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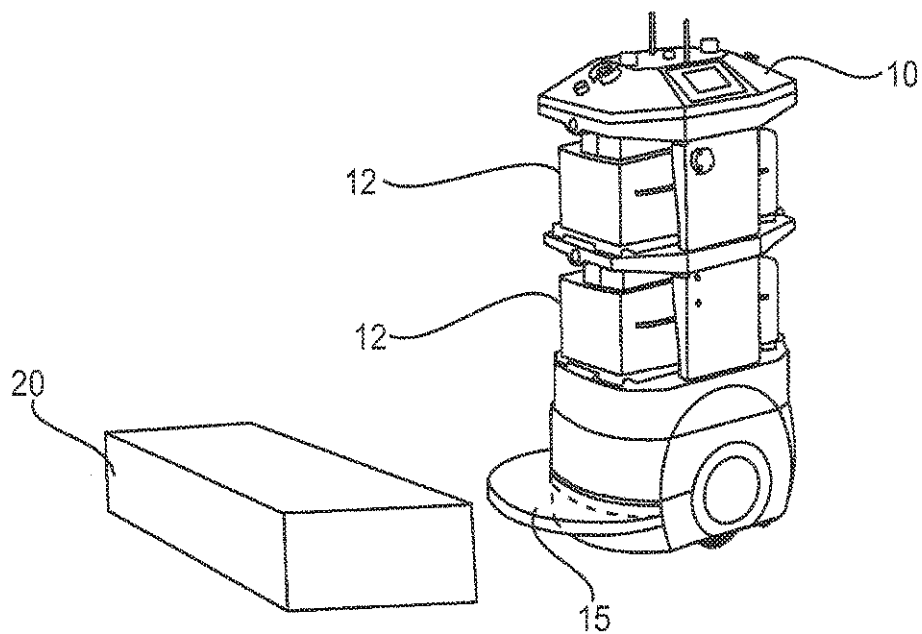


