FIG. 1

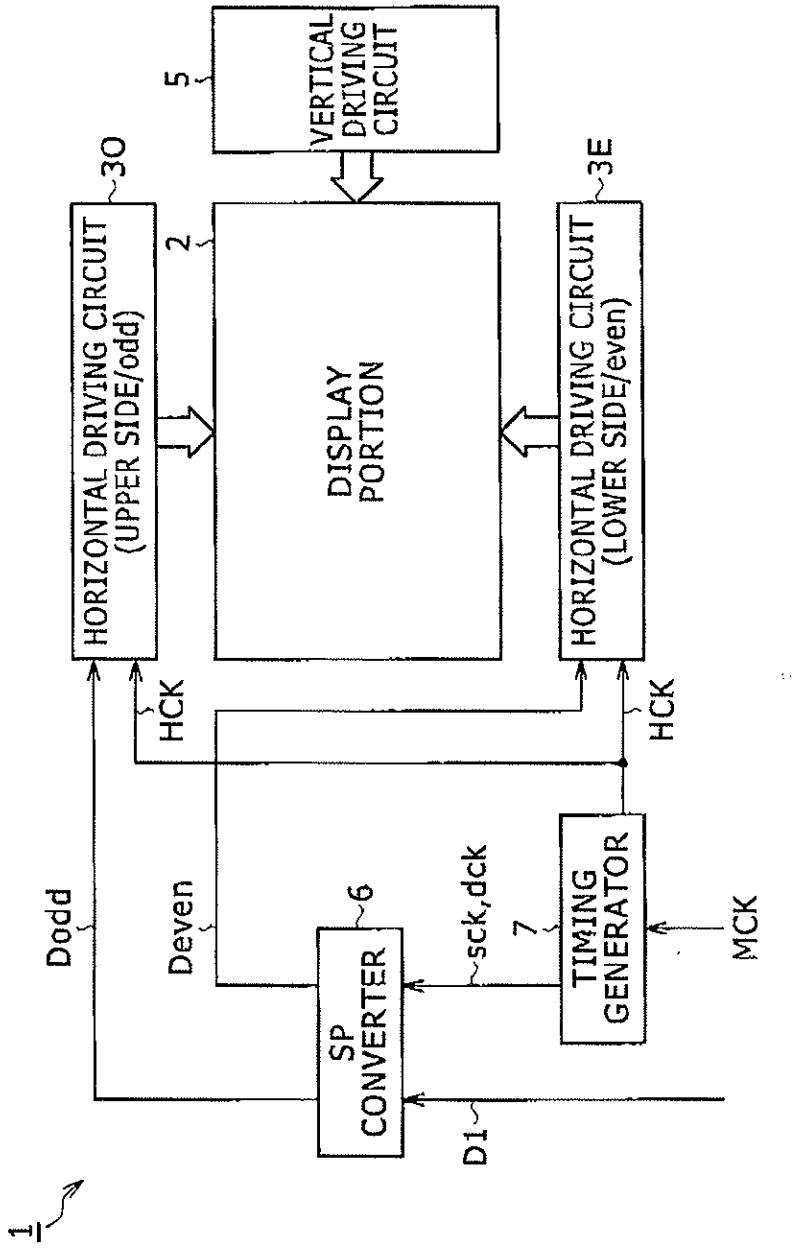

1
5
VERTICAL DRIVING CIRCUIT
30
HORIZONTAL DRIVING CIRCUIT (UPPER SIDE/odd)
2
DISPLAY PORTION
3E
HORIZONTAL DRIVING CIRCUIT (LOWER SIDE/even)
HCK
HCK
Dodd
Deven
6
SP CONVERTER
sck,dck
7
TIMING GENERATOR
MCK
D1

