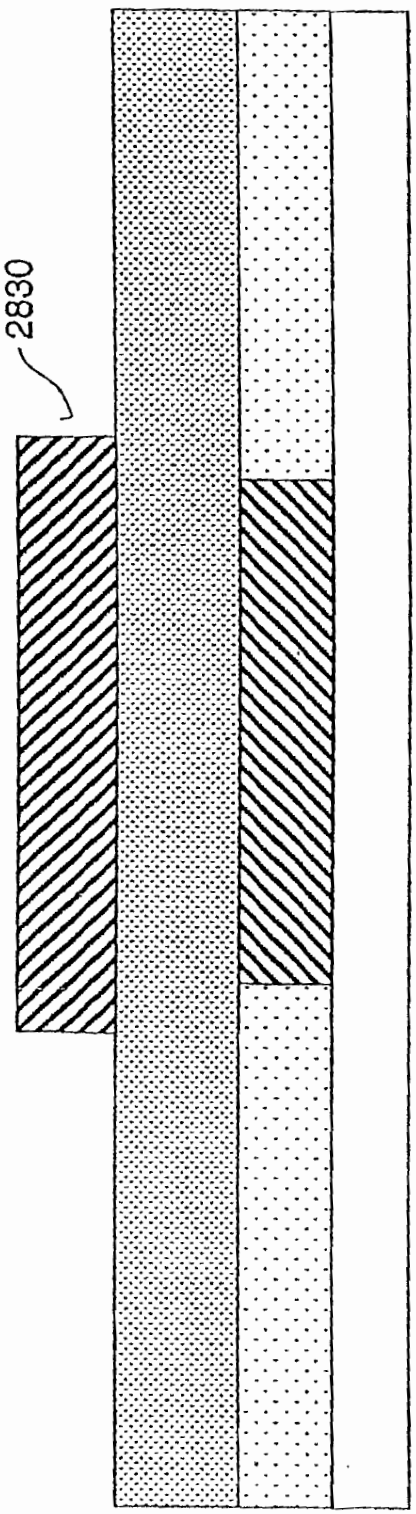


Figure 16C

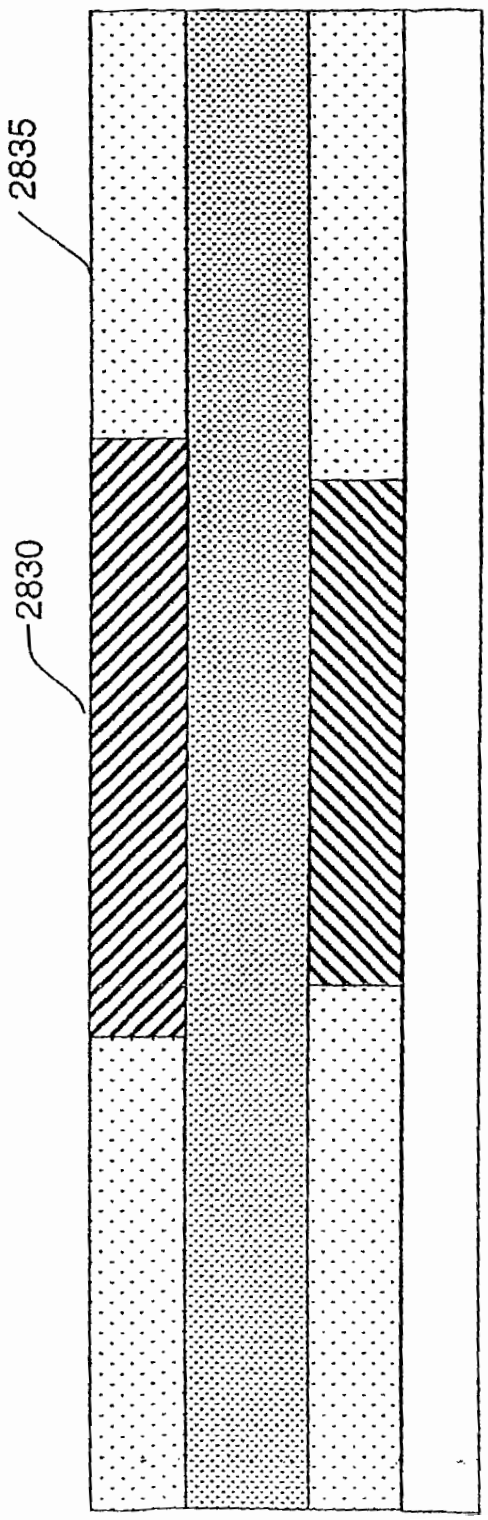


Figure 16D

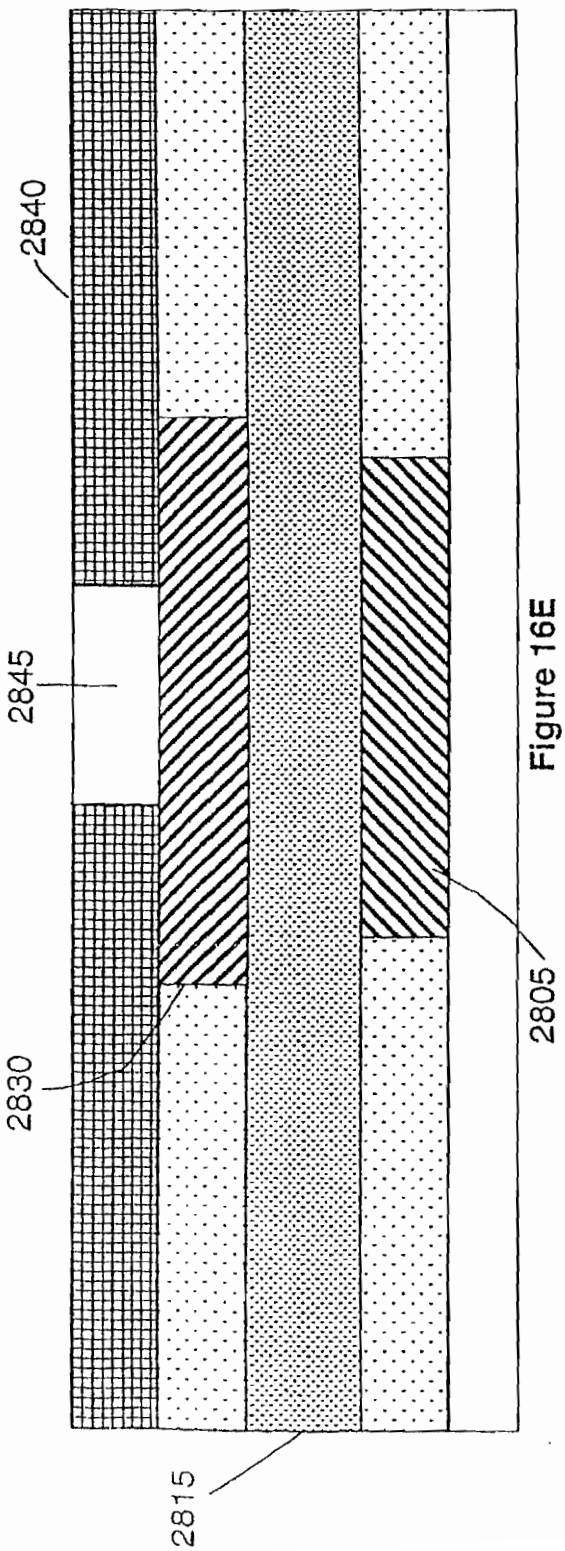


Figure 16E

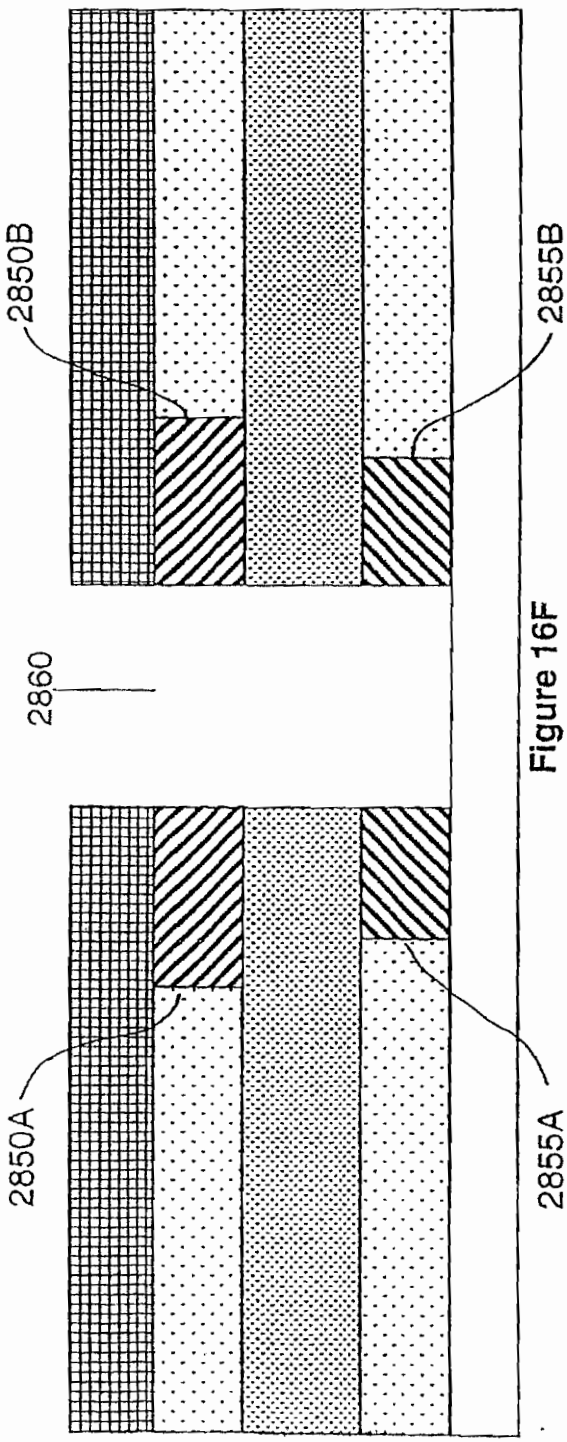


Figure 16F

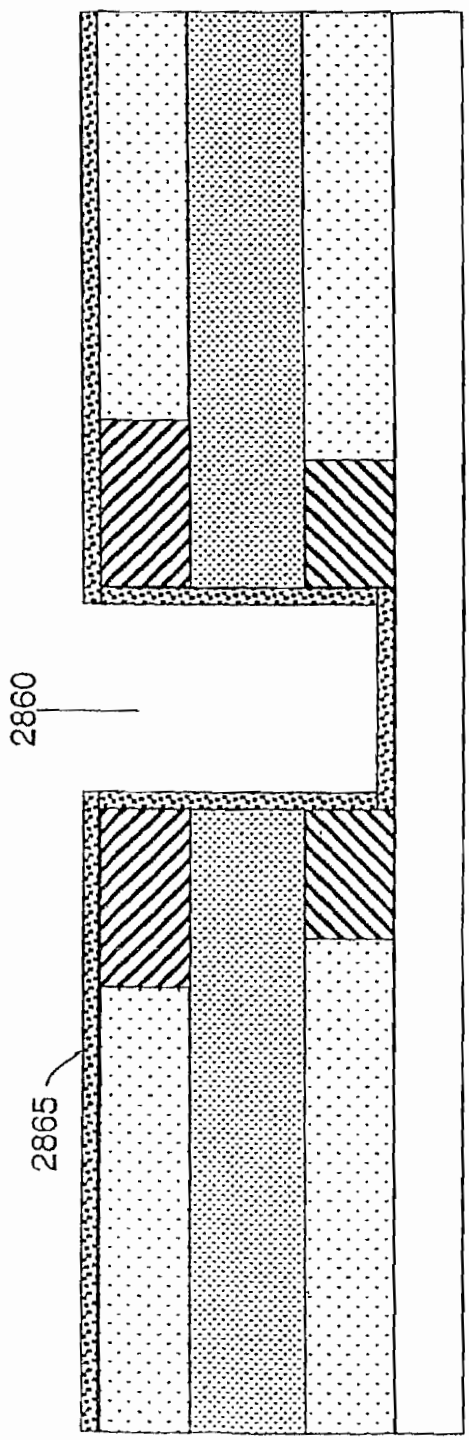


Figure 16G

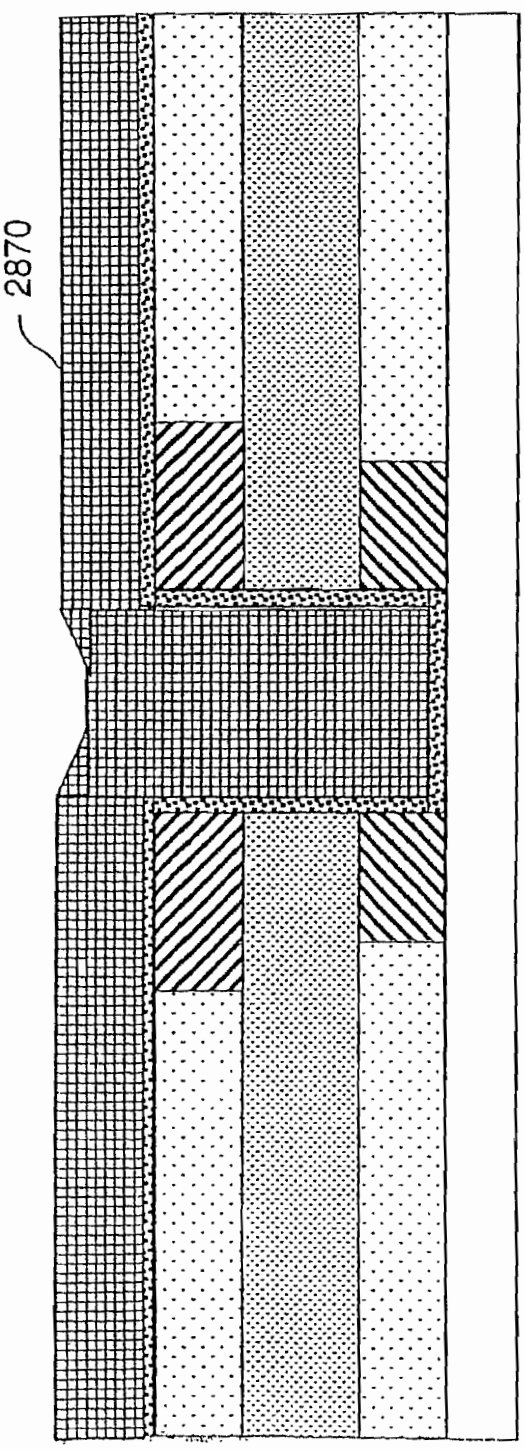


Figure 16H

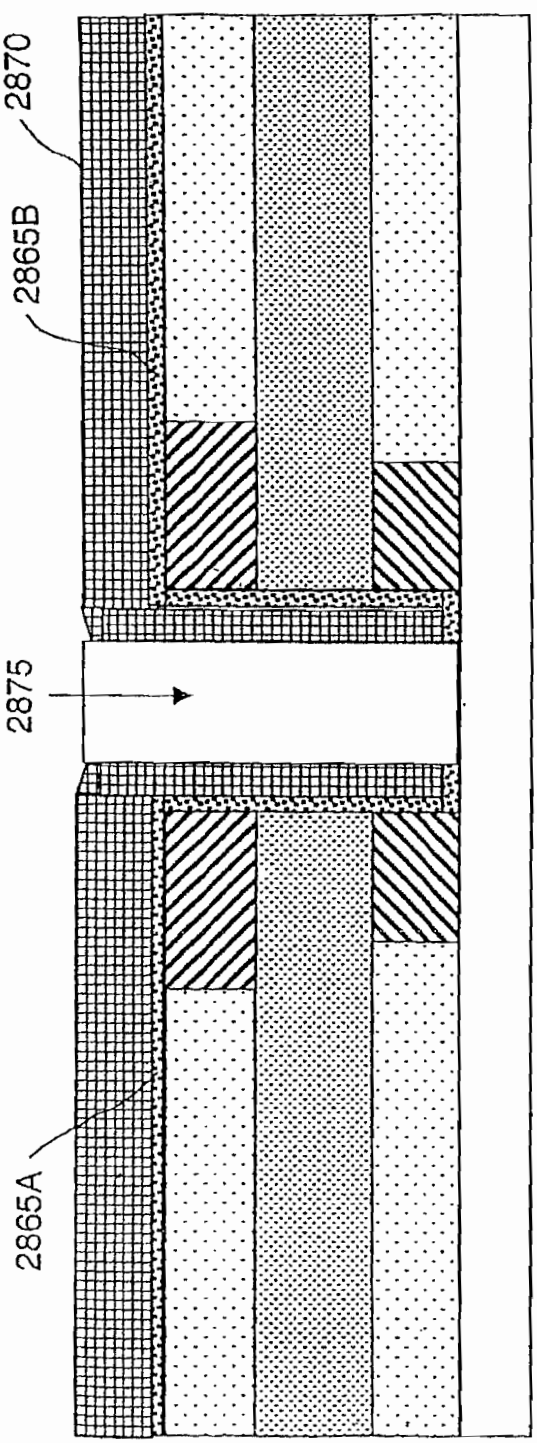


Figure 16I

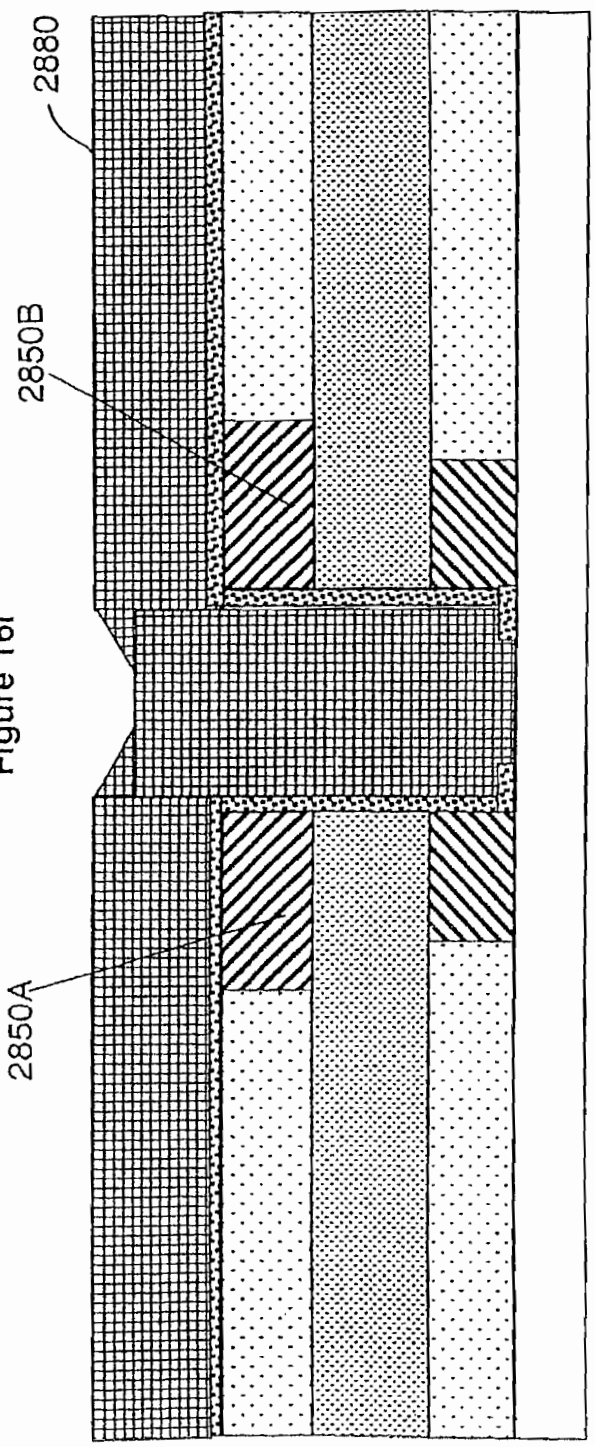


Figure 16J

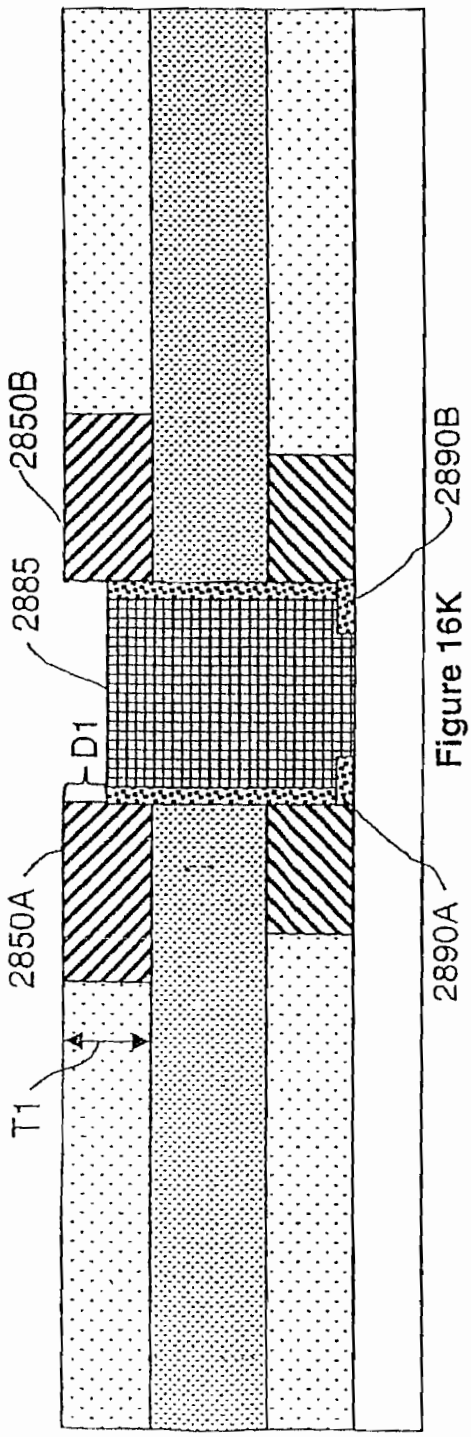


Figure 16K

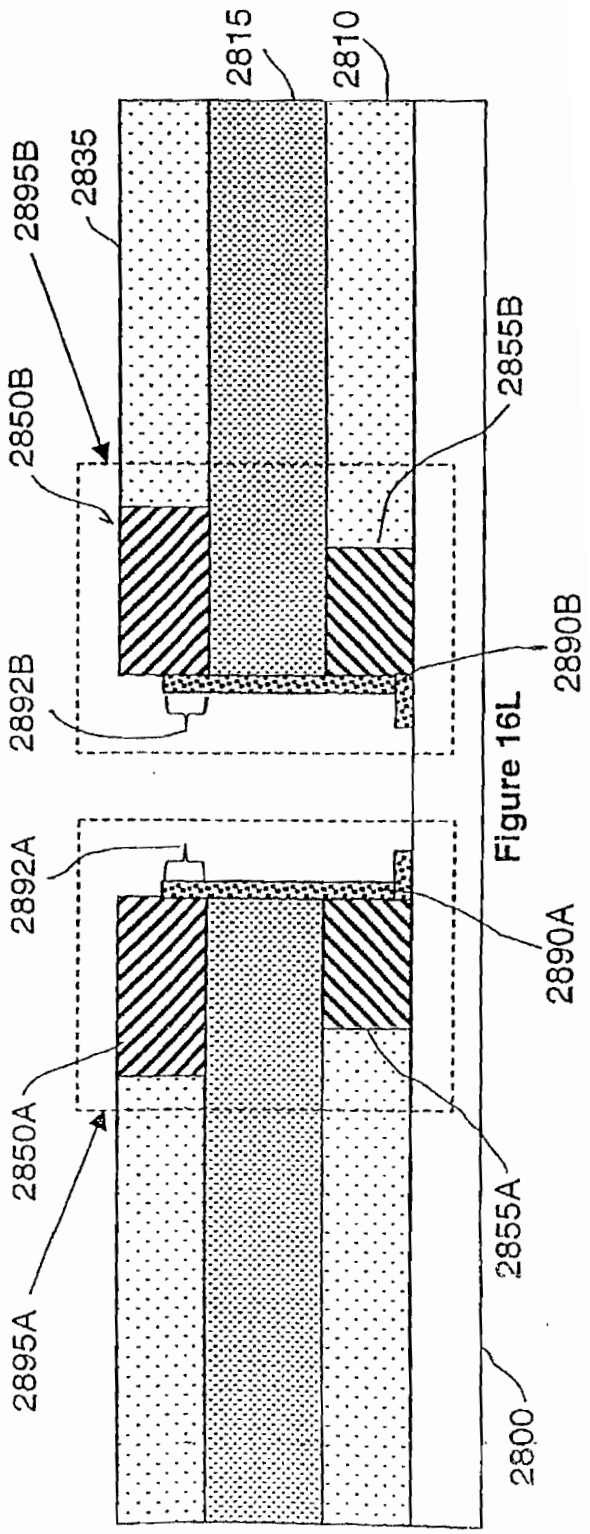


Figure 16L

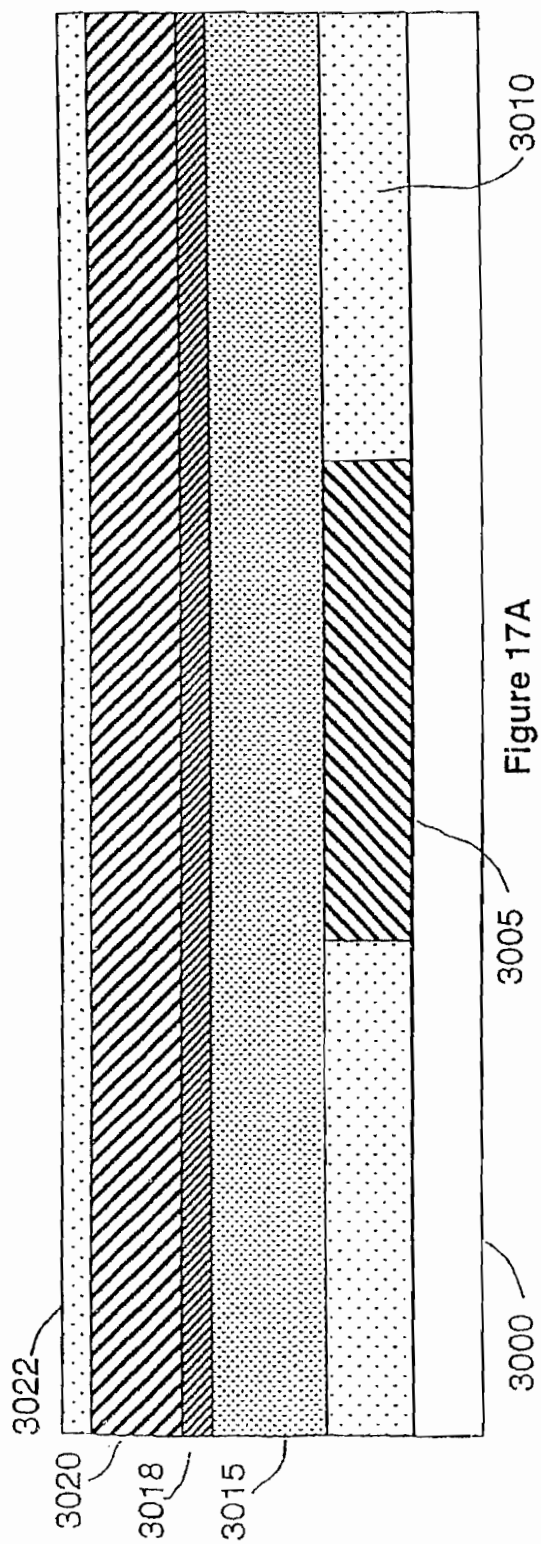


Figure 17A

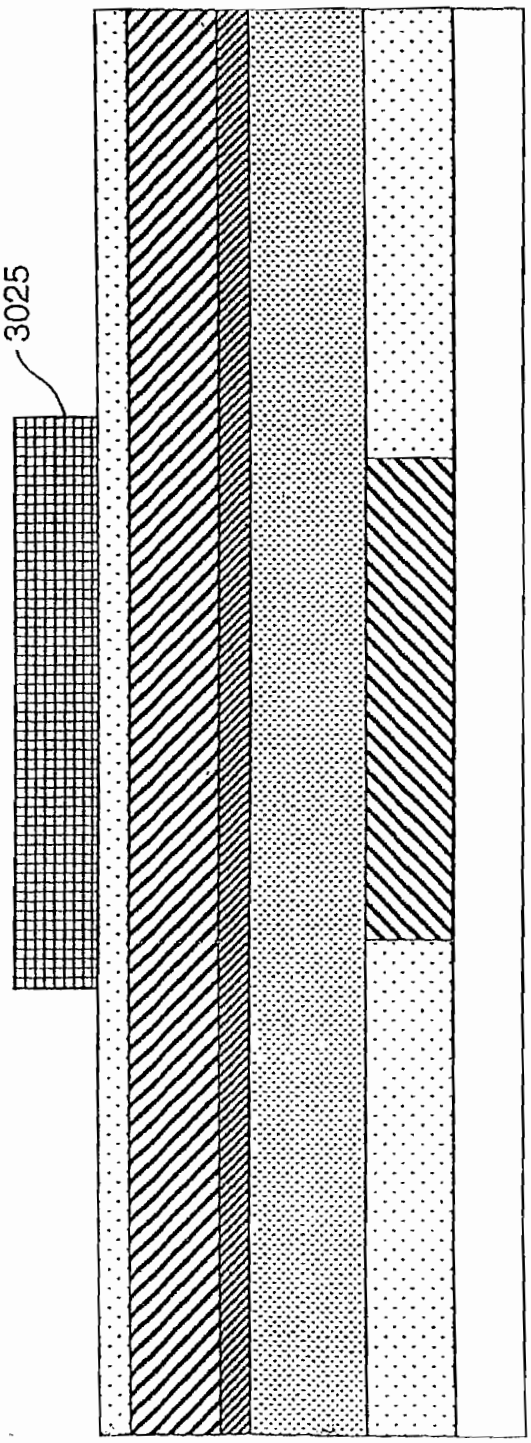


Figure 17B

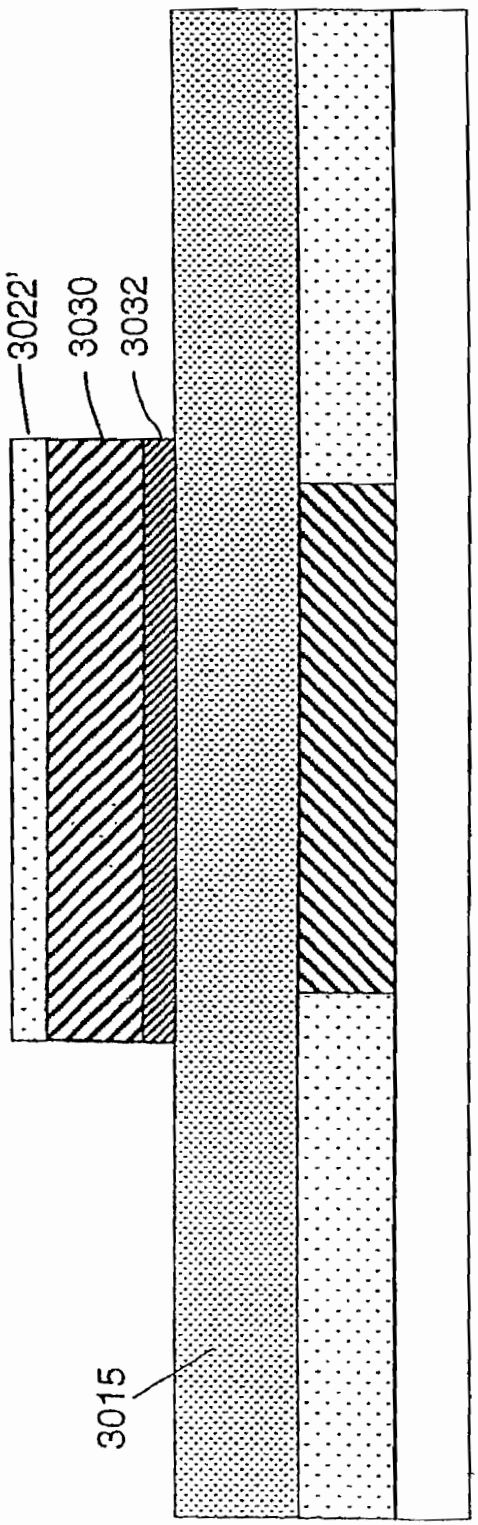


Figure 17C

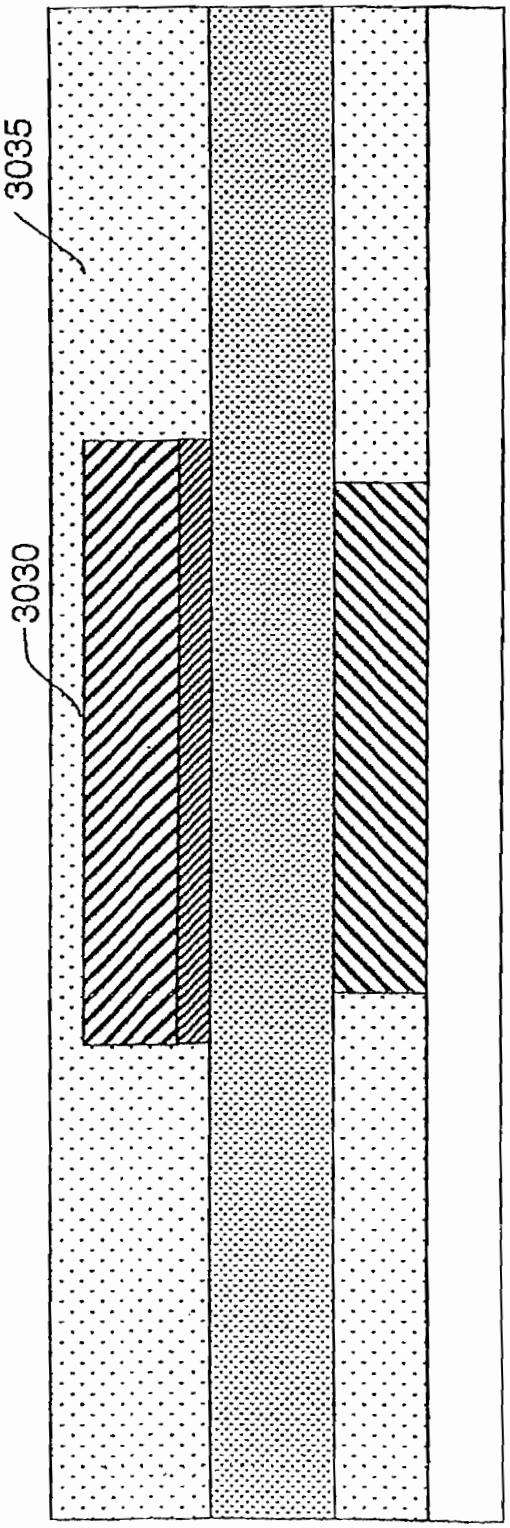


Figure 17D

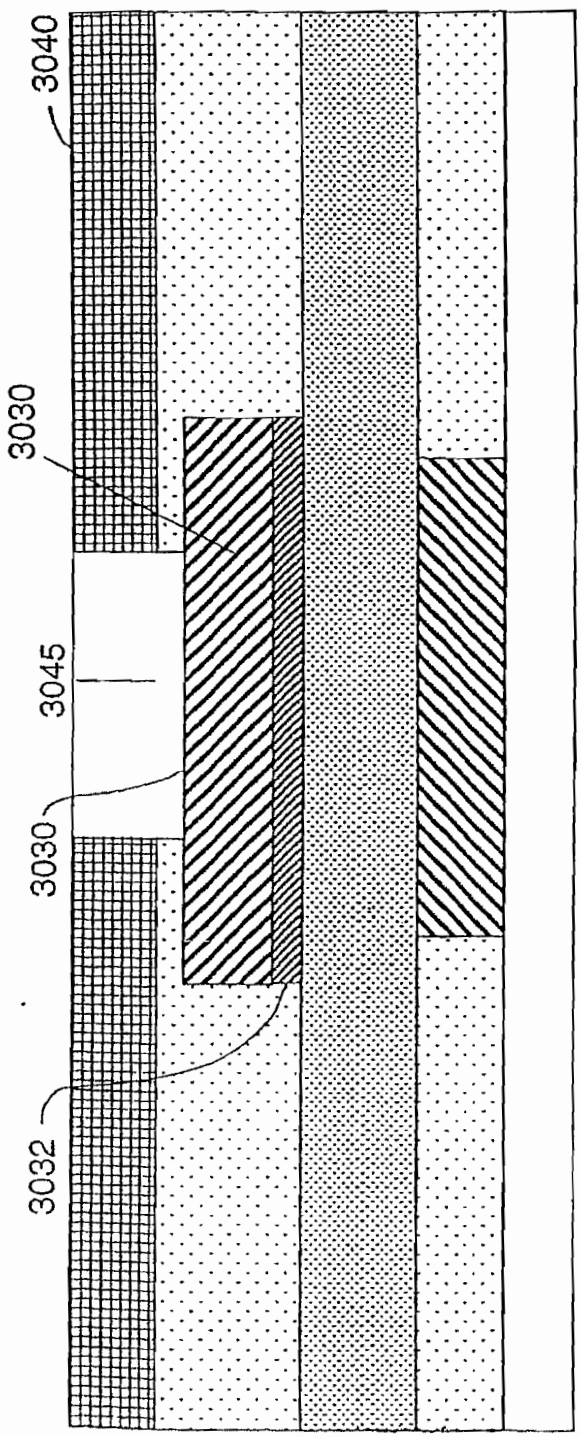


Figure 17E

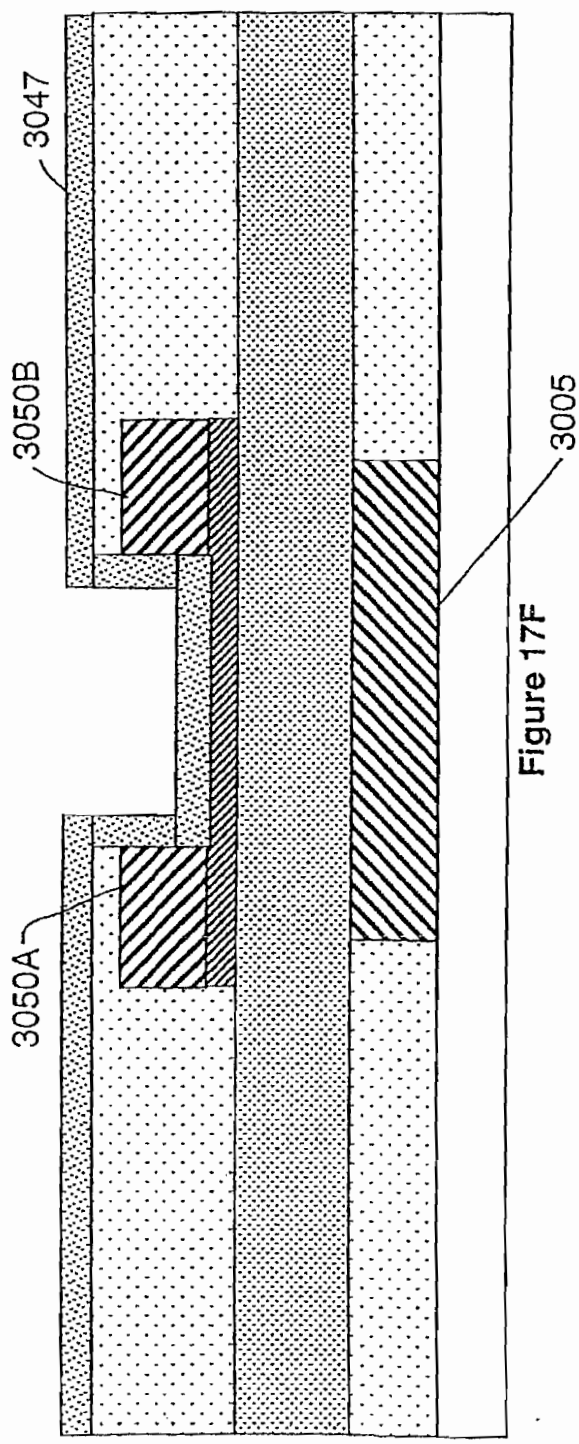


