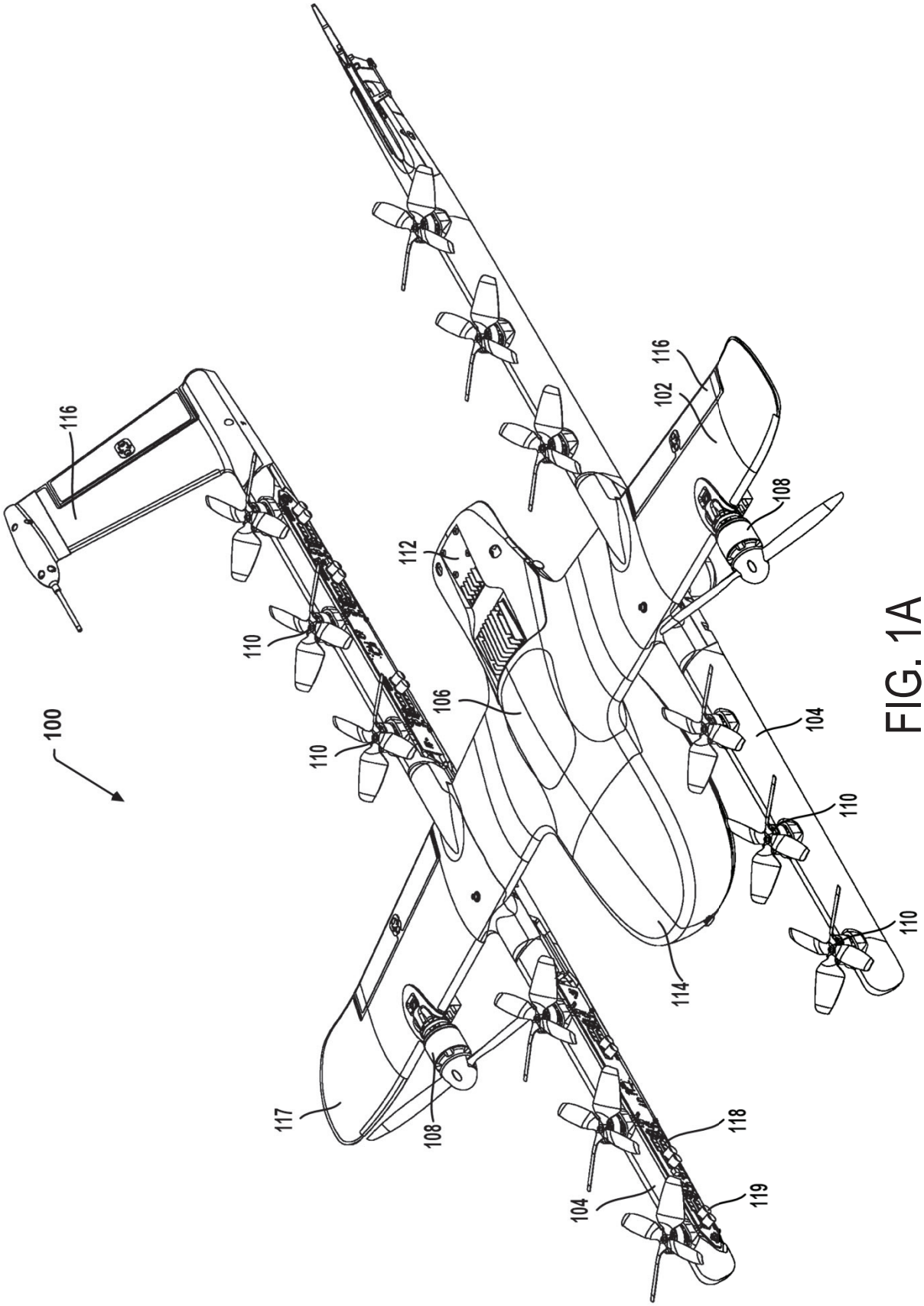

100
116
110
110
106
112
108
102
116
104
110
110
114
117
108
118
104
119

FIG. 1A

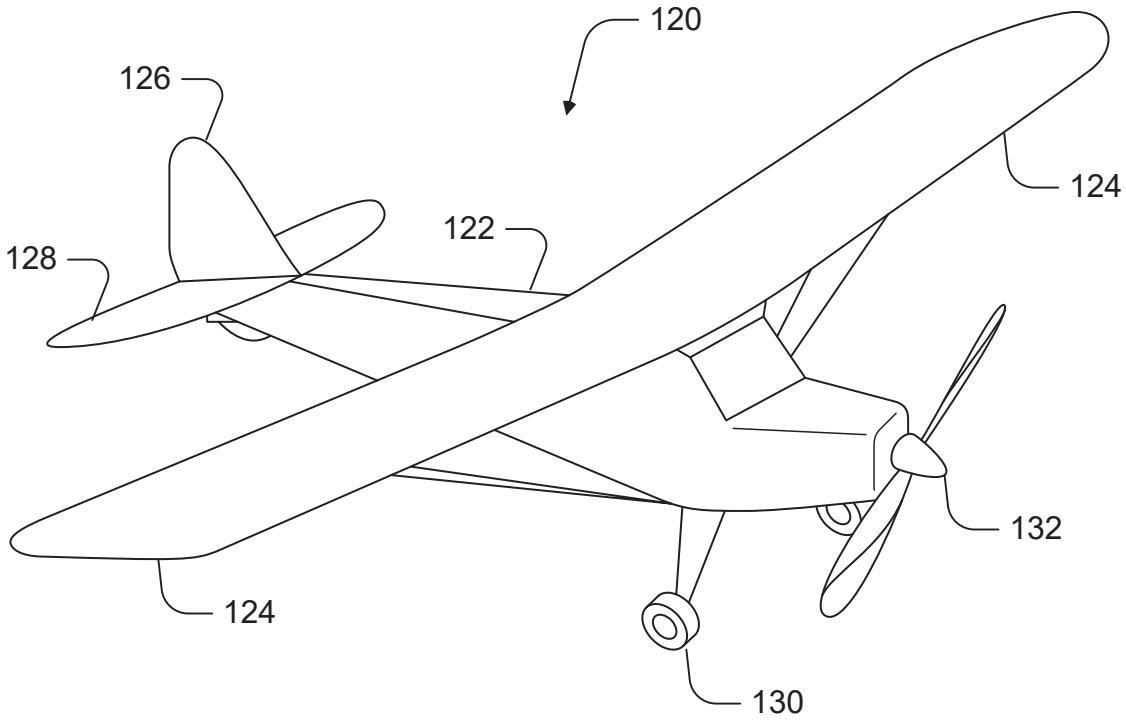



FIG. 1B

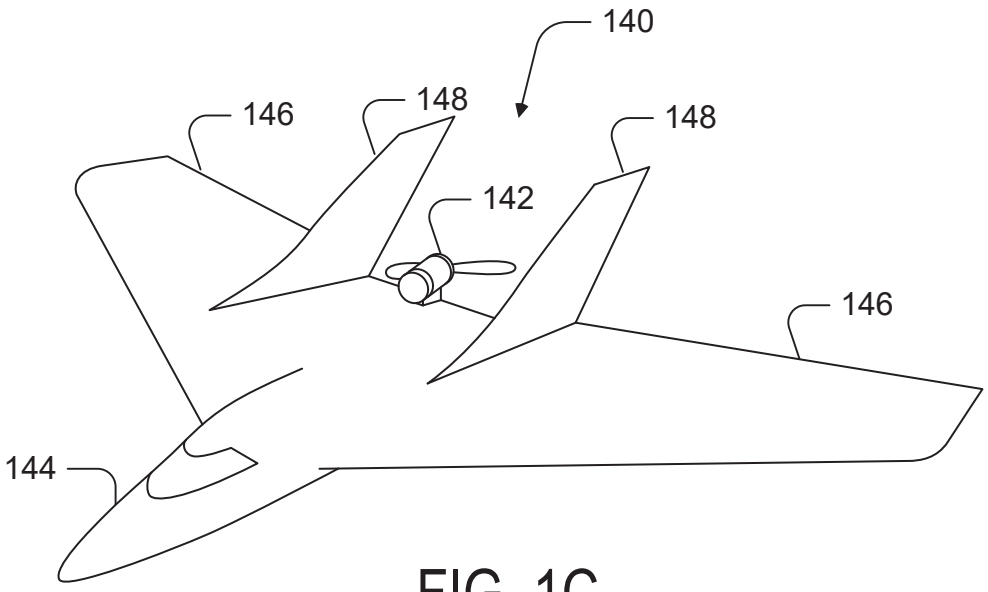



FIG. 1C

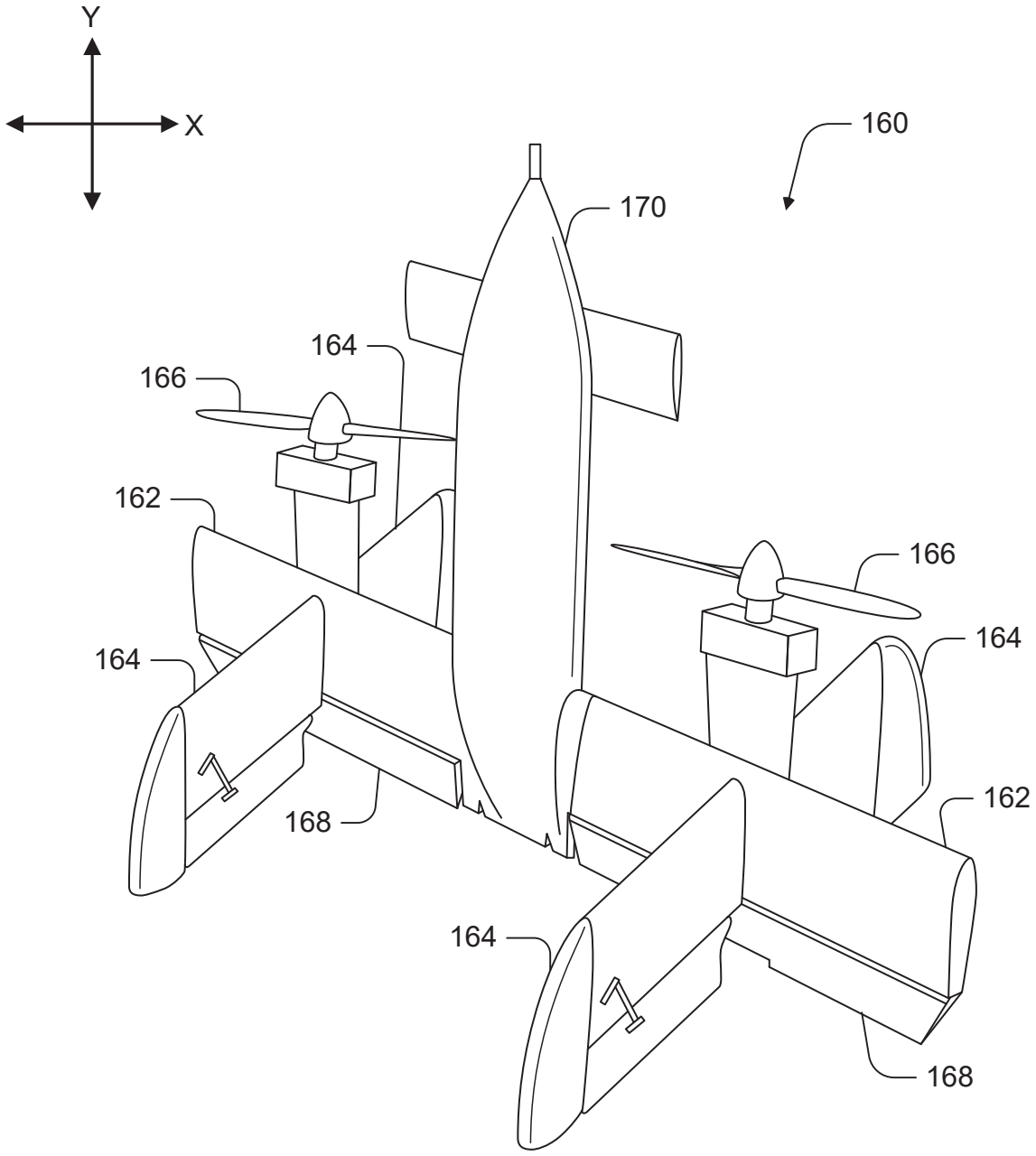



FIG. 1D

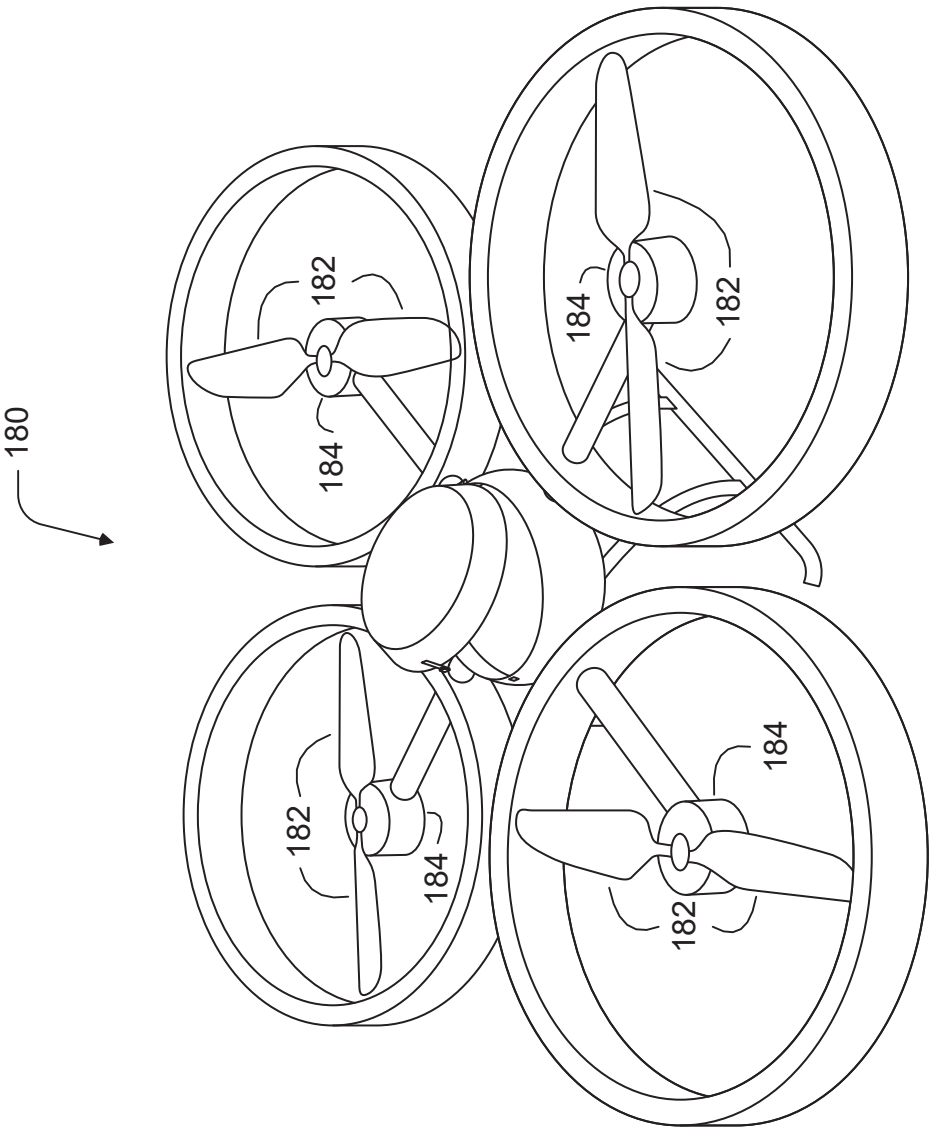



FIG. 1E