FIG. 2

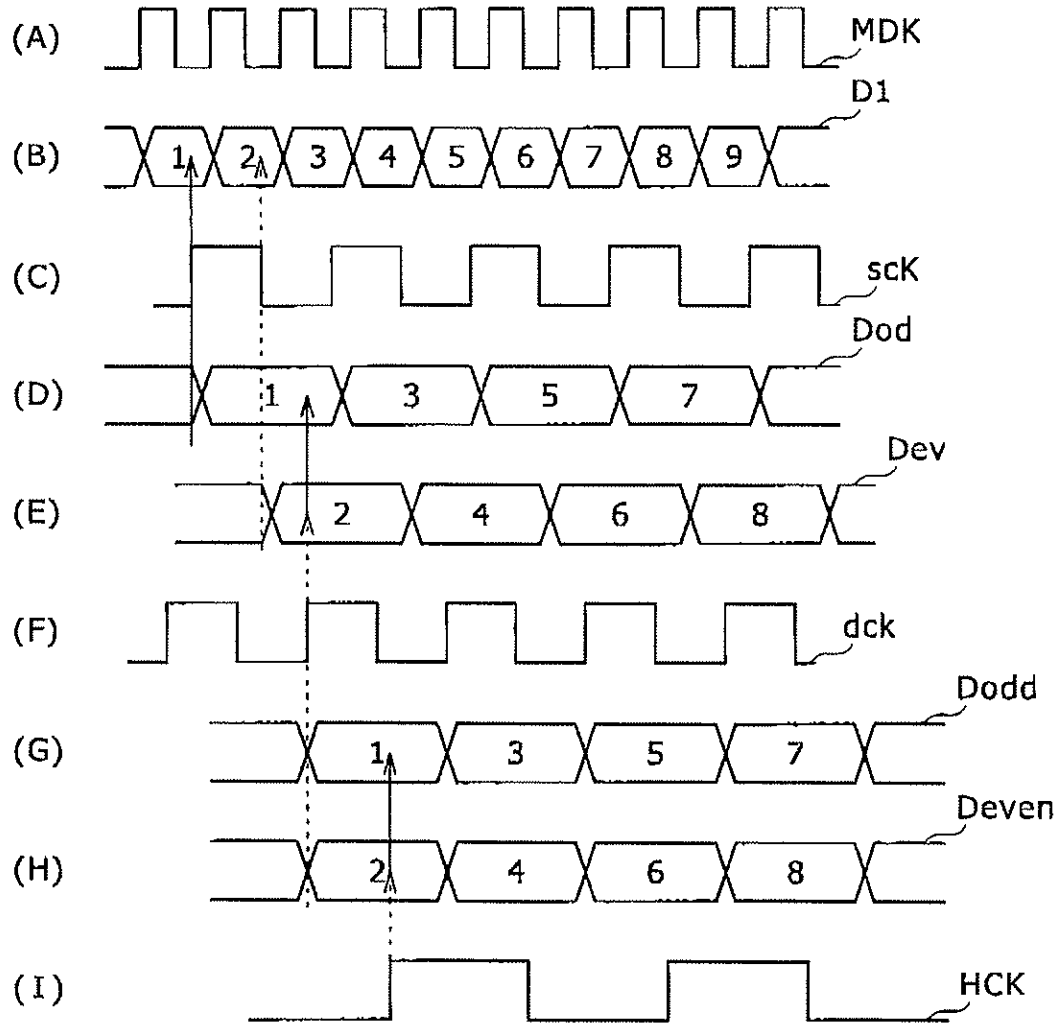

(A)
MDK
D1
(B)
1
2
3
4
5
6
7
8
9
(C)
scK
Dod
(D)
1
3
5
7
Dev
(E)
2
4
6
8
(F)
dck
Dodd
(G)
1
3
5
7
Deven
(H)
2
4
6
8
(I)
HCK

