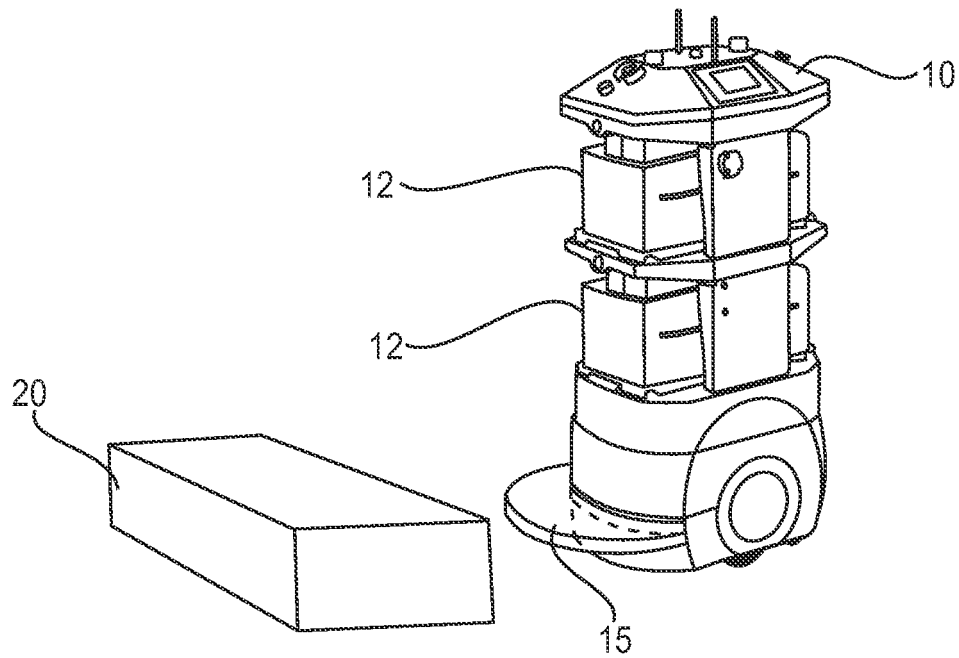
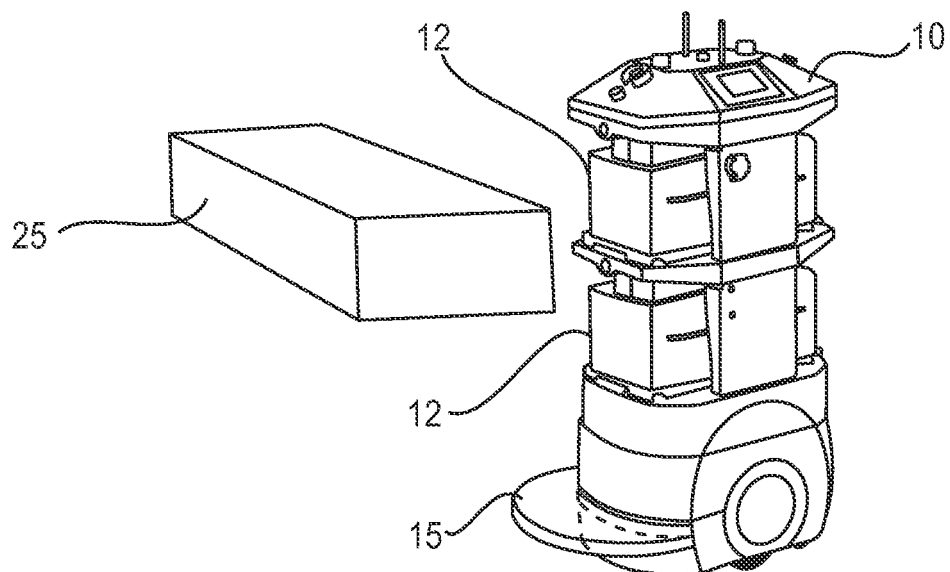


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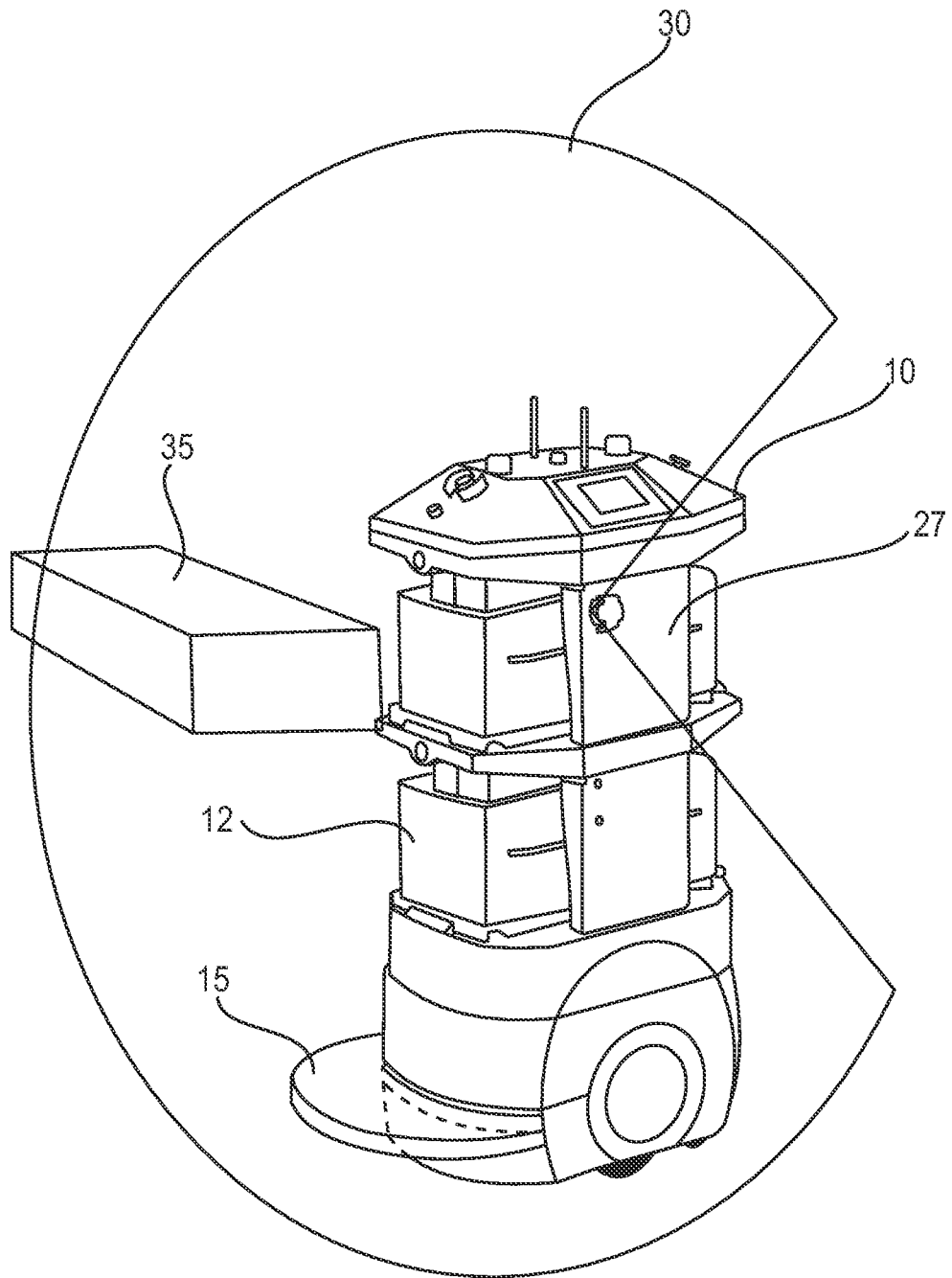


**FIG. 1A**



**FIG. 1B**

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**FIG. 2**

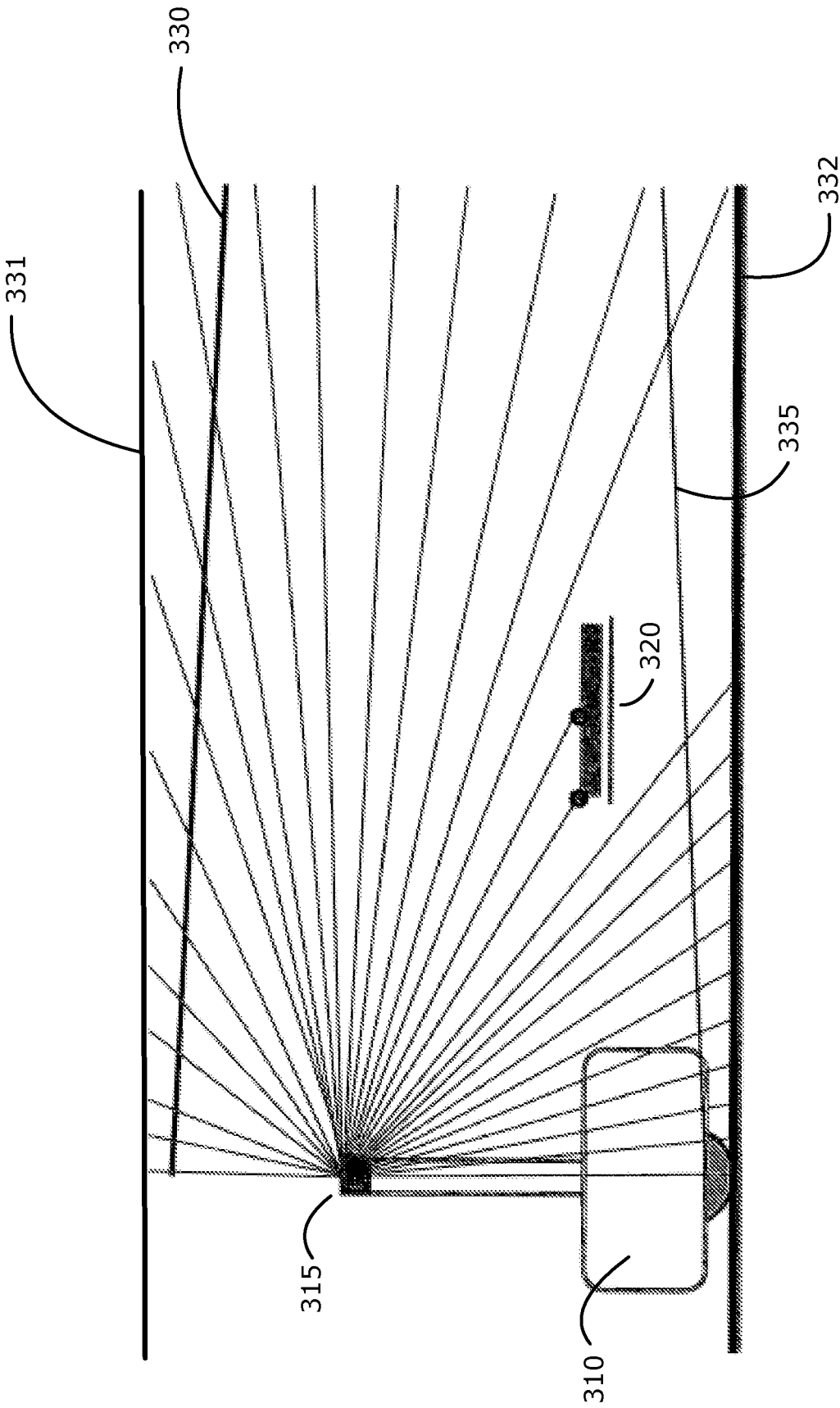
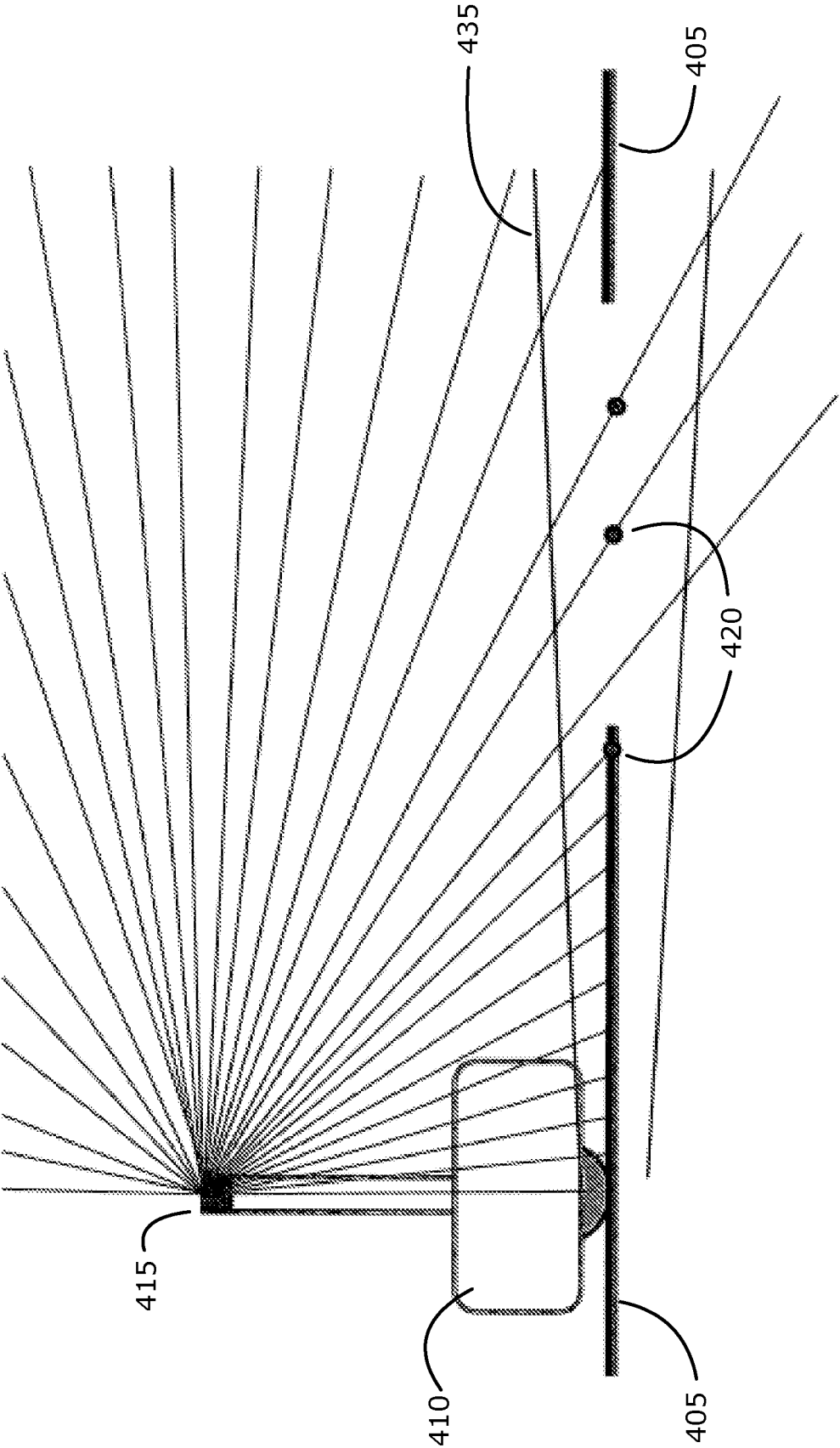


FIG. 3



**FIG. 4**

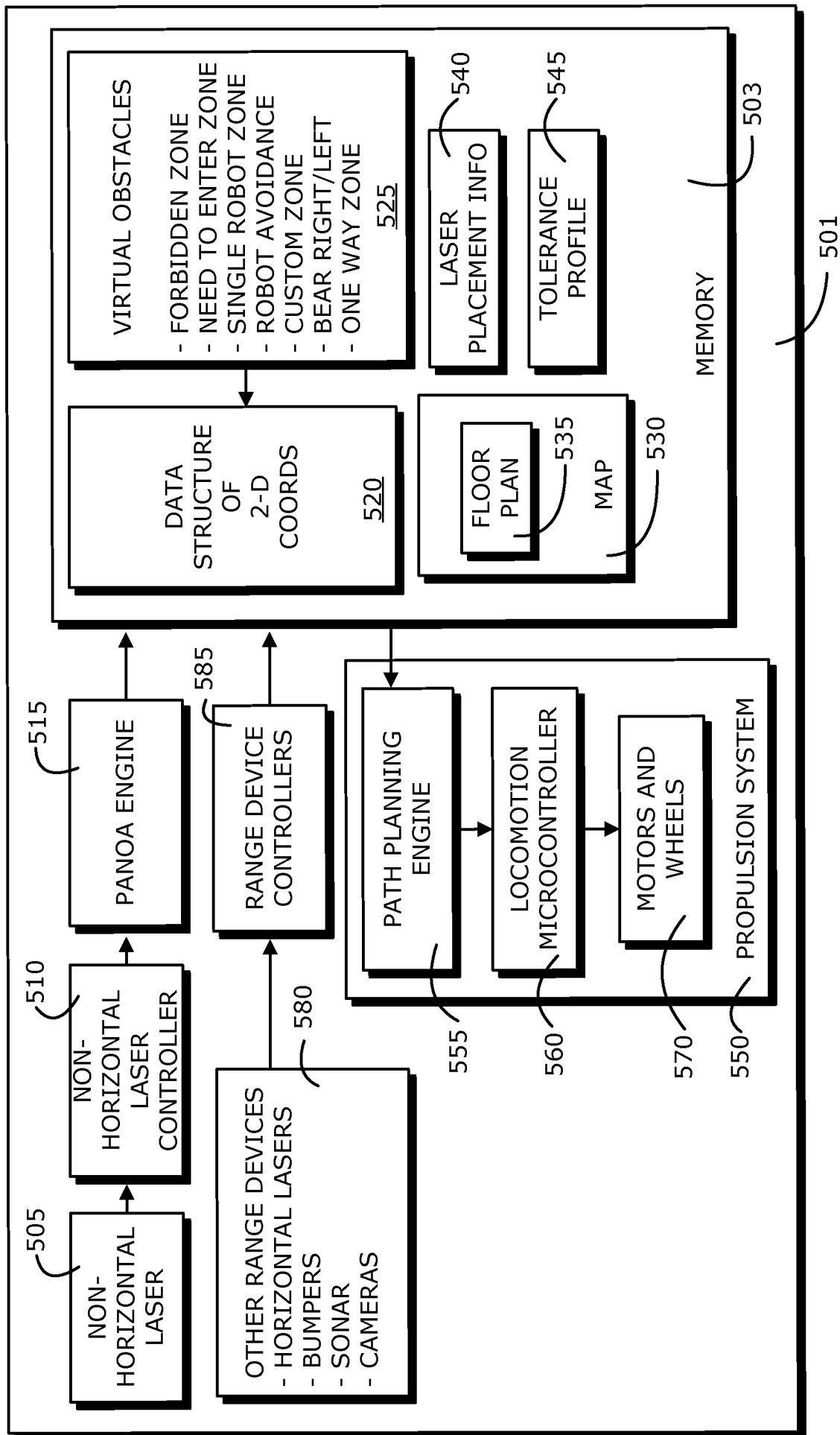


FIG. 5

```

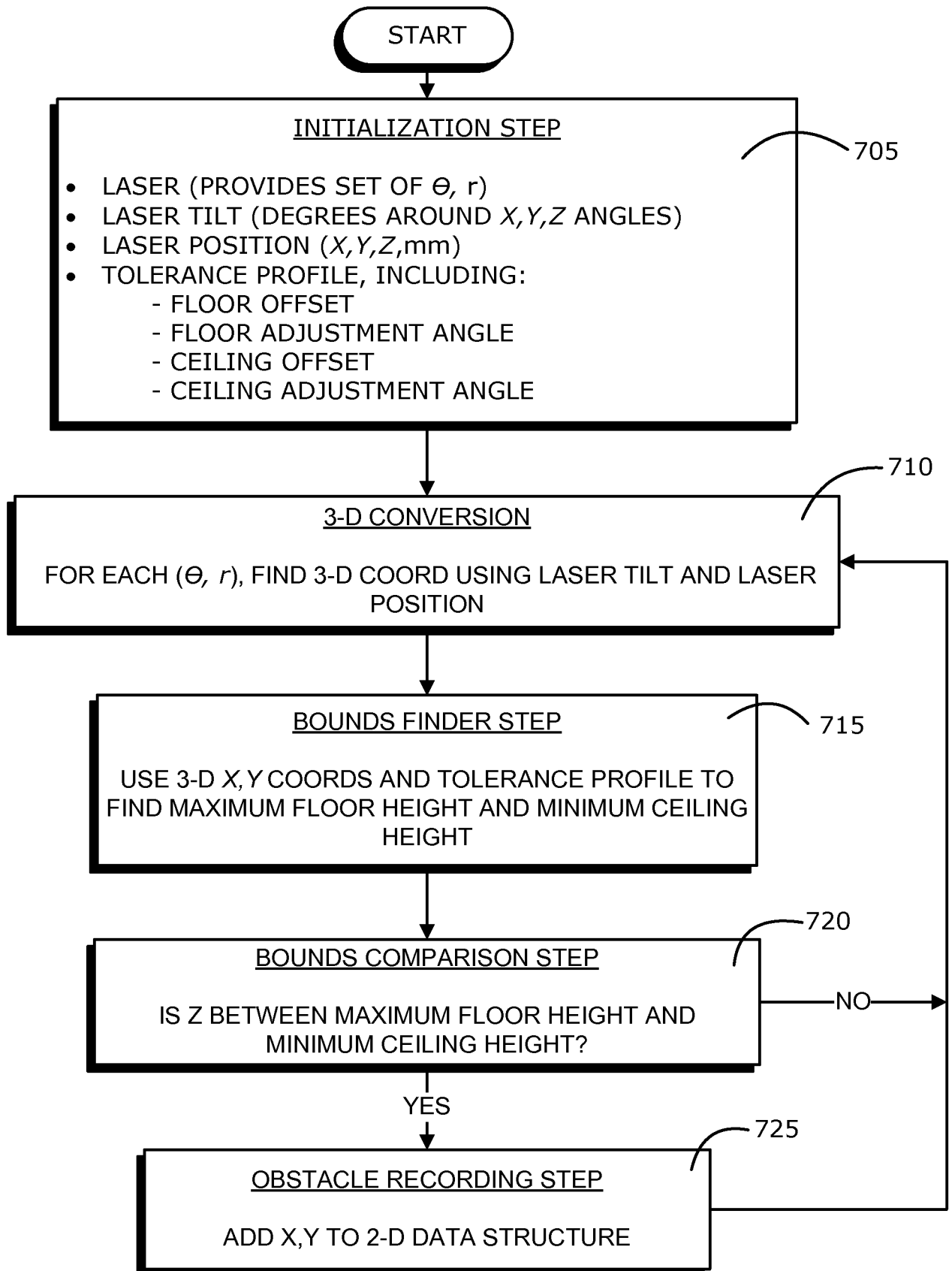
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-9467 19366 -9561 19369 -9678 19389 -9785 19400 -9897 19427
