FIG. 1

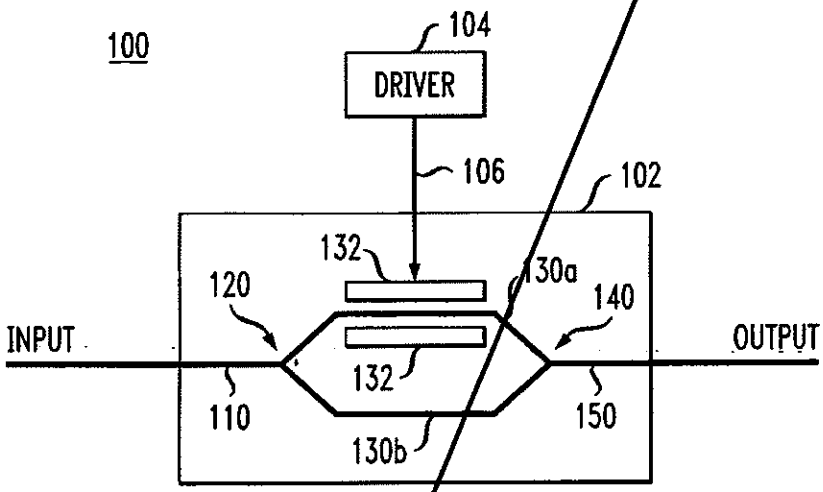

100
104
DRIVER
106
102
132
130a
120
140
INPUT
OUTPUT
132
110
150
130b

FIG. 2

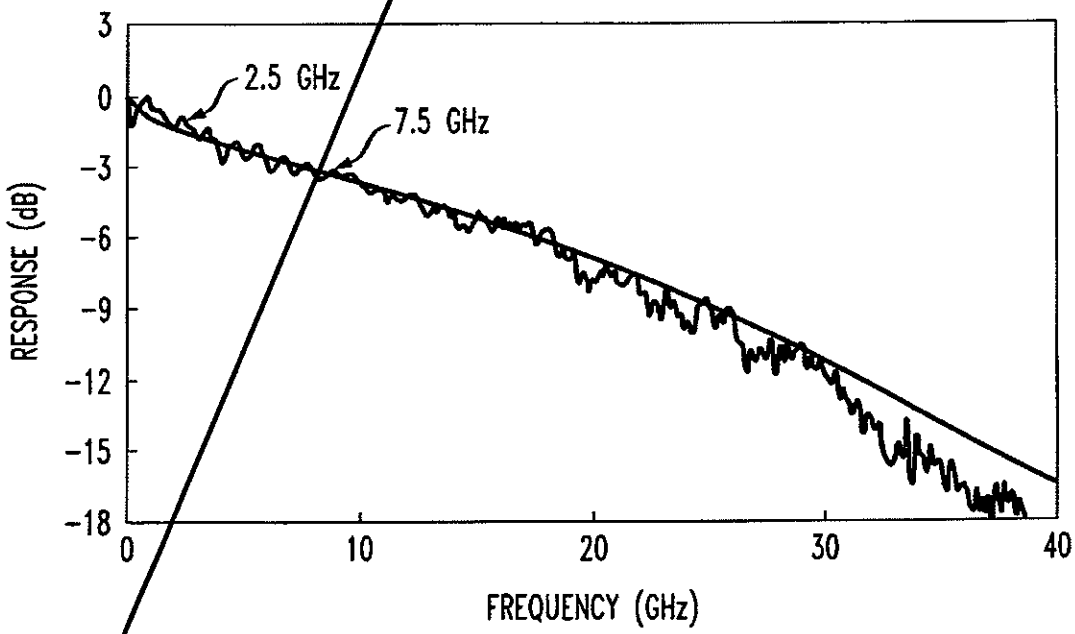

3
0
-3
-6
-9
-12
-15
-18
RESPONSE (dB)
2.5 GHz
7.5 GHz
0
10
20
30
40
FREQUENCY (GHz)

FIG. 3

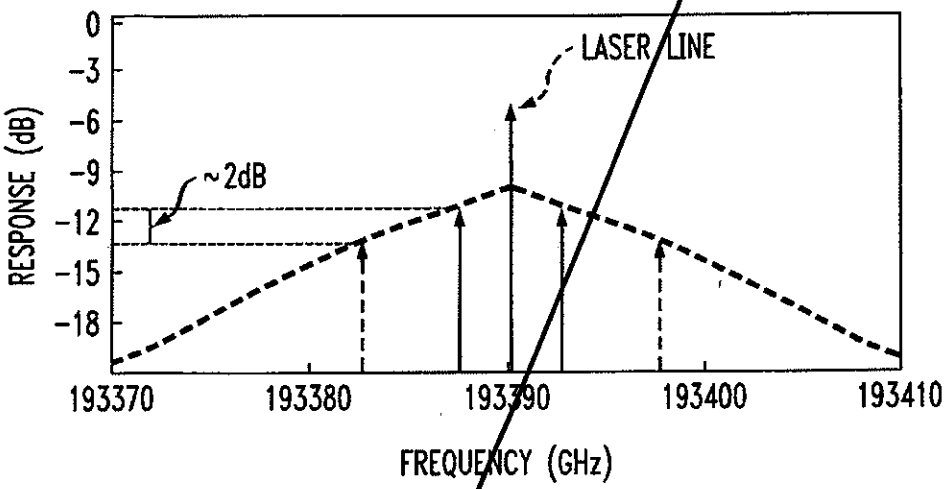

0
-3
-6
-9
-12
-15
-18
RESPONSE (dB)
LASER LINE
~2dB
193370
193380
193390
193400
193410
FREQUENCY (GHz)

FIG. 4A

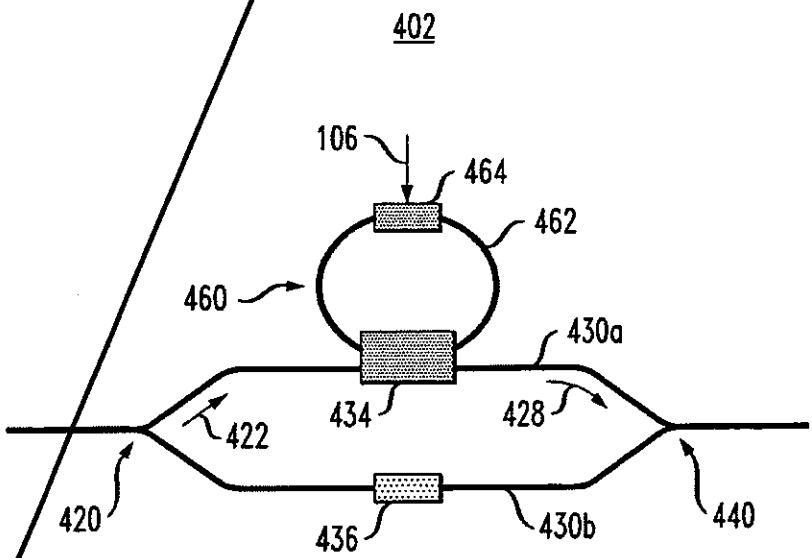

402
106
464
462
460
430a
434
428
422
420
436
430b
440

FIG. 4B

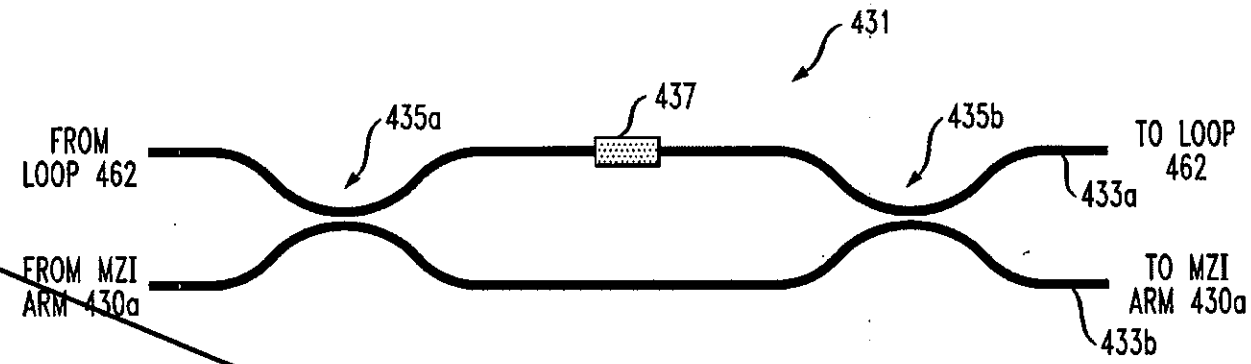


FIG. 4C

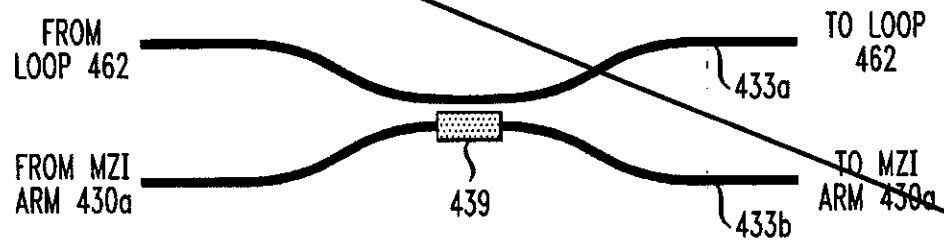


FIG. 4D

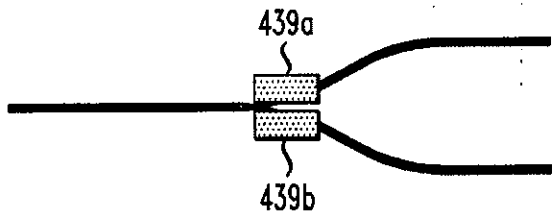


FIG. 5A

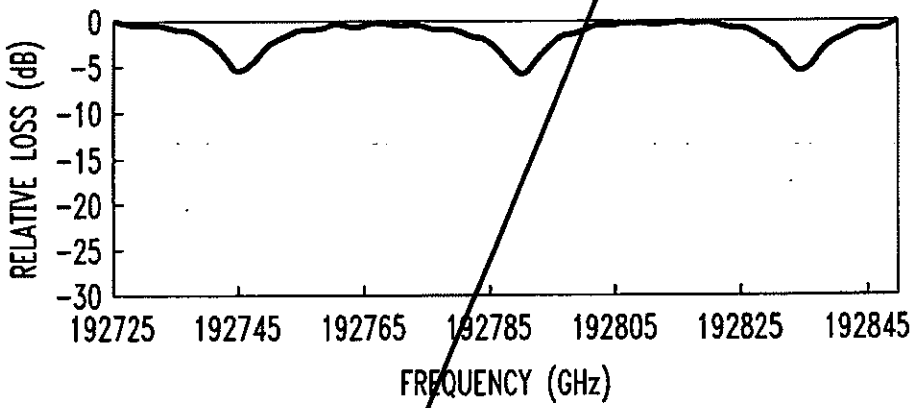

RELATIVE LOSS (dB)
0
-5
-10
-15
-20
-25
-30
192725
192745
192765
192785
192805
192825
192845
FREQUENCY (GHz)