FIG. 3

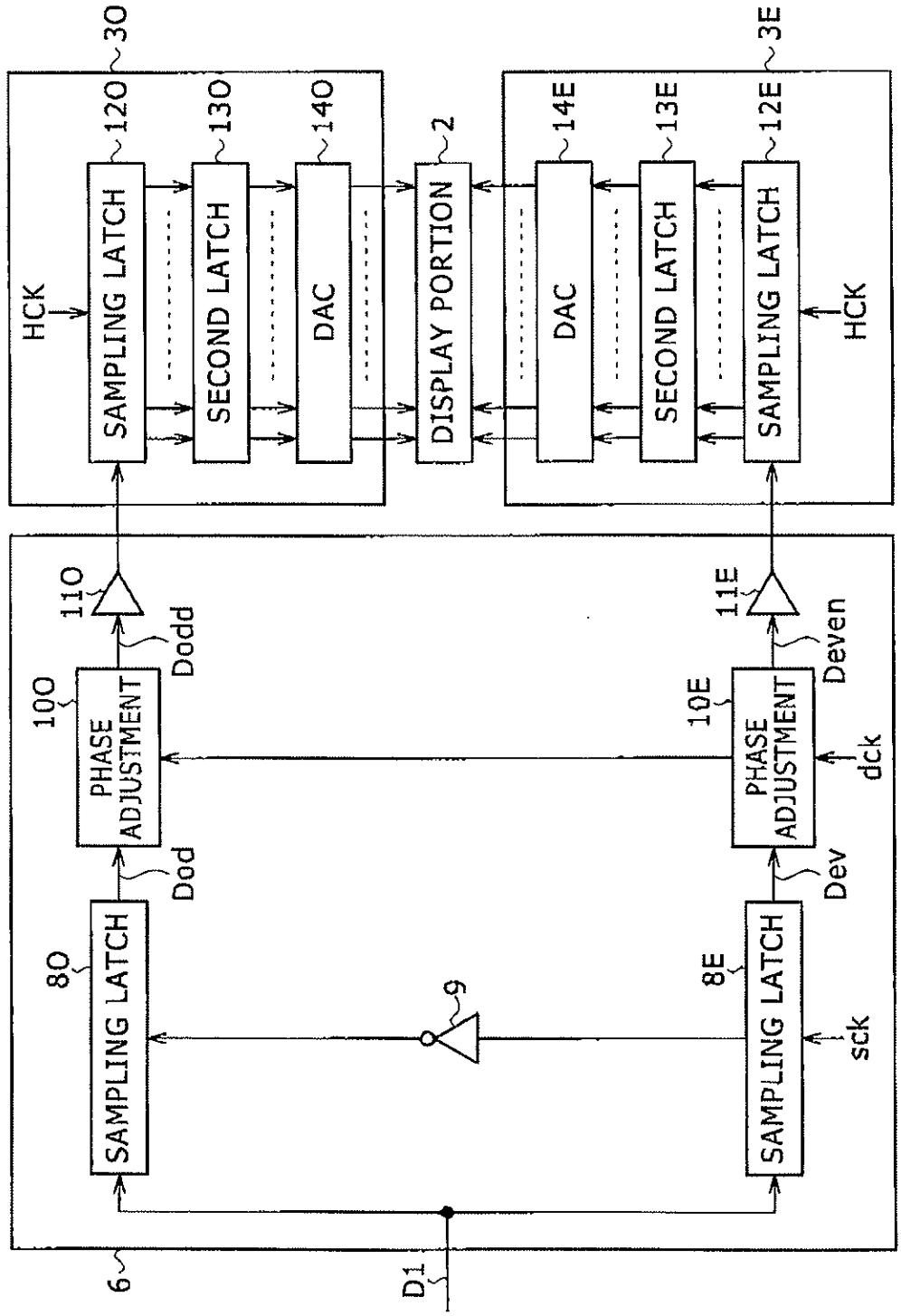

30
120
130
140
2
14E
13E
12E
3E
HCK
SAMPLING LATCH
SECOND LATCH
DAC
DISPLAY PORTION
DAC
SECOND LATCH
SAMPLING LATCH
HCK
110
11E
Dodd
Deven
100
10E
PHASE ADJUSTMENT
PHASE ADJUSTMENT
dck
Dod
Dev
80
8E
9
SAMPLING LATCH
SAMPLING LATCH
sck
6
D1

