FIG. 1

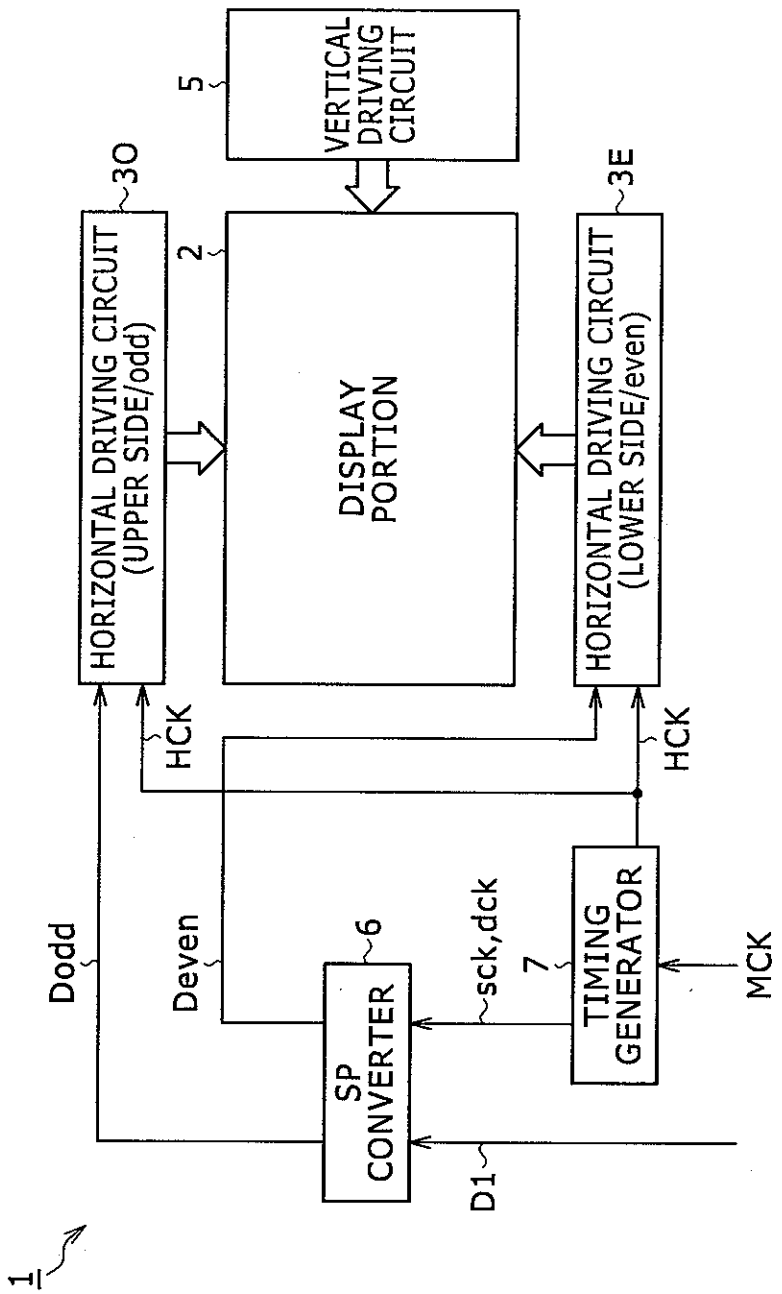

1
5
VERTICAL DRIVING CIRCUIT
3O
HORIZONTAL DRIVING CIRCUIT (UPPER SIDE/odd)
2
DISPLAY PORTION
3E
HORIZONTAL DRIVING CIRCUIT (LOWER SIDE/even)
HCK
HCK
Dodd
Deven
6
SP CONVERTER
sck,dck
7
TIMING GENERATOR
MCK
D1

