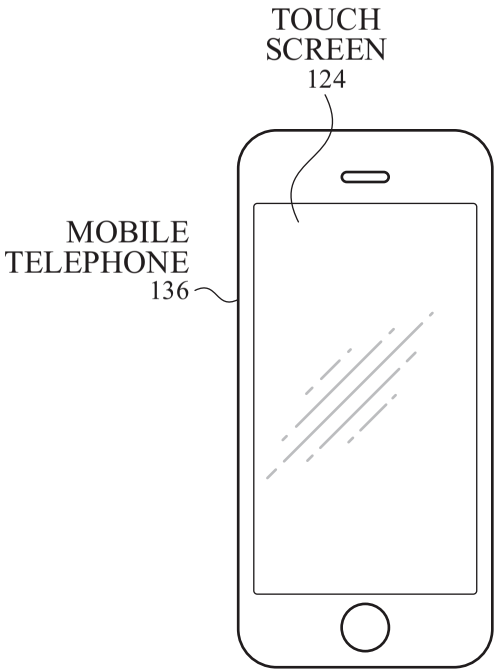

FIG. 1A

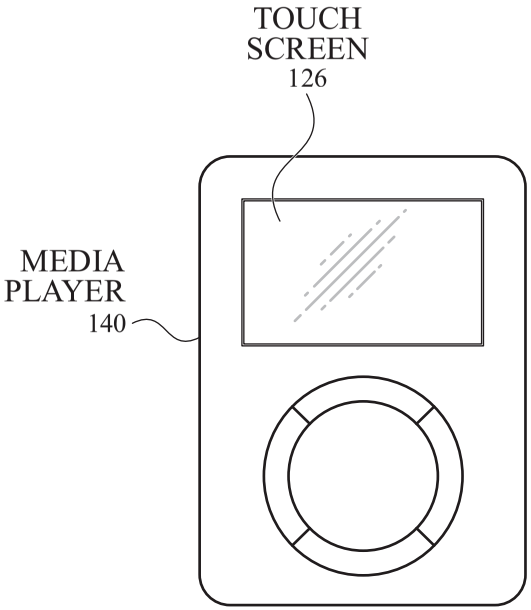

FIG. 1B

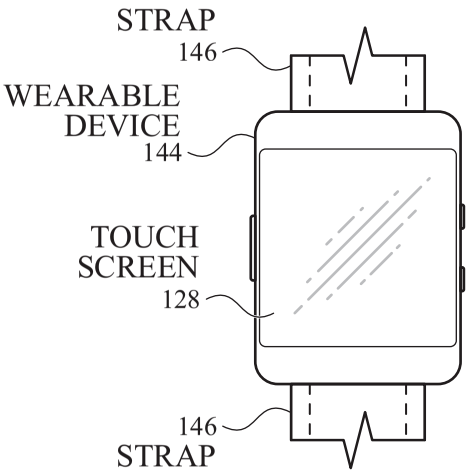

FIG. 1C

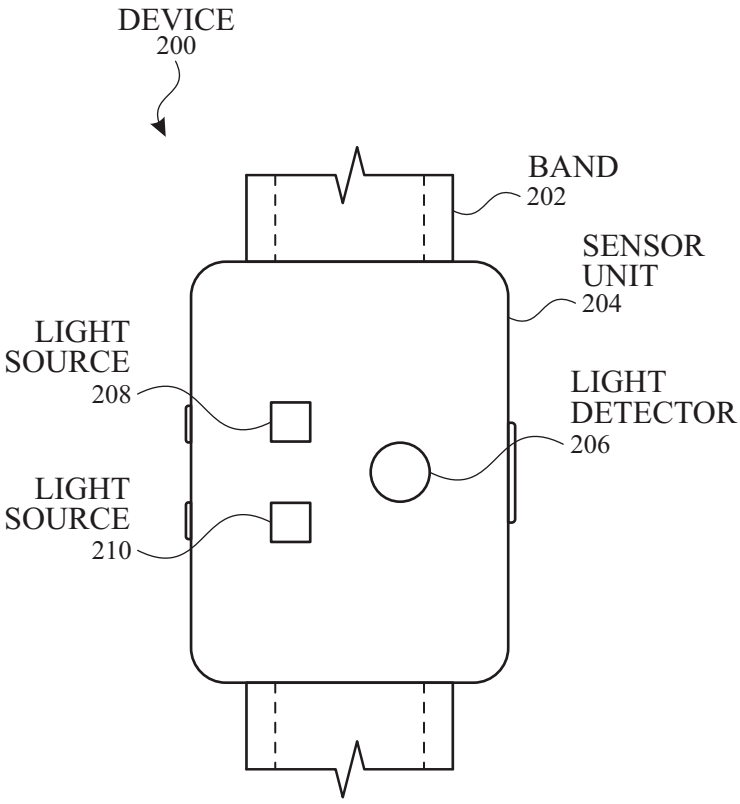
DEVICE
200
BAND
202
SENSOR
UNIT
204
LIGHT
SOURCE
208
LIGHT
DETECTOR
206
LIGHT
SOURCE
210

FIG. 2

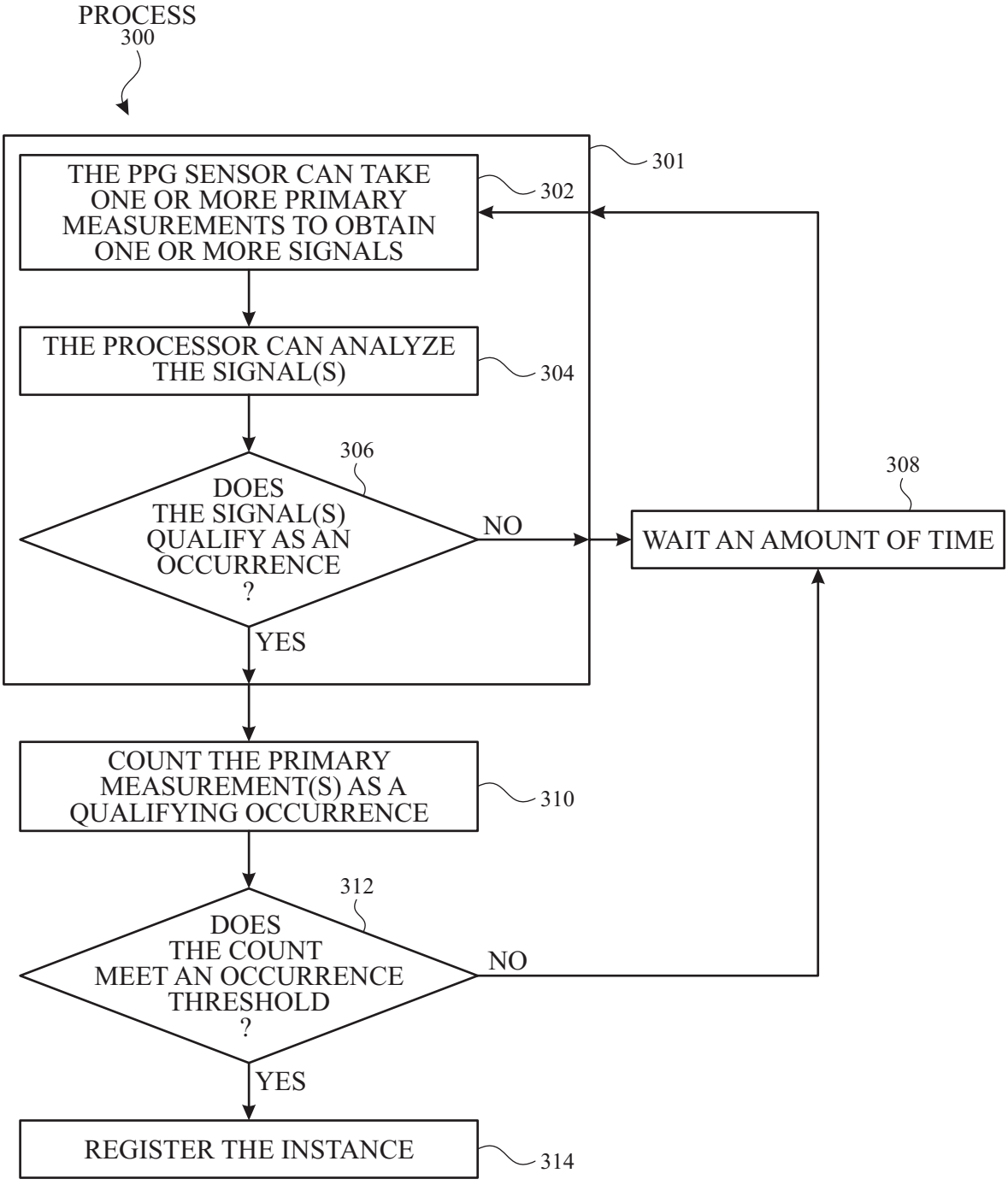
PROCESS
300
301
THE PPG SENSOR CAN TAKE ONE OR MORE PRIMARY MEASUREMENTS TO OBTAIN ONE OR MORE SIGNALS
302
THE PROCESSOR CAN ANALYZE THE SIGNAL(S)
304
306
DOES THE SIGNAL(S) QUALIFY AS AN OCCURRENCE ?
NO
YES
308
WAIT AN AMOUNT OF TIME
COUNT THE PRIMARY MEASUREMENT(S) AS A QUALIFYING OCCURRENCE
310
312
DOES THE COUNT MEET AN OCCURRENCE THRESHOLD ?
NO
YES
REGISTER THE INSTANCE
314