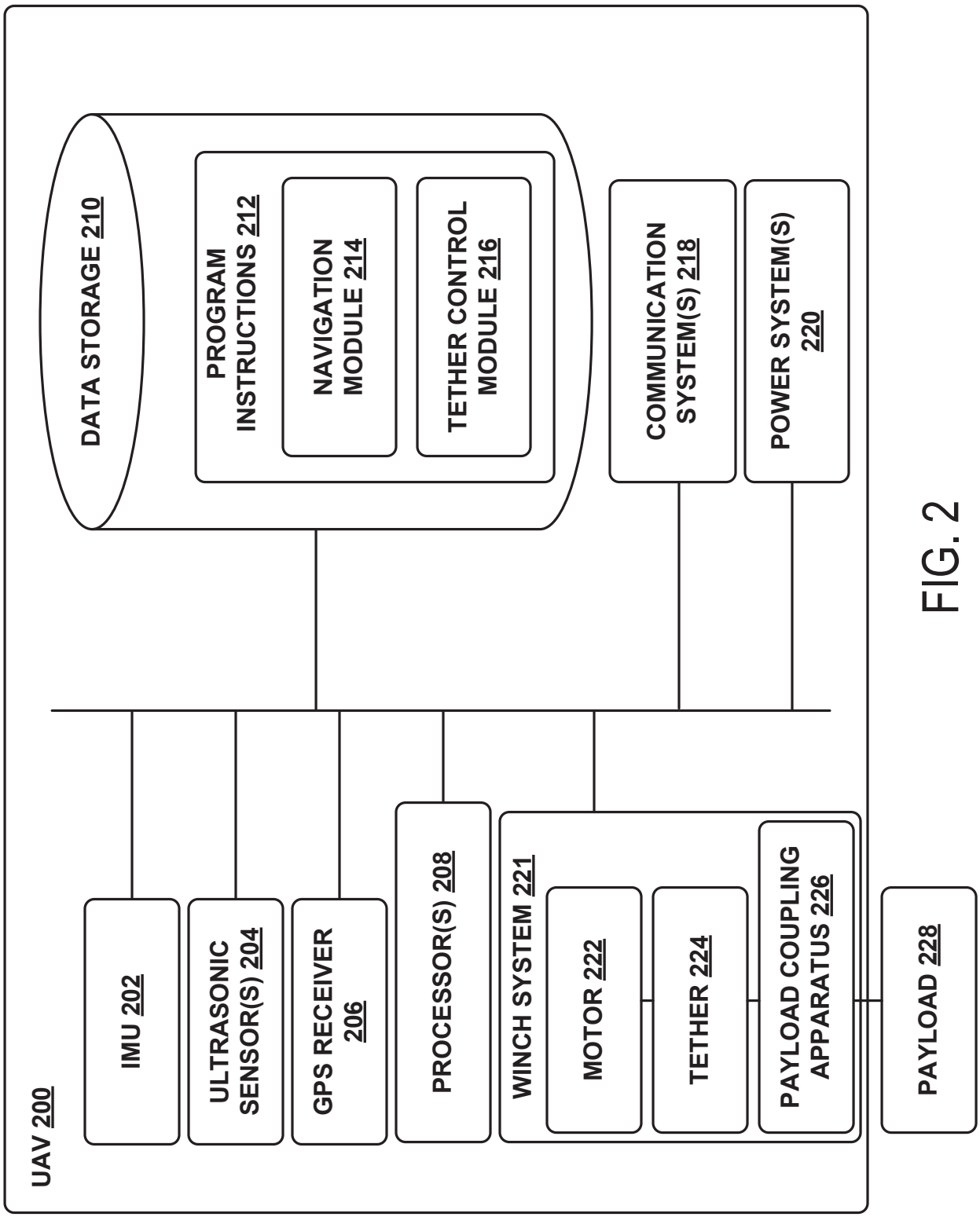

UAV 200
IMU 202
ULTRASONIC SENSOR(S) 204
GPS RECEIVER 206
PROCESSOR(S) 208
WINCH SYSTEM 221
MOTOR 222
TETHER 224
PAYLOAD COUPLING APPARATUS 226
PAYLOAD 228
DATA STORAGE 210
PROGRAM INSTRUCTIONS 212
NAVIGATION MODULE 214
TETHER CONTROL MODULE 216
COMMUNICATION SYSTEM(S) 218
POWER SYSTEM(S) 220

