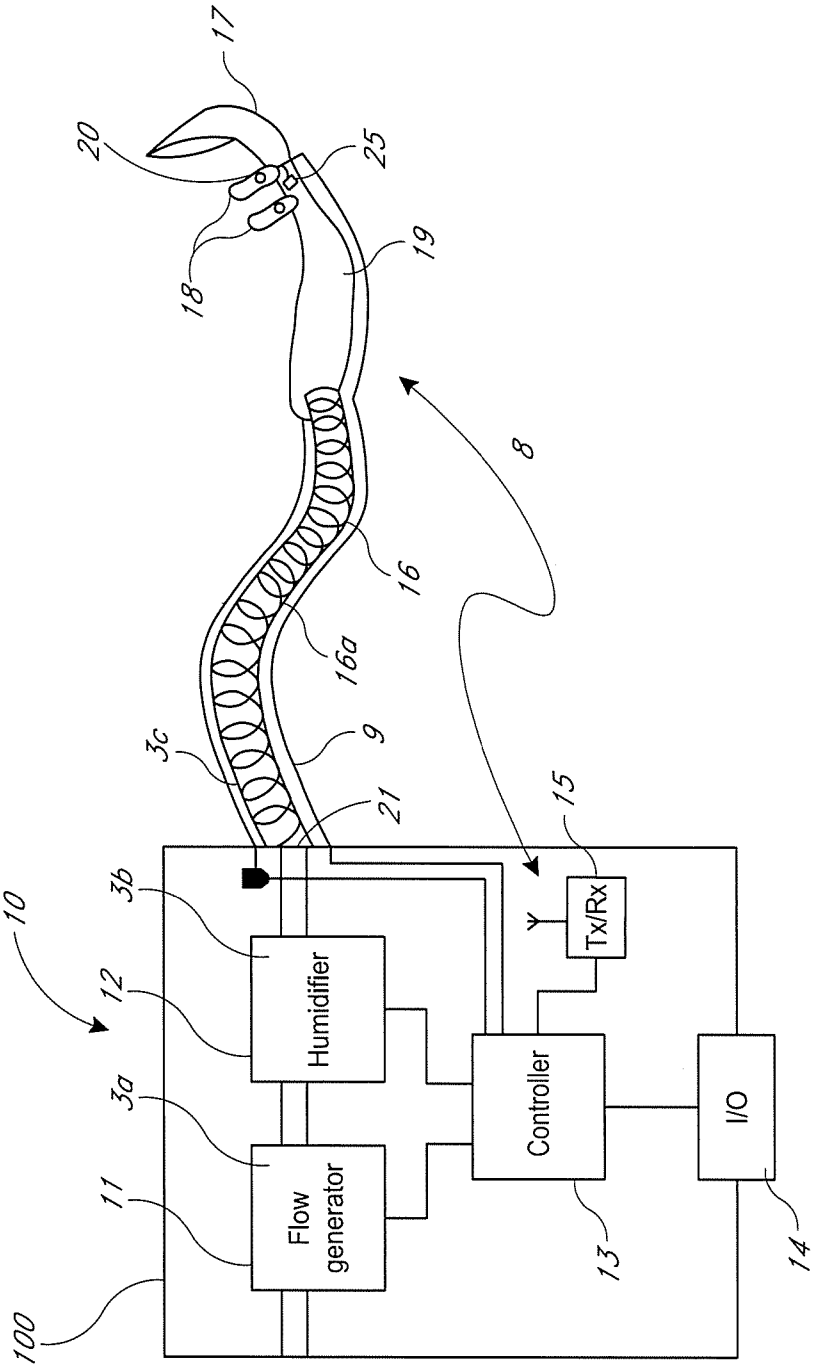

17
20
25
18
19
8
16
16a
3c
9
21
15
10
3b
12
Humidifier
Tx/Rx
3a
Controller
I/O
11
Flow generator
13
14
100

