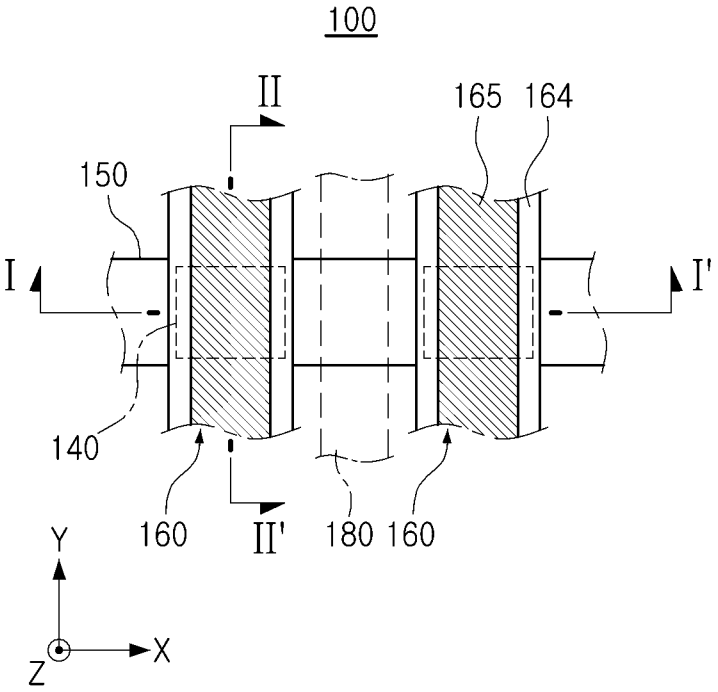


FIG. 1

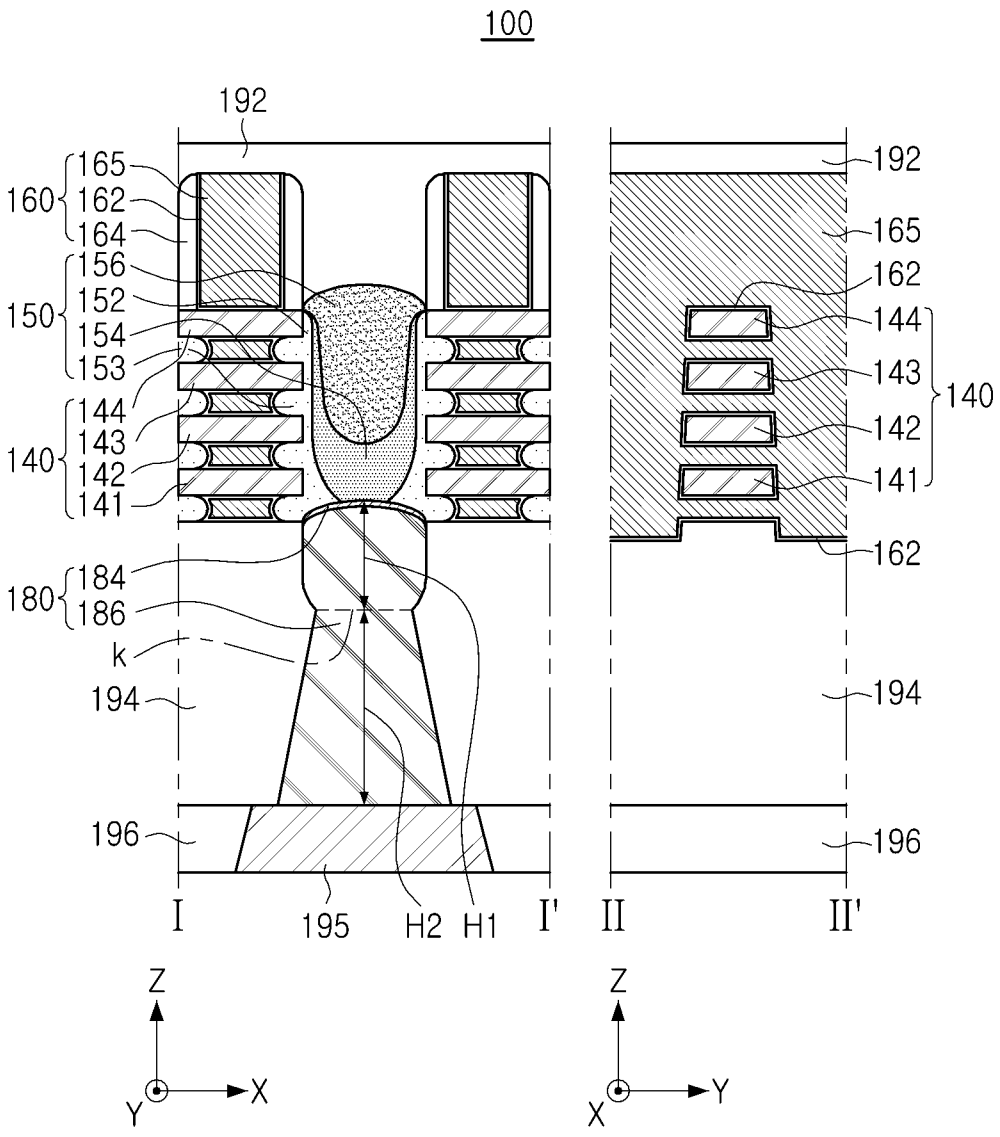

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153
144
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140
142
141
184
180
186
k
194
196
I
195
H2
H1
I'
II
II'
Z
X
Y
Z
Y
X

FIG. 2

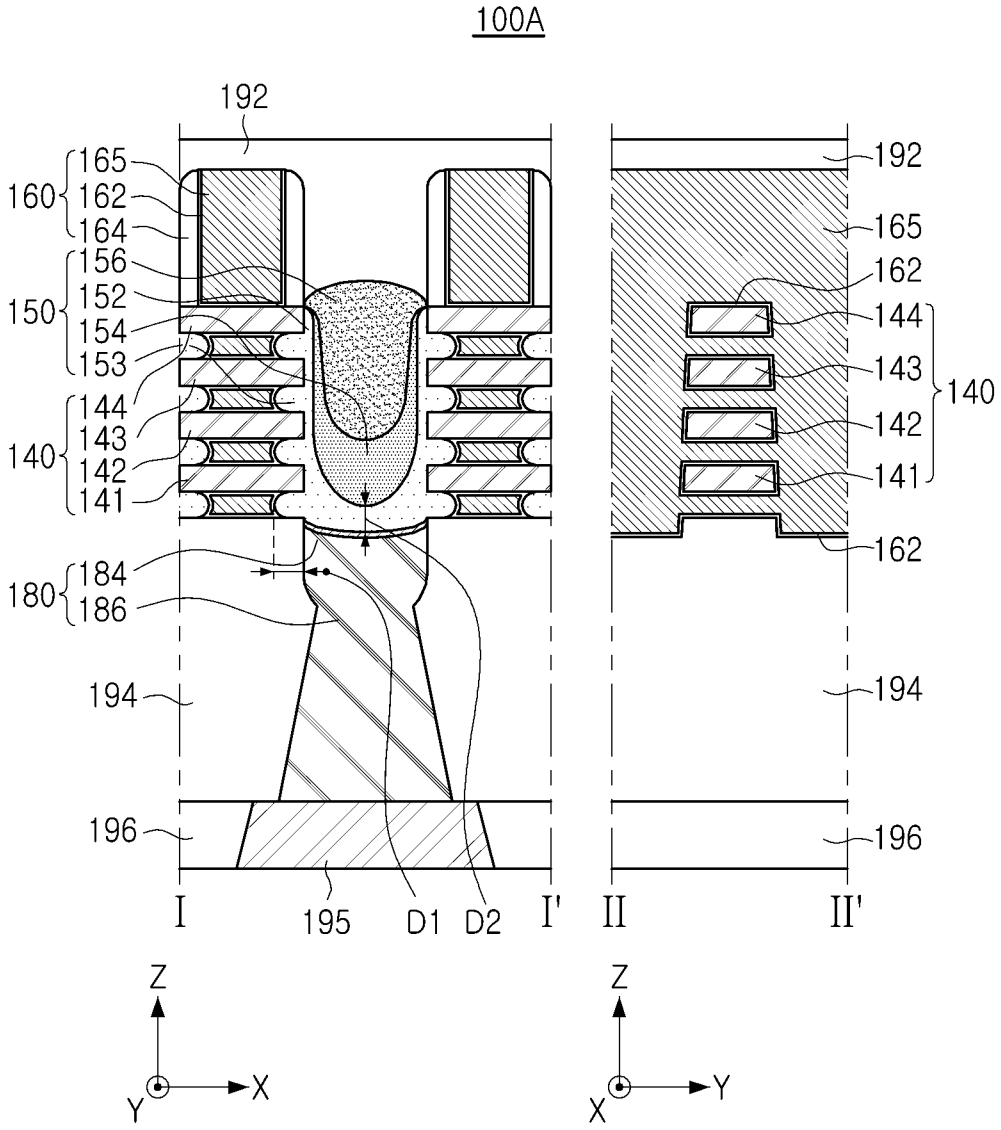

100A
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143
142
141
140
184
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180
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196
I
195
D1
D2
I'
II
II'
Z
X
Y
Z
Y
X

