FIG. 1

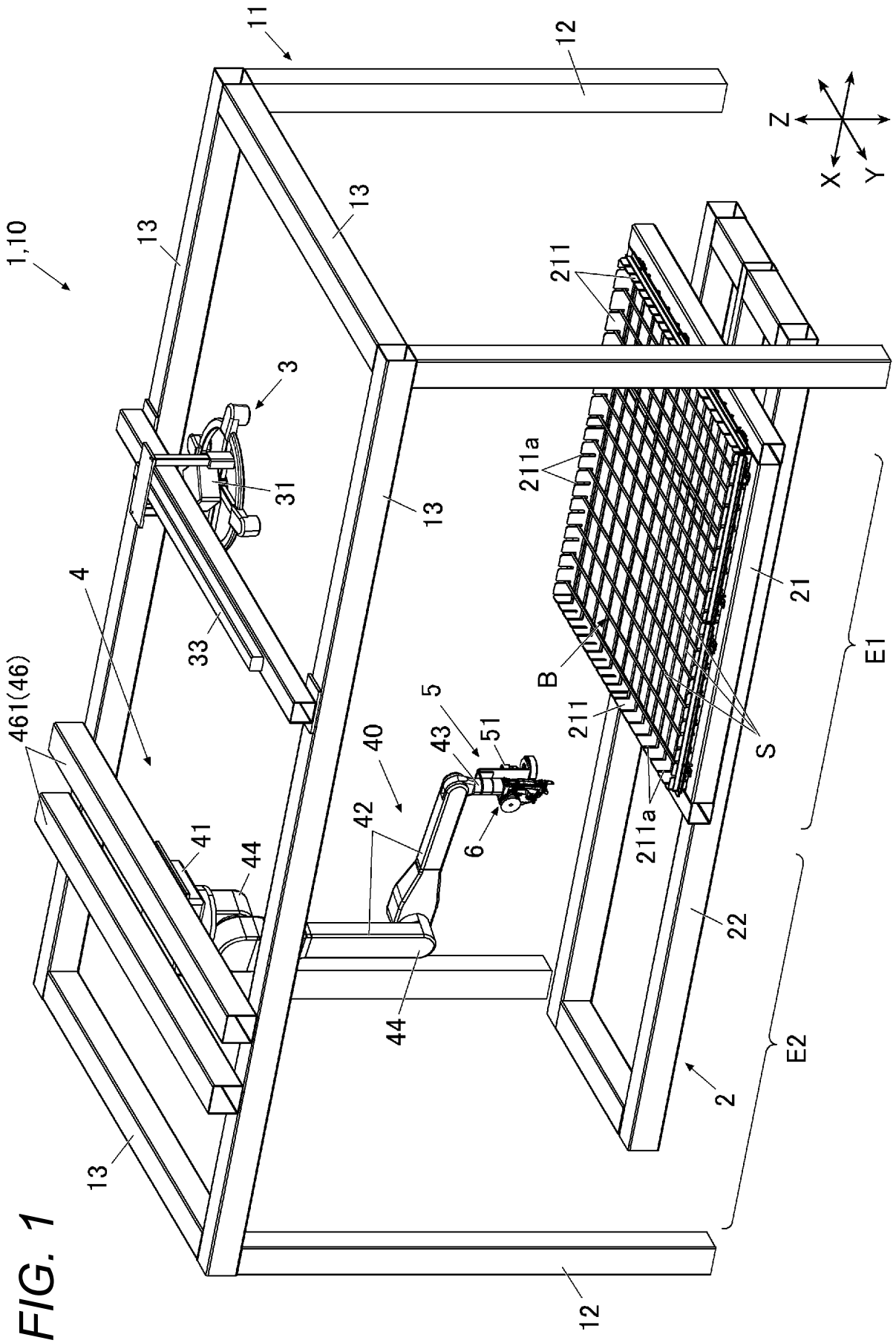

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461(46)
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FIG. 2