-10001 19416 -10121 19423 -10232 19438 -10339 19452 -10446
19501 -10537 19272 -10742 19217 -10873 19235 -10973 19261 -11070
19353 -11143 19566 -11173 19590 -11272 19624 -11368 20378
-11227 20421 -11327 18800 -12041 18807 -12136 18881 -12212
19214 -12218 19153 -12628 19106 -12736 18873 -12883 18901 -12971
18969 -13051 19831 -12982 20155 -13025 20567 -13059 20555
-13168 20591 -13270 20587 -13378 20602 -13483 20605 -13589
20618 -13694 20620 -13800 20611 -13907 20641 -14011 20651 -14116
20659 -14222 23475 -14404 23471 -14535 23545 -14663 20951
-14958 20792 -15066 20742 -15173 20731 -15279 20749 -15385
20846 -15495 20773 -15599 20199 -15678 20083 -15773 20077 -15874
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-16465 20836 -16571 20853 -16682 20868 -16793 20883 -16905
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13325 -16732 13283 -16763 13202 -16781 13206 -16828 13219
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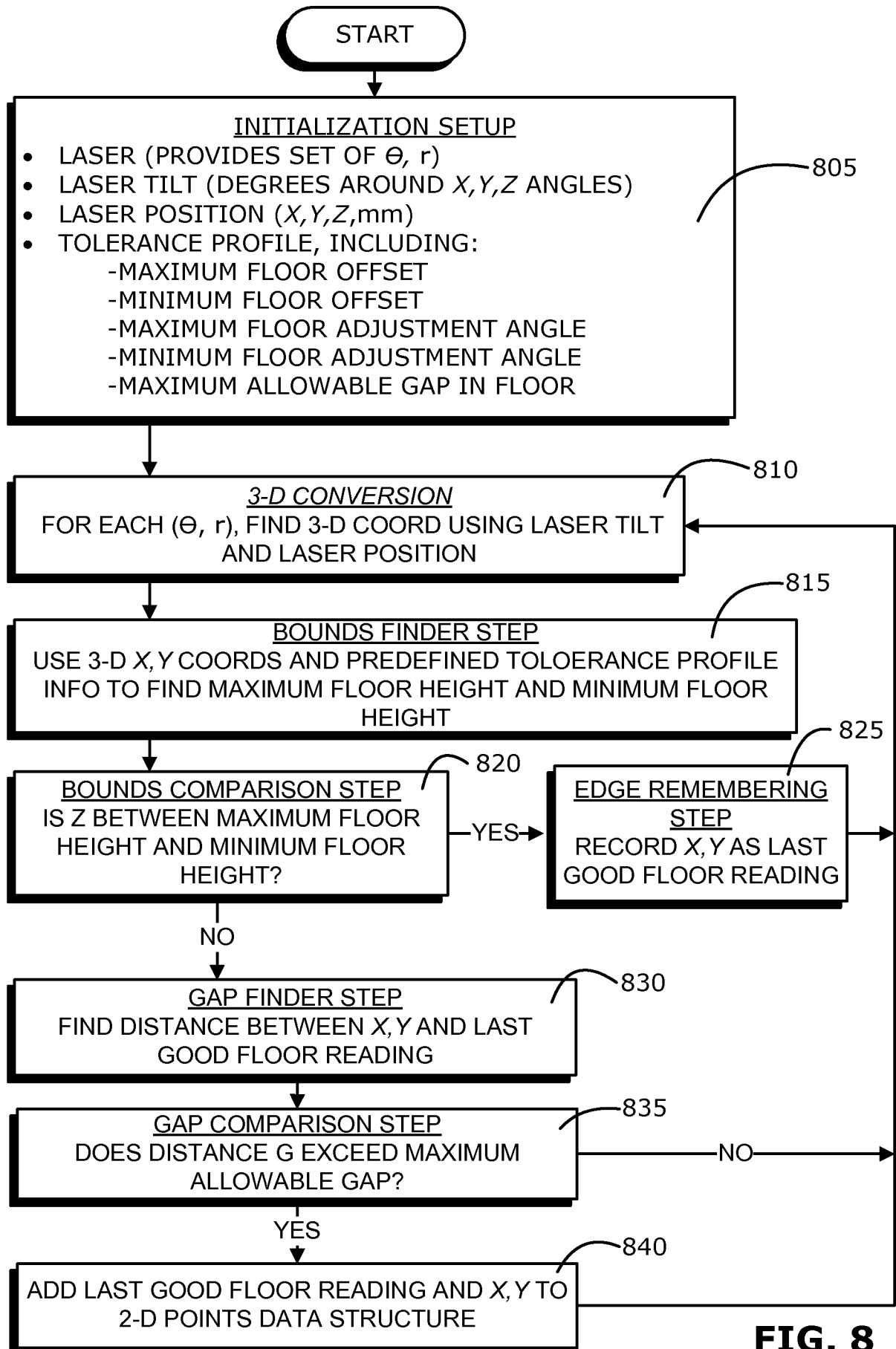
FIG. 6