FIG. 3

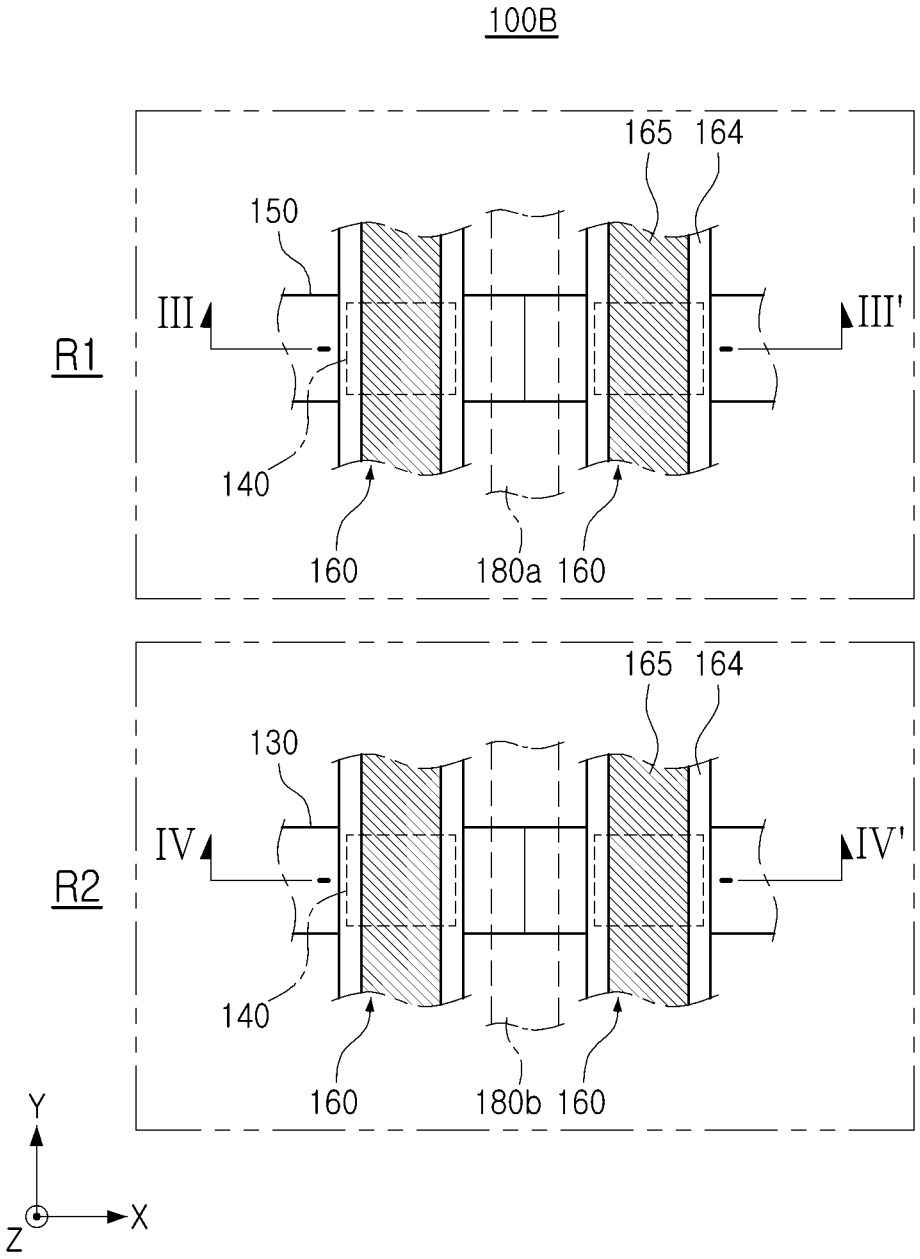


FIG. 4

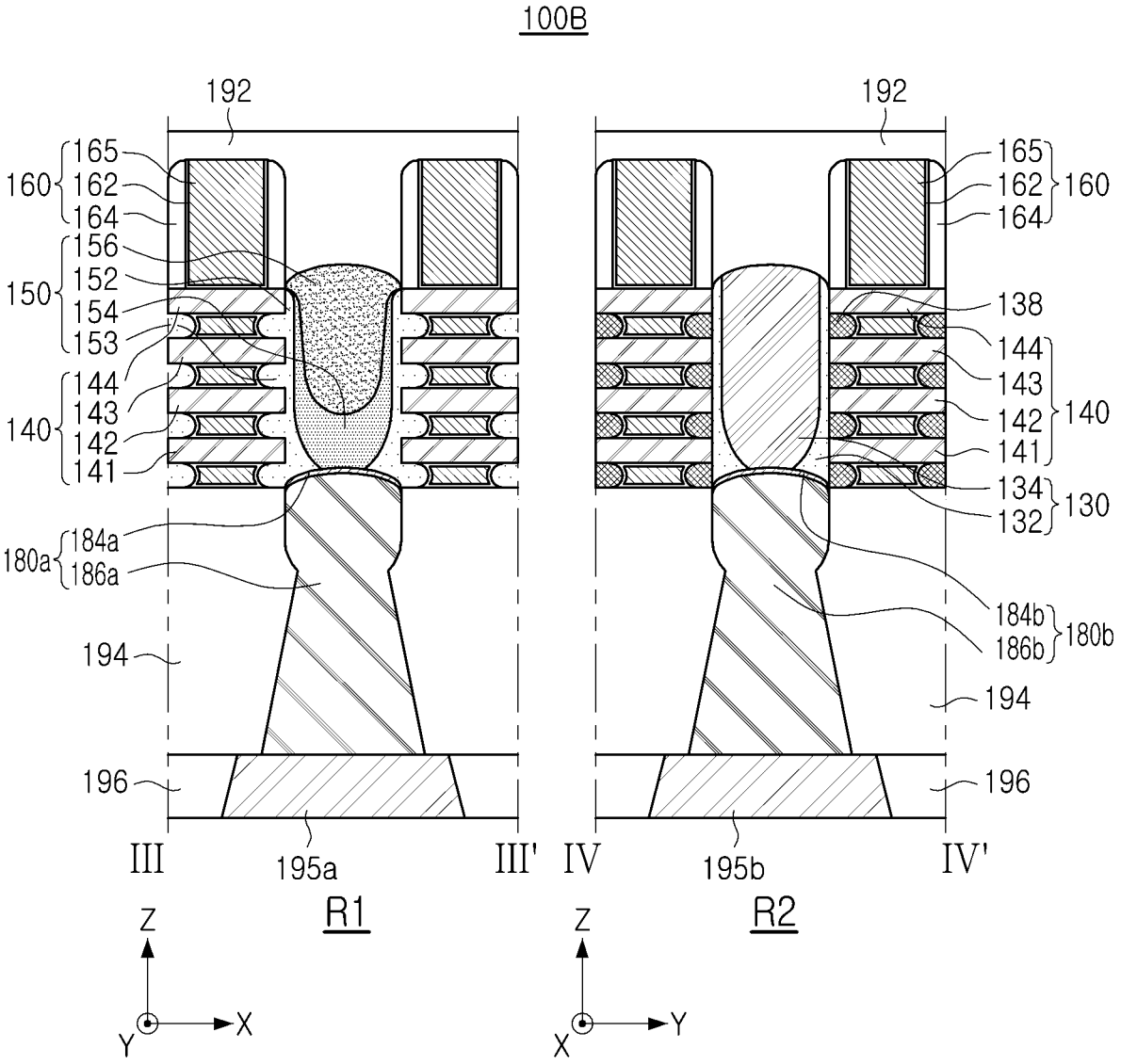

100B
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162
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180a
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186a
194
196
III
195a
III'
R1
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Y
X
IV
195b
IV'
R2
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134
132
130
184b
186b
180b

FIG. 5

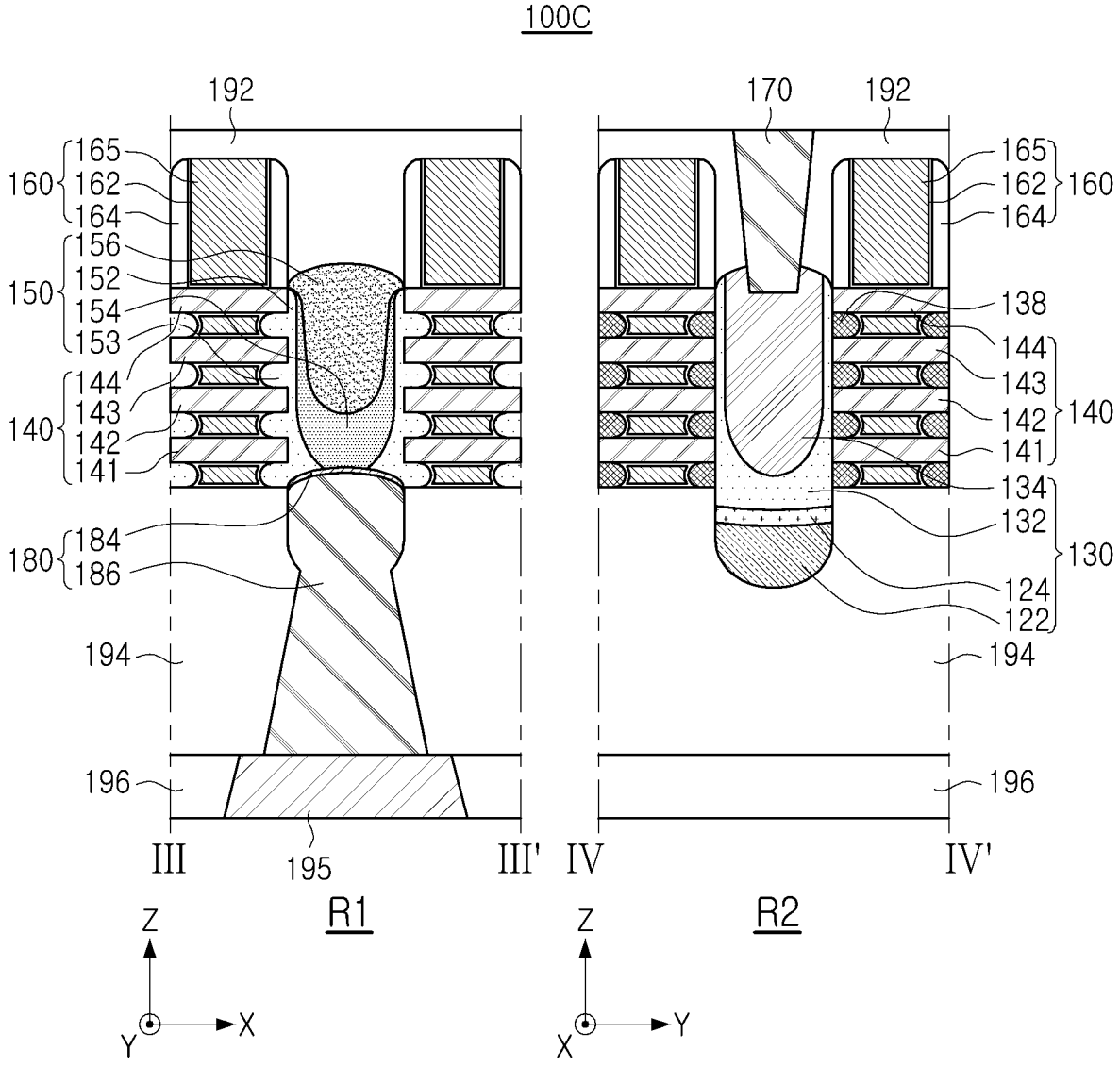

100C
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192
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162
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152
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153
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142
141
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134
132
124
122
130
184
186
180
194
196
195
III
III'
IV
IV'
R1
R2
Z
X
Y
Z
Y
X

FIG. 6

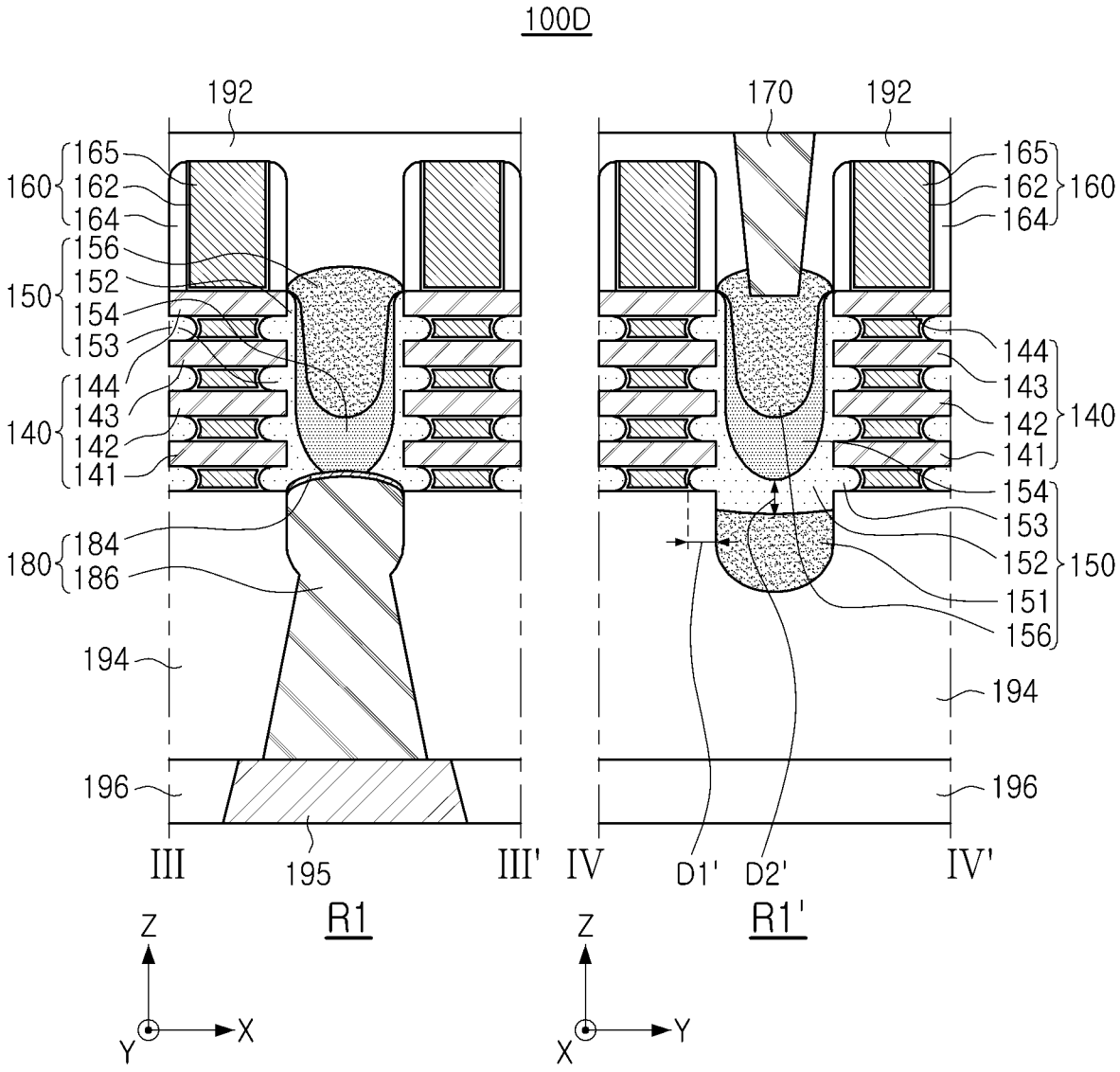

100D
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192
165
162
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152
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153
150
144
143
142
141
140
184
186
180
194
196
III
195
III'
IV
D1'
D2'
IV'
R1
R1'
Z
X
Y
Z
Y
X

