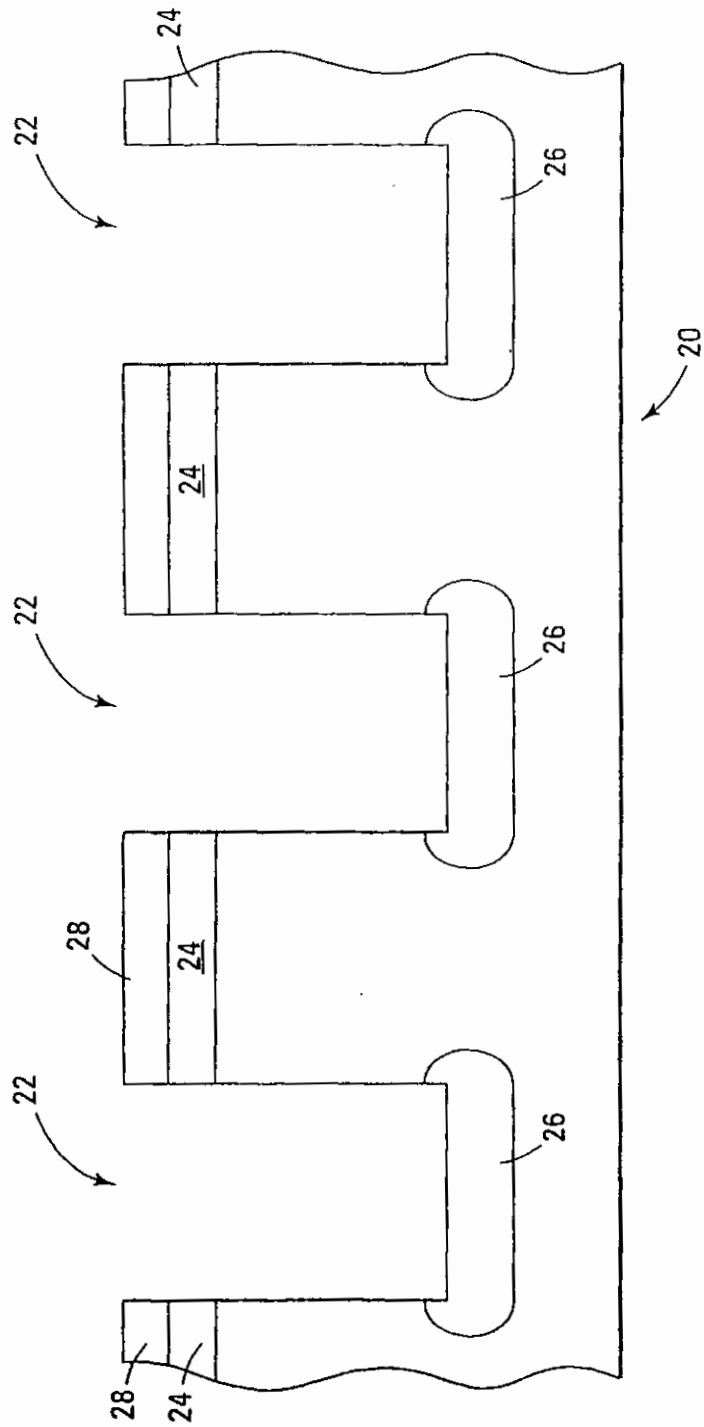


Fig. 1

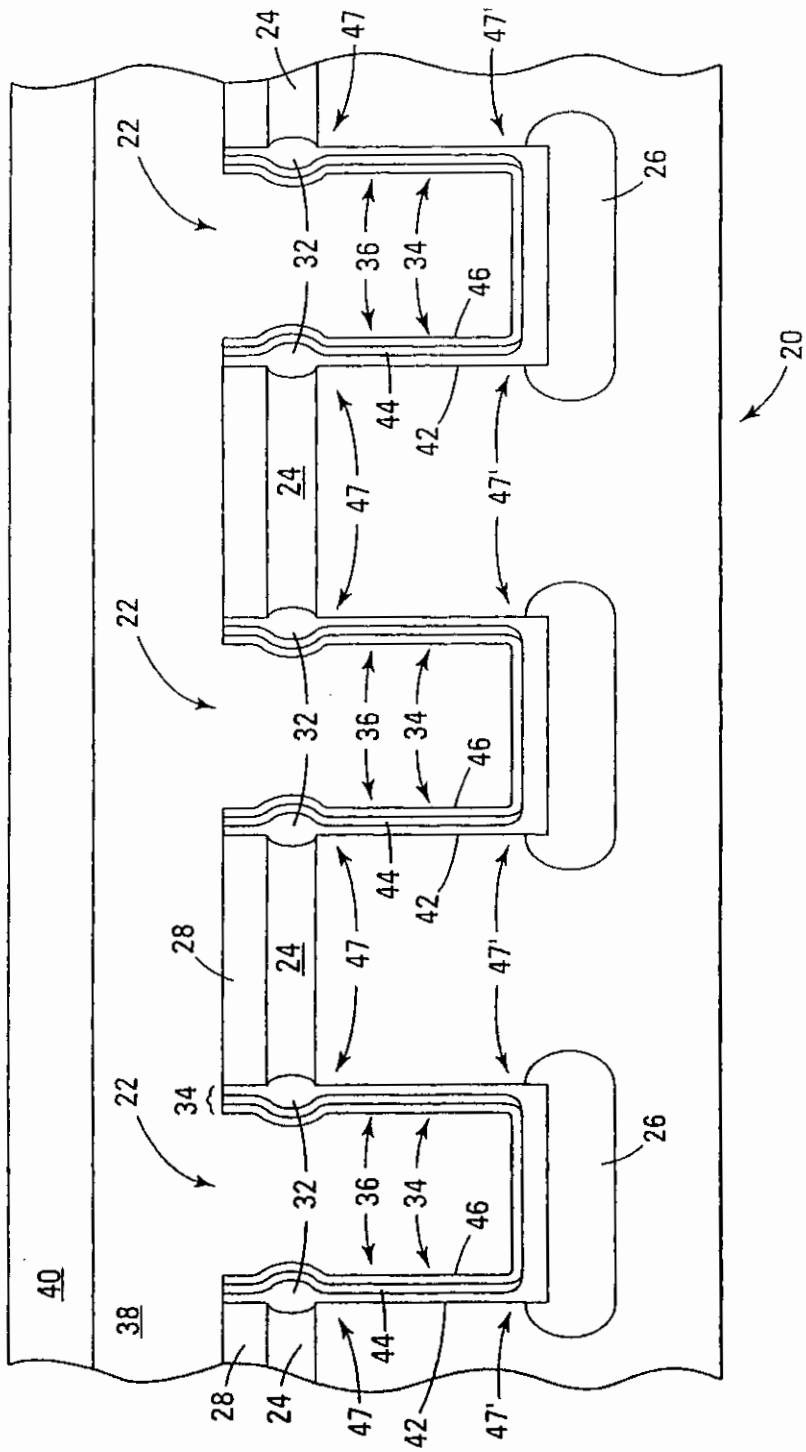

24
47
47'
22
26
32
36
34
46
20
44
42
24
47
47'
22
32
36
34
46
44
42
28
24
47
47'
22
34
32
36
34
46
26
40
38
44
28
24
47
42
47'

