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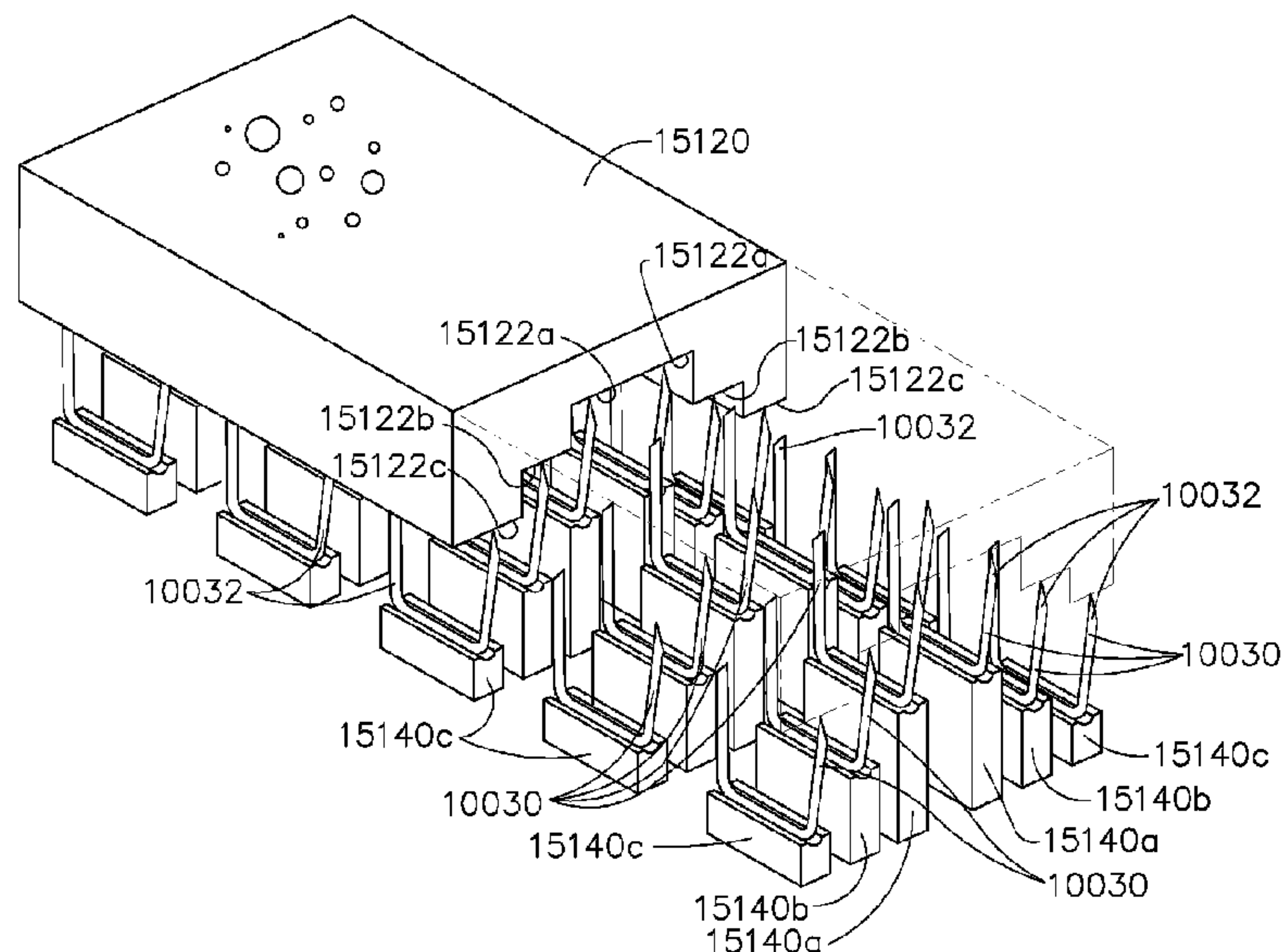
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(54) Title: TISSUE THICKNESS COMPENSATOR COMPRISING PORTIONS HAVING DIFFERENT PROPERTIES



(57) Abrégé/Abstract:

A fastener cartridge can comprise a support portion, a tissue thickness compensator positioned relative to the support portion, and a plurality of fasteners positioned within the support portion and/or the tissue thickness compensator which can be utilized to fasten tissue. In use, the fastener cartridge can be positioned in a first jaw of a surgical fastening device, wherein a second jaw, or anvil, can be positioned opposite the first jaw. To deploy the fasteners, a staple-deploying member is advanced through the fastener cartridge to move the fasteners toward the anvil. As the fasteners are deployed, the fasteners can capture at least a portion of the tissue thickness compensator therein along with at least a portion of the tissue being fastened.

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(54) Title: TISSUE THICKNESS COMPENSATOR COMPRISING PORTIONS HAVING DIFFERENT PROPERTIES

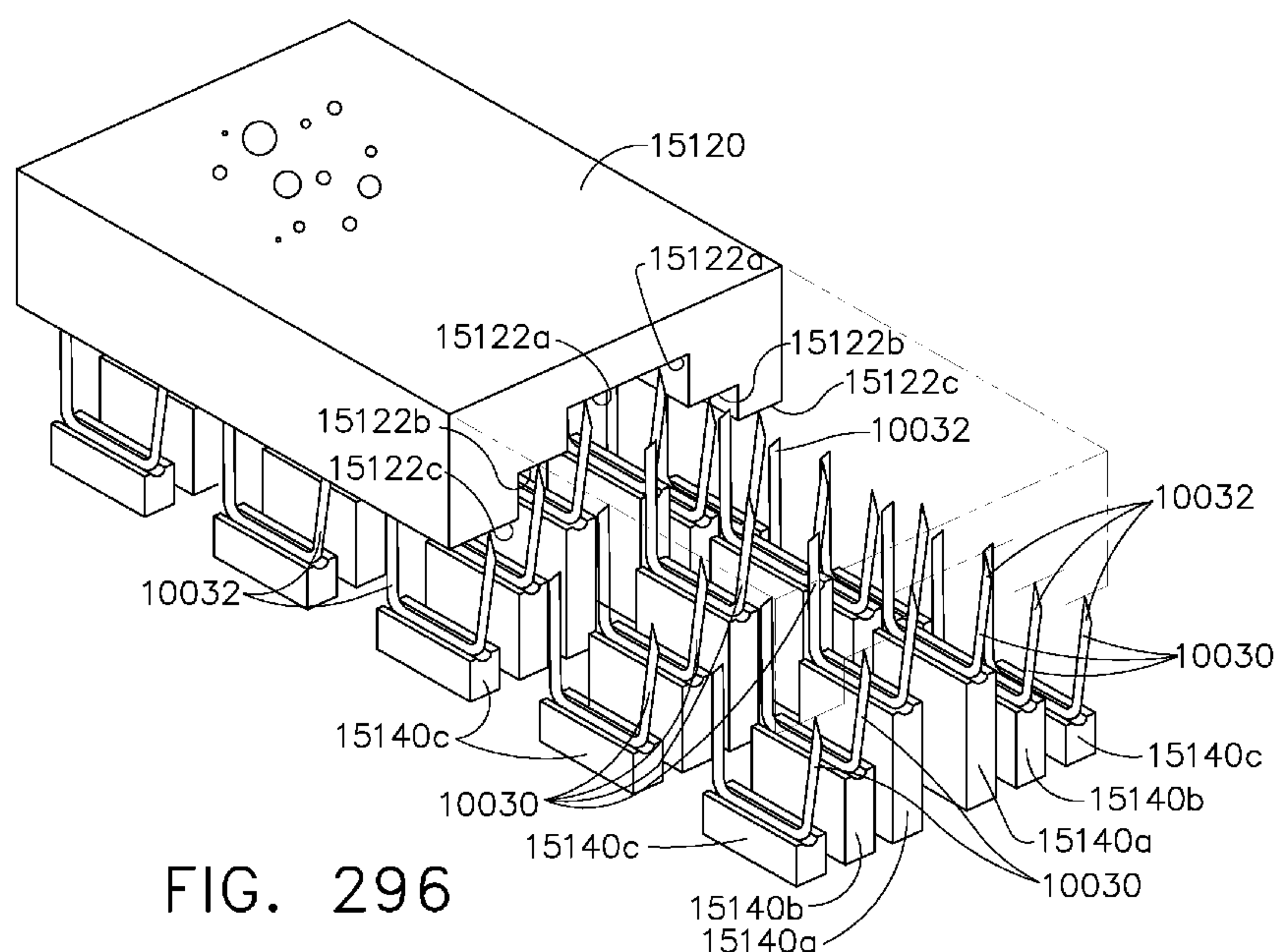


FIG. 296

(57) Abstract: A fastener cartridge can comprise a support portion, a tissue thickness compensator positioned relative to the support portion, and a plurality of fasteners positioned within the support portion and/or the tissue thickness compensator which can be utilized to fasten tissue. In use, the fastener cartridge can be positioned in a first jaw of a surgical fastening device, wherein a second jaw, or anvil, can be positioned opposite the first jaw. To deploy the fasteners, a staple-deploying member is advanced through the fastener cartridge to move the fasteners toward the anvil. As the fasteners are deployed, the fasteners can capture at least a portion of the tissue thickness compensator therein along with at least a portion of the tissue being fastened.

WO 2012/148698 A3



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WHAT IS CLAIMED IS:

1. An end effector for use with a surgical stapler, said end effector comprising:
 - a frame;
 - an implantable compressible portion, wherein said compressible portion comprises a stepped surface comprising a first step comprising a first thickness and a second step comprising a second thickness, and wherein said first thickness is different than said second thickness;
 - an anvil fixed relative to said frame;
 - a staple cartridge rotatable relative to said anvil, wherein said compressible portion is positioned intermediate said fixed anvil and said staple cartridge, and wherein said staple cartridge comprises:
 - a cartridge body, comprising:
 - a proximal end;
 - a distal end;
 - a deck extending between said proximal end and said distal end; and
 - a plurality of staple cavities defined within said deck, wherein said staple cavities are positioned along at least two staple forming paths defined between said proximal end and said distal end, wherein said first thickness and said second thickness of said implantable compressible portion are positioned along at least one of said at least two staple forming paths, and wherein each said staple cavity comprises an opening in said deck; and wherein each said staple cavity further comprises:
 - a proximal guide surface extending from said deck into said
 - cartridge body; and

a distal guide surface extending from said deck into said cartridge body;

a plurality of drivers, wherein each said driver comprises a top surface and a staple-supporting cradle defined into said top surface, wherein each said driver is moveable between an unfired driver position and a fired driver position during a firing stroke, wherein said top surface of each said driver is positioned below said deck when said driver is in said unfired driver position, wherein at least a portion of said top surface of each said driver is positioned above said deck when said driver is in said fired driver position, wherein each said opening in said deck is positioned and dimensioned to receive one of said top surface of one of said driver, wherein said plurality of drivers comprises a first driver and a second driver, wherein said top surface of said first driver is positioned a first distance above said deck when said first driver is in said fired driver position, wherein said top surface of said second driver is positioned a second distance above said deck when said second driver is in said fired driver position, wherein said drivers push said implantable compressible portion away from said deck when said drivers are progressively moved to said fired driver positions during said firing stroke, and wherein said implantable compressible portion is progressively released from said cartridge body during said firing stroke;

wherein at least two said drivers are connected, and wherein said at least two drivers comprises one of said driver positioned along each of said at least two staple forming paths, wherein said at least two drivers comprises a distal driver and a proximal driver, and wherein said proximal driver is positioned laterally outboard of said distal driver; and wherein said staple cartridge further comprises:

a plurality of staples, wherein each said staple comprises:

a proximal leg; and

a distal leg extending non-parallelly relative to said proximal leg;

wherein at least a portion of each said staple is removably stored within one of said staple cavity relative to a corresponding said driver, wherein each said proximal leg is positioned in abutting engagement with one of said proximal guide surface, and wherein each said distal leg is positioned in abutting engagement with one of said distal guide surface;

wherein each said staple is movable between an unfired staple position and a fired staple position when said corresponding driver is moved between said unfired driver position and said fired driver position, wherein each said staple is deformable between an unfired configuration and a fired configuration when each said staple is moved between said unfired staple position and said fired staple position, wherein said compressible portion is captured within said staples and assume different compressed heights within at least two said staples when said staples are deformed between said unfired configuration and said fired configuration, and wherein said plurality of staples comprises:

a first portion of staples, wherein each said staple of said first portion of staples comprises a first undeformed height when in said unfired configuration and a first deformed height when in said fired configuration; and

second portion of staples, wherein each said staple of said second portion of staples comprises a second undeformed height when in said unfired configuration and a second deformed height when in said fired configuration, wherein said first undeformed height is different than said second undeformed

height, wherein said first deformed height is different than said second deformed height; and wherein said end effector further comprises:

a sled for translating between said proximal end and said distal end to move each said driver between said unfired driver position and said fired driver position during said firing stroke; and

a cutting element for translating between said proximal end and said distal end.

2. An end effector for use with a surgical stapler, said end effector comprising:

a frame;

an anvil fixed relative to said frame;

a staple cartridge rotatable relative to said anvil, wherein said staple cartridge comprises:

a cartridge body, comprising:

a proximal end;

a distal end;

a deck extending between said proximal end and said distal end, wherein said deck comprises an undulating surface comprising a plurality of crests and a plurality of valleys; and

a plurality of staple cavities defined within said deck, wherein said staple cavities are positioned along at least two staple forming paths defined between said proximal end and said distal end, wherein said crests and valleys are positioned along said at least two staple forming paths, wherein each said staple cavity comprises an opening in said deck, wherein at least one said staple cavity opening is defined in one of said crest and at least one said staple

cavity opening is defined in one of said valley, and wherein each said staple cavity further comprises:

proximal guide surface extending from said deck into said cartridge body; and

a distal guide surface extending from said deck into said cartridge body;

an implantable compressible portion positioned adjacent to said deck, wherein said compressible portion conforms to said undulating surface;

a plurality of drivers, wherein each said driver comprises a top surface and a staple-supporting cradle defined into said top surface, wherein each said driver is moveable between an unfired driver position and a fired driver position during a firing stroke, wherein said top surface of each said driver is positioned below said deck when said driver is in said unfired driver position, wherein at least a portion of said top surface of each said driver is positioned above said deck when said driver is in said fired driver position, wherein each said opening in said deck is positioned and dimensioned to receive one of said top surface of one of said driver, wherein said plurality of drivers comprises a first driver and a second driver, wherein said top surface of said first driver is positioned a first distance above said deck when said first driver is in said fired driver position, wherein said top surface of said second driver is positioned a second distance above said deck when said second driver is in said fired driver position, wherein said drivers push said implantable compressible portion away from said deck when said drivers are progressively moved to said fired driver positions during said firing stroke, and wherein

said implantable compressible portion is progressively released from said cartridge body during said firing stroke;

wherein at least two drivers are connected, and wherein said at least two drivers comprises one of said driver positioned along each of said at least two staple forming paths, wherein said at least two drivers comprises a distal driver and a proximal driver, and wherein said proximal driver is positioned laterally outboard of said distal driver; and wherein said staple cartridge further comprises:

a plurality of staples, wherein each said staple comprises:

a proximal leg; and

a distal leg extending non-parallelly relative to said proximal leg;

wherein at least a portion of each said staple is removably stored within one of said staple cavity relative to a corresponding said driver, wherein each said proximal leg is positioned in abutting engagement with one of said proximal guide surface, and wherein each said distal leg is positioned in abutting engagement with one of said distal guide surface;

wherein each said staple is movable between an unfired staple position and a fired staple position when said corresponding driver is moved between said unfired driver position and said fired driver position, wherein each said staple is deformable between an unfired configuration and a fired configuration when each said staple is moved between said unfired staple position and said fired staple position, wherein said compressible portion is captured within said staples and assume different compressed heights within at least two said staples when said staples are deformed between said unfired configuration and said fired configuration, and wherein said plurality of staples comprises:

a first group of staples, wherein each said staple of said first group of staples comprises a first undeformed height when in said unfired configuration and a first deformed height when in said fired configuration; and

a second group of staples, wherein each said staple of said second group of staples comprises a second undeformed height when in said unfired configuration and a second deformed height when in said fired configuration, wherein said first undeformed height is different than said second undeformed height, and wherein said first deformed height is different than said second deformed height; and wherein said end effector further comprises:

a sled for translating between said proximal end and said distal end to move each said driver between said unfired driver position and said fired driver position during said firing stroke; and

a cutting element for translating between said proximal end and said distal end.

3. An end effector for use with a surgical stapler, said end effector comprising:

a frame;

an anvil fixed relative to said frame;

a staple cartridge rotatable relative to said anvil, wherein said staple cartridge comprises:

a cartridge body, comprising:

a proximal end;

a distal end;

a deck; and

a plurality of staple cavities defined within said deck, wherein said staple cavities are positioned along at least two staple forming paths, and wherein each said staple cavity comprises an opening in said deck, wherein each said staple cavity further comprises:

a proximal guide surface extending from said deck into said cartridge body; and

a distal guide surface extending from said deck into said cartridge body;

a plurality of drivers, wherein each said driver comprises a top surface and a staple-supporting cradle defined into said top surface, wherein each said driver is moveable between a unfired driver position and a fired driver position during a firing stroke, wherein said top surface of each said driver is positioned below said deck when said driver is in said unfired driver position, wherein at least a portion of said top surface of each said driver is positioned above said deck when said driver is in said fired driver position, wherein each said opening in said deck is positioned and dimensioned to receive one of said top surface of one of said driver, wherein said plurality of drivers comprises a first driver and a second driver, wherein said top surface of said first driver is positioned a first distance above said deck when said first driver is in said fired driver position, and wherein said top surface of said second driver is positioned a second distance above said deck when said second driver is in said fired driver position;

wherein at least two said drivers are connected, and wherein said at least two drivers comprises one of said driver positioned along each of said at least two staple forming paths, wherein said at least two drivers comprises a distal driver and a proximal

driver, and wherein said proximal driver is positioned laterally outboard of said distal driver; and wherein said staple cartridge further comprises:

a plurality of staples, wherein each said staple comprises:

a proximal leg; and

a distal leg extending non-parallelly relative to said proximal leg;

wherein at least a portion of each said staple is removably stored within one of said staple cavity relative to a corresponding said driver, wherein each said proximal leg is positioned in abutting engagement with one of said proximal guide surface, and wherein each said distal leg is positioned in abutting engagement with one of said distal guide surface;

wherein each said staple is movable between an unfired staple position and a fired staple position when said corresponding driver is moved between said unfired driver position and said fired driver position, wherein each said staple is deformable between an unfired configuration and a fired configuration when each said staple is moved between said unfired staple position and said fired staple position, and wherein said plurality of staples comprises:

a first group of staples, wherein each said staple of said first group of staples comprises a first undeformed height when in said unfired configuration and a first deformed height when in said fired configuration; and

a second group of staples, wherein each said staple of said second group of staples comprises a second undeformed height when in said unfired configuration and a second deformed height when in said fired configuration, wherein said first

undeformed height is different than said second undeformed height; and wherein
said end effector further comprises:

a support surface;

an implantable compressible portion positioned adjacent to said support surface, wherein
said compressible portion conforms to said support surface, wherein said compressible portion
comprises at least one void defined therein, and wherein said at least one void is positioned along
at least one of said at least two staple forming paths, and wherein said compressible portion is
captured within said staples and assume different compressed heights within at least two said
staples when said staples are deformed between said unfired configuration and said fired
configuration;

a sled for translating between said proximal end and said distal end to move each said
driver between said unfired driver position and said fired driver position during said firing
stroke, wherein said drivers push said implantable compressible portion away from said deck
when said drivers are progressively moved to said fired driver positions during said firing stroke,
and wherein said implantable compressible portion is progressively released from said cartridge
body during said firing stroke; and

a cutting element for translating between said proximal end and said distal end.

4. An end effector for use with a surgical stapler, said end effector comprising:

a frame;

an anvil fixed relative to said frame;

a staple cartridge rotatable relative to said anvil, wherein said staple cartridge comprises:

a cartridge body, comprising:

a proximal end;

a distal end;

a deck; and

a plurality of staple cavities defined within said deck, wherein each said staple cavity comprises an opening in said deck, wherein said staple cavities are arranged in a plurality of rows extending between said proximal end and said distal end, wherein said plurality of rows comprises a first row, a second row, and a third row, and wherein each said staple cavity further comprises:

a proximal guide surface extending from said deck into said

cartridge body; and

a distal guide surface extending from said deck into said cartridge

body;

a plurality of drivers, wherein each said driver comprises a top surface and a staple-supporting cradle defined into said top surface, wherein each said driver is moveable between an unfired driver position and a fired driver position during a firing stroke, wherein said top surface of each said driver is positioned below said deck when said driver is in said unfired driver position, wherein at least a portion of said top surface of each said driver is positioned above said deck when said driver is in said fired driver position, wherein each said opening in said deck is positioned and dimensioned to receive one of said top surface of one of said driver, and wherein said plurality of drivers comprises:

a first driver positioned in one of said staple cavity along said first row, wherein said top surface of said first driver is positioned a first distance above said deck when said first driver is in said fired driver position;

a second driver positioned in one of said staple cavity along said second row, wherein said top surface of said second driver is positioned a second distance above said deck when said second driver is in said fired driver position; and

a third driver positioned in one of said staple cavity along said third row, wherein said top surface of said third driver is positioned a third distance above said deck when said third driver is in said fired driver position, wherein said first driver, said second driver, and said third driver are connected, wherein said third row is laterally outboard of said second row, and wherein said third driver is proximal relative to said second driver; and wherein said staple cartridge further comprises:

a plurality of staples, wherein each said staple comprises:

a proximal leg; and

a distal leg extending non-parallelly relative to said proximal leg;

wherein at least a portion of each said staple is removably stored within one of said staple cavity relative to a corresponding said driver, wherein each said staple is movable between an unfired staple position and a fired staple position when said corresponding driver is moved between said unfired driver position and said fired driver position, wherein each said proximal guide surface is for guiding one of said proximal leg and each said distal guide surface is for guiding one of said distal leg as said staple moves

from said unfired staple position toward said fired staple position, wherein each said staple is deformable between an unfired configuration and a fired configuration when each said staple is moved between said unfired staple position and said fired staple position, and wherein said plurality of staples comprises:

a first group of staples, wherein each said staple of said first group of staples comprises a first undeformed height when in said unfired configuration and a first deformed height when in said fired configuration; and

a second group of staples, wherein each said staple of said second group of staples comprises a second undeformed height when in said unfired configuration and a second deformed height when in said fired configuration, wherein said first undeformed height is different than said second undeformed height, and wherein said first deformed height is different than said second deformed height; and wherein said end effector further comprises:

an implantable compressible portion positioned intermediate said fixed anvil and said staple cartridge, wherein said implantable compressible portion comprises a stepped surface, and wherein said compressible portion is captured within said staples when said staples are deformed to said fired configuration;

a sled for translating between said proximal end and said distal end to move each said driver between said unfired driver position and said fired driver position during said firing stroke, wherein said drivers push said implantable compressible portion away from said deck when said drivers are progressively moved to said fired driver positions during said firing stroke, and wherein said implantable compressible portion is progressively released from said cartridge body during said firing stroke; and

a cutting element for translating between said proximal end and said distal end.

5. An end effector for use with a surgical stapler, said end effector comprising:

a frame;

an anvil fixed relative to said frame;

a staple cartridge rotatable relative to said anvil, wherein said staple cartridge comprises:

a cartridge body, comprising:

a proximal end;

a distal end;

a deck; and

a plurality of staple cavities defined within said deck, wherein each said staple cavity comprises an opening in said deck, wherein said staple cavities are arranged in a plurality of rows extending between said proximal end and said distal end, wherein said plurality of rows comprises a first row and a second row, and wherein each said staple cavity further comprises:

a proximal guide surface extending from said deck into said

cartridge body; and

a distal guide surface extending from said deck into said cartridge

body;

a plurality of drivers, wherein each said driver comprises a top surface and a staple-supporting groove defined into said top surface, wherein each said driver is moveable between an unfired driver position and a fired driver position during a firing stroke, wherein said top surface of each said driver is positioned below said deck when

said driver is in said unfired driver position, wherein at least a portion of said top surface of each said driver extends above said deck when said driver is in said fired driver position, wherein each said opening in said deck is positioned and dimensioned to receive one of said top surface of one of said driver, and wherein said plurality of drivers comprises:

a first driver positioned in one of said staple cavity along said first row, wherein said top surface of said first driver is positioned a first distance above said deck when said first driver is in said fired driver position; and

a second driver positioned in one of said staple cavity along said second row, wherein said top surface of said second driver is positioned a second distance above said deck when said second driver is in said fired driver position, wherein said second row is laterally inboard of said first row, wherein said first driver and said second driver are connected, and wherein said second driver is distal relative to said first driver;

a plurality of staples, wherein each said staple comprises a pair of non-parallel legs, wherein each said pair of non-parallel legs comprises a proximal leg and a distal leg, wherein at least a portion of each said staple is removably stored within one of said staple cavity relative to a corresponding said driver, wherein each said proximal leg is positioned in abutting engagement with one of said proximal guide surface, and wherein each said distal leg is positioned in abutting engagement with one of said distal guide surface;

wherein each said staple is movable between an unfired staple position and a fired staple position when said corresponding driver is moved between said unfired driver position and said fired driver position, wherein each said staple is deformable between an unfired configuration and a fired configuration when each said staple is moved between said unfired staple position and said fired staple position, and wherein said plurality of staples comprises:

a first group of staples, wherein each said staple of said first group of staples comprises a first undeformed height when in said unfired configuration and a first deformed height when in said fired configuration; and

a second group of staples, wherein each said staple of said second group of staples comprises a second undeformed height when in said unfired configuration and a second deformed height when in said fired configuration, wherein said first undeformed height is different than said second undeformed height, and wherein said first deformed height is different than said second deformed height; and wherein said end effector further comprises:

a layer positioned intermediate said fixed anvil and said staple cartridge, wherein said layer comprises a stepped surface, wherein said layer is captured within said staples when said staples are deformed to said fired configuration, and wherein said layer comprises a variable thickness;

a sled for translating between said proximal end and said distal end to move each said driver from said unfired driver position to said fired driver position during said firing stroke, wherein said drivers push said layer away from said deck when said drivers are progressively moved to said fired driver positions during said firing stroke, and wherein said implantable

compressible portion is progressively released from said cartridge body during said firing stroke;
and

a cutting element for translating between said proximal end and said distal end.

6. An end effector for use with a surgical stapler, said end effector comprising:

a frame;

an anvil fixed relative to said frame;

a staple cartridge rotatable relative to said anvil, wherein said staple cartridge comprises:

a cartridge body, comprising:

a proximal end;

a distal end;

a deck; and

a plurality of staple cavities defined within said deck, wherein each said staple cavity comprises an opening in said deck, wherein said staple cavities are arranged in a plurality of rows extending between said proximal end and said distal end, wherein said plurality of rows comprises a first row and a second row, and wherein each said staple cavity further comprises:

a proximal guide surface extending from said deck into said cartridge body; and

a distal guide surface extending from said deck into said cartridge body; and

a plurality of drivers, wherein each said driver comprises a top surface and a cradle defined into said top surface, wherein each said driver is moveable between an

unfired driver position and a fired driver position during a firing stroke, wherein said top surface of each said driver is positioned below said deck when said driver is in said unfired driver position, wherein at least a portion of said top surface of each said driver extends above said deck when said driver is in said fired driver position, wherein each said opening in said deck is positioned and dimensioned to receive one of said top surface of one of said driver, and wherein said plurality of drivers comprises:

- a first driver positioned in one of said staple cavity along said first row, wherein said top surface of said first driver is positioned a first distance above said deck when said first driver is in said fired driver position; and

- a second driver positioned in one of said staple cavity along said second row, wherein said top surface of said second driver is positioned a second a distance above said deck when said second driver is in said fired driver position, wherein said second row is laterally inboard of said first row, wherein said first driver and said second driver are connected, and wherein said second driver is distal relative to said first driver;

synergistic means for compressing tissue, comprising:

- a layer positioned intermediate said fixed anvil and said staple cartridge, wherein said layer comprises a stepped surface, and wherein said layer comprises a variable thickness; and

- a plurality of staples, wherein each said staple comprises:

- a proximal leg; and

- a distal leg extending non-parallelly with respect to said proximal leg;

wherein at least a portion of each said staple is removably stored within one of said staple cavity relative to a corresponding said driver, wherein each said proximal leg is positioned in abutting engagement with one of said proximal guide surface, and wherein each said distal leg is positioned in abutting engagement with one of said distal guide surface;

wherein each said staple is movable between an unfired staple position and a fired staple position when said corresponding driver is moved between said unfired driver position and said fired driver position, wherein each said staple is deformable between an unfired configuration and a fired configuration when each said staple is moved between said unfired staple position and said fired staple position, wherein said layer is captured within said staples when said staples are deformed to said fired configuration, and wherein said plurality of staples comprises:

a first group of staples, wherein each said staple of said first group of staples comprises a first undeformed height when in said unfired configuration and a first deformed height when in said fired configuration; and

a second group of staples, wherein each said staple of said second group of staples comprises a second undeformed height when in said unfired configuration and a second deformed height when in said fired configuration, wherein said first undeformed height is different than said second undeformed height, and wherein said first deformed height is different than said second deformed height; and wherein said end effector further comprises:

a sled for translating between said proximal end and said distal end to move each said driver from said unfired driver position to said fired driver position during said firing stroke,

wherein said drivers push said layer away from said deck when said drivers are progressively moved to said fired driver positions during said firing stroke, and wherein said implantable compressible portion is progressively released from said cartridge body during said firing stroke; and

a cutting element for translating between said proximal end and said distal end.

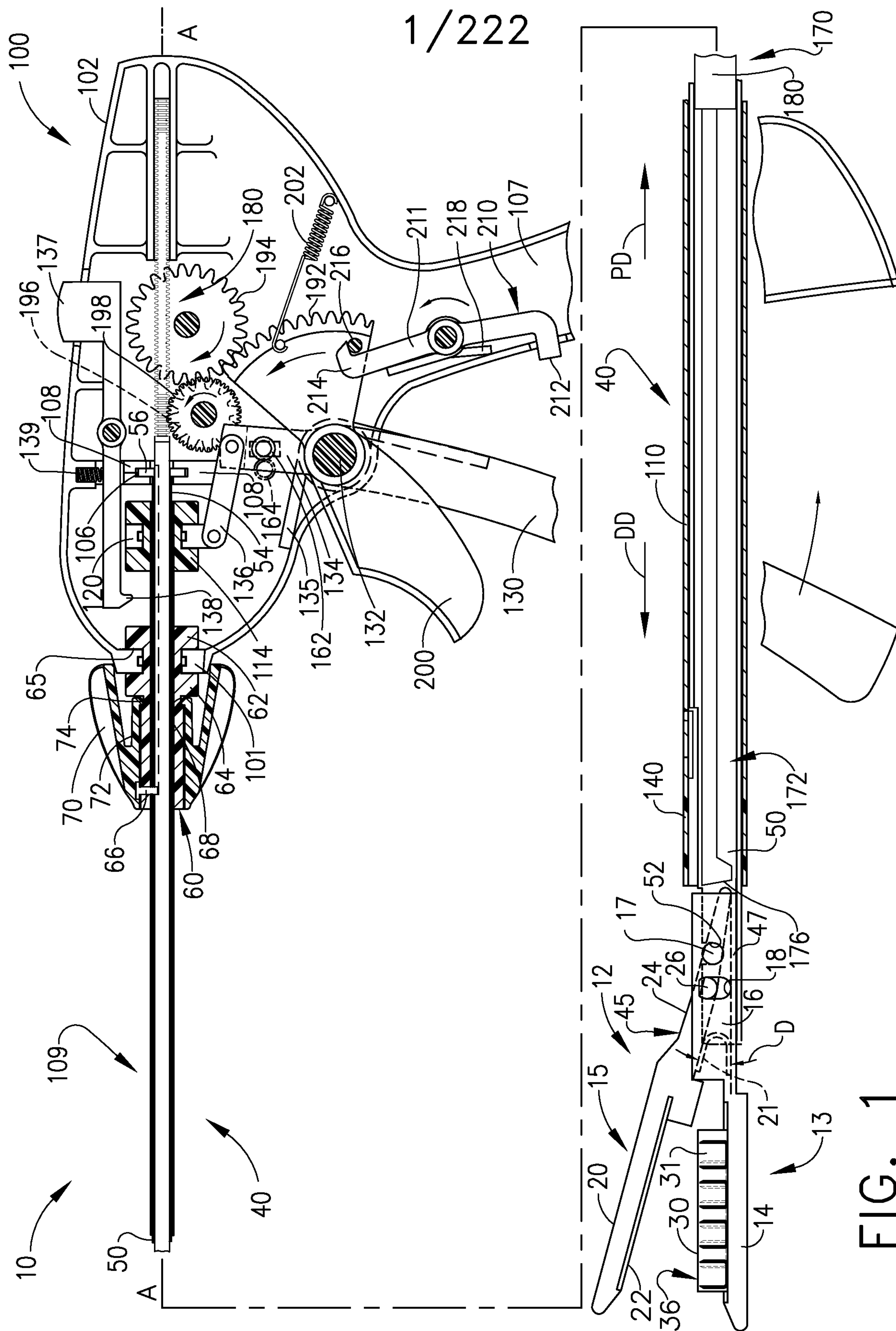


FIG. 1

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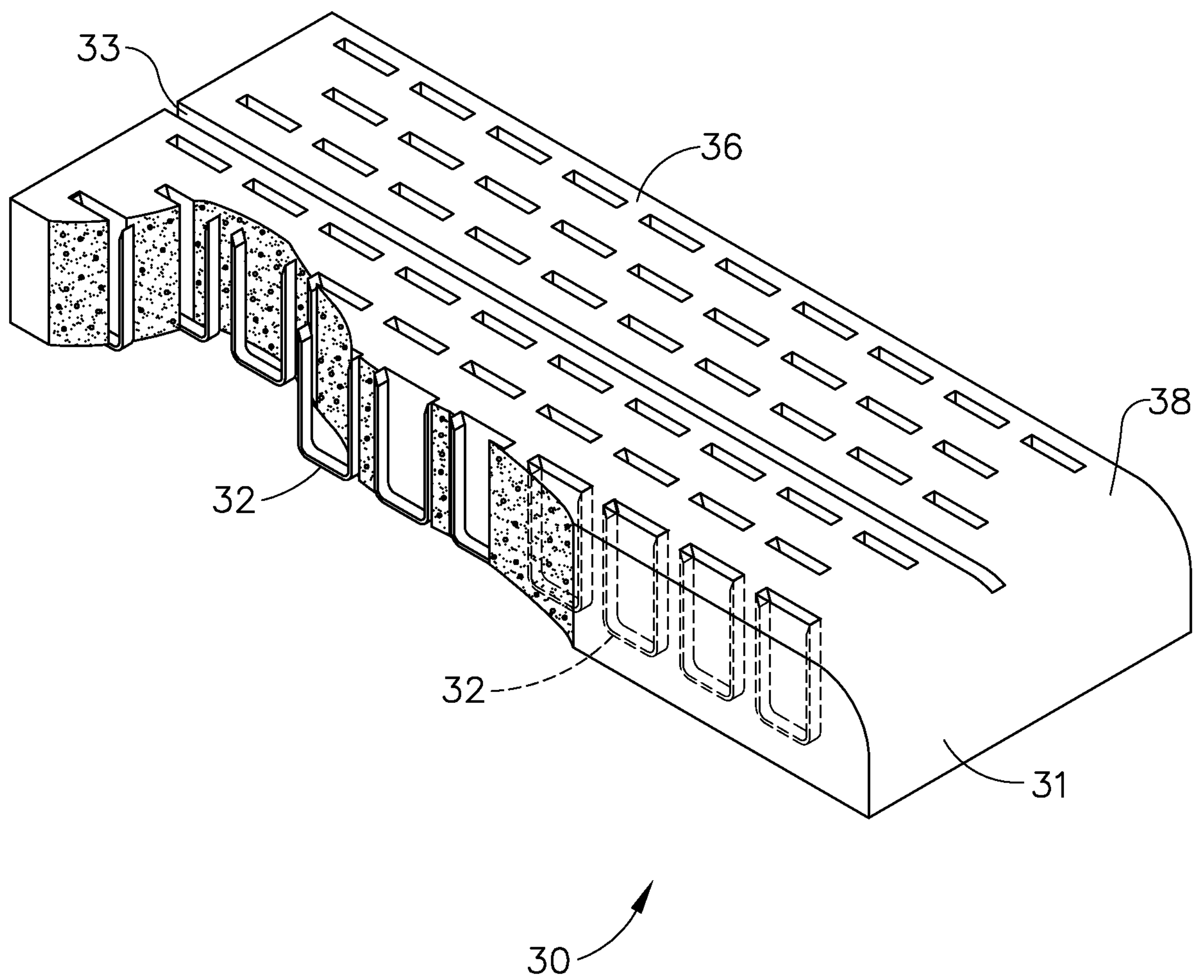


FIG. 1A

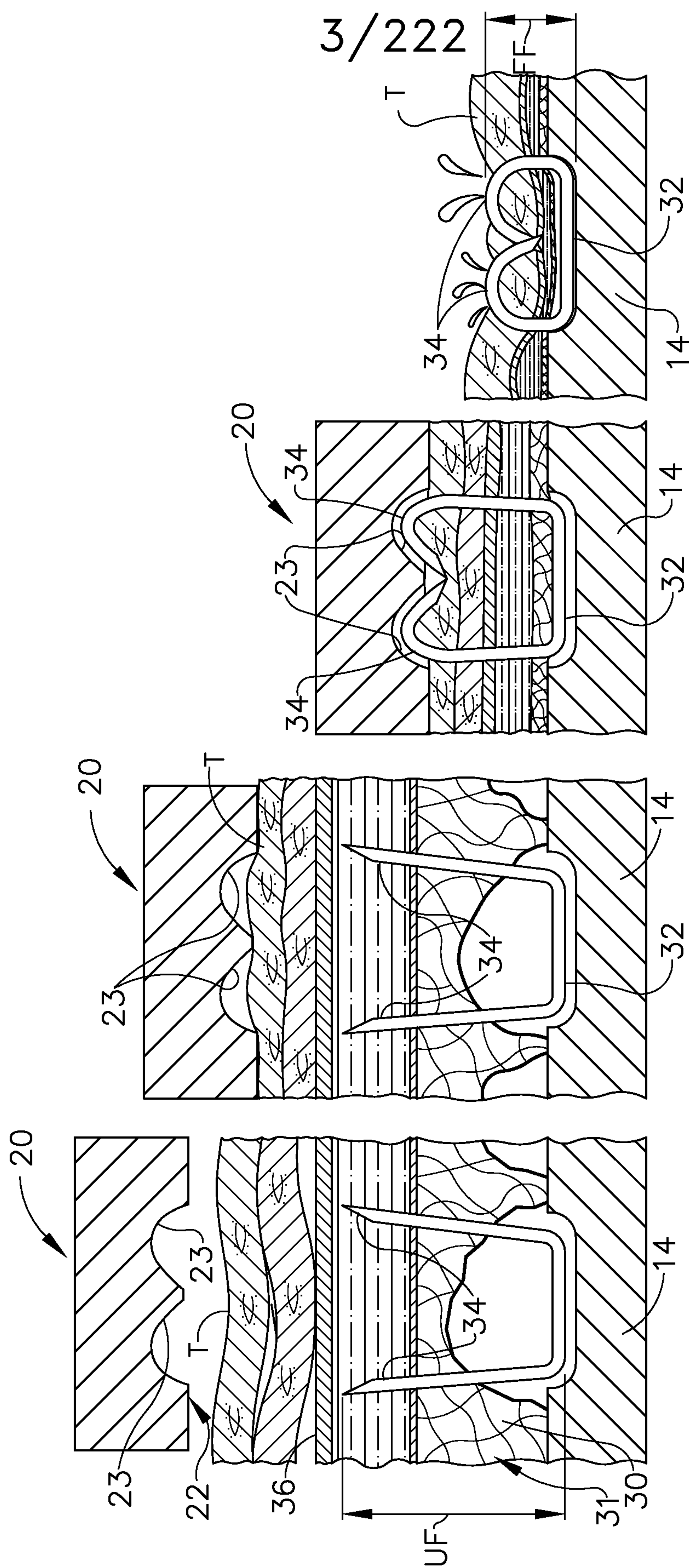


FIG. 1B FIG. 1C FIG. 1D FIG. 1E

FIG. 1C

FIG. 1D

FIG. 1E

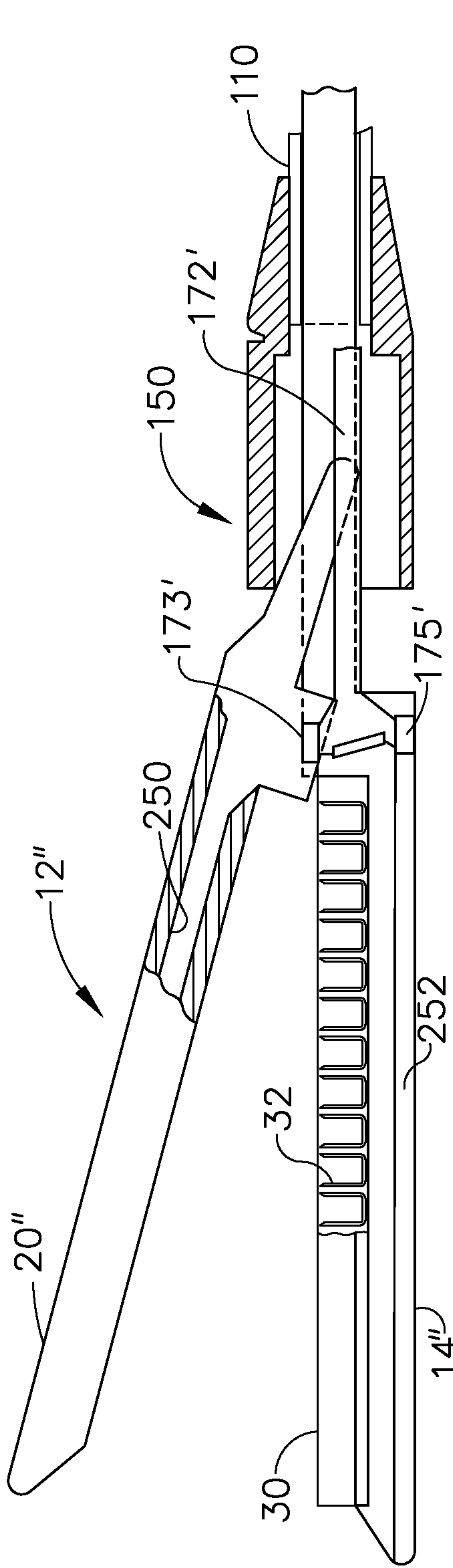


FIG. 2

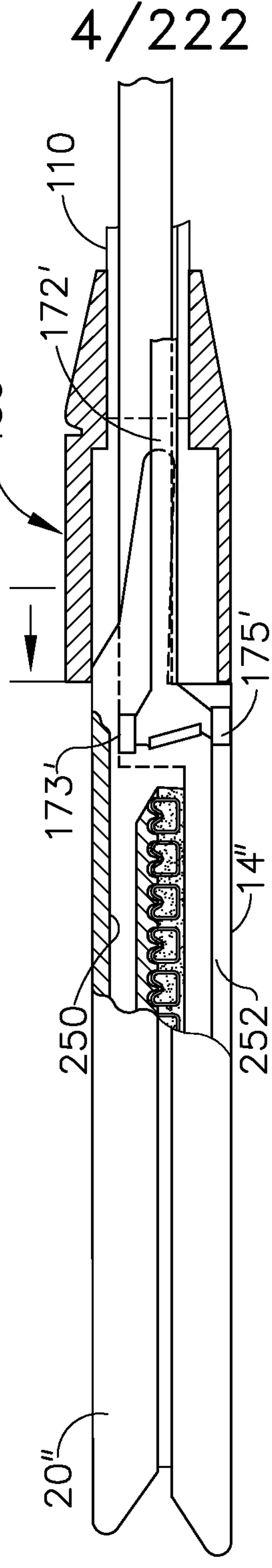


FIG. 3

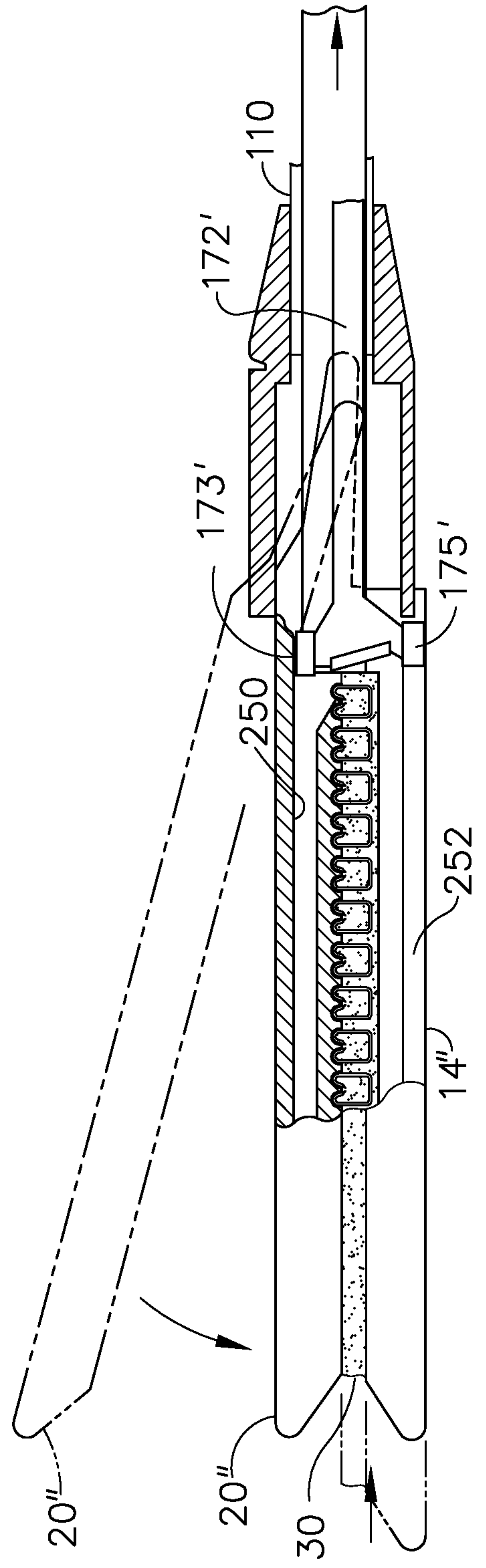


FIG. 4

5/222

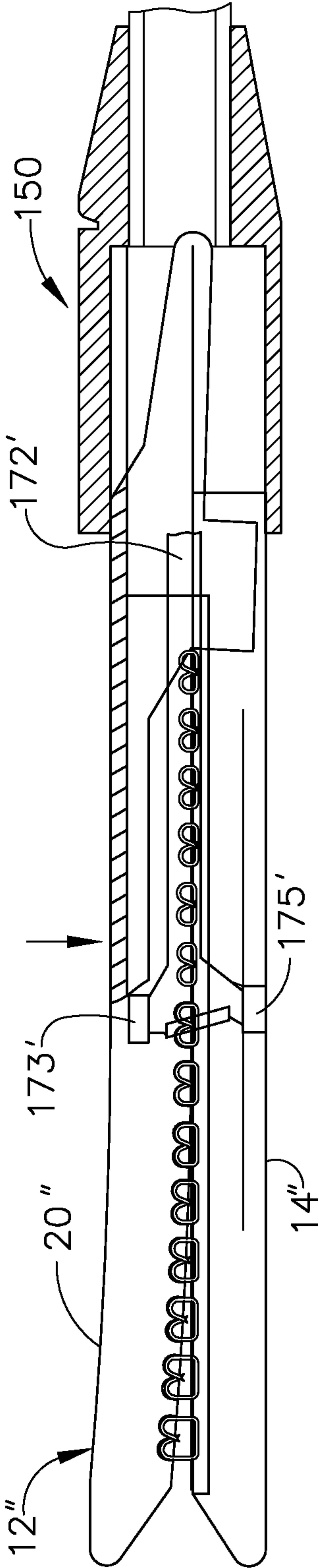


FIG. 5

6/222

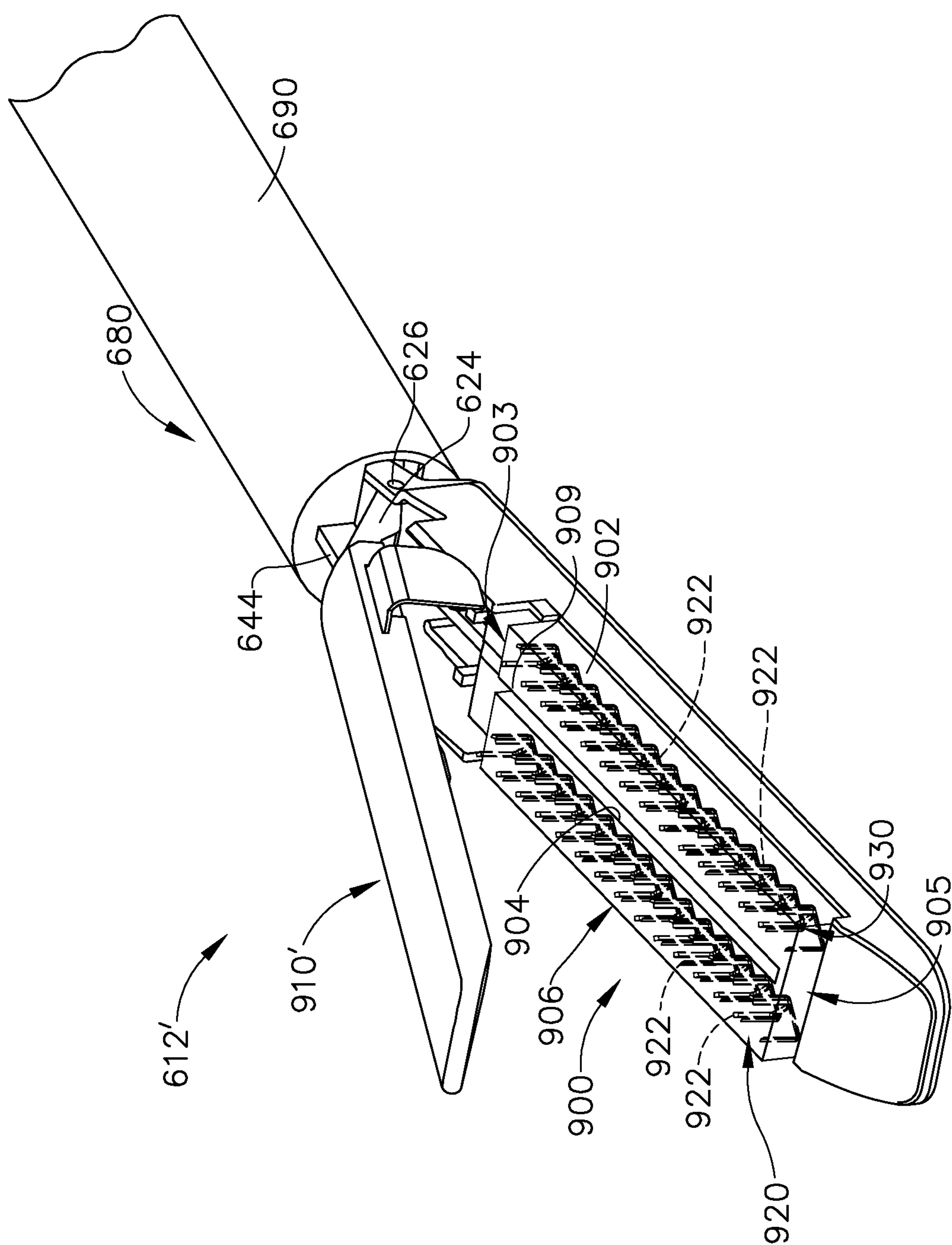


Fig. 6

7/222

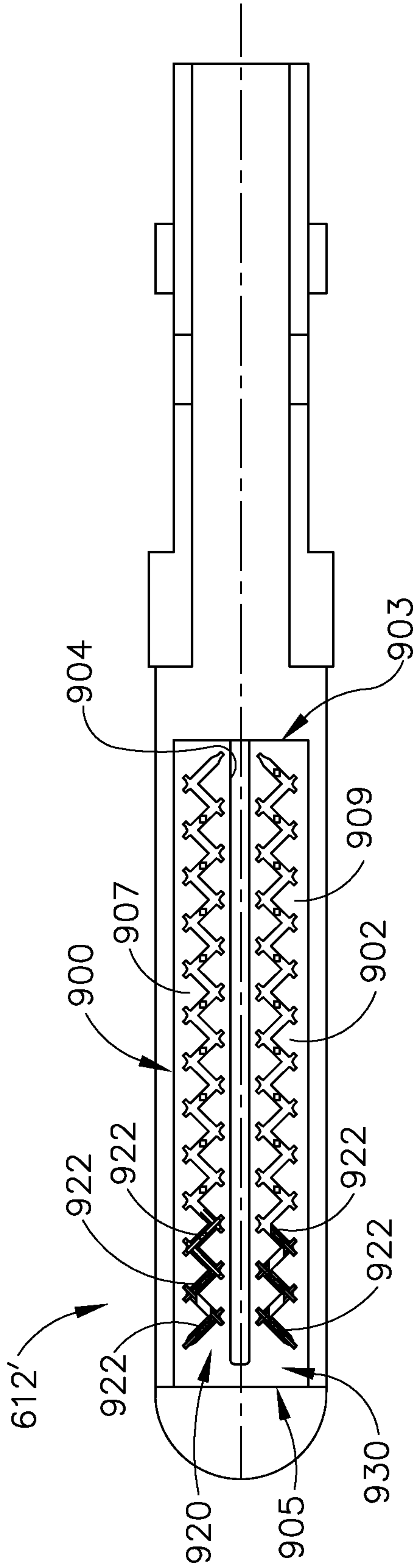


FIG. 7

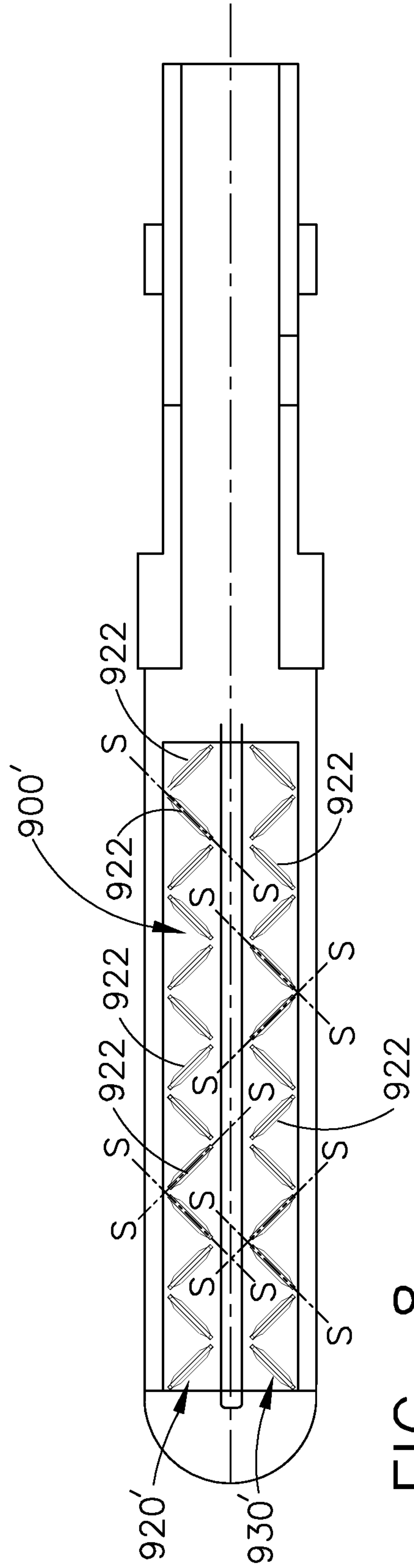


FIG. 8

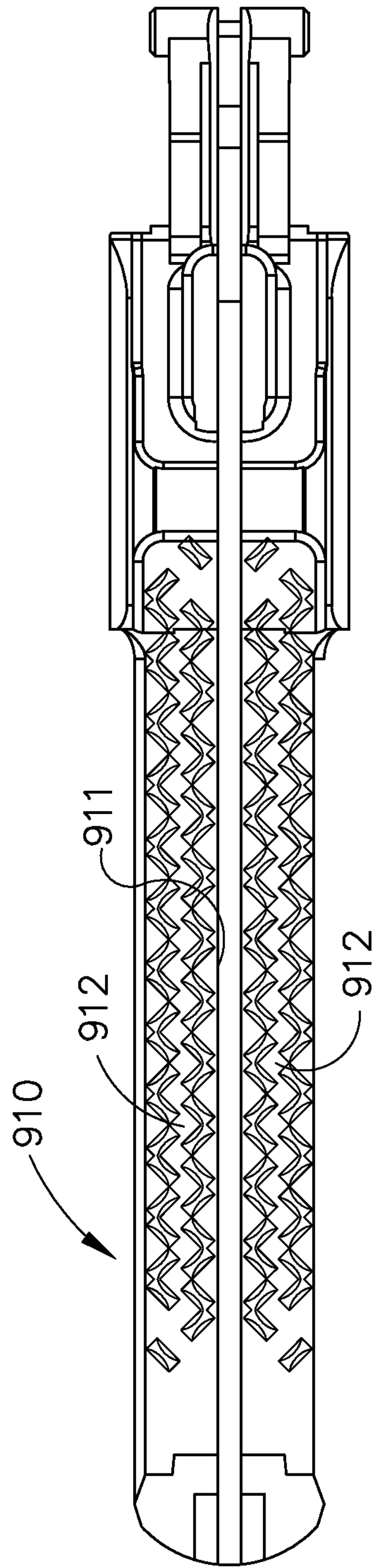


FIG. 9

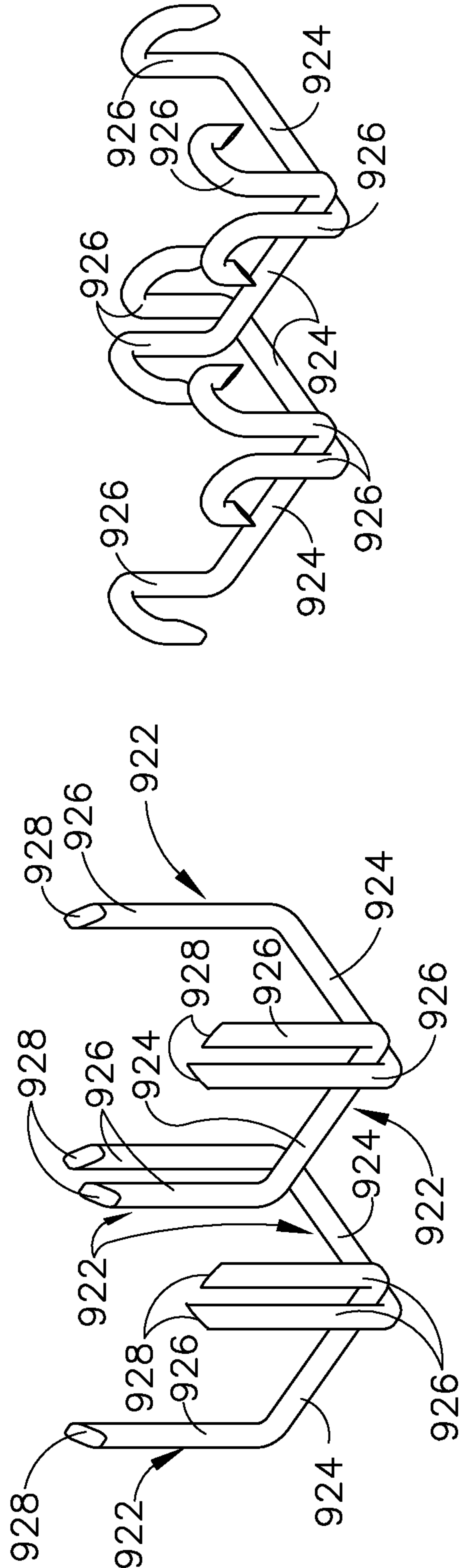


FIG. 10

FIG. 11

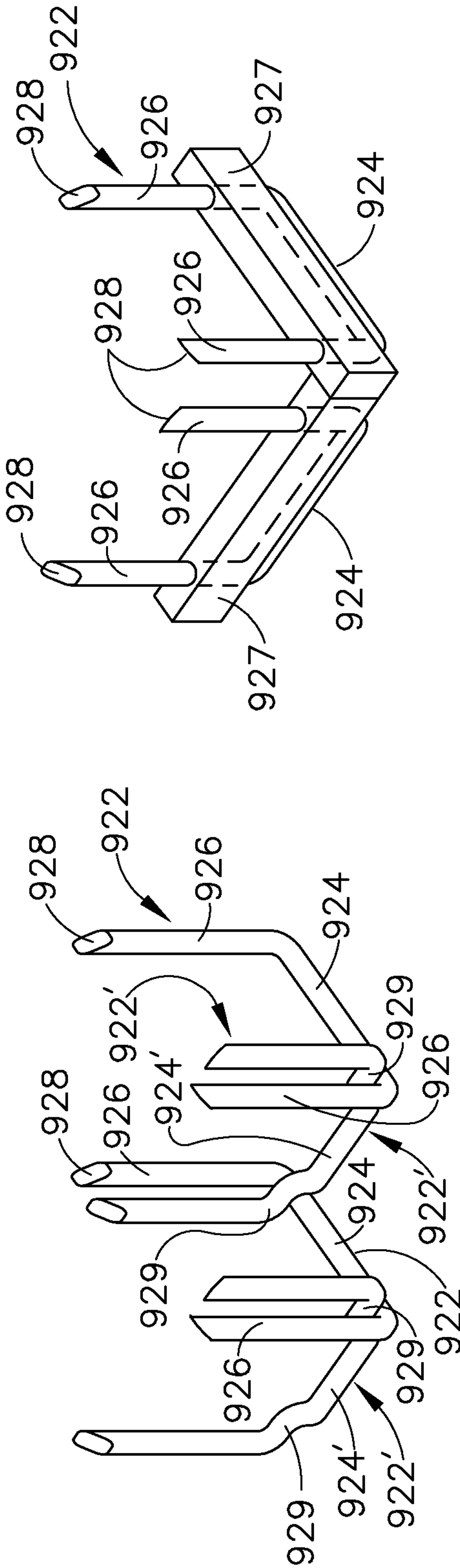


FIG. 13

FIG. 12

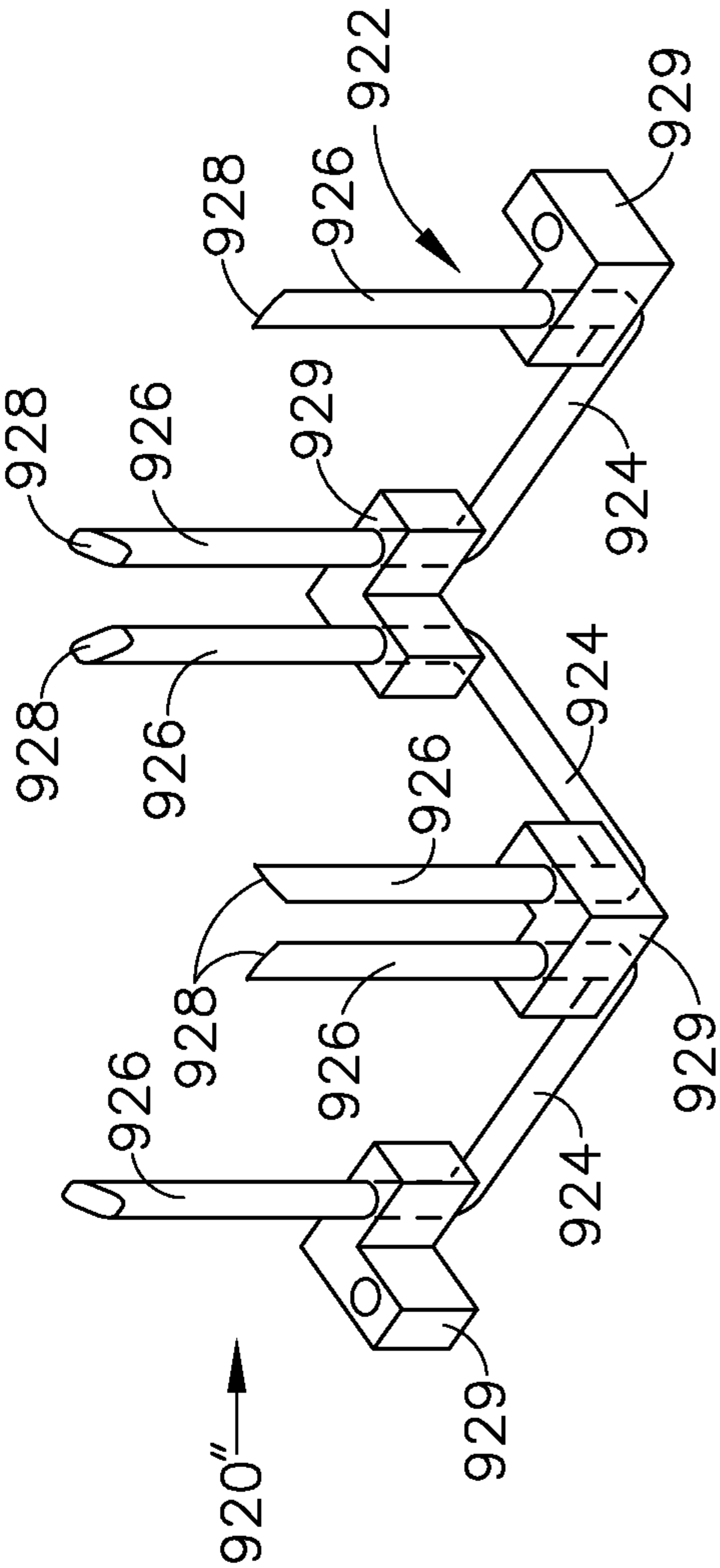


FIG. 14

10/222

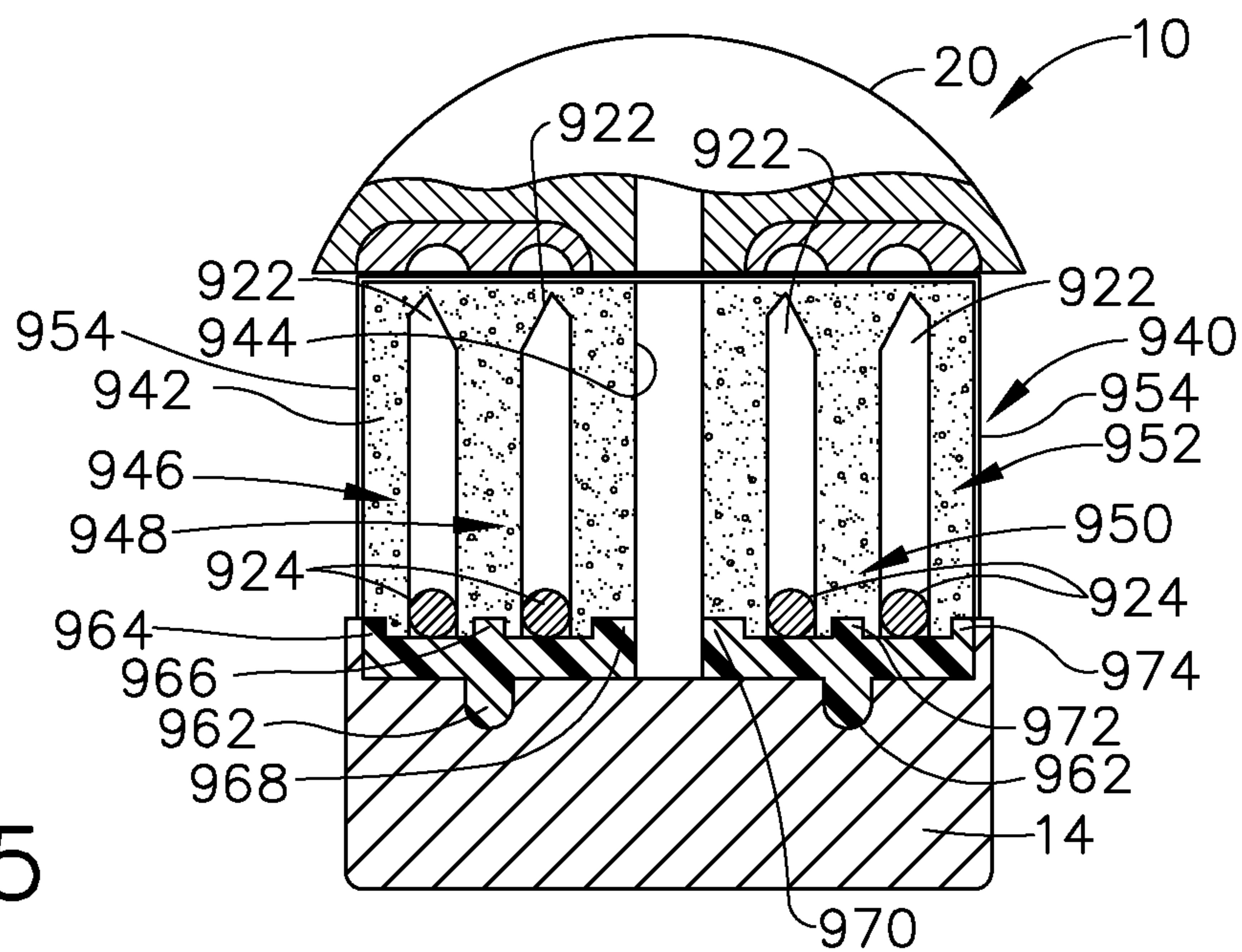


FIG. 15

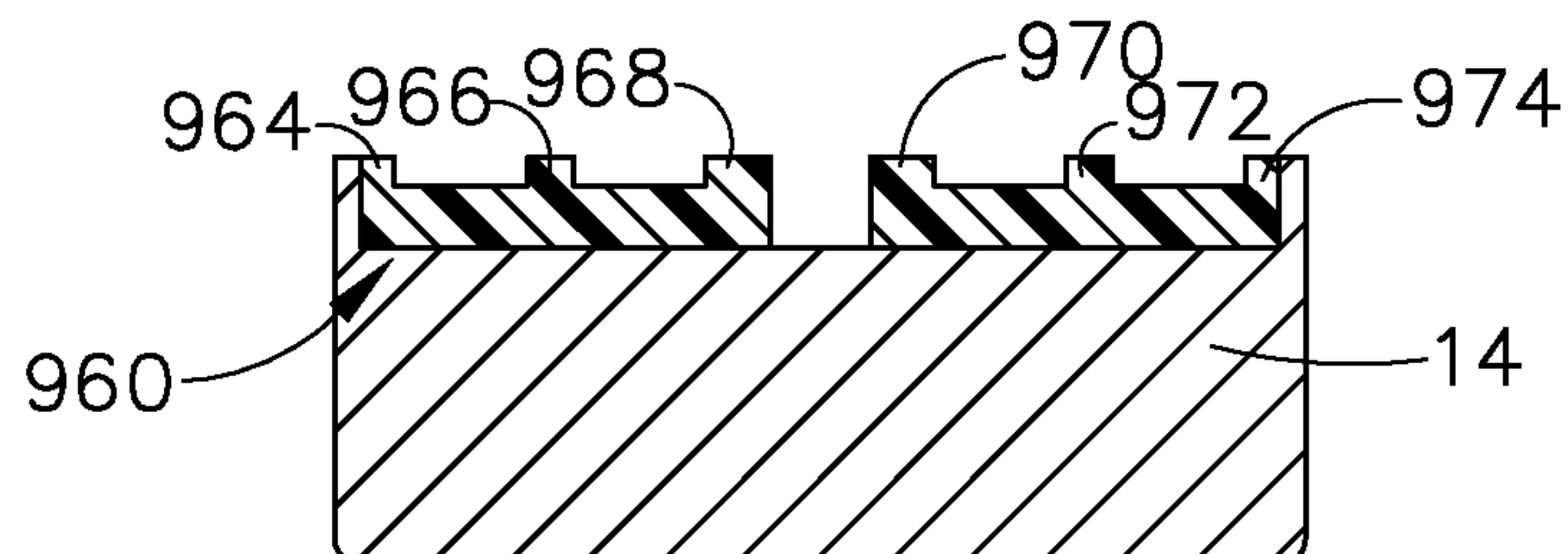


FIG. 16

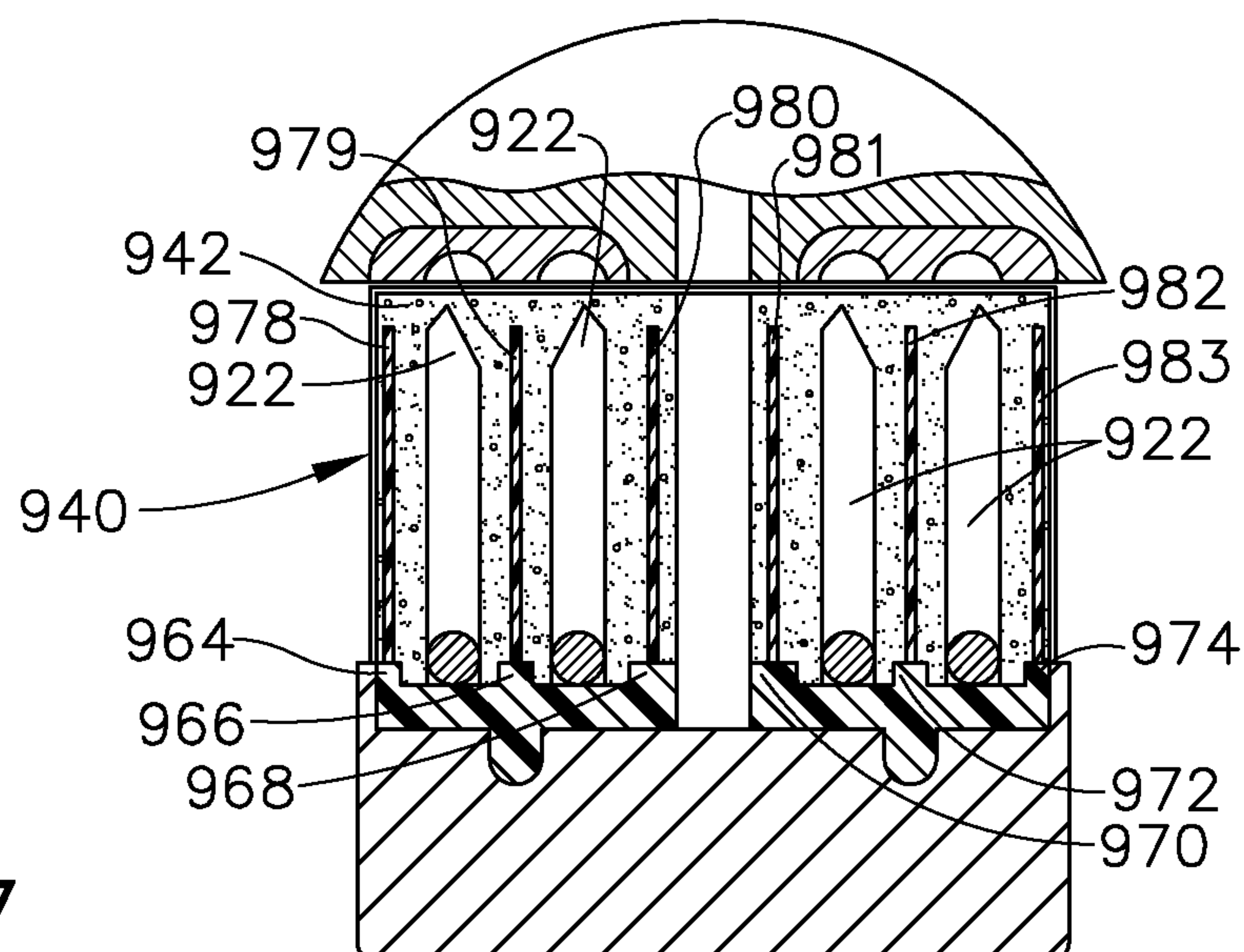
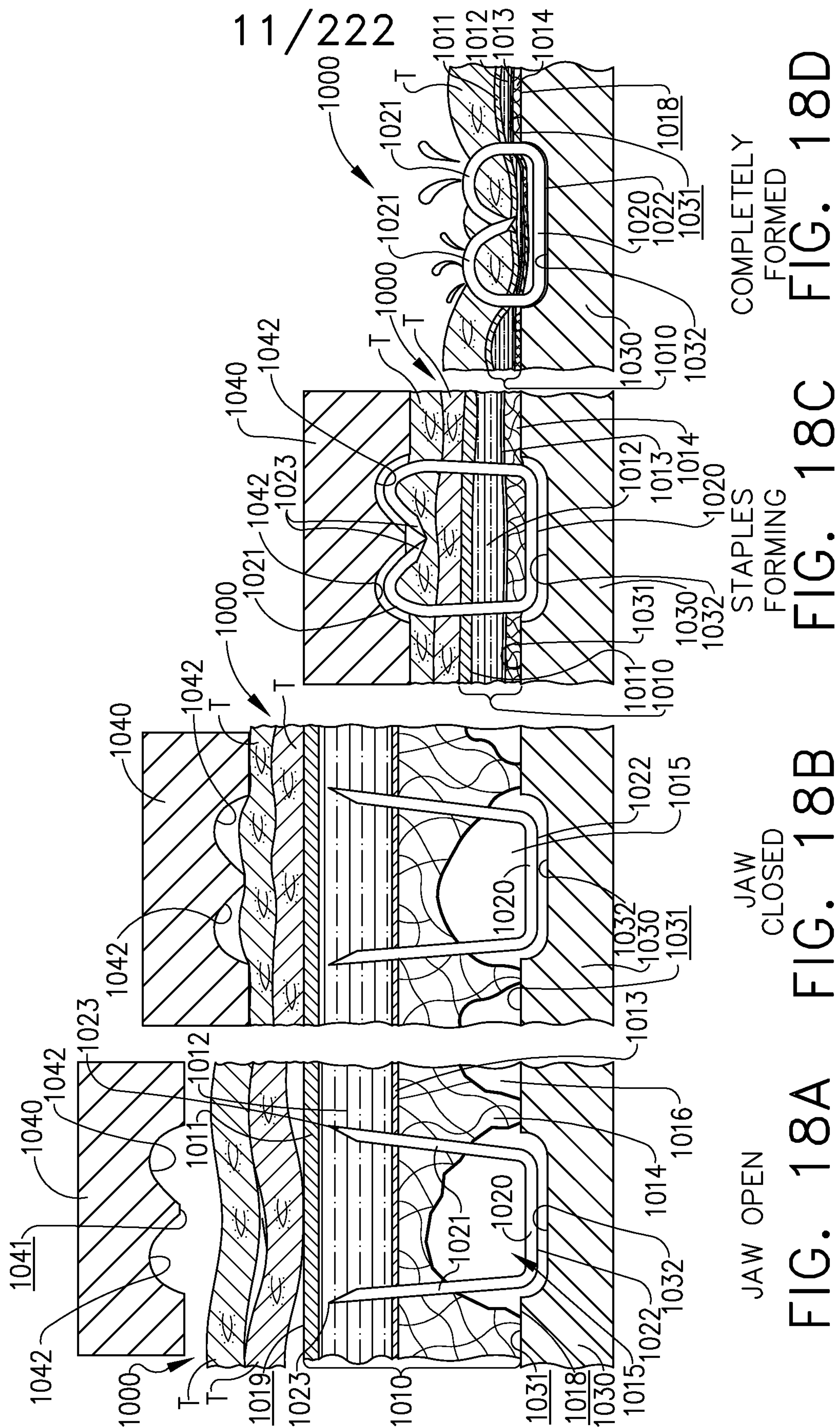