FIG. 1A

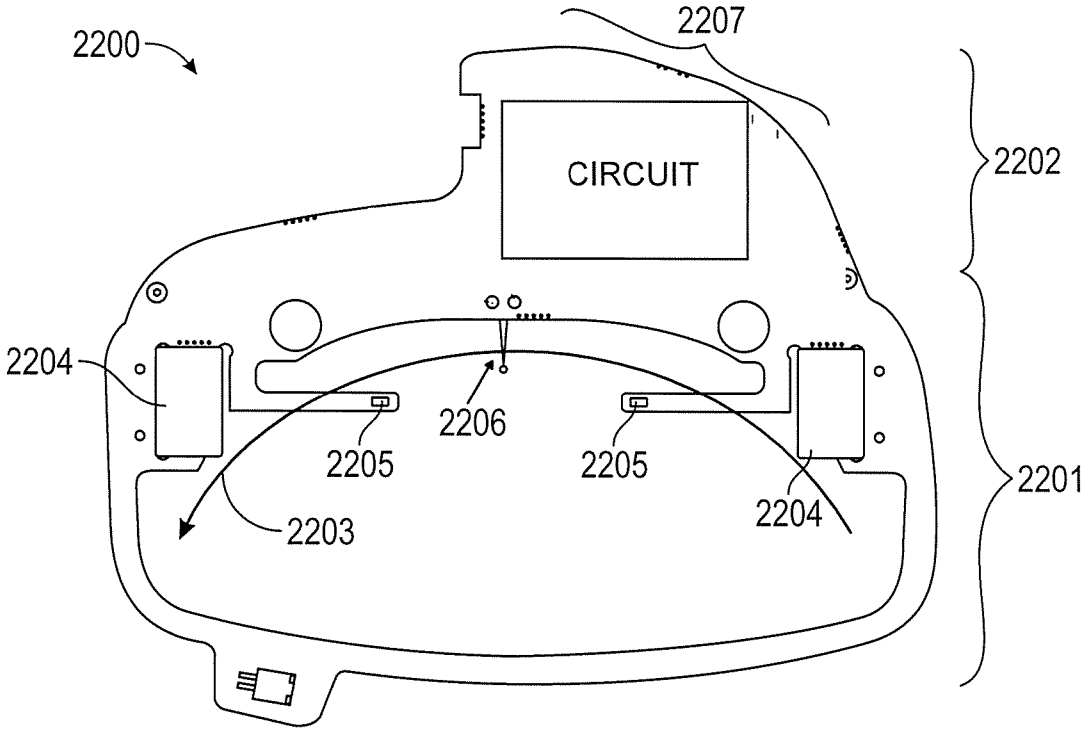


FIG. 1B

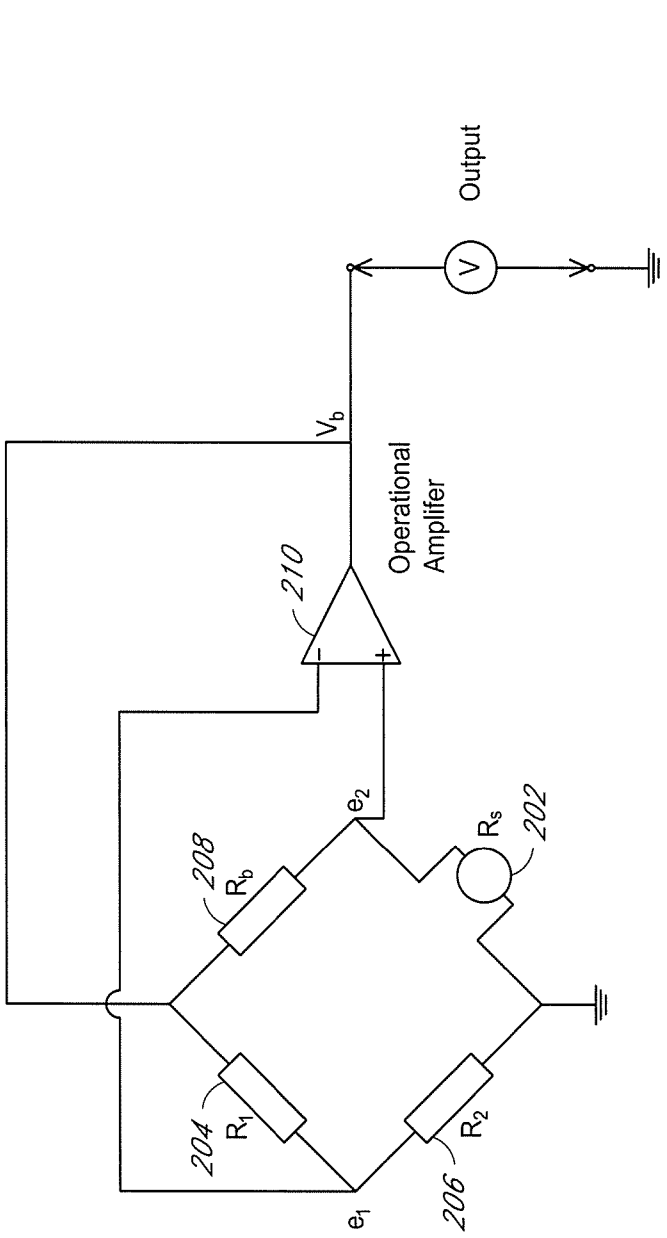

200
Output
V
V_b
Operational Amplifer
210
208
R_b
e_2
R_s
202
204
R_1
R_2
206
e_1

FIG. 2