FIG. 4

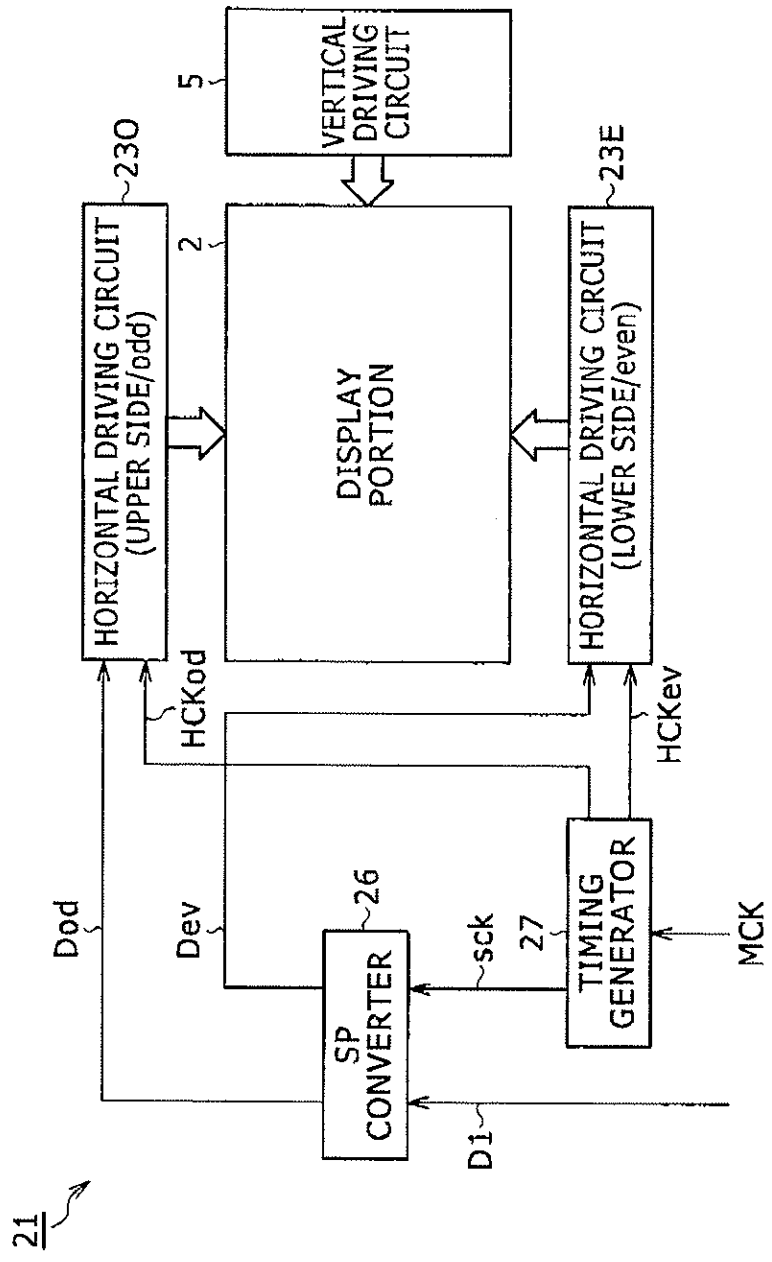

21
VERTICAL DRIVING CIRCUIT
5
HORIZONTAL DRIVING CIRCUIT (UPPER SIDE/odd)
23O
DISPLAY PORTION
2
HORIZONTAL DRIVING CIRCUIT (LOWER SIDE/even)
23E
HCKod
HCKev
Dod
Dev
SP CONVERTER
26
sck
TIMING GENERATOR
27
MCK
D1

