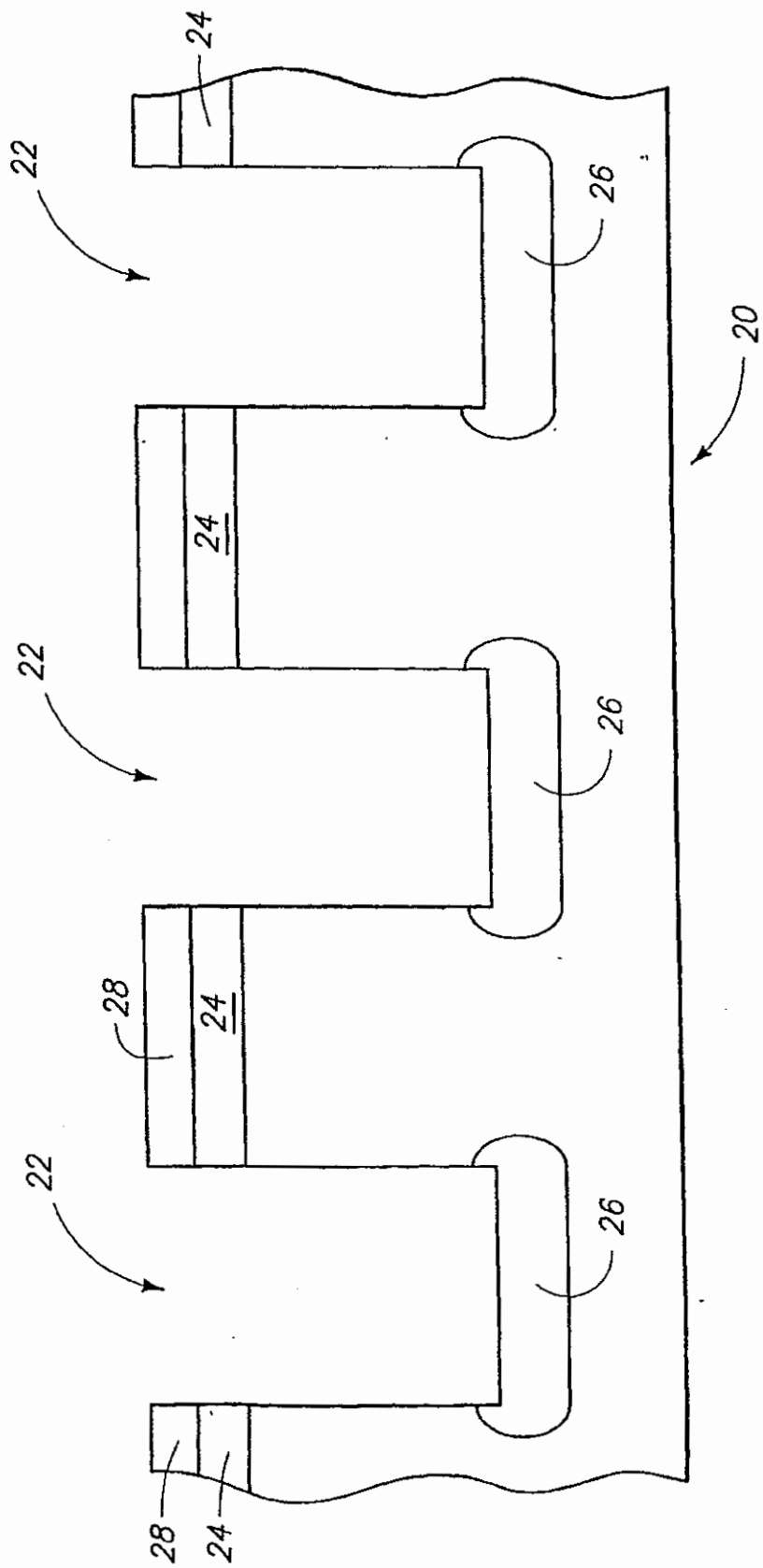


Fig. 1

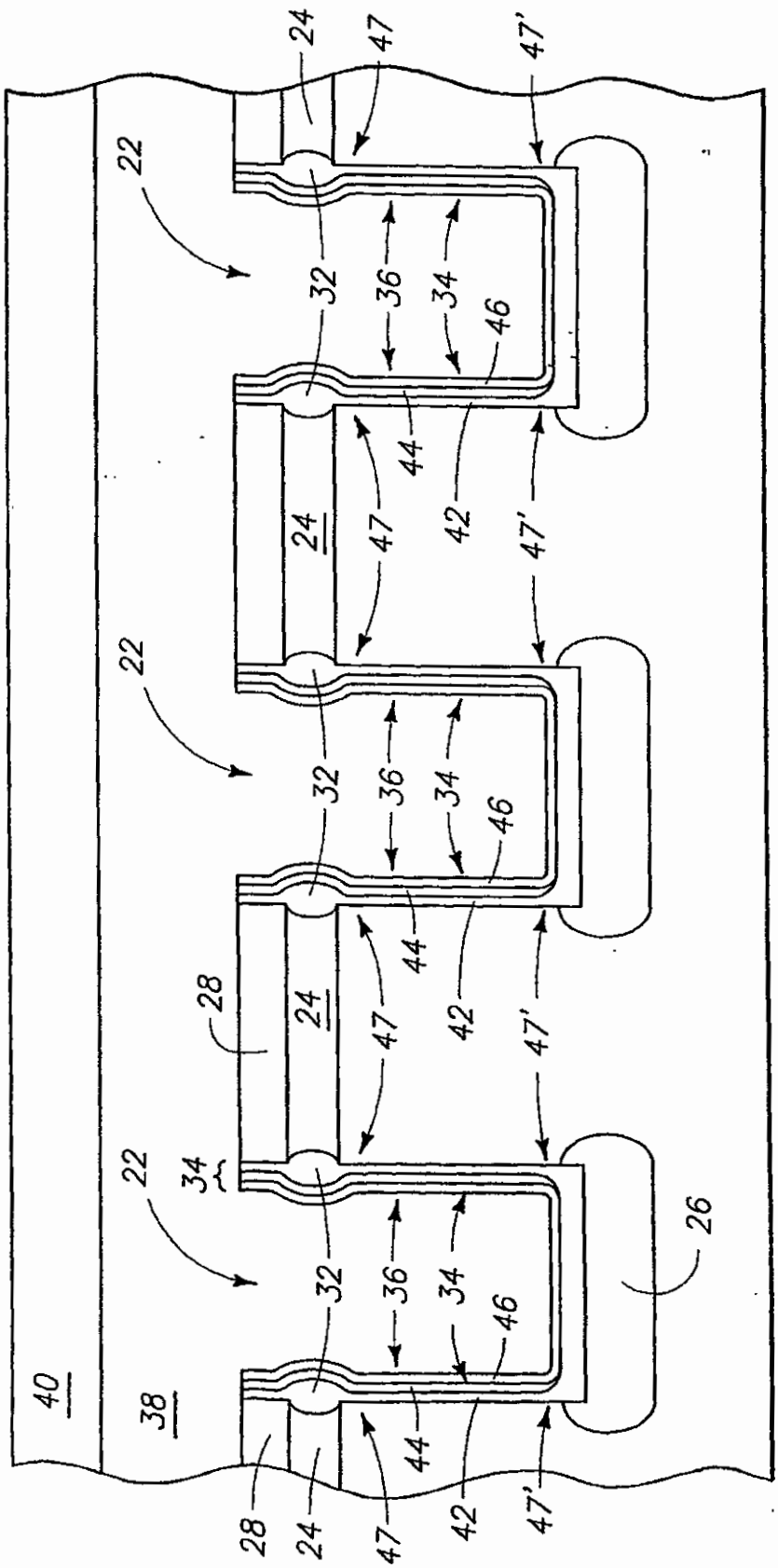

24
47
47'
22
32
36
34
46
20
44
42
24
47
47'
22
32
36
34
46
44
28
24
47
42
47'
22
34
32
36
34
46
26
40
38
28
24
47
42
47'