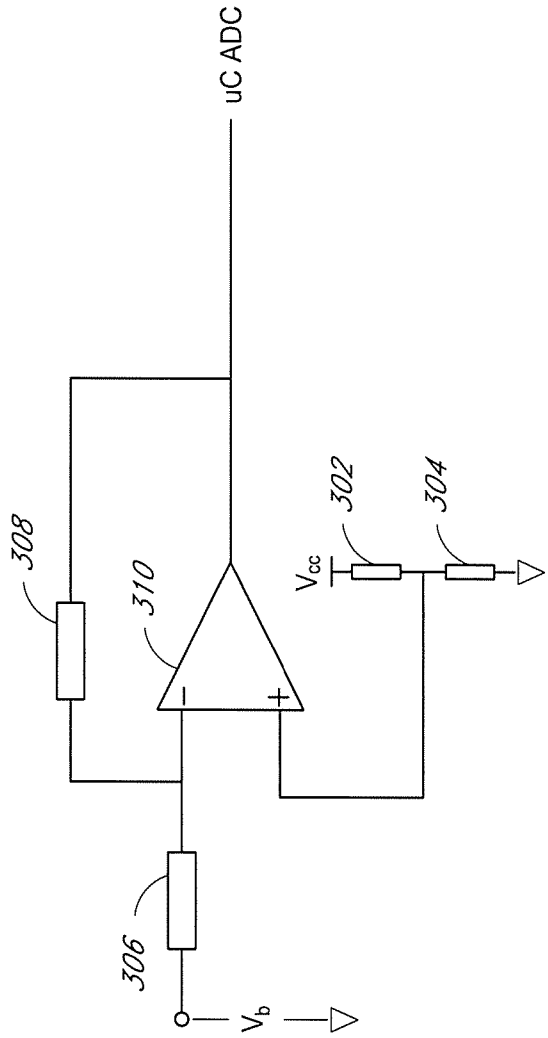


FIG. 3

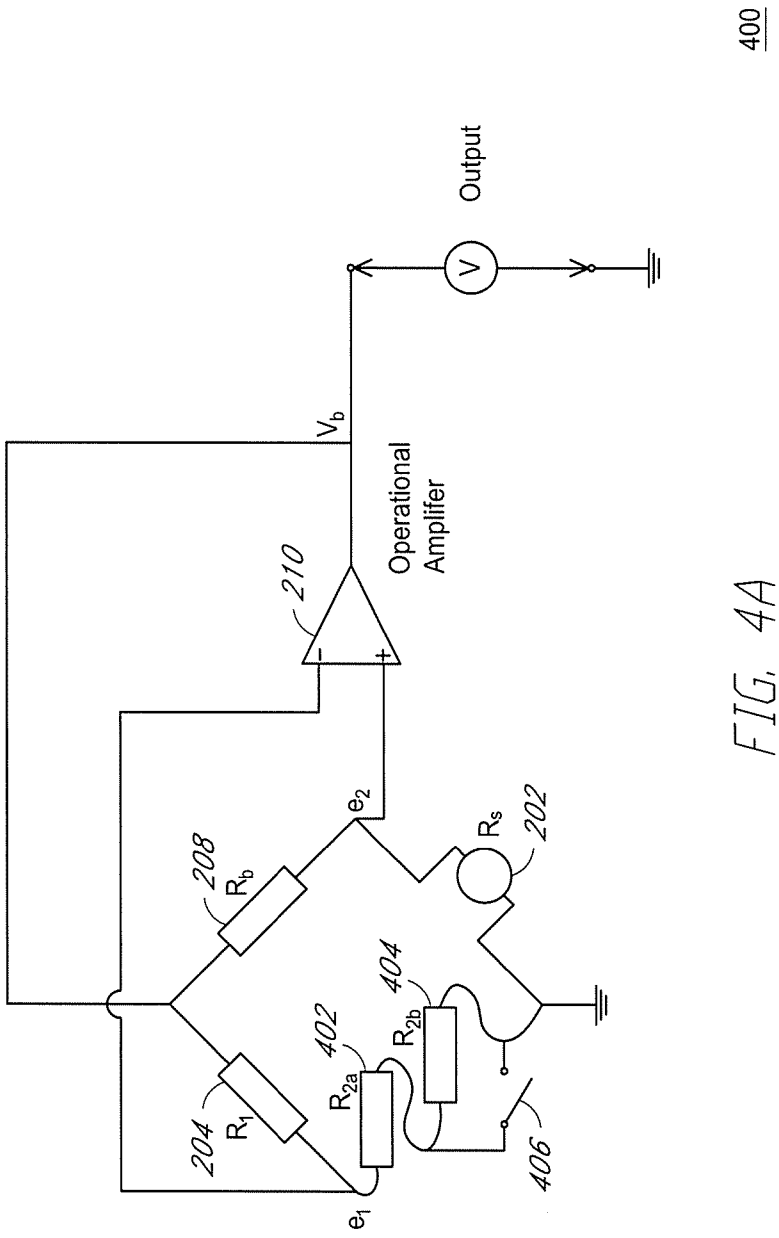

400
Output
V
V_b
Operational Amplifer
210
208
R_b
e_2
R_s
202
404
R_{2b}
402
R_{2a}
204
R_1
406
e_1

