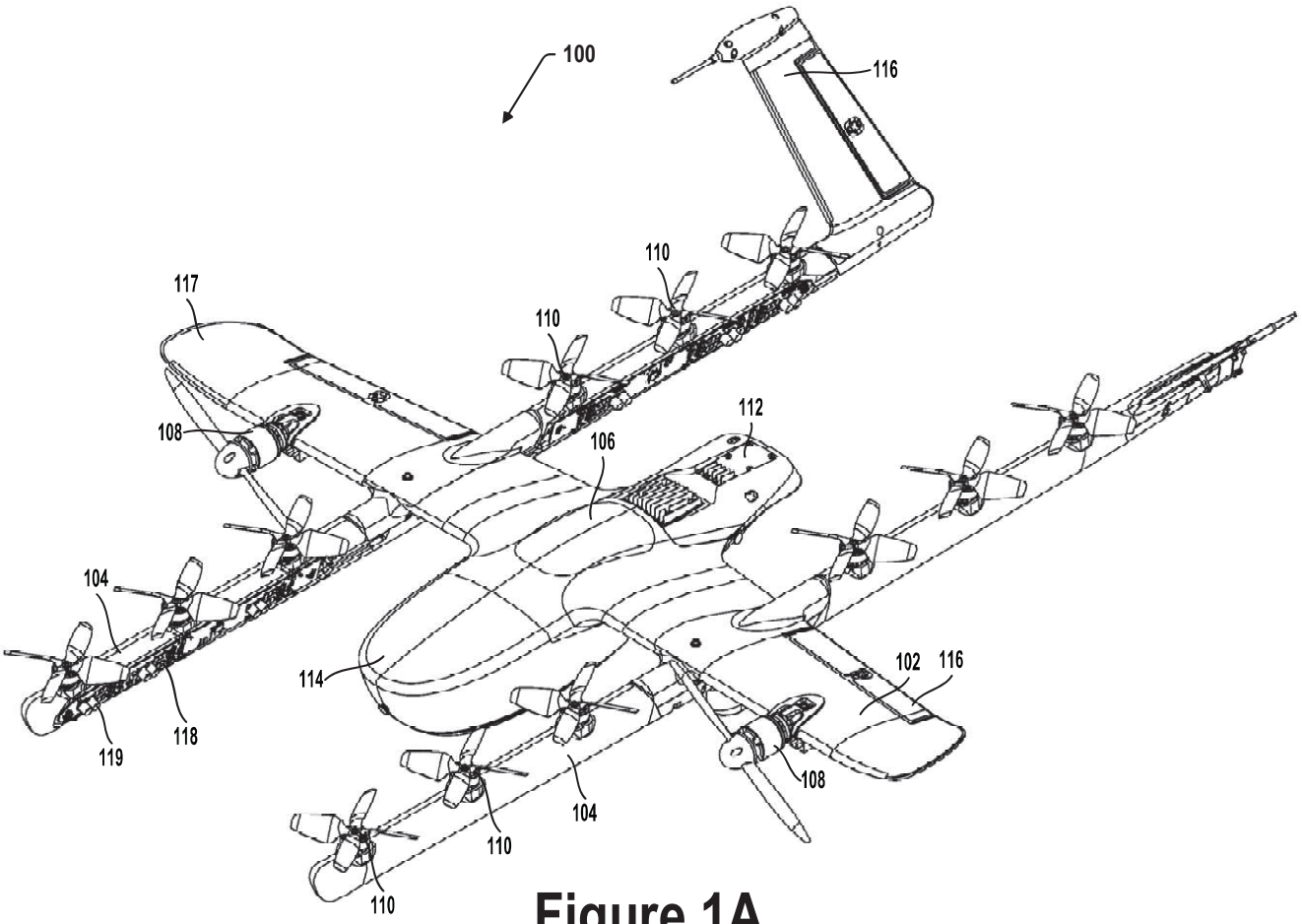

100
116
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Figure 1A

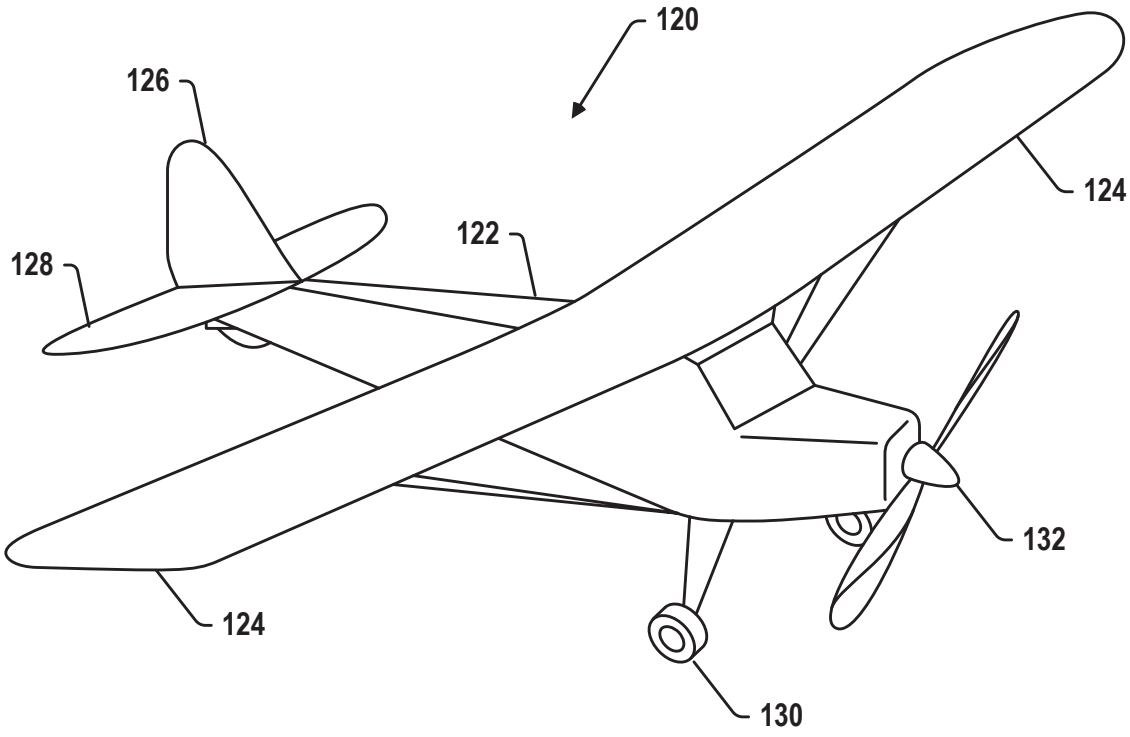


Figure 1B

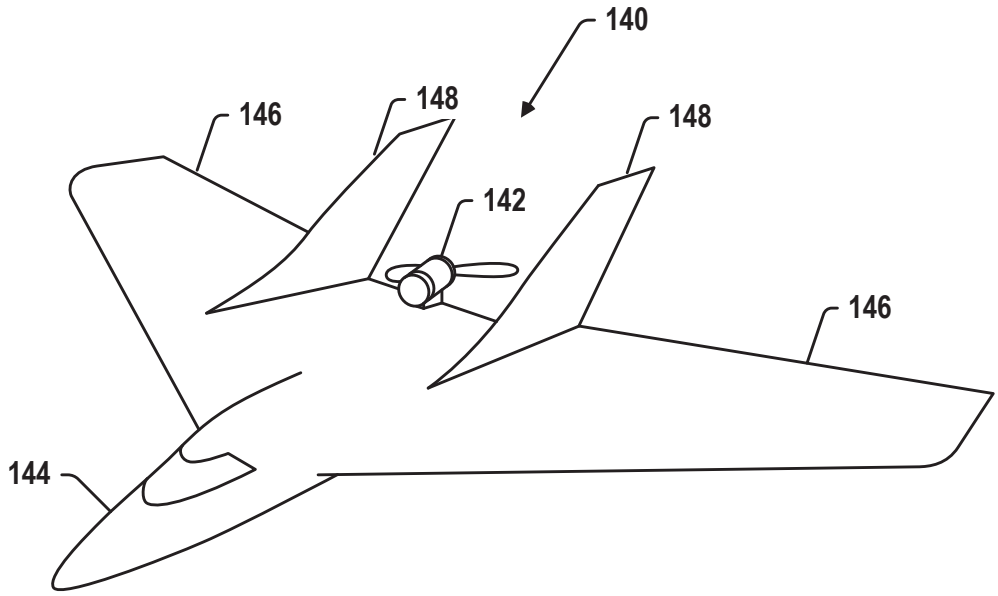


Figure 1C

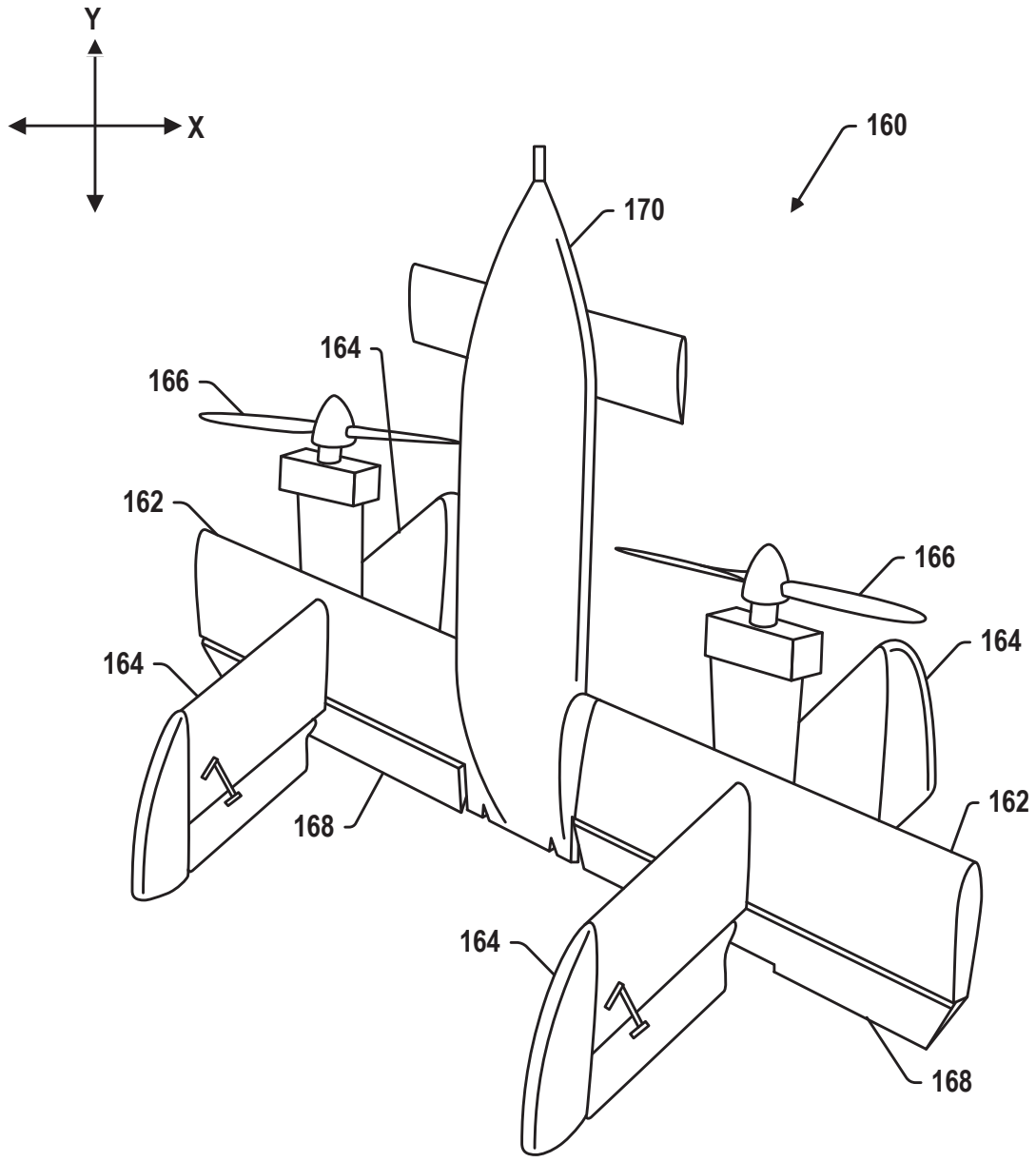


Figure 1D

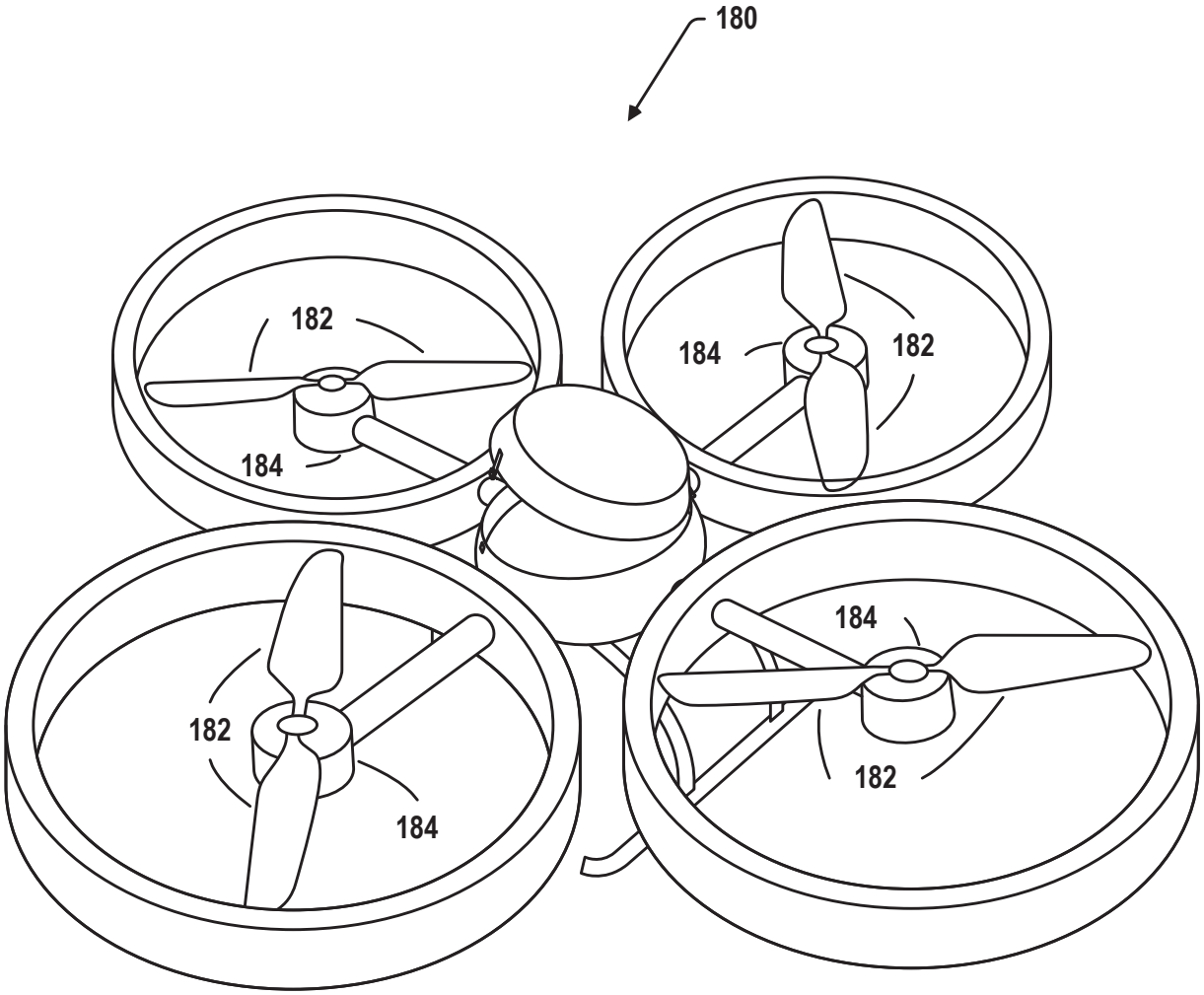


FIG. 1E

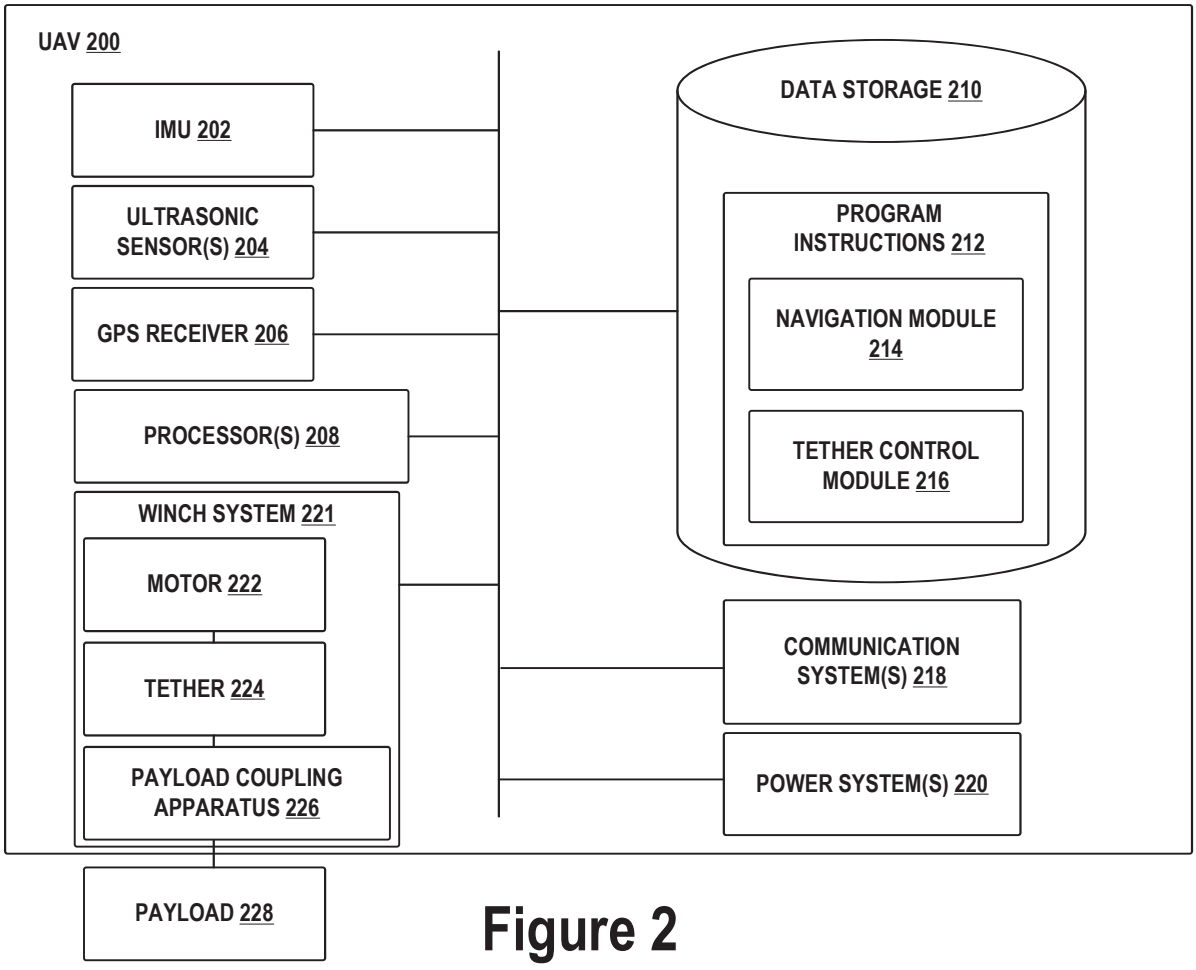