Fig. 2

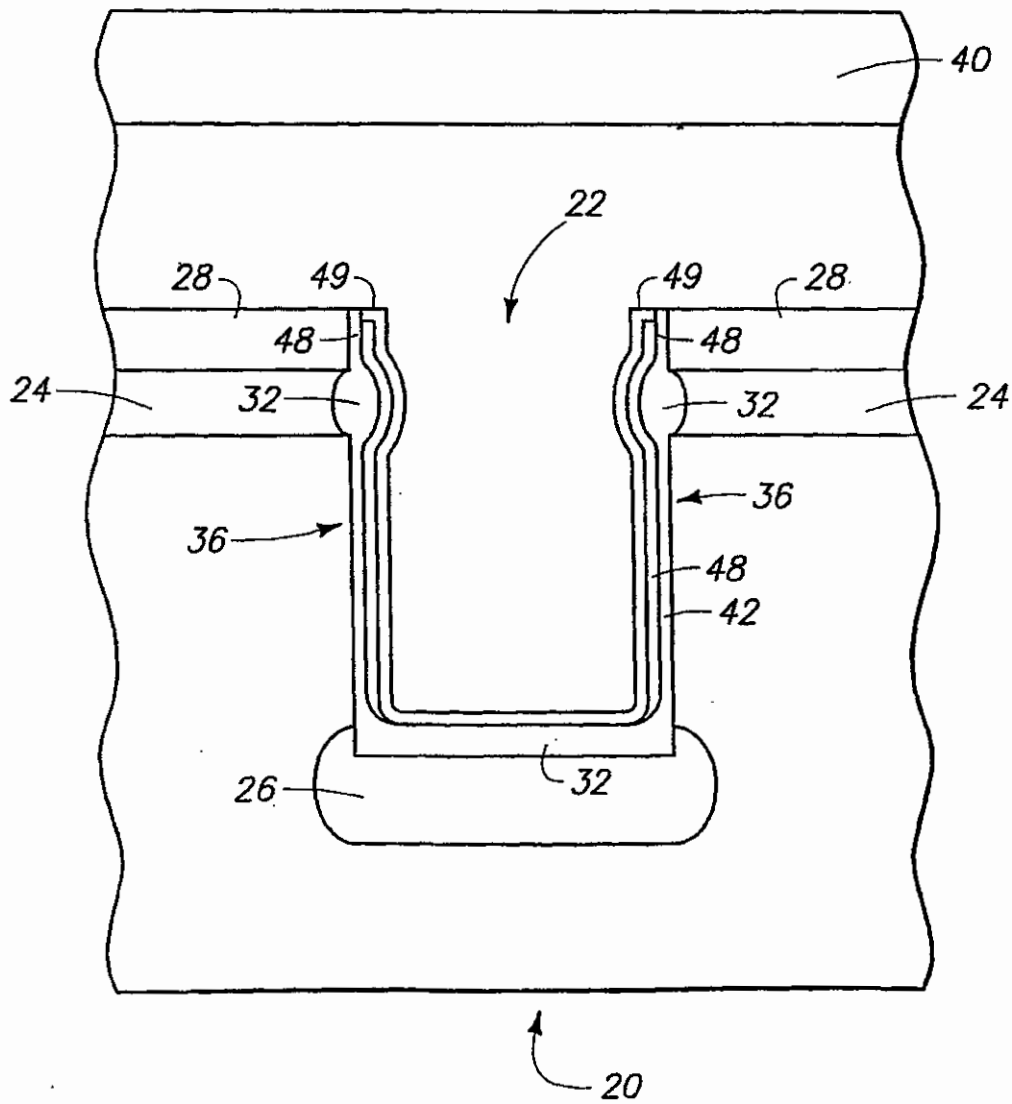


Fig. 3

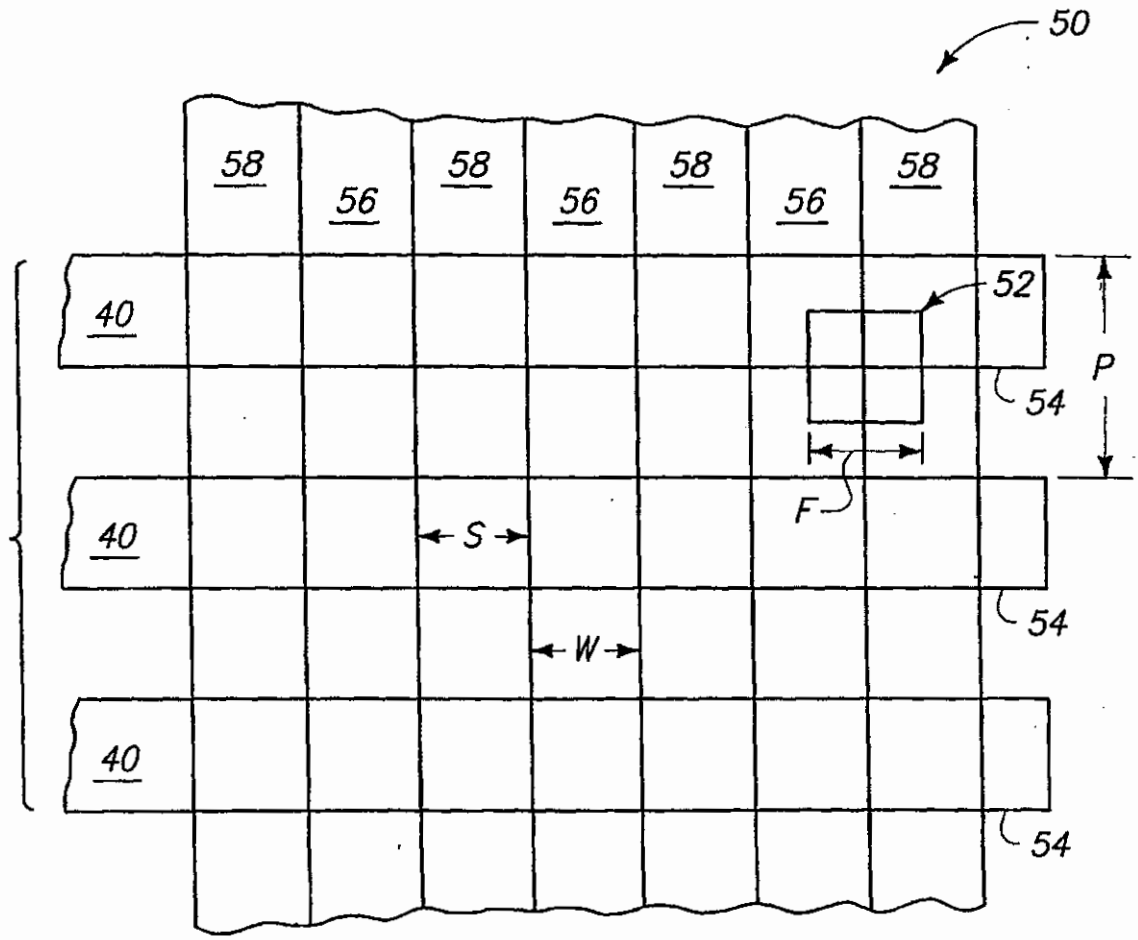

50
58
56
58
56
58
56
58
40
52
54
P
F
40
S
54
W
40
54

Fig. 4

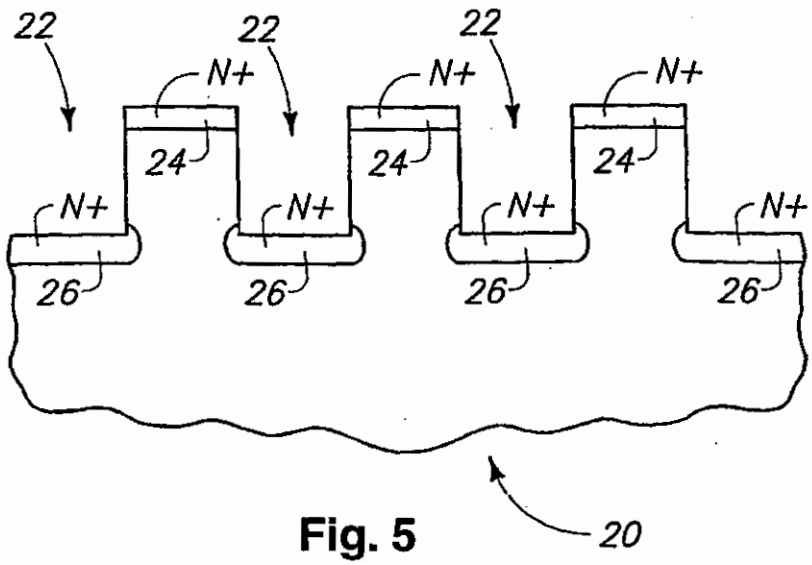

22
22
22
N+
N+
N+
24
24
24
N+
N+
N+
N+
26
26
26
26
20

Fig. 5

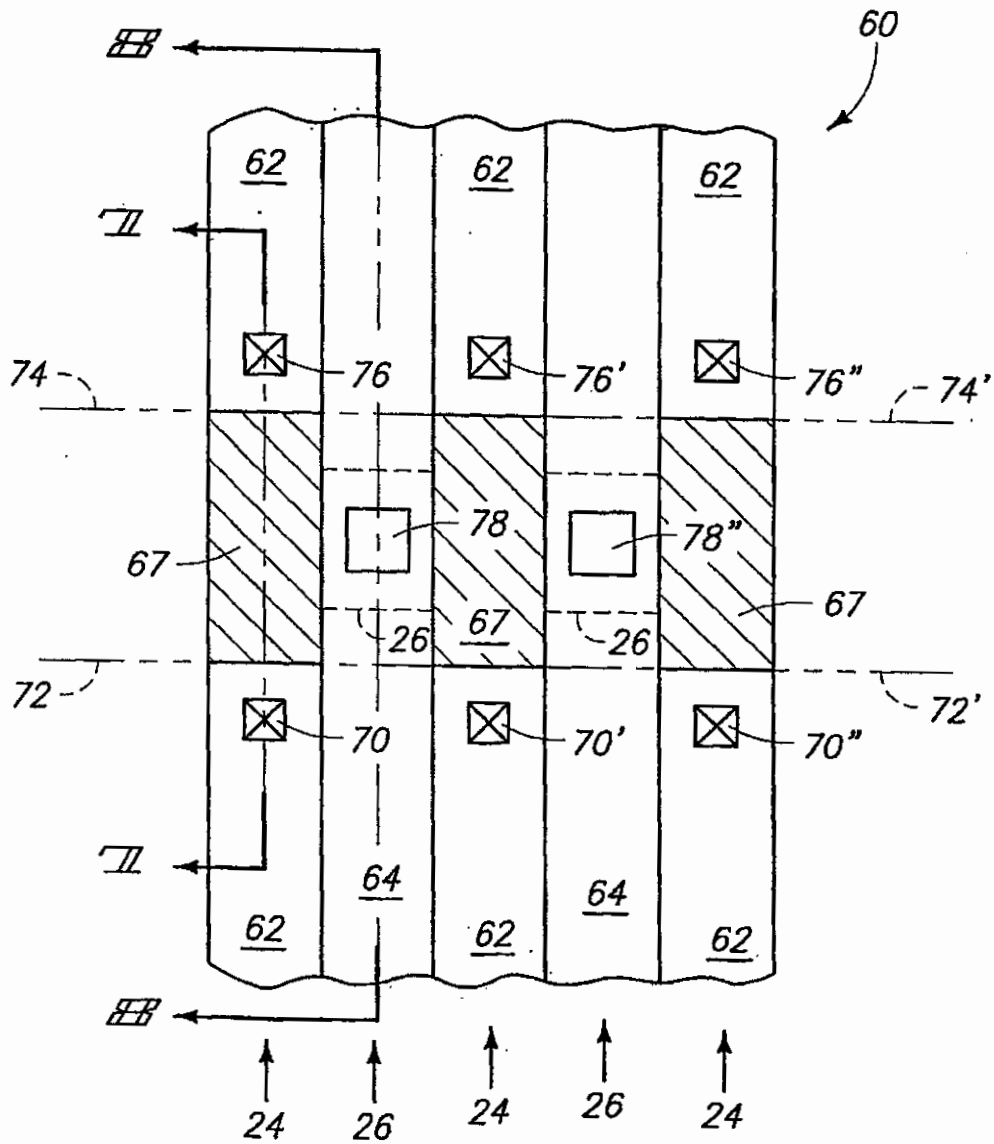

60
62
62
62
II
II
74
76
76'
76"
74'
78
78"
67
67
67
26
26
72
72'
70
70'
70"
64
64
62
62
62
24
26
