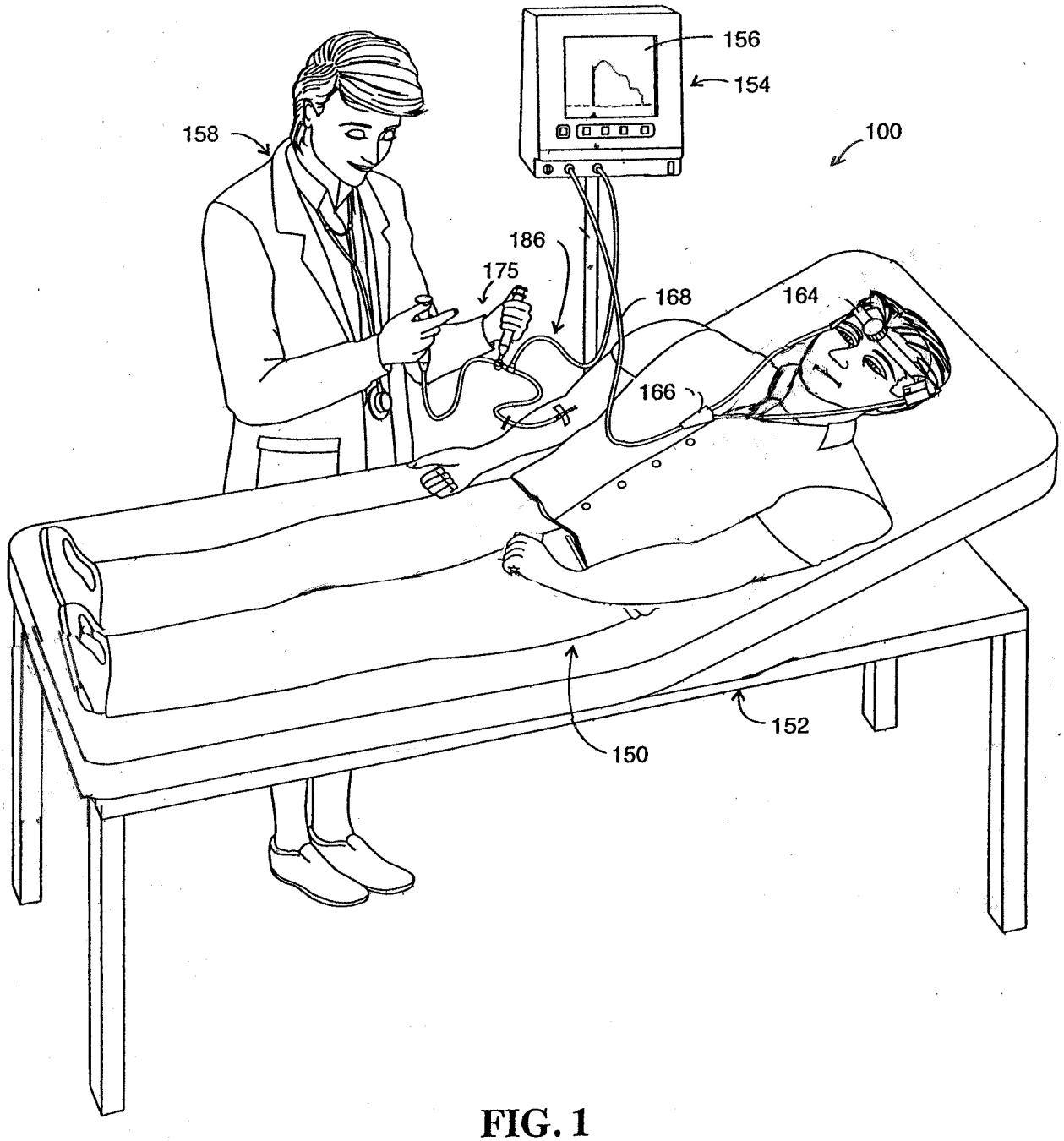


FIG. 1

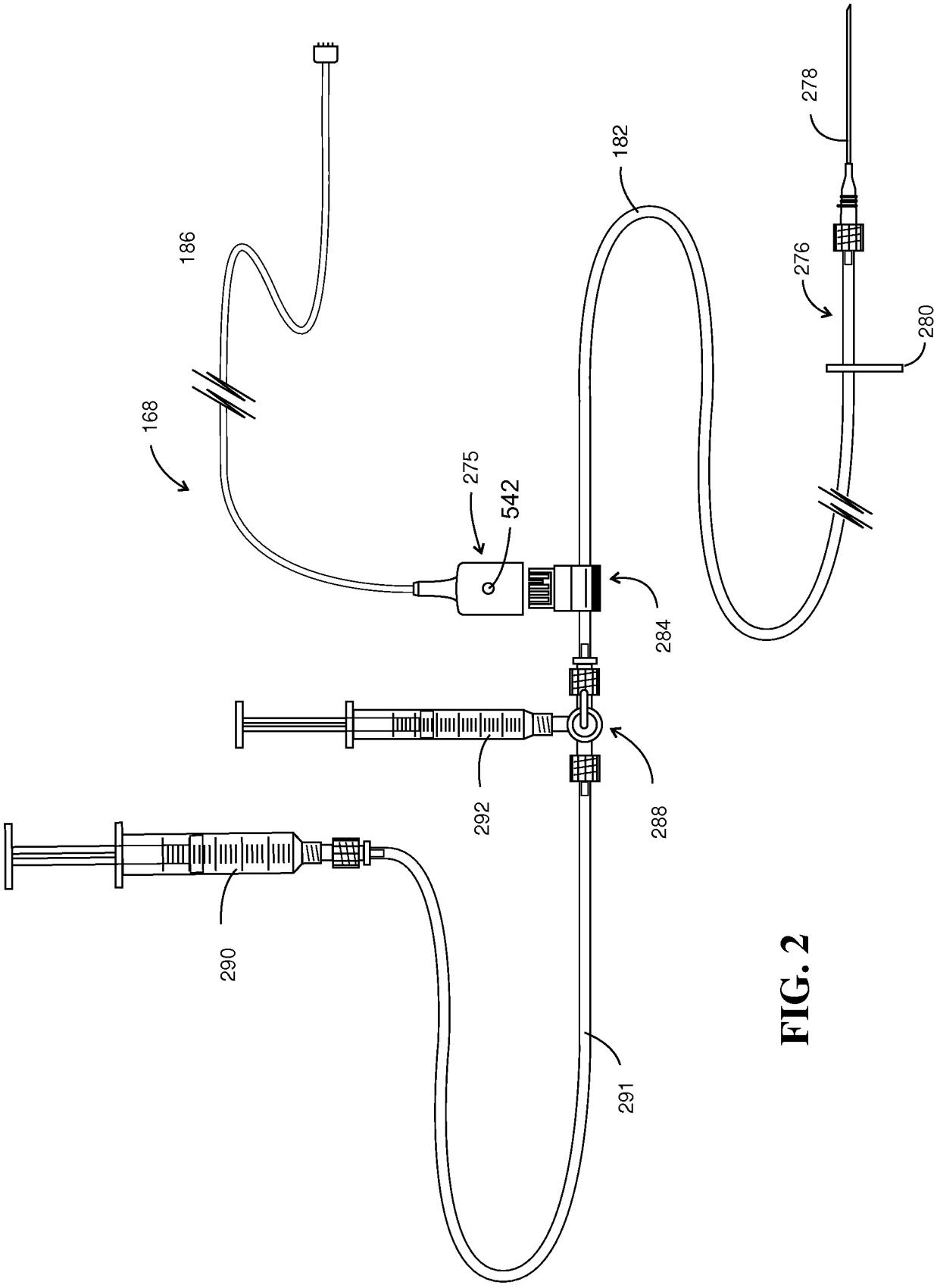
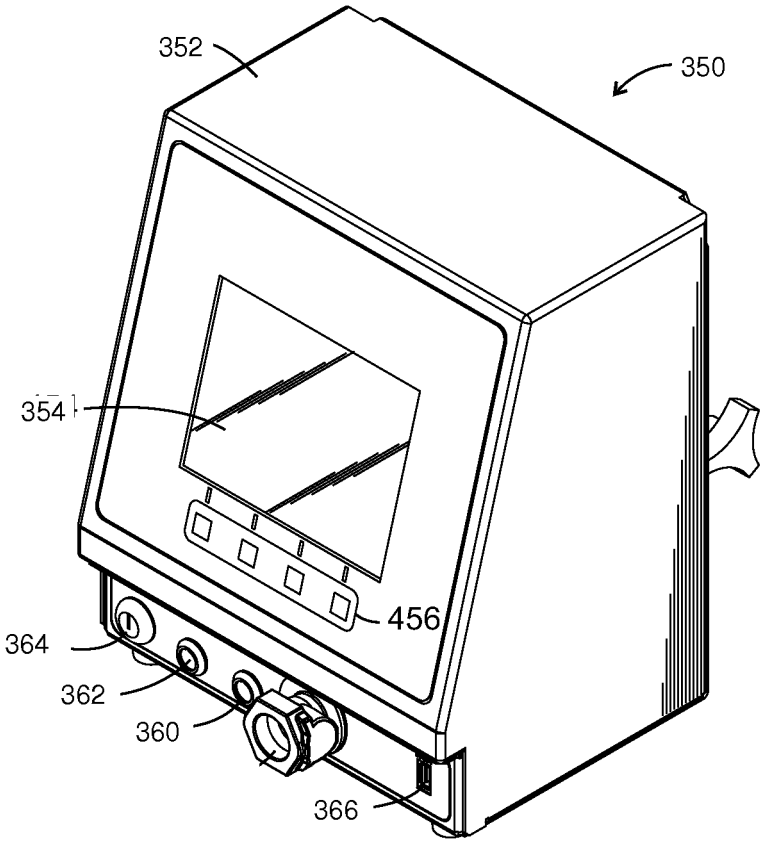