FIG. 1A

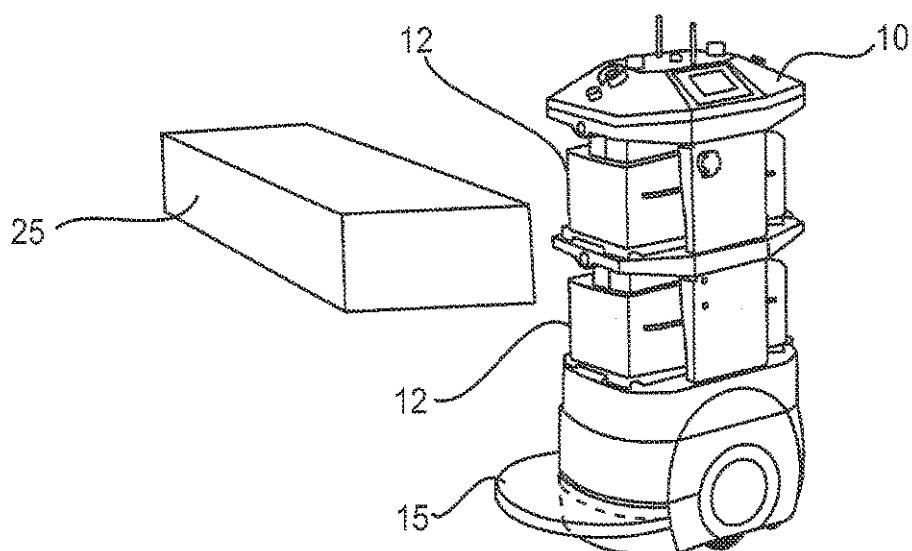
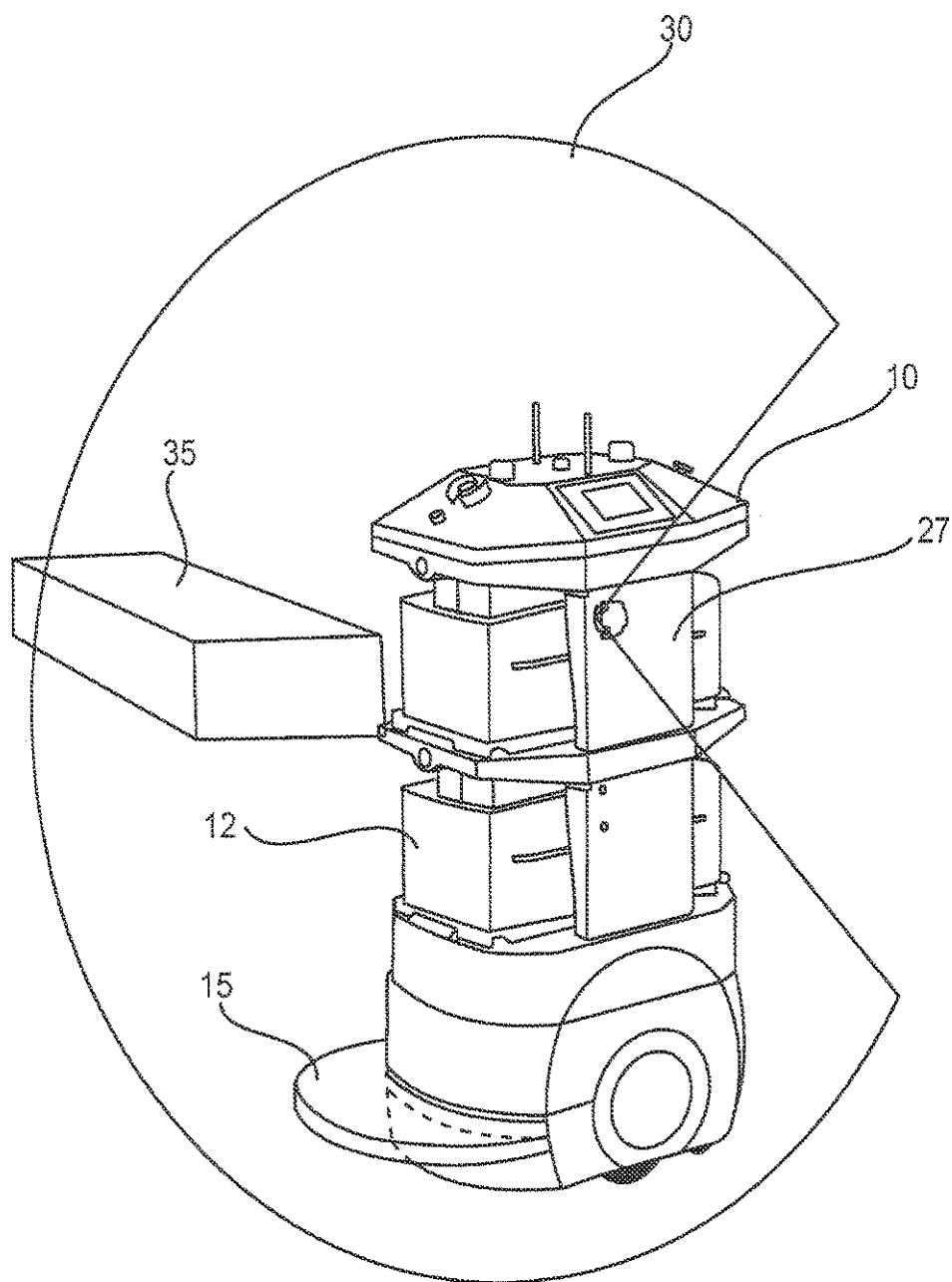