Figure 17F

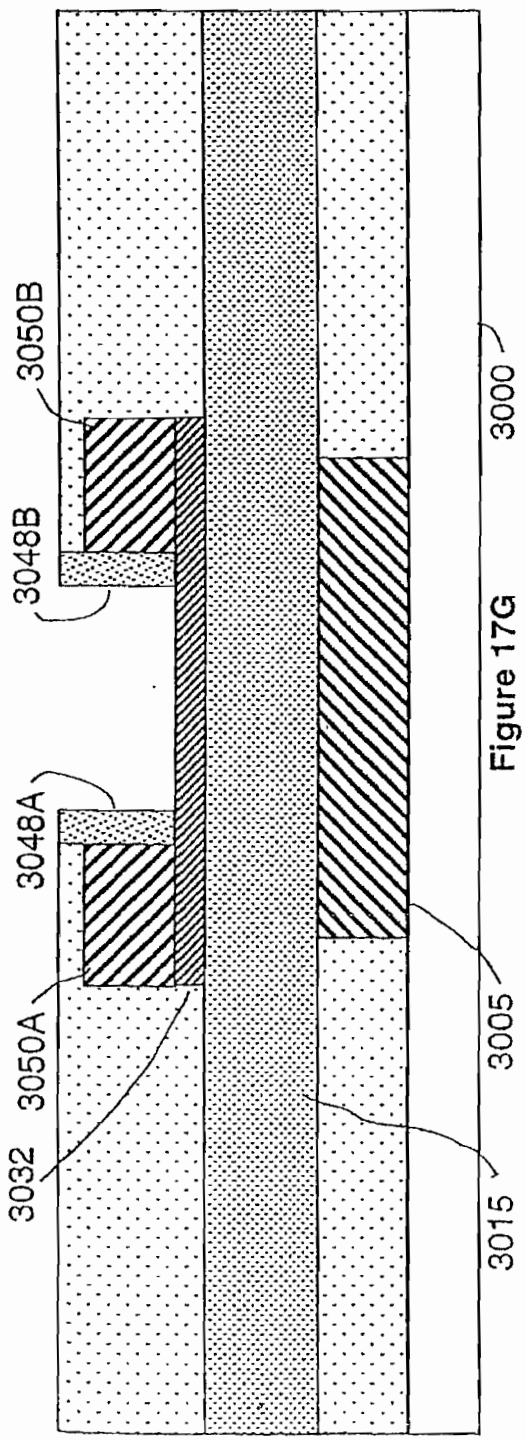


Figure 17G

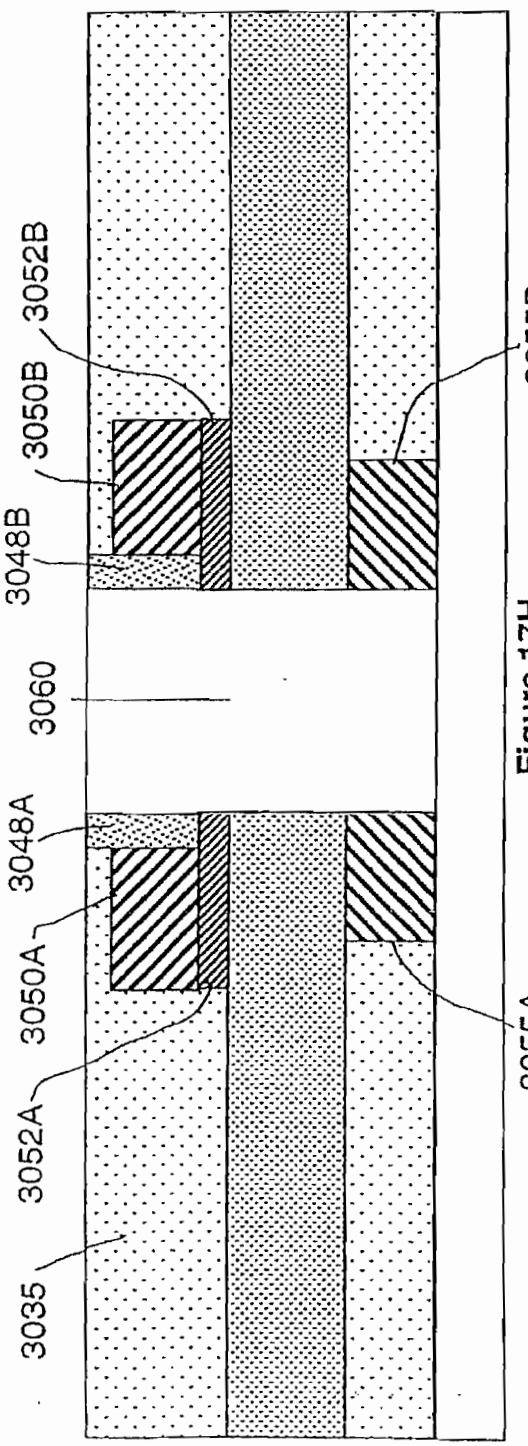


Figure 17H

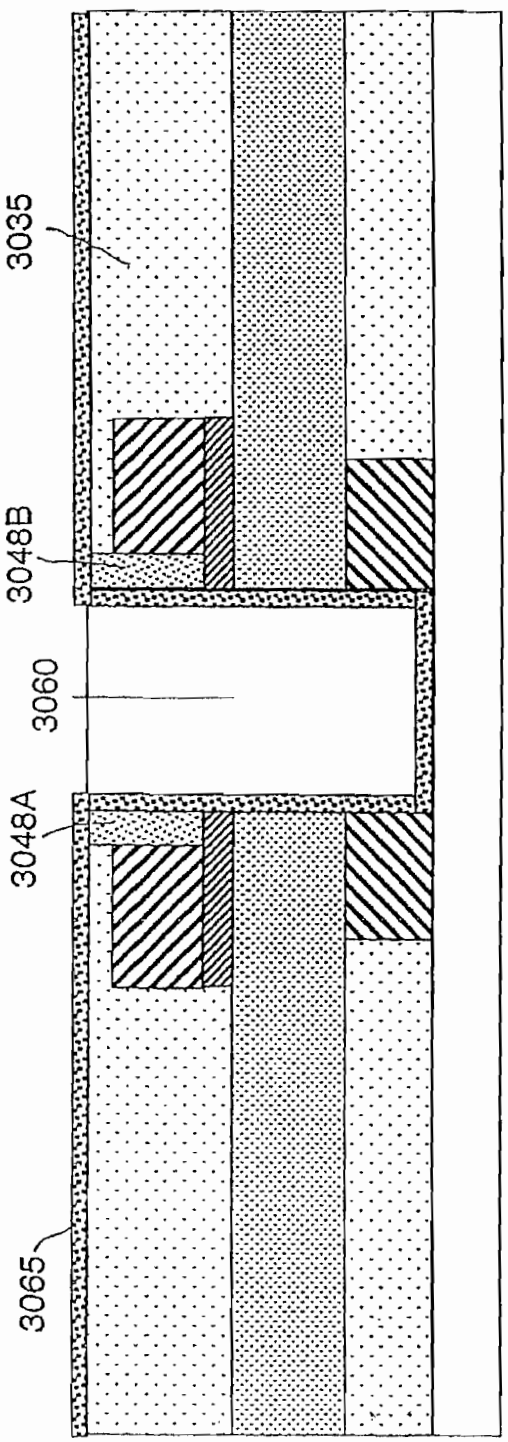


Figure 17I

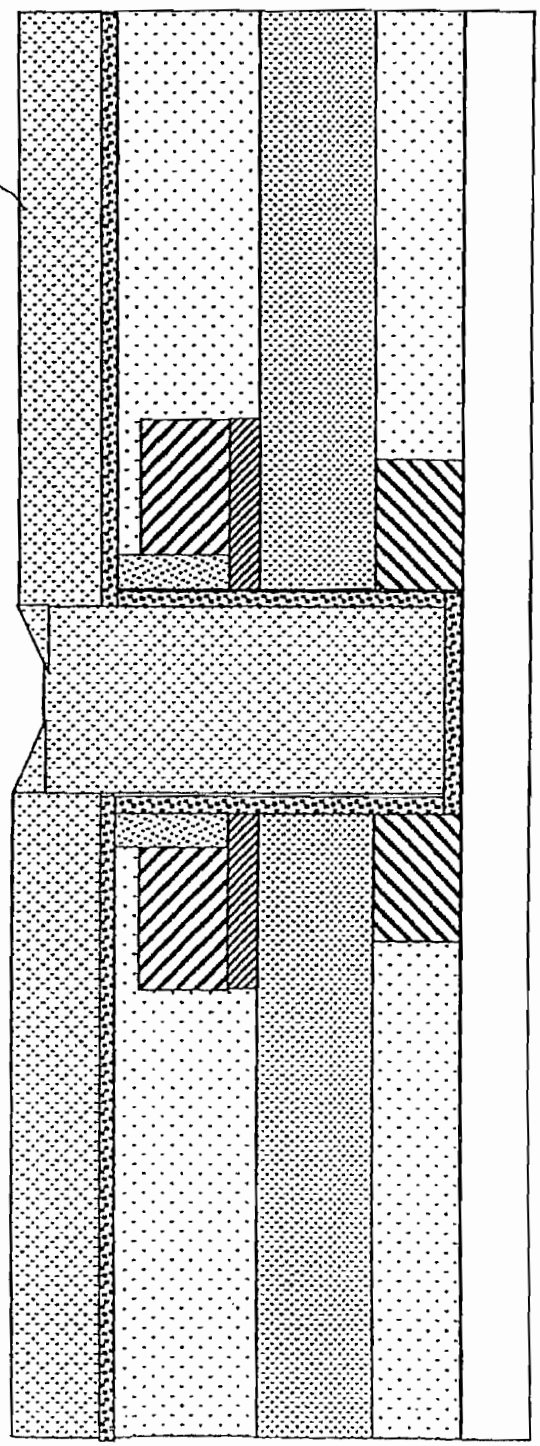


Figure 17J

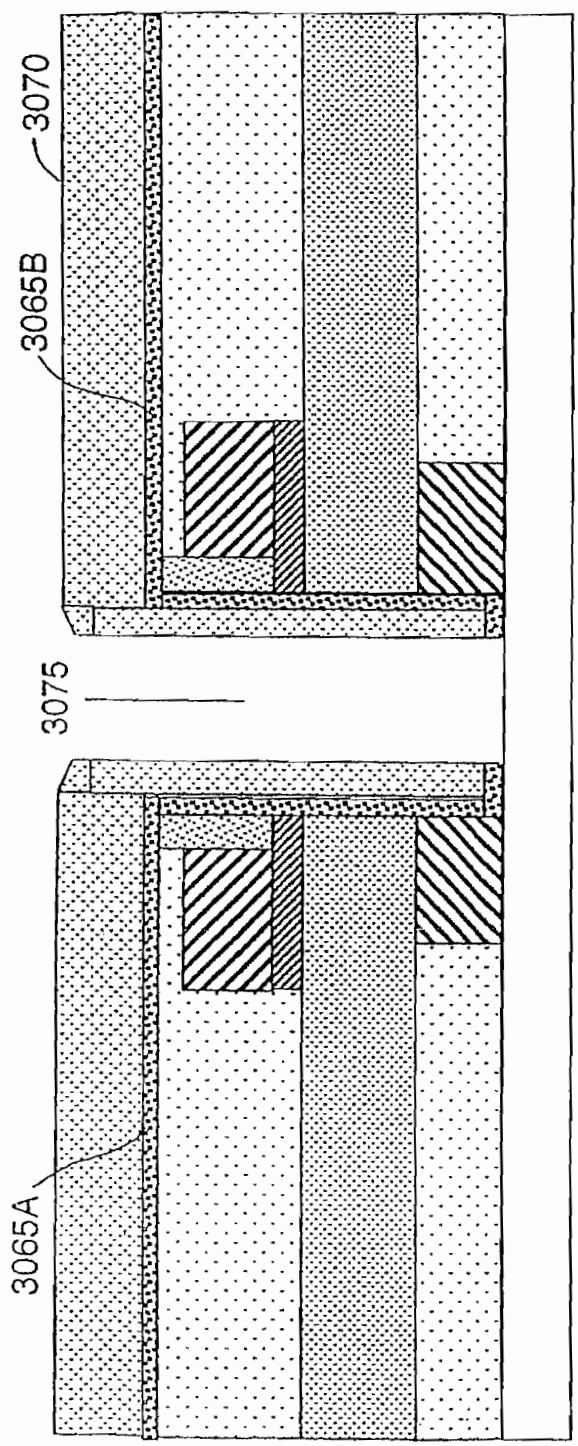


Figure 17K

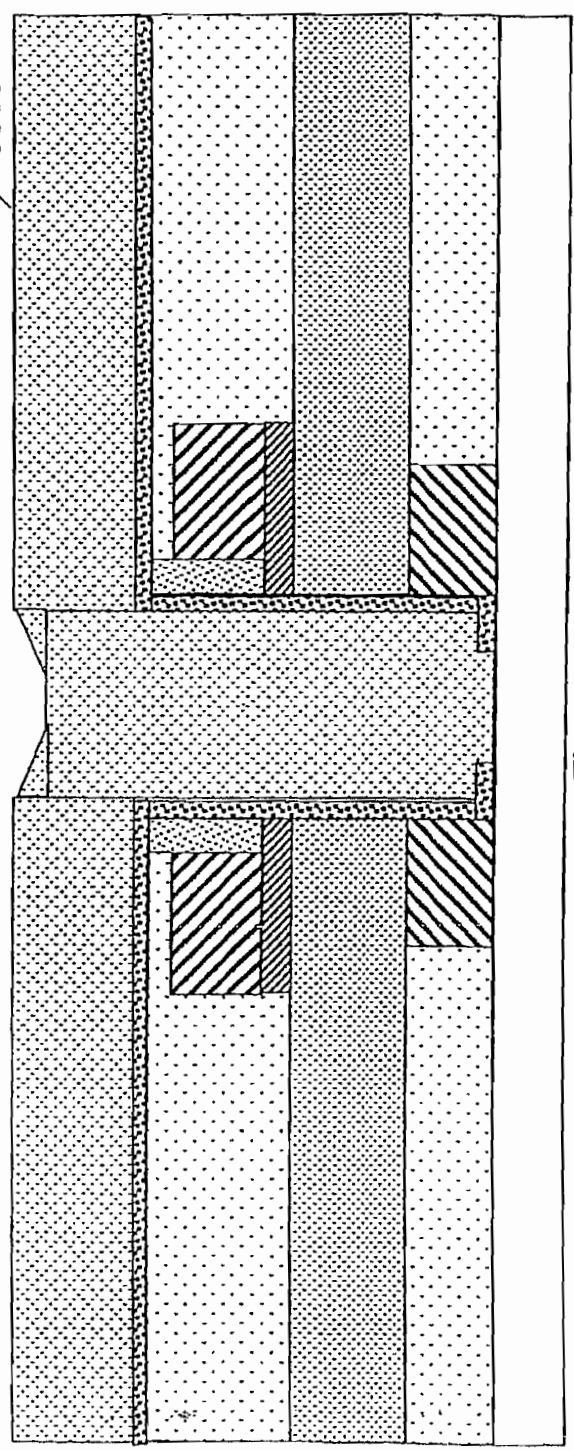


Figure 17L

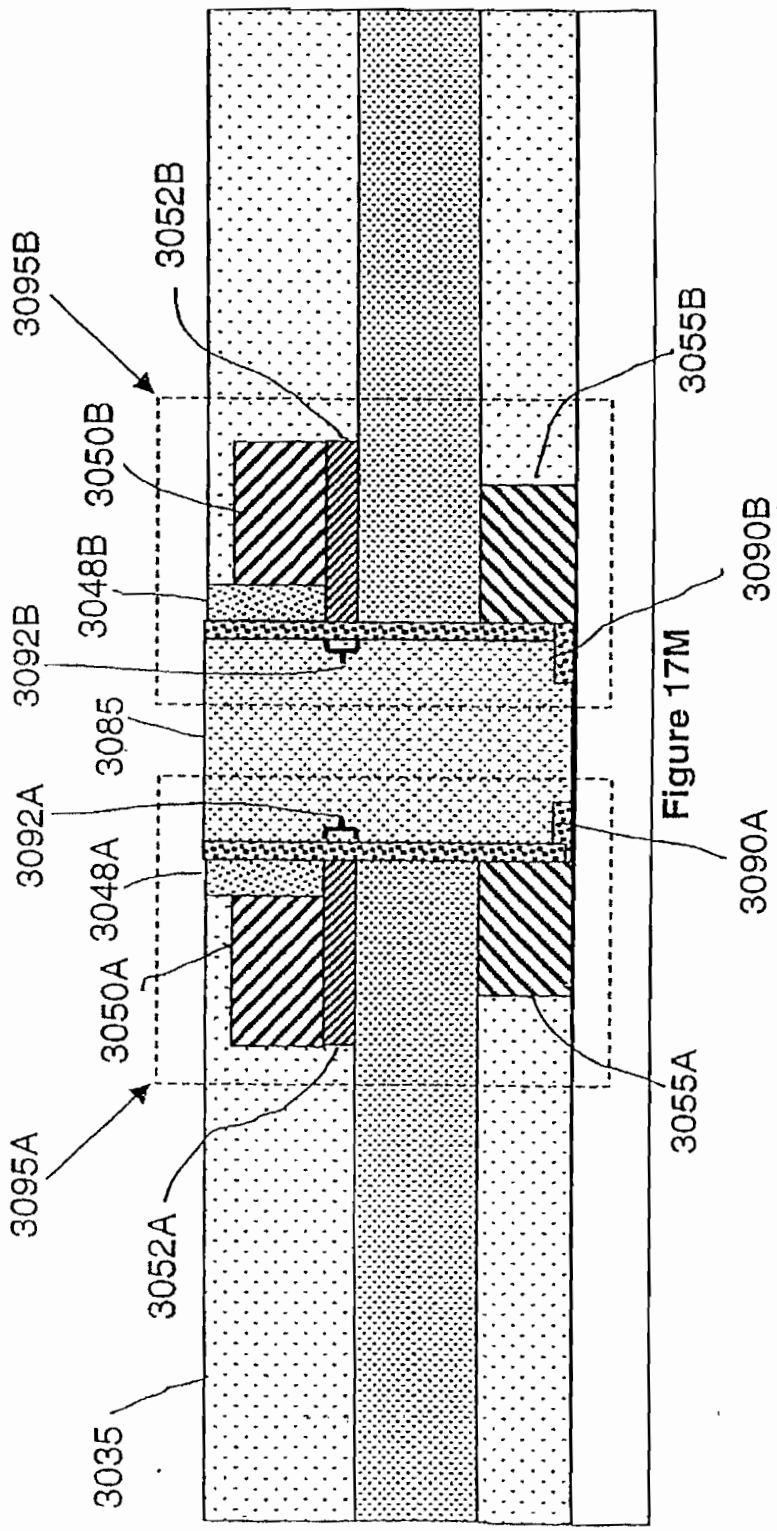

3095B
3052B
3055B
3050B
3048B
3090B
3092B
3085
3092A
3048A
3090A
3050A
3055A
3095A
3052A
3035

Figure 17M

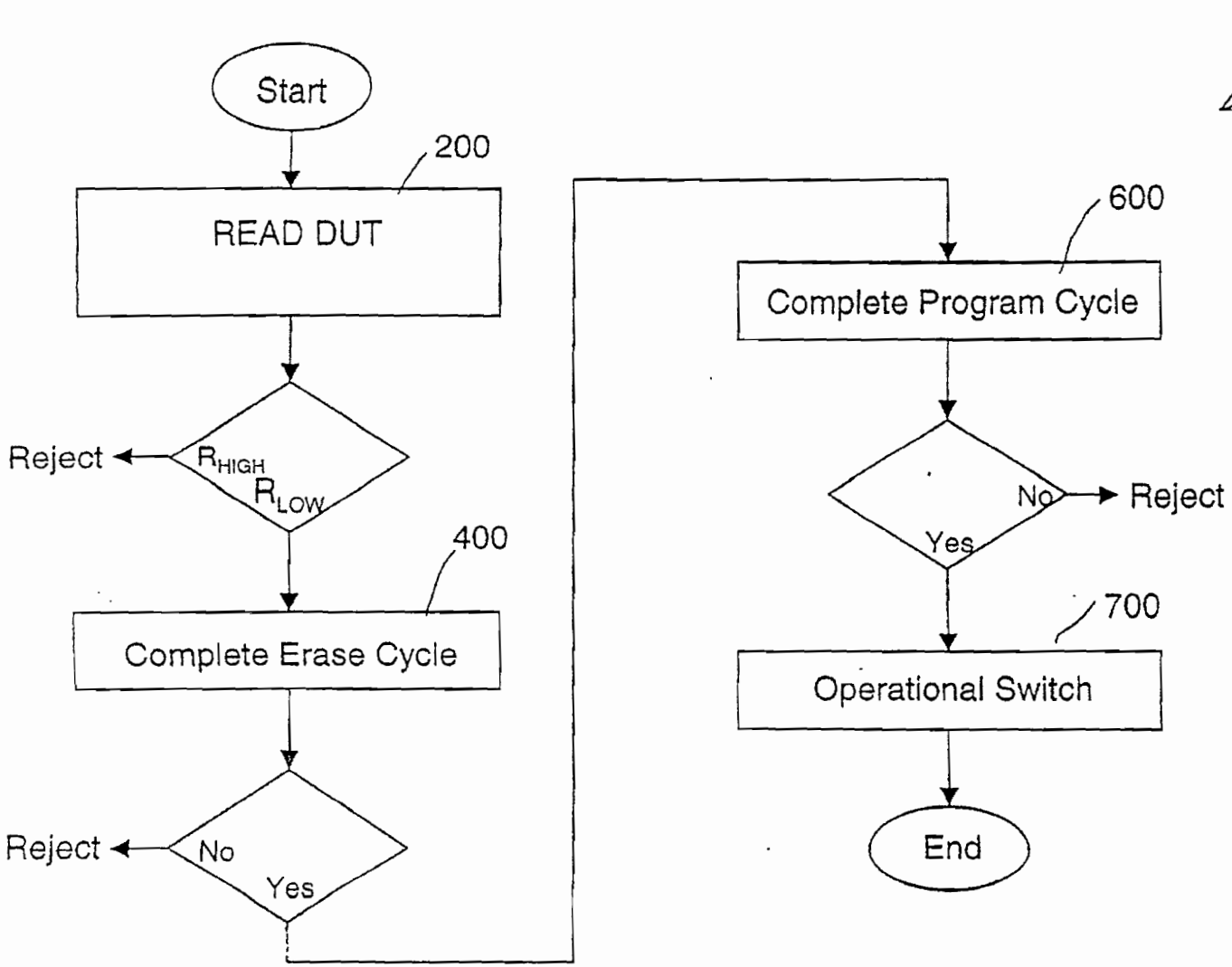

100
Start
200
READ DUT
Reject
R_{HIGH}
R_{LOW}
400
Complete Erase Cycle
Reject
No
Yes
600
Complete Program Cycle
No
Reject
Yes
700
Operational Switch
End

Figure 18

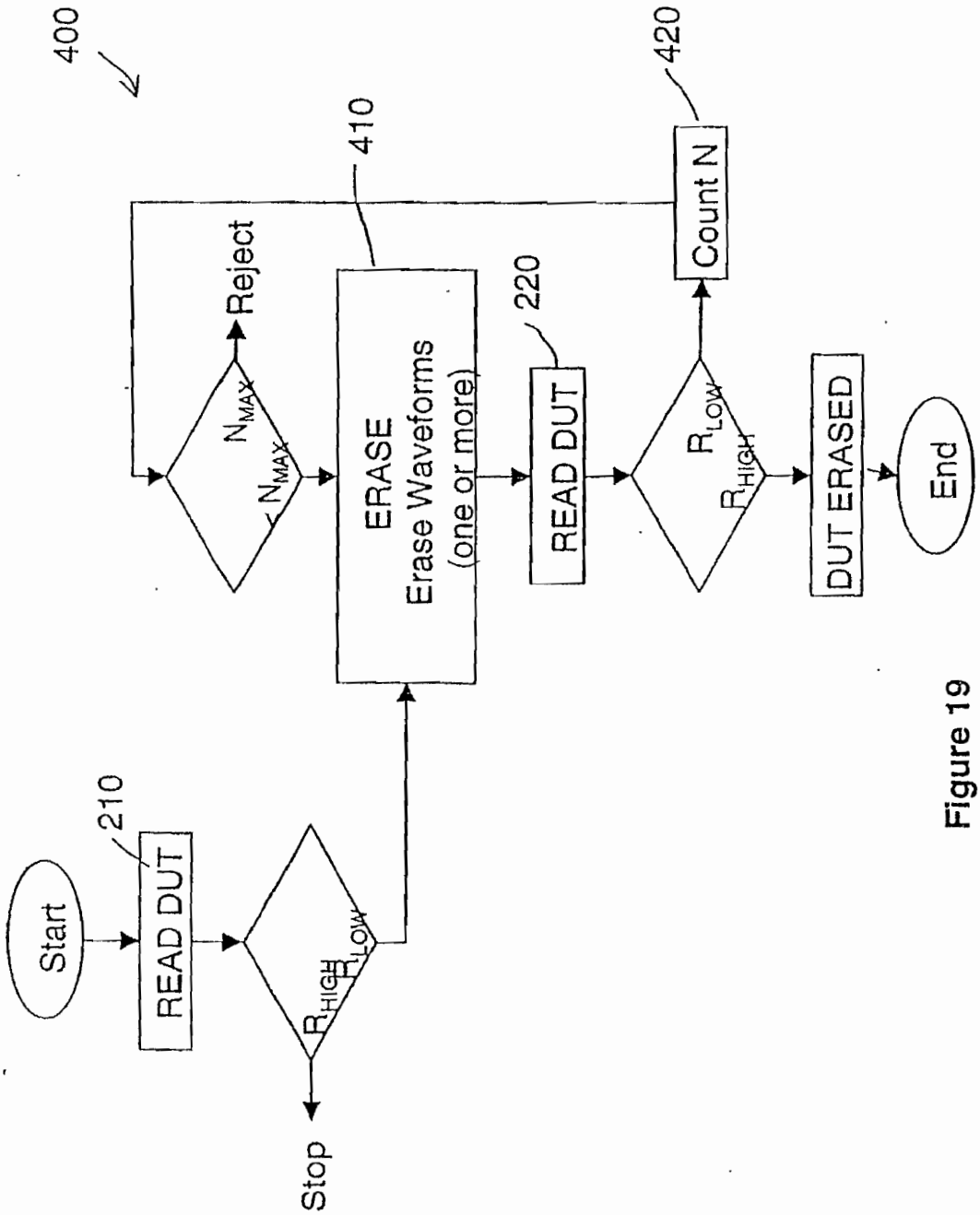

400
Start
210
READ DUT
R_{HIGH} R_{LOW}
Stop
410
ERASE
Erase Waveforms
(one or more)
220
READ DUT
R_{LOW} R_{HIGH}
420
Count N
N_{MAX} N_{MAX}