FIG. 4A

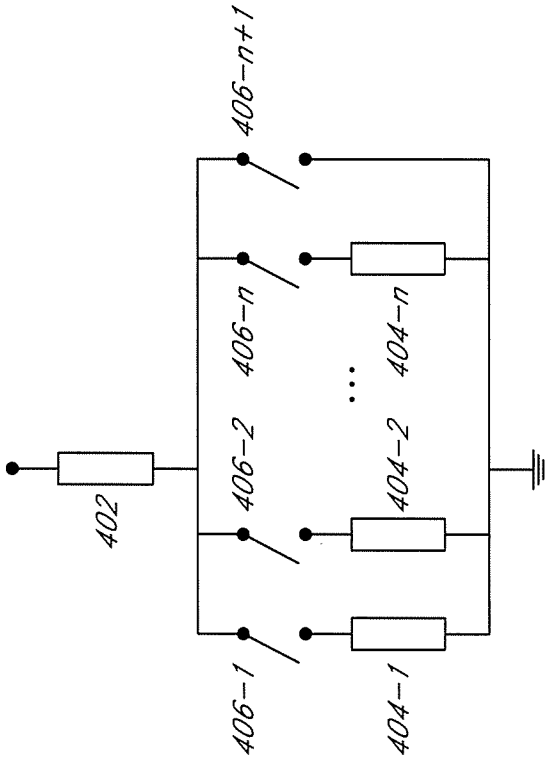

406-n+1
406-n
406-2
406-1
402
404-n
404-2
404-1

FIG. 4C

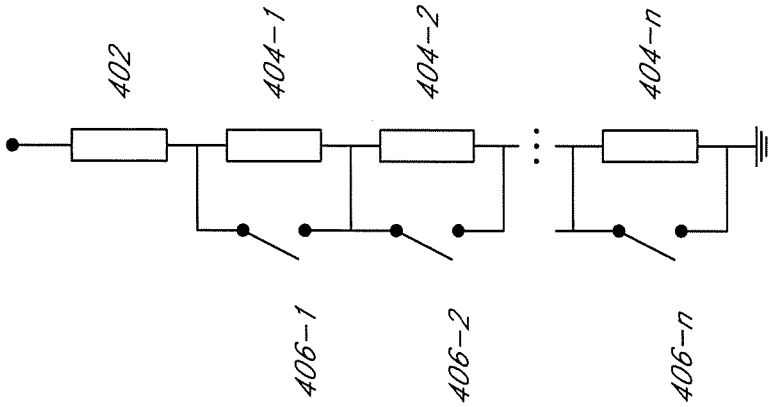

402
404-1
404-2
404-n
406-1
406-2
406-n