24
26
24

Fig. 6

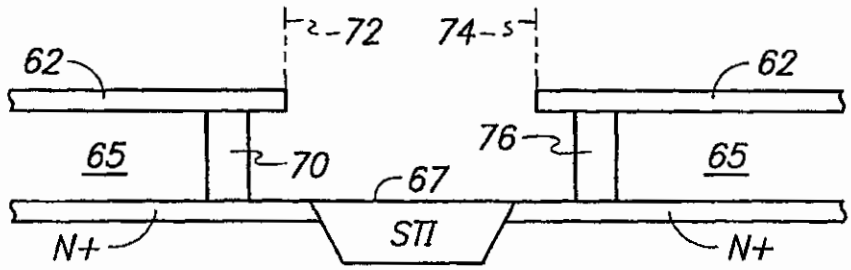


Fig. 7

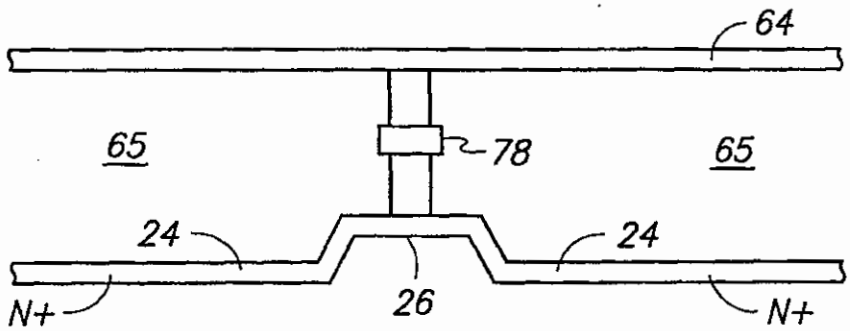


Fig. 8

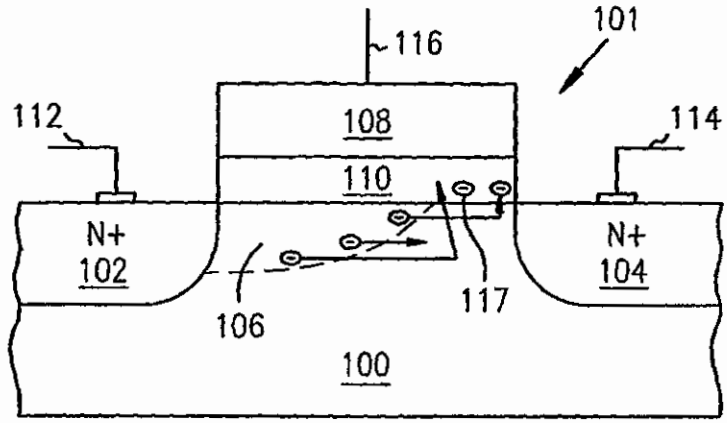


Fig. 9A

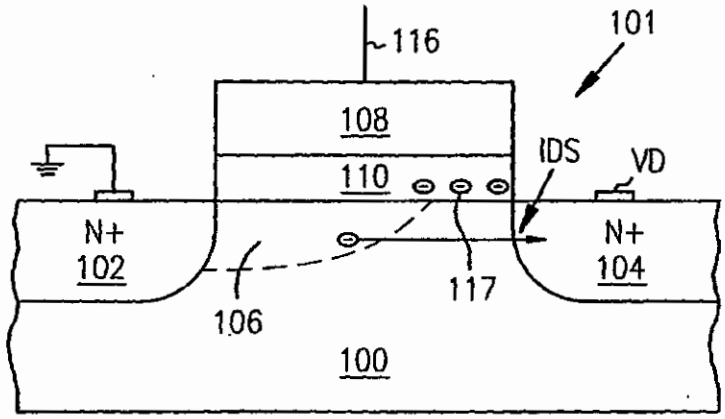


Fig. 9B

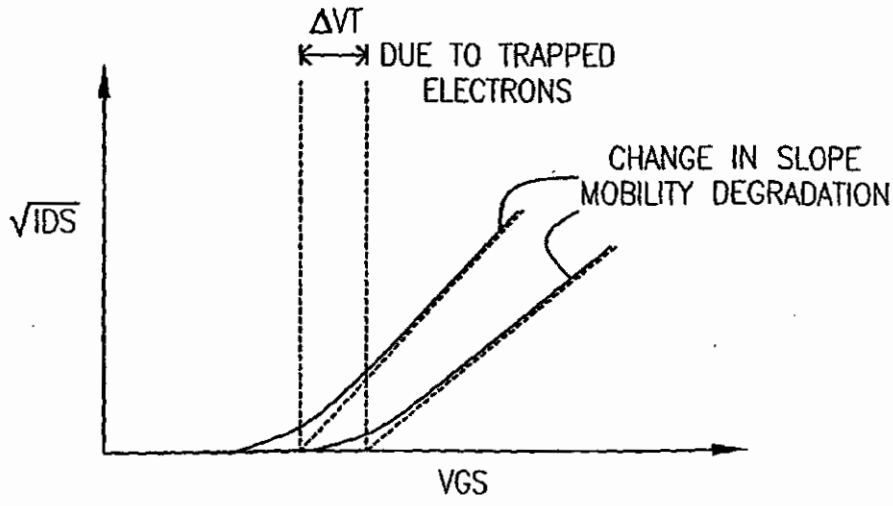


Fig. 9C

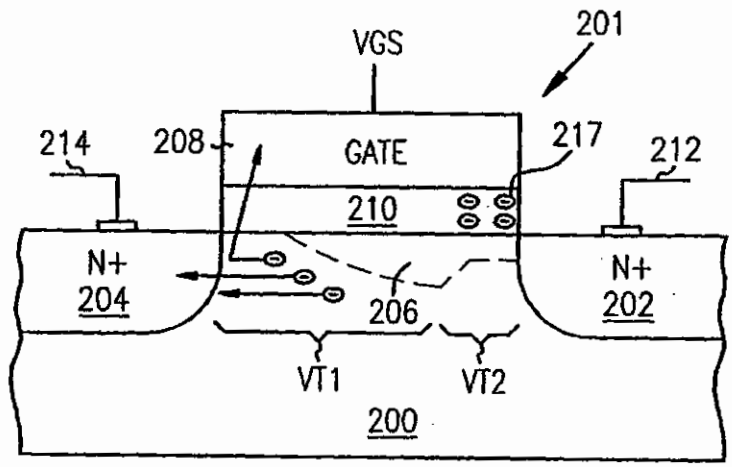


Fig. 10A

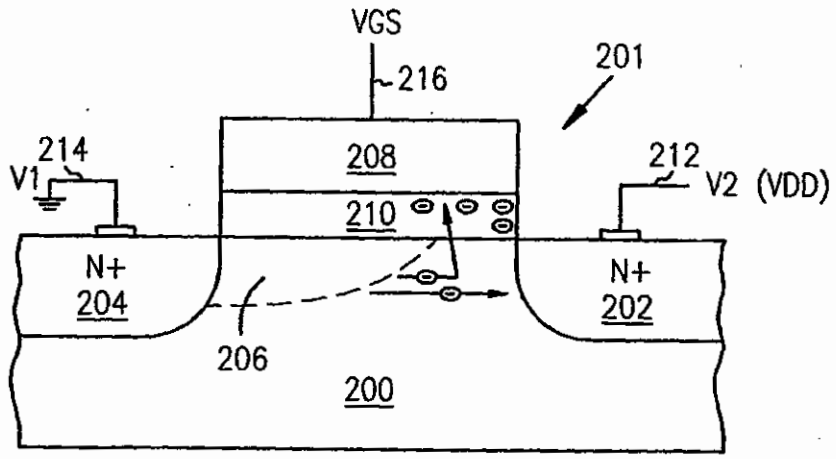


Fig. 10B

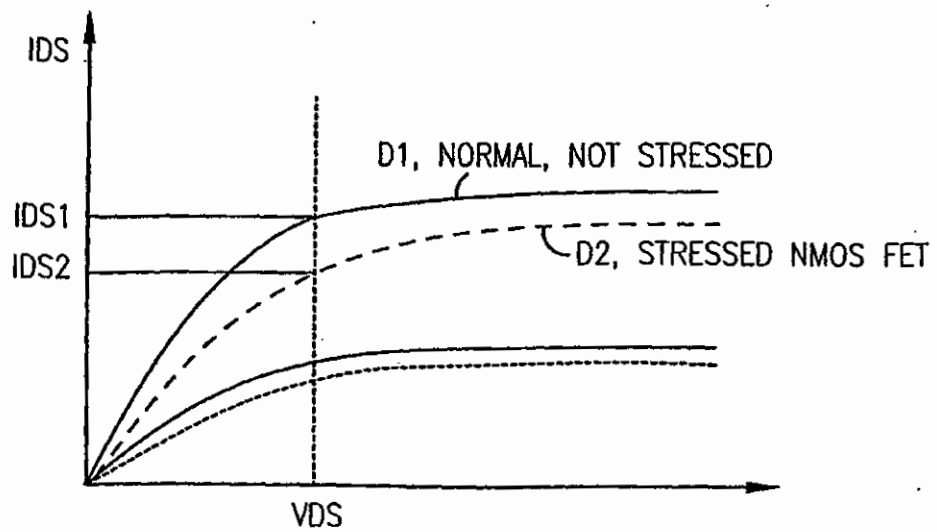