FIG. 17



13/222

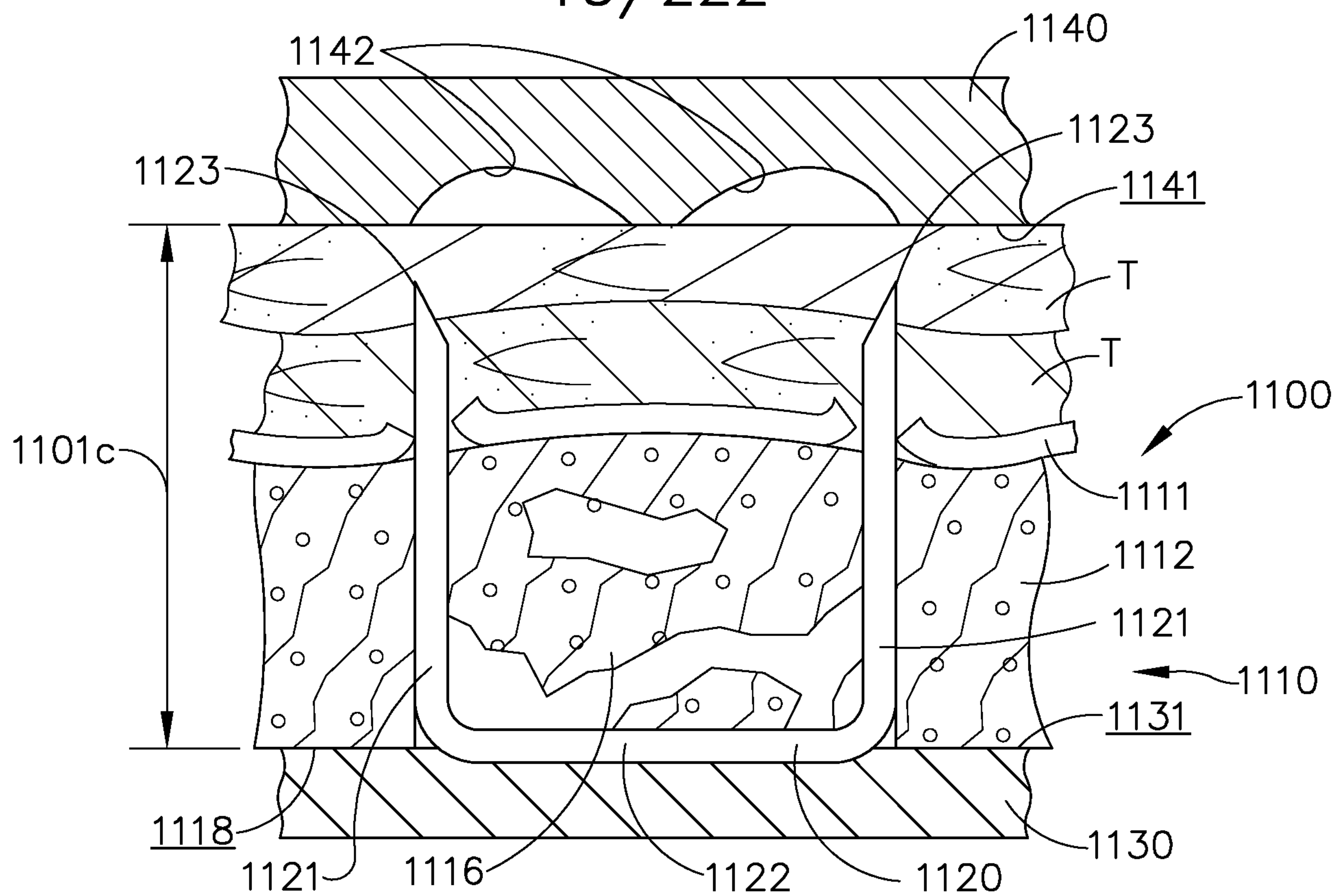


FIG. 19C

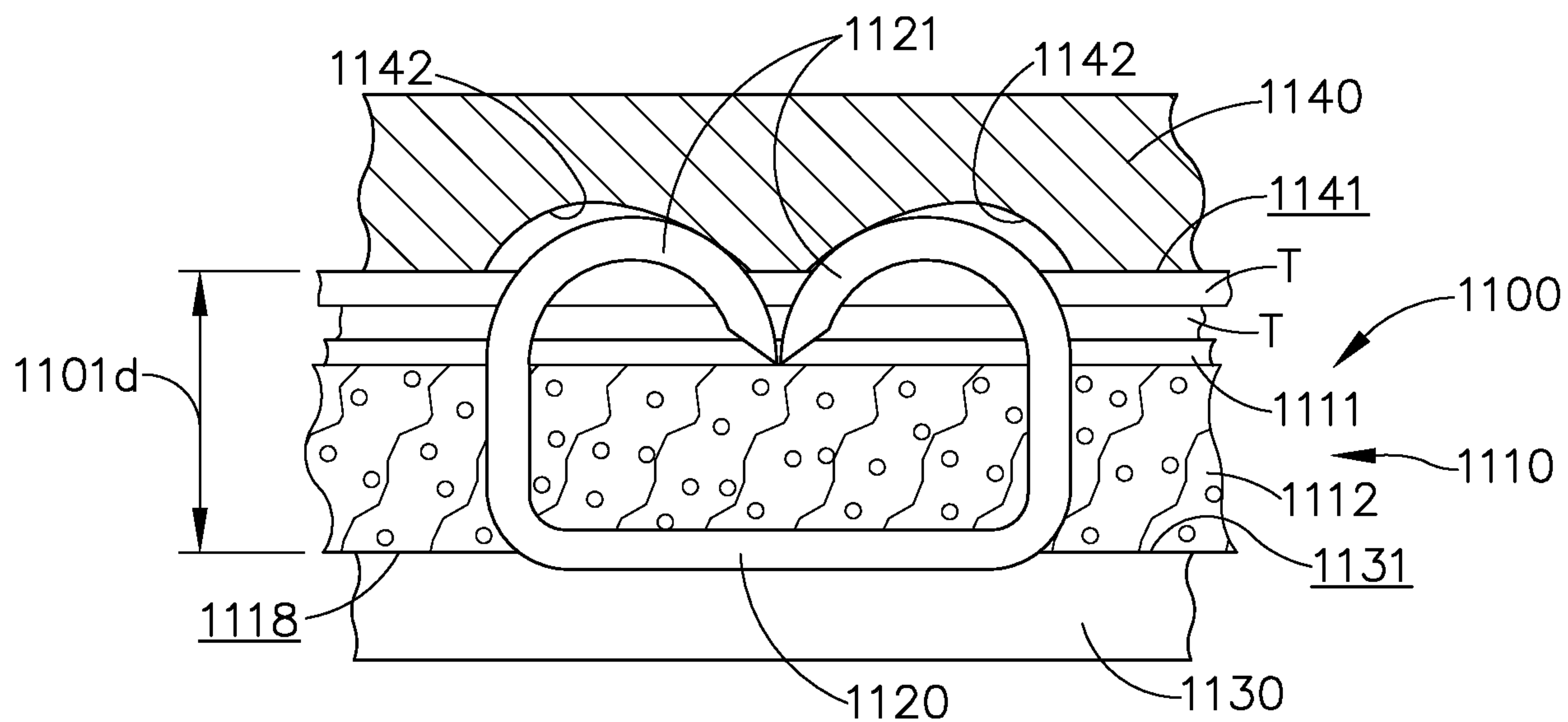


FIG. 19D

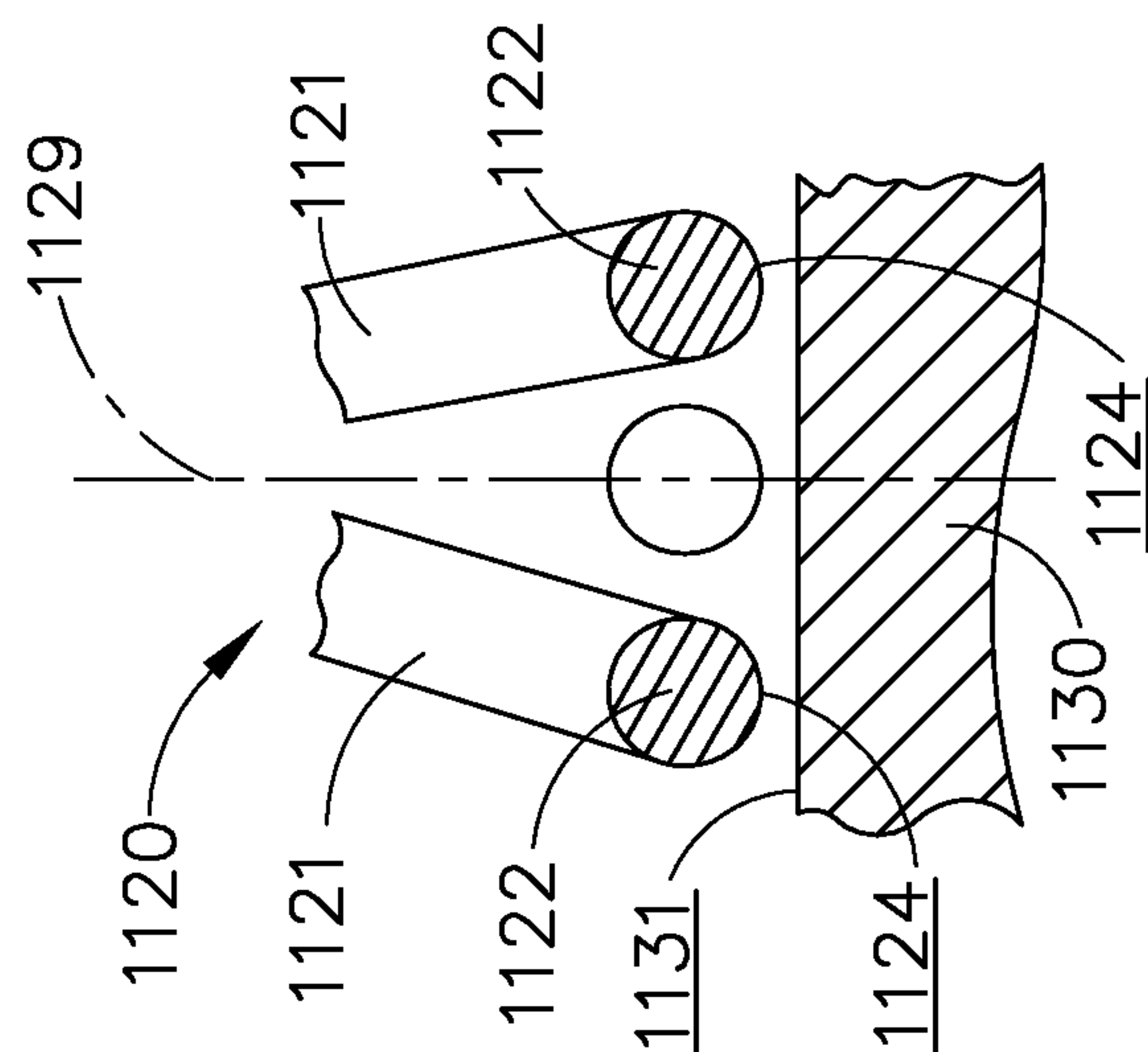


FIG. 20

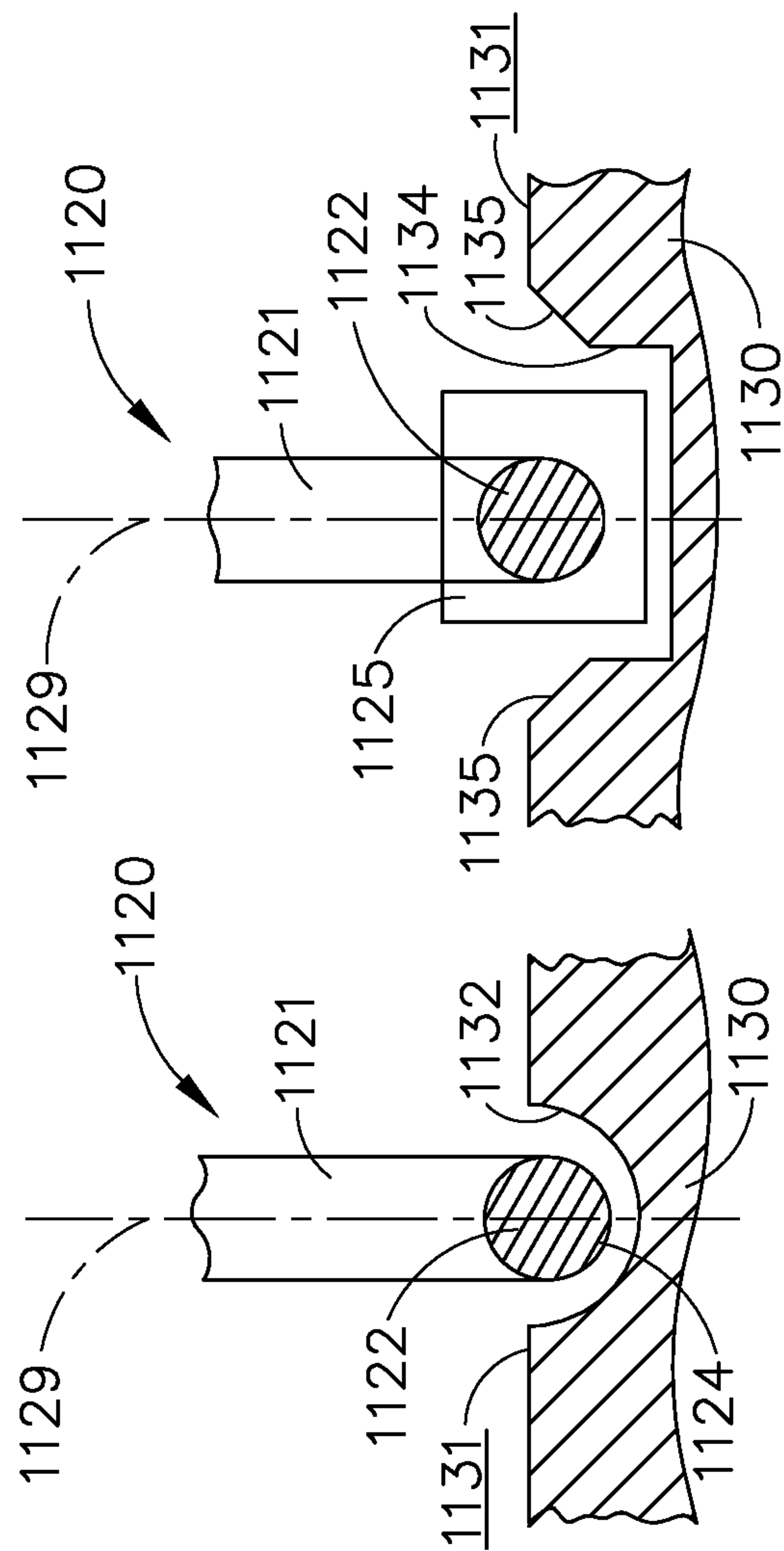


FIG. 21

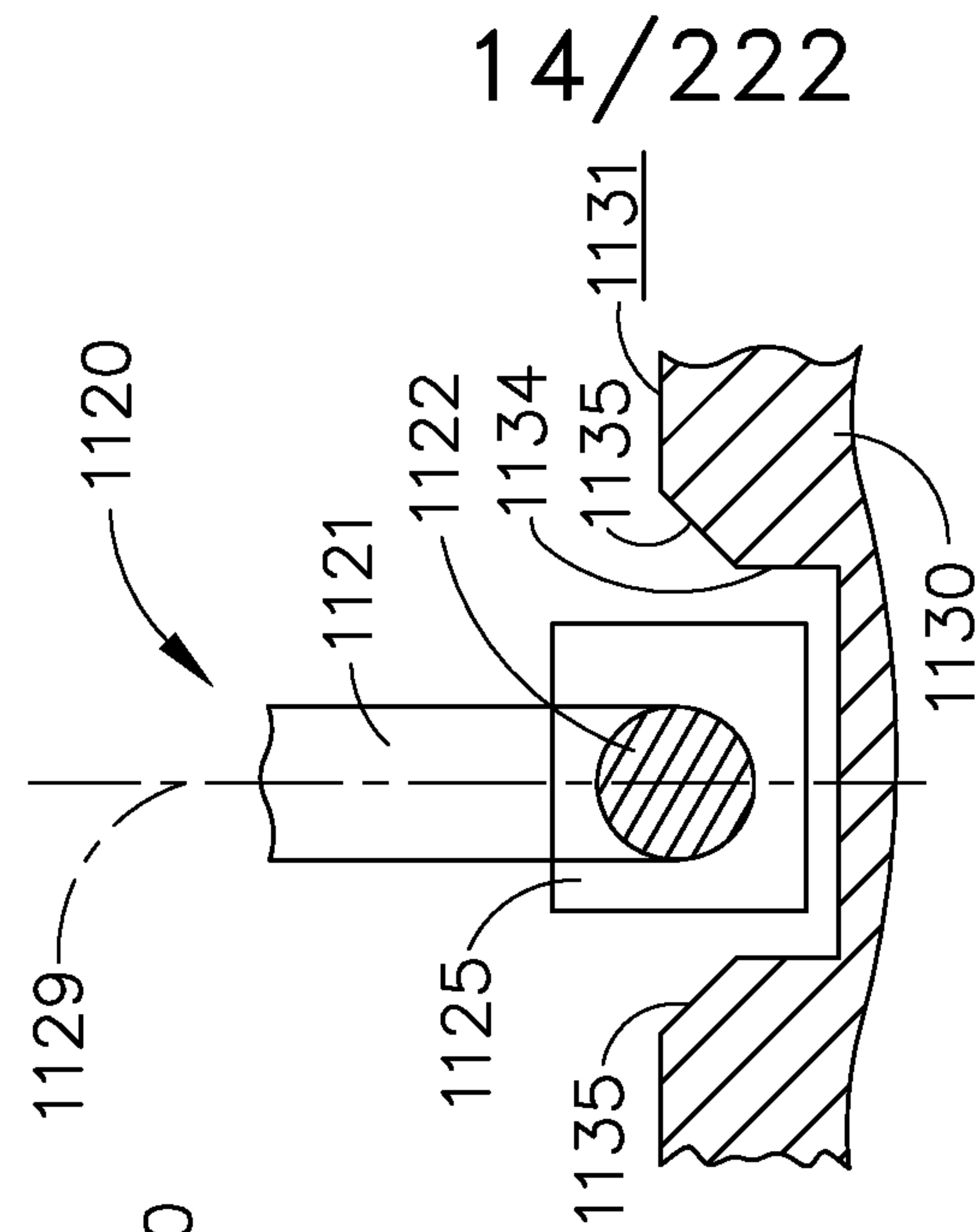


FIG. 22

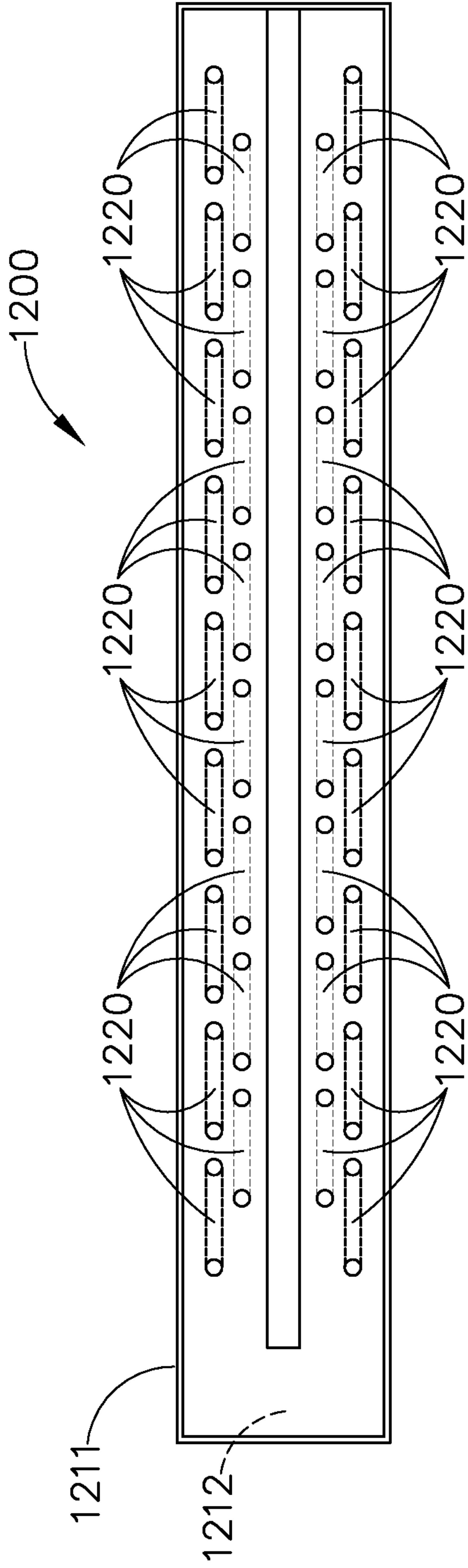


FIG. 23

15/222

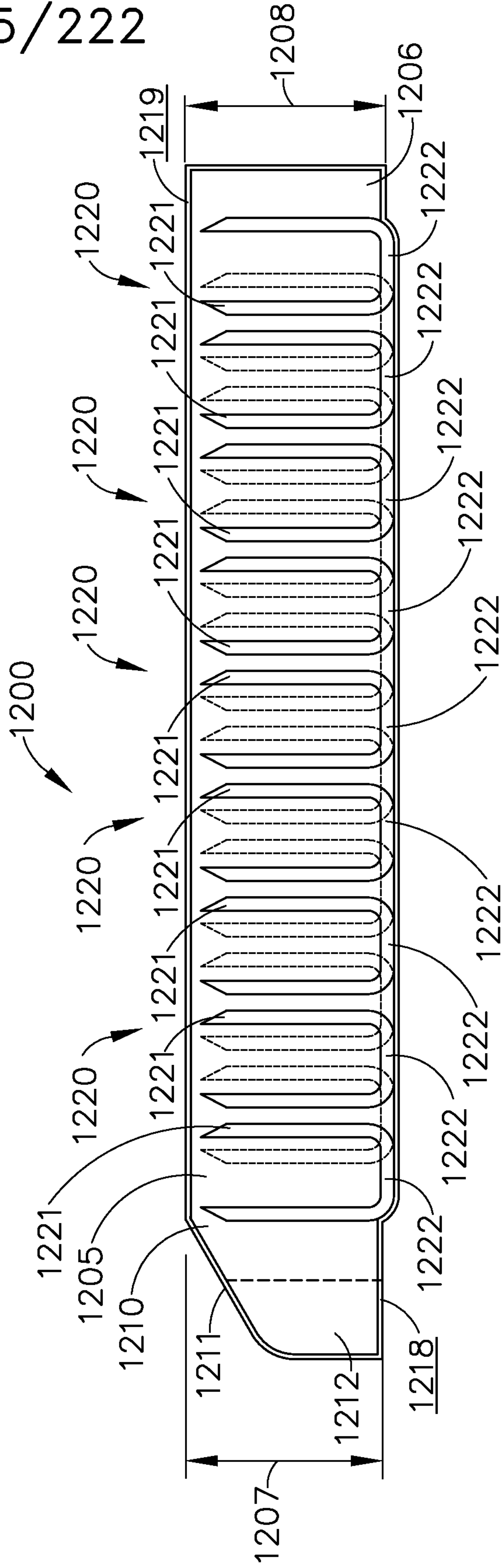


FIG. 24

16/222

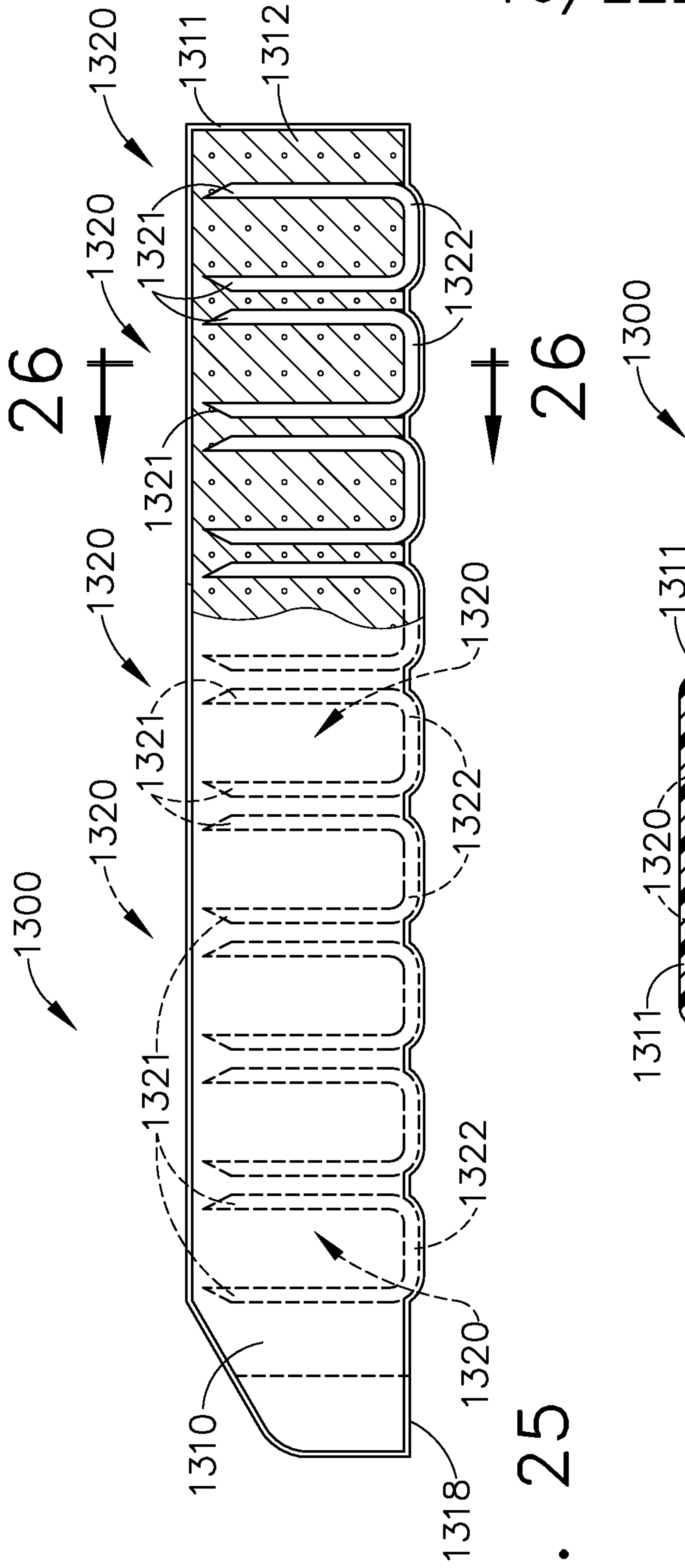


FIG. 25

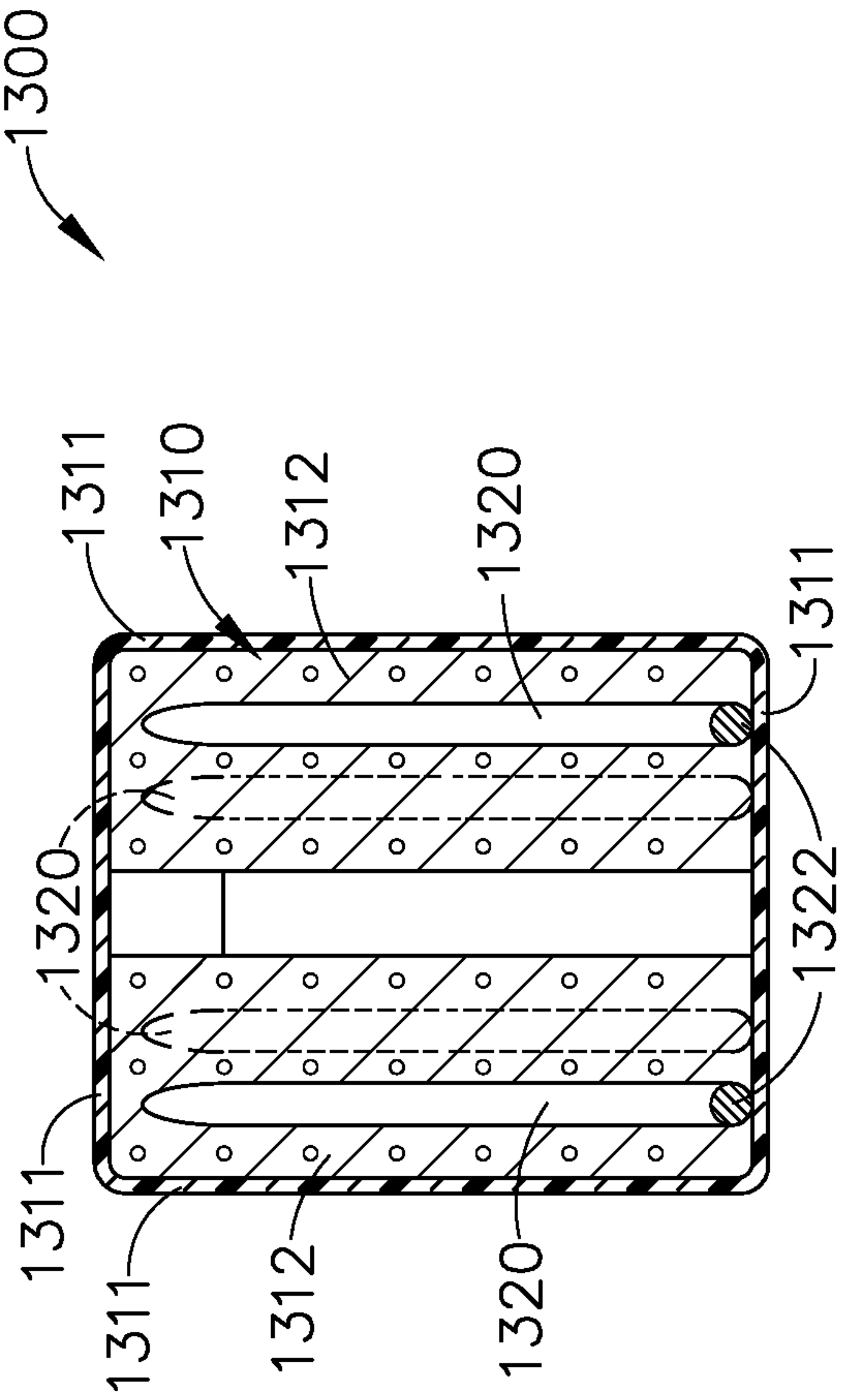


FIG. 26

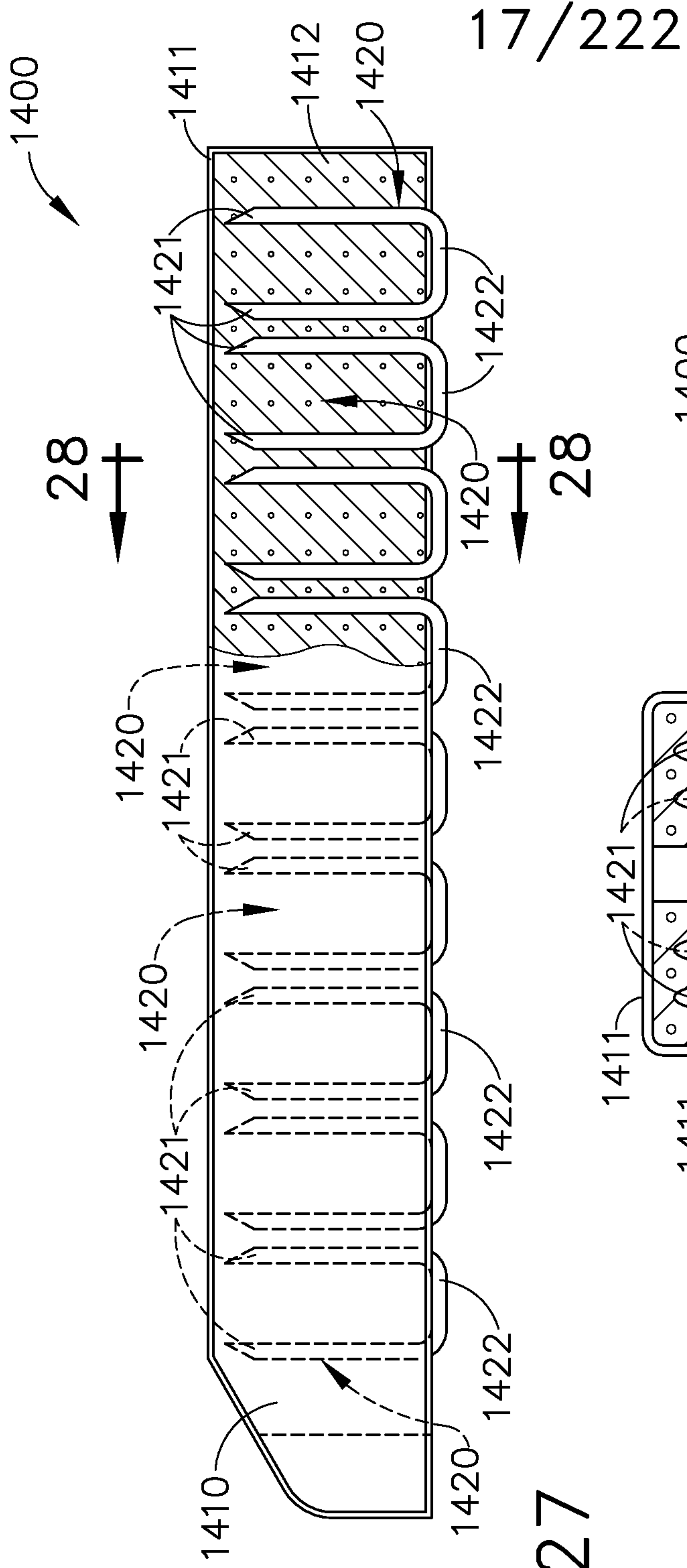


FIG. 27

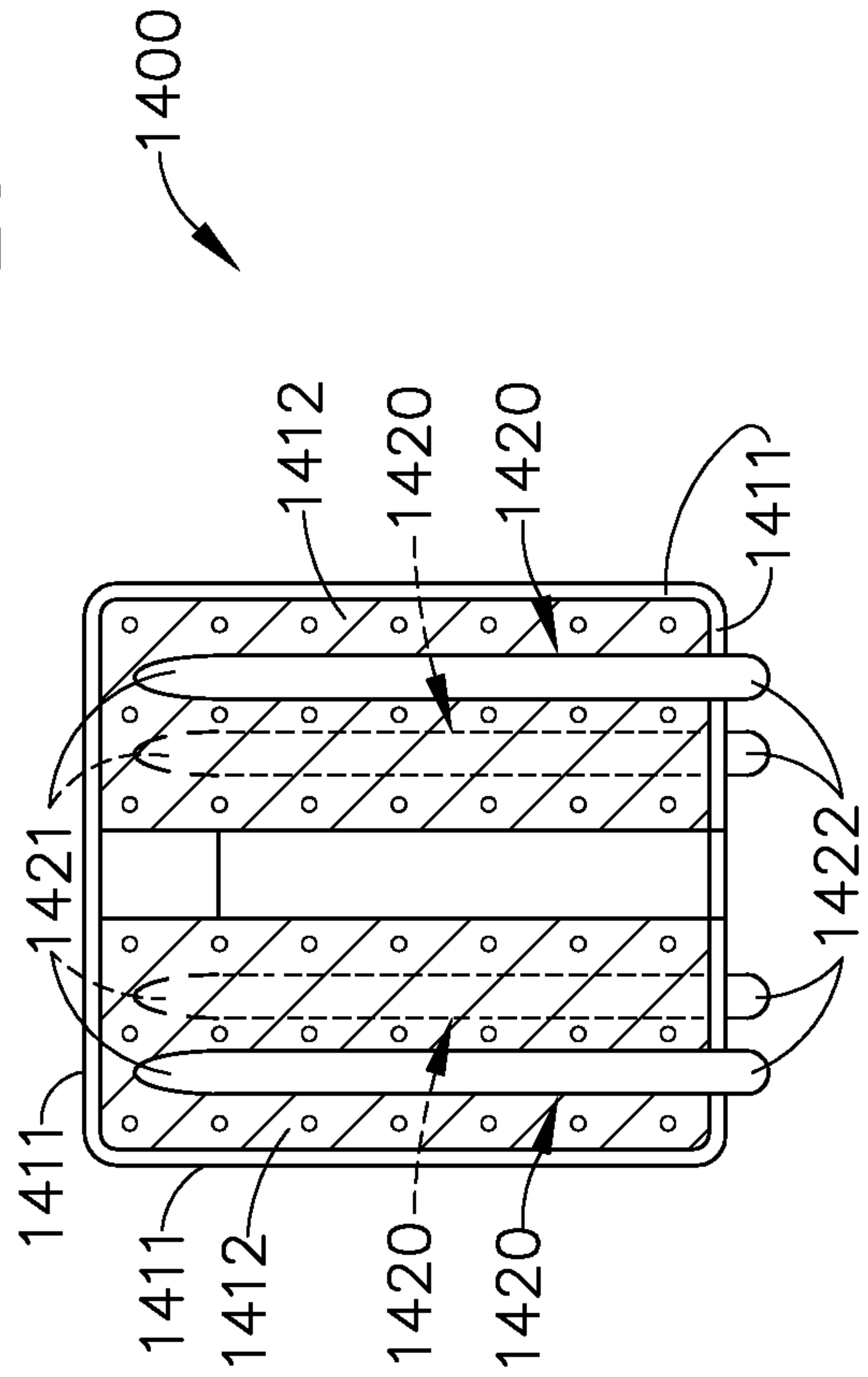
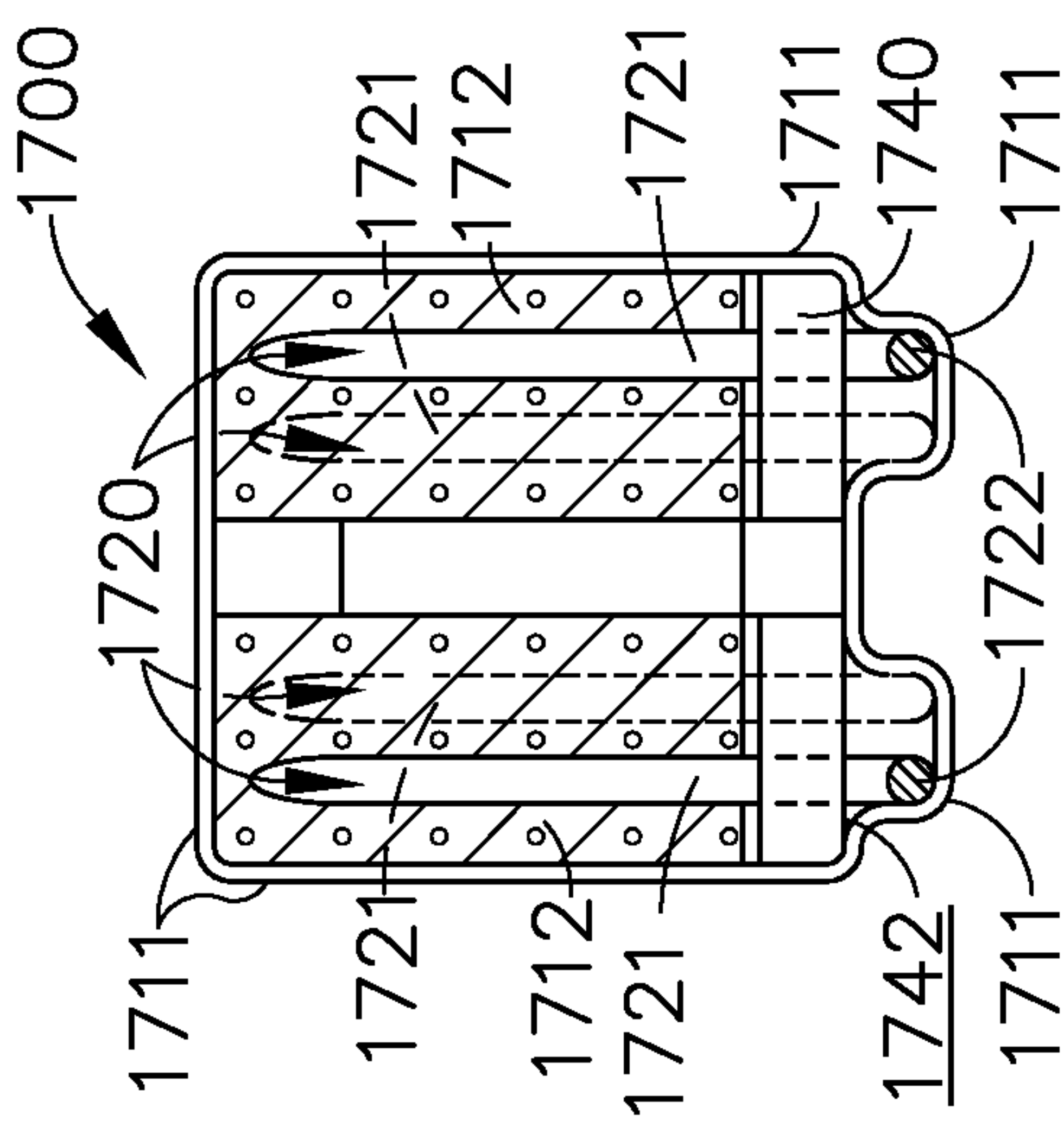
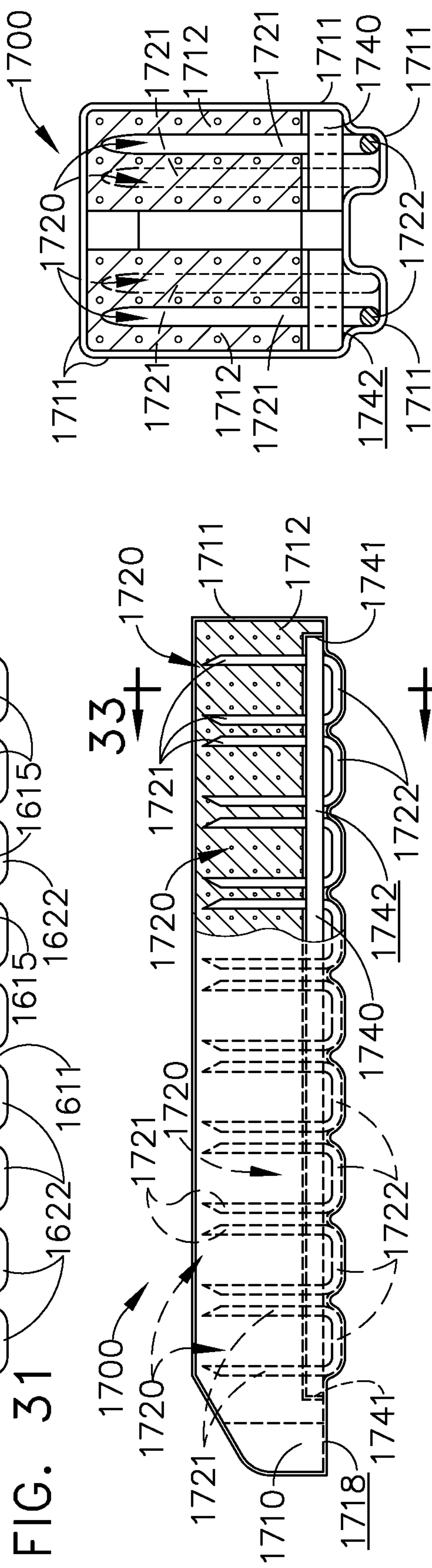
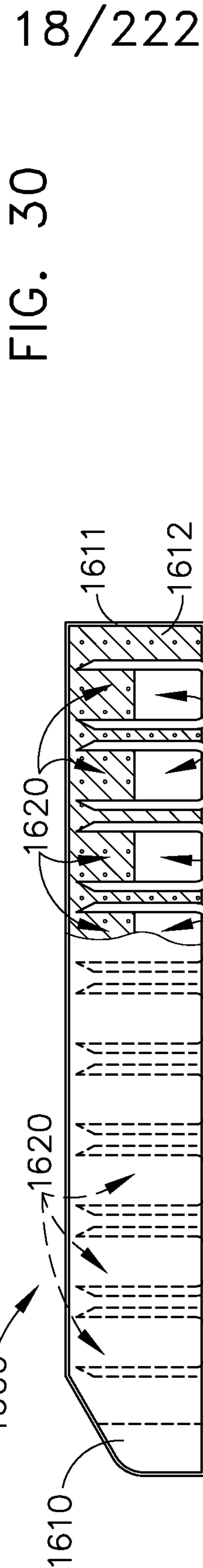
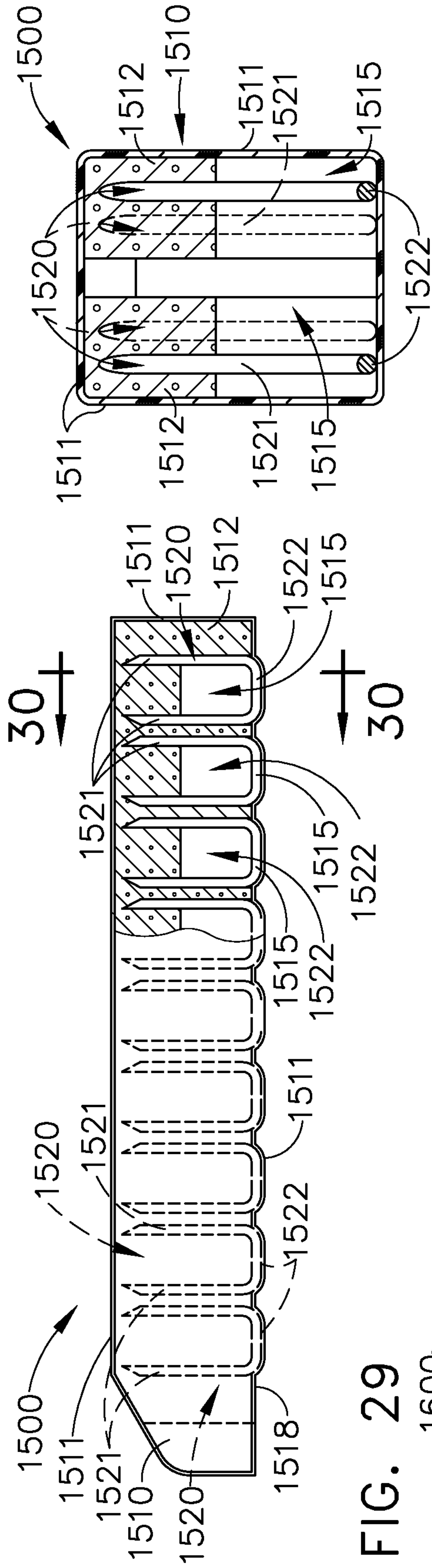


FIG. 28



19/222

FIG. 34

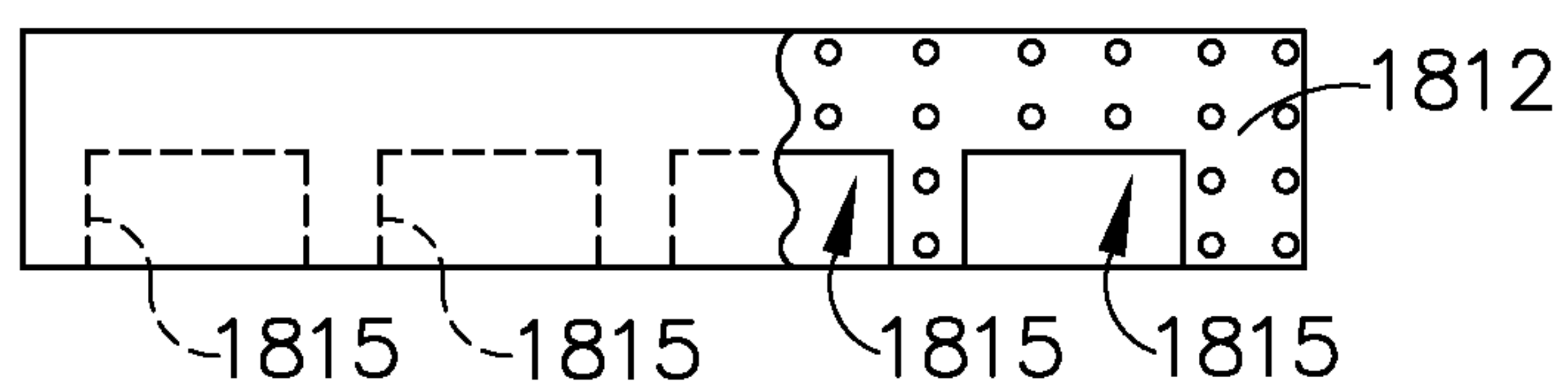


FIG. 35

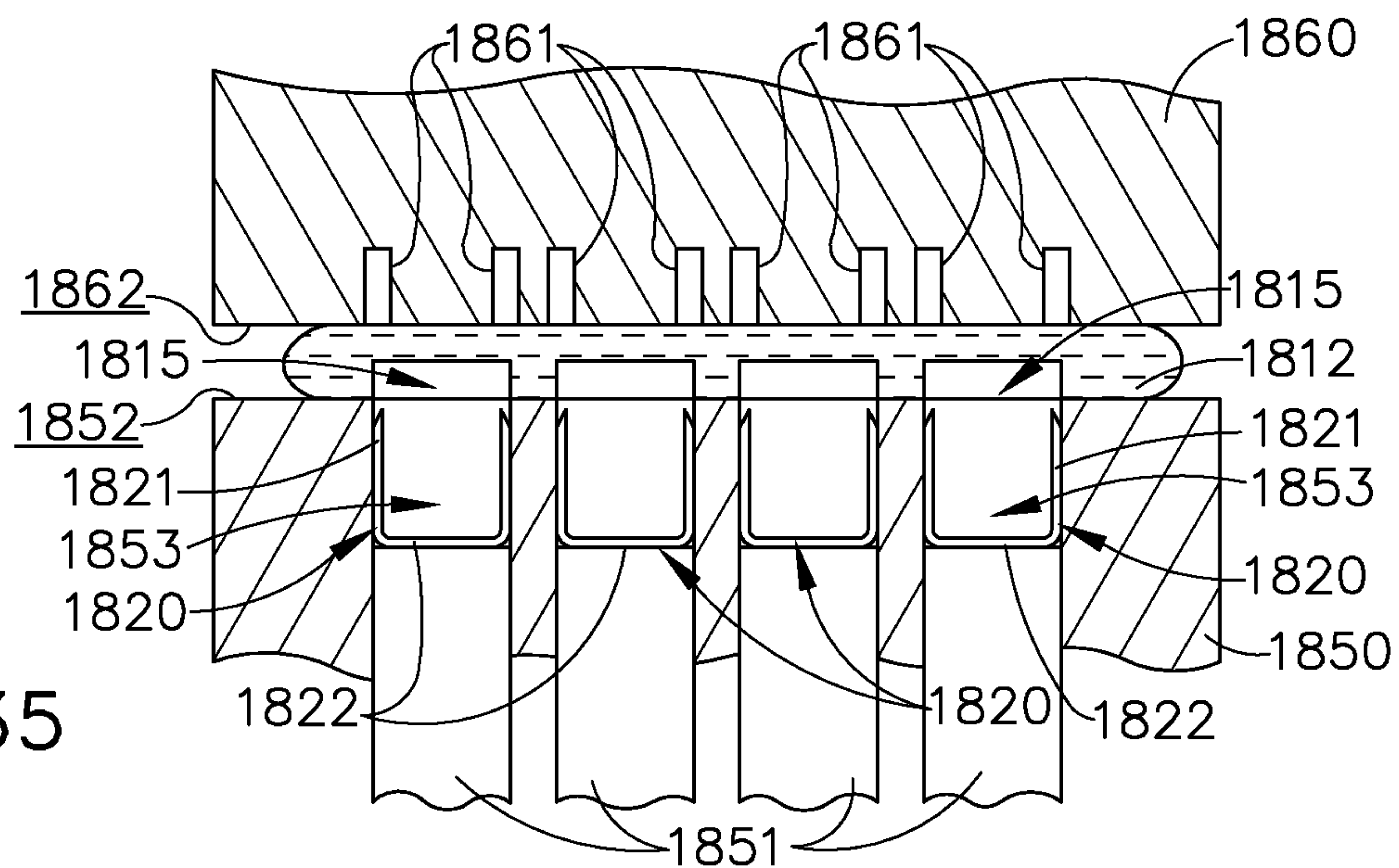
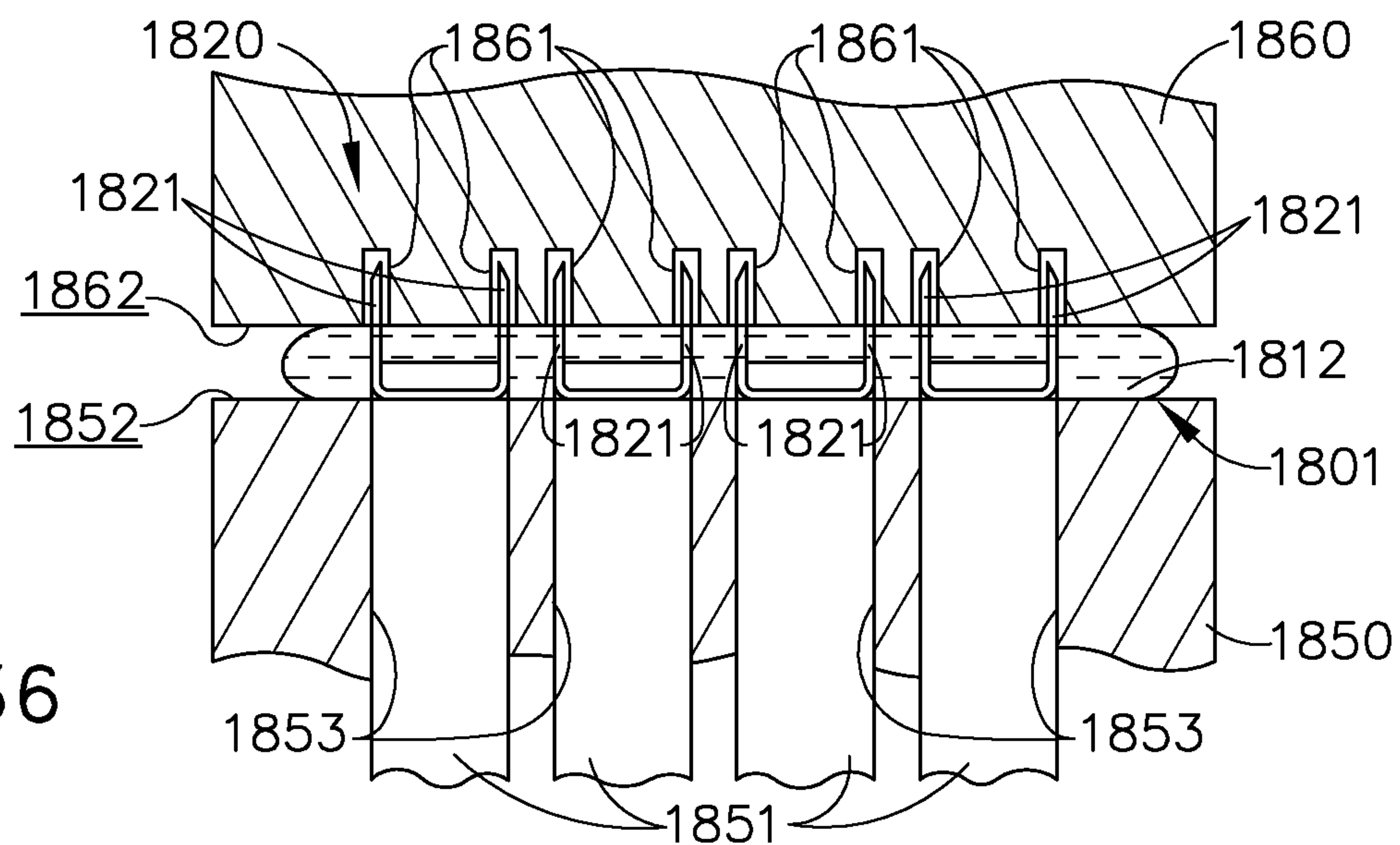


FIG. 36



20/222

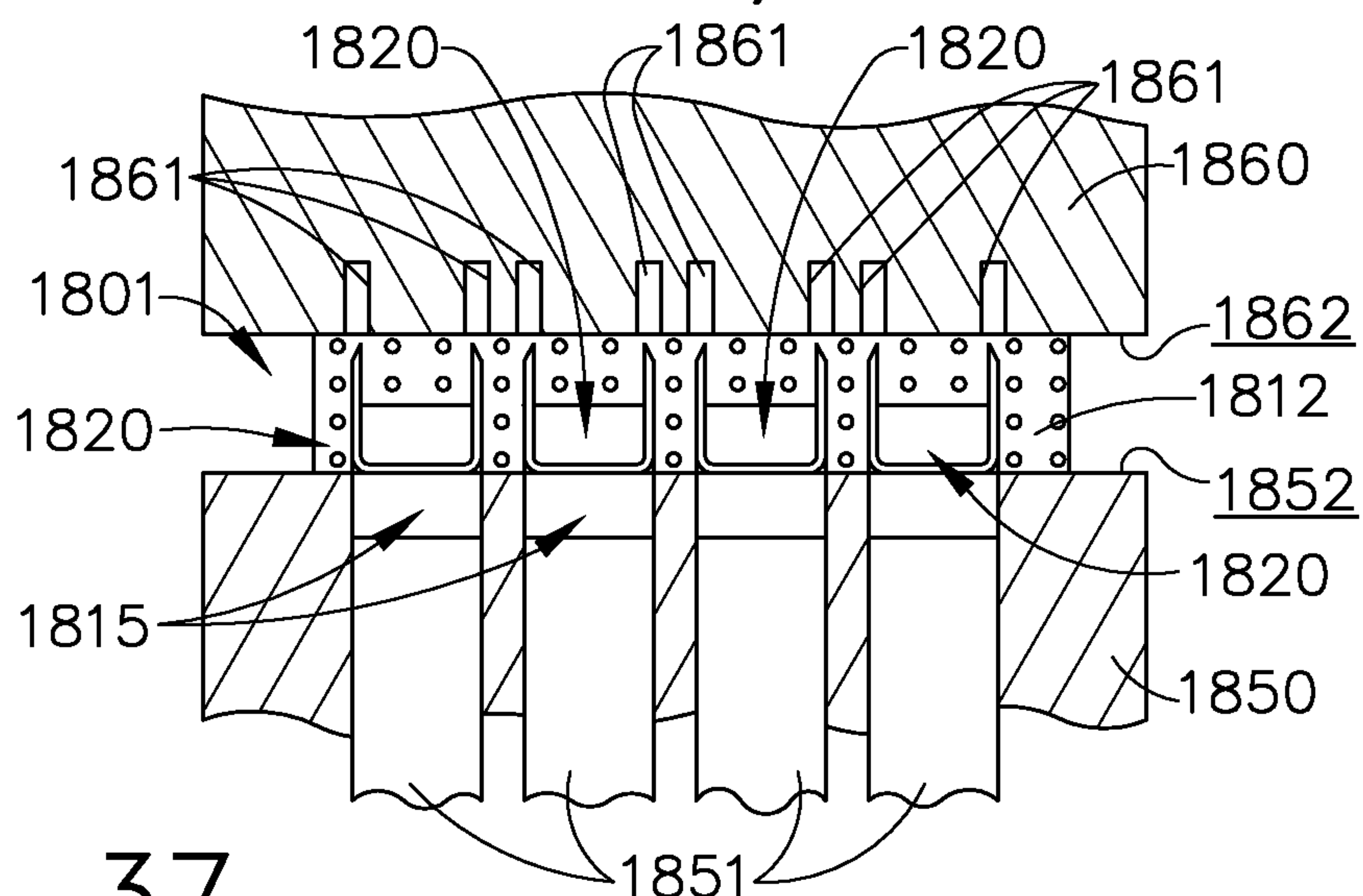


FIG. 37

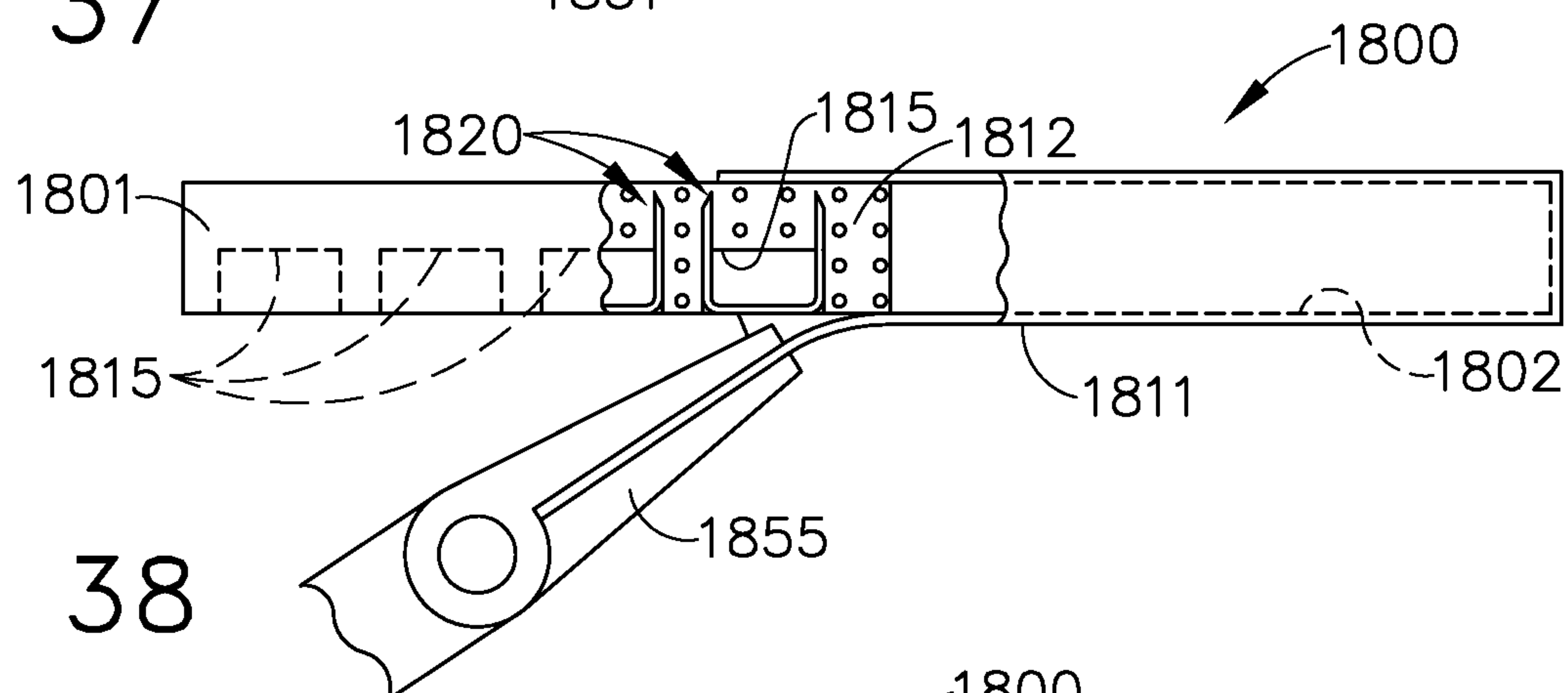


FIG. 38

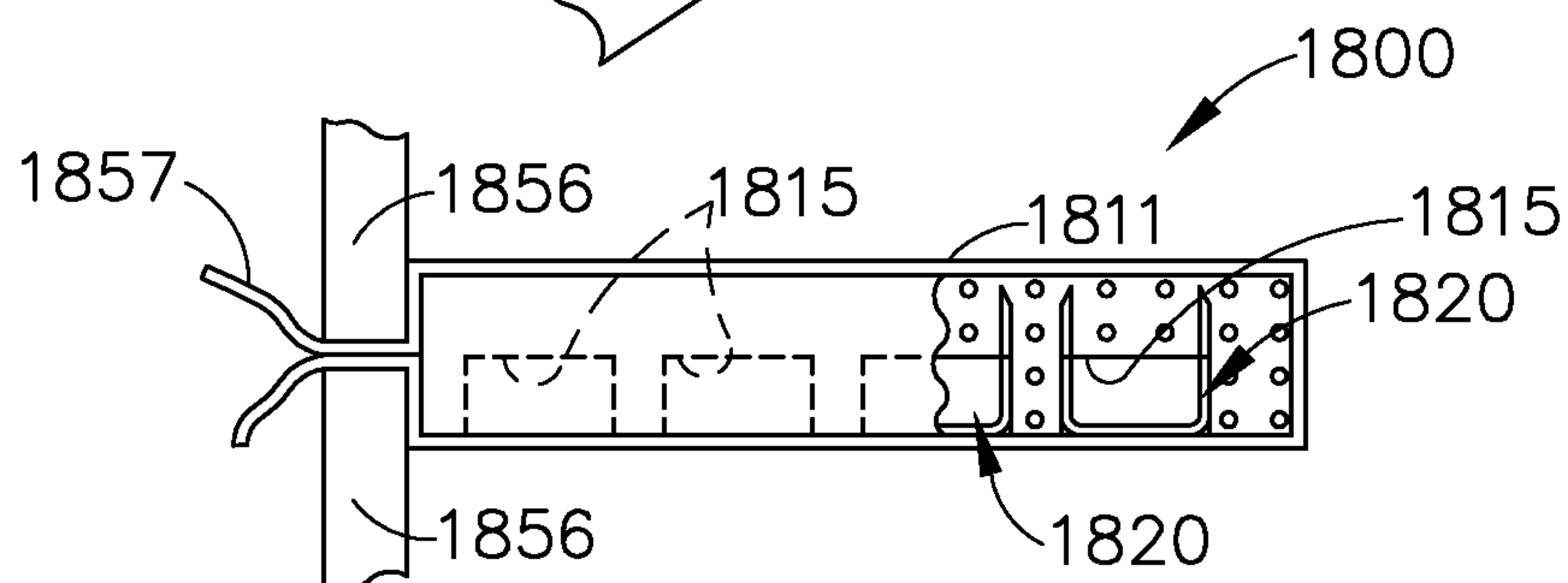


FIG. 39

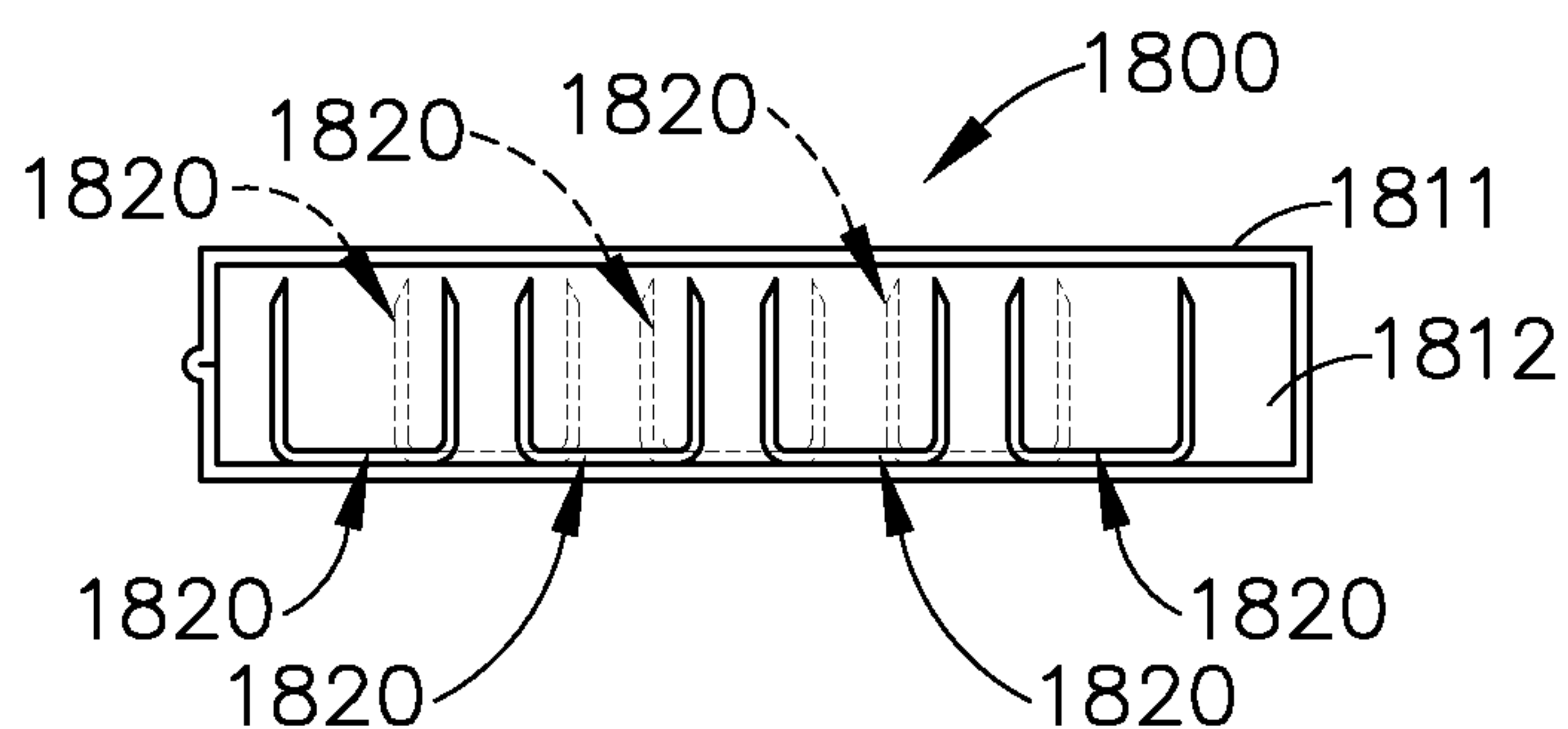


FIG. 40

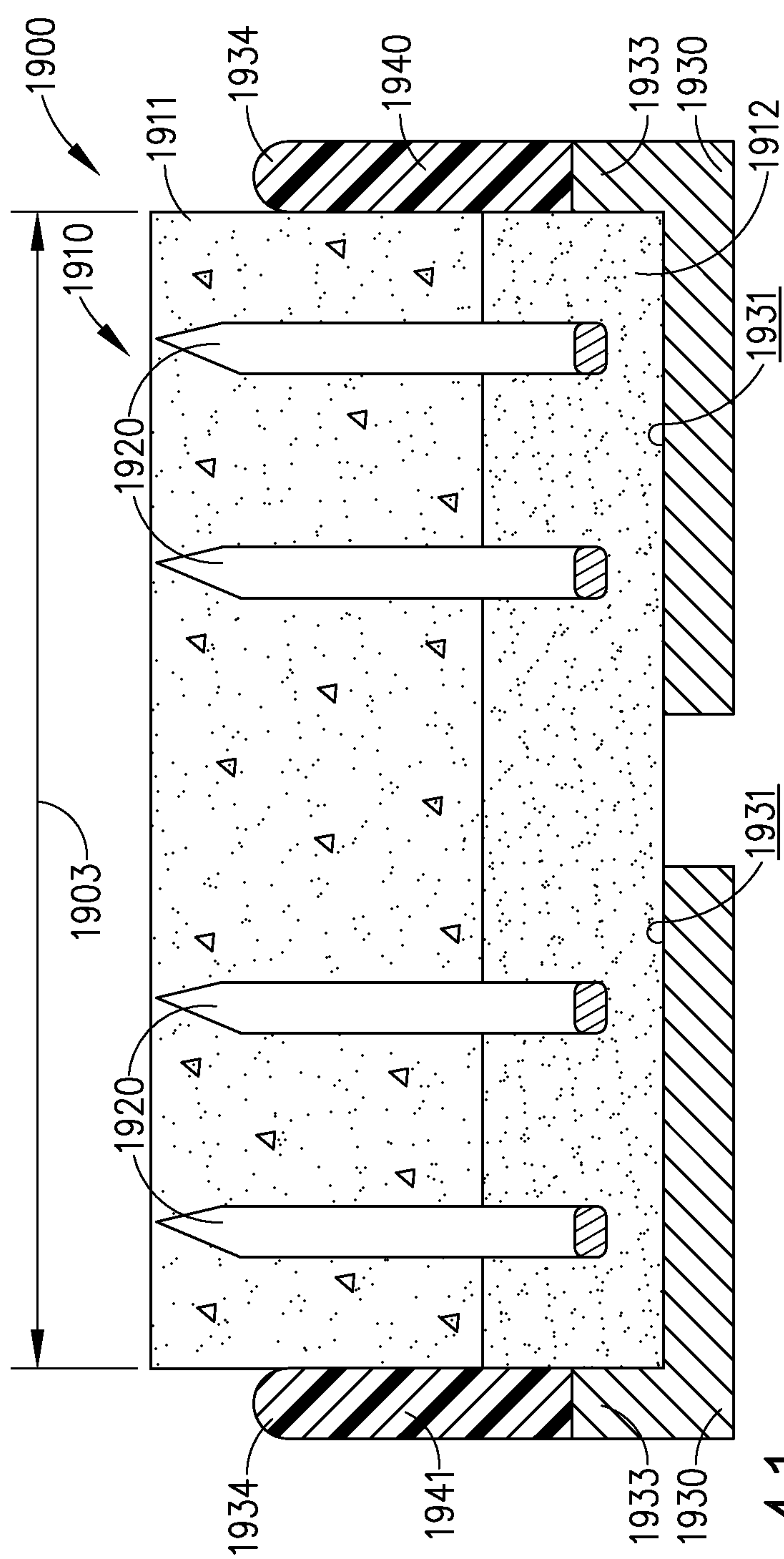


FIG. 41

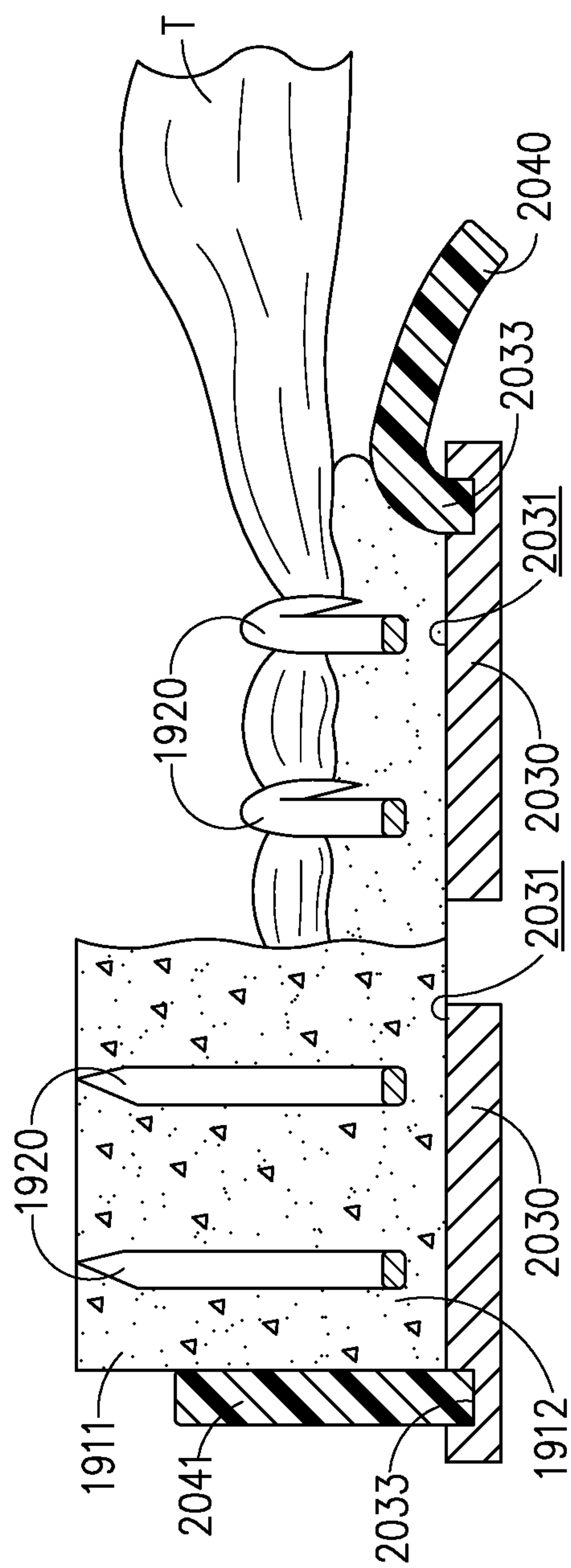


FIG. 42

22/222

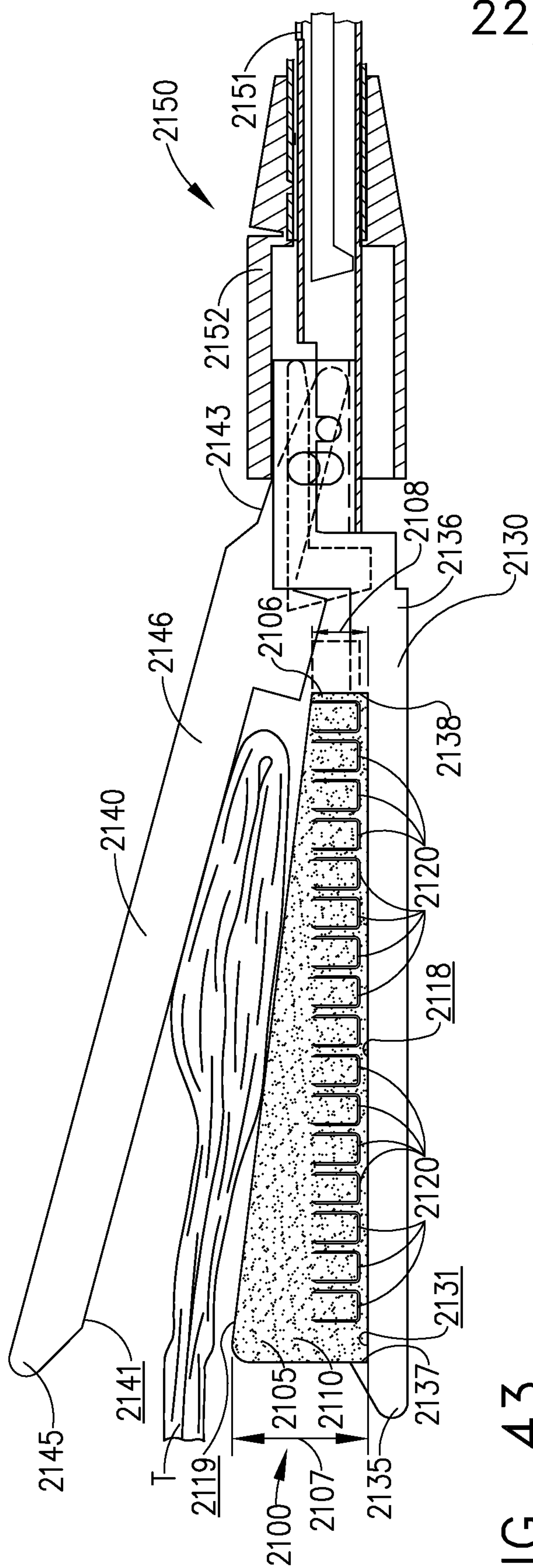


FIG. 43

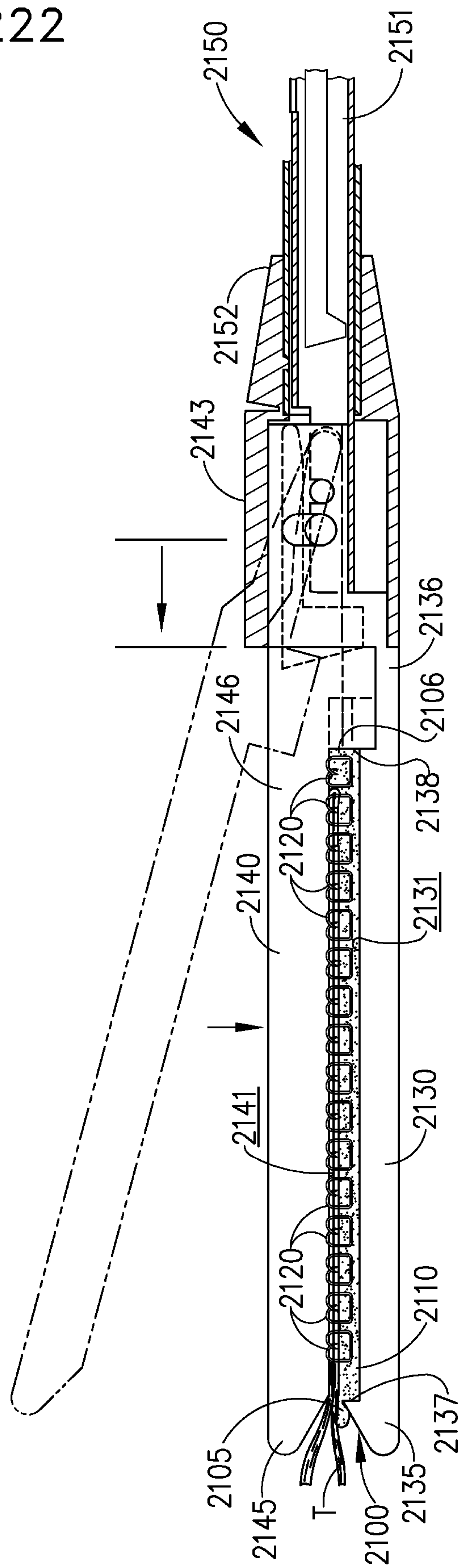
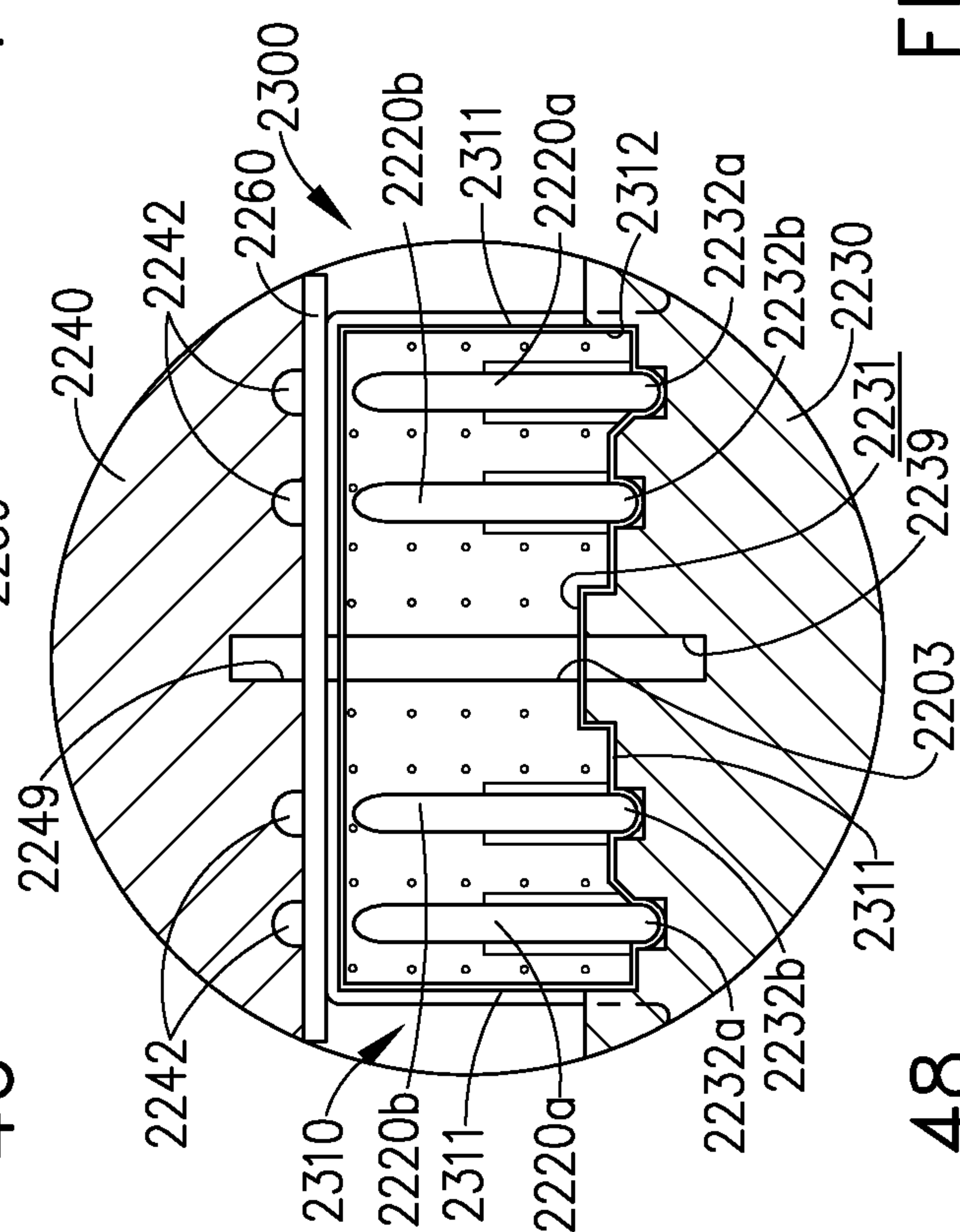
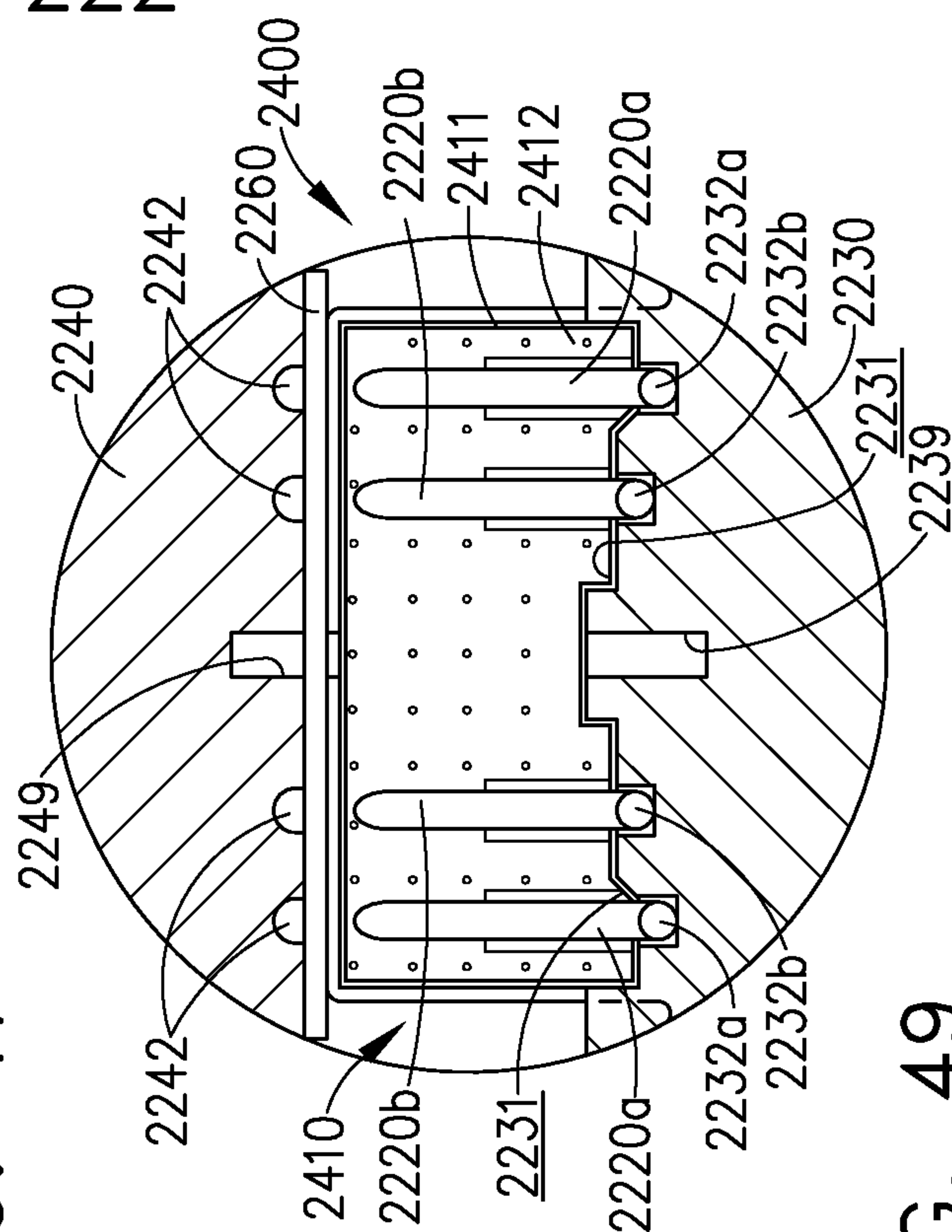
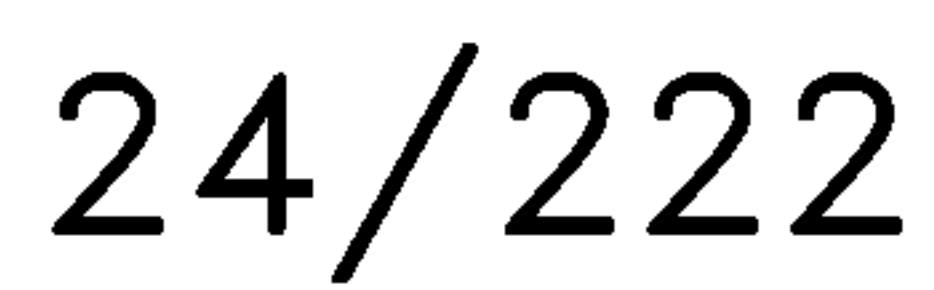
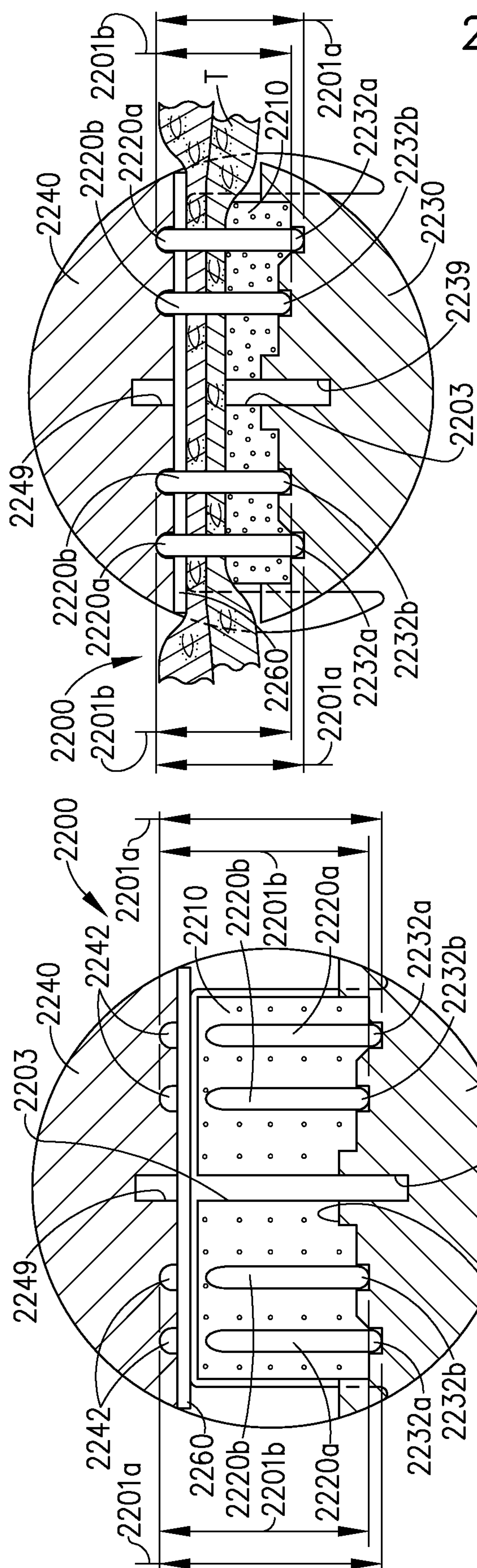


FIG. 44



26/222

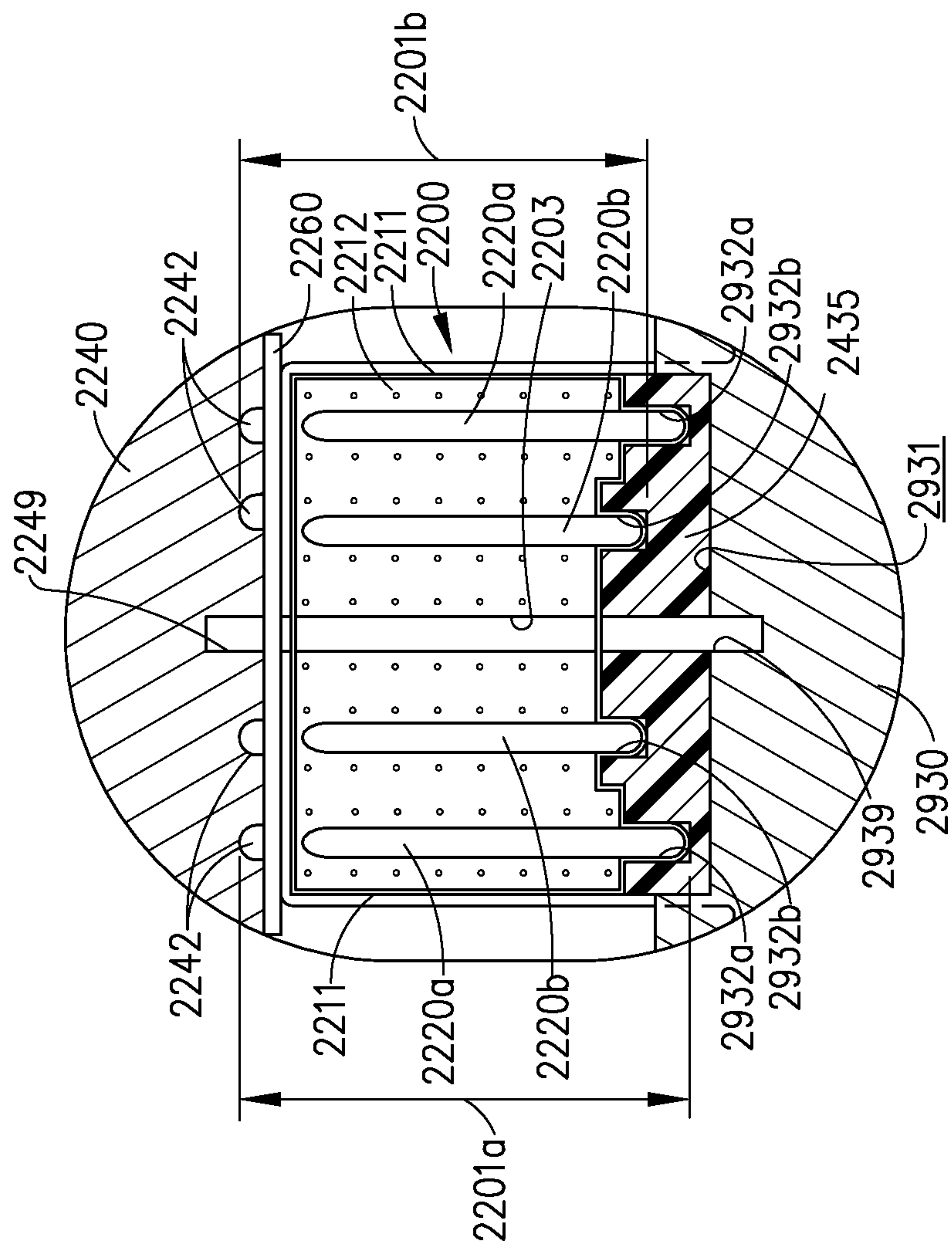
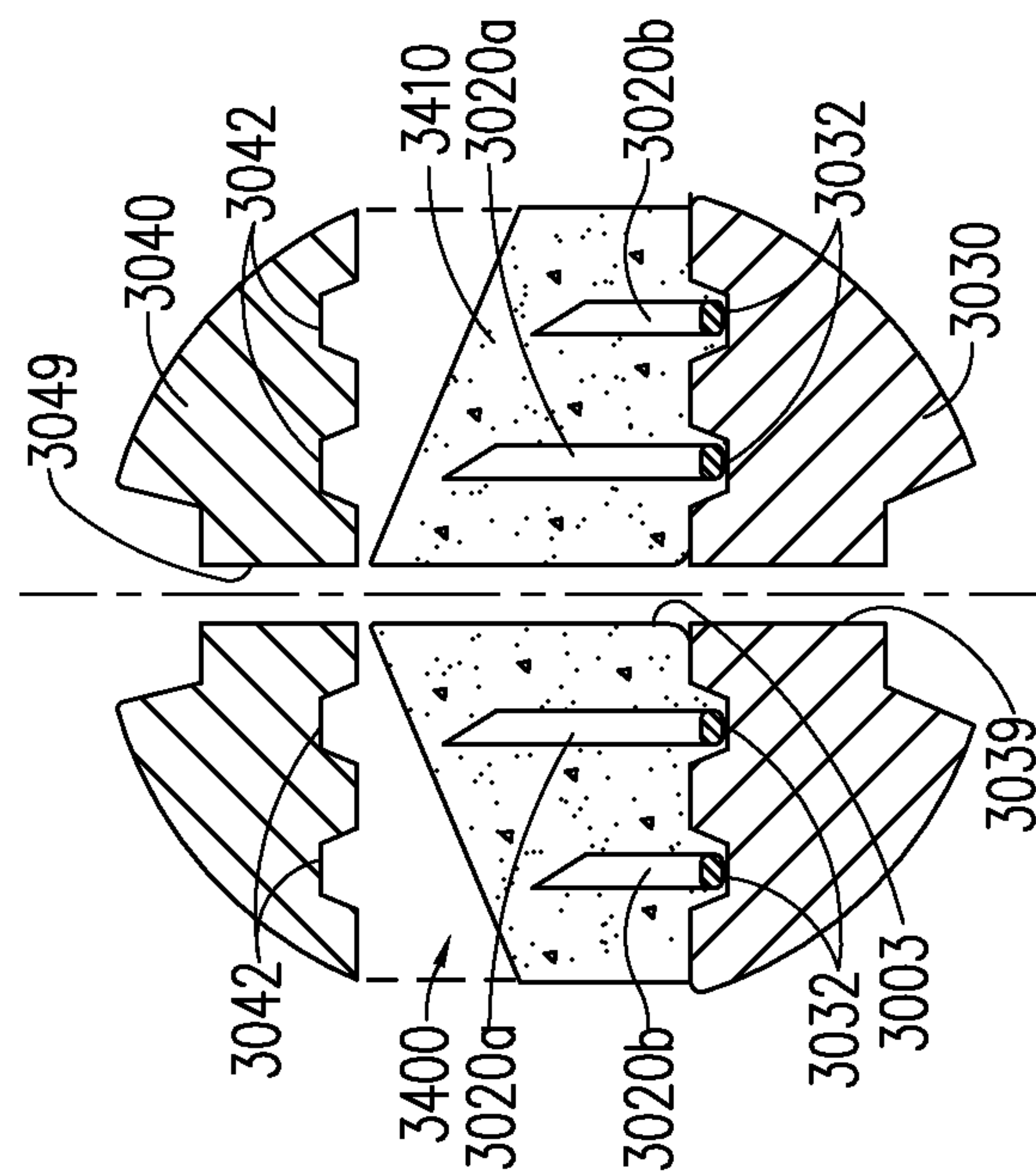
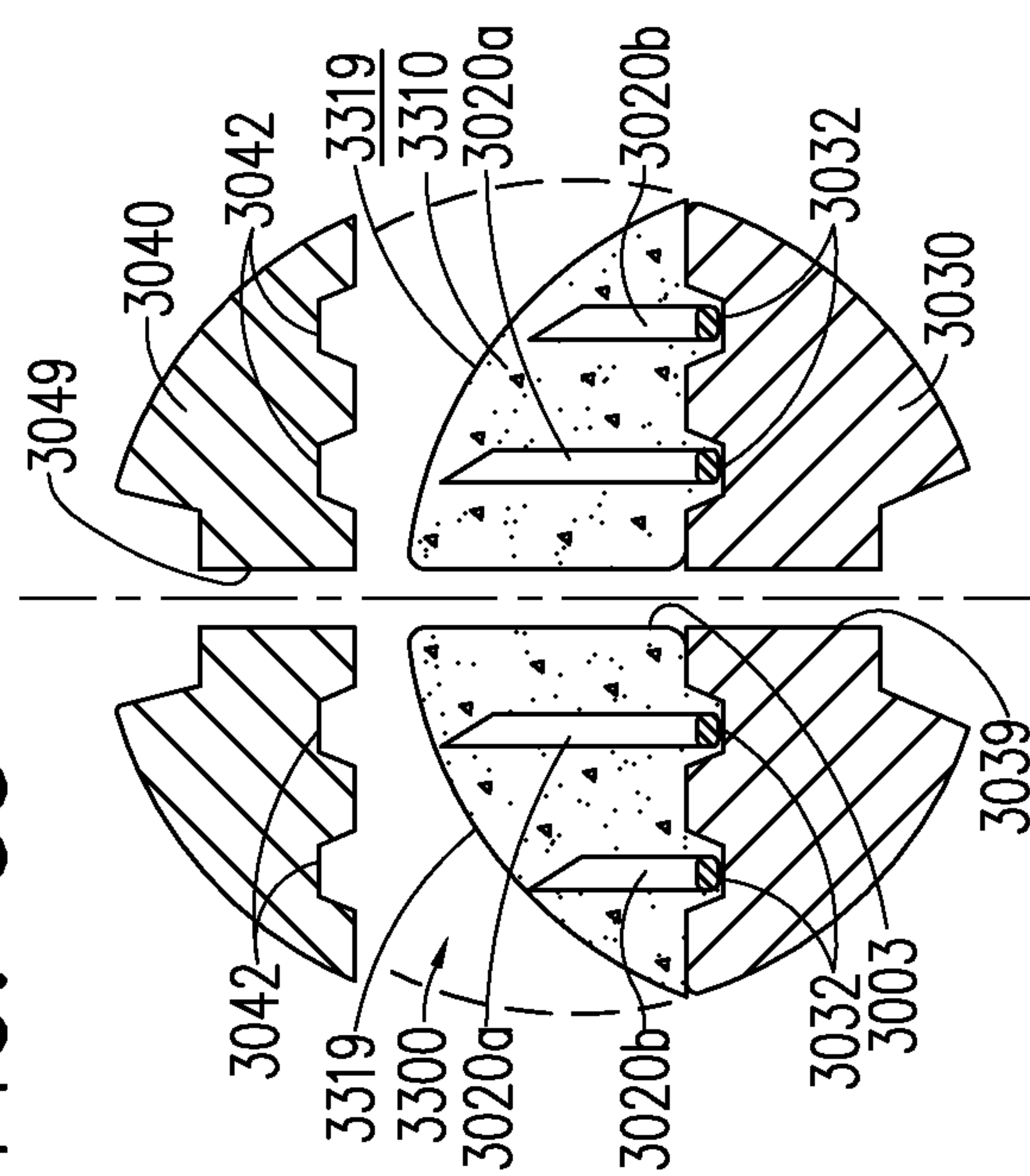
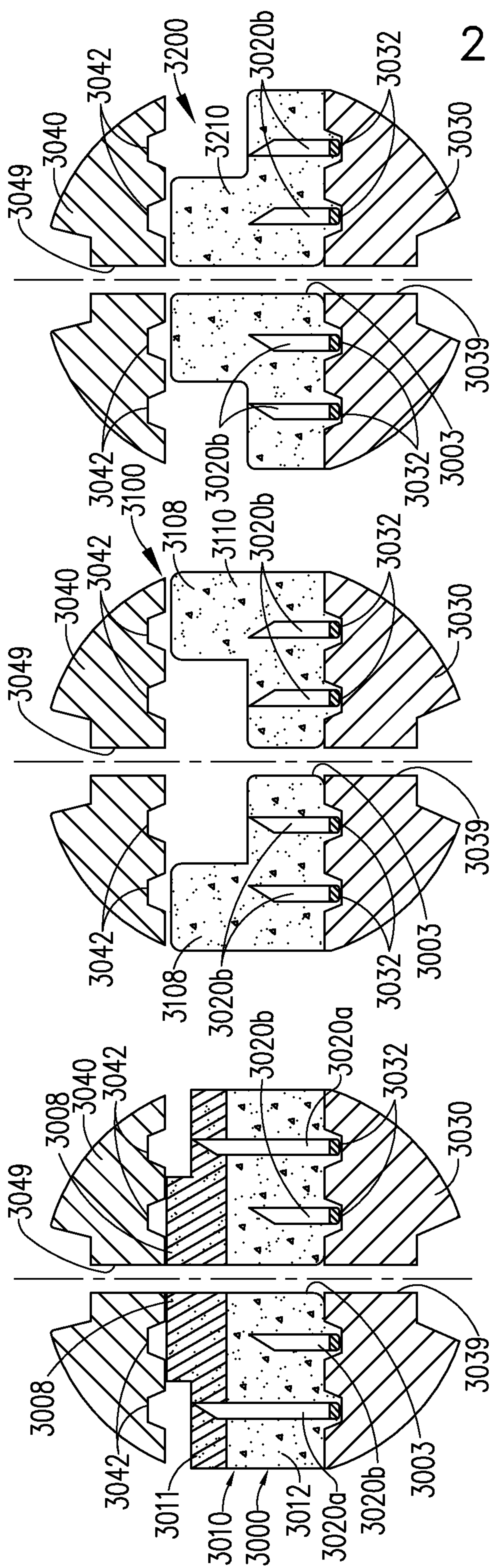


FIG. 54



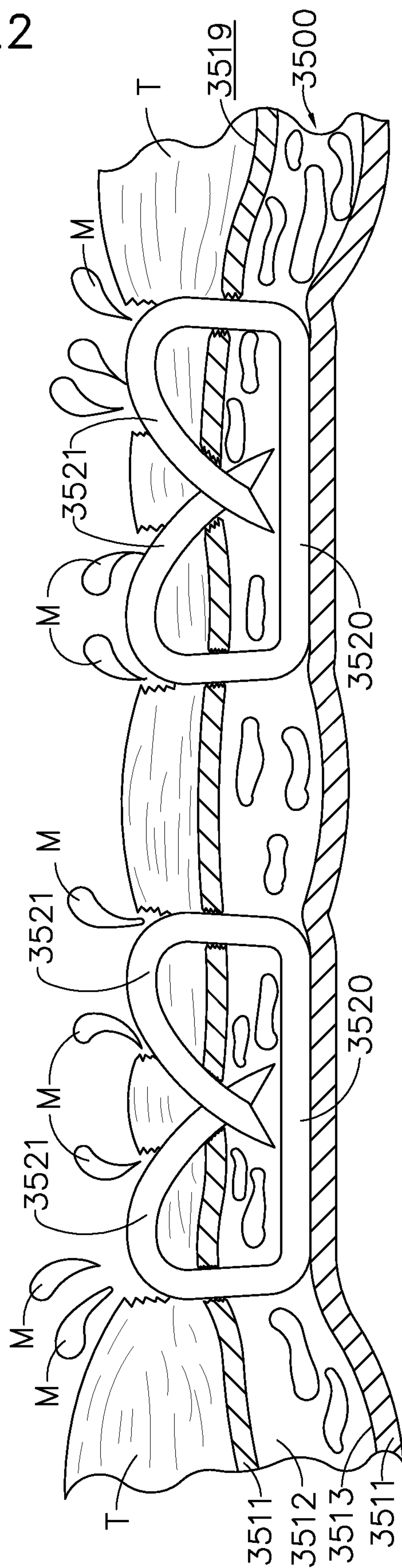
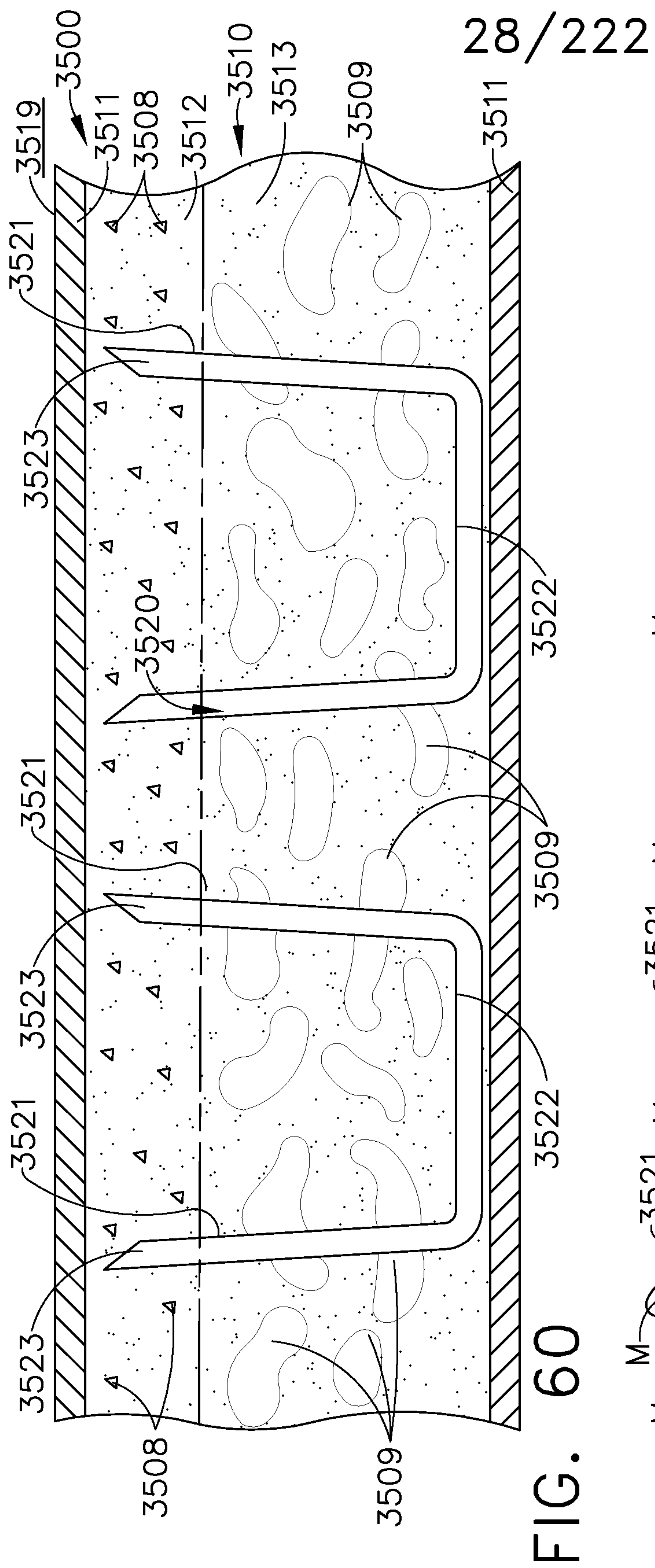
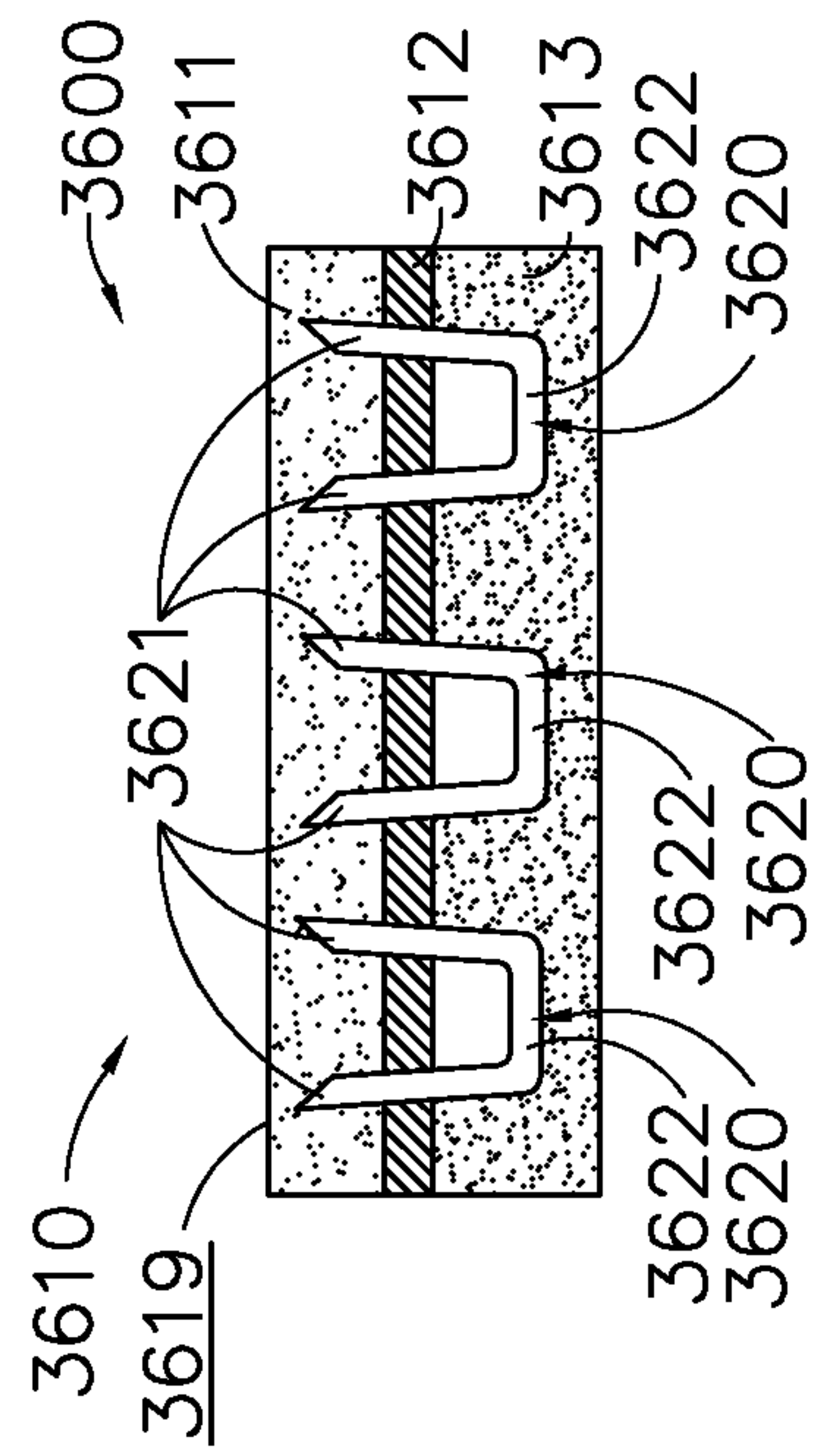
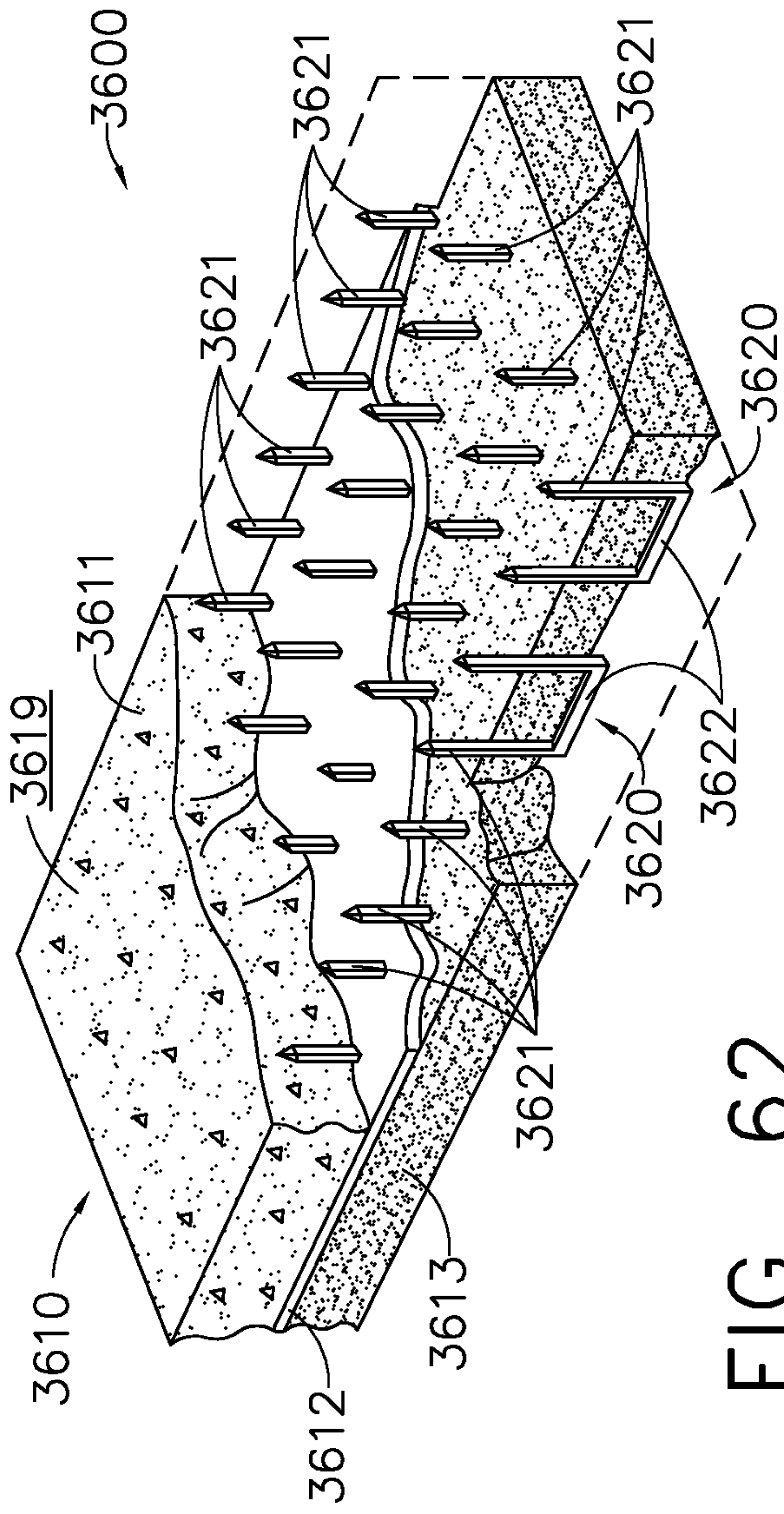
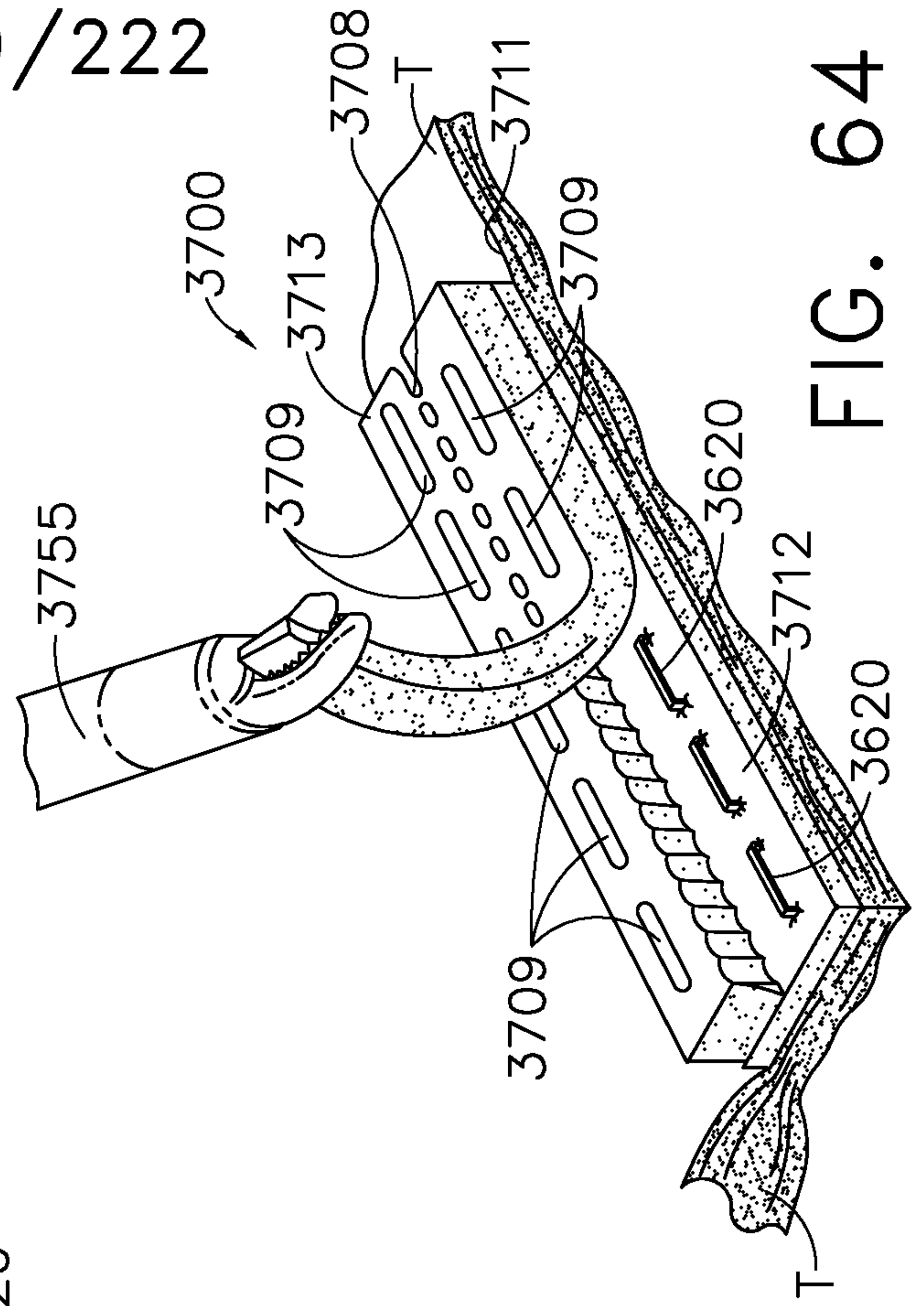