FIG. 1B

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**FIG. 2**

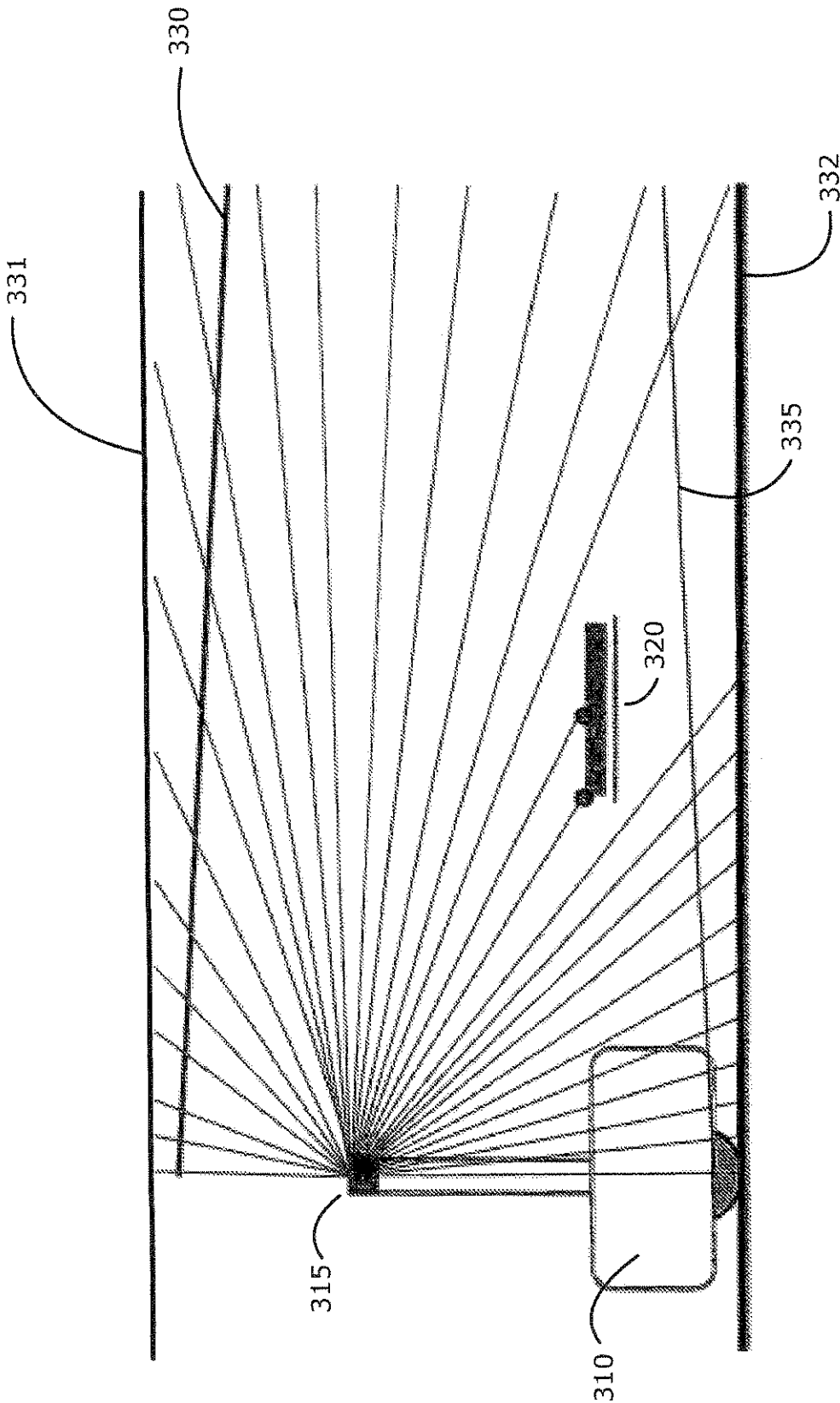


FIG. 3