Fig. 10C

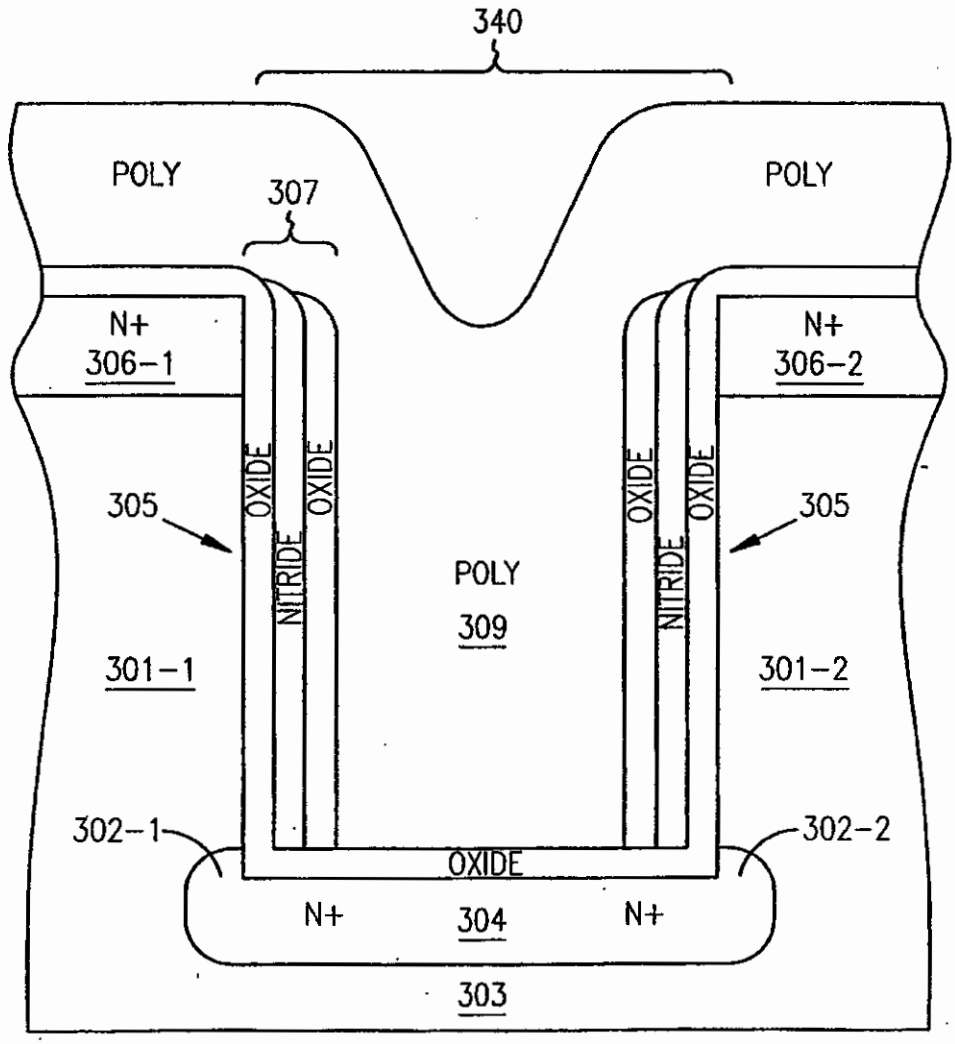

340
POLY
307
POLY
N+
306-1
N+
306-2
OXIDE
OXIDE
OXIDE
OXIDE
305
305
NITRIDE
NITRIDE
POLY
309
301-1
301-2
302-1
302-2
OXIDE
N+
304
N+
303

Fig. 11

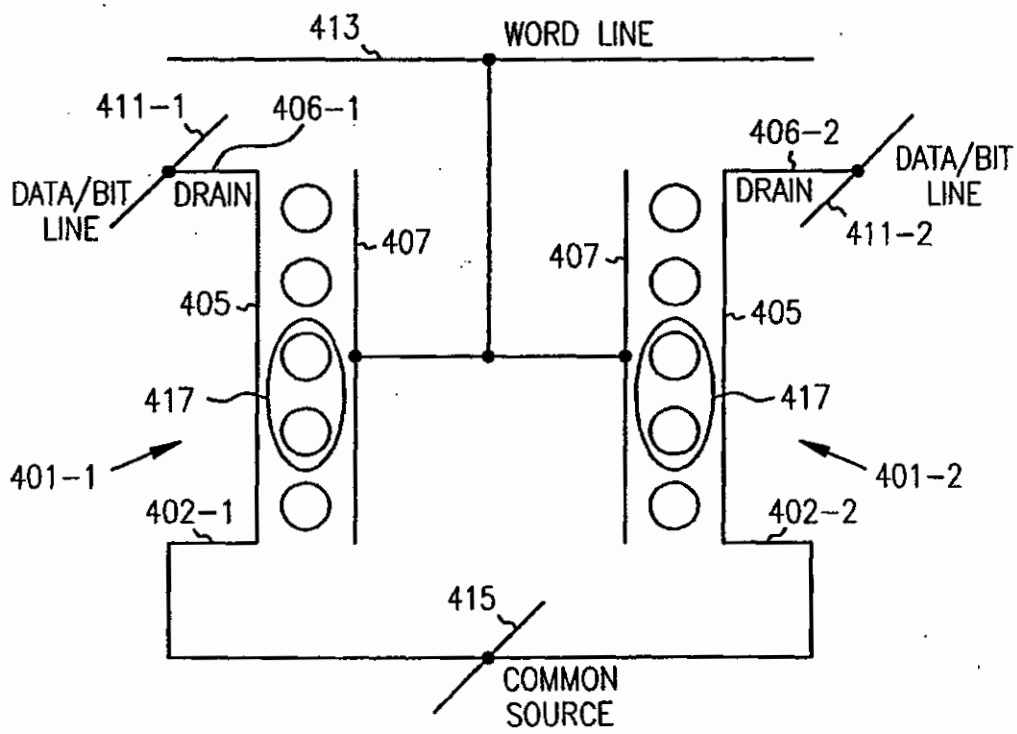

413
WORD LINE
411-1
406-1
406-2
DATA/BIT LINE
DRAIN
DRAIN
DATA/BIT LINE
411-2
407
407
405
405
417
417
401-1
401-2
402-1
402-2
415
COMMON SOURCE