FIG. 2

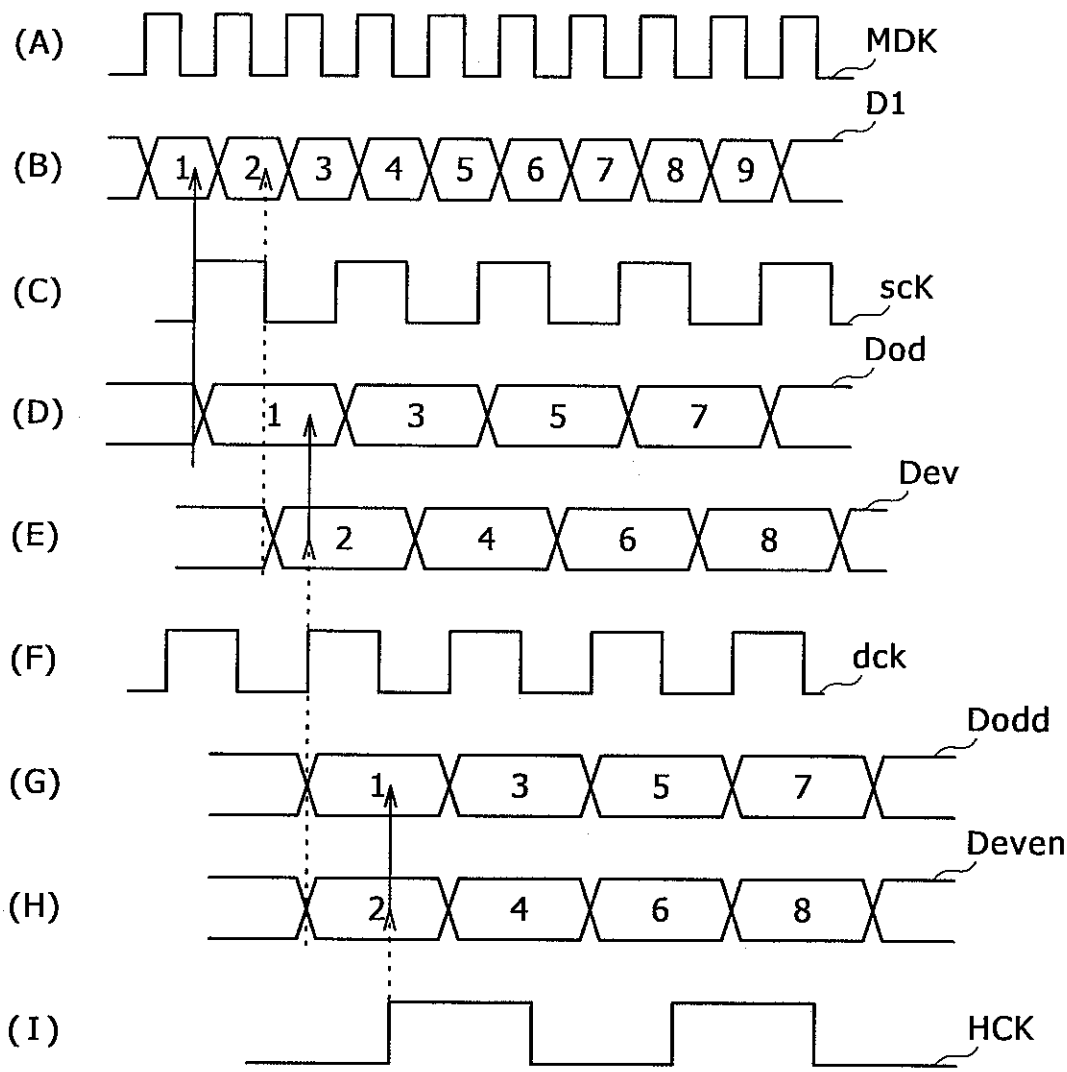

(A)
MDK
D1
(B)
1
2
3
4
5
6
7
8
9
(C)
scK
Dod
(D)
1
3
5
7
Dev
(E)
2
4
6
8
(F)
dck
Dodd
(G)
1
3
5
7
Deven
(H)
2
4
6
8
(I)
HCK