FIG. 2

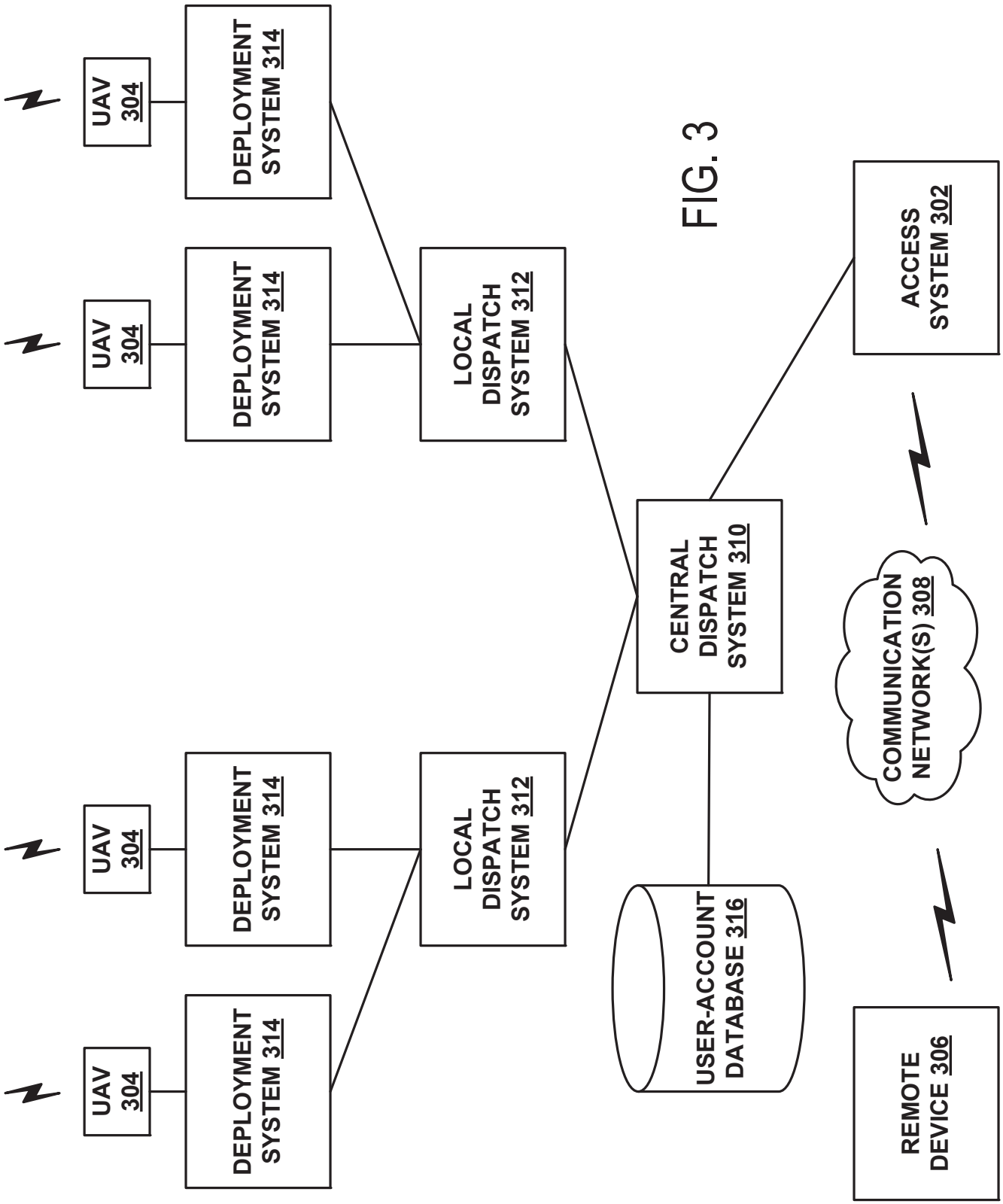

UAV 304
UAV 304
UAV 304
UAV 304
DEPLOYMENT SYSTEM 314
DEPLOYMENT SYSTEM 314
DEPLOYMENT SYSTEM 314
DEPLOYMENT SYSTEM 314
LOCAL DISPATCH SYSTEM 312
LOCAL DISPATCH SYSTEM 312
CENTRAL DISPATCH SYSTEM 310
USER-ACCOUNT DATABASE 316
ACCESS SYSTEM 302
COMMUNICATION NETWORK(S) 308
REMOTE DEVICE 306