Fig. 12

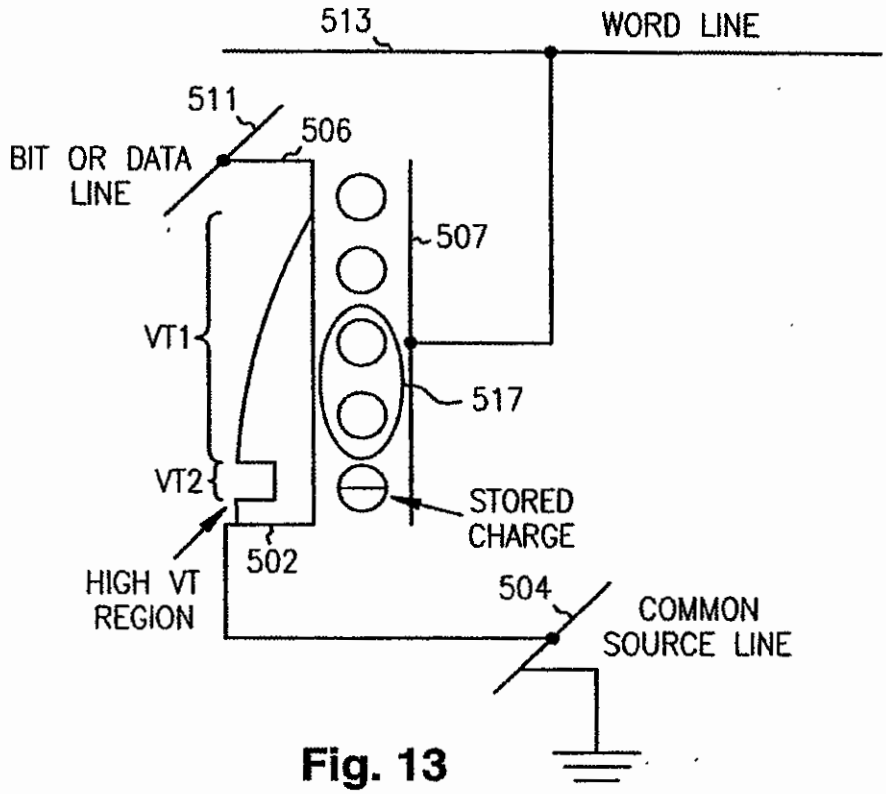

513
WORD LINE
511
506
BIT OR DATA LINE
507
VT1
517
VT2
STORED CHARGE
502
HIGH VT REGION
504
COMMON SOURCE LINE

Fig. 13

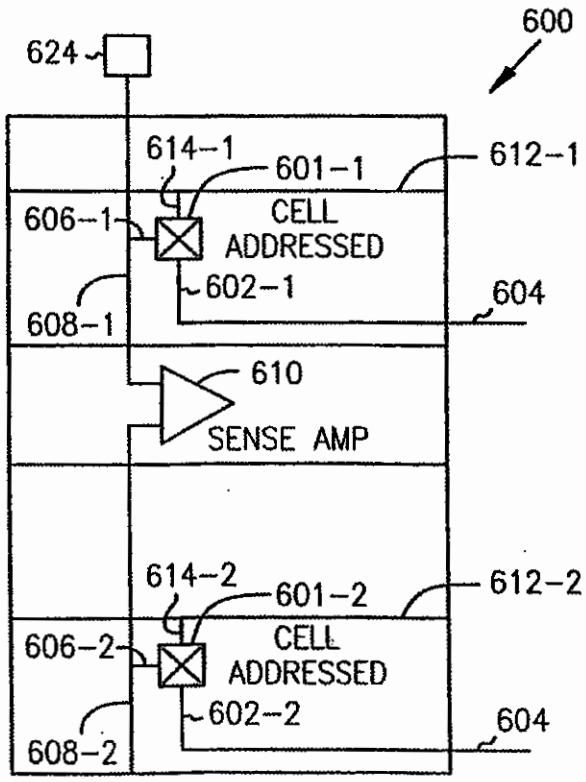
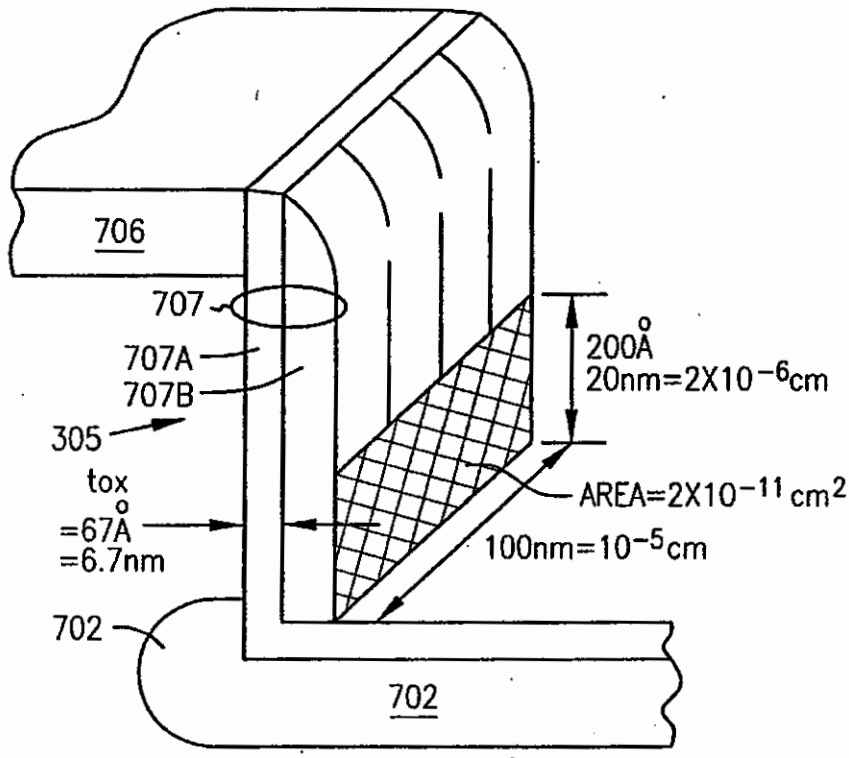

600
624
614-1
601-1
612-1
606-1
CELL ADDRESSED
602-1
604
608-1
610
SENSE AMP
614-2
601-2
612-2
606-2
CELL ADDRESSED
602-2
604
608-2

Fig. 14



$$C_{OX} = \frac{1.06X10^{-12}}{3X6.7X10^{-7}} = 0.5 \times 10^{-6}\ F/cm^2$$

$$C_{OX} = 0.5 \times 10^{-6}\ F/cm^2 \times 2 \times 10^{-11} cm^2$$

$$= 10^{-17} F$$

$\Delta V = 1.6V$ $Q = C\Delta V = 1.6 \times 10^{-17}$ COULOMBS

$Q = Nq$

$$N = \frac{160 \times 10^{-19}\ \text{COULOMBS}}{1.6 \times 10^{-19}\ \text{COULOMBS}} = \frac{160}{1.6} = 100\ \text{ELECTRONS}$$