FIG. 2

FIG. 3A



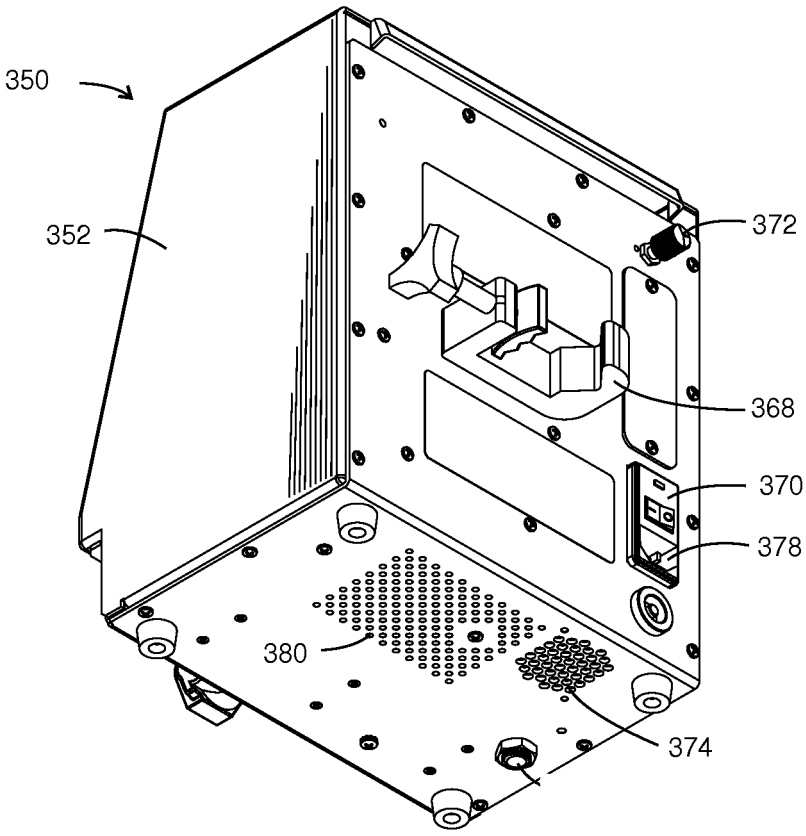
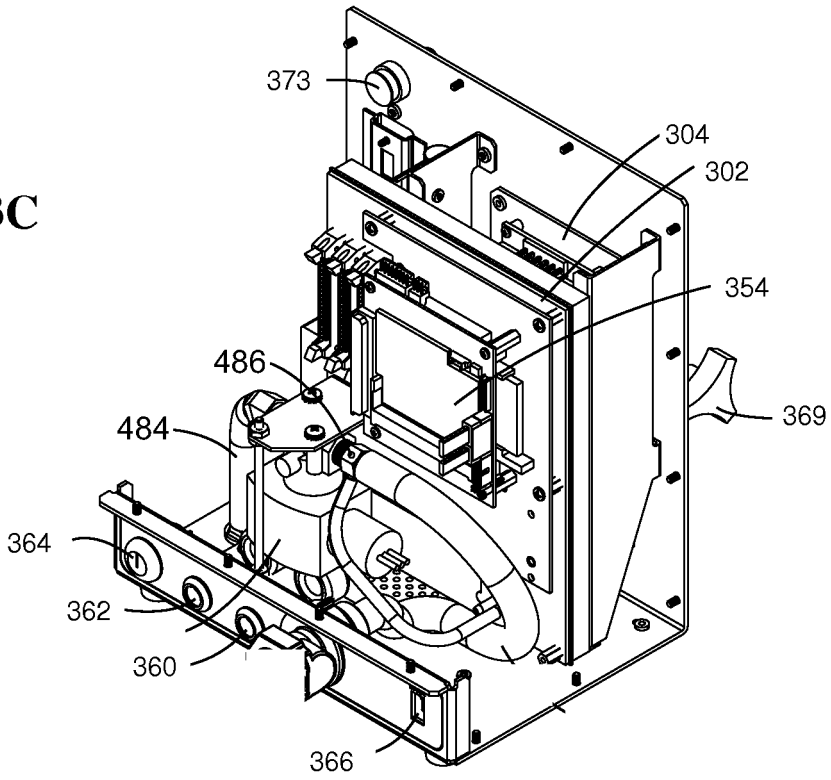


FIG. 3B

FIG. 3C


373
304
302
354
486
369
484
364
362
360
366

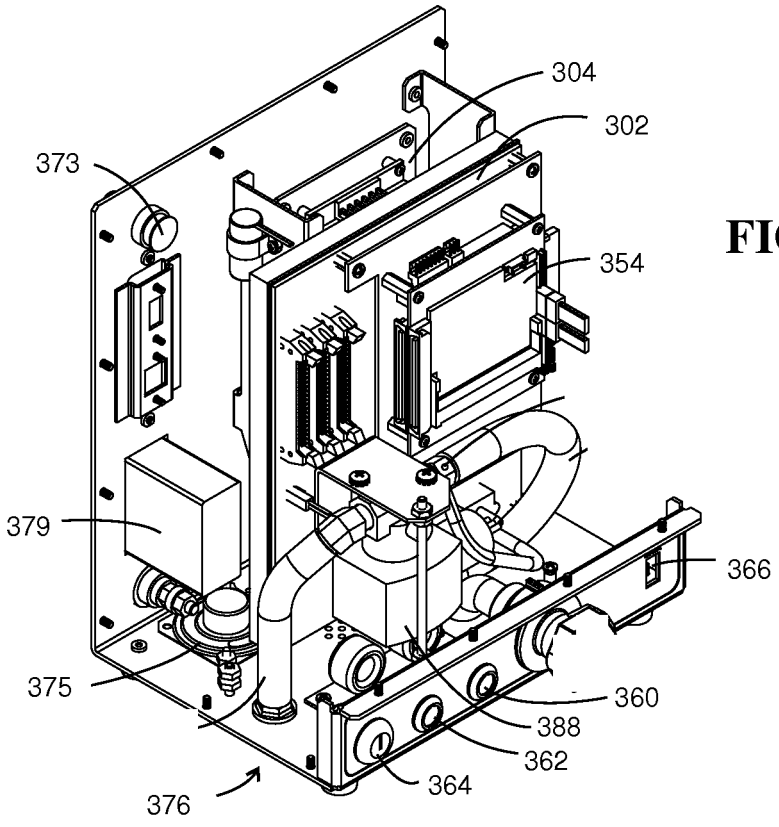
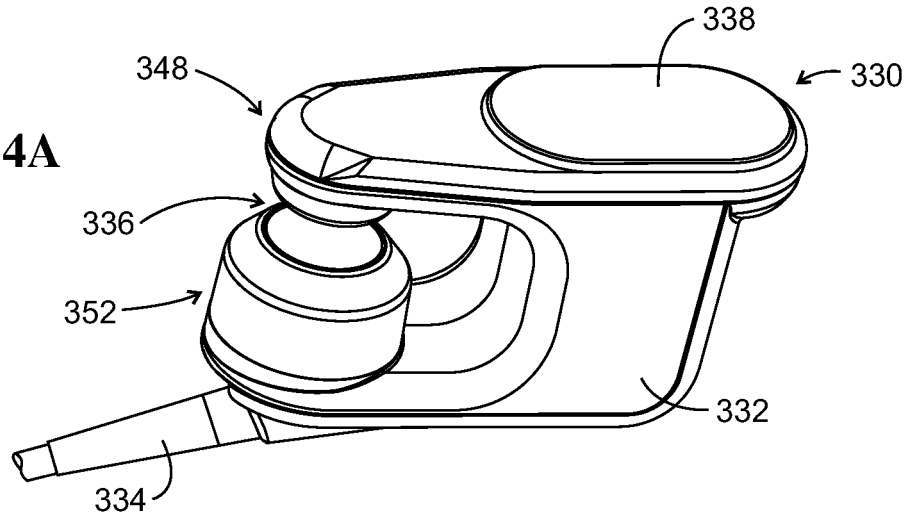

304
302
373
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379
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375
360
388
362
364
376