FIG. 5B

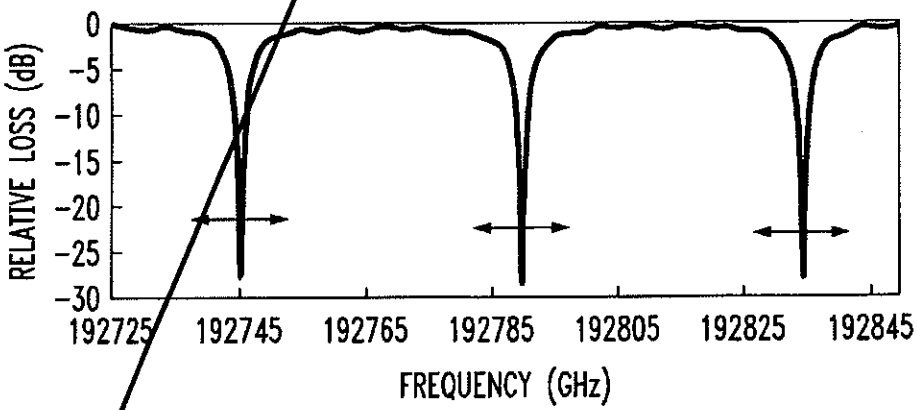

RELATIVE LOSS (dB)
0
-5
-10
-15
-20
-25
-30
192725
192745
192765
192785
192805
192825
192845
FREQUENCY (GHz)