Fig. 15A

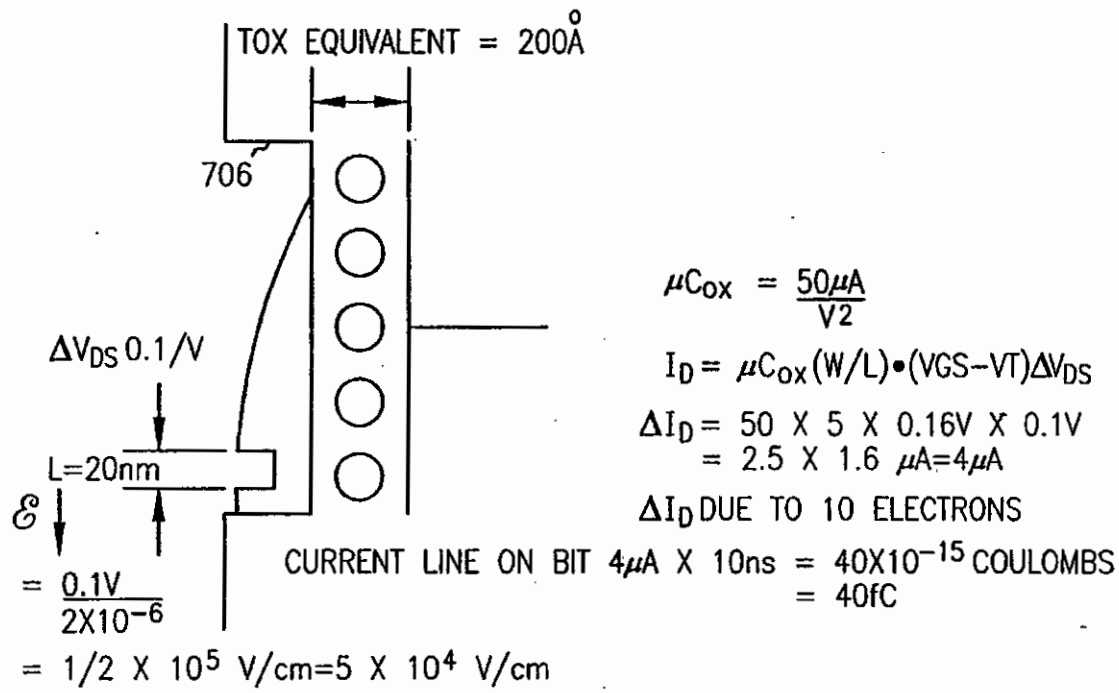

TOX EQUIVALENT = 200Å
706
ΔVDS 0.1/V
L=20nm
E
= 0.1V / 2X10−6
= 1/2 X 10^5 V/cm=5 X 10^4 V/cm
μCox = 50μA / V2
ID = μCox(W/L)•(VGS−VT)ΔVDS
ΔID = 50 X 5 X 0.16V X 0.1V
= 2.5 X 1.6 μA=4μA
ΔID DUE TO 10 ELECTRONS
CURRENT LINE ON BIT 4μA X 10ns = 40X10−15 COULOMBS
= 40fC