FIG. 3

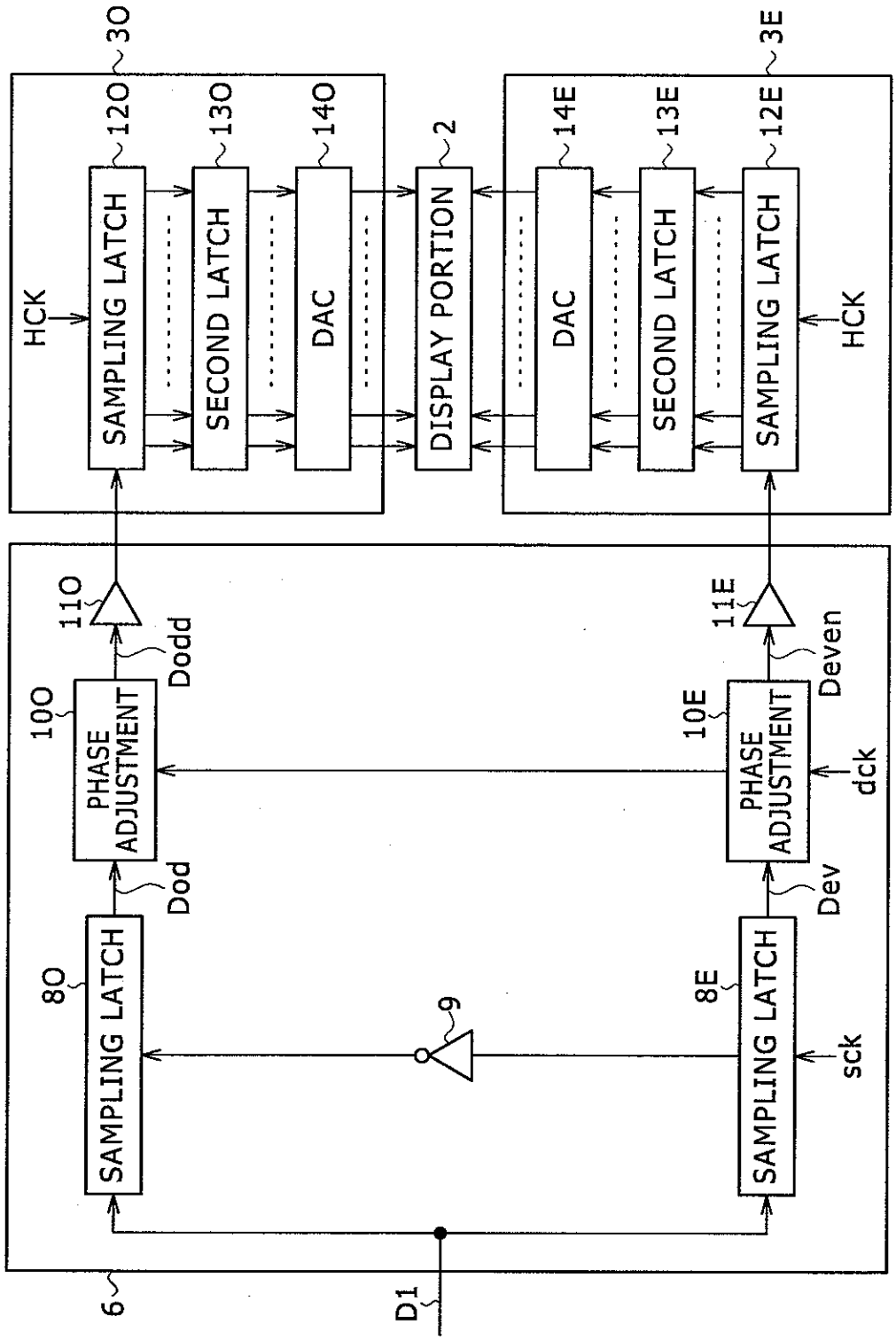

3O
3E
12O
13O
14O
2
14E
13E
12E
HCK
SAMPLING LATCH
SECOND LATCH
DAC
DISPLAY PORTION
DAC
SECOND LATCH
SAMPLING LATCH
HCK
11O
11E
Dodd
Deven
10O
10E
PHASE ADJUSTMENT
PHASE ADJUSTMENT
dck
Dod
Dev
8O
8E
9
SAMPLING LATCH
SAMPLING LATCH
sck
6
D1

FIG. 4

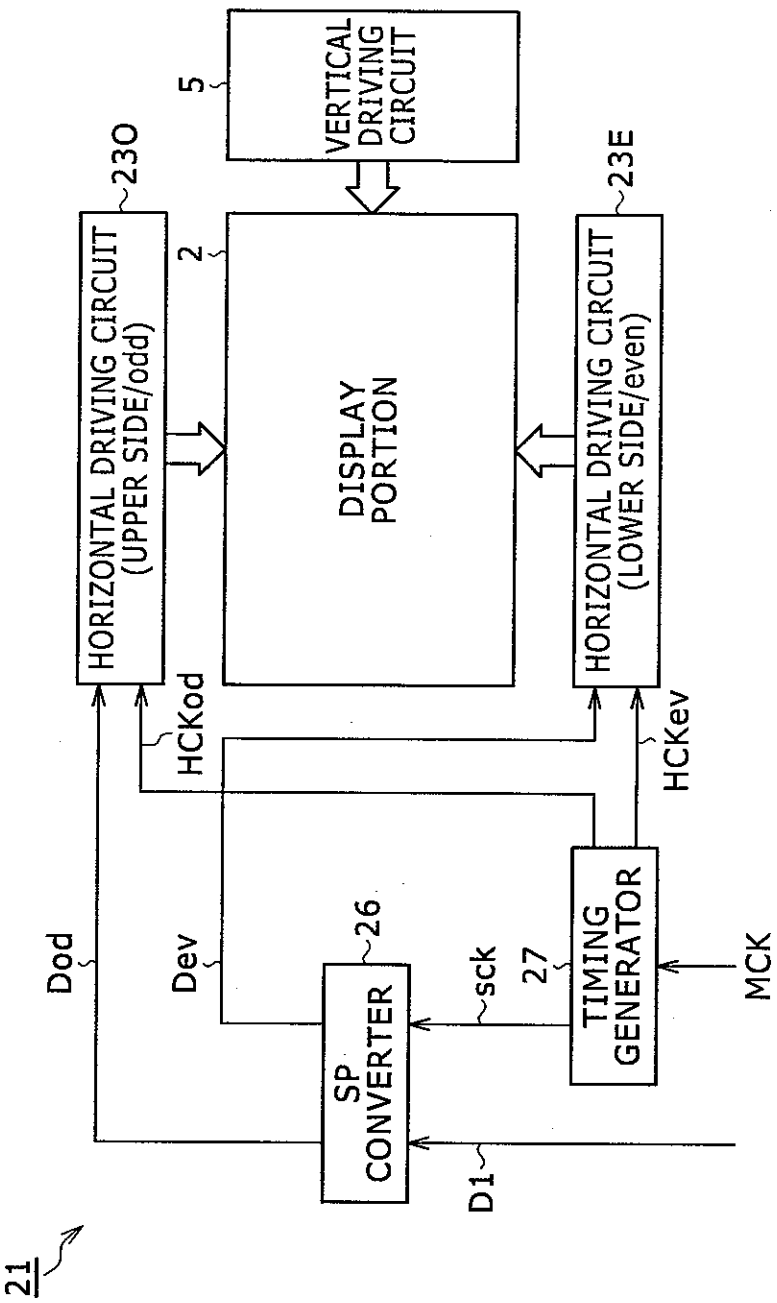

21
VERTICAL DRIVING CIRCUIT
5
HORIZONTAL DRIVING CIRCUIT (UPPER SIDE/odd)
23O
DISPLAY PORTION
2
HORIZONTAL DRIVING CIRCUIT (LOWER SIDE/even)
23E
HCKod
HCKev
Dod
Dev
SP CONVERTER
26
sck
TIMING GENERATOR
27
MCK
D1