FIG. 61



29/222



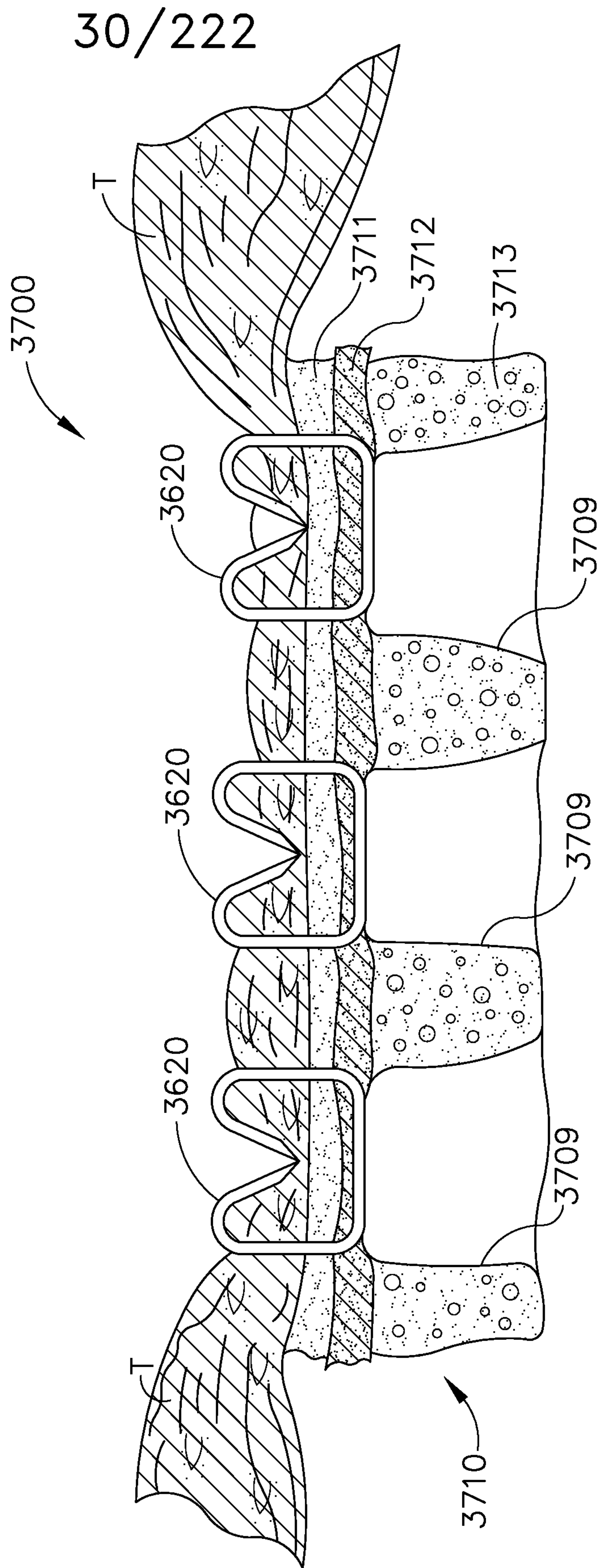


FIG. 65

31/222

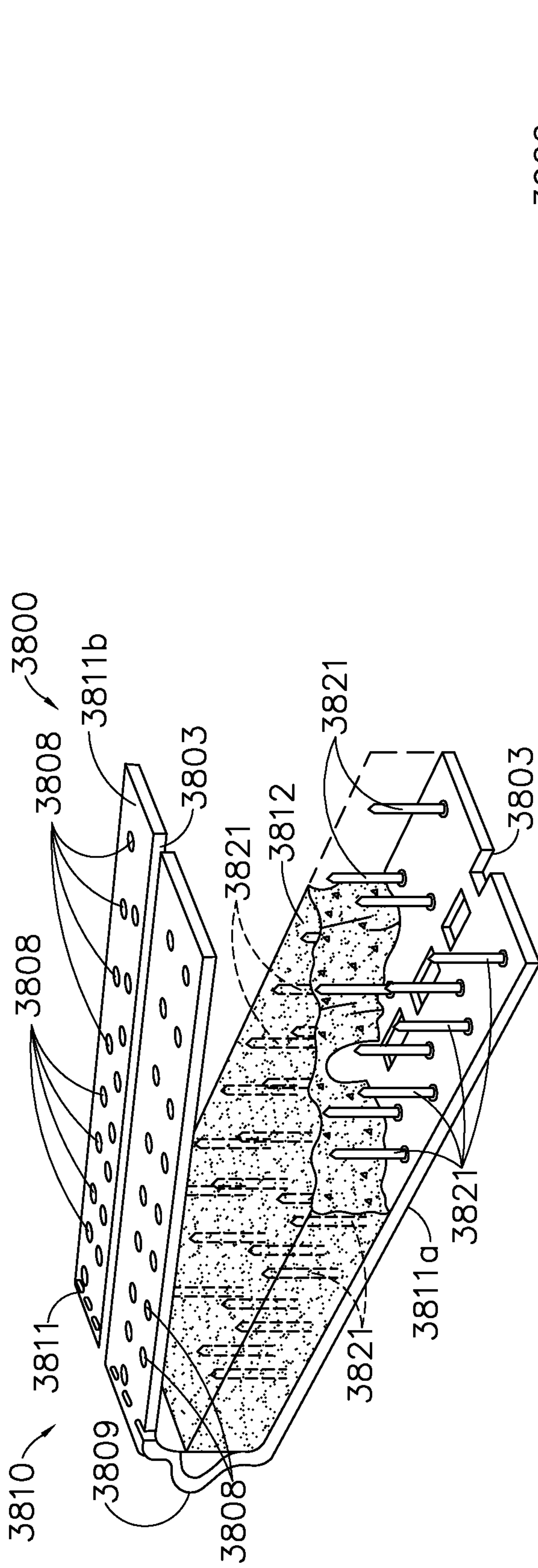


FIG. 66

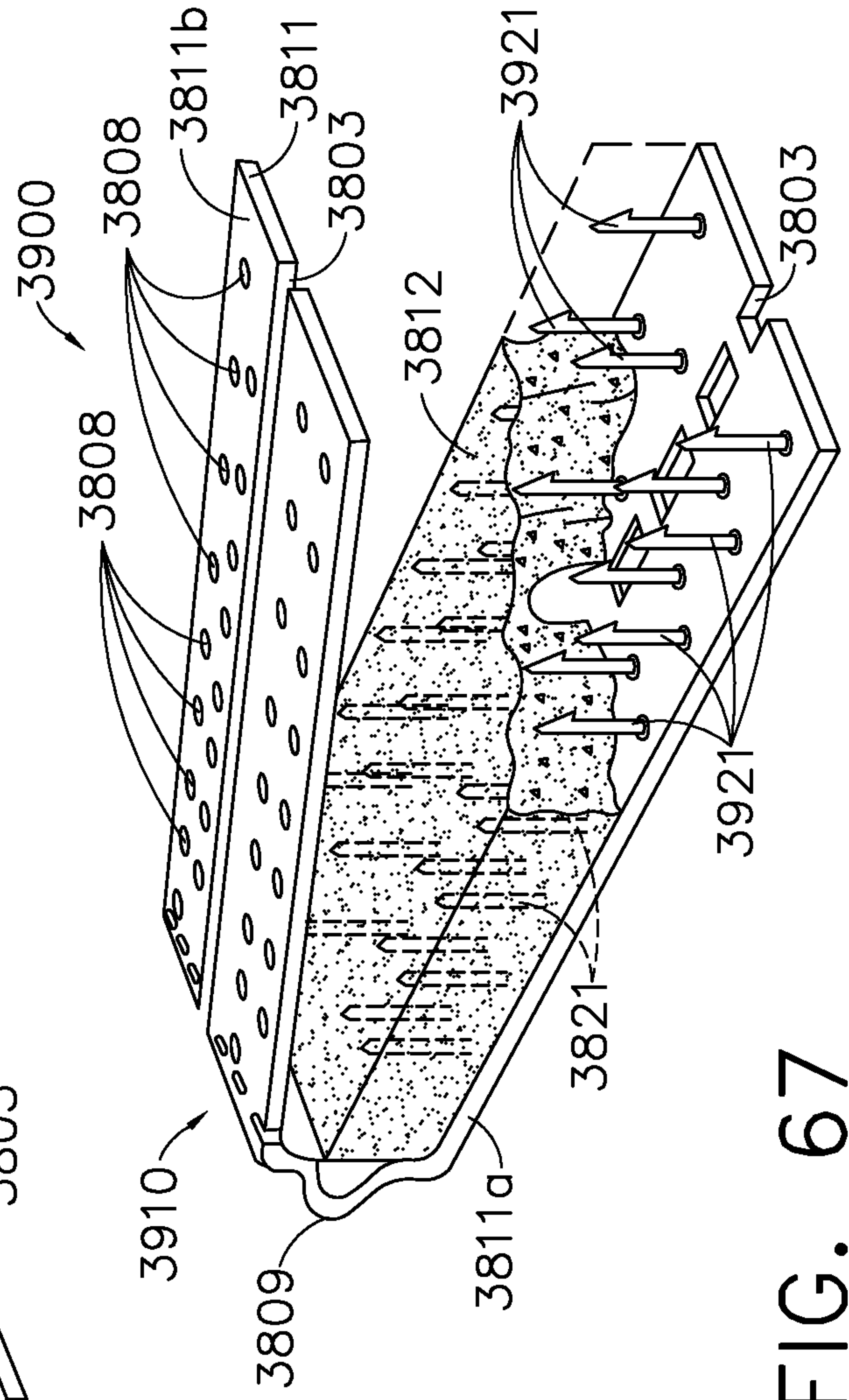
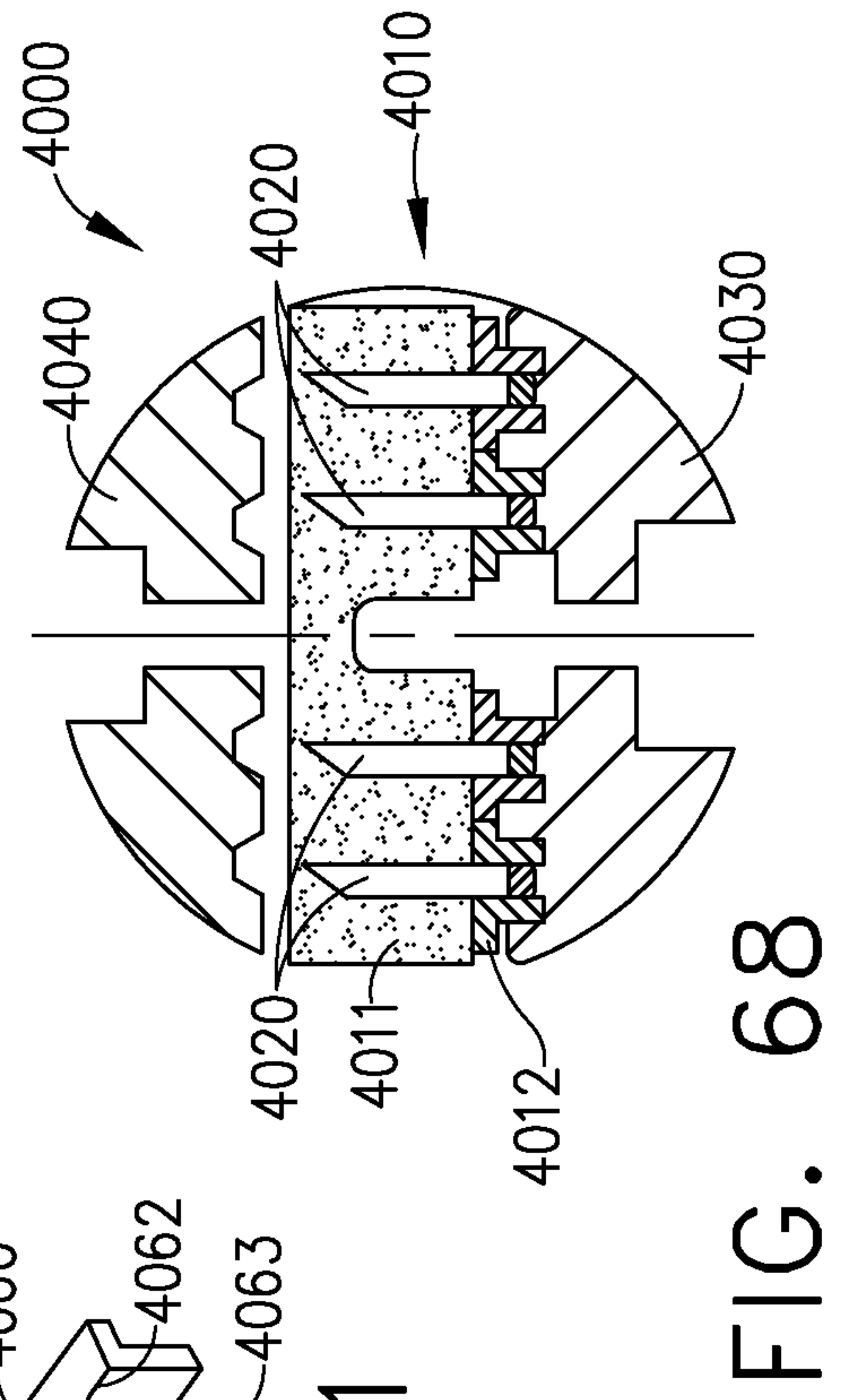
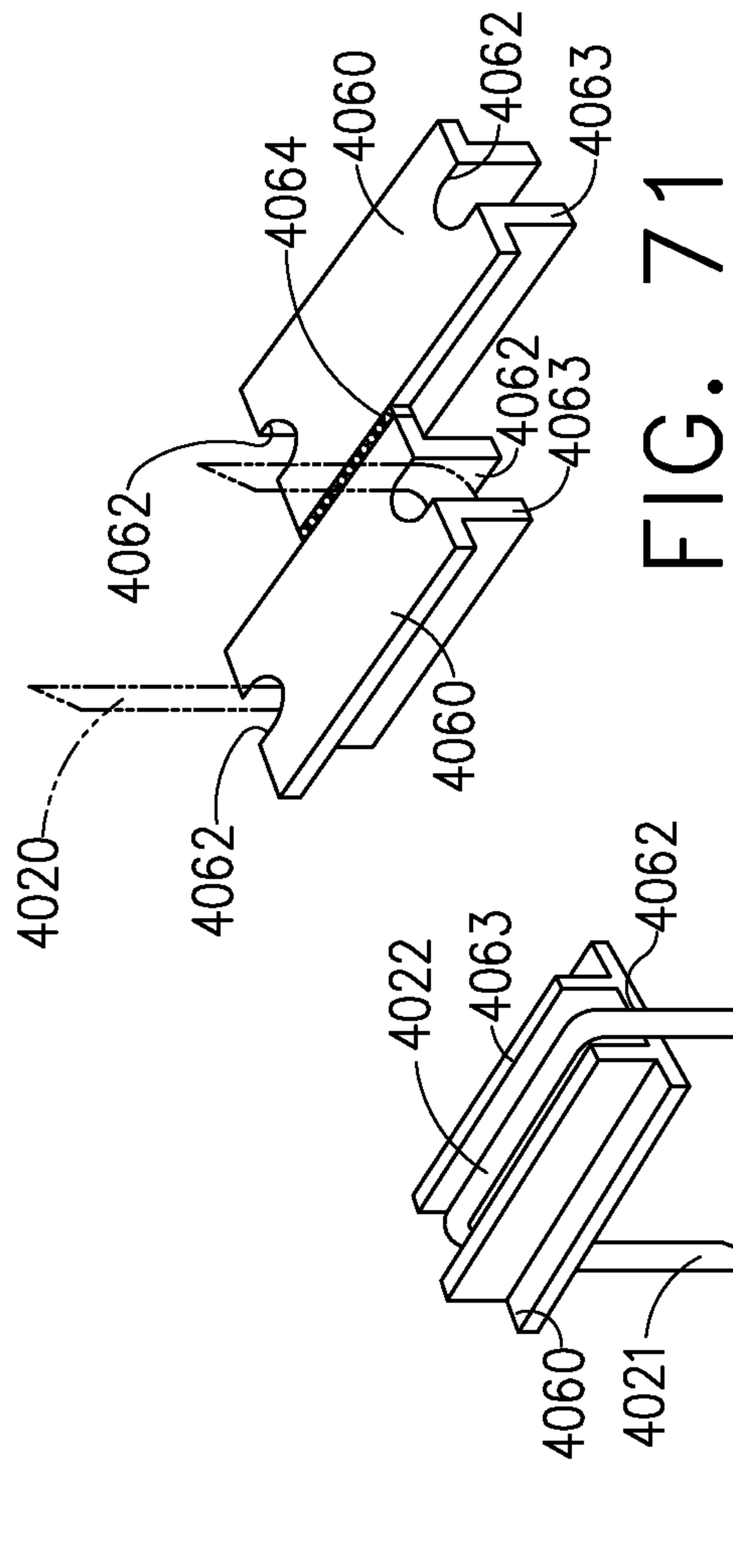
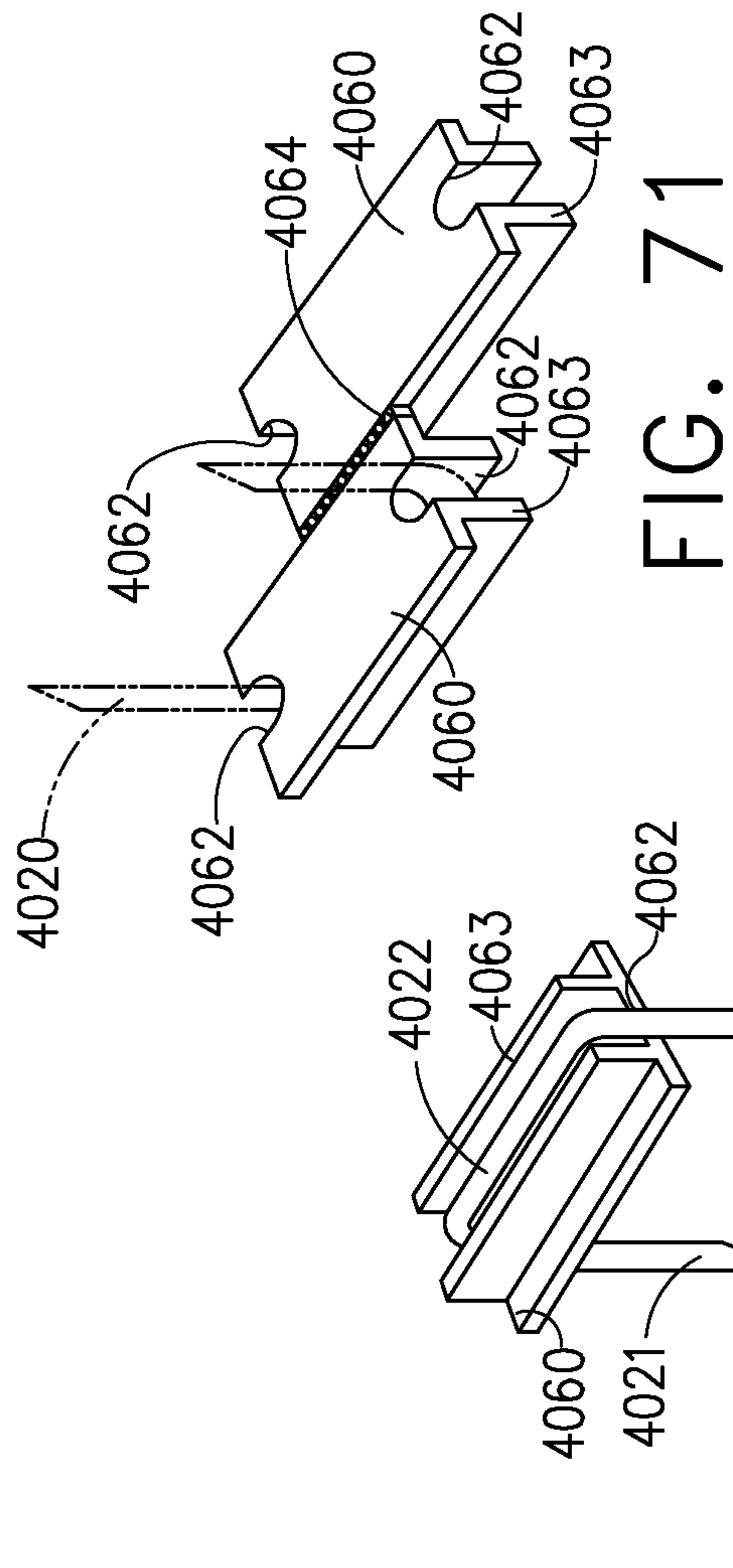
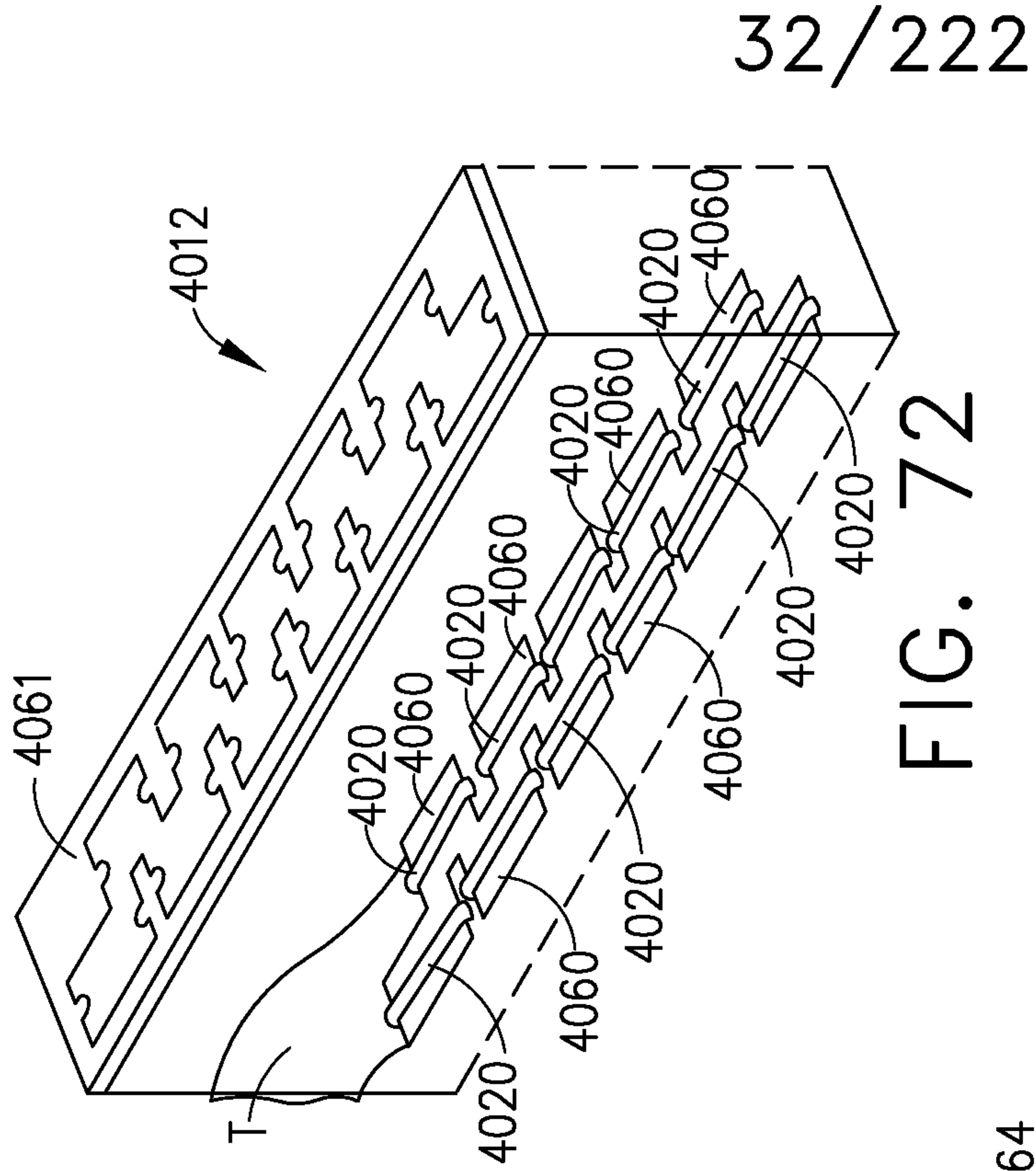
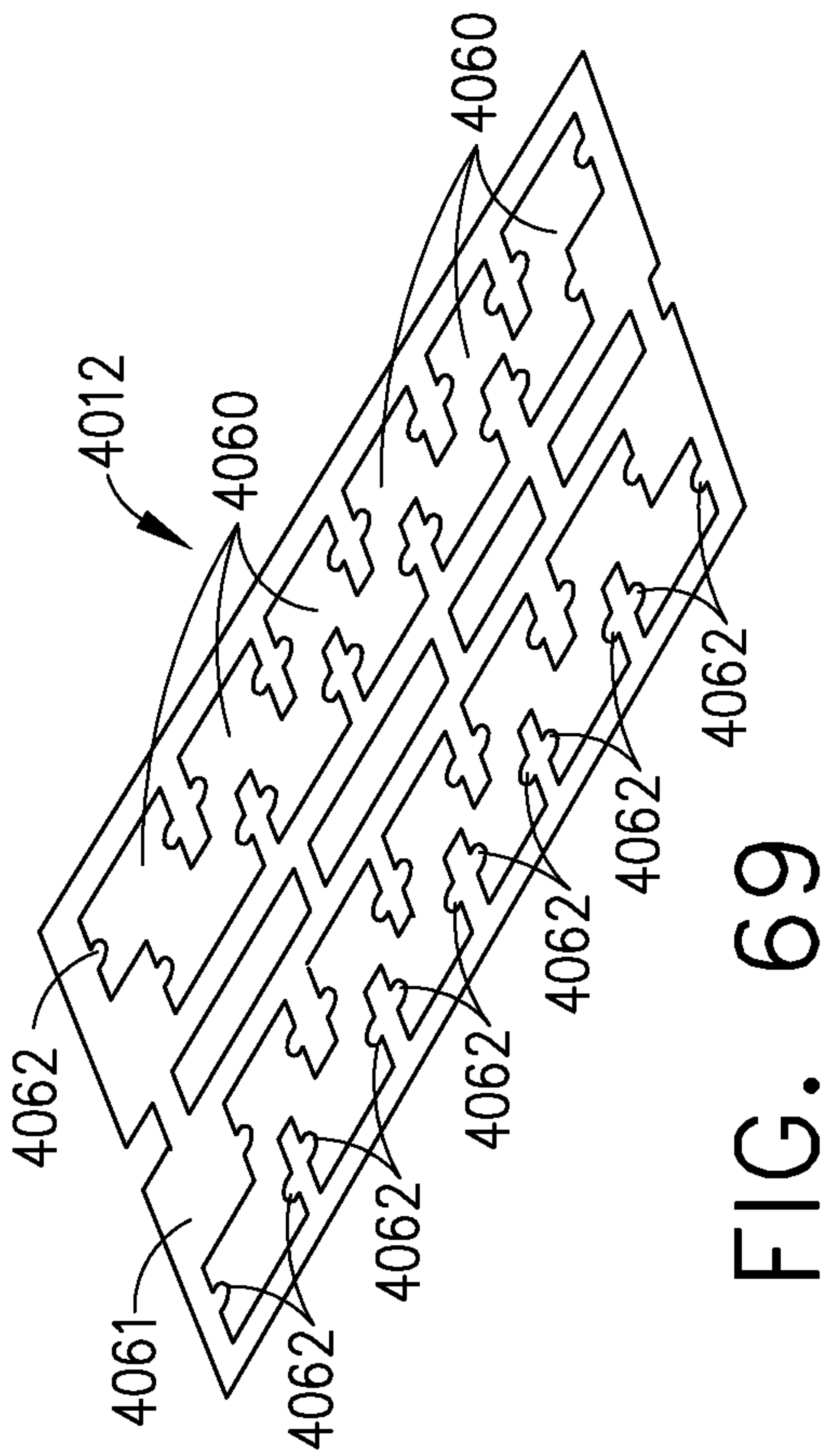


FIG. 67



32/222

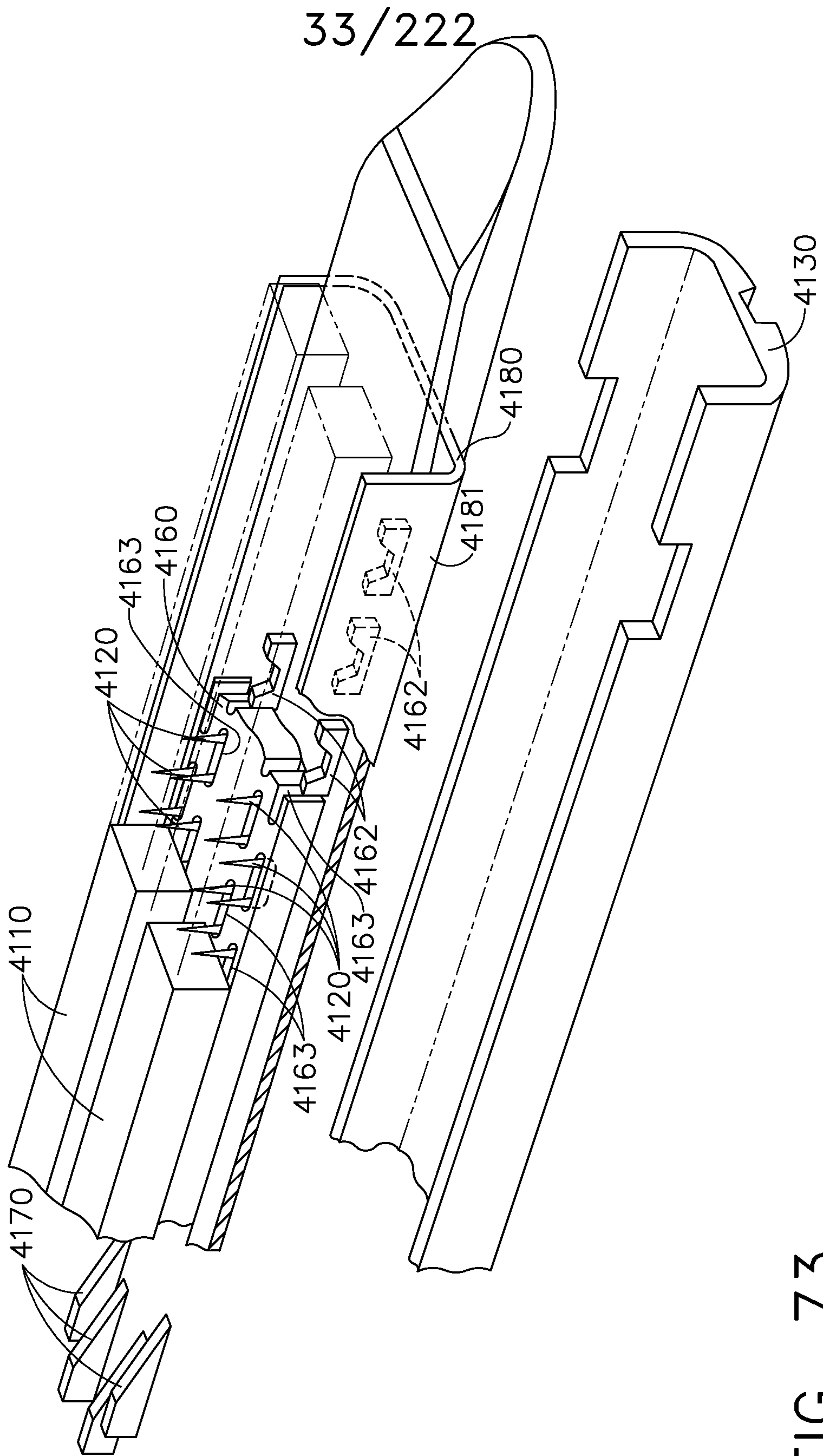


FIG. 73

34/222

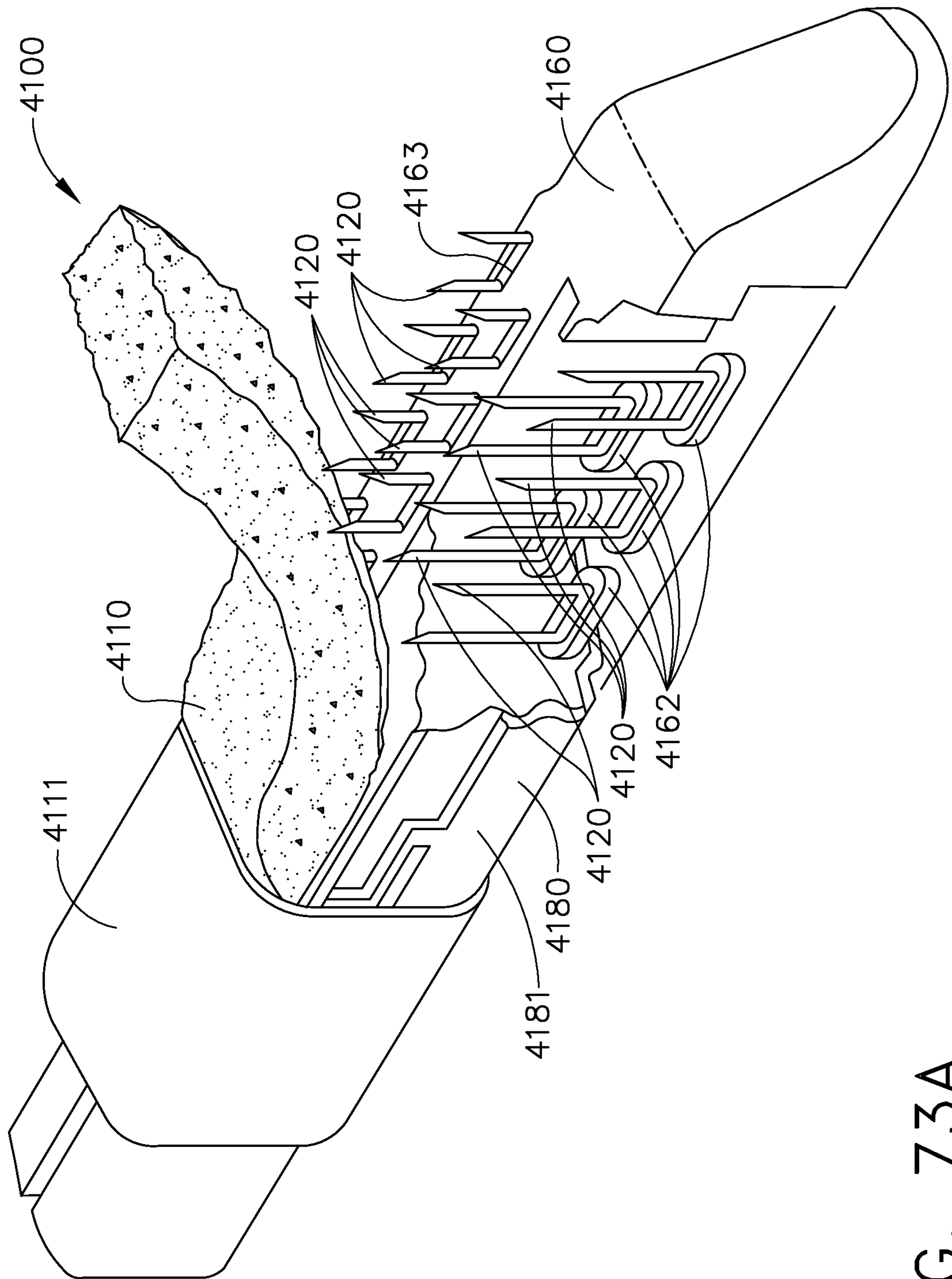
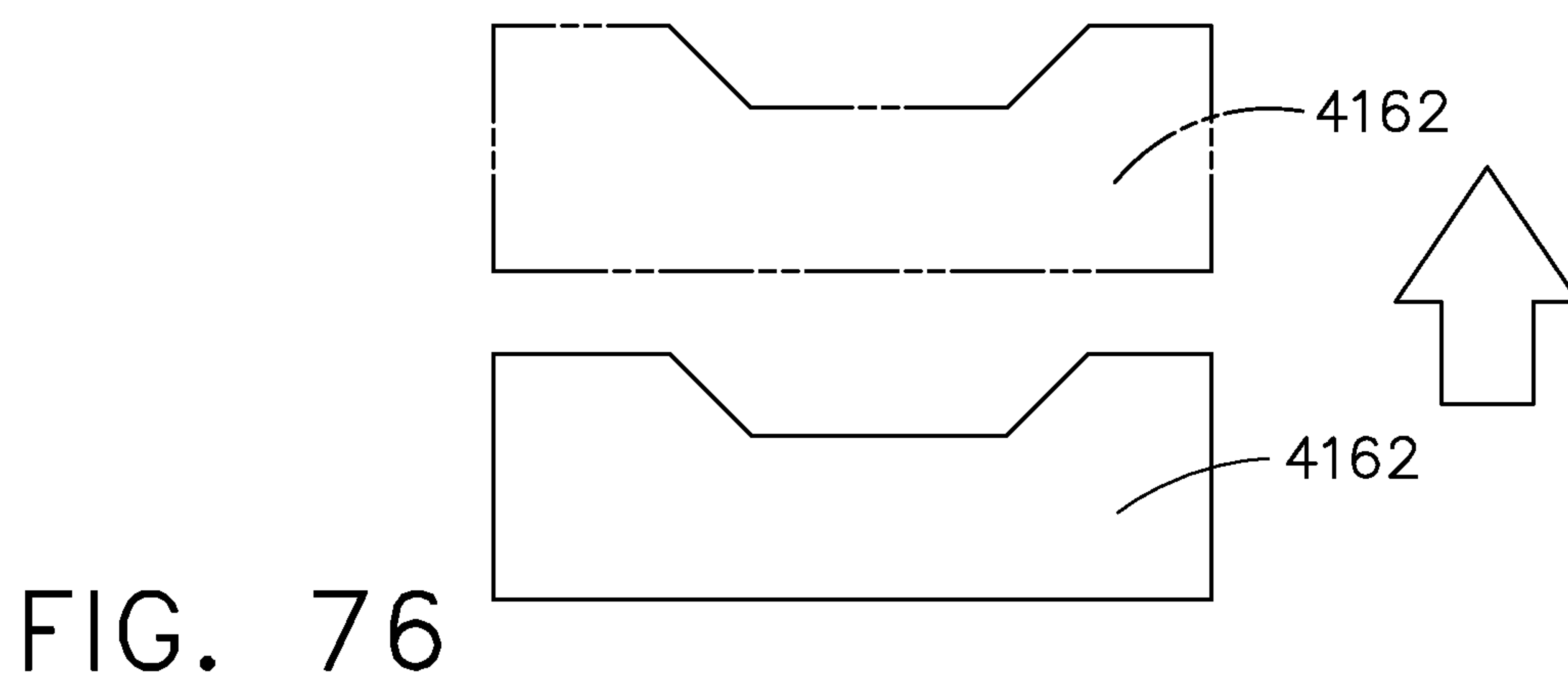
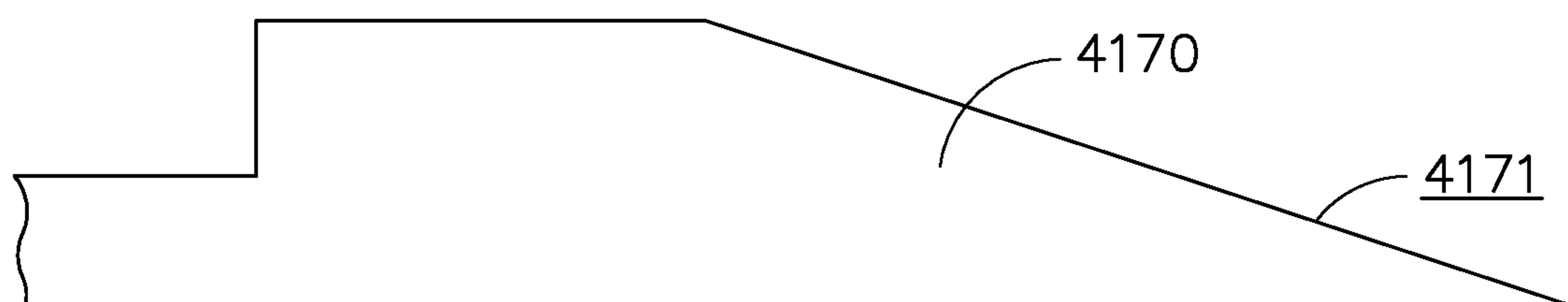
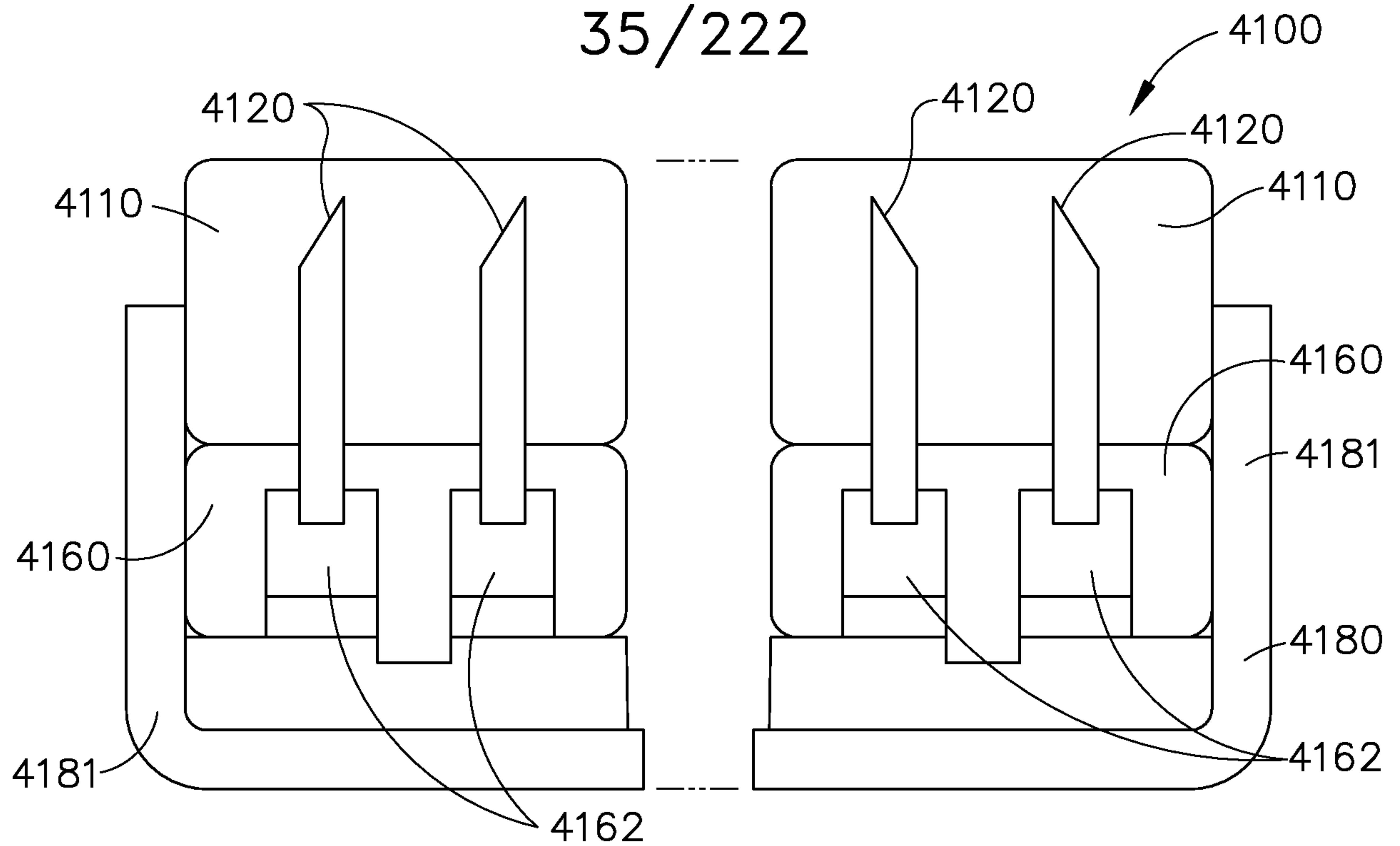
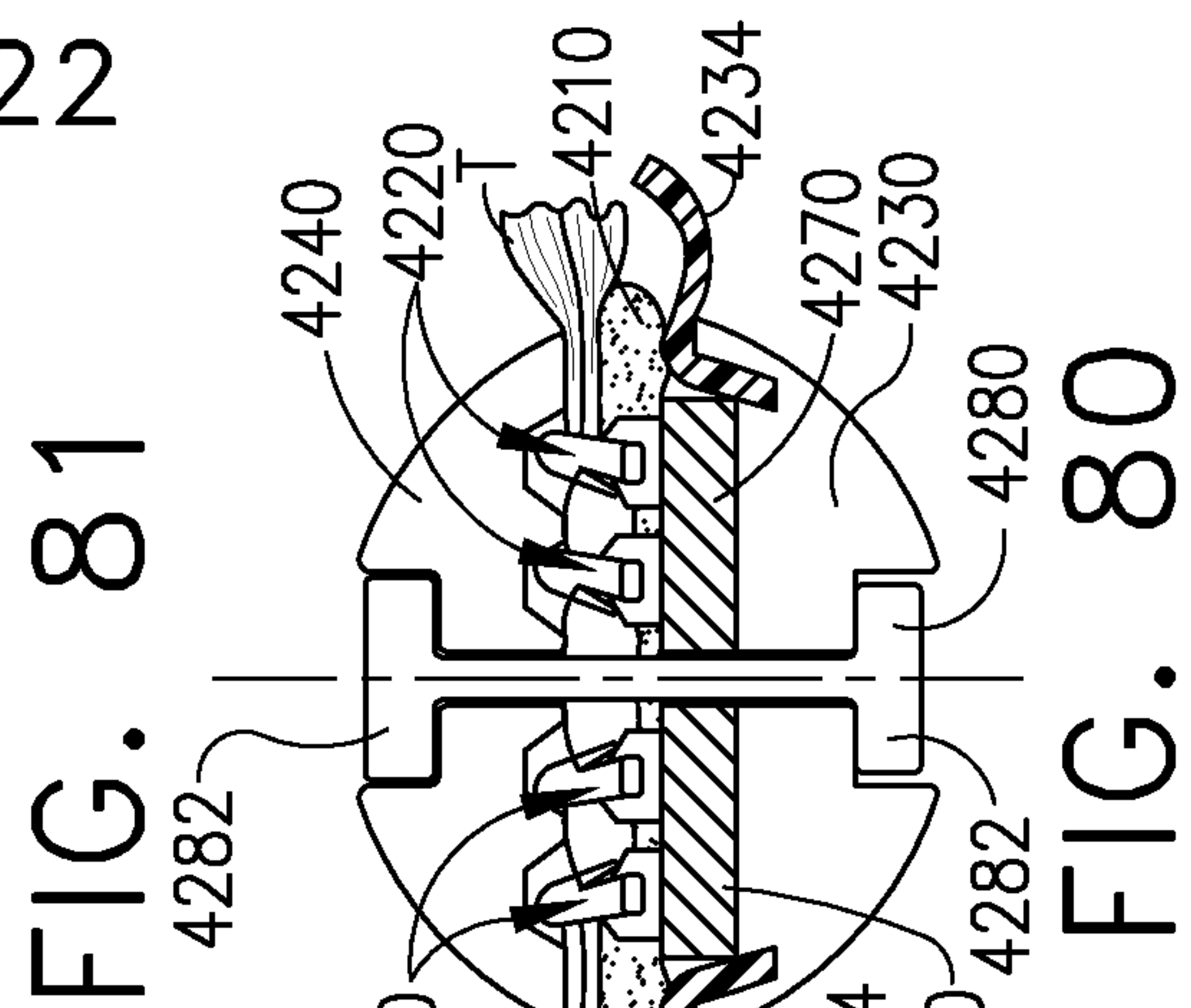
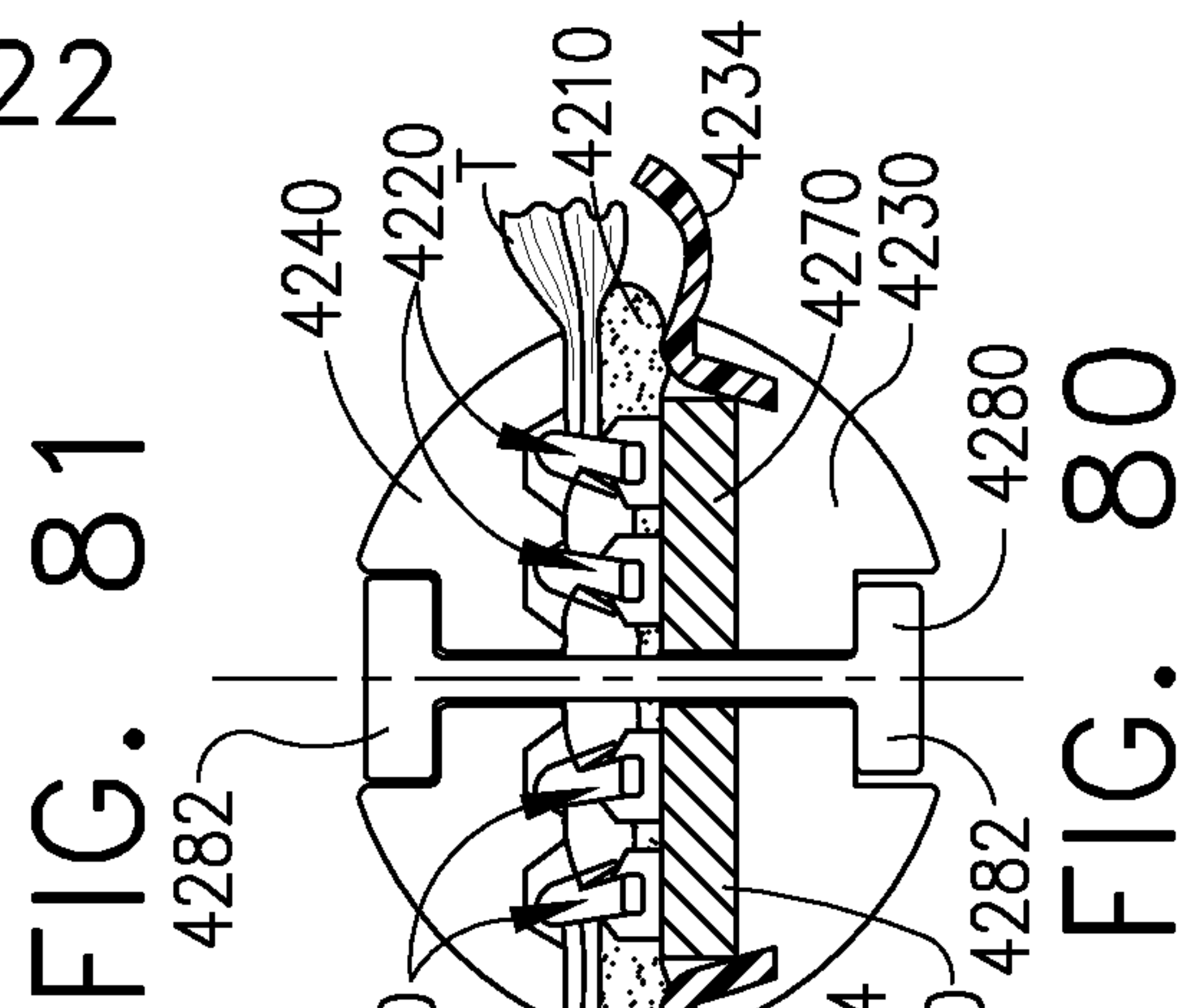
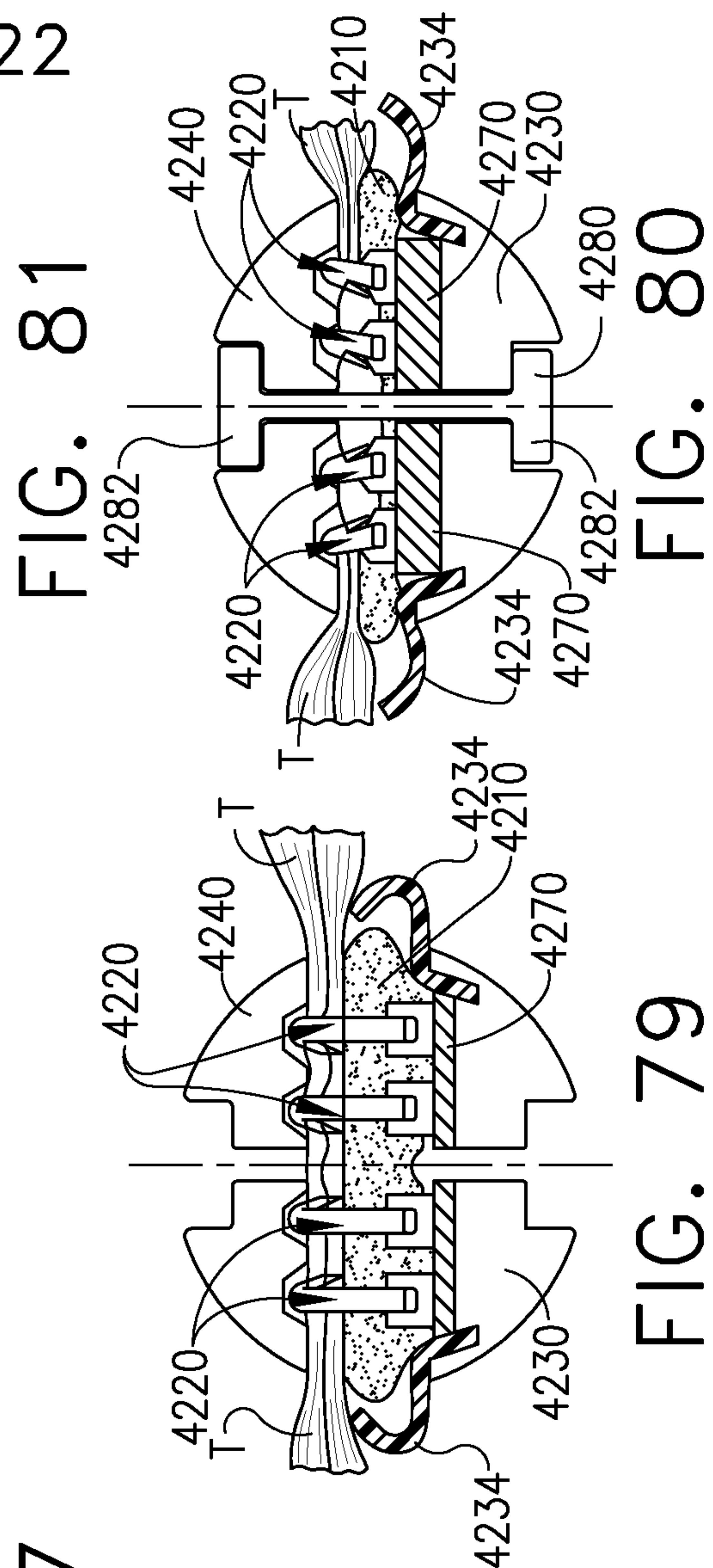
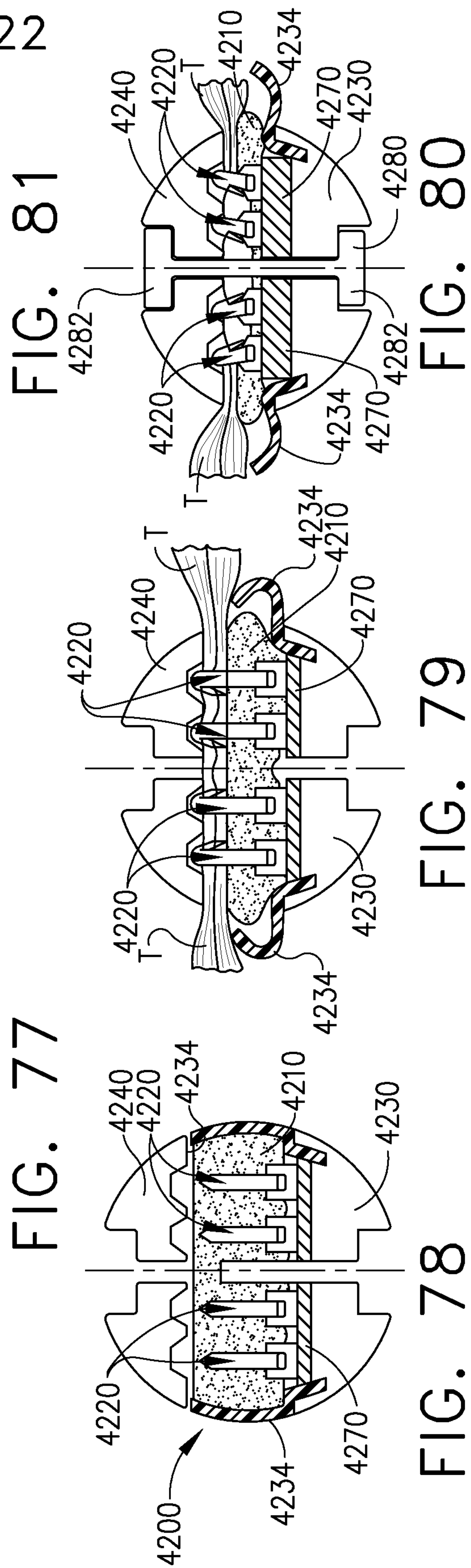
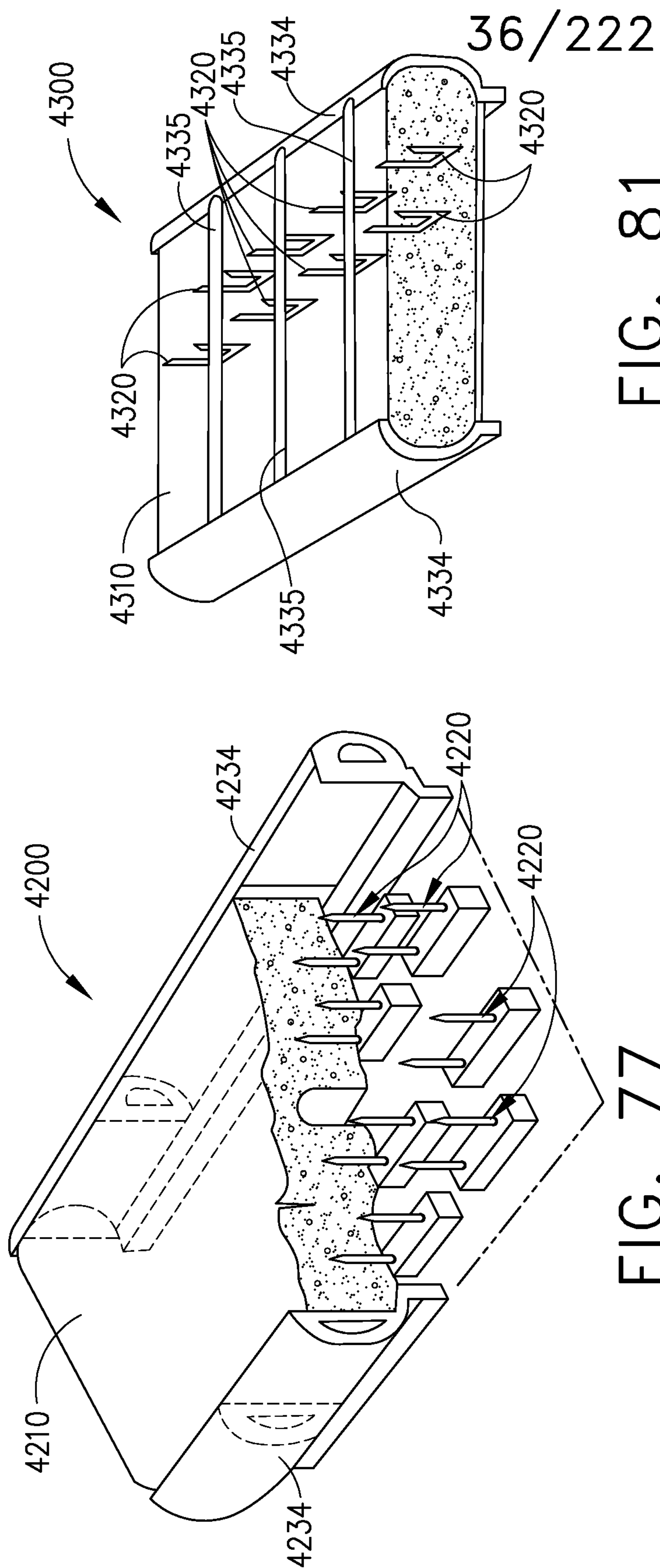


FIG. 73A

35/222





37/222

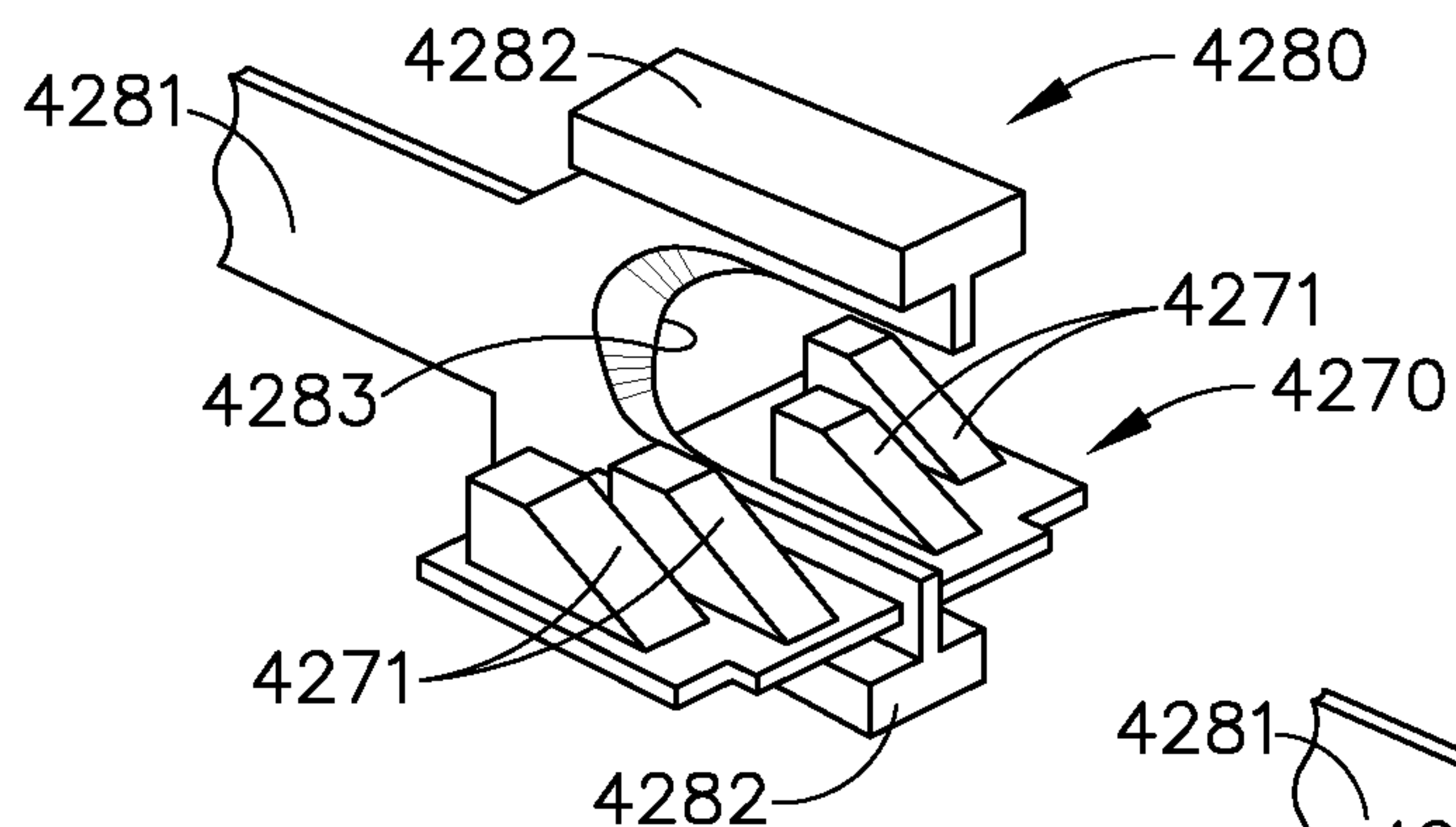


FIG. 82

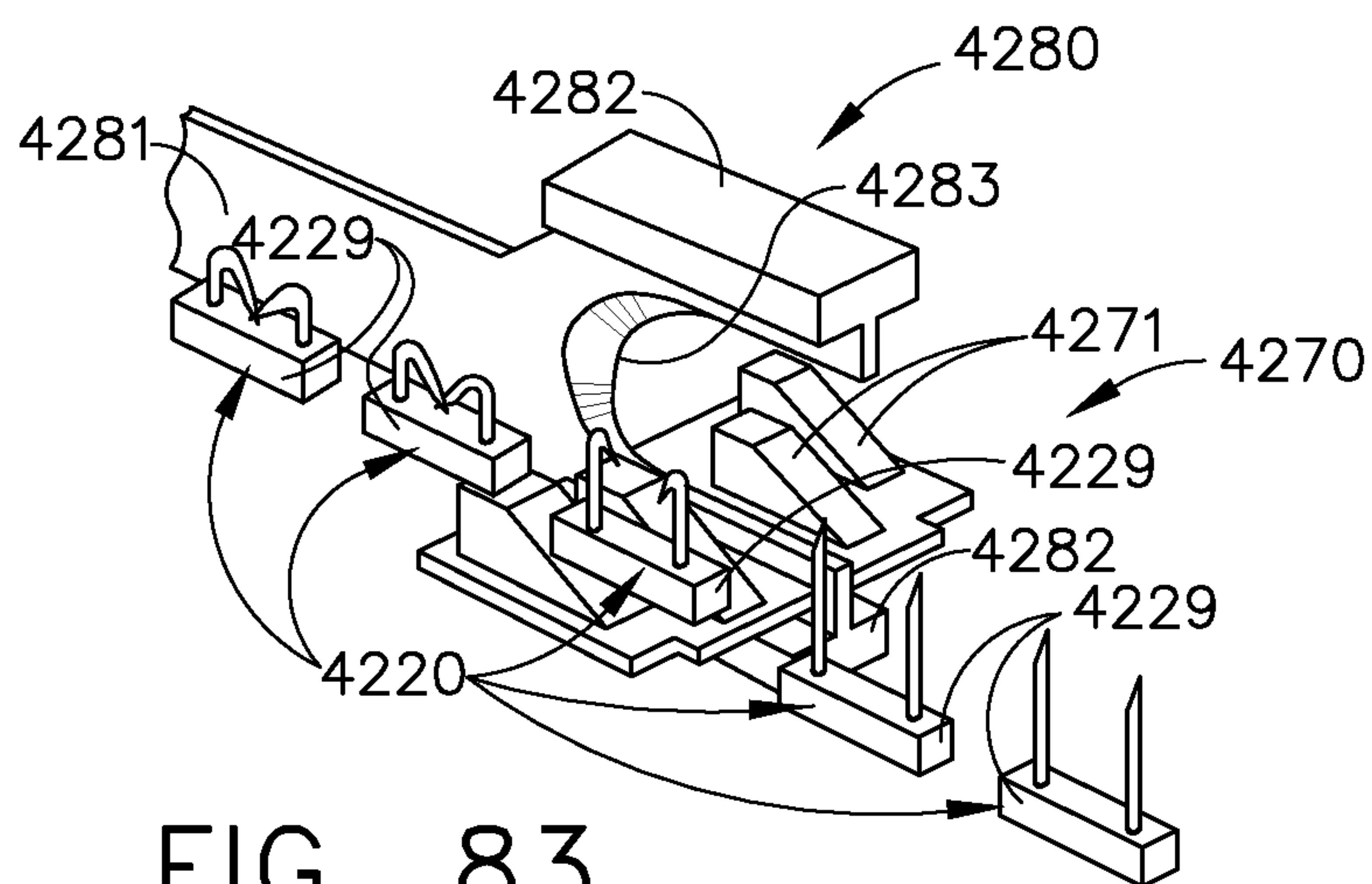


FIG. 83

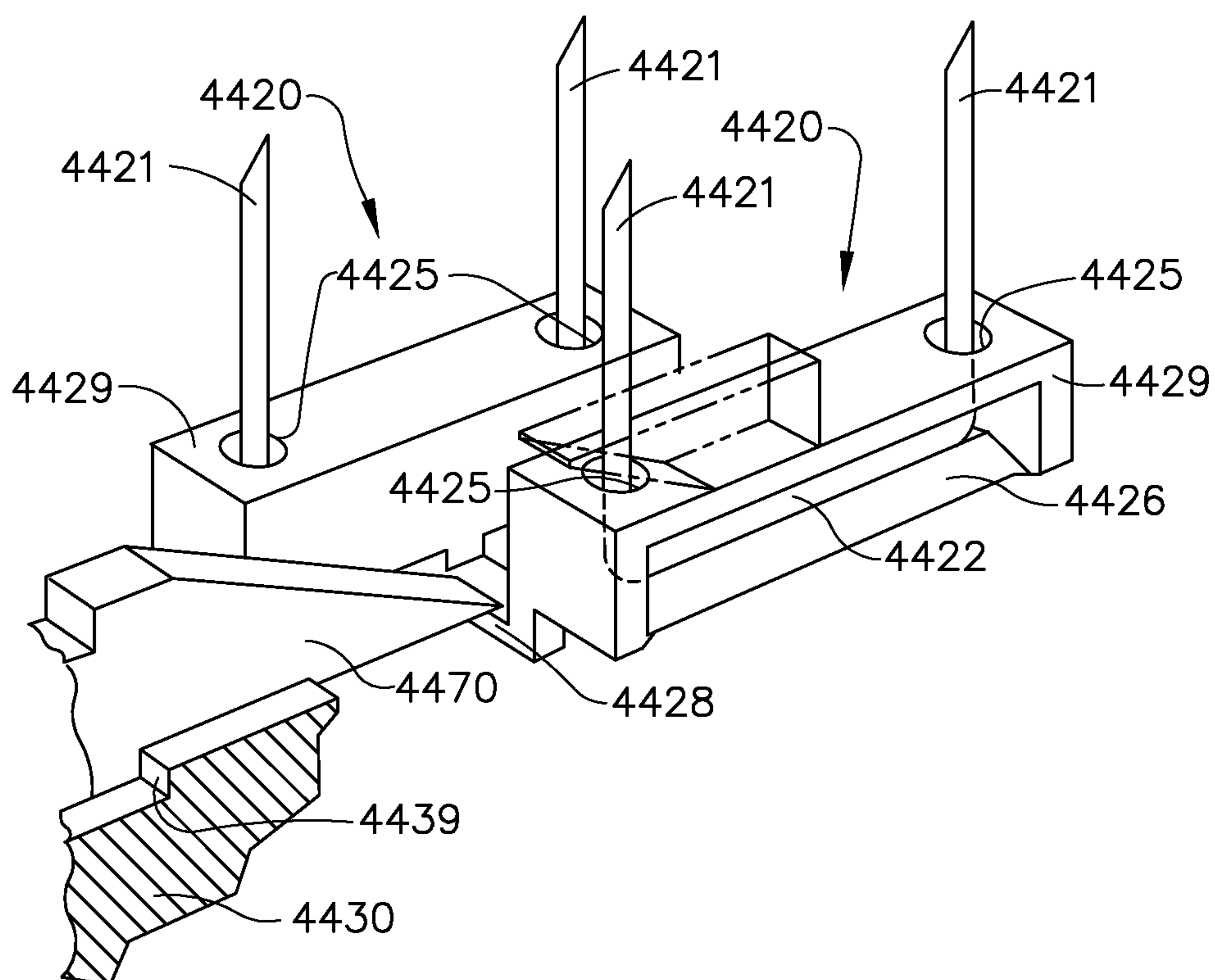
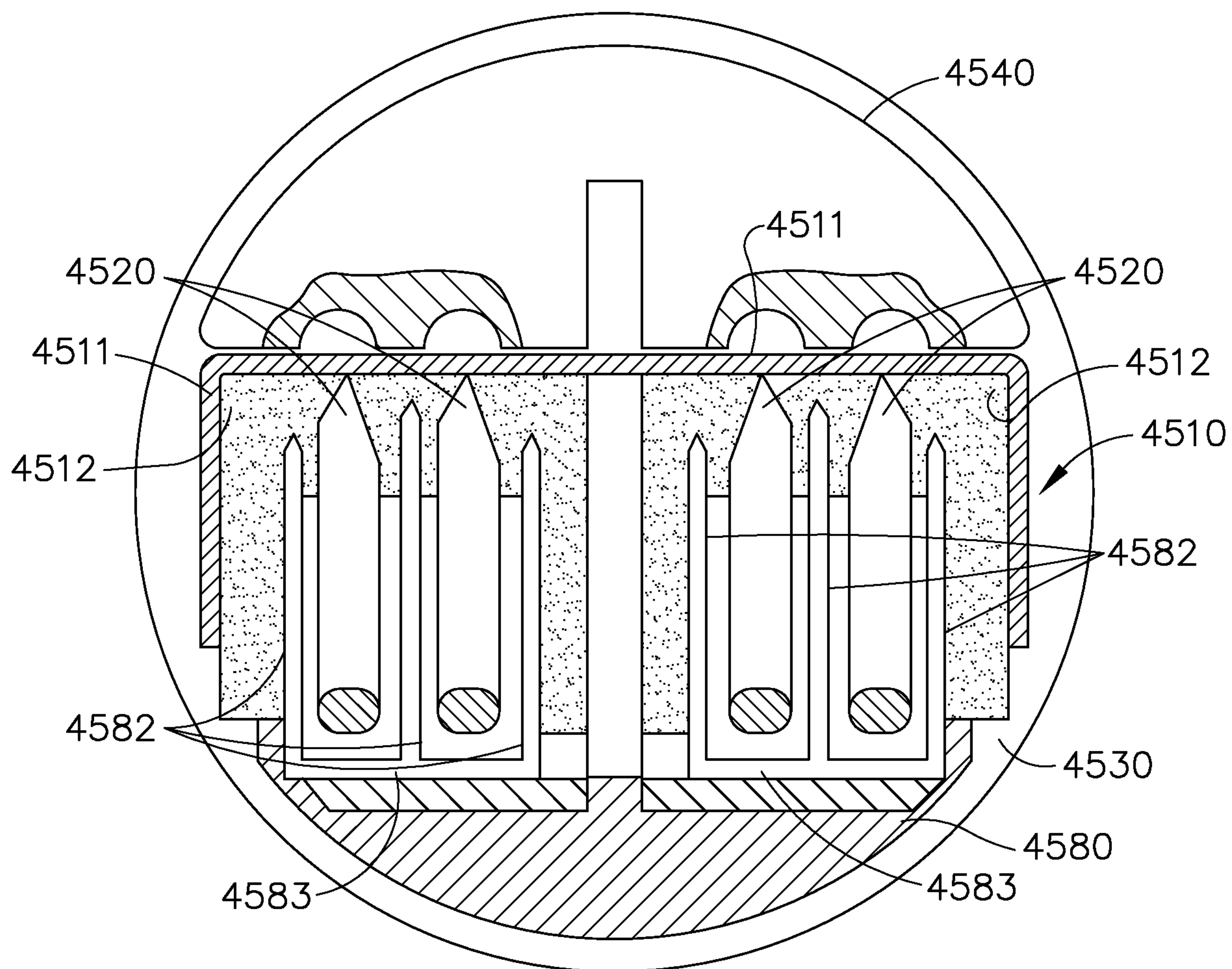
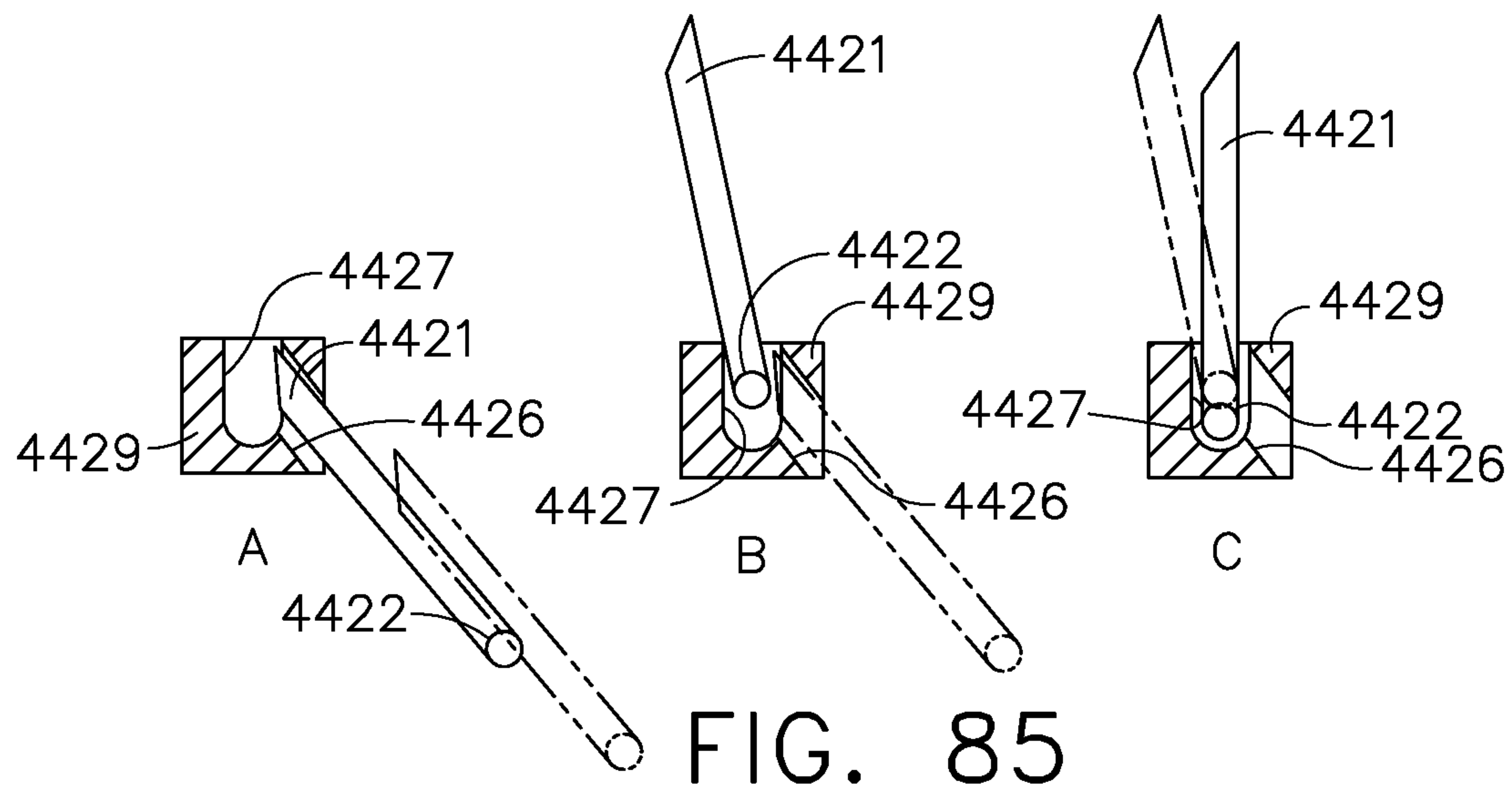


FIG. 84

38/222



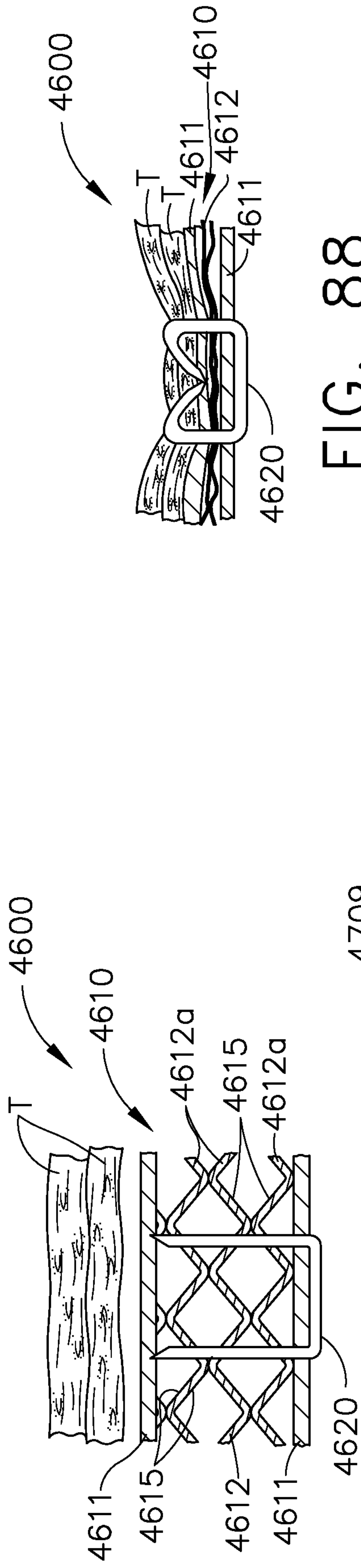


FIG. 87

FIG. 88

39/222

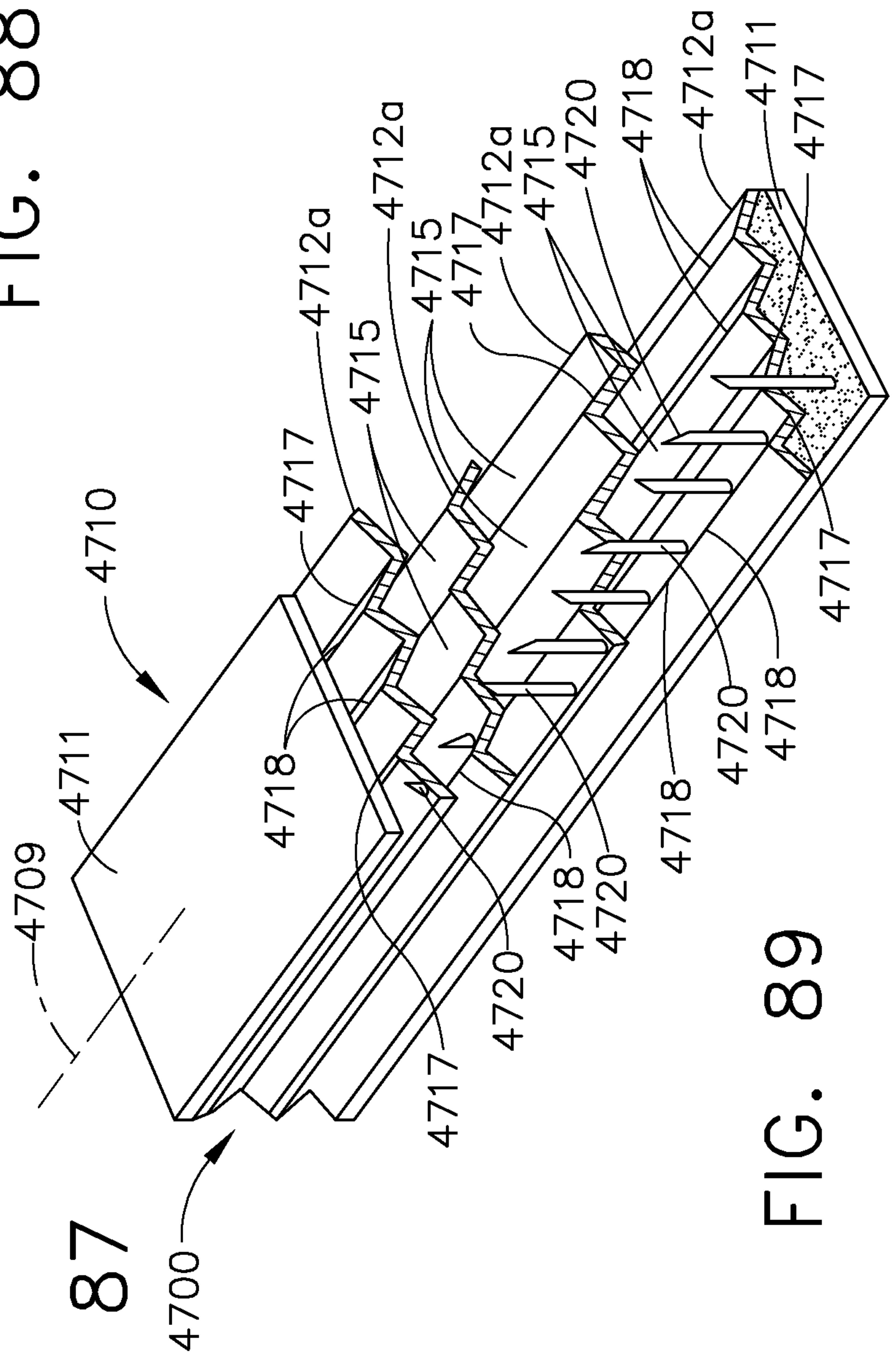
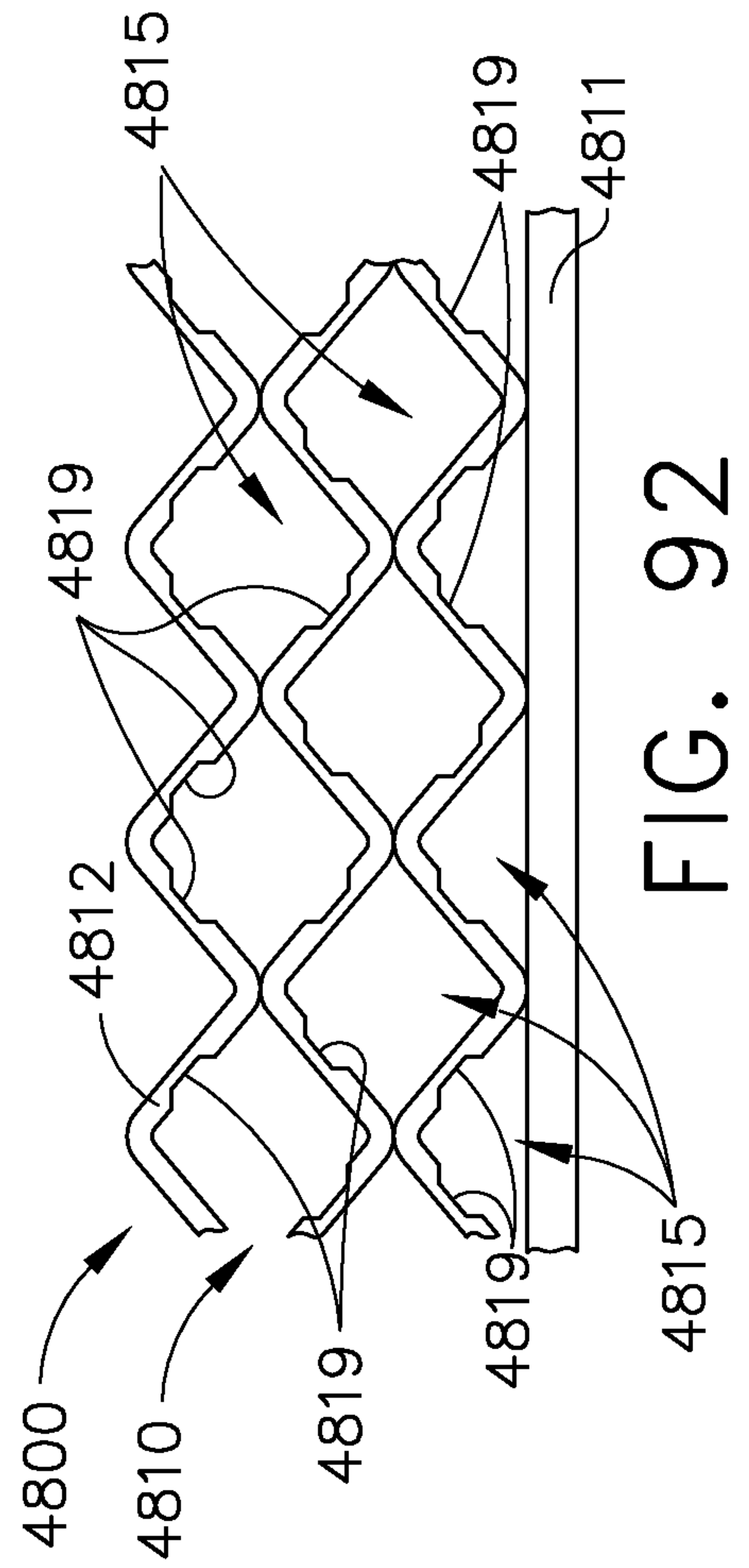
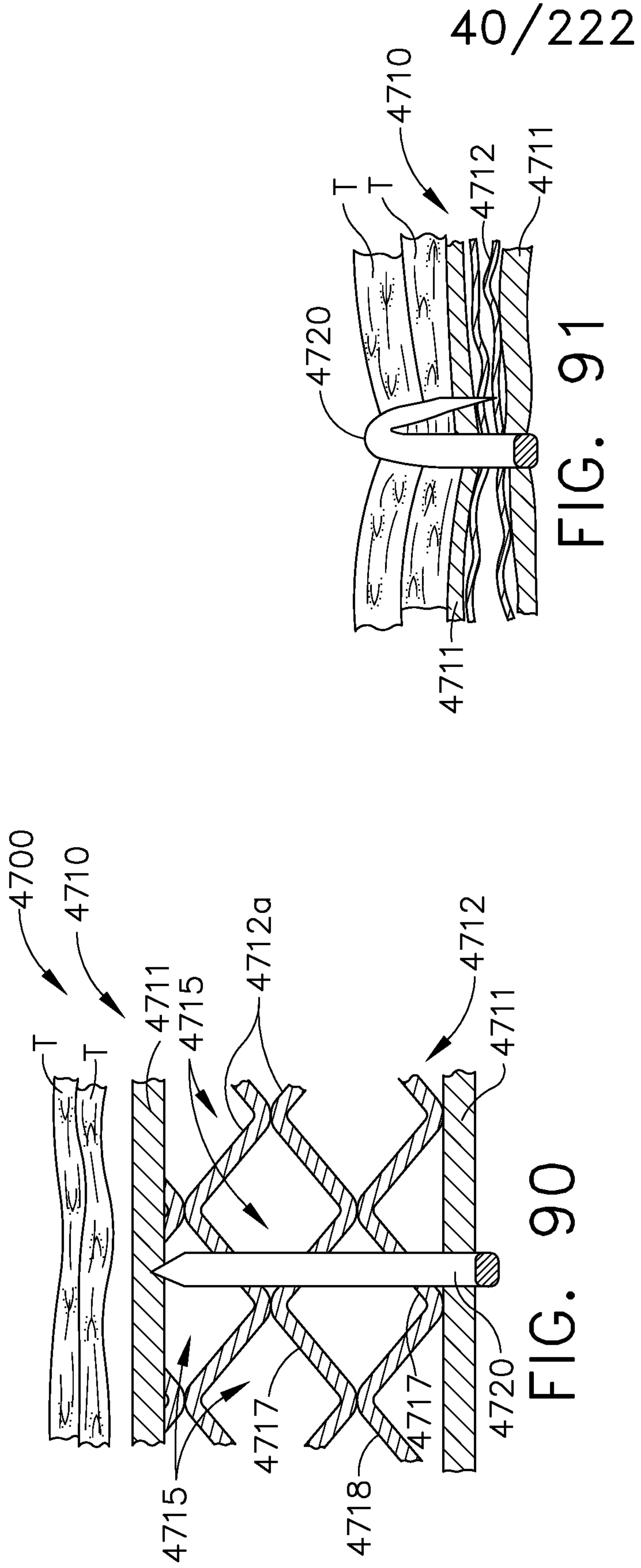