FIG. 7

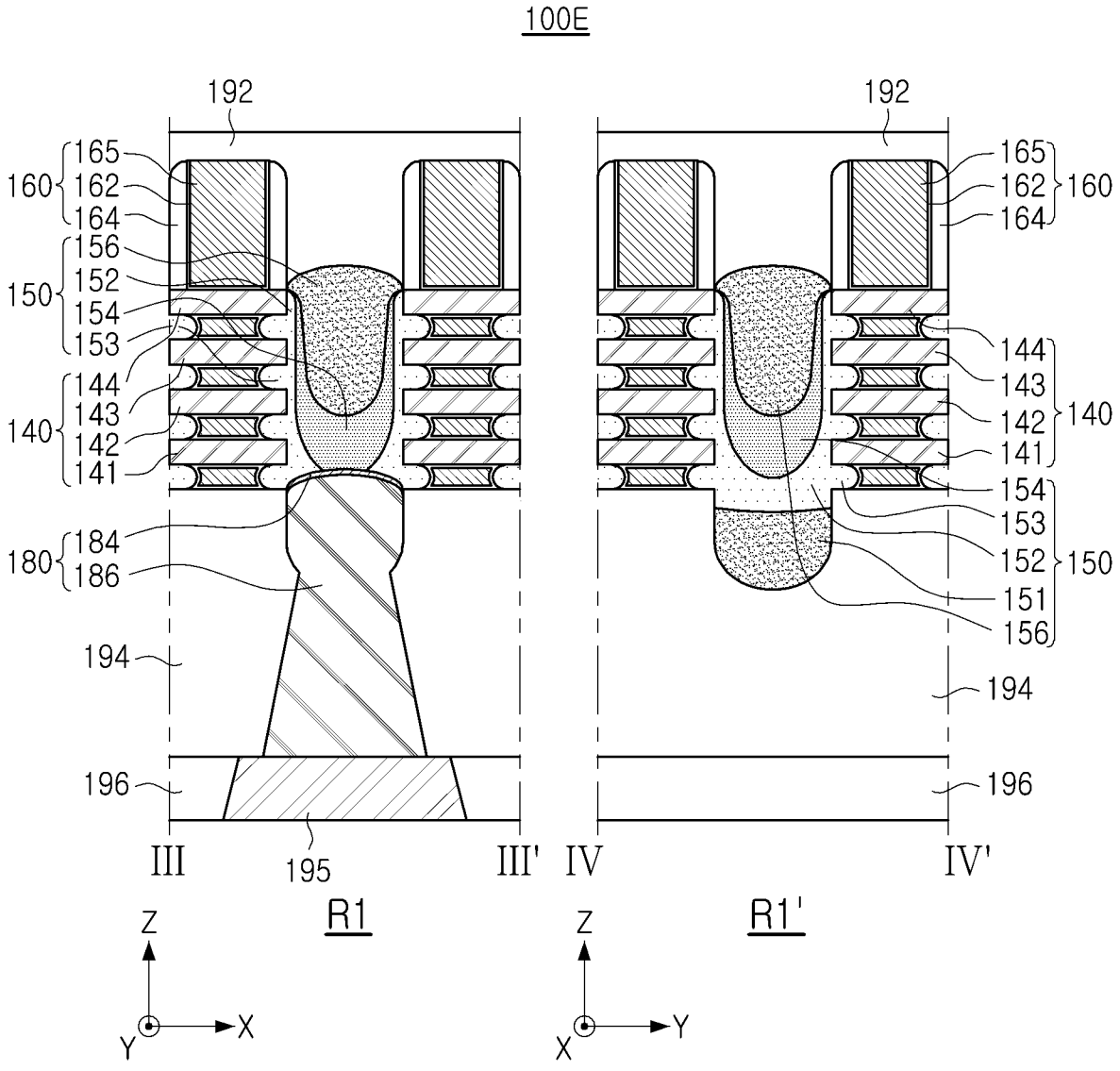

100E
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162
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152
154
153
150
144
143
142
141
140
184
186
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194
196
III
195
III'
IV
IV'
R1
R1'
Z
X
Y
Z
Y
X

FIG. 8

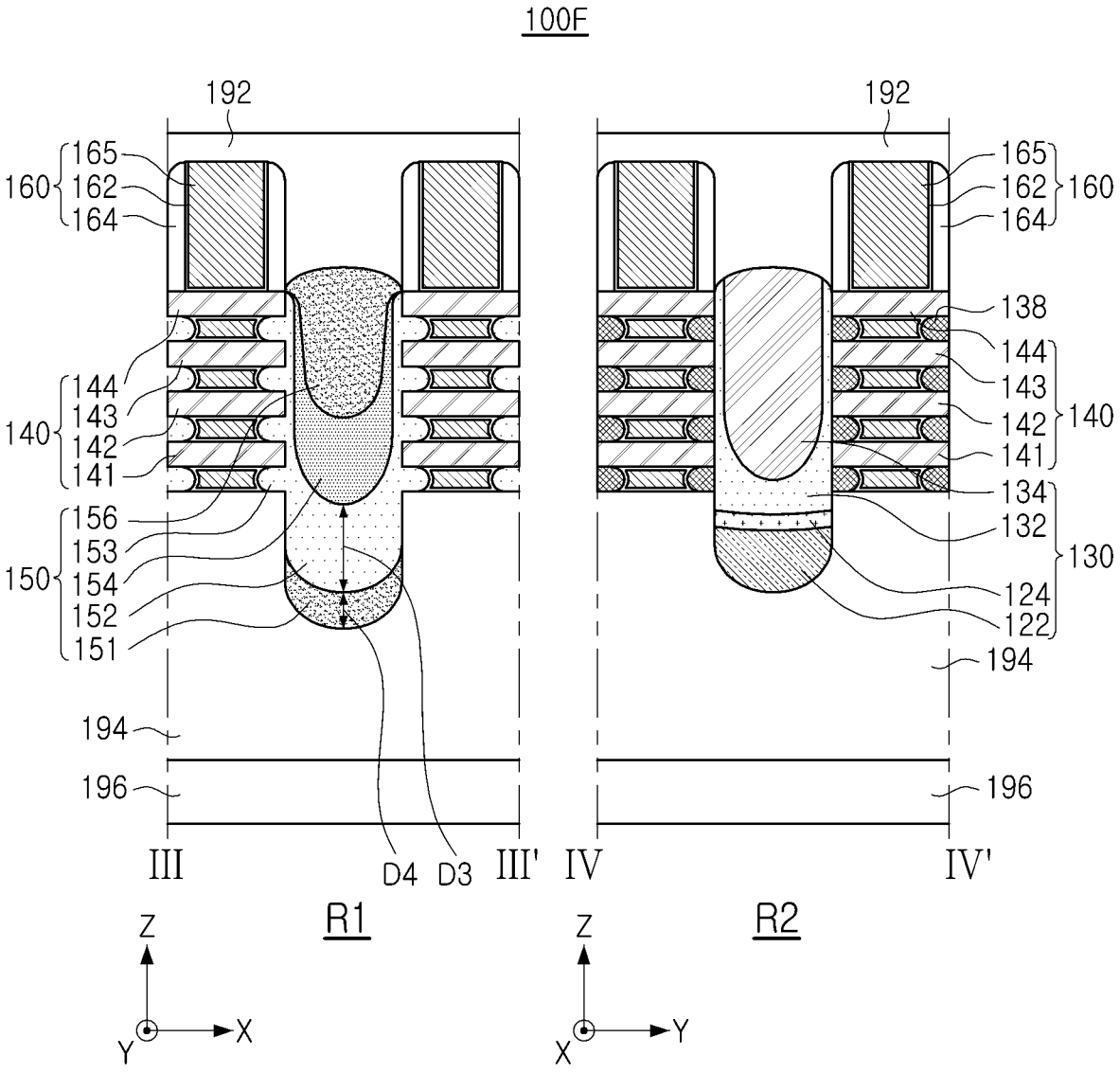

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165
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140
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142
141
140
134
132
130
156
153
154
152
151
150
124
122
194
194
196
196
III
D4
D3
III'
IV
IV'
R1
R2
Z
X
Y
Z
Y
X

FIG. 9

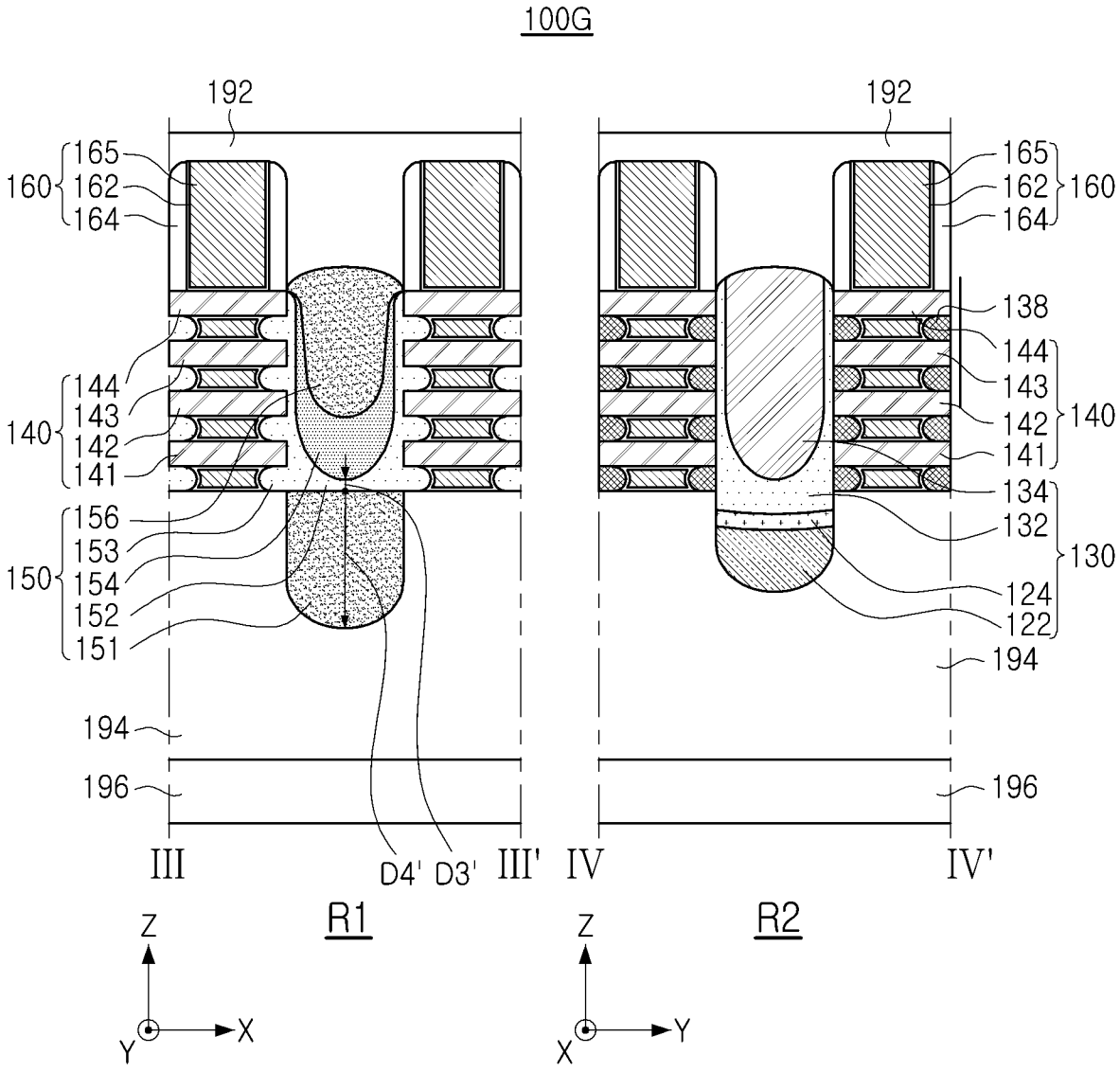

100G
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140
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142
141
140
134
132
130
156
153
154
152
151
150
124
122
194
194
196
196
III
D4'
D3'
III'
IV
IV'
R1
R2
Z
X
Y
Z
Y
X