UAV 200
IMU 202
ULTRASONIC SENSOR(S) 204
GPS RECEIVER 206
PROCESSOR(S) 208
WINCH SYSTEM 221
MOTOR 222
TETHER 224
PAYLOAD COUPLING APPARATUS 226
PAYLOAD 228
DATA STORAGE 210
PROGRAM INSTRUCTIONS 212
NAVIGATION MODULE 214
TETHER CONTROL MODULE 216
COMMUNICATION SYSTEM(S) 218
POWER SYSTEM(S) 220

Figure 2

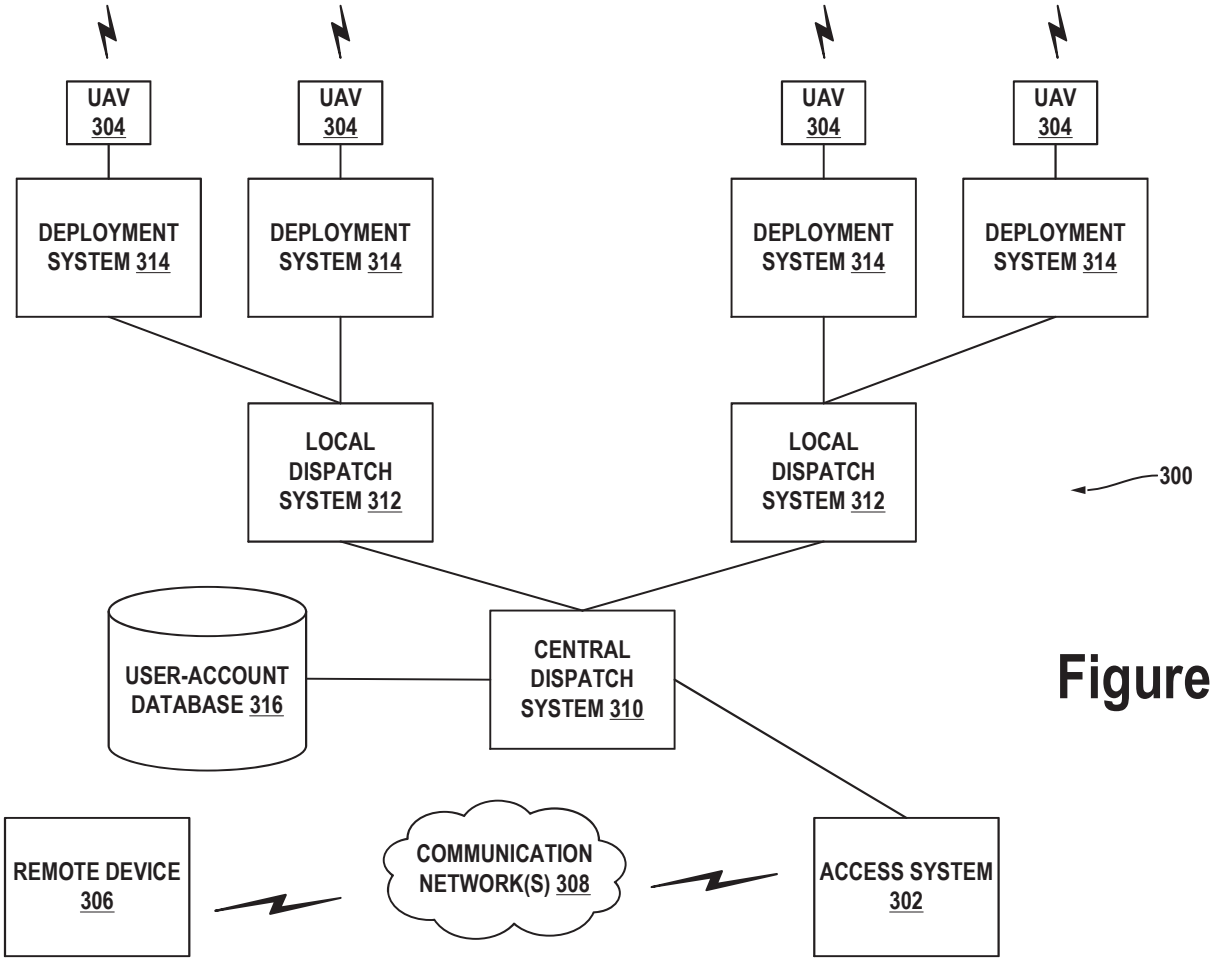

UAV 304
UAV 304
UAV 304
UAV 304
DEPLOYMENT SYSTEM 314
DEPLOYMENT SYSTEM 314
DEPLOYMENT SYSTEM 314
DEPLOYMENT SYSTEM 314
LOCAL DISPATCH SYSTEM 312
LOCAL DISPATCH SYSTEM 312
300
USER-ACCOUNT DATABASE 316
CENTRAL DISPATCH SYSTEM 310
REMOTE DEVICE 306
COMMUNICATION NETWORK(S) 308
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Figure 3