FIG. 5

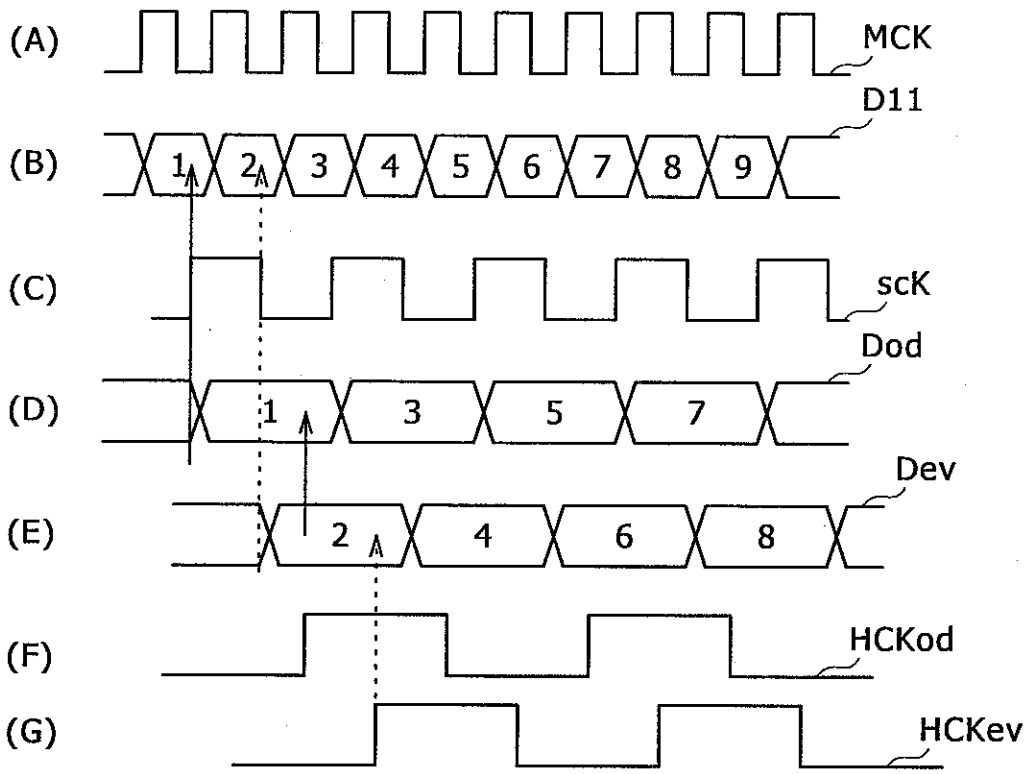


FIG. 6

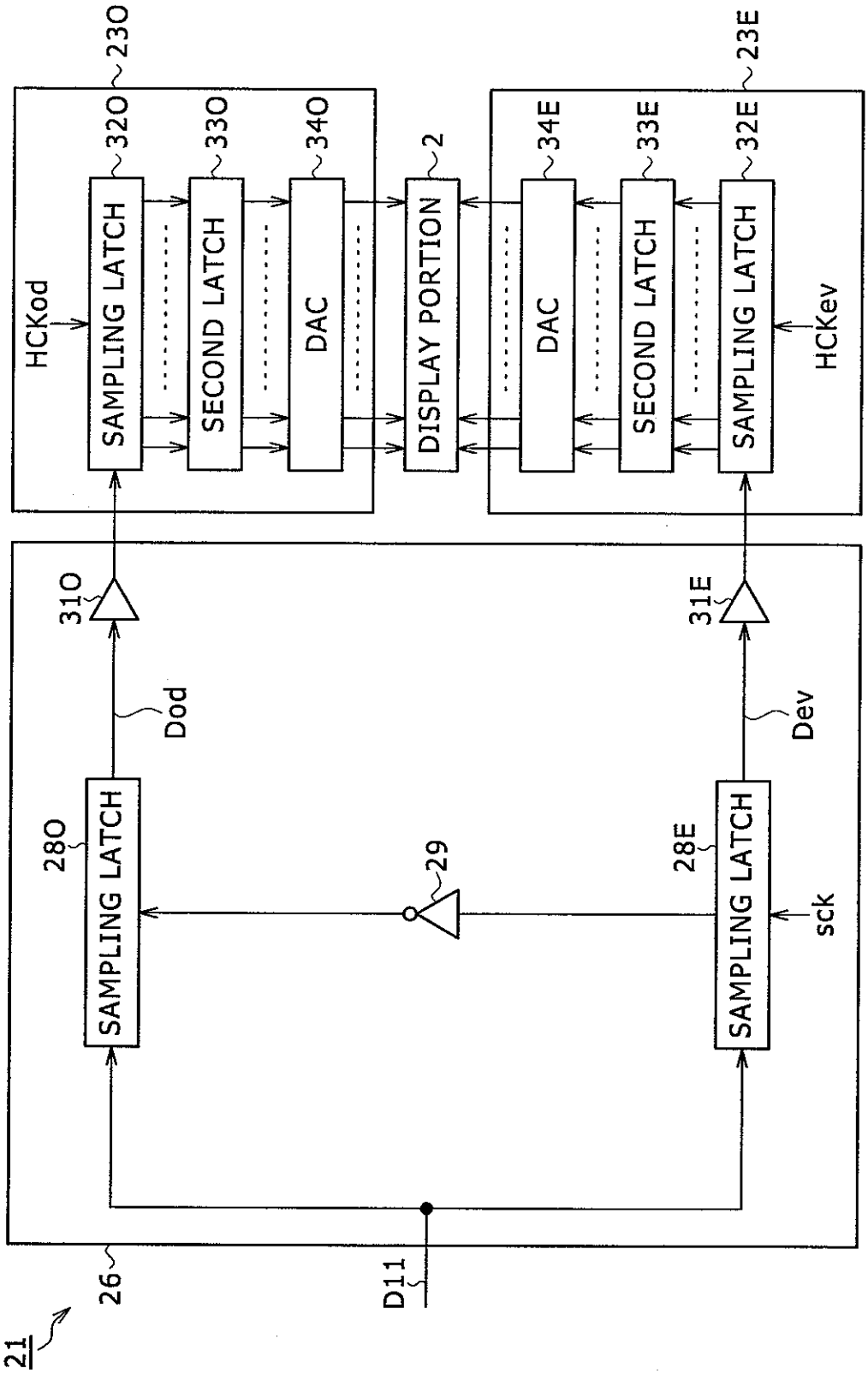

21
26
D11
28O
SAMPLING LATCH
29
28E
SAMPLING LATCH
sck
31O
Dod
31E
Dev
23O
32O
SAMPLING LATCH
33O
SECOND LATCH
34O
DAC
HCKod
2
DISPLAY PORTION
23E
34E
DAC
33E
SECOND LATCH
32E
SAMPLING LATCH
HCKev