Reject
DUT ERASED
End

Figure 19

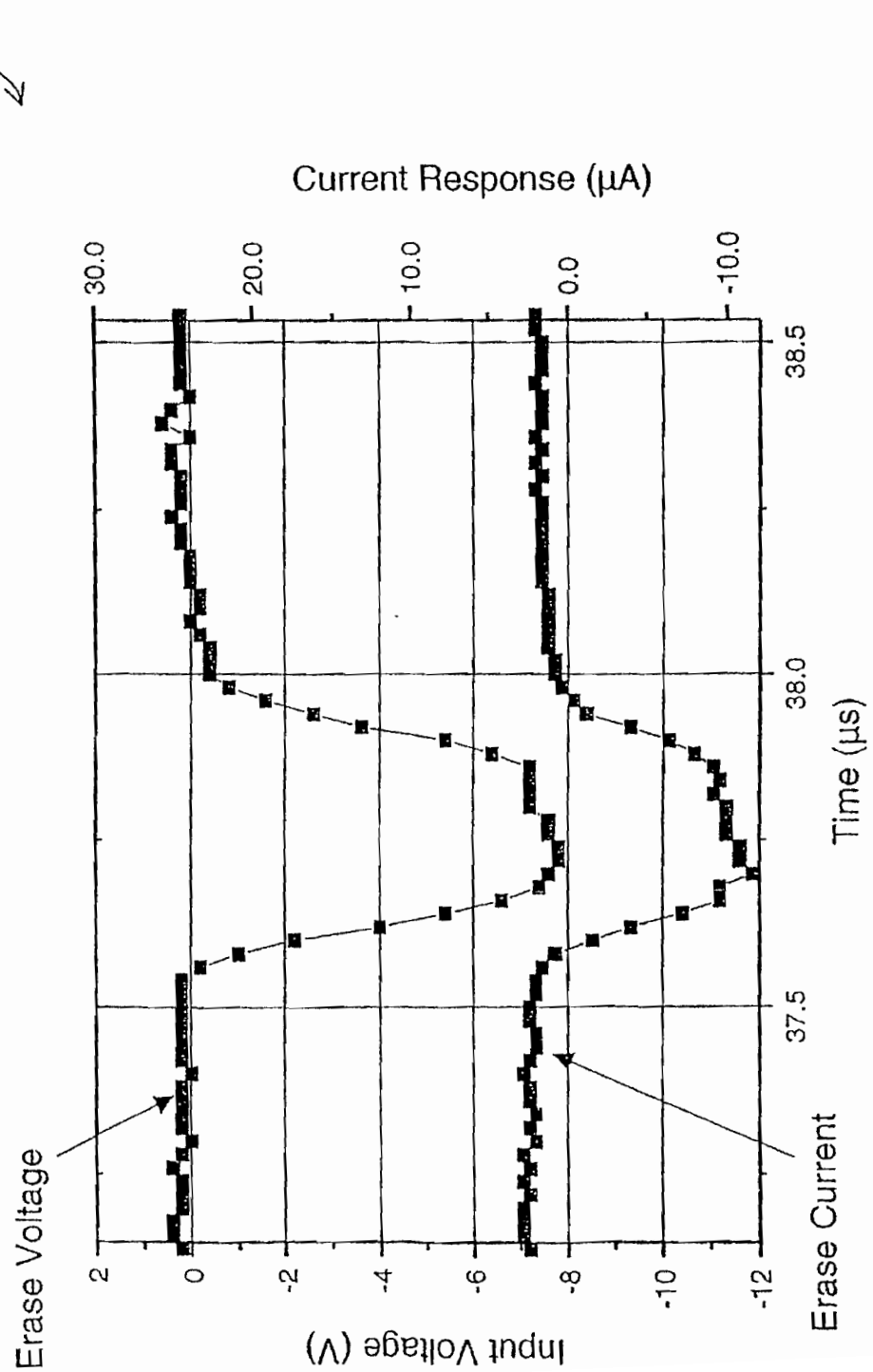

410
Current Response (µA)
30.0
20.0
10.0
0.0
-10.0
38.5
38.0
37.5
Time (µs)
Erase Voltage
Erase Current
2
0
-2
-4
-6
-8
-10
-12
Input Voltage (V)

Figure 20

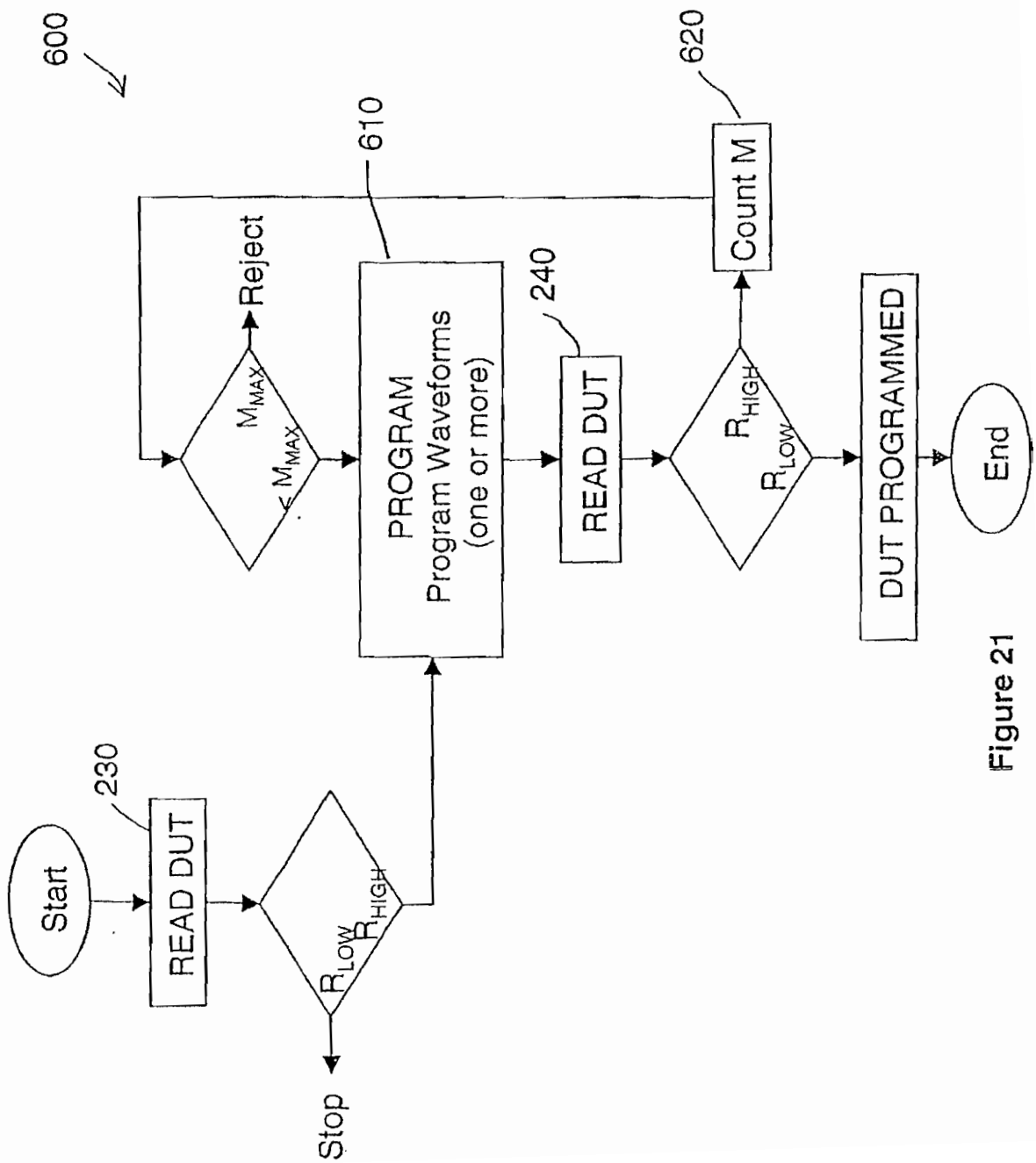

600
Start
230
READ DUT
R_{LOW} R_{HIGH}
Stop
610
PROGRAM
Program Waveforms
(one or more)
240
READ DUT
R_{HIGH} R_{LOW}
620
Count M
M_{MAX} M_{MAX}
Reject
DUT PROGRAMMED
End

Figure 21

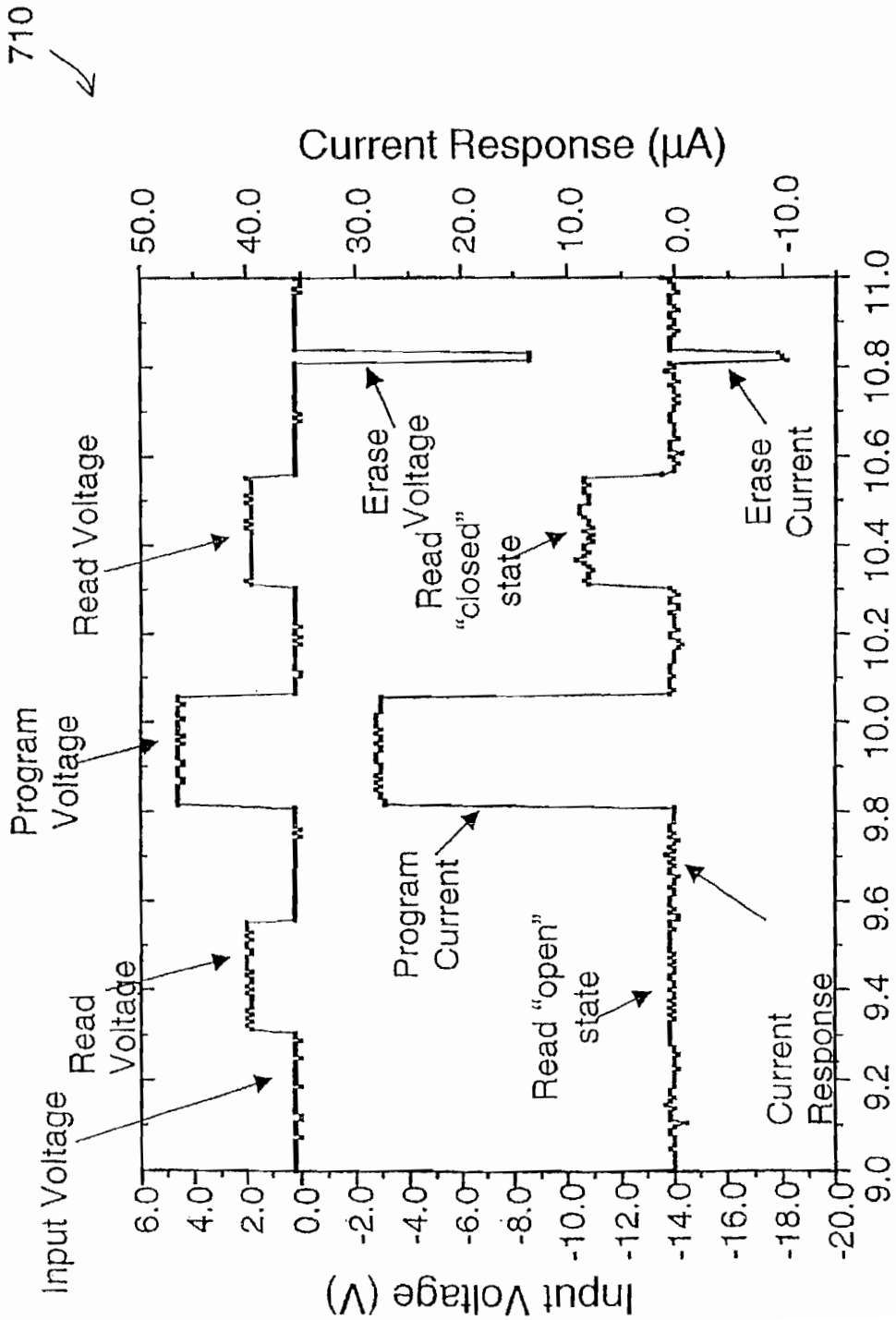

710
Current Response (μA)
50.0
40.0
30.0
20.0
10.0
0.0
-10.0
Read Voltage
Erase
Read Voltage
"closed"
state
Erase
Current
Program
Voltage
Program
Current
Read
Voltage
Read "open"
state
Current
Response
Input Voltage
6.0
4.0
2.0
0.0
-2.0
-4.0
-6.0
-8.0
-10.0
-12.0
-14.0
-16.0
-18.0
-20.0
Input Voltage (V)
9.0
9.2
9.4
9.6
9.8
10.0
10.2
10.4
10.6
10.8
11.0
Time (ms)