FIG. 3

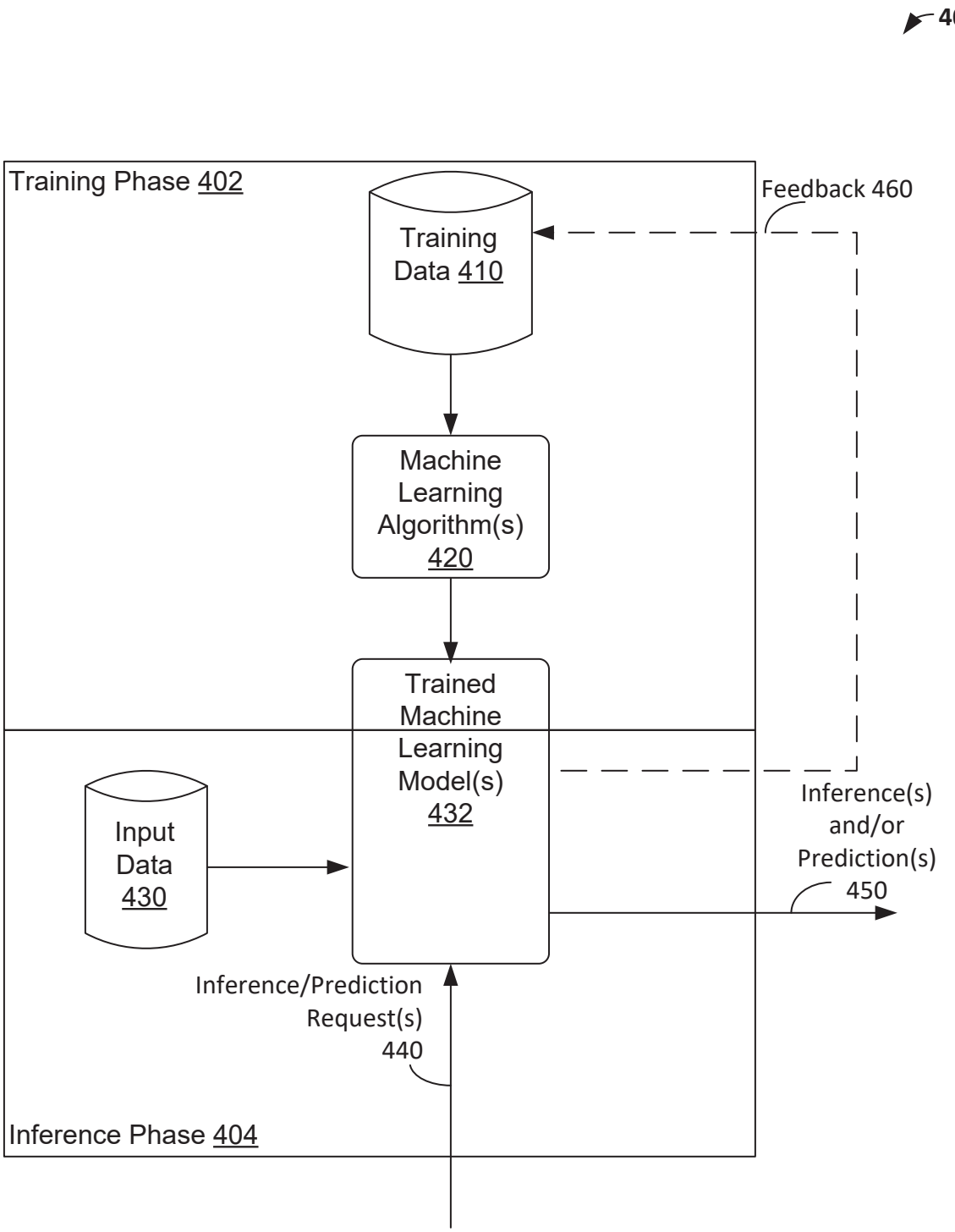

400
Training Phase 402
Training Data 410
Feedback 460
Machine Learning Algorithm(s) 420
Trained Machine Learning Model(s) 432
Input Data 430
Inference(s) and/or Prediction(s) 450
Inference/Prediction Request(s) 440
Inference Phase 404

FIG. 4

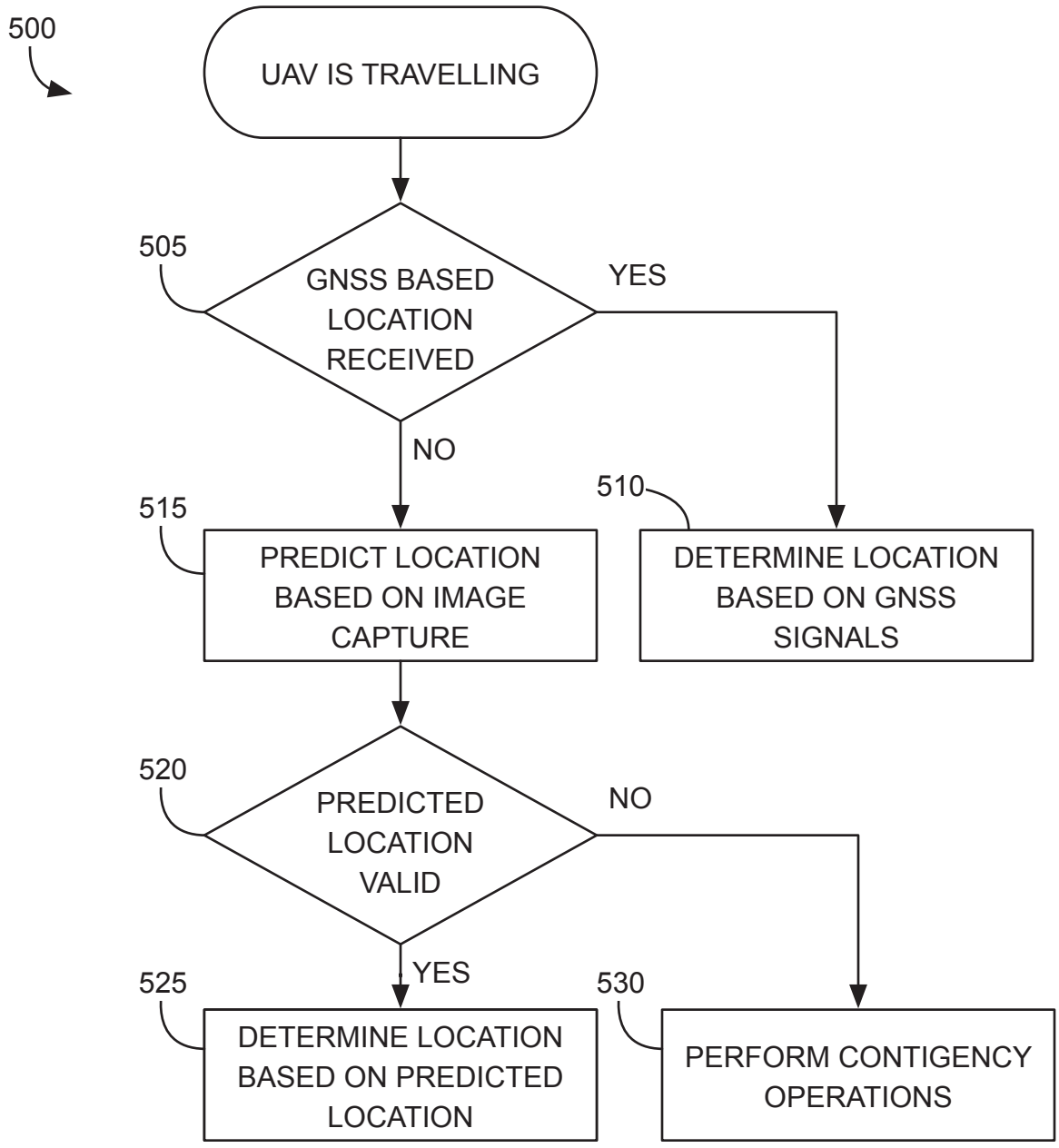

500
UAV IS TRAVELLING
505
GNSS BASED LOCATION RECEIVED
YES
NO
510
515
PREDICT LOCATION BASED ON IMAGE CAPTURE
DETERMINE LOCATION BASED ON GNSS SIGNALS
520
PREDICTED LOCATION VALID
NO
YES
525
530
DETERMINE LOCATION BASED ON PREDICTED LOCATION
PERFORM CONTIGENCY OPERATIONS