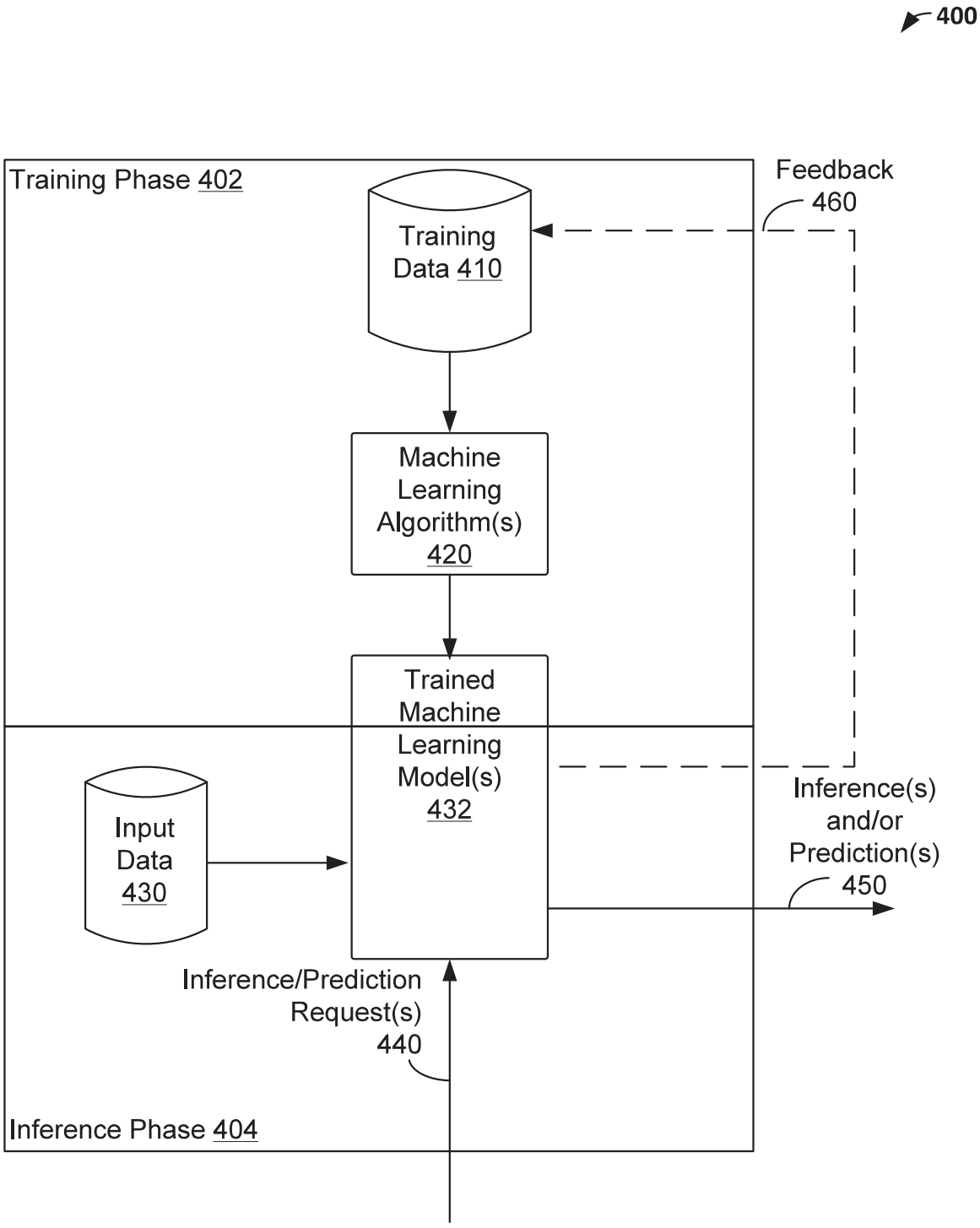

400
Training Phase 402
Training Data 410
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Machine Learning Algorithm(s) 420
Trained Machine Learning Model(s) 432
Input Data 430
Inference(s) and/or Prediction(s) 450
Inference/Prediction Request(s) 440
Inference Phase 404