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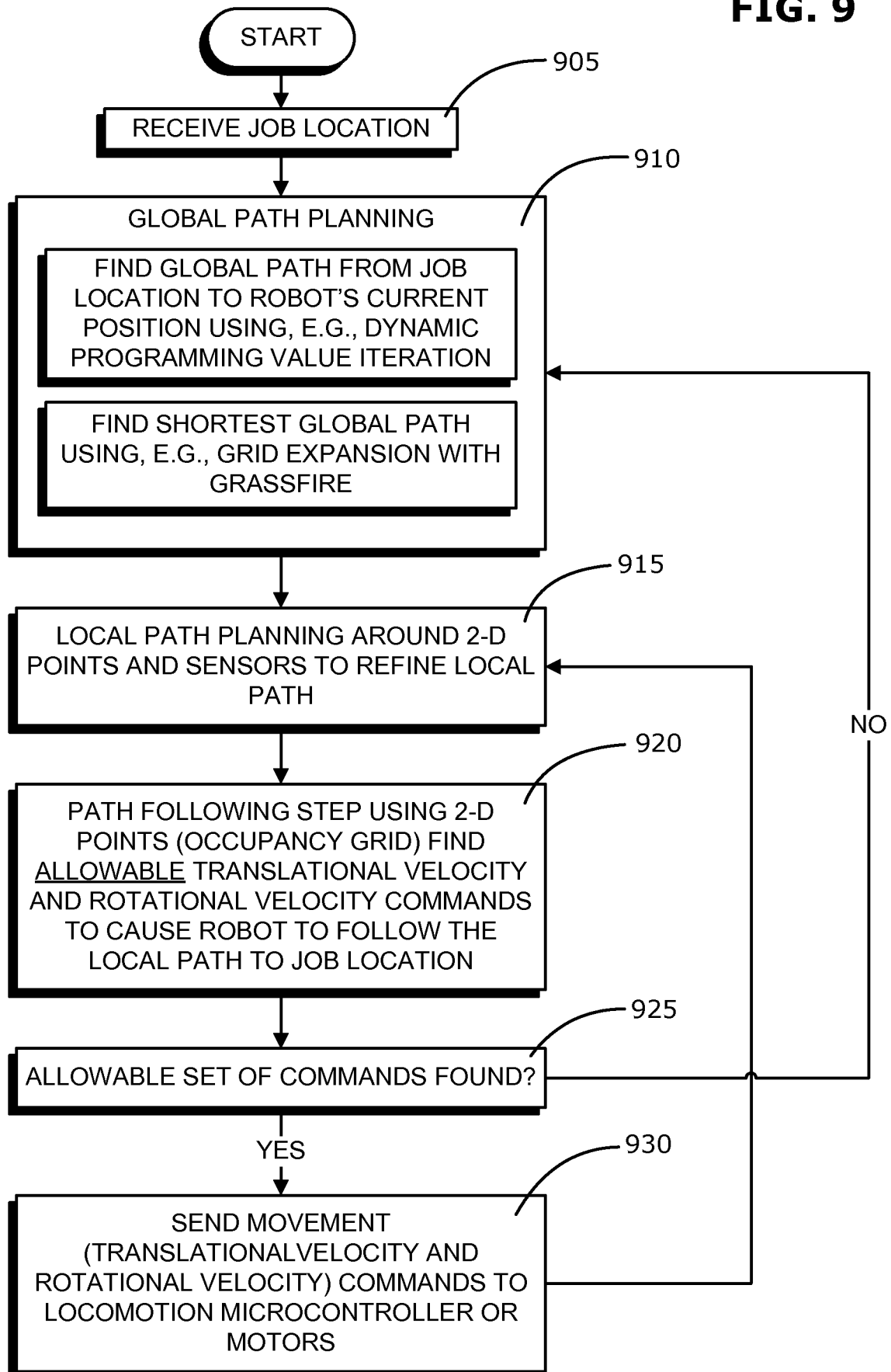
## POSITIVE OBSTACLE AVOIDANCE

**FIG. 7**

## NEGATIVE OBSTACLE AVOIDANCE



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**FIG. 9**

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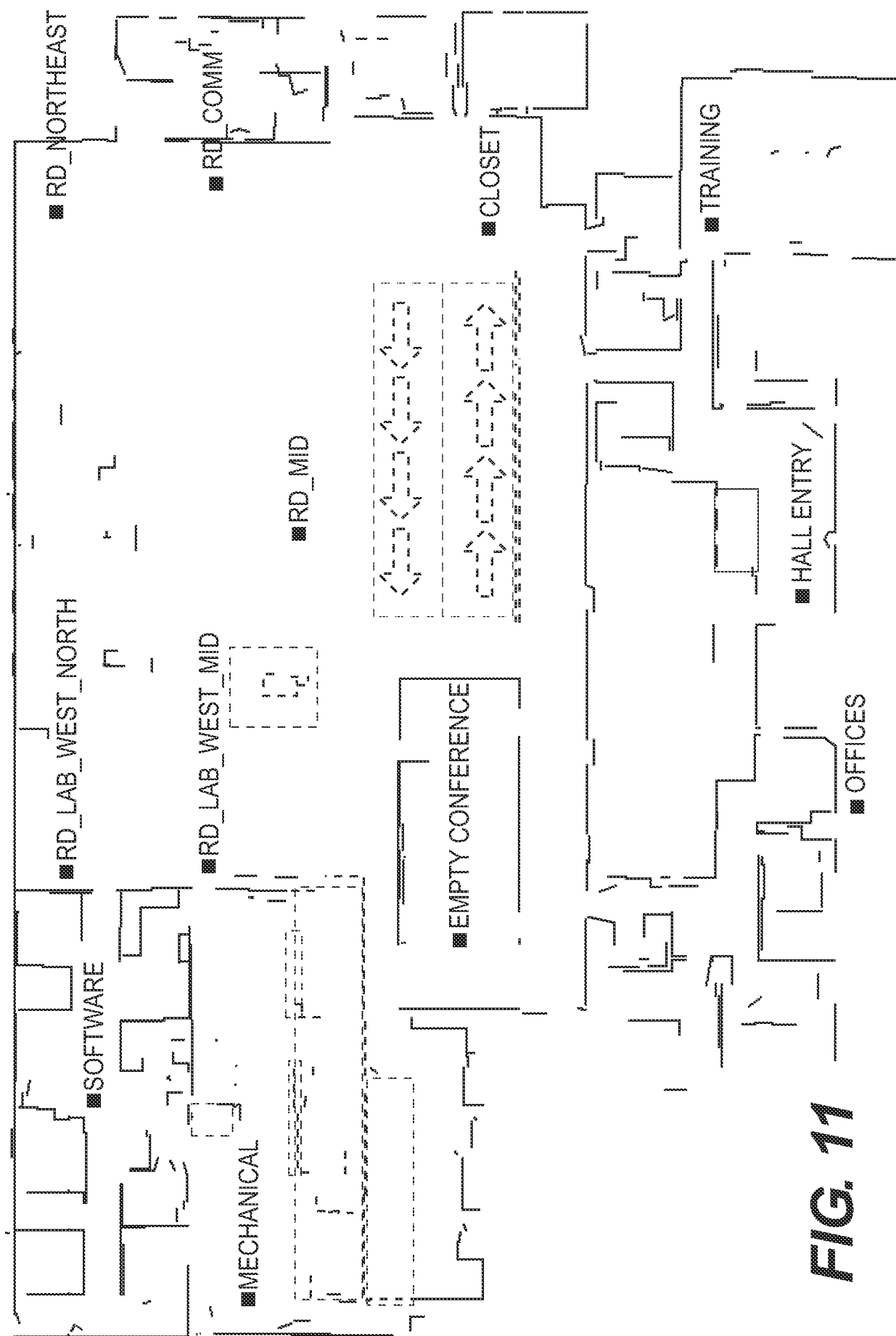
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2D-Map
MapInfo: DockType "Name=Dock" "Label=Dock" "NameRequired=1" "Color3=0xffff00" "Heading=Required"
MapInfo: GoalType "Name=Goal" "Label=Goal" "NameRequired=1" "Color0=0x000000" "Color1=0x00ffff" "Color2=0x000000"