FIG. 3A

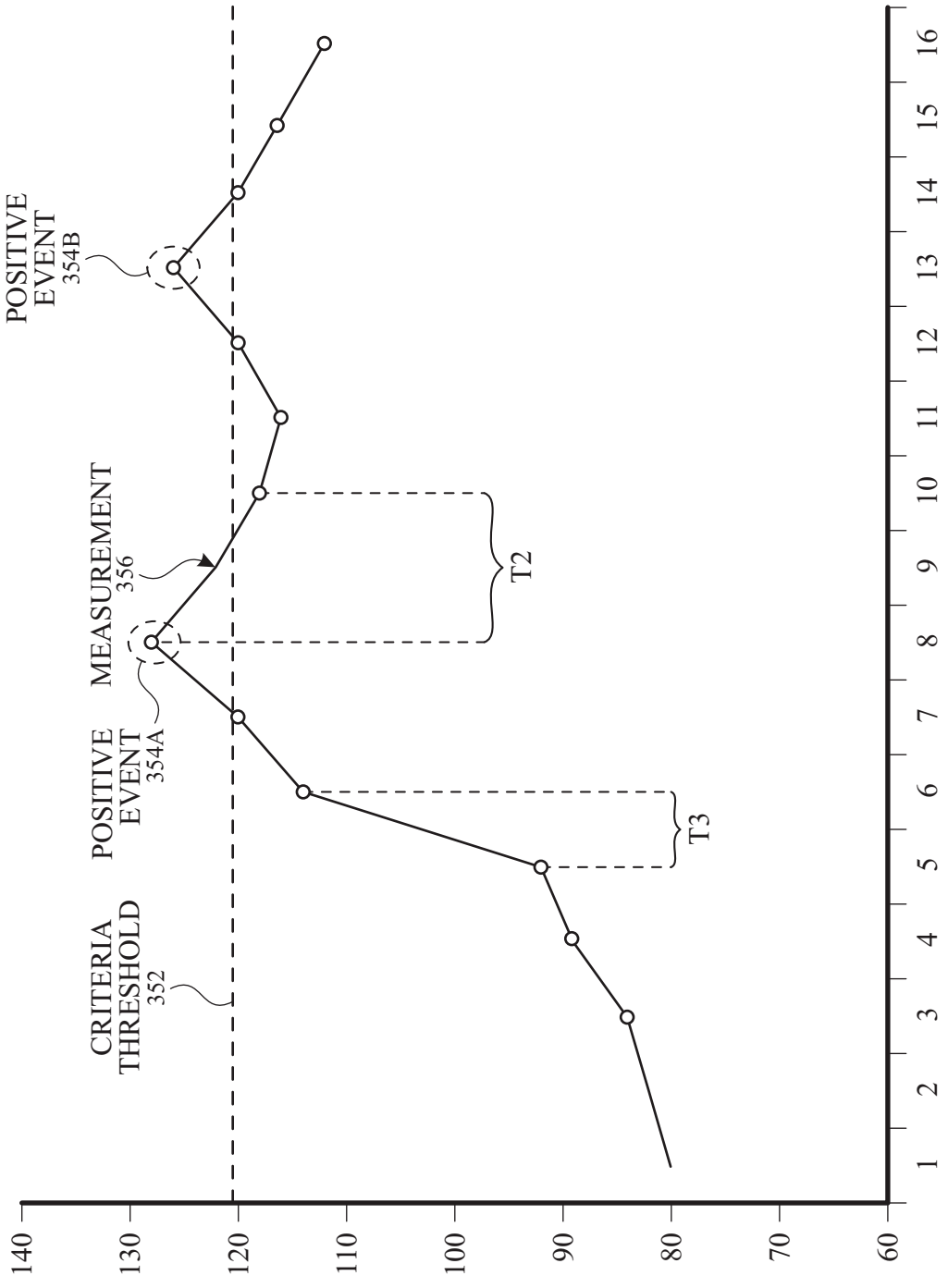
140
130
120
110
100
90
80
70
60
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
CRITERIA THRESHOLD 352
POSITIVE EVENT 354A
MEASUREMENT 356
POSITIVE EVENT 354B
T1
T2
T3

FIG. 3B

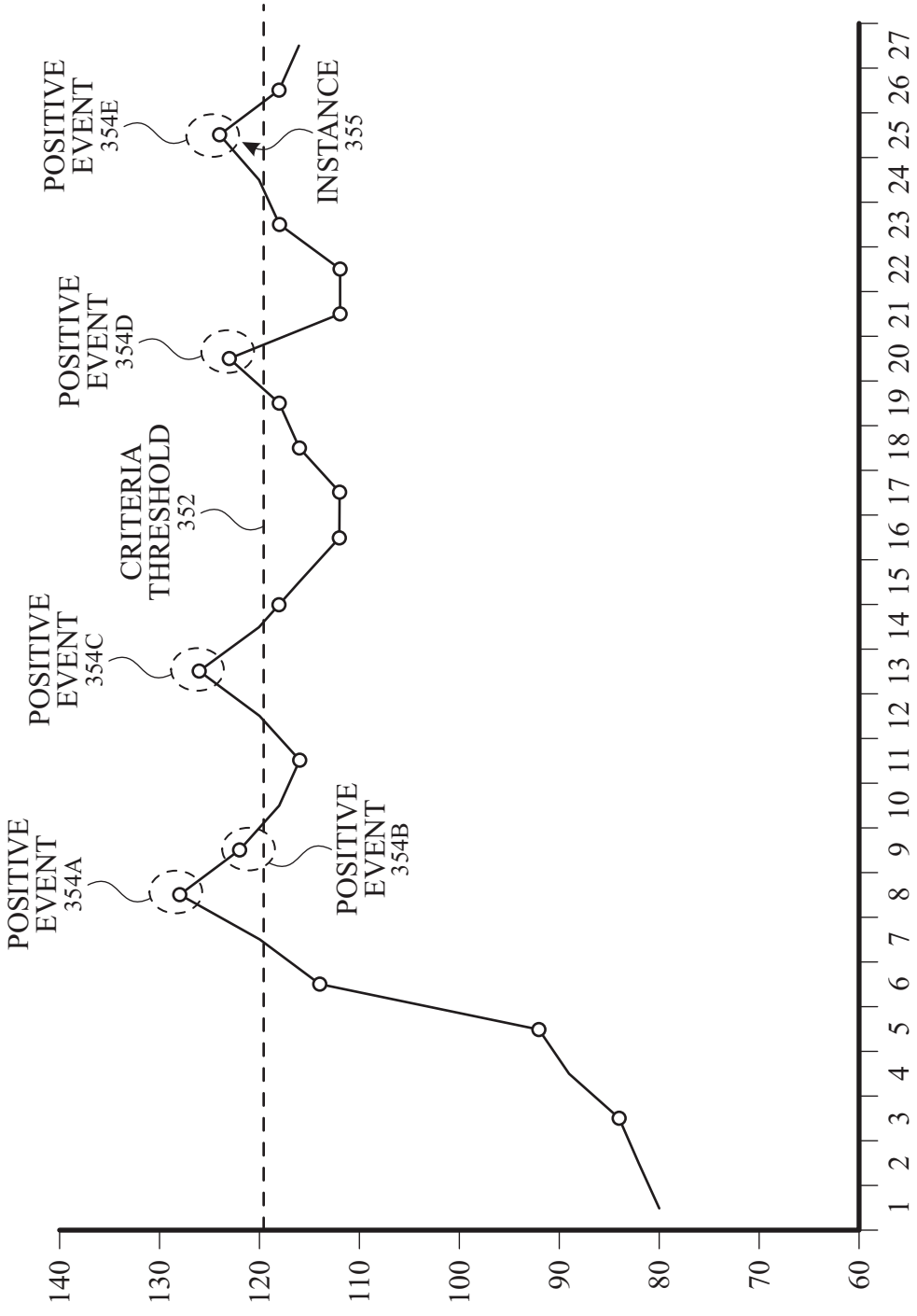
POSITIVE EVENT 354A
POSITIVE EVENT 354B
POSITIVE EVENT 354C
CRITERIA THRESHOLD 352
POSITIVE EVENT 354D
POSITIVE EVENT 354E
INSTANCE 355
140
130
120
110
100
90
80
70
60
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27