Fig. 2

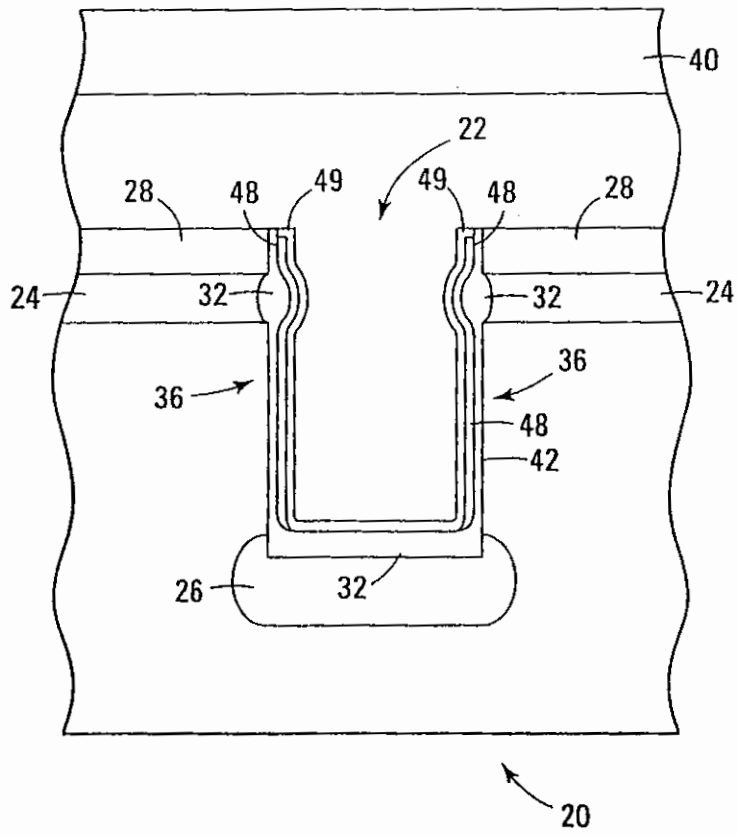


Fig. 3

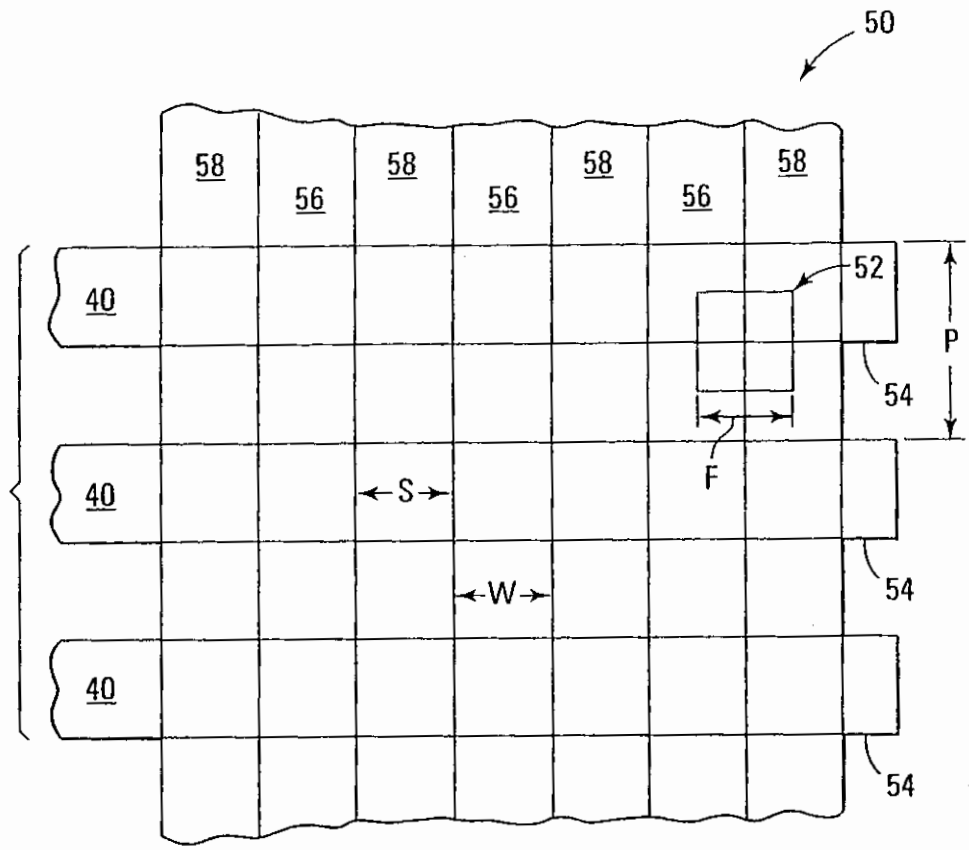

50
58
56
58
56
58
56
58
40
40
40
52
54
54
54
P
F
S
W

Fig. 4

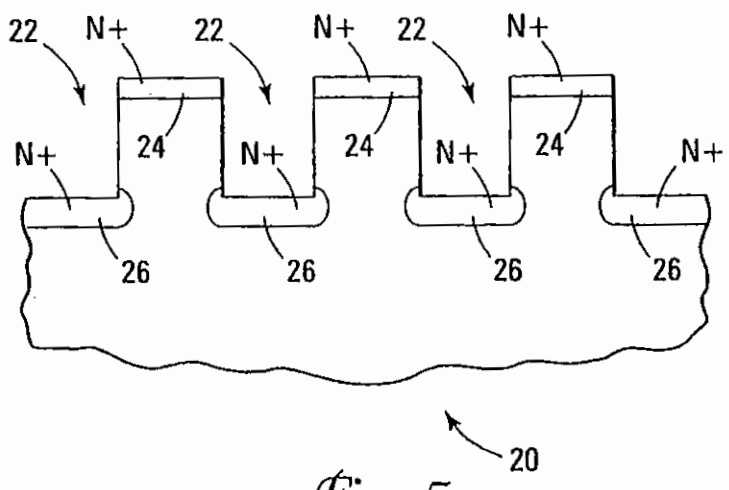

22
N+
22
N+
22
N+
N+
24
N+
24
N+
24
N+
26
26
26
26
20

Fig. 5

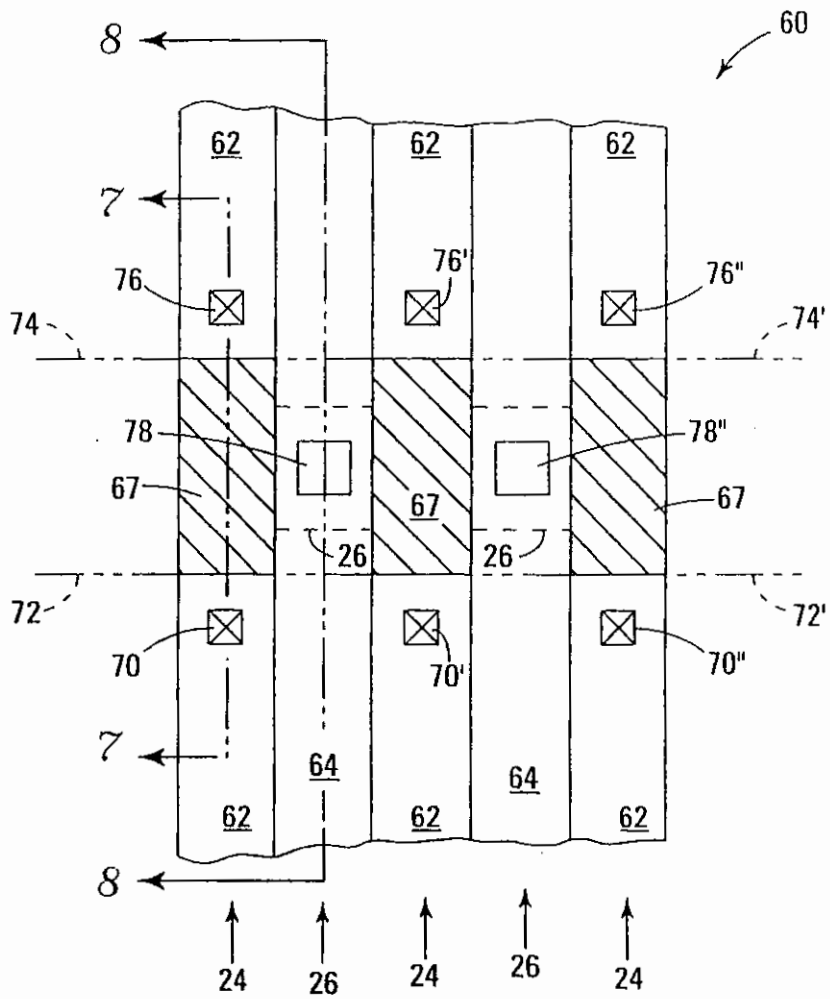

8
60
62
62
62
7
76
76'
76"
74
74'
78
78"
67
67
67
26
26
72
72'
70
70'
70"
7
64
64
62
62
62
8
24
26
24
26
24