FIG. 5

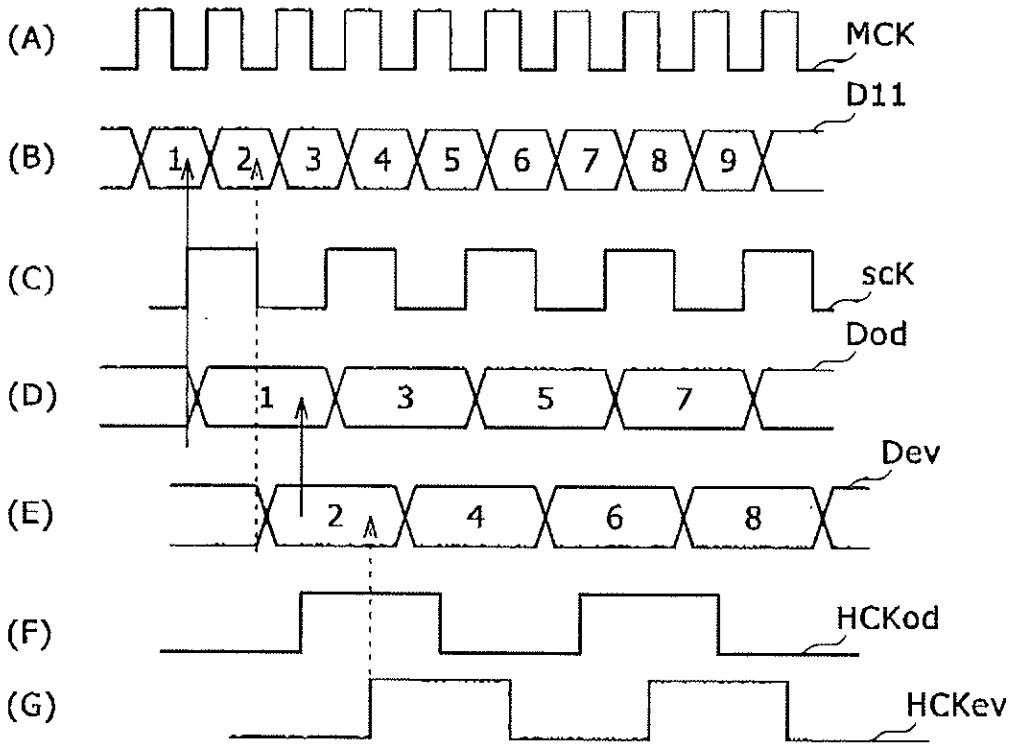


FIG. 6

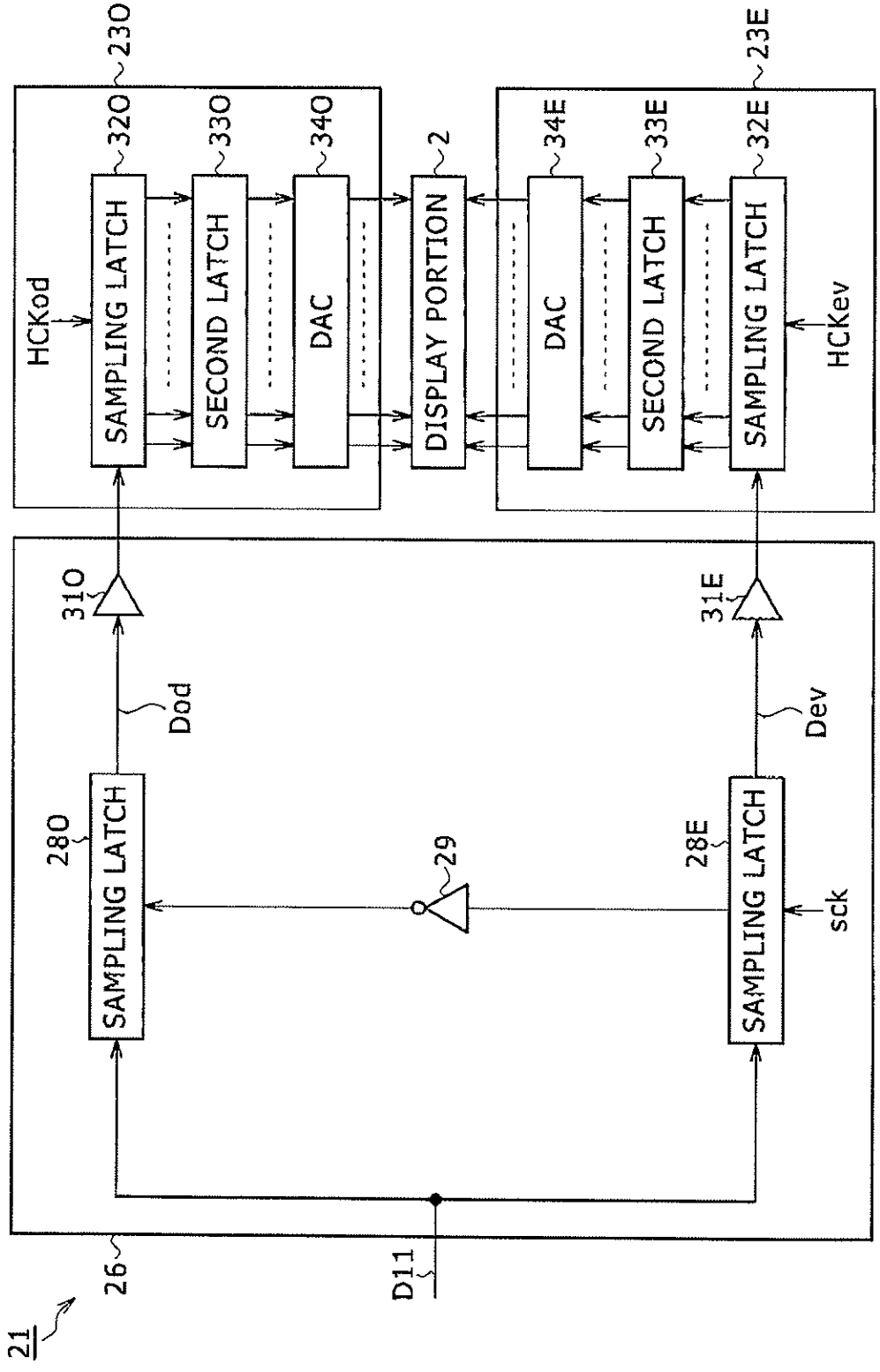

21
26
D11
280
SAMPLING LATCH
29
28E
SAMPLING LATCH
sck
310
Dod
31E
Dev
320
SAMPLING LATCH
330
SECOND LATCH
340
DAC
2
DISPLAY PORTION
34E
DAC
33E
SECOND LATCH
32E
SAMPLING LATCH
230
23E
HCKod
HCKev