FIG. 4B

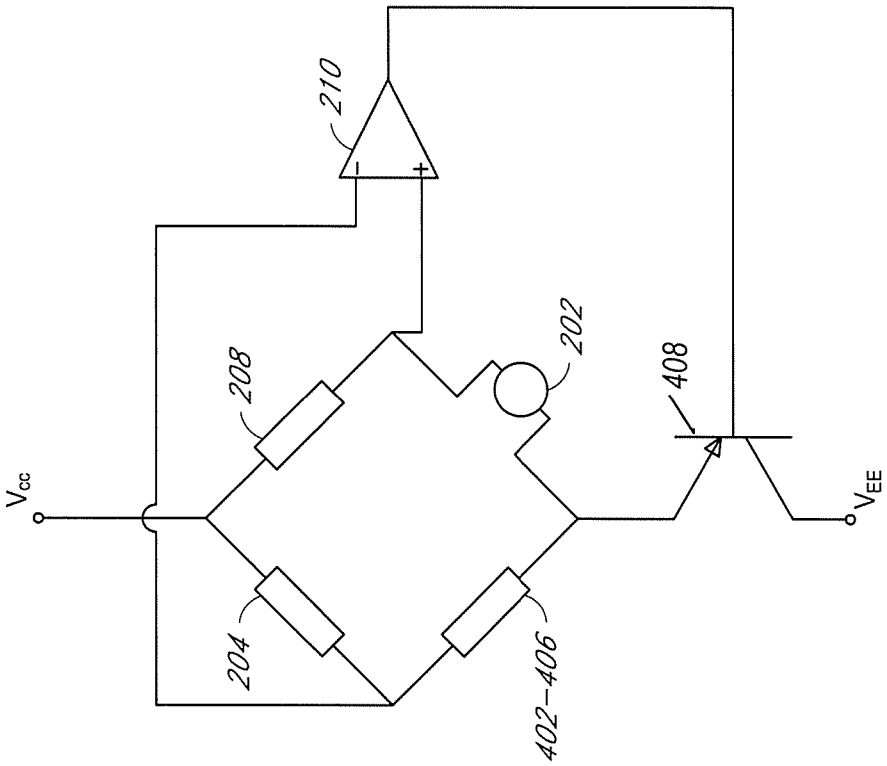

210
208
202
408
V_{cc}
V_{EE}
204
402–406

FIG. 4E

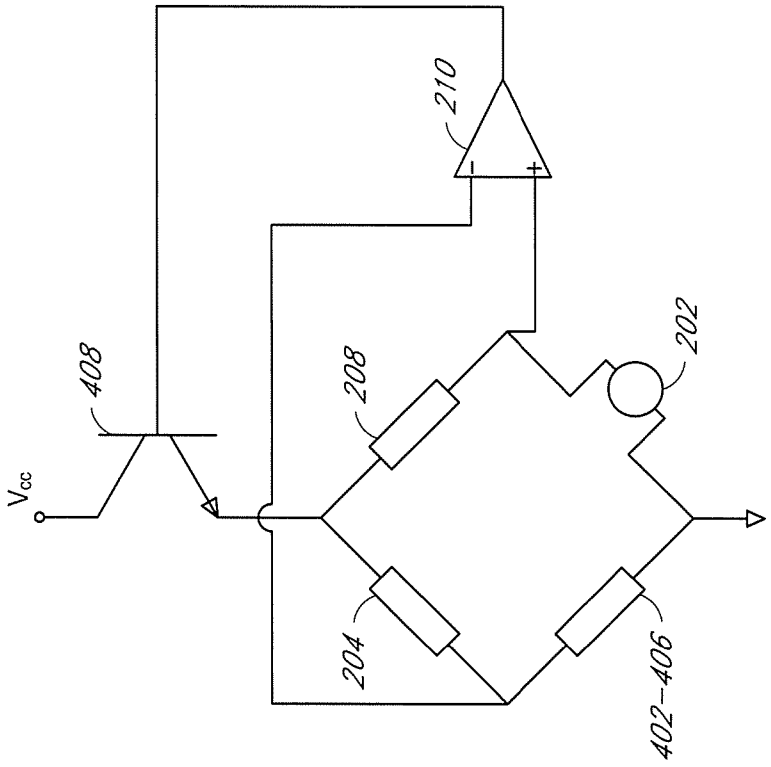

210
408
208
202
V_{cc}
204
402–406

FIG. 4D