FIG. 3C

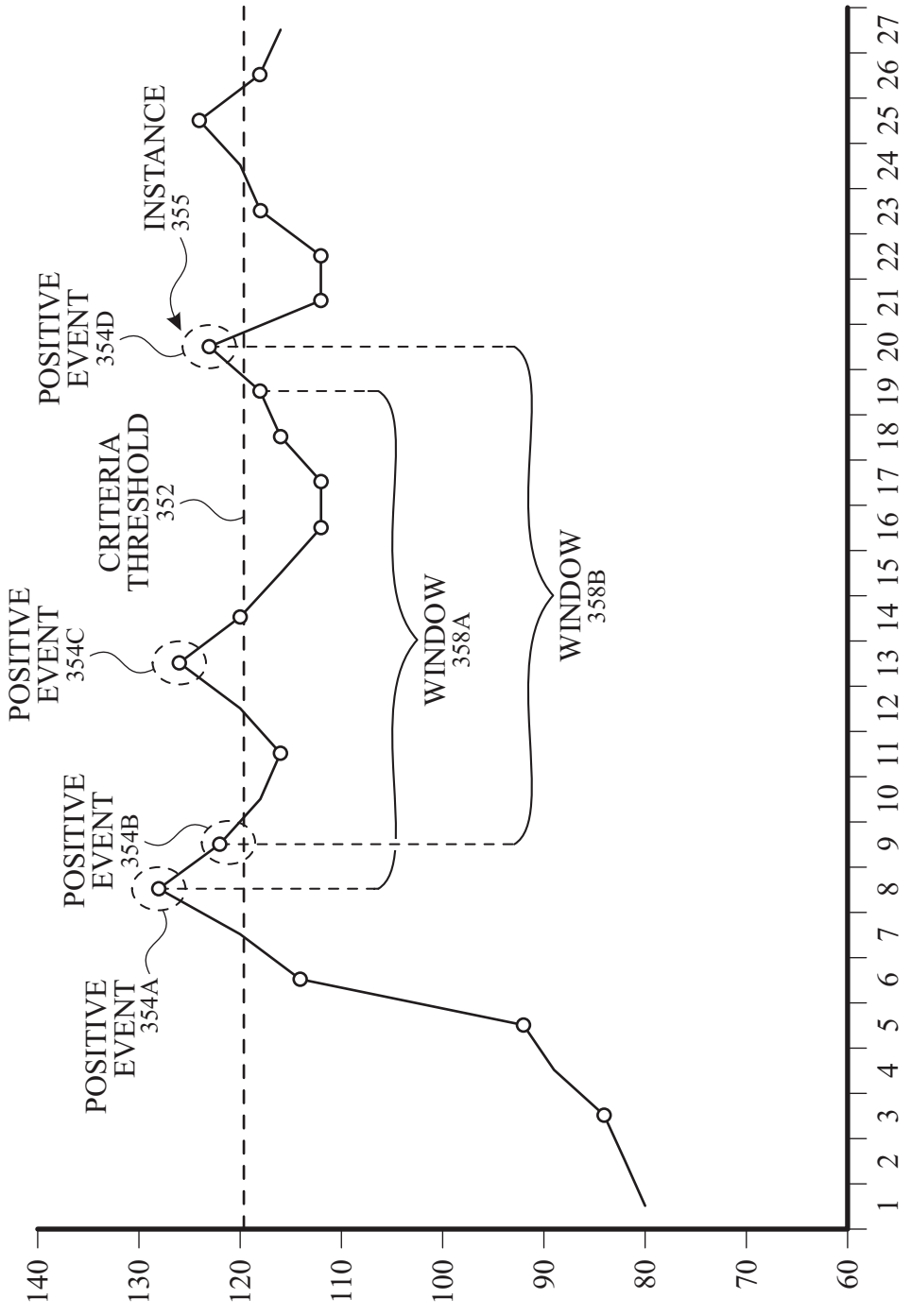
140
130
120
110
100
90
80
70
60
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27
POSITIVE EVENT 354A
POSITIVE EVENT 354B
POSITIVE EVENT 354C
POSITIVE EVENT 354D
INSTANCE 355
CRITERIA THRESHOLD 352
WINDOW 358A
WINDOW 358B