Figure 22A

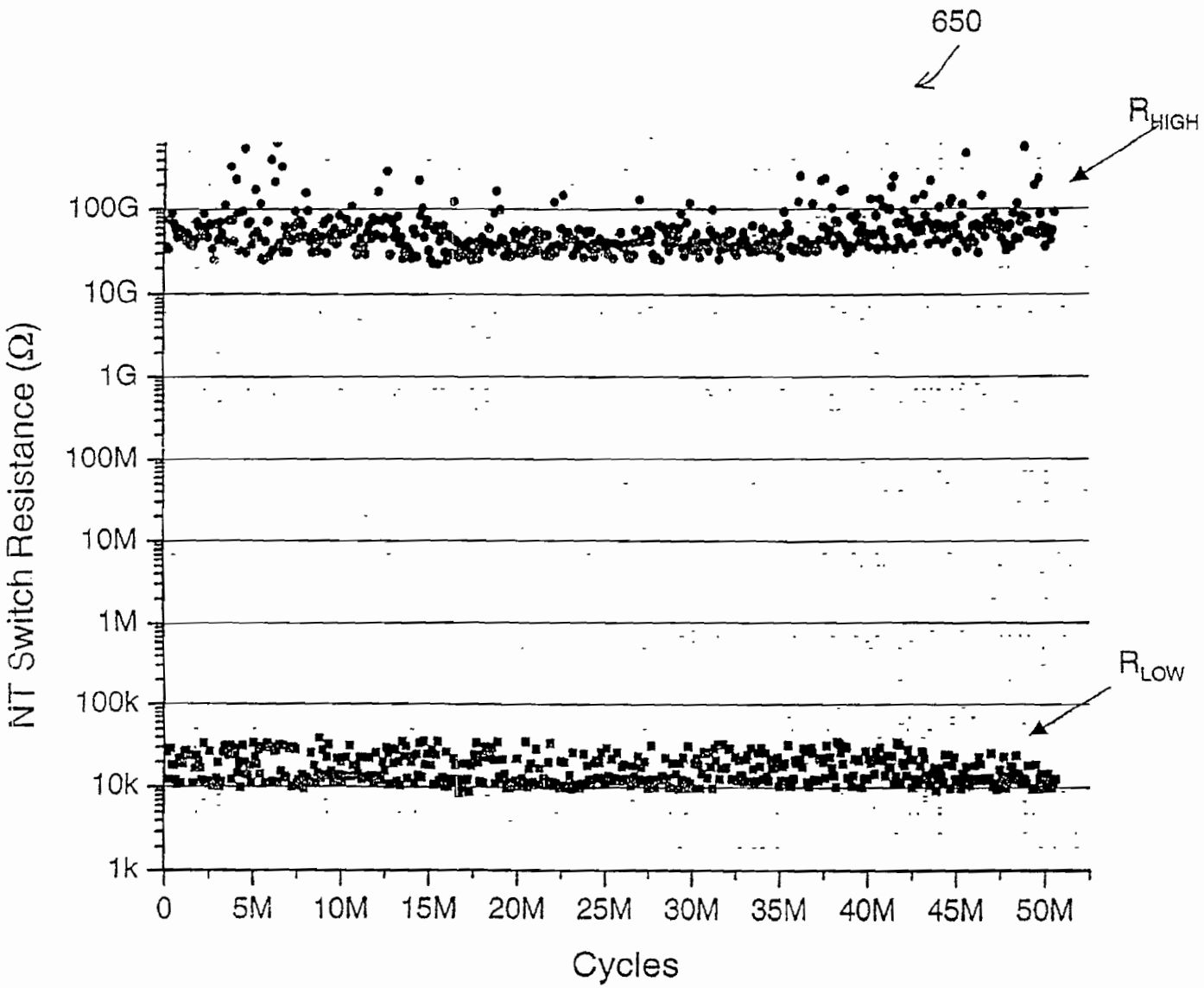

650
R_{HIGH}
R_{LOW}
NT Switch Resistance (Ω)
100G
10G
1G
100M
10M
1M
100k
10k
1k
0
5M
10M
15M
20M
25M
30M
35M
40M
45M
50M
Cycles

Figure 22B

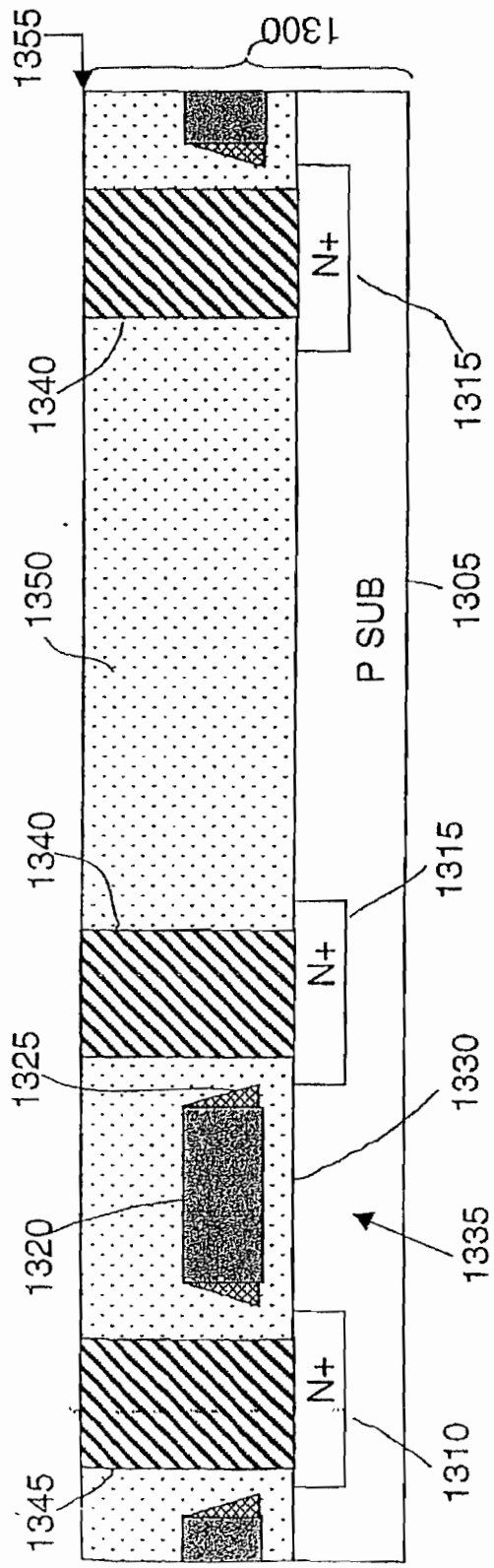

1355
1300
N+
1340
1315
1350
P SUB
1305
1340
1315
N+
1325
1330
1320
1335
N+
1310
1345

Figure 23A

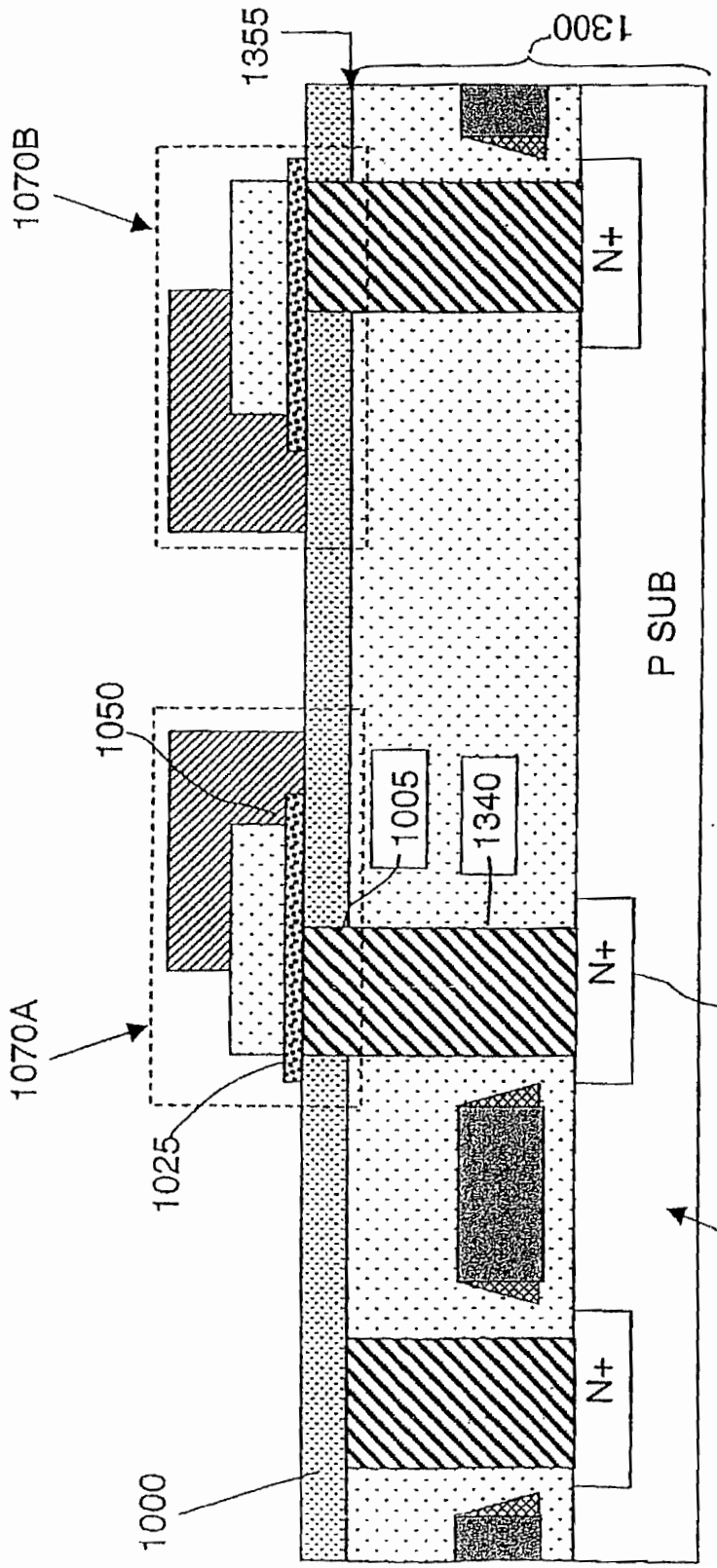

1355
1300
1070B
N+
P SUB
1050
1005
1340
1070A
N+
1315
1025
1335
N+
1000

Figure 23B

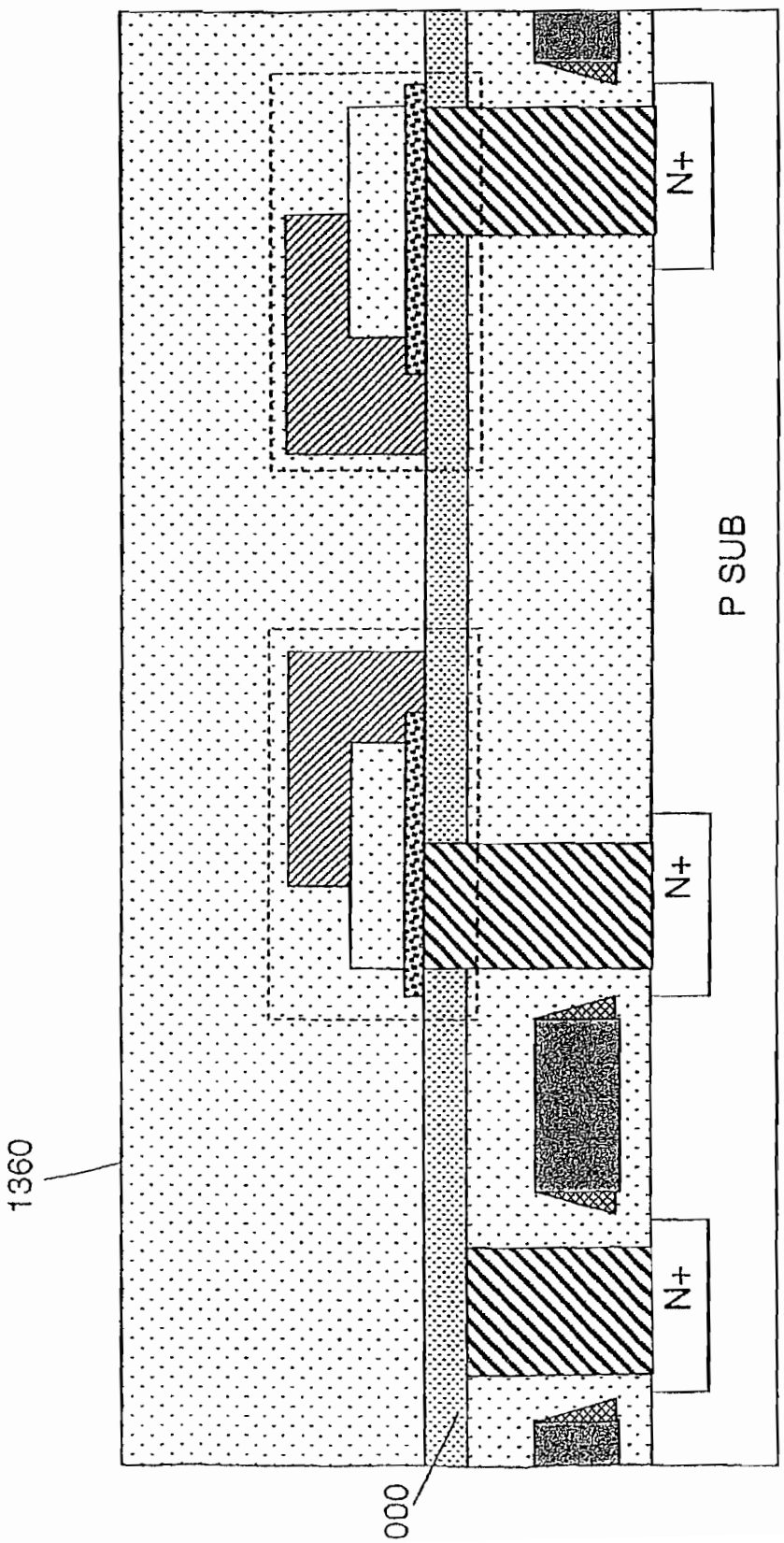


Figure 23C

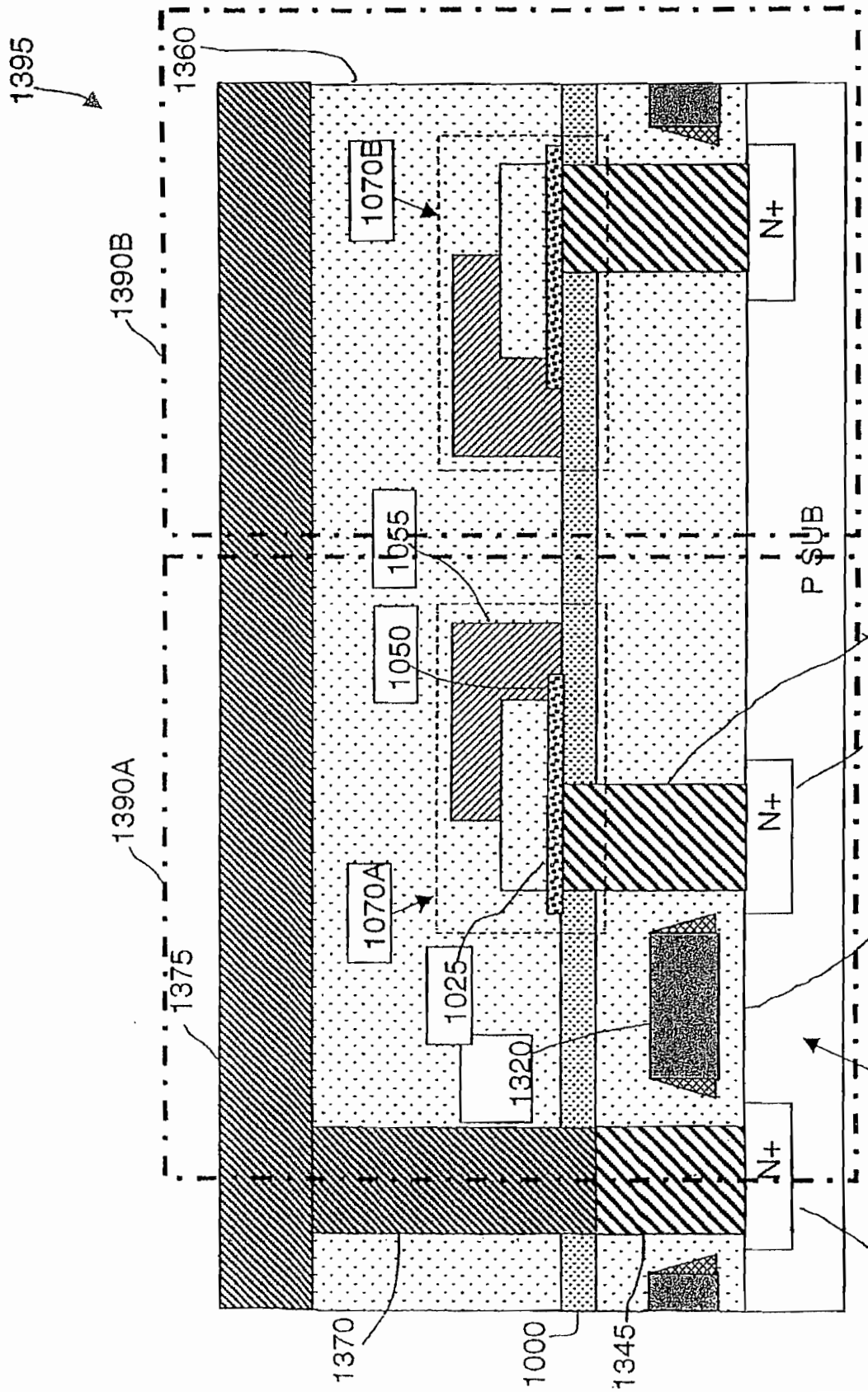

1395
1360
1390B
1070B
1055
1050
1025
1070A
1320
1375
1390A
1370
1000
1345
1310
1335
1330
1340
1315
N+
N+
N+
P SUB

Figure 23D

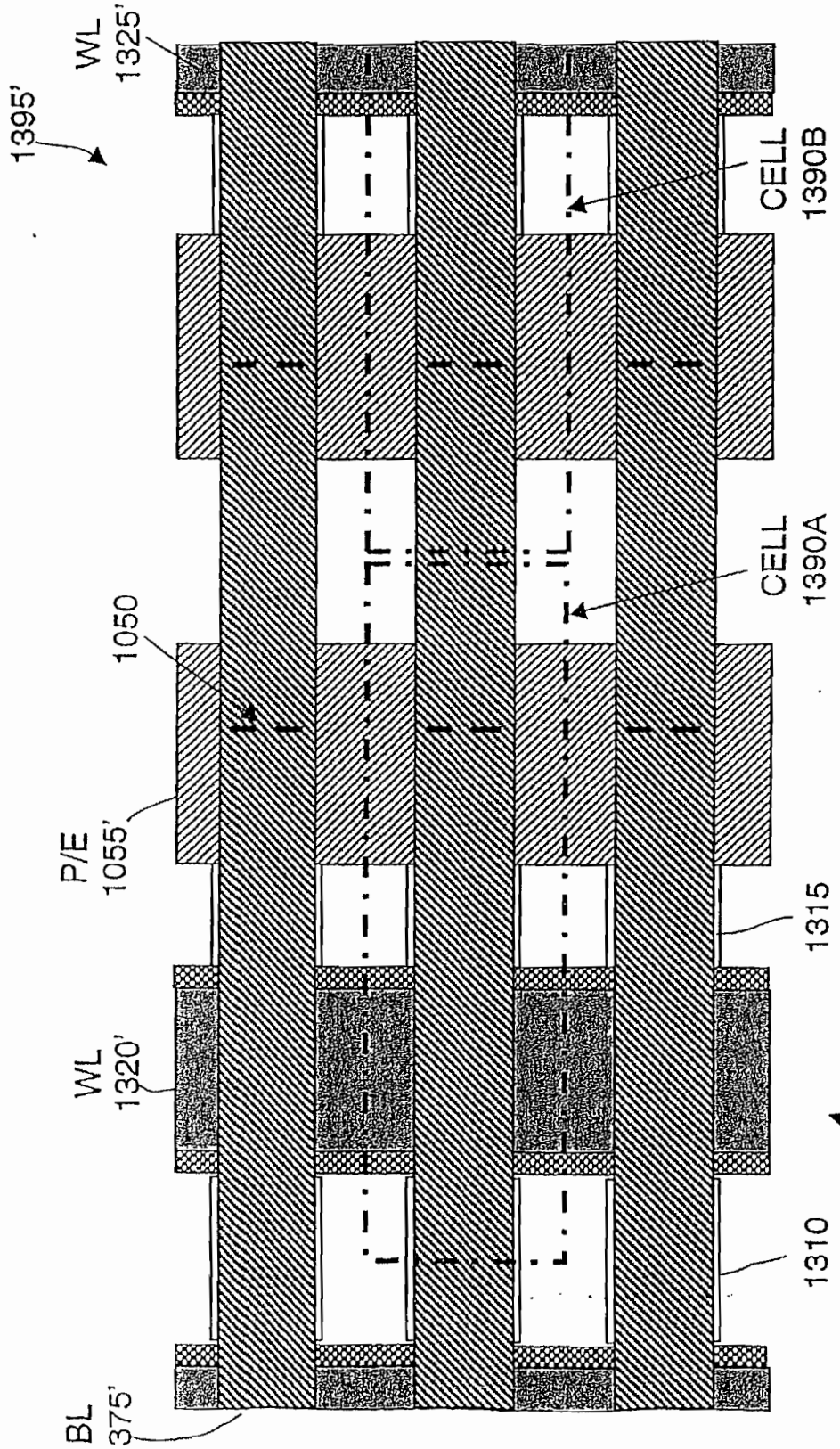

1395'
WL
1325'
CELL
1390B
CELL
1390A
1050
P/E
1055'
1315
WL
1320'
1335
1310
BL
1375'