FIG. 10

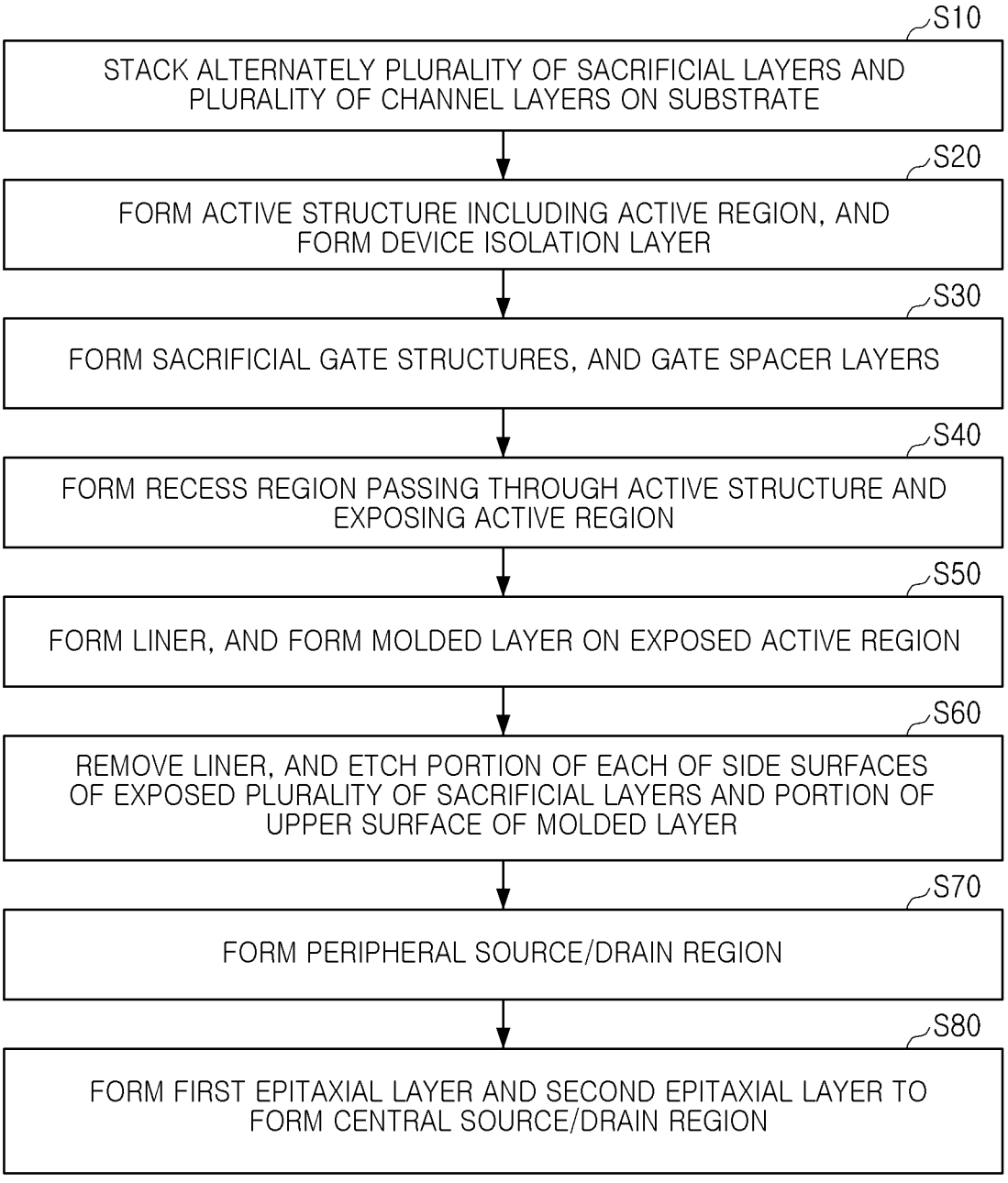

S10
STACK ALTERNATELY PLURALITY OF SACRIFICIAL LAYERS AND PLURALITY OF CHANNEL LAYERS ON SUBSTRATE
S20
FORM ACTIVE STRUCTURE INCLUDING ACTIVE REGION, AND FORM DEVICE ISOLATION LAYER
S30
FORM SACRIFICIAL GATE STRUCTURES, AND GATE SPACER LAYERS
S40
FORM RECESS REGION PASSING THROUGH ACTIVE STRUCTURE AND EXPOSING ACTIVE REGION
S50
FORM LINER, AND FORM MOLDED LAYER ON EXPOSED ACTIVE REGION
S60
REMOVE LINER, AND ETCH PORTION OF EACH OF SIDE SURFACES OF EXPOSED PLURALITY OF SACRIFICIAL LAYERS AND PORTION OF UPPER SURFACE OF MOLDED LAYER
S70
FORM PERIPHERAL SOURCE/DRAIN REGION
S80
FORM FIRST EPITAXIAL LAYER AND SECOND EPITAXIAL LAYER TO FORM CENTRAL SOURCE/DRAIN REGION

FIG. 11A

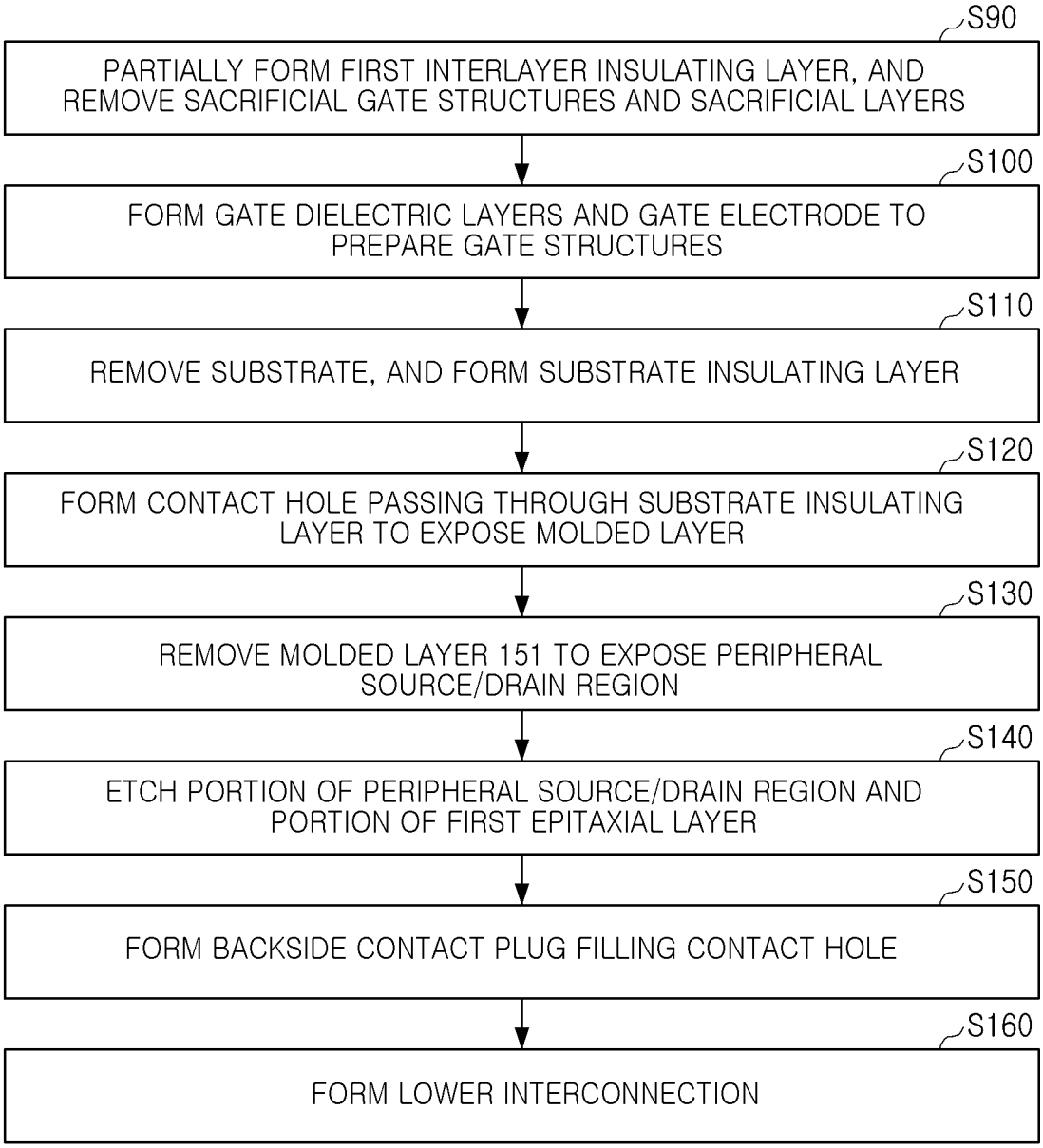

S90
PARTIALLY FORM FIRST INTERLAYER INSULATING LAYER, AND REMOVE SACRIFICIAL GATE STRUCTURES AND SACRIFICIAL LAYERS
S100
FORM GATE DIELECTRIC LAYERS AND GATE ELECTRODE TO PREPARE GATE STRUCTURES
S110
REMOVE SUBSTRATE, AND FORM SUBSTRATE INSULATING LAYER
S120
FORM CONTACT HOLE PASSING THROUGH SUBSTRATE INSULATING LAYER TO EXPOSE MOLDED LAYER
S130
REMOVE MOLDED LAYER 151 TO EXPOSE PERIPHERAL SOURCE/DRAIN REGION
S140
ETCH PORTION OF PERIPHERAL SOURCE/DRAIN REGION AND PORTION OF FIRST EPITAXIAL LAYER
S150
FORM BACKSIDE CONTACT PLUG FILLING CONTACT HOLE
S160
FORM LOWER INTERCONNECTION