FIG. 89



41/222

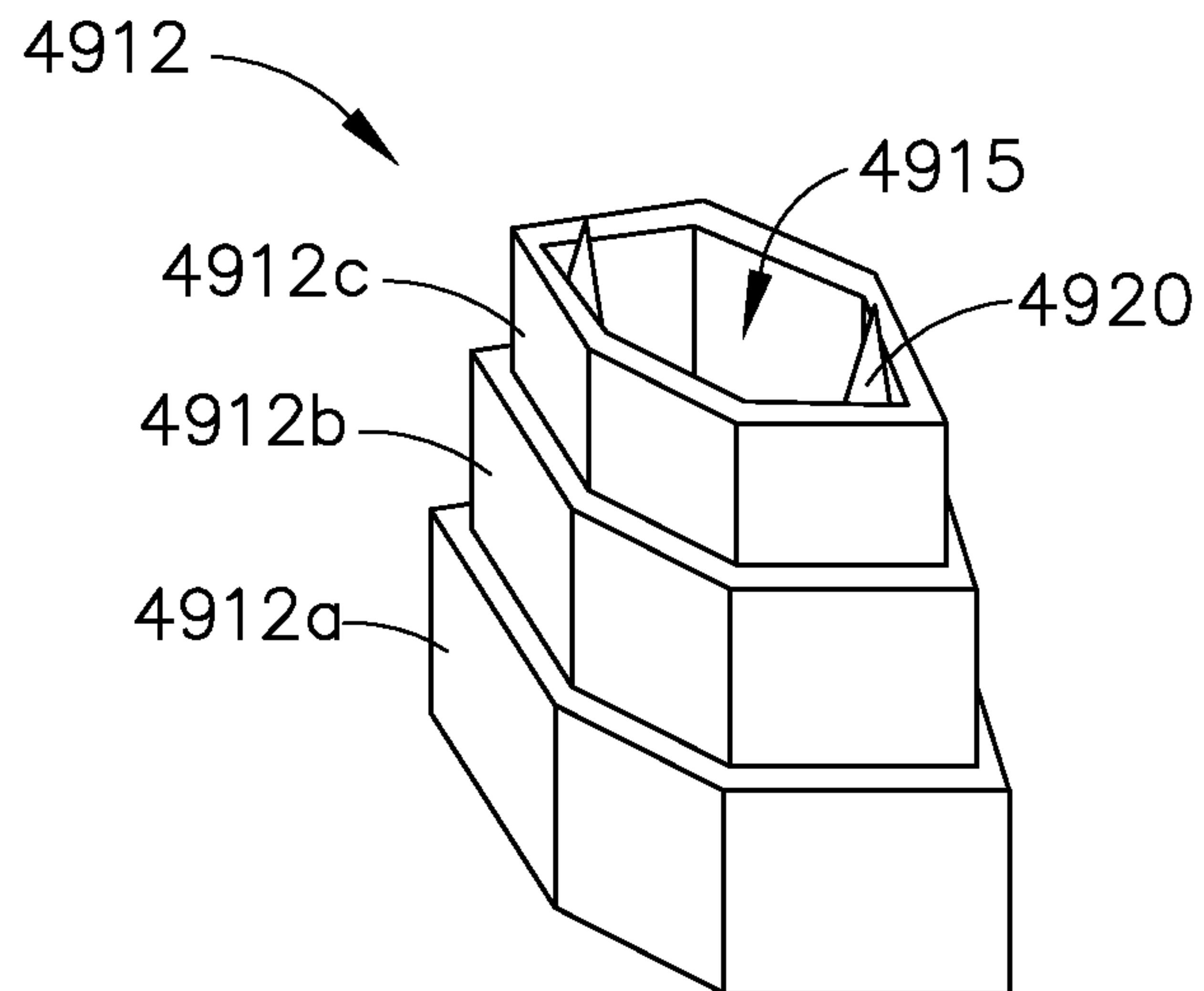


FIG. 94

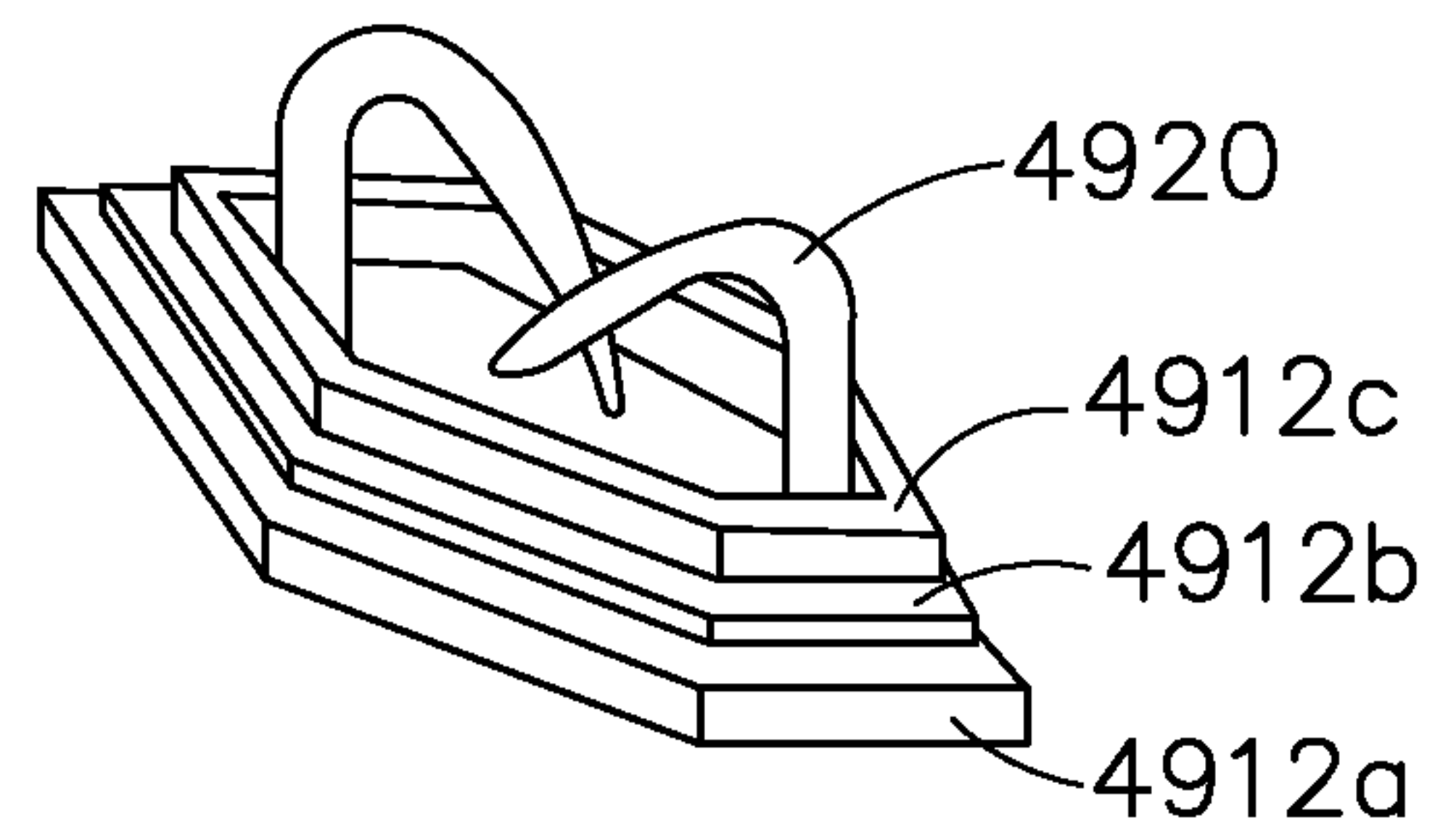


FIG. 95

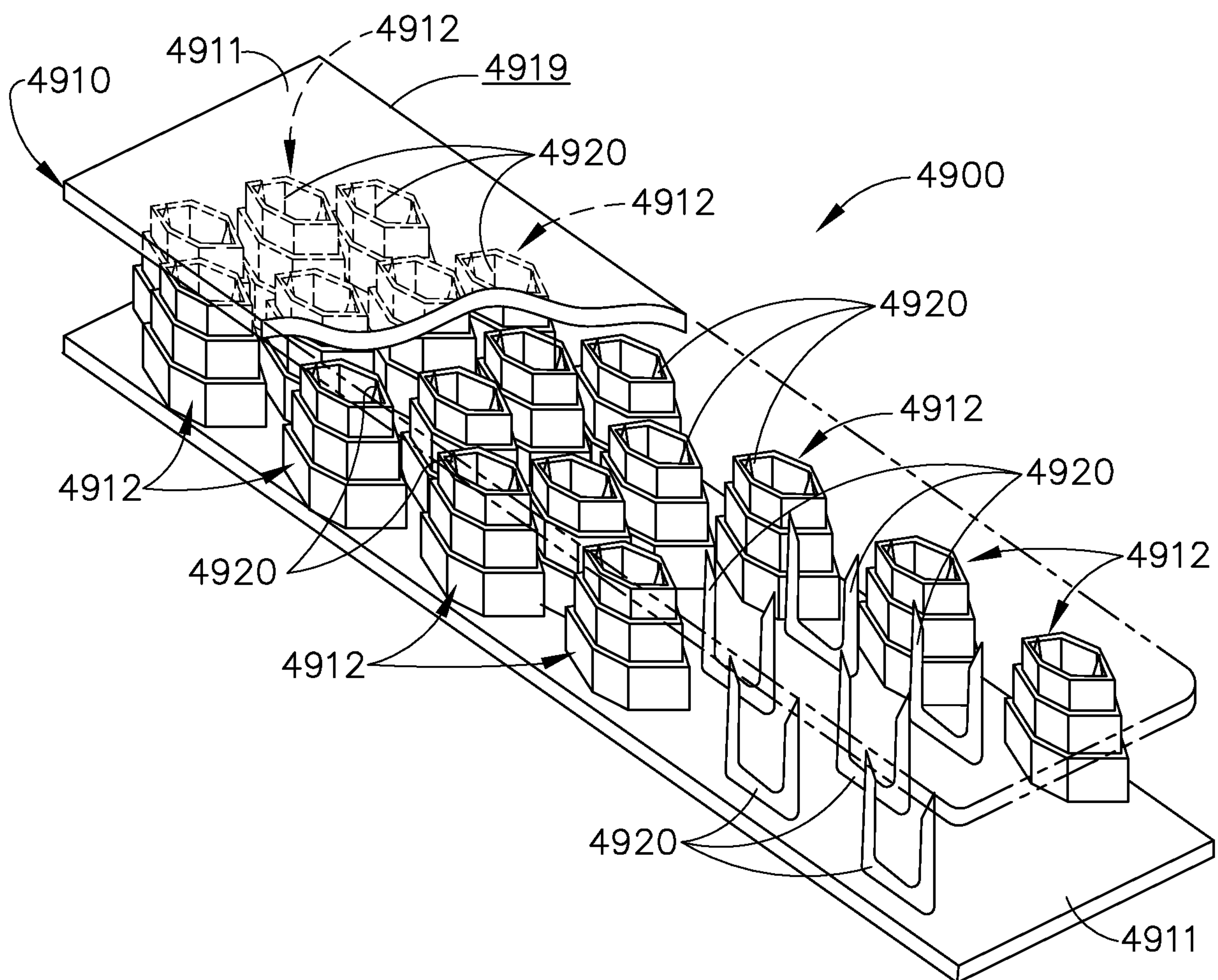


FIG. 93

42/222

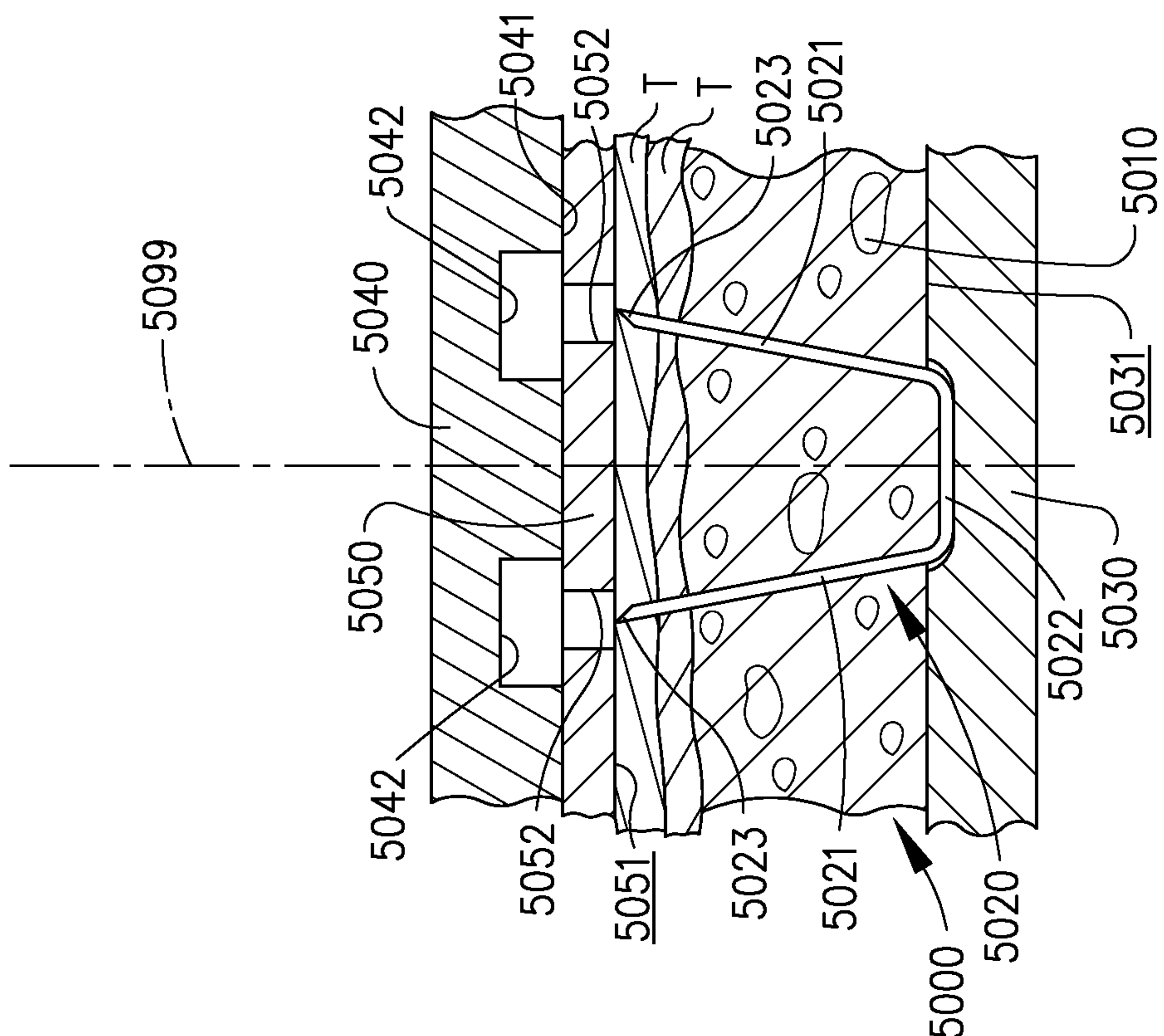


FIG. 96B

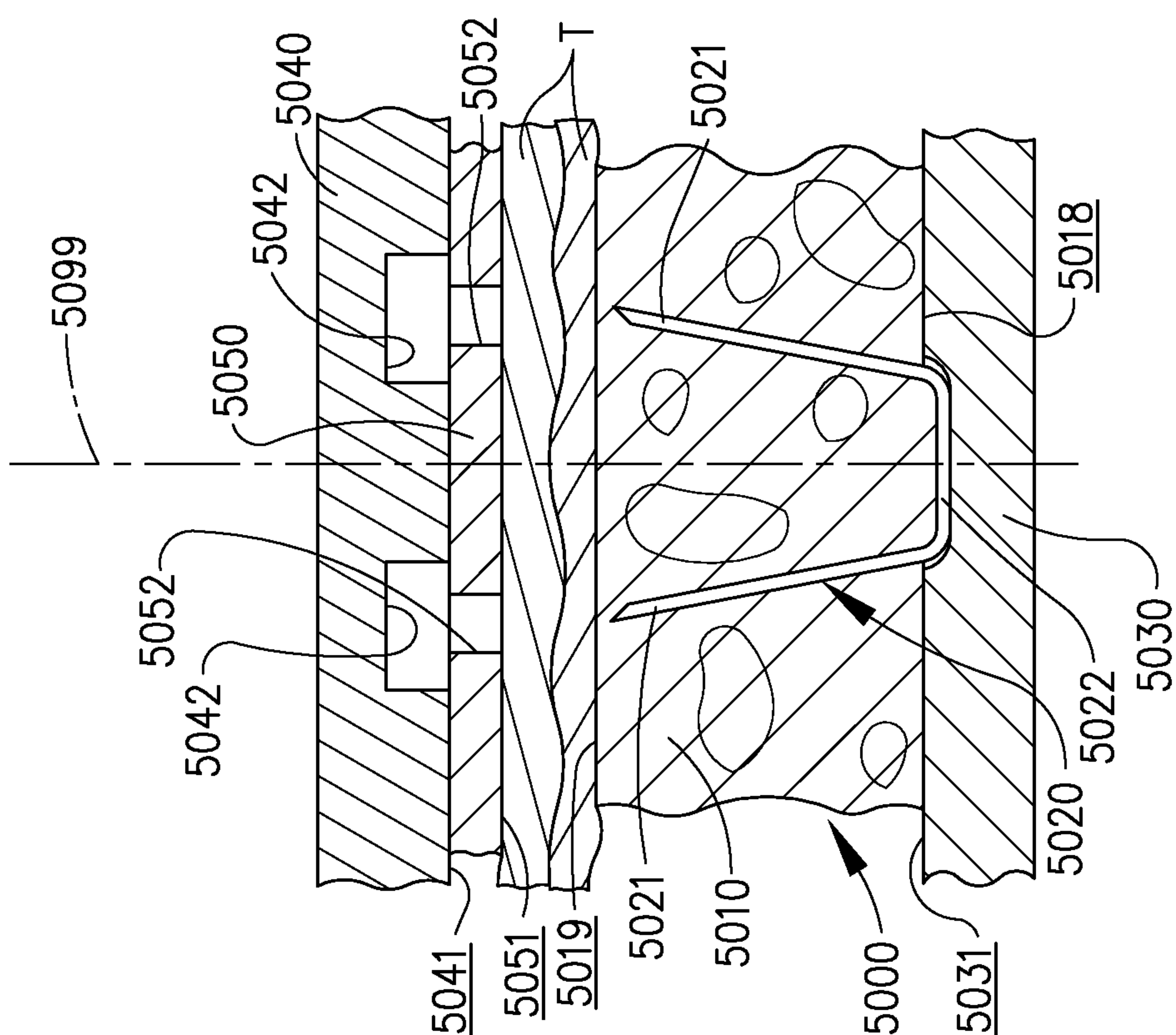


FIG. 96A

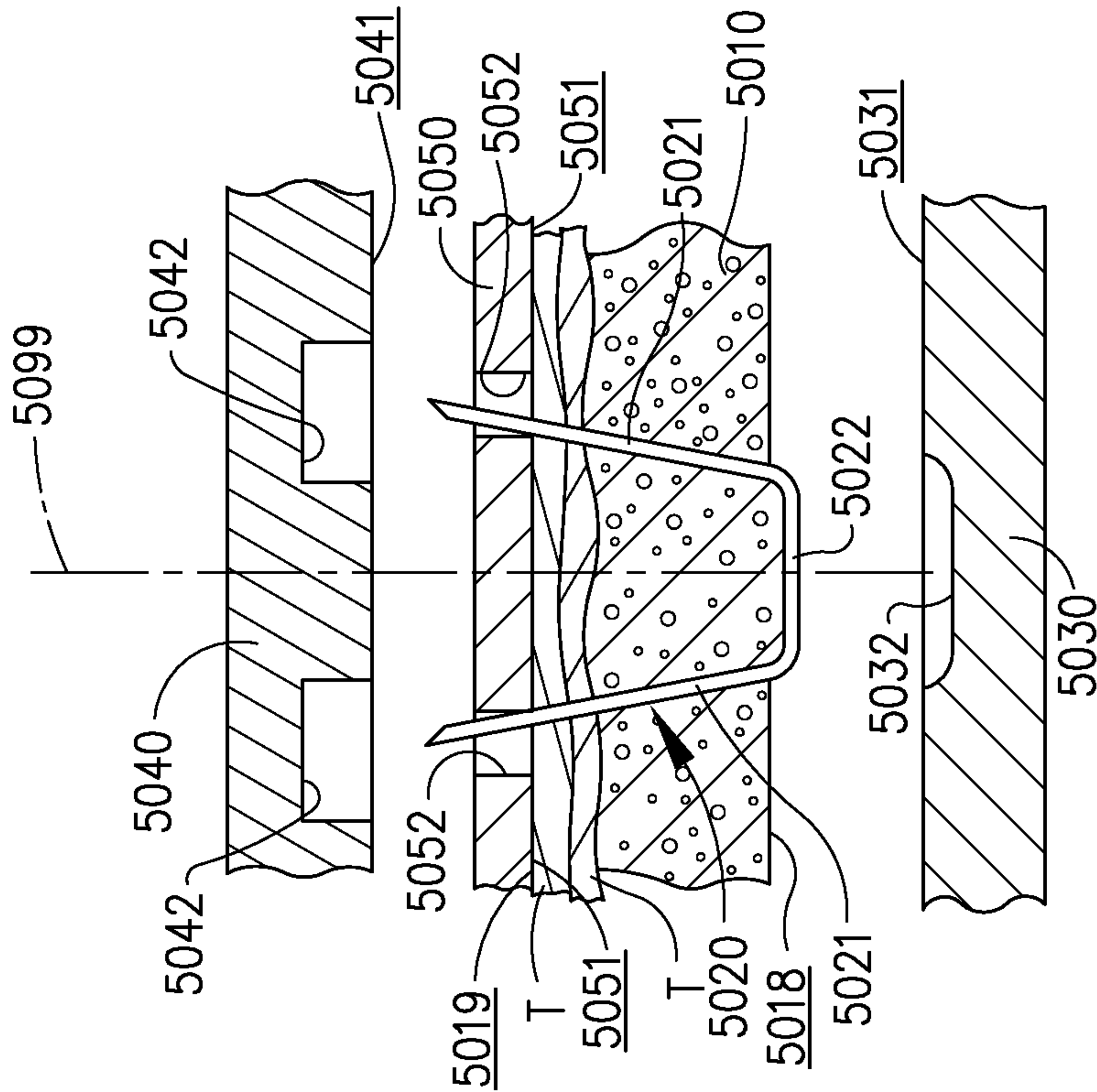


FIG. 96D

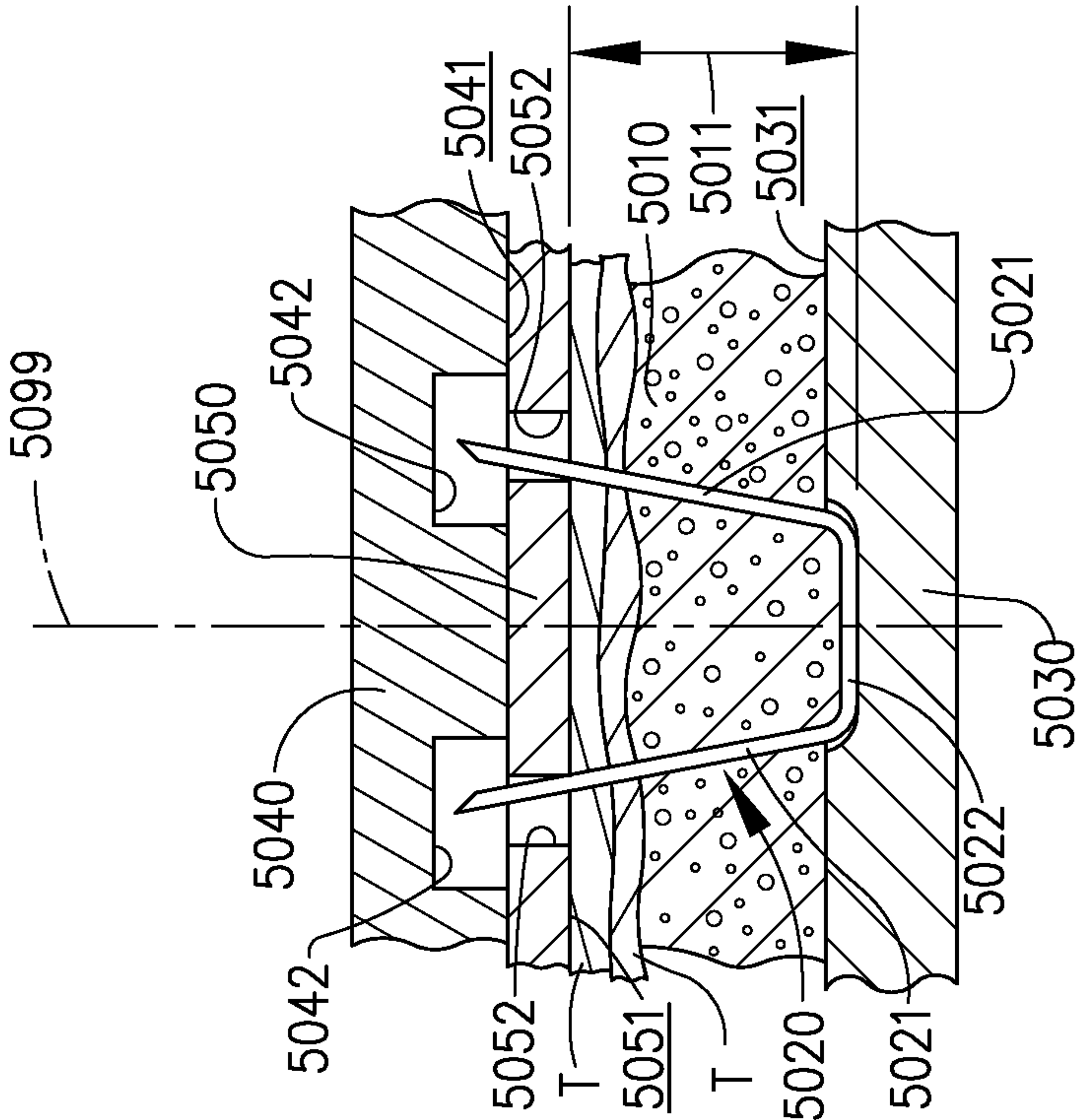
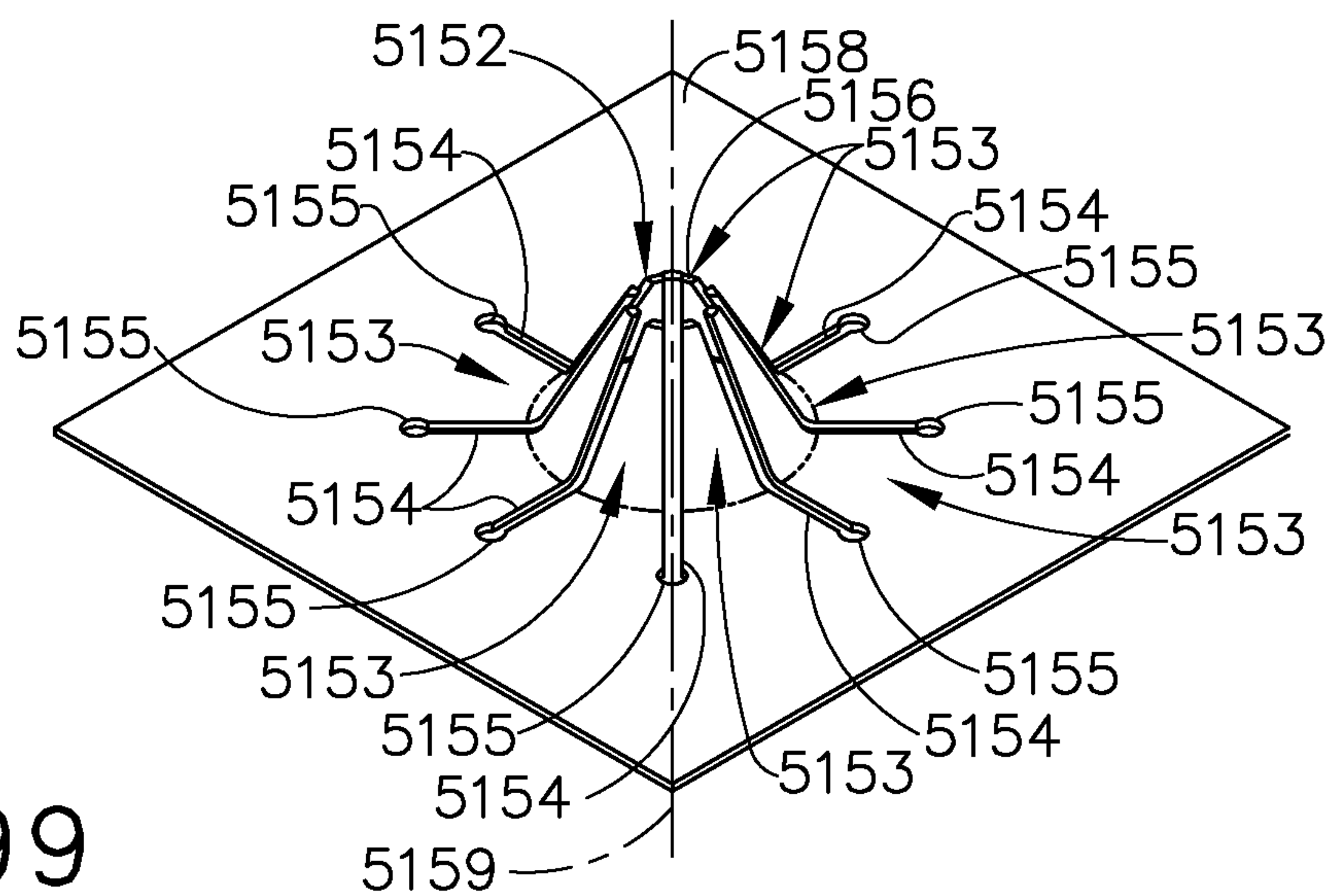
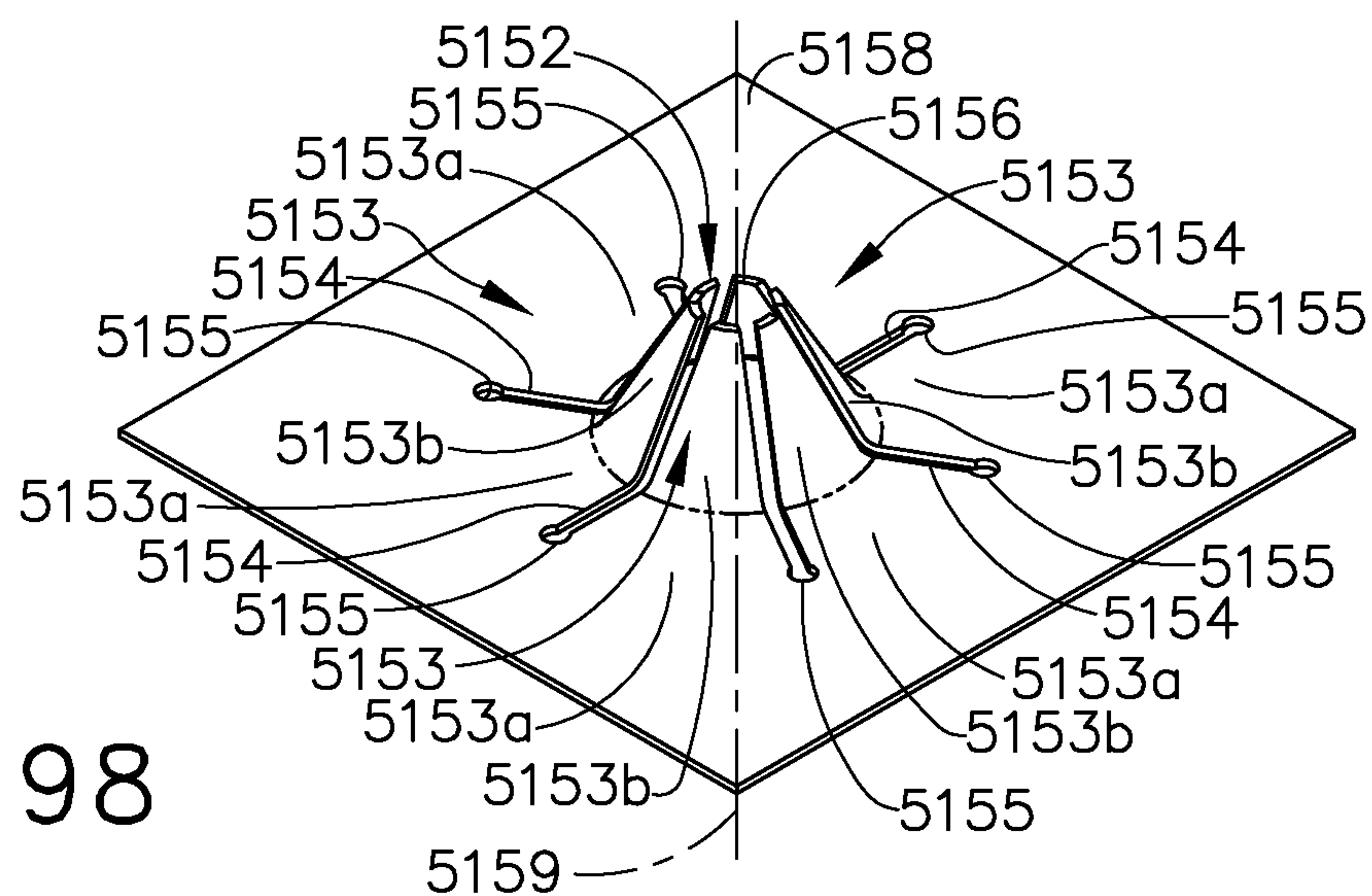
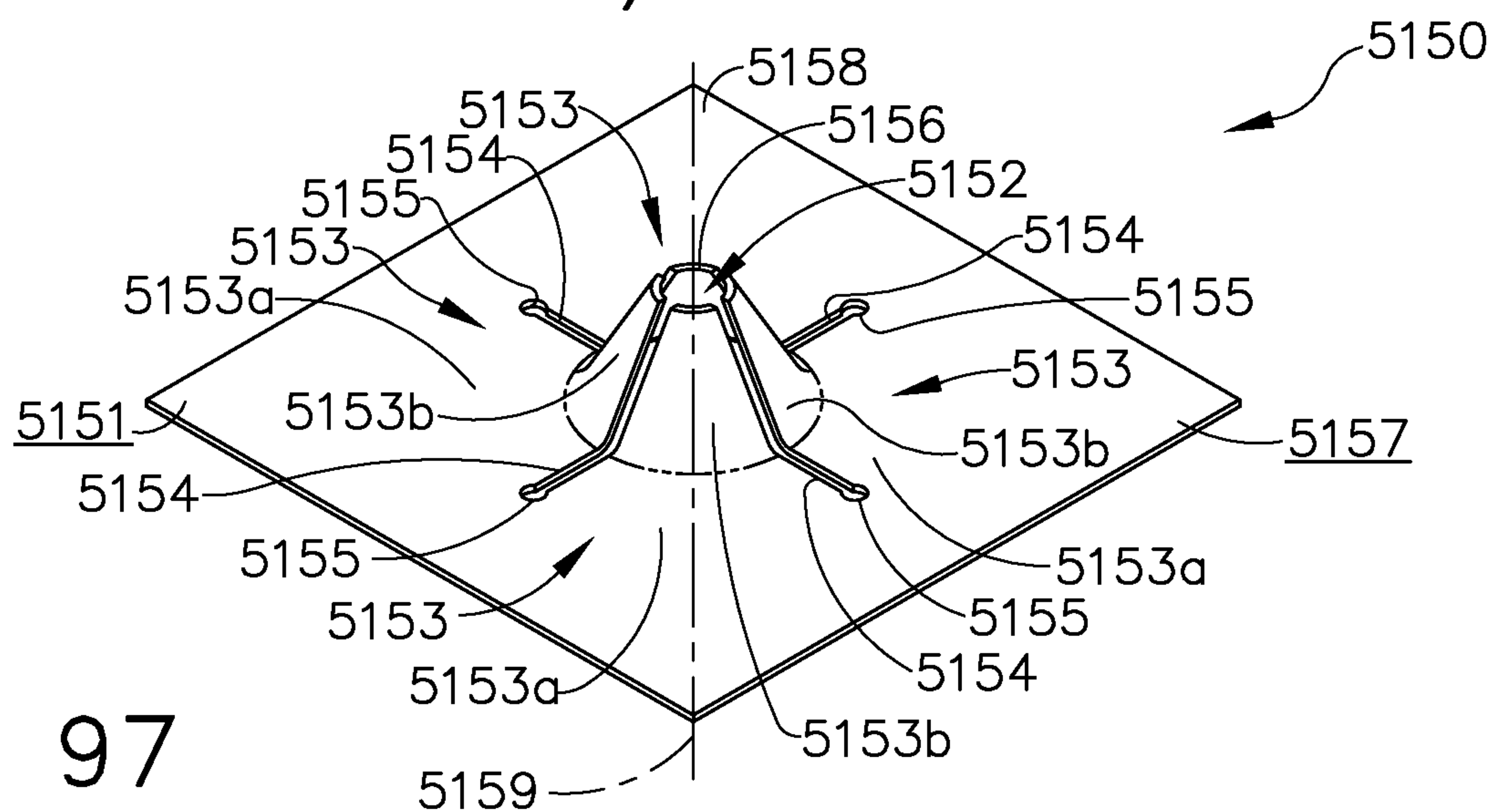
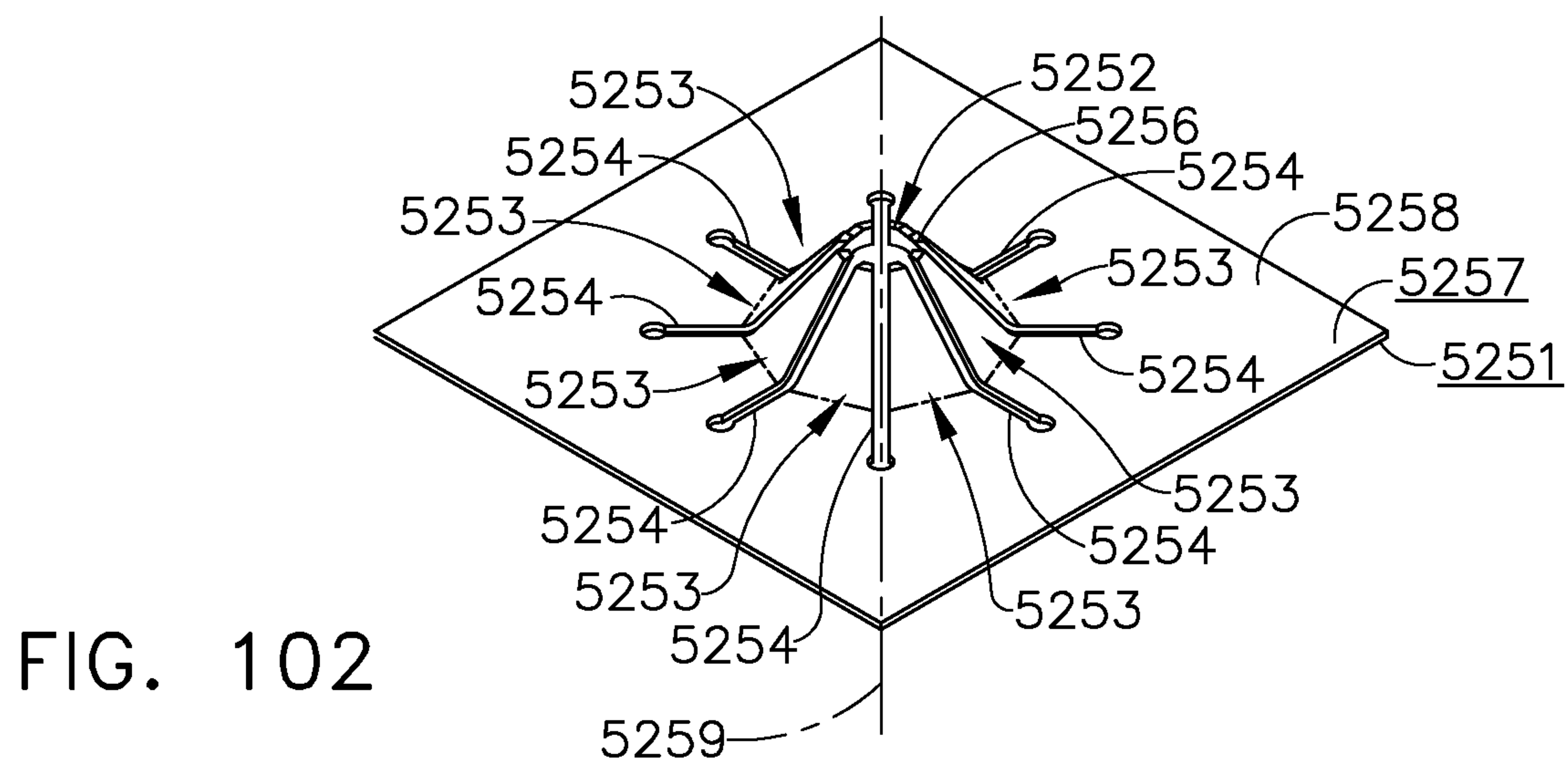
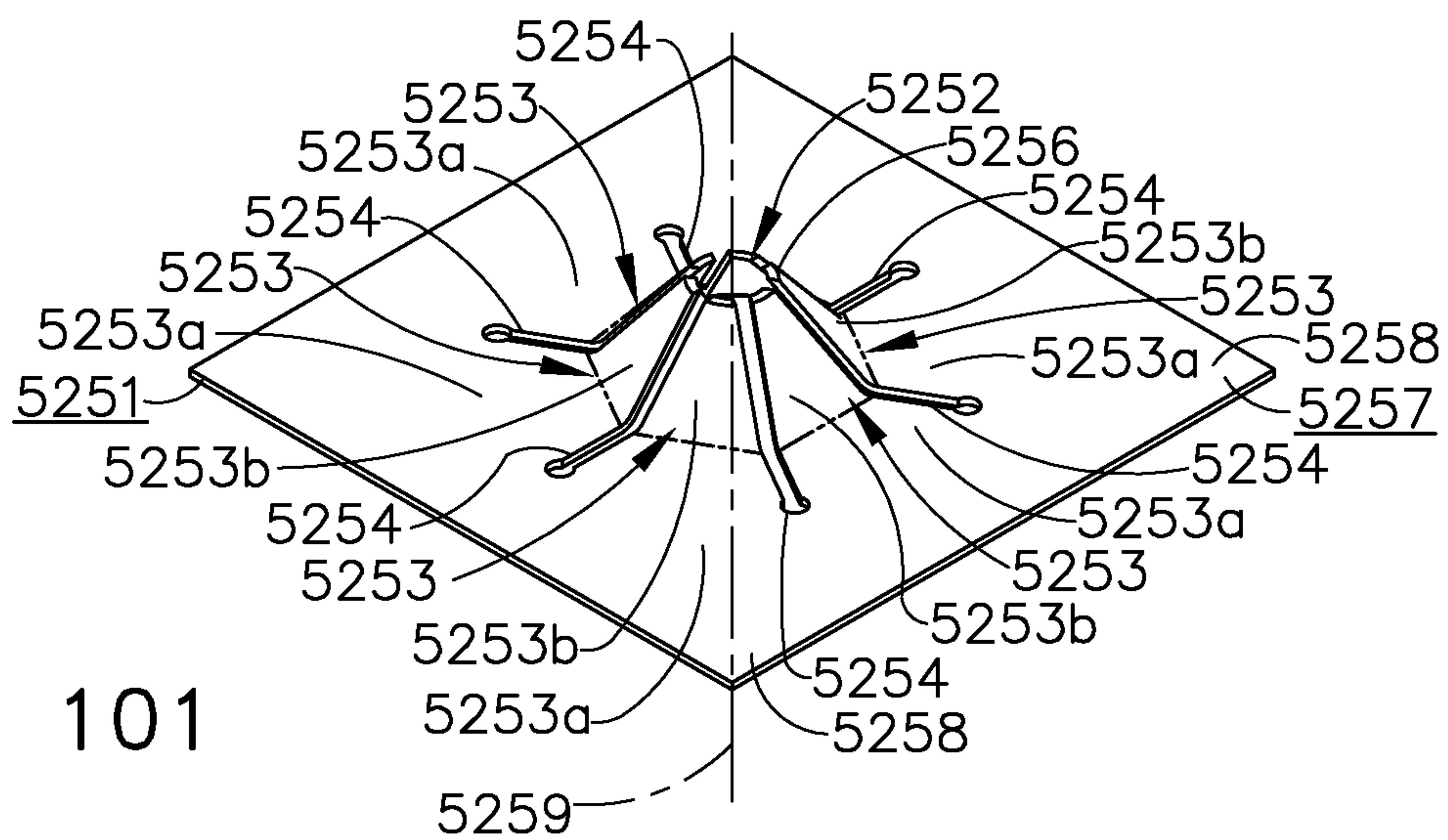
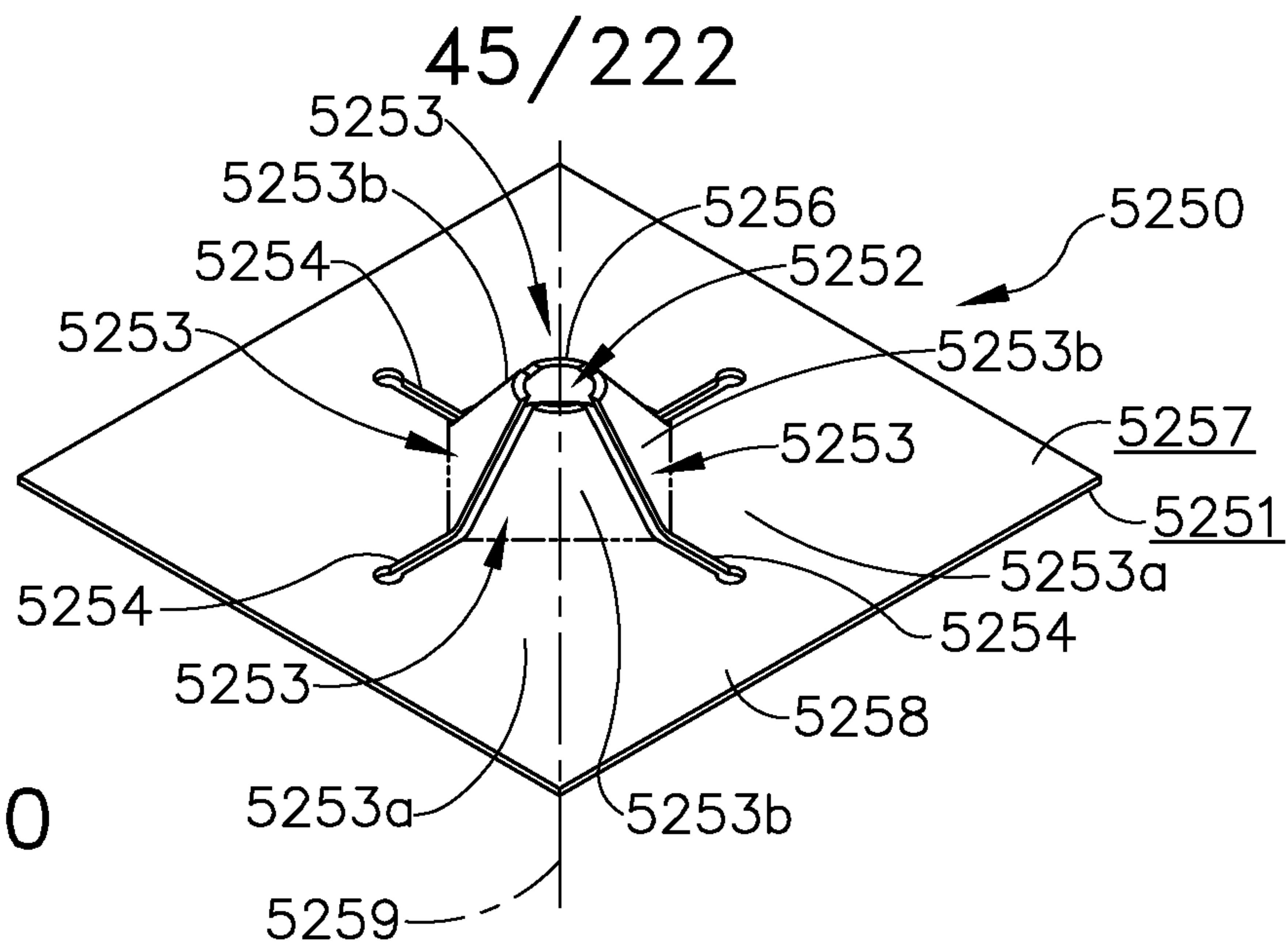


FIG. 96C

44/222





46/222

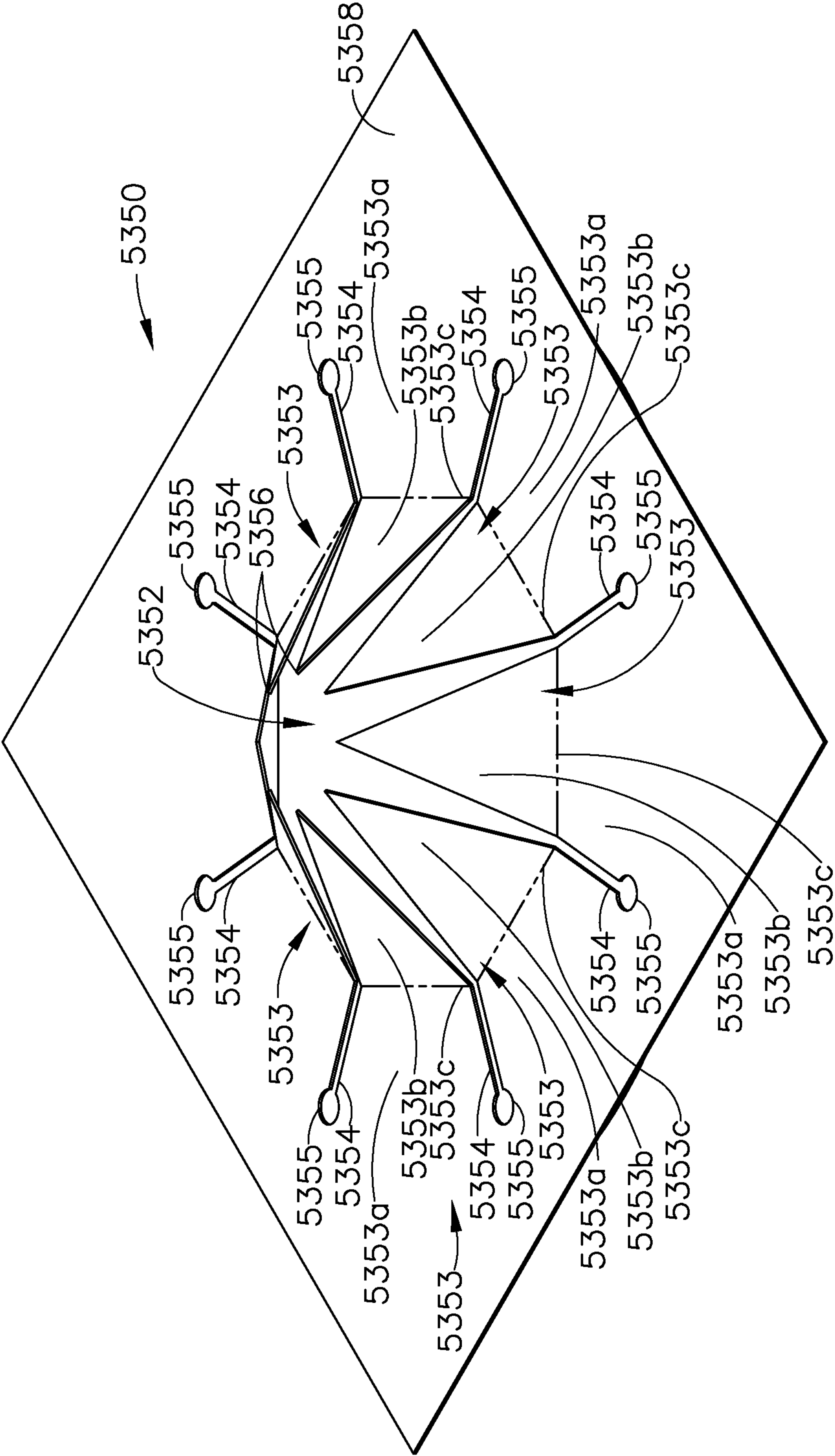


FIG. 103

47/222

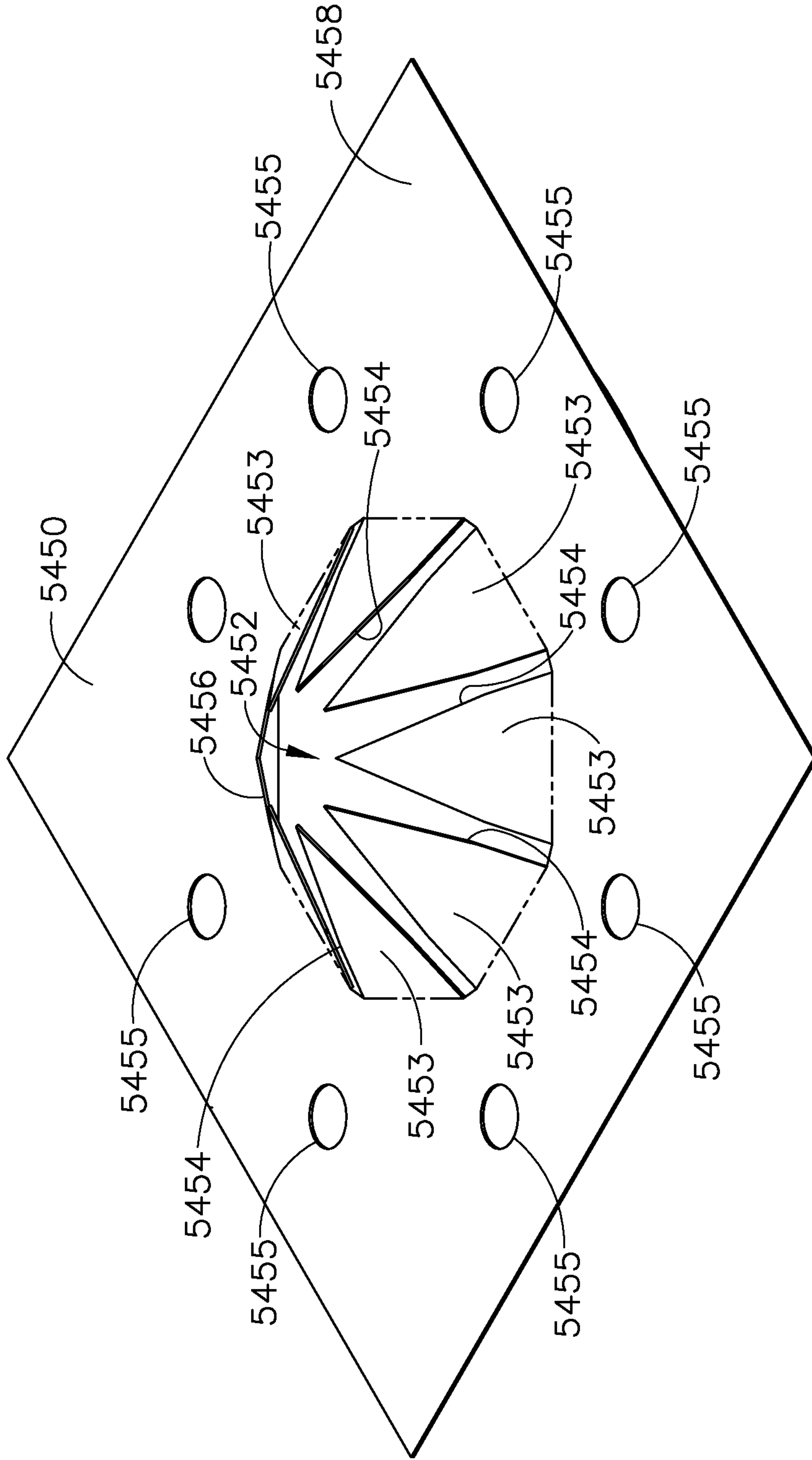


FIG. 104

48/222

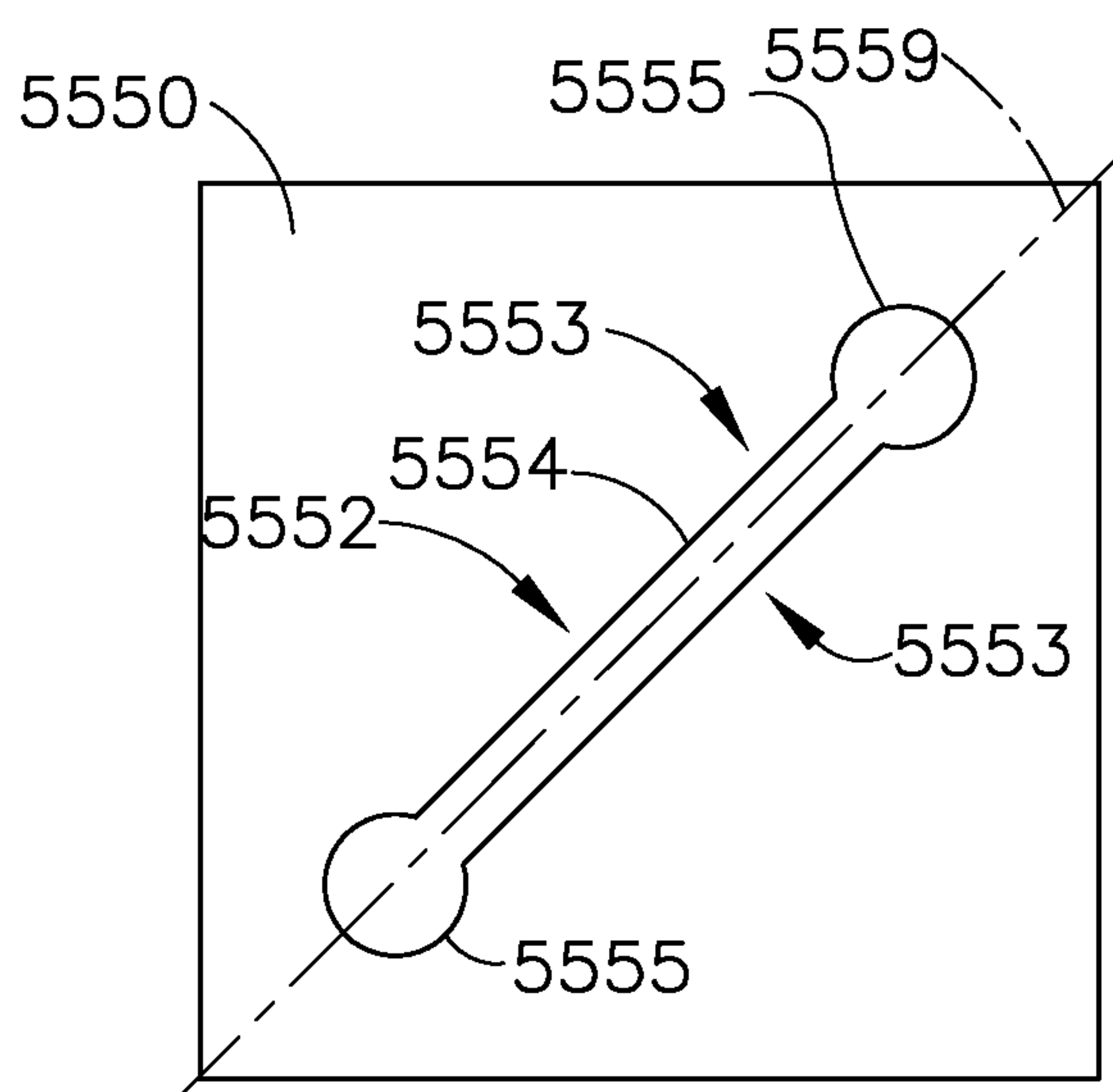


FIG. 105

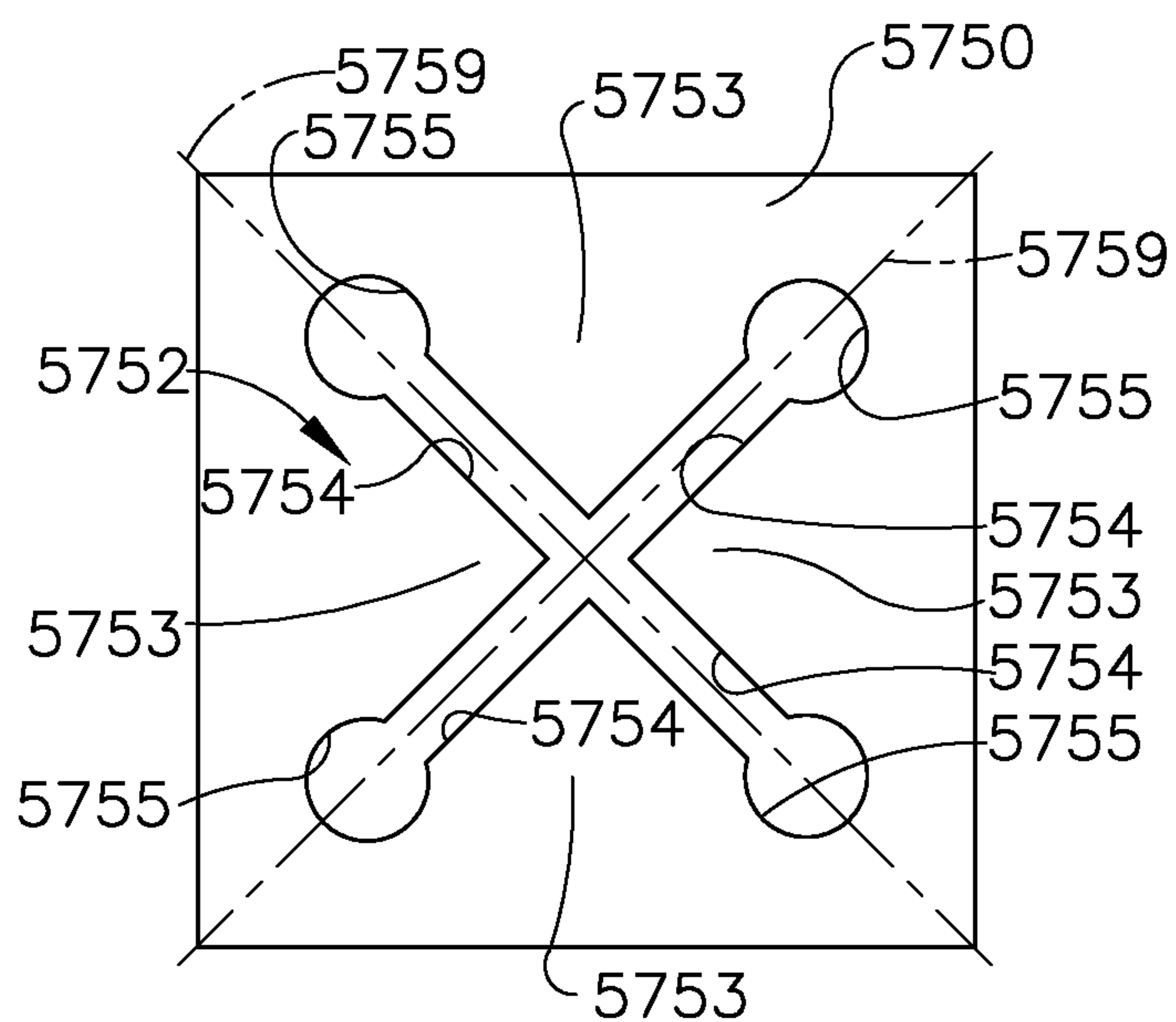


FIG. 107

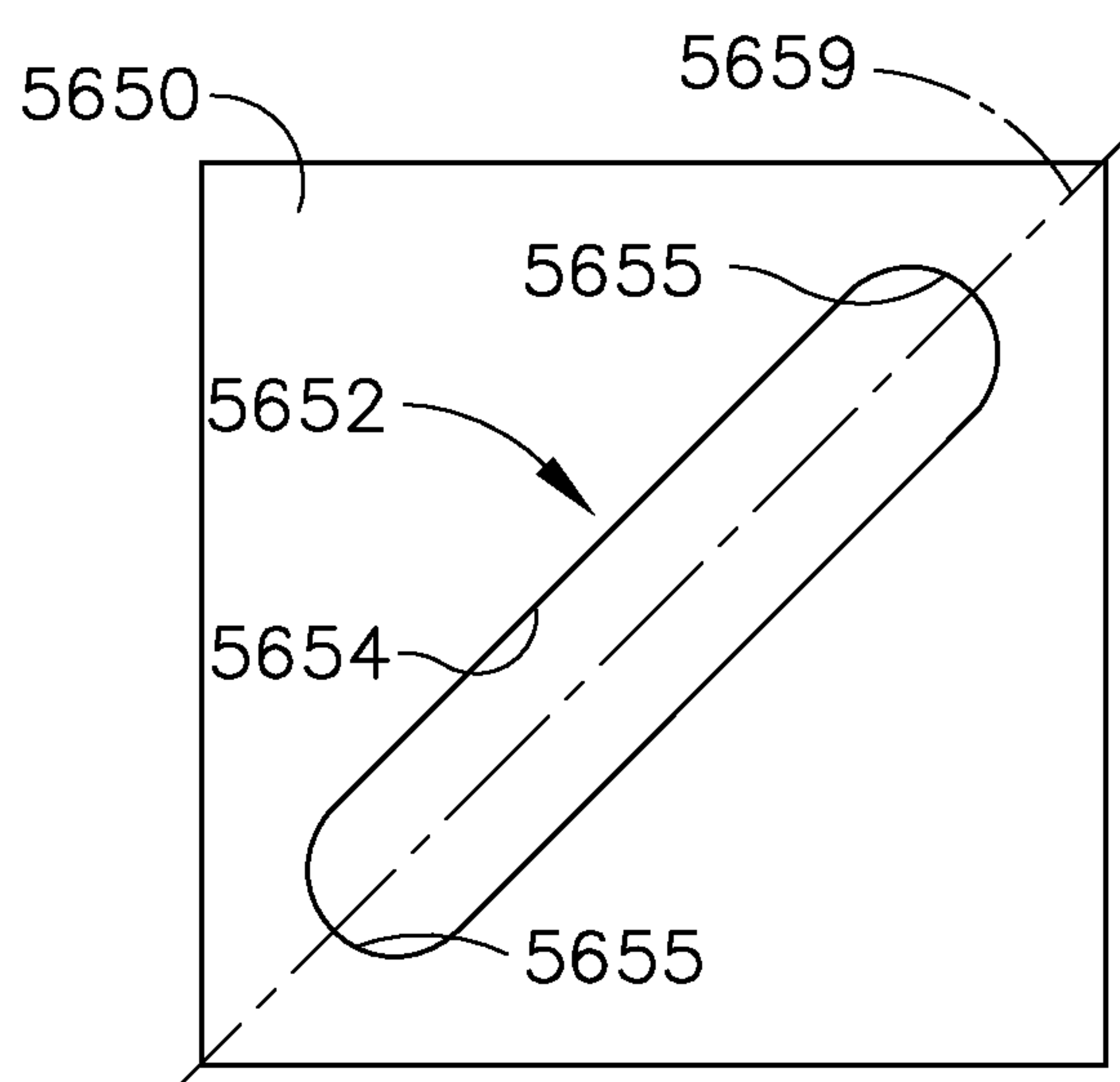


FIG. 106

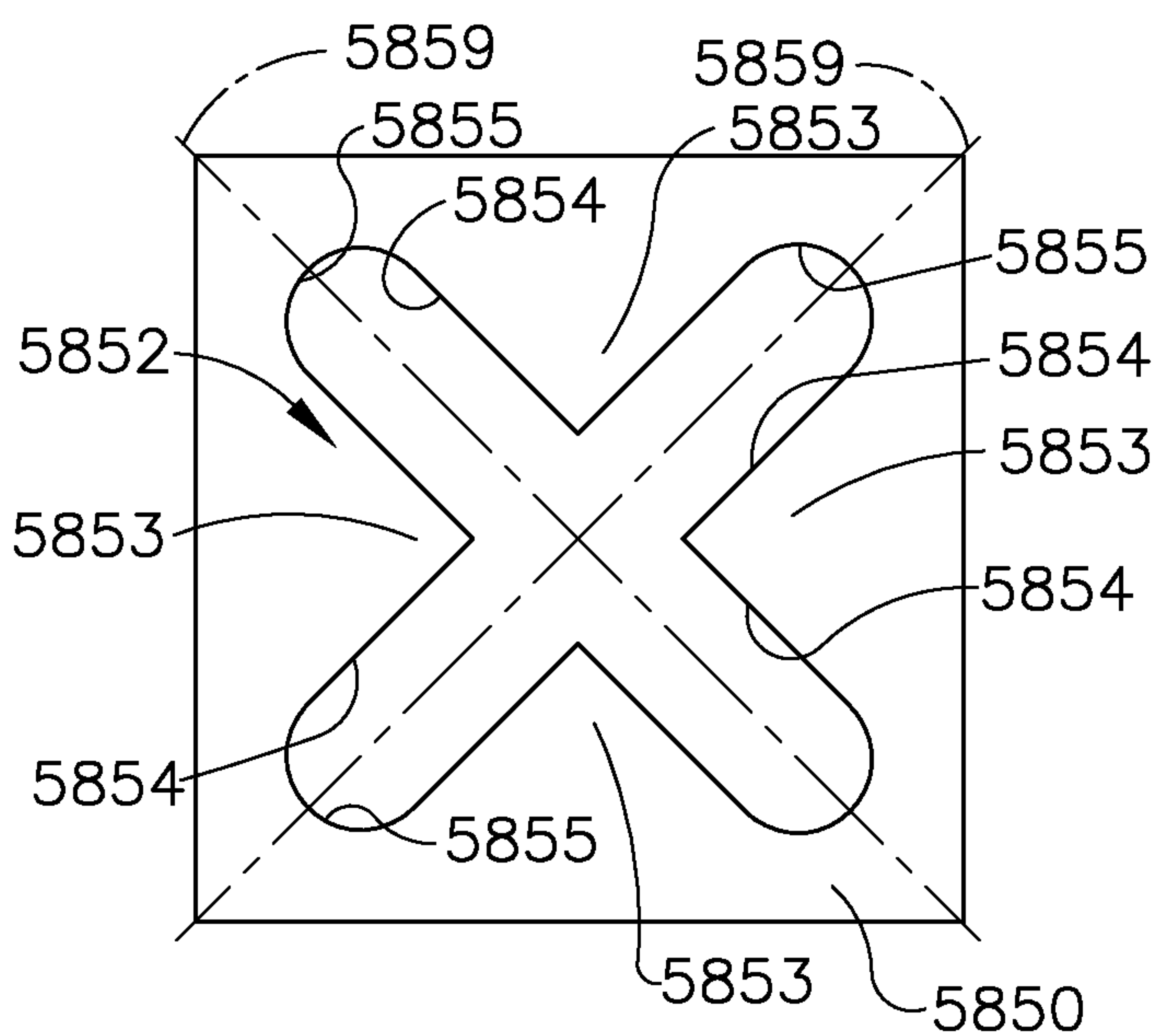


FIG. 108

49/222

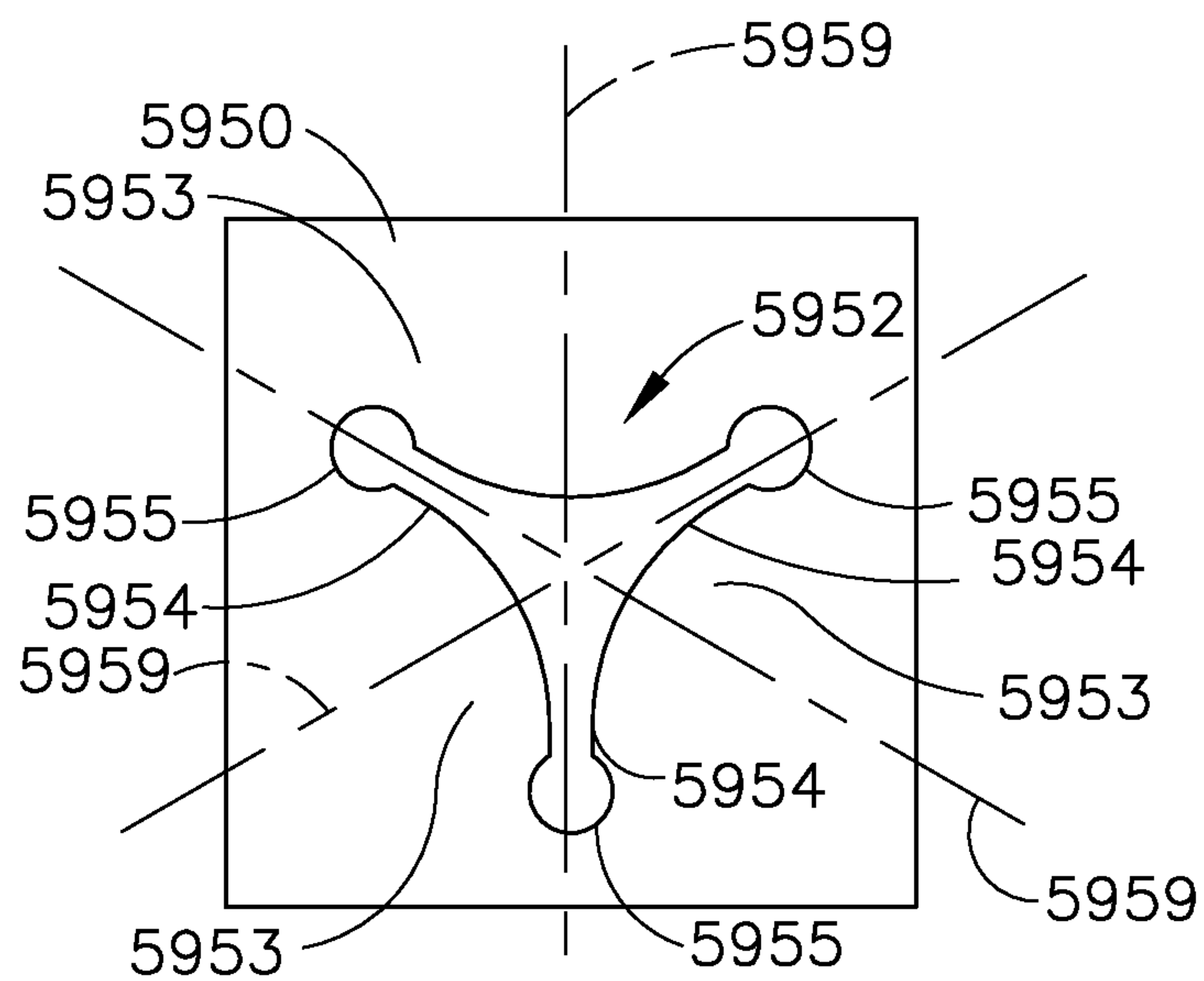


FIG. 109

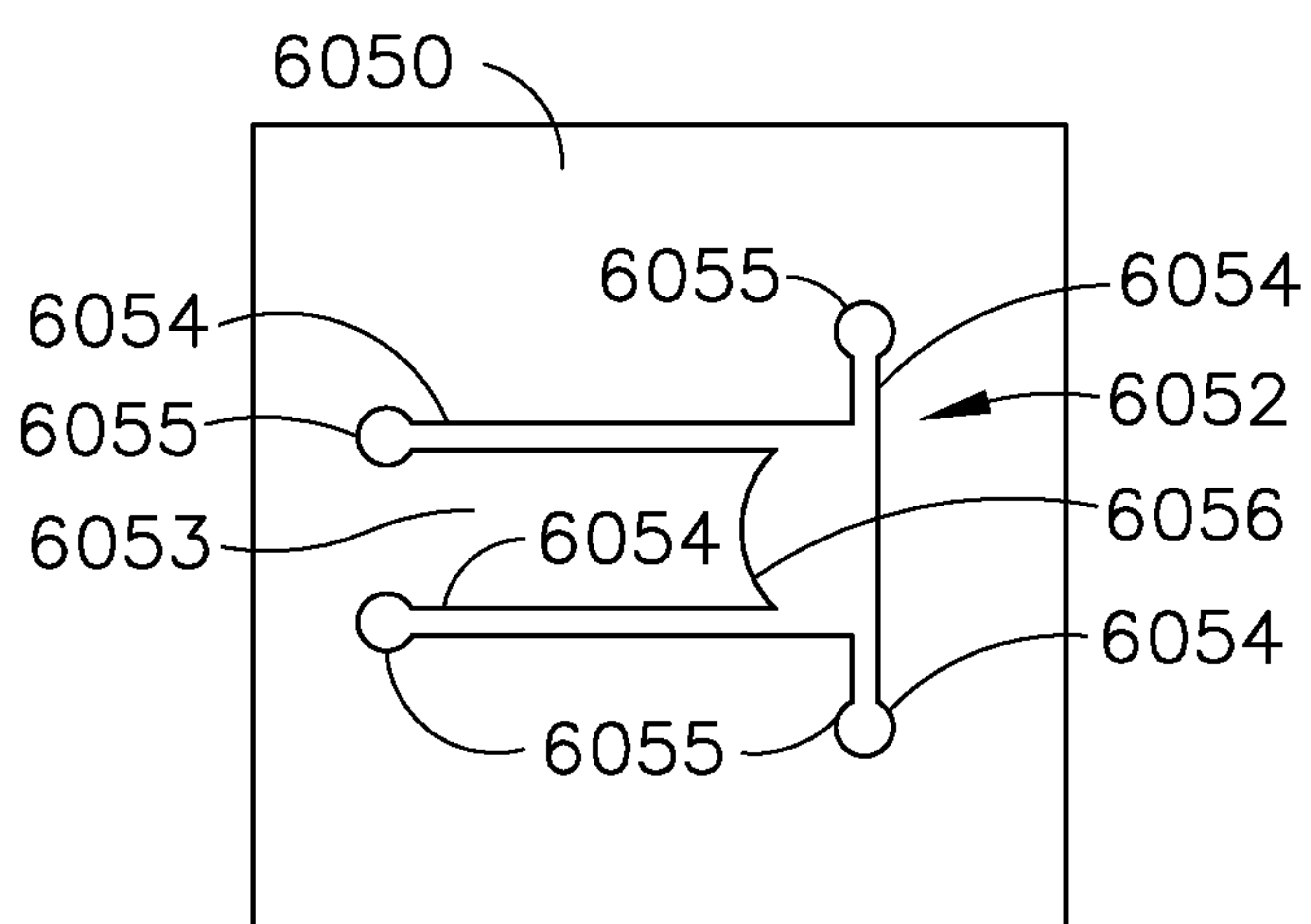


FIG. 110

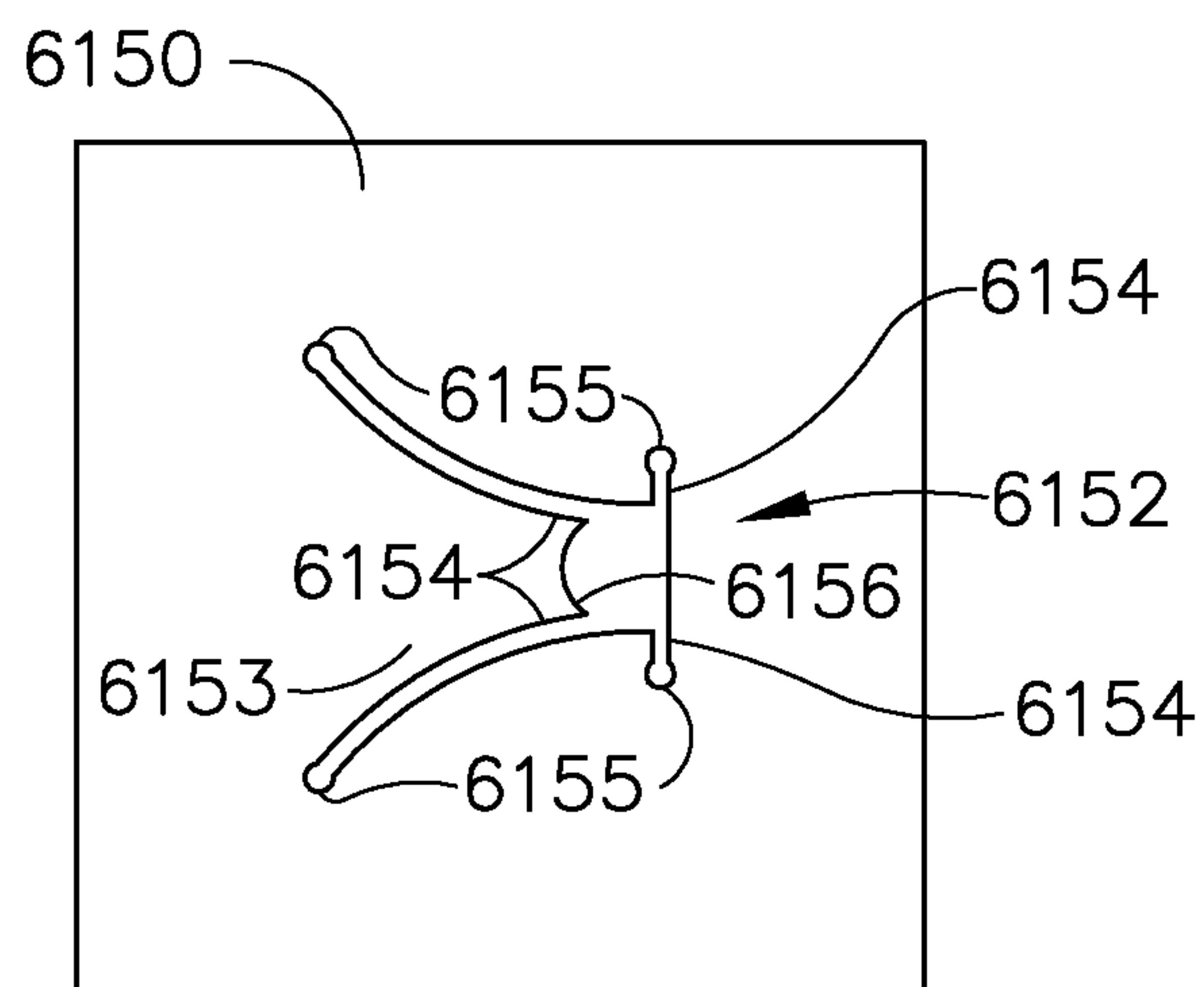
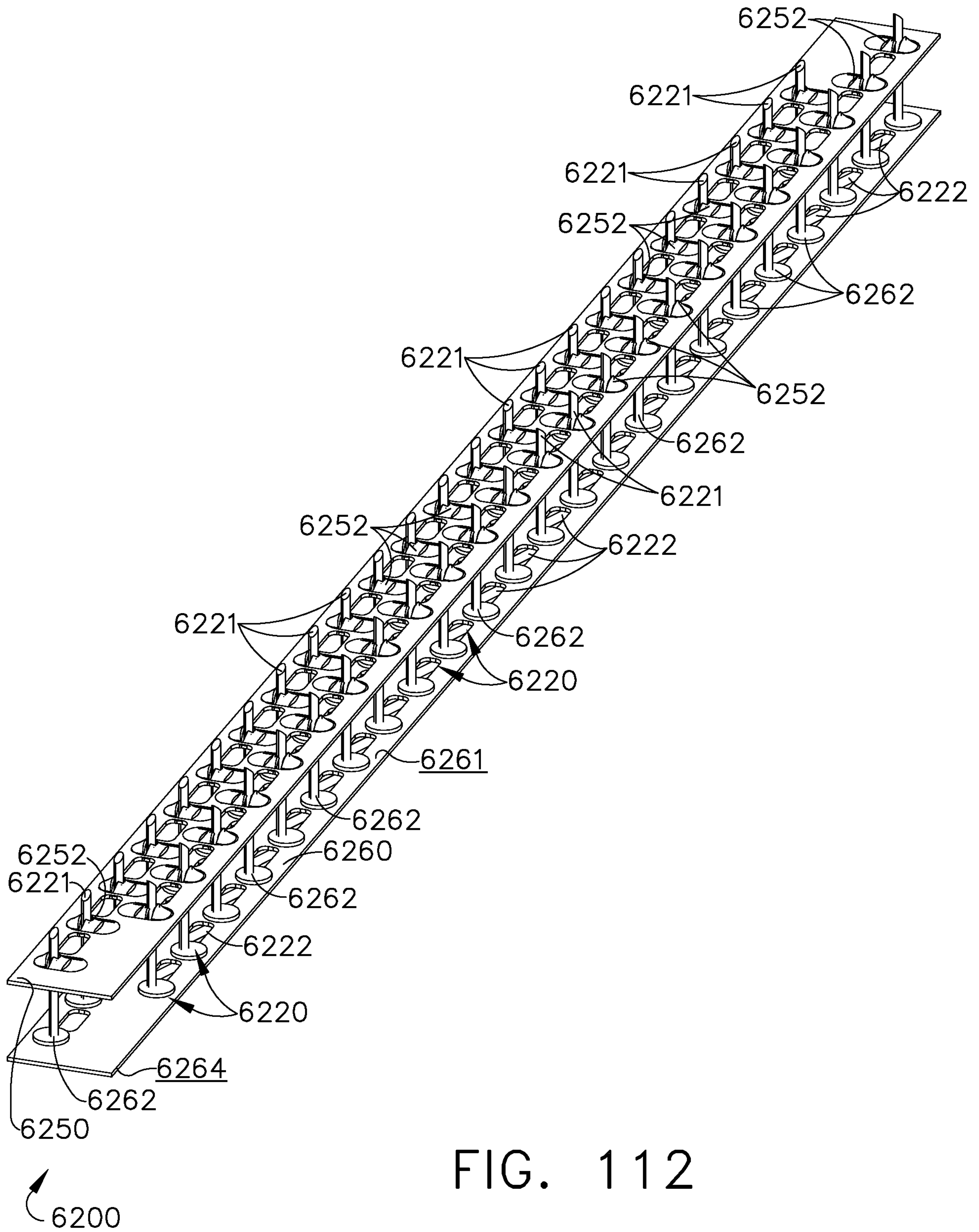