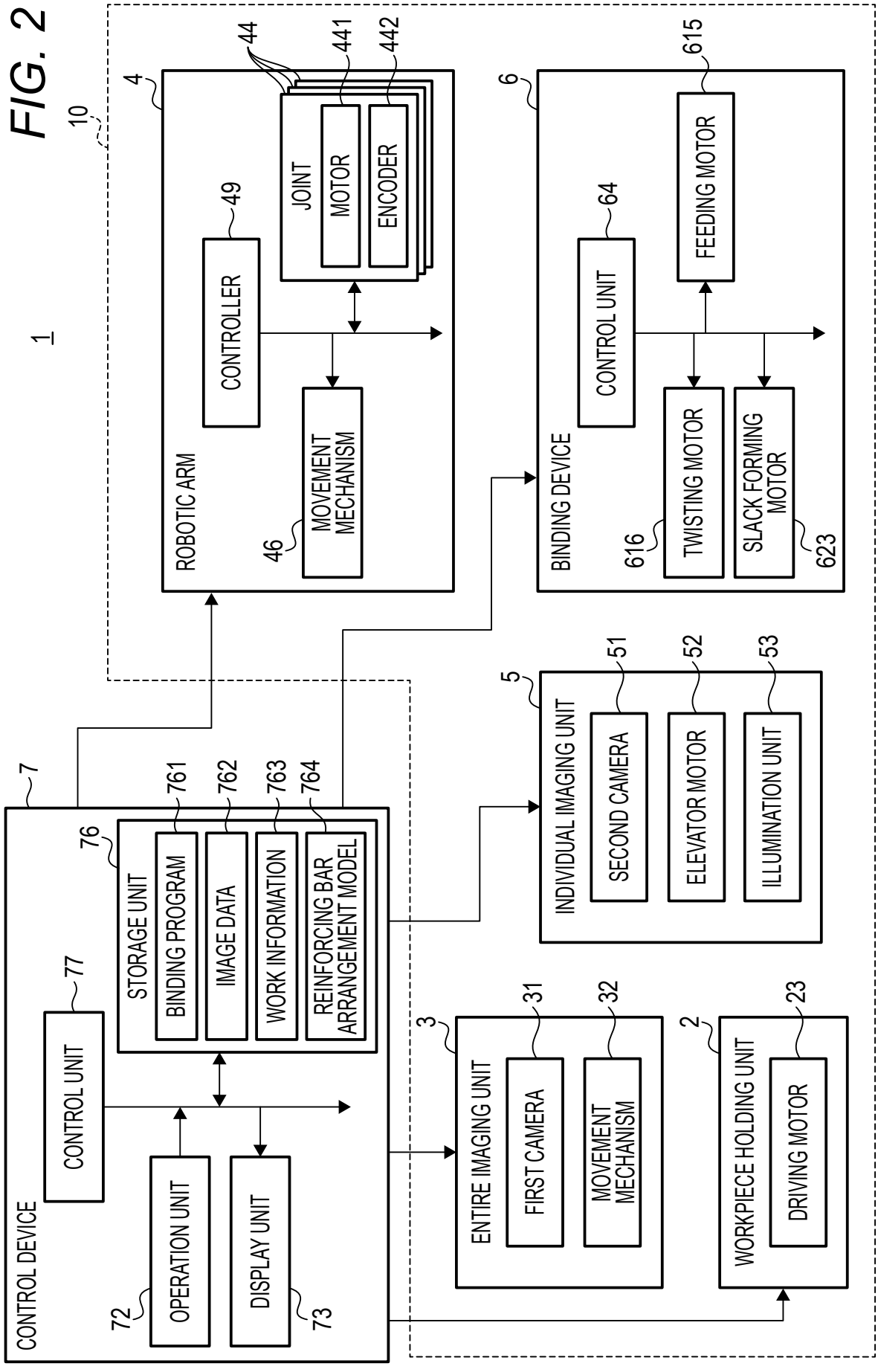

1
10
4
ROBOTIC ARM
CONTROLLER
49
JOINT
MOTOR
ENCODER
44
441
442
MOVEMENT MECHANISM
46
6
BINDING DEVICE
CONTROL UNIT
64
FEEDING MOTOR
615
TWISTING MOTOR
616
SLACK FORMING MOTOR
623
5
INDIVIDUAL IMAGING UNIT
SECOND CAMERA
51
ELEVATOR MOTOR
52
ILLUMINATION UNIT
53
7
STORAGE UNIT
76
BINDING PROGRAM
761
IMAGE DATA
762
WORK INFORMATION
763
REINFORCING BAR ARRANGEMENT MODEL
764
CONTROL DEVICE
CONTROL UNIT
77
OPERATION UNIT
72
DISPLAY UNIT
73
3
ENTIRE IMAGING UNIT
FIRST CAMERA
31
MOVEMENT MECHANISM
32
2
WORKPIECE HOLDING UNIT
DRIVING MOTOR
23