Fig. 6

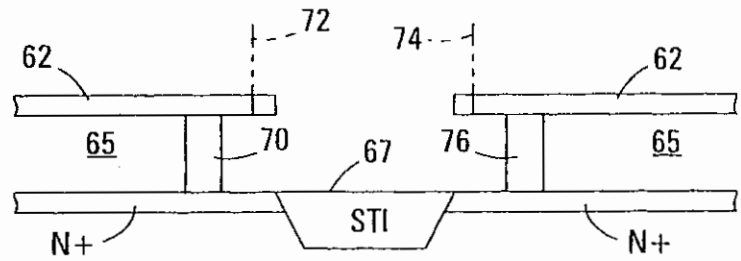


Fig. 7

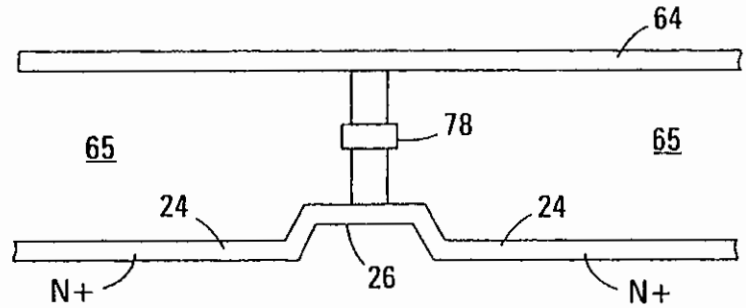


Fig. 8

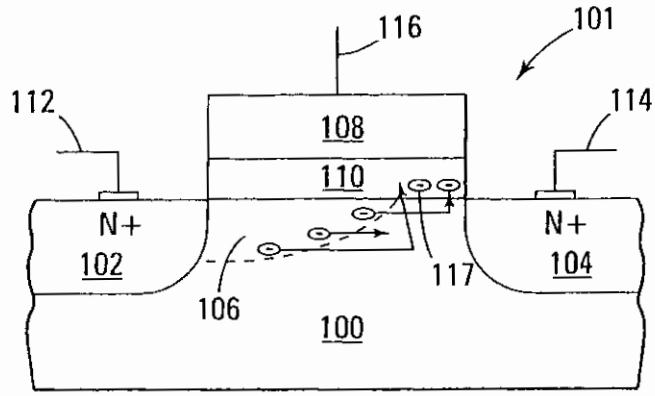


Fig. 9A

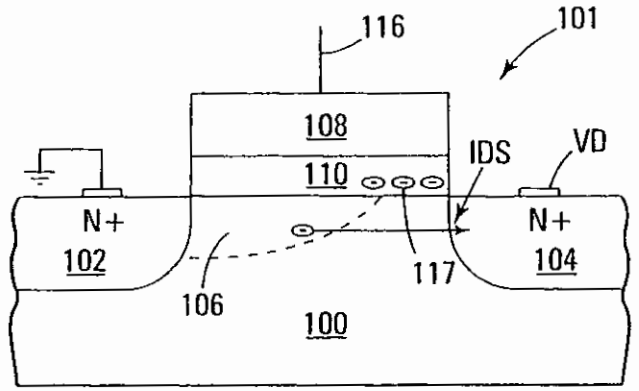


Fig. 9B

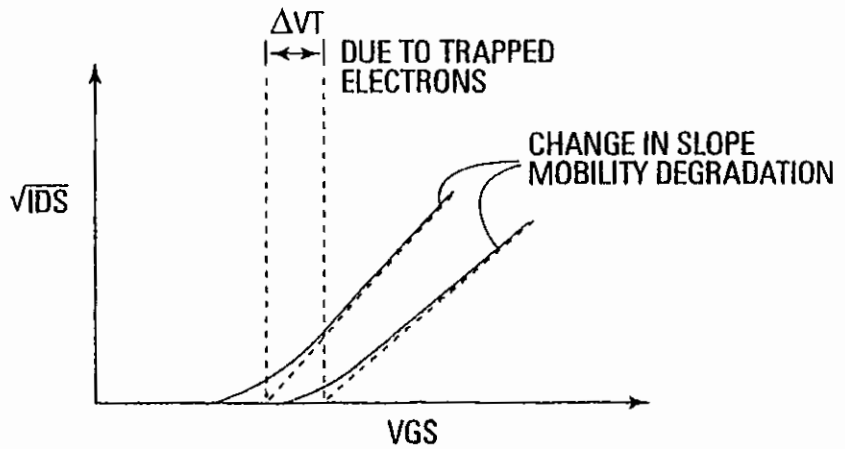


Fig. 9C

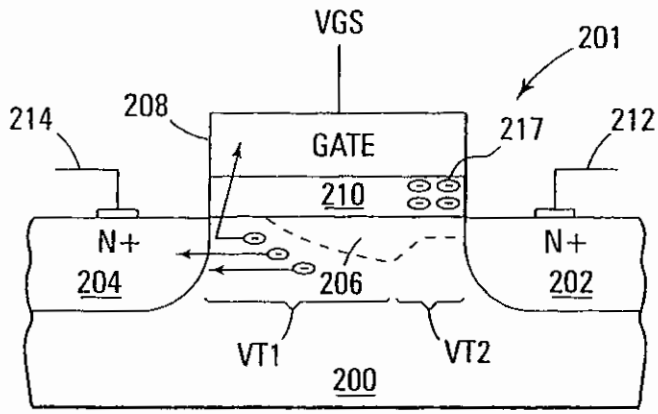