FIG. 111

50/222



51/222

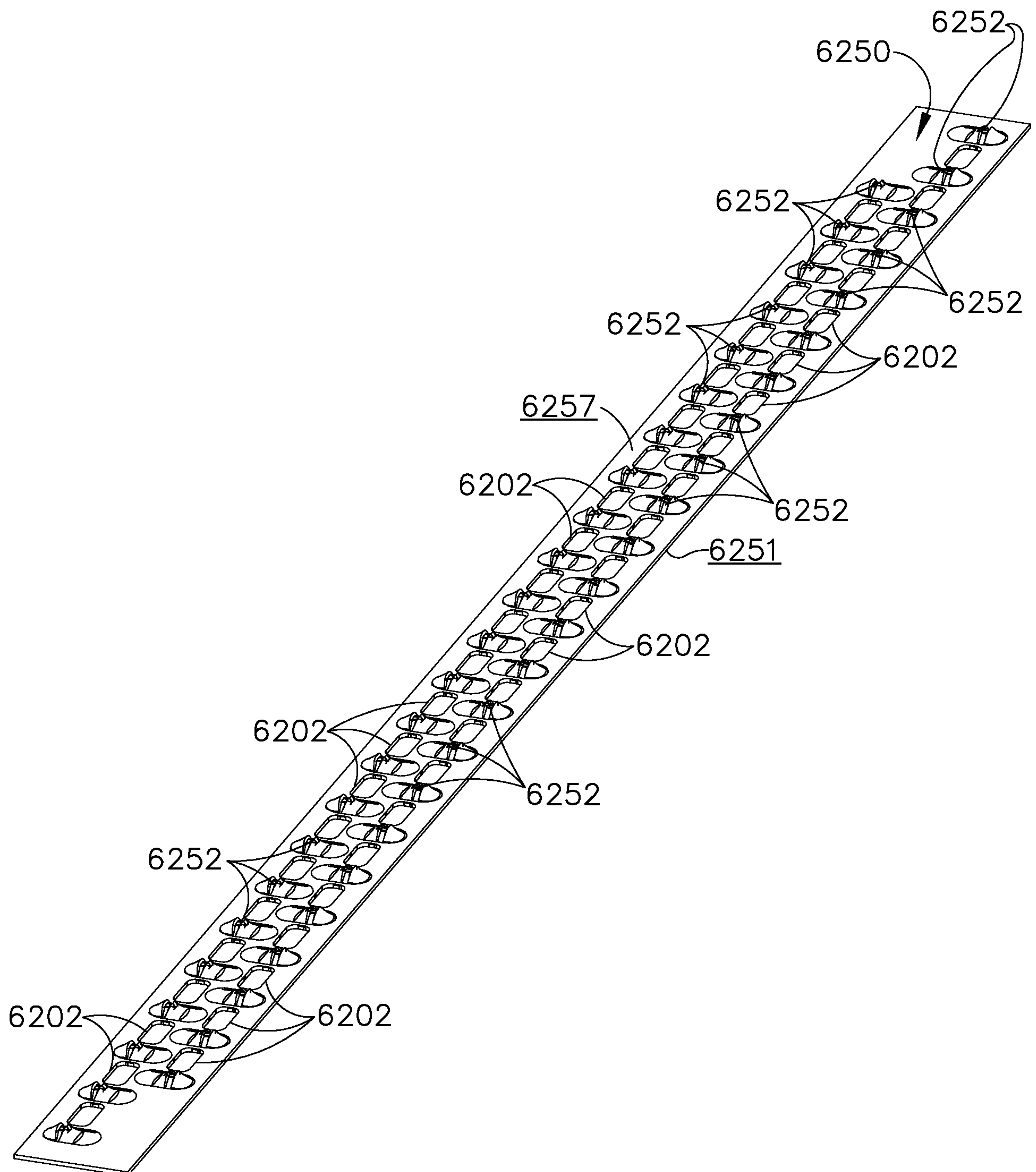


FIG. 113

52/222

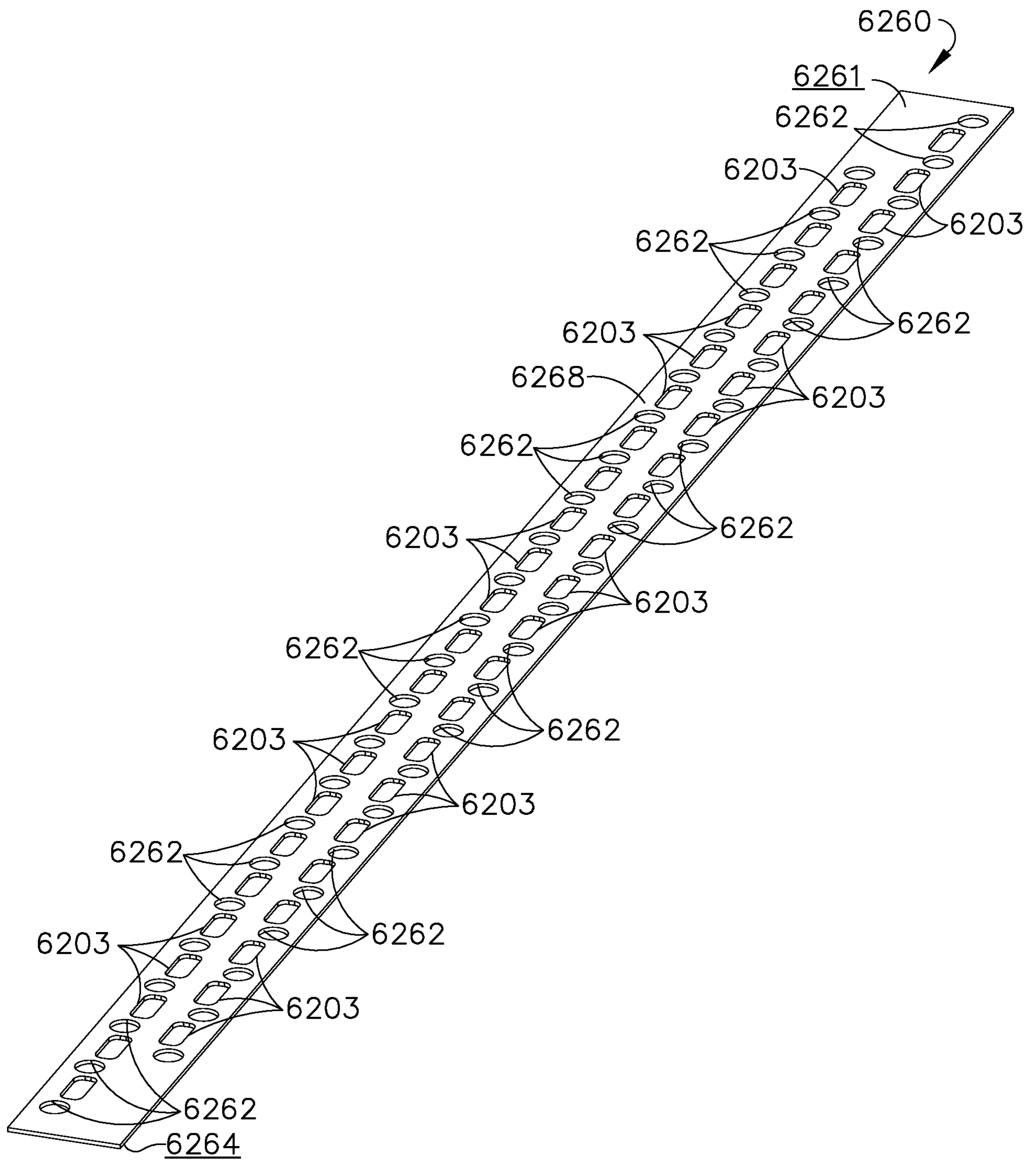


FIG. 114

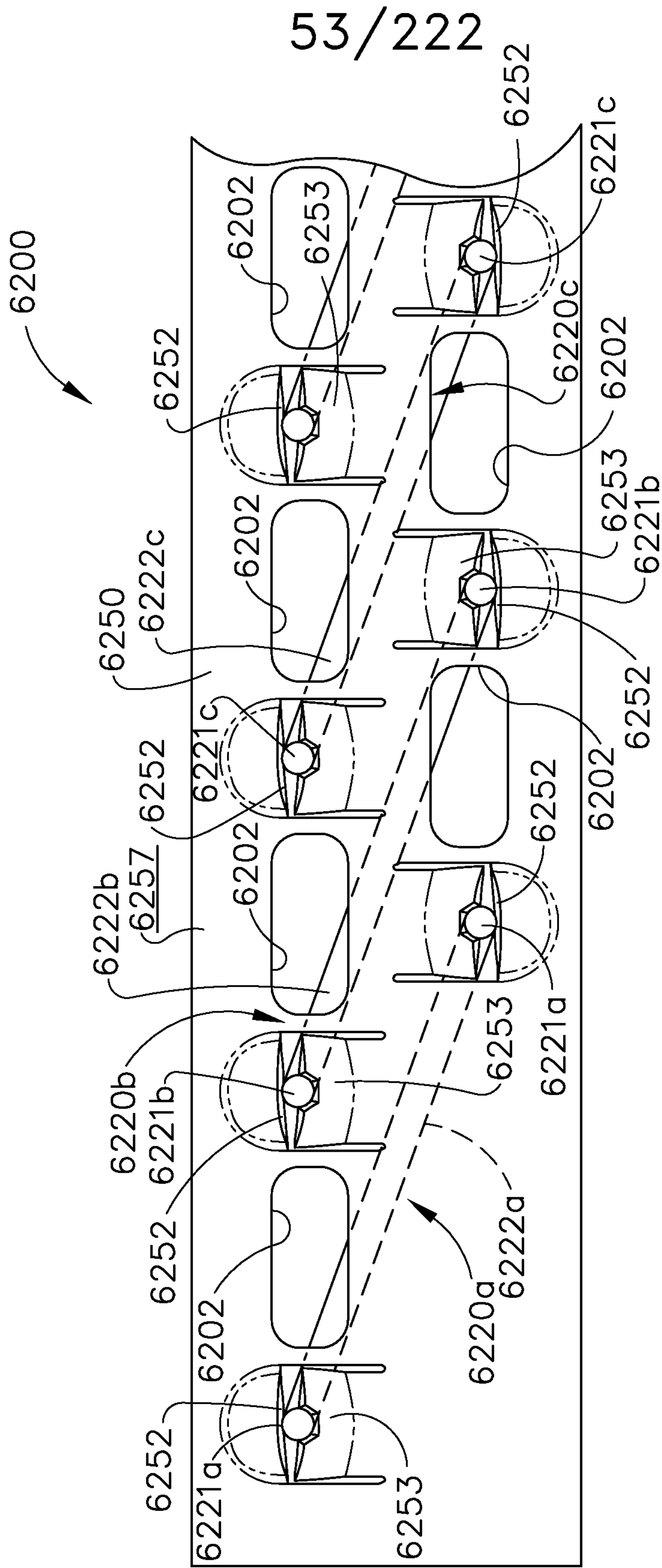


FIG. 115

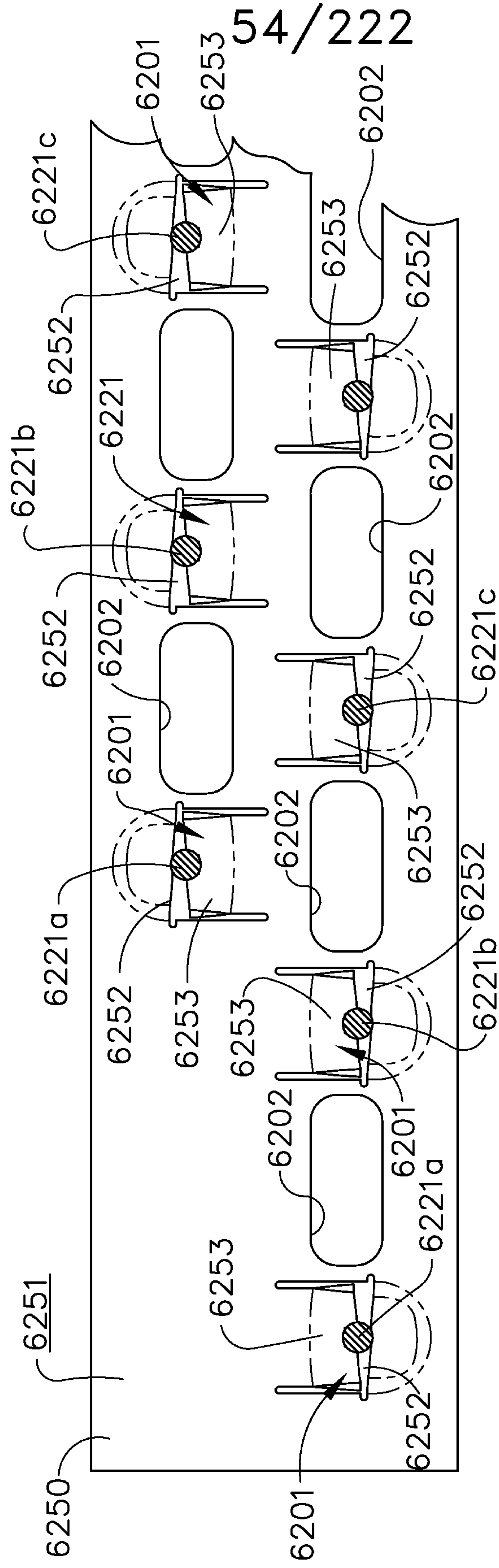


FIG. 116

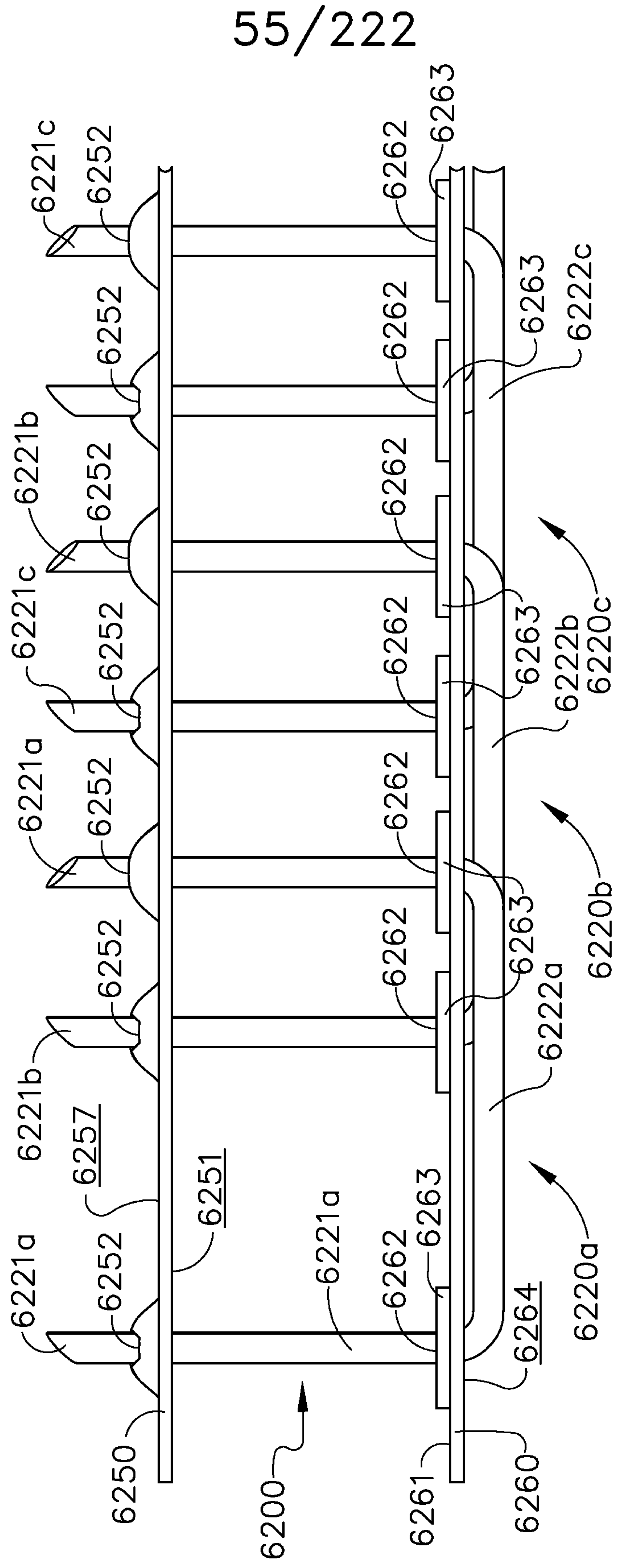


FIG. 117

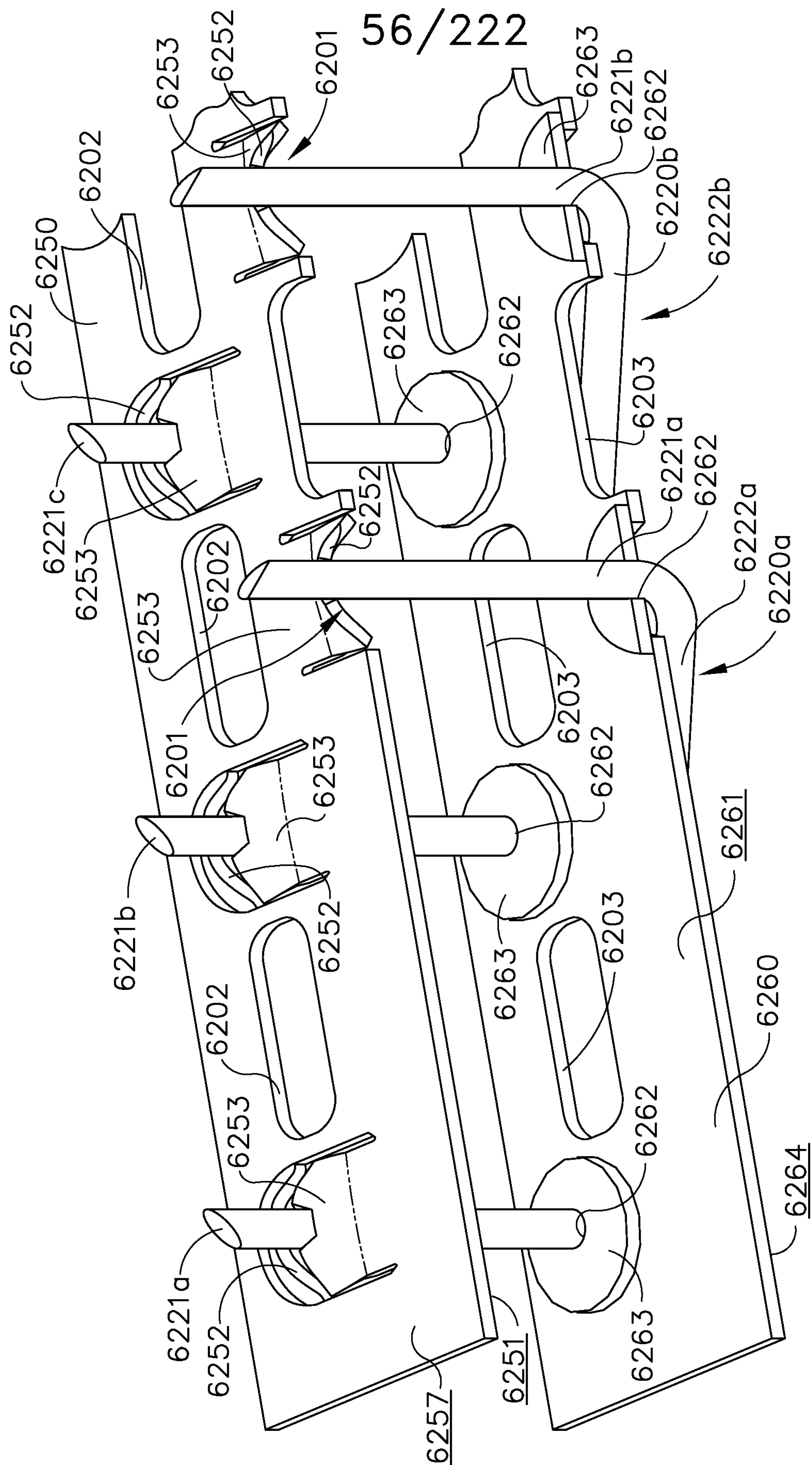


FIG. 118

57/222

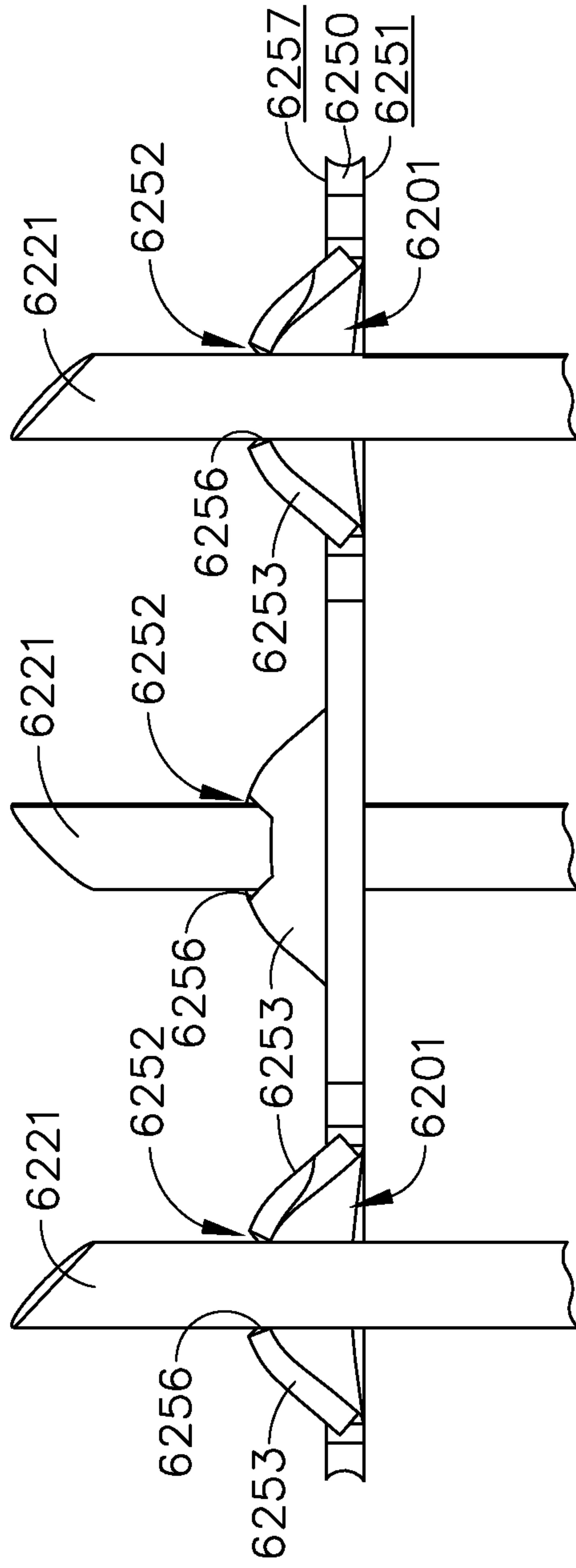


FIG. 119

58/222

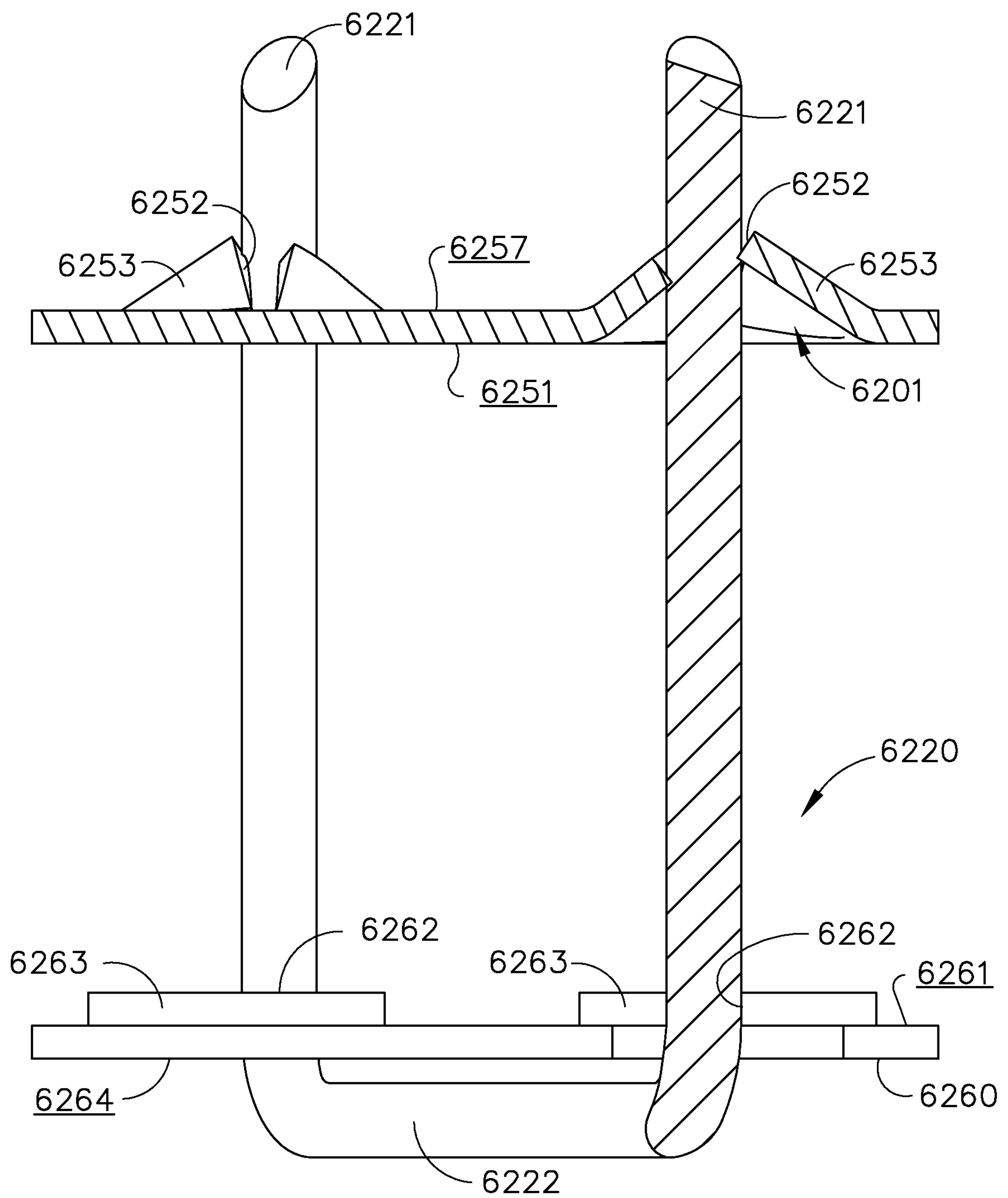


FIG. 120

59/222

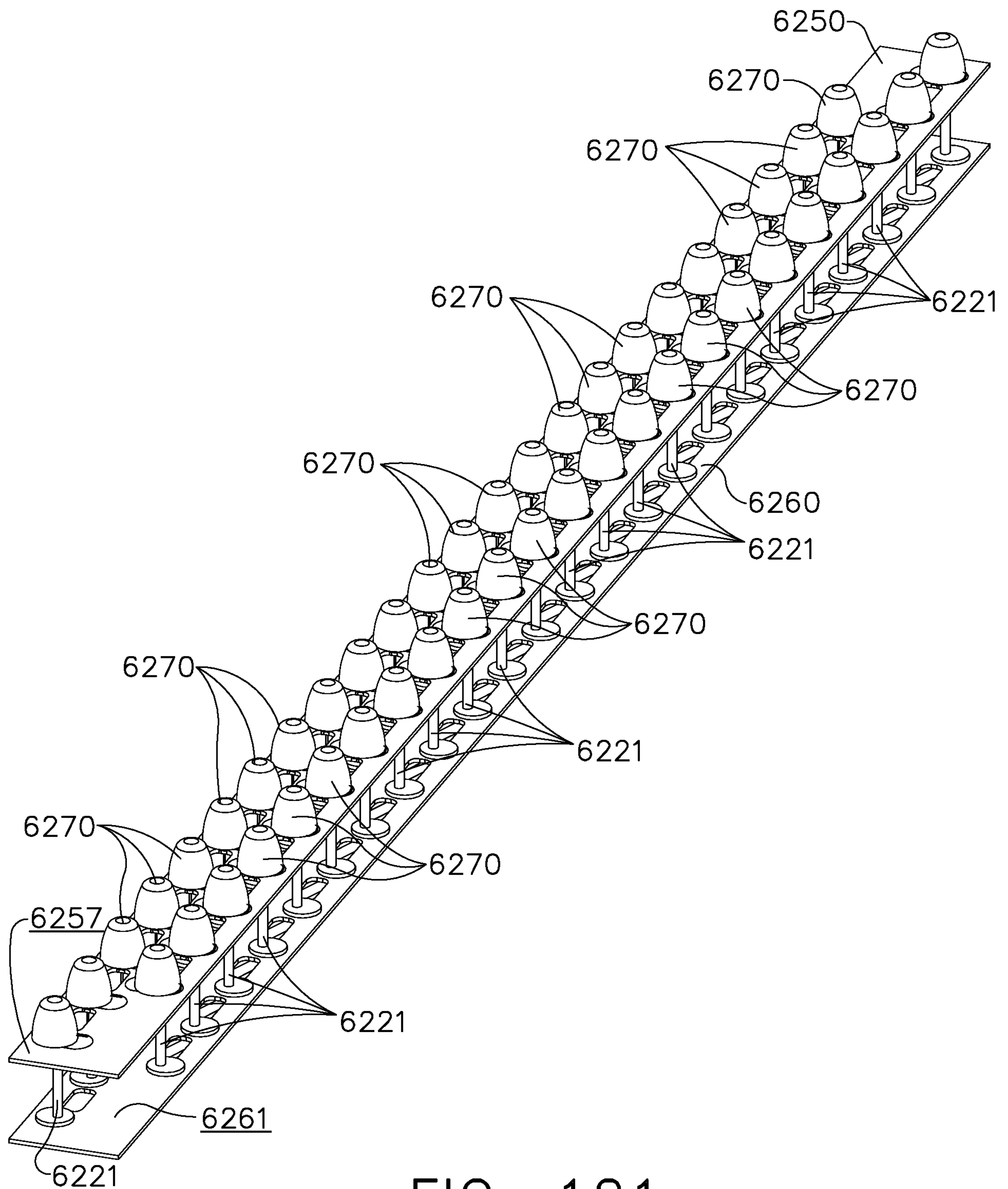


FIG. 121

60/222

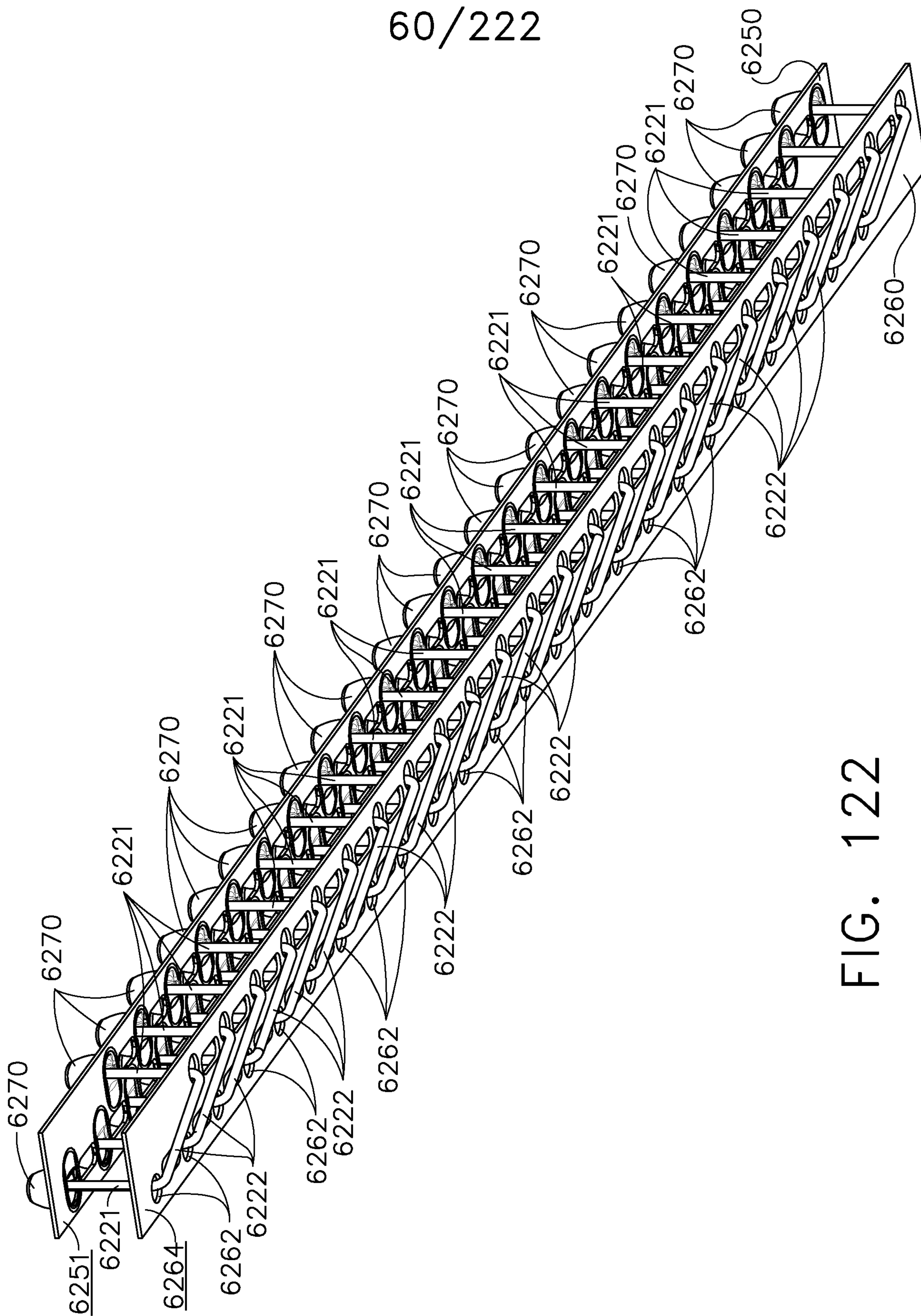


FIG. 122

61/222

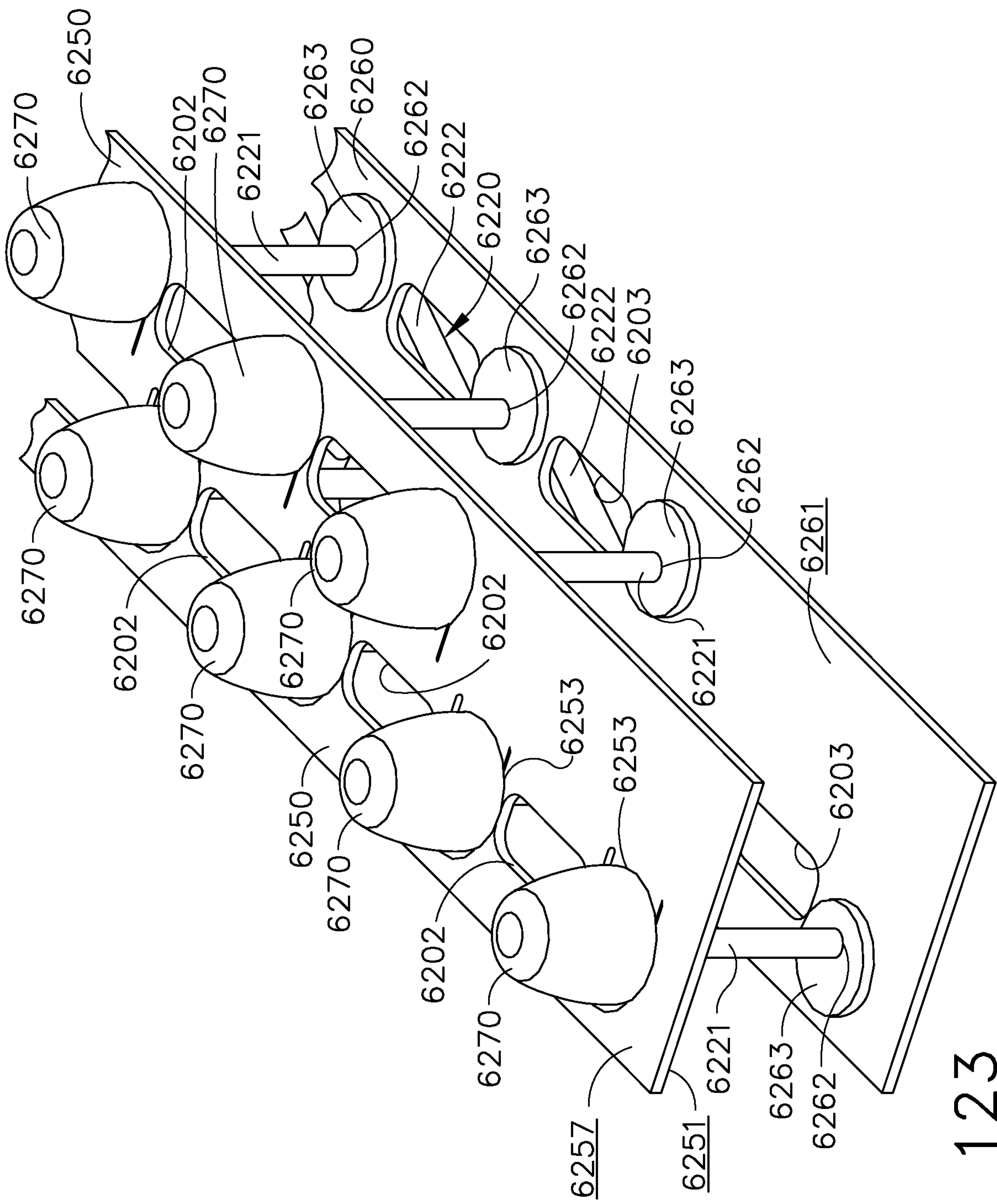


FIG. 123

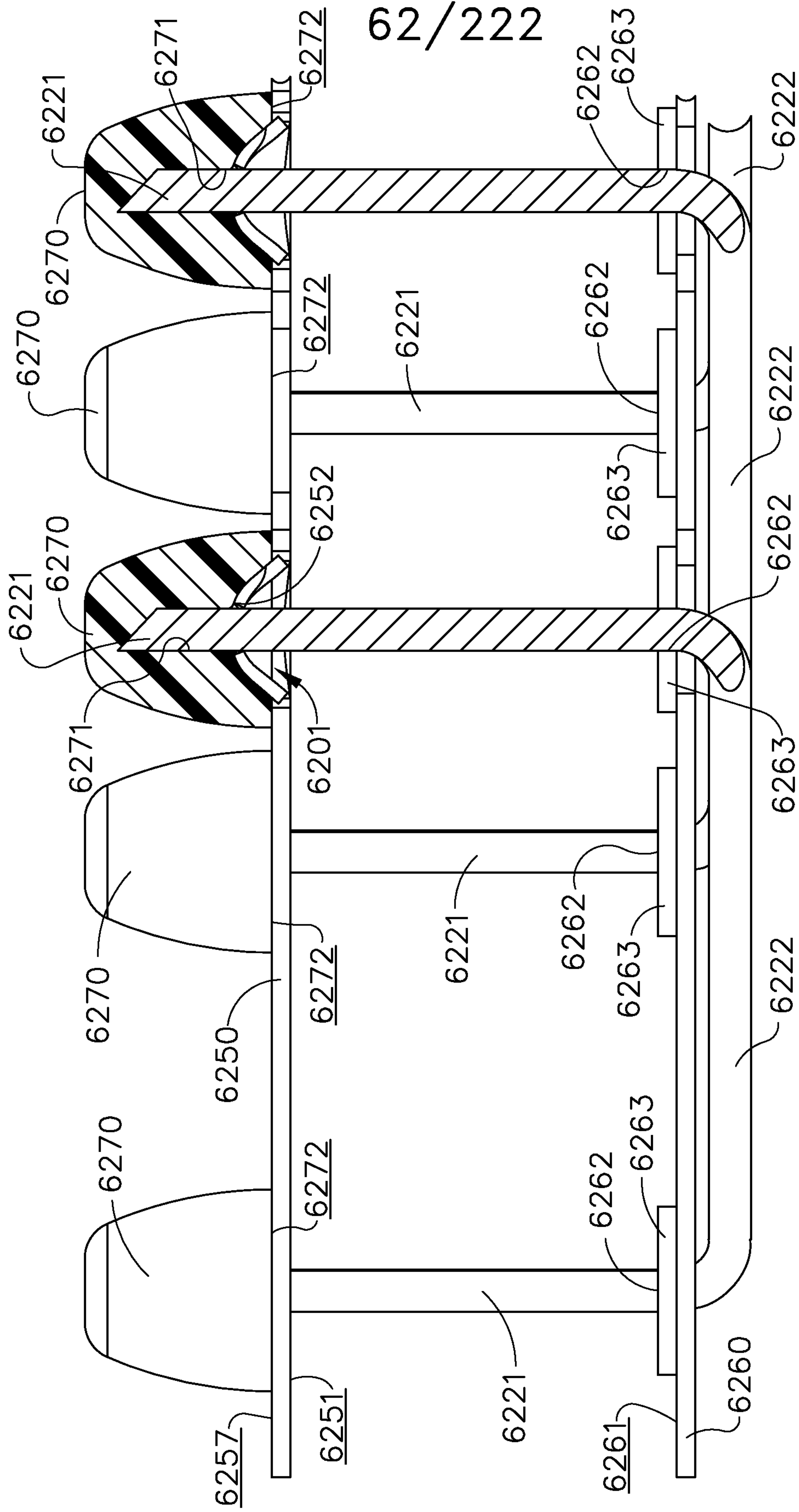
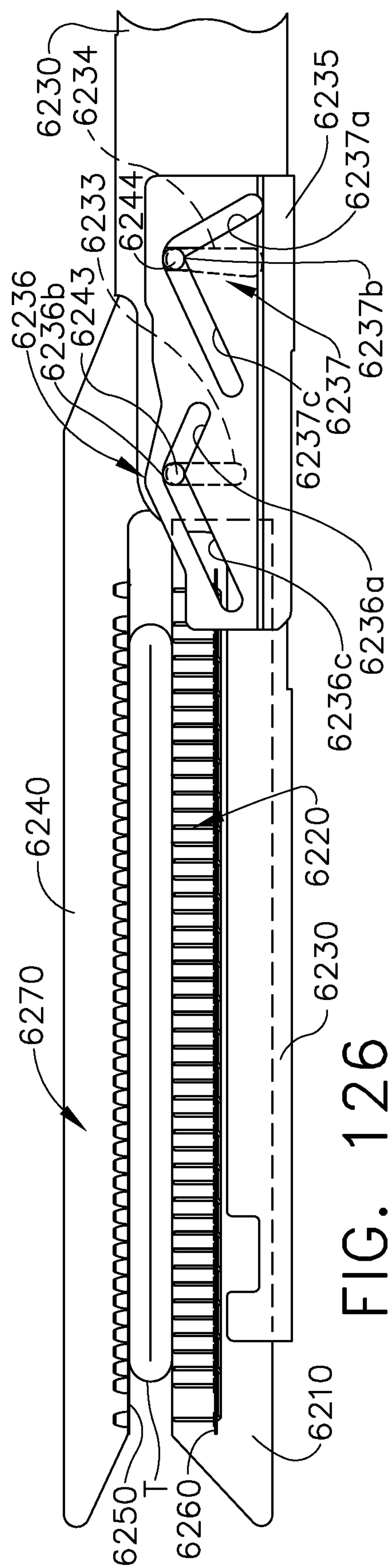
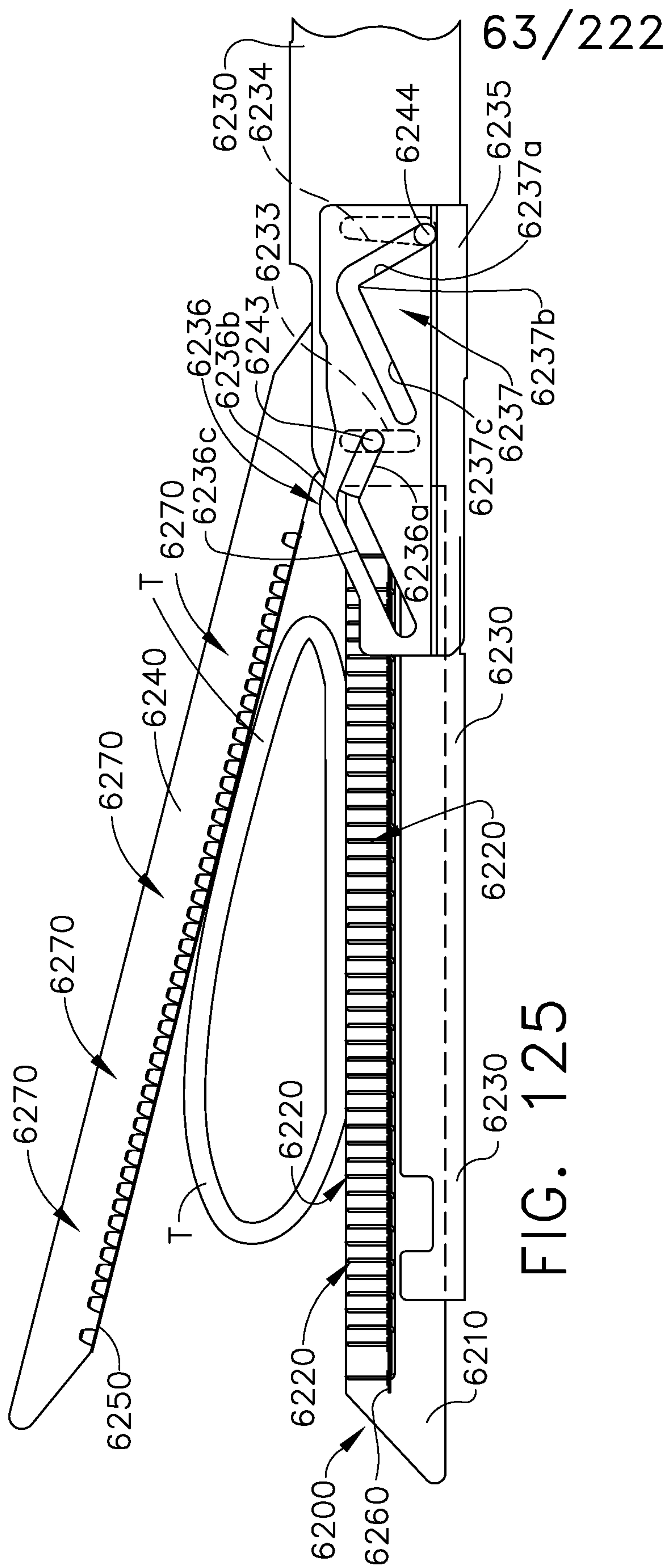


FIG. 124



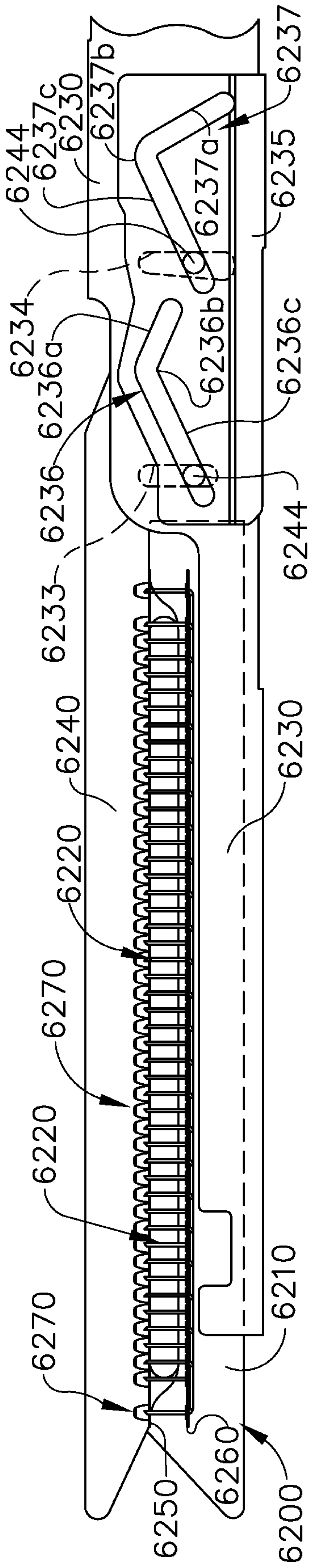


FIG. 127

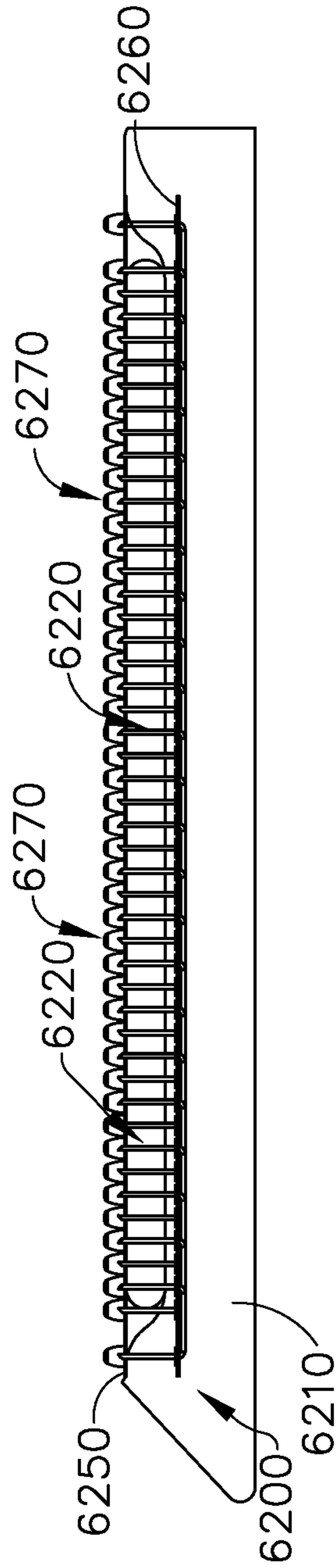


FIG. 128

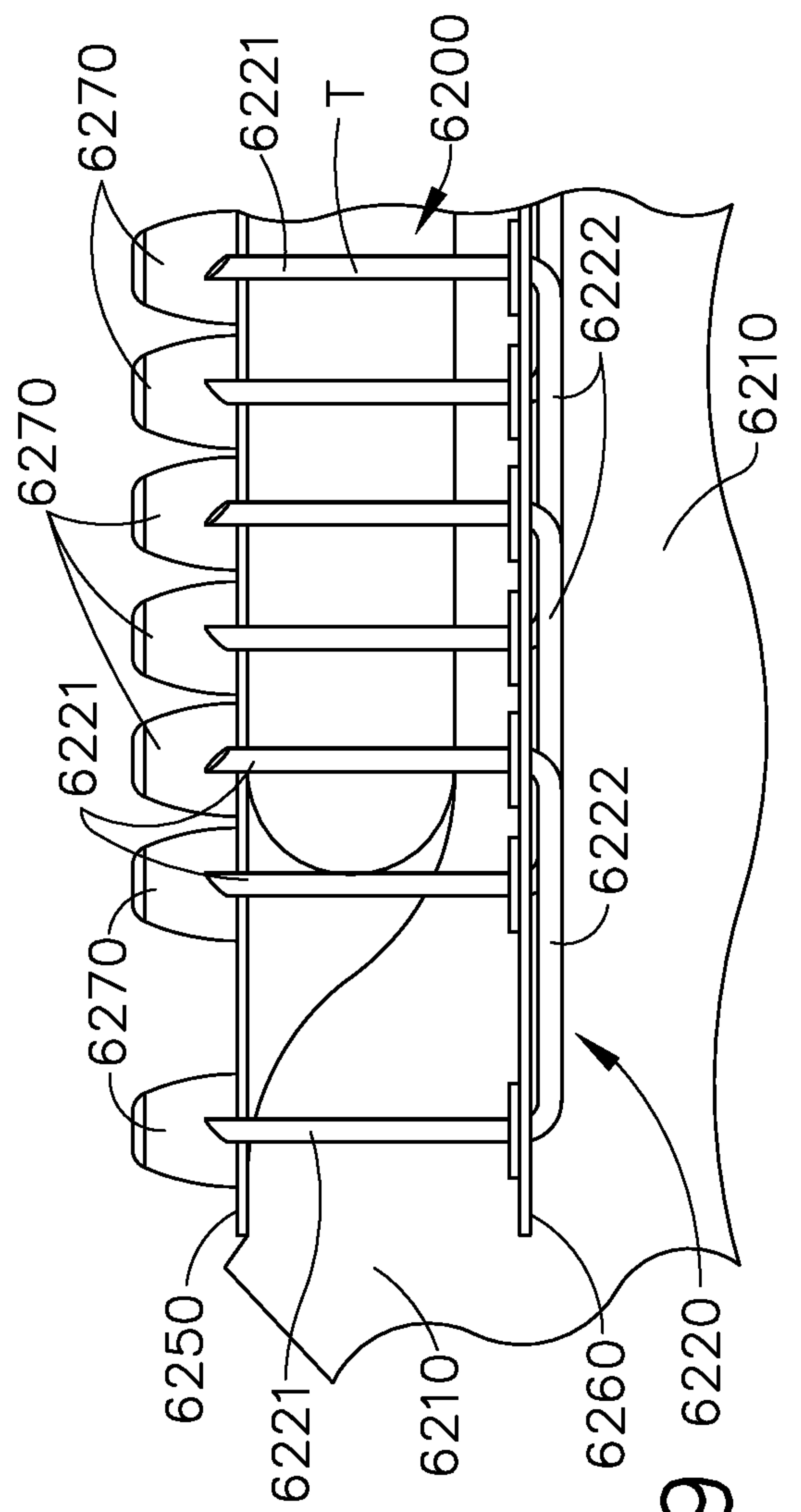
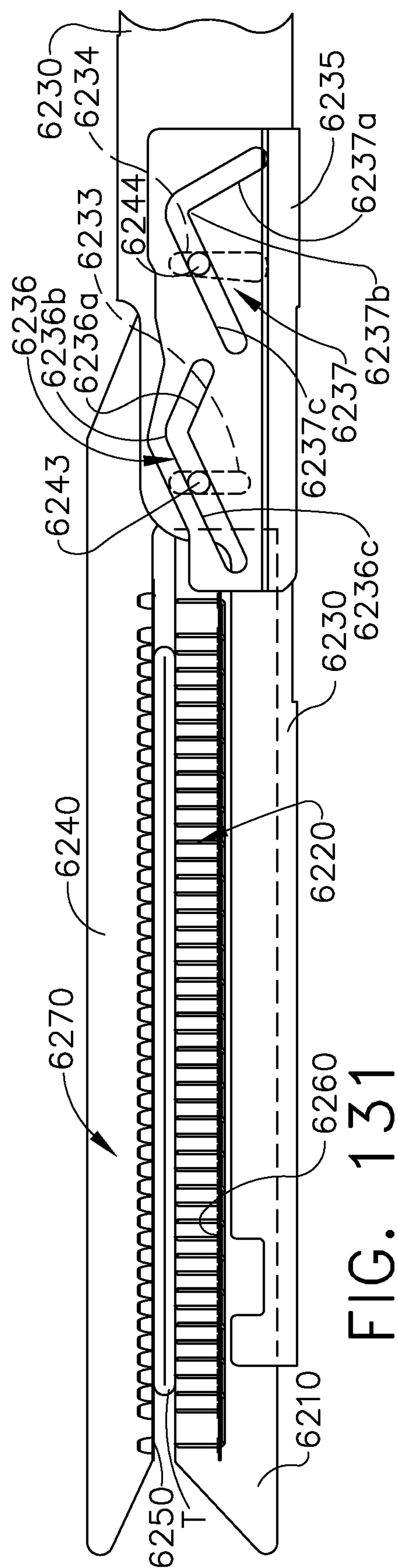
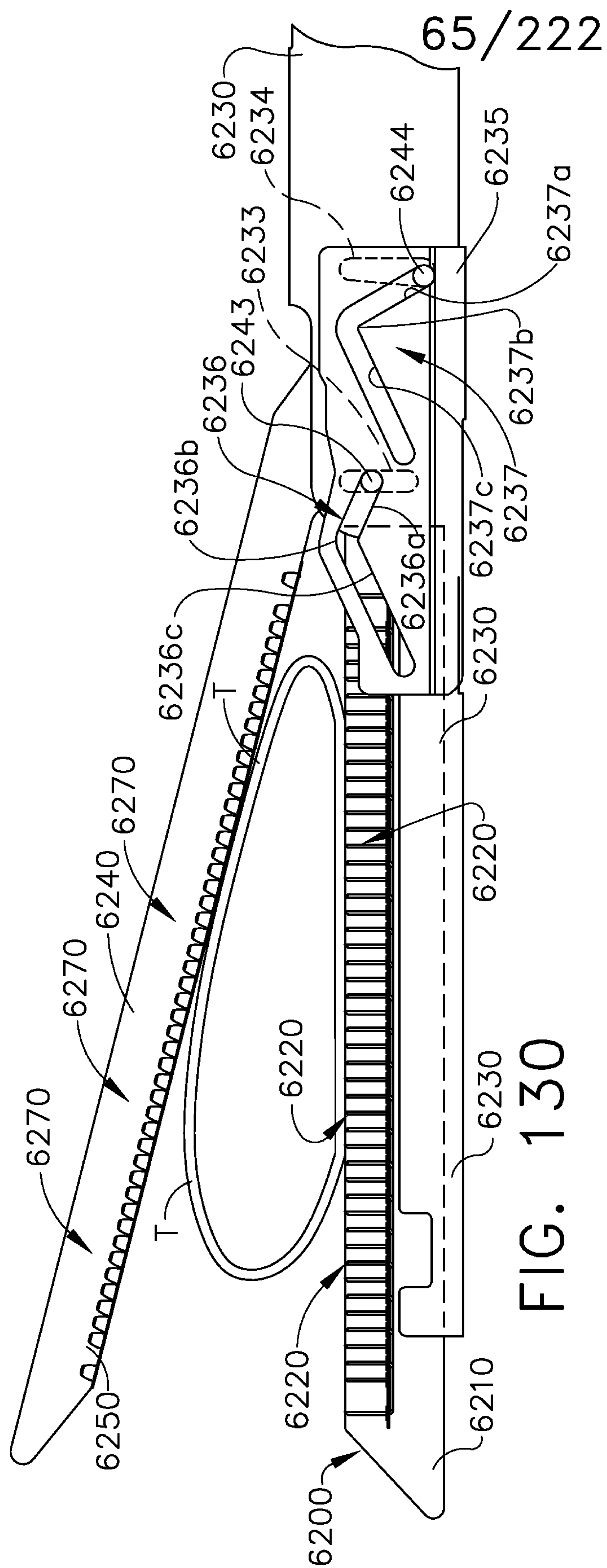


FIG. 129



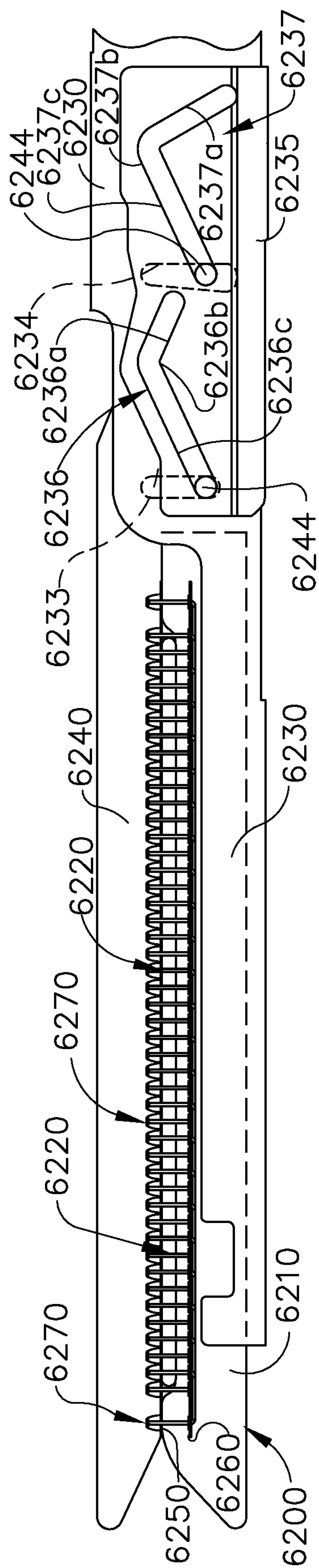


FIG. 132

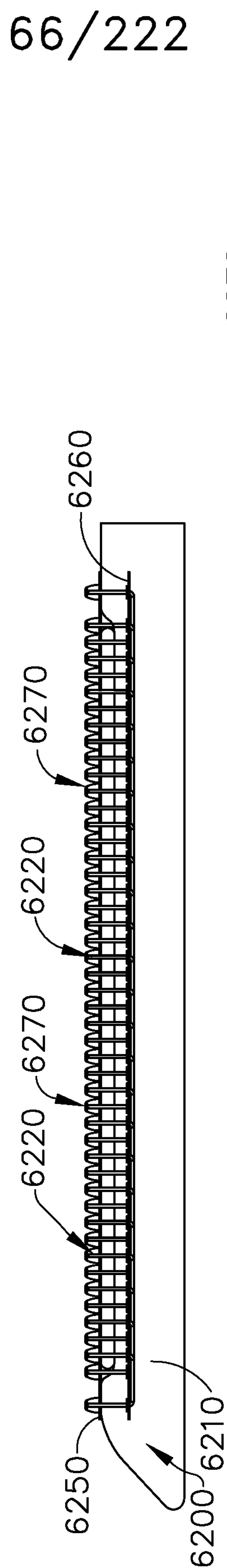


FIG. 133

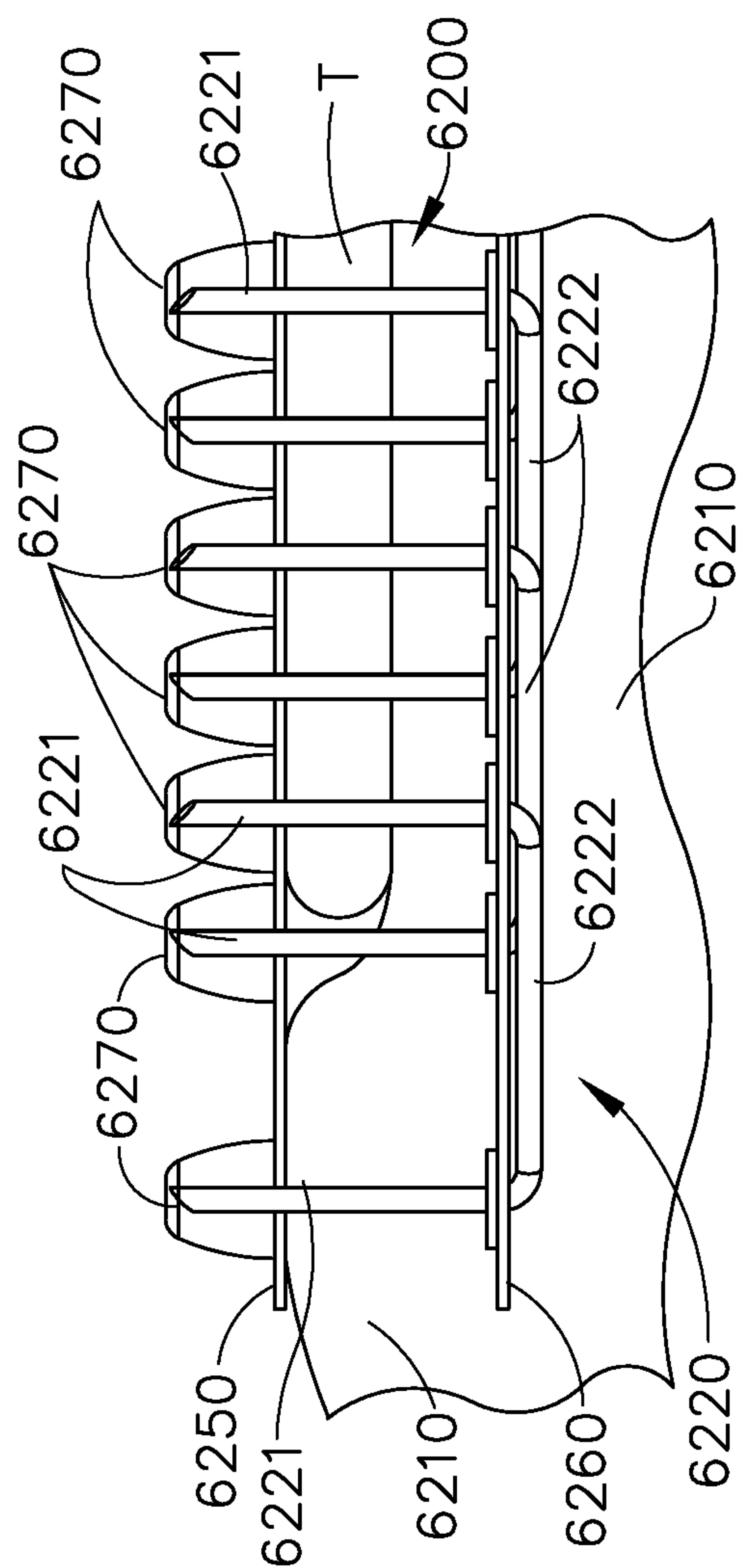


FIG. 134

67/222

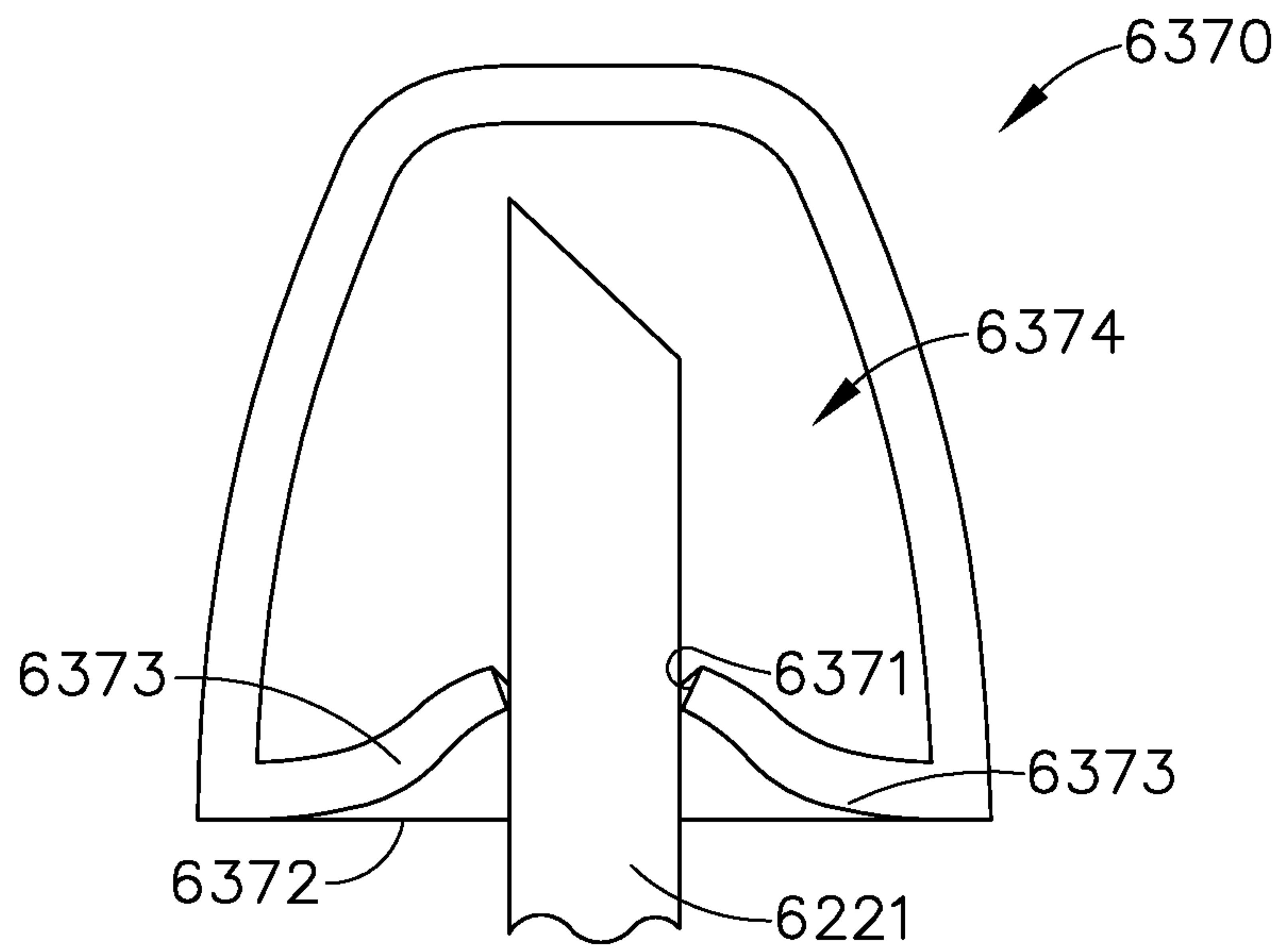


FIG. 135

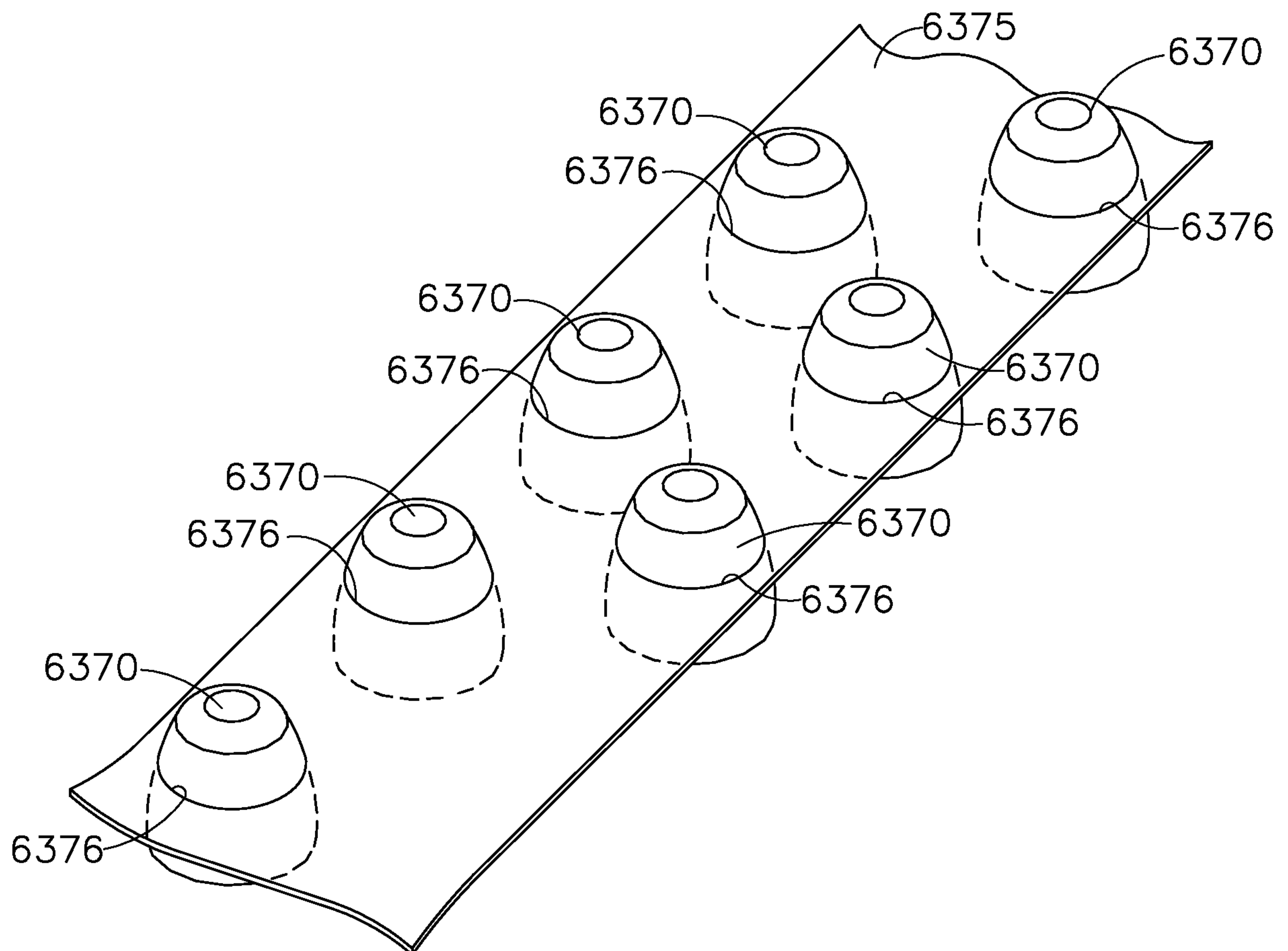
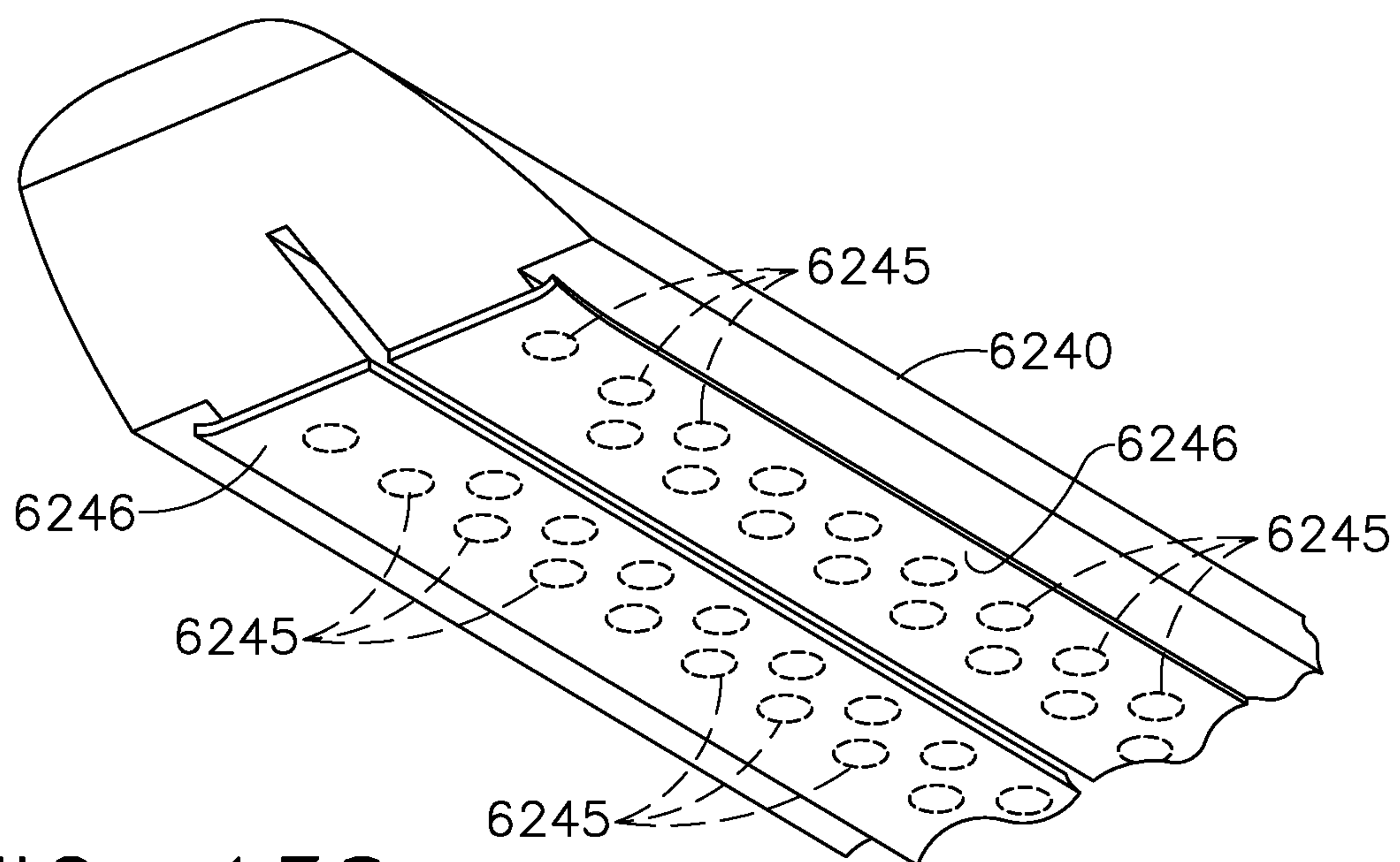
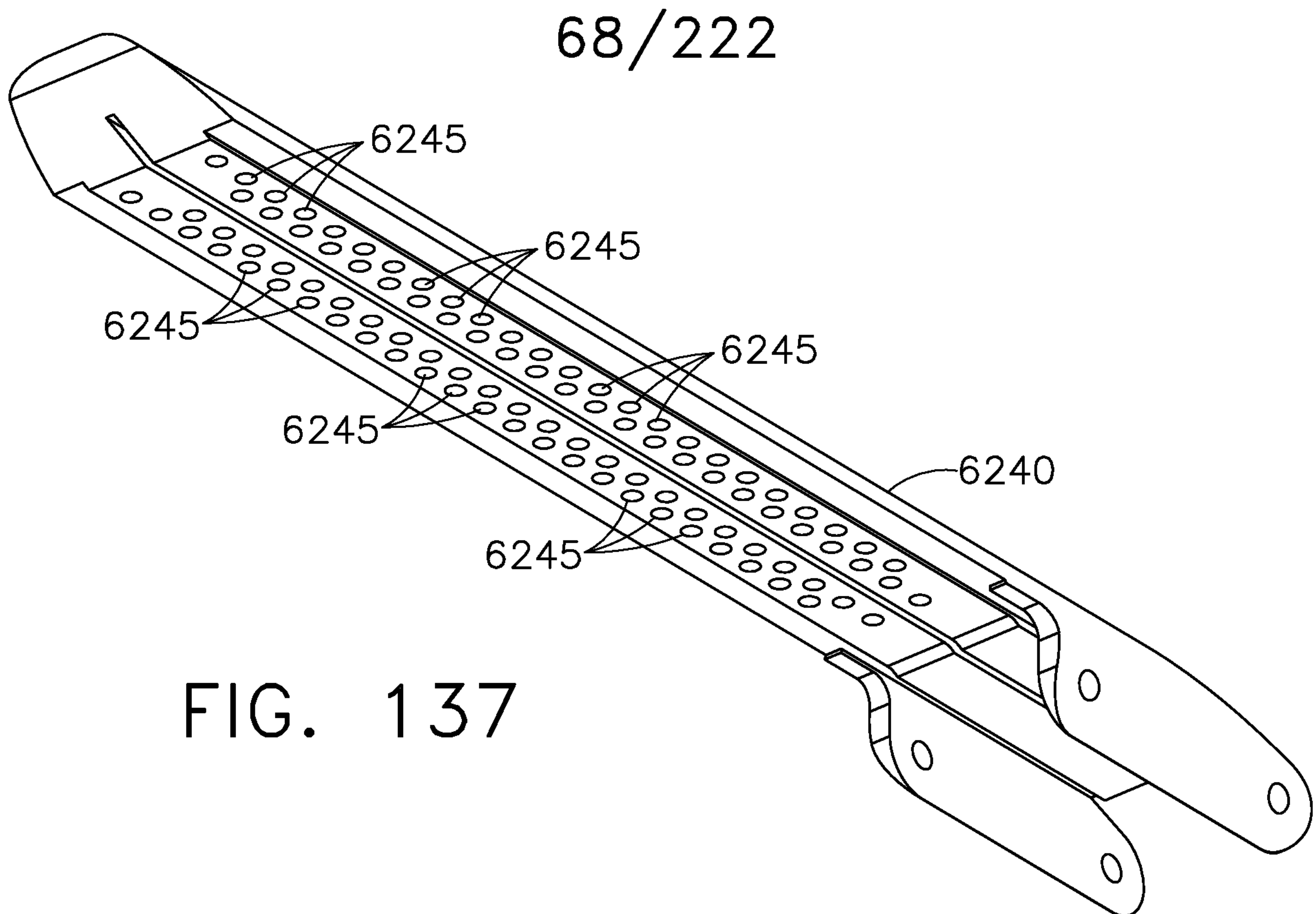


FIG. 136



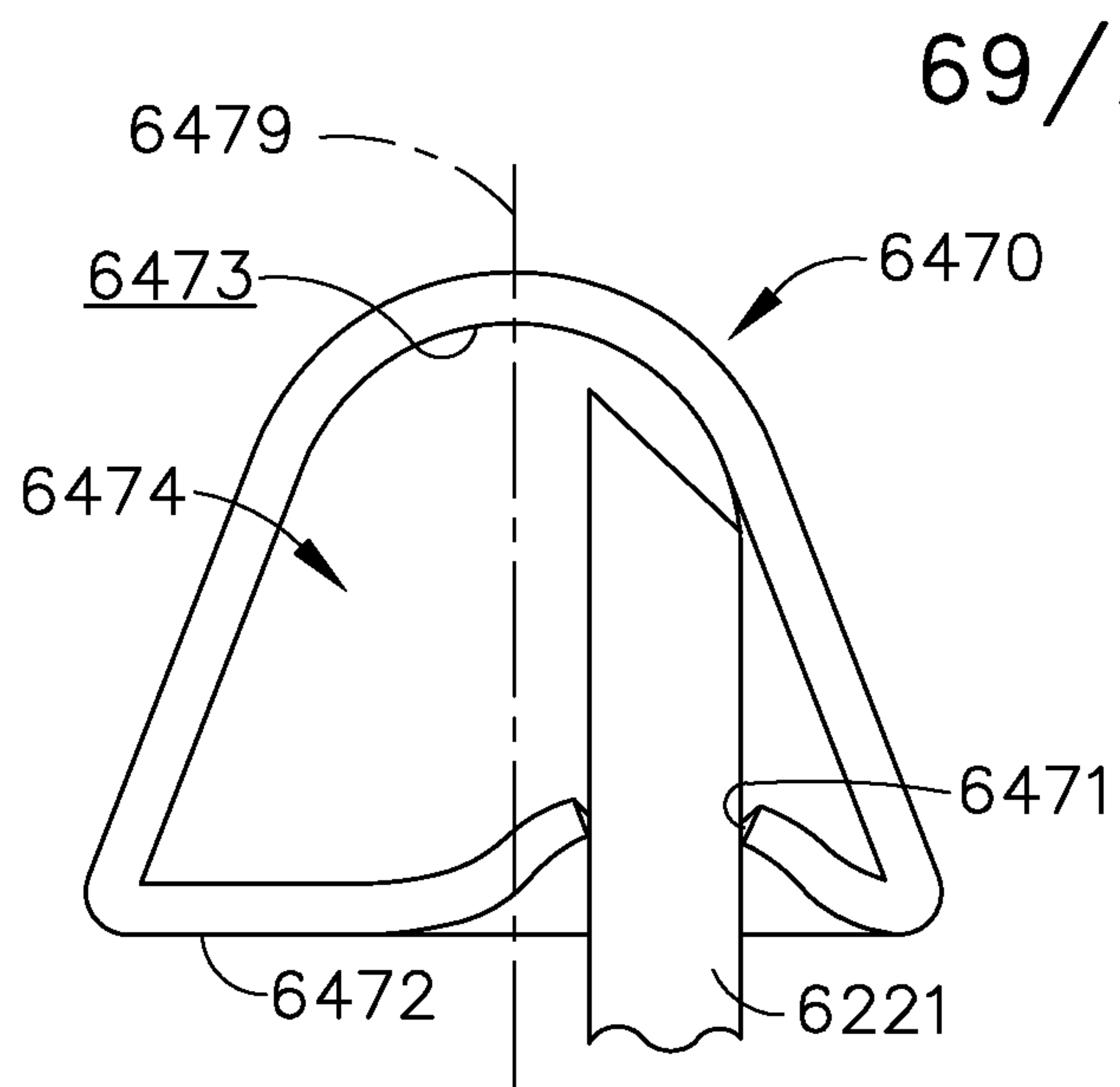


FIG. 139

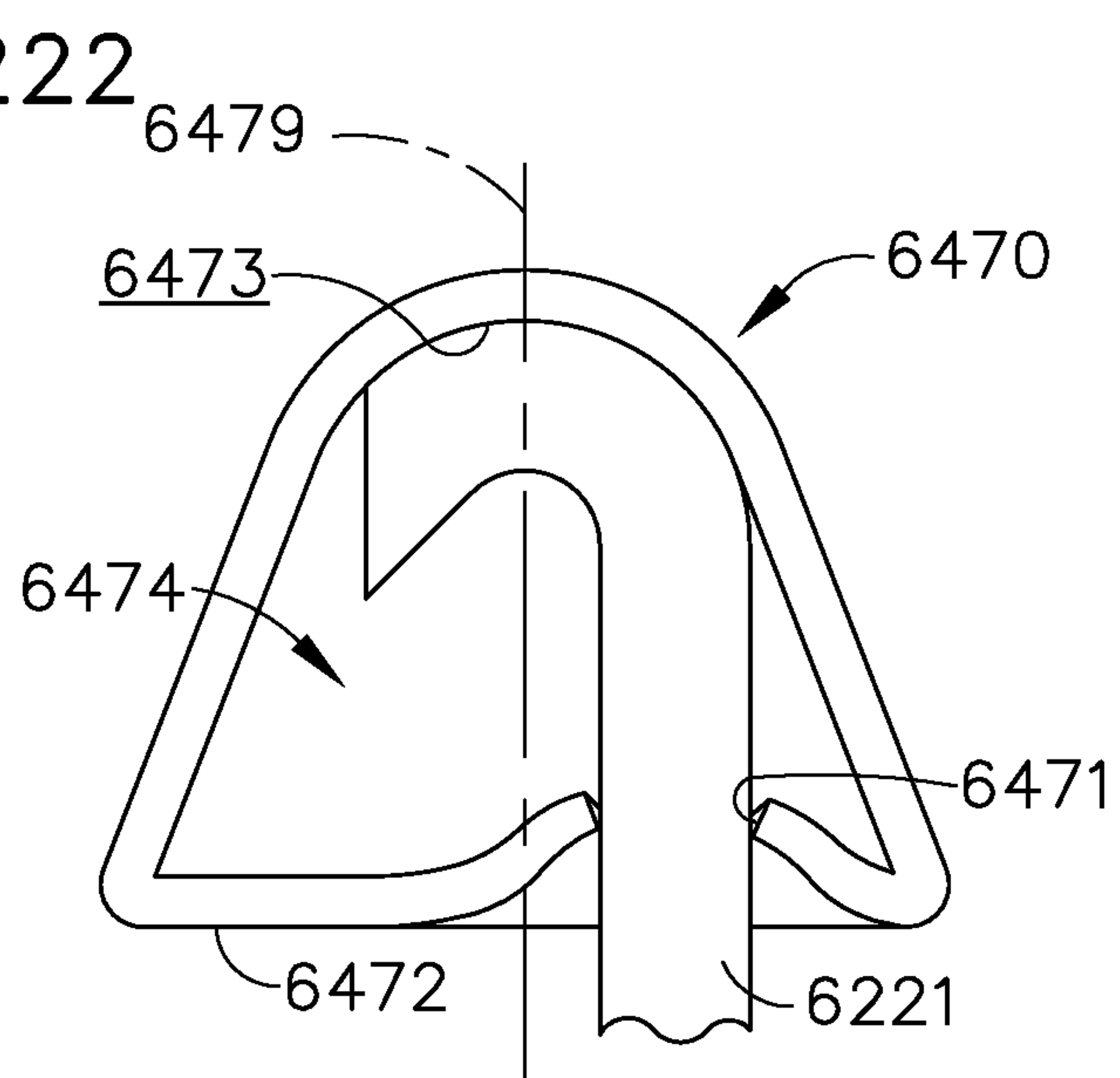


FIG. 140

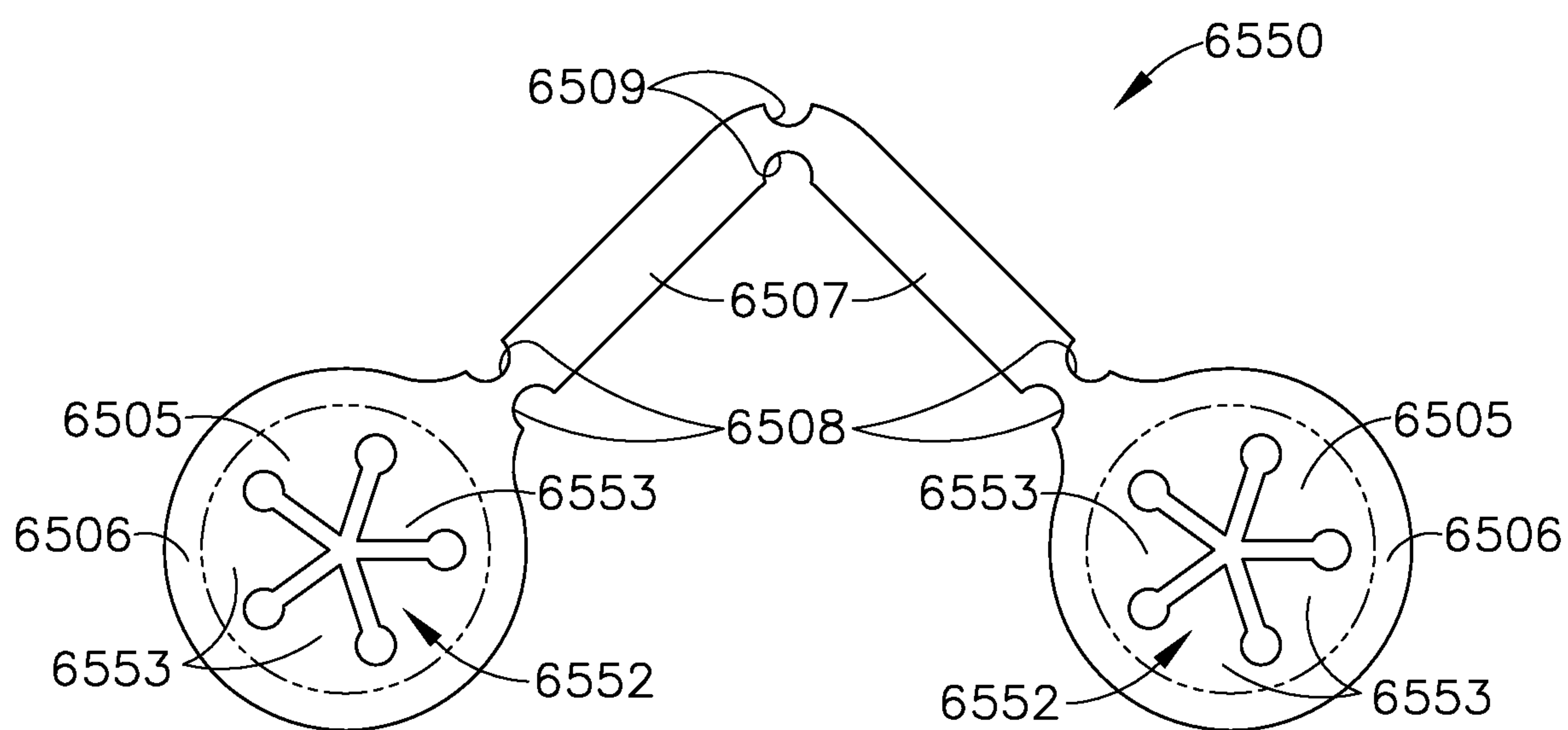


FIG. 141

70/222

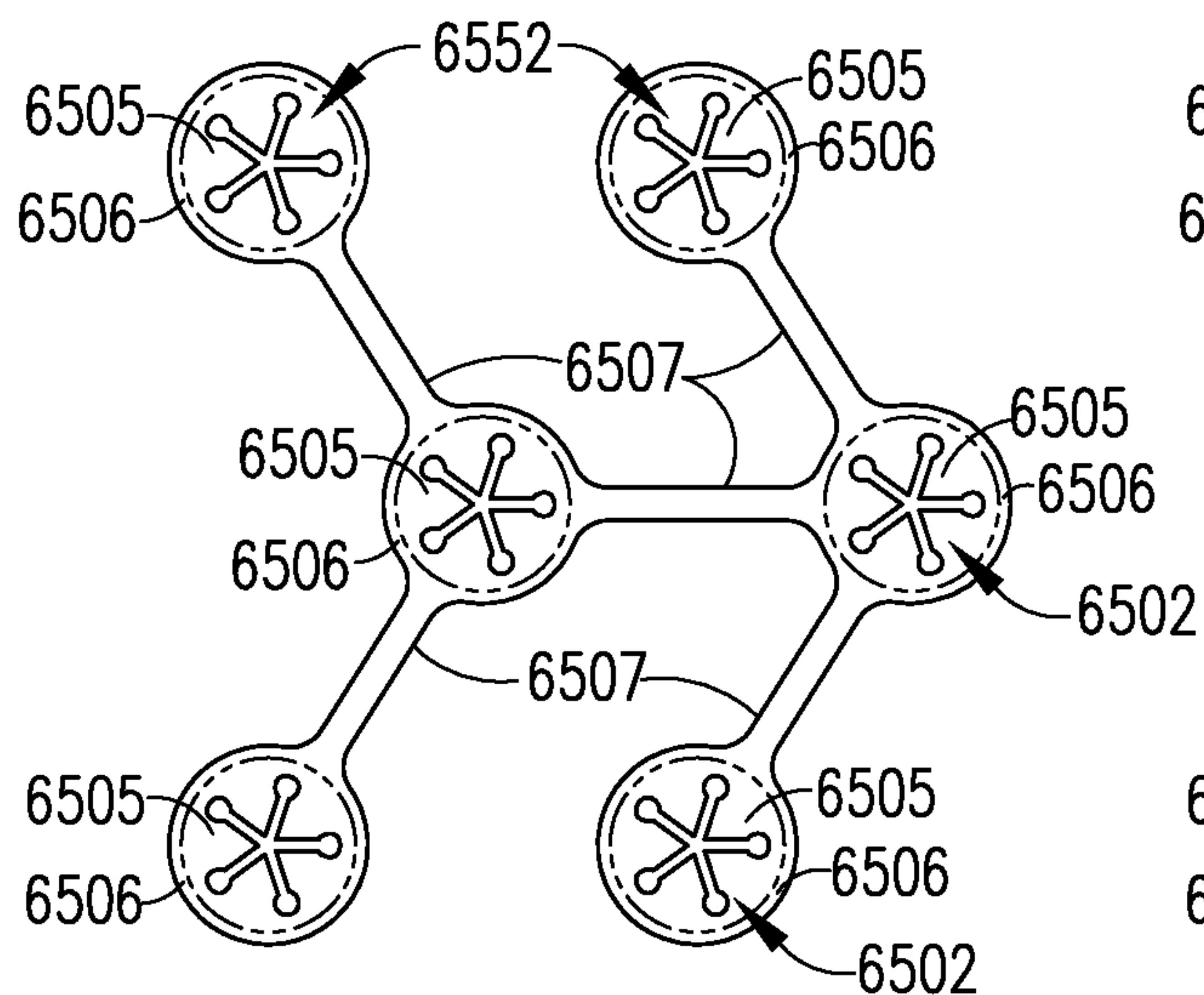


FIG. 142

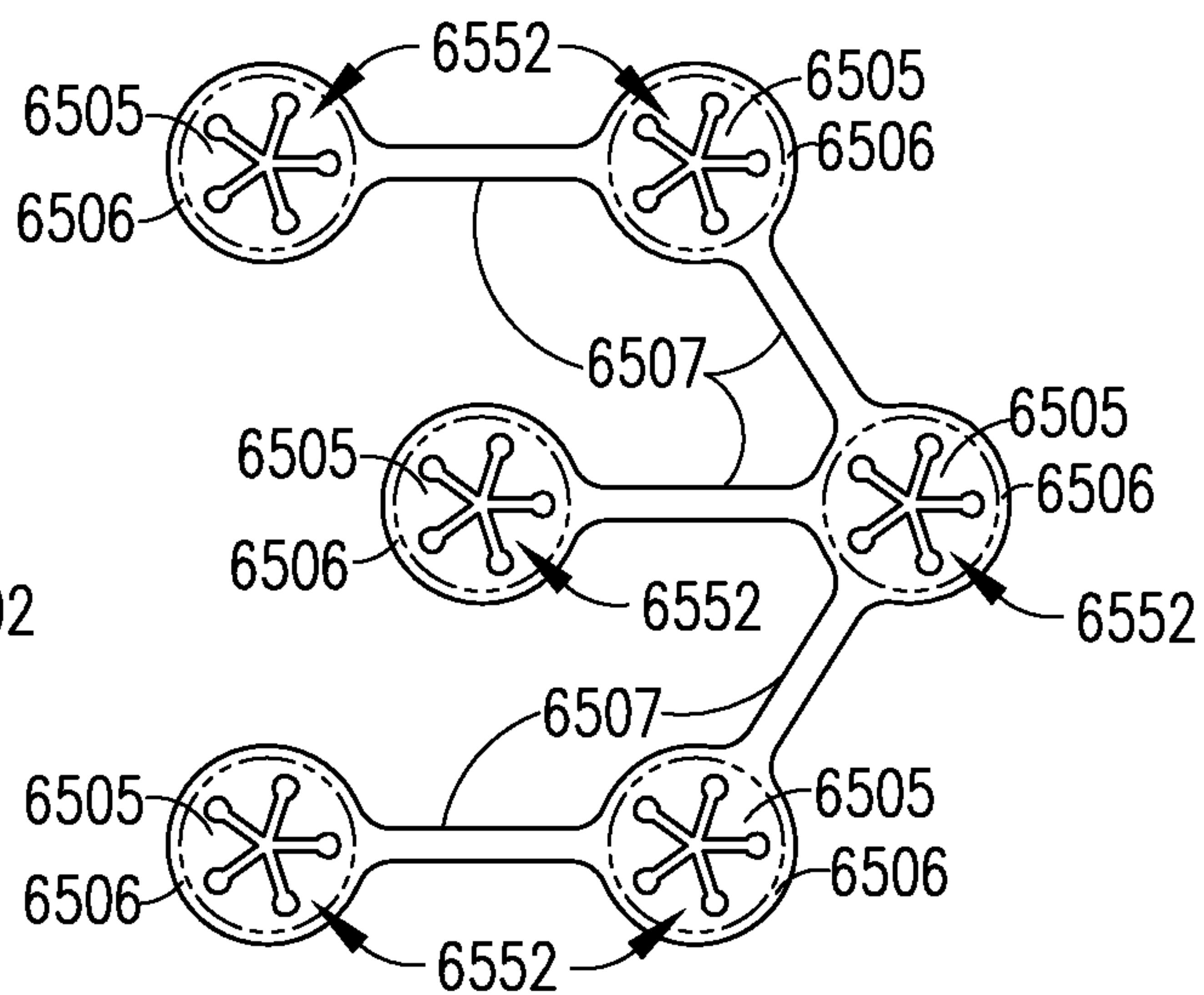


FIG. 143

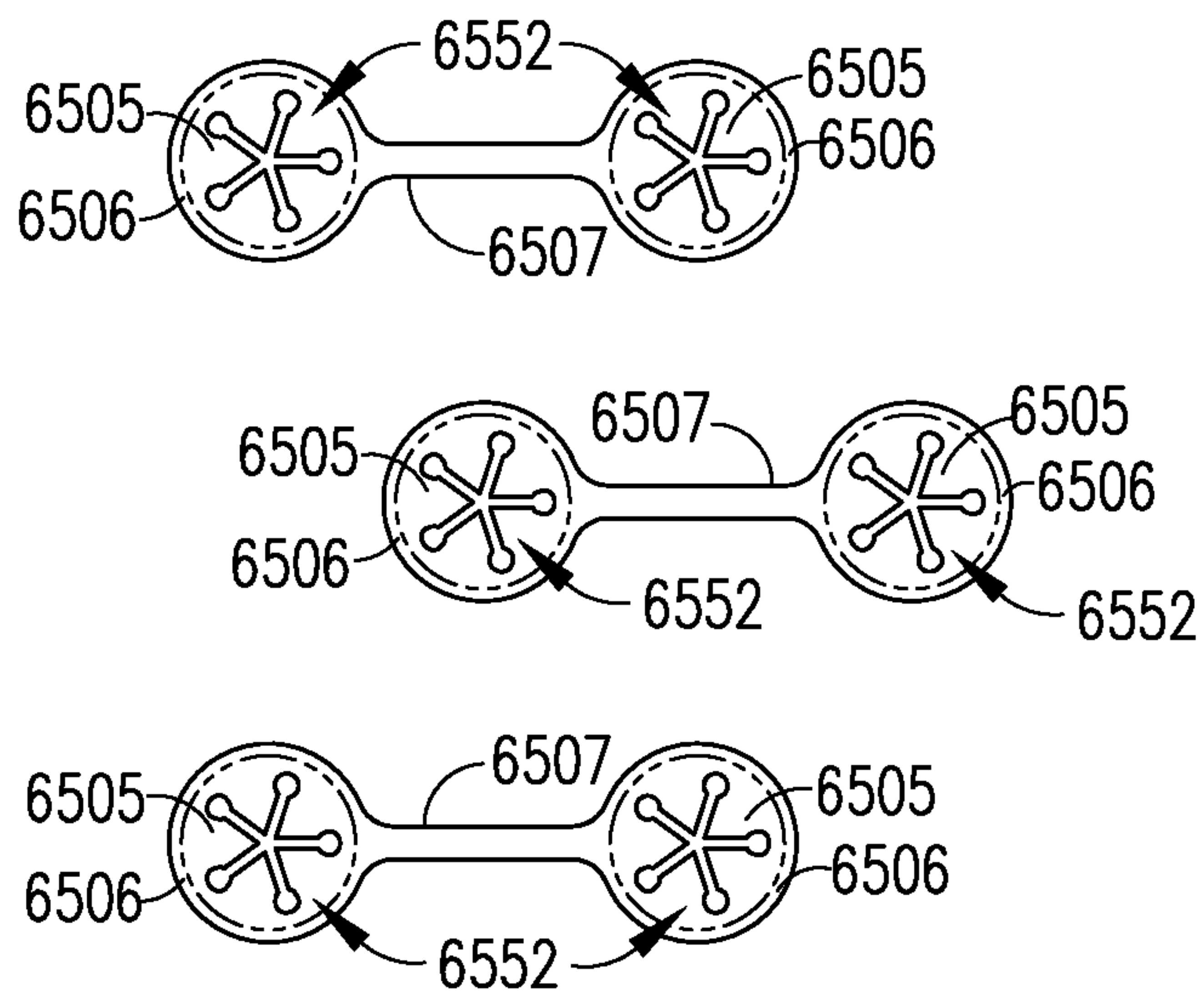


FIG. 144

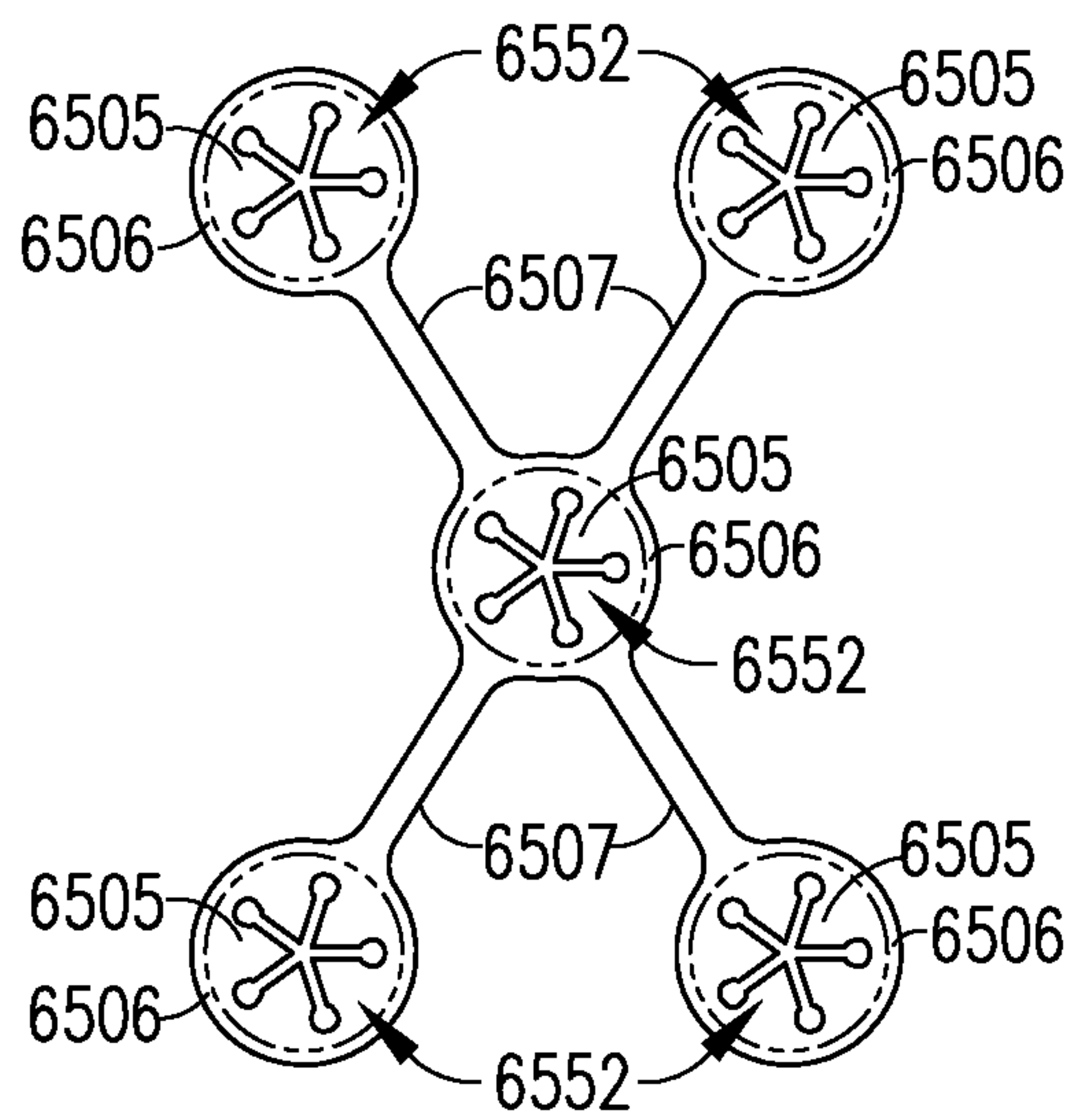


FIG. 145

71/222

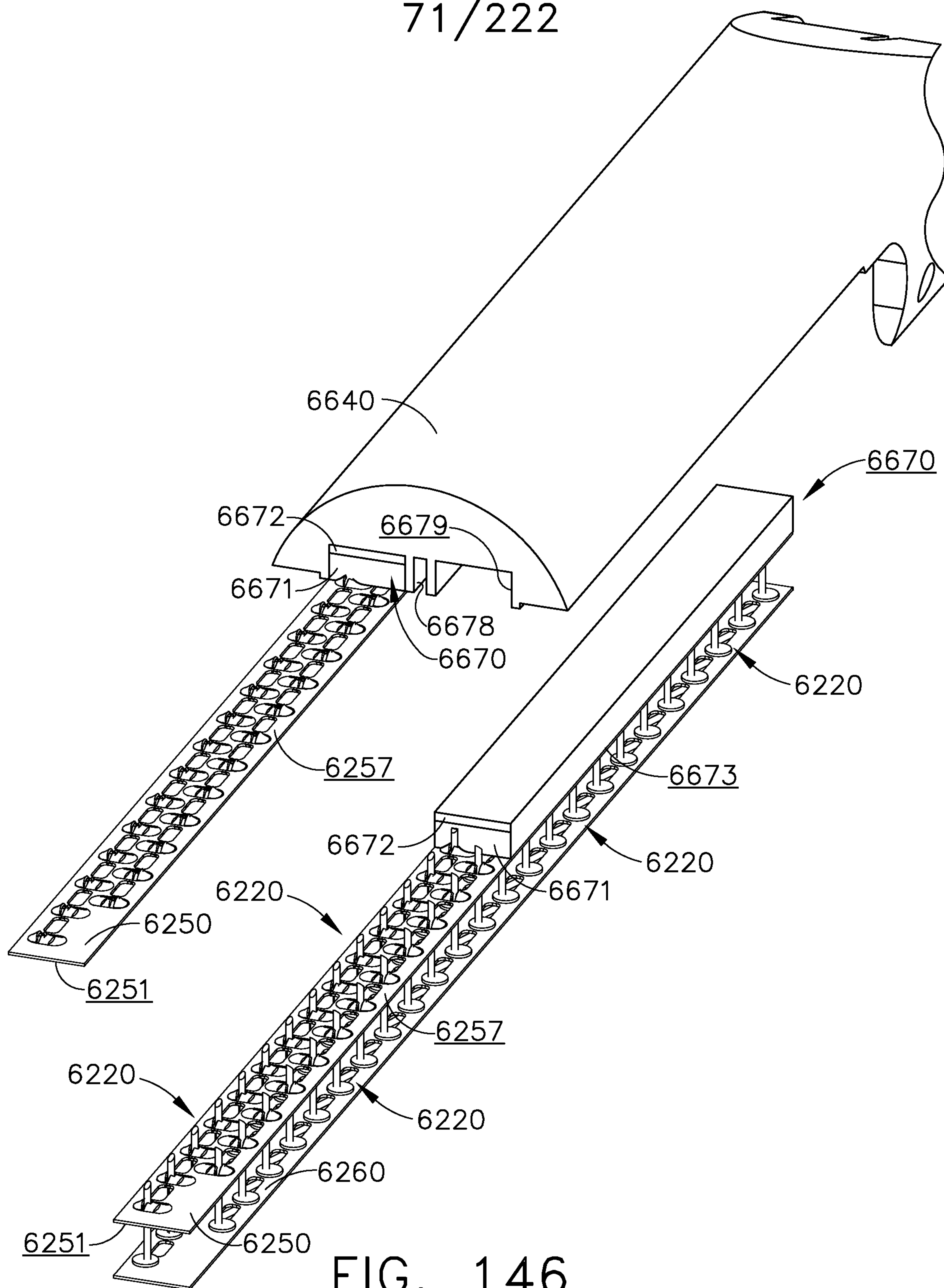


FIG. 146

72/222

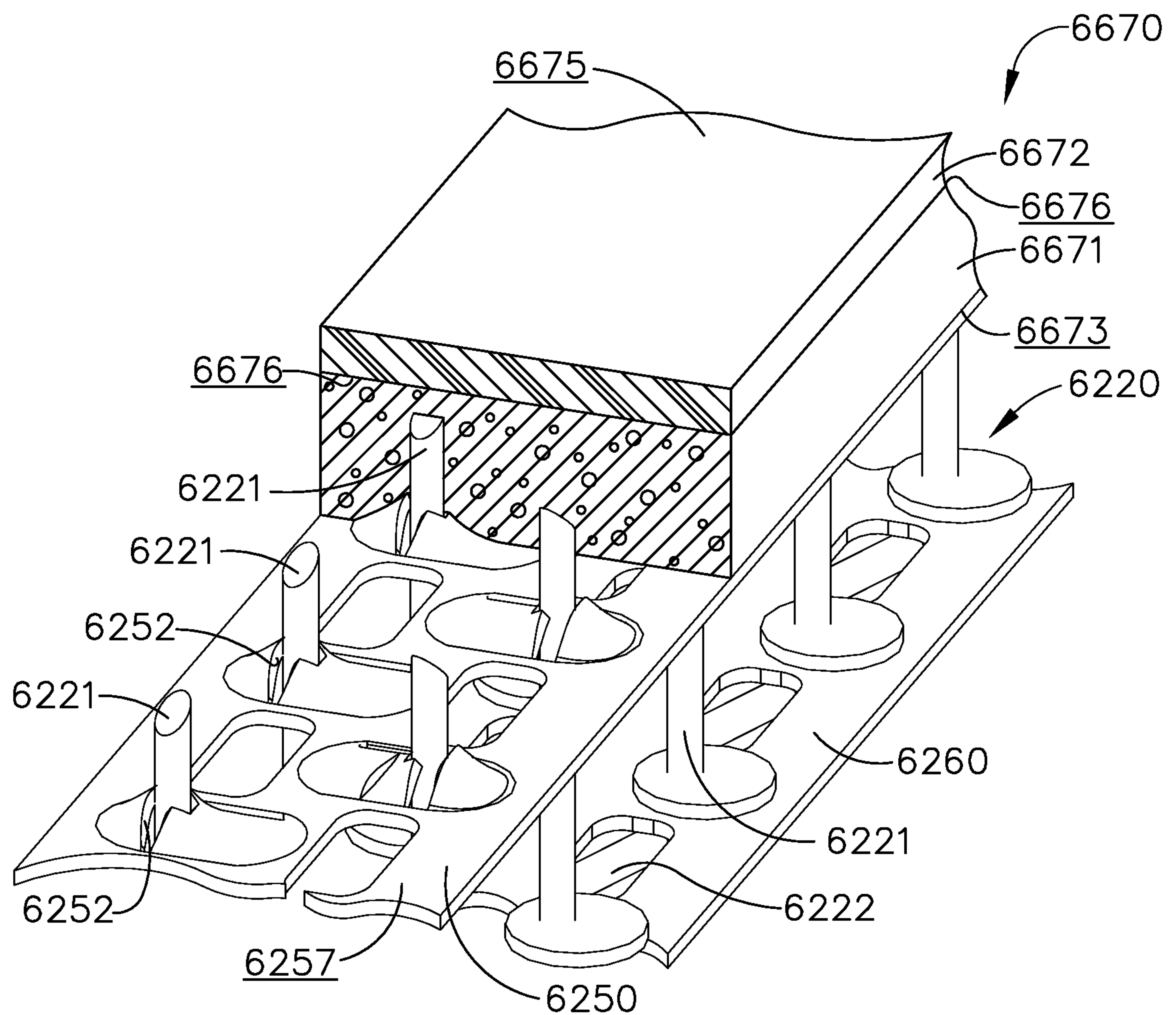


FIG. 147

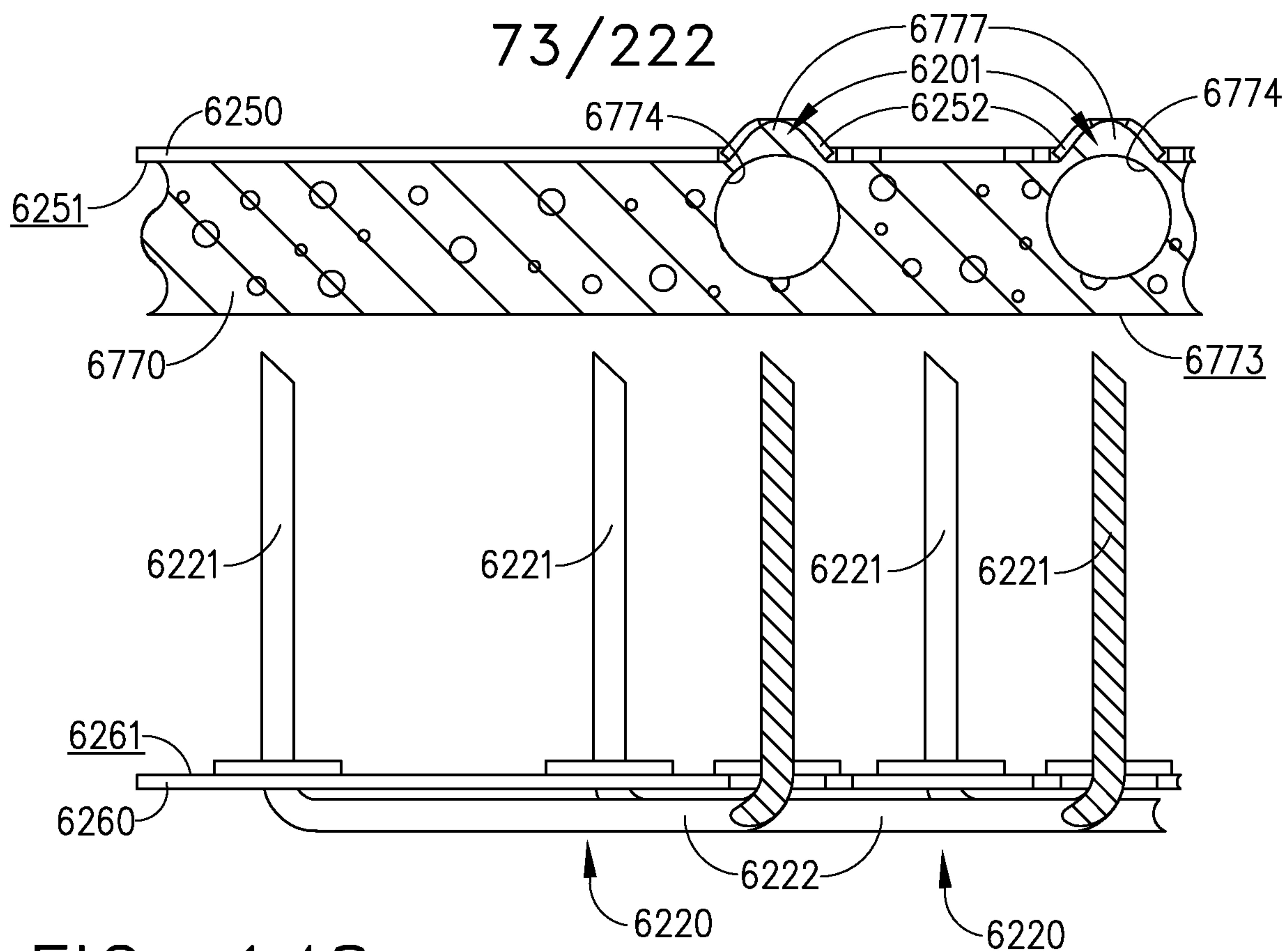


FIG. 148

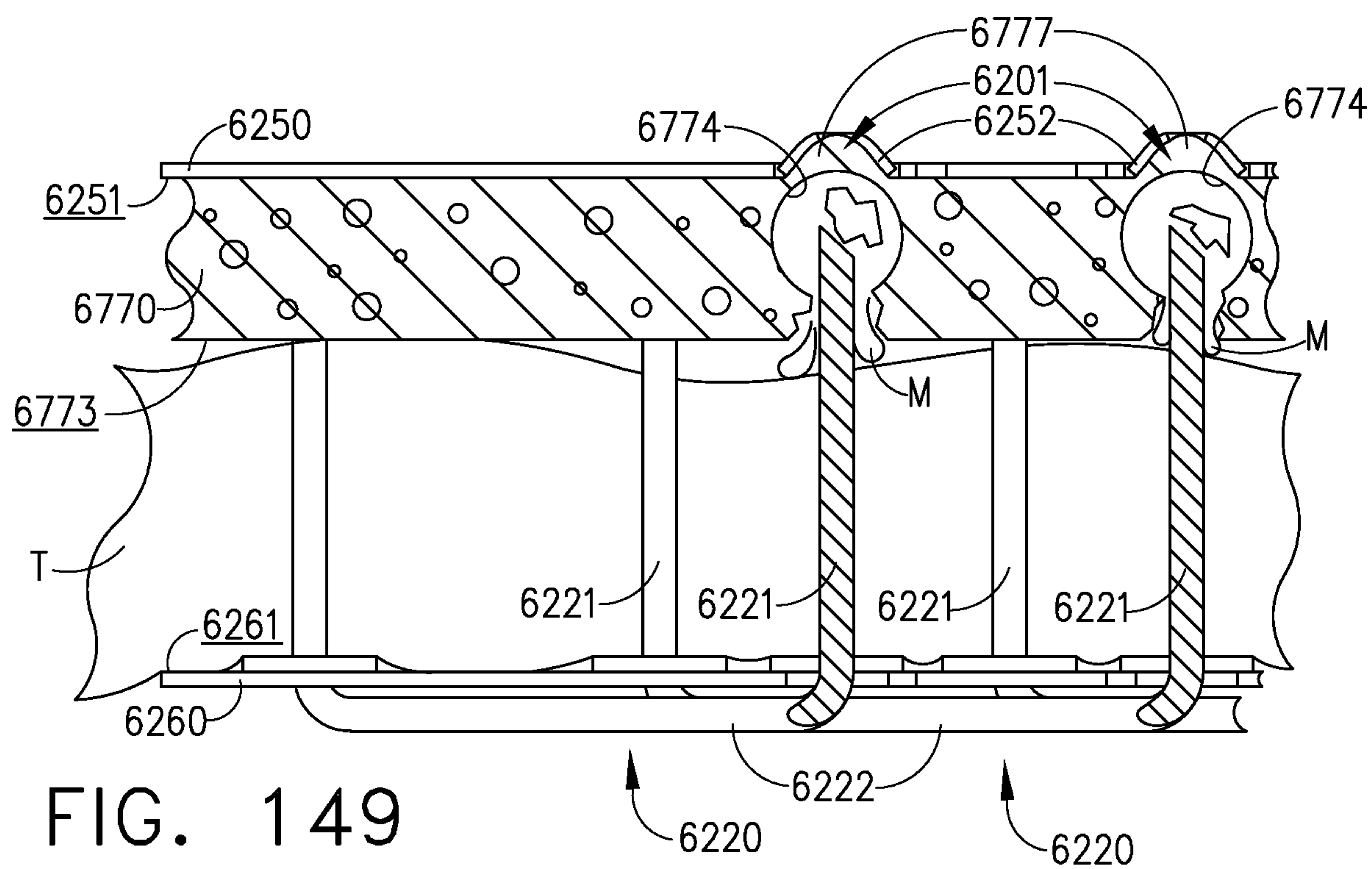


FIG. 149

74/222

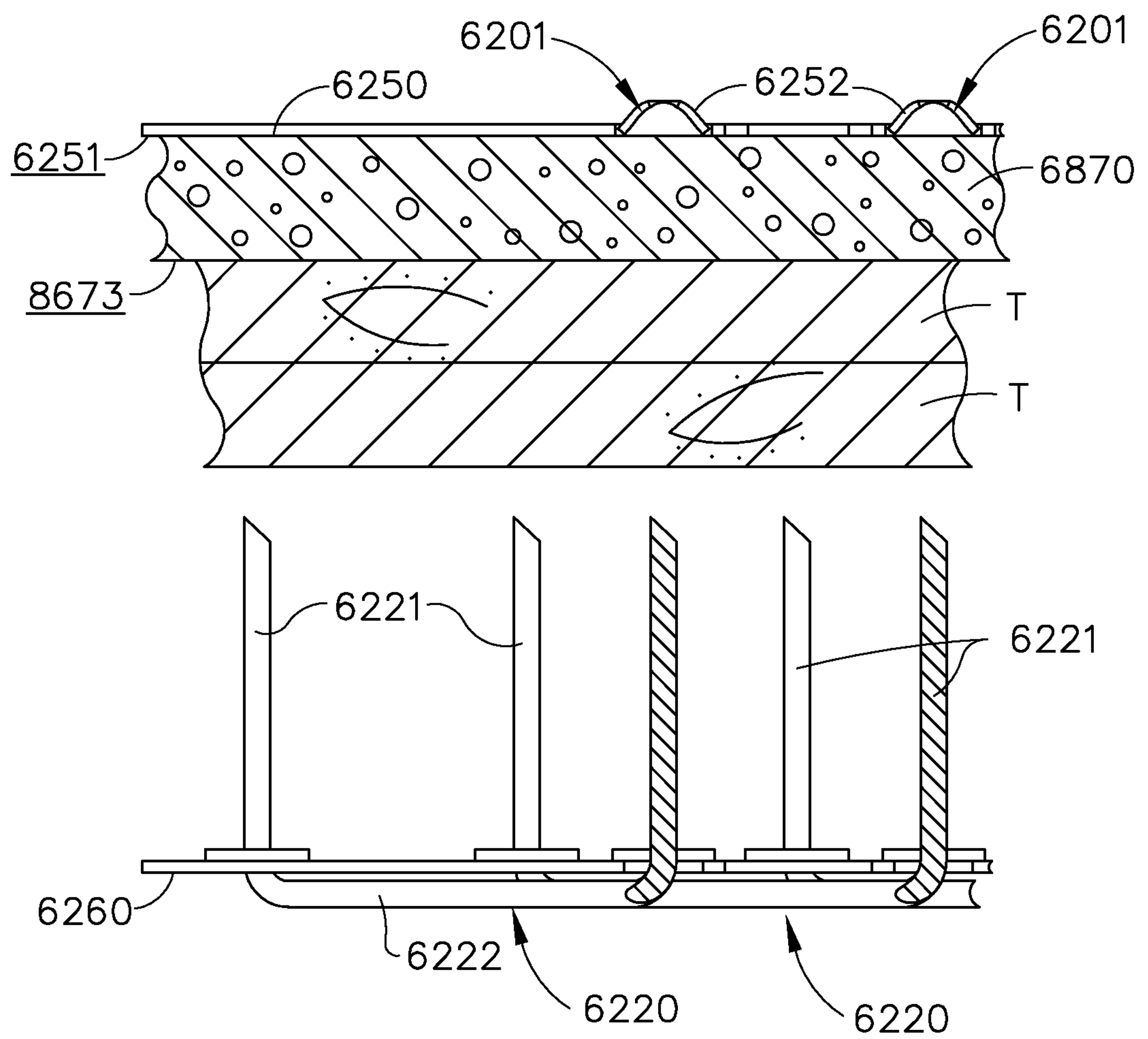


FIG. 150

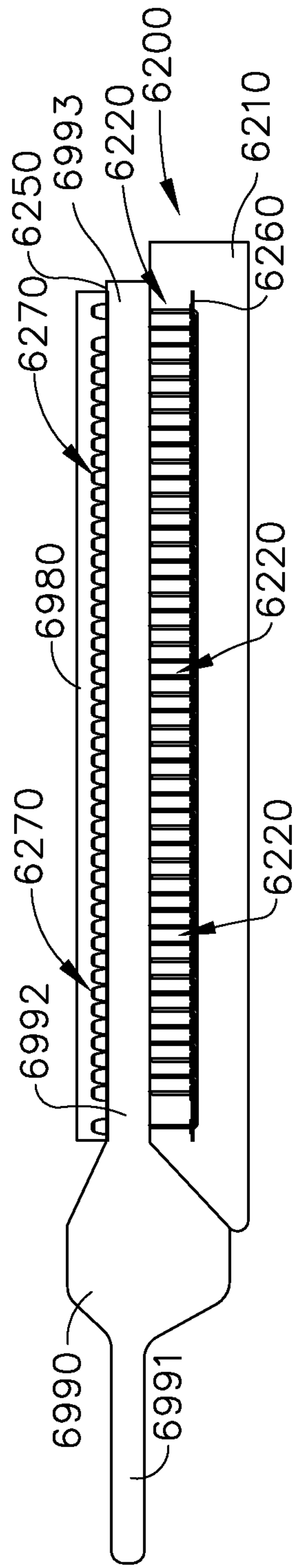


FIG. 151

75/222

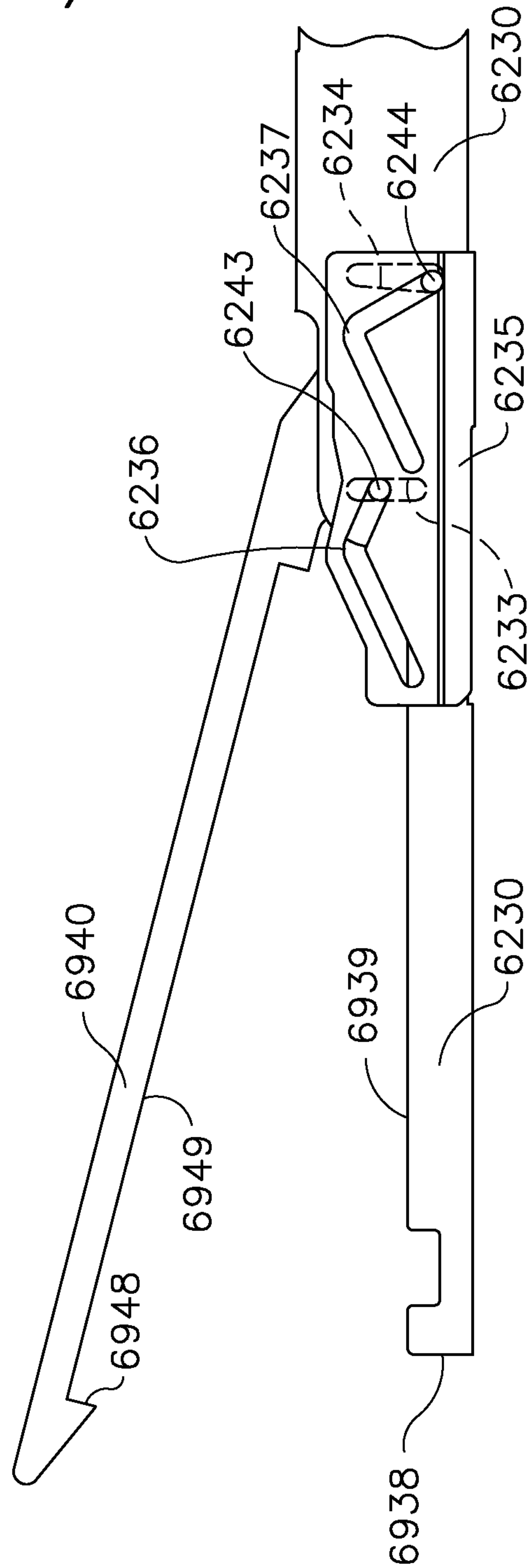


FIG. 152

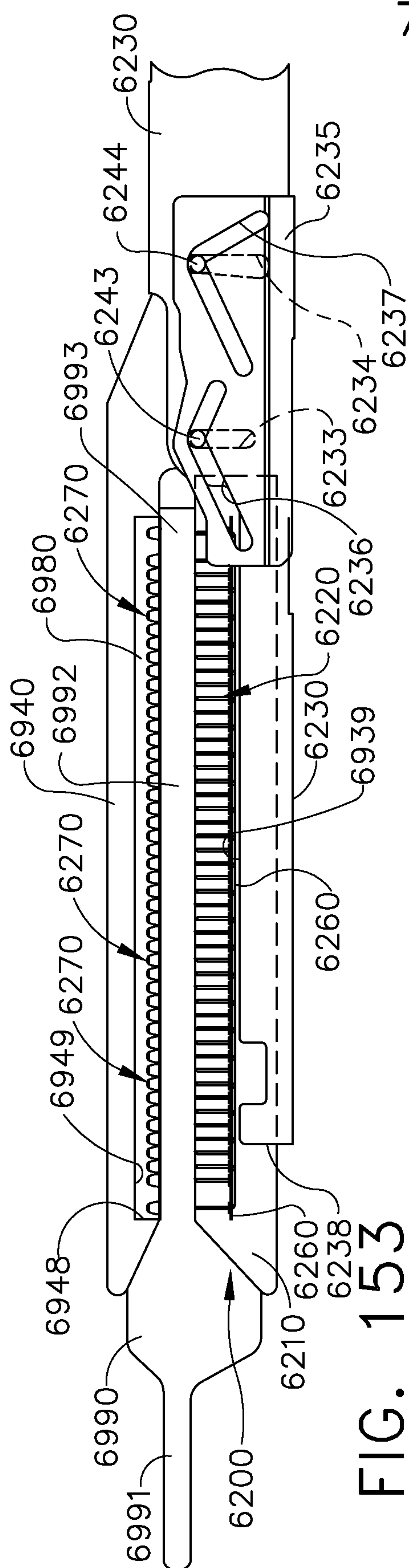


FIG. 153

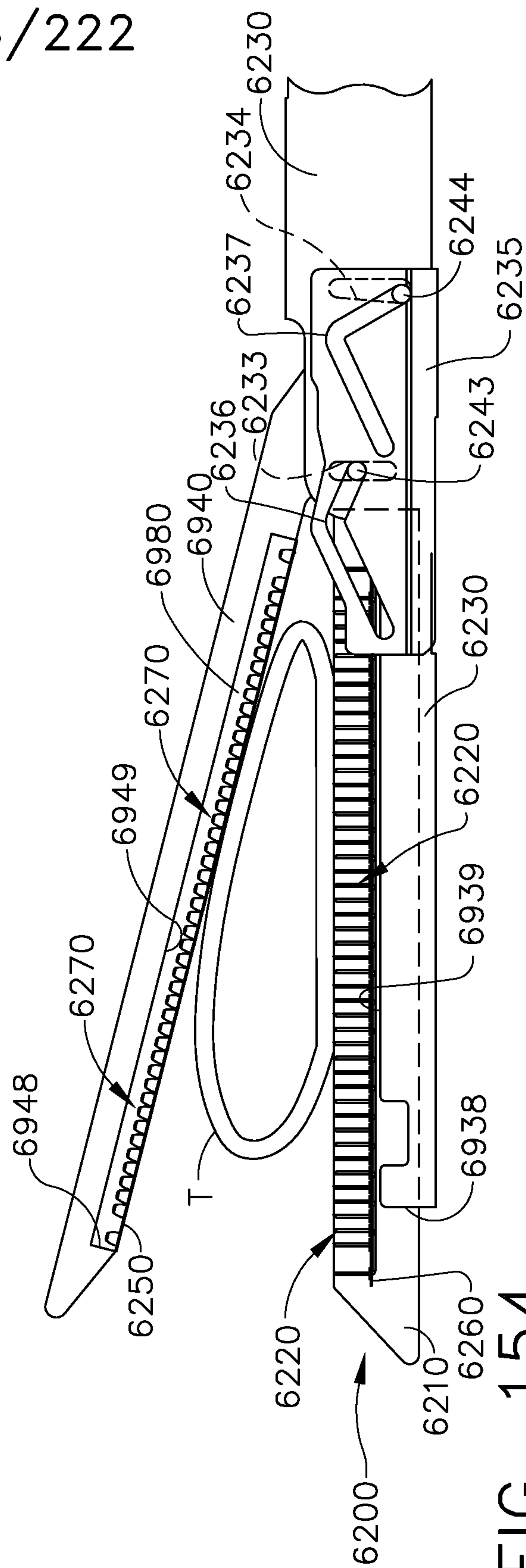
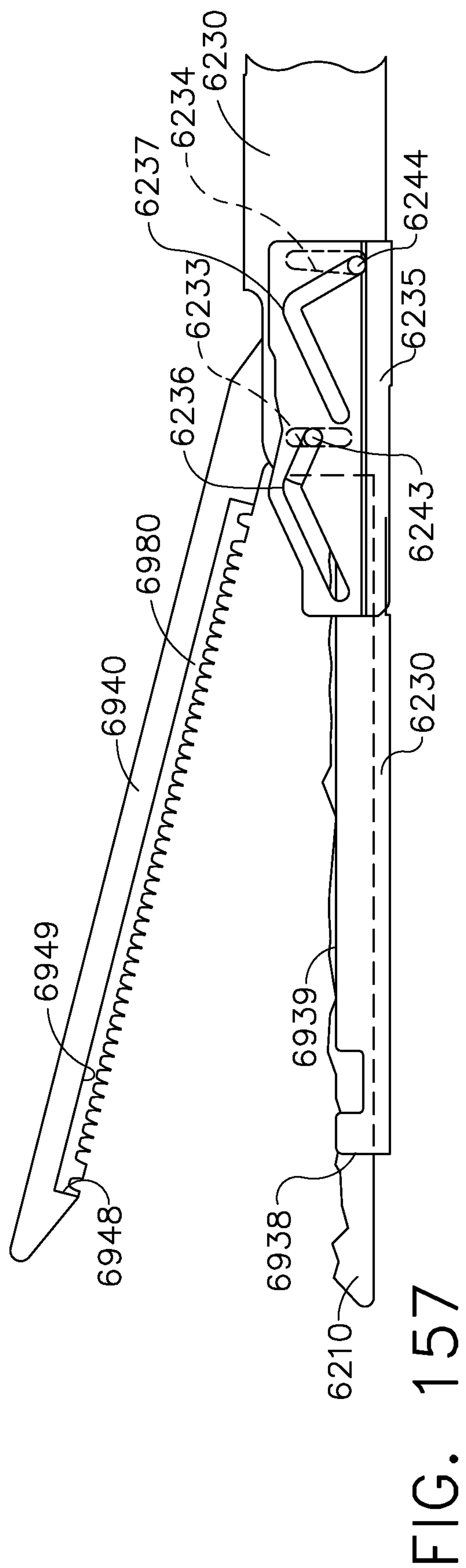
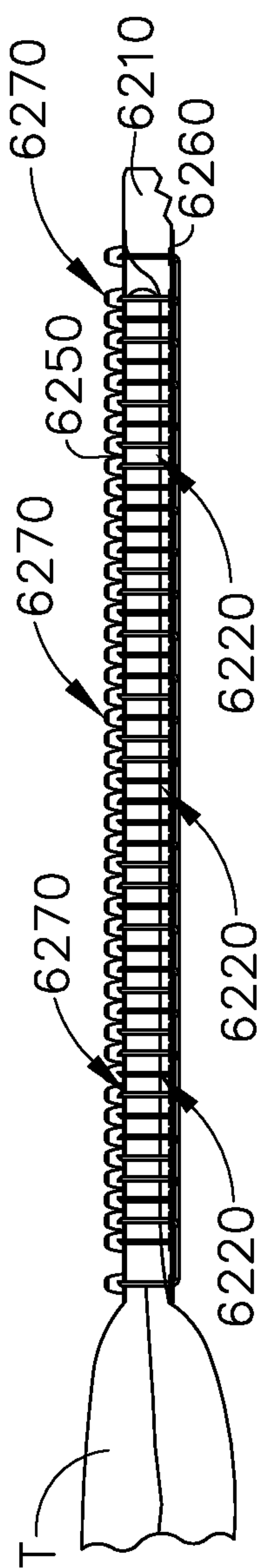
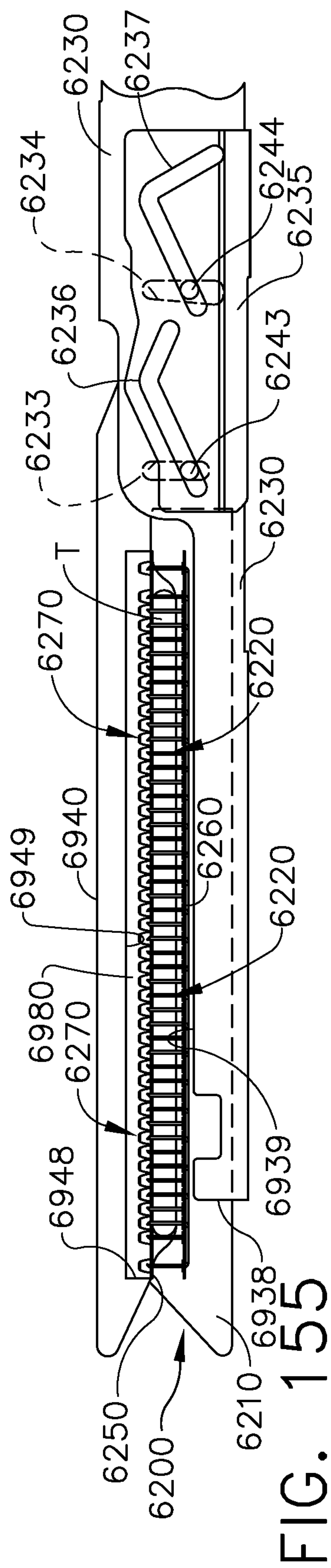


FIG. 154.