FIG. 11B

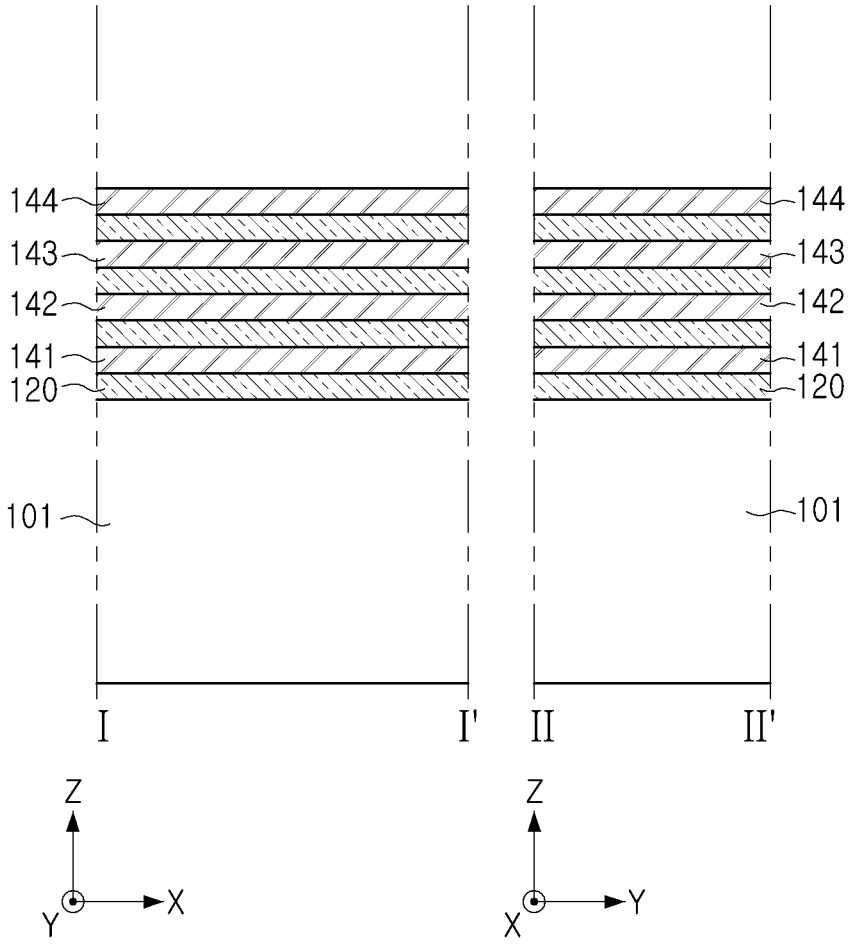


FIG. 12A

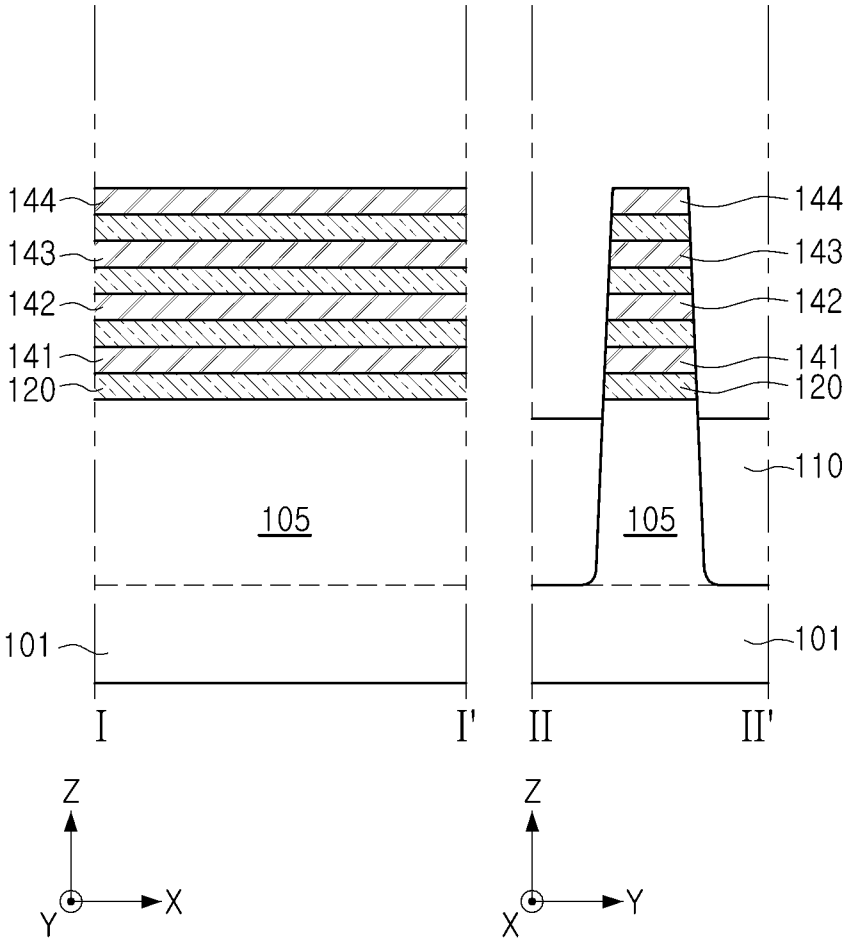

144
143
142
141
120
105
101
I
I'
144
143
142
141
120
110
105
101
II
II'
Z
Y
X
Z
X
Y

FIG. 12B

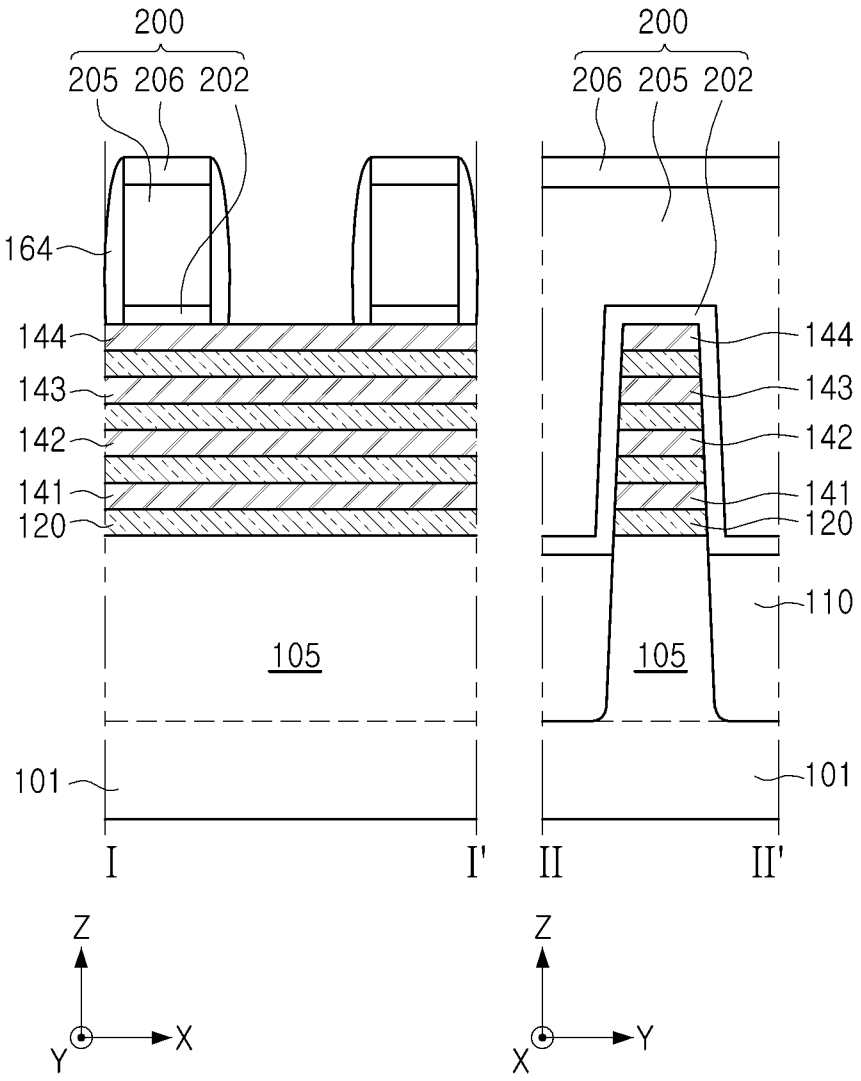

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205 206 202
164
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143
142
141
120
105
101
I
I'
200
206 205 202
144
143
142
141
120
110
105
101
II
II'
Z
X
Y
Z
Y
X

FIG. 12C

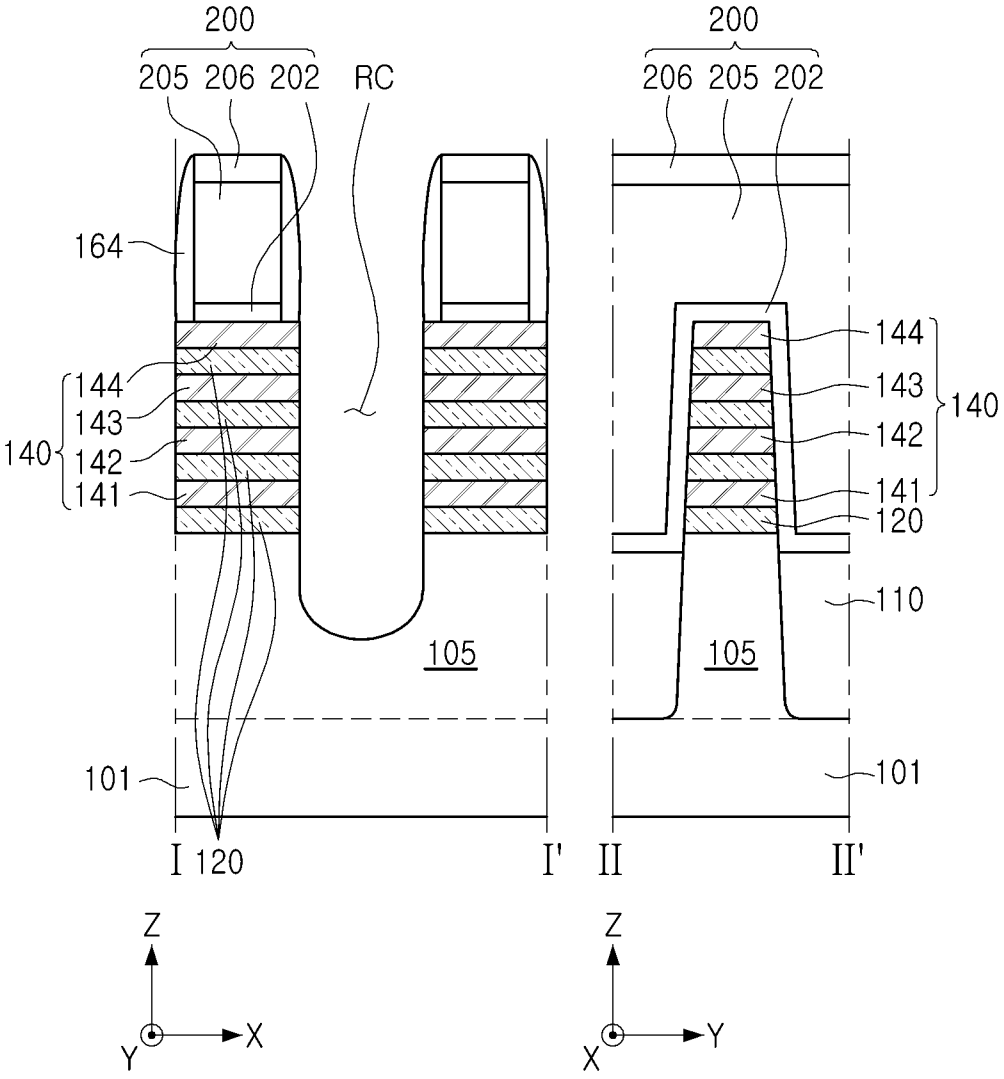

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205 206 202
RC
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143
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142
141
105
101
I 120
I'
200
206 205 202
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120
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105
101
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II'
Z
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Y
Z
Y
X

FIG. 12D

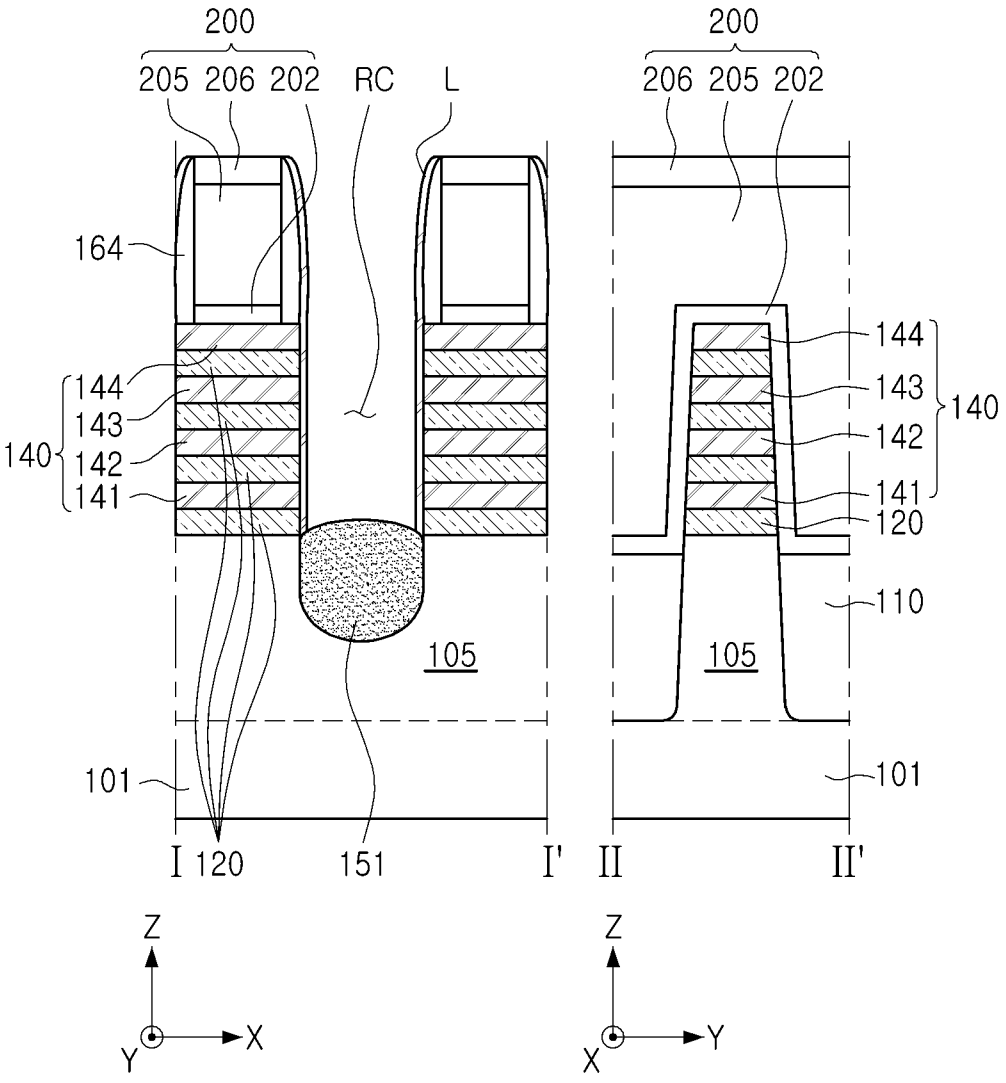

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205 206 202
RC
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164
144
143
140
142
141
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101
I
120
151
I'
Z
Y
X
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144
143
140
142
141
120
110
105
101
II
II'
Z
X
Y