Figure 23E

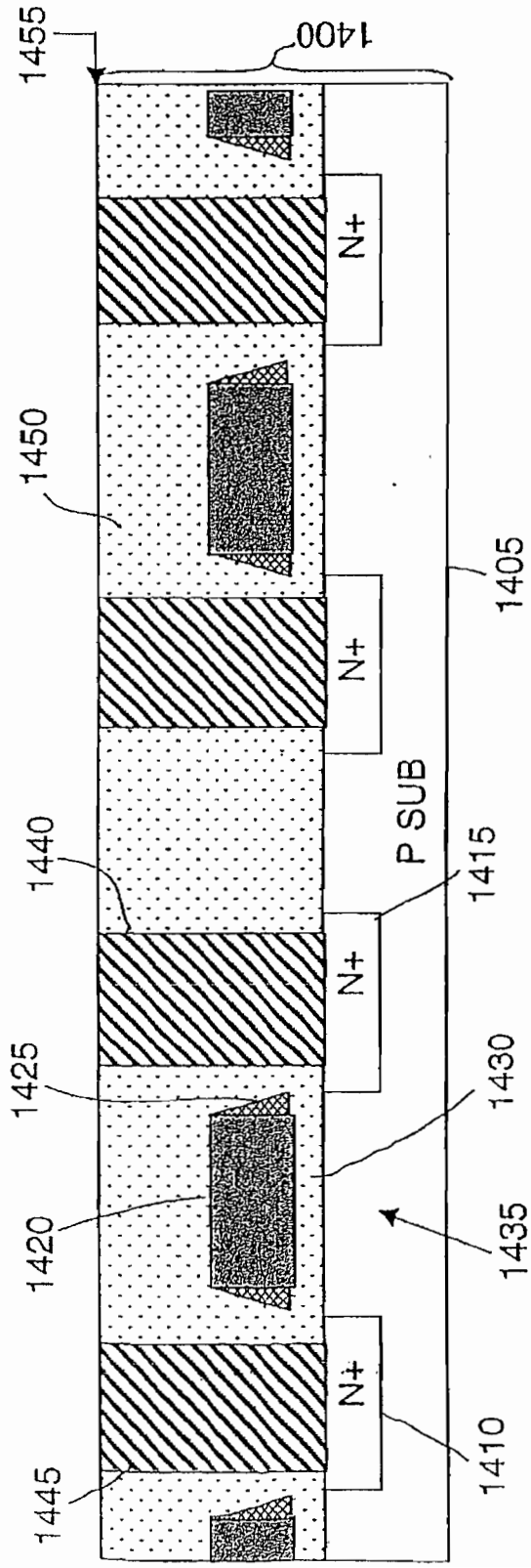

1455
1400
N+
1450
1405
N+
1440
P SUB
1415
N+
1425
1430
1420
1435
N+
1410
1445

Figure 24A

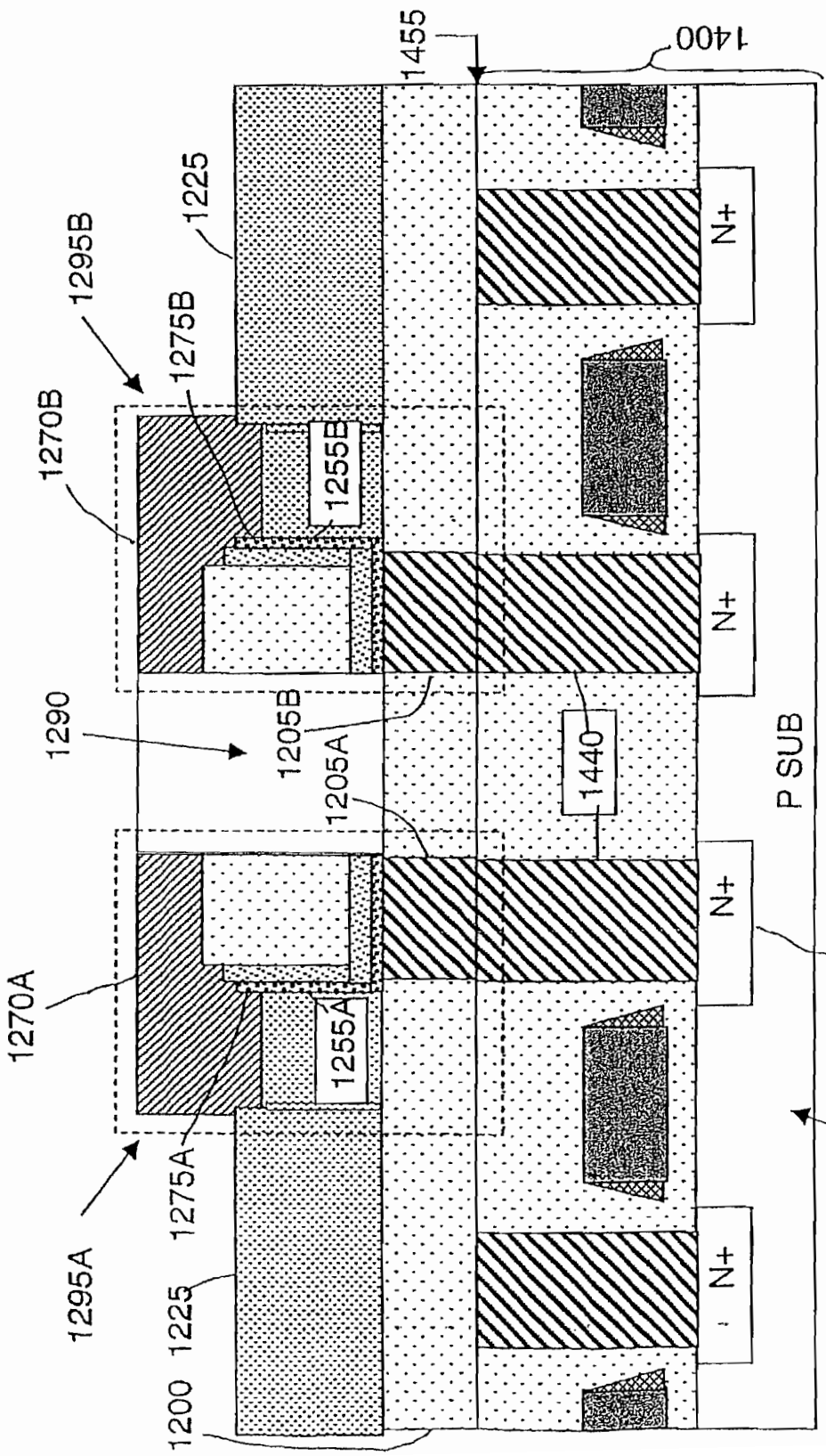

1455
1400
1225
1295B
1275B
1270B
1255B
1290
1205B
1205A
1440
N+
N+
N+
N+
P SUB
1415
1435
1270A
1255A
1275A
1295A
1225
1200

Figure 24B

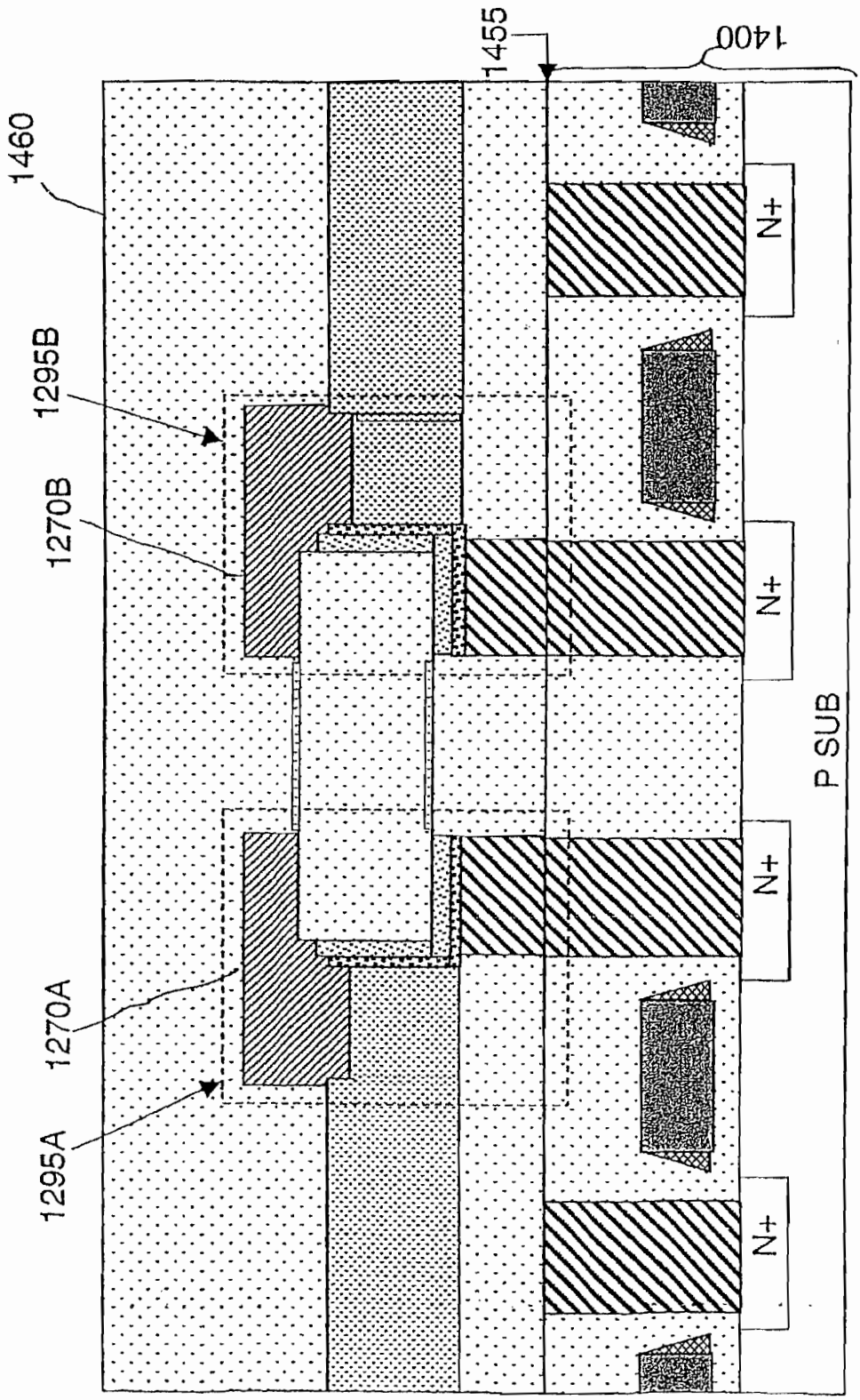


Figure 24C

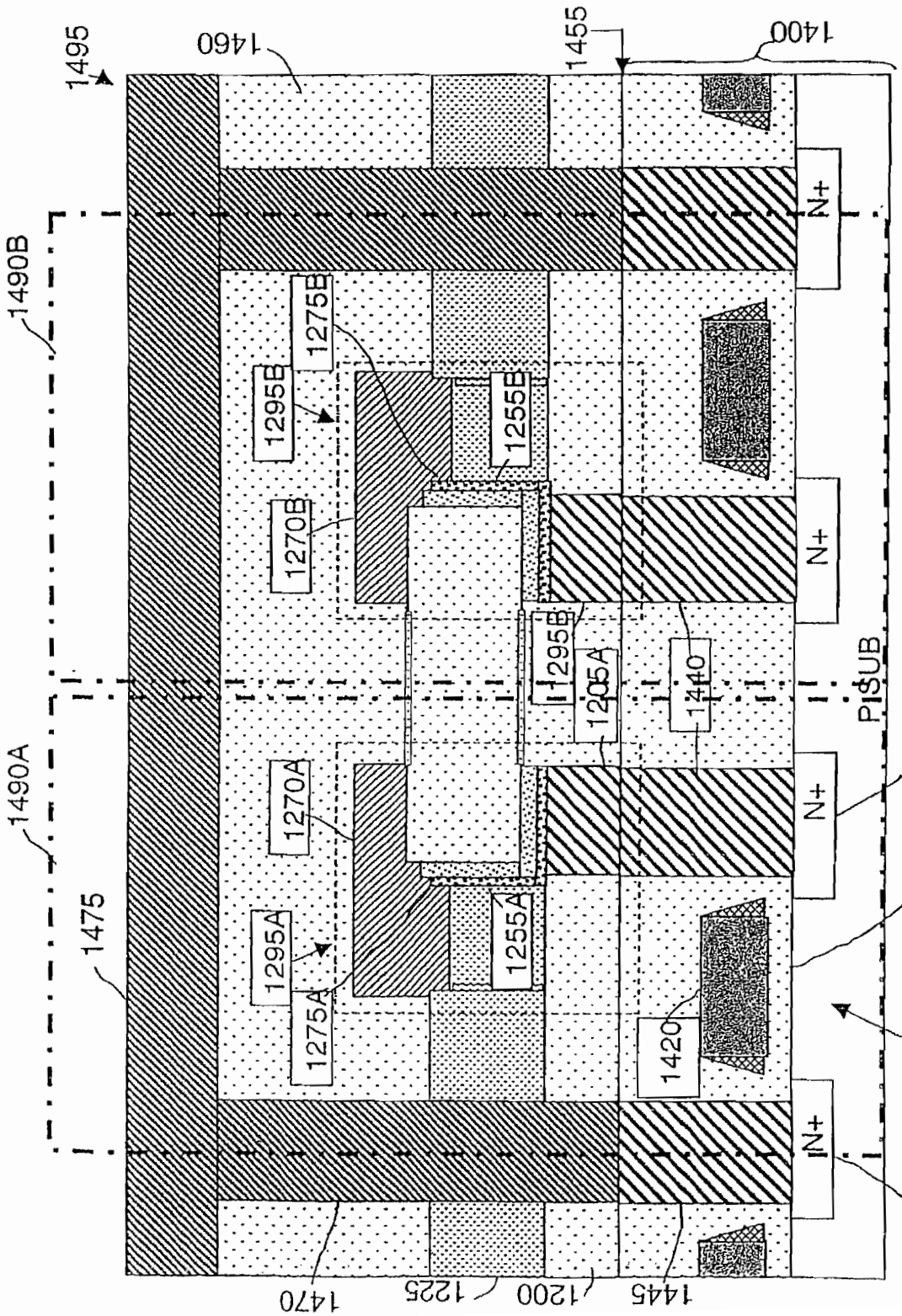

1495
1460
1455
1400
1490B
1490A
1475
1295B
1275B
1255B
1270B
1295A
1275A
1255A
1270A
1205A
1440
1420
N+
PISUB
1415
1430
1435
1410
1470
1225
1200
1445

Figure 24D

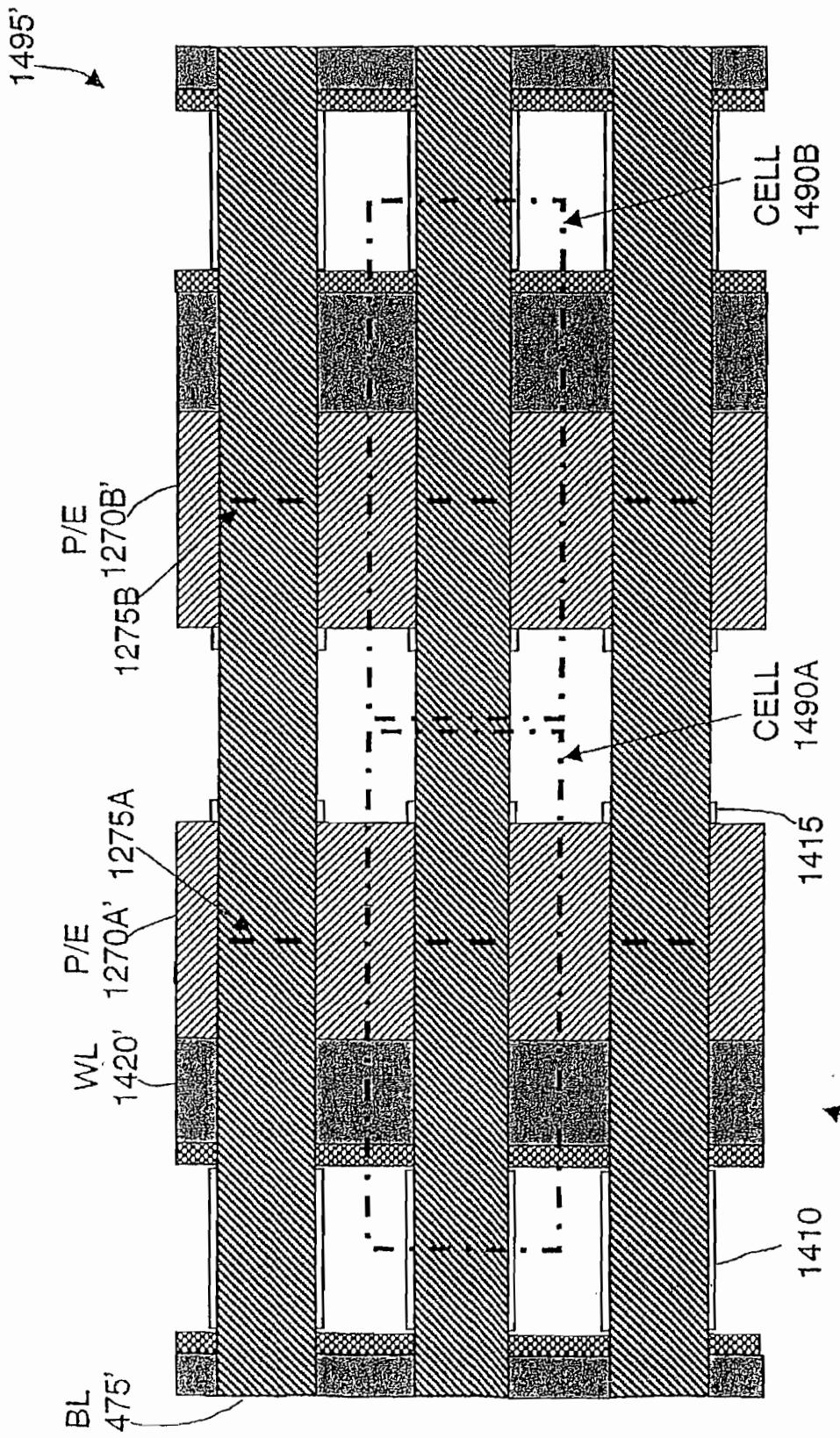

1495'
CELL 1490B
P/E 1270B'
1275B
CELL 1490A
1275A
P/E 1270A'
1415
WL 1420'
1435
1410
BL 1475'