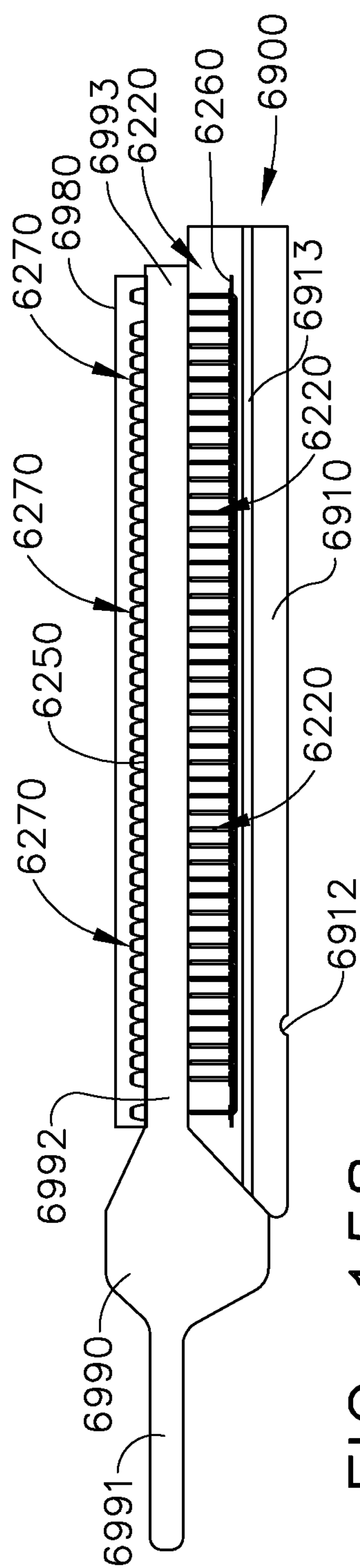


FIG. 158

78/222

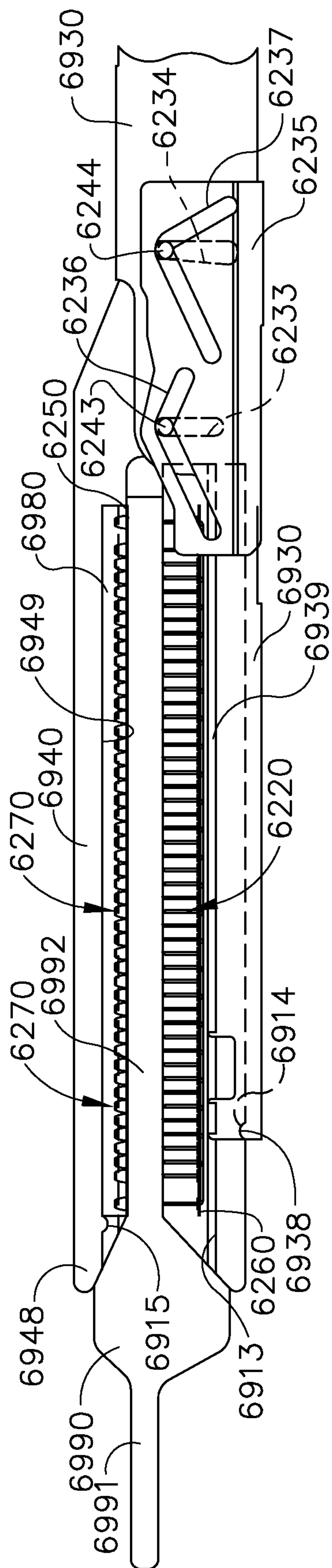


FIG. 159

79/222

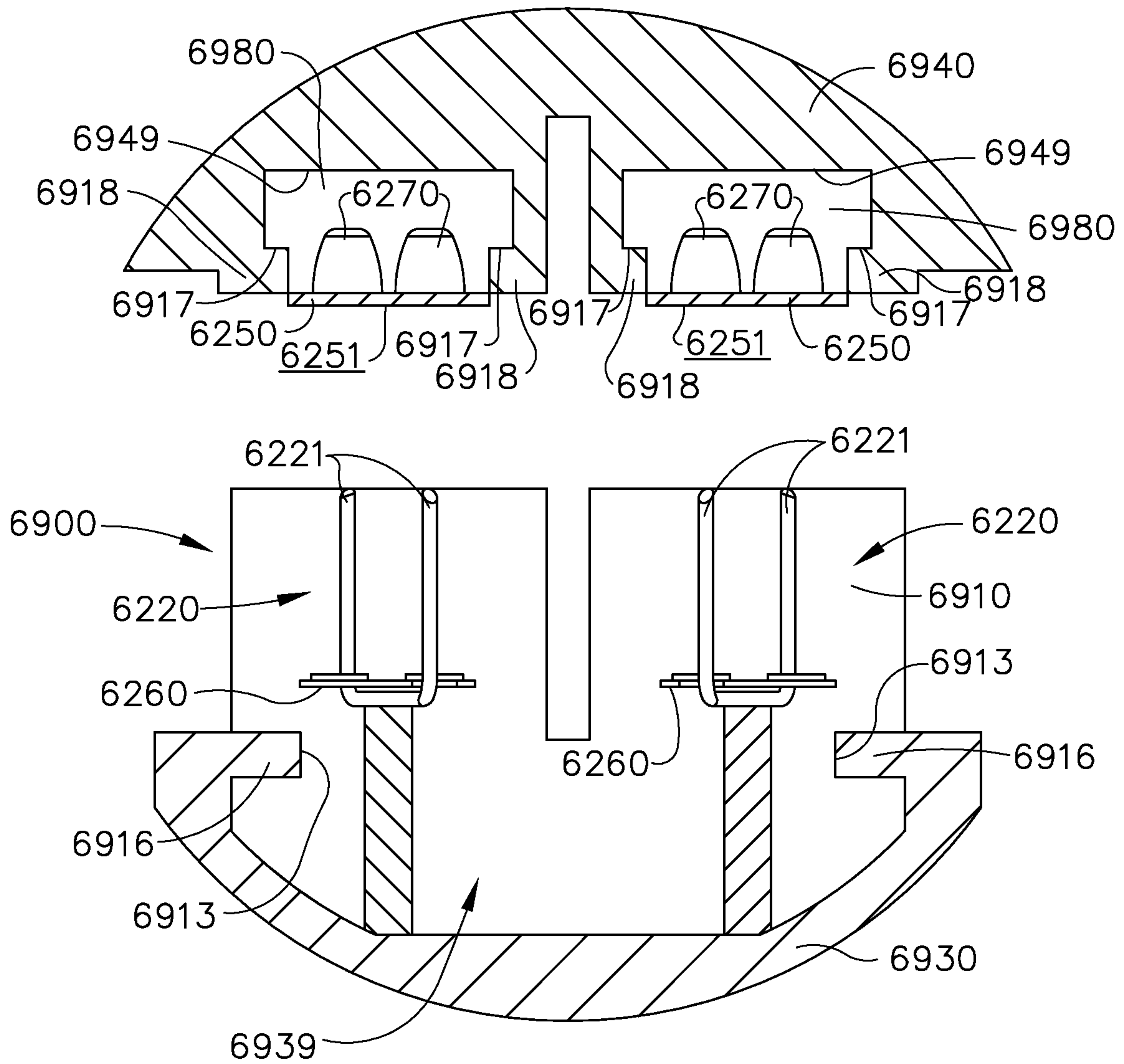


FIG. 160

80/222

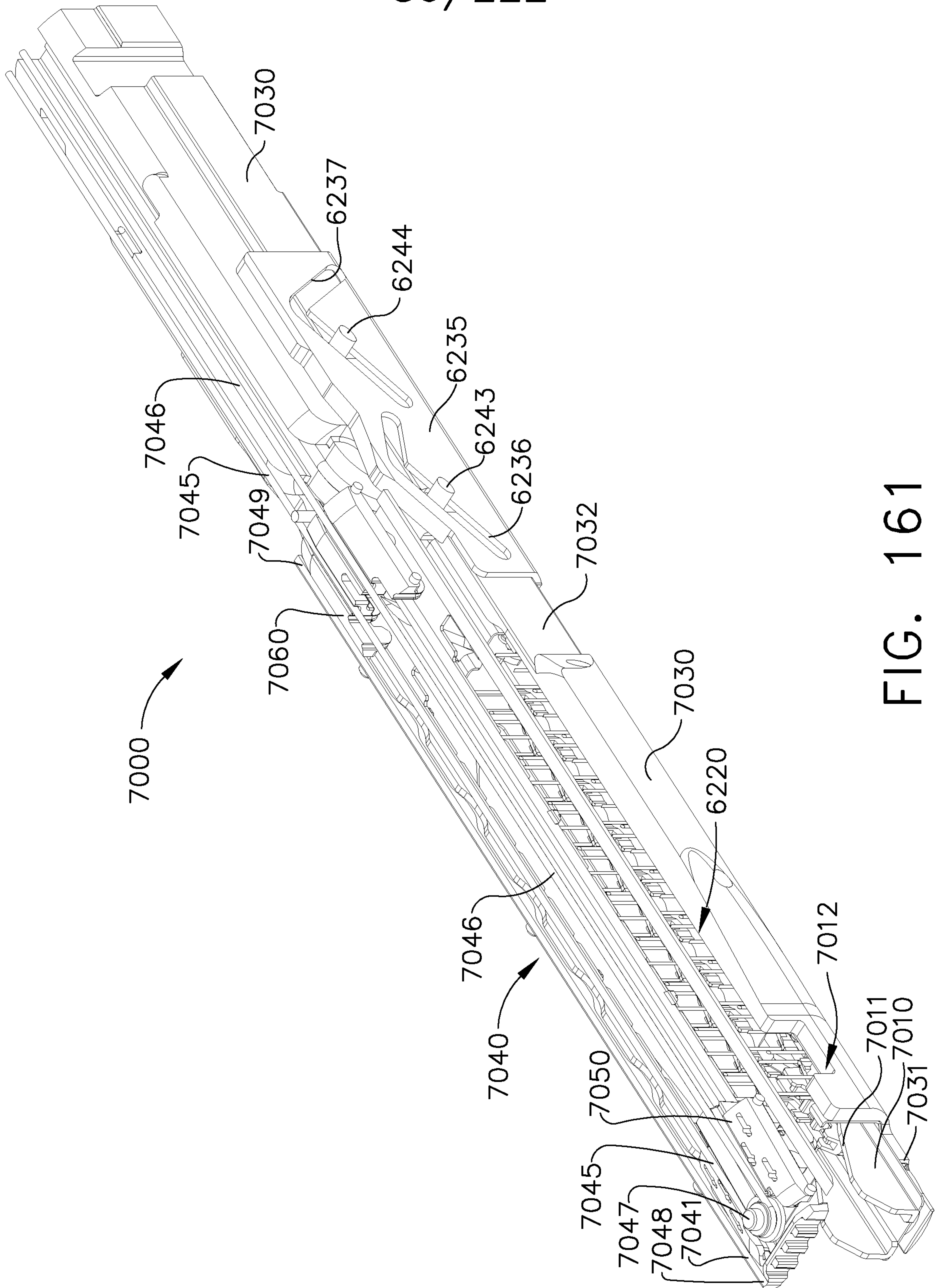
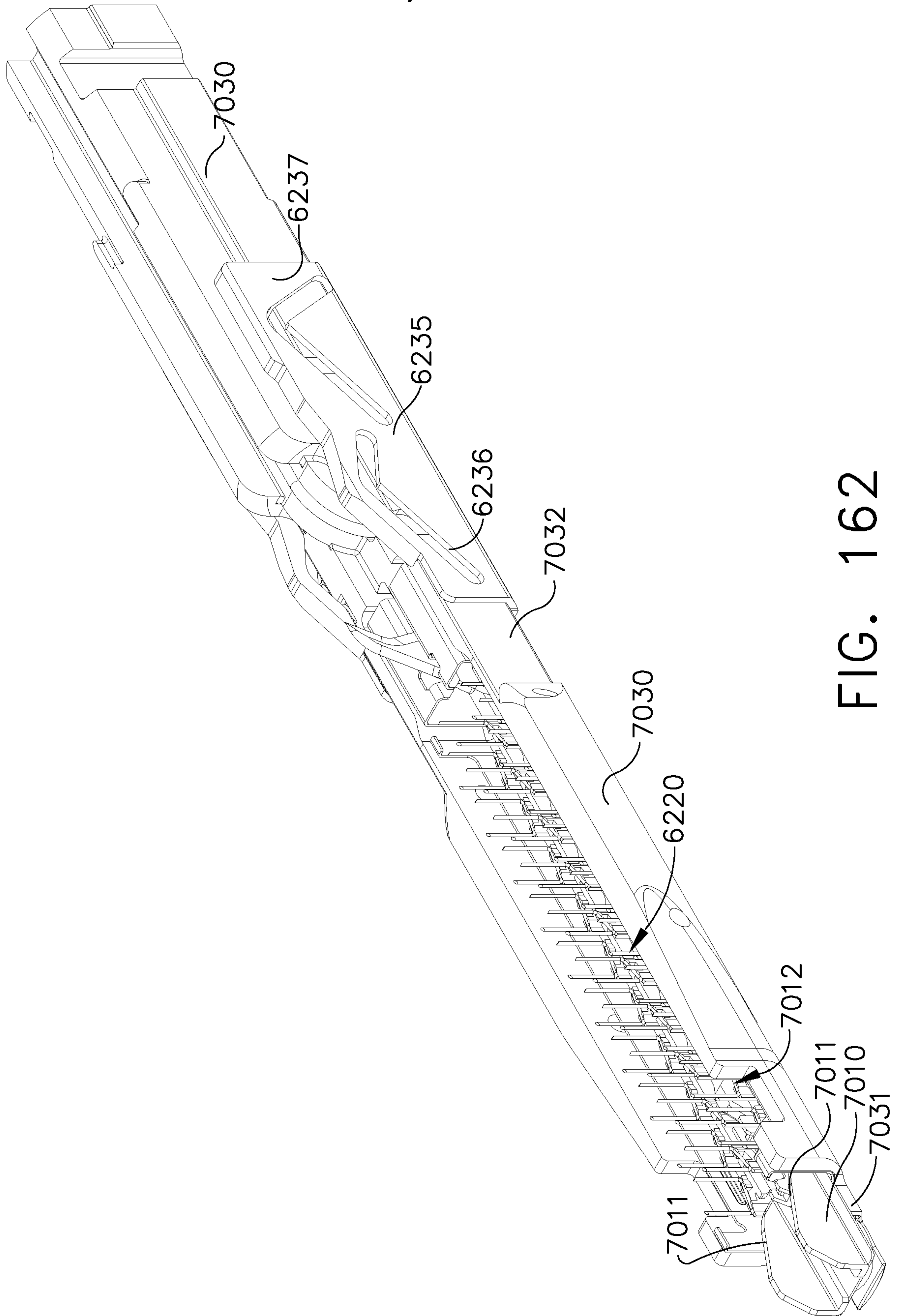


FIG. 161

81/222



82/222

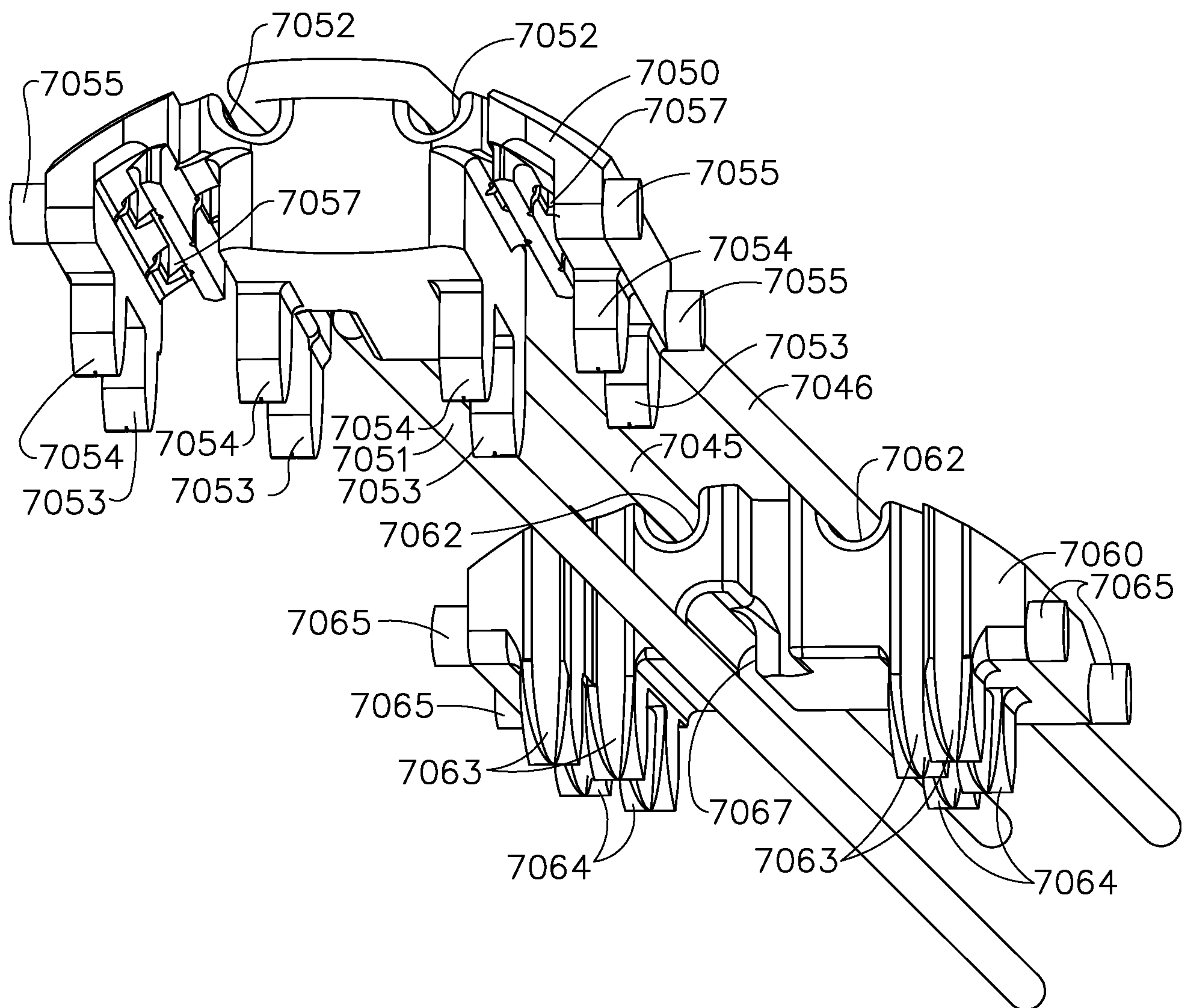


FIG. 163

83/222

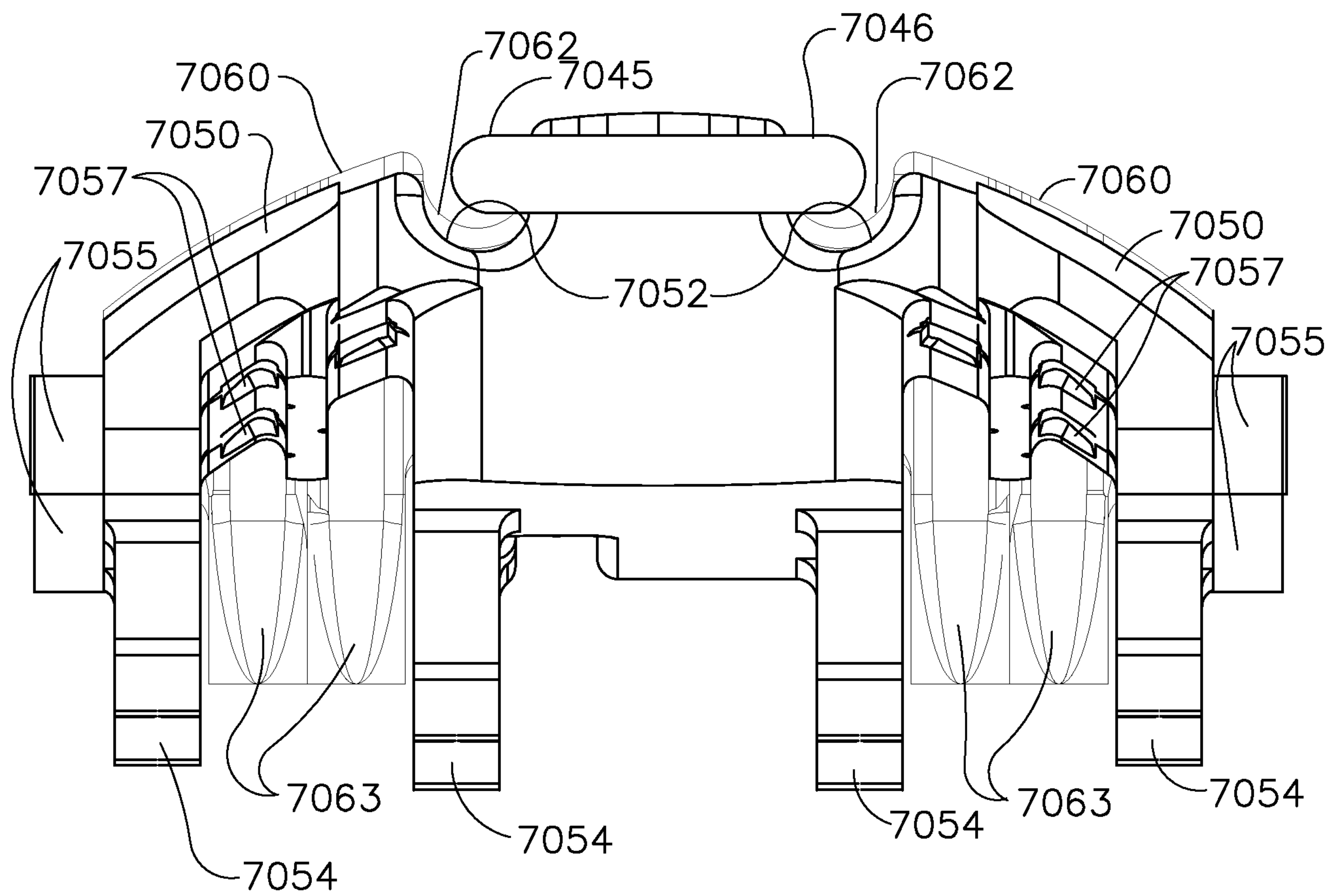


FIG. 164

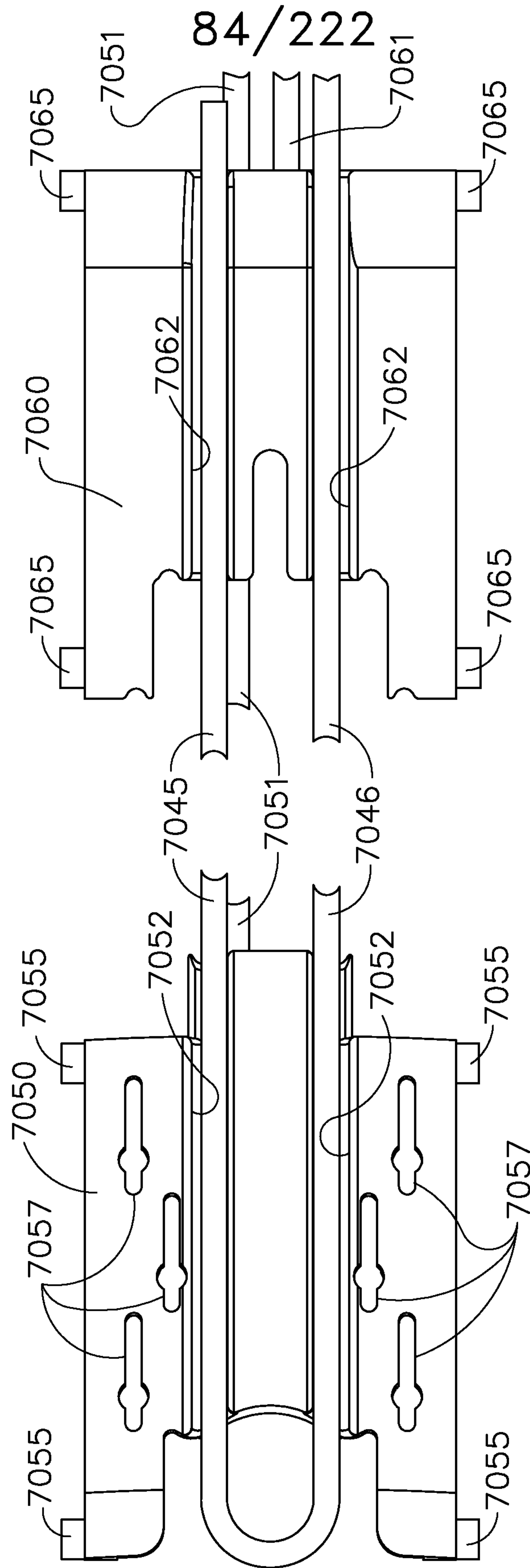


FIG. 165

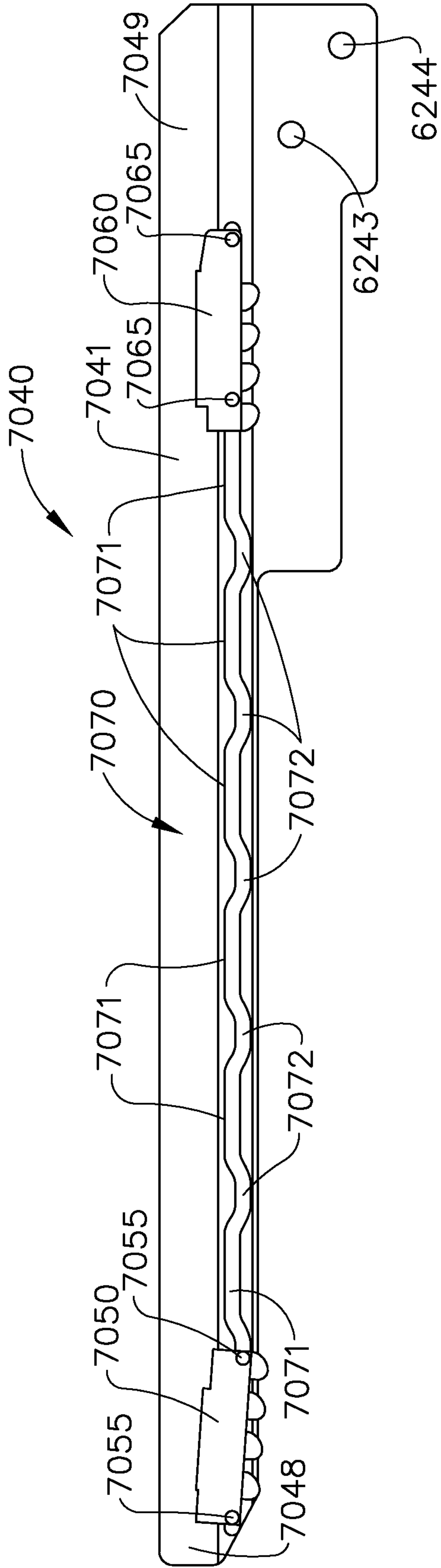


FIG. 166

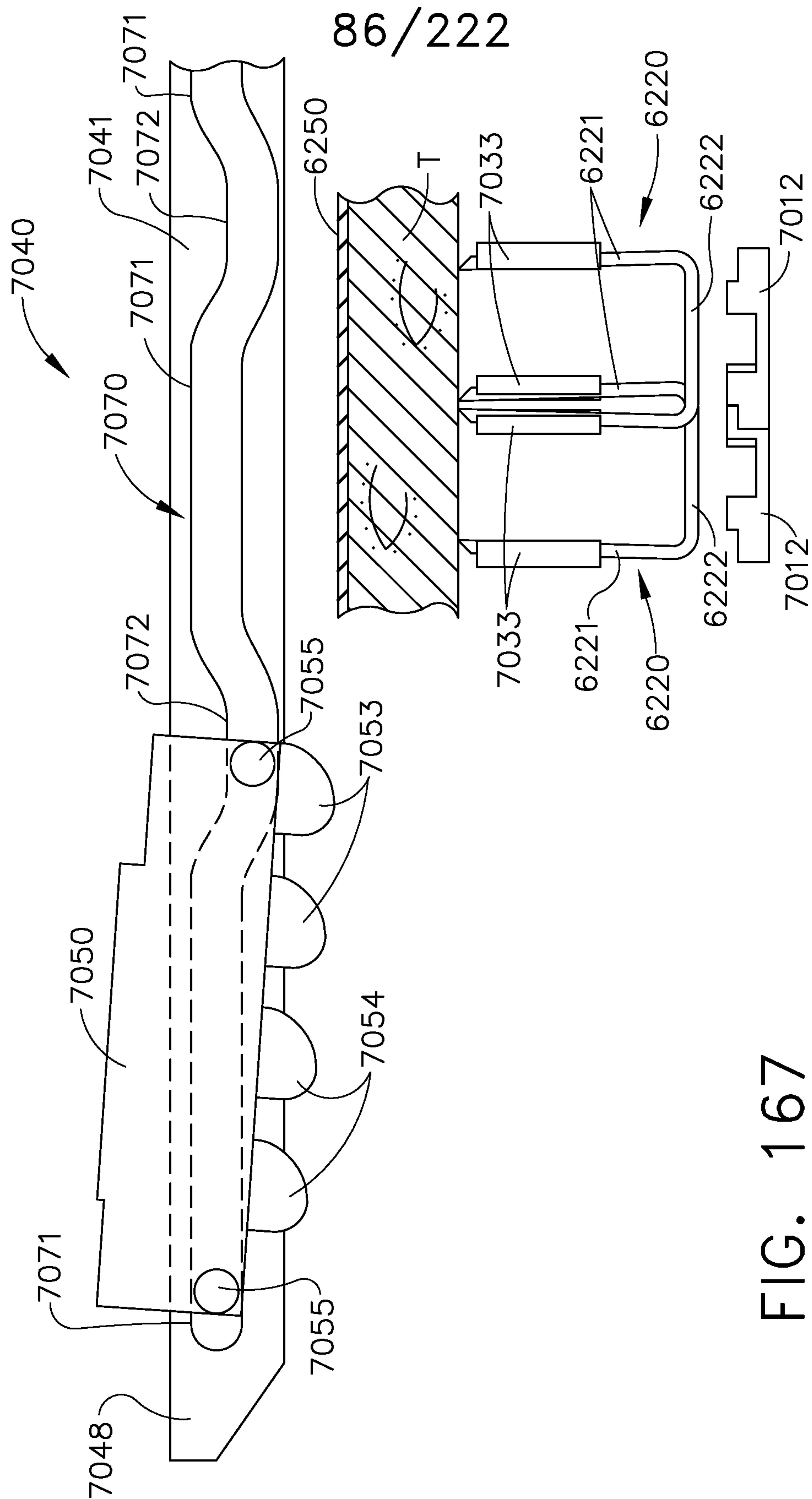


FIG. 167

87/222

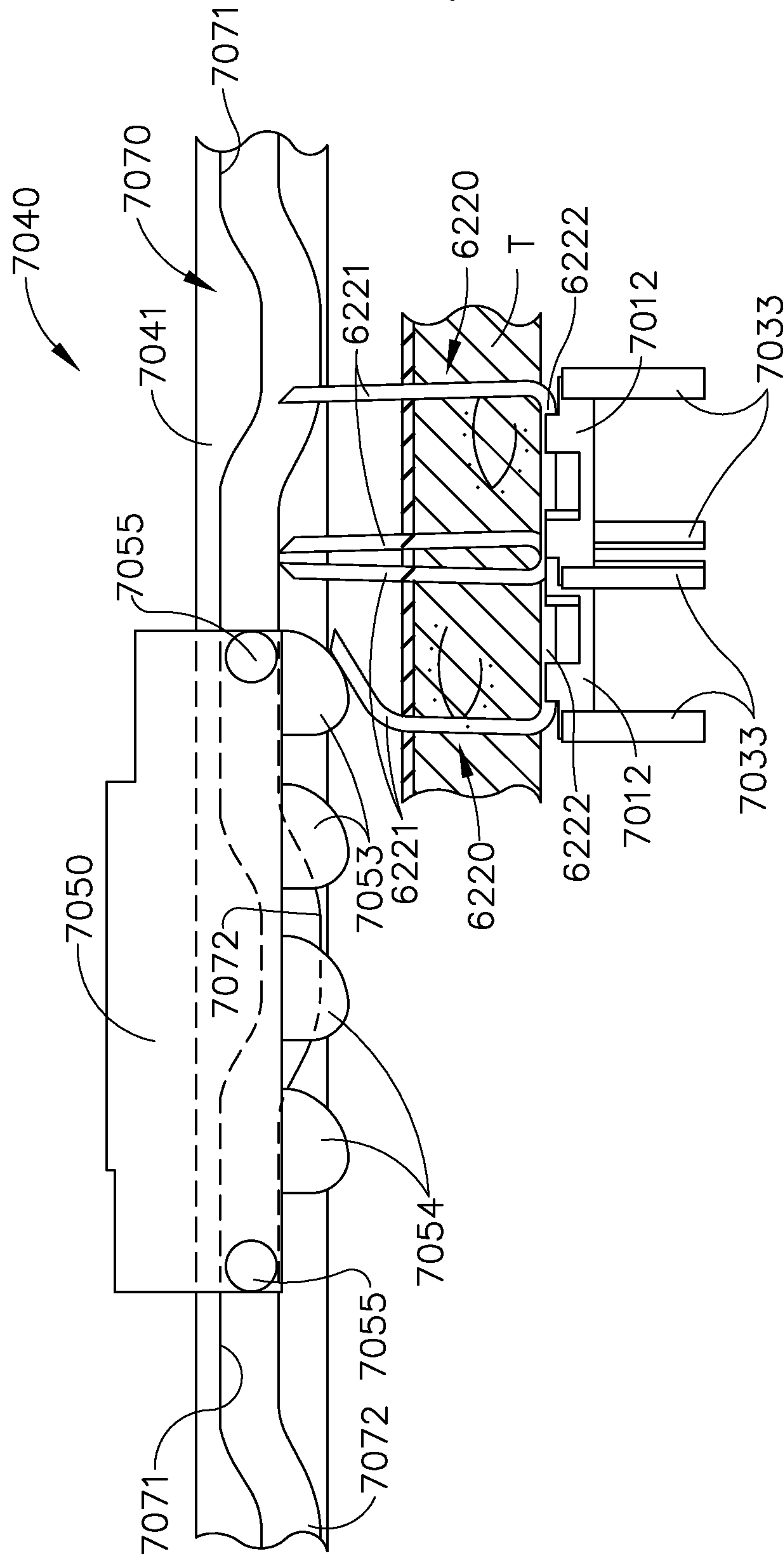


FIG. 168

88/222

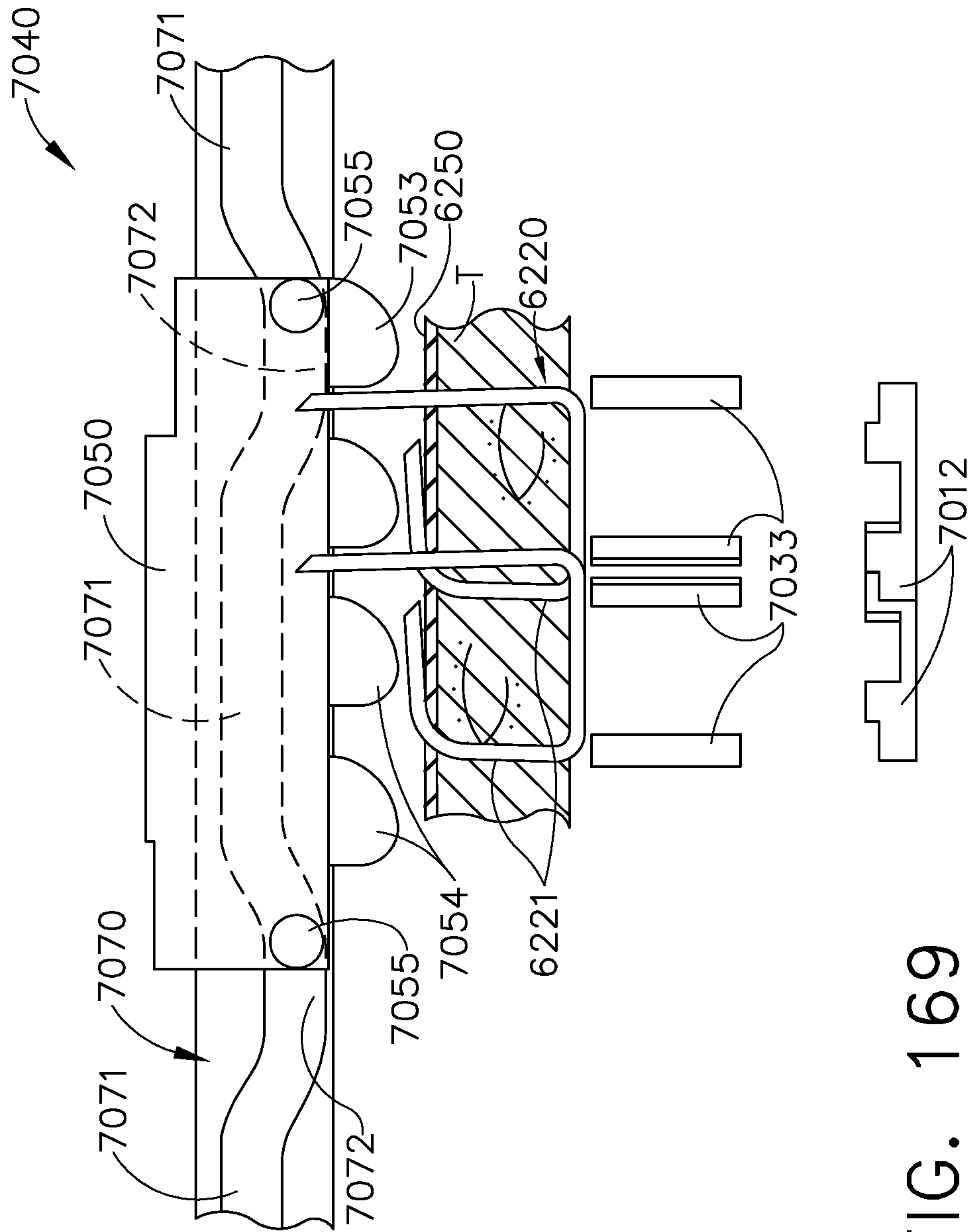


FIG. 169

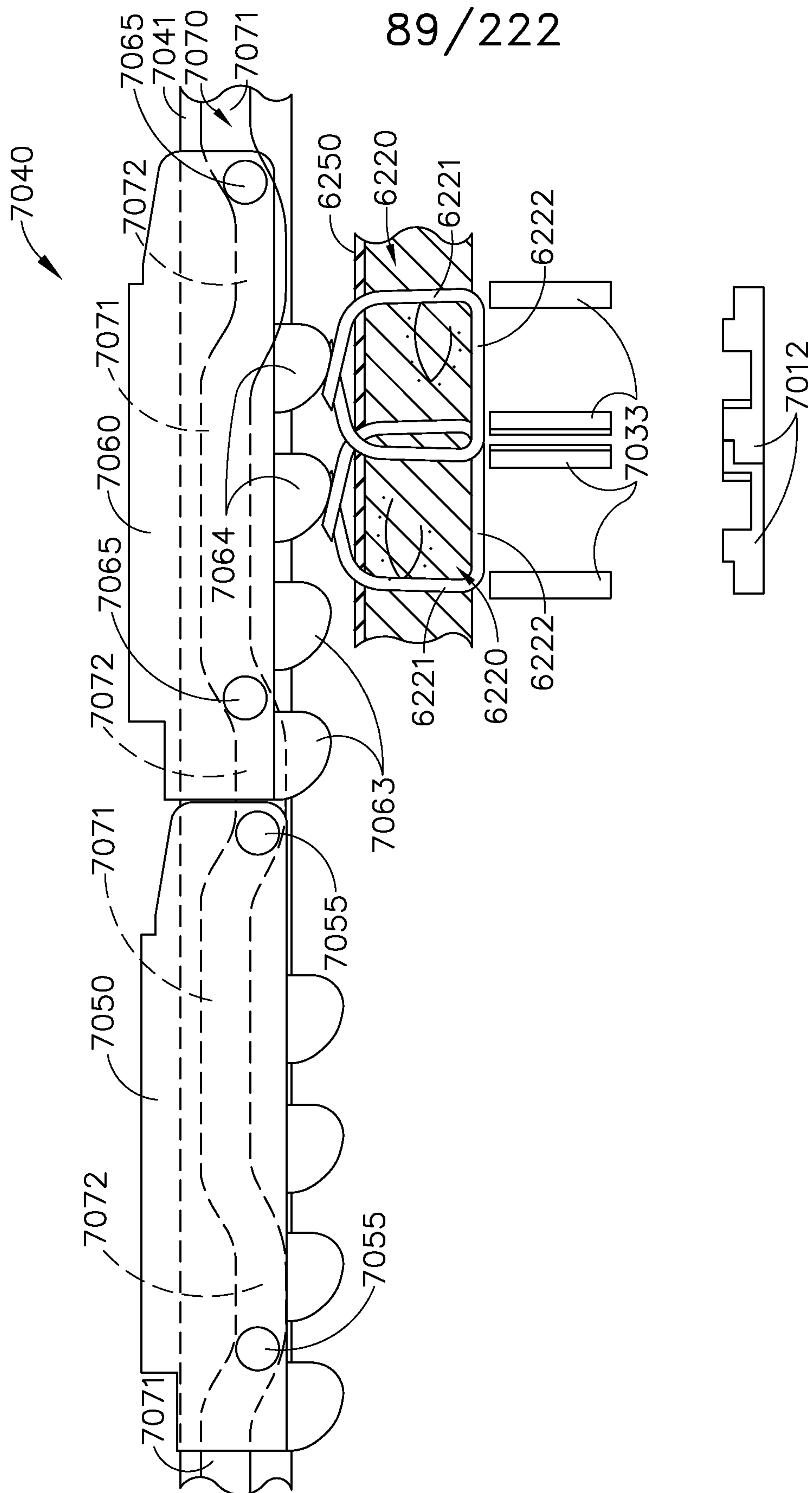
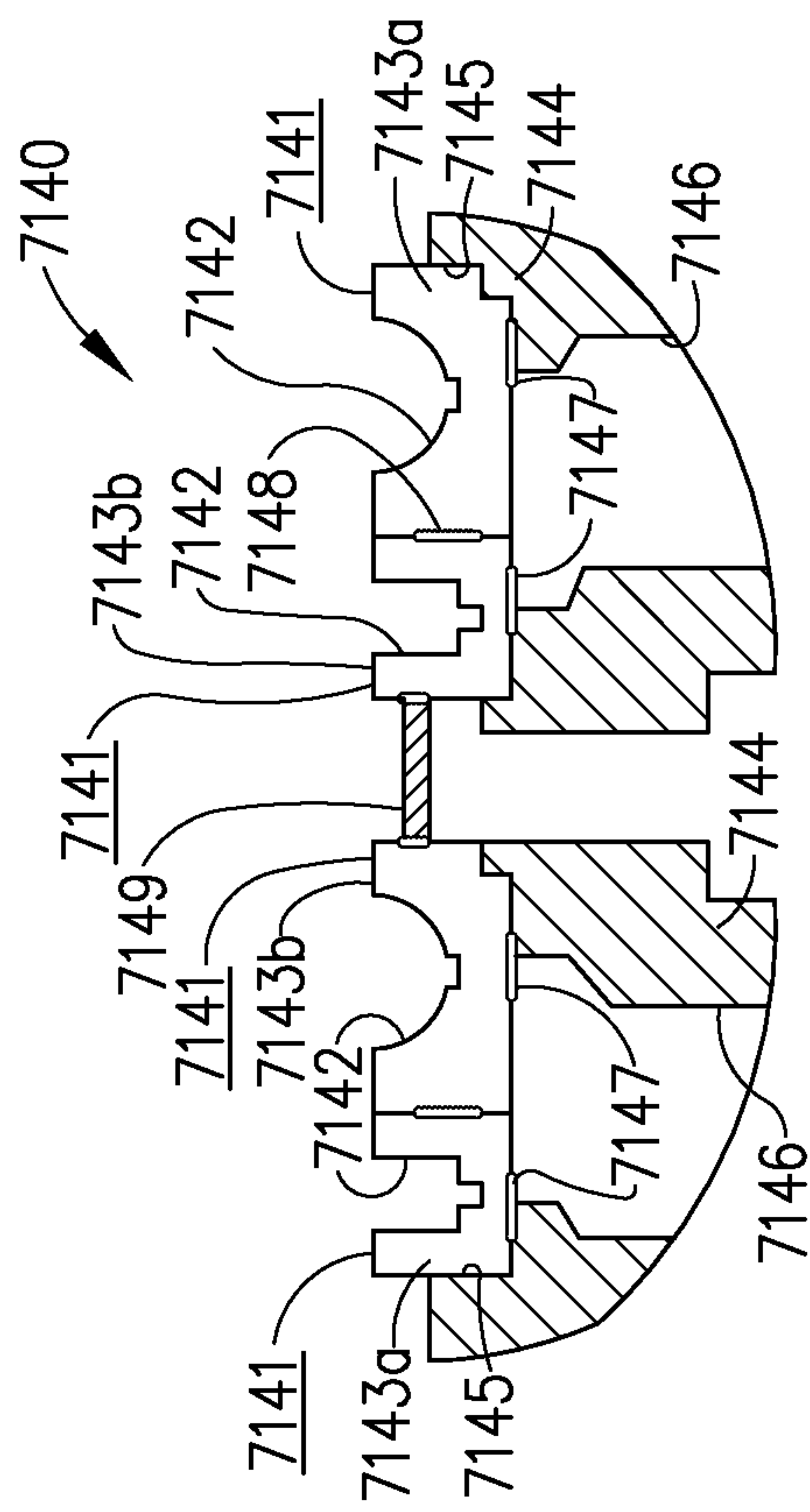
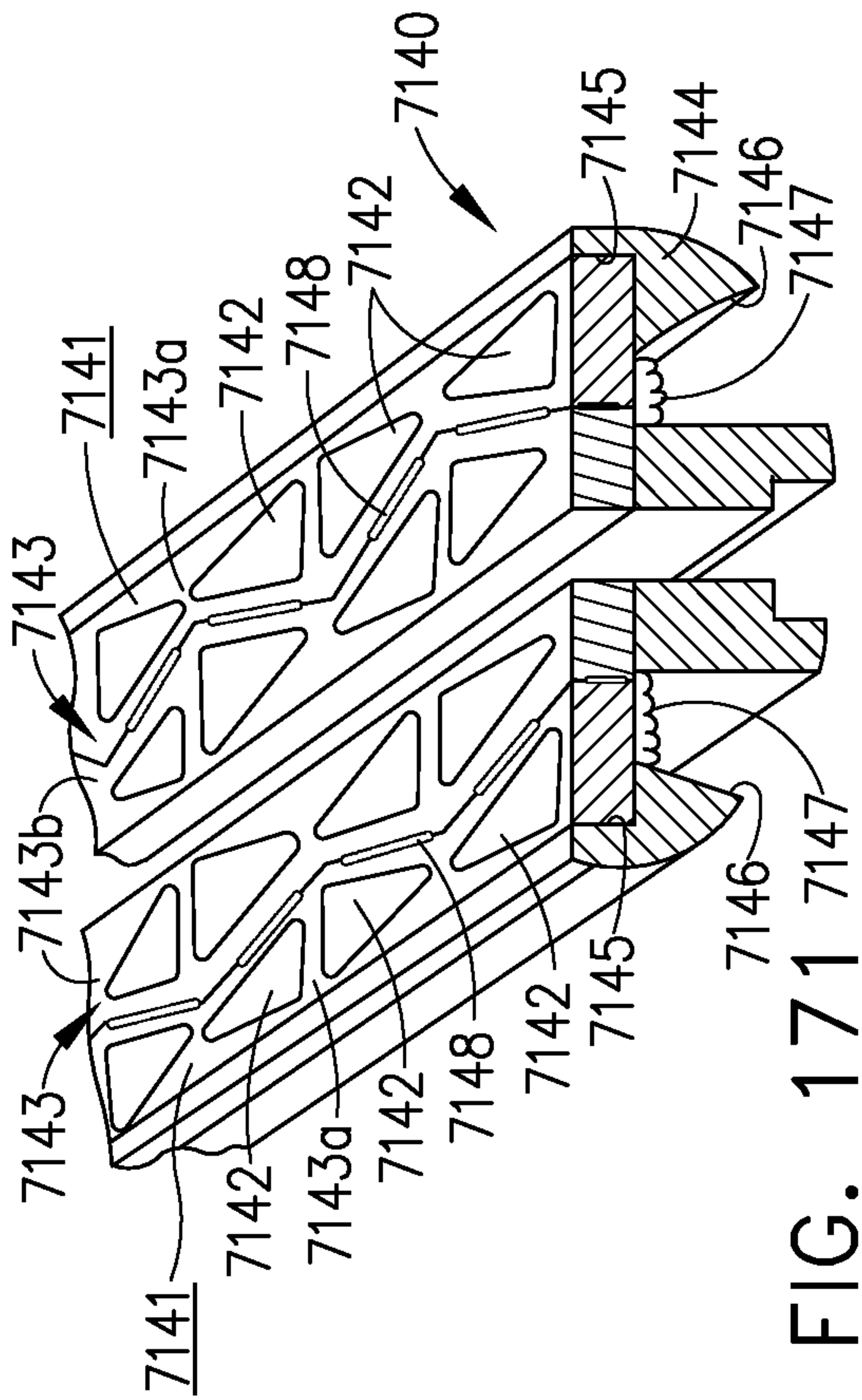
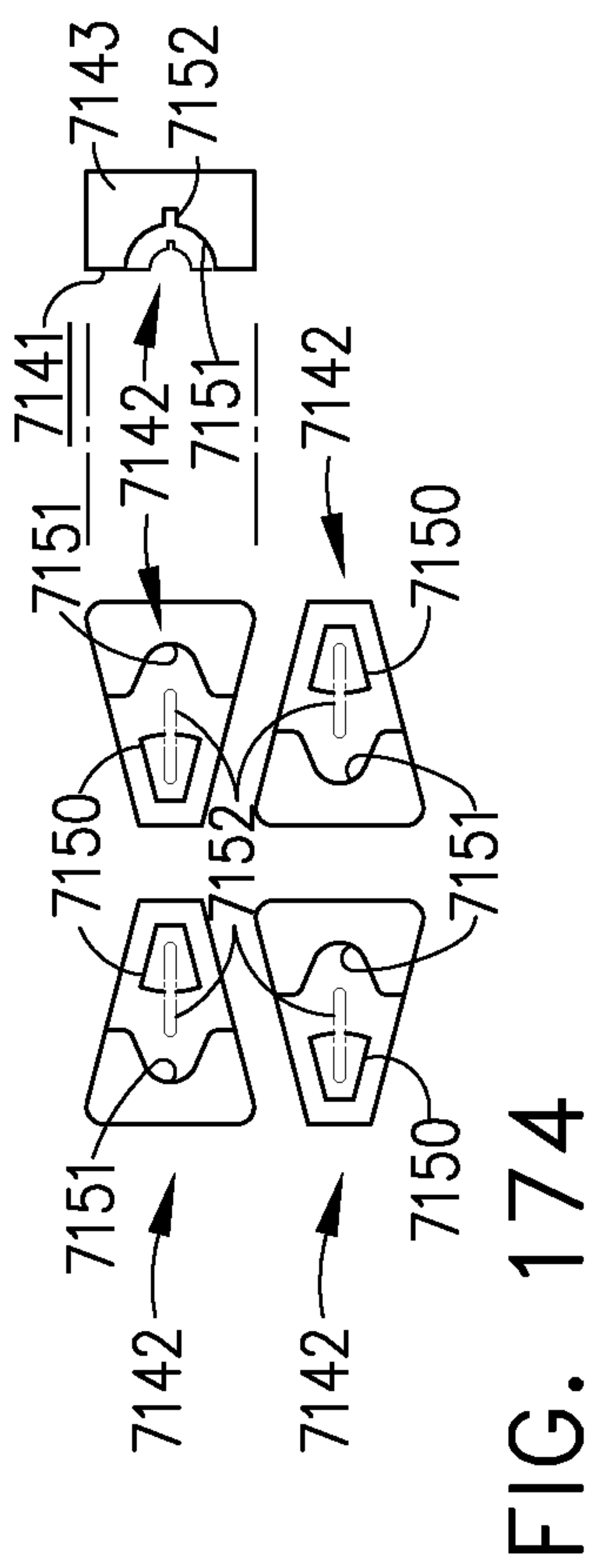
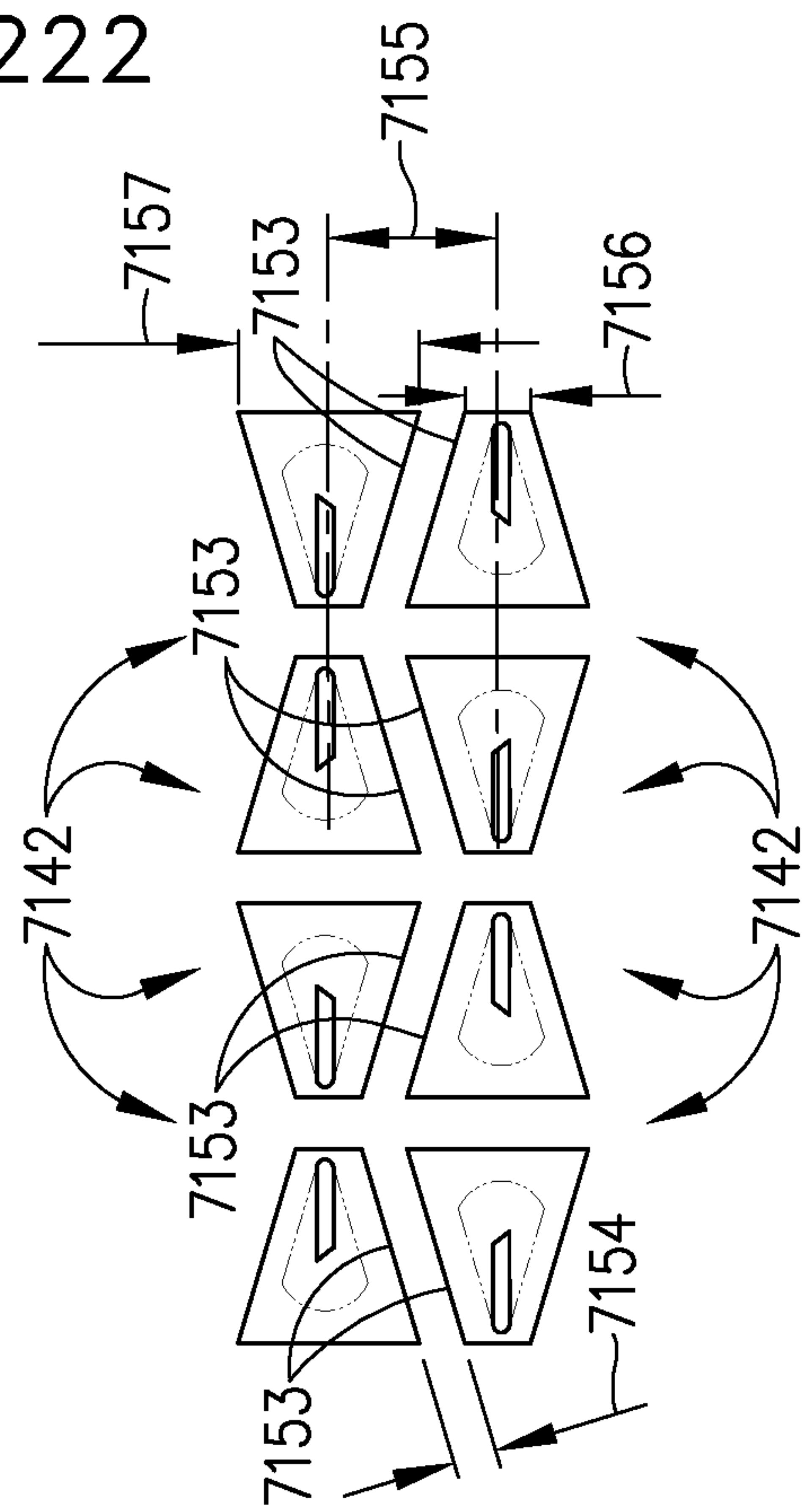
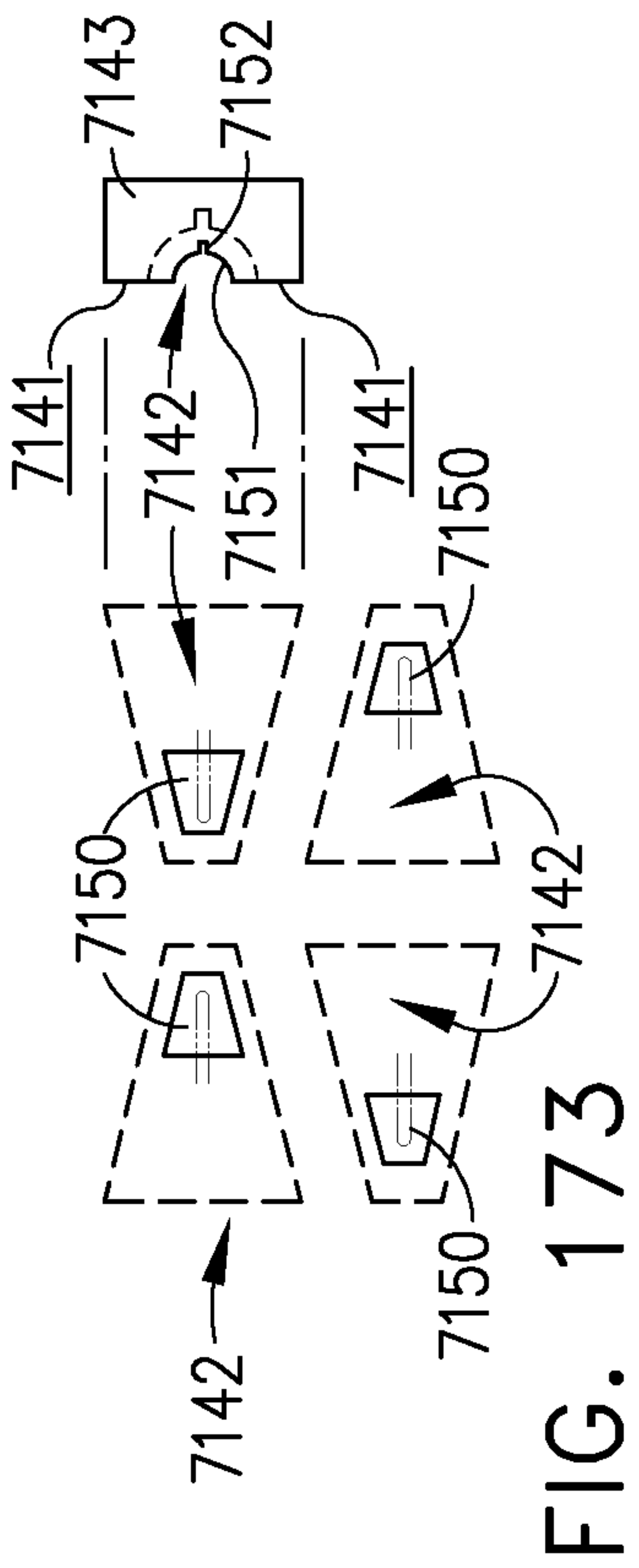


FIG. 170



90/222



91/222

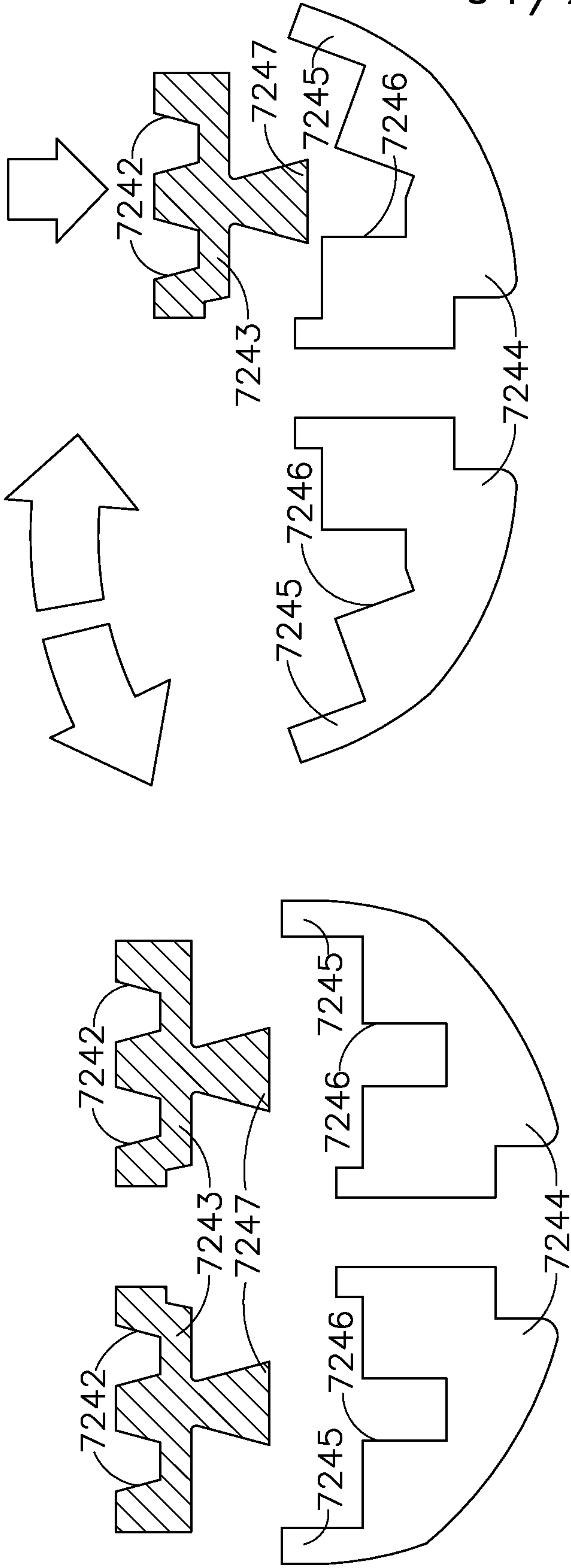


FIG. 176

FIG. 177

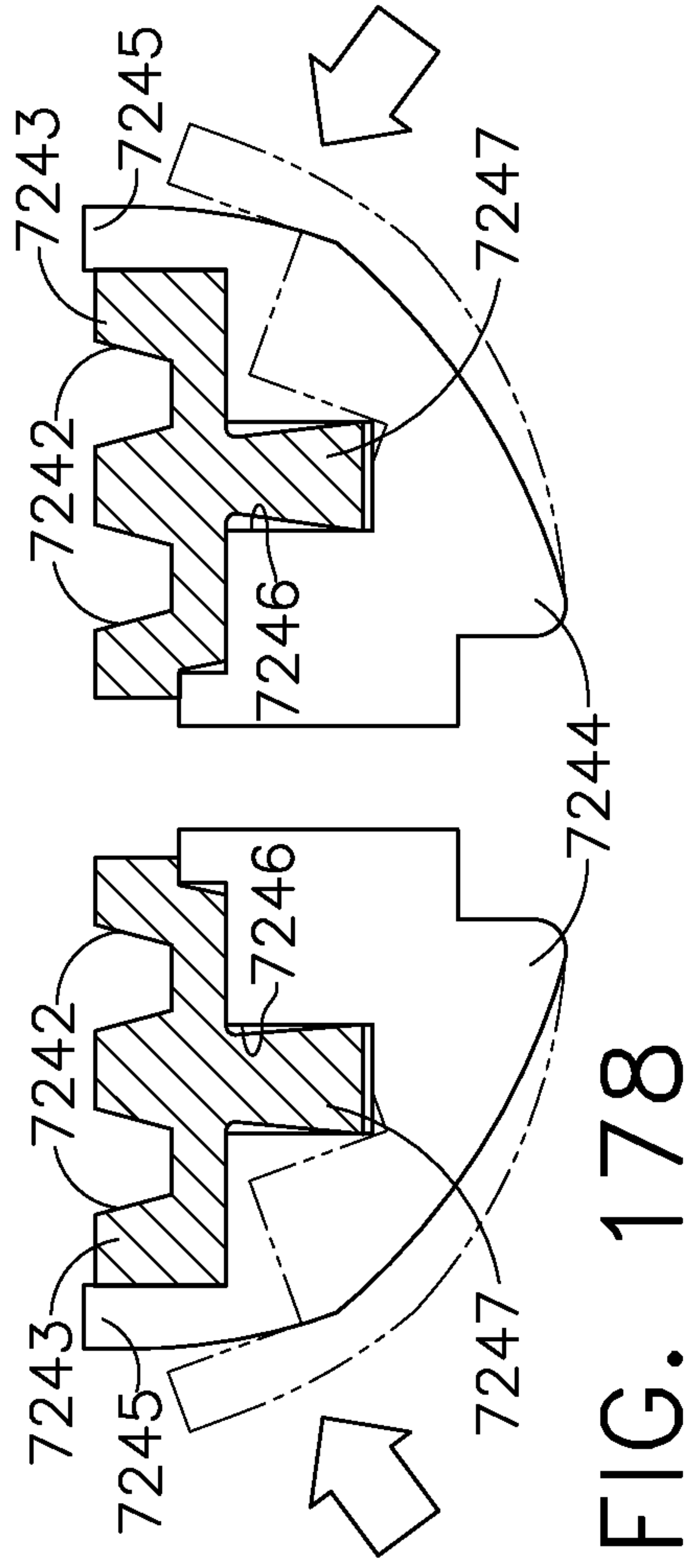


FIG. 178

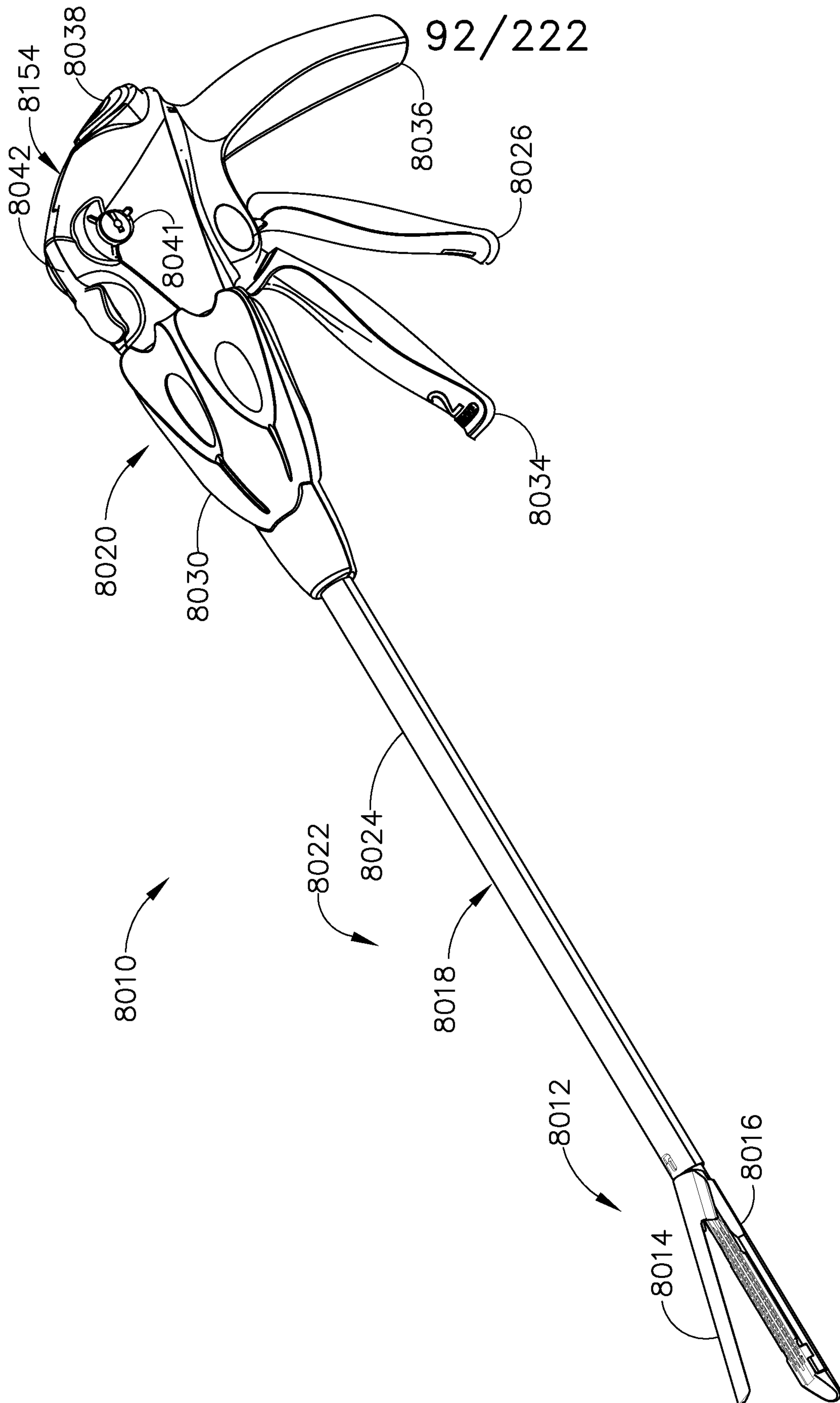
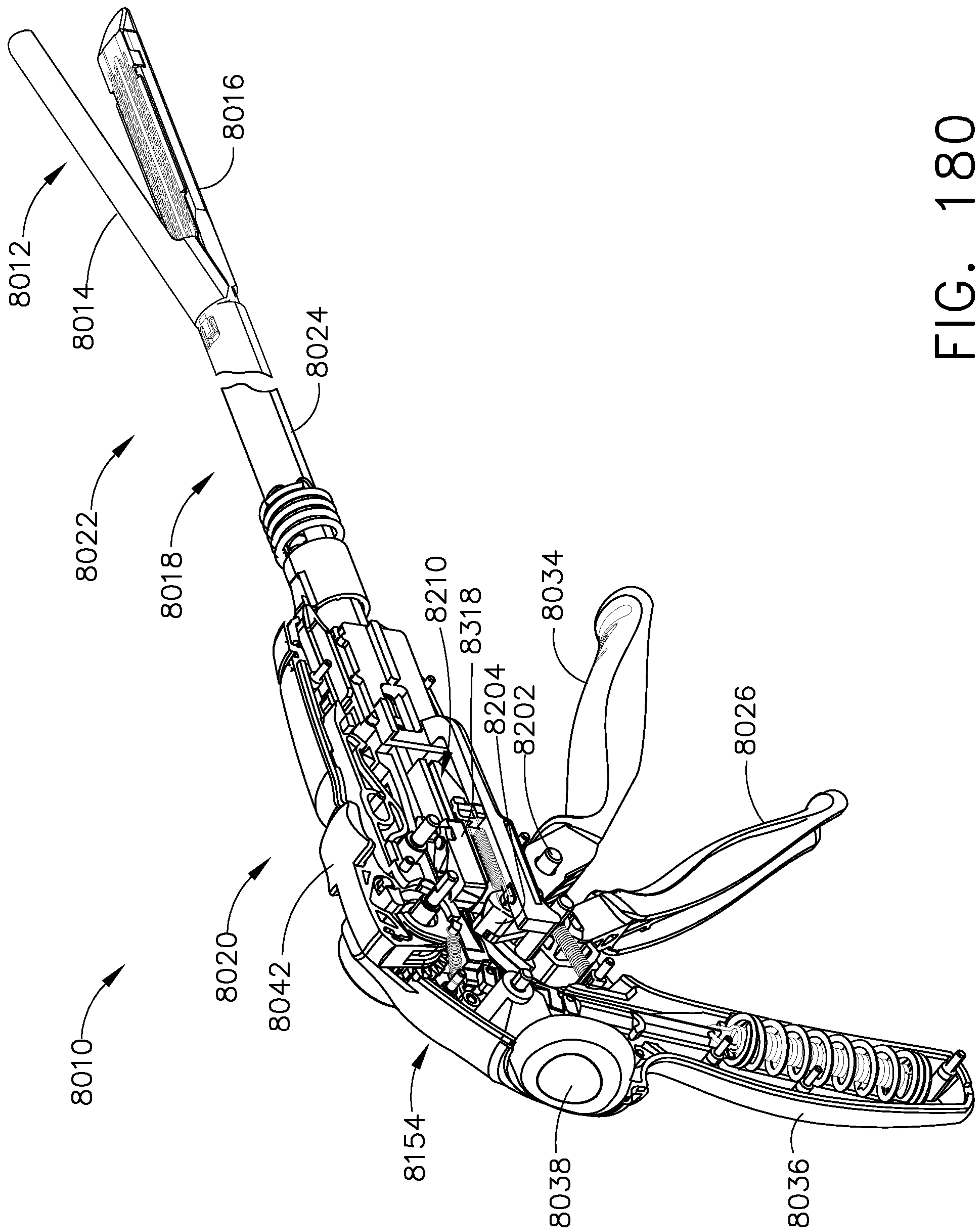


FIG. 179

93/222



94/222

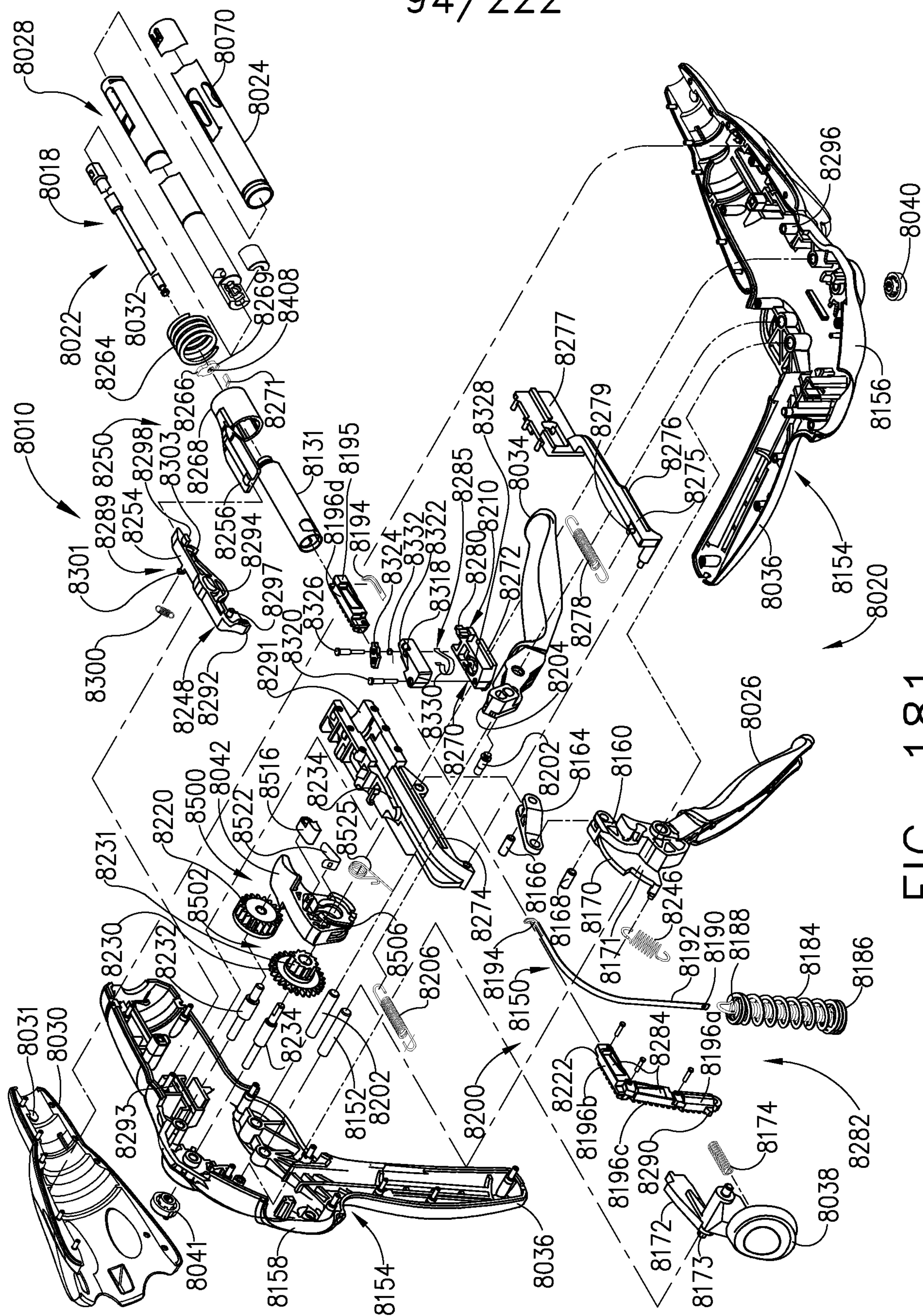


FIG. 181

95/222

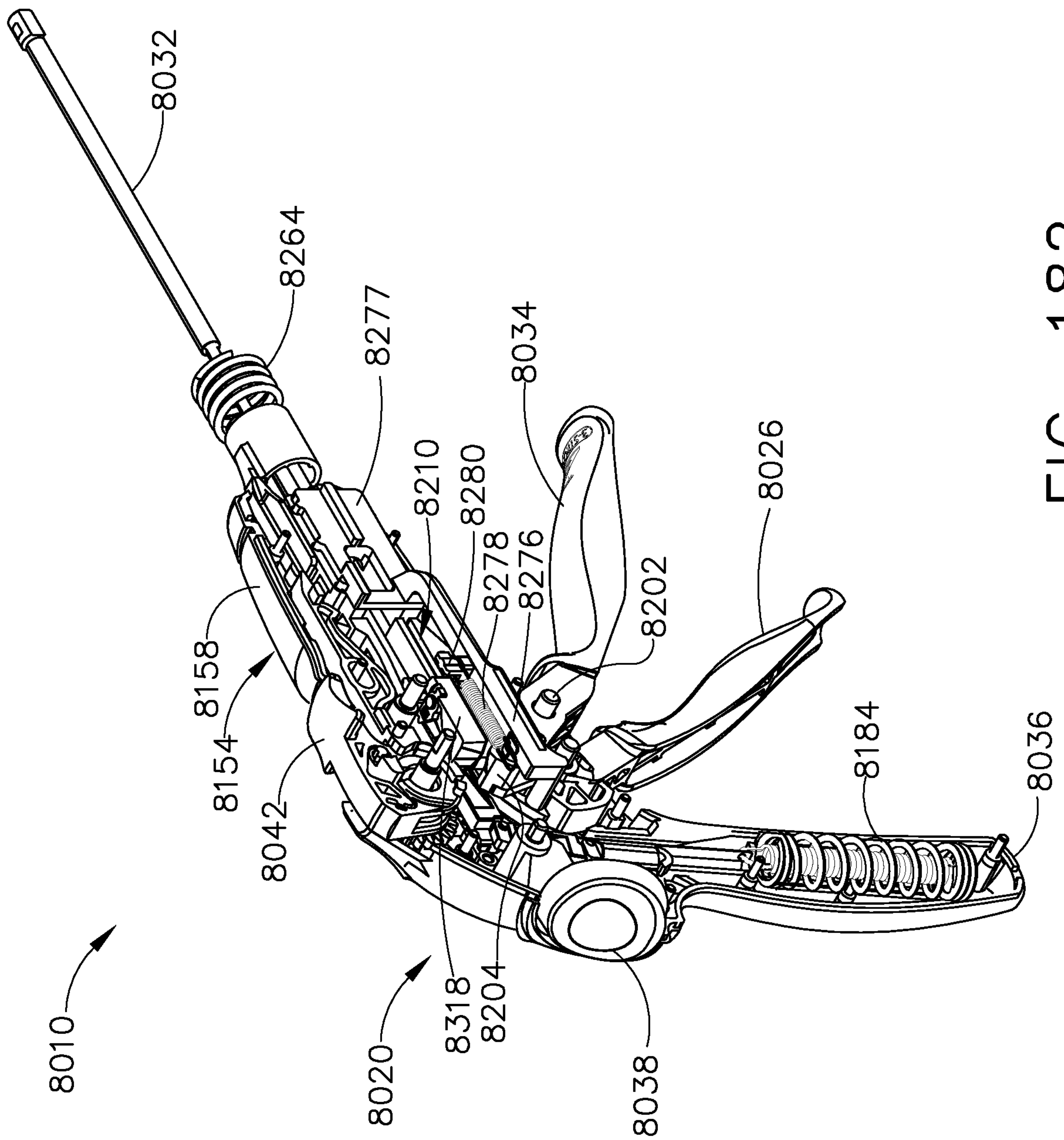


FIG. 182

96/222

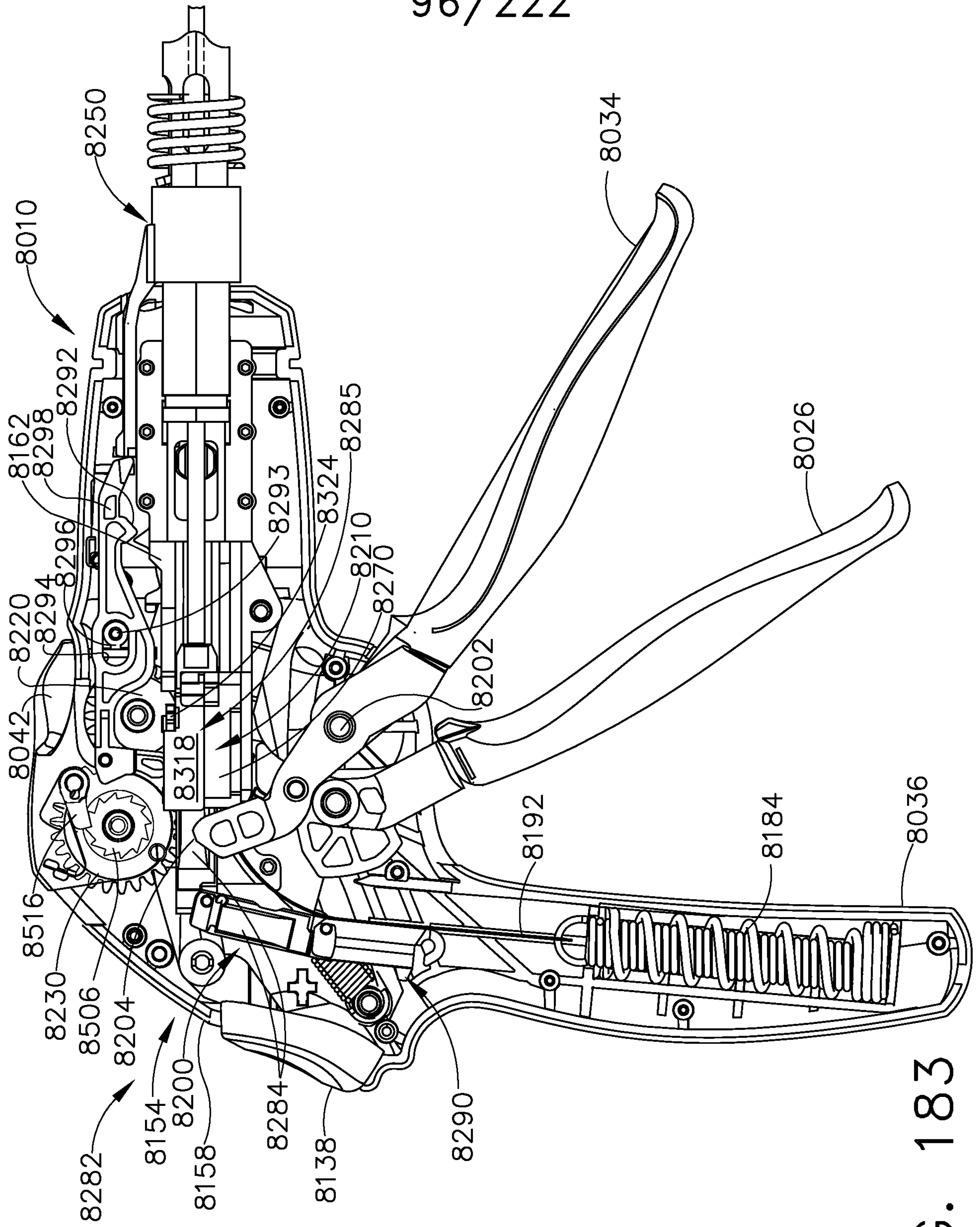
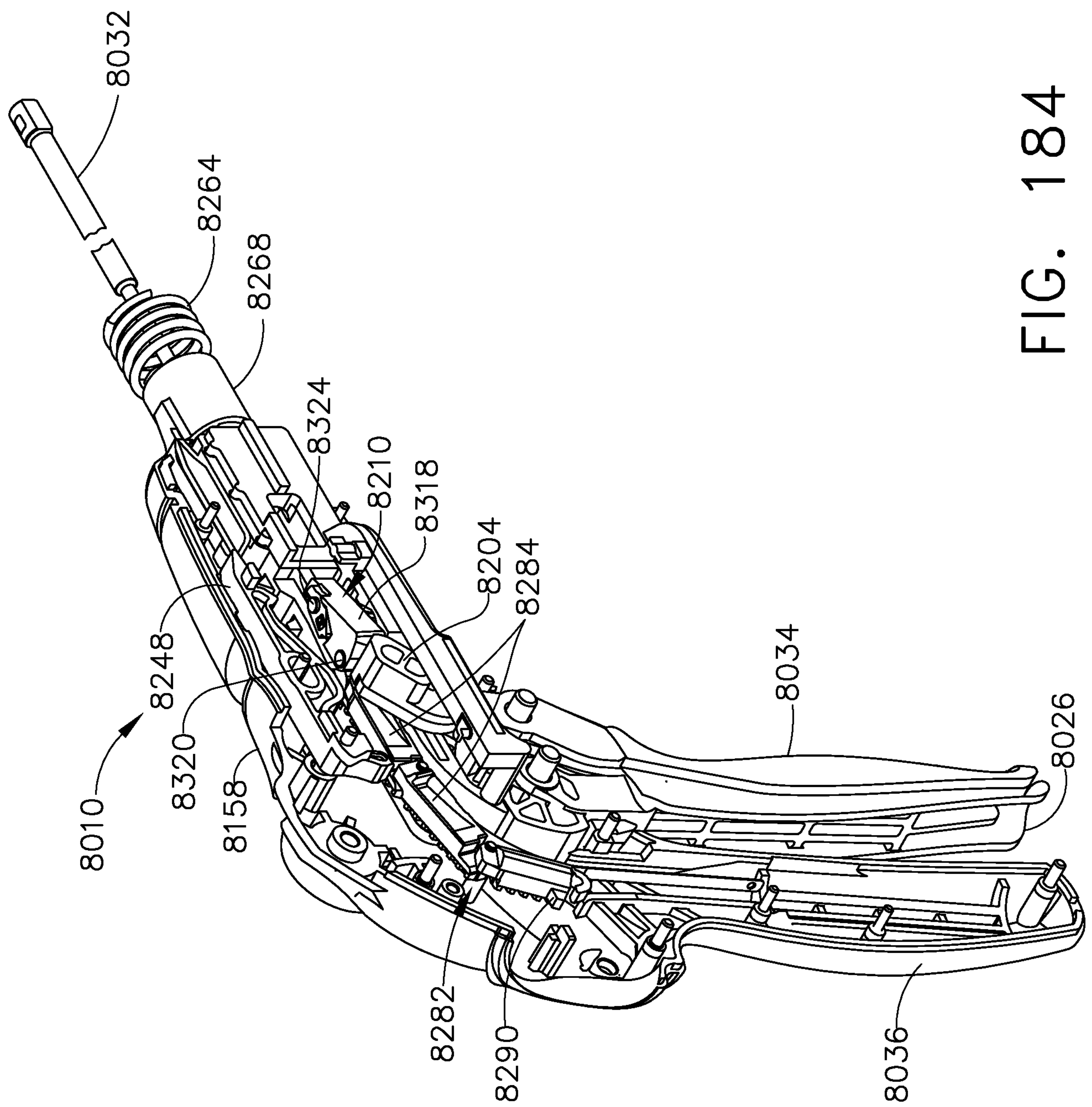