FIG. 12E

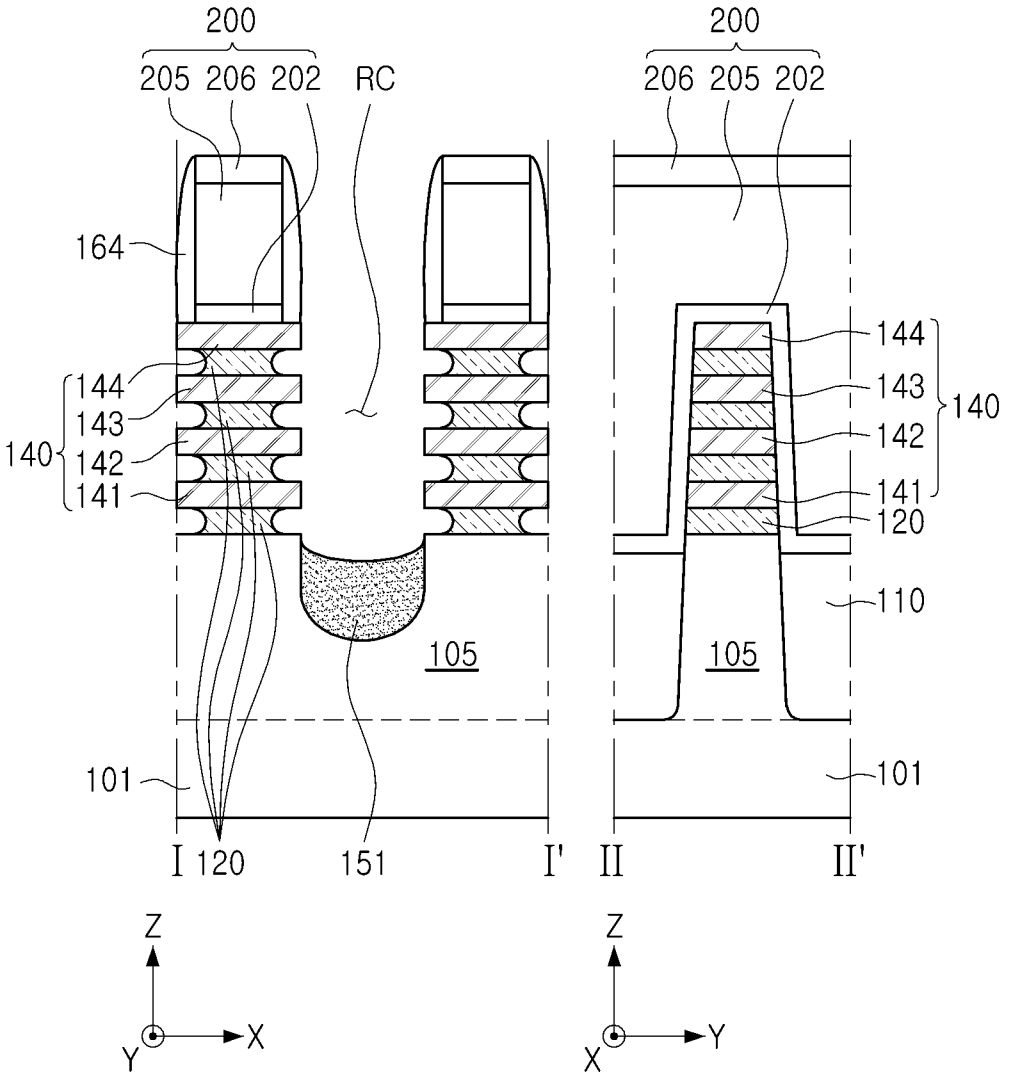

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205 206 202
RC
164
144
143
140
142
141
105
101
I 120
151
I'
200
206 205 202
144
143
140
142
141
120
110
105
101
II
II'
Z
X
Y
Z
Y
X

FIG. 12F

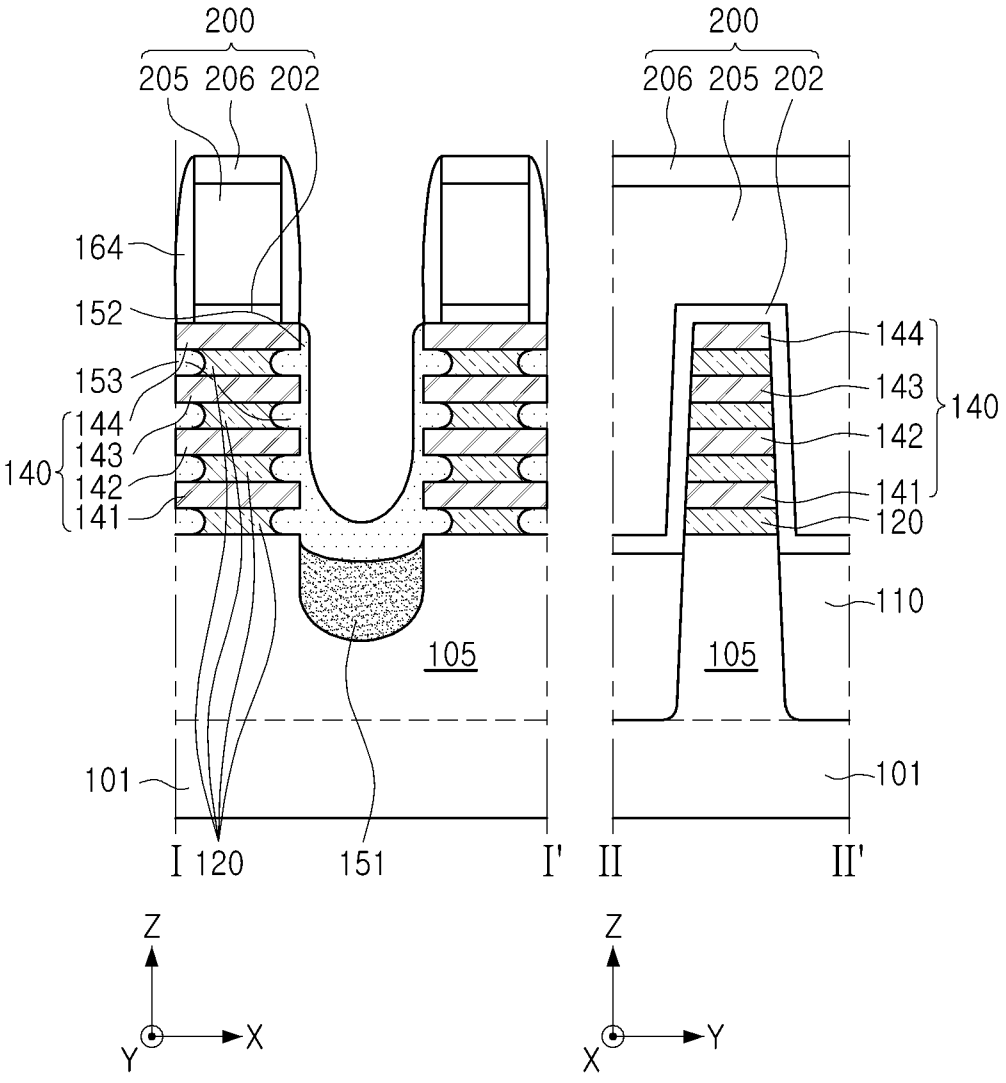

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205 206 202
164
152
153
144
143
142
141
140
105
101
I
120
151
I'
Z
Y
X
200
206 205 202
144
143
142
141
140
120
110
105
101
II
II'
Z
X
Y

FIG. 12G

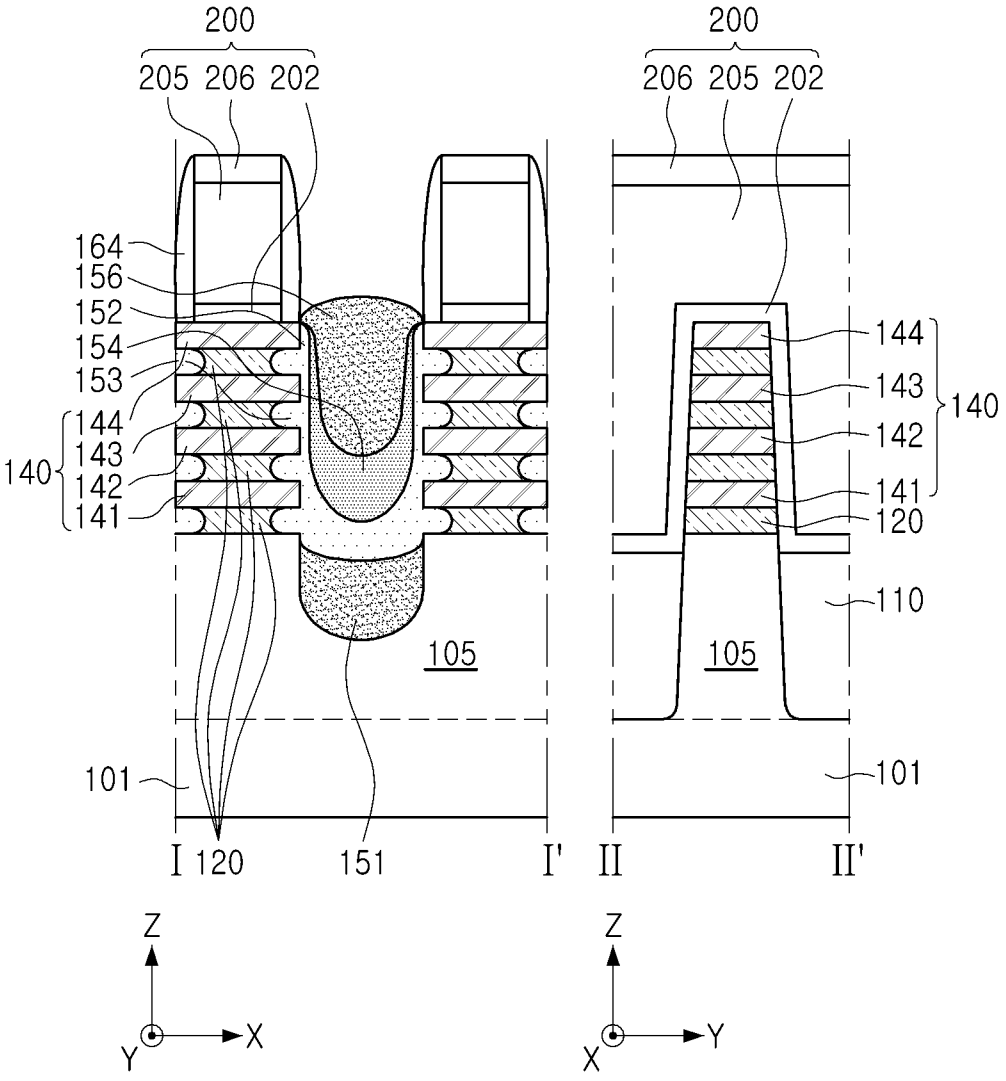

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205 206 202
164
156
152
154
153
144
143
142
141
140
105
101
I 120
151
I'
Z
Y
X
200
206 205 202
144
143
142
141
140
120
110
105
101
II
II'
Z
X
Y