FIG. 5

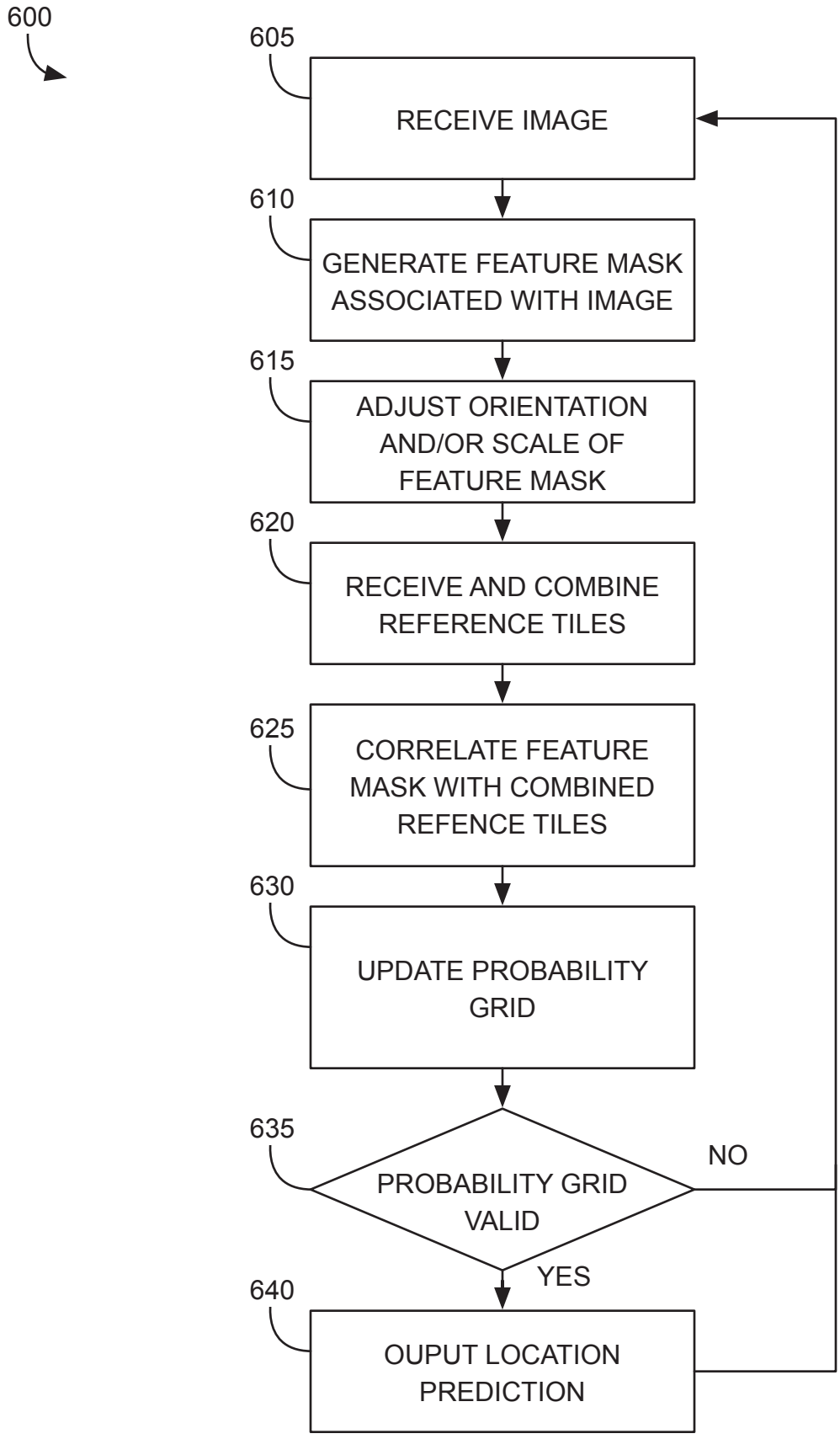

600
605
RECEIVE IMAGE
610
GENERATE FEATURE MASK ASSOCIATED WITH IMAGE
615
ADJUST ORIENTATION AND/OR SCALE OF FEATURE MASK
620
RECEIVE AND COMBINE REFERENCE TILES
625
CORRELATE FEATURE MASK WITH COMBINED REFENCE TILES
630
UPDATE PROBABILITY GRID
635
PROBABILITY GRID VALID
NO
YES
640
OUPUT LOCATION PREDICTION