Fig. 10A

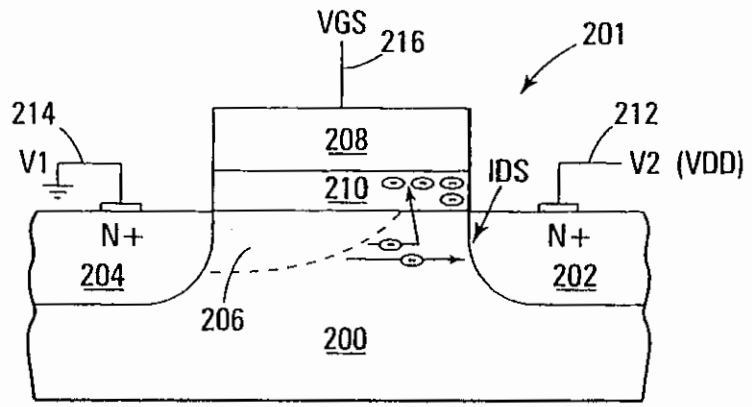


Fig. 10B

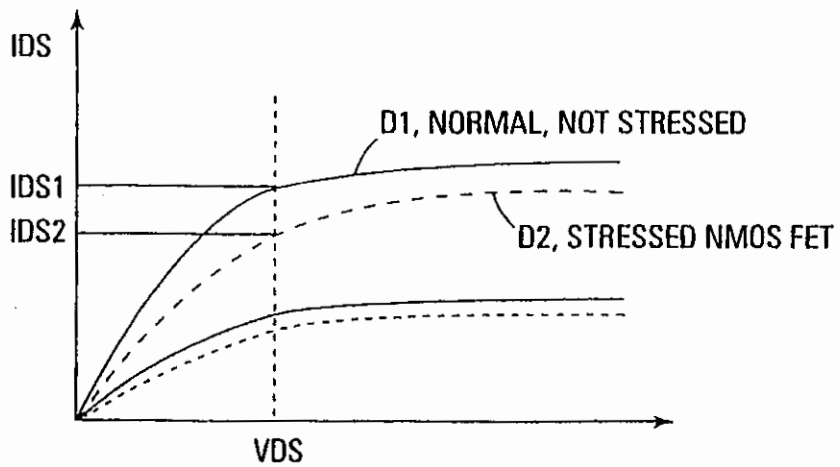


Fig. 10C

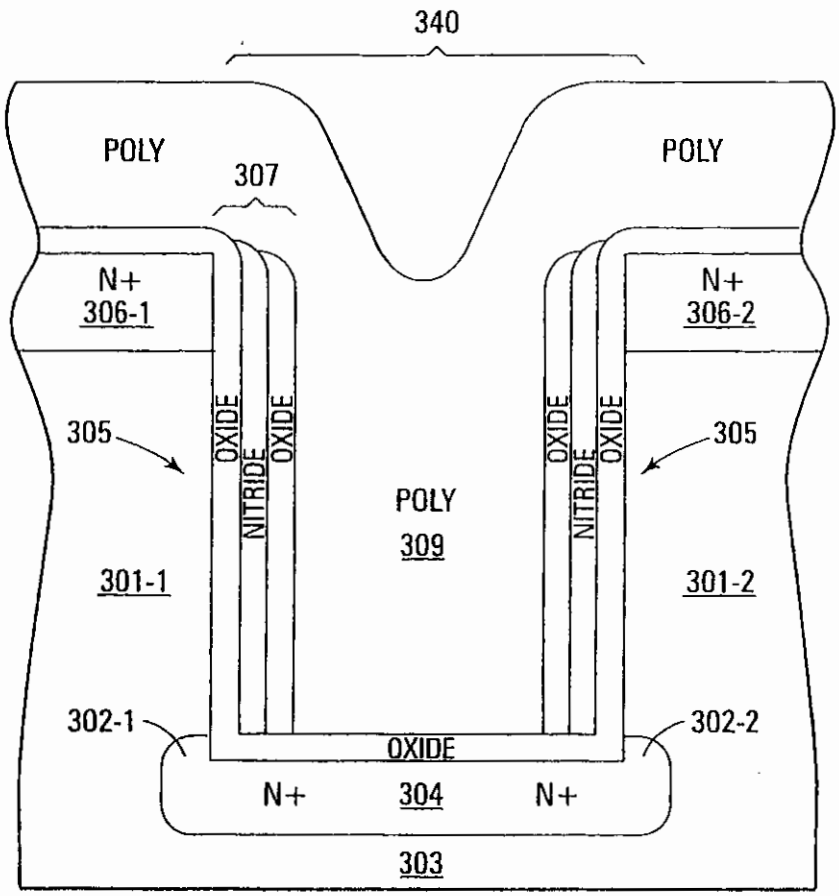

340
POLY
307
POLY
N+
306-1
N+
306-2
305
OXIDE
NITRIDE
OXIDE
POLY
309
OXIDE
NITRIDE
OXIDE
305
301-1
301-2
302-1
302-2
OXIDE
N+
304
N+
303