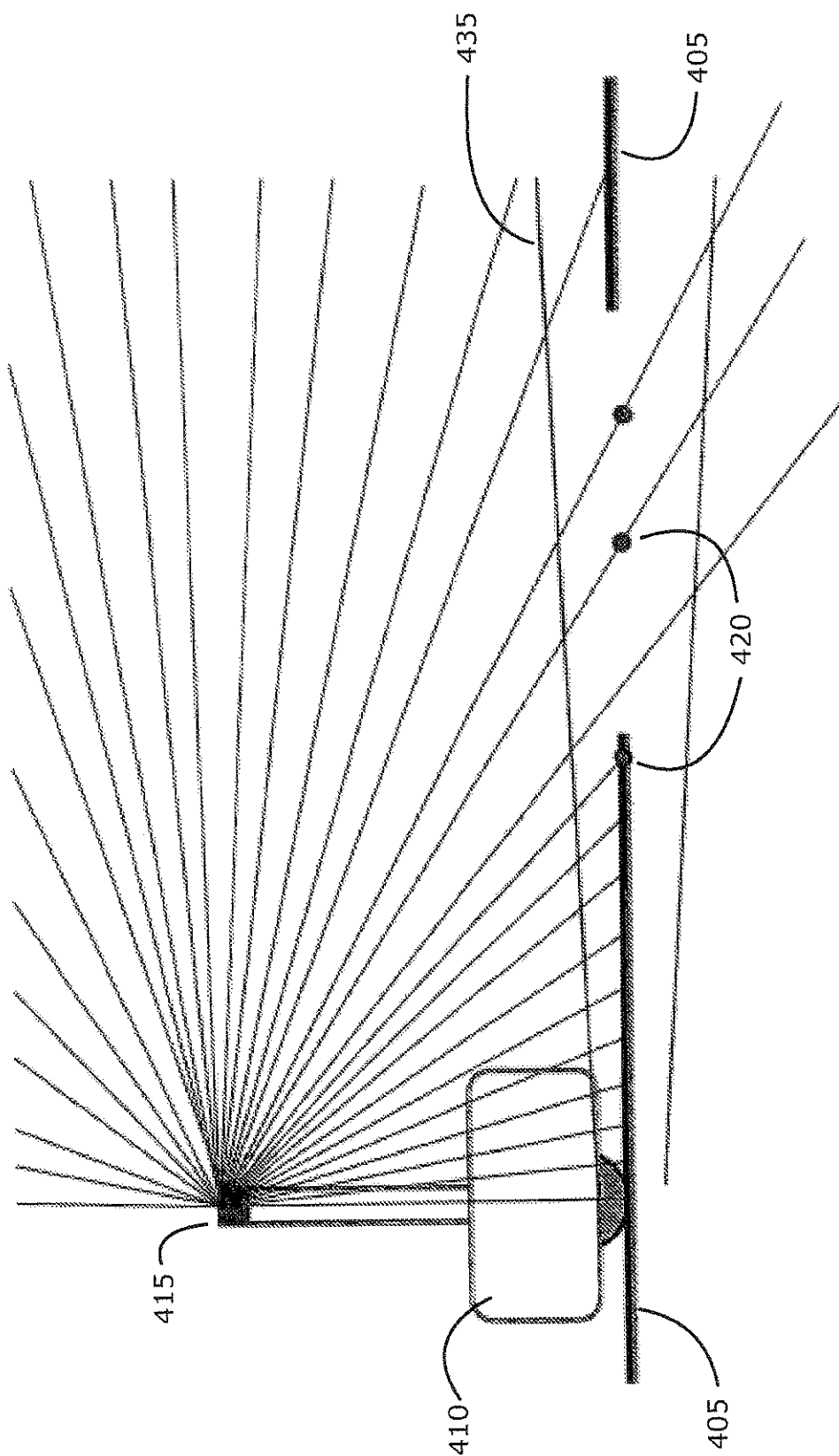


FIG. 4

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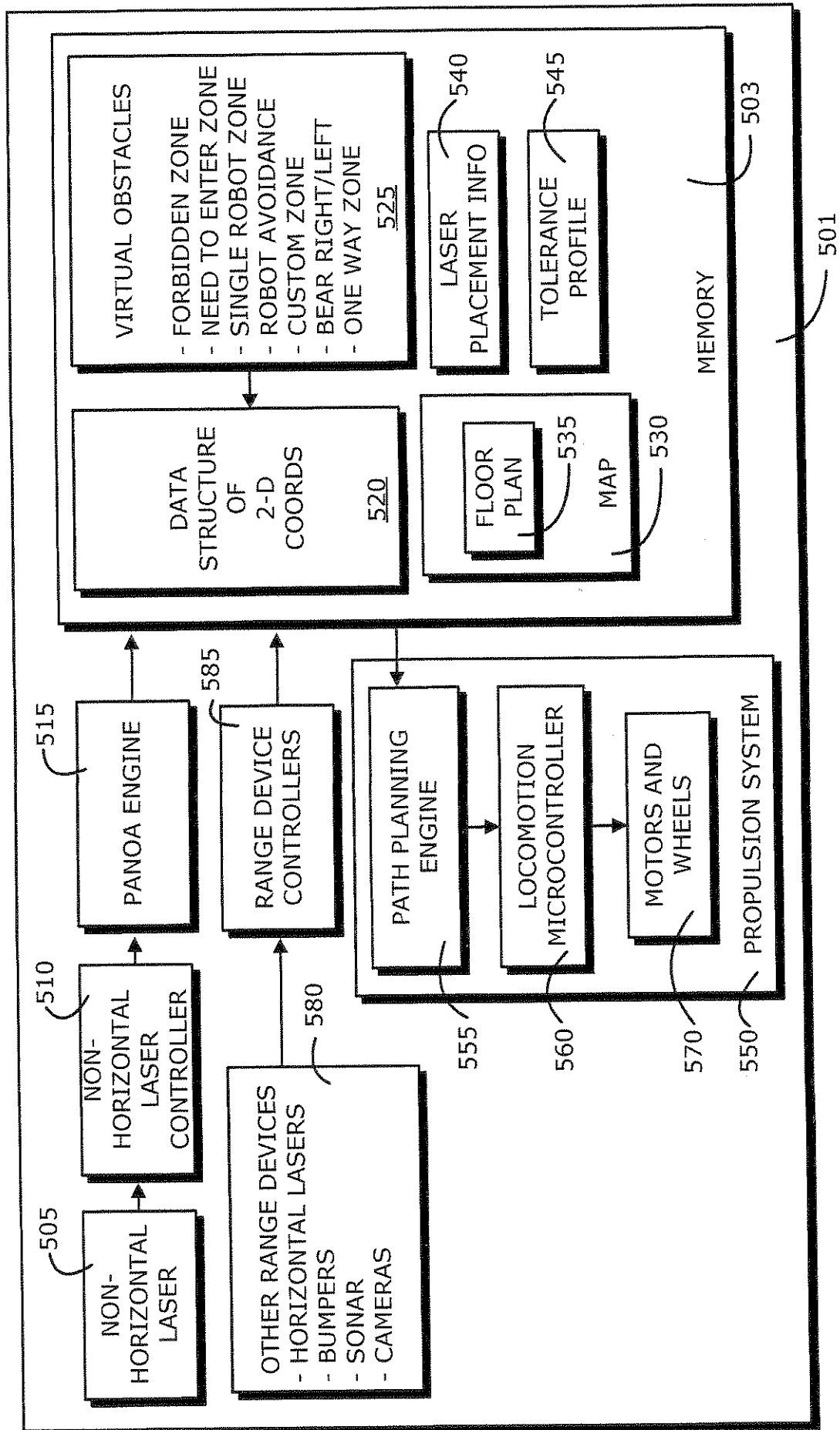