FIG. 6

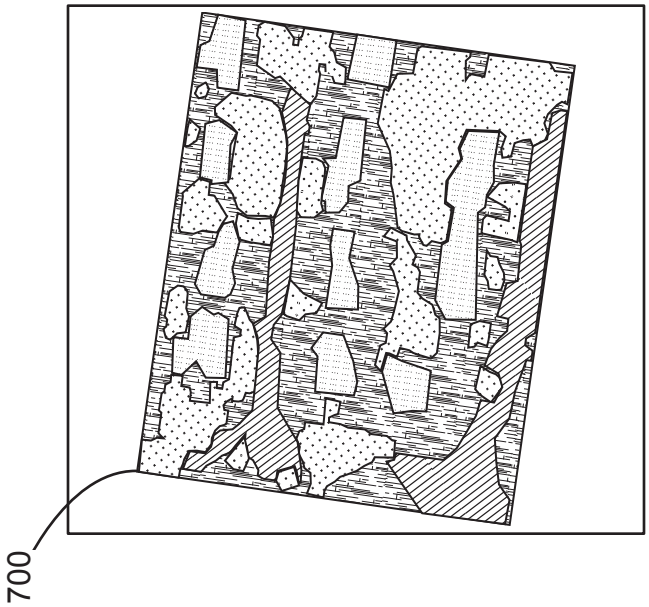



FIG. 7B

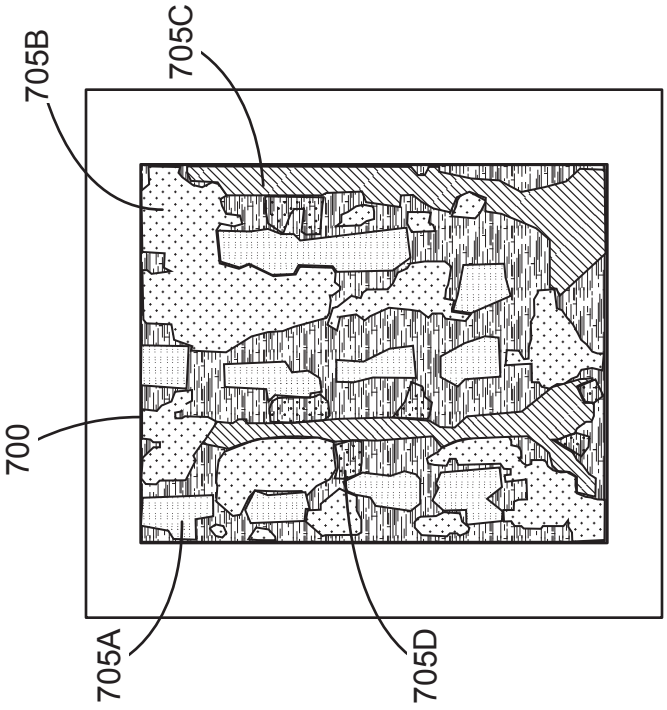



FIG. 7A

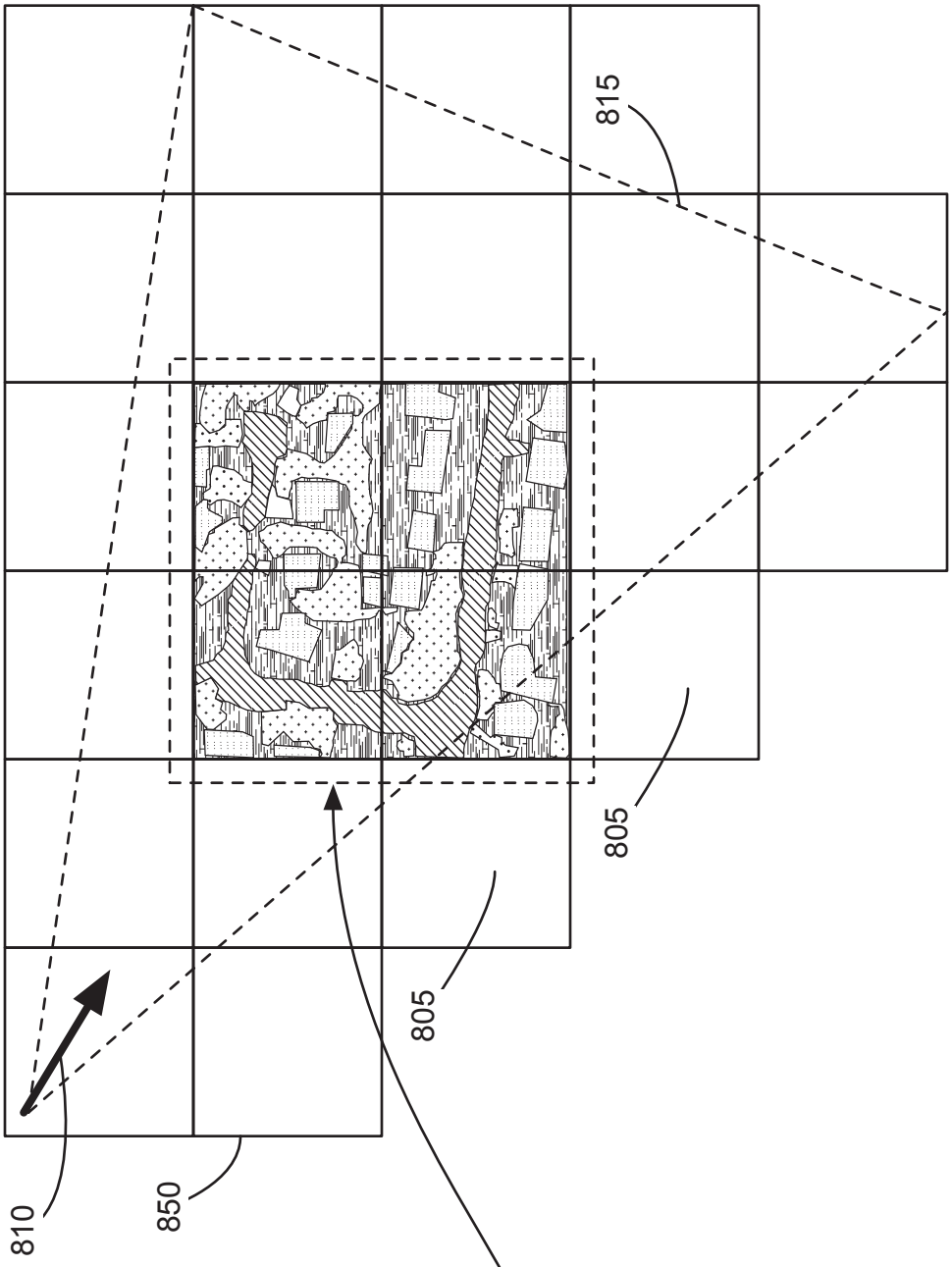



FIG. 8B

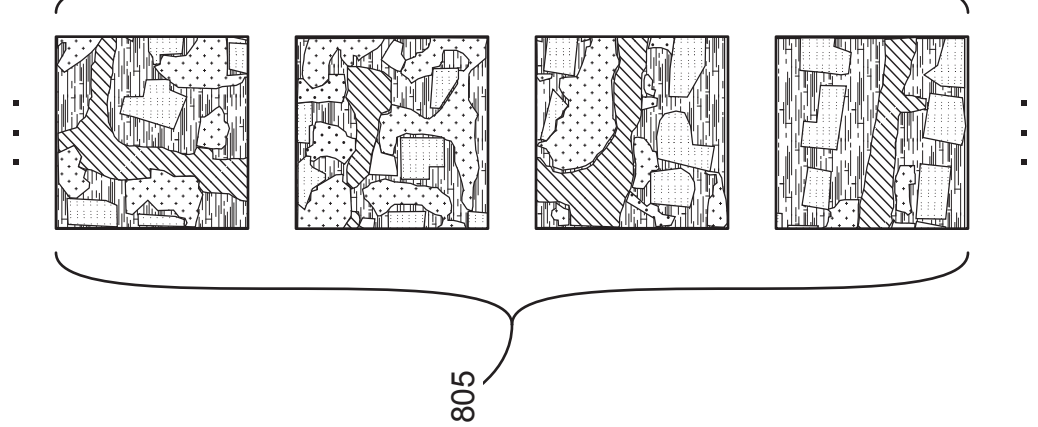



FIG. 8A

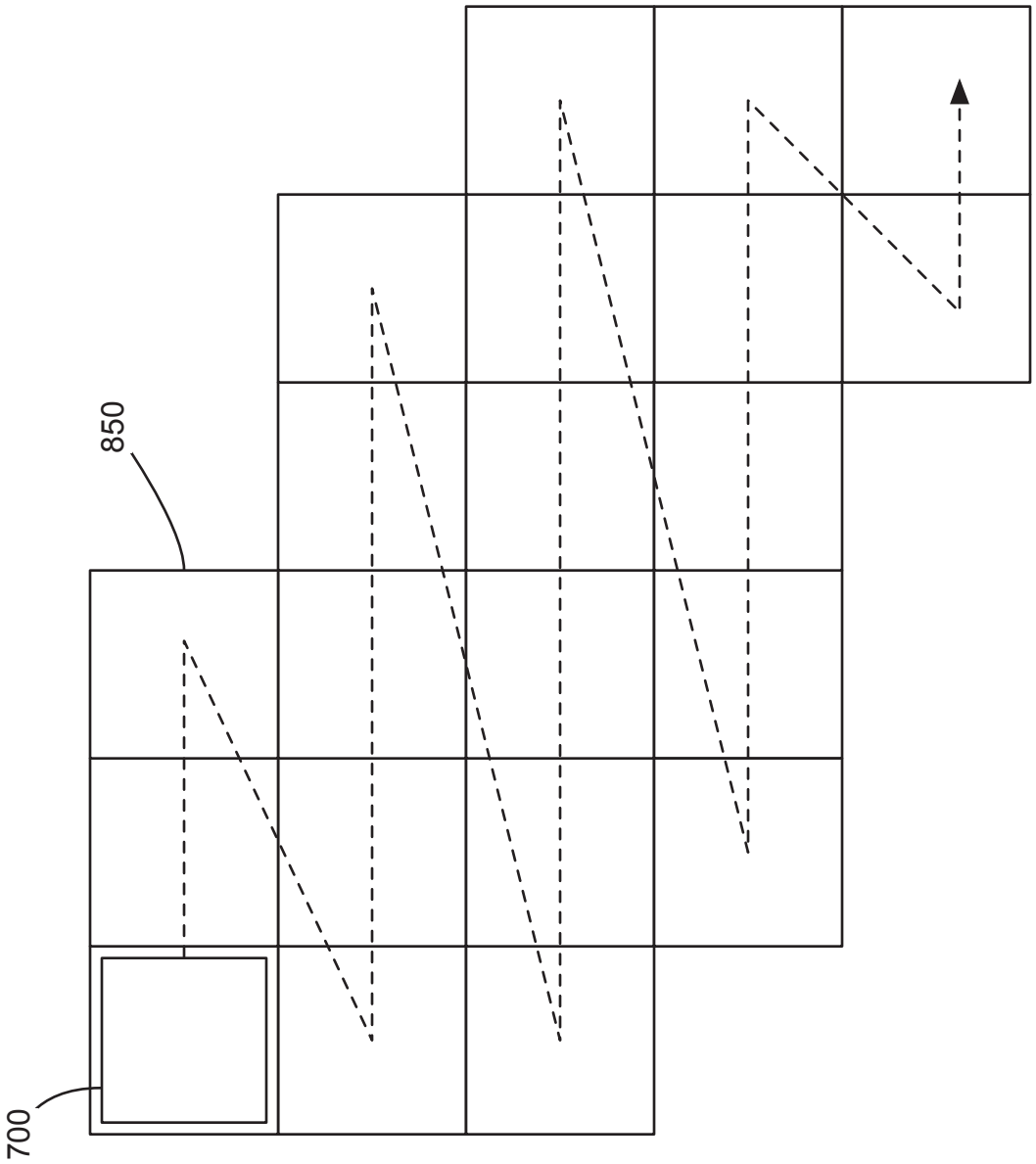



FIG. 9A

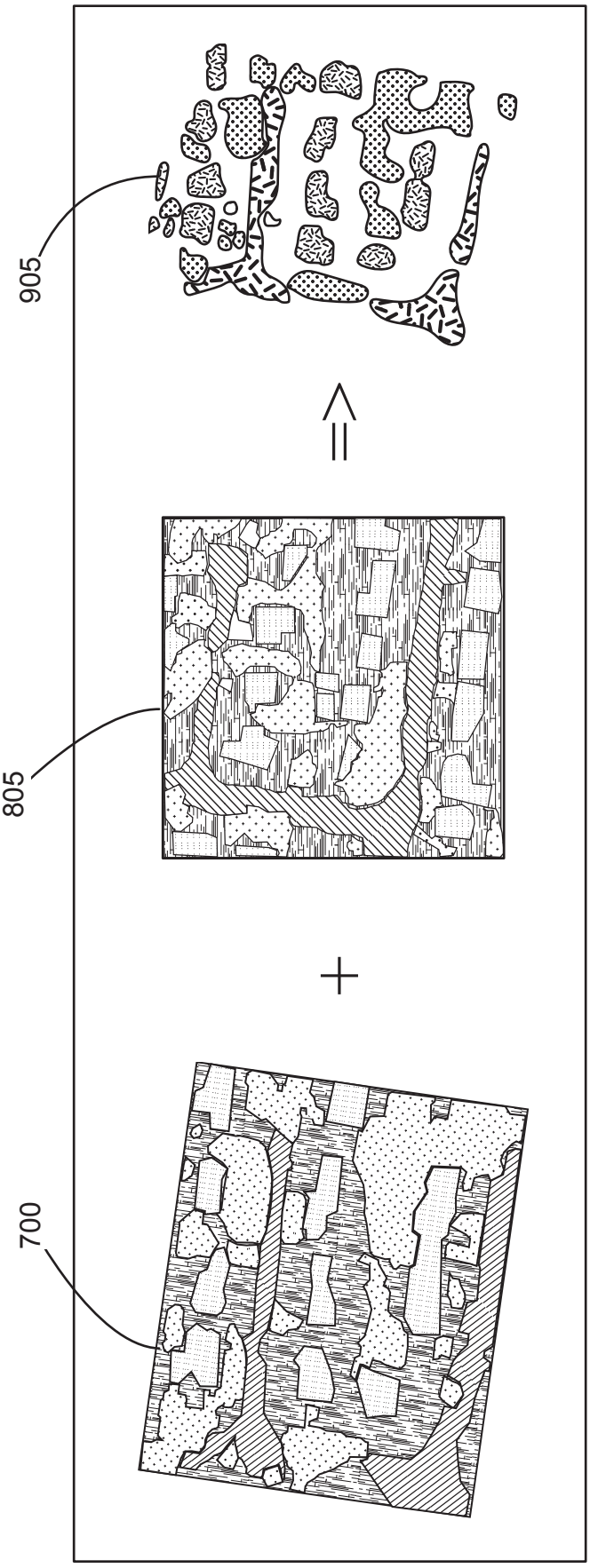



FIG. 9B

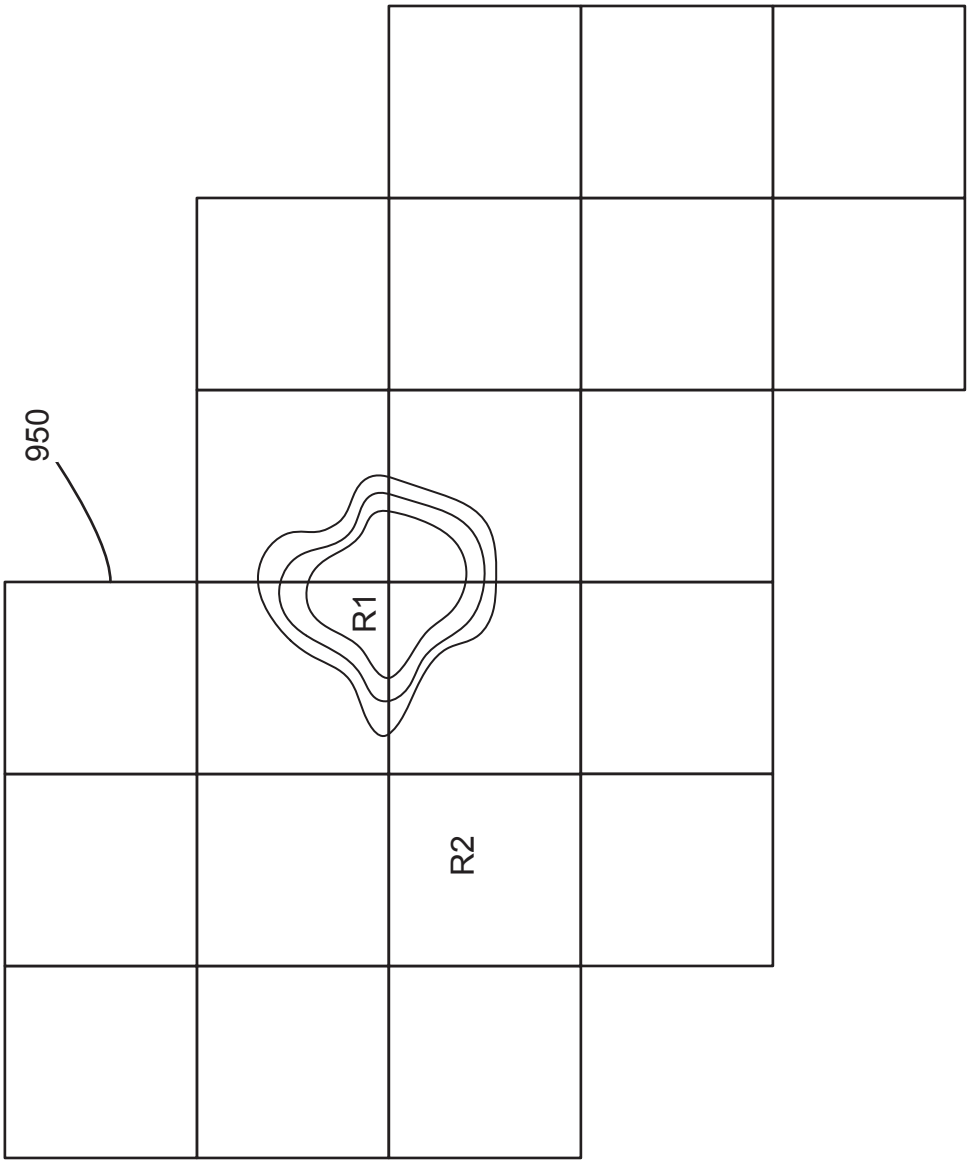



FIG. 9C

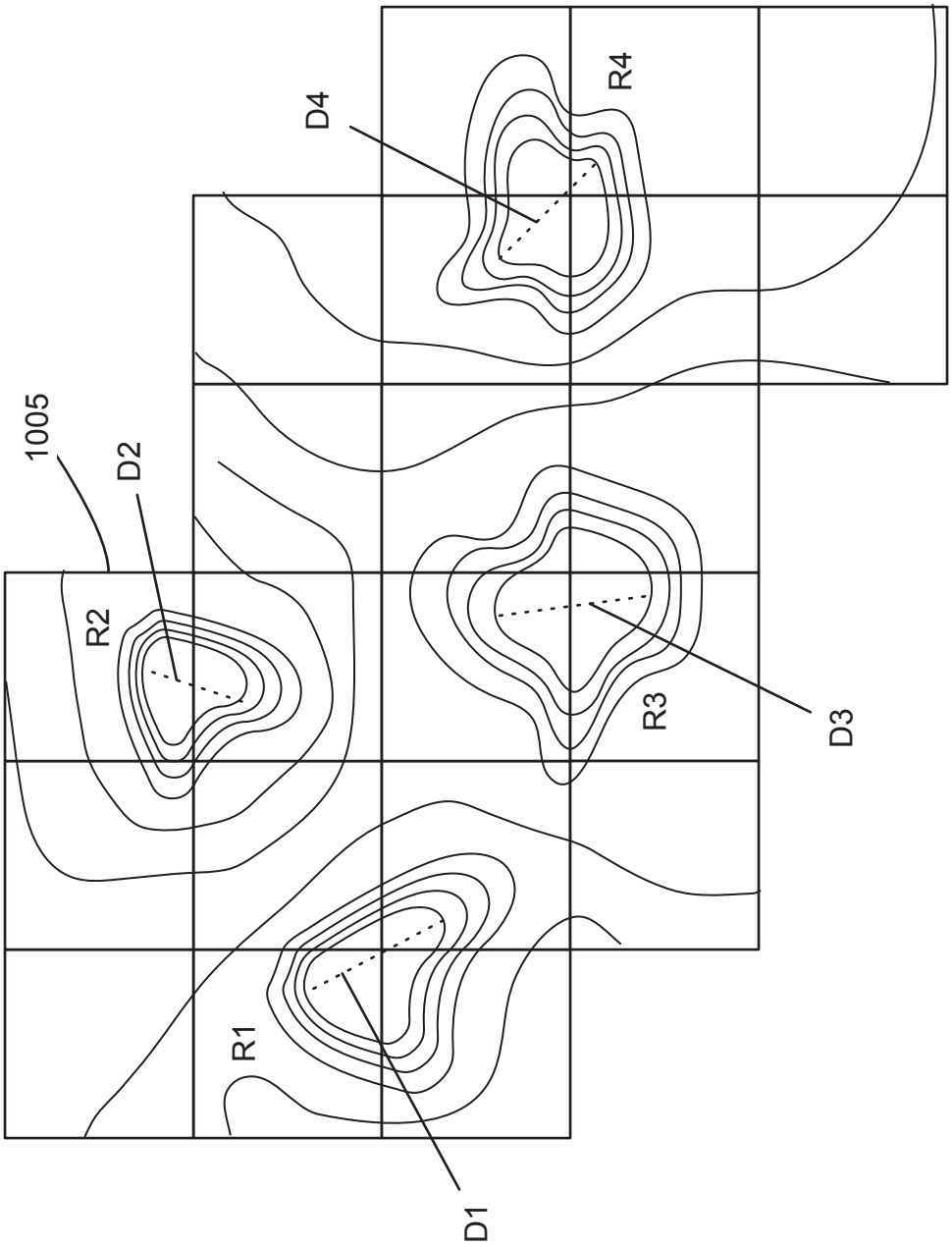



FIG. 10A