FIG. 3D

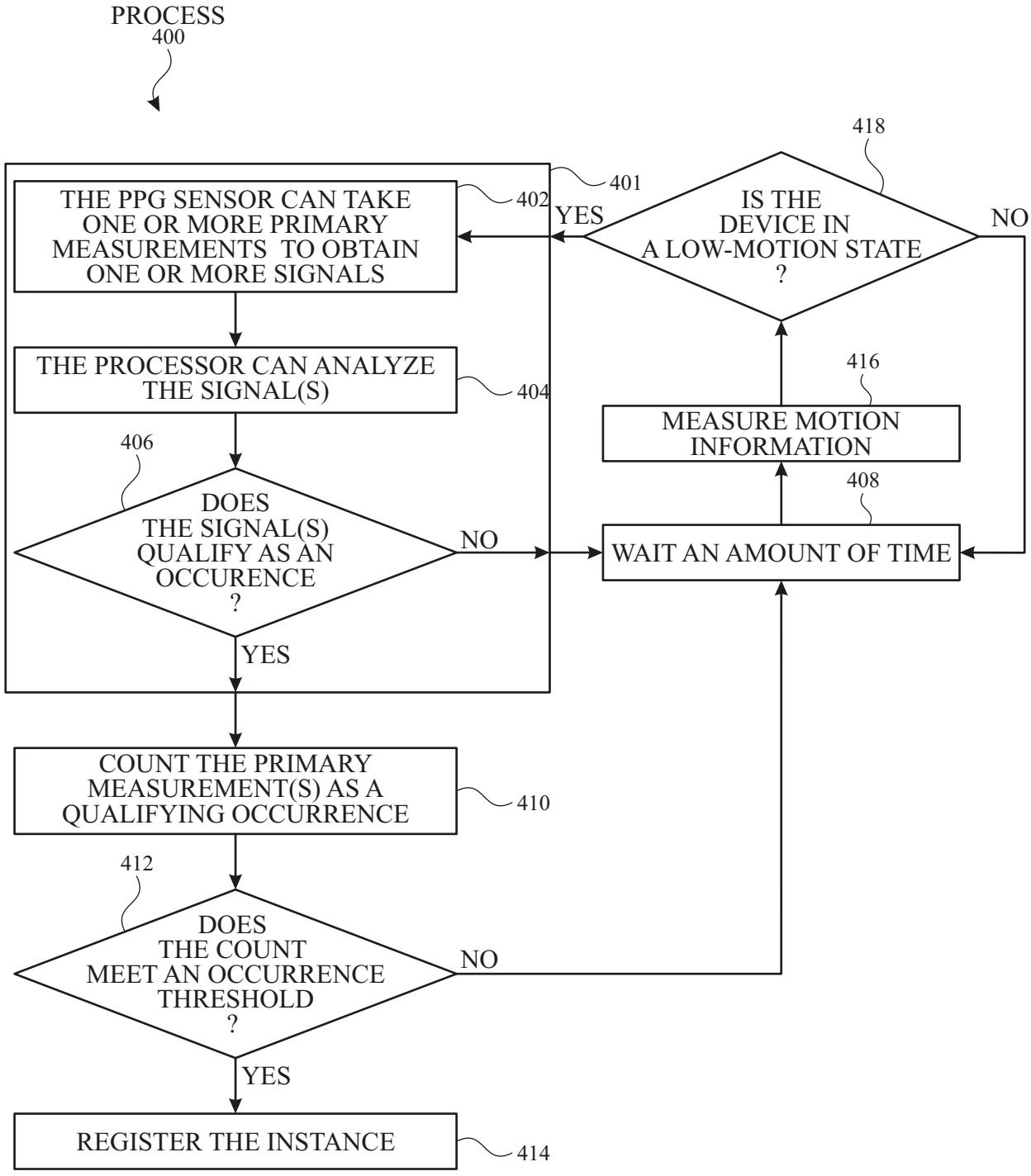
PROCESS
400
401
THE PPG SENSOR CAN TAKE ONE OR MORE PRIMARY MEASUREMENTS TO OBTAIN ONE OR MORE SIGNALS
402
THE PROCESSOR CAN ANALYZE THE SIGNAL(S)
404
406
DOES THE SIGNAL(S) QUALIFY AS AN OCCURENCE ?
NO
YES
COUNT THE PRIMARY MEASUREMENT(S) AS A QUALIFYING OCCURRENCE
410
412
DOES THE COUNT MEET AN OCCURRENCE THRESHOLD ?
NO
YES
REGISTER THE INSTANCE
414
418
IS THE DEVICE IN A LOW-MOTION STATE ?
YES
NO
416
MEASURE MOTION INFORMATION
408
WAIT AN AMOUNT OF TIME

FIG. 4A

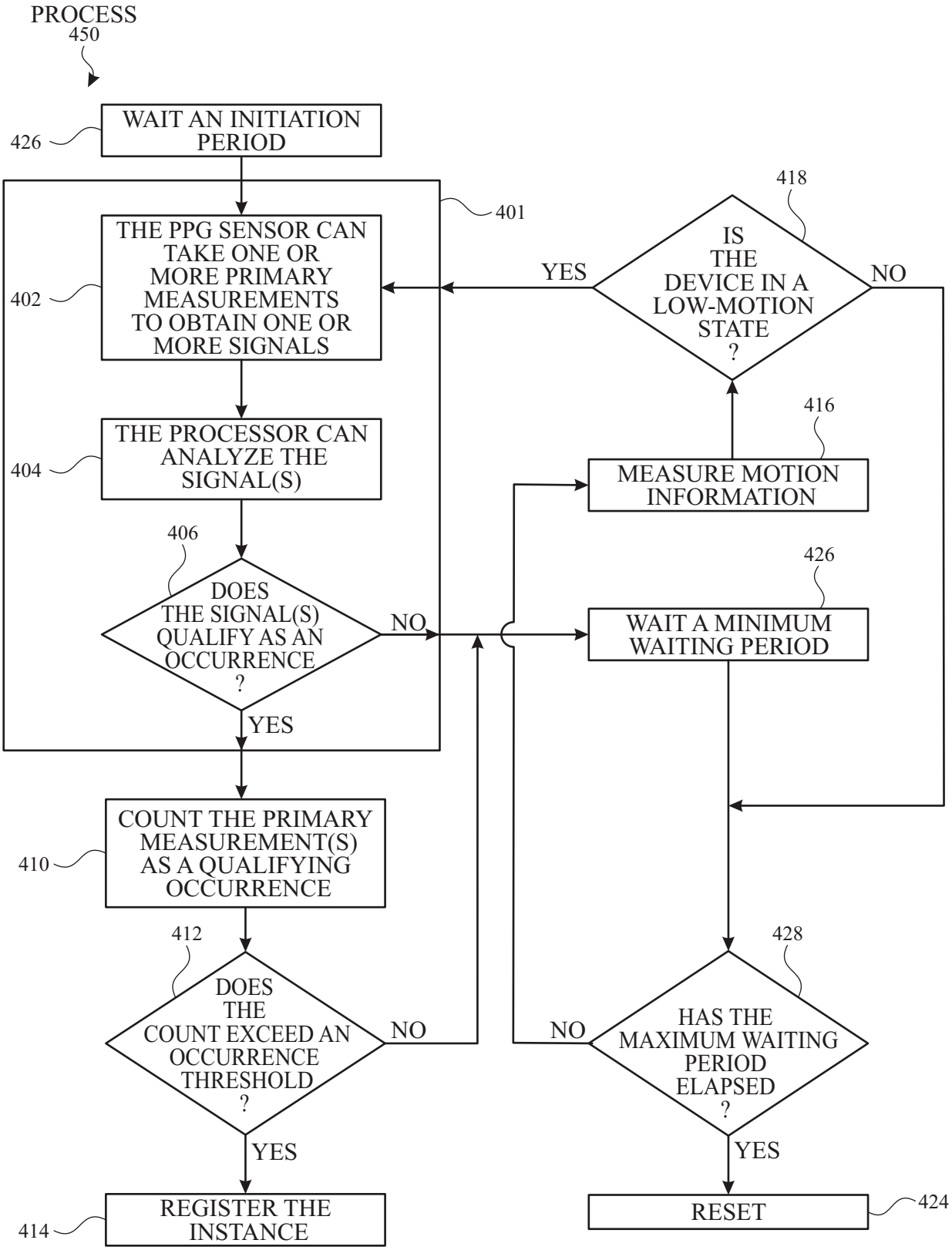
PROCESS
450
WAIT AN INITIATION PERIOD
426
401
THE PPG SENSOR CAN TAKE ONE OR MORE PRIMARY MEASUREMENTS TO OBTAIN ONE OR MORE SIGNALS
402
THE PROCESSOR CAN ANALYZE THE SIGNAL(S)
404
DOES THE SIGNAL(S) QUALIFY AS AN OCCURRENCE ?
406
NO
YES
COUNT THE PRIMARY MEASUREMENT(S) AS A QUALIFYING OCCURRENCE
410
DOES THE COUNT EXCEED AN OCCURRENCE THRESHOLD ?
412
NO
YES
REGISTER THE INSTANCE
414
IS THE DEVICE IN A LOW-MOTION STATE ?
418
YES
NO
MEASURE MOTION INFORMATION
416
WAIT A MINIMUM WAITING PERIOD
426
HAS THE MAXIMUM WAITING PERIOD ELAPSED ?
428
NO
YES
RESET
424