FIG. 7

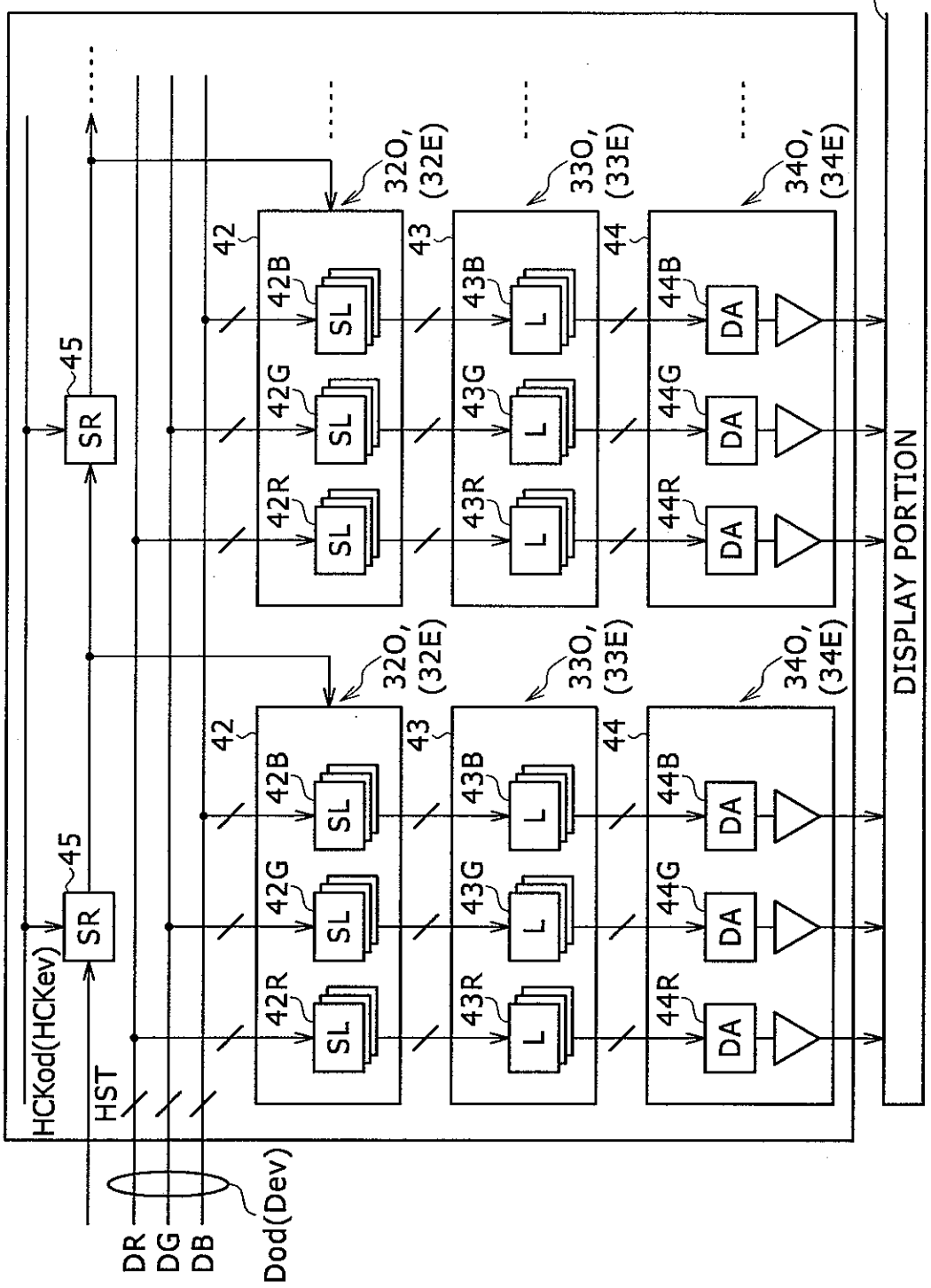

2
DISPLAY PORTION
HCKod(HCKev)
HST
DR
DG
DB
Dod(Dev)
45
SR
42
43
44
42R
42G
42B
43R
43G
43B
44R
44G
44B
SL
L
DA
32O, (32E)
33O, (33E)
34O, (34E)

FIG. 8