Figure 4

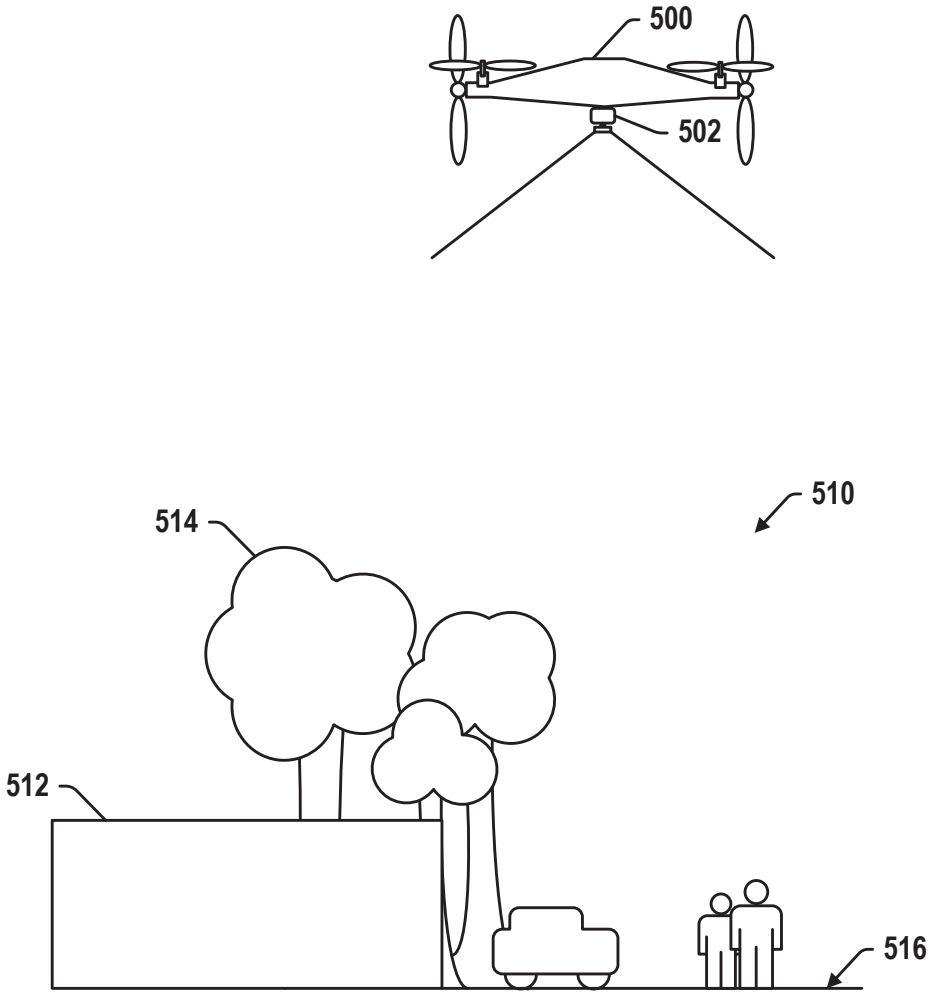


Figure 5

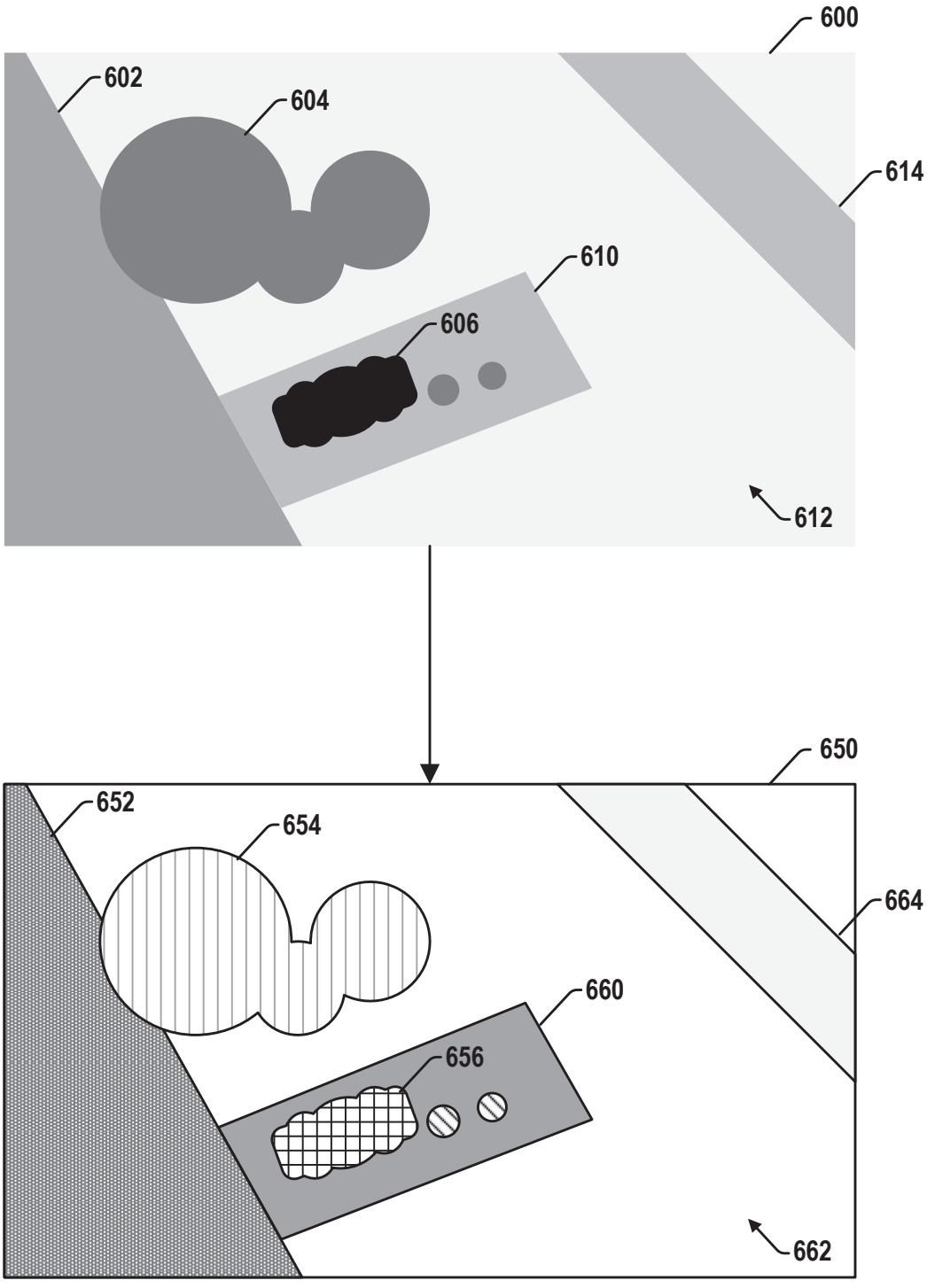


Figure 6

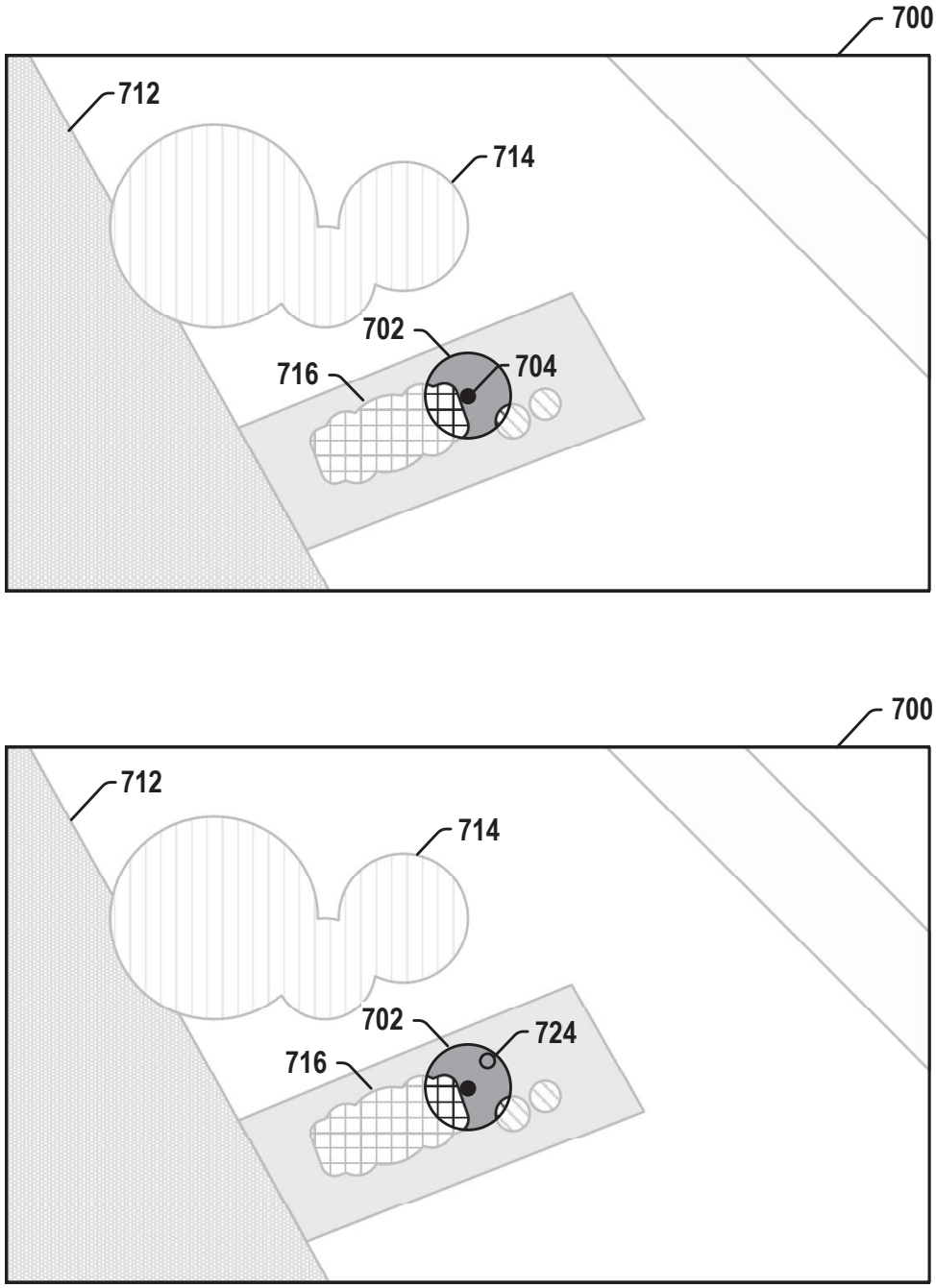


Figure 7

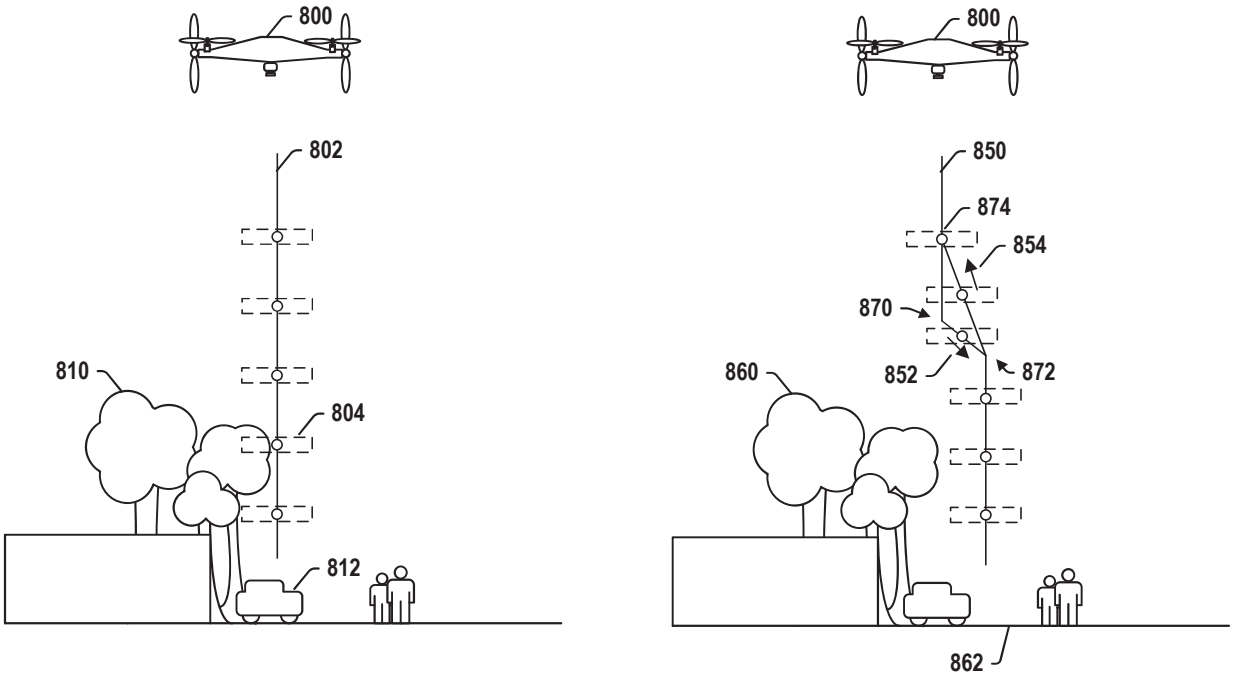


Figure 8

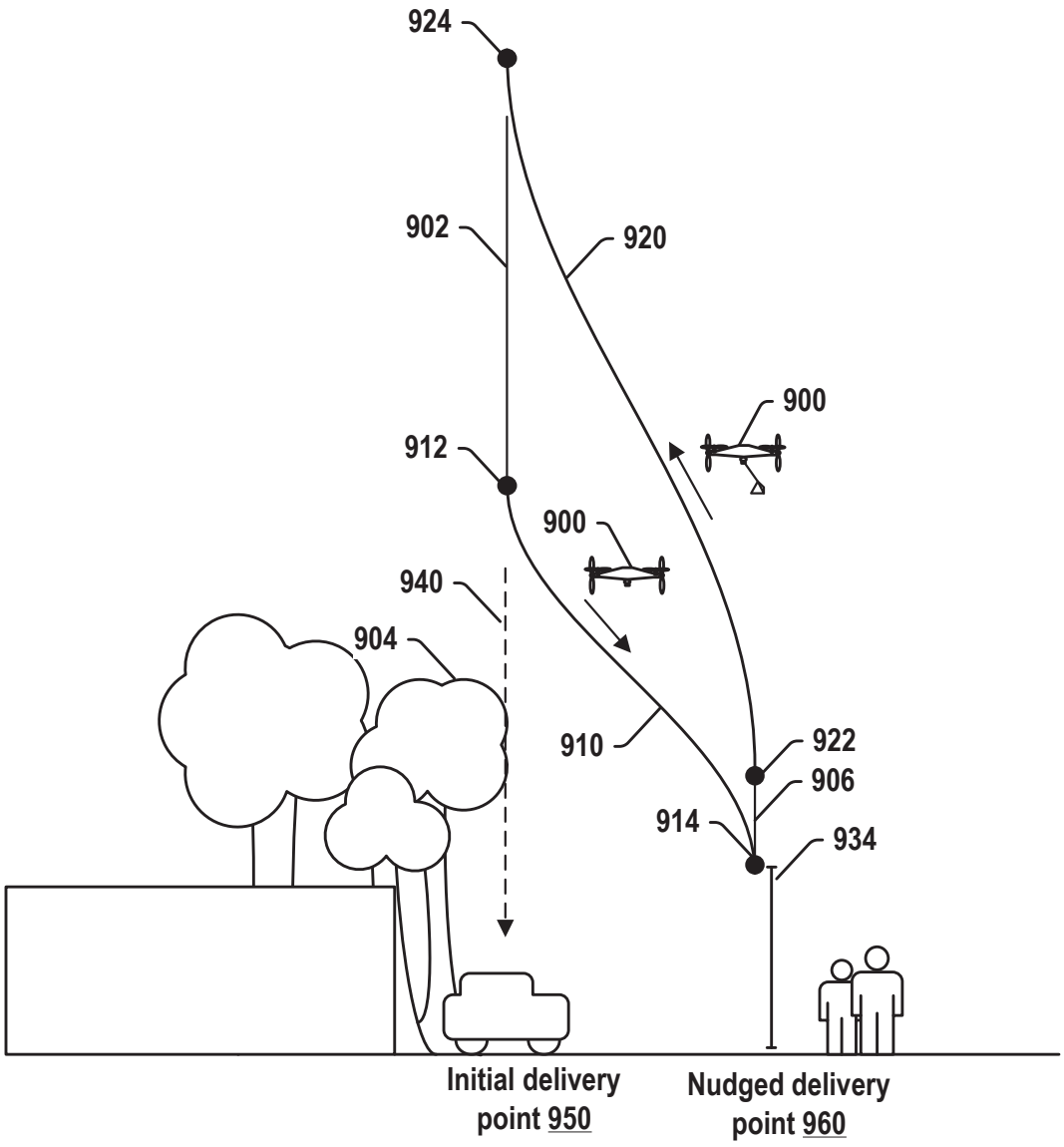