FIG. 4B

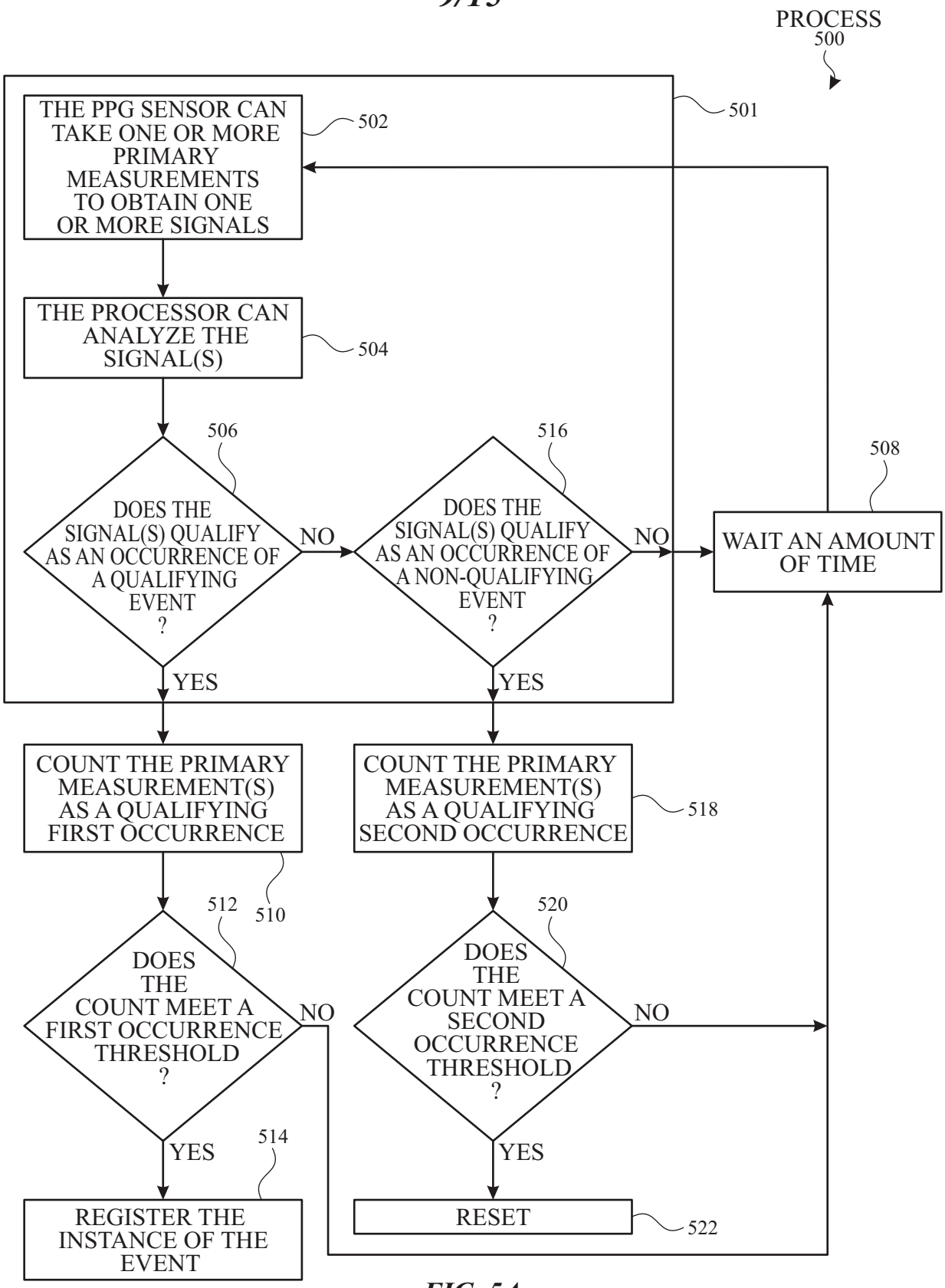
PROCESS
500
501
THE PPG SENSOR CAN TAKE ONE OR MORE PRIMARY MEASUREMENTS TO OBTAIN ONE OR MORE SIGNALS
502
THE PROCESSOR CAN ANALYZE THE SIGNAL(S)
504
506
DOES THE SIGNAL(S) QUALIFY AS AN OCCURRENCE OF A QUALIFYING EVENT ?
NO
516
DOES THE SIGNAL(S) QUALIFY AS AN OCCURRENCE OF A NON-QUALIFYING EVENT ?
NO
508
WAIT AN AMOUNT OF TIME
YES
YES
COUNT THE PRIMARY MEASUREMENT(S) AS A QUALIFYING FIRST OCCURRENCE
510
COUNT THE PRIMARY MEASUREMENT(S) AS A QUALIFYING SECOND OCCURRENCE
518
512
DOES THE COUNT MEET A FIRST OCCURRENCE THRESHOLD ?
NO
520
DOES THE COUNT MEET A SECOND OCCURRENCE THRESHOLD ?
NO
YES
514
YES
REGISTER THE INSTANCE OF THE EVENT
RESET
522

FIG. 5A

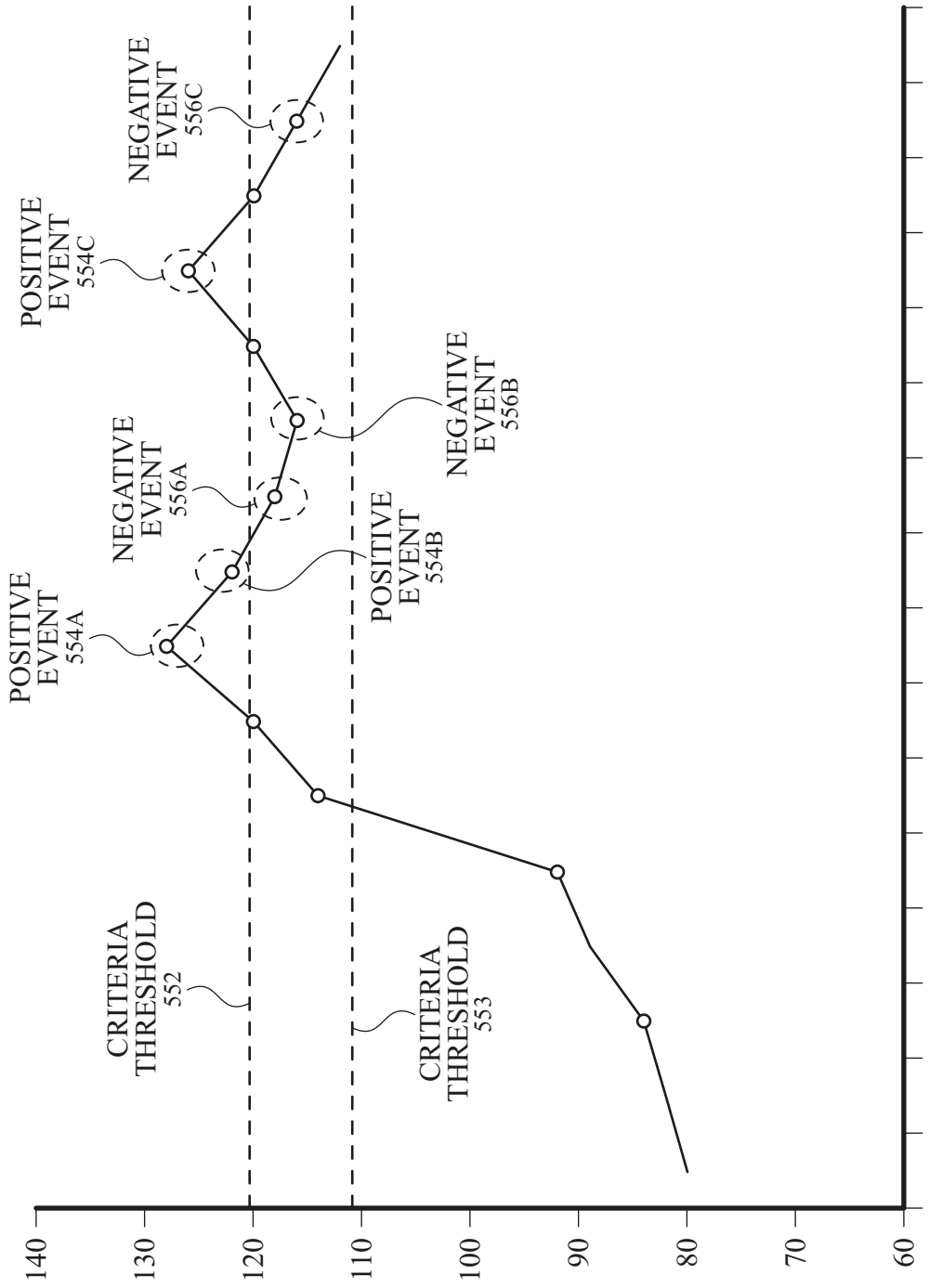
140
130
120
110
100
90
80
70
60
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
CRITERIA THRESHOLD 552
CRITERIA THRESHOLD 553
POSITIVE EVENT 554A
POSITIVE EVENT 554B
POSITIVE EVENT 554C
NEGATIVE EVENT 556A
NEGATIVE EVENT 556B
NEGATIVE EVENT 556C