FIG. 7

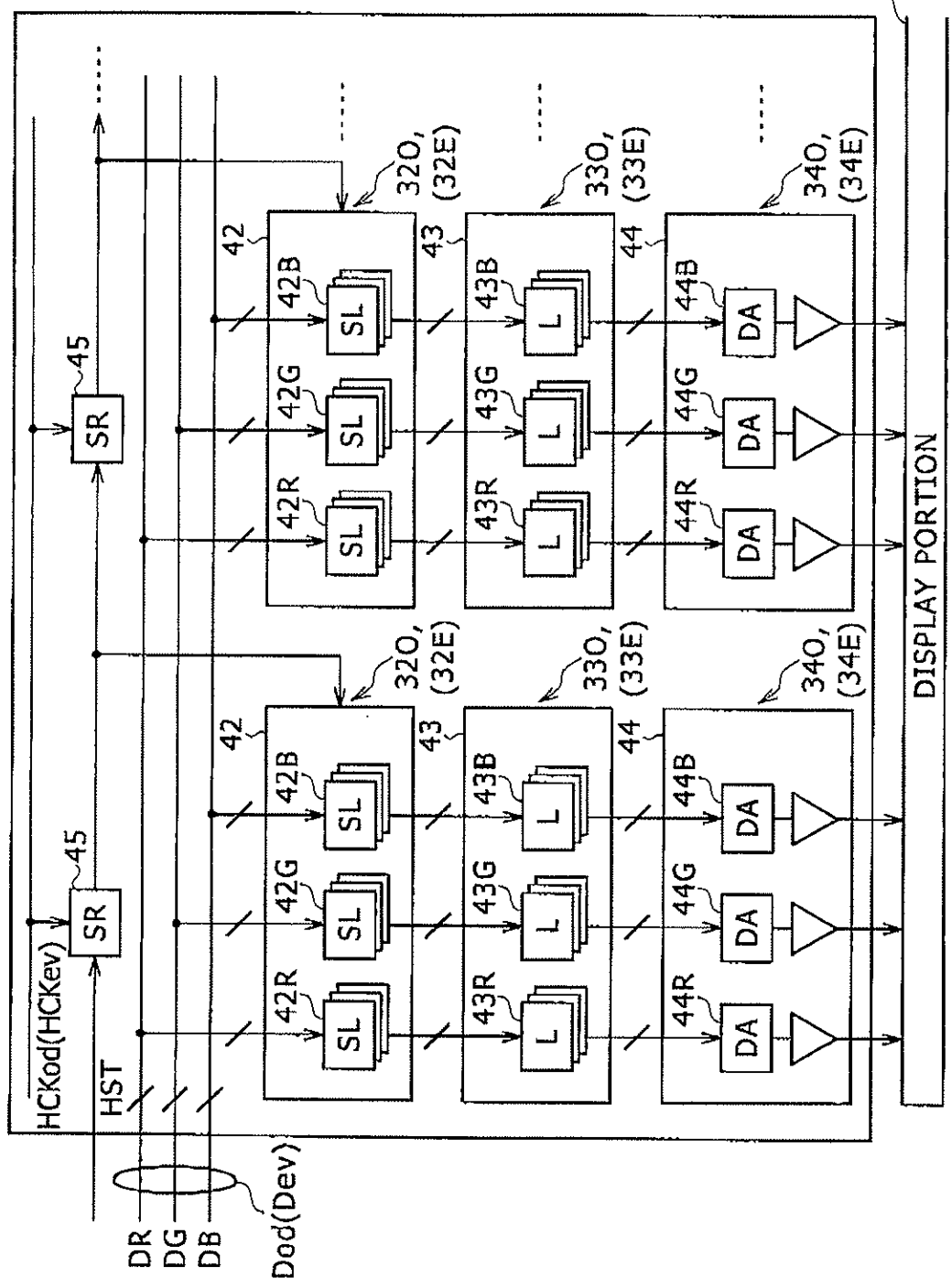

2
DISPLAY PORTION
45
SR
HCKod(HCKev)
HST
DR
DG
DB
Dod(Dev)
42
42B
42G
42R
SL
43
43B
43G
43R
L
44
44B
44G
44R
DA
32O, (32E)
33O, (33E)
34O, (34E)