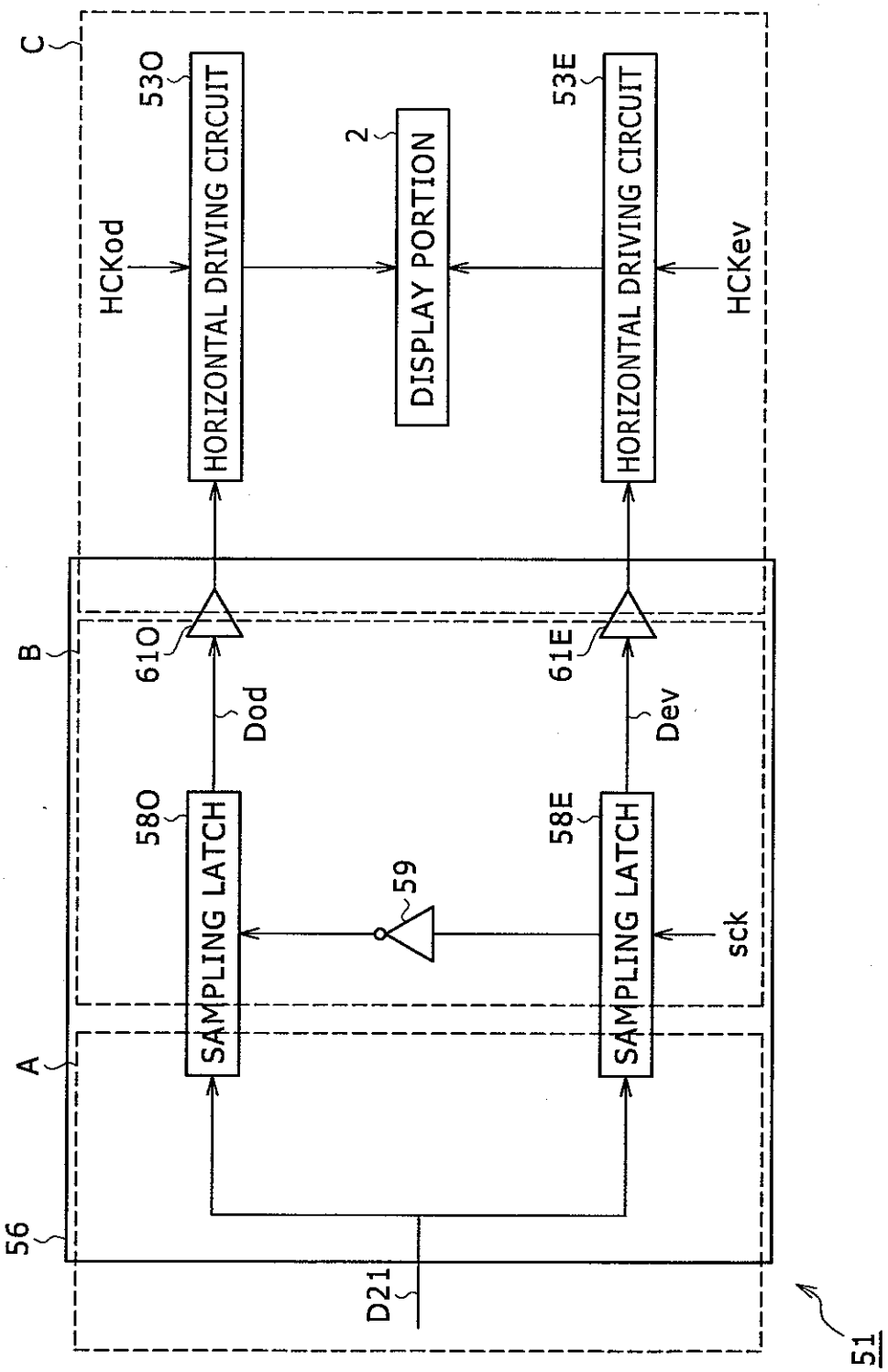

C
53O
HORIZONTAL DRIVING CIRCUIT
2
DISPLAY PORTION
53E
HORIZONTAL DRIVING CIRCUIT
HCKod
HCKev
B
61O
61E
Dod
Dev
58O
58E
SAMPLING LATCH
59
SAMPLING LATCH
sck
A
56
D21
51