FIG. 183

97/222



98/222

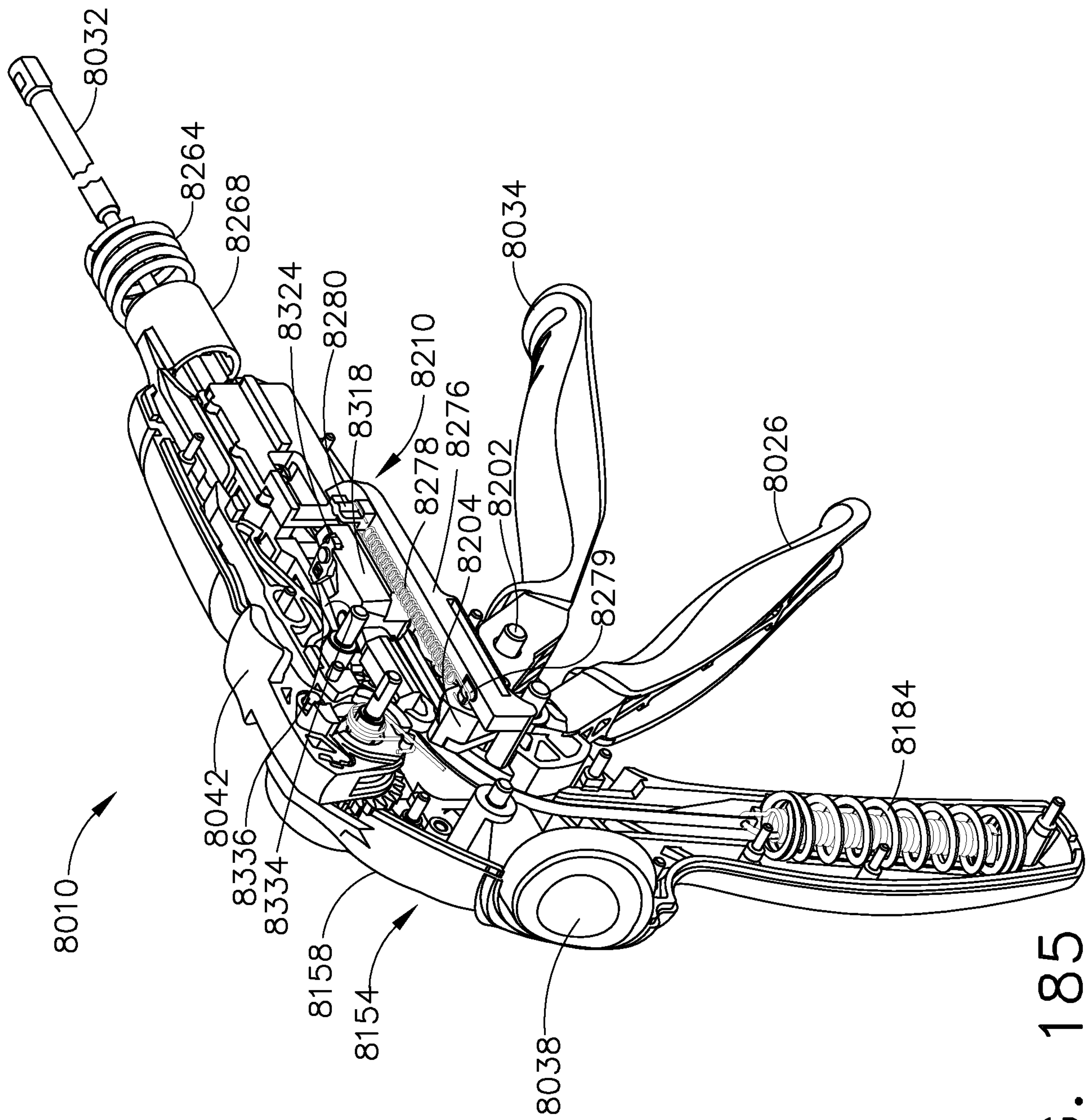


FIG. 185

99/222

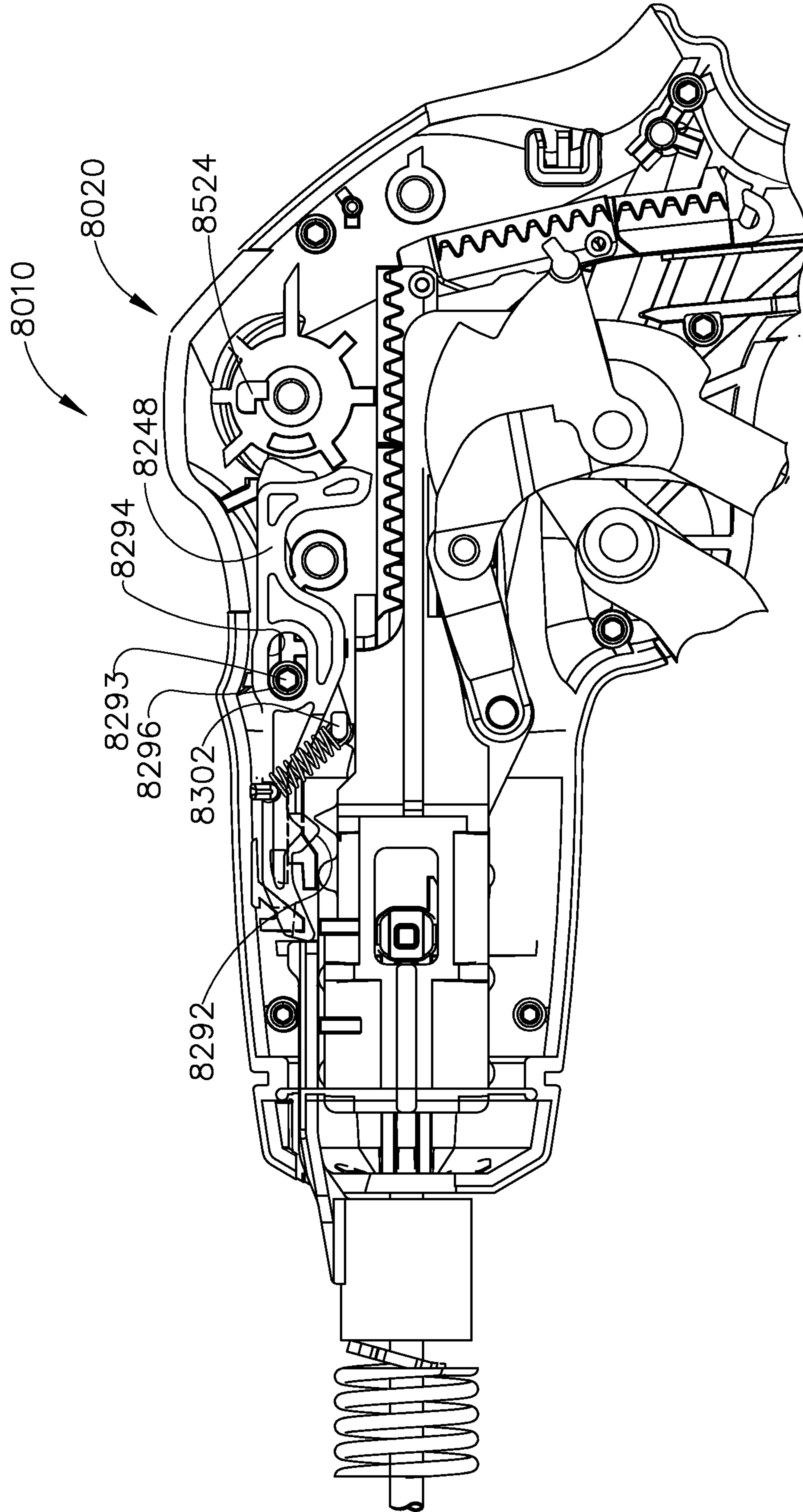


FIG. 186

100/222

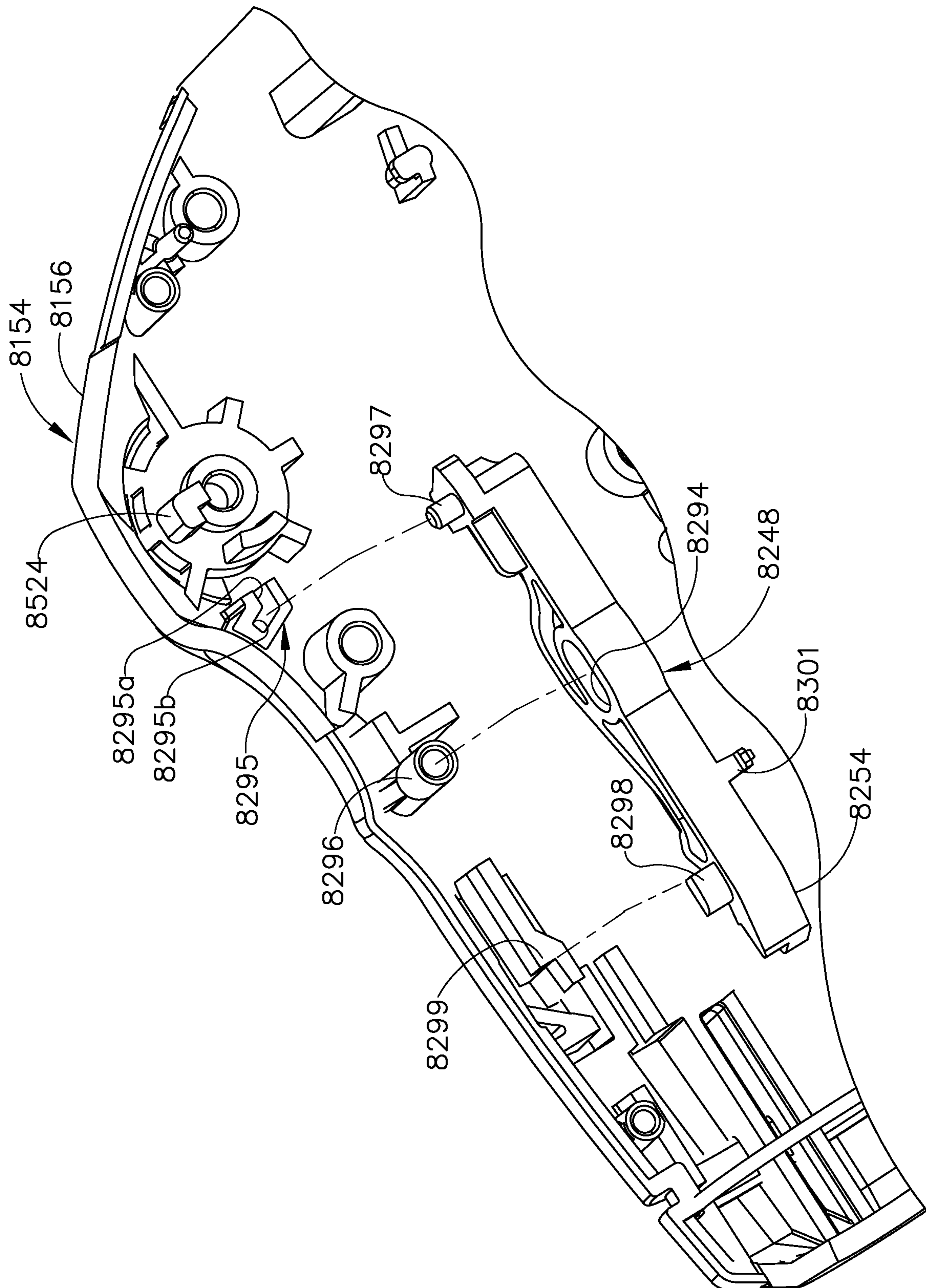


FIG. 187

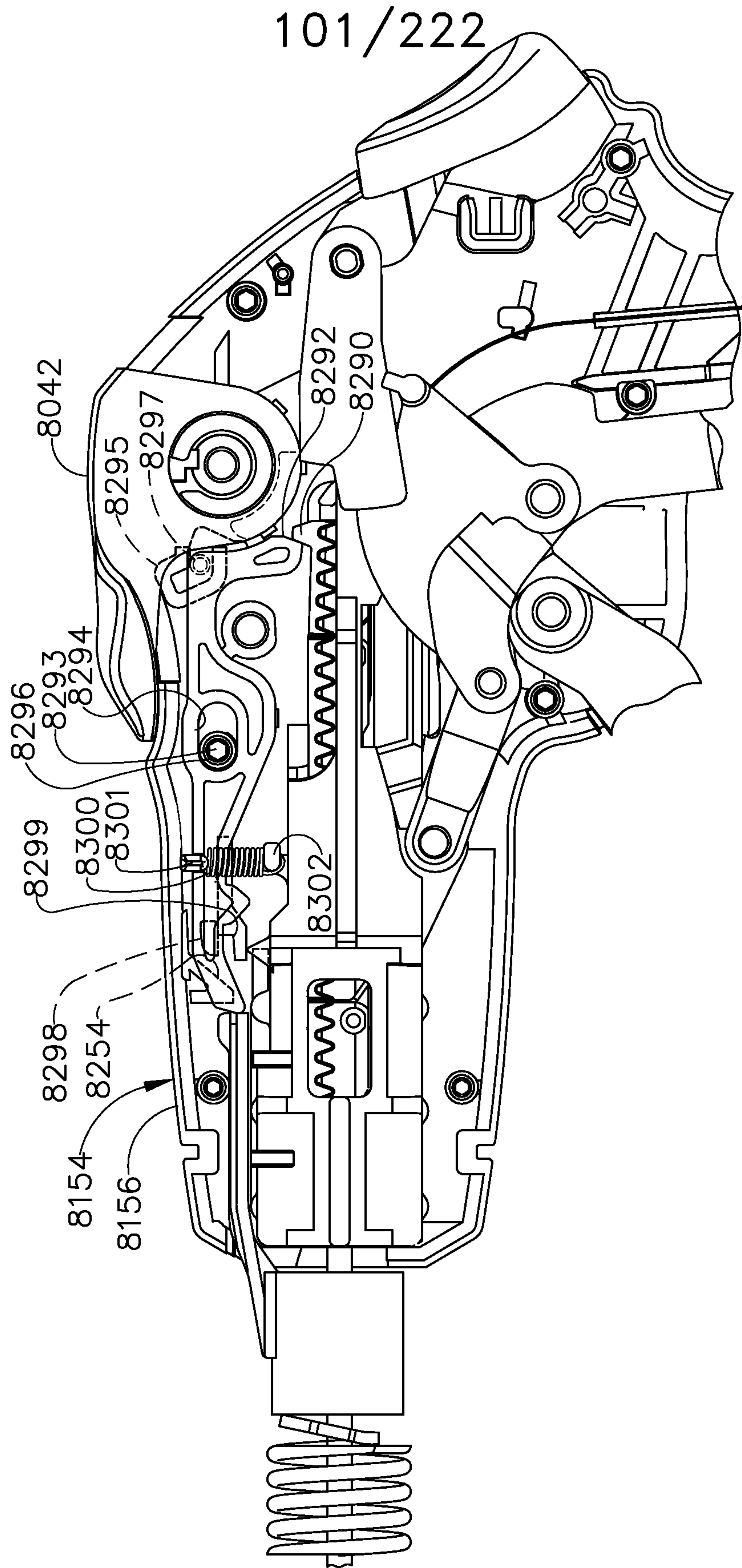


FIG. 188

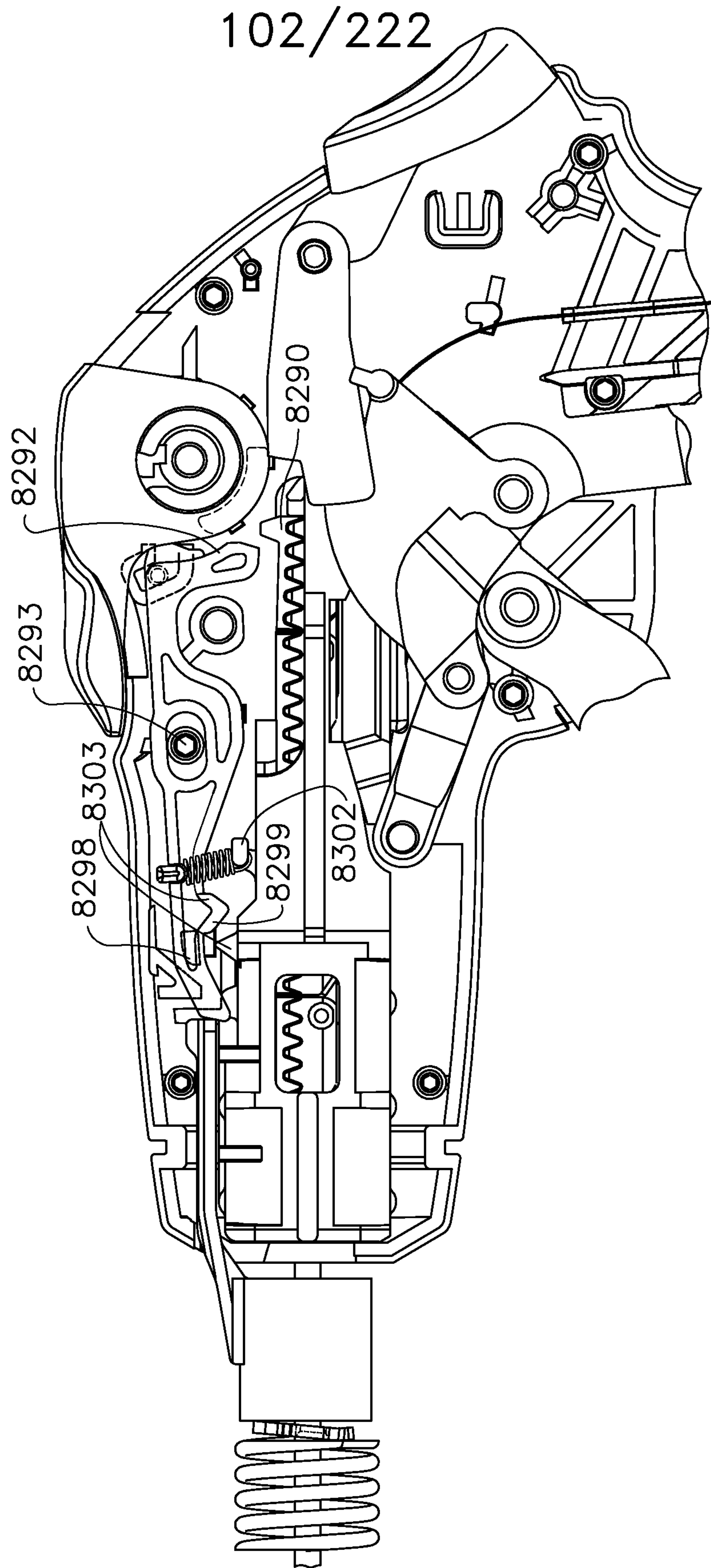


FIG. 189

103/222

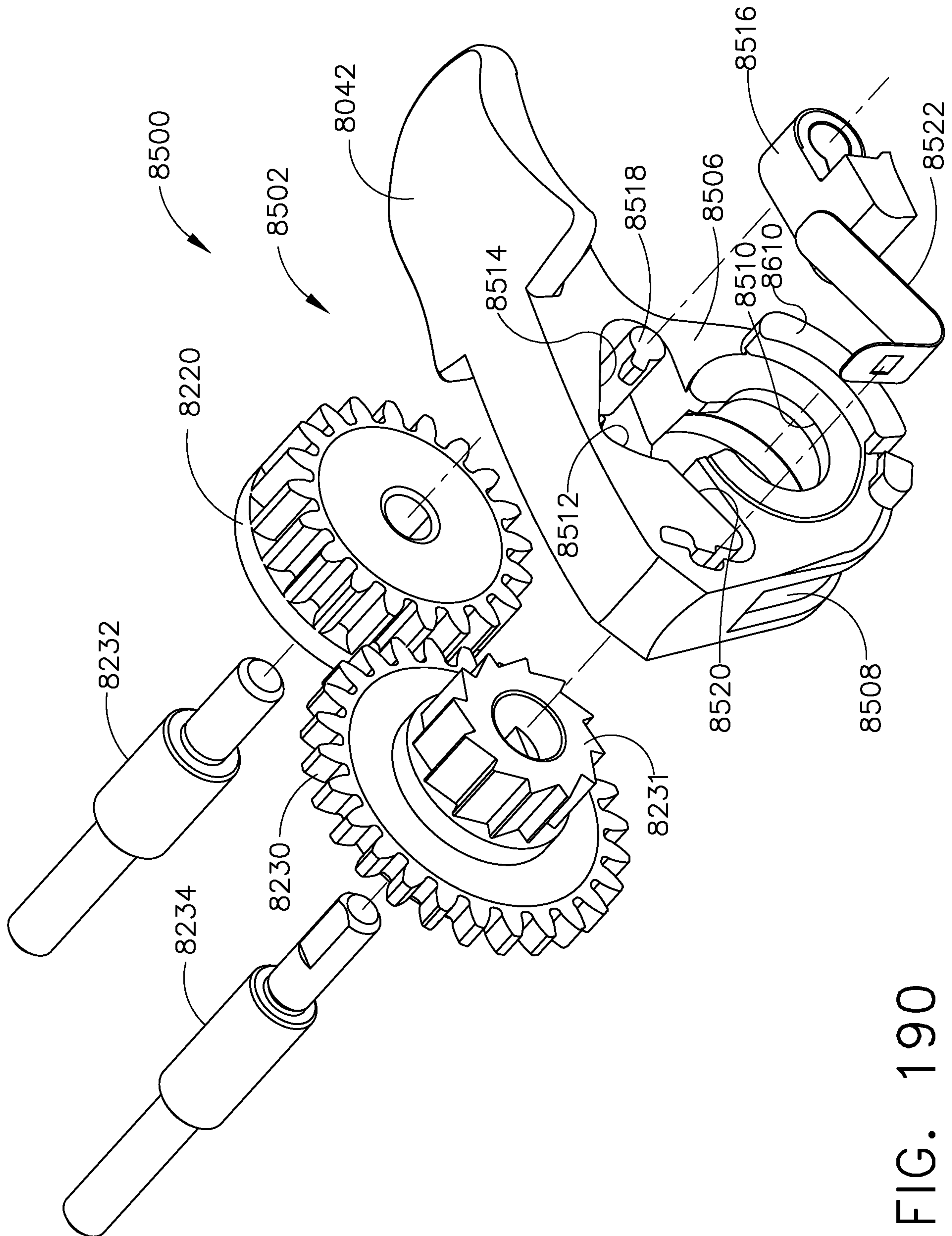
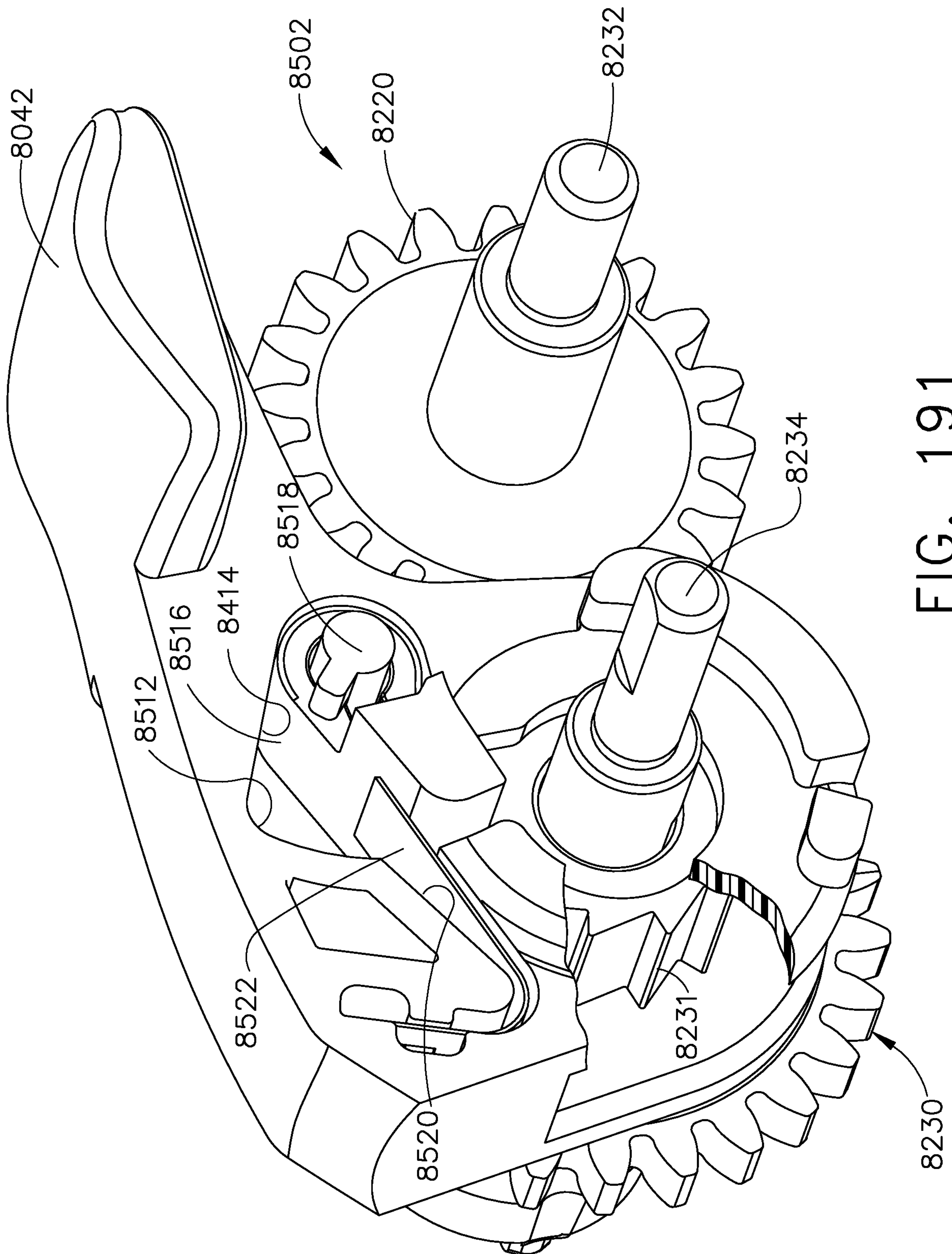


FIG. 190

104/222



105/222

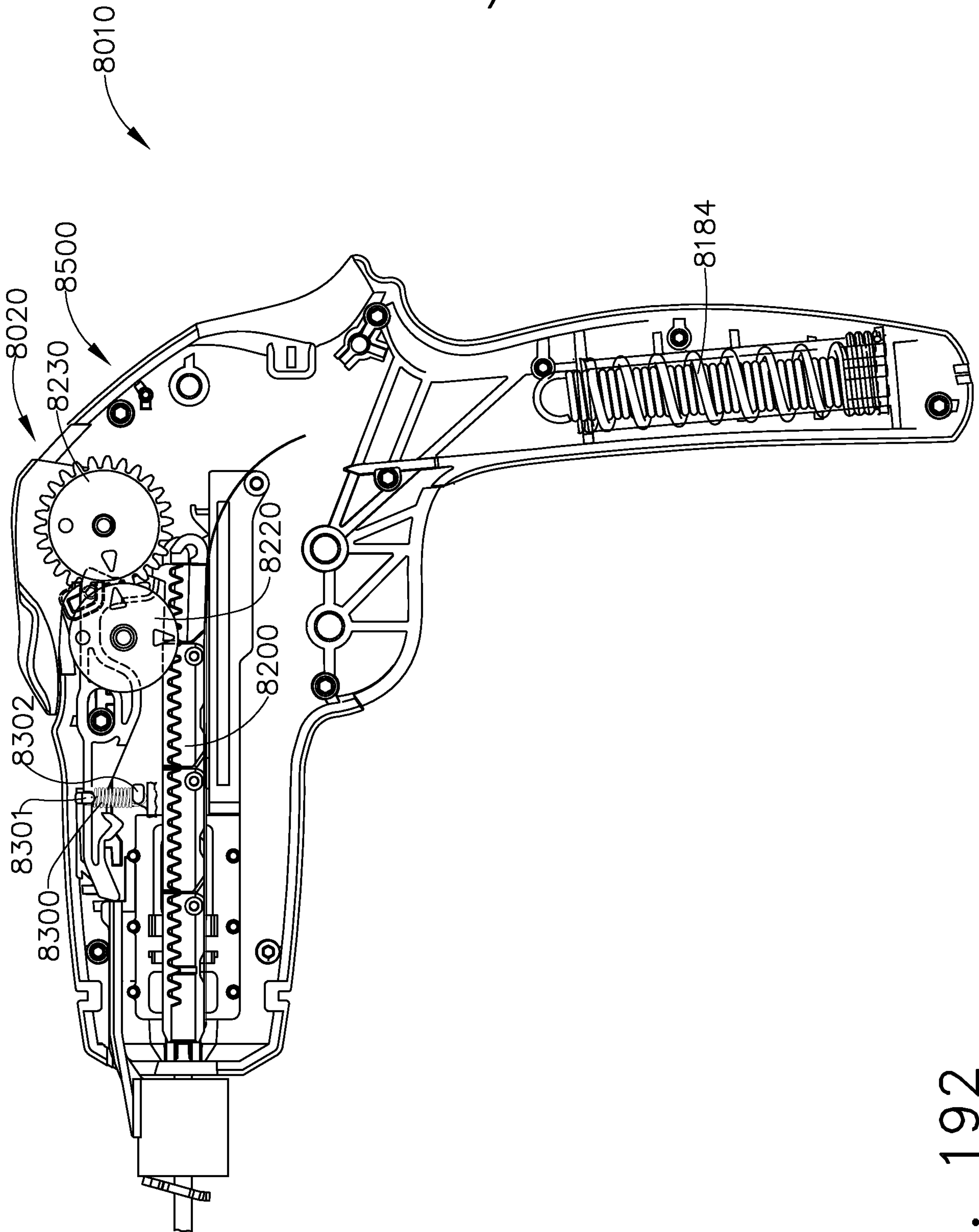


FIG. 192

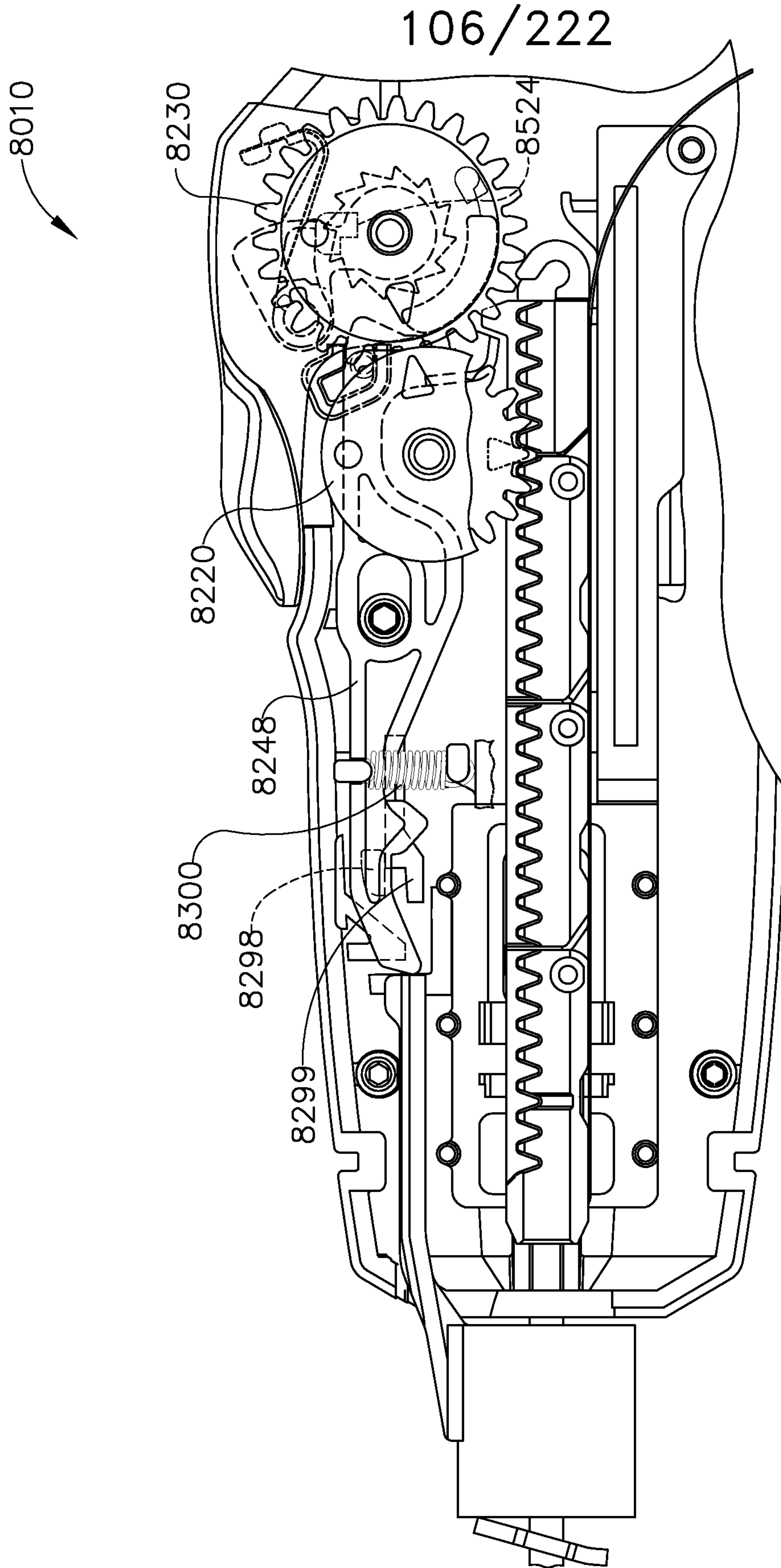


FIG. 193

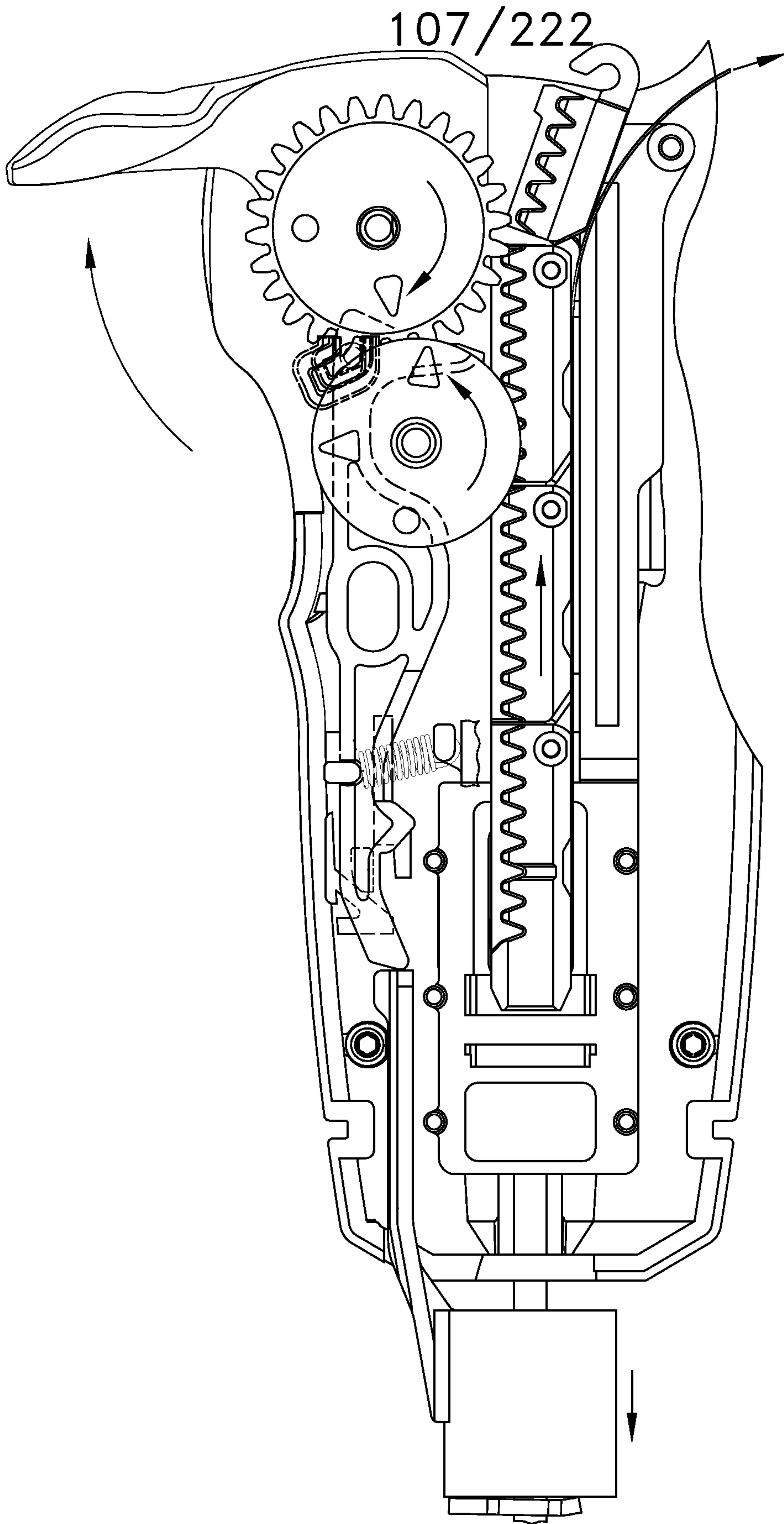


FIG. 194

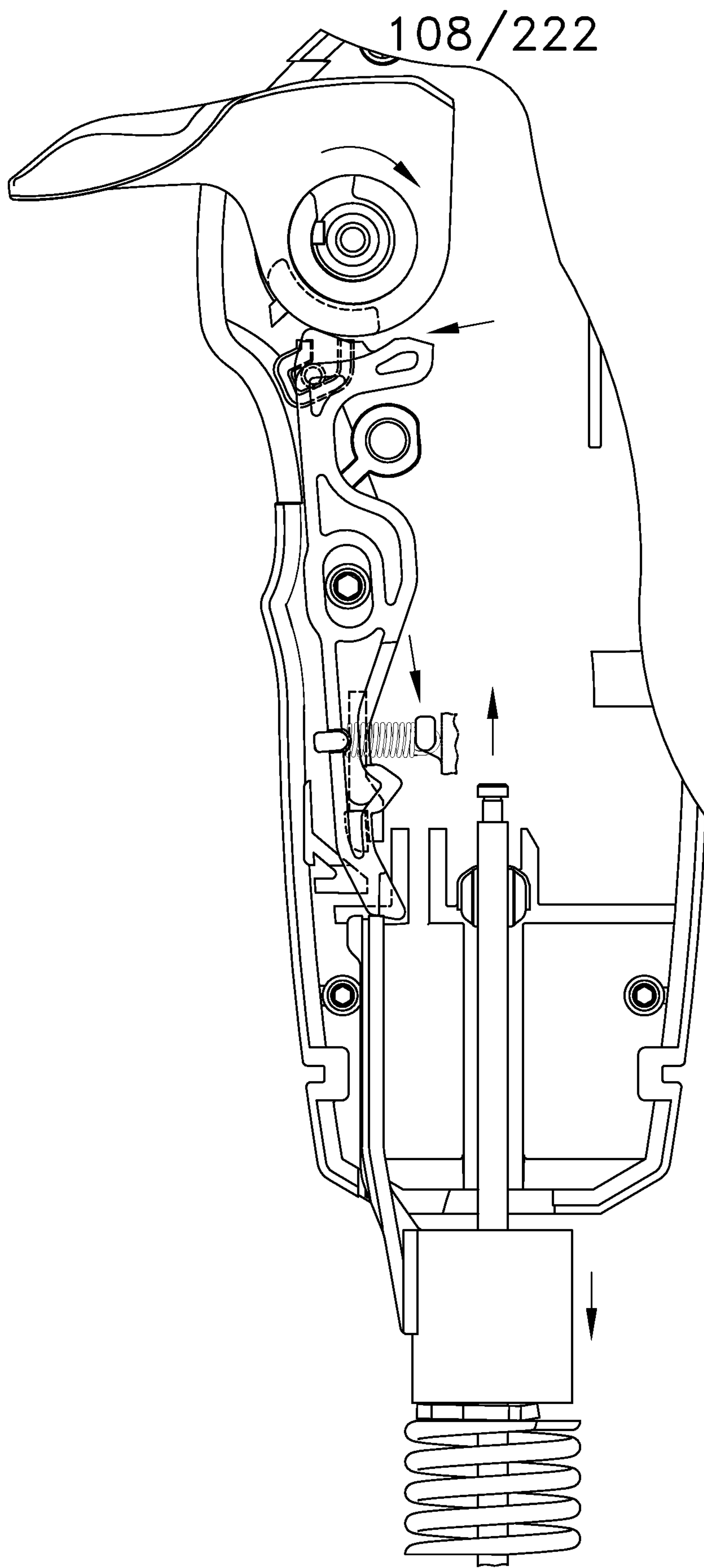


FIG. 195

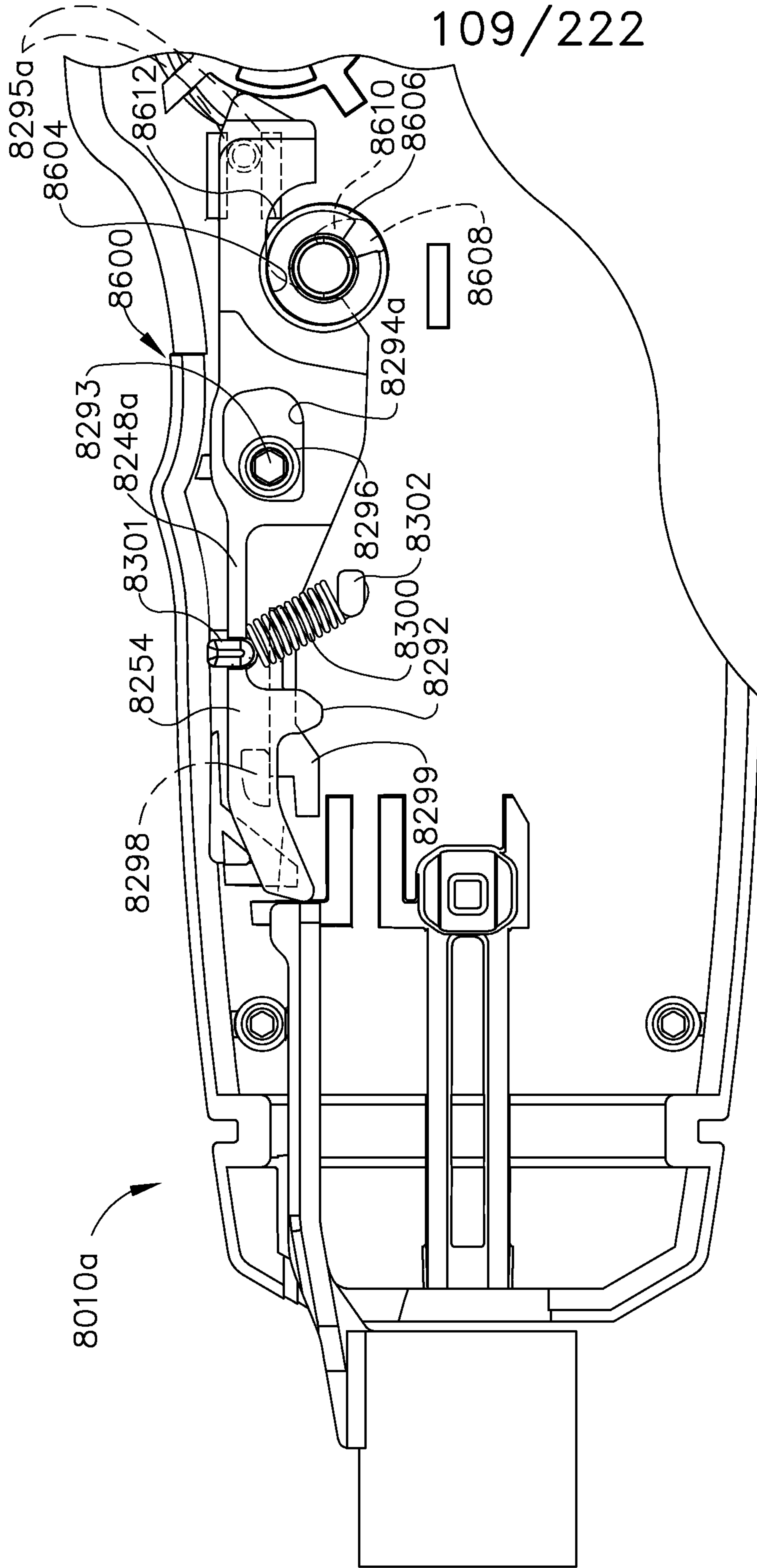


FIG. 196

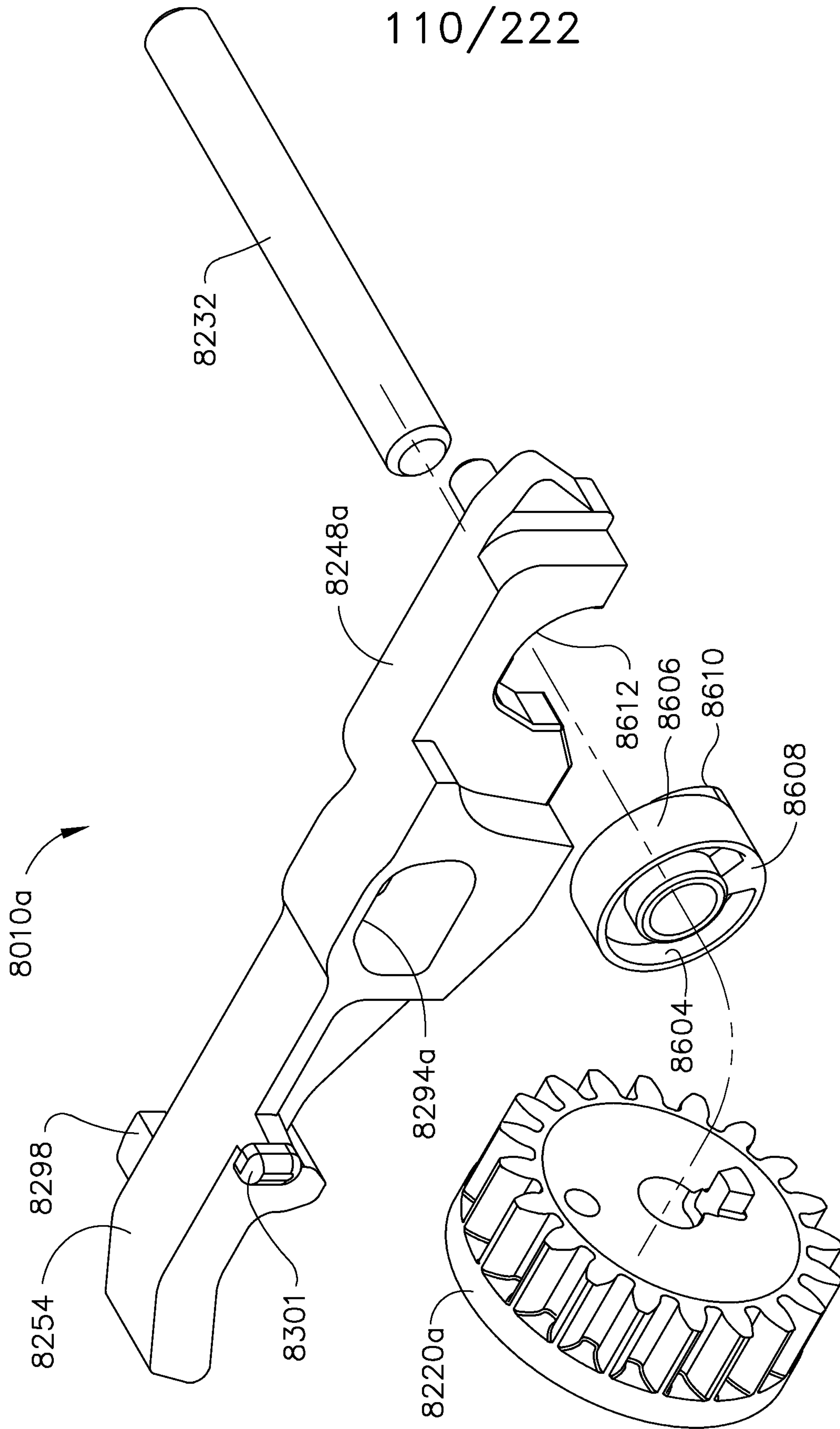
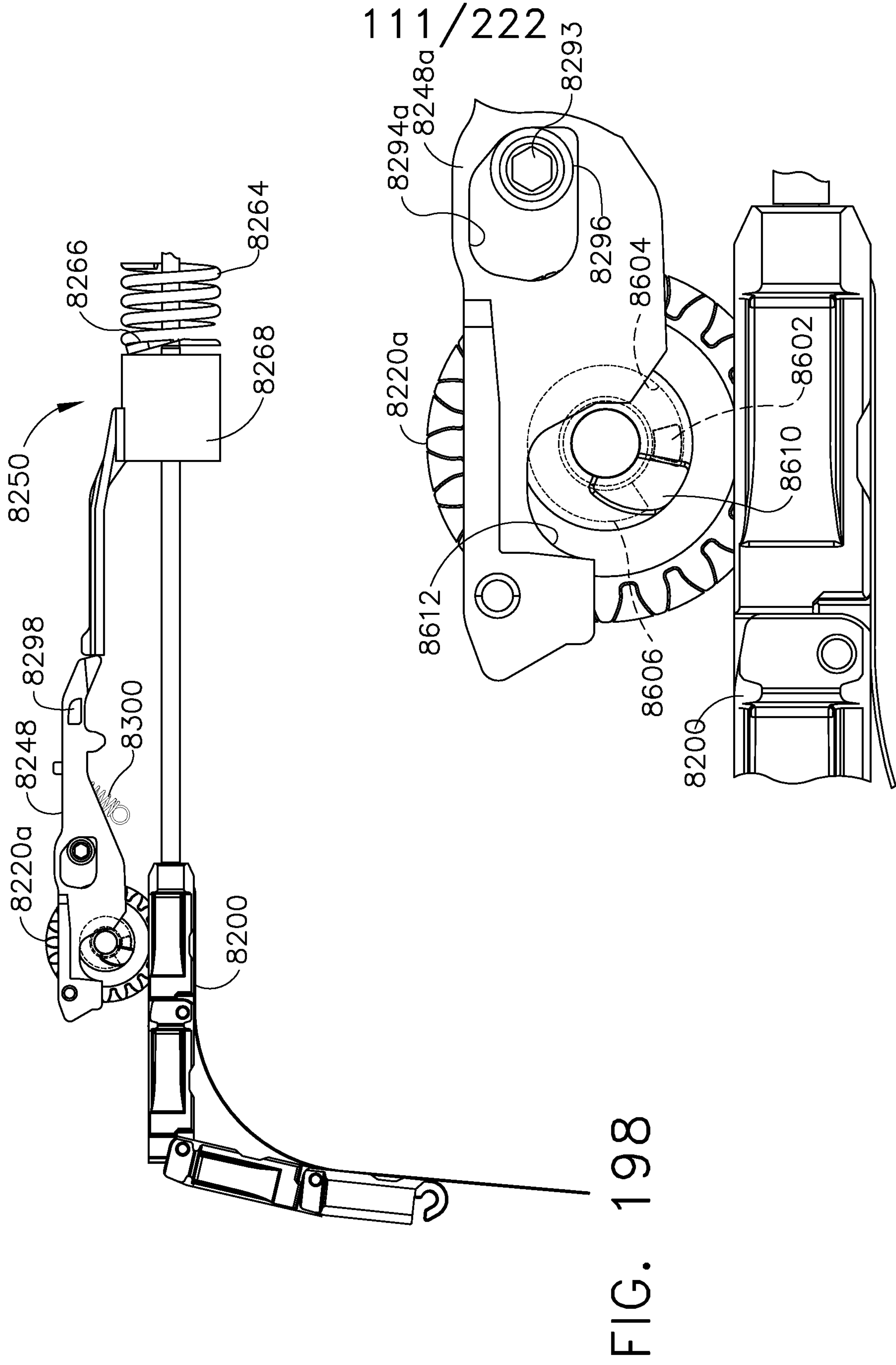


FIG. 197



112/222

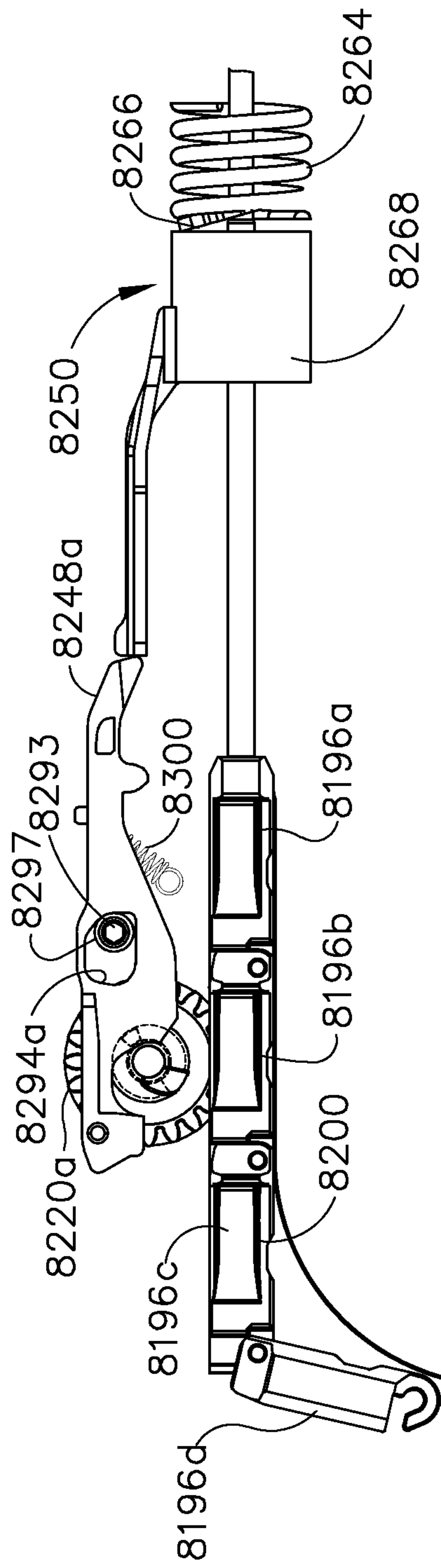


FIG. 199

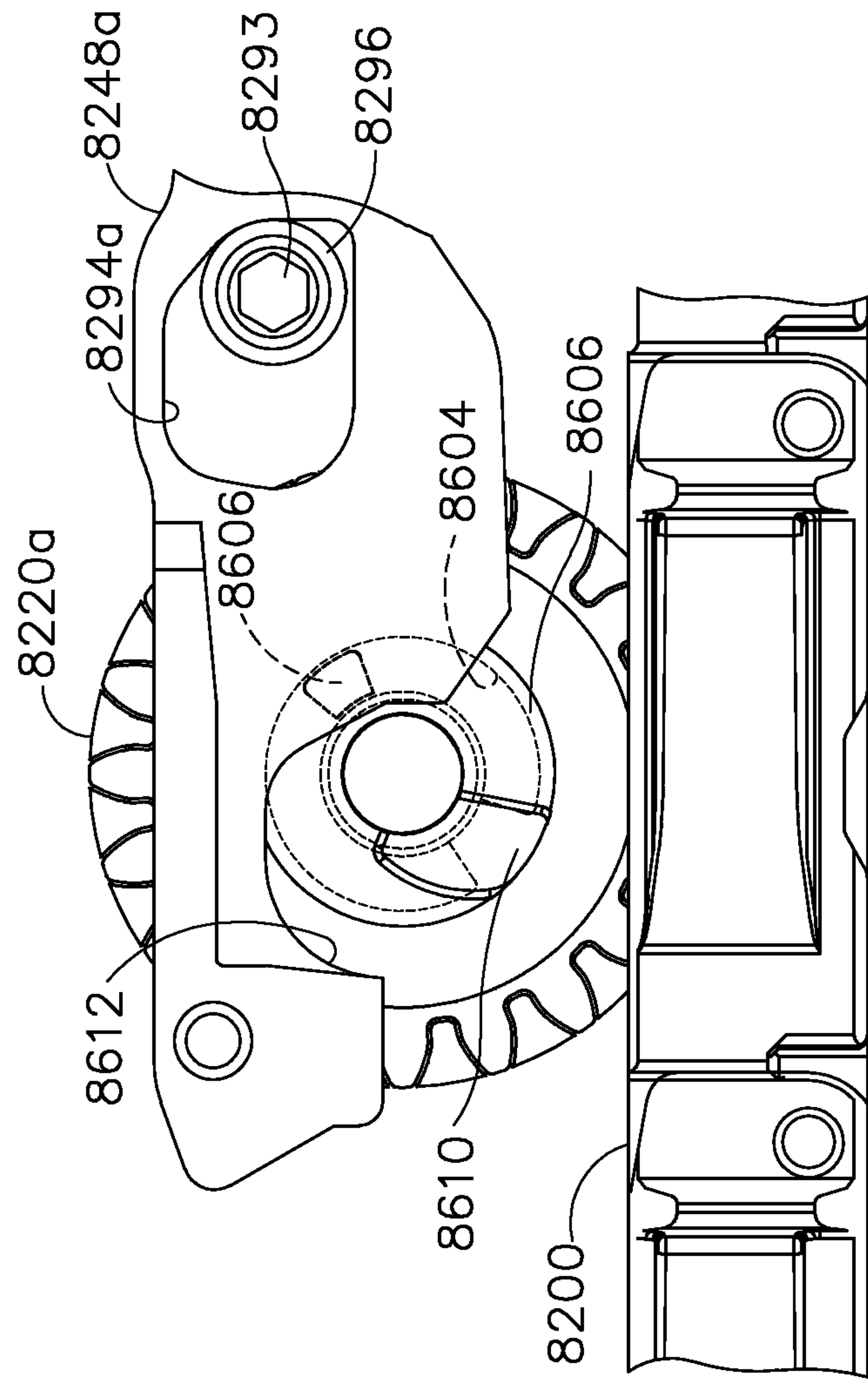


FIG. 199A

113/222

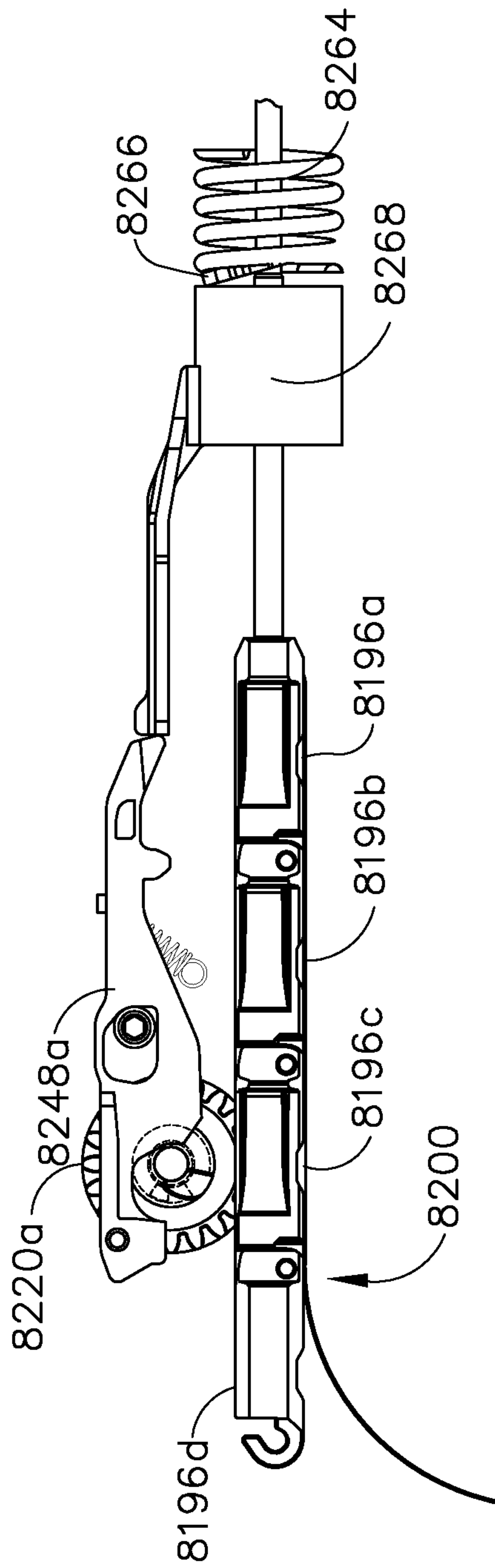


FIG. 200

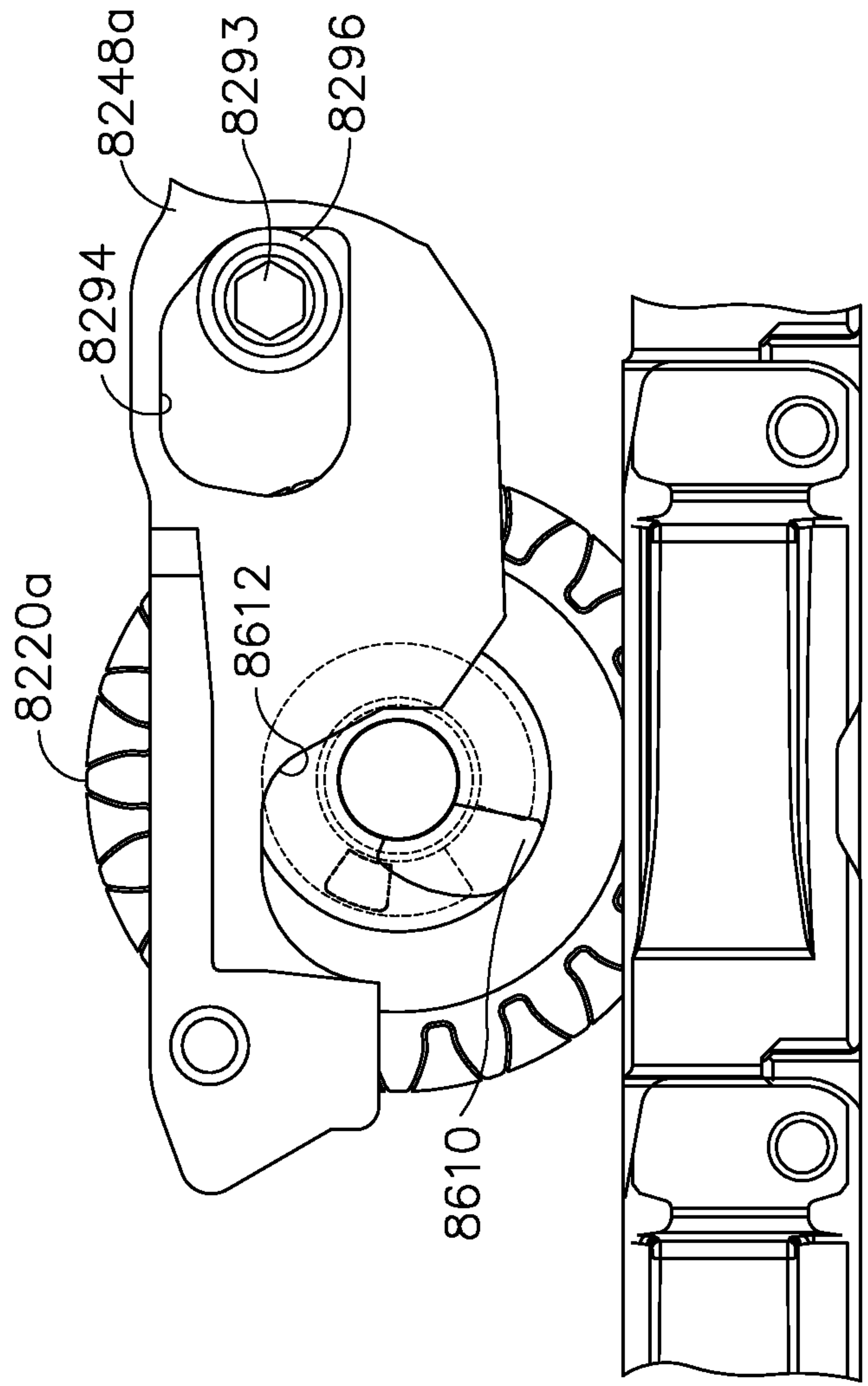


FIG. 200A

114/222

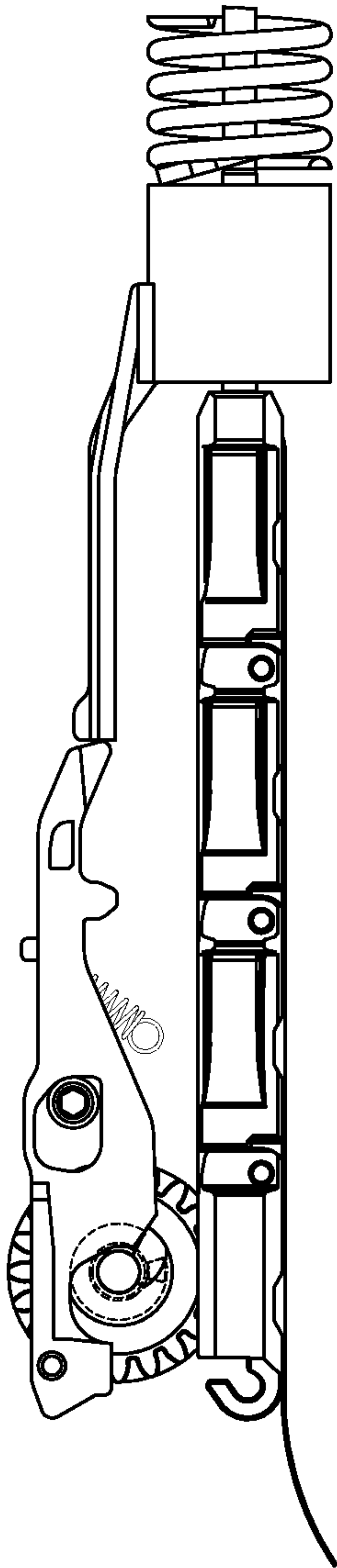


FIG. 201

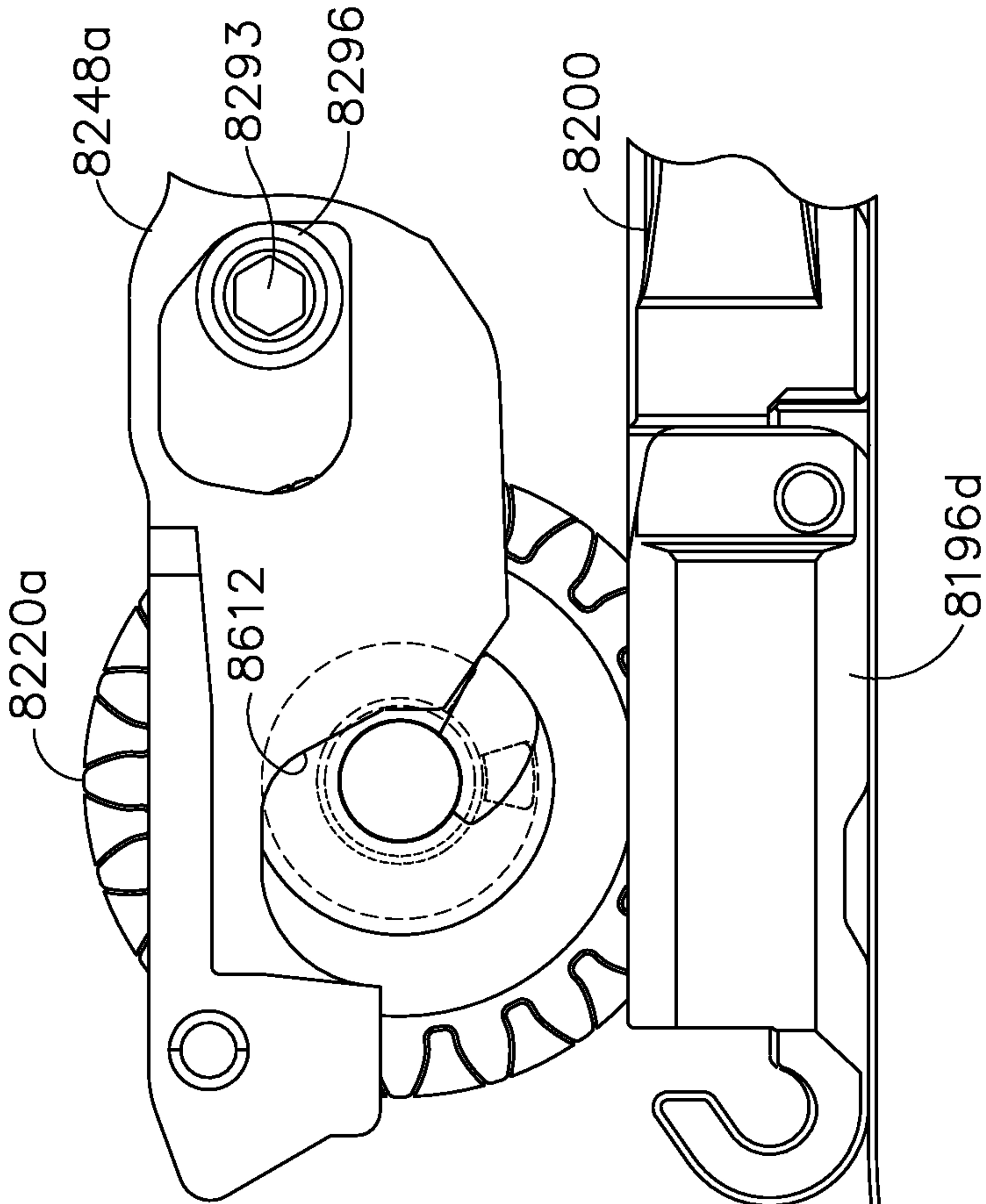


FIG. 201A

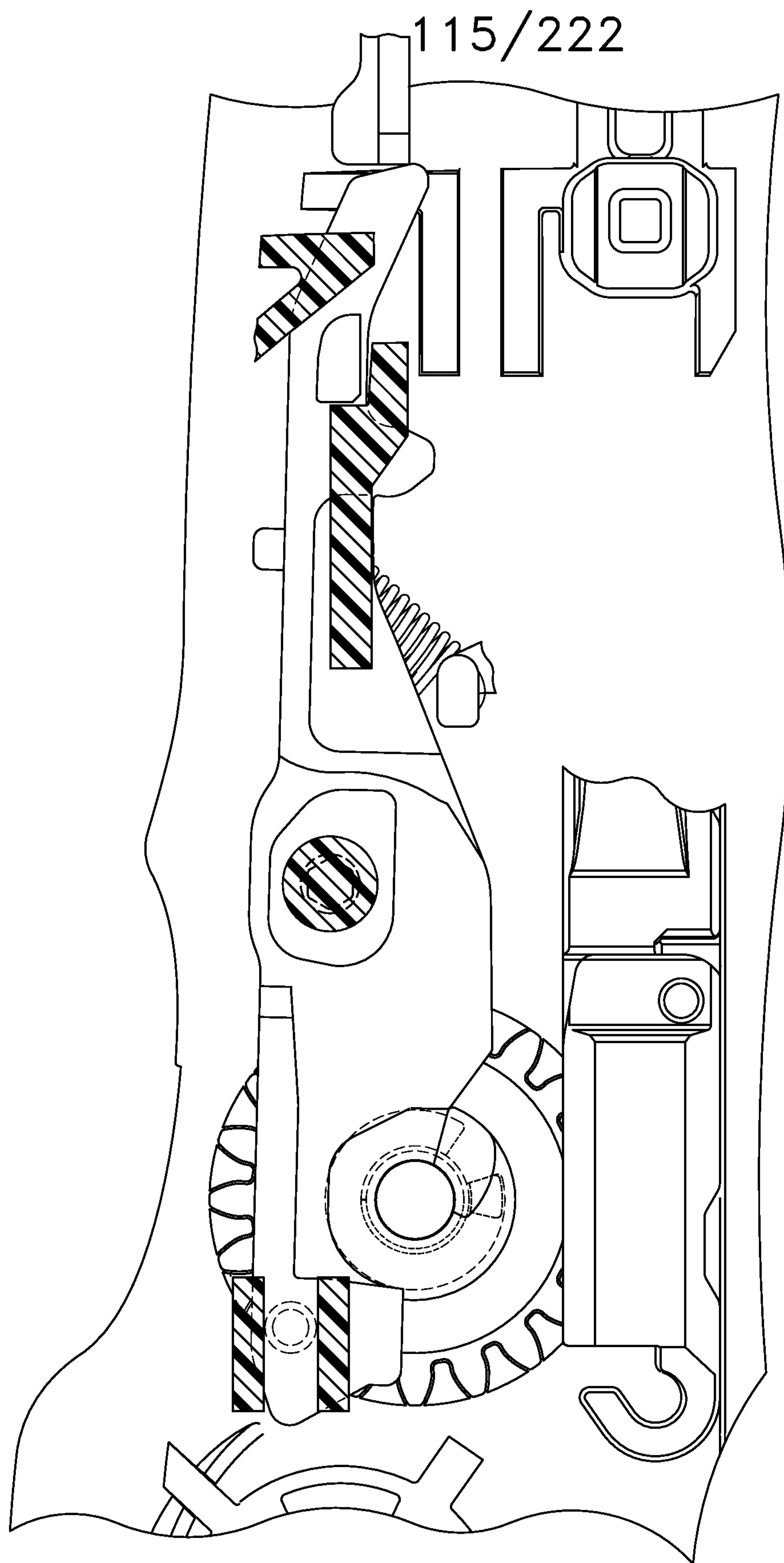
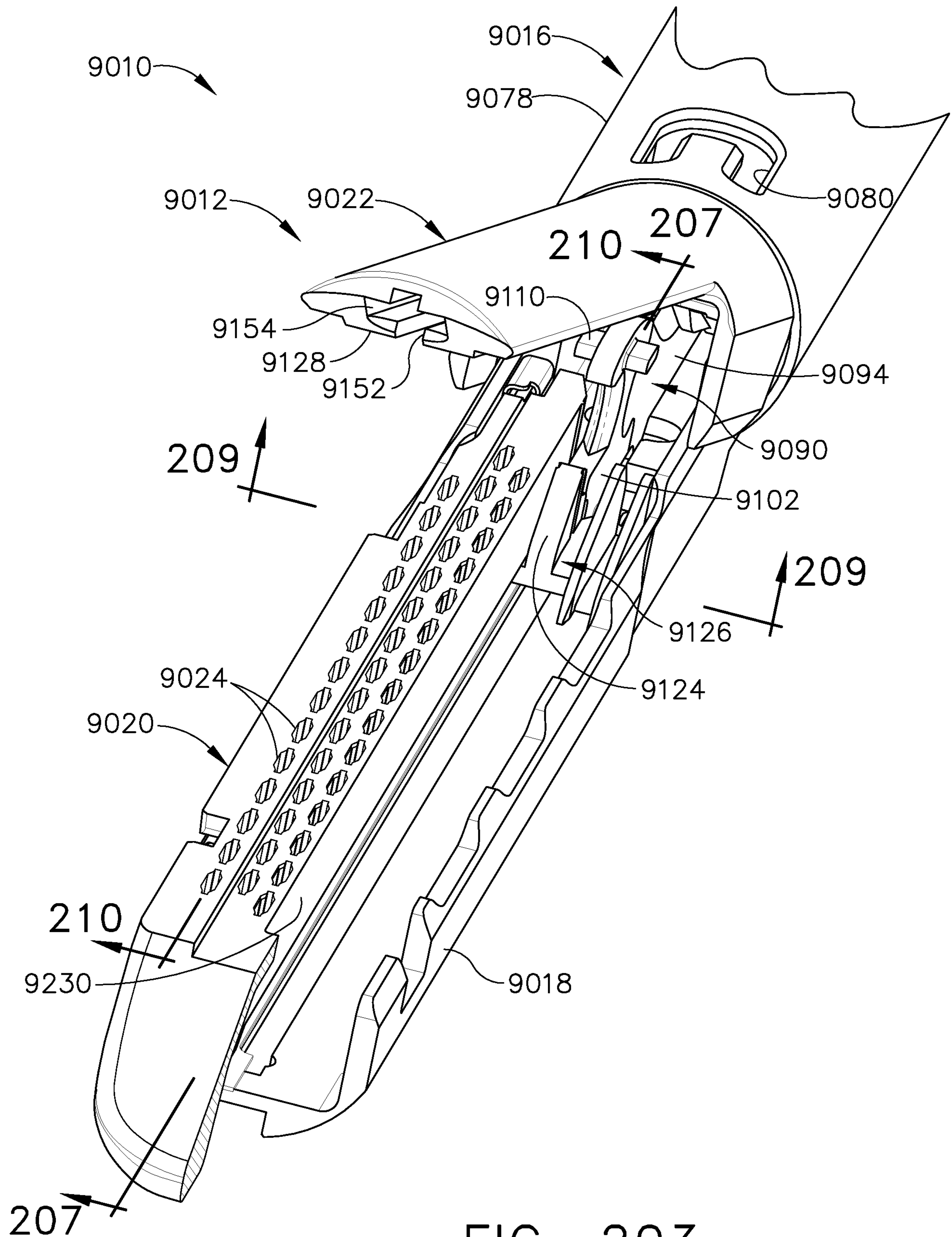
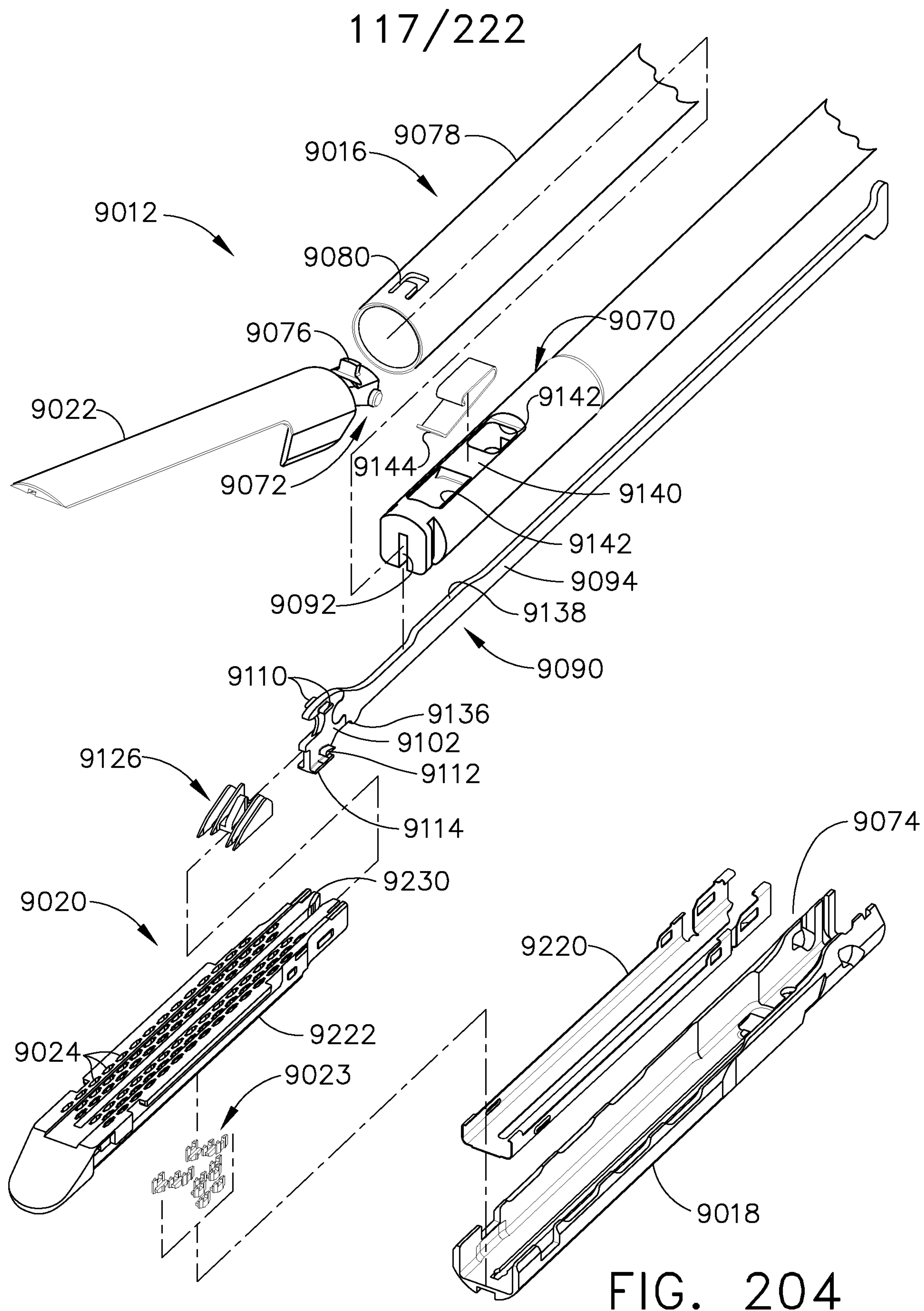


FIG. 202

116/222





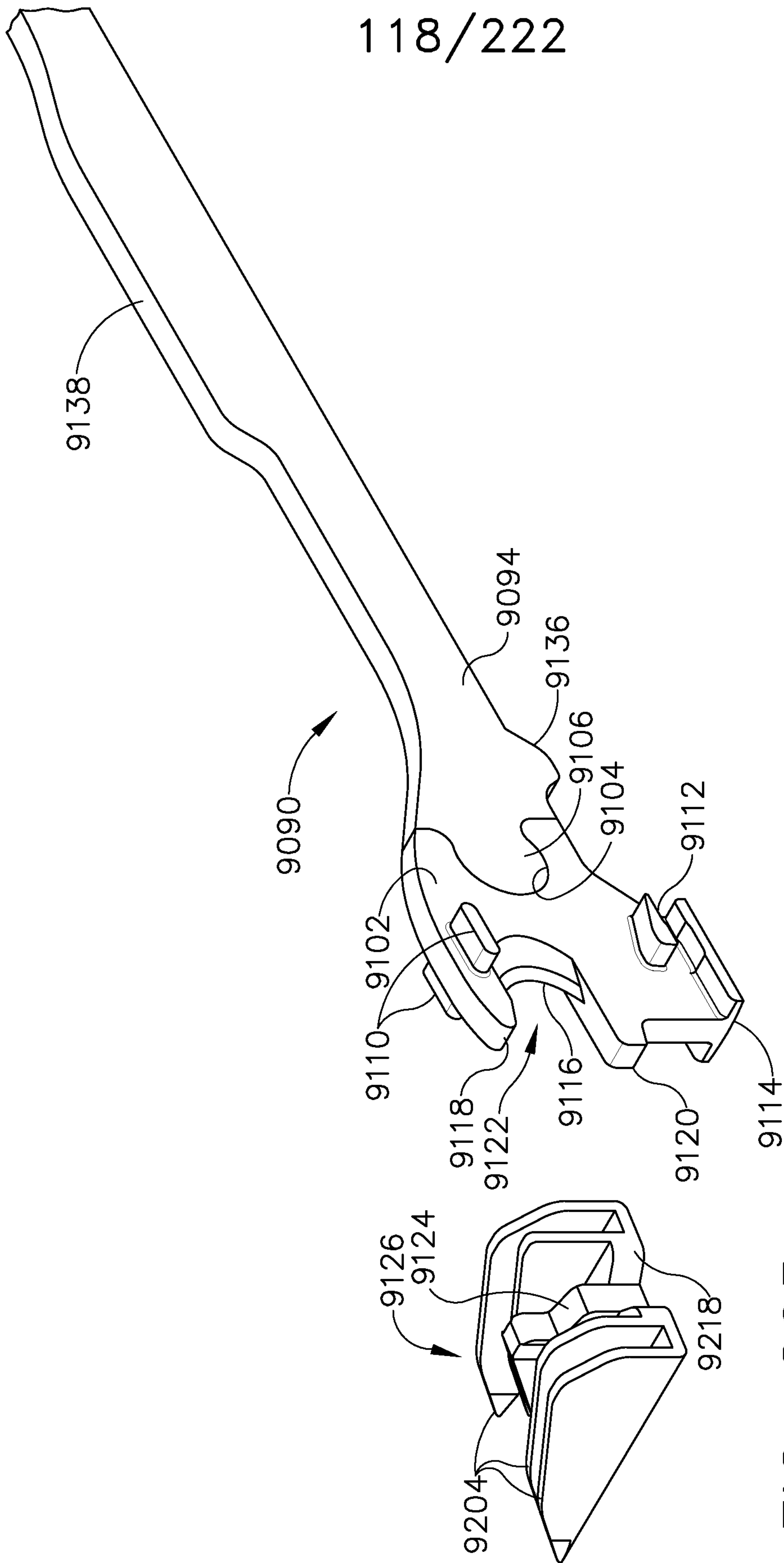


FIG. 206

FIG. 205

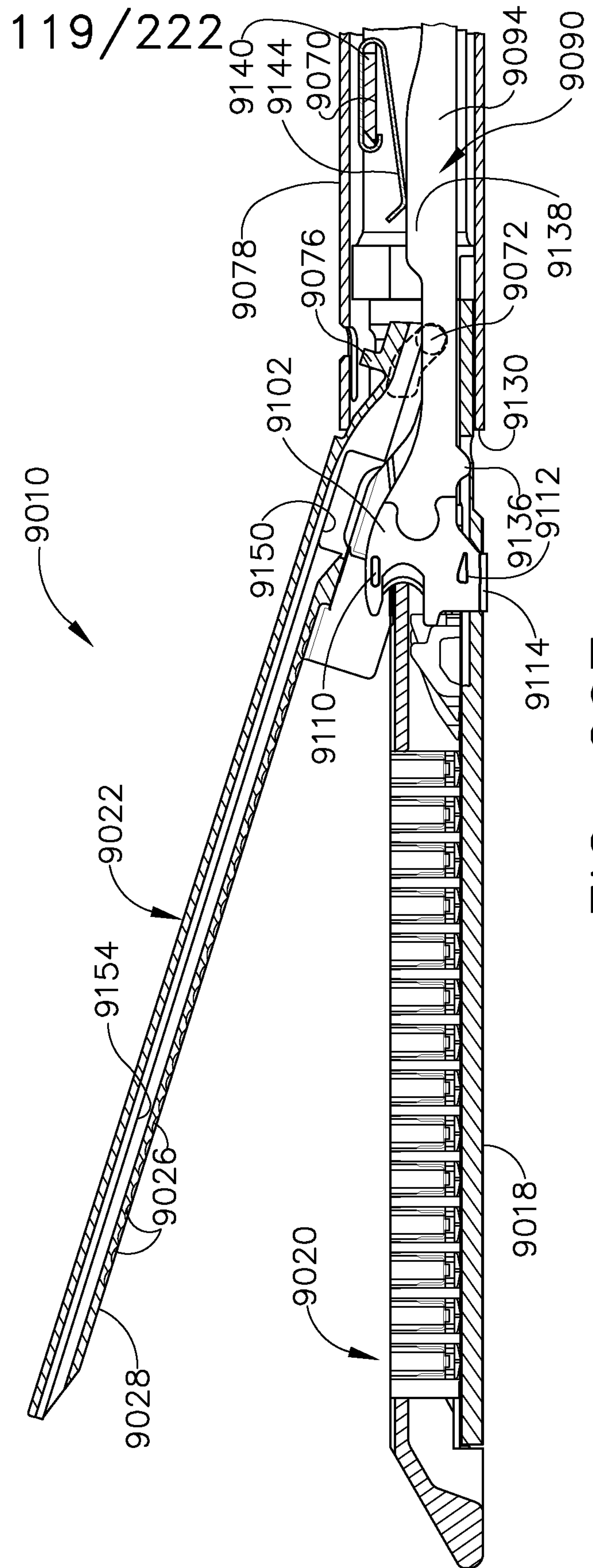


FIG. 207

121/222

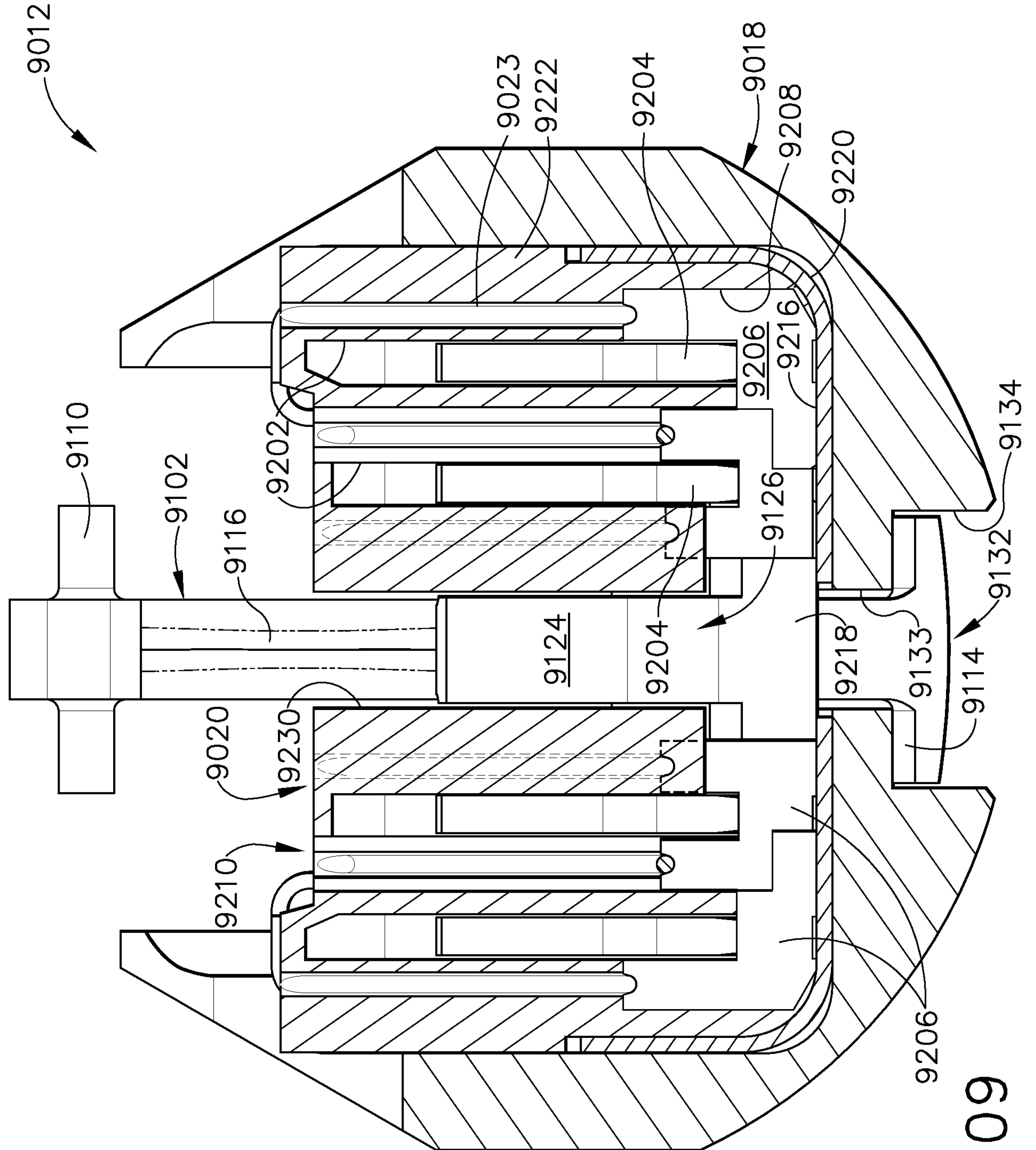


FIG. 209.