FIG. 3D

FIG. 4A



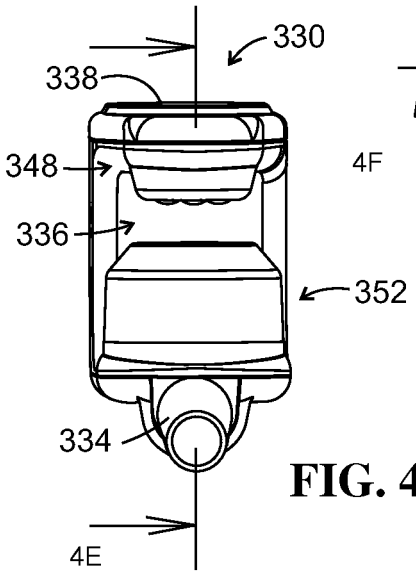


FIG. 4B

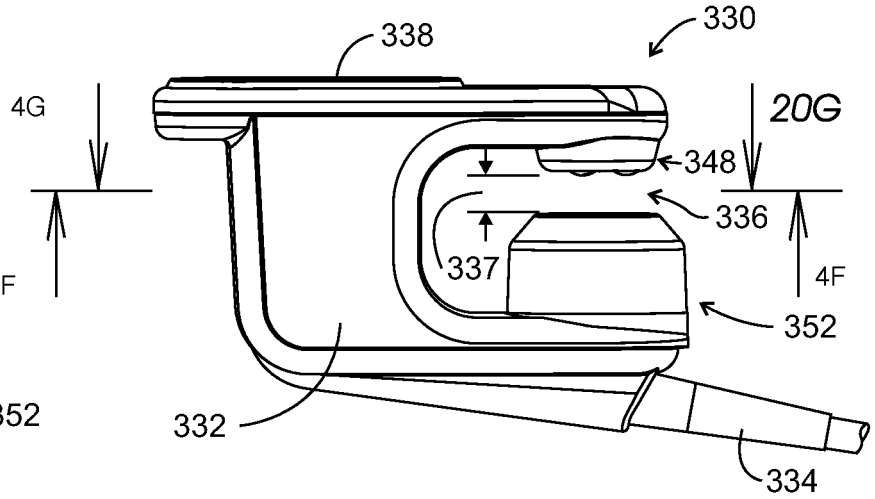


FIG. 4C

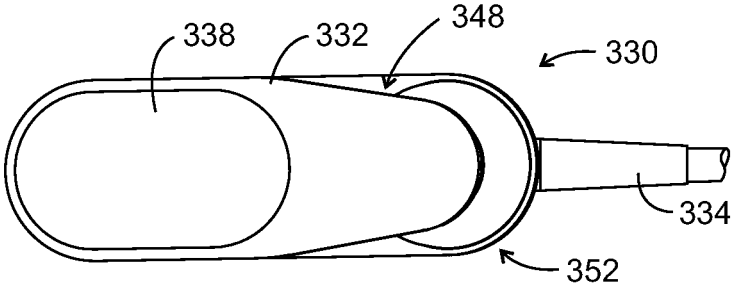


FIG. 4D

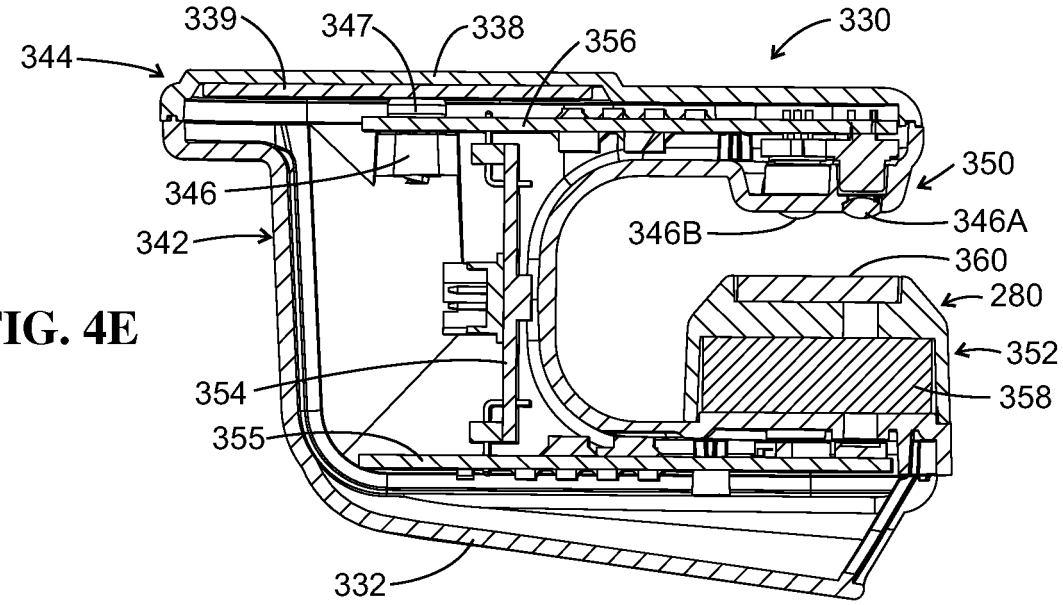


FIG. 4E

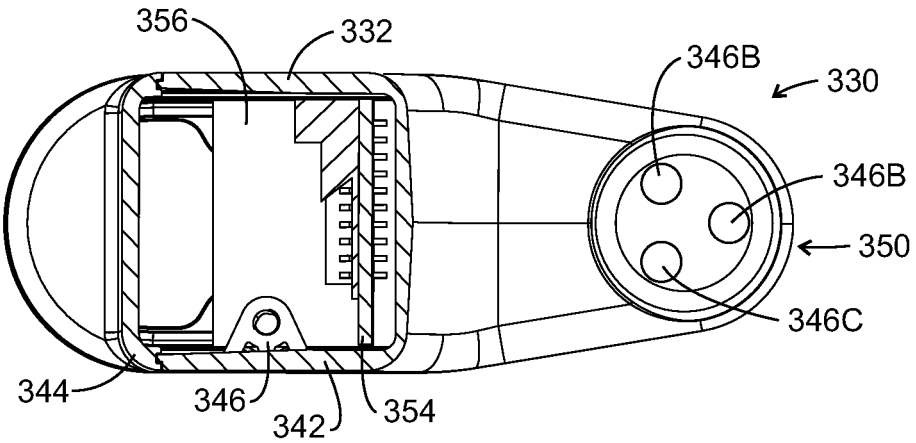


FIG. 4F

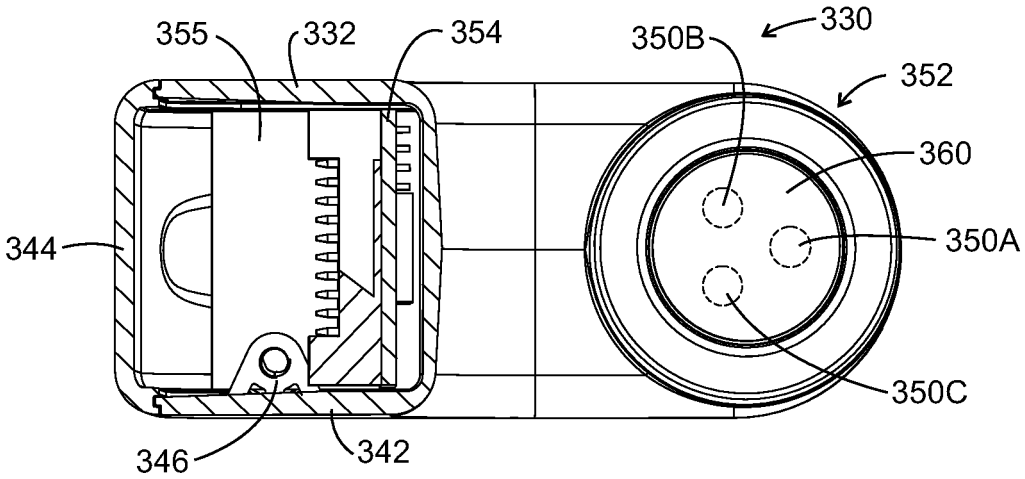


FIG. 4G

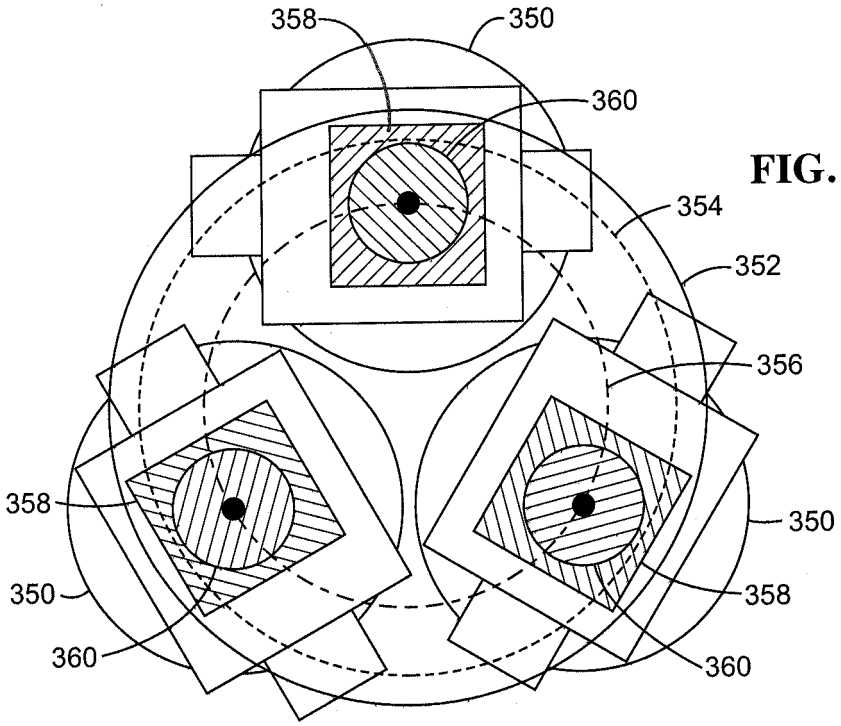

358
350
360
354
352
356
358
350
350
358
360
360

FIG. 5

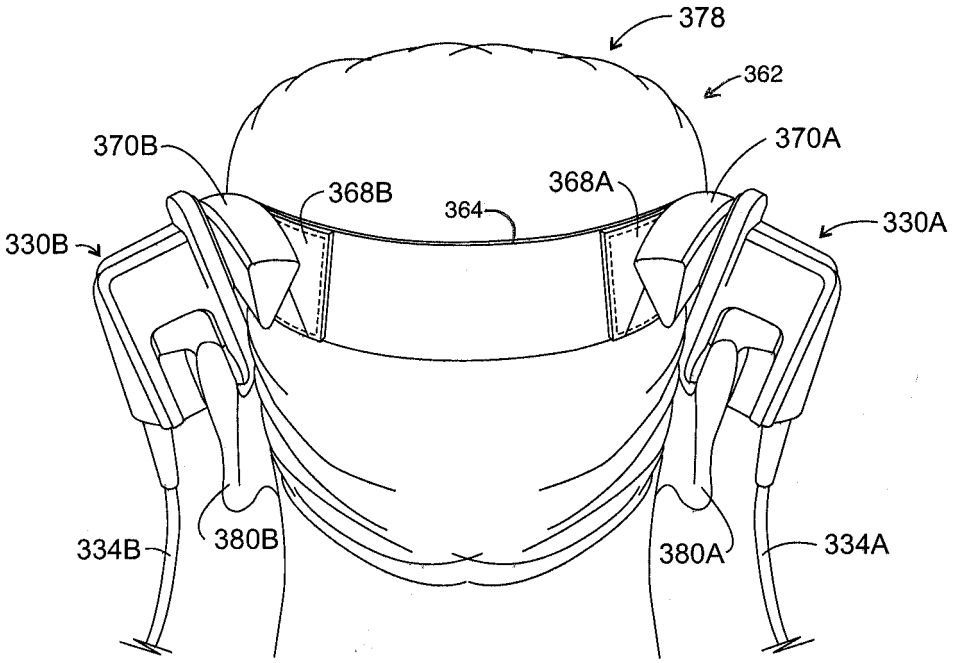
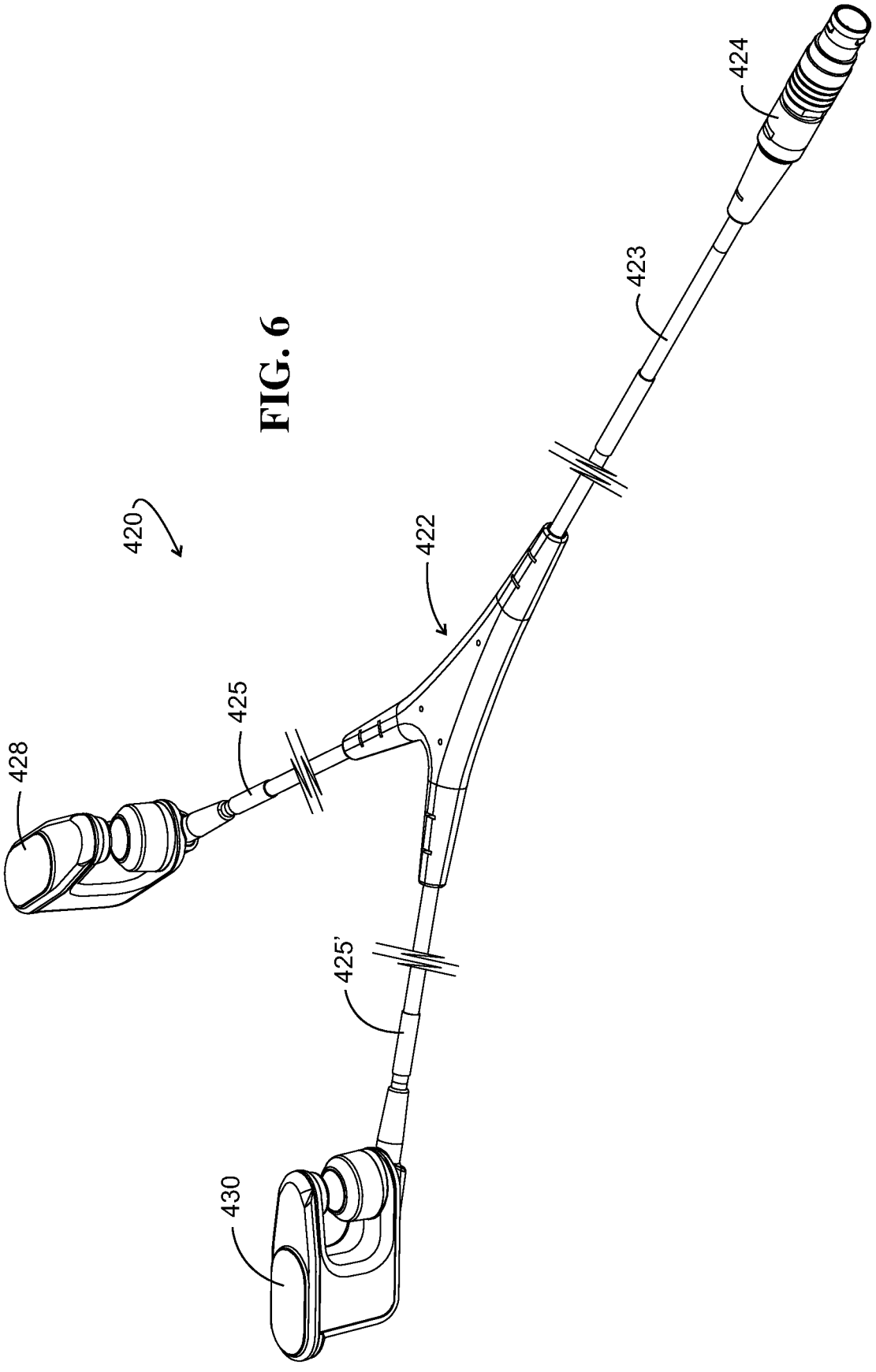