FIG. 5C

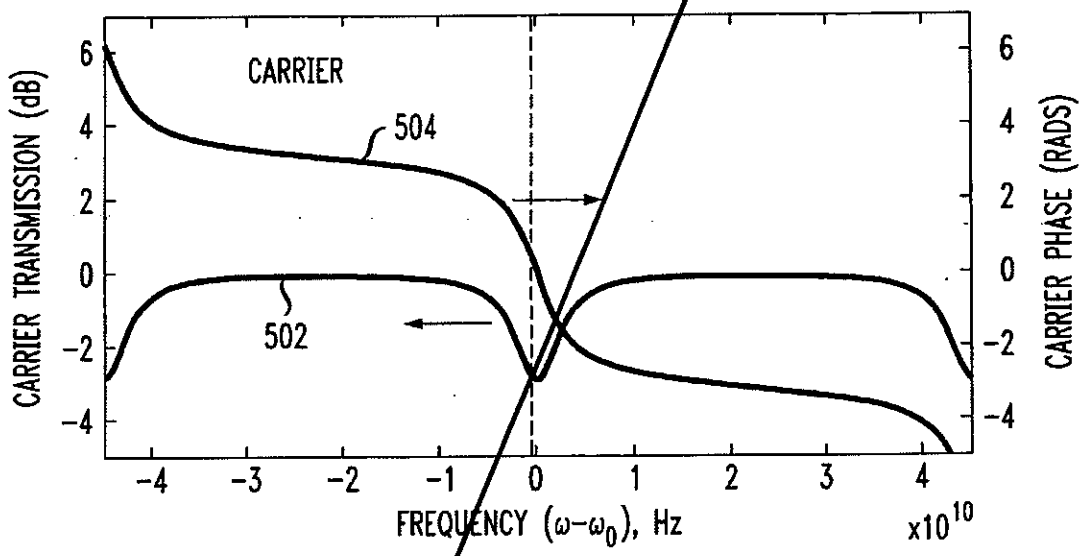

CARRIER
504
502
CARRIER TRANSMISSION (dB)
CARRIER PHASE (RADS)
FREQUENCY (ω−ω0), Hz
x10^10

FIG. 5D

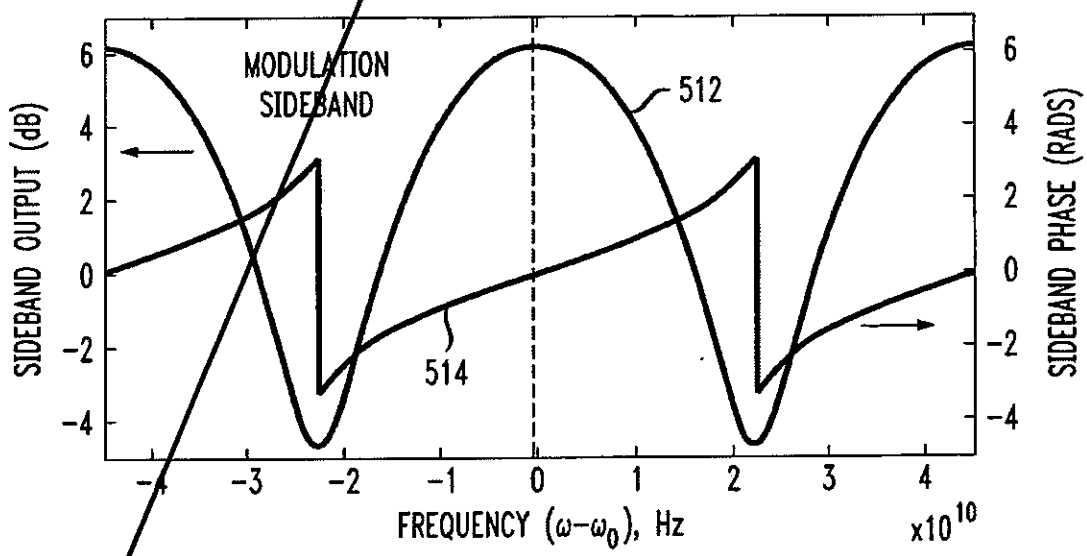

MODULATION SIDEBAND
512
514
SIDEBAND OUTPUT (dB)
SIDEBAND PHASE (RADS)
FREQUENCY (ω−ω0), Hz
x10^10

FIG. 5E

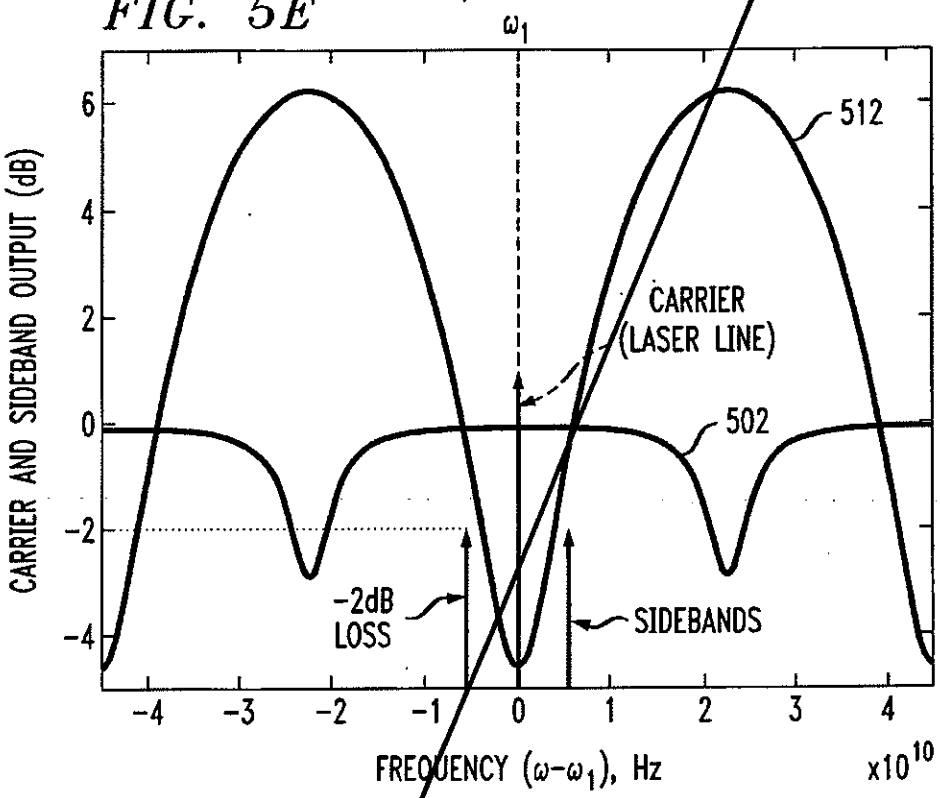

ω1
512
CARRIER
(LASER LINE)
502
-2dB
LOSS
SIDEBANDS
CARRIER AND SIDEBAND OUTPUT (dB)
FREQUENCY (ω-ω1), Hz
x10^10

FIG. 5F

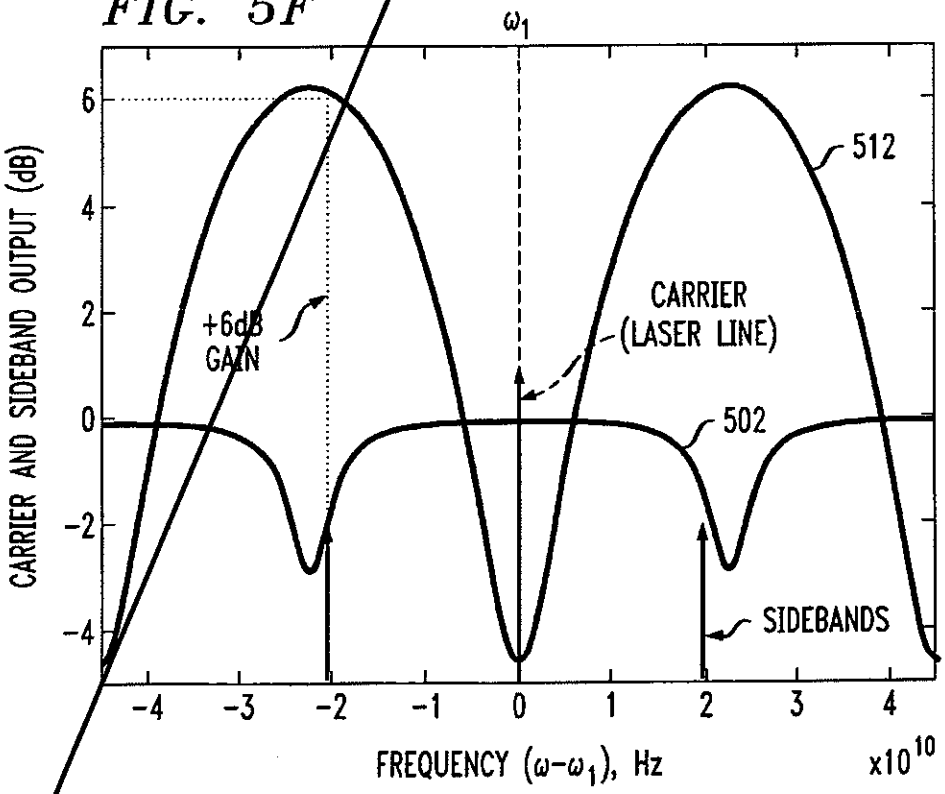

ω1
512
+6dB
GAIN
CARRIER
(LASER LINE)
502
SIDEBANDS
CARRIER AND SIDEBAND OUTPUT (dB)
FREQUENCY (ω-ω1), Hz
x10^10

FIG. 6A

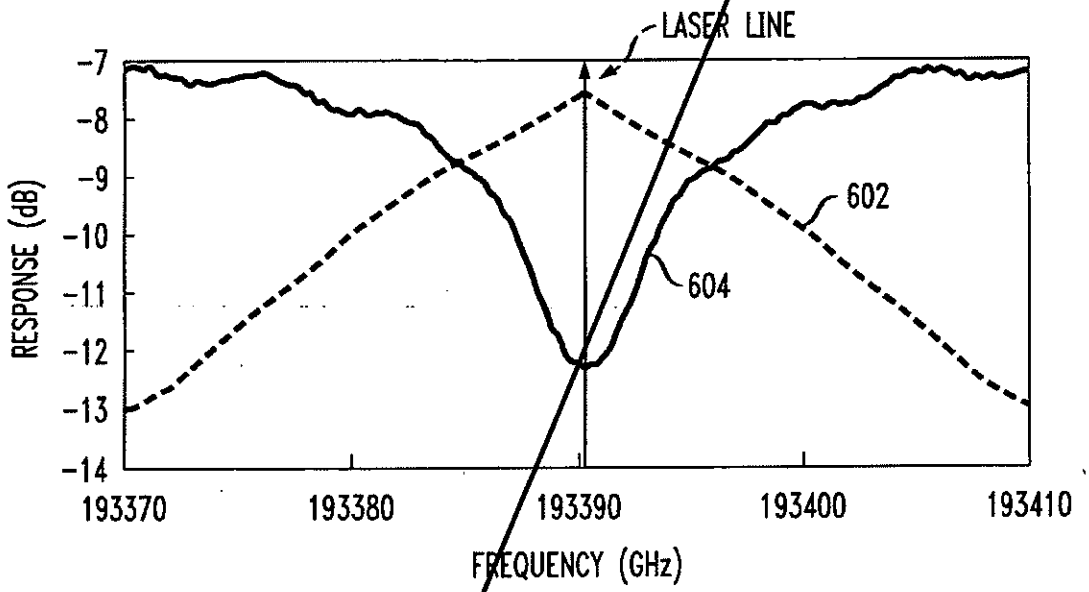

LASER LINE
602
604
RESPONSE (dB)
-7
-8
-9
-10
-11
-12
-13
-14
193370
193380
193390
193400
193410
FREQUENCY (GHz)

FIG. 6B

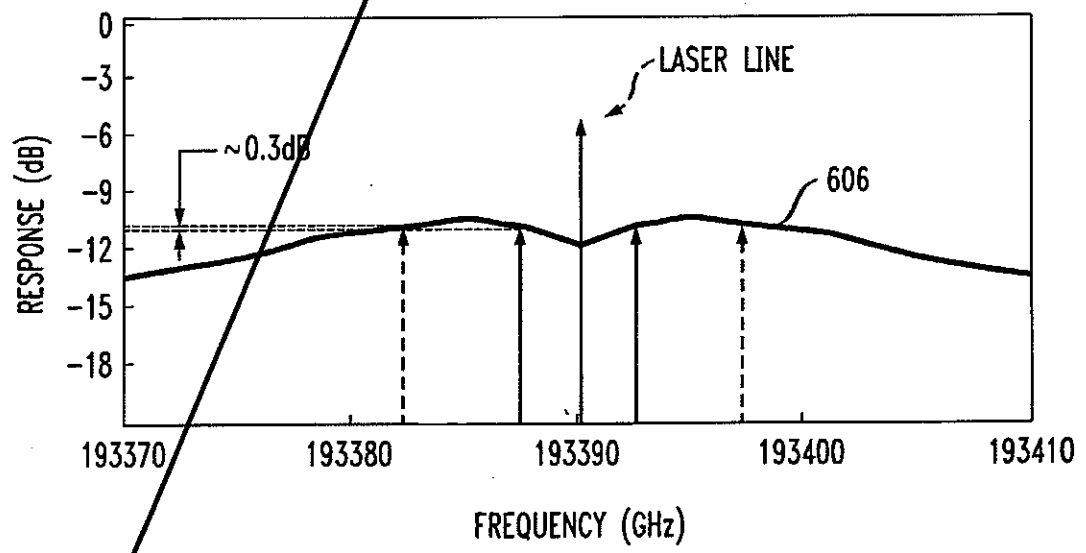

LASER LINE
~0.3dB
606
RESPONSE (dB)
0
-3
-6
-9
-12
-15
-18
193370
193380
193390
193400
193410
FREQUENCY (GHz)