Fig. 15B

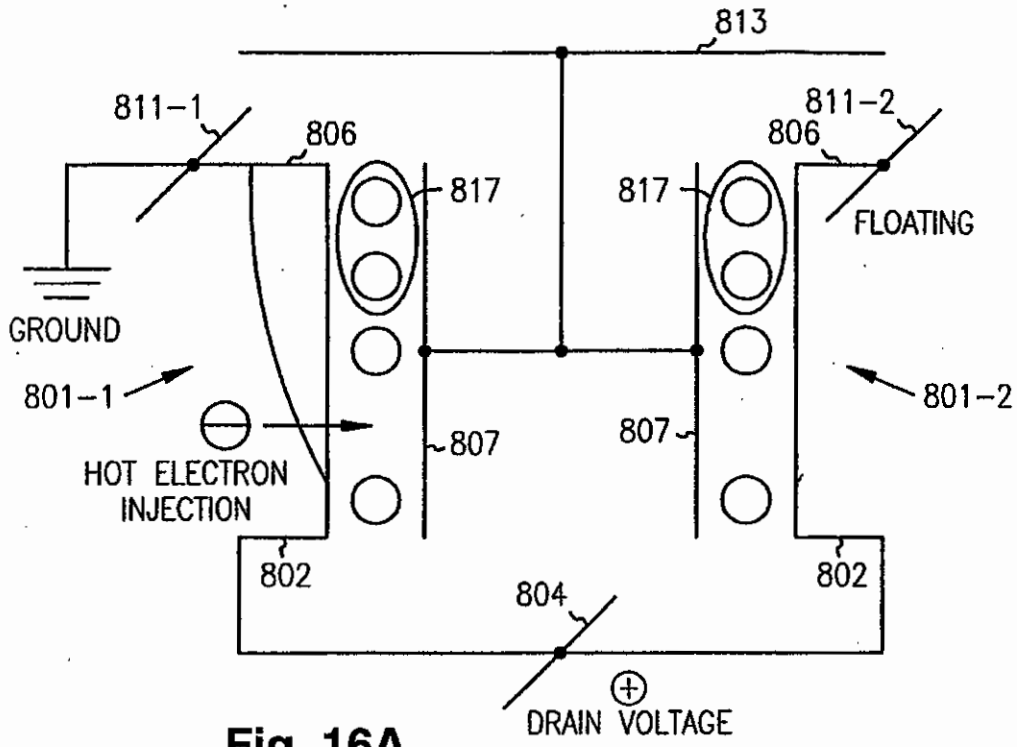


Fig. 16A

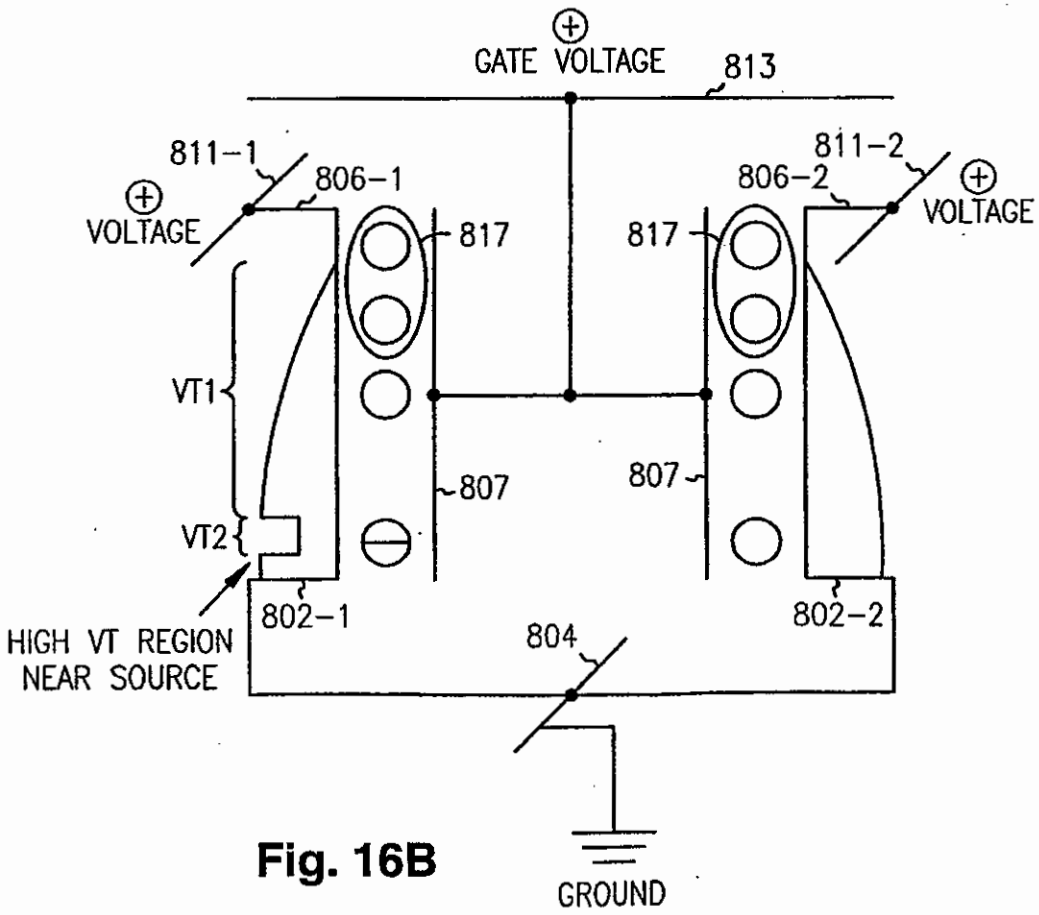


Fig. 16B

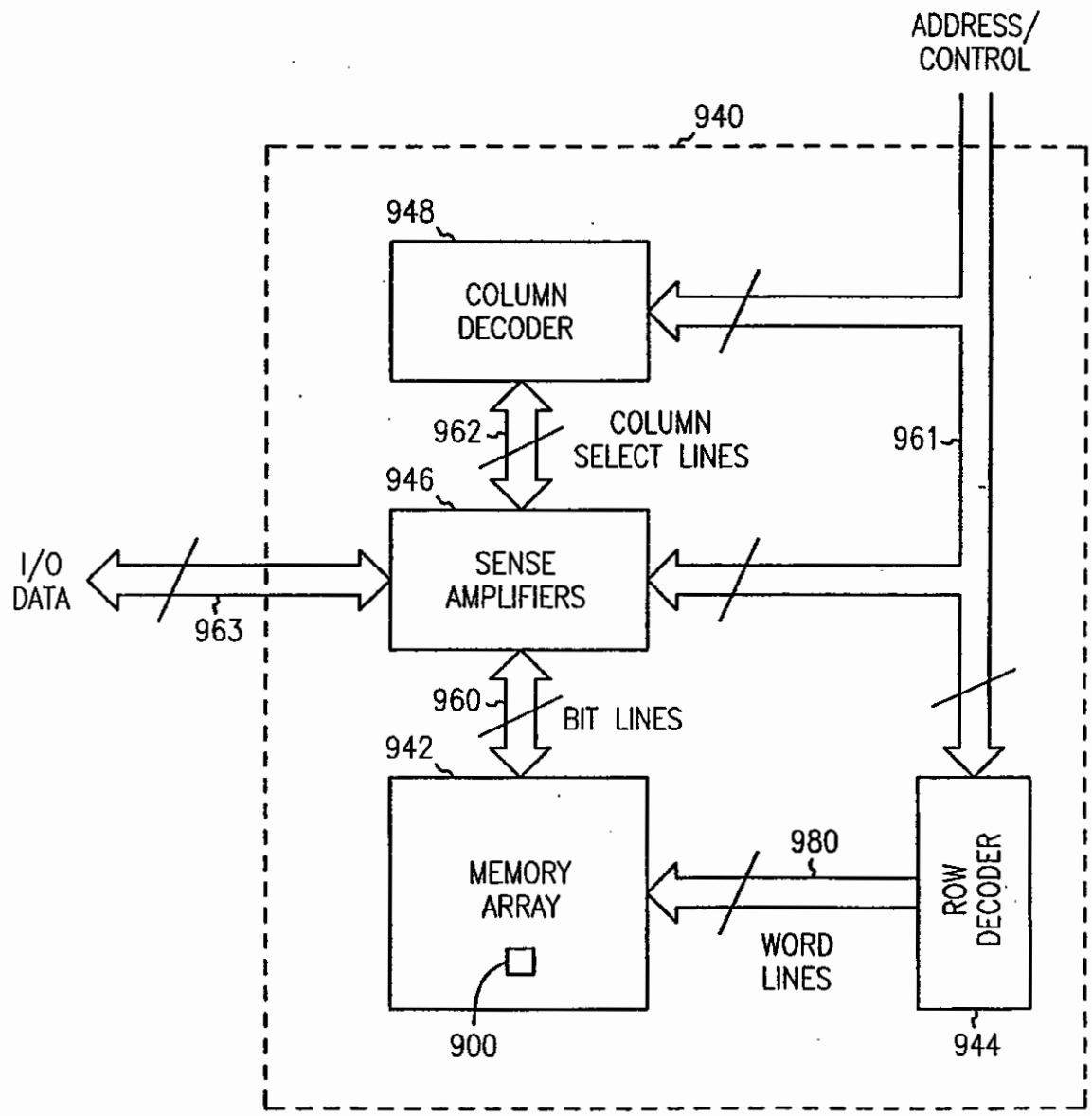

ADDRESS/
CONTROL
940
948
COLUMN
DECODER
962
COLUMN
SELECT LINES
961
946
I/O
DATA
SENSE
AMPLIFIERS