Fig. 11

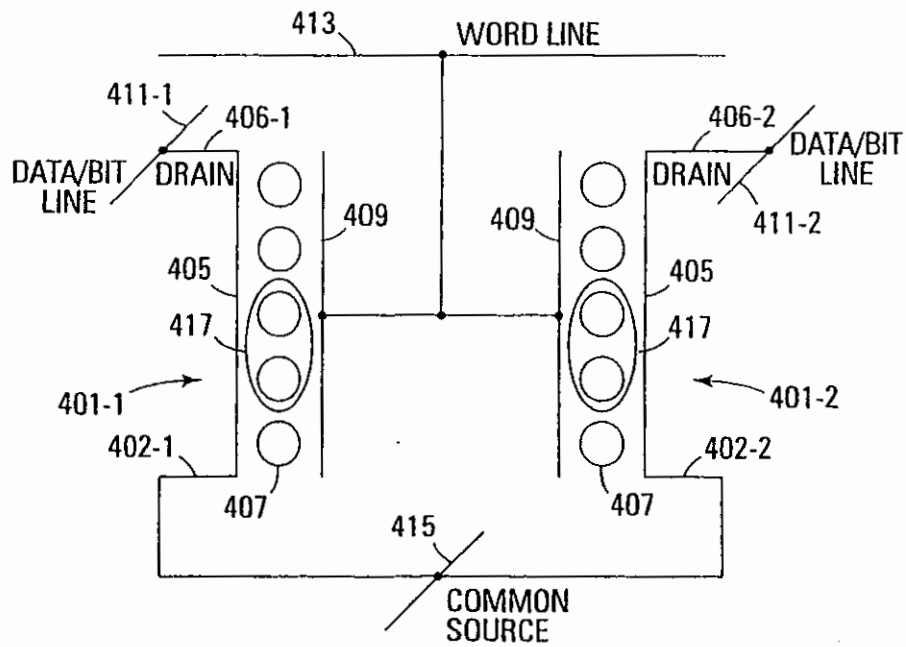

413
WORD LINE
411-1
406-1
406-2
DATA/BIT LINE
DRAIN
DRAIN
DATA/BIT LINE
411-2
409
409
405
405
417
417
401-1
401-2
402-1
402-2
407
407
415
COMMON SOURCE

Fig. 12

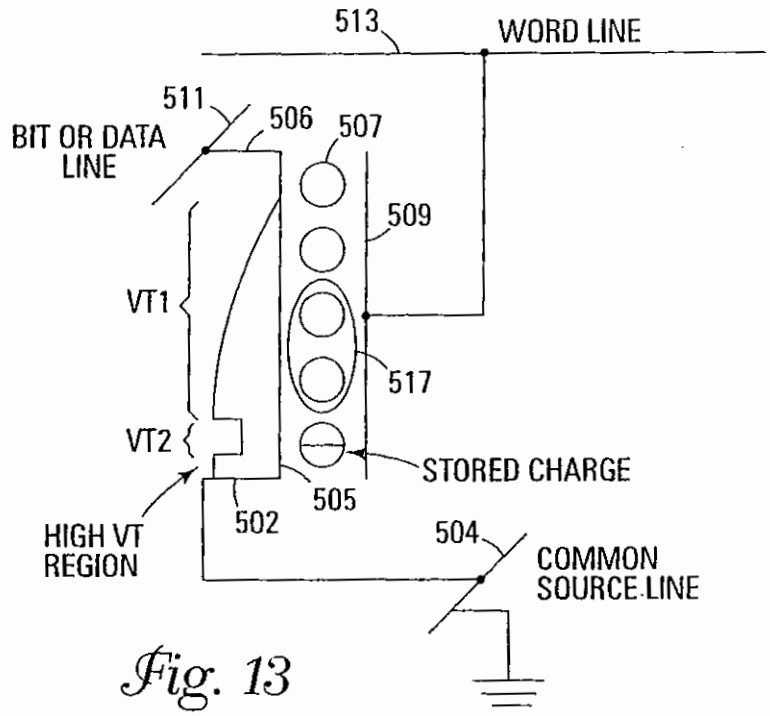

513
WORD LINE
511
BIT OR DATA LINE
506
507
509
VT1
517
VT2
STORED CHARGE
505
502
HIGH VT REGION
504
COMMON SOURCE LINE

Fig. 13

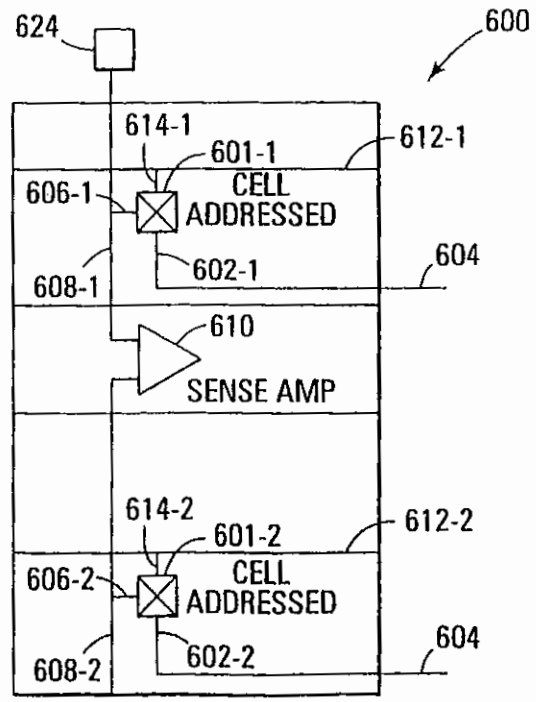
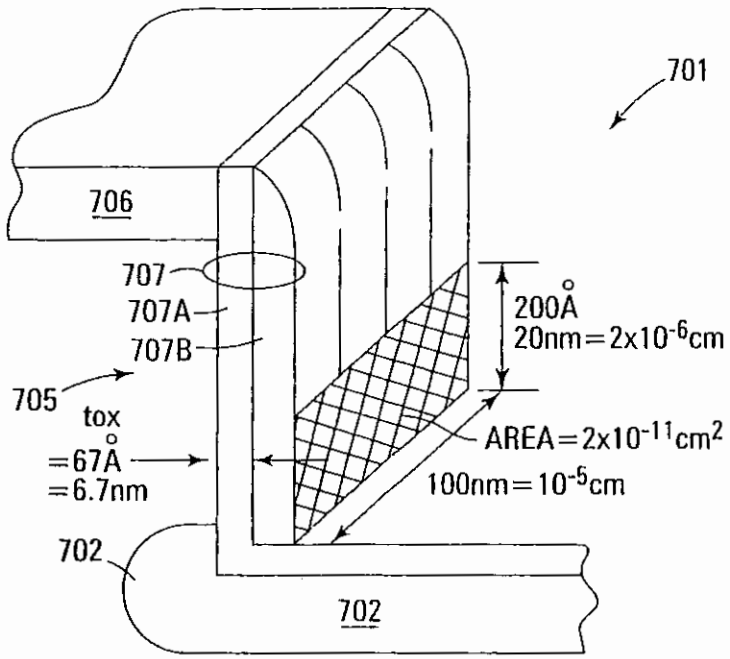