FIG. 7A

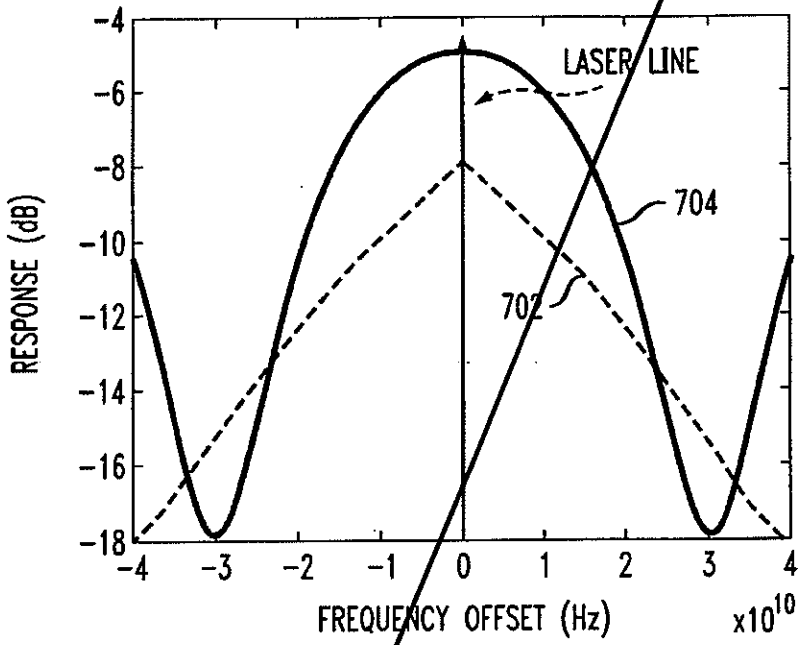

LASER LINE
704
702
RESPONSE (dB)
-4
-6
-8
-10
-12
-14
-16
-18
-4 -3 -2 -1 0 1 2 3 4
FREQUENCY OFFSET (Hz)
x10^10

FIG. 7B

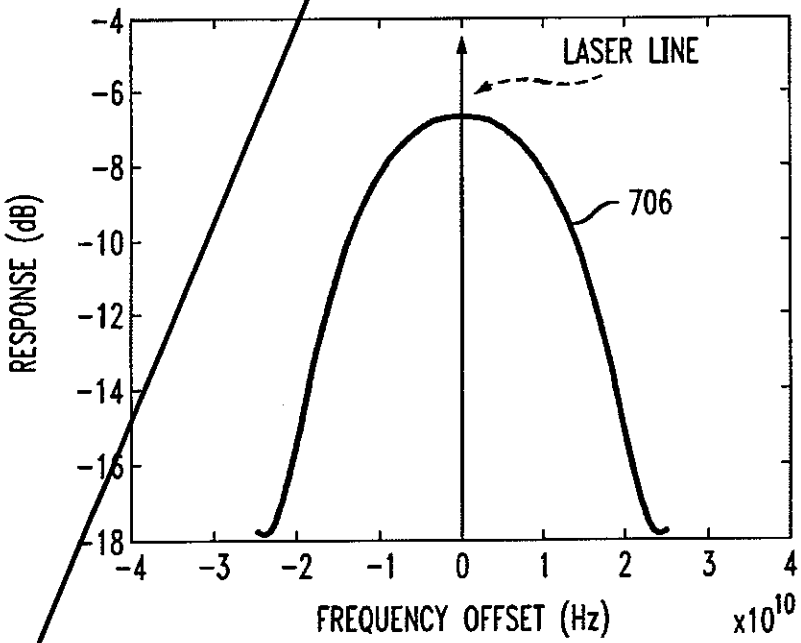

LASER LINE
706
RESPONSE (dB)
-4
-6
-8
-10
-12
-14
-16
-18
-4 -3 -2 -1 0 1 2 3 4
FREQUENCY OFFSET (Hz)
x10^10

FIG. 8A

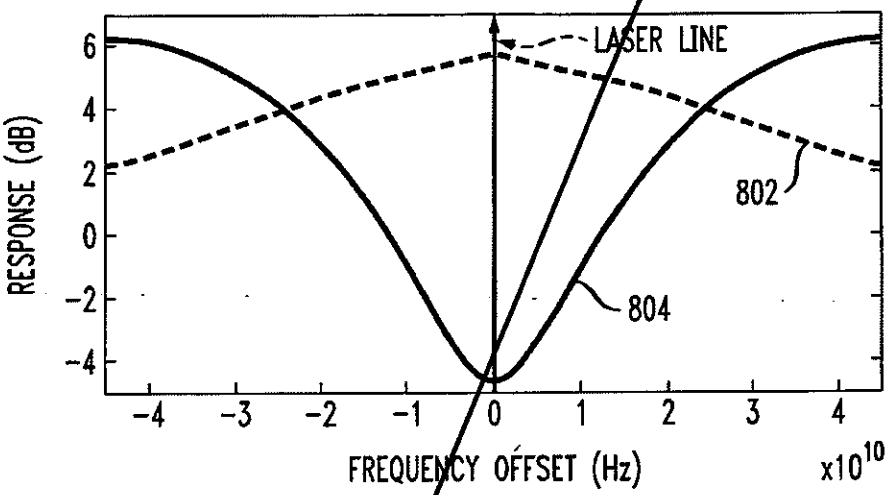
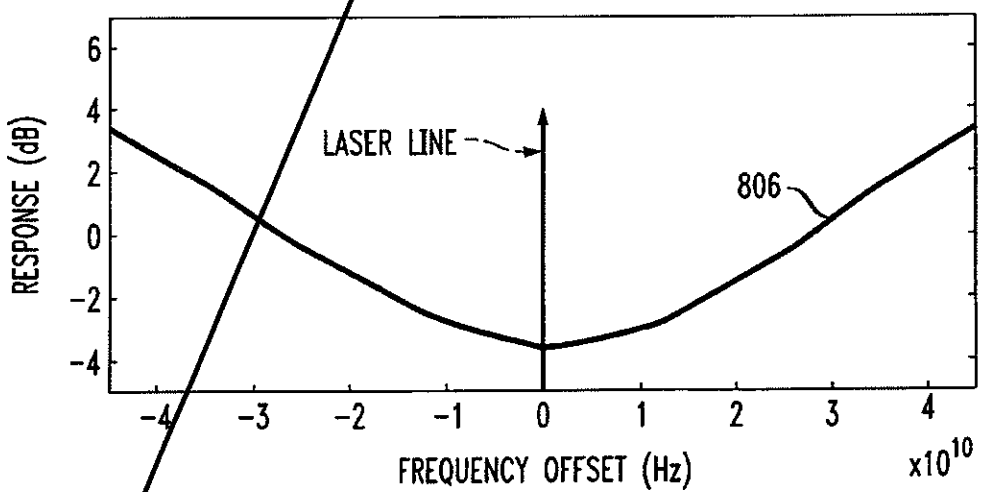

LASER LINE
802
804
RESPONSE (dB)
6
4
2
0
-2
-4
-4
-3
-2
-1
0
1
2
3
4
FREQUENCY OFFSET (Hz)
x10^10

FIG. 8B


LASER LINE
806
RESPONSE (dB)
6
4
2
0
-2
-4
-4
-3
-2
-1
0
1
2
3
4
FREQUENCY OFFSET (Hz)
x10^10

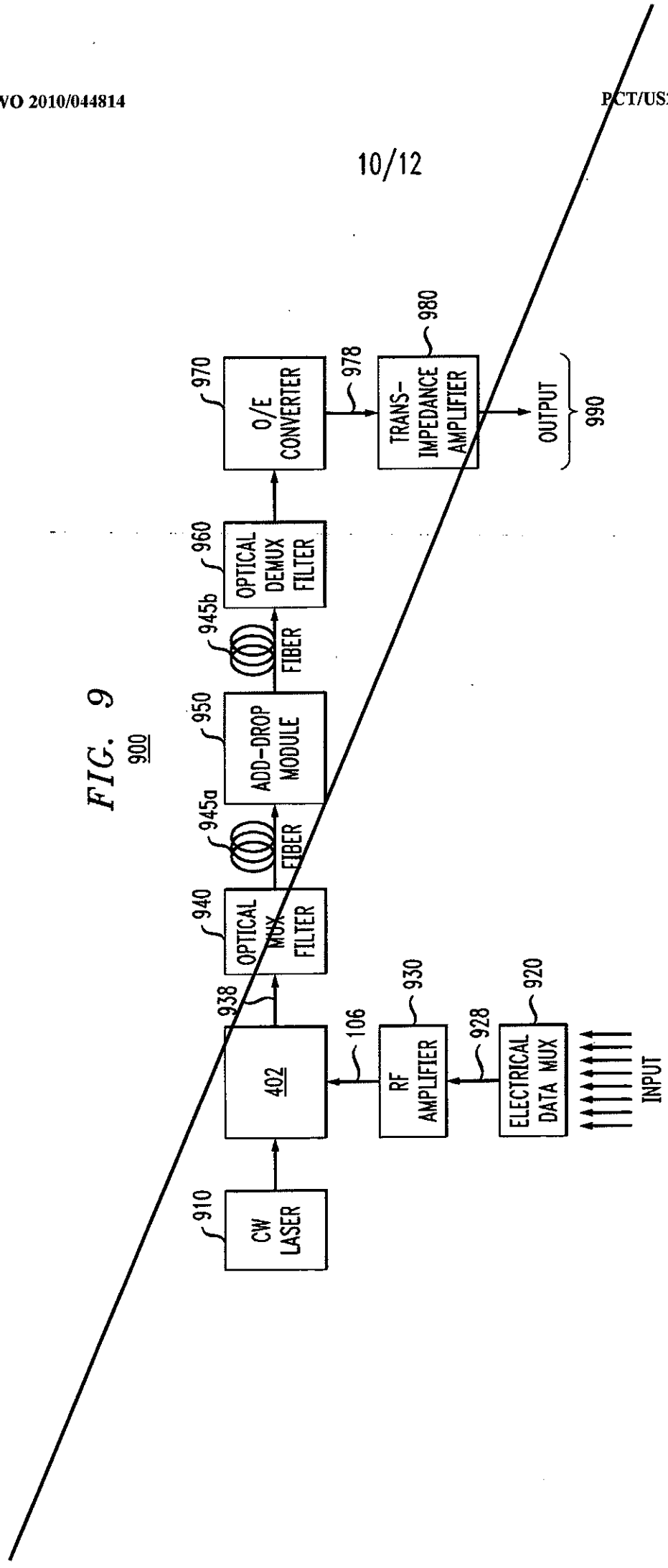

900
910
CW LASER
938
402
106
930
RF AMPLIFIER
928
920
ELECTRICAL DATA MUX
INPUT
940
OPTICAL MUX FILTER
945a
FIBER
950
ADD-DROP MODULE
945b
FIBER
960
OPTICAL DEMUX FILTER
970
O/E CONVERTER
978
980
TRANS-IMPEDANCE AMPLIFIER
OUTPUT
990

FIG. 9

FIG. 10

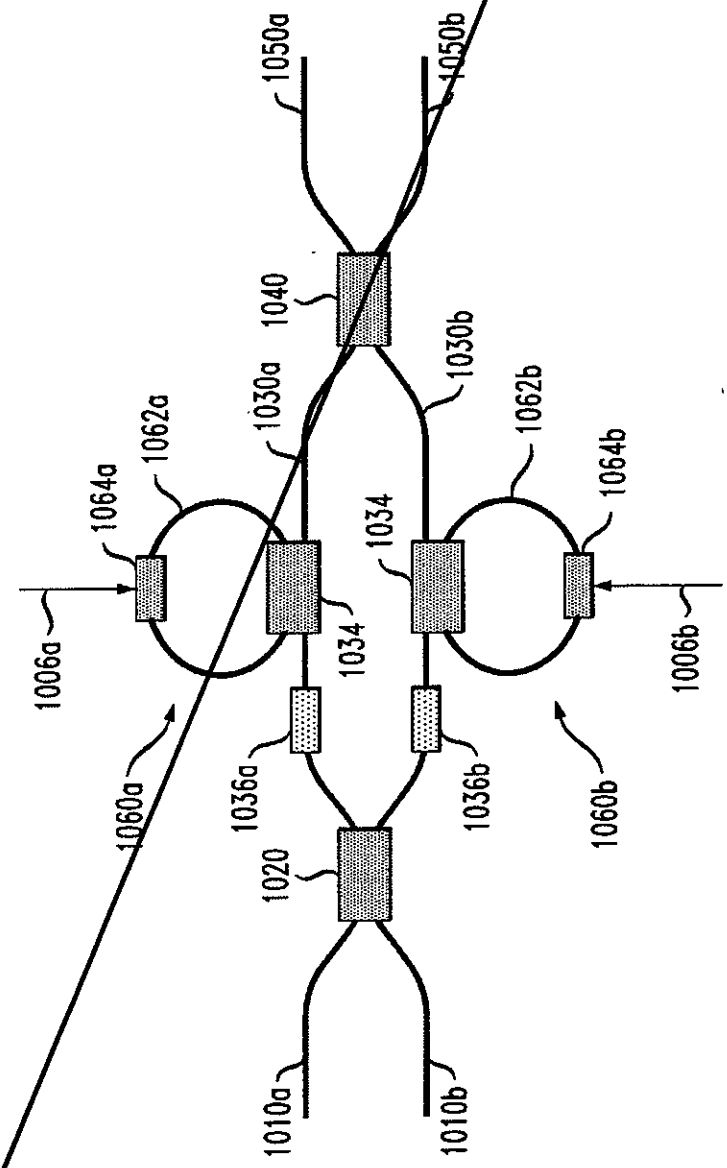

1002
1050a
1050b
1040
1030a
1030b
1062a
1062b
1064a
1064b
1034
1034
1006a
1006b
1060a
1060b
1036a
1036b
1020
1010a
1010b