FIG. 5

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Laser_1 19305 -8479 19294 -8614 19333 -8718 19294 -8868 19317
-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
20090 -15976 20122 -16079 20133 -16182 20362 -16307 20858
-16465 20836 -16571 20853 -16682 20868 -16793 20883 -16905
20887 -17015 20899 -17127 20911 -17240 14161 -16129 14339 -16213
20929 -17578 20937 -17692 20953 -17808 20949 -17920 20963
-18038 20976 -18155 20968 -18268 20650 -18300 20303 -18318
20005 -18344 13647 -16646 13547 -16663 13362 -16652 13330 -16687
13325 -16732 13283 -16763 13202 -16781 13206 -16828 13219
-16879 13213 -16923 13206 -16967 13227 -17023 13247 -17079
13258 -17131 13258 -17180 13240 -17221 13258 -17279 13266 -17332
13237 -17369 11666 -16644 11626 -16657 11577 -16666 11528
-16673 9576 -15657 9563 -15561 11434 -16721 11419 -16745 11336
-16730 11279 -16728 11256 -16747 9773 -15875 9674 -15826 9626
-15808 11141 -16835 9812 -15962 9763 -15944 9560 -15816 9505
-15789 9491 -15792 9525 -15829 9535 -15850 9663 -15962 9687
-15997 9711 -16031 9679 -16022 9387 -15795 9473 -15880 9542
-15953 9519 -15948 9527 -15970 9527 -15985 9527 -16000 9533
-16022 9533 -16037 9539 -16059 9538 -16075 9543 -16098 9542
-16113 9547 -16136 9552 -16159 9549 -16175 9554 -16198 9557
-16222 9554 -16238 9558 -16261 9560 -16285 9569 -16317 9565
-16333 9567 -16358 9569 -16382 9570 -16406 9577 -16439 9583
-16472 9583 -16497 9588 -16530 9588 -16555 9586 -16580 9590
-16614 9594 -16647 9663 -16782 10497 -18112 10466 -18120 10429
-18119 10392 -18118 10361 -18126 10330 -18132 10293 -18130
10257 -18128 10231 -18142 10195 -18139 10159 -18135 10128 -18140
10097 -18145 10066 -18149 10031 -18144 10000 -18147 9970 -18151
9943 -18163 9909 -18156 9882 -18168 9848 -18161 9817 -18163
9787 -18164 9757 -18165 9730 -18175 9696 -18167 9670 -18176
9640 -18176 9613 -18186 9583 -18185 9553 -18184 9526 -18193
9494 -18182 9470 -18199 9440 -18197 9413 -18205 9381 -18193
9354 -18200 9237 -17837 9078 -17269 9024 -17117 9047 -17306
9099 -17653 9188 -18217 9159 -18212 9134 -18227 9105 -18222
9078 -18226 9048 -18211 9022 -18225 8995 -18229 8968 -18232
8939 -18226 8912 -18229 8885 -18232 8858 -18234 8831 -18247
8804 -18249 8777 -18251 8749 -18252 8722 -18254 8695 -18255
8667 -18256 8640 -18247 8612 -18247 8585 -18267 8558 -18257
8530 -18267 8503 -18267 8475 -18266 8447 -18275 8420 -18274
8392 -18272 8364 -18280 8336 -18288 8309 -18276 8280 -18284
8252 -18291 8224 -18288 8196 -18285 8166 -18302 8139 -18298