624
600
614-1
601-1
612-1
606-1
CELL ADDRESSED
608-1
602-1
604
610
SENSE AMP
614-2
601-2
612-2
606-2
CELL ADDRESSED
608-2
602-2
604

Fig. 14



$$C_{OX} = \frac{1.06\times10^{-12}}{3\times6.7\times10^{-7}} = 0.5 \times 10^{-6}\ F/cm^2$$

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

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

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

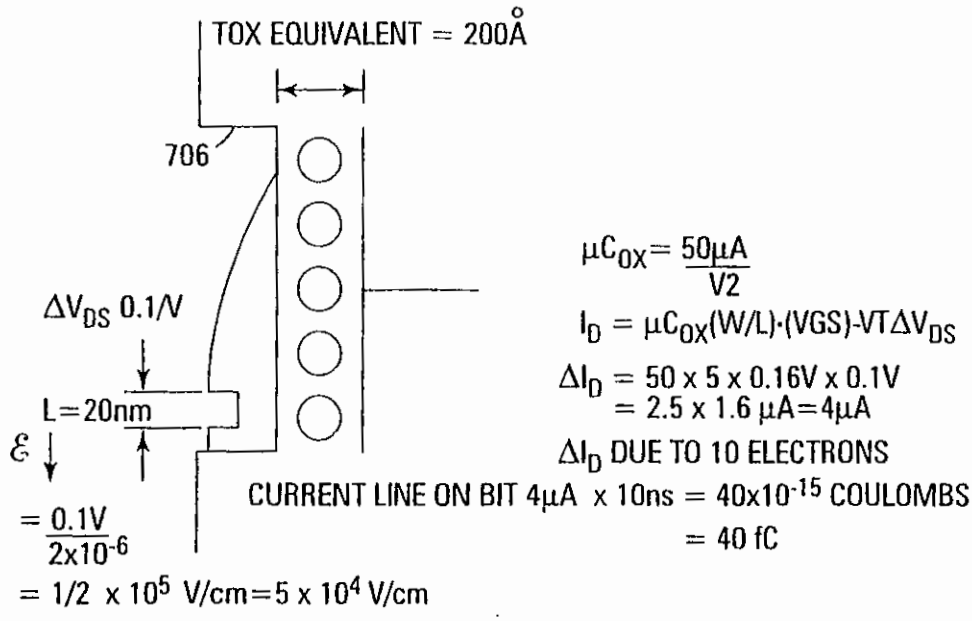

TOX EQUIVALENT = 200Å
706
ΔV_{DS} 0.1/V
L=20nm
$\mathcal{E}$
$= \frac{0.1V}{2x10^{-6}}$
$= 1/2 \times 10^5$ V/cm $= 5 \times 10^4$ V/cm
$\mu C_{OX} = \frac{50\mu A}{V2}$
$I_D = \mu C_{OX}(W/L)\cdot(VGS)\text{-}VT\Delta V_{DS}$
$\Delta I_D = 50 \times 5 \times 0.16V \times 0.1V$
$= 2.5 \times 1.6\ \mu A = 4\mu A$
ΔI_D DUE TO 10 ELECTRONS
CURRENT LINE ON BIT $4\mu A \times 10ns = 40x10^{-15}$ COULOMBS
$= 40$ fC