Figure 24E

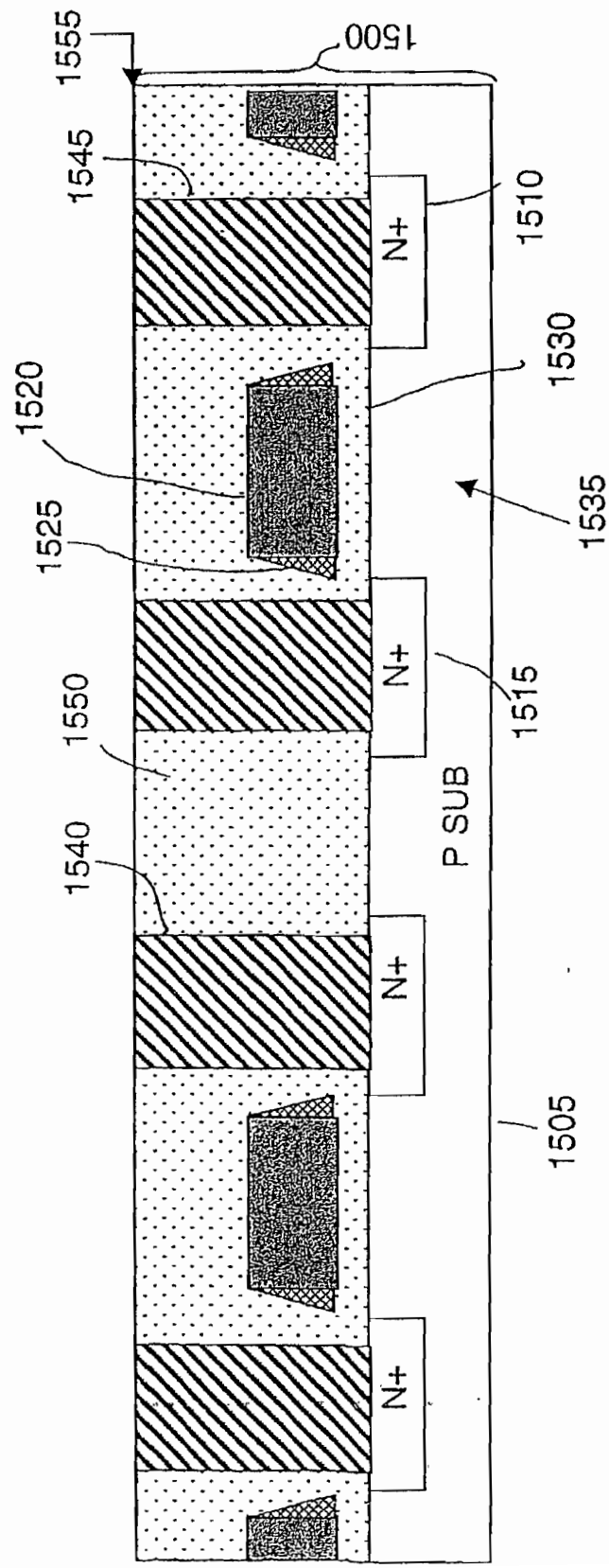

1555
1500
1545
1510
N+
1530
1520
1535
1525
N+
1515
1550
P SUB
1540
N+
1505
N+

Figure 25A

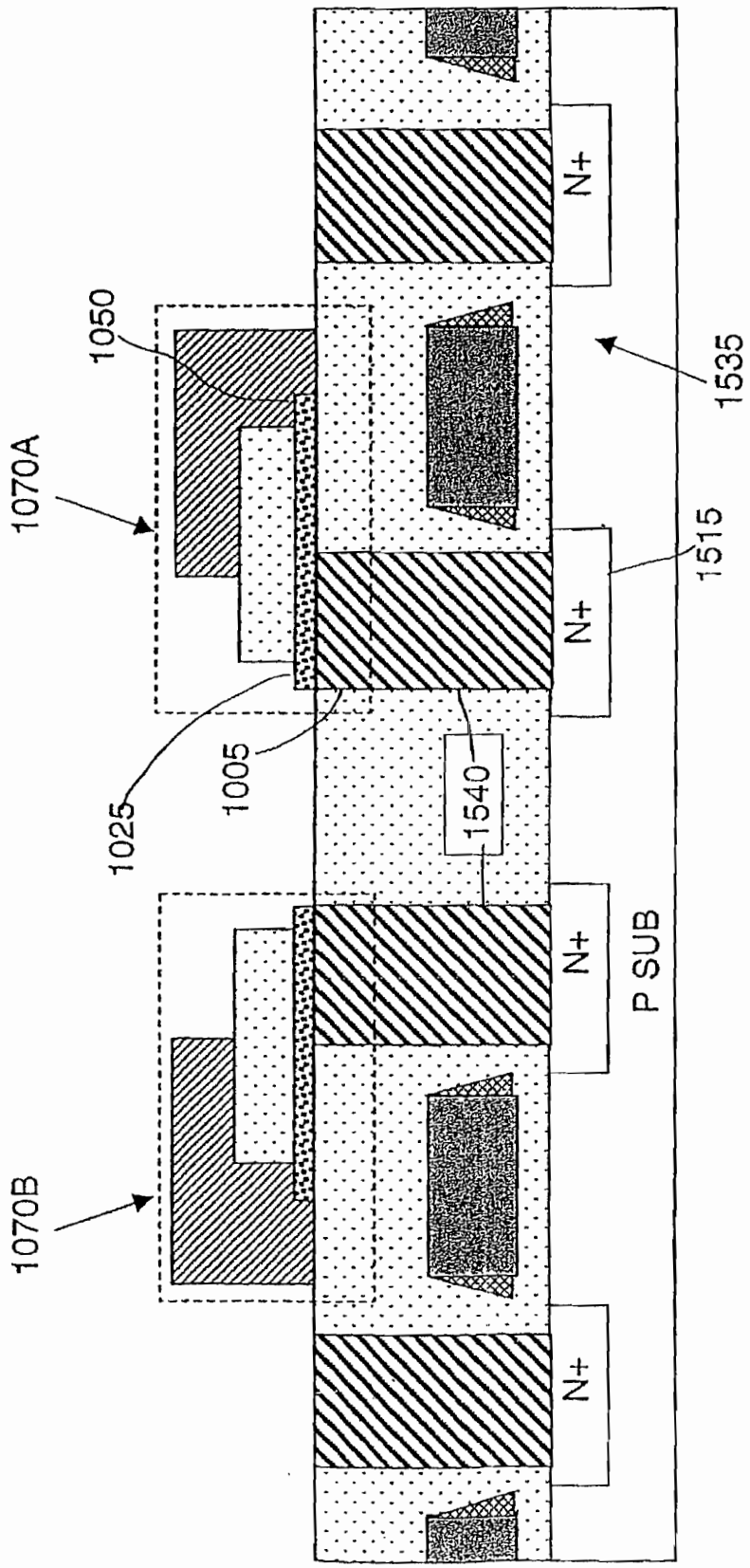


Figure 25B

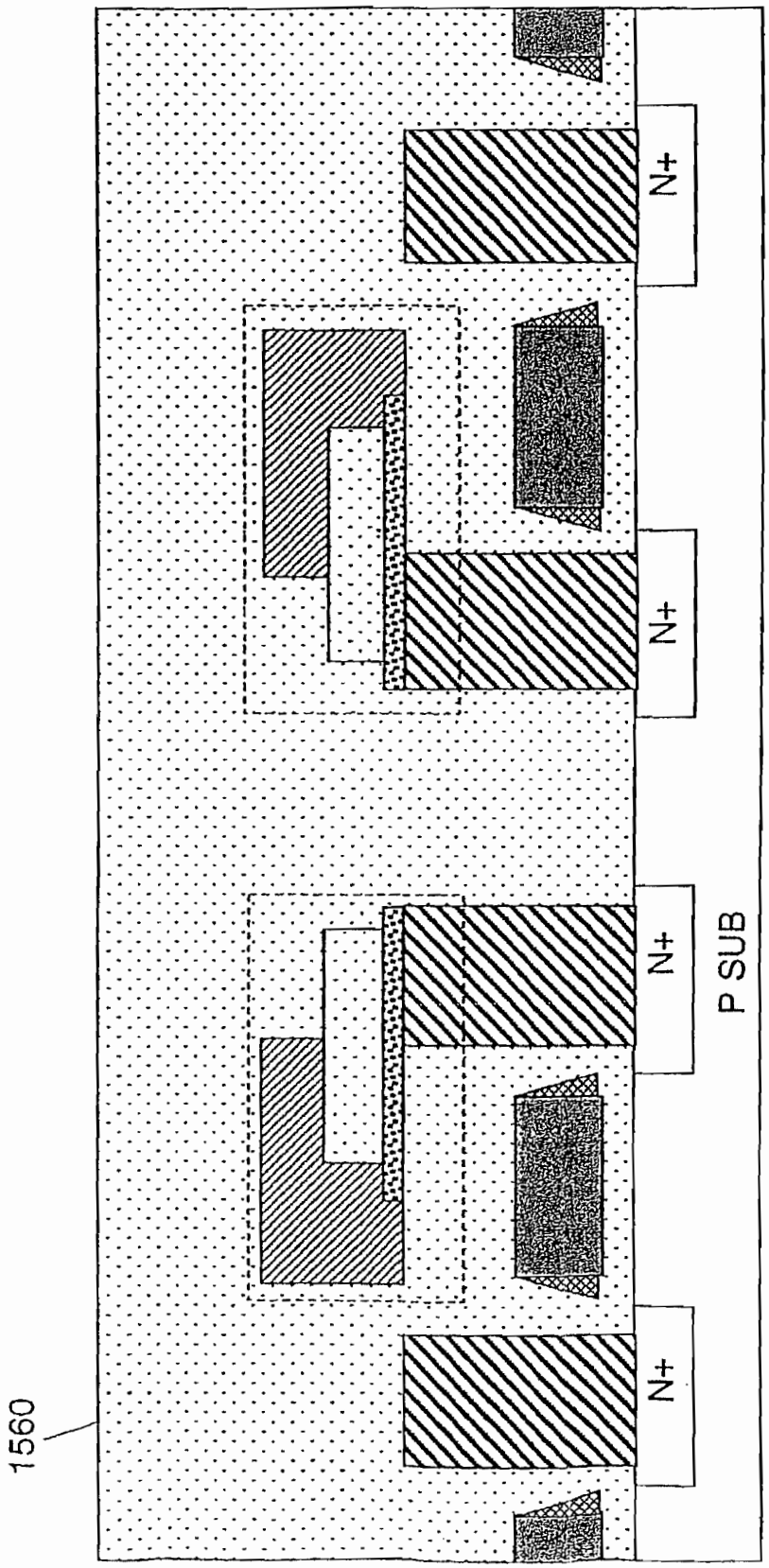


Figure 25C

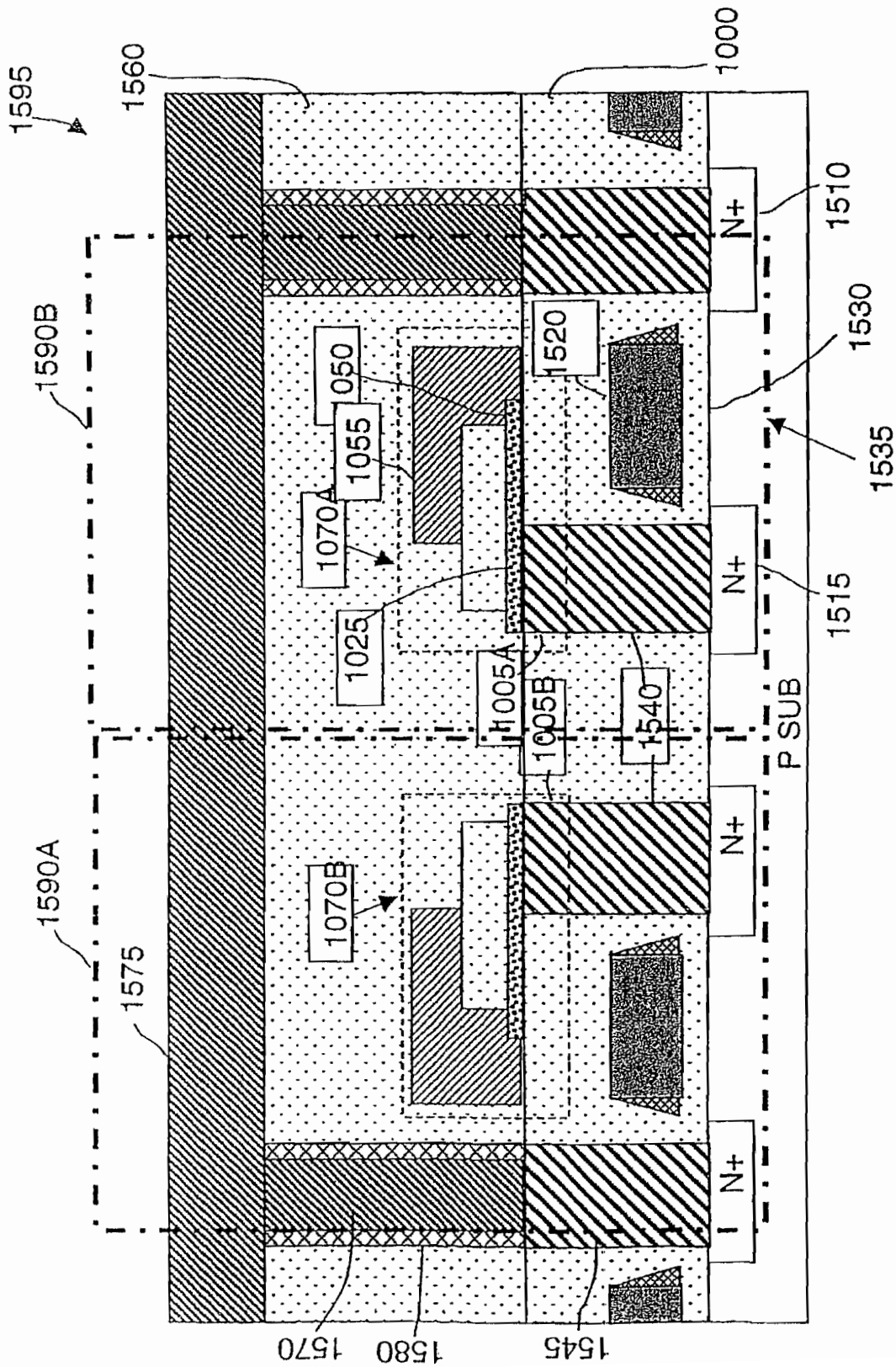

1595
1560
1000
1590B
1590A
1575
1510
1530
1535
1515
1520
1050
1055
1070A
1025
1005A
1005B
1540
1070B
N+
P SUB
1570
1580
1545

Figure 25D

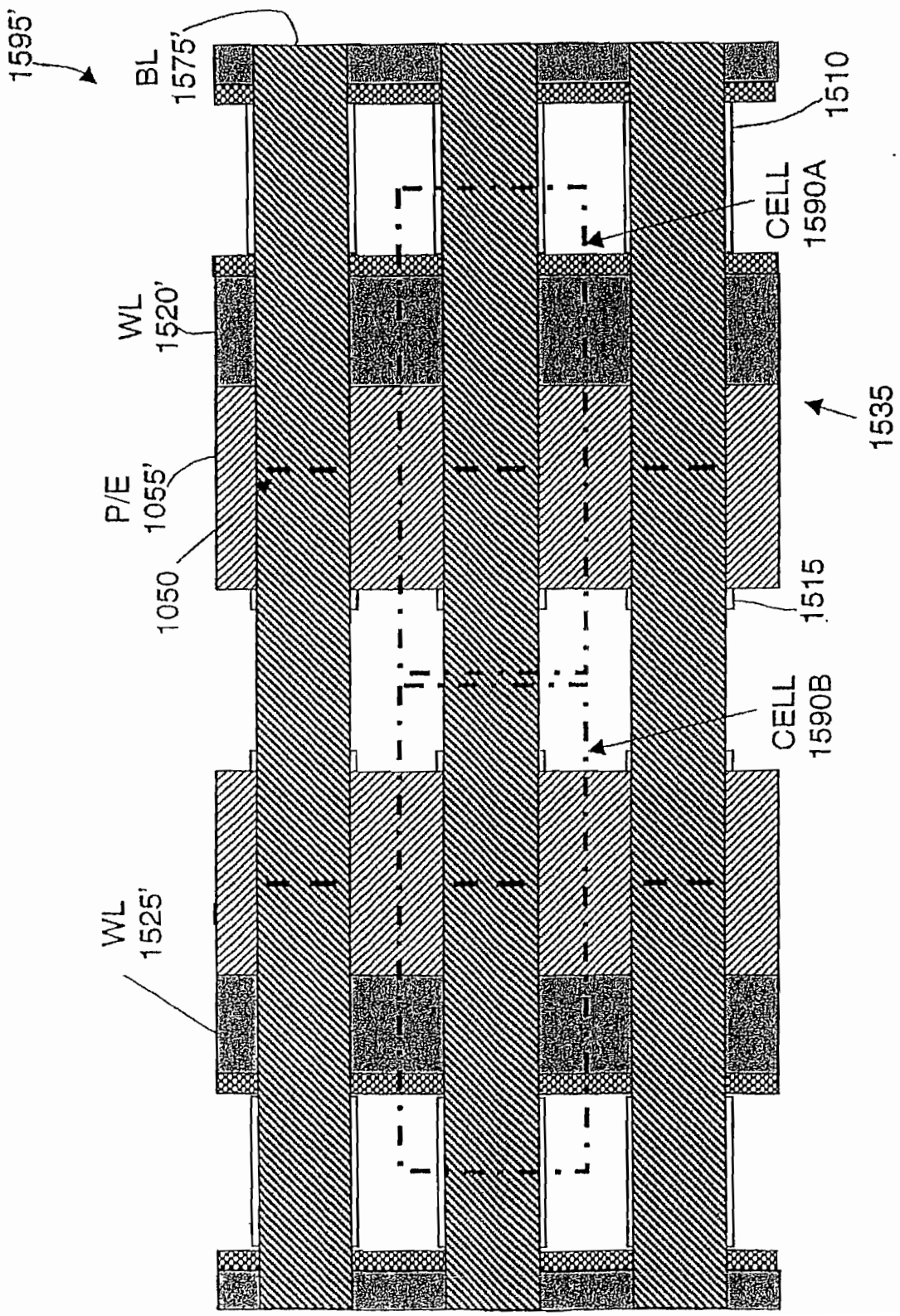

1595'
BL
1575'
1510
CELL
1590A
WL
1520'
1535
P/E
1055'
1050
1515
CELL
1590B
WL
1525'

Figure 25E

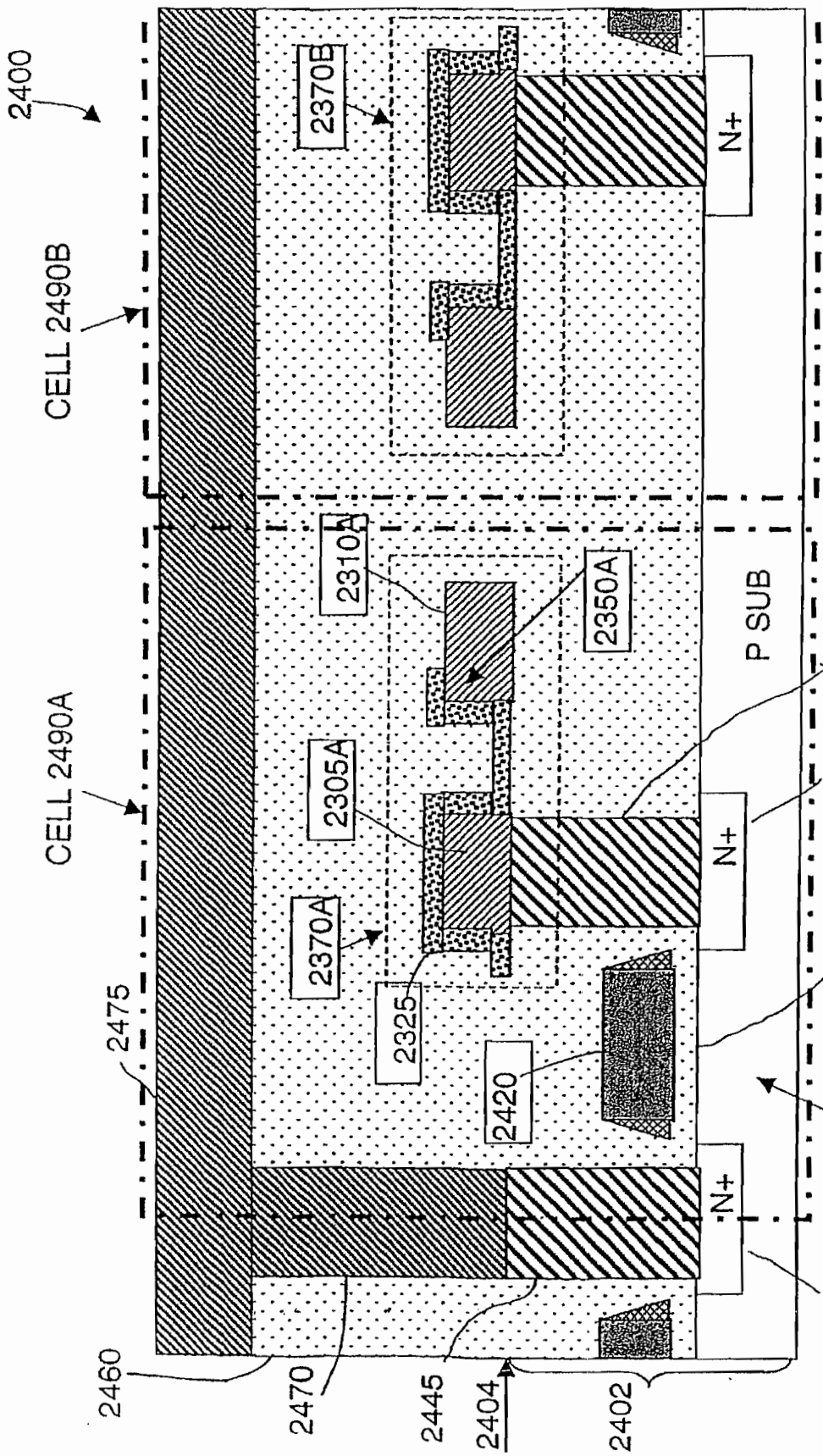

2400
CELL 2490B
CELL 2490A
2370B
2310A
2350A
2305A
2370A
2325
2420
2475
2460
2470
2445
2404
2402
2410
2435
2430
2440
2415
N+
N+
N+
P SUB

Figure 26

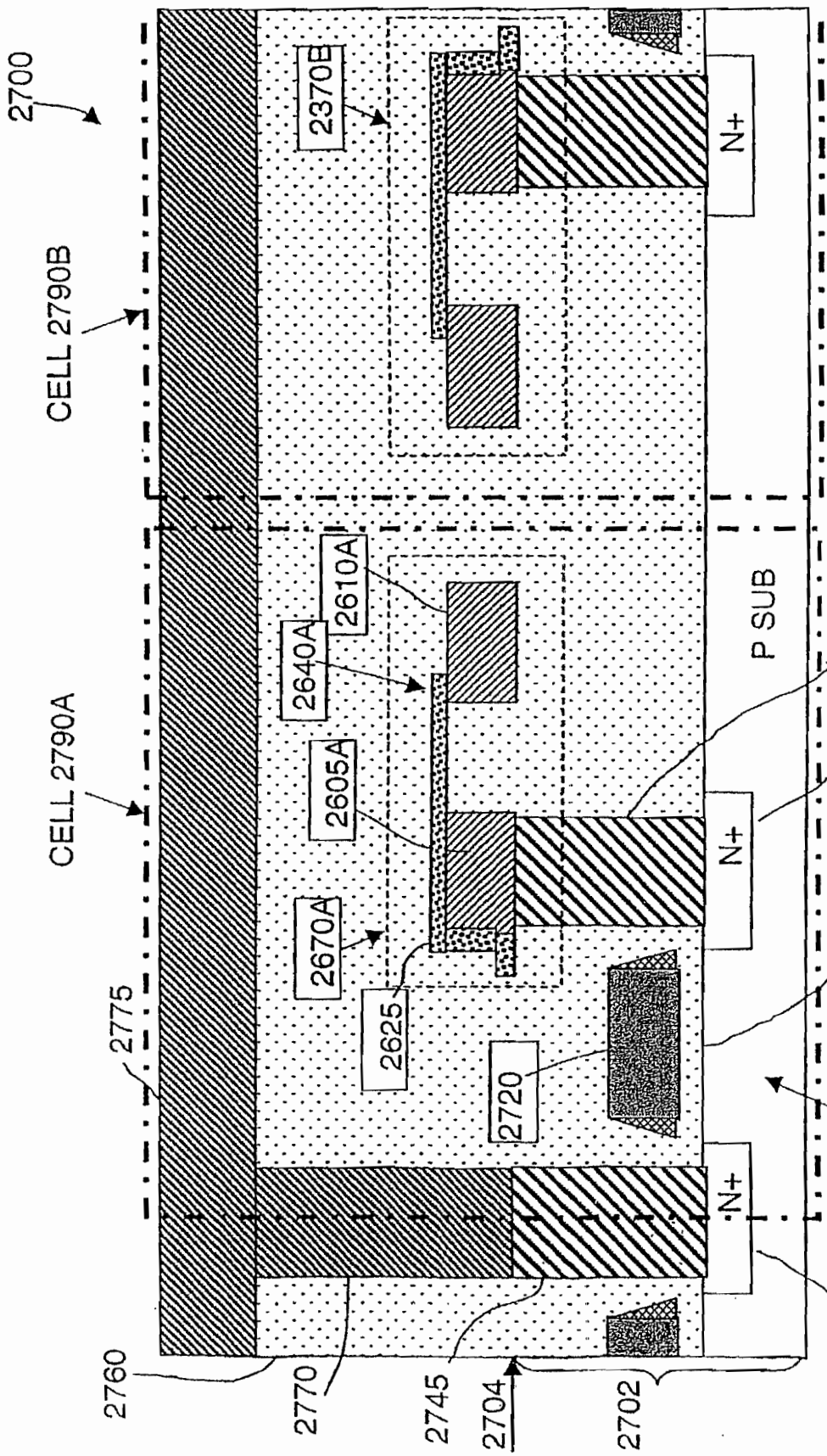

2700
CELL 2790B
CELL 2790A
2370B
2640A
2610A
2605A
2670A
2625
2720
2775
2760
2770
2745
2704
2702
2710
2735
2730
2715
2740
N+
N+
N+
P SUB

Figure 27

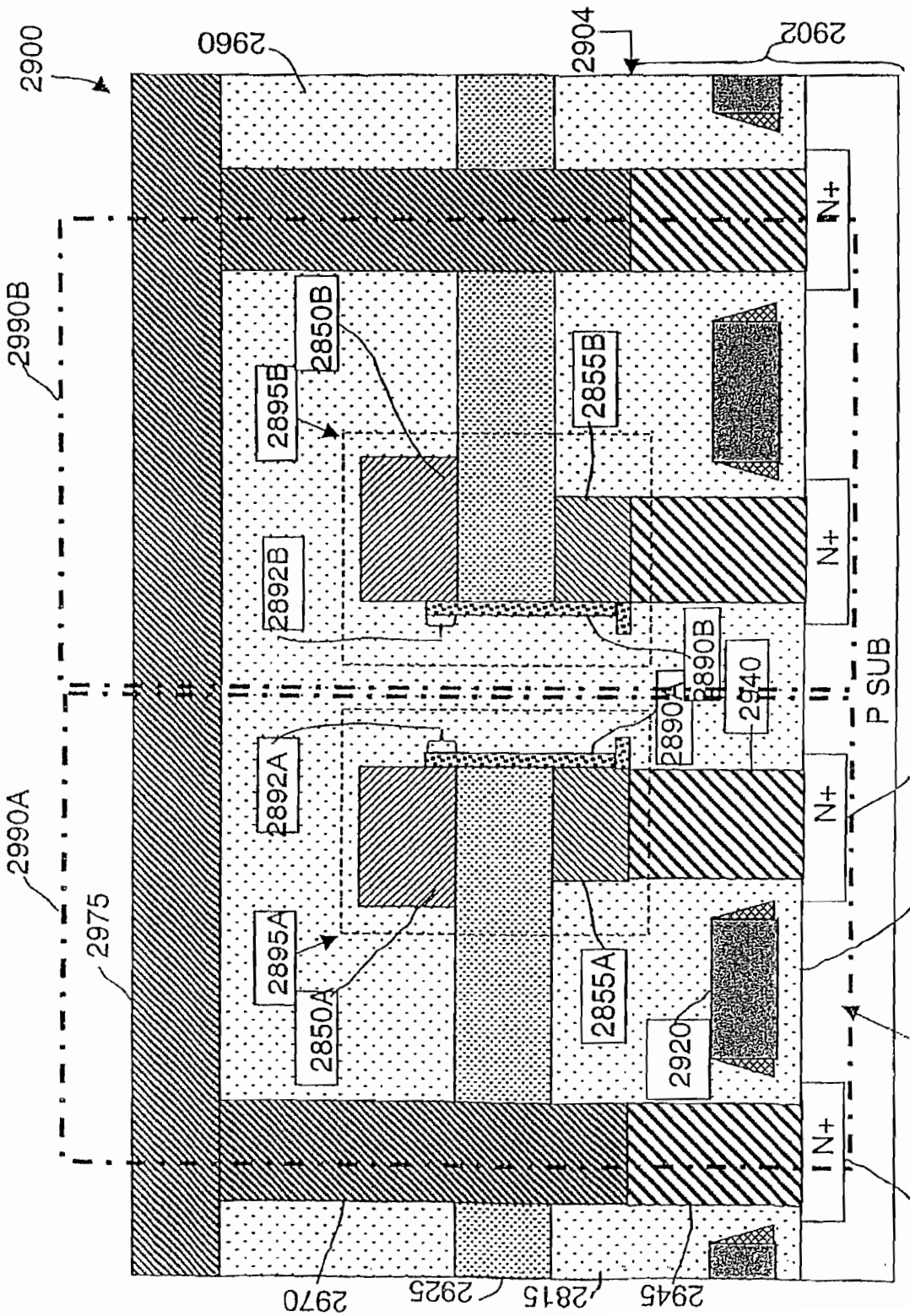

2900
2960
2904
2902
2990B
2850B
2895B
2855B
2892B
2890B
2940
2890A
2892A
2990A
2975
2895A
2850A
2855A
2920
2915
2930
2935
2910
2970
2925
2815
2945
N+
P SUB

Figure 28

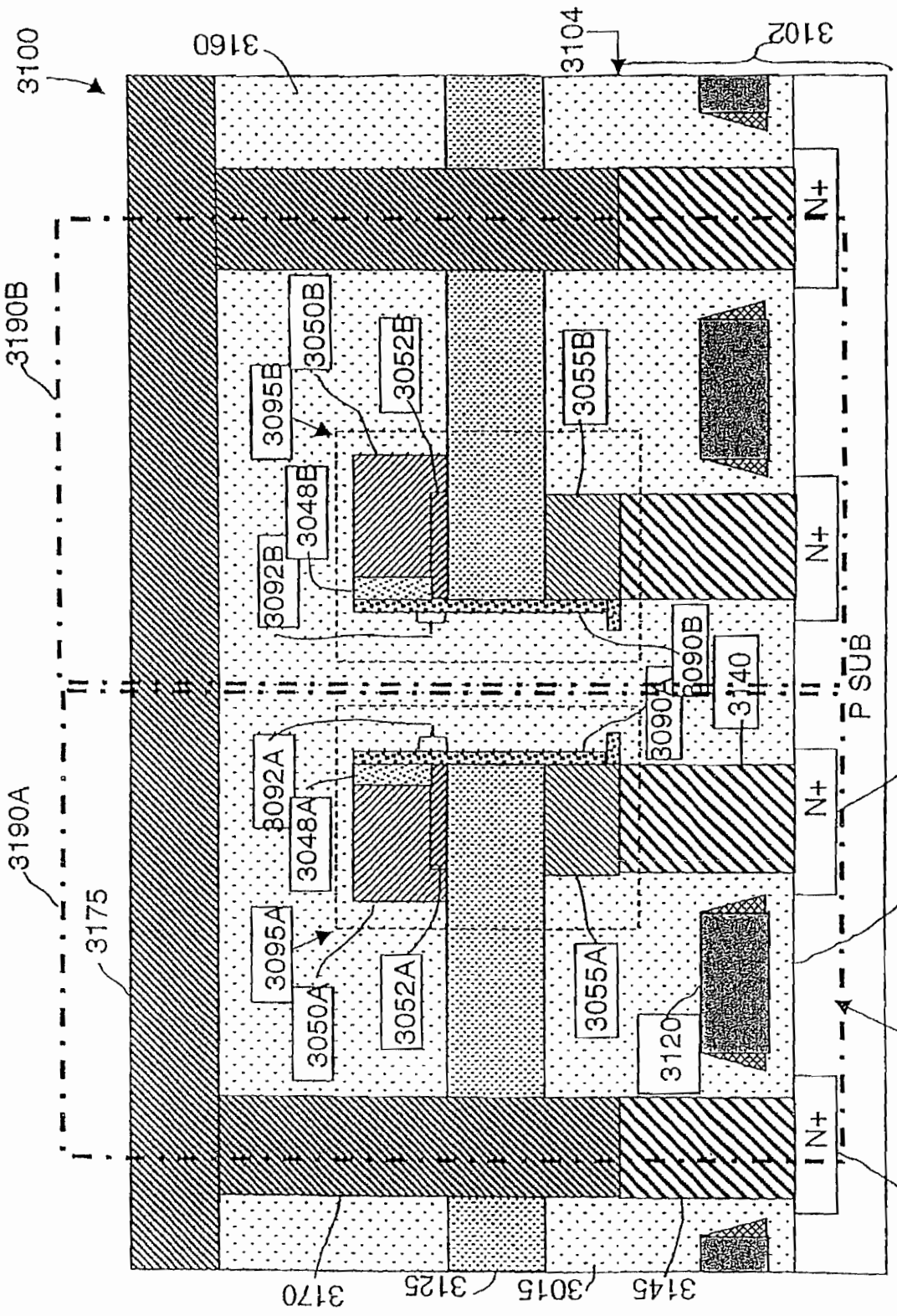

3100
3160
3104
3102
3190B
3190A
3175
3095B
3050B
3052B
3055B
3048B
3092B
3090B
3140
3092A
3048A
3095A
3050A
3052A
3055A
3090A
3120
3115
3130
3135
3110
3170
3125
3015
3145
N+
P SUB