FIG. 5B

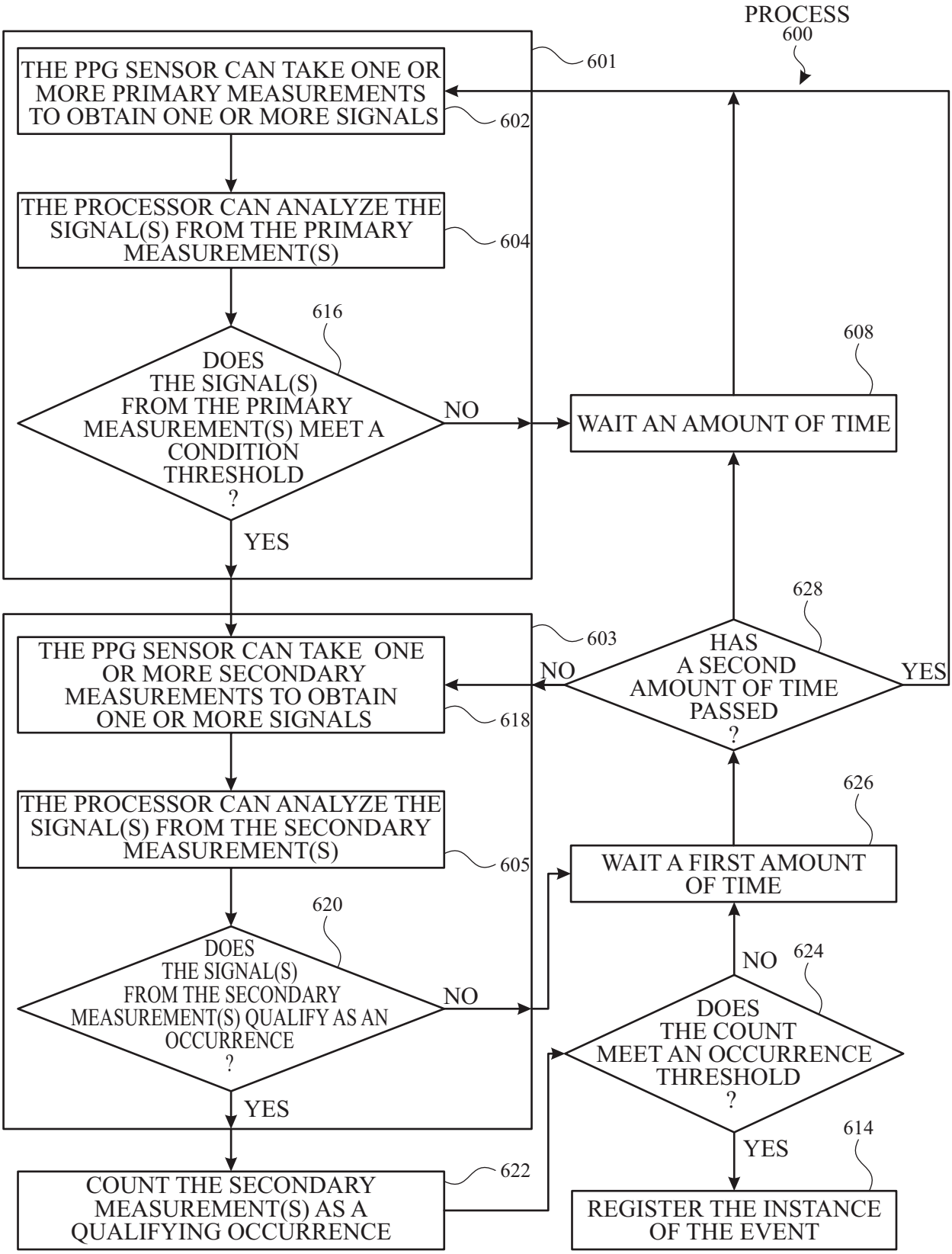
PROCESS
600
601
THE PPG SENSOR CAN TAKE ONE OR MORE PRIMARY MEASUREMENTS TO OBTAIN ONE OR MORE SIGNALS
602
THE PROCESSOR CAN ANALYZE THE SIGNAL(S) FROM THE PRIMARY MEASUREMENT(S)
604
616
DOES THE SIGNAL(S) FROM THE PRIMARY MEASUREMENT(S) MEET A CONDITION THRESHOLD ?
NO
608
WAIT AN AMOUNT OF TIME
YES
628
603
THE PPG SENSOR CAN TAKE ONE OR MORE SECONDARY MEASUREMENTS TO OBTAIN ONE OR MORE SIGNALS
618
NO
HAS A SECOND AMOUNT OF TIME PASSED ?
YES
626
THE PROCESSOR CAN ANALYZE THE SIGNAL(S) FROM THE SECONDARY MEASUREMENT(S)
605
WAIT A FIRST AMOUNT OF TIME
620
DOES THE SIGNAL(S) FROM THE SECONDARY MEASUREMENT(S) QUALIFY AS AN OCCURRENCE ?
NO
NO
624
DOES THE COUNT MEET AN OCCURRENCE THRESHOLD ?
YES
614
YES
622
COUNT THE SECONDARY MEASUREMENT(S) AS A QUALIFYING OCCURRENCE
REGISTER THE INSTANCE OF THE EVENT