MapInfo: SectorType "Name=ResistedSector" "Label=ResistedSector" "Desc=Area that the robot will try to avoid, but will
drive through if necessary." "NameRequired=1" "Color0=0xf2ea72" "Color1=0xbea4ce" "NameRequired=1"
MapInfo: SectorType "Name=TwoWayDriveOnRightSector" "Label=PreferredDirectionRight" "Desc=Two Way Drive on Right"
"NameRequired=1" "Color0=0xad83b4" "Color1=0x91b899" "Shape=GradTwoWayDriveOnRight" "NameRequired=1"
Cairn: ResistedSector 0 0 0.000000 "" ICON "ResistedSector17" -22940 -14446 -14715 -12754
Cairn: ResistedSector 0 0 0.000000 "" ICON "ResistedSector14" -22794 -12582 -7732 -10205
Cairn: GoalWithHeading -20215 -8485 -87.900000 "" ICON "Mechanical"
Cairn: ResistedSector 0 0 0.000000 "" ICON "ResistedSector18" -18240 -10369 -14050 -9911
Cairn: Goal -13843 -3056 0.000000 "" ICON "Software"
Cairn: ResistedSector 0 0 0.000000 "" ICON "ResistedSector15" -12453 -10401 -9275 -9816
Cairn: ResistedSector 0 0 90.000000 "" ICON "ResistedSector13" -7824 15631 -6354 16802
Cairn: Goal -7126 -16086 0.000000 "" ICON "Empty Conference"