FIG. 11

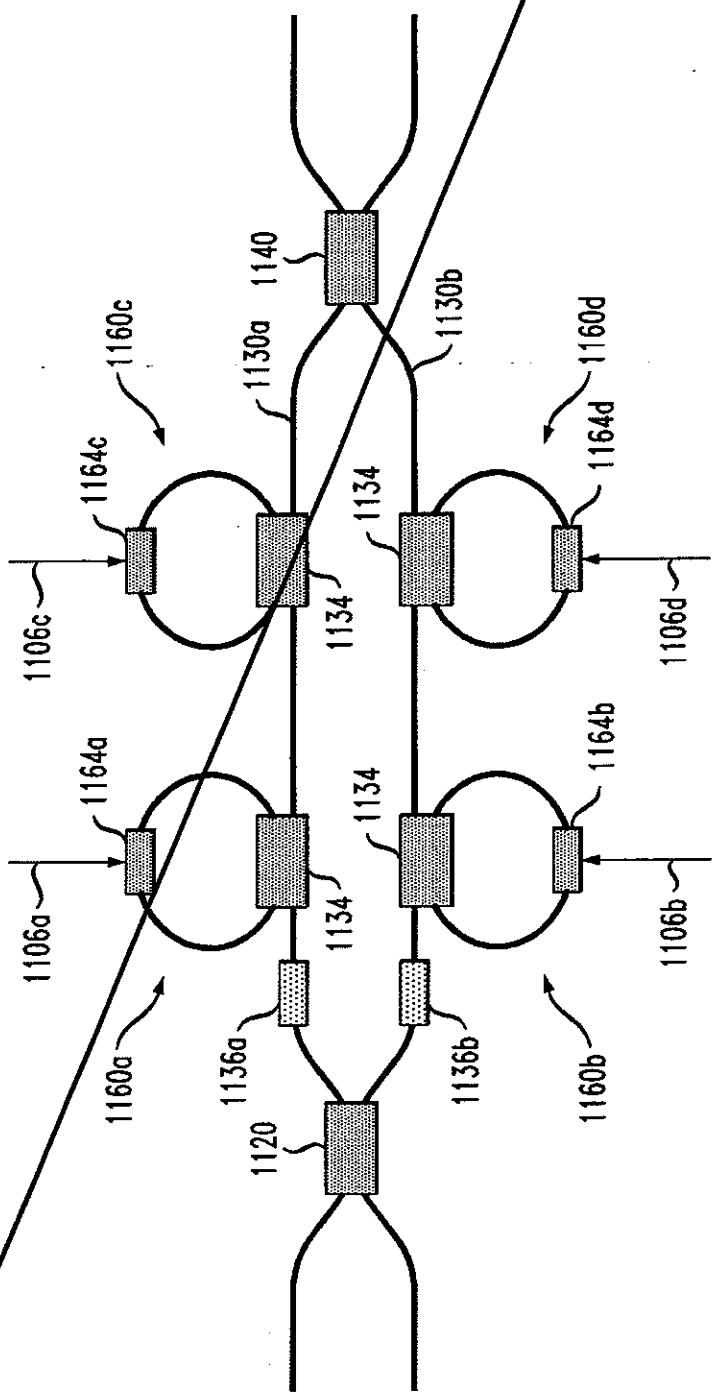

1102
1140
1130a
1130b
1160c
1160d
1164c
1164d
1134
1106c
1106d
1164a
1164b
1106a
1106b
1160a
1160b
1136a
1136b
1120

FIG. 1

PRIOR ART

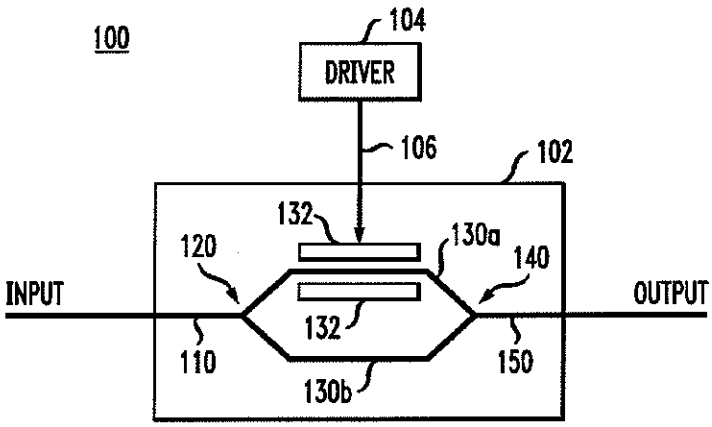


FIG. 2

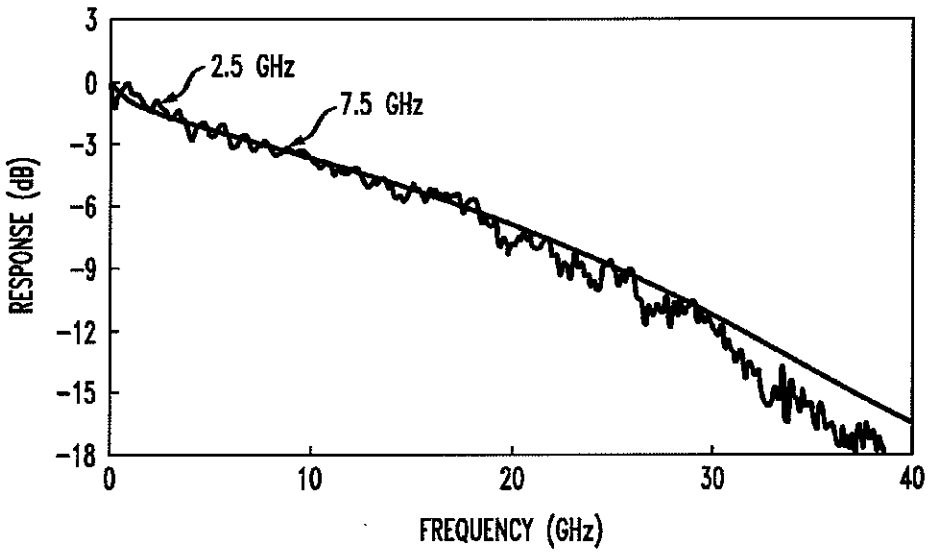


FIG. 3

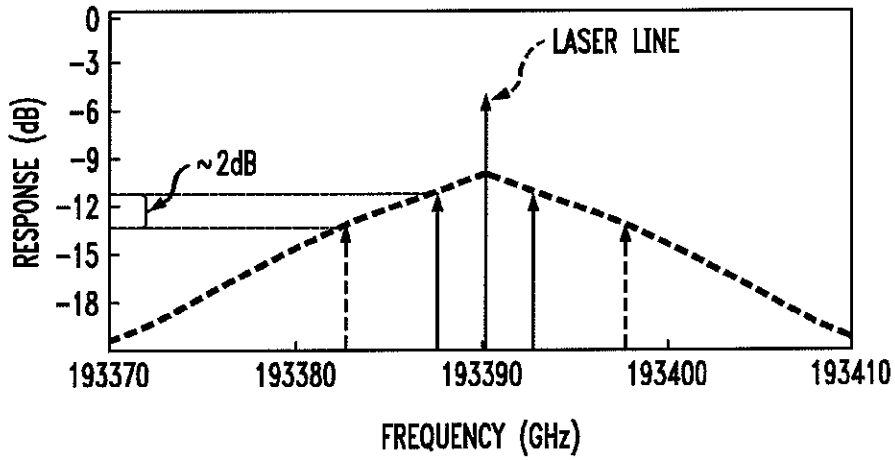


FIG. 4A

402

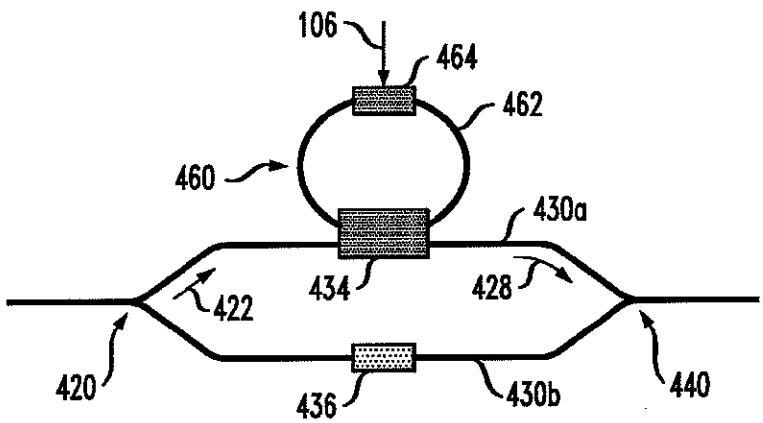


FIG. 4B

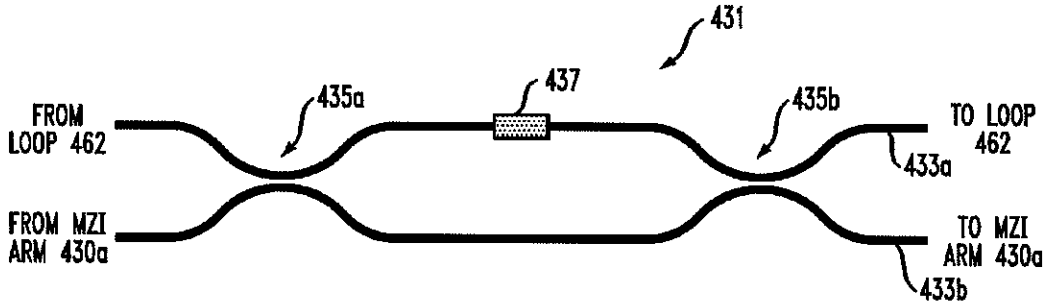


FIG. 4C

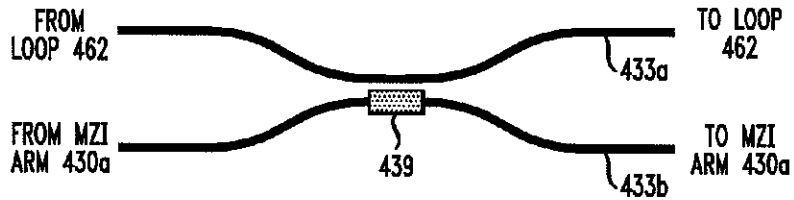


FIG. 4D

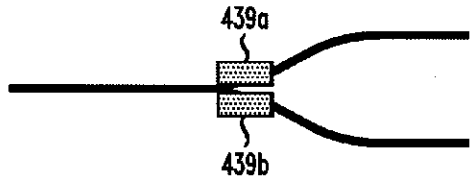


FIG. 5A

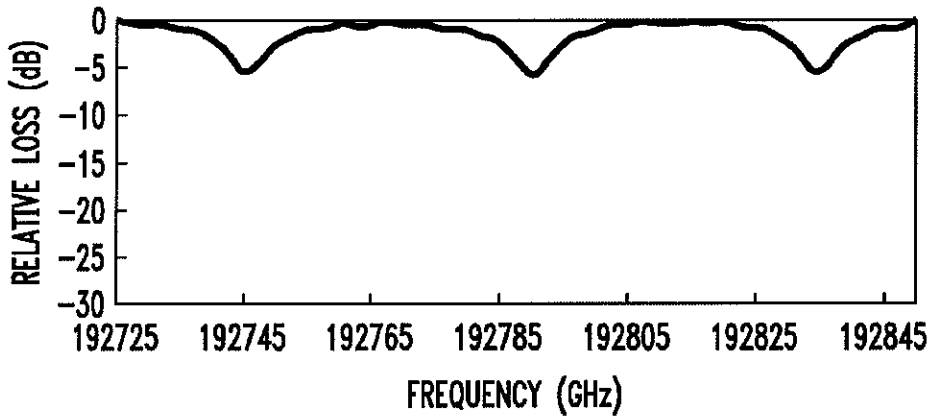

RELATIVE LOSS (dB)
0
-5
-10
-15
-20
-25
-30
192725
192745
192765
192785
192805
192825
192845
FREQUENCY (GHz)