FIG. 8

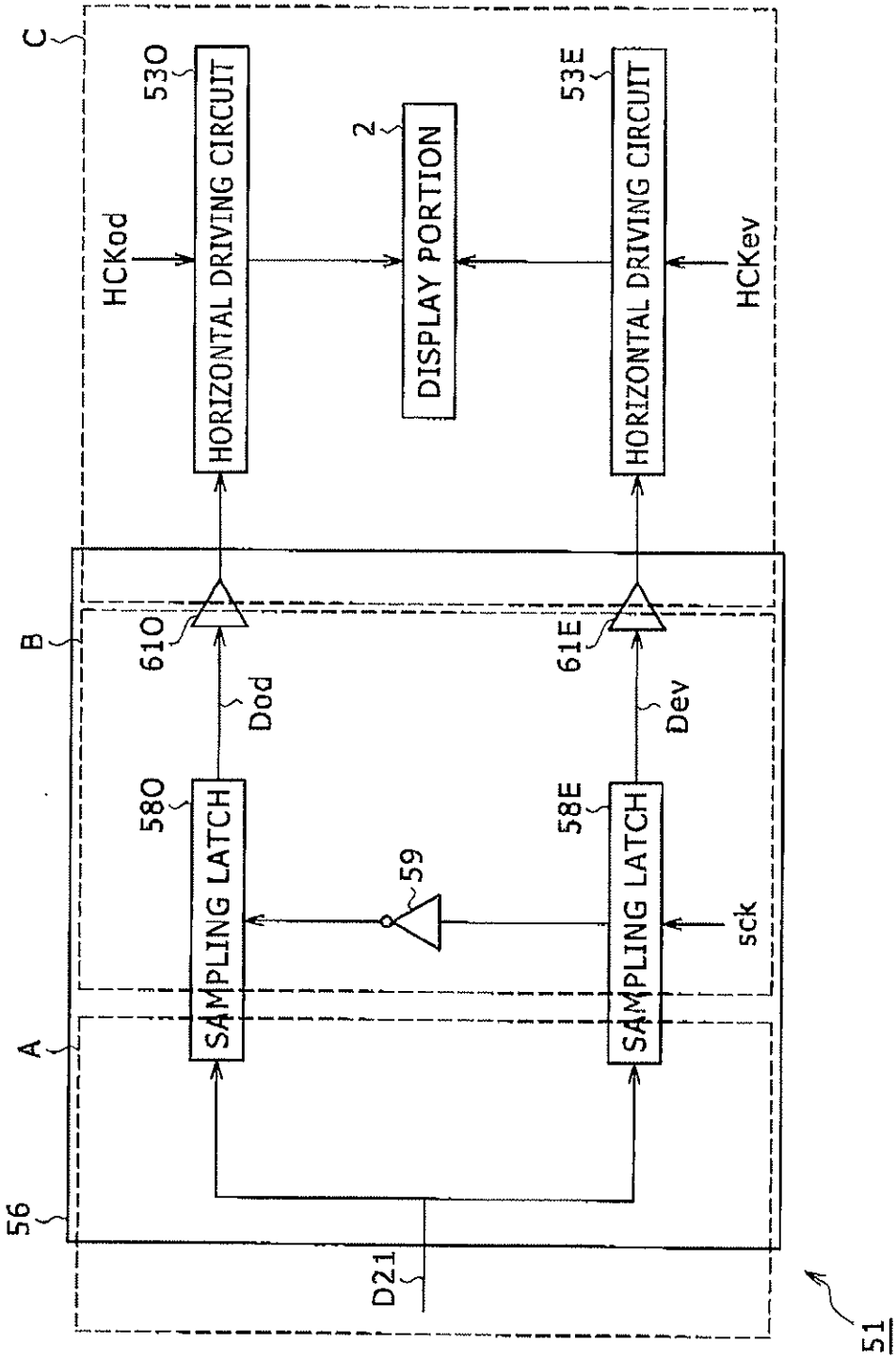

C
530
HORIZONTAL DRIVING CIRCUIT
2
DISPLAY PORTION
53E
HORIZONTAL DRIVING CIRCUIT
HCKod
HCKev
B
610
61E
Dod
Dev
580
SAMPLING LATCH
59
58E
SAMPLING LATCH
sck
A
56
D21
51