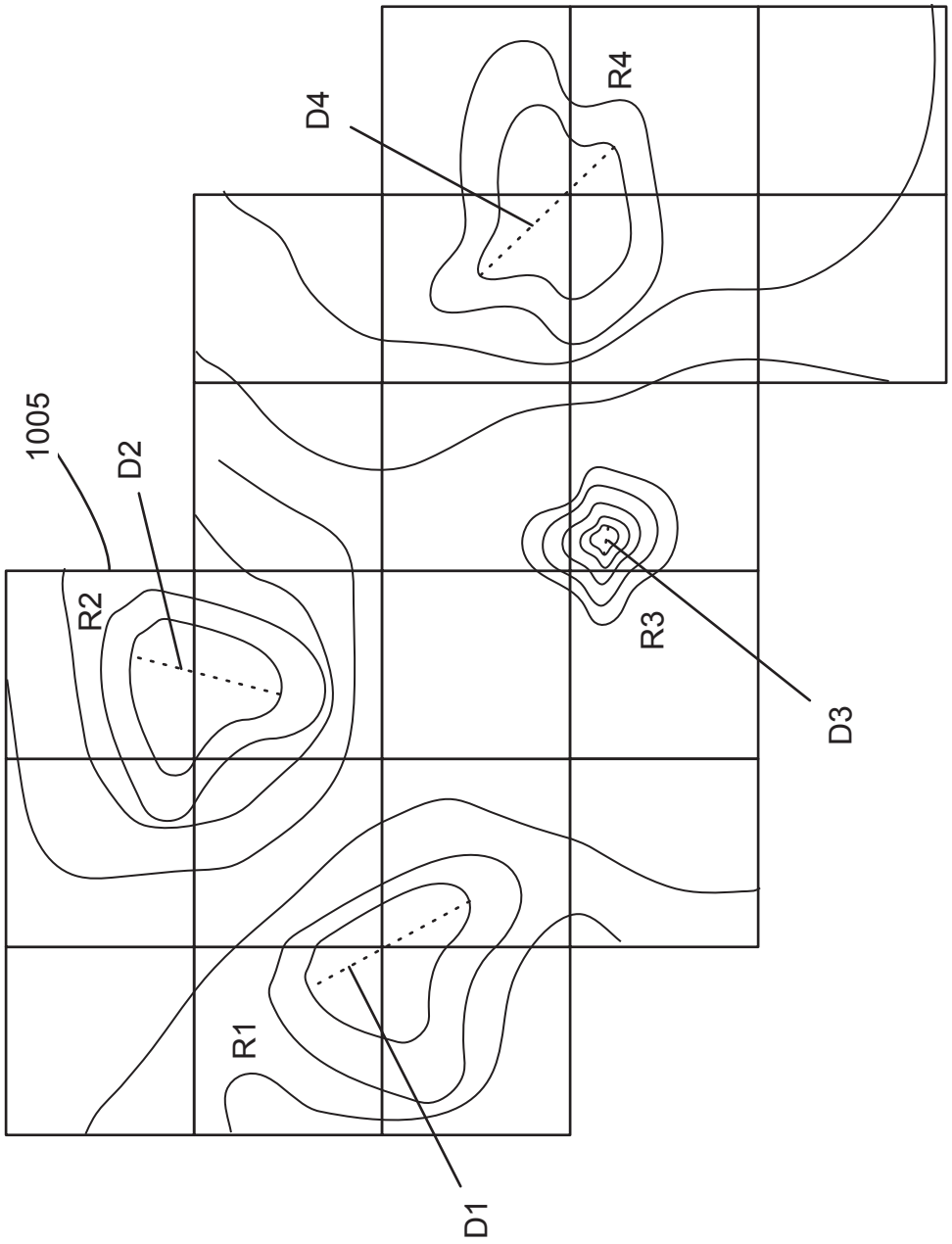



FIG. 10B

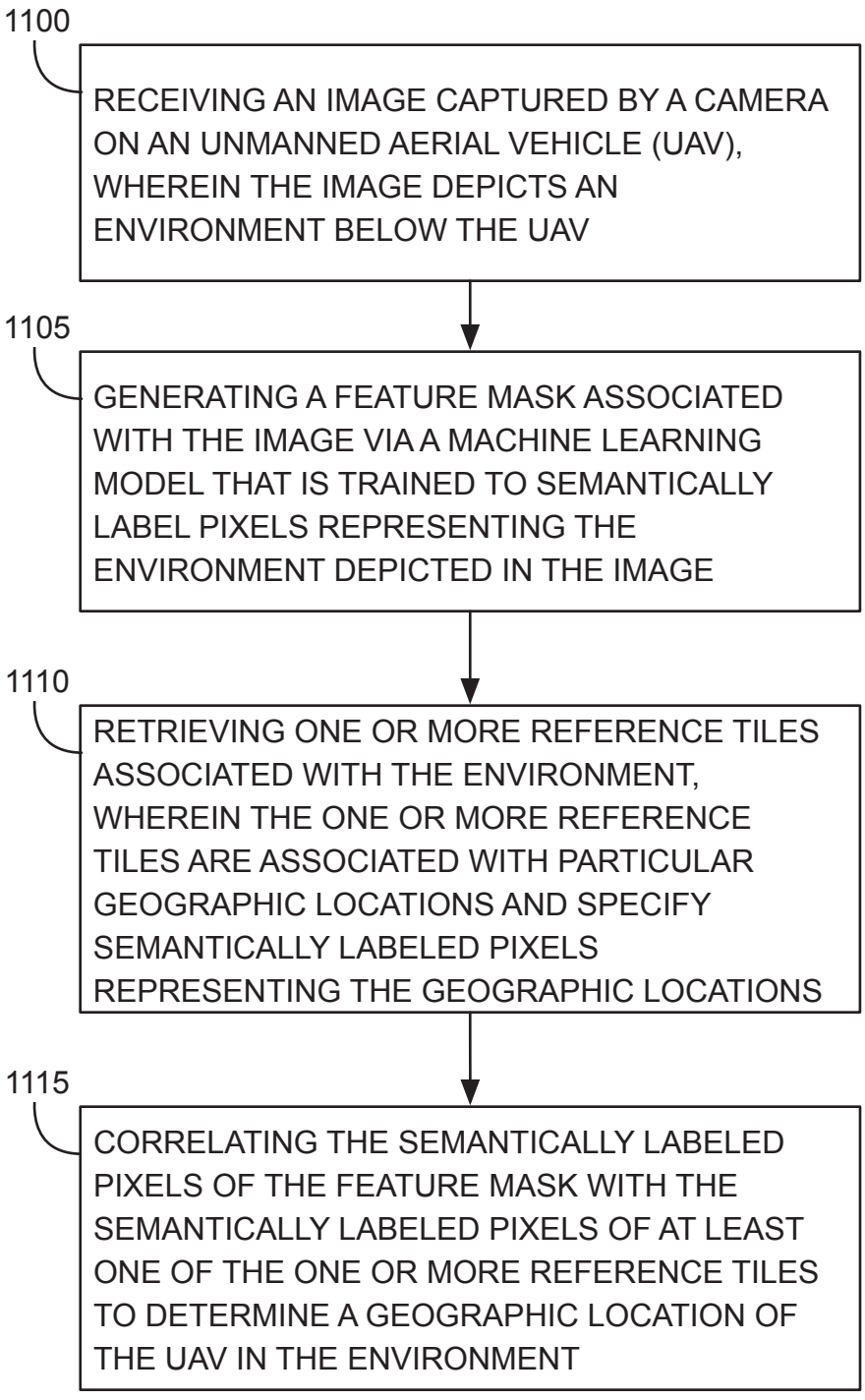

1100
RECEIVING AN IMAGE CAPTURED BY A CAMERA ON AN UNMANNED AERIAL VEHICLE (UAV), WHEREIN THE IMAGE DEPICTS AN ENVIRONMENT BELOW THE UAV
1105
GENERATING A FEATURE MASK ASSOCIATED WITH THE IMAGE VIA A MACHINE LEARNING MODEL THAT IS TRAINED TO SEMANTICALLY LABEL PIXELS REPRESENTING THE ENVIRONMENT DEPICTED IN THE IMAGE
1110
RETRIEVING ONE OR MORE REFERENCE TILES ASSOCIATED WITH THE ENVIRONMENT, WHEREIN THE ONE OR MORE REFERENCE TILES ARE ASSOCIATED WITH PARTICULAR GEOGRAPHIC LOCATIONS AND SPECIFY SEMANTICALLY LABELED PIXELS REPRESENTING THE GEOGRAPHIC LOCATIONS
1115
CORRELATING THE SEMANTICALLY LABELED PIXELS OF THE FEATURE MASK WITH THE SEMANTICALLY LABELED PIXELS OF AT LEAST ONE OF THE ONE OR MORE REFERENCE TILES TO DETERMINE A GEOGRAPHIC LOCATION OF THE UAV IN THE ENVIRONMENT

FIG. 11