FIG. 3

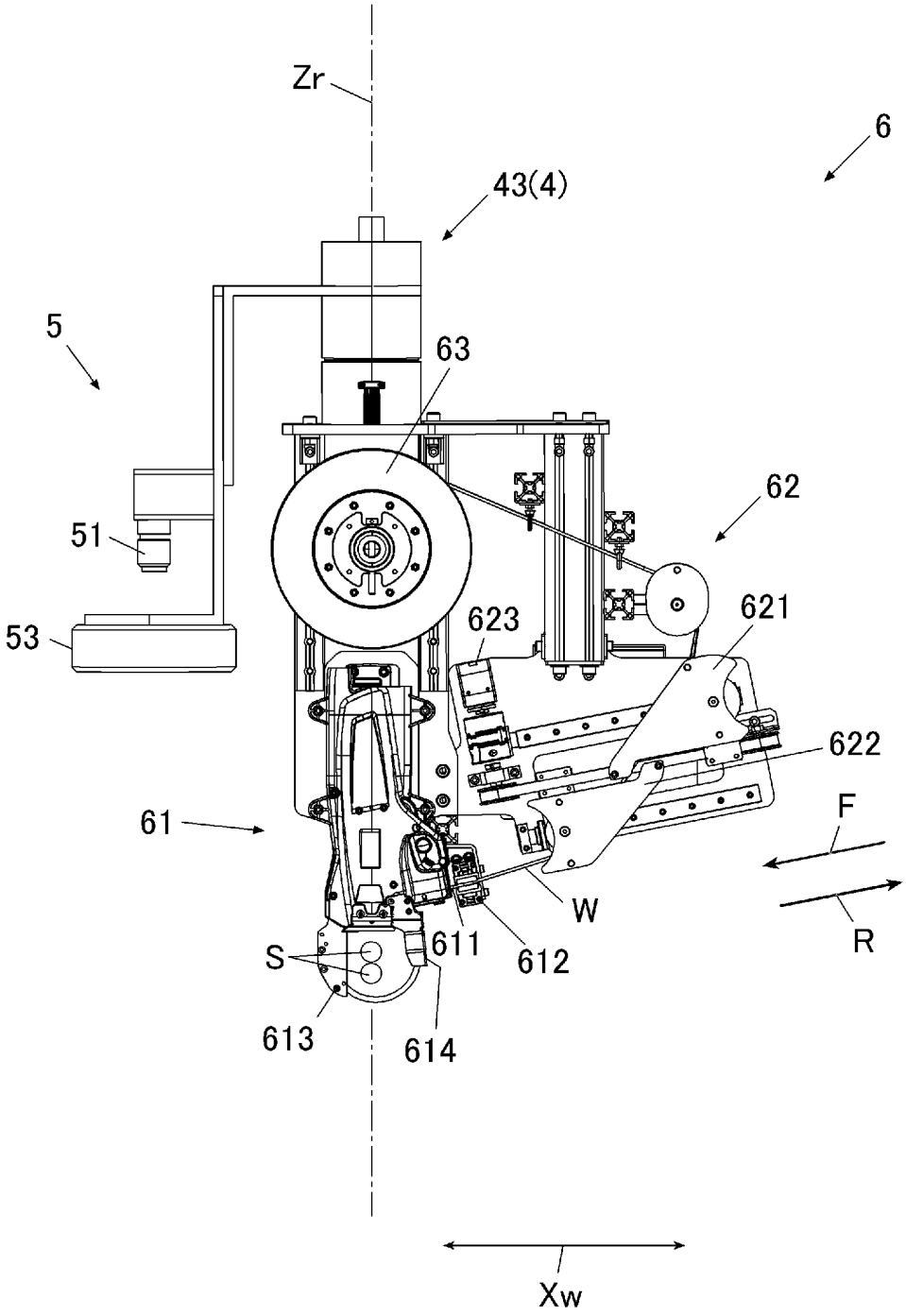


FIG. 4

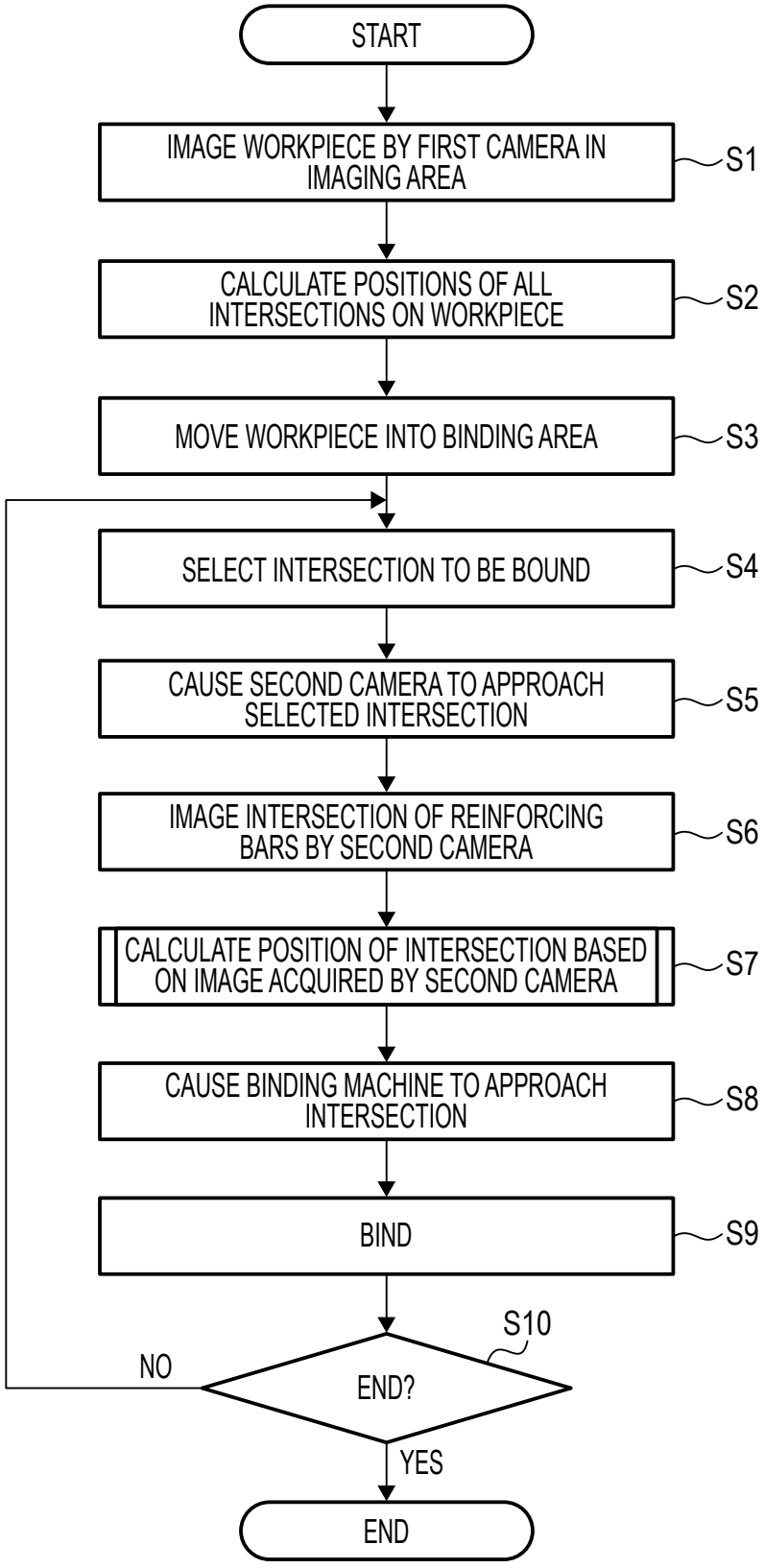

START
IMAGE WORKPIECE BY FIRST CAMERA IN IMAGING AREA
S1
CALCULATE POSITIONS OF ALL INTERSECTIONS ON WORKPIECE
S2
MOVE WORKPIECE INTO BINDING AREA
S3
SELECT INTERSECTION TO BE BOUND
S4
CAUSE SECOND CAMERA TO APPROACH SELECTED INTERSECTION
S5
IMAGE INTERSECTION OF REINFORCING BARS BY SECOND CAMERA
S6
CALCULATE POSITION OF INTERSECTION BASED ON IMAGE ACQUIRED BY SECOND CAMERA
S7
CAUSE BINDING MACHINE TO APPROACH INTERSECTION
S8
BIND
S9
S10
END?
NO
YES
END