378
362
370B
370A
368B
368A
364
330B
330A
334B
380B
380A
334A

FIG. 7

FIG. 6



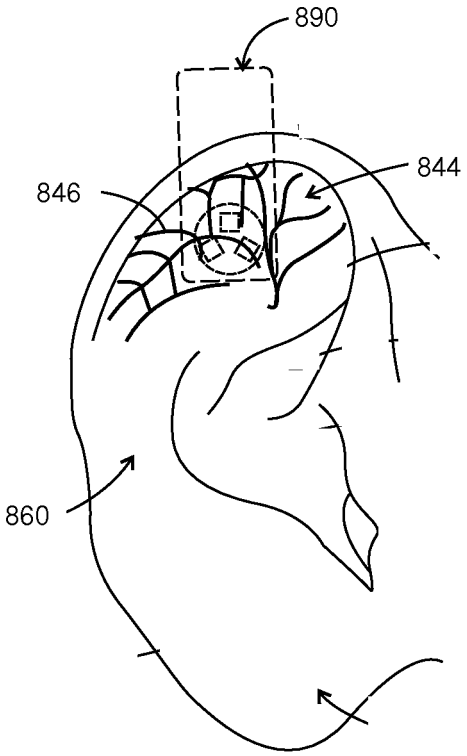


FIG. 8

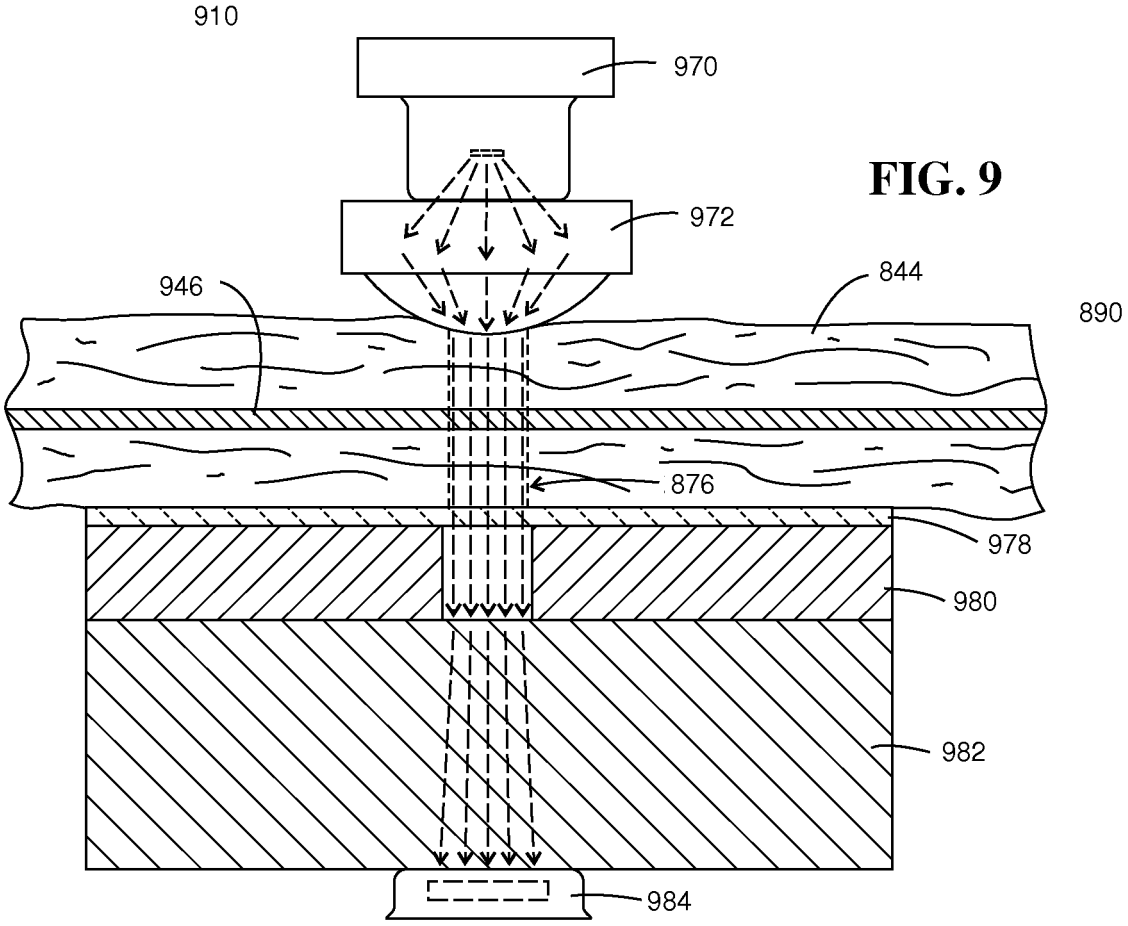


FIG. 9

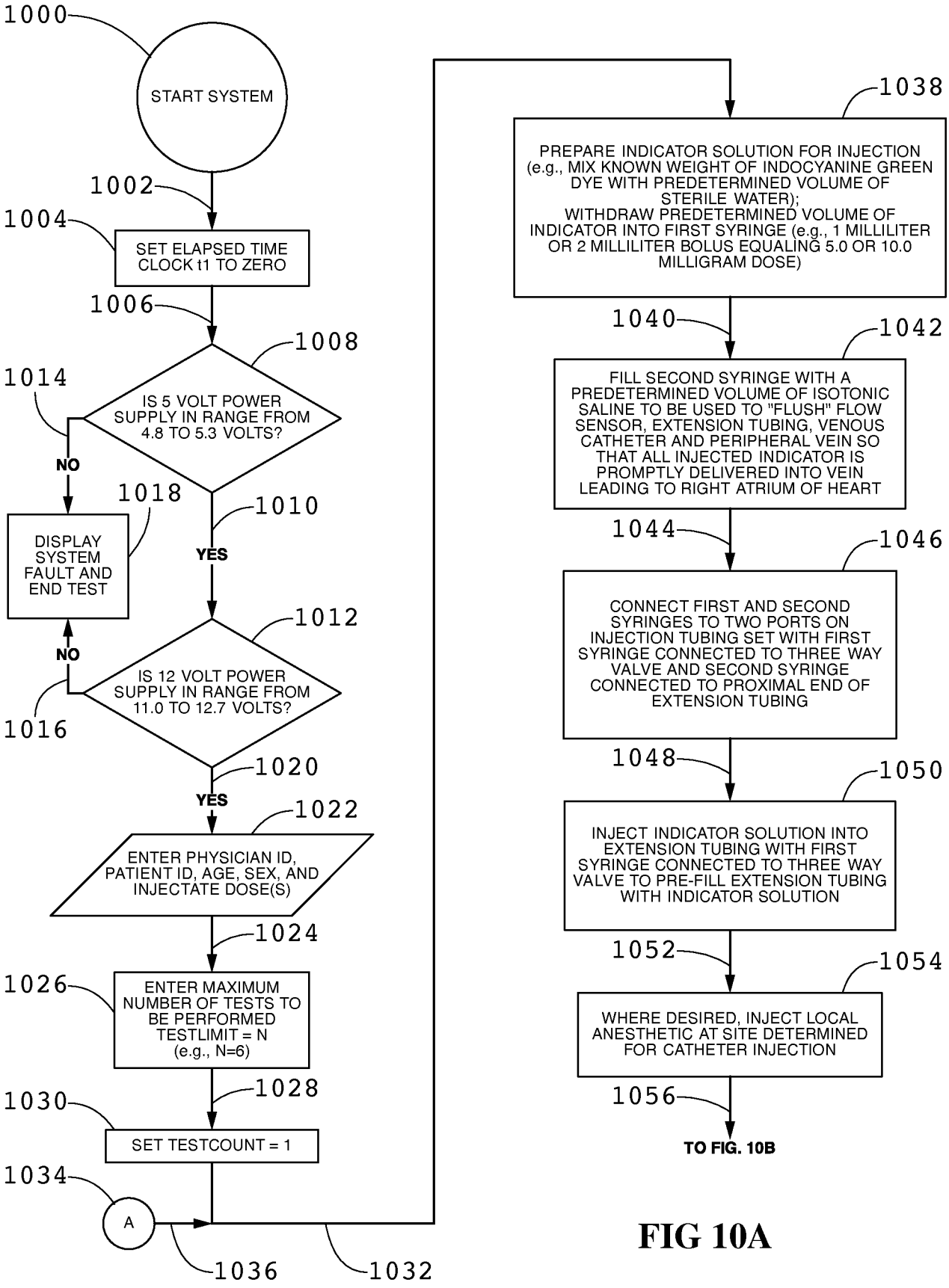

1000
START SYSTEM
1002
1004
SET ELAPSED TIME CLOCK t1 TO ZERO
1006
1008
IS 5 VOLT POWER SUPPLY IN RANGE FROM 4.8 TO 5.3 VOLTS?
1014
NO
1018
DISPLAY SYSTEM FAULT AND END TEST
1010
YES
1012
IS 12 VOLT POWER SUPPLY IN RANGE FROM 11.0 TO 12.7 VOLTS?
NO
1016
1020
YES
1022
ENTER PHYSICIAN ID, PATIENT ID, AGE, SEX, AND INJECTATE DOSE(S)
1024
1026
ENTER MAXIMUM NUMBER OF TESTS TO BE PERFORMED TESTLIMIT = N (e.g., N=6)
1028
1030
SET TESTCOUNT = 1
1034
A
1036
1032
1038
PREPARE INDICATOR SOLUTION FOR INJECTION (e.g., MIX KNOWN WEIGHT OF INDOCYANINE GREEN DYE WITH PREDETERMINED VOLUME OF STERILE WATER); WITHDRAW PREDETERMINED VOLUME OF INDICATOR INTO FIRST SYRINGE (e.g., 1 MILLILITER OR 2 MILLILITER BOLUS EQUALING 5.0 OR 10.0 MILLIGRAM DOSE)
1040
1042
FILL SECOND SYRINGE WITH A PREDETERMINED VOLUME OF ISOTONIC SALINE TO BE USED TO "FLUSH" FLOW SENSOR, EXTENSION TUBING, VENOUS CATHETER AND PERIPHERAL VEIN SO THAT ALL INJECTED INDICATOR IS PROMPTLY DELIVERED INTO VEIN LEADING TO RIGHT ATRIUM OF HEART
1044
1046
CONNECT FIRST AND SECOND SYRINGES TO TWO PORTS ON INJECTION TUBING SET WITH FIRST SYRINGE CONNECTED TO THREE WAY VALVE AND SECOND SYRINGE CONNECTED TO PROXIMAL END OF EXTENSION TUBING
1048
1050
INJECT INDICATOR SOLUTION INTO EXTENSION TUBING WITH FIRST SYRINGE CONNECTED TO THREE WAY VALVE TO PRE-FILL EXTENSION TUBING WITH INDICATOR SOLUTION
1052
1054
WHERE DESIRED, INJECT LOCAL ANESTHETIC AT SITE DETERMINED FOR CATHETER INJECTION
1056
TO FIG. 10B

FIG 10A

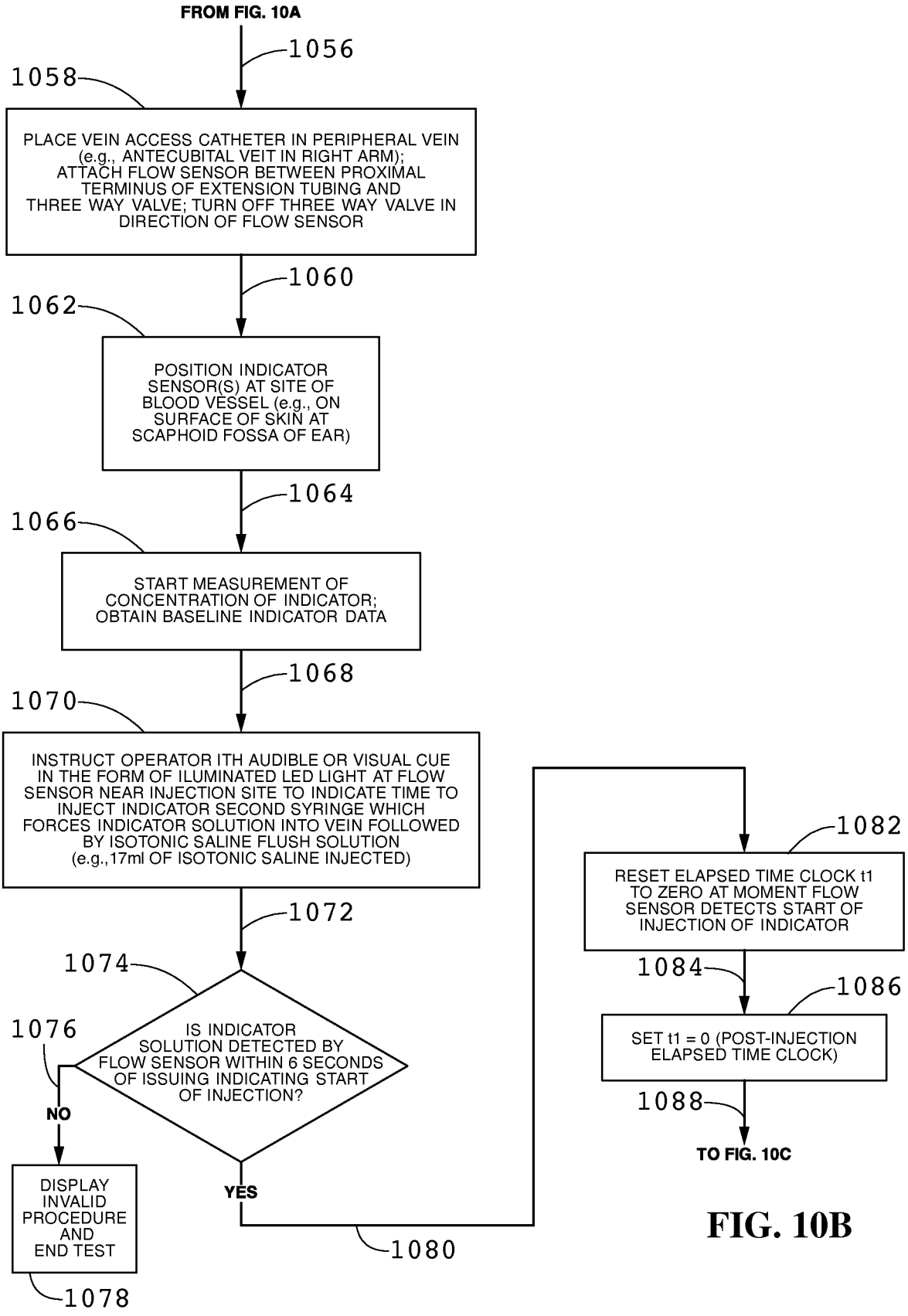

FROM FIG. 10A
1056
1058
PLACE VEIN ACCESS CATHETER IN PERIPHERAL VEIN (e.g., ANTECUBITAL VEIT IN RIGHT ARM); ATTACH FLOW SENSOR BETWEEN PROXIMAL TERMINUS OF EXTENSION TUBING AND THREE WAY VALVE; TURN OFF THREE WAY VALVE IN DIRECTION OF FLOW SENSOR
1060
1062
POSITION INDICATOR SENSOR(S) AT SITE OF BLOOD VESSEL (e.g., ON SURFACE OF SKIN AT SCAPHOID FOSSA OF EAR)
1064
1066
START MEASUREMENT OF CONCENTRATION OF INDICATOR; OBTAIN BASELINE INDICATOR DATA
1068
1070
INSTRUCT OPERATOR ITH AUDIBLE OR VISUAL CUE IN THE FORM OF ILUMINATED LED LIGHT AT FLOW SENSOR NEAR INJECTION SITE TO INDICATE TIME TO INJECT INDICATOR SECOND SYRINGE WHICH FORCES INDICATOR SOLUTION INTO VEIN FOLLOWED BY ISOTONIC SALINE FLUSH SOLUTION (e.g.,17ml OF ISOTONIC SALINE INJECTED)
1072
1074
1076
IS INDICATOR SOLUTION DETECTED BY FLOW SENSOR WITHIN 6 SECONDS OF ISSUING INDICATING START OF INJECTION?
NO
YES
DISPLAY INVALID PROCEDURE AND END TEST
1078
1080
1082
RESET ELAPSED TIME CLOCK t1 TO ZERO AT MOMENT FLOW SENSOR DETECTS START OF INJECTION OF INDICATOR
1084
1086
SET t1 = 0 (POST-INJECTION ELAPSED TIME CLOCK)
1088
TO FIG. 10C