FIG. 5B

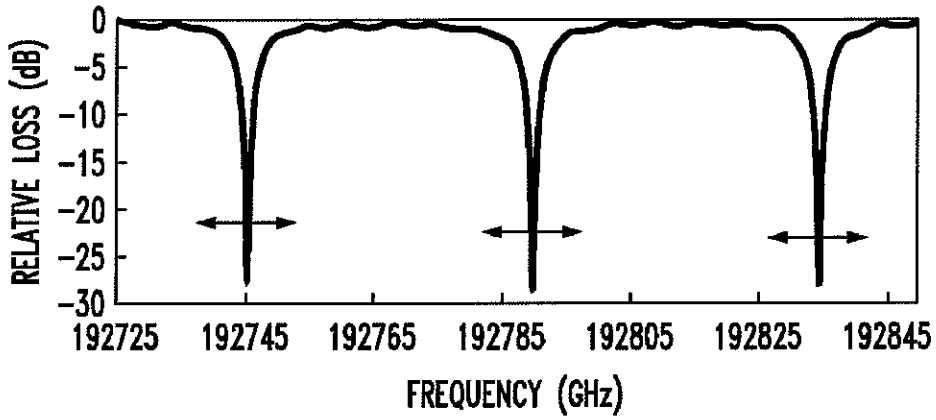

RELATIVE LOSS (dB)
0
-5
-10
-15
-20
-25
-30
192725
192745
192765
192785
192805
192825
192845
FREQUENCY (GHz)

FIG. 5C

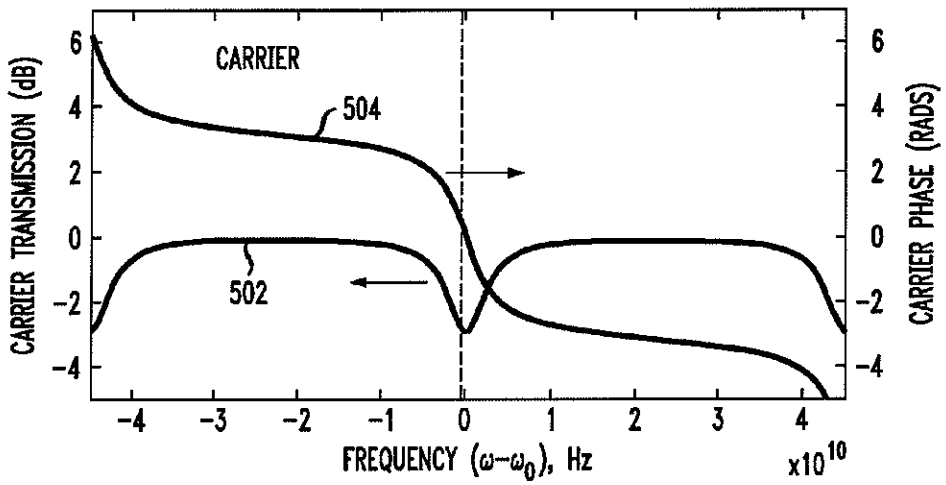

CARRIER
504
502
CARRIER TRANSMISSION (dB)
CARRIER PHASE (RADS)
FREQUENCY (ω−ω0), Hz
x10^10
6
4
2
0
−2
−4
−4
−3
−2
−1
0
1
2
3
4

FIG. 5D

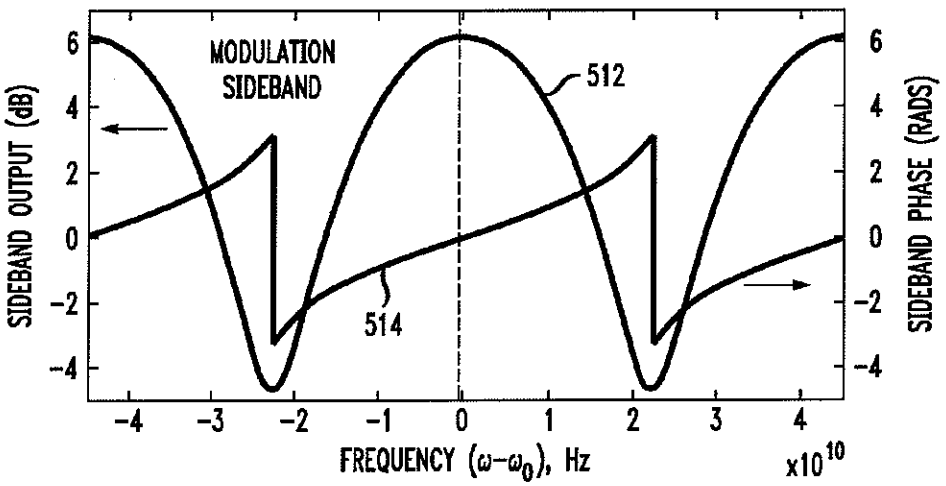

MODULATION
SIDEBAND
512
514
SIDEBAND OUTPUT (dB)
SIDEBAND PHASE (RADS)
FREQUENCY (ω−ω0), Hz
x10^10
6
4
2
0
−2
−4
−4
−3
−2
−1
0
1
2
3
4

FIG. 5E

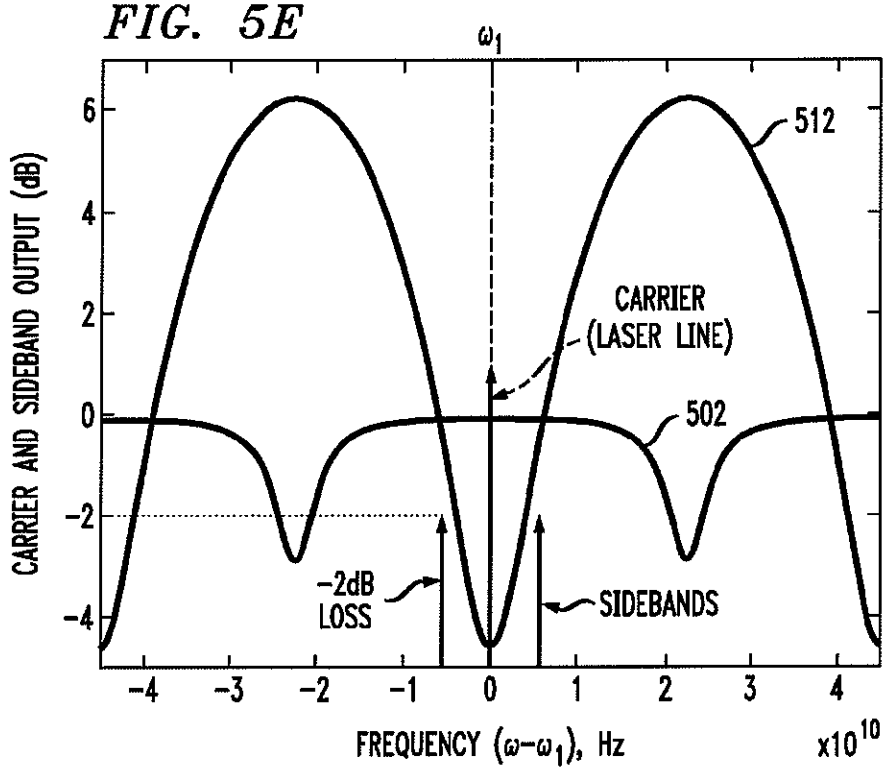

ω_1
512
CARRIER
(LASER LINE)
502
-2dB
LOSS
SIDEBANDS
CARRIER AND SIDEBAND OUTPUT (dB)
6
4
2
0
-2
-4
-4 -3 -2 -1 0 1 2 3 4
FREQUENCY $(\omega-\omega_1)$, Hz
x10^{10}

FIG. 5F

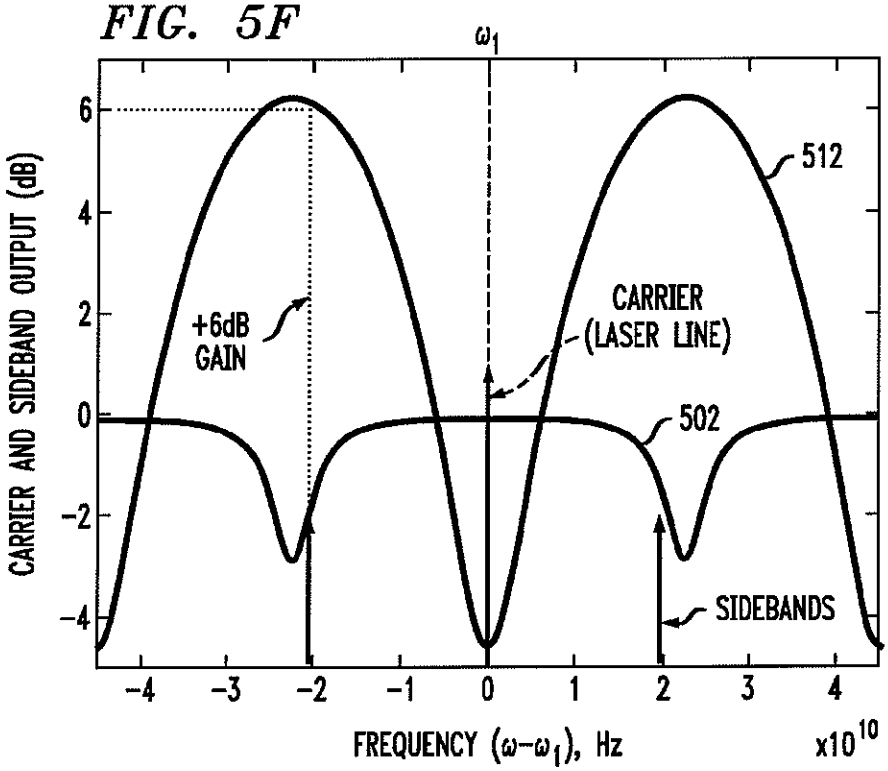

ω_1
512
+6dB
GAIN
CARRIER
(LASER LINE)
502
SIDEBANDS
CARRIER AND SIDEBAND OUTPUT (dB)
6
4
2
0
-2
-4
-4 -3 -2 -1 0 1 2 3 4
FREQUENCY $(\omega-\omega_1)$, Hz
x10^{10}