FIG. 5

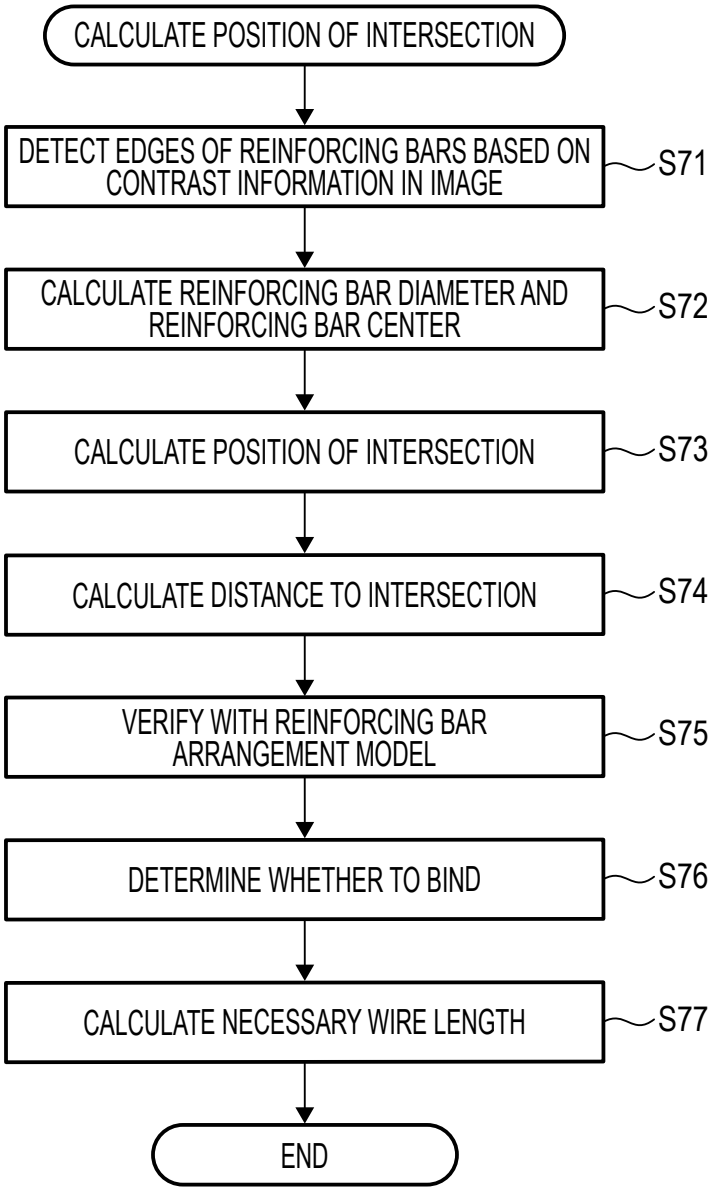
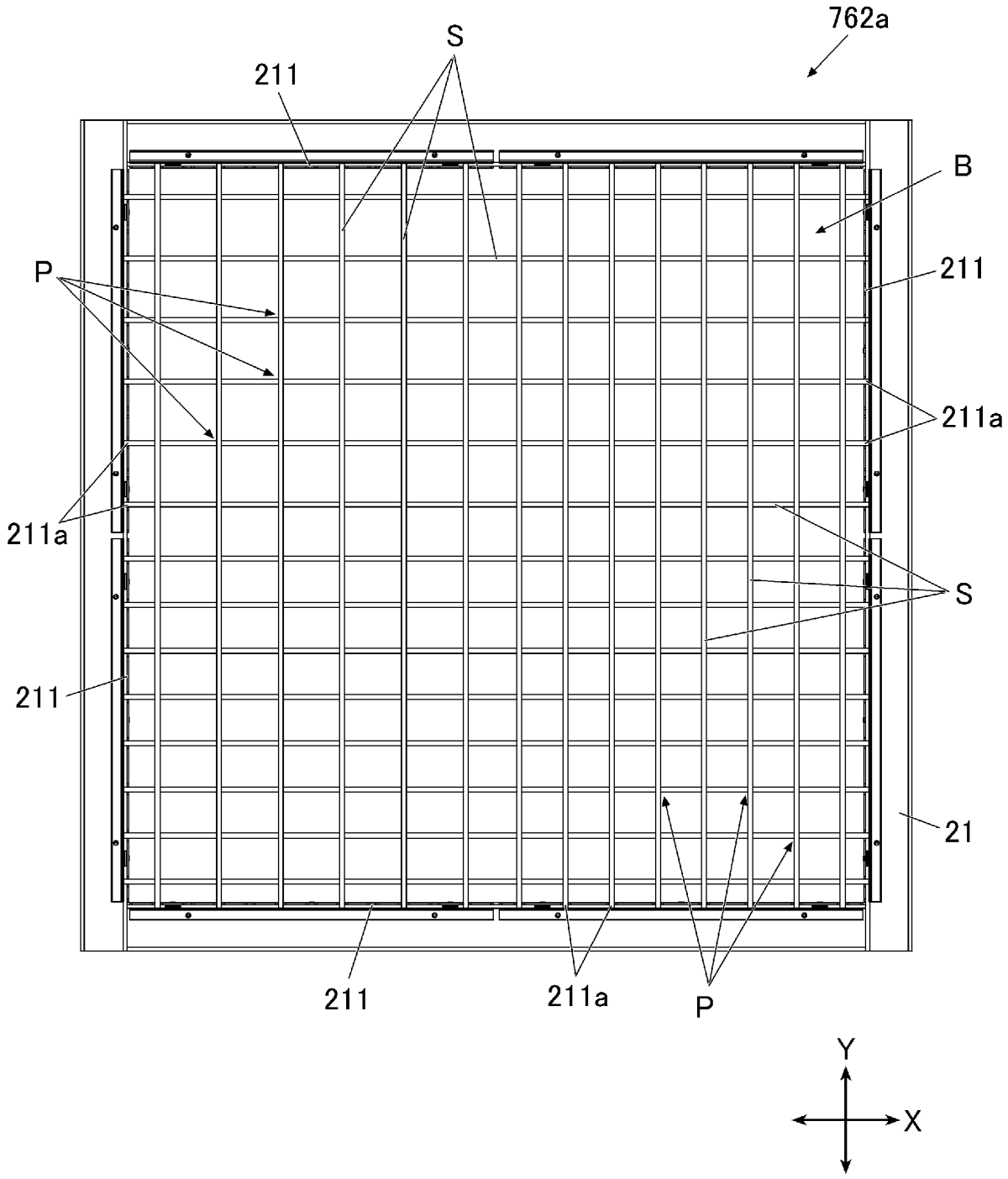