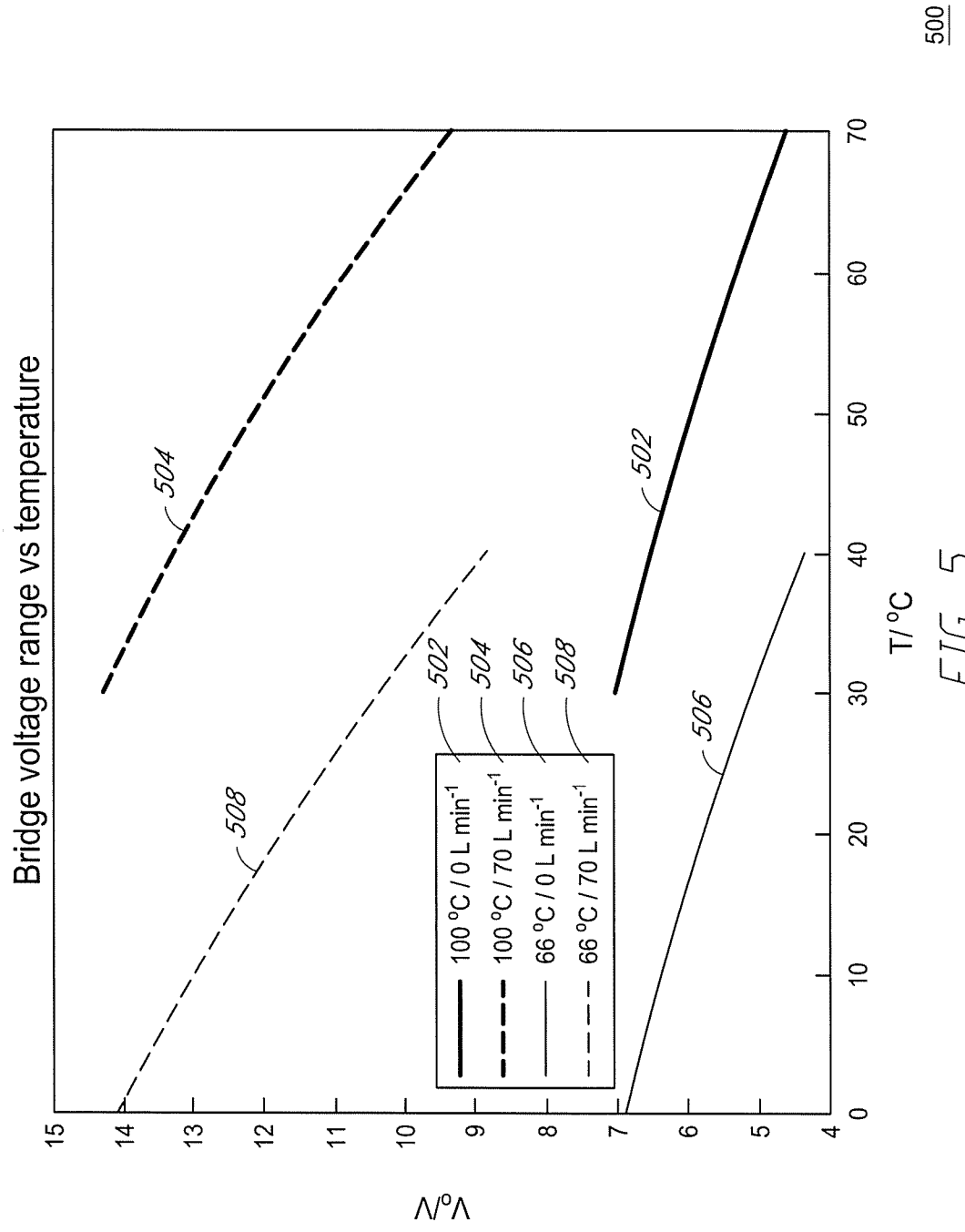

500
Bridge voltage range vs temperature
V_o/V
T/ °C
100 °C / 0 L min^{-1}
100 °C / 70 L min^{-1}
66 °C / 0 L min^{-1}
66 °C / 70 L min^{-1}
502
504
506
508