963
960
BIT LINES
942
MEMORY
ARRAY
980
WORD
LINES
ROW
DECODER
900
944

Fig. 17

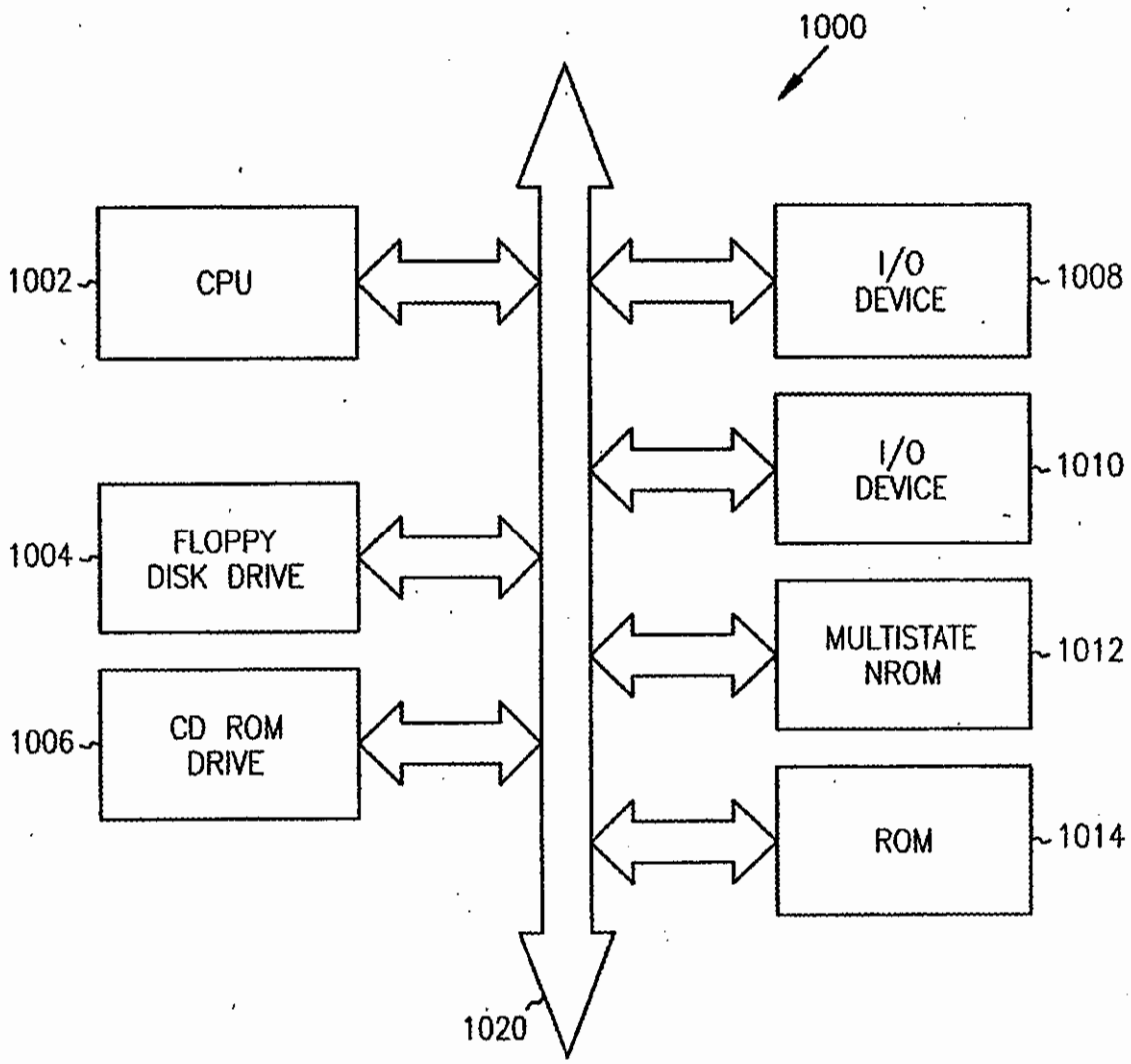

1000
1002
CPU
1004
FLOPPY DISK DRIVE
1006
CD ROM DRIVE
1020
I/O DEVICE
1008
I/O DEVICE
1010
MULTISTATE NROM
1012
ROM
1014

Fig. 18