FIG. 6A

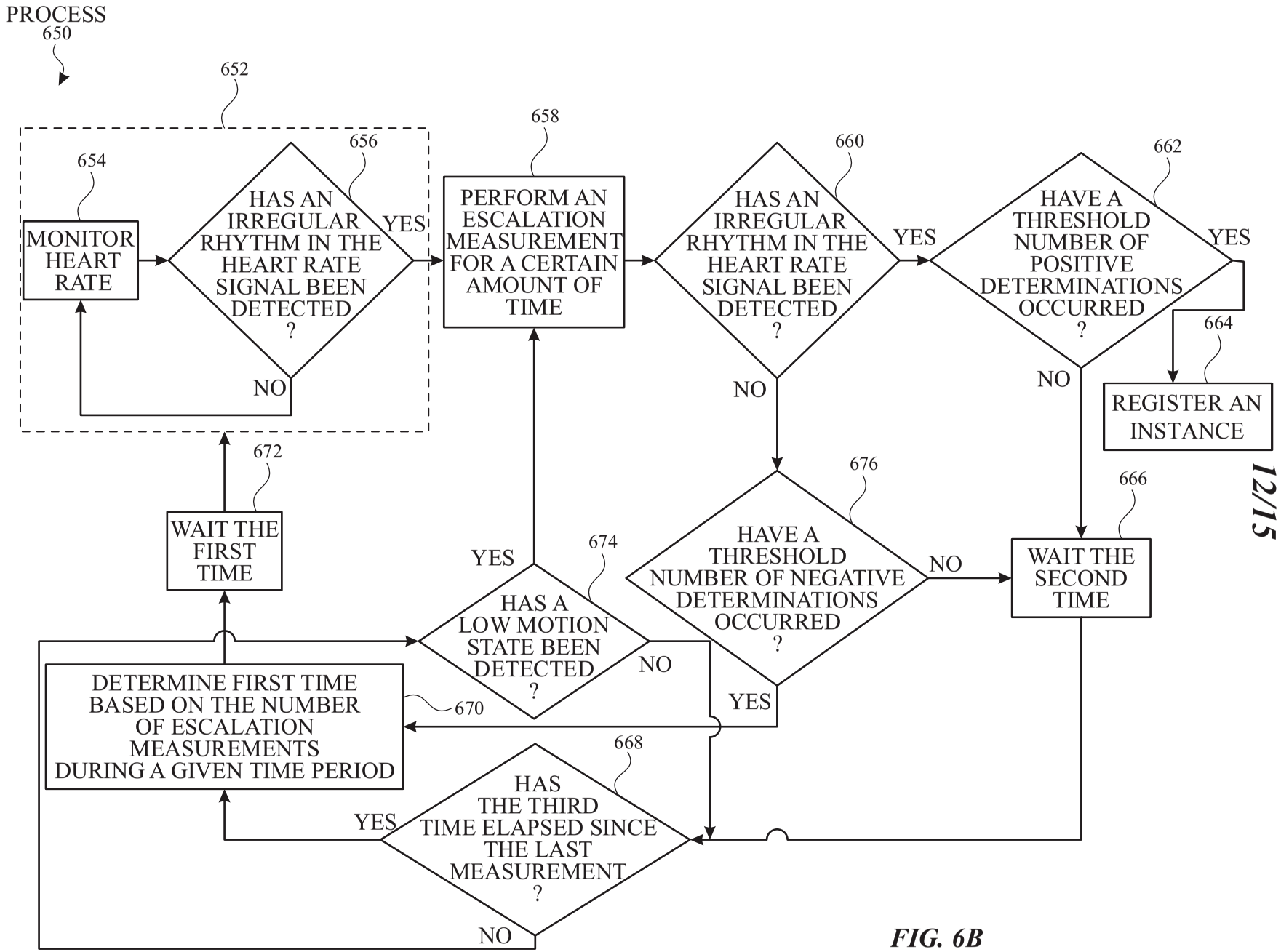
PROCESS
650
652
654
MONITOR HEART RATE
656
HAS AN IRREGULAR RHYTHM IN THE HEART RATE SIGNAL BEEN DETECTED ?
YES
NO
658
PERFORM AN ESCALATION MEASUREMENT FOR A CERTAIN AMOUNT OF TIME
660
HAS AN IRREGULAR RHYTHM IN THE HEART RATE SIGNAL BEEN DETECTED ?
YES
NO
662
HAVE A THRESHOLD NUMBER OF POSITIVE DETERMINATIONS OCCURRED ?
YES
NO
664
REGISTER AN INSTANCE
666
WAIT THE SECOND TIME
672
WAIT THE FIRST TIME
674
HAS A LOW MOTION STATE BEEN DETECTED ?
YES
NO
676
HAVE A THRESHOLD NUMBER OF NEGATIVE DETERMINATIONS OCCURRED ?
NO
YES
668
HAS THE THIRD TIME ELAPSED SINCE THE LAST MEASUREMENT ?
YES
NO
670
DETERMINE FIRST TIME BASED ON THE NUMBER OF ESCALATION MEASUREMENTS DURING A GIVEN TIME PERIOD

FIG. 6B

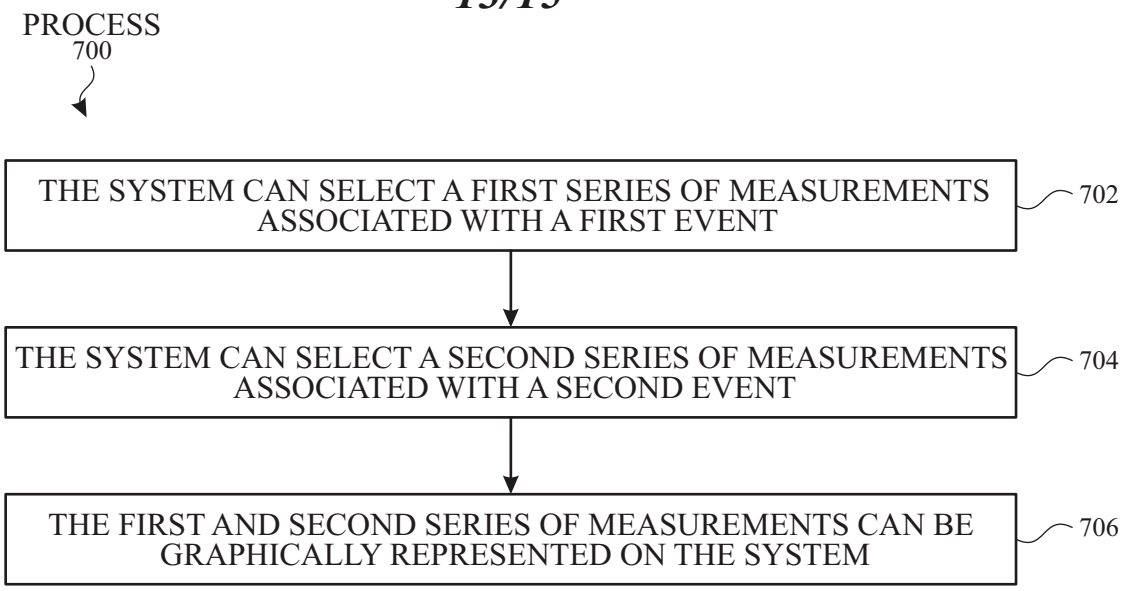
PROCESS
700
THE SYSTEM CAN SELECT A FIRST SERIES OF MEASUREMENTS ASSOCIATED WITH A FIRST EVENT
702
THE SYSTEM CAN SELECT A SECOND SERIES OF MEASUREMENTS ASSOCIATED WITH A SECOND EVENT
704
THE FIRST AND SECOND SERIES OF MEASUREMENTS CAN BE GRAPHICALLY REPRESENTED ON THE SYSTEM
706

FIG. 7A

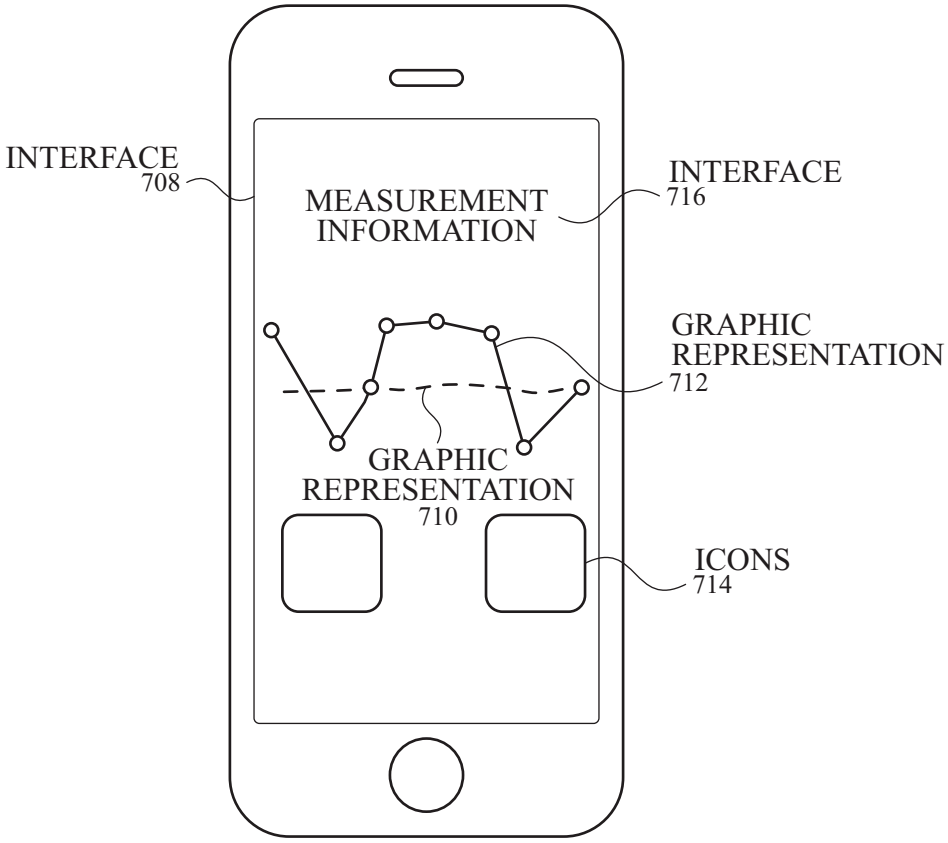
INTERFACE
708
MEASUREMENT INFORMATION
INTERFACE
716
GRAPHIC REPRESENTATION
712
GRAPHIC REPRESENTATION
710
ICONS
714