FIG. 9

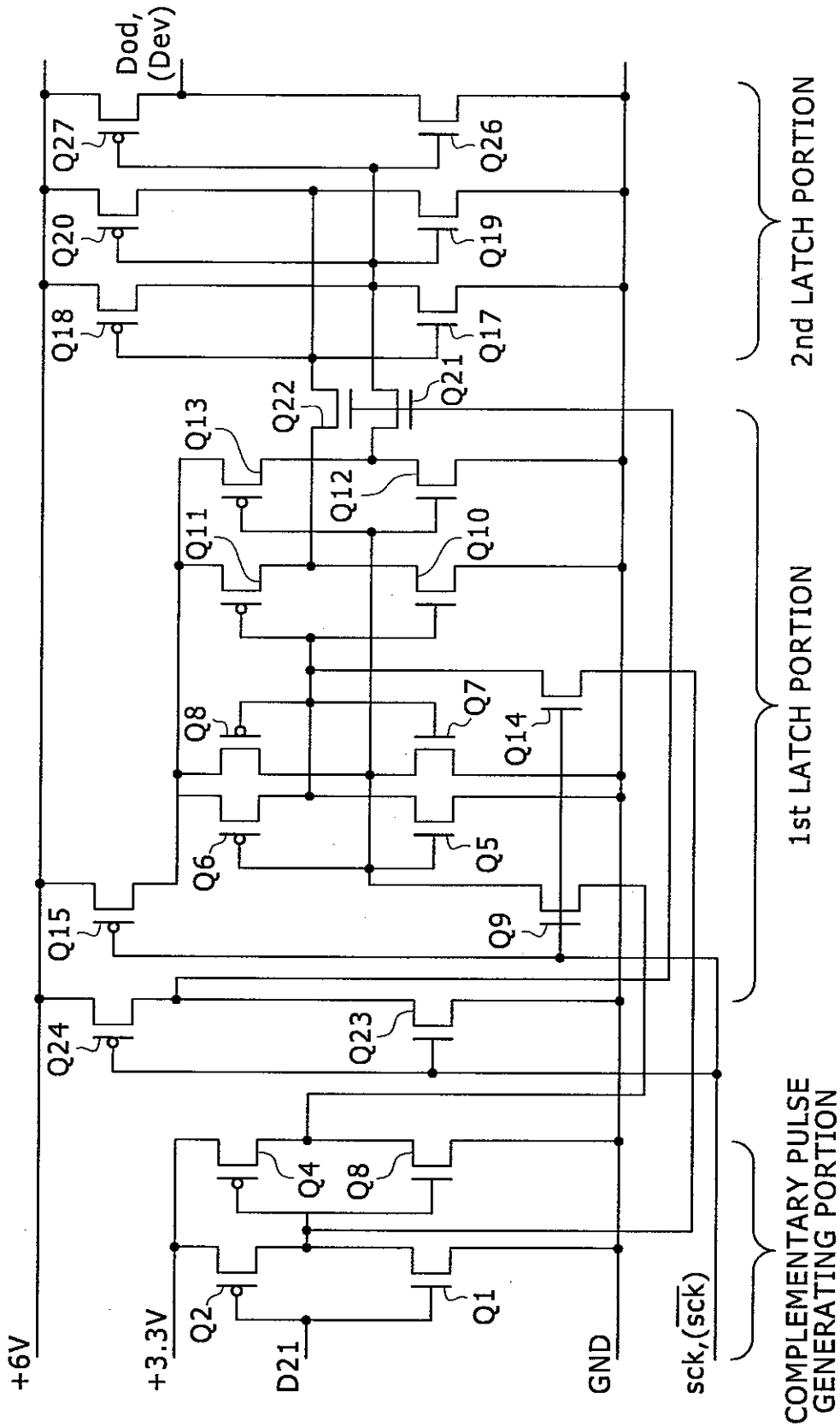
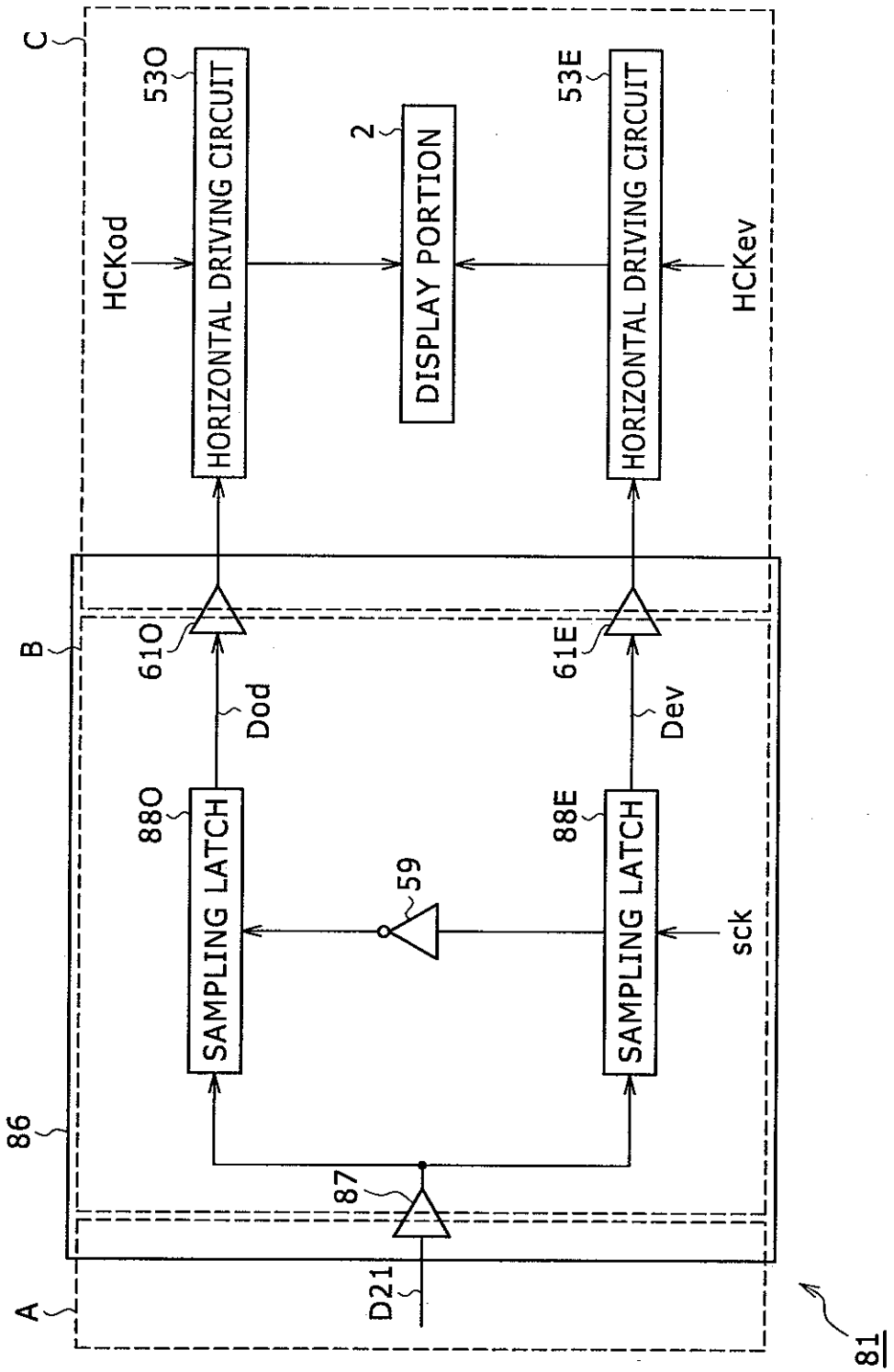