Figure 29

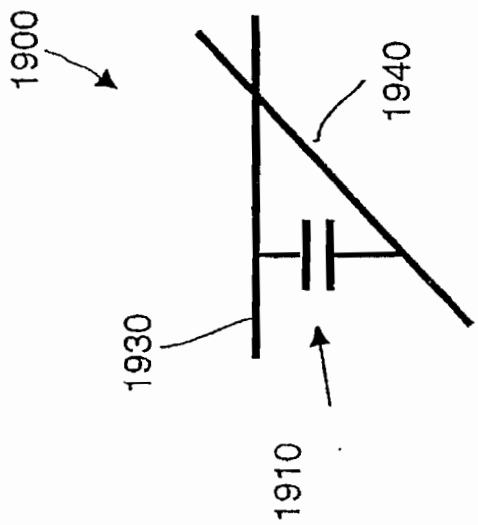


Figure 30B: Prior Art

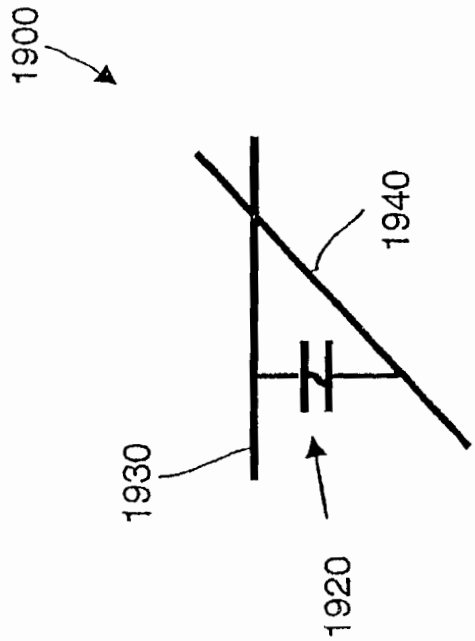


Figure 30A: Prior Art

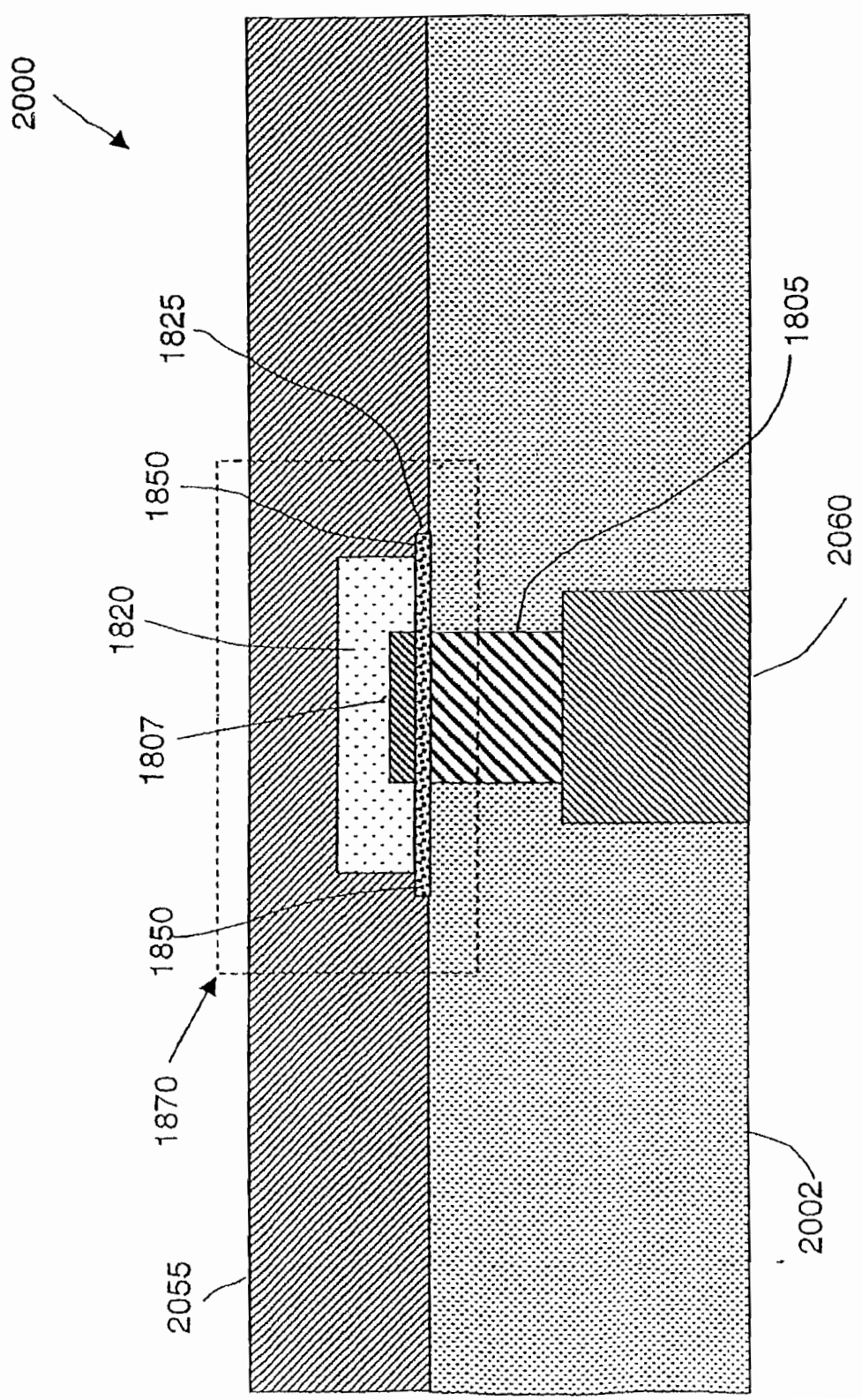


Figure 31

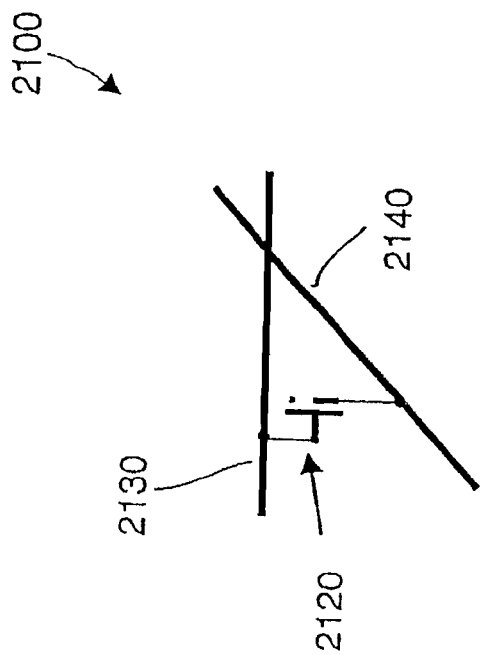


Figure 32B

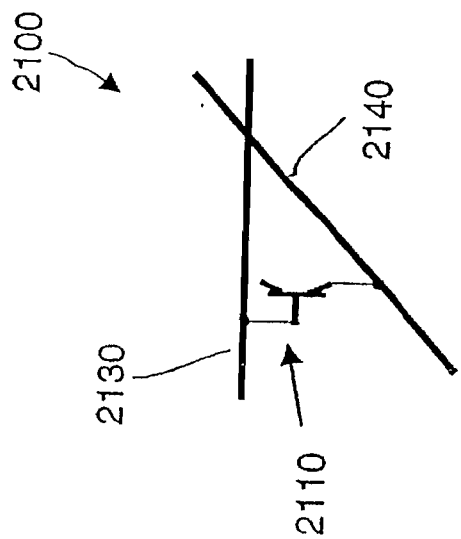


Figure 32A

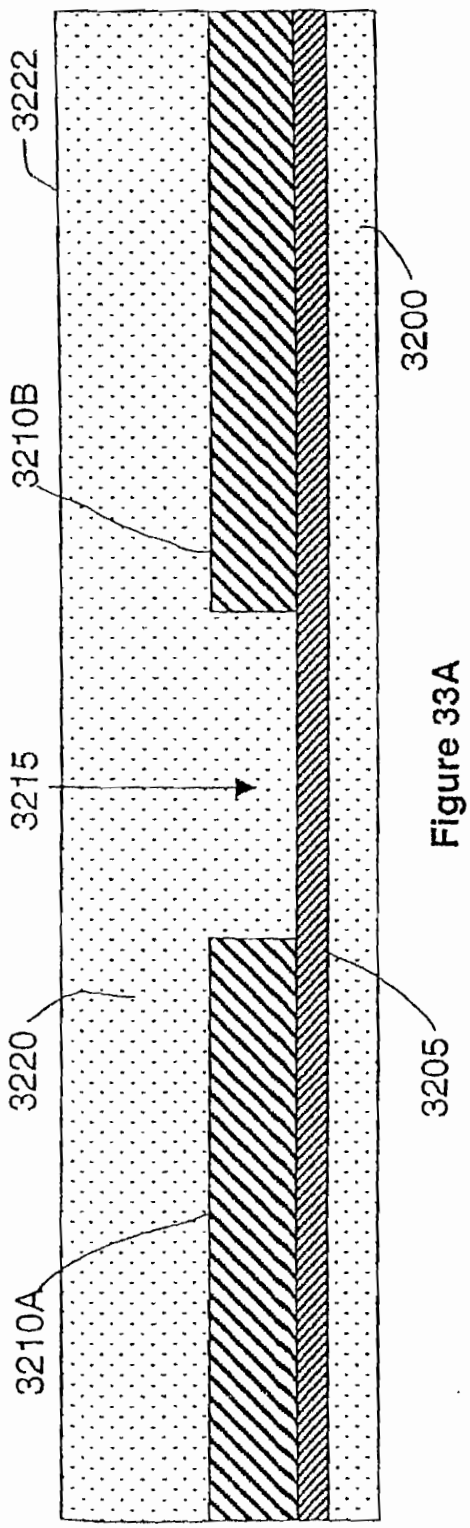


Figure 33A

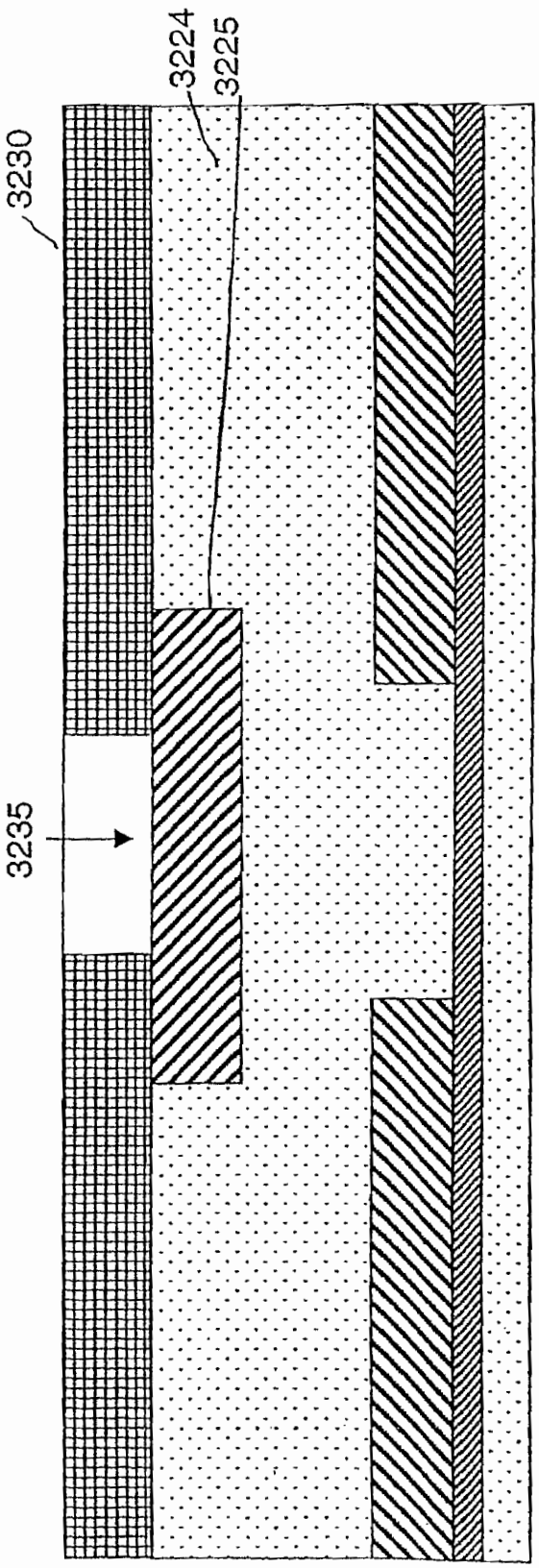


Figure 33B

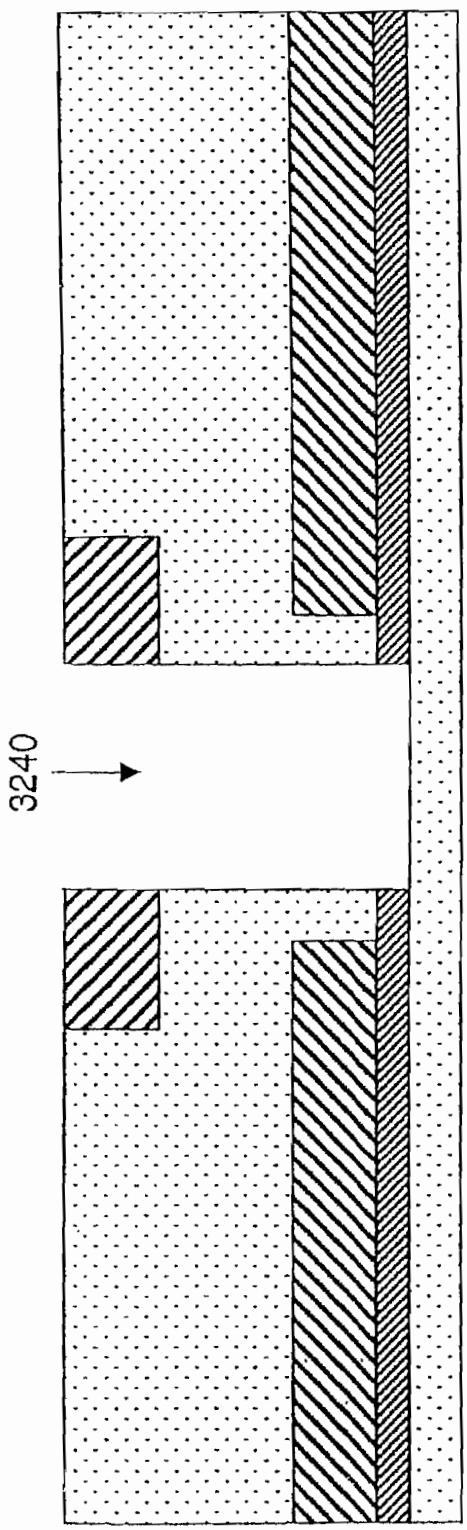


Figure 33C

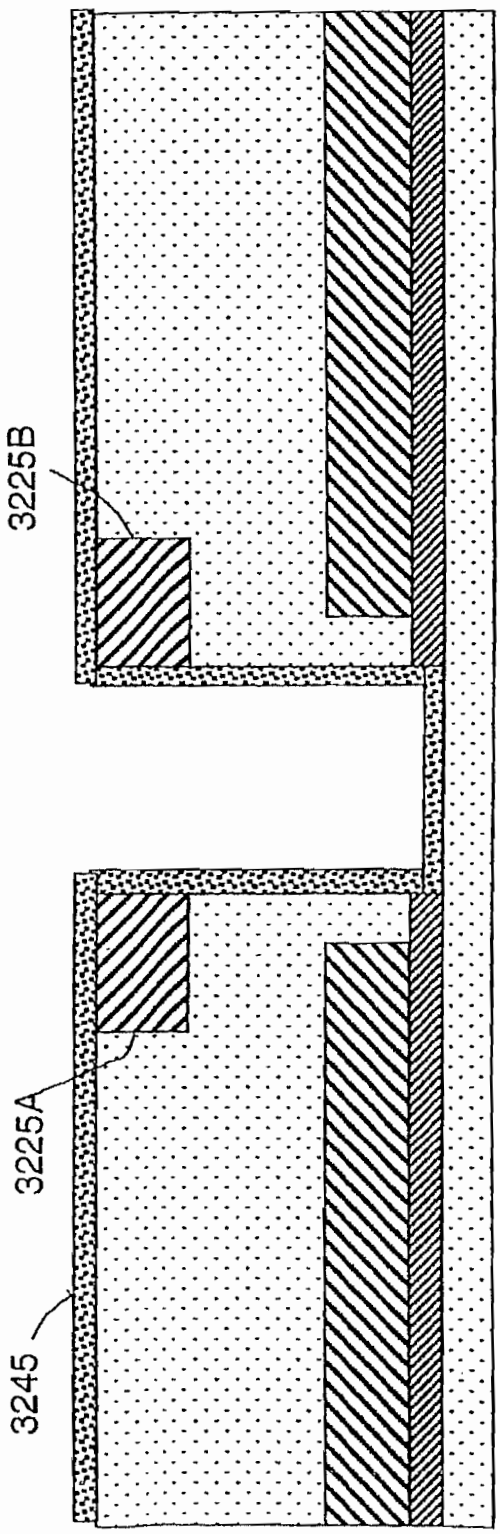


Figure 33D

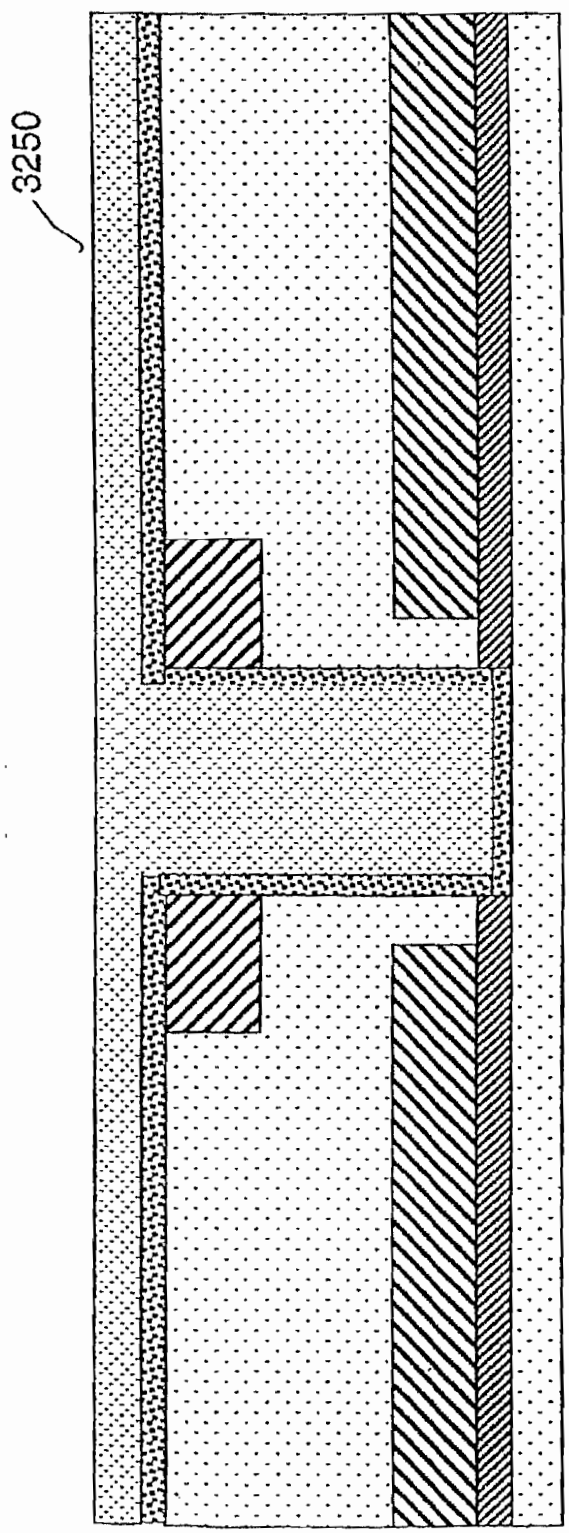


Figure 33E

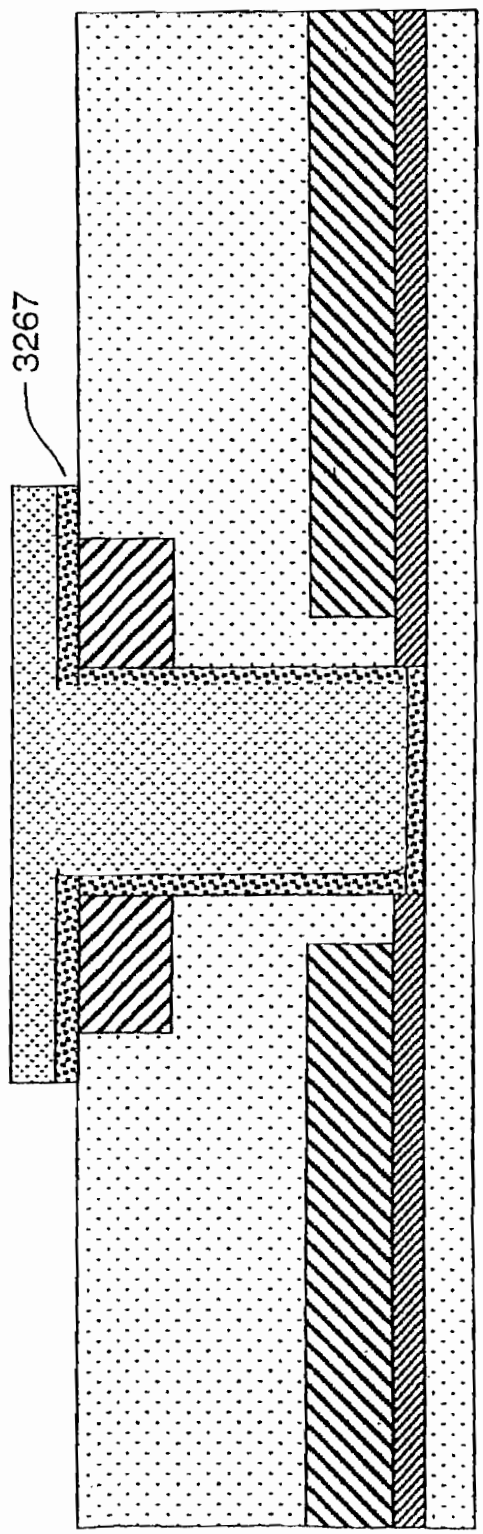


Figure 33F