Fig. 15B

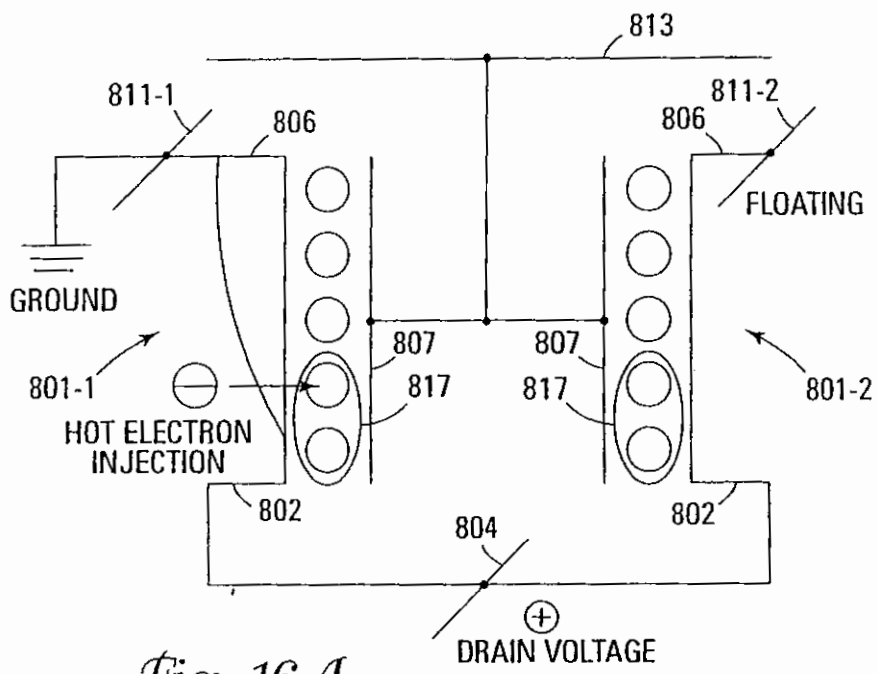


Fig. 16A

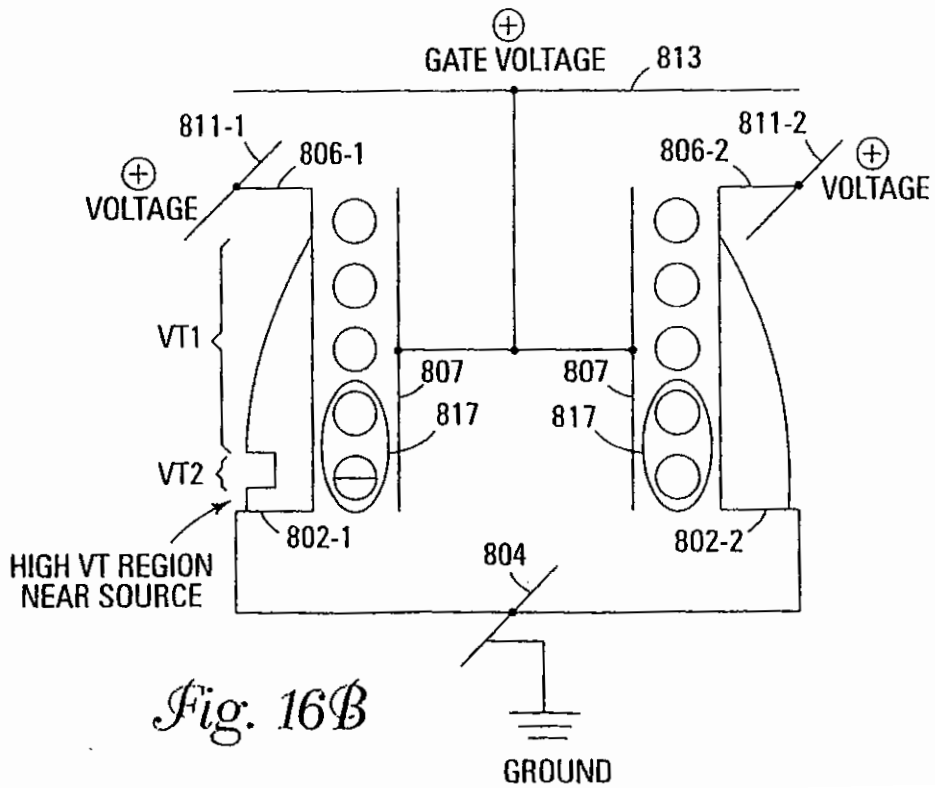


Fig. 16B

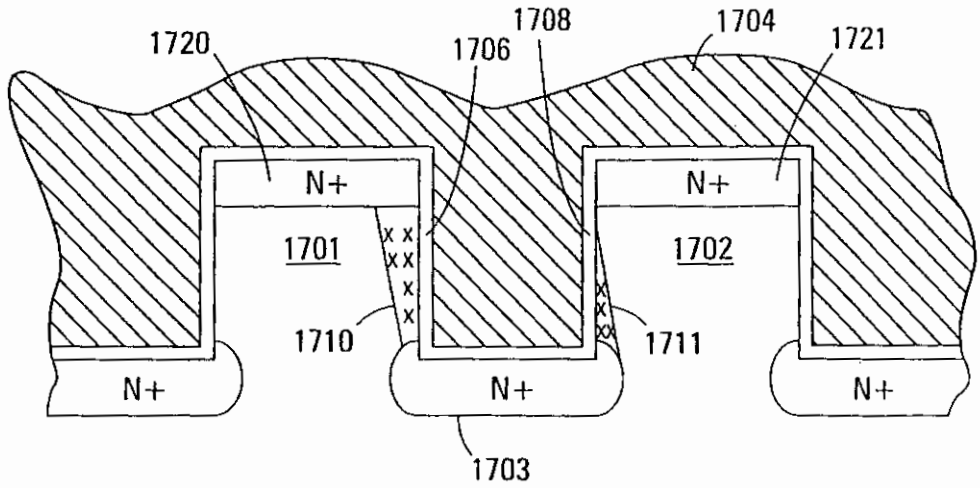

1720
1706
1708
1704
1721
N+
N+
1701
1702
1710
1711
N+
N+
N+
1703

Fig. 17

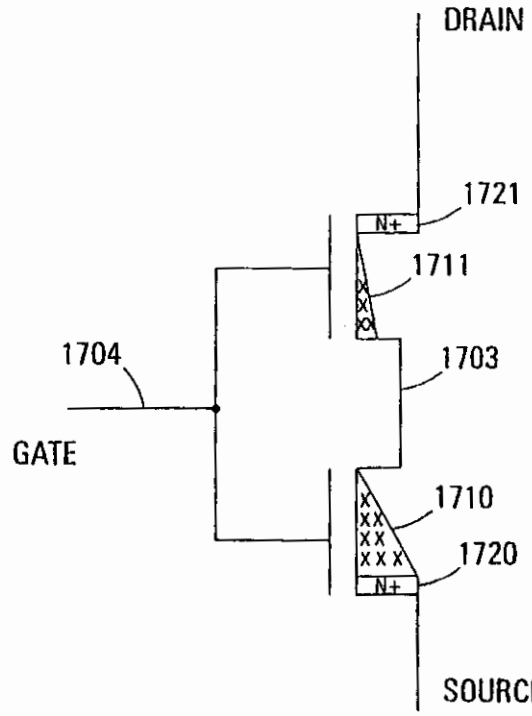

DRAIN
1721
N+
1711
1704
1703
GATE
1710
1720
N+
SOURCE

Fig. 19

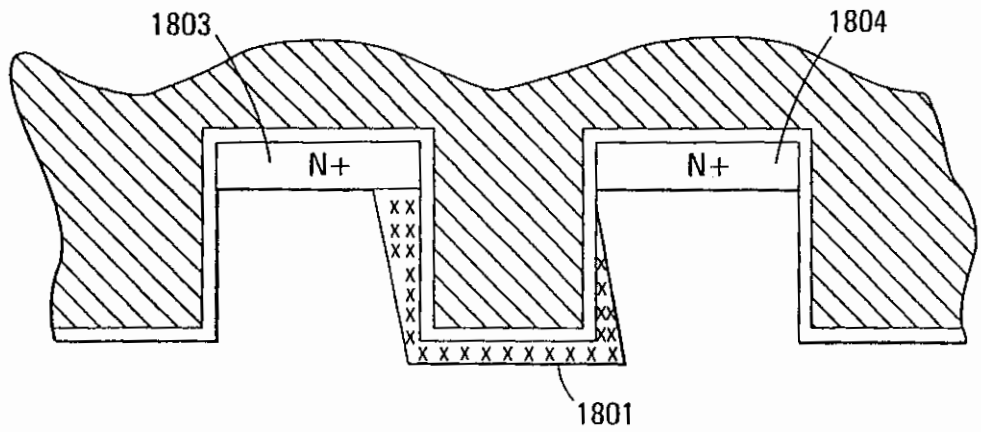


Fig. 18