FIG. 6

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POSITIVE OBSTACLE AVOIDANCE

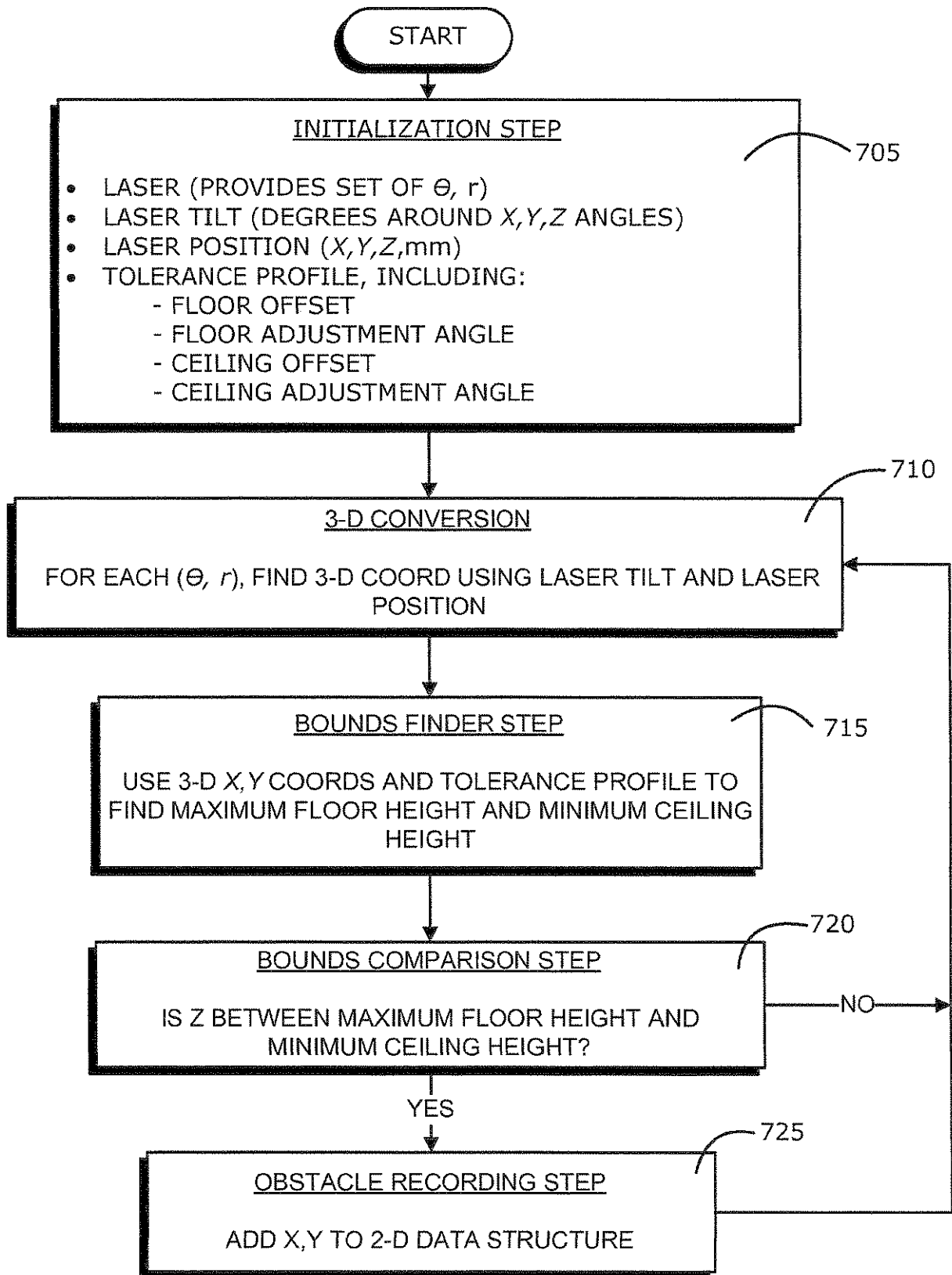


FIG. 7