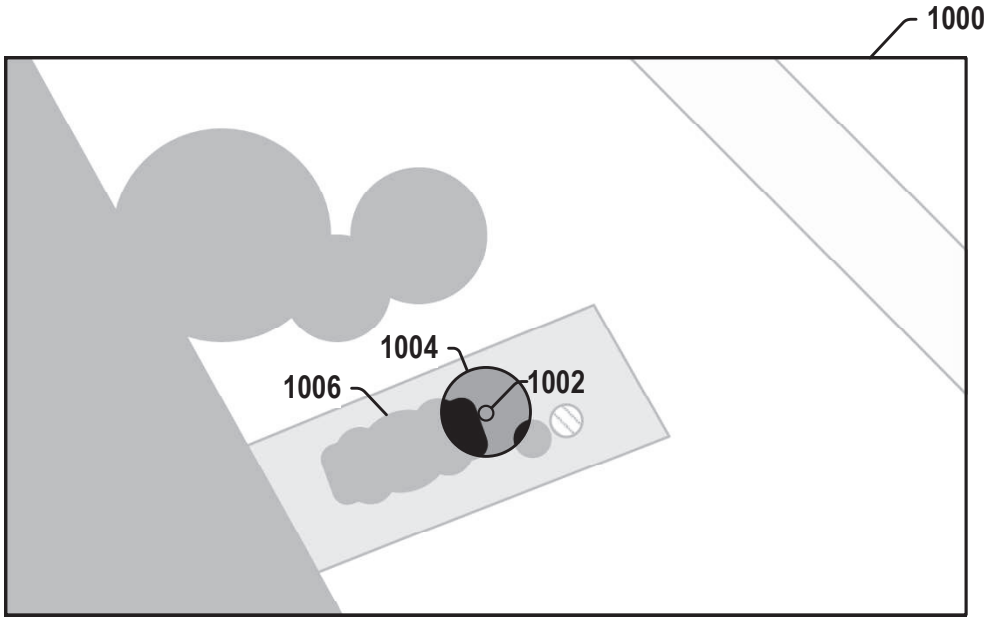

924
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904
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922
906
914
934
Initial delivery point 950
Nudged delivery point 960