FIG. 6A

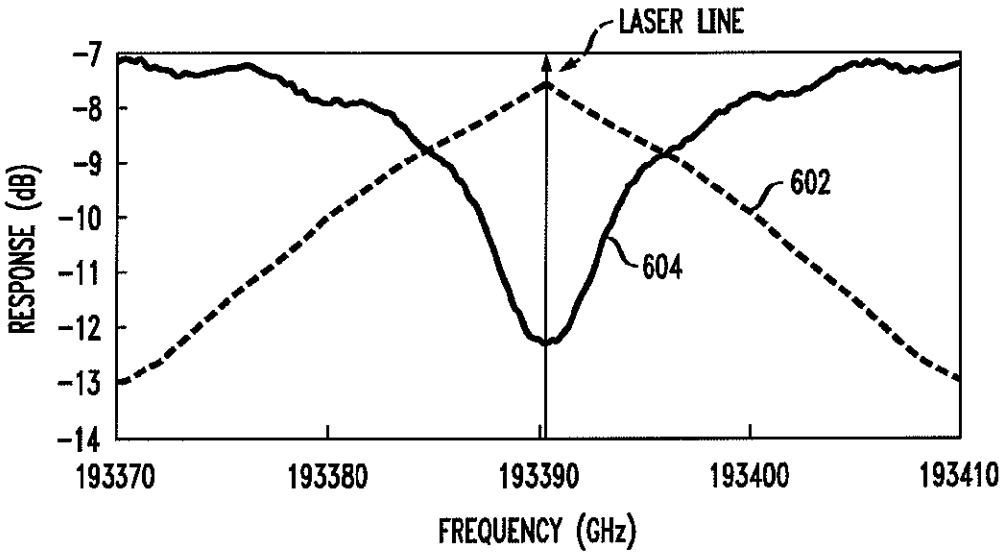

LASER LINE
602
604
RESPONSE (dB)
-7
-8
-9
-10
-11
-12
-13
-14
193370
193380
193390
193400
193410
FREQUENCY (GHz)

FIG. 6B

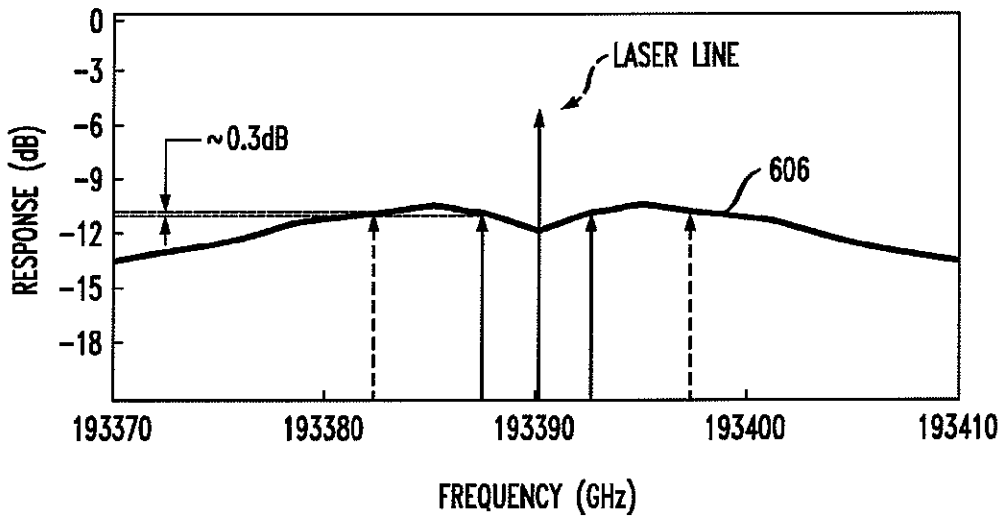

LASER LINE
~0.3dB
606
RESPONSE (dB)
0
-3
-6
-9
-12
-15
-18
193370
193380
193390
193400
193410
FREQUENCY (GHz)