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NEGATIVE OBSTACLE AVOIDANCE

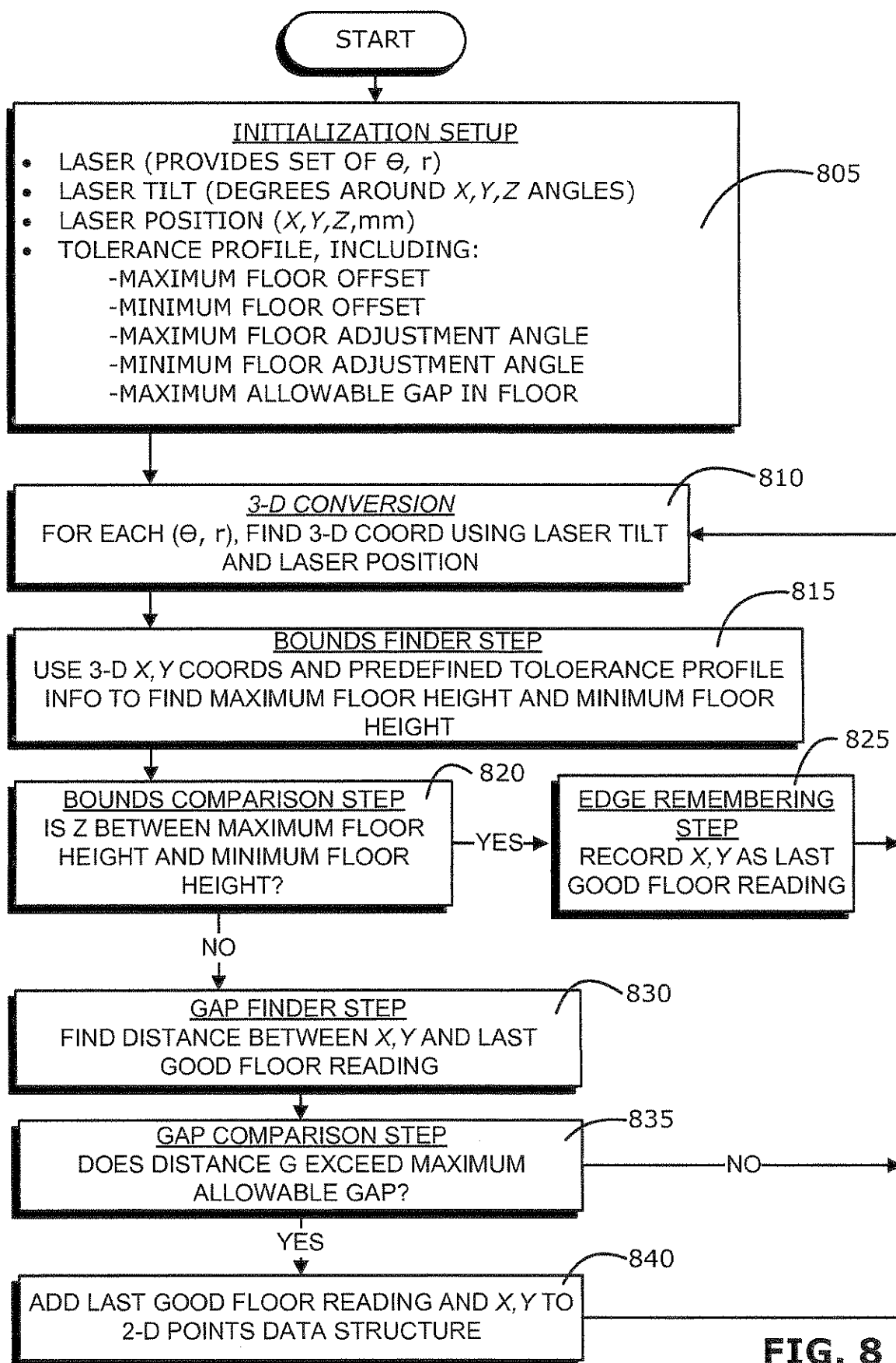
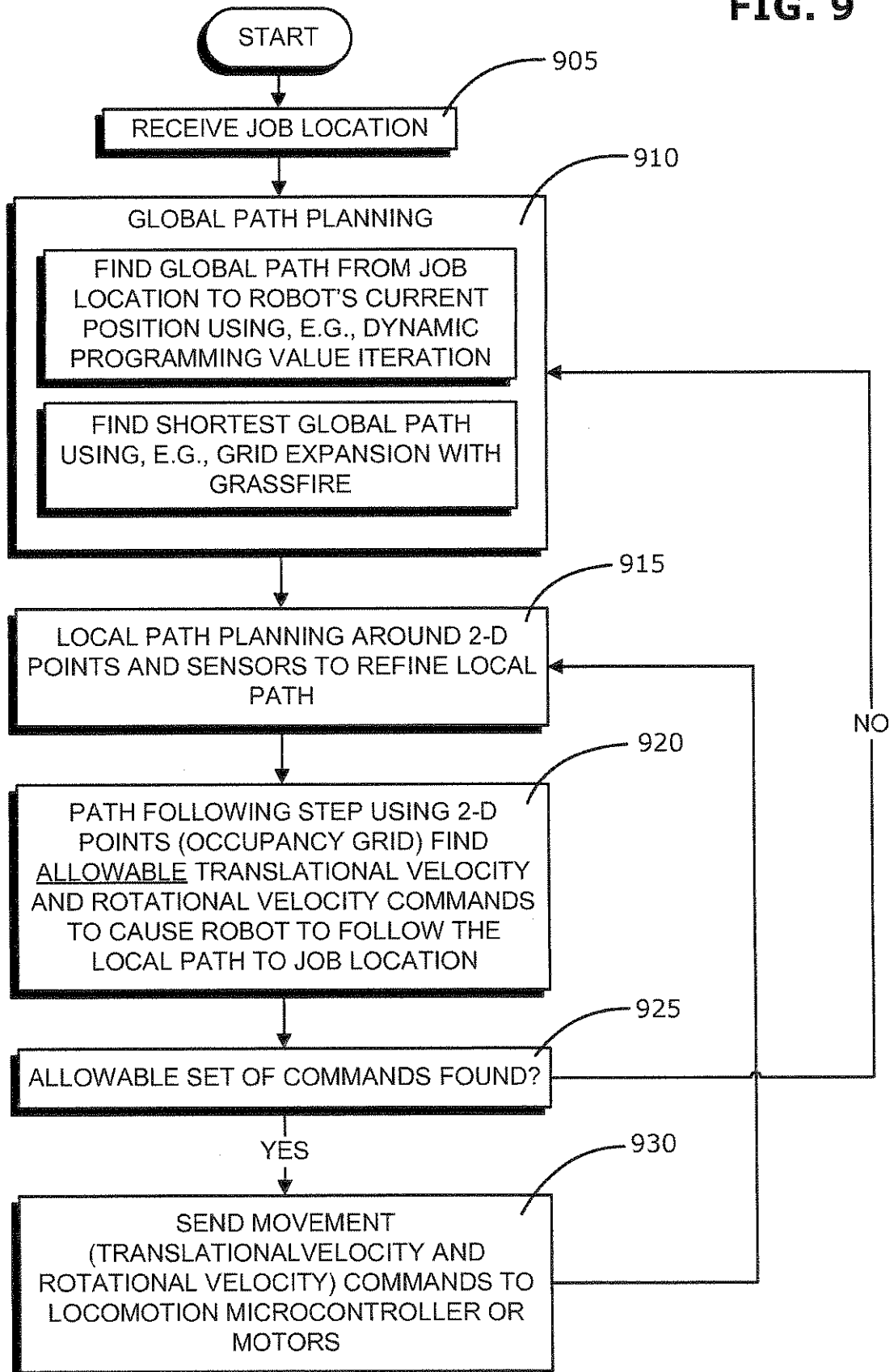