FIG. 5

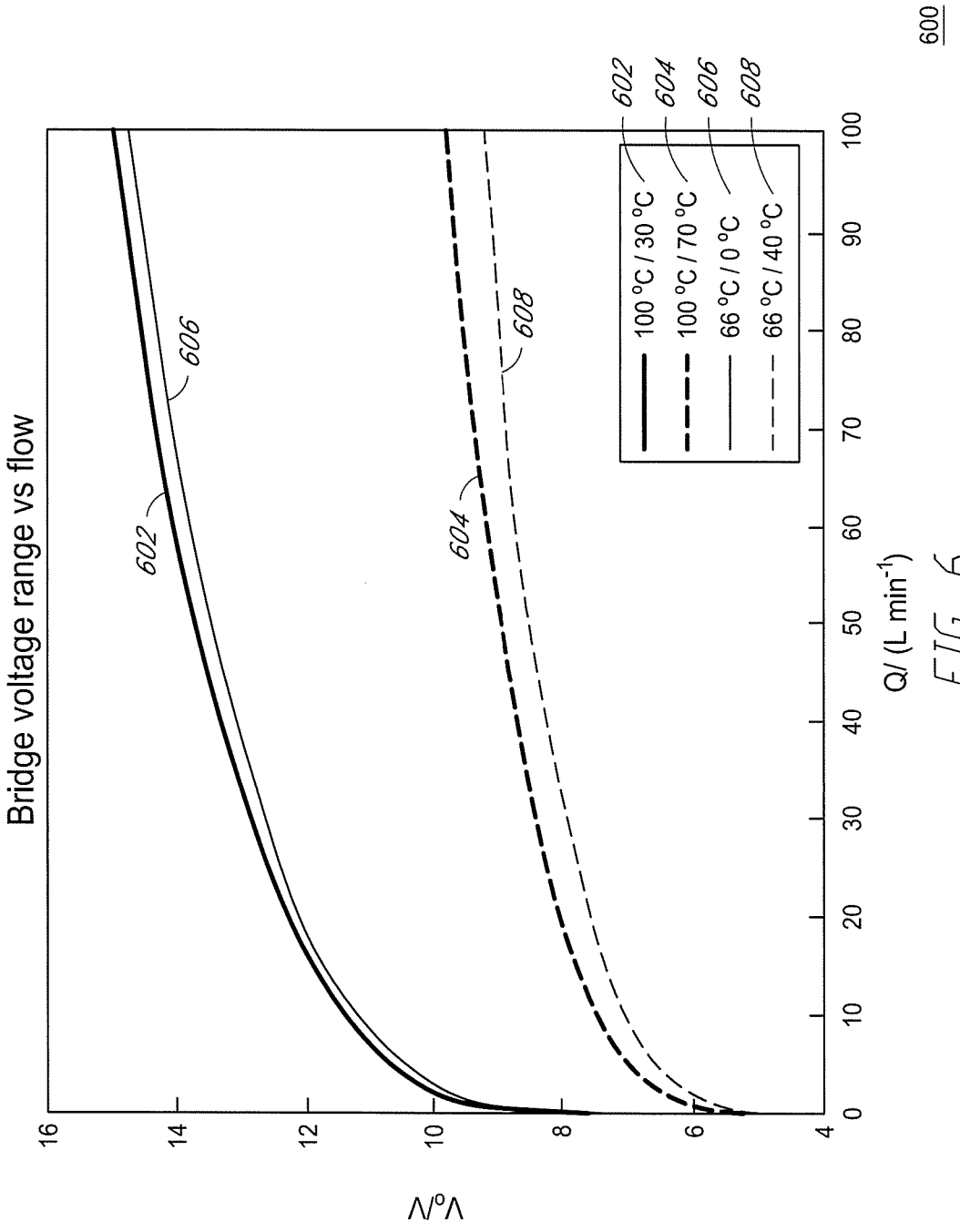

600
Bridge voltage range vs flow
V_o/V
Q/ (L min^{-1})
602
604
606
608
100 °C / 30 °C
100 °C / 70 °C
66 °C / 0 °C
66 °C / 40 °C
16
14
12
10
8
6
4
0
10
20
30
40
50
60
70
80
90
100

FIG. 6

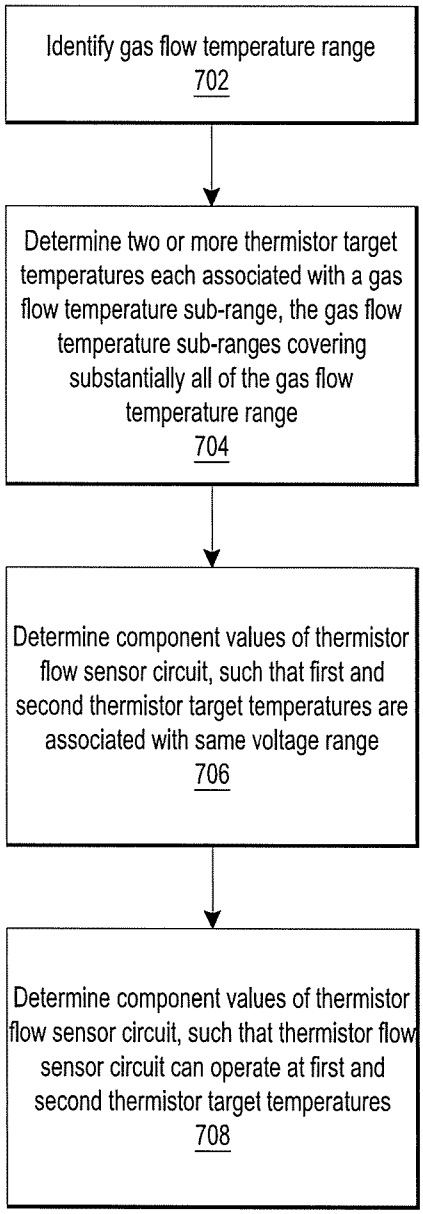

Identify gas flow temperature range
702
Determine two or more thermistor target temperatures each associated with a gas flow temperature sub-range, the gas flow temperature sub-ranges covering substantially all of the gas flow temperature range
704
Determine component values of thermistor flow sensor circuit, such that first and second thermistor target temperatures are associated with same voltage range
706
Determine component values of thermistor flow sensor circuit, such that thermistor flow sensor circuit can operate at first and second thermistor target temperatures
708