FIG. 10B

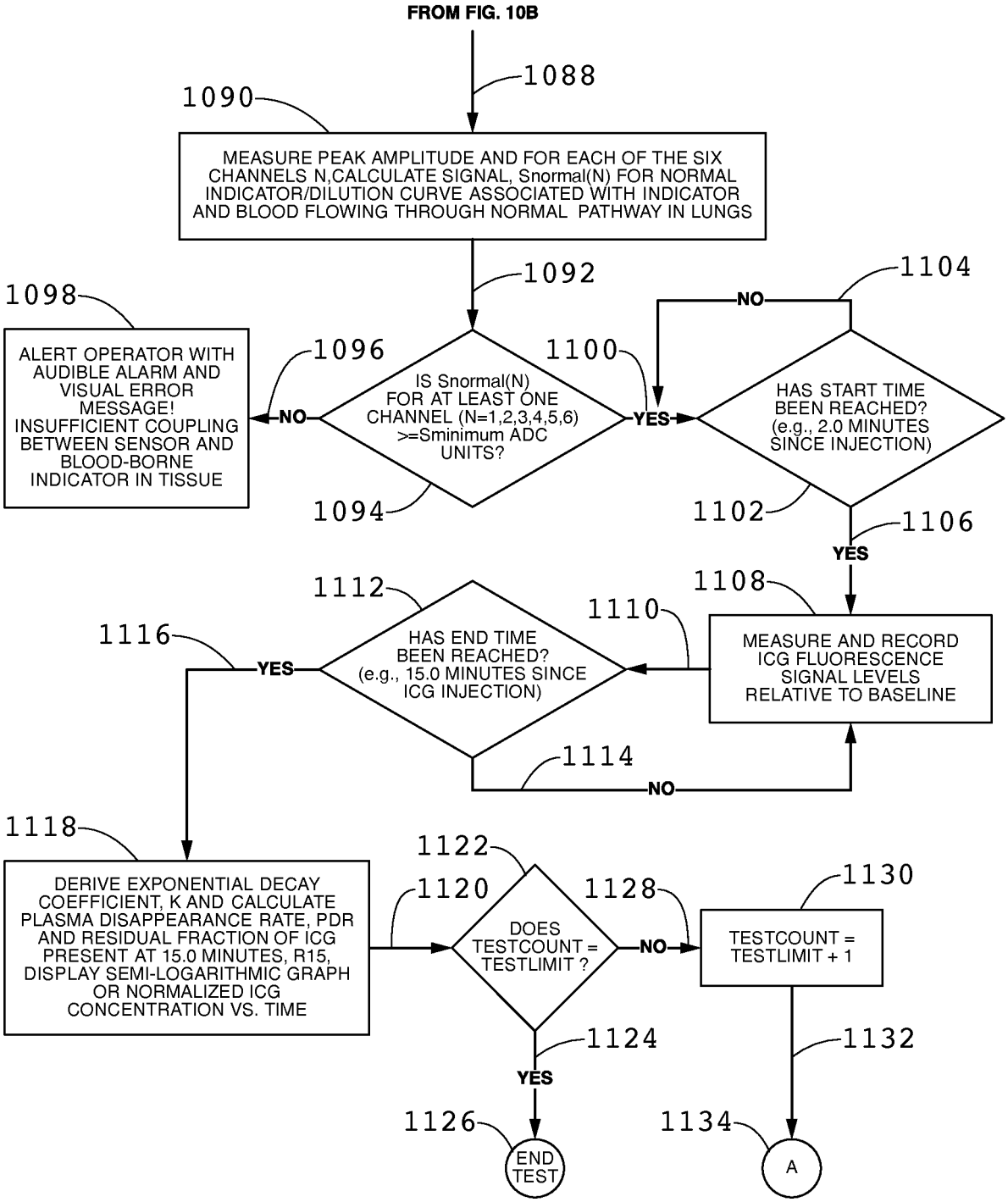

FROM FIG. 10B
1088
1090
MEASURE PEAK AMPLITUDE AND FOR EACH OF THE SIX CHANNELS N,CALCULATE SIGNAL, Snormal(N) FOR NORMAL INDICATOR/DILUTION CURVE ASSOCIATED WITH INDICATOR AND BLOOD FLOWING THROUGH NORMAL PATHWAY IN LUNGS
1092
1098
ALERT OPERATOR WITH AUDIBLE ALARM AND VISUAL ERROR MESSAGE! INSUFFICIENT COUPLING BETWEEN SENSOR AND BLOOD-BORNE INDICATOR IN TISSUE
1096
NO
IS Snormal(N) FOR AT LEAST ONE CHANNEL (N=1,2,3,4,5,6) >=Sminimum ADC UNITS?
1094
YES
1100
NO
1104
HAS START TIME BEEN REACHED? (e.g., 2.0 MINUTES SINCE INJECTION)
1102
YES
1106
1108
MEASURE AND RECORD ICG FLUORESCENCE SIGNAL LEVELS RELATIVE TO BASELINE
1110
1112
HAS END TIME BEEN REACHED? (e.g., 15.0 MINUTES SINCE ICG INJECTION)
1116
YES
1114
NO
1118
DERIVE EXPONENTIAL DECAY COEFFICIENT, K AND CALCULATE PLASMA DISAPPEARANCE RATE, PDR AND RESIDUAL FRACTION OF ICG PRESENT AT 15.0 MINUTES, R15, DISPLAY SEMI-LOGARITHMIC GRAPH OR NORMALIZED ICG CONCENTRATION VS. TIME
1120
1122
DOES TESTCOUNT = TESTLIMIT ?
1128
NO
TESTCOUNT = TESTLIMIT + 1
1130
1124
YES
1126
END TEST
1132
1134
A

FIG. 10C

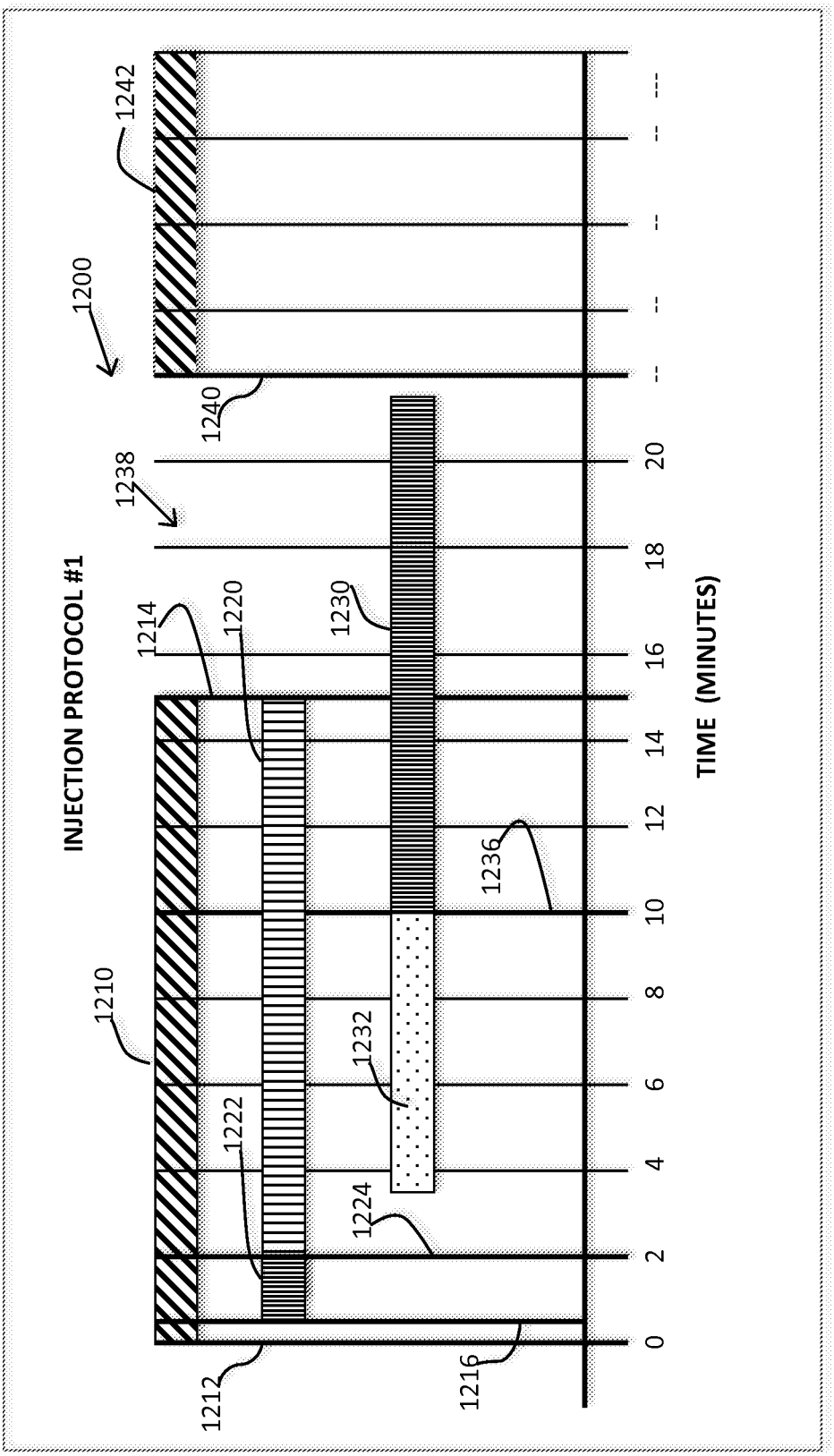

INJECTION PROTOCOL #1
TIME (MINUTES)
0
2
4
6
8
10
12
14
16
18
20
1200
1210
1212
1214
1216
1220
1222
1224
1230
1232
1236
1238
1240
1242