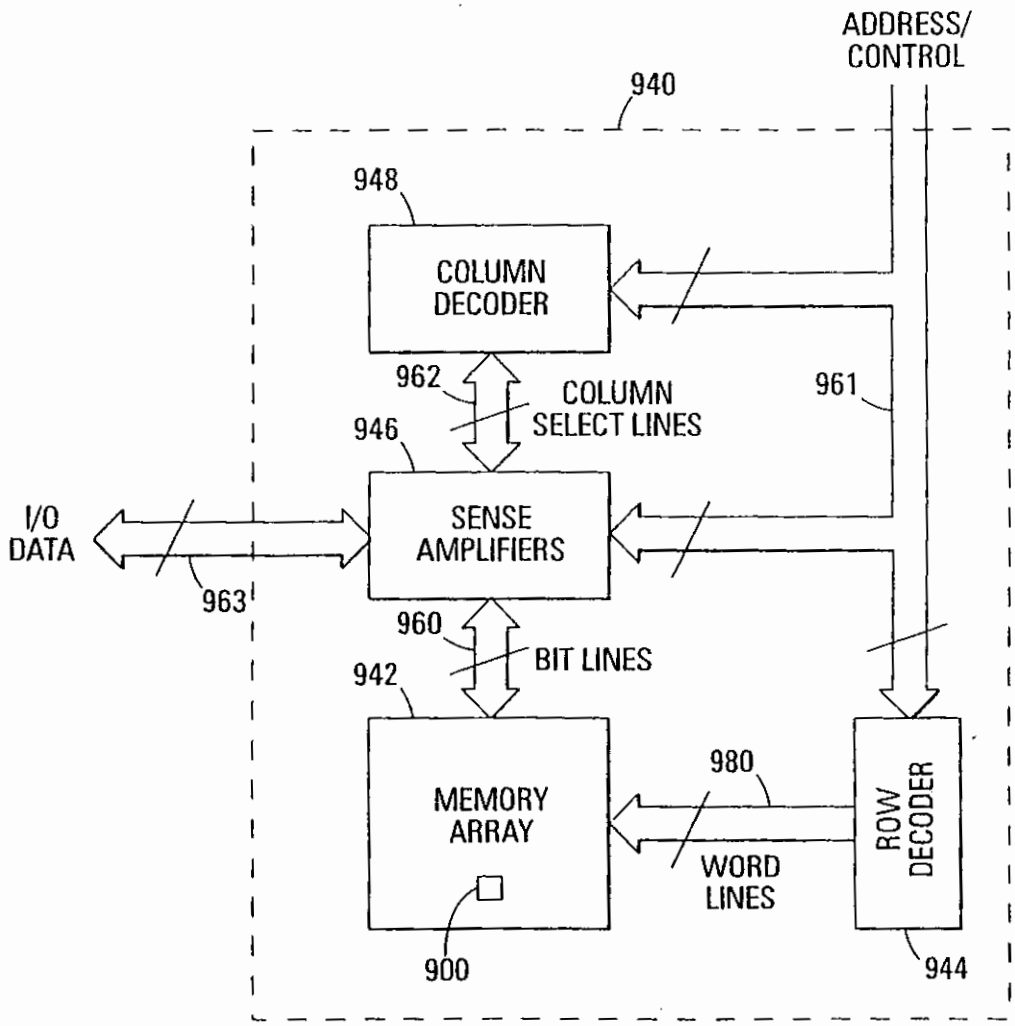

ADDRESS/
CONTROL
940
948
COLUMN
DECODER
962
COLUMN
SELECT LINES
961
946
I/O
DATA
SENSE
AMPLIFIERS
963
960
BIT LINES
942
MEMORY
ARRAY
980
WORD
LINES
ROW
DECODER
900
944

Fig. 20

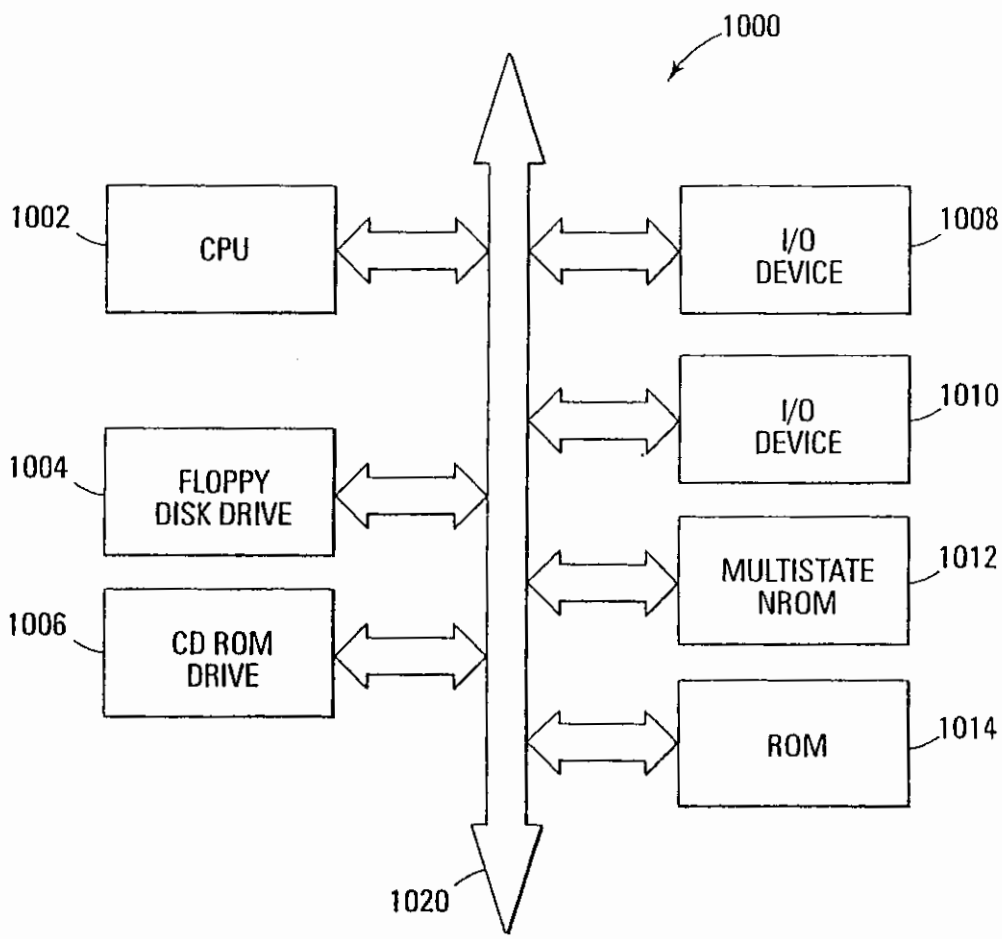

1000
1002
CPU
1004
FLOPPY DISK DRIVE
1006
CD ROM DRIVE
1008
I/O DEVICE
1010
I/O DEVICE
1012
MULTISTATE NROM
1014
ROM
1020

Fig. 21