FIG. 12H

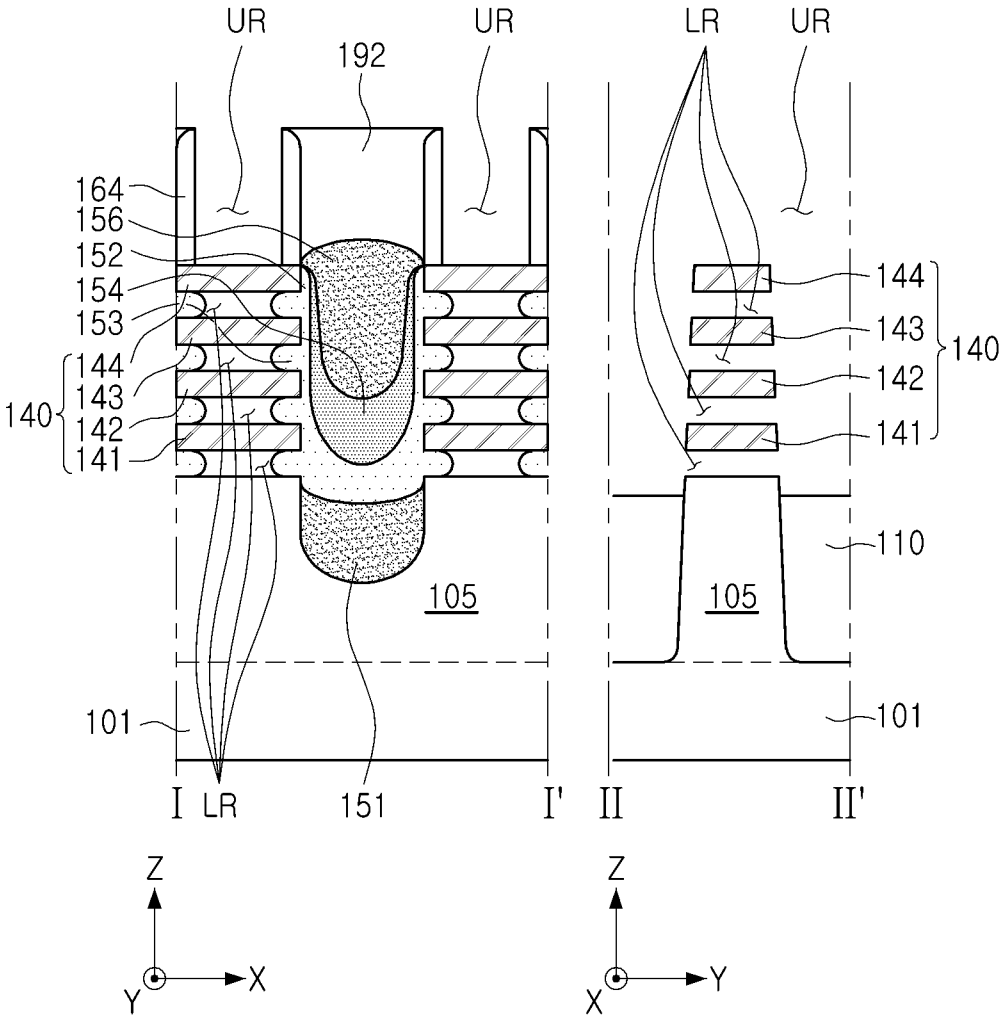

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LR
UR
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154
153
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143
142
141
140
144
143
142
141
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110
105
105
101
101
I
LR
151
I'
II
II'
Z
X
Y
Z
Y
X

FIG. 12I

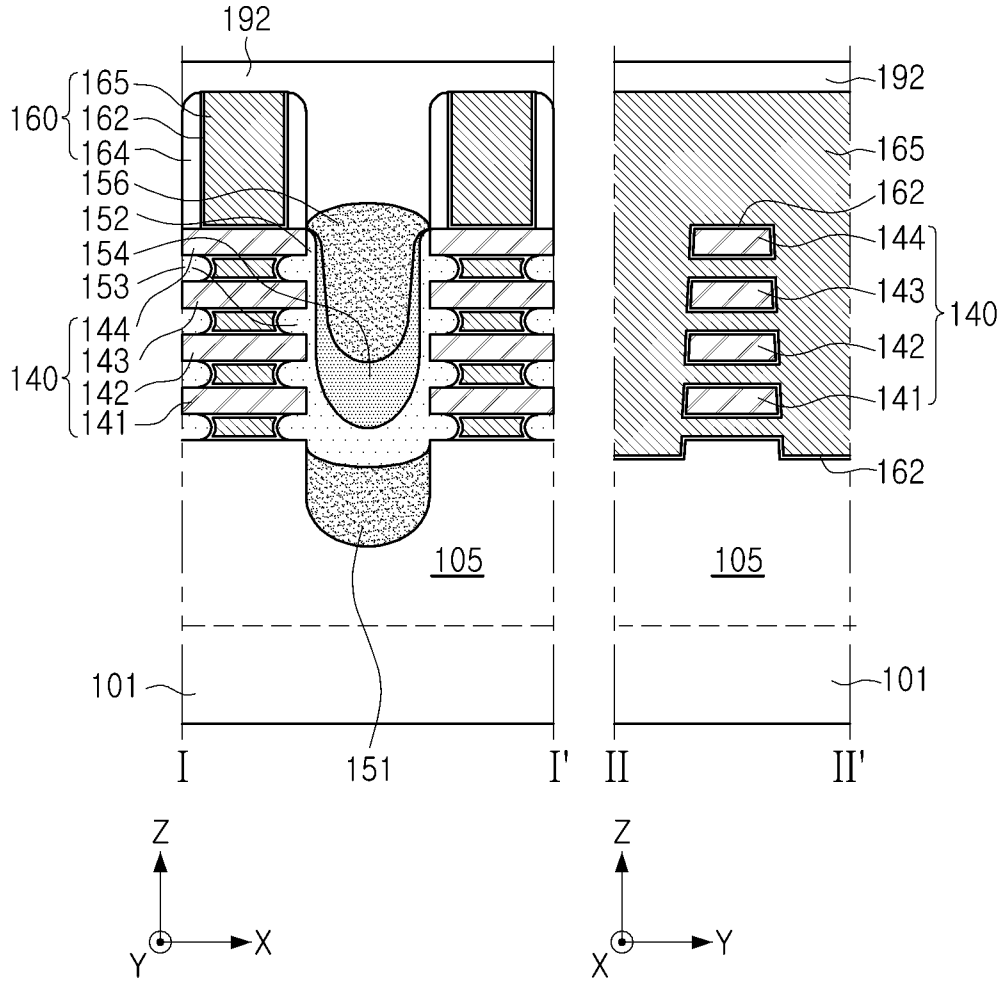

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151
I
I'
II
II'
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162
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141
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162
105
101
Z
X
Y

FIG. 12J

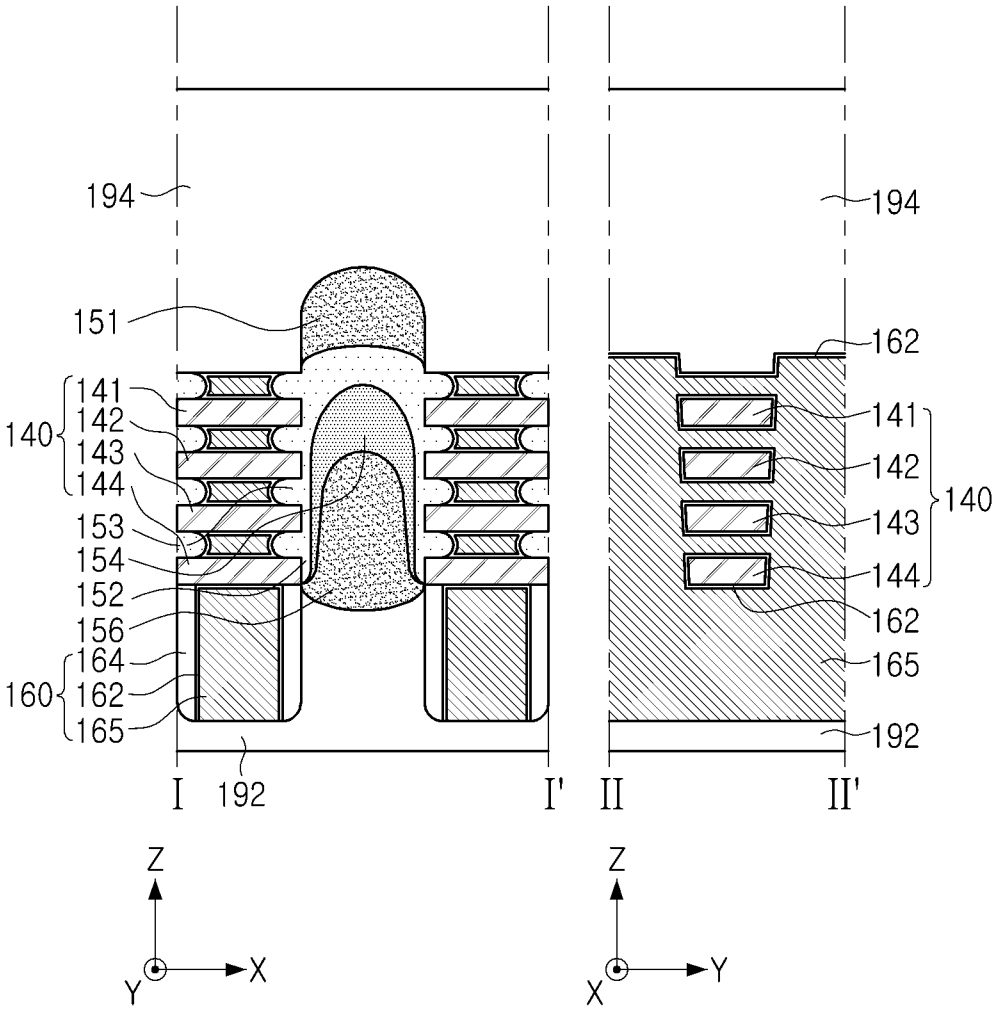

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164
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165
192
I
I'
II
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143
144
140
162
165
192