FIG. 7A

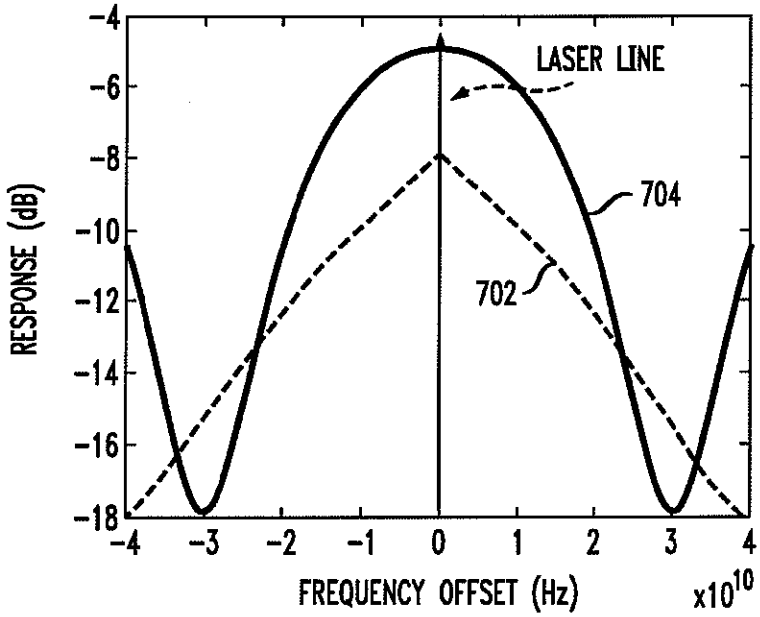

LASER LINE
704
702
RESPONSE (dB)
-4
-6
-8
-10
-12
-14
-16
-18
-4 -3 -2 -1 0 1 2 3 4
FREQUENCY OFFSET (Hz)
x10^10

FIG. 7B

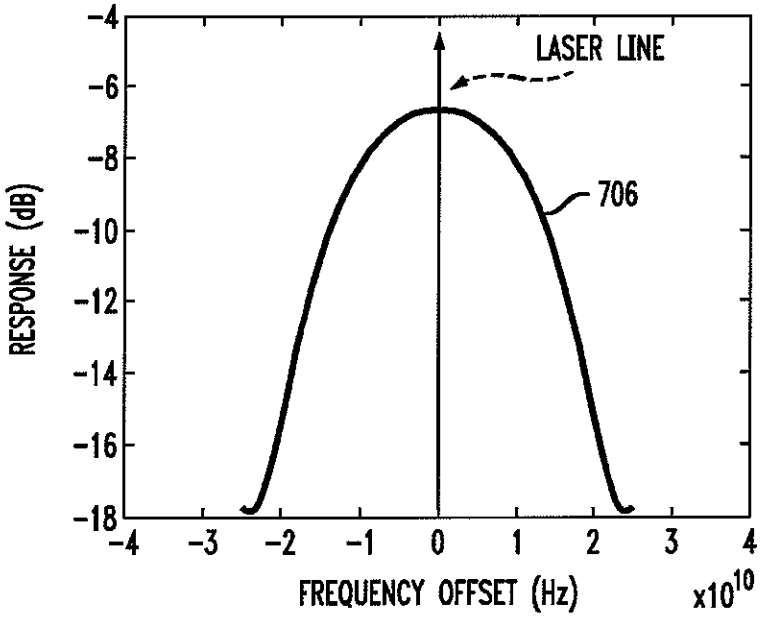

LASER LINE
706
RESPONSE (dB)
-4
-6
-8
-10
-12
-14
-16
-18
-4 -3 -2 -1 0 1 2 3 4
FREQUENCY OFFSET (Hz)
x10^10

FIG. 8A

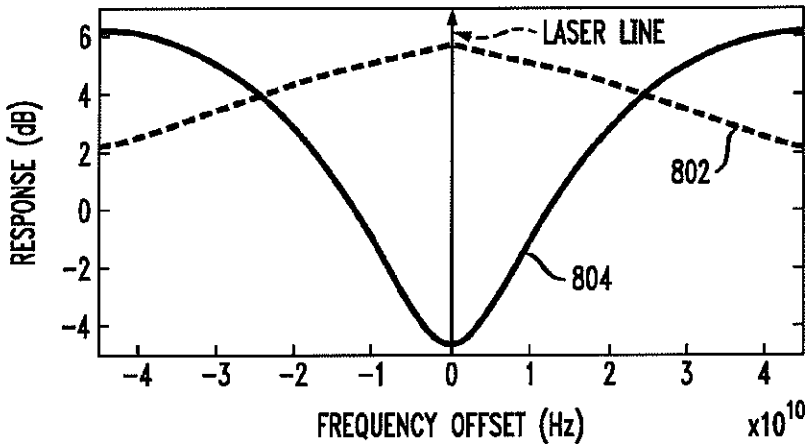

LASER LINE
802
804
RESPONSE (dB)
6
4
2
0
-2
-4
-4
-3
-2
-1
0
1
2
3
4
FREQUENCY OFFSET (Hz)
x10^10

FIG. 8B

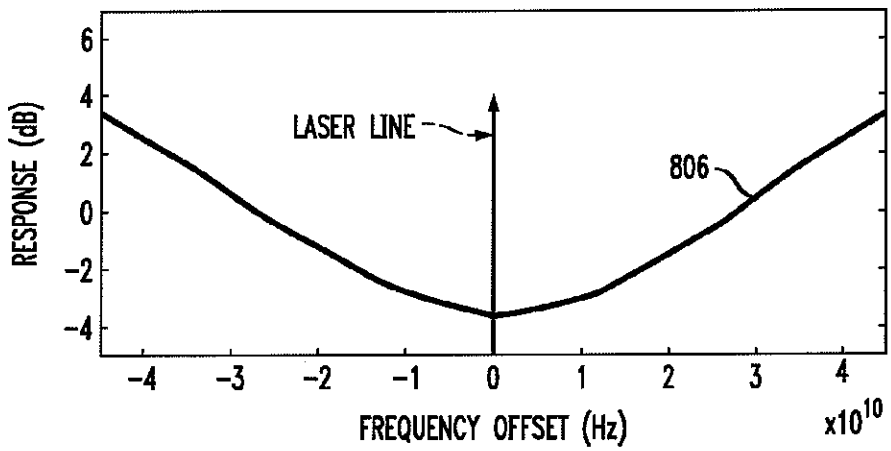

LASER LINE
806
RESPONSE (dB)
6
4
2
0
-2
-4
-4
-3
-2
-1
0
1
2
3
4
FREQUENCY OFFSET (Hz)
x10^10

FIG. 9

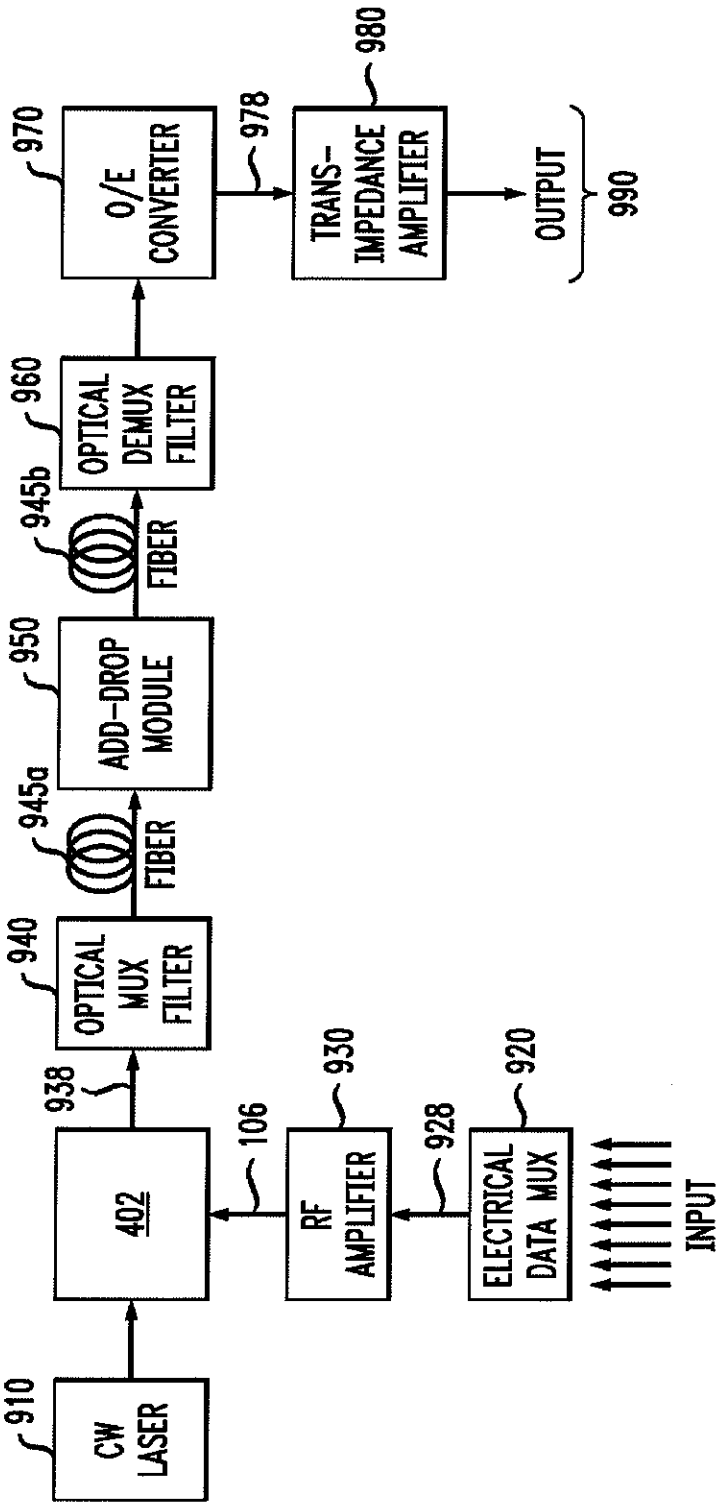

900
910
CW LASER
402
938
106
930
RF AMPLIFIER
928
920
ELECTRICAL DATA MUX
INPUT
940
OPTICAL MUX FILTER
945a
FIBER
950
ADD-DROP MODULE
945b
FIBER
960
OPTICAL DEMUX FILTER
970
O/E CONVERTER
978
980
TRANS-IMPEDANCE AMPLIFIER
OUTPUT
990

FIG. 10

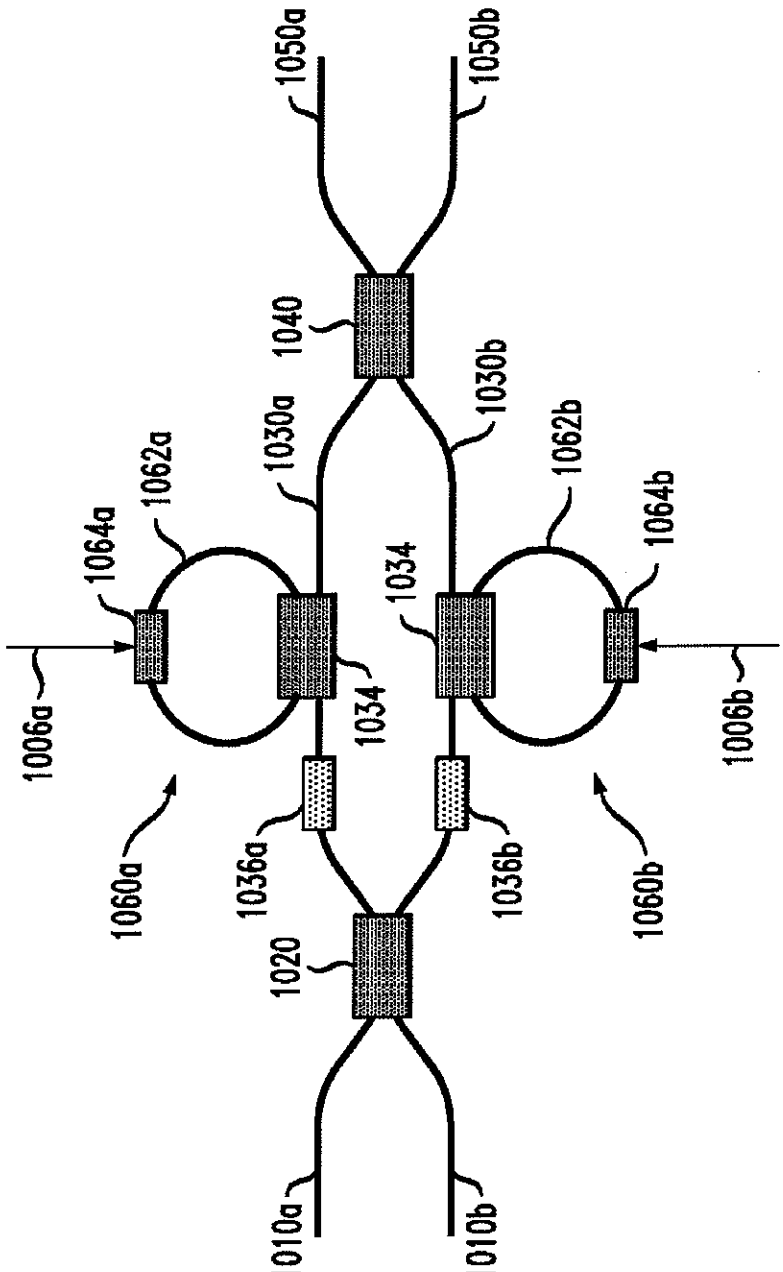
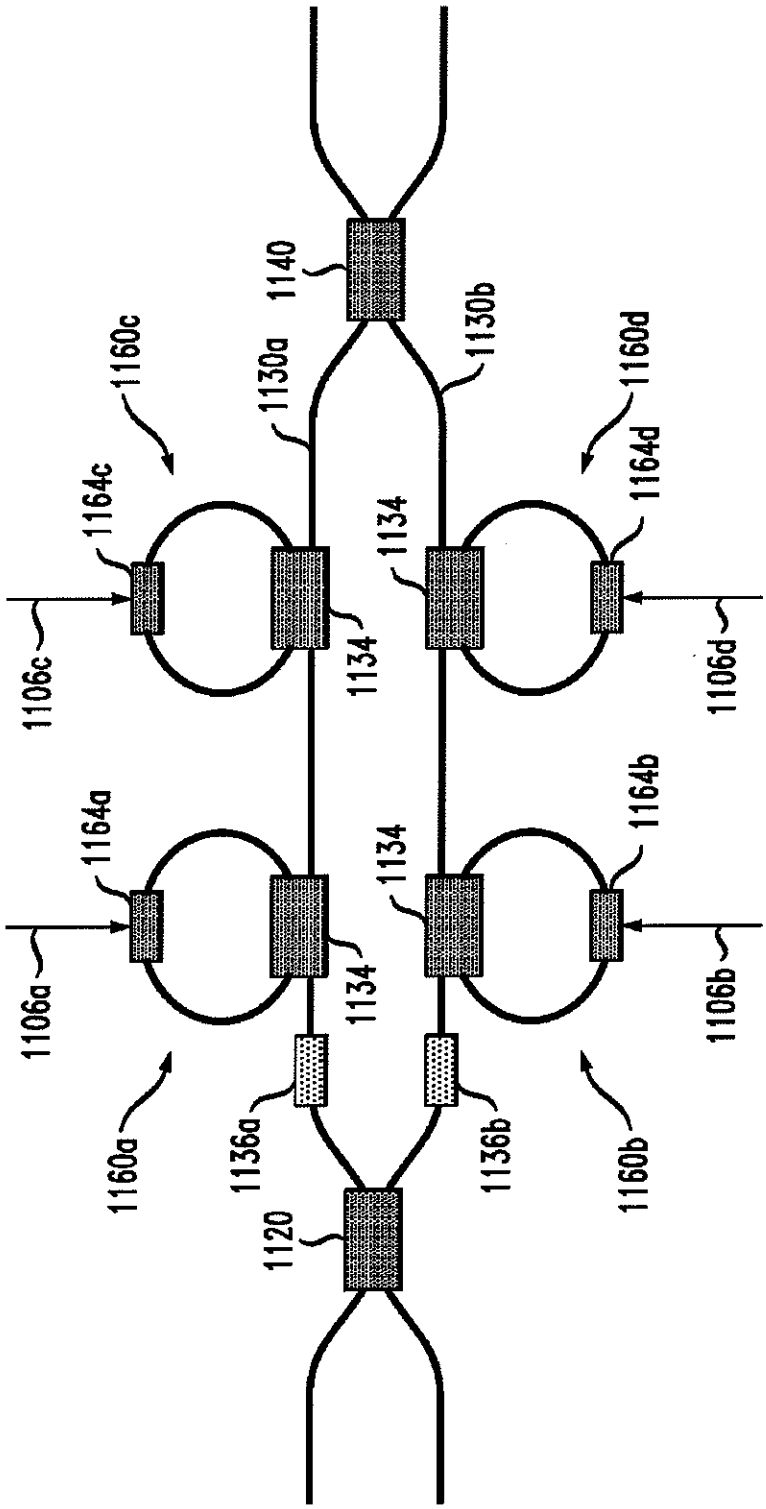

1002
1050a
1050b
1040
1030a
1030b
1062a
1062b
1064a
1064b
1034
1034
1006a
1006b
1060a
1060b
1036a
1036b
1020
1010a
1010b

FIG. 11


1102
1140
1130a
1130b
1160c
1160d
1164c
1164d
1134
1106c
1106d
1164a
1164b
1106a
1106b
1160a
1160b
1136a
1136b
1120