FIG. 11

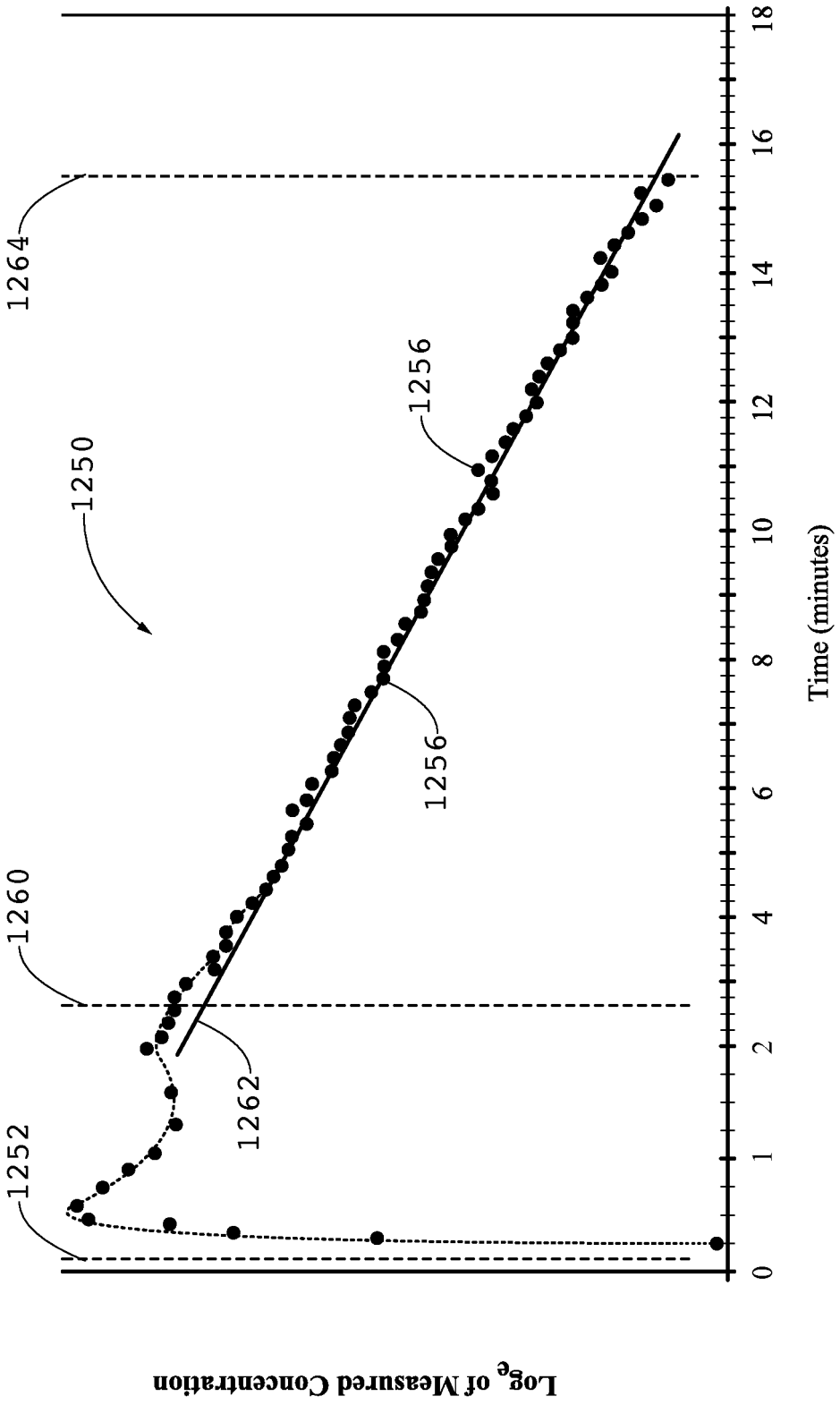

1252
1260
1262
1256
1256
1250
1264
0
1
2
4
6
8
10
12
14
16
18
Time (minutes)
Log$_e$ of Measured Concentration