FIG. 12K

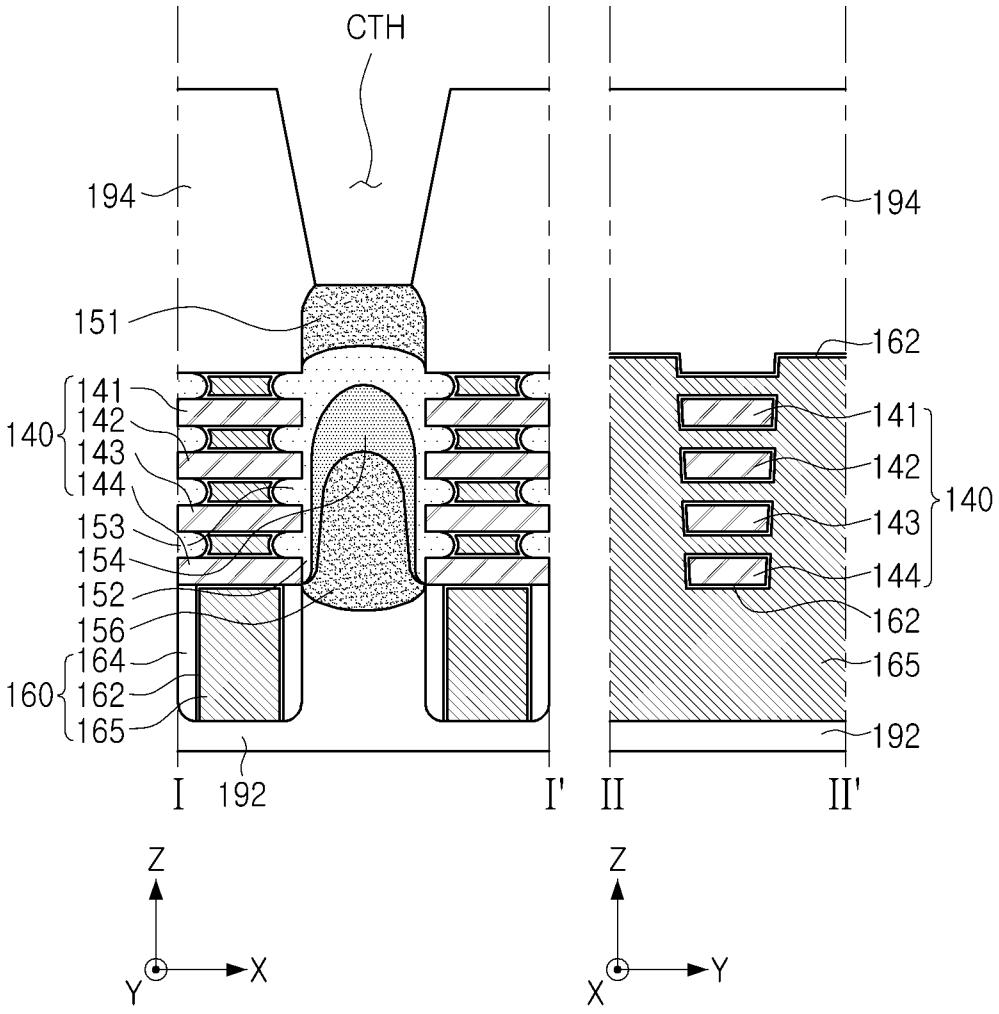

CTH
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165
160
192
I
I'
II
II'
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Y
Z
Y
X
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141
142
143
144
140
162
165
192

FIG. 12L

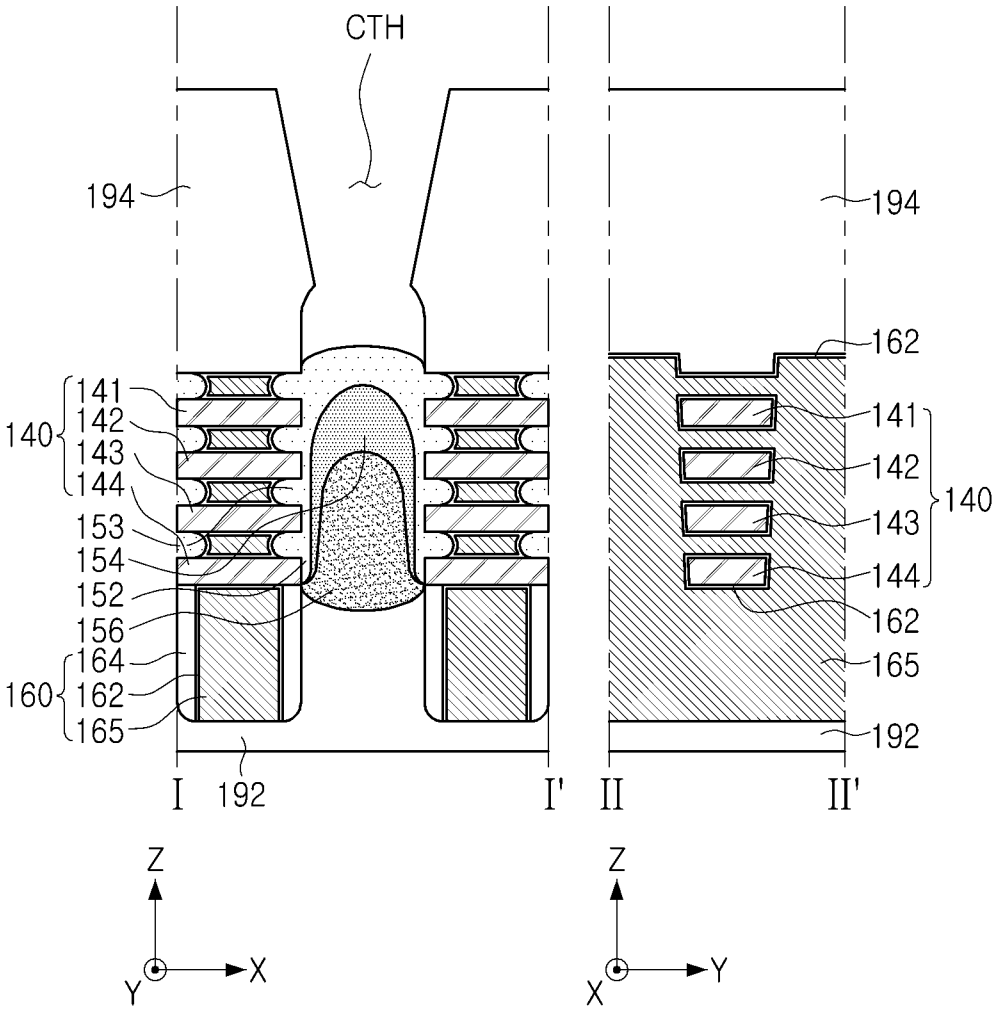

CTH
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142
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152
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164
162
165
160
141
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143
144
140
162
165
192
192
I
I'
II
II'
Z
X
Y
Z
Y
X

FIG. 12M

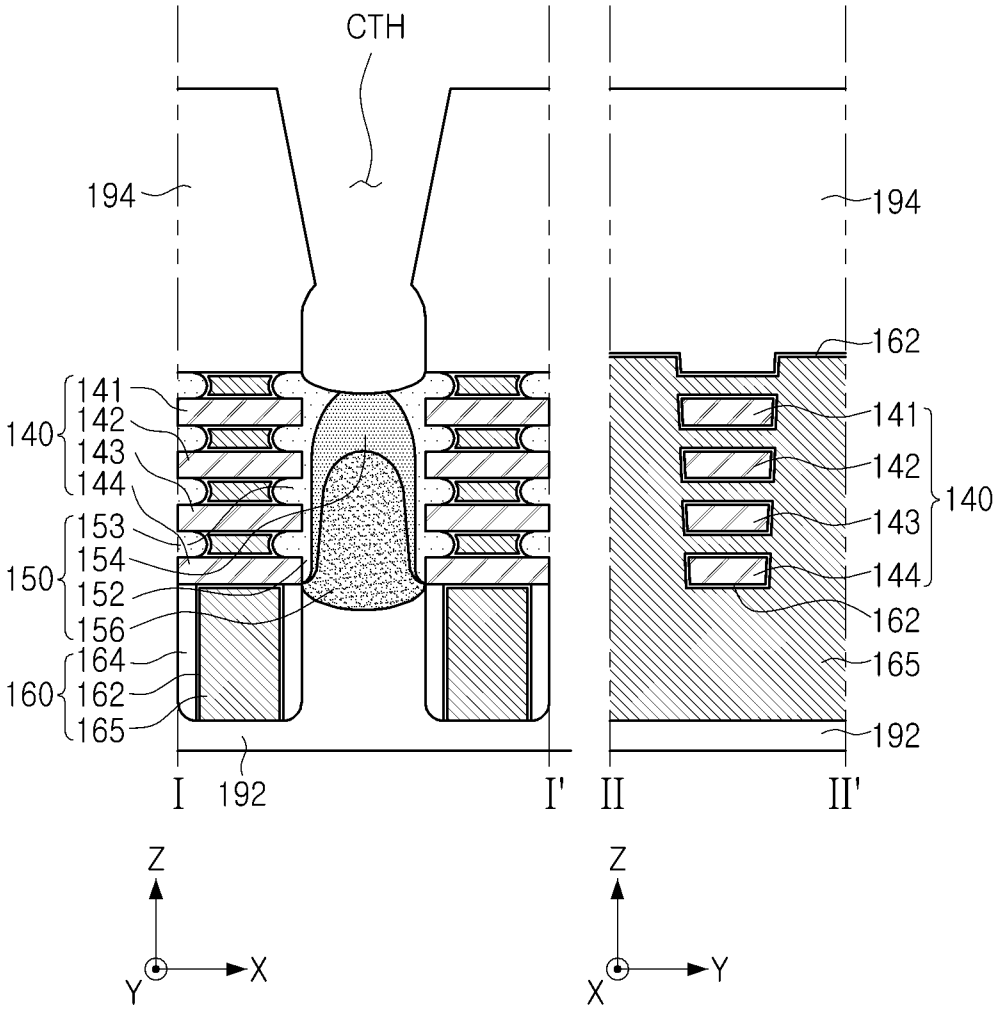

CTH
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165
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165
192
192
I
I'
II
II'
Z
X
Y
Z
Y
X

FIG. 12N

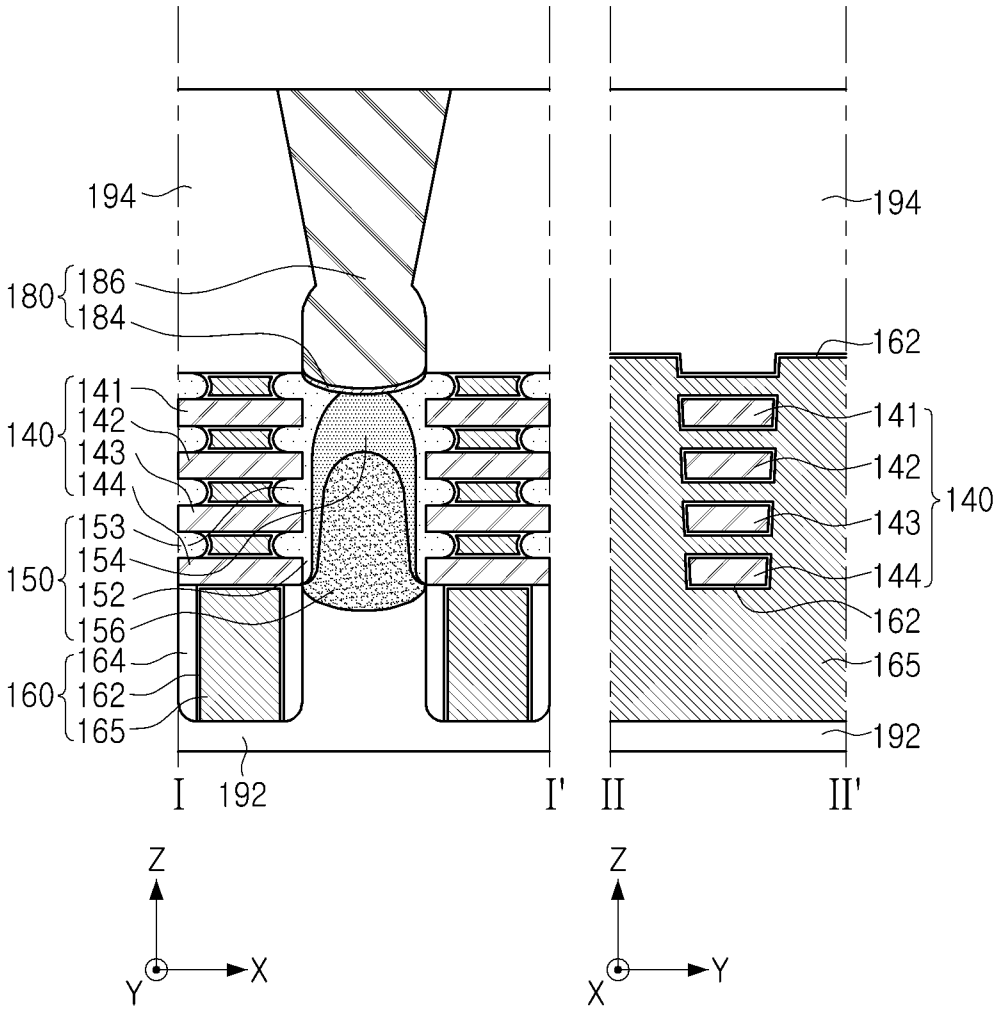

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192
I
I'
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II'
Z
X
Y
Z
Y
X
194
162
141
142
143
144
140
162
165
192

FIG. 120