CALCULATE POSITION OF INTERSECTION
DETECT EDGES OF REINFORCING BARS BASED ON CONTRAST INFORMATION IN IMAGE
S71
CALCULATE REINFORCING BAR DIAMETER AND REINFORCING BAR CENTER
S72
CALCULATE POSITION OF INTERSECTION
S73
CALCULATE DISTANCE TO INTERSECTION
S74
VERIFY WITH REINFORCING BAR ARRANGEMENT MODEL
S75
DETERMINE WHETHER TO BIND
S76
CALCULATE NECESSARY WIRE LENGTH
S77
END

FIG. 6



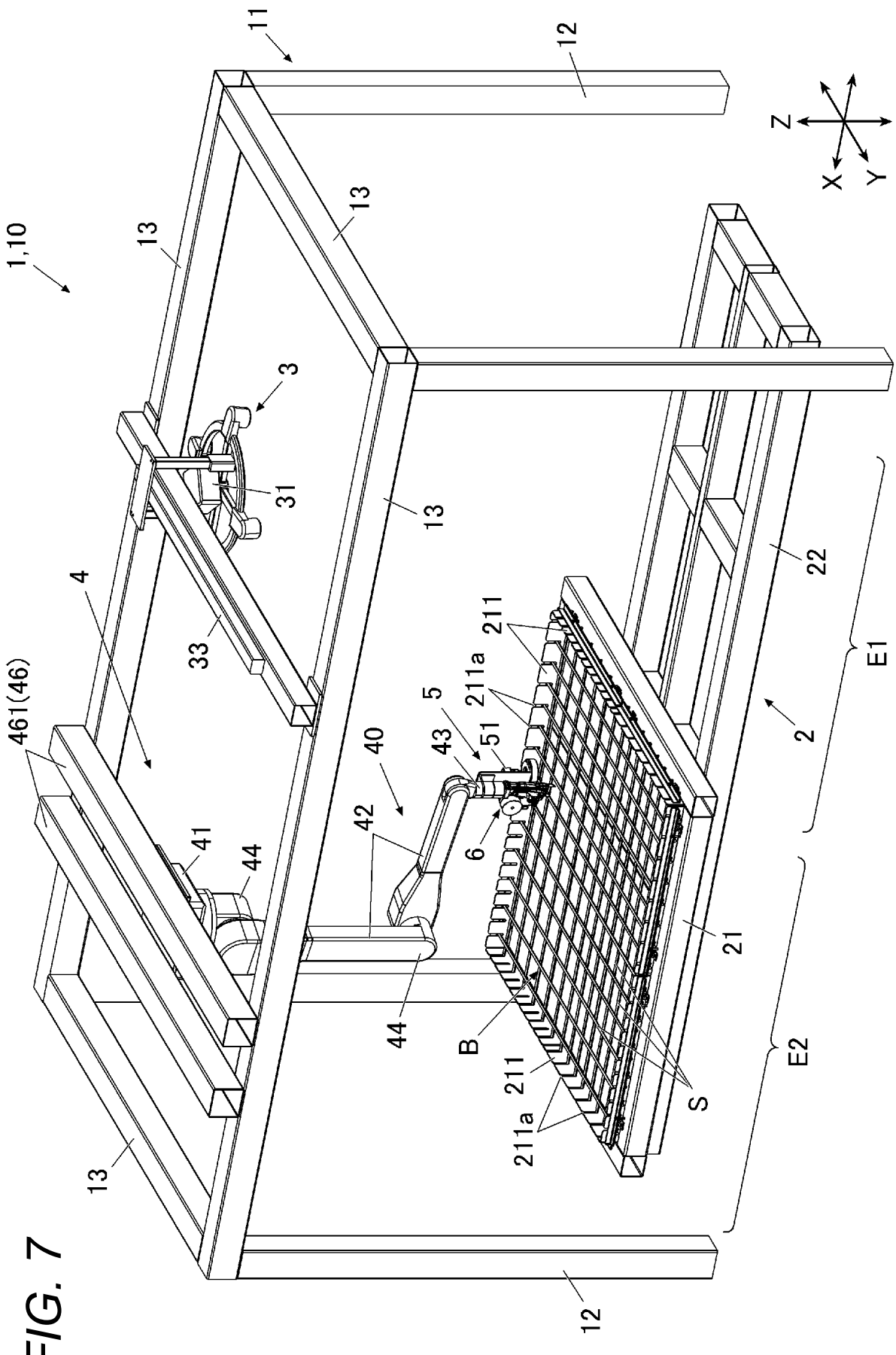

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E2
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FIG. 7