Figure 9



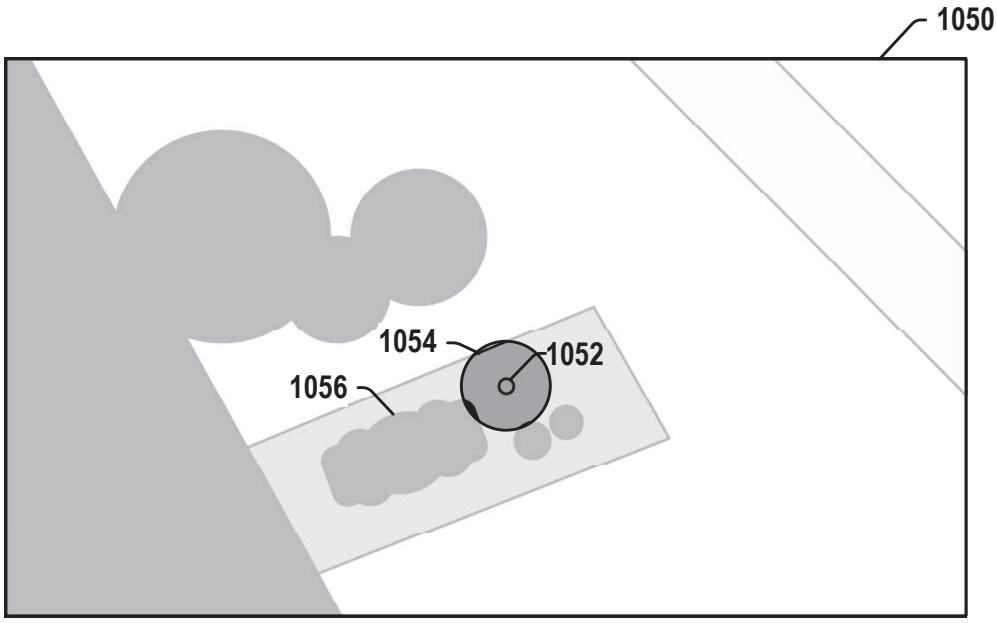


Figure 10

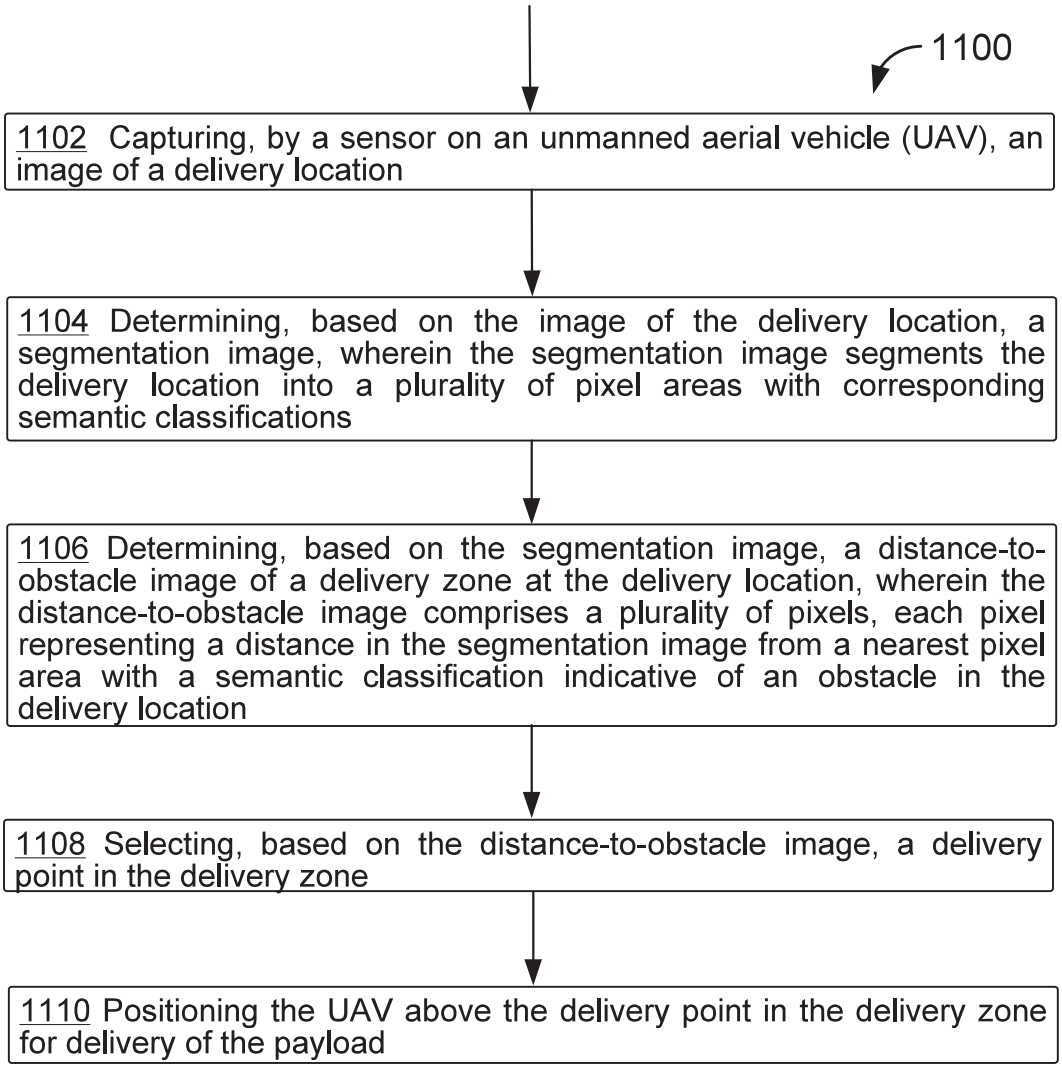

1100
1102 Capturing, by a sensor on an unmanned aerial vehicle (UAV), an image of a delivery location
1104 Determining, based on the image of the delivery location, a segmentation image, wherein the segmentation image segments the delivery location into a plurality of pixel areas with corresponding semantic classifications
1106 Determining, based on the segmentation image, a distance-to-obstacle image of a delivery zone at the delivery location, wherein the distance-to-obstacle image comprises a plurality of pixels, each pixel representing a distance in the segmentation image from a nearest pixel area with a semantic classification indicative of an obstacle in the delivery location
1108 Selecting, based on the distance-to-obstacle image, a delivery point in the delivery zone
1110 Positioning the UAV above the delivery point in the delivery zone for delivery of the payload