FIG. 12

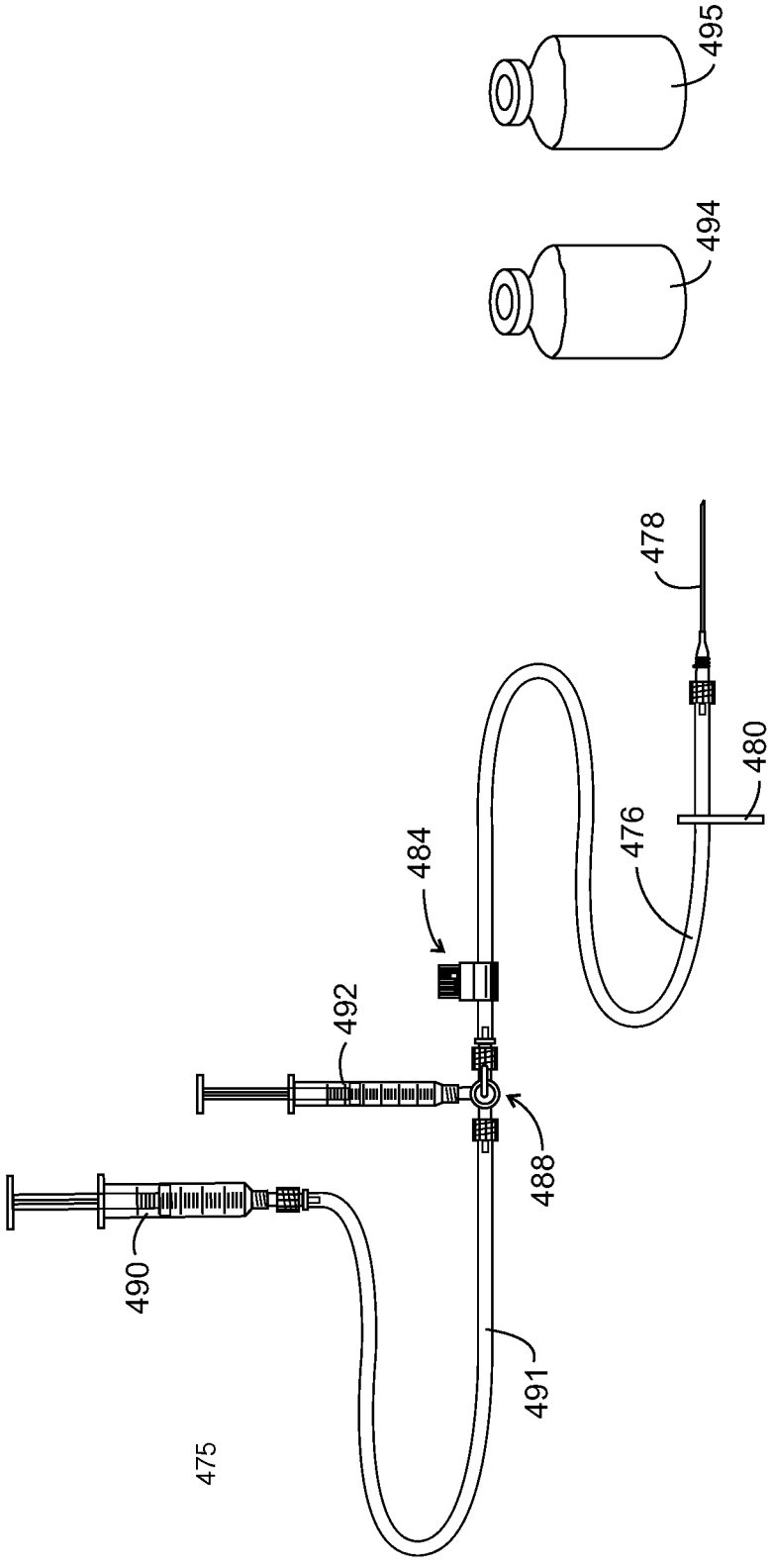


FIG. 13

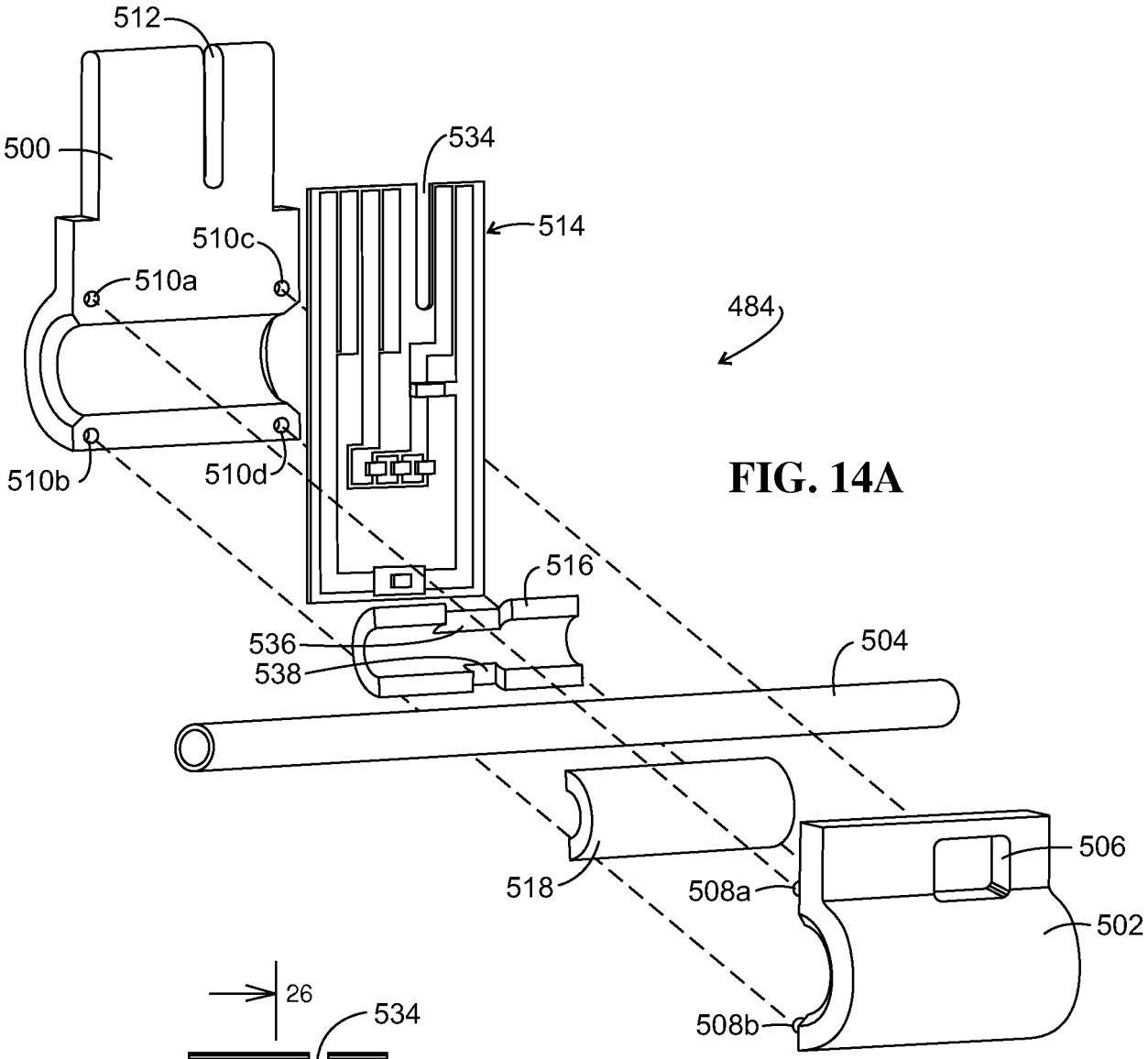


FIG. 14A

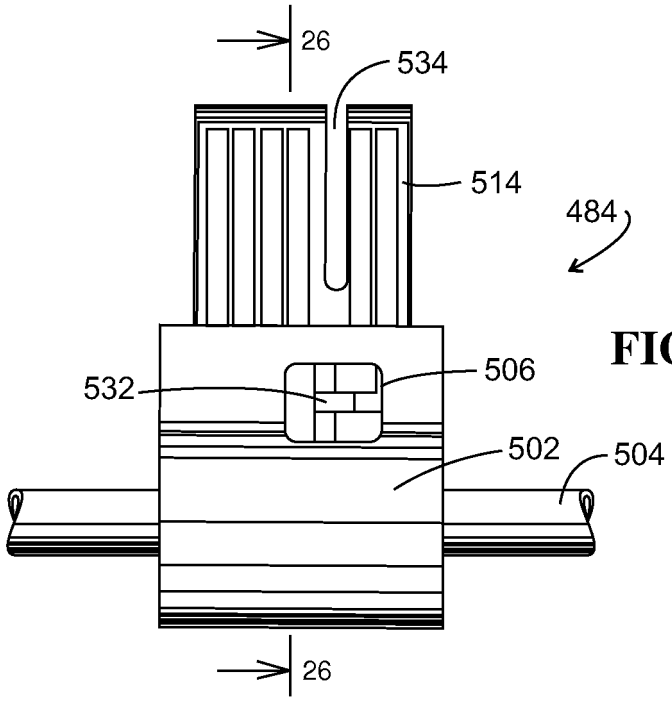


FIG. 14B