FIG. 8

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FIG. 9

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2D-Map
MapInfo: DockType "Name=Dock" "Label=Dock" "NameRequired=1" "Color0=0xffff00" "Heading=Required"
MapInfo: GoalType "Name=Goal" "Label=Goal" "NameRequired=1" "Color0=0x000080" "Color1=0x0080ff" "Color2=0x000080"
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=0xbea5ce" "NameRequired=1"
MapInfo: SectorType "Name=TwoWayDriveOnRightSector" "Label=PreferredDirectionRight" "Desc=Two Way Drive on Right"
"NameRequired=1" "Color0=0xad3b4" "Color1=0x91b899" "Shape=GradTwoWayDriveOnRight" "NameRequired=1"
Cairn: ResistedSector 0 0 0.000000 "" ICON "ResistedSector17" -22940 -14446 -14715 -12764
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" -18248 -10369 -14050 -9911
Cairn: Goal -13843 -3056 0.000000 "" ICON "Software"
Cairn: ResistedSector 0 0 0.000000 "" ICON "ResistedSector15" -12453 -10401 -9276 -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 "ED Lab West Mid"
Cairn: GoalWithHeading -5693 -1853 135.145272 "" ICON "ED 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 "PreferredDirectionRight" 2271 -18108 14449 -13021
Cairn: ResistedSector 0 0 0.000000 "" ICON "ResistedSector16" 3896 -27897 6854 -25557
Cairn: GoalWithHeading 4195 -28833 -80.258274 "" ICON "Hall Entry"
Cairn: GoalWithHeading 5868 -10253 -90.000000 "" ICON "ED_Mid"
Cairn: GoalWithHeading 17212 -1515 -90.000000 "" ID=3145776 "ED Northeast"
Cairn: Goal 18401 -17381 0.000000 "" ICON "Closet"
Cairn: GoalWithHeading 19220 -25801 -154.771535 "" ICON "Training"
Cairn: Goal 21597 -7451 0.000000 "" ICON "ED_comm_support"
LINES
-24162 -6218 -21563 -6227
-24148 -2057 -24152 -6218
-24141 168 -24148 -2057
-24096 -10015 -24097 -13709
-24096 -1842 -24096 -1843

```

FIG. 10

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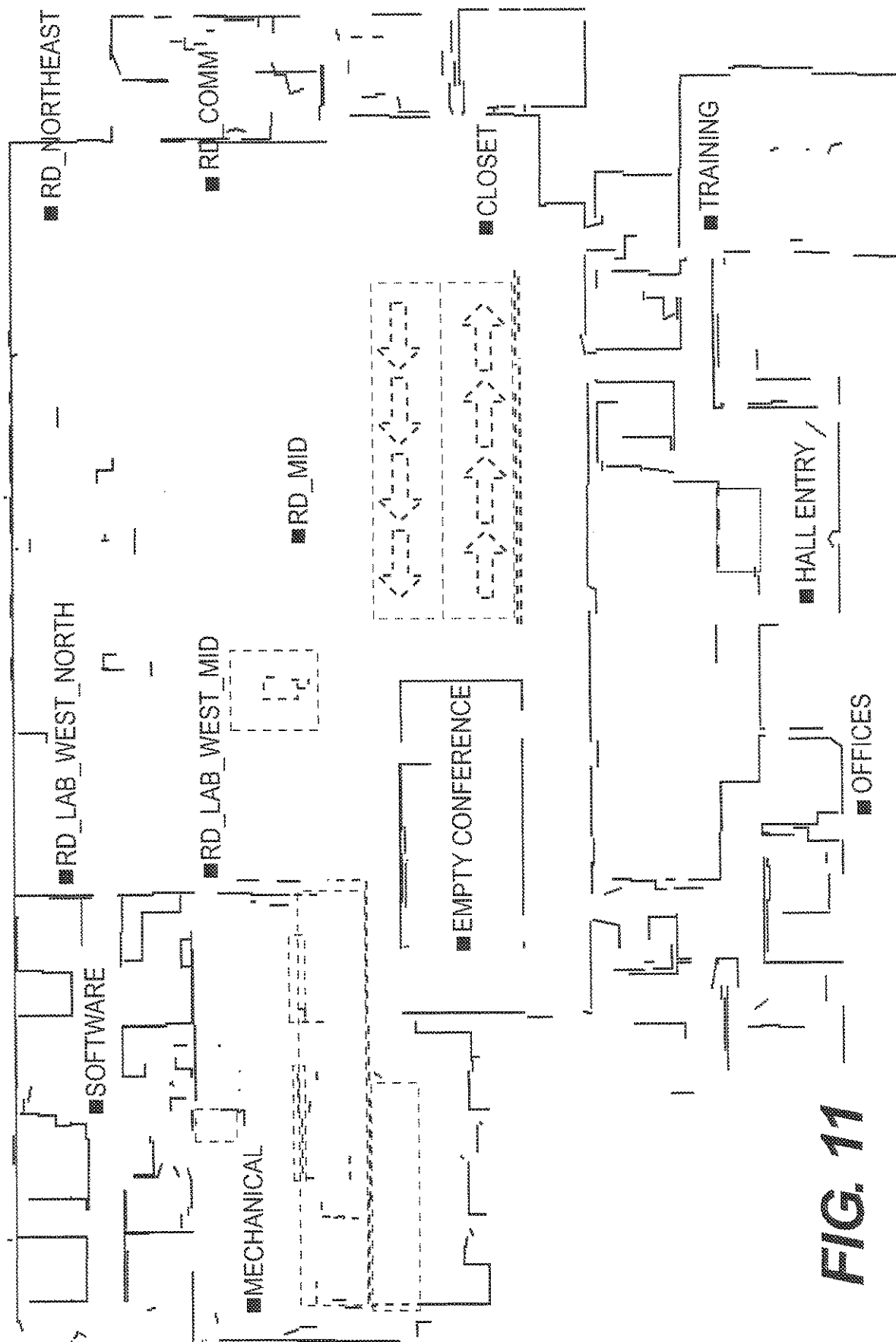


FIG. 11