+6V
+3.3V
D21
Q2
Q4
Q8
Q1
GND
sck, (sck)
COMPLEMENTARY PULSE GENERATING PORTION
Q24
Q23
Q15
Q9
Q6
Q5
Q8
Q7
Q14
Q11
Q10
Q13
Q12
Q22
Q21
Q18
Q17
Q20
Q19
Q27
Q26
Dod, (Dev)
1st LATCH PORTION
2nd LATCH PORTION

FIG.10


C
53O
HORIZONTAL DRIVING CIRCUIT
2
DISPLAY PORTION
53E
HORIZONTAL DRIVING CIRCUIT
HCKod
HCKev
B
61O
61E
Dod
Dev
88O
SAMPLING LATCH
59
88E
SAMPLING LATCH
sck
86
87
A
D21
81

1, 21, 51, 81 : LIQUID CRYSTAL DISPLAY APPARATUS

2 : DISPLAY PORTION

3O, 3E, 23O, 23E, 53O, 53E : HORIZONTAL DRIVING CIRCUIT

5 : VERTICAL DRIVING CIRCUIT

6, 26, 56, 86 : SERIAL-PARALLEL CONVERTER

7, 27 : TIMING GENERATOR

8O, 8E, 12O, 12E, 28O, 28E, 32O, 32E, 42, 42R, 42G, 42B, 58O, 58E, 88O, 88E : SAMPLING LATCH

9, 29 : INVERTER

10O, 10E : PHASE ADJUSTING CIRCUIT

11O, 11E, 31O, 31E, 61O, 61E : DATA OUTPUTTING CIRCUIT

13O, 13E, 33O, 33E, 43, 43R, 43G, 43B : LATCH

14O, 14E, 34O, 34E, 44, 44R, 44G, 44B : DIGITAL TO ANALOG CONVERTER

45 : SHIFT REGISTER

87 : LEVEL SHIFTING CIRCUIT

Q1-Q15, Q17-Q24, Q26, Q27 : TRANSISTOR