FIG. 8A

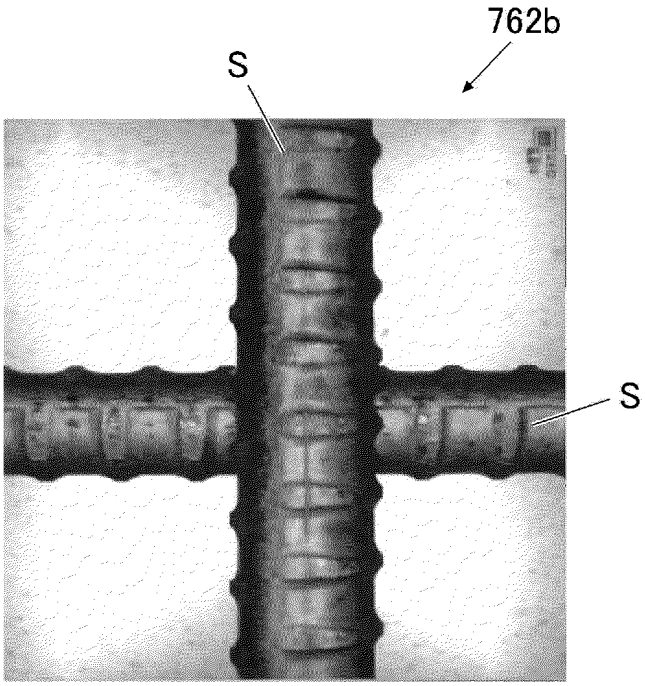


FIG. 8B

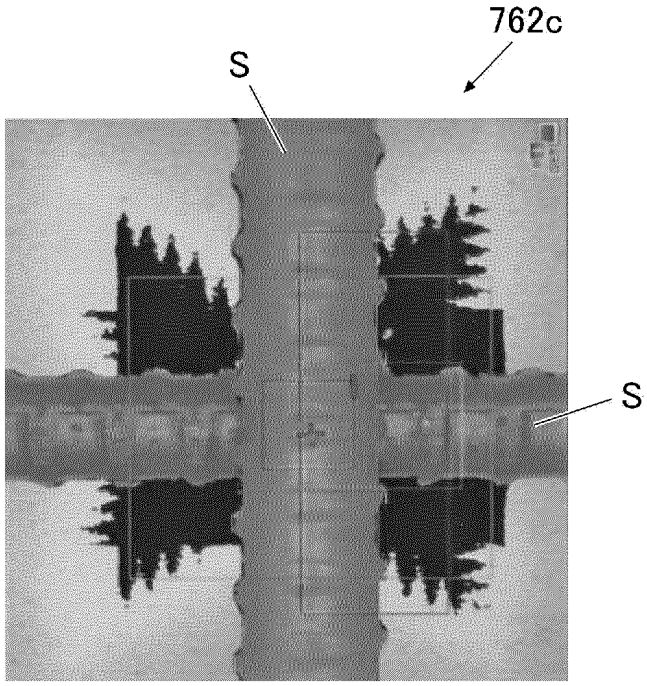


FIG. 9

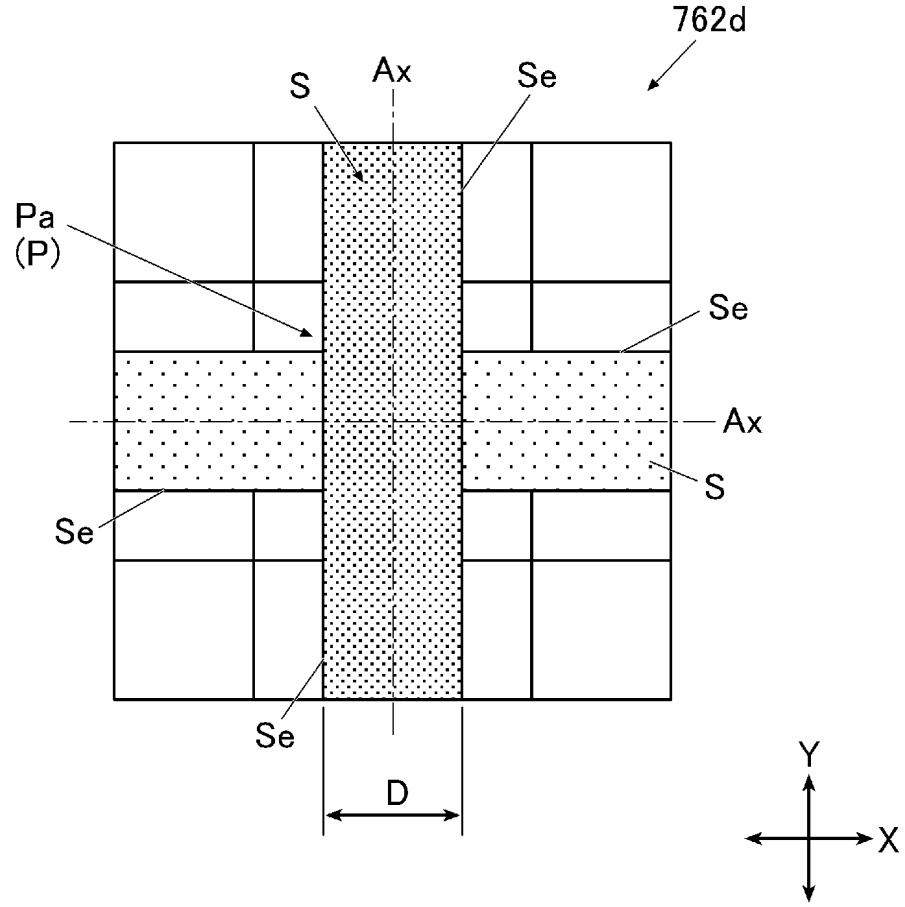
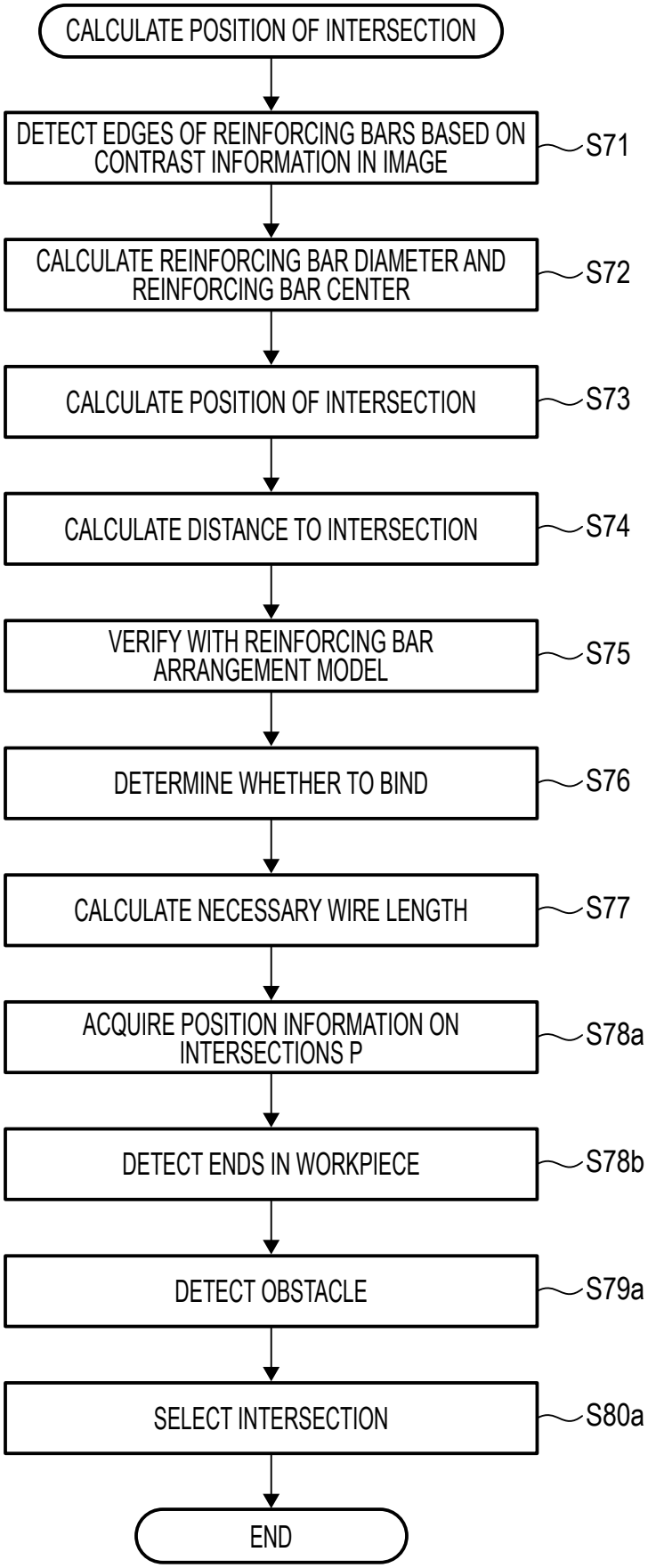


FIG. 10


CALCULATE POSITION OF INTERSECTION
DETECT EDGES OF REINFORCING BARS BASED ON CONTRAST INFORMATION IN IMAGE
S71
CALCULATE REINFORCING BAR DIAMETER AND REINFORCING BAR CENTER
S72
CALCULATE POSITION OF INTERSECTION
S73
CALCULATE DISTANCE TO INTERSECTION
S74
VERIFY WITH REINFORCING BAR ARRANGEMENT MODEL
S75
DETERMINE WHETHER TO BIND
S76
CALCULATE NECESSARY WIRE LENGTH
S77
ACQUIRE POSITION INFORMATION ON INTERSECTIONS P
S78a
DETECT ENDS IN WORKPIECE
S78b
DETECT OBSTACLE
S79a
SELECT INTERSECTION
S80a
END