FIG. 9

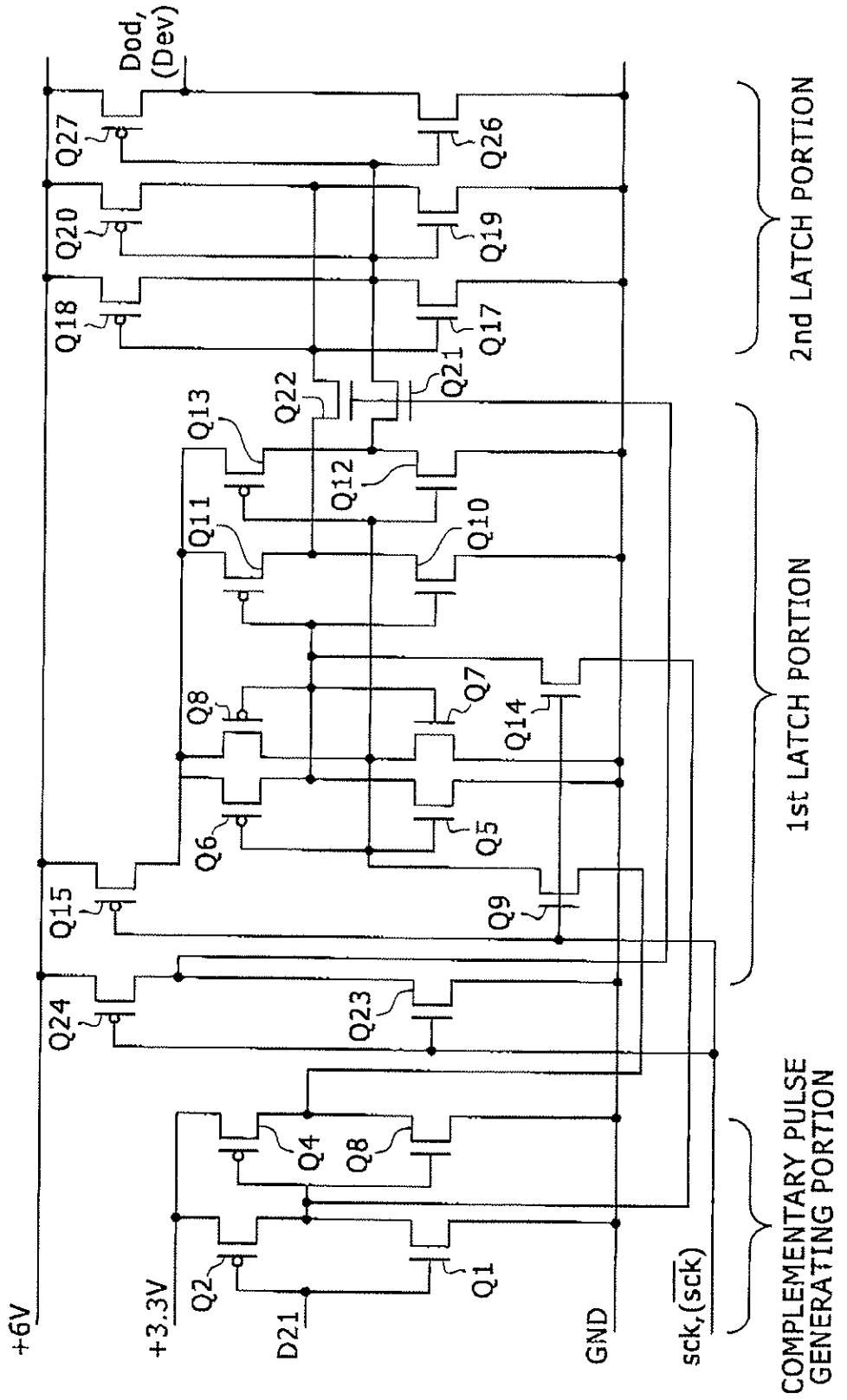
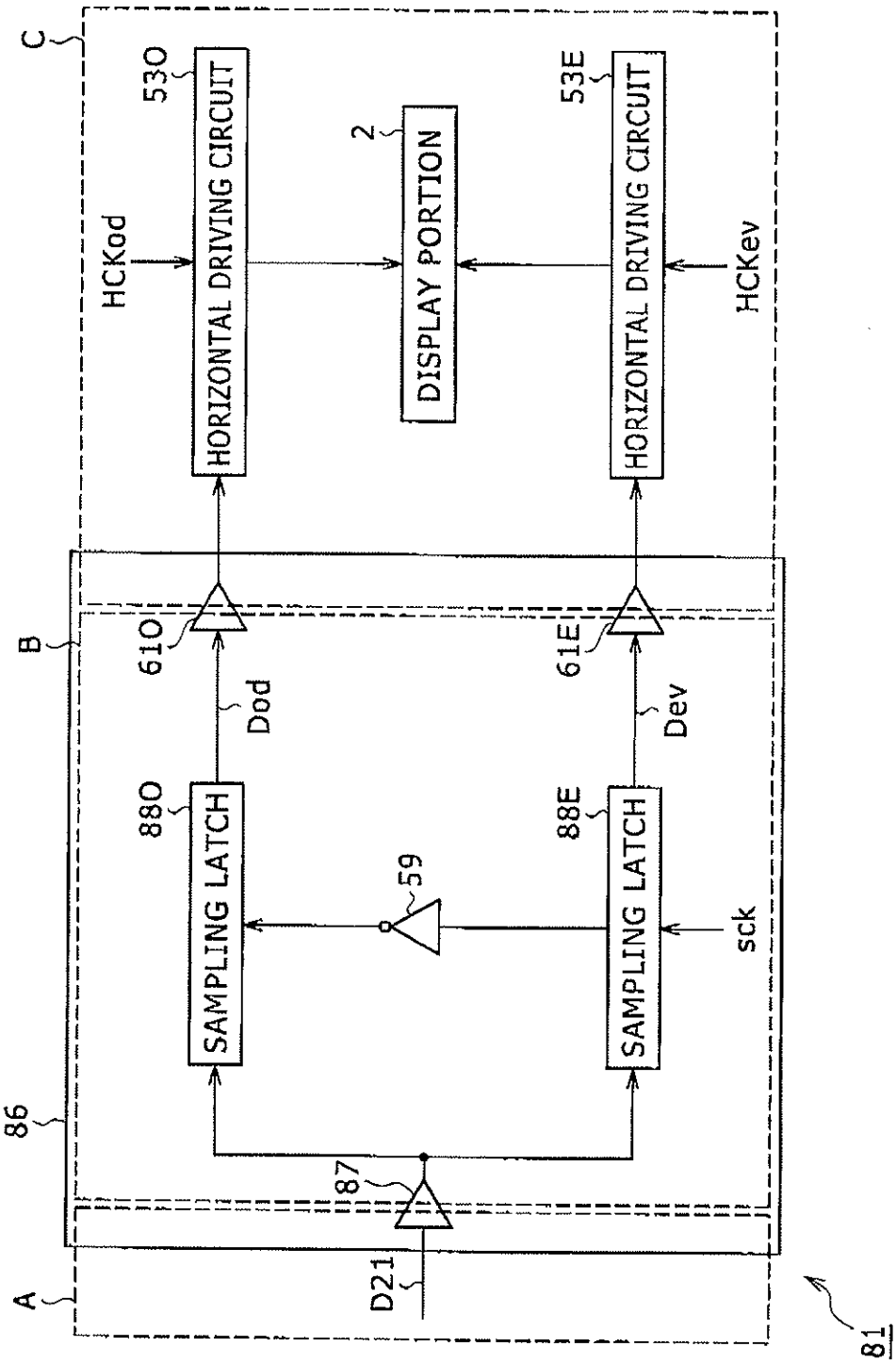

Dod, (Dev)
Q27
Q26
Q20
Q19
Q18
Q17
Q21
Q22
Q13
Q12
Q11
Q10
Q8
Q7
Q14
Q6
Q5
Q15
Q9
Q24
Q23
Q4
Q8
Q2
Q1
+6V
+3.3V
D21
GND
sck, (sck)
2nd LATCH PORTION
1st LATCH PORTION
COMPLEMENTARY PULSE GENERATING PORTION

FIG. 10


C
530
HORIZONTAL DRIVING CIRCUIT
2
DISPLAY PORTION
53E
HORIZONTAL DRIVING CIRCUIT
HCKod
HCKev
B
610
61E
Dod
Dev
880
SAMPLING LATCH
59
88E
SAMPLING LATCH
sck
86
87
D21
A
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