Figure 11

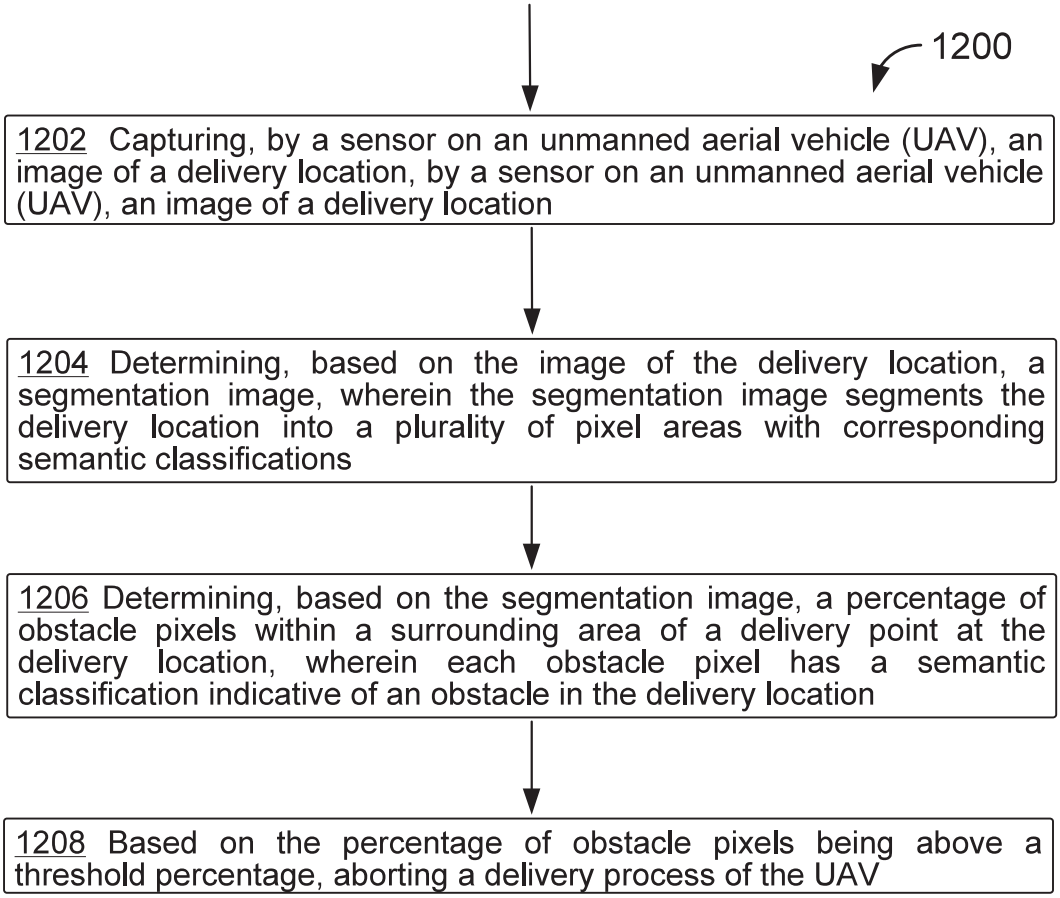

1200
1202 Capturing, by a sensor on an unmanned aerial vehicle (UAV), an image of a delivery location, by a sensor on an unmanned aerial vehicle (UAV), an image of a delivery location
1204 Determining, based on the image of the delivery location, a segmentation image, wherein the segmentation image segments the delivery location into a plurality of pixel areas with corresponding semantic classifications
1206 Determining, based on the segmentation image, a percentage of obstacle pixels within a surrounding area of a delivery point at the delivery location, wherein each obstacle pixel has a semantic classification indicative of an obstacle in the delivery location
1208 Based on the percentage of obstacle pixels being above a threshold percentage, aborting a delivery process of the UAV

Figure 12

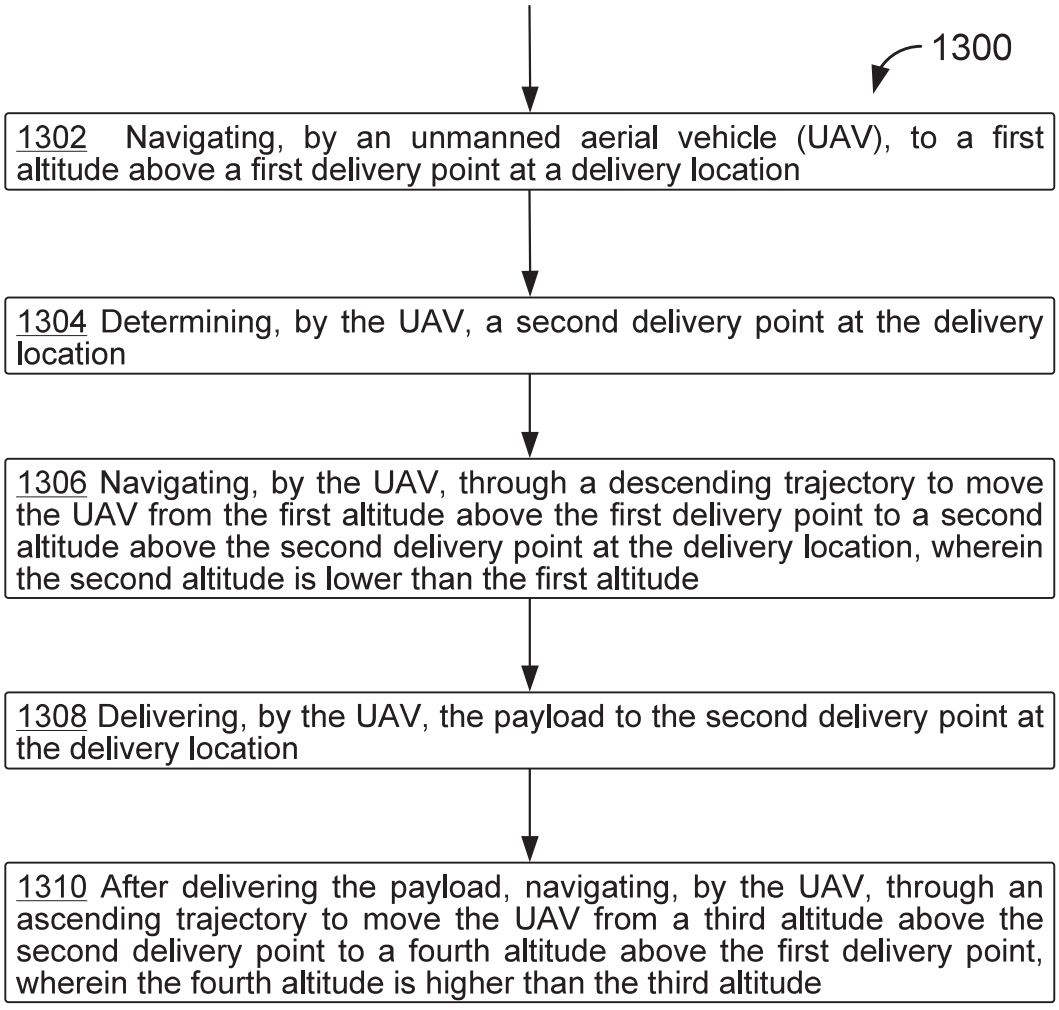

1300
1302 Navigating, by an unmanned aerial vehicle (UAV), to a first altitude above a first delivery point at a delivery location
1304 Determining, by the UAV, a second delivery point at the delivery location
1306 Navigating, by the UAV, through a descending trajectory to move the UAV from the first altitude above the first delivery point to a second altitude above the second delivery point at the delivery location, wherein the second altitude is lower than the first altitude
1308 Delivering, by the UAV, the payload to the second delivery point at the delivery location
1310 After delivering the payload, navigating, by the UAV, through an ascending trajectory to move the UAV from a third altitude above the second delivery point to a fourth altitude above the first delivery point, wherein the fourth altitude is higher than the third altitude

Figure 13

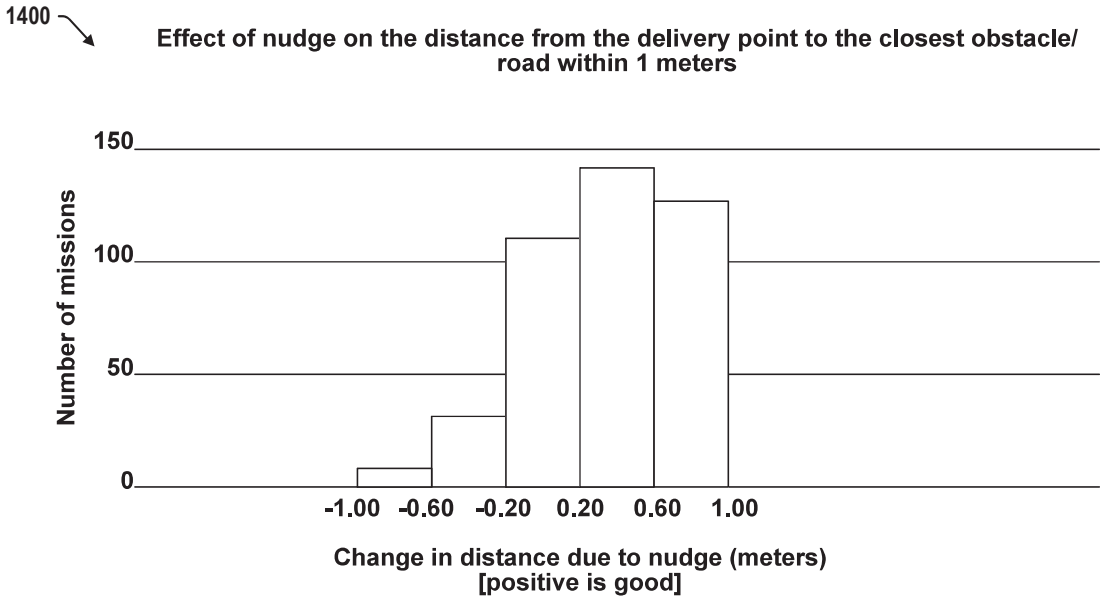

1400
Effect of nudge on the distance from the delivery point to the closest obstacle/ road within 1 meters
150
100
50
0
Number of missions
-1.00
-0.60
-0.20
0.20
0.60
1.00
Change in distance due to nudge (meters) [positive is good]

Figure 14