Cairn: Goal -5823 -7570 0.000000 "" ICON "RD Lab West_Mid"
Cairn: GoalWithHeading -5693 -1653 135.145272 "" ICON "RD Lab West_North"
Cairn: GoalWithHeading -3908 -28384 -179.800000 "" ICON "Offices"
Cairn: ResistedSector 0 0 0.000000 "" ICON "ResistedSector12" -1804 -10937 1082 -7773
Cairn: TwoWayDriveOnRightSector 0 0 0.000000 "" ID=13346 "PreferredDirectionRight1" 2271 -18108 14449 -13021
Cairn: ResistedSector 0 0 0.000000 "" ICON "ResistedSector16" 3896 -27097 6854 -25557
Cairn: GoalWithHeading 4195 -28833 -80.258274 "" ICON "Hall Entry"
Cairn: GoalWithHeading 5868 -10253 -90.000000 "" ICON "RD Mid"
Cairn: GoalWithHeading 17212 -1515 -90.000000 "" ID=3145775 "RD Northeast"
Cairn: Goal 18401 -17381 0.000000 "" ICON "Closet"
Cairn: GoalWithHeading 19220 -25601 -154.771535 "" ICON "Training"
Cairn: Goal 21597 -7451 0.000000 "" ICON "RD comm_support"
LINES
-24162 -6218 -21563 -6227
-24148 -2057 -24162 -6218
-24141 168 -24148 -2057
-24096 -10015 -24097 -13709
-24096 -1842 -24096 -1843

```

FIG. 10

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**FIG. 11**