FIG. 7B

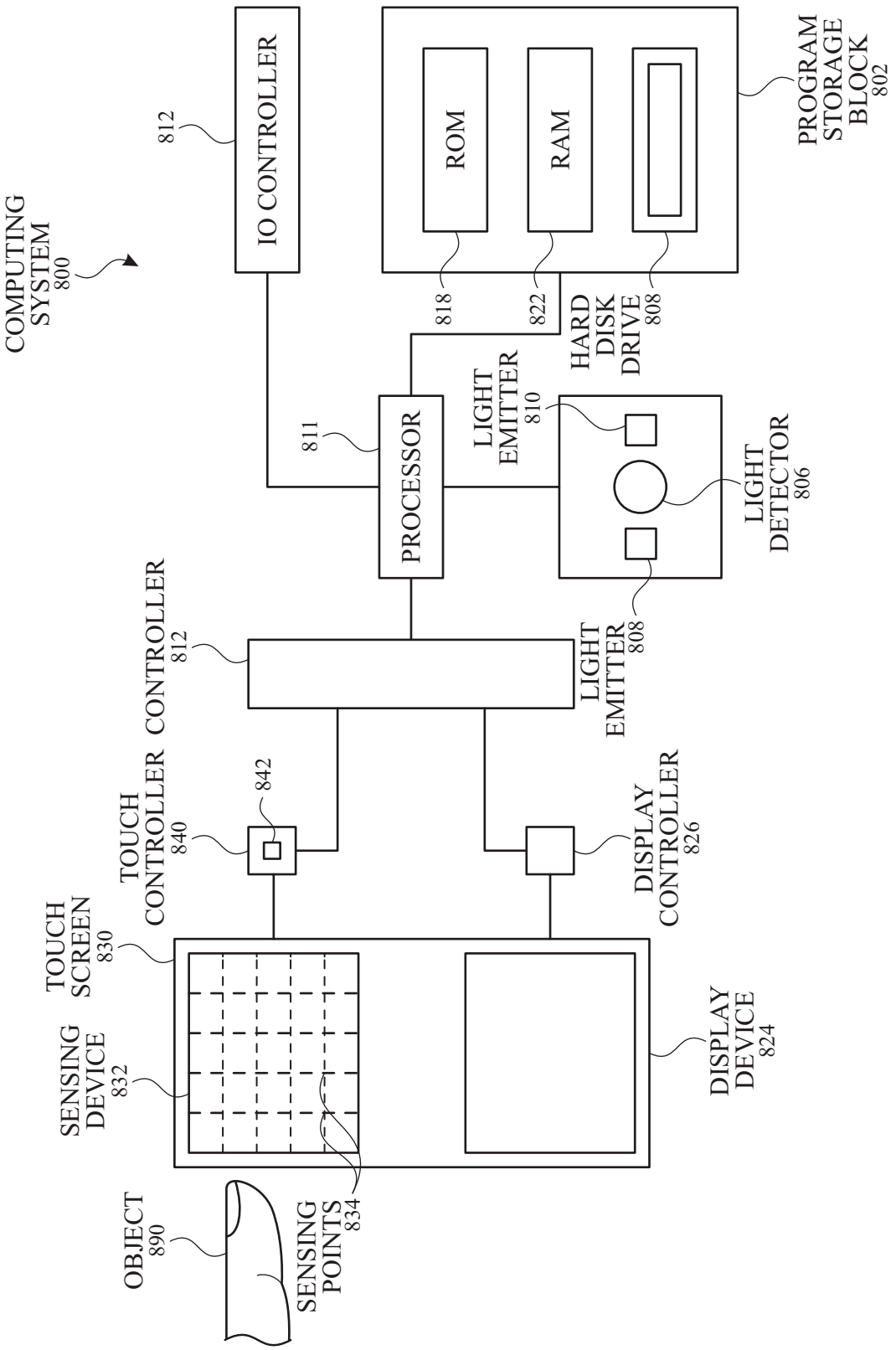
COMPUTING SYSTEM 800
IO CONTROLLER 812
PROGRAM STORAGE BLOCK 802
ROM
RAM
818
822
HARD DISK DRIVE 808
PROCESSOR 811
LIGHT EMITTER 810
LIGHT DETECTOR 806
LIGHT EMITTER 808
CONTROLLER 812
TOUCH CONTROLLER 840
842
DISPLAY CONTROLLER 826
TOUCH SCREEN 830
SENSING DEVICE 832
DISPLAY DEVICE 824
OBJECT 890
SENSING POINTS 834

FIG. 8

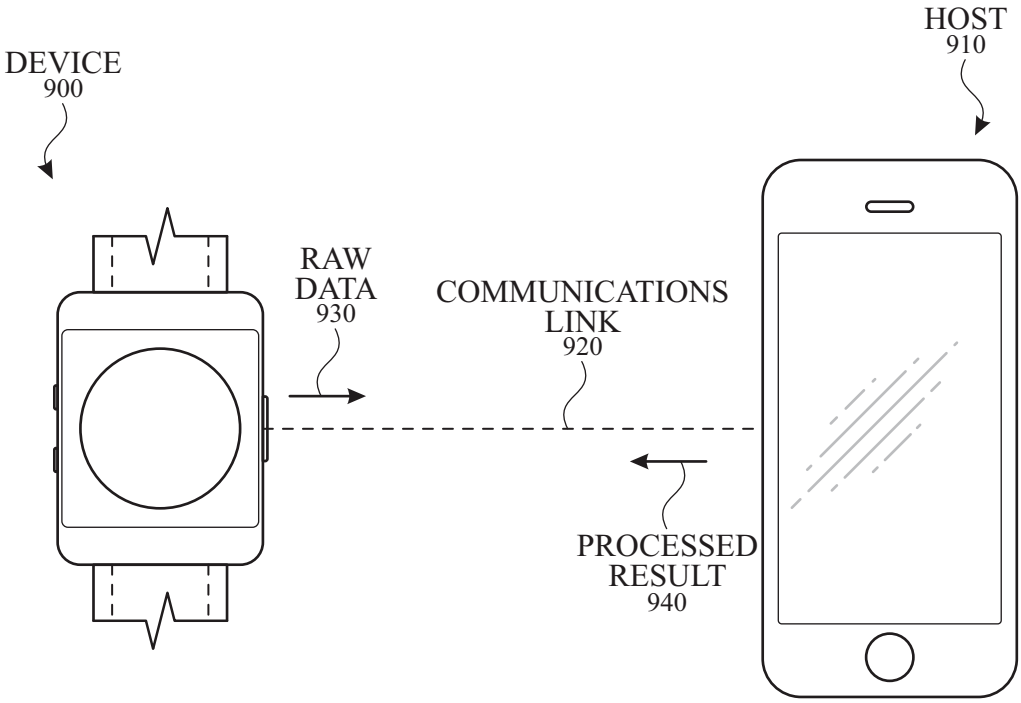
DEVICE
900
HOST
910
RAW
DATA
930
COMMUNICATIONS
LINK
920
PROCESSED
RESULT
940

FIG. 9