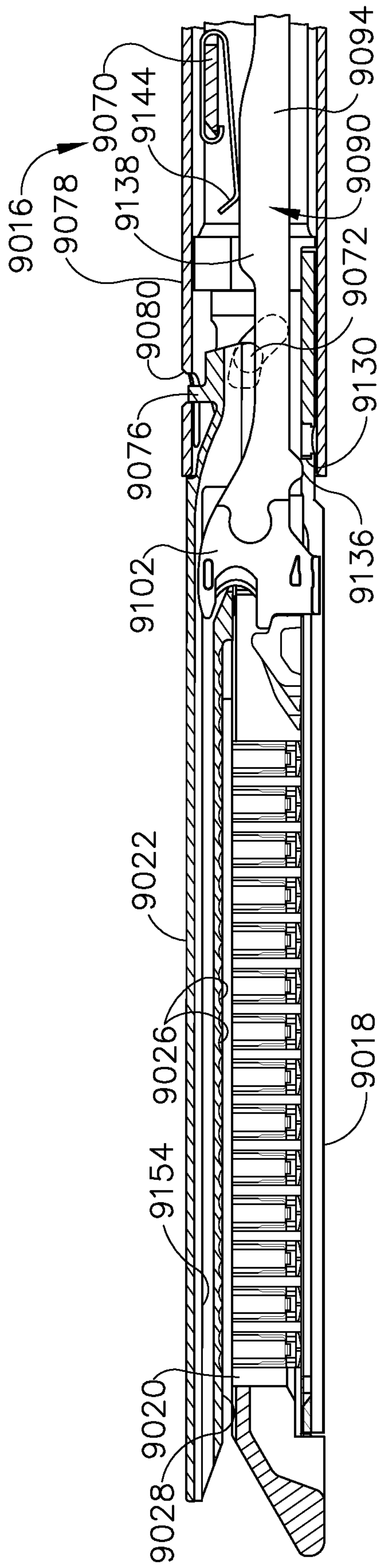


FIG. 210

122/222

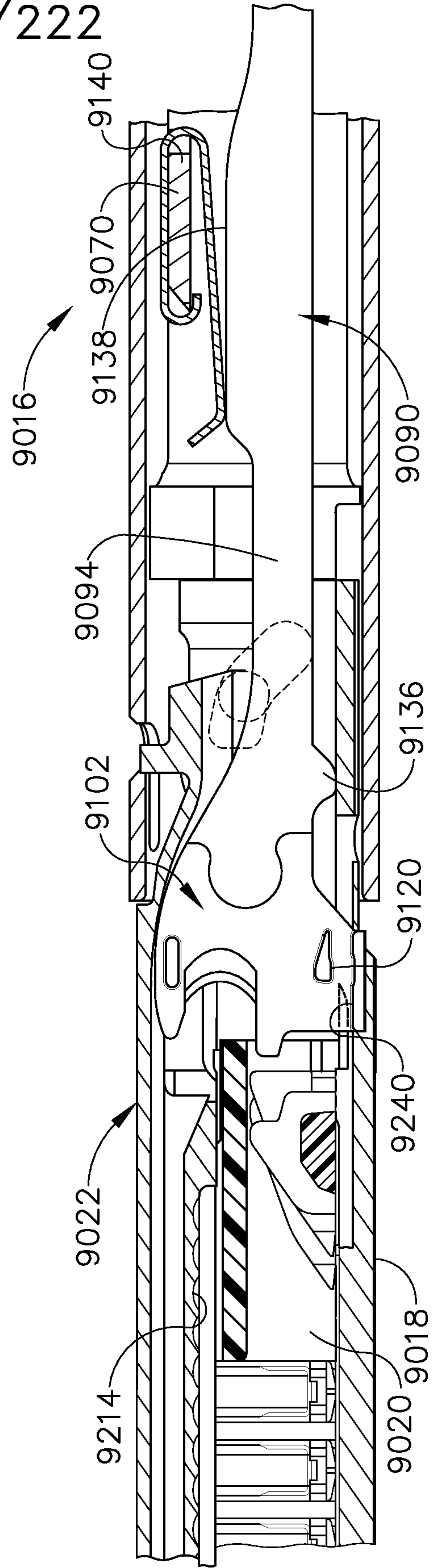


FIG. 211

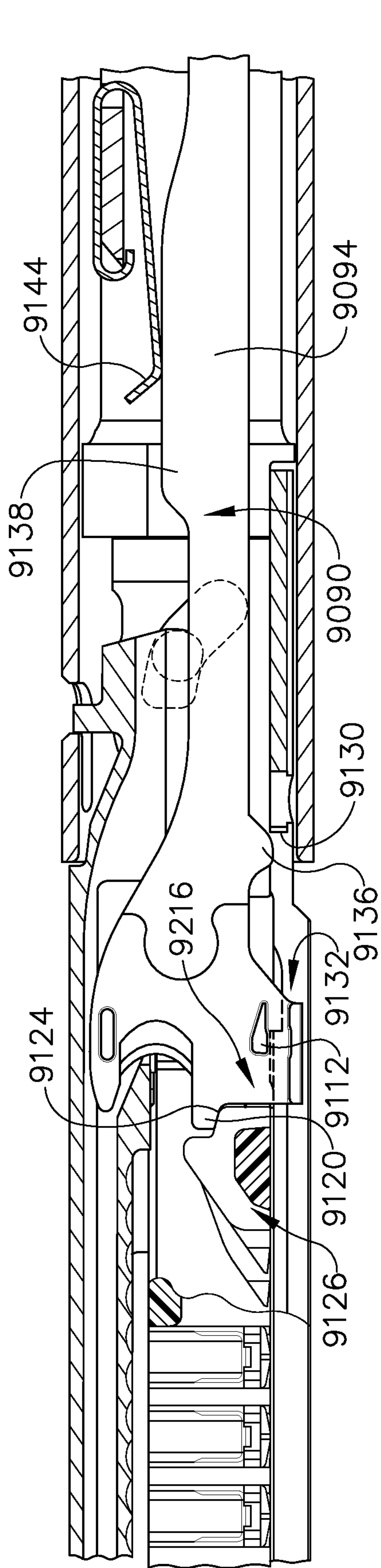


FIG. 212

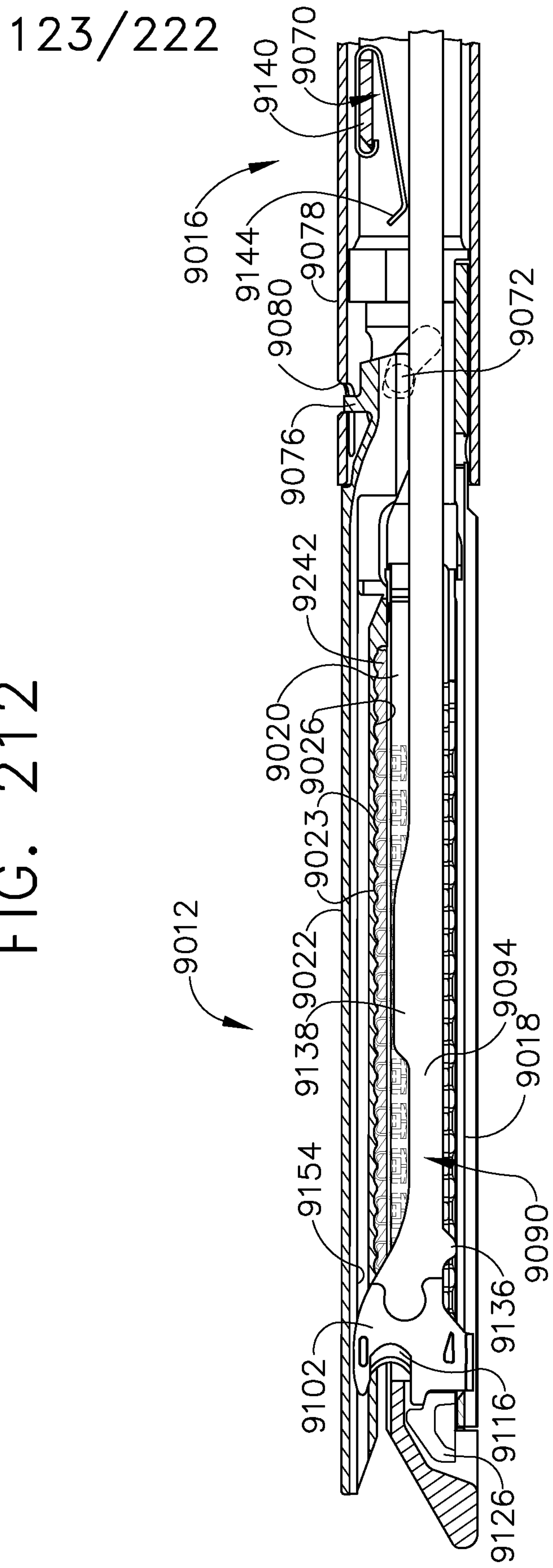


FIG. 213

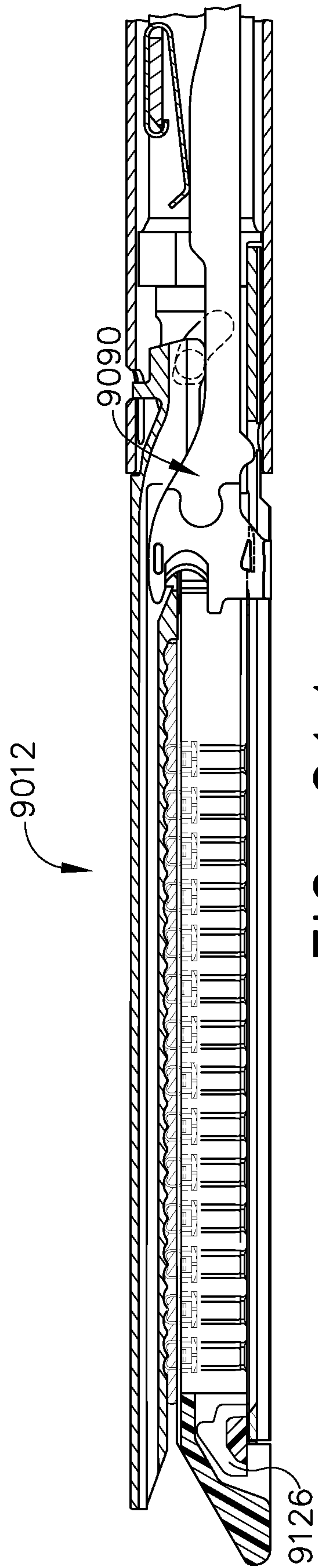


FIG. 214

124/222

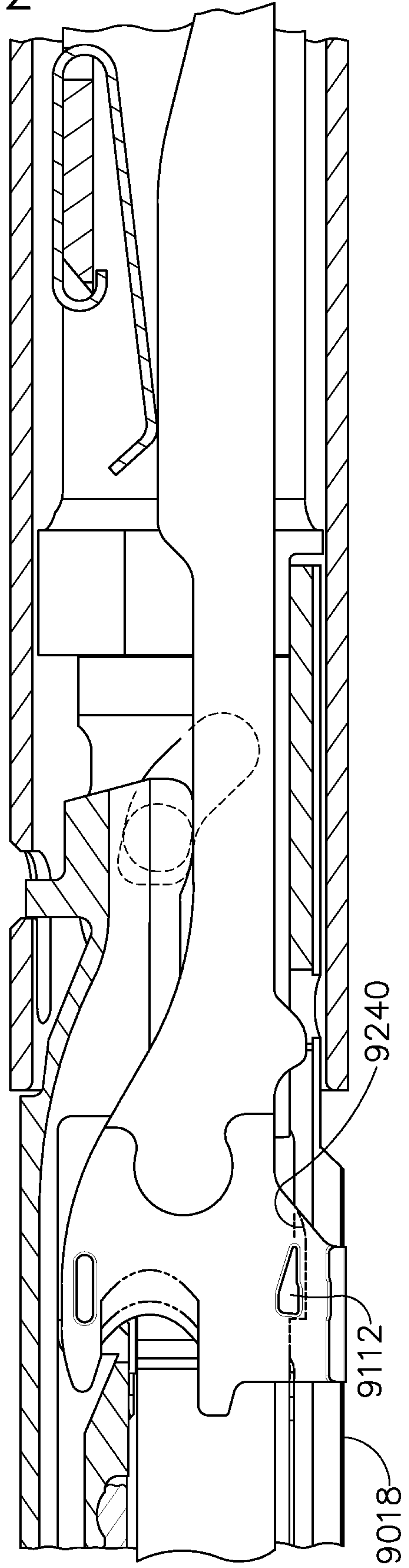


FIG. 215

125/222

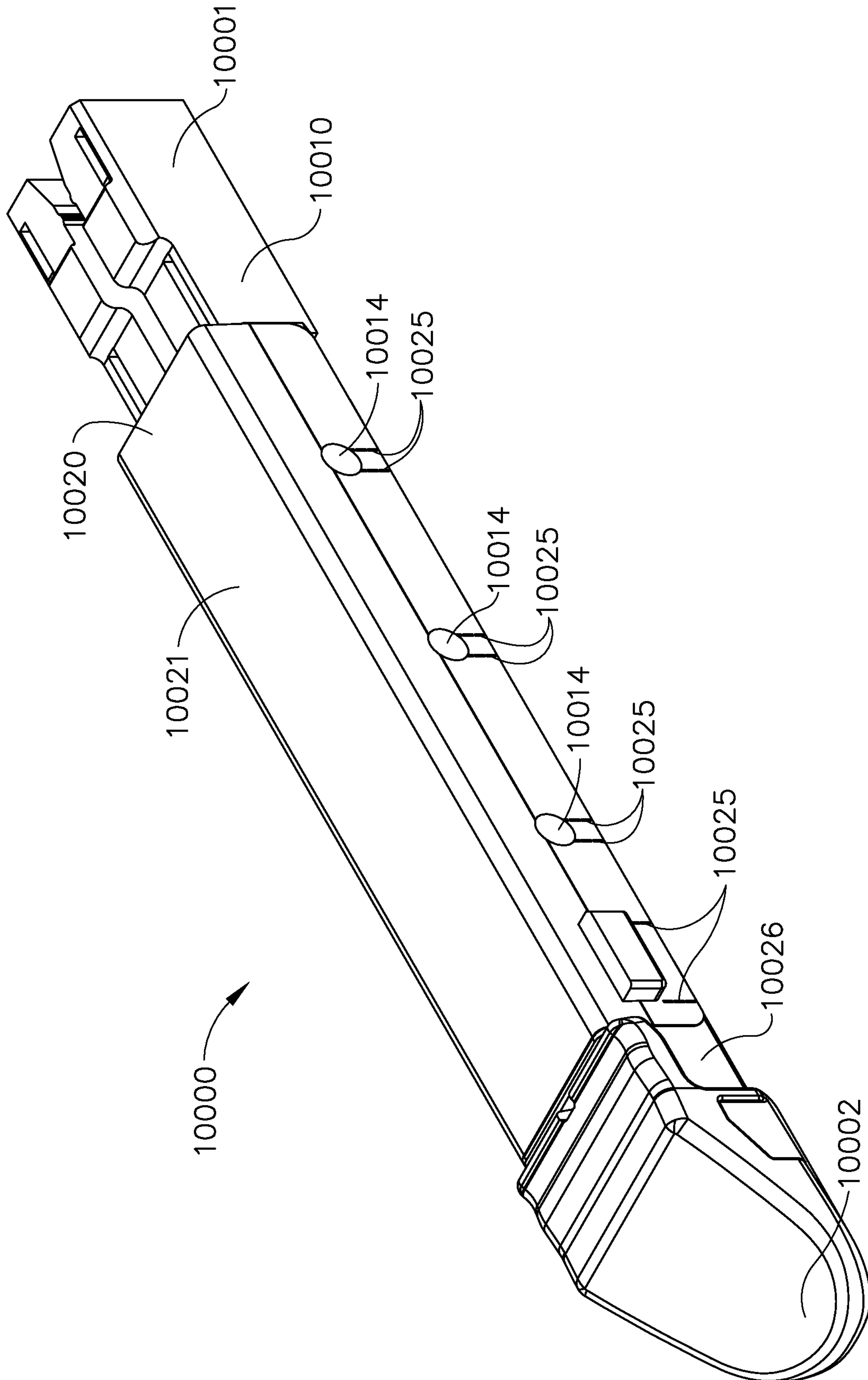


FIG. 216

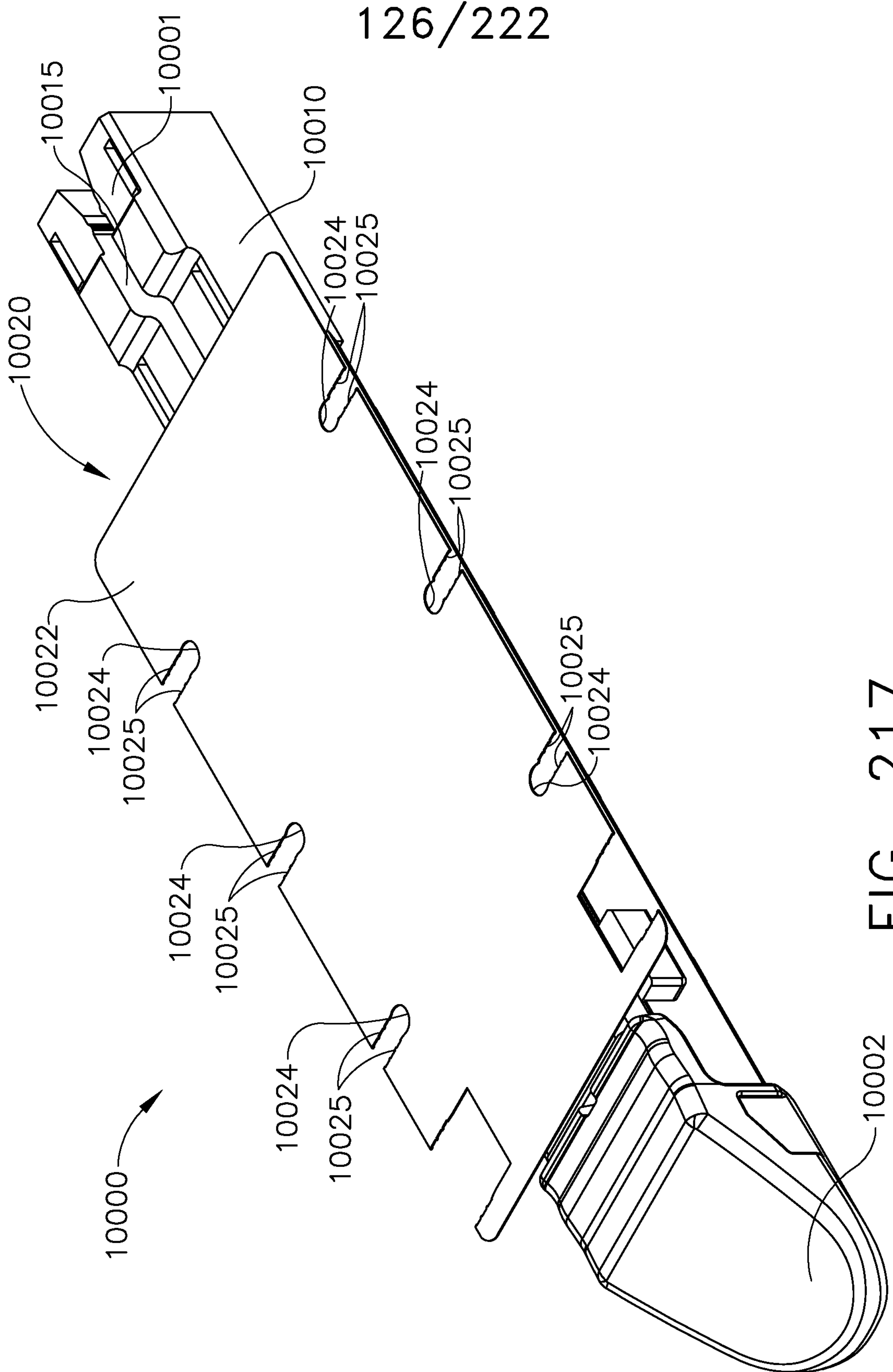


FIG. 217

127/222

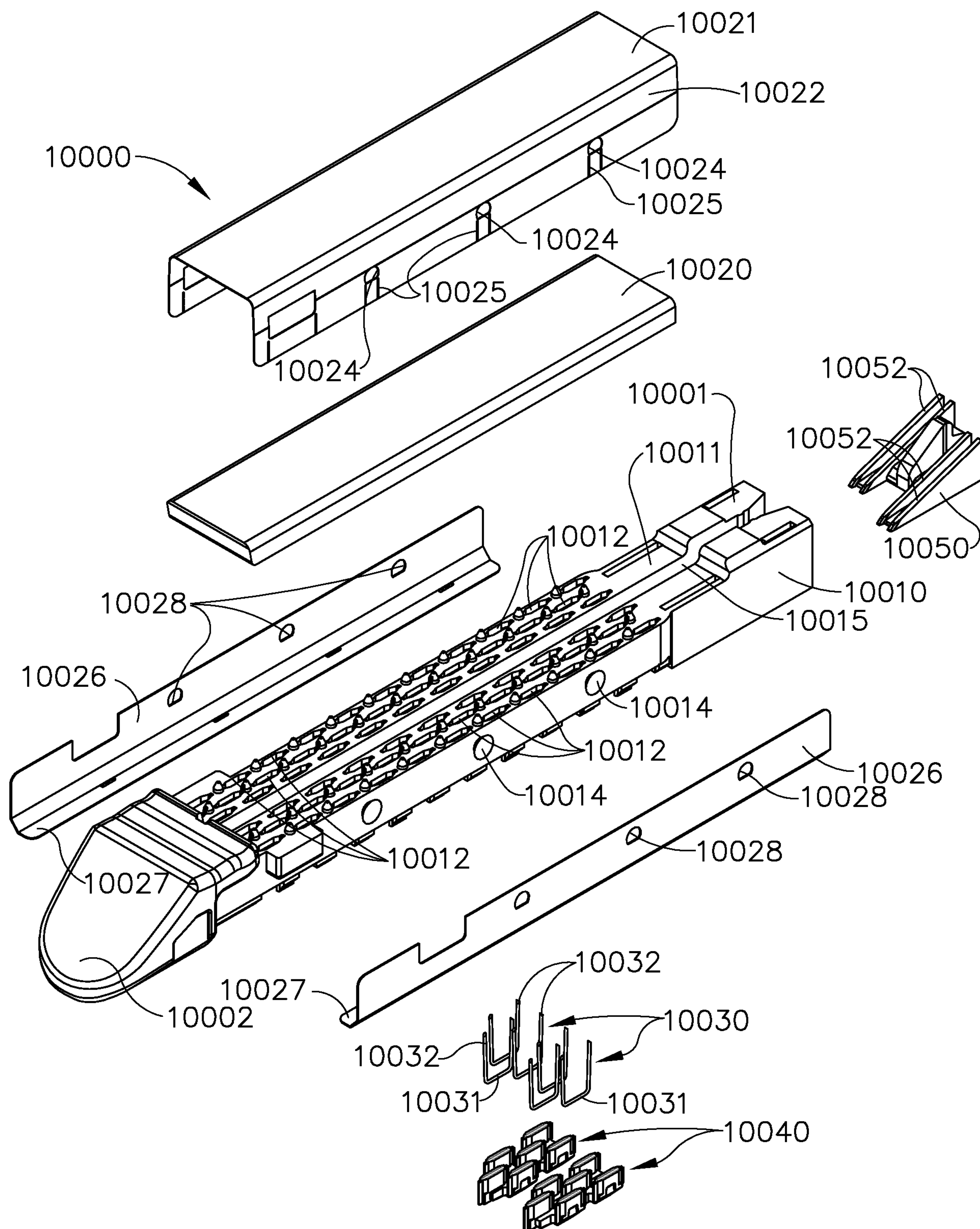


FIG. 218

128/222

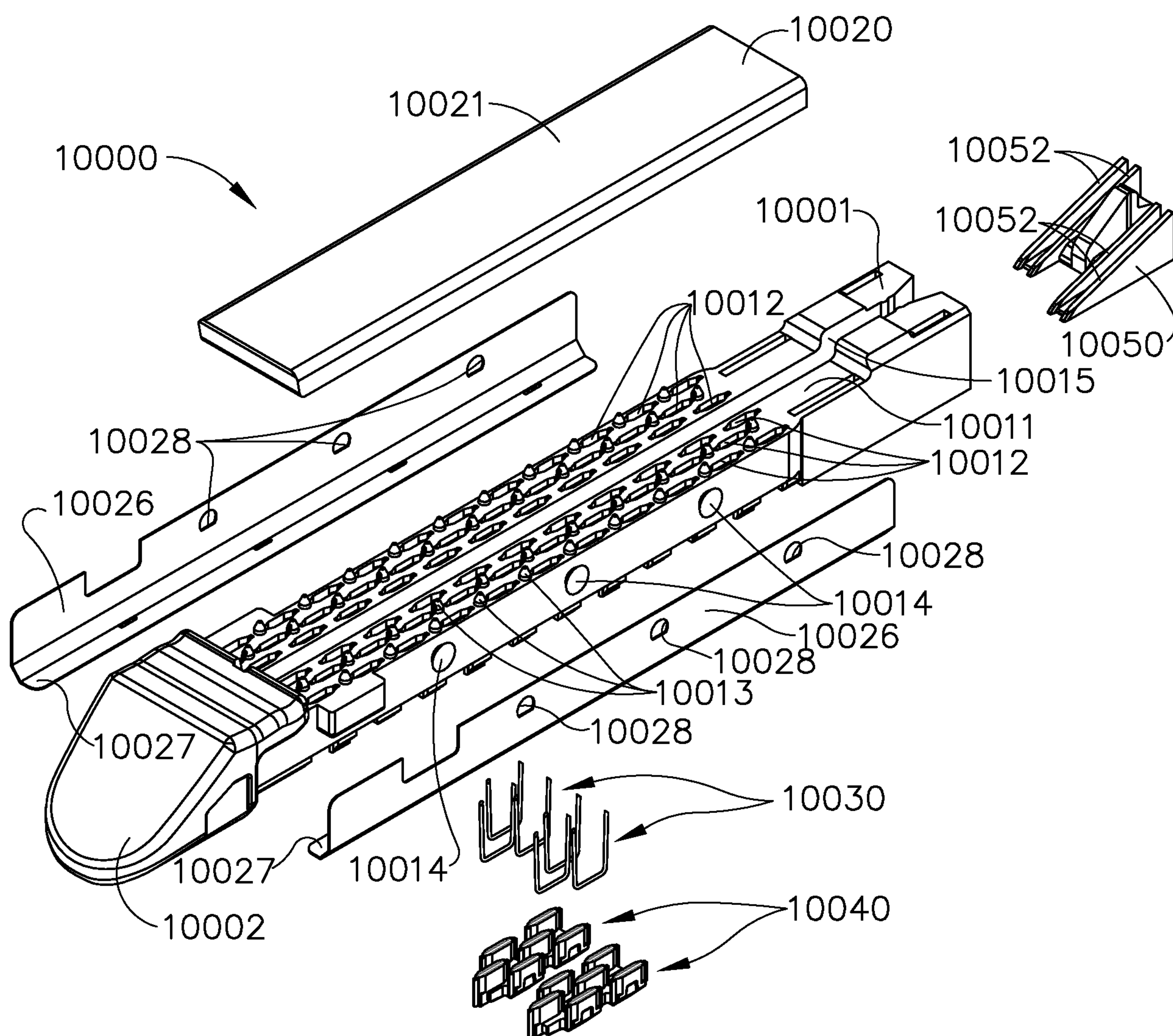


FIG. 219

129/222

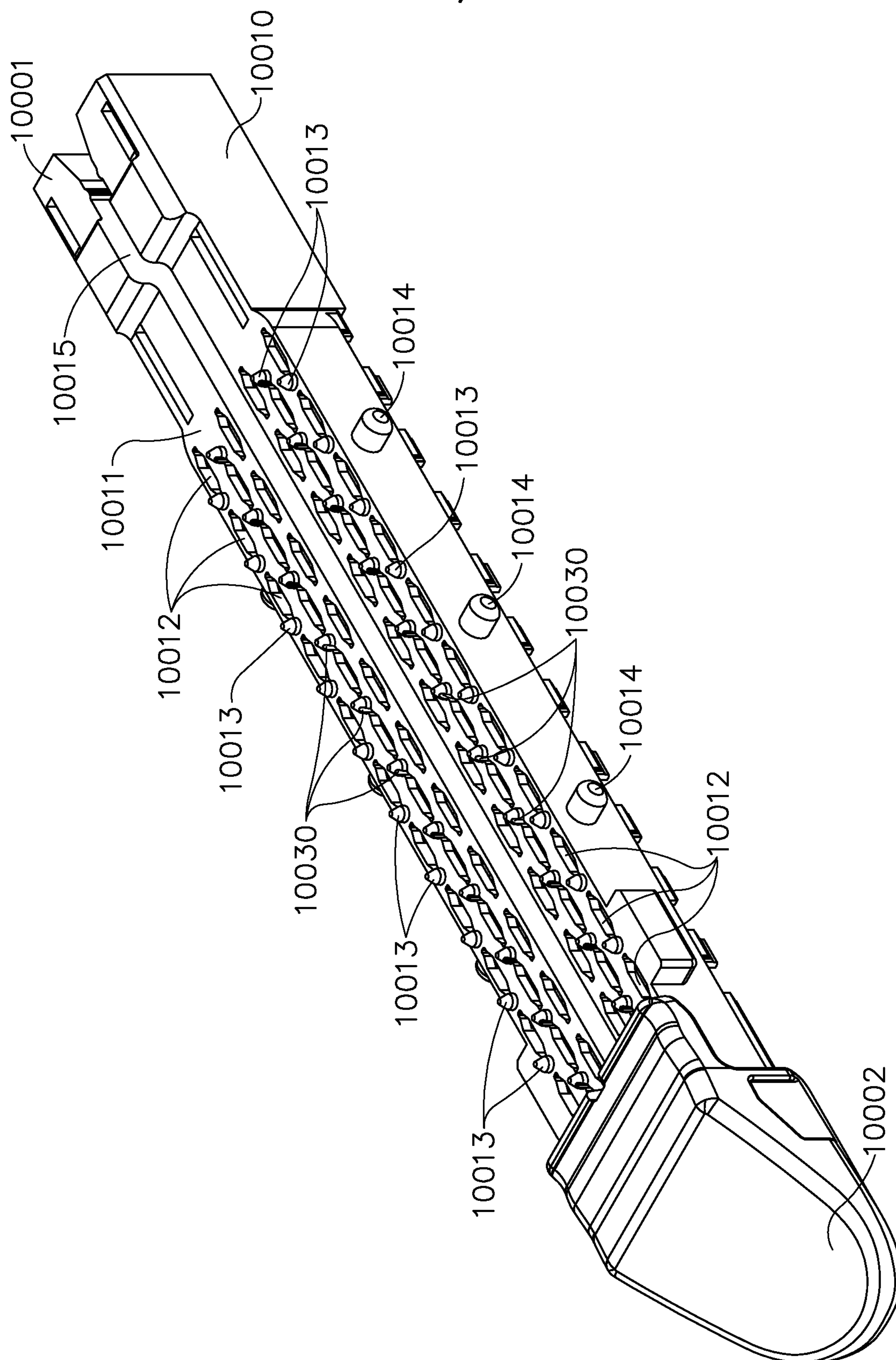


FIG. 220

130/222

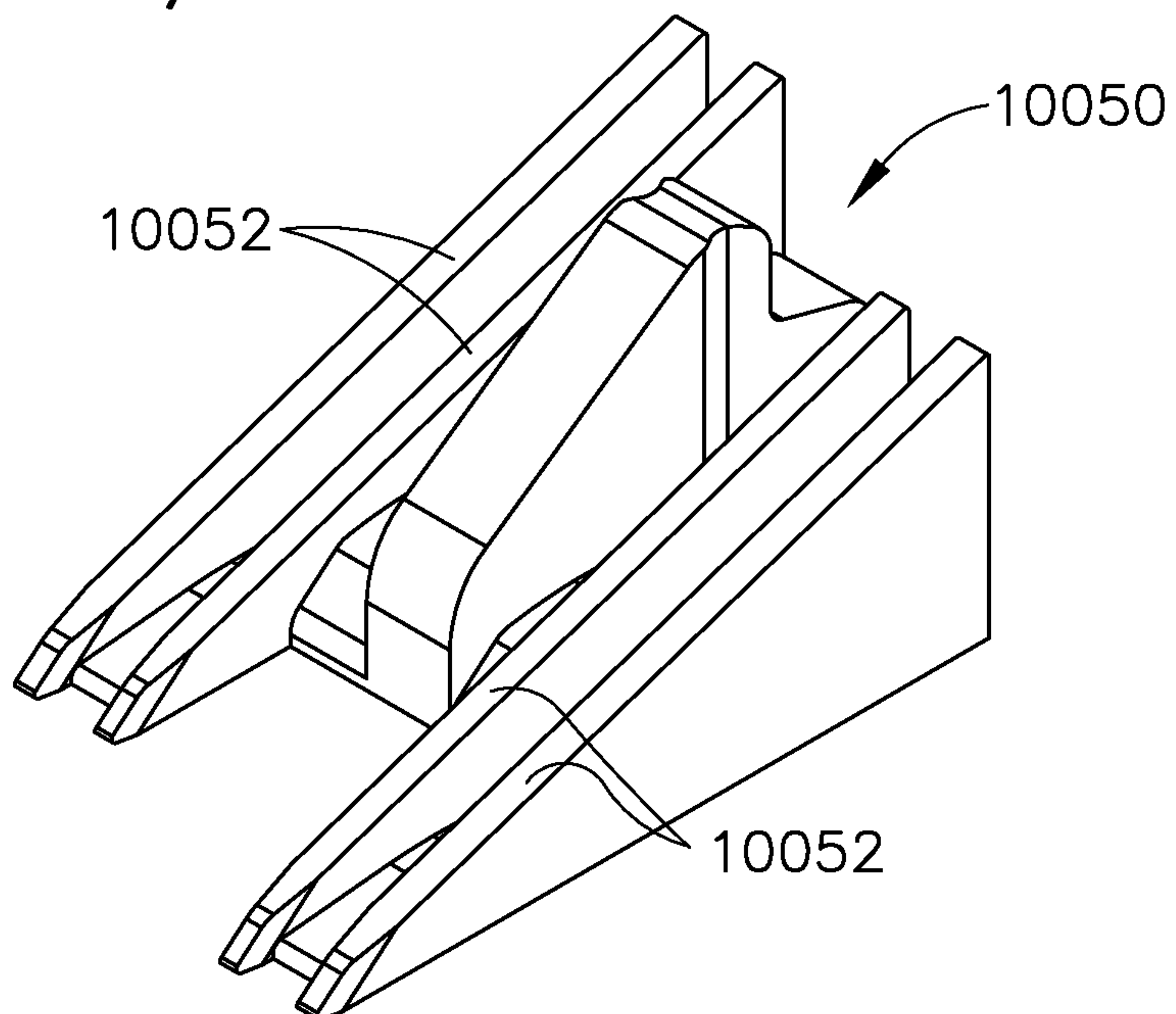


FIG. 221

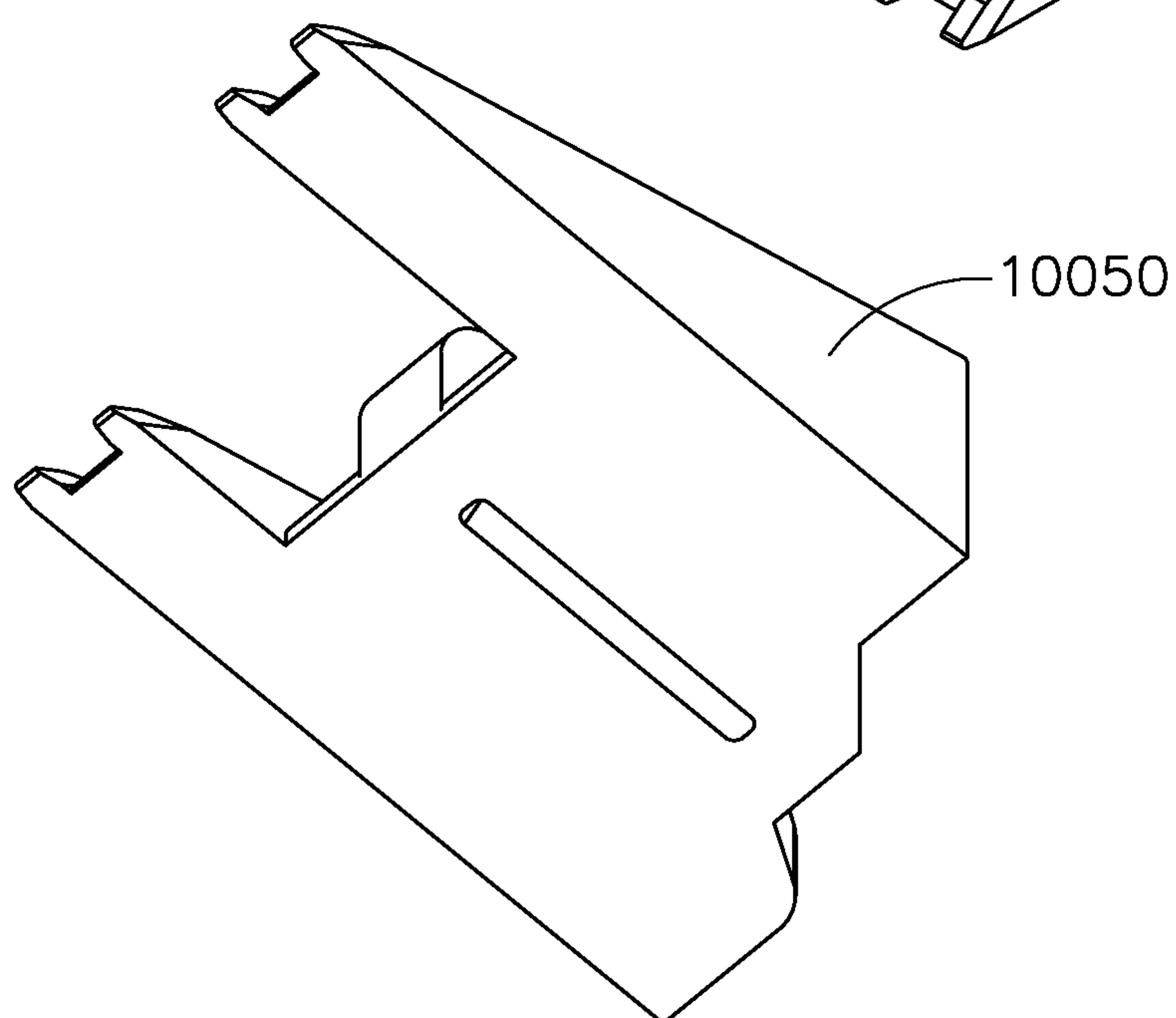


FIG. 222

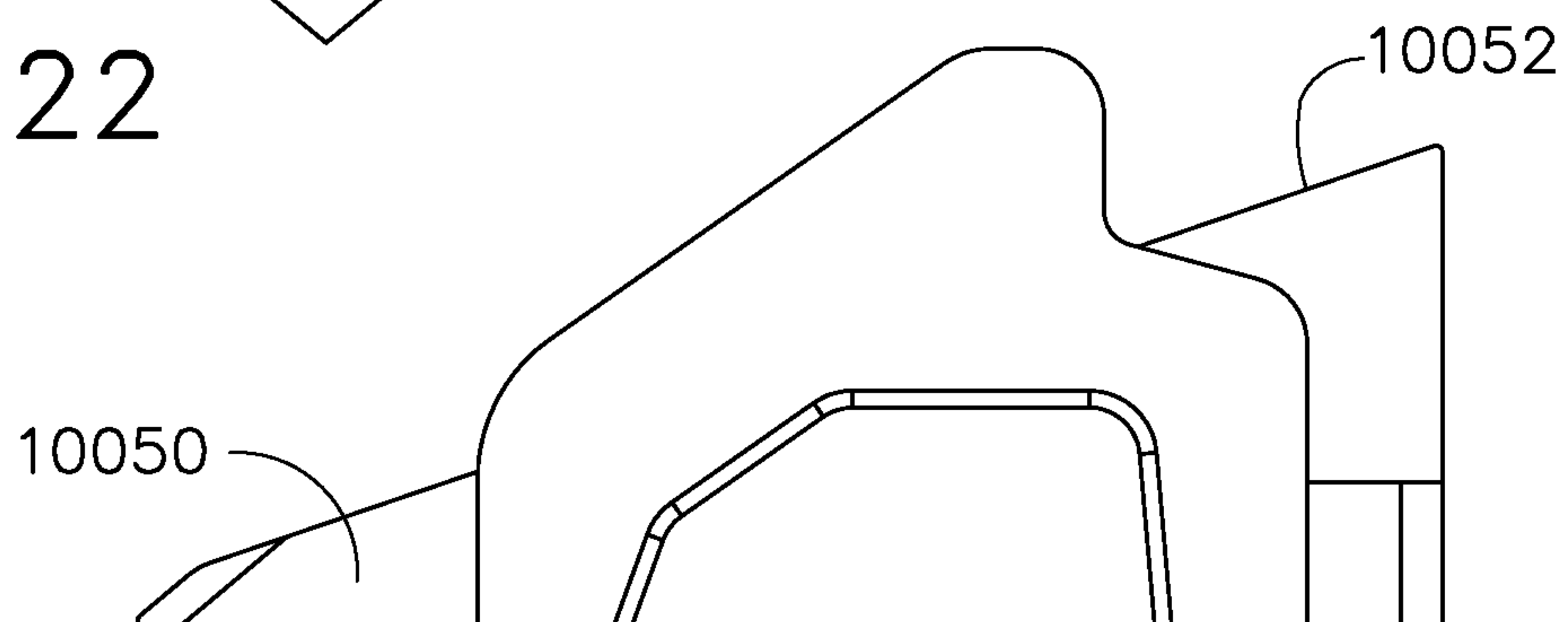


FIG. 223

131/222

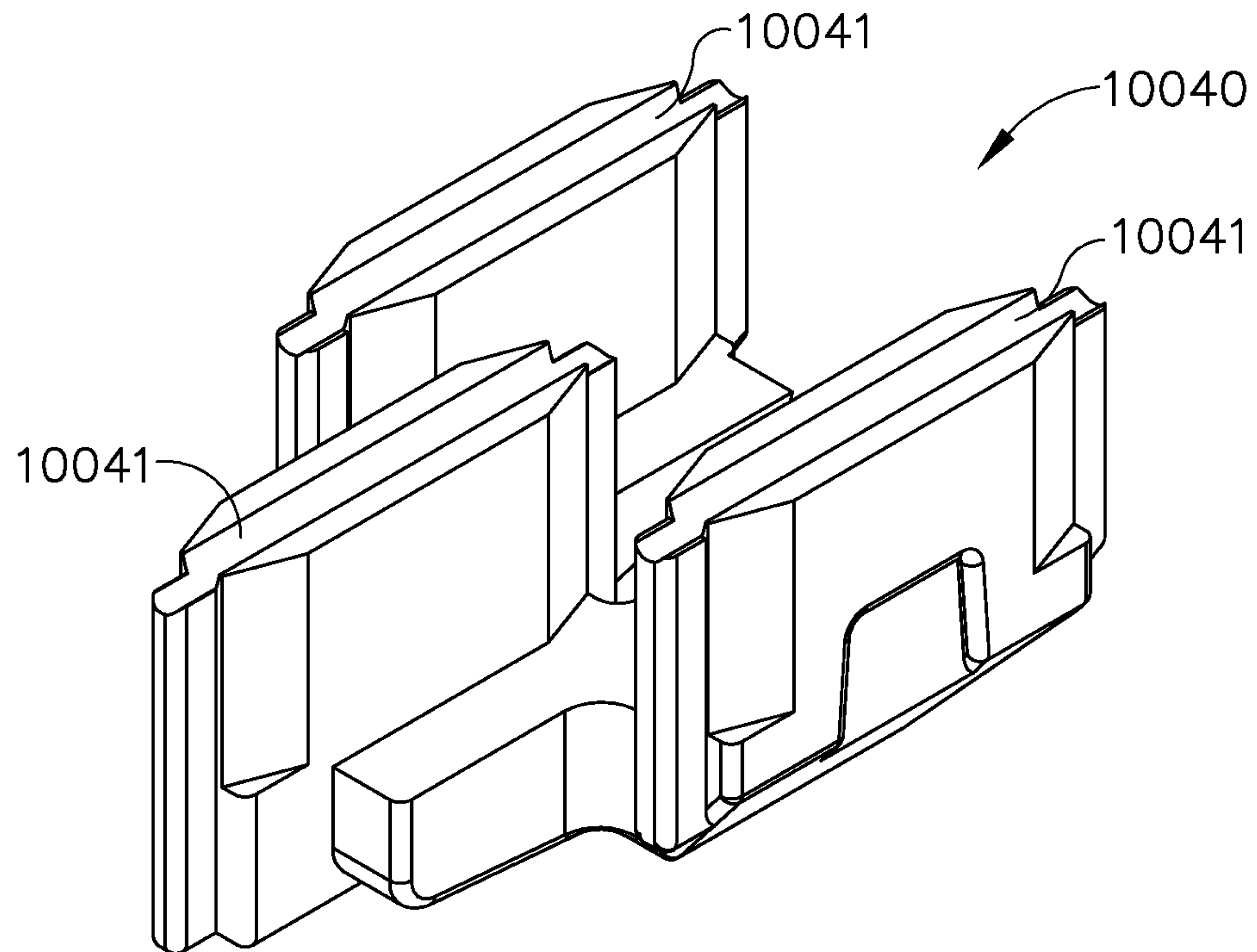


FIG. 224

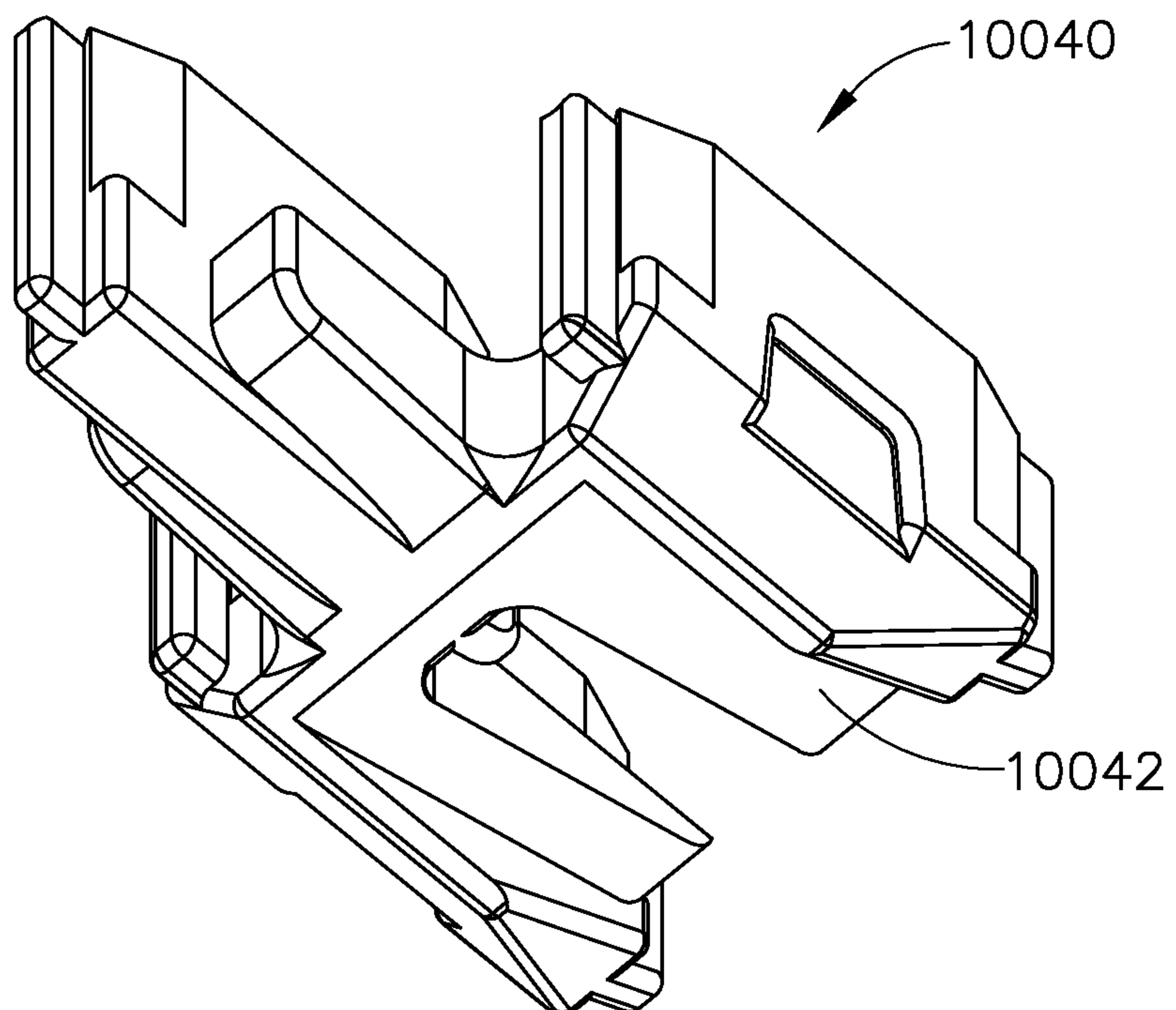


FIG. 225

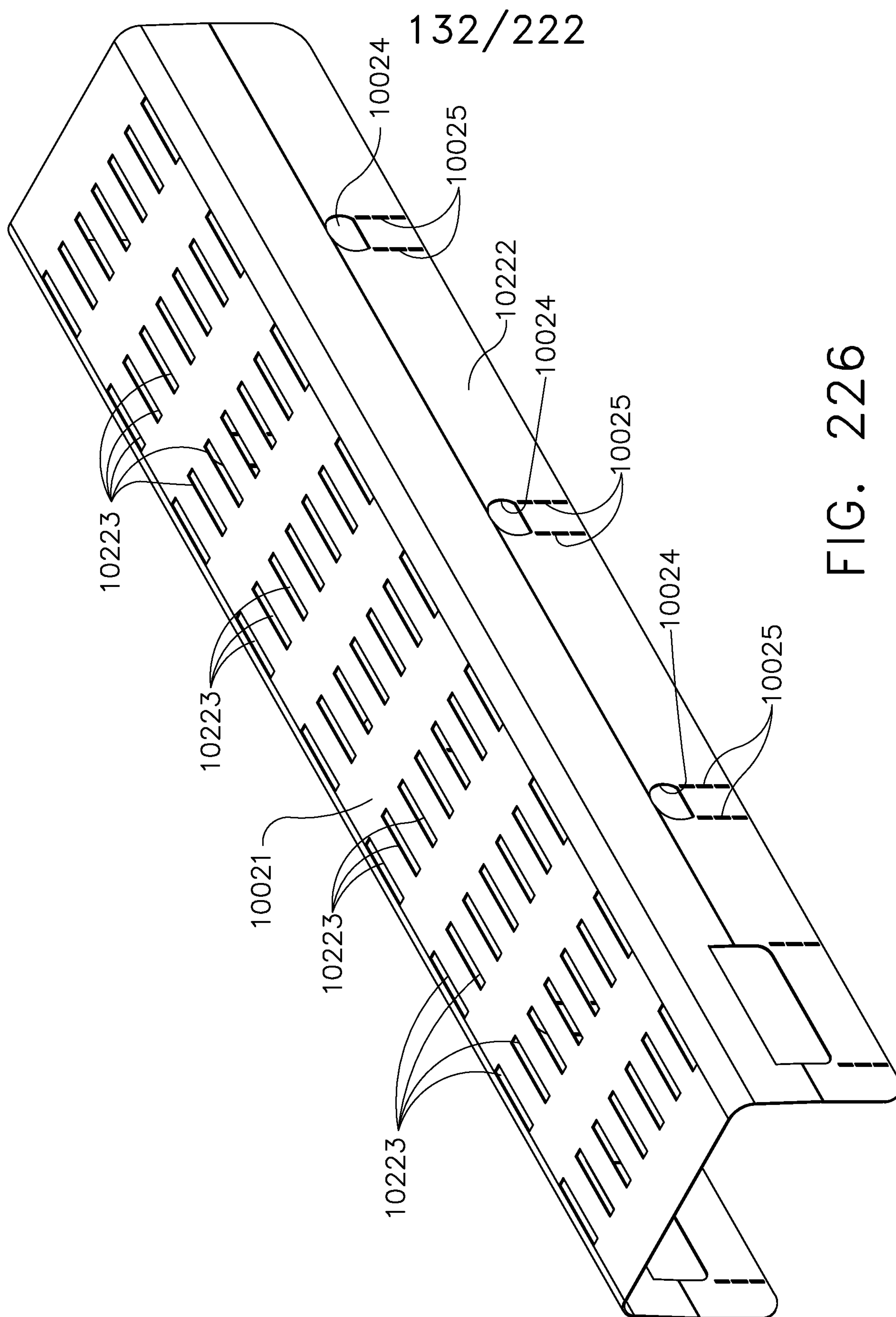
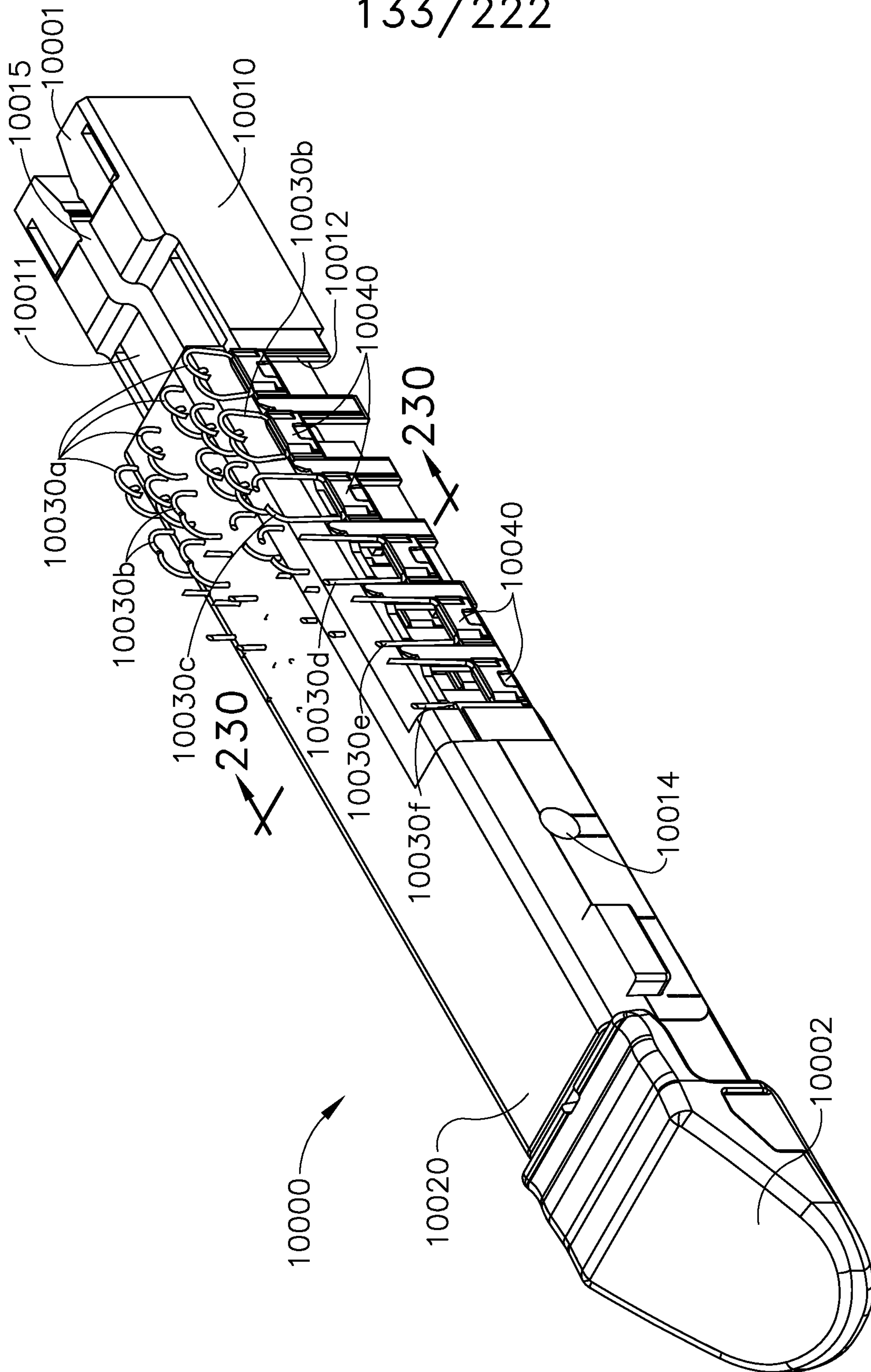


FIG. 226



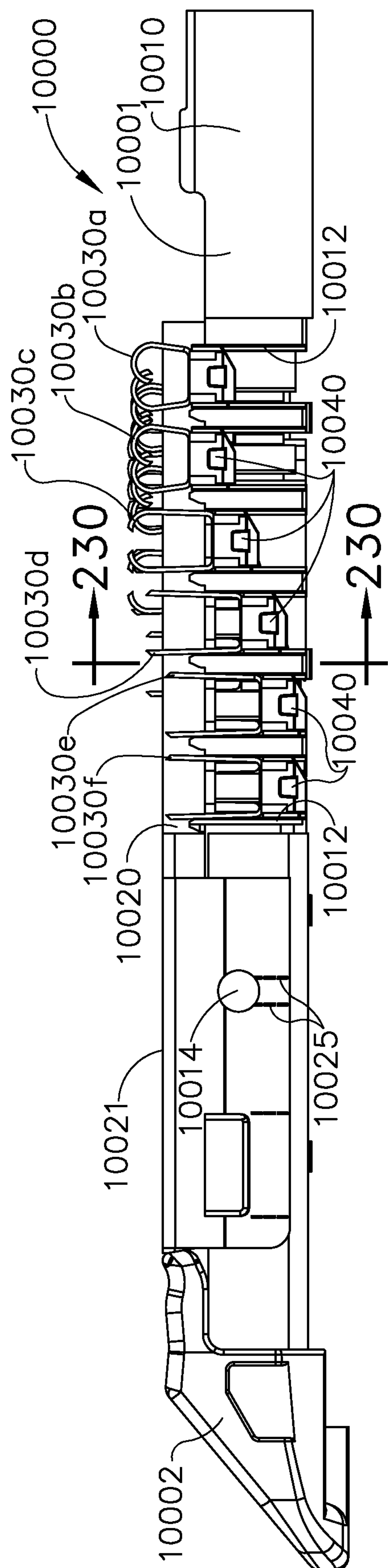


FIG. 228

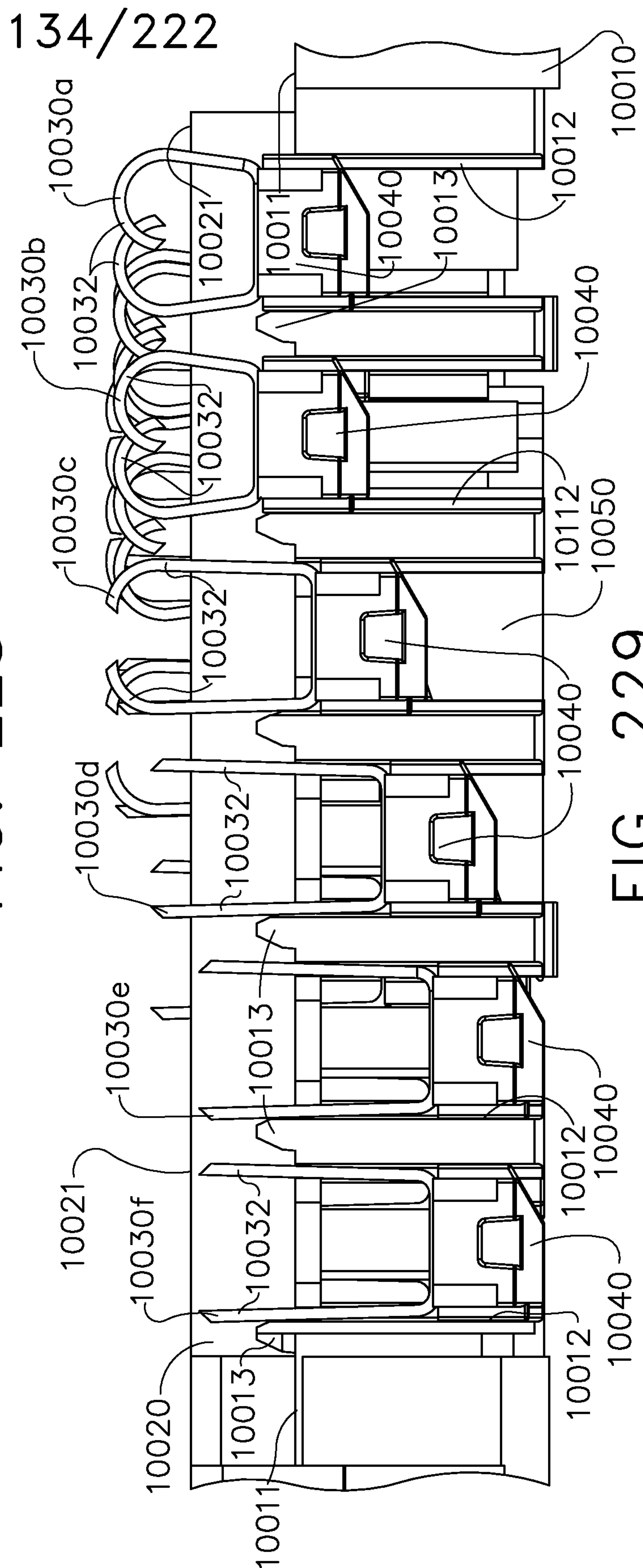


FIG. 229

135/222

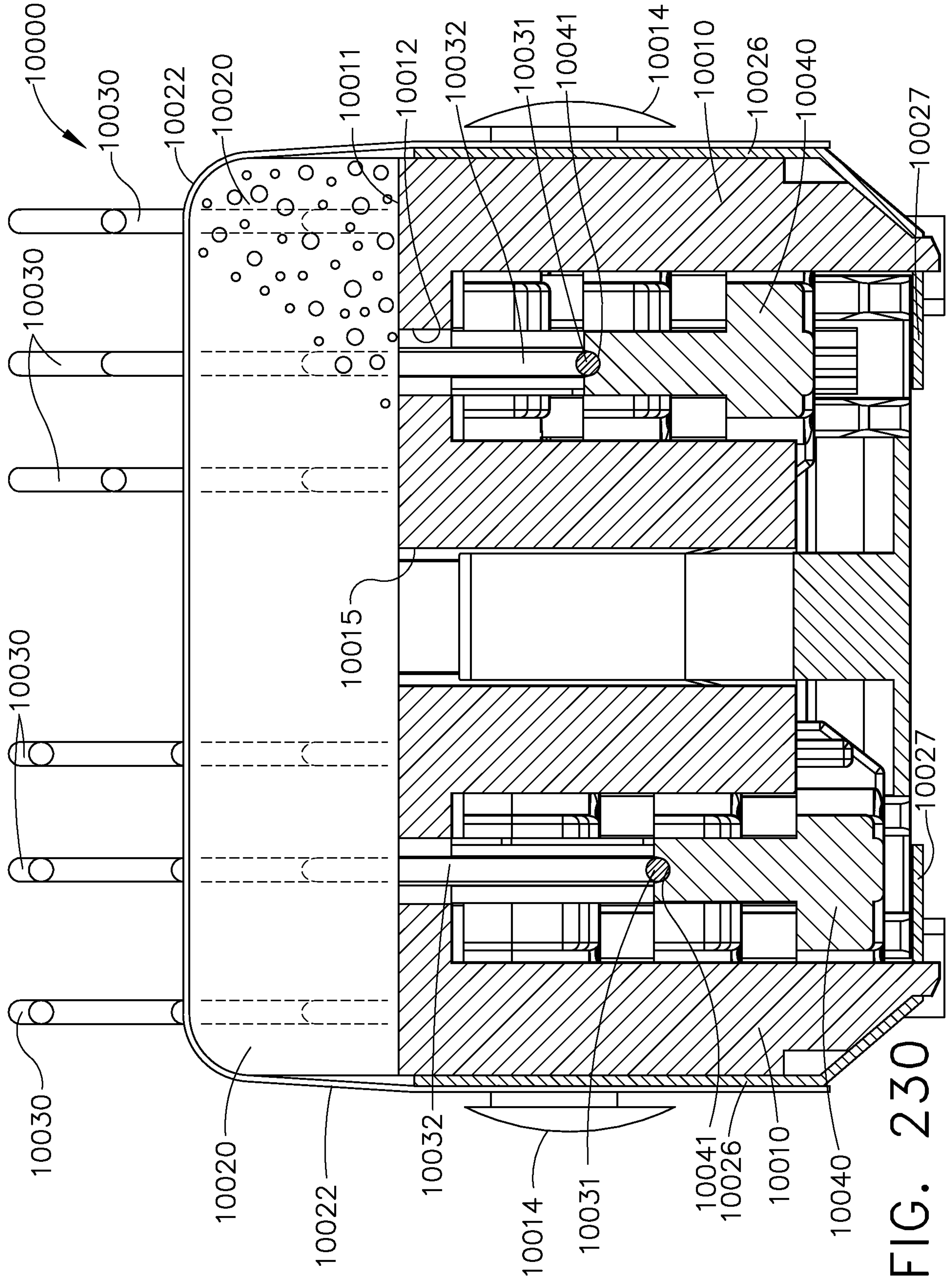


FIG. 230

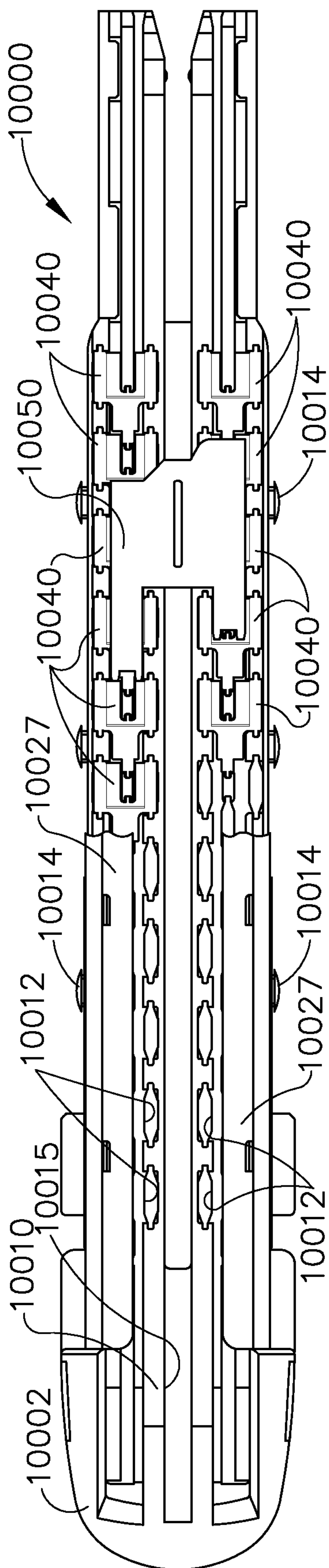


FIG. 231

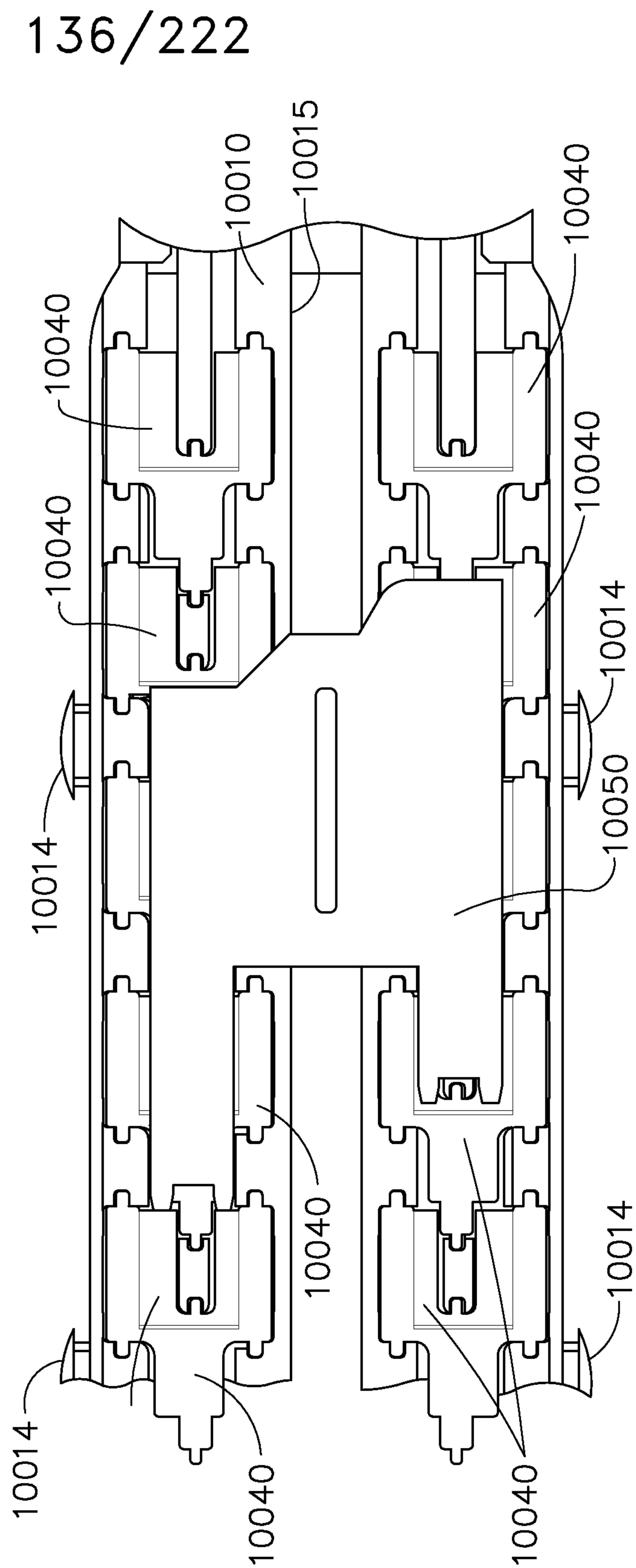


FIG. 232

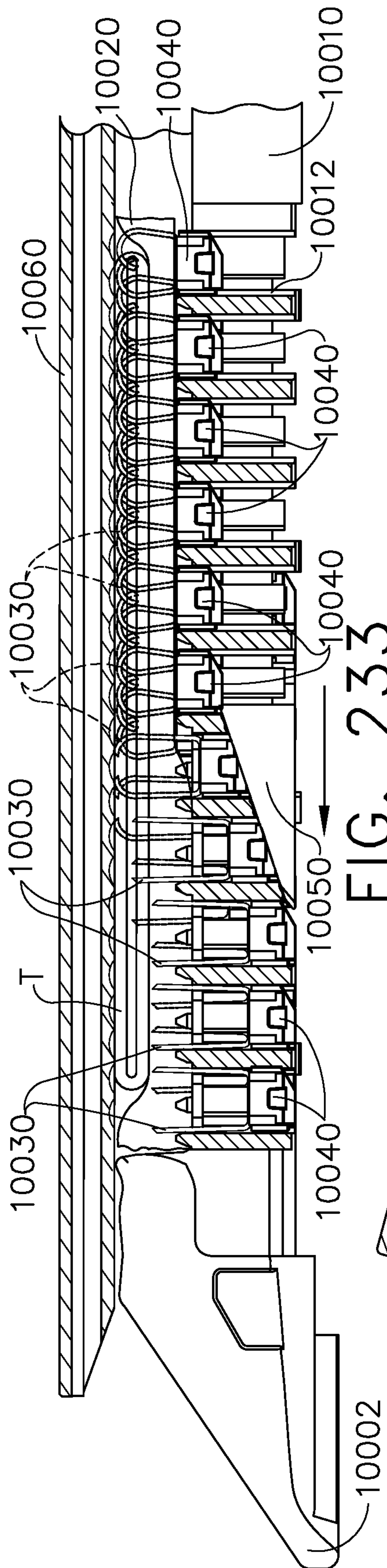


FIG. 233

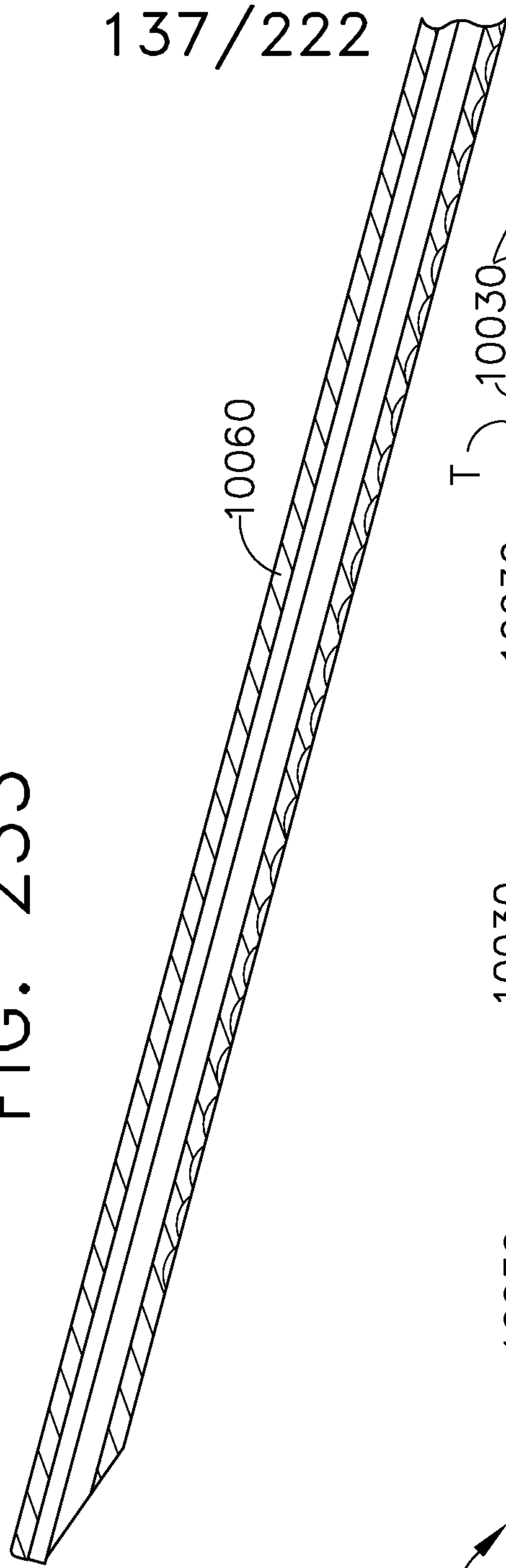


FIG. 234

137/222

138/222

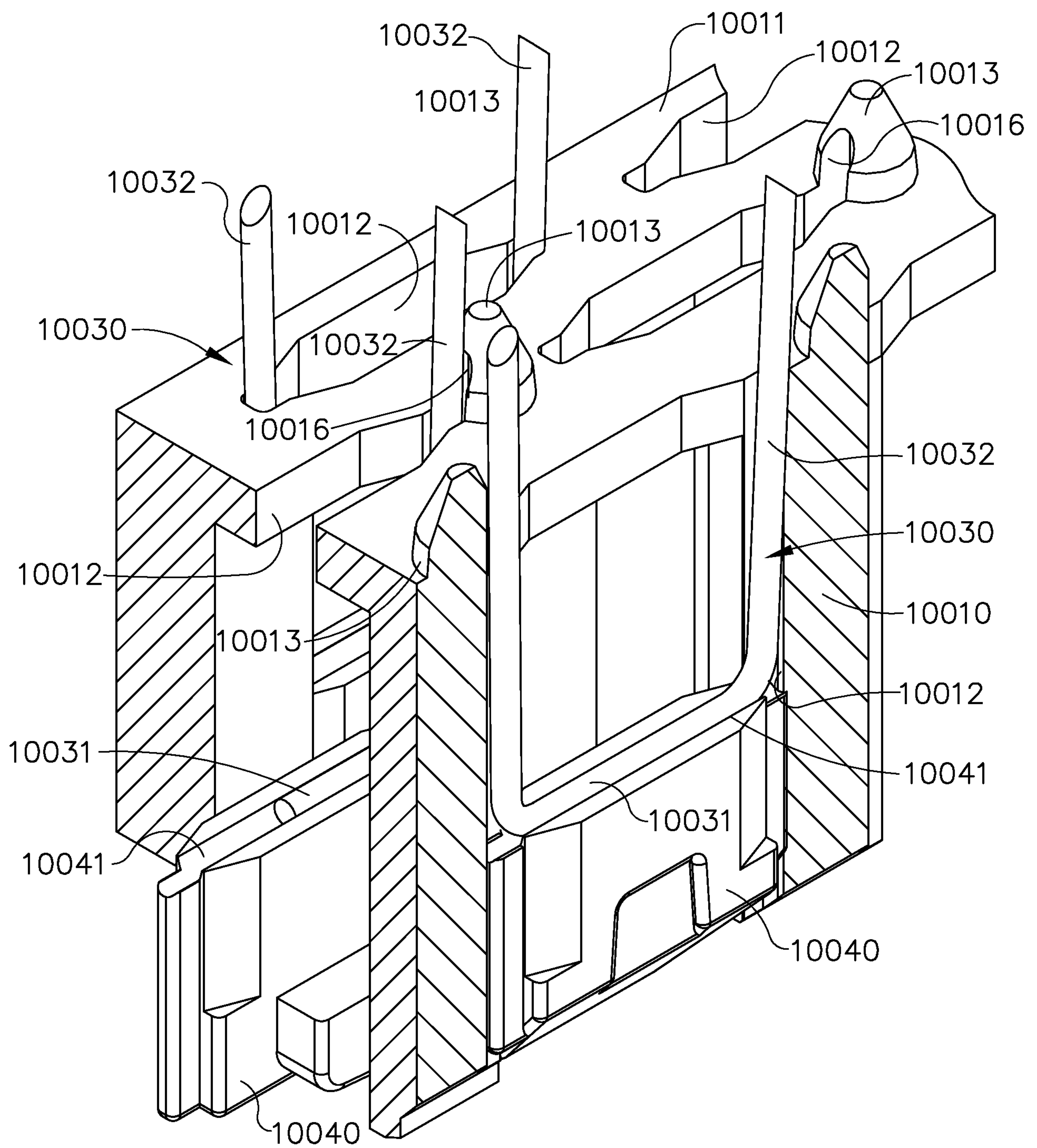


FIG. 235

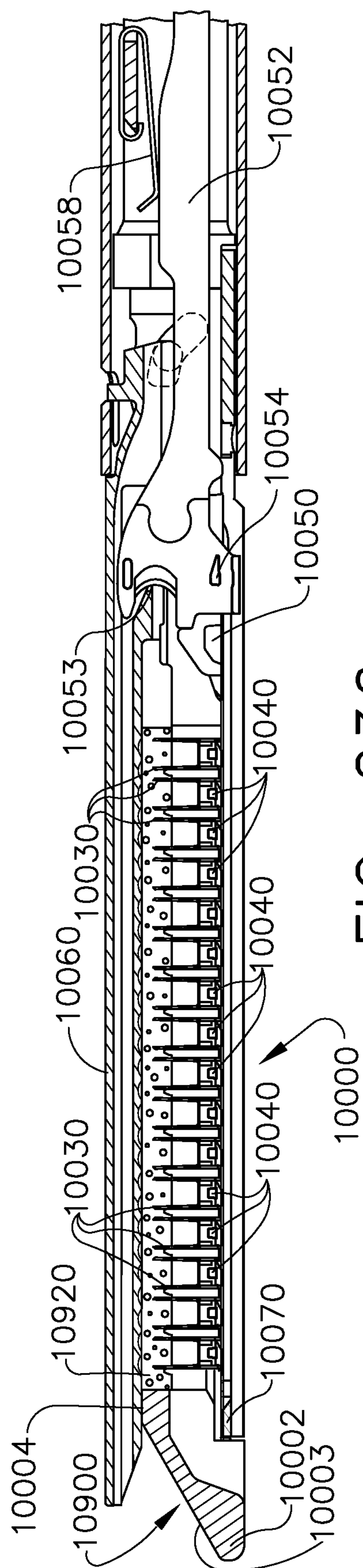


FIG. 236

139/222

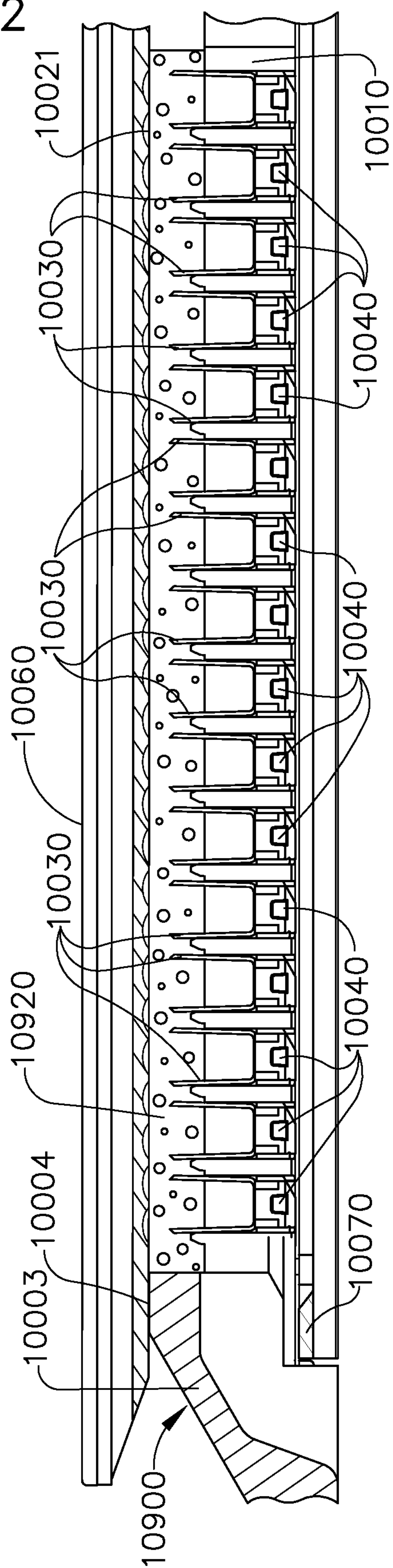


FIG. 237

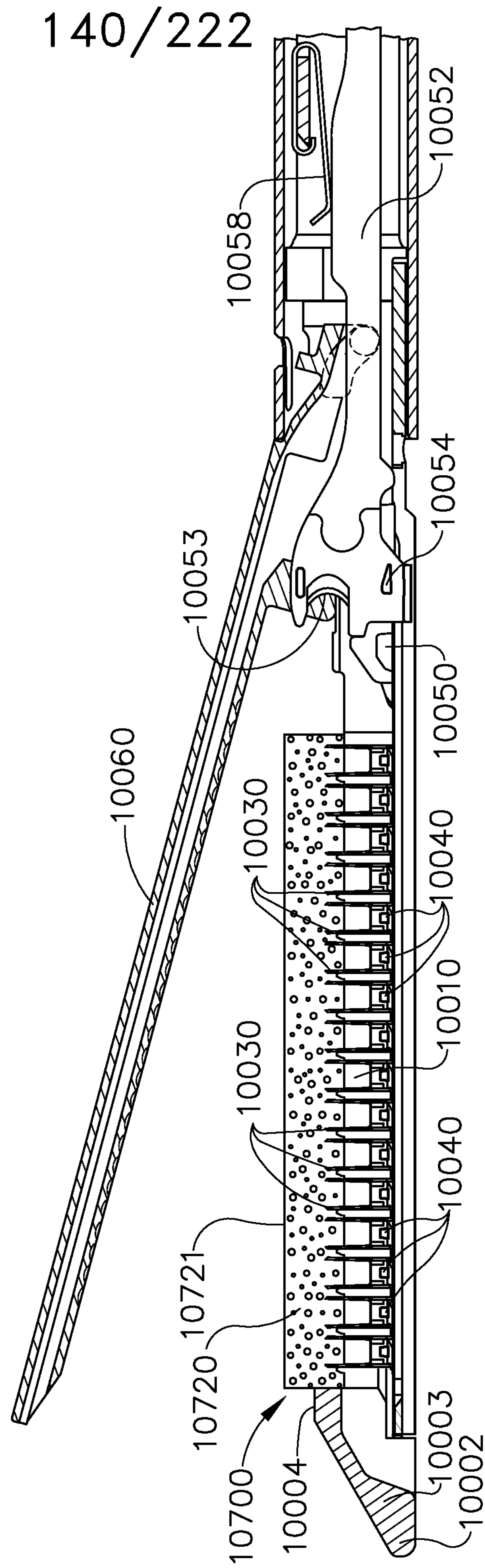
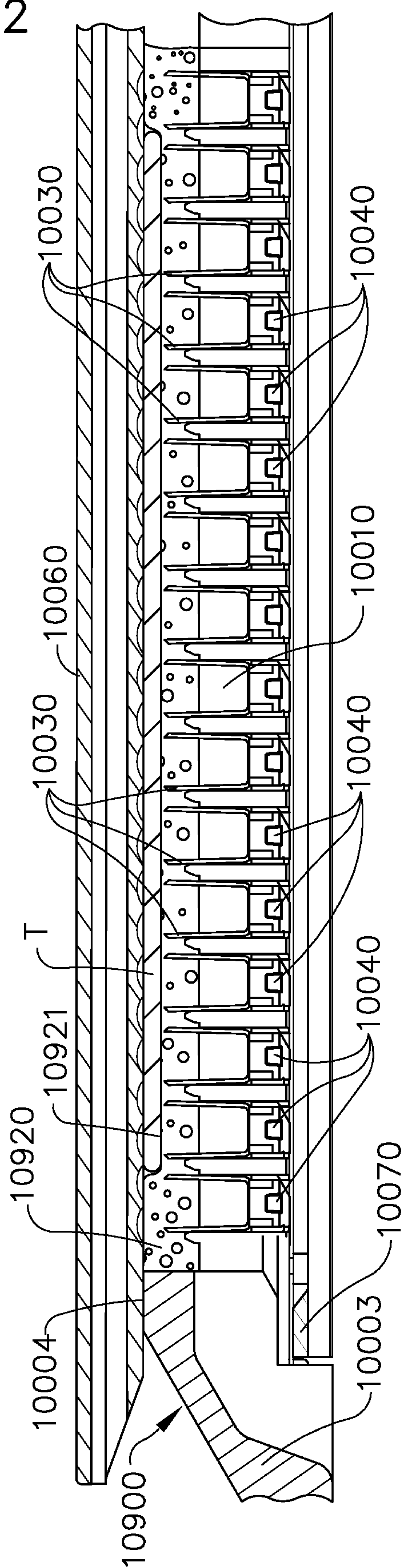
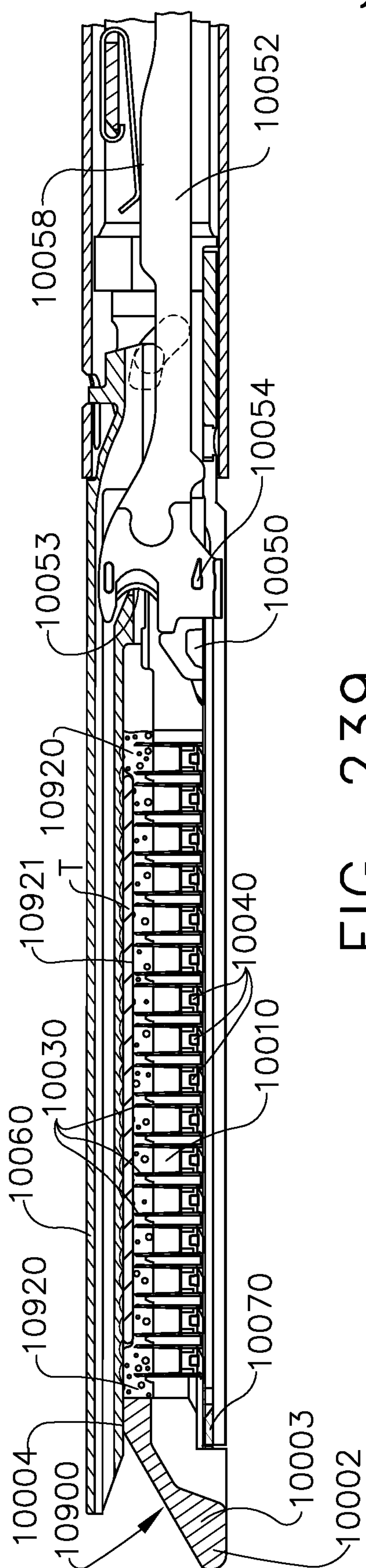


FIG. 238



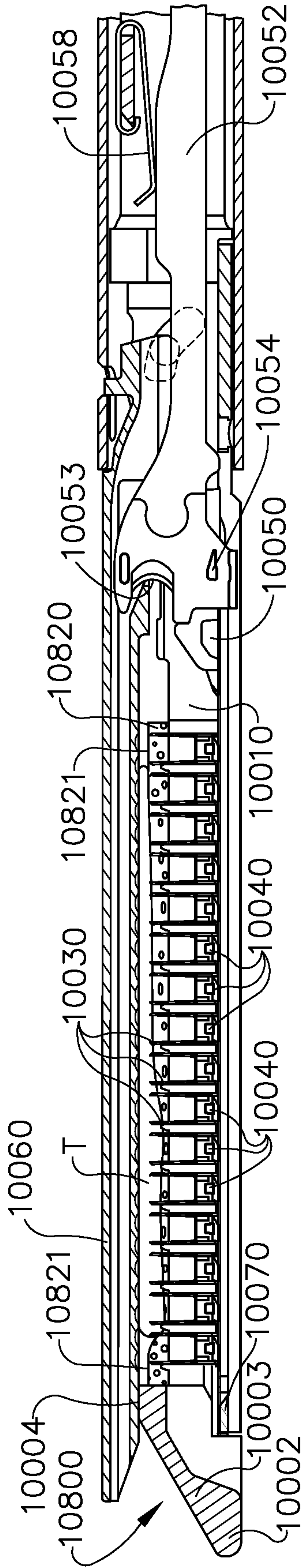


FIG. 243

143/222

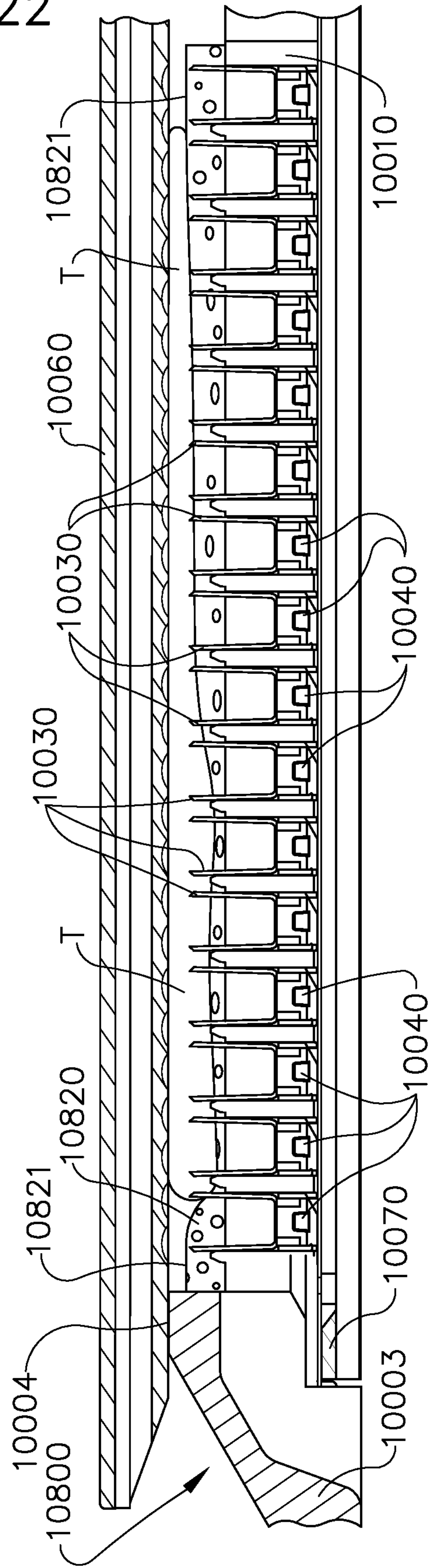


FIG. 244

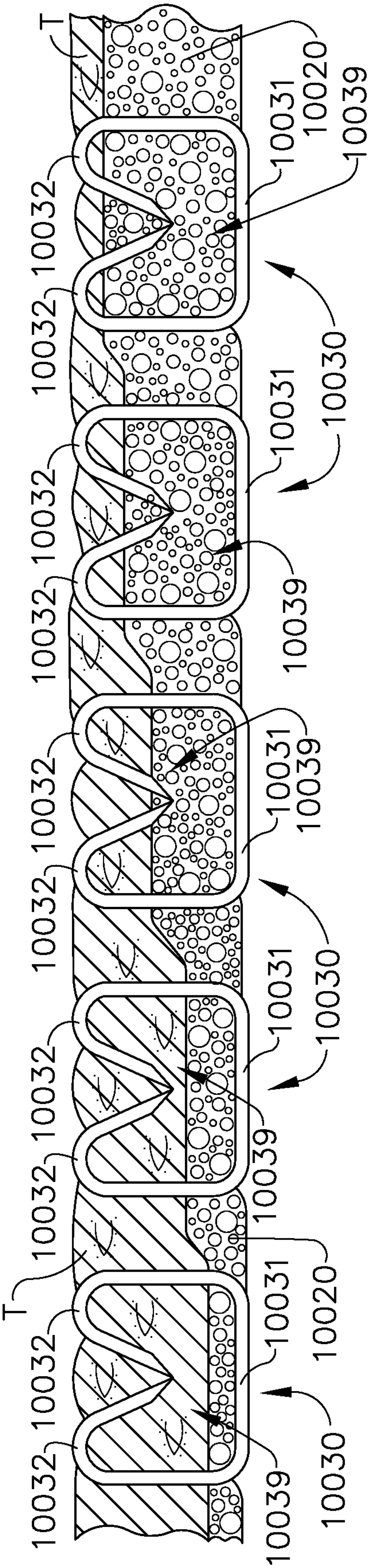


FIG. 245

144/222

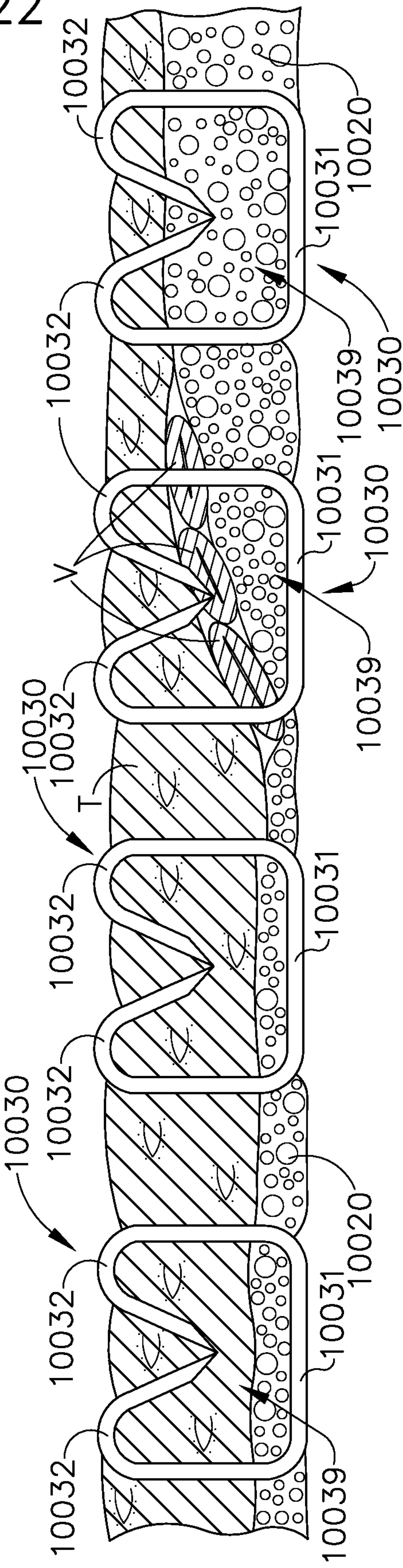


FIG. 246

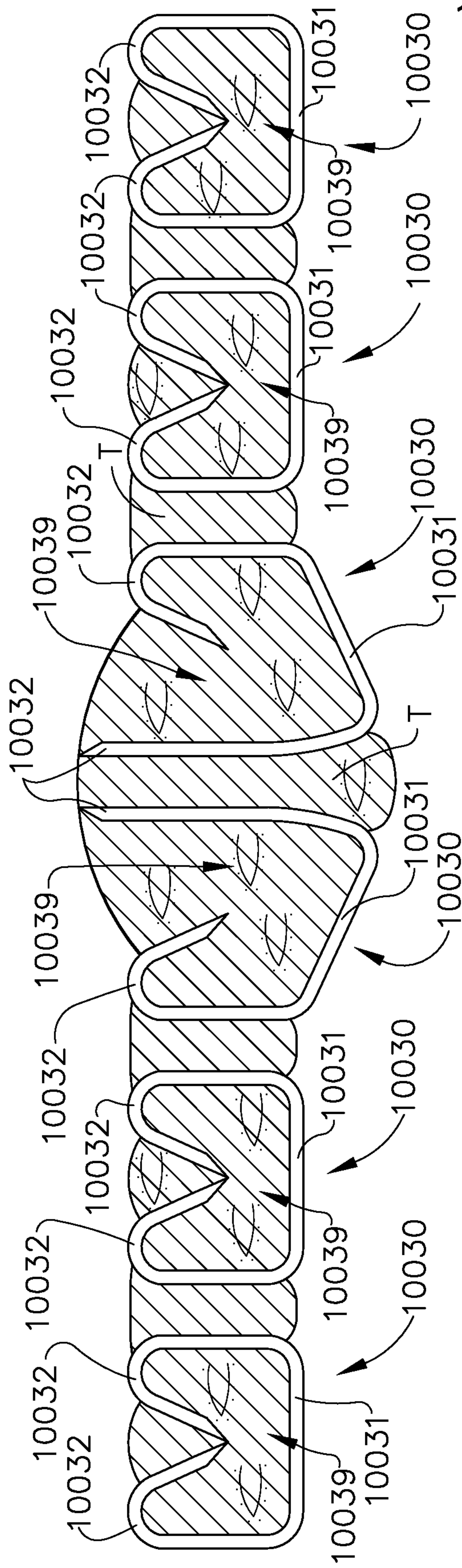


FIG. 247

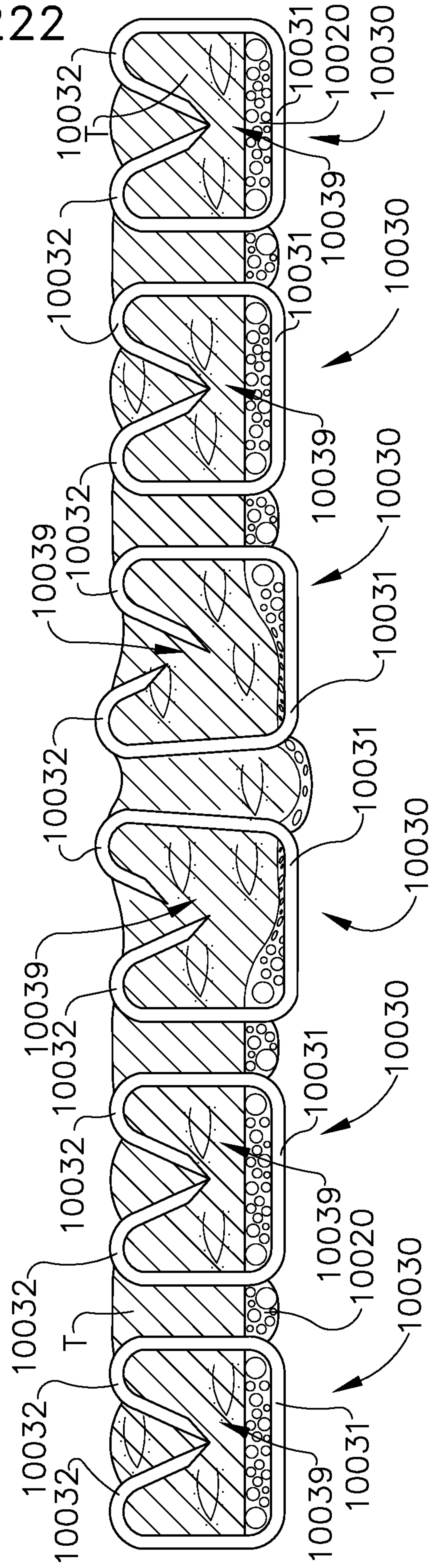


FIG. 248

145/222

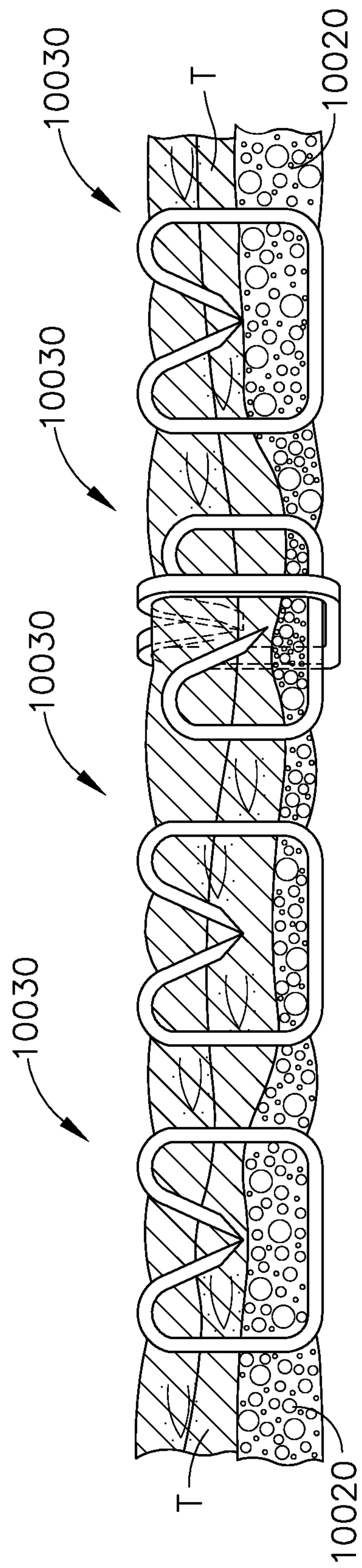


FIG. 249

1 46 / 222

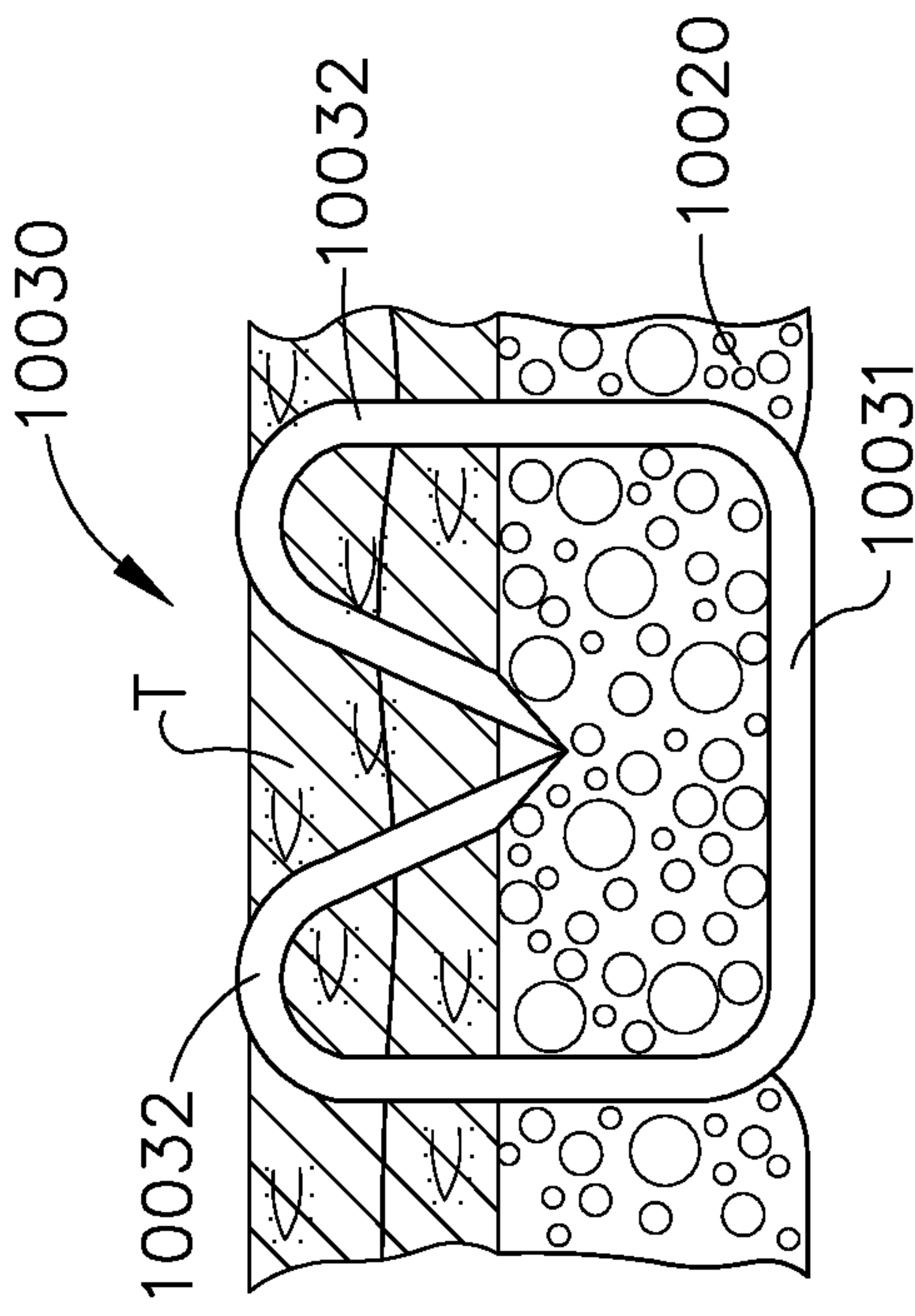


FIG. 251

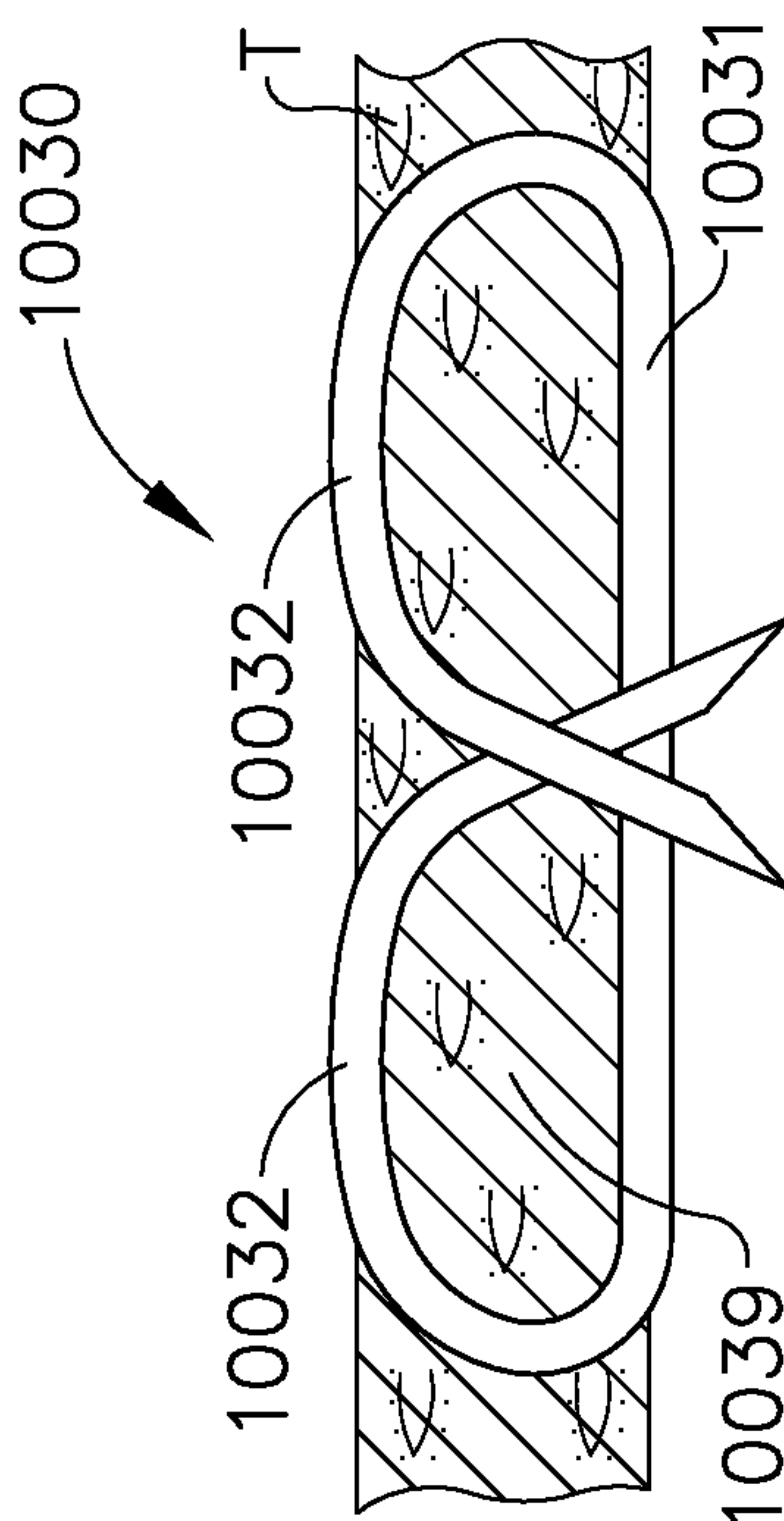


FIG. 250

147/222

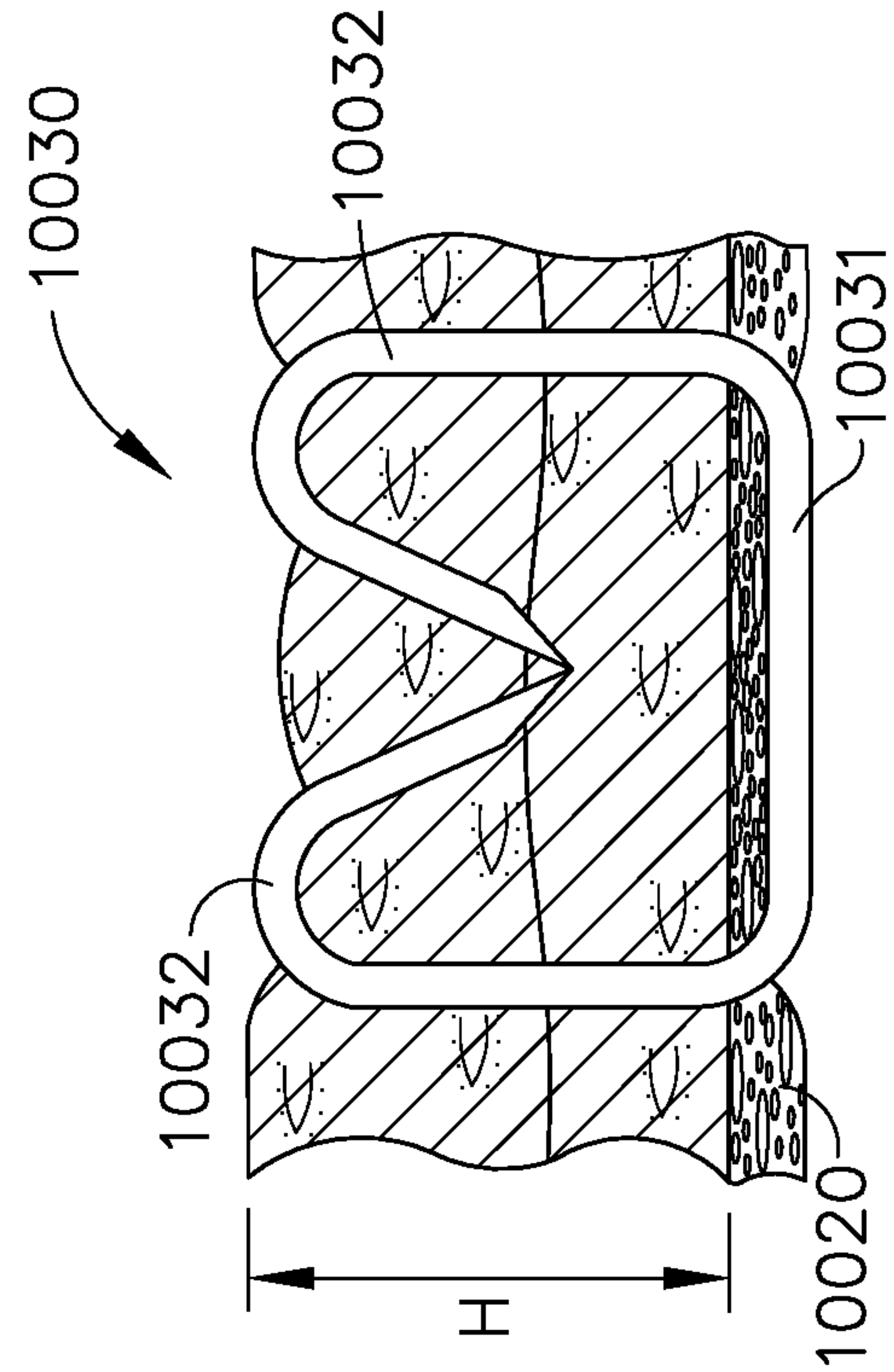


FIG. 253

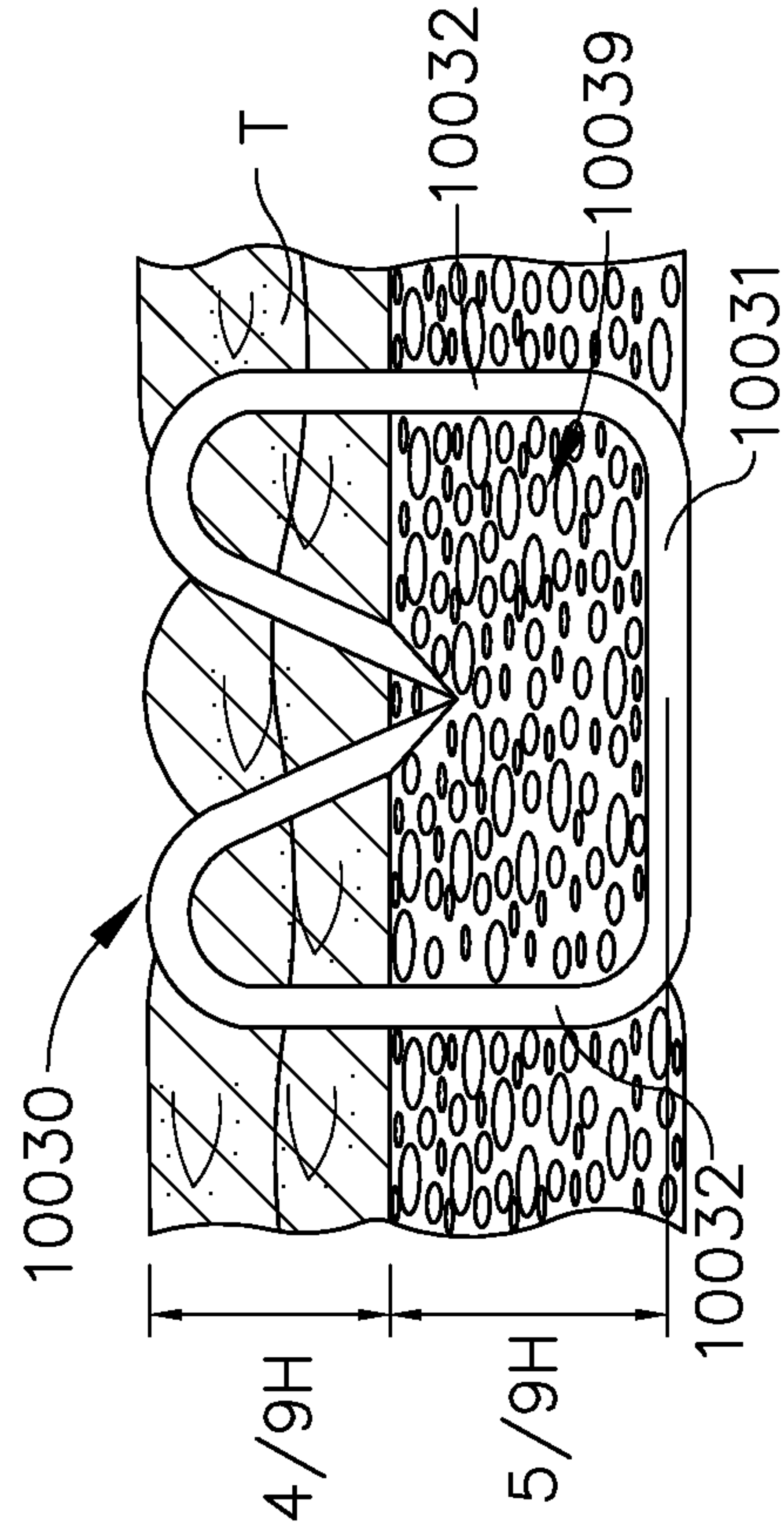


FIG. 255

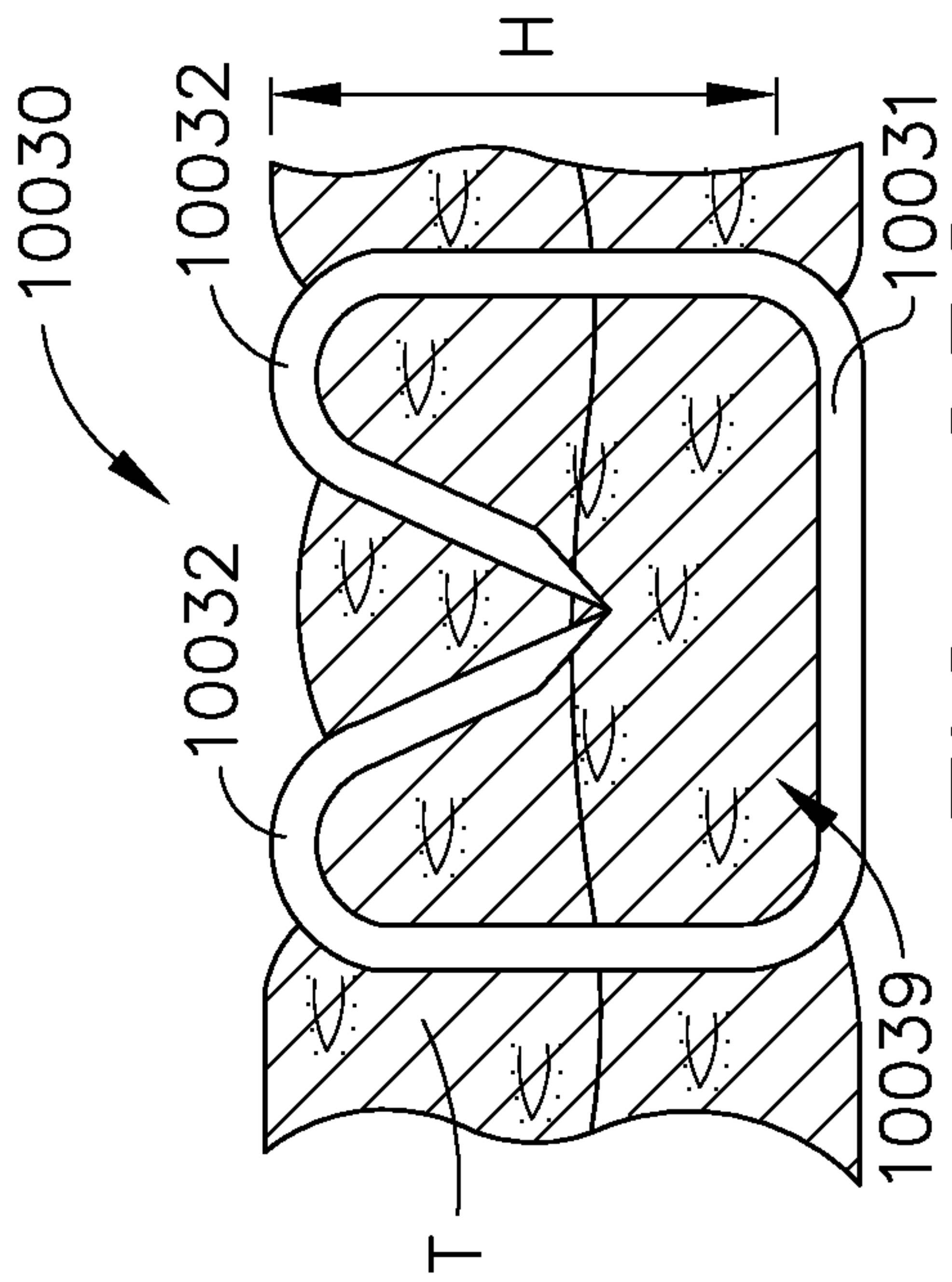


FIG. 252