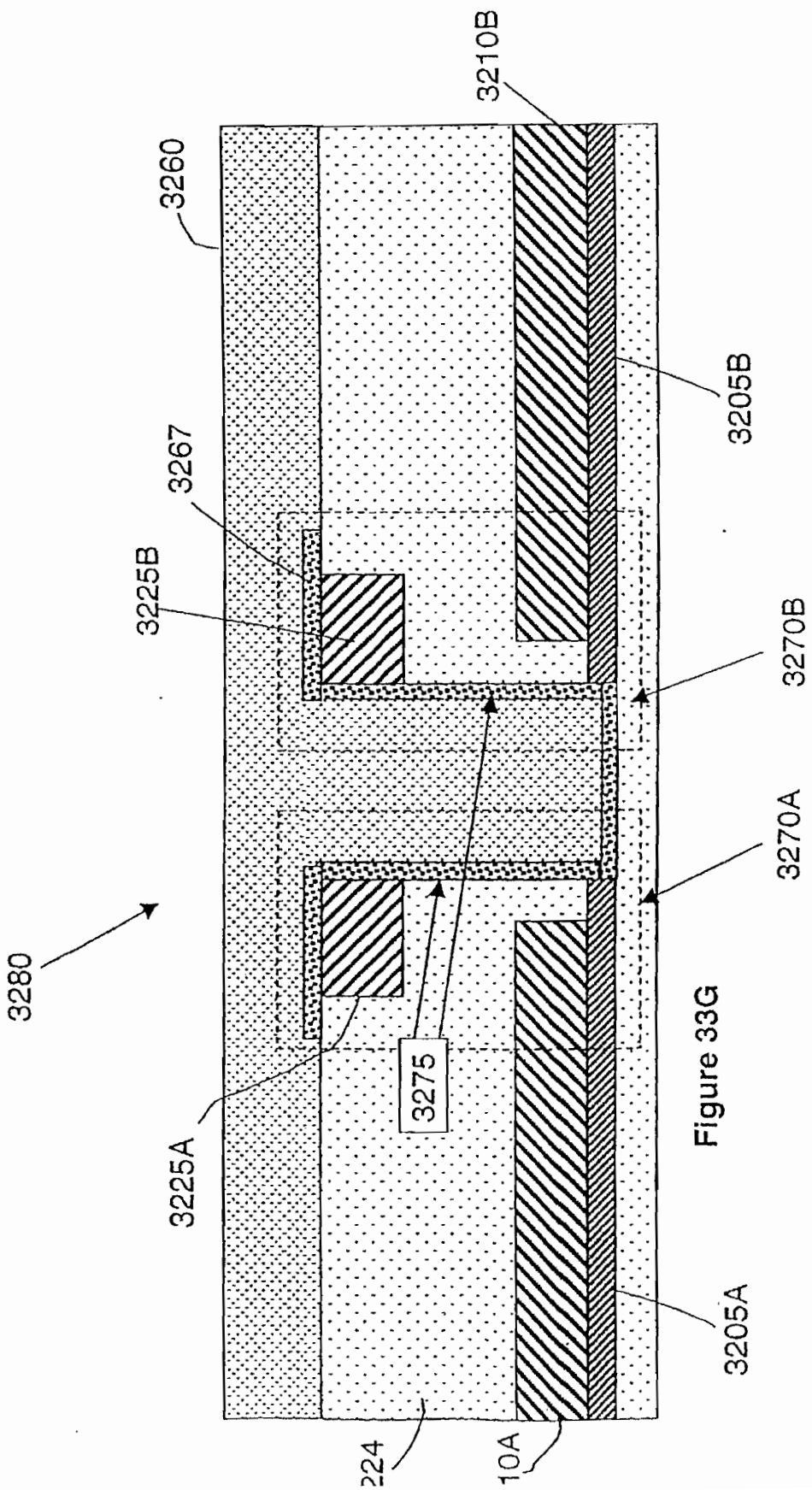

3210B
3260
3205B
3267
3225B
3270B
3270A
3280
3275
3225A
3205A
224
10A

Figure 33G

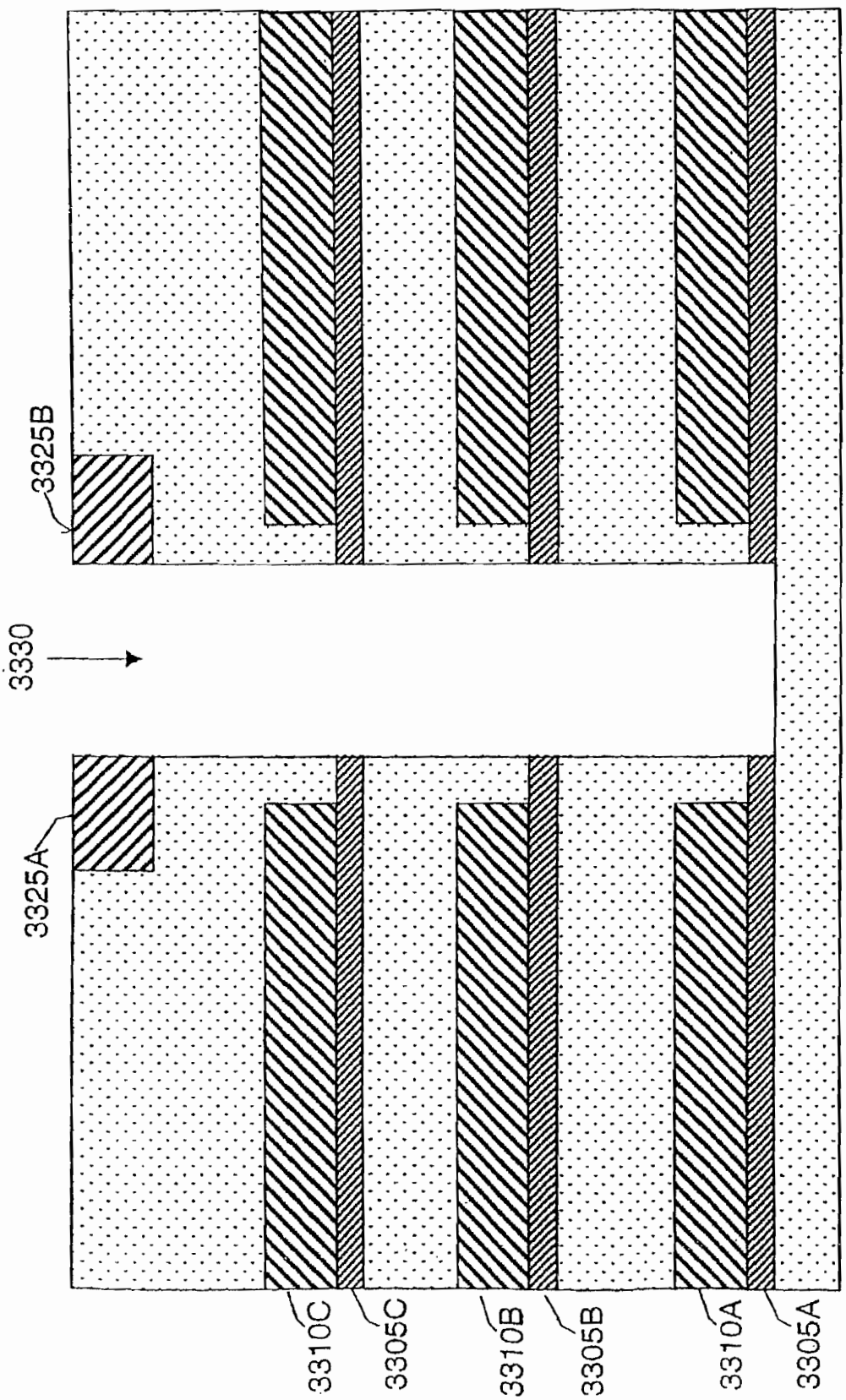


Figure 34A

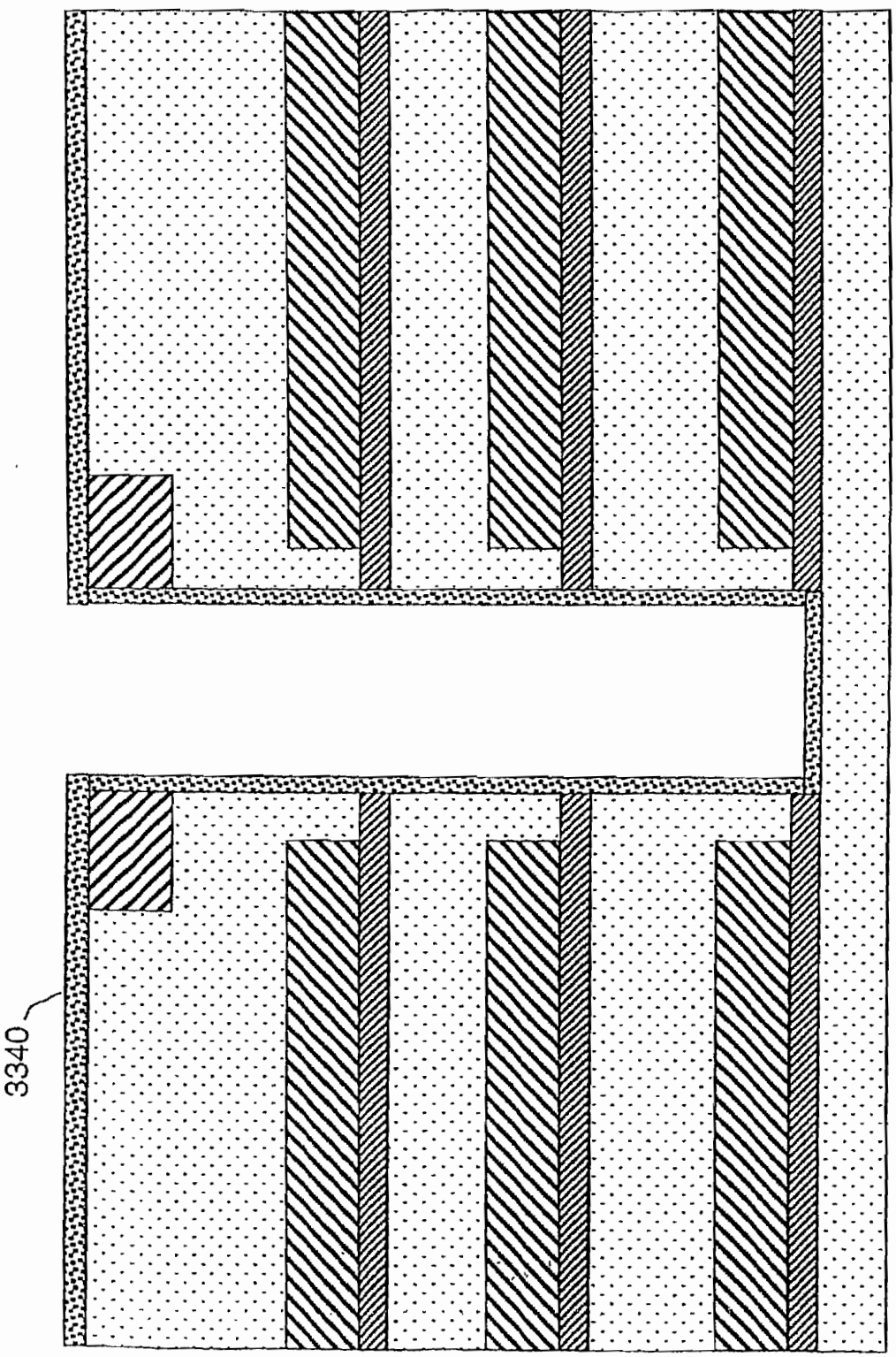


Figure 34B

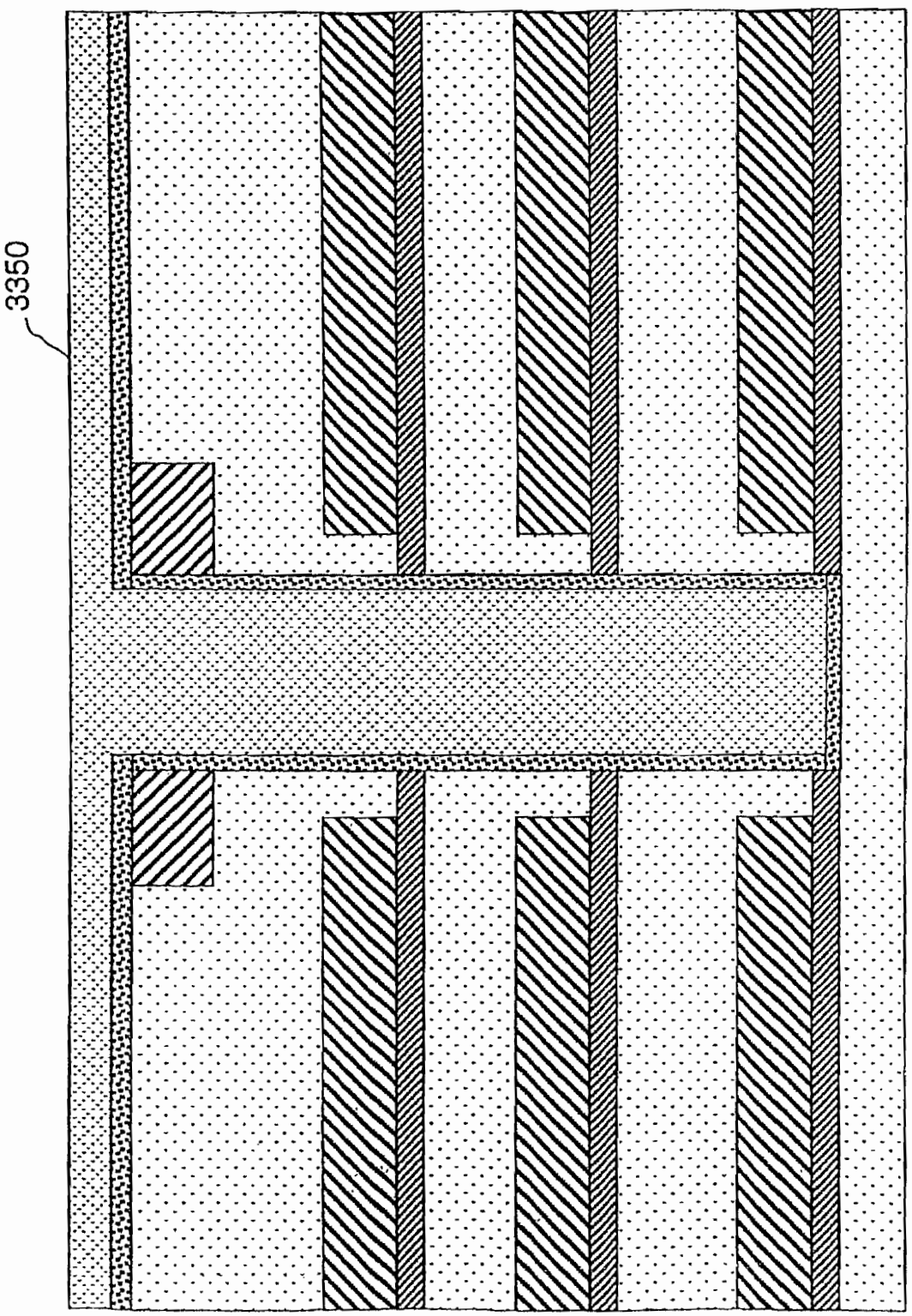


Figure 34C

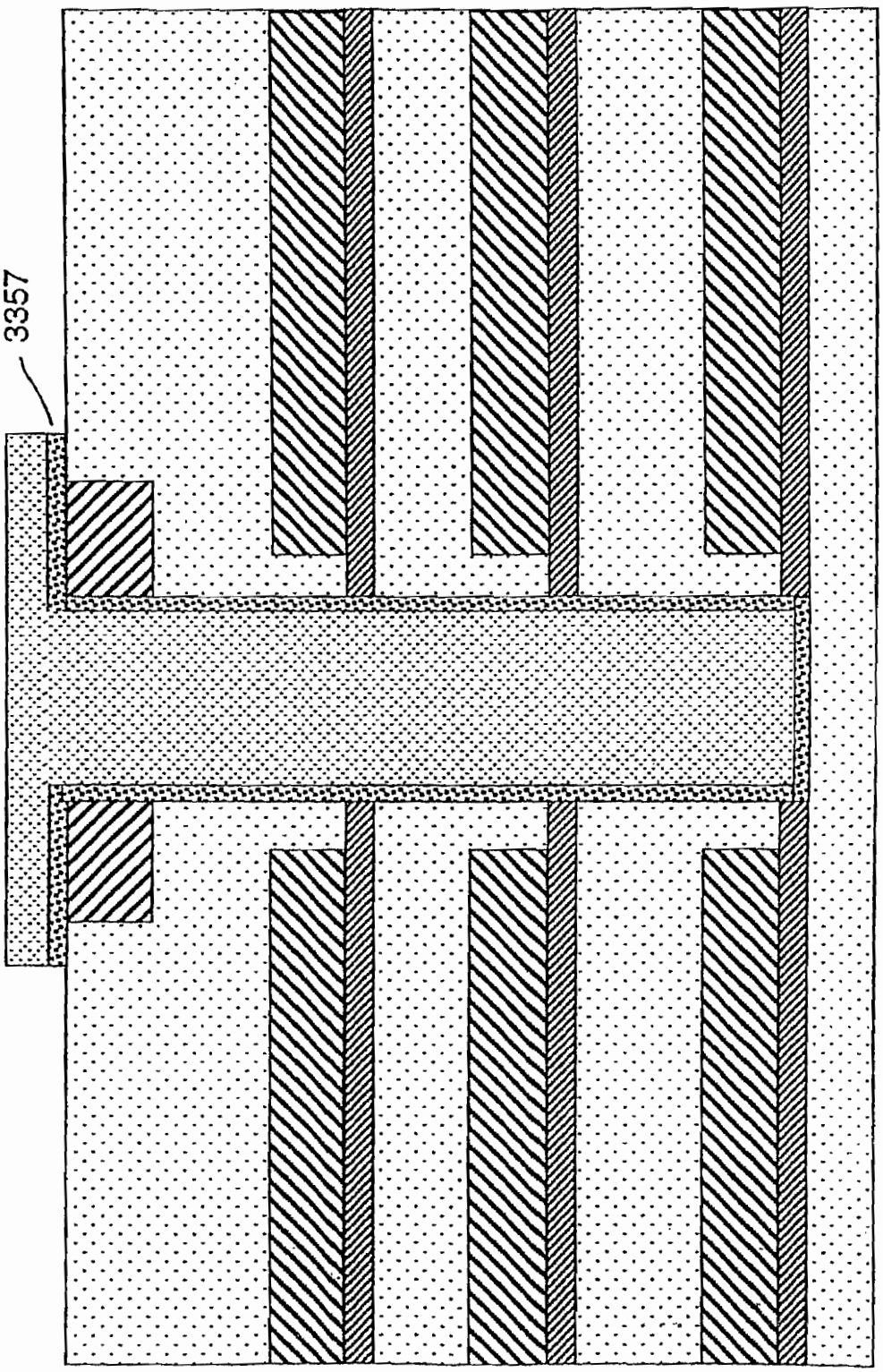


Figure 34D

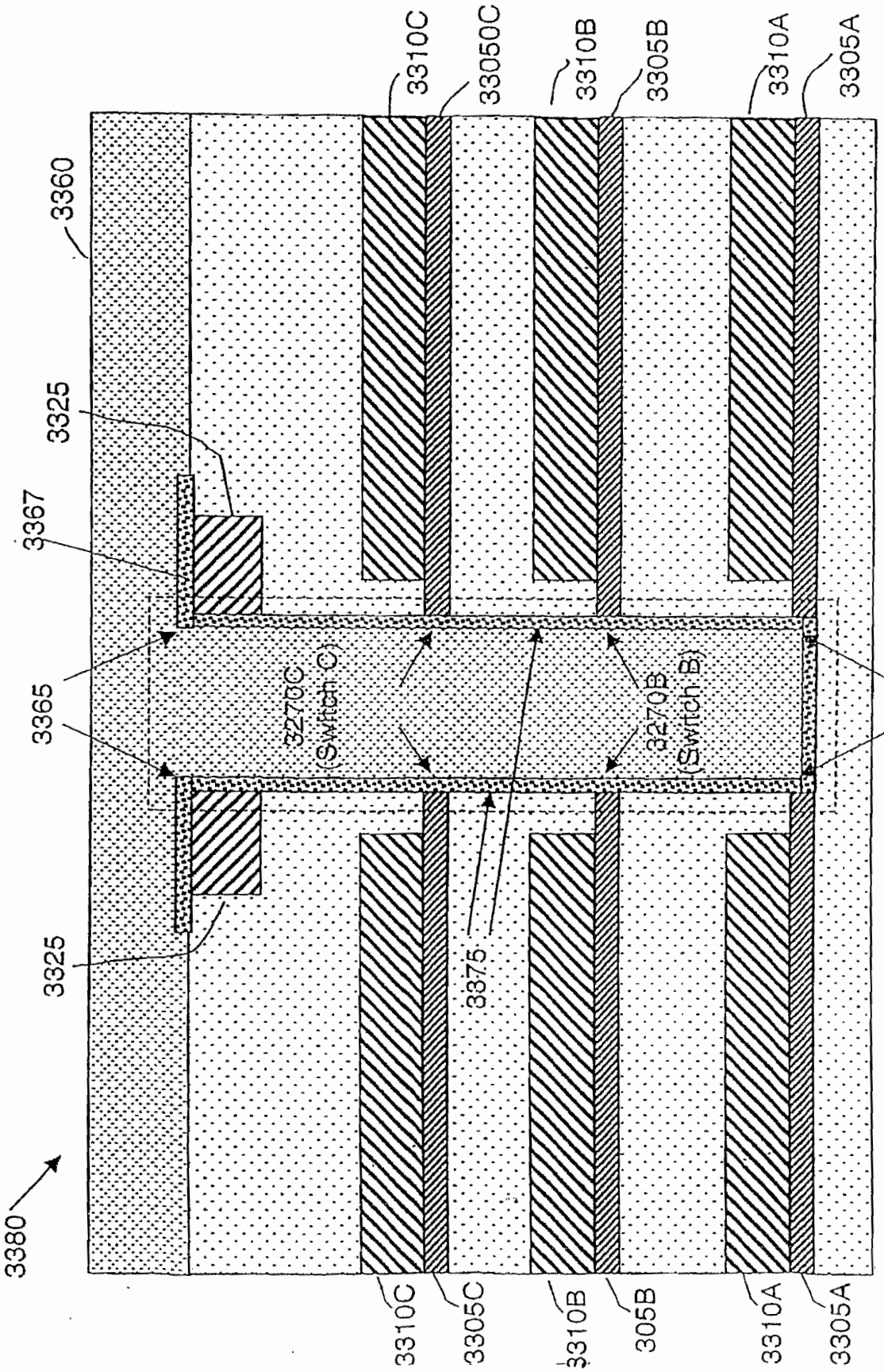

3380
3360
3325
3367
3365
3325
3375
3270C (Switch C)
3270B (Switch B)
3270A (Switch A)
3310C
3305C
3310B
305B
3310A
3305A
3310C
33050C
3310B
3305B
3310A
3305A

Figure 34E

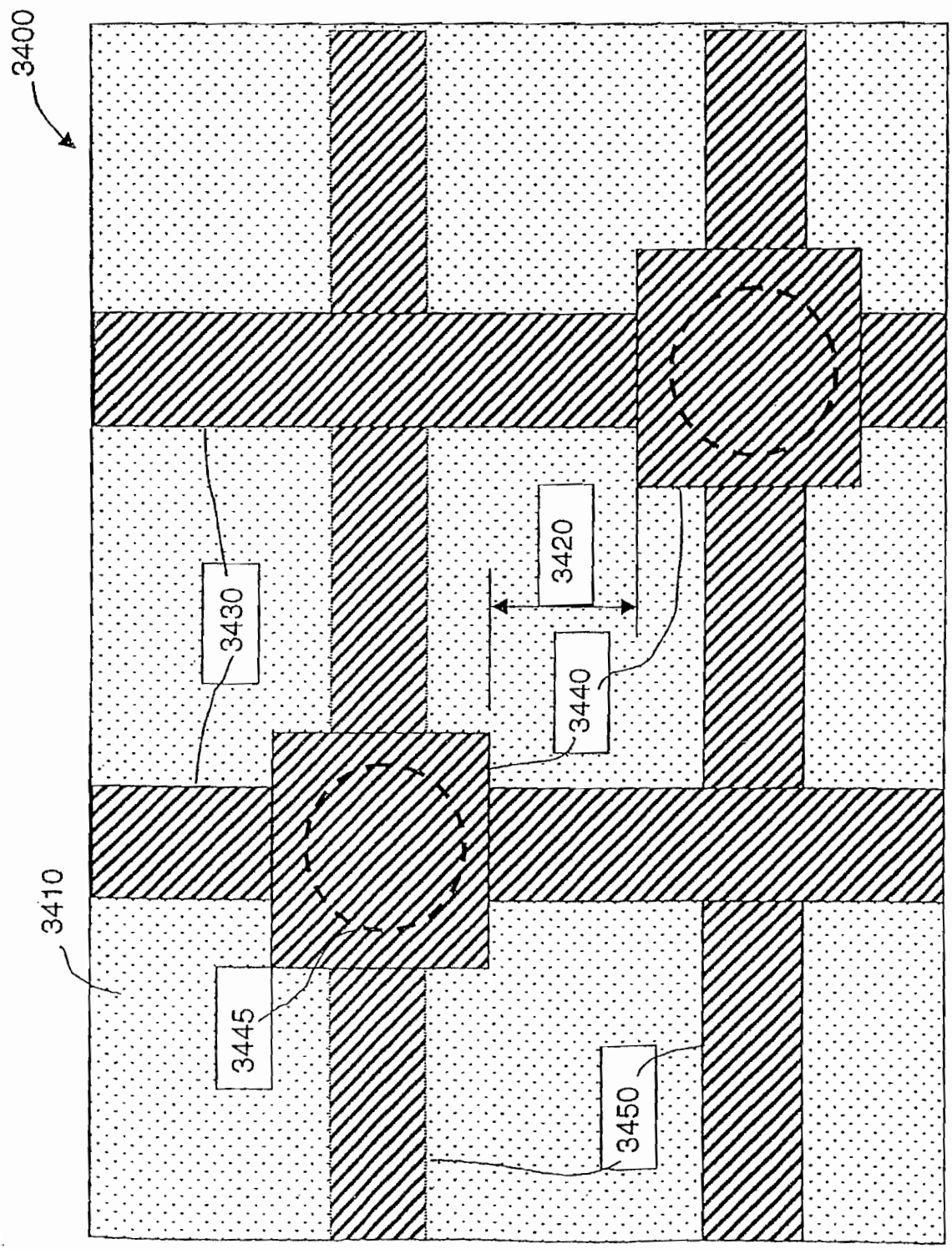


Figure 35

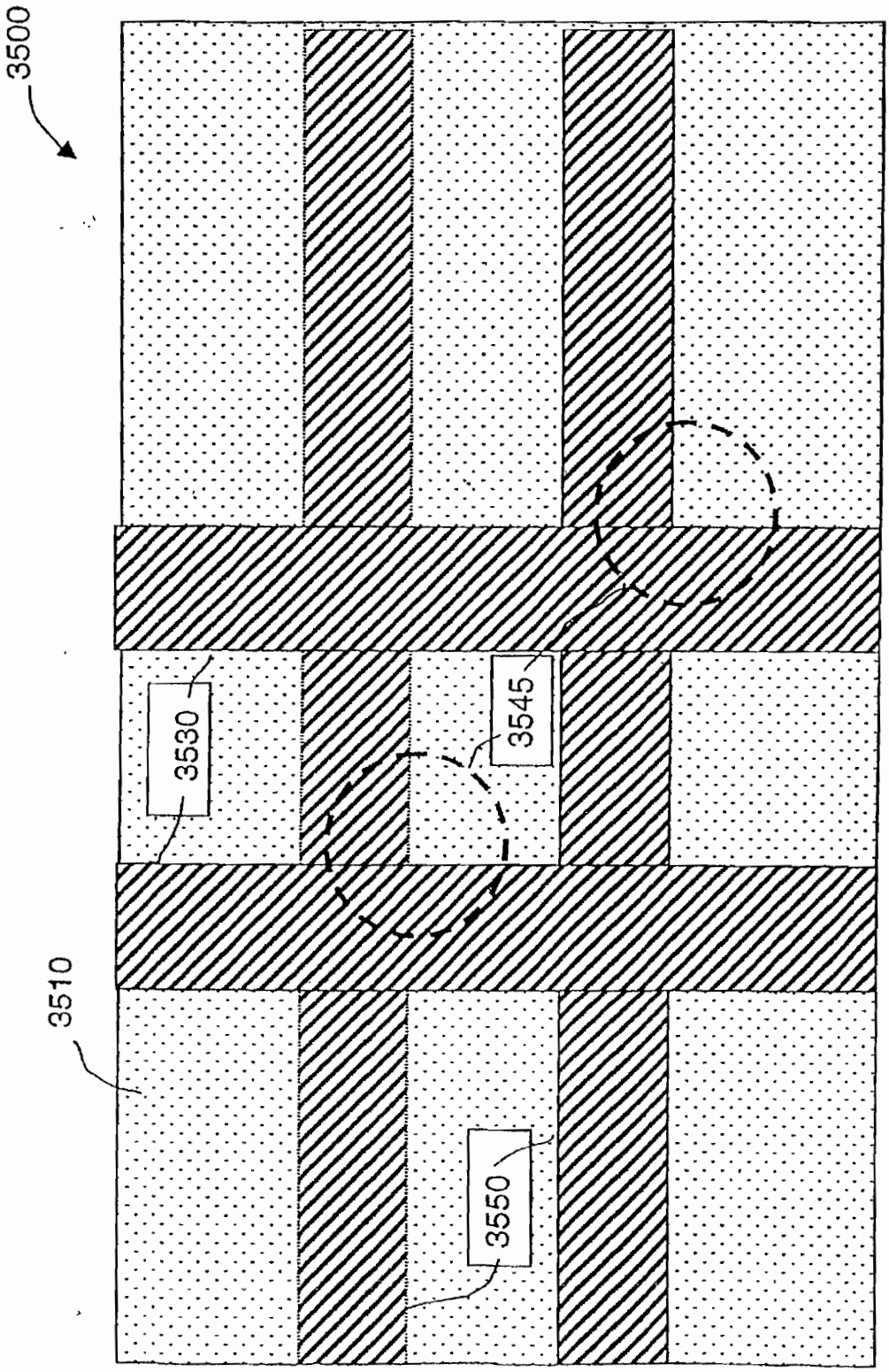


Figure 36