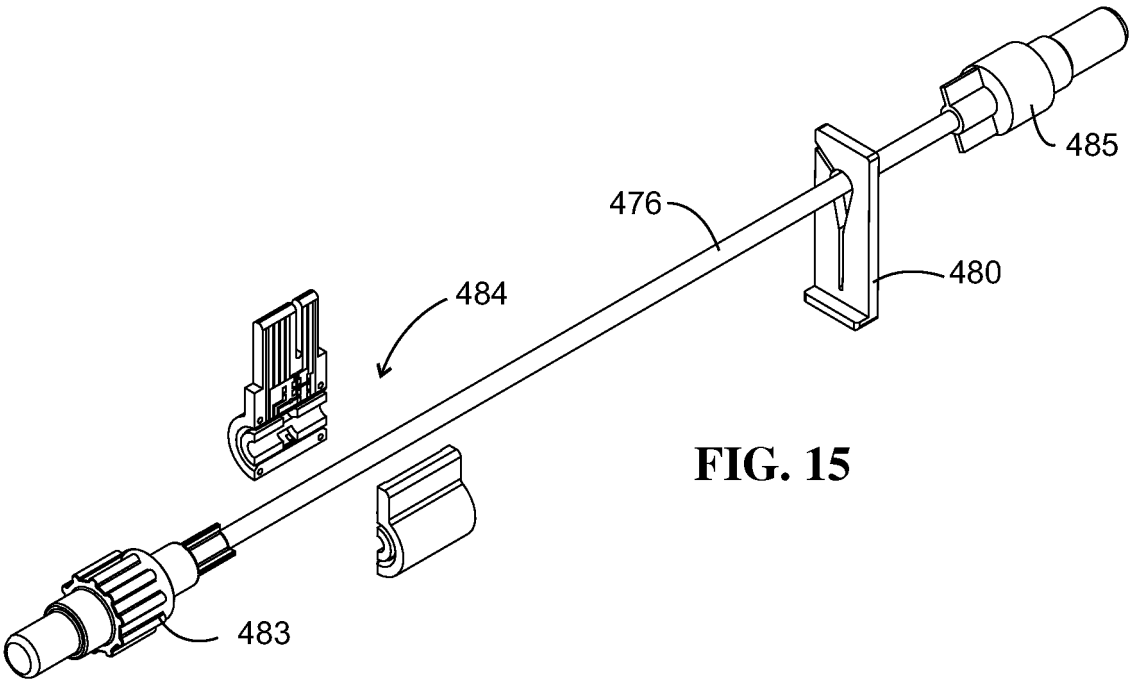


FIG. 15

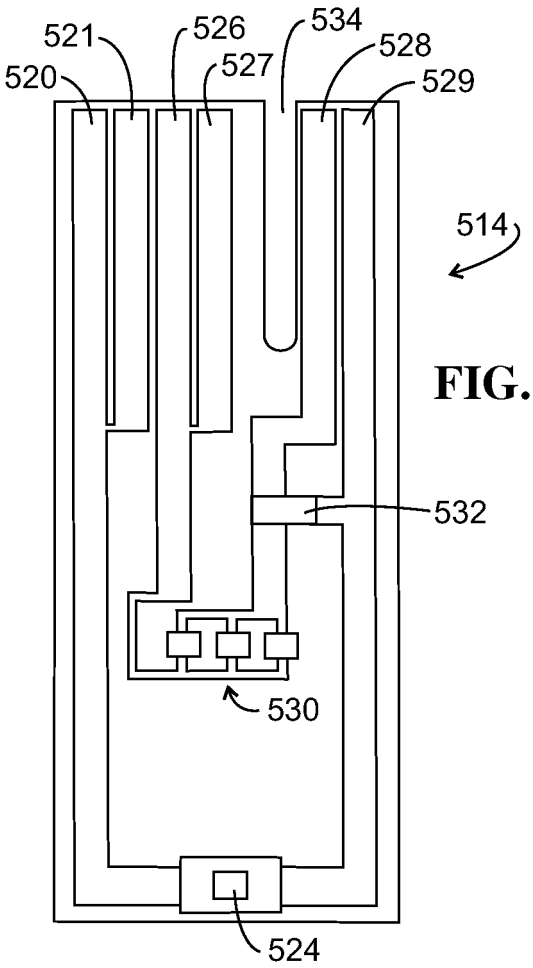


FIG.14C

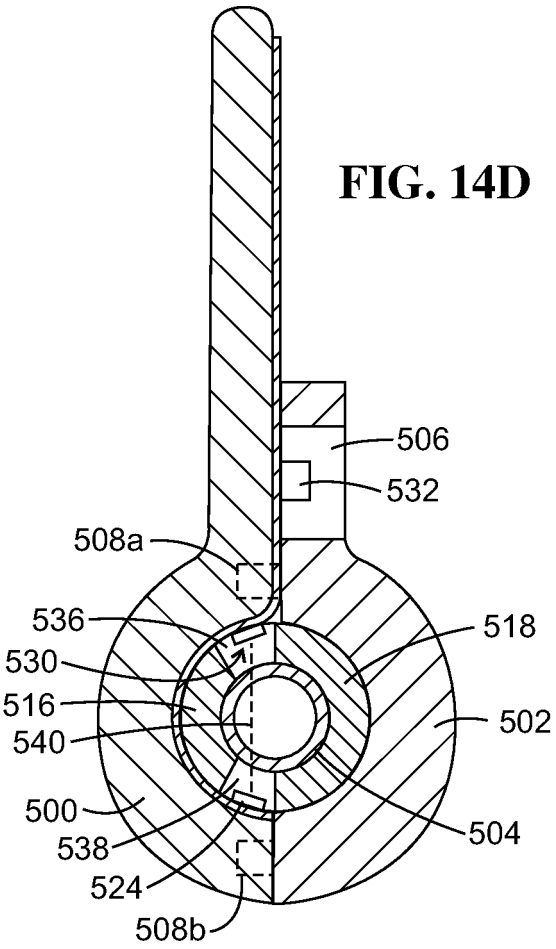


FIG. 14D

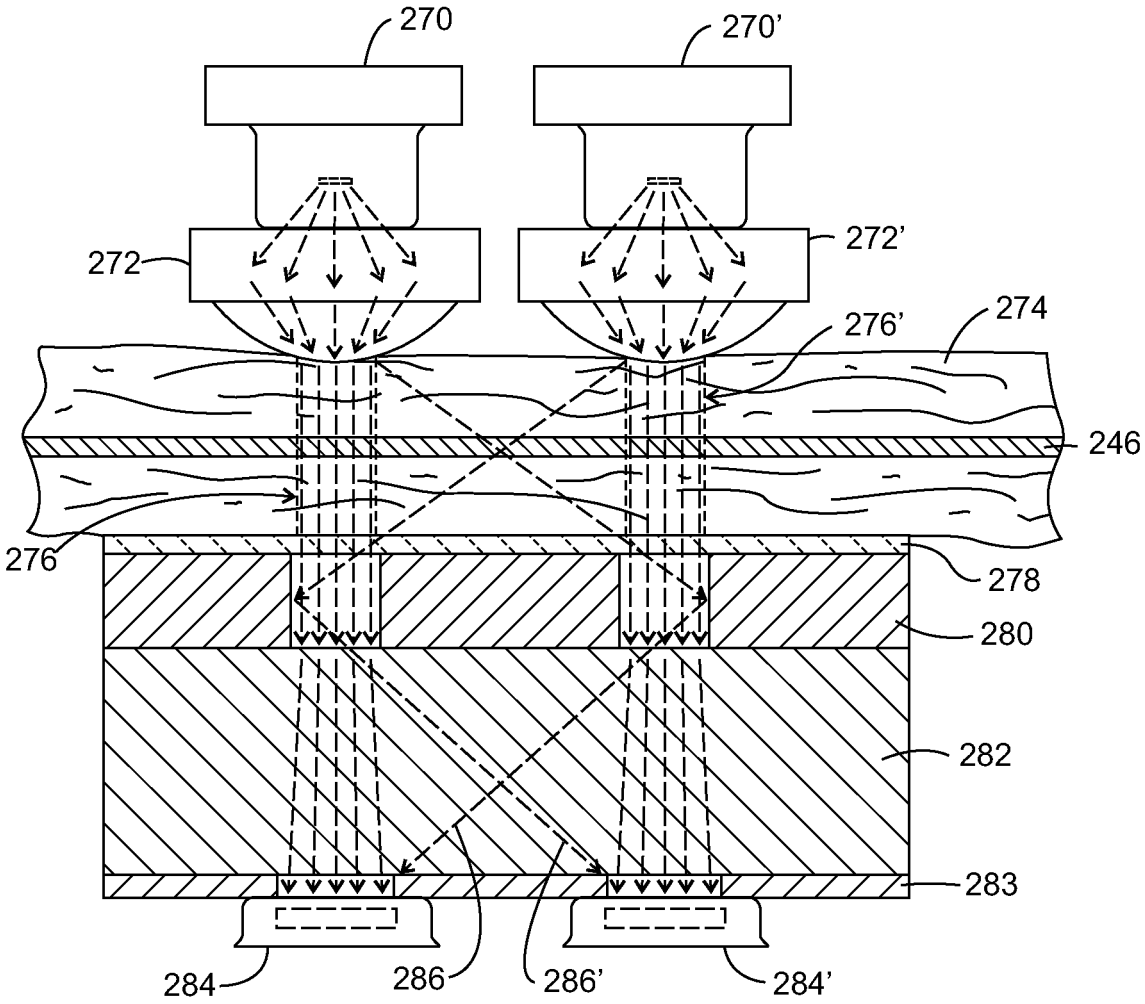


FIG. 16