FIG. 7

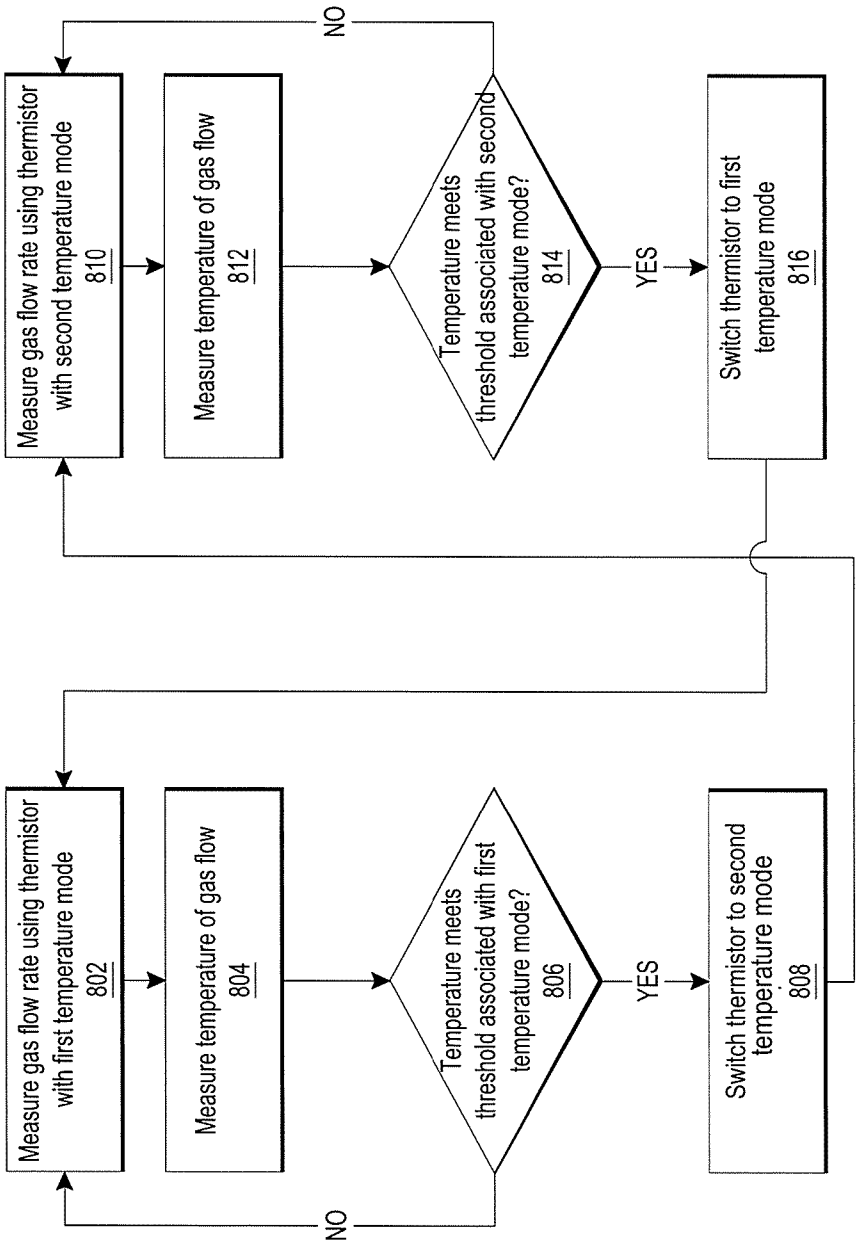

Measure gas flow rate using thermistor with first temperature mode
802
Measure temperature of gas flow
804
Temperature meets threshold associated with first temperature mode?
806
YES
NO
Switch thermistor to second temperature mode
808
Measure gas flow rate using thermistor with second temperature mode
810
Measure temperature of gas flow
812
Temperature meets threshold associated with second temperature mode?
814
YES
NO
Switch thermistor to first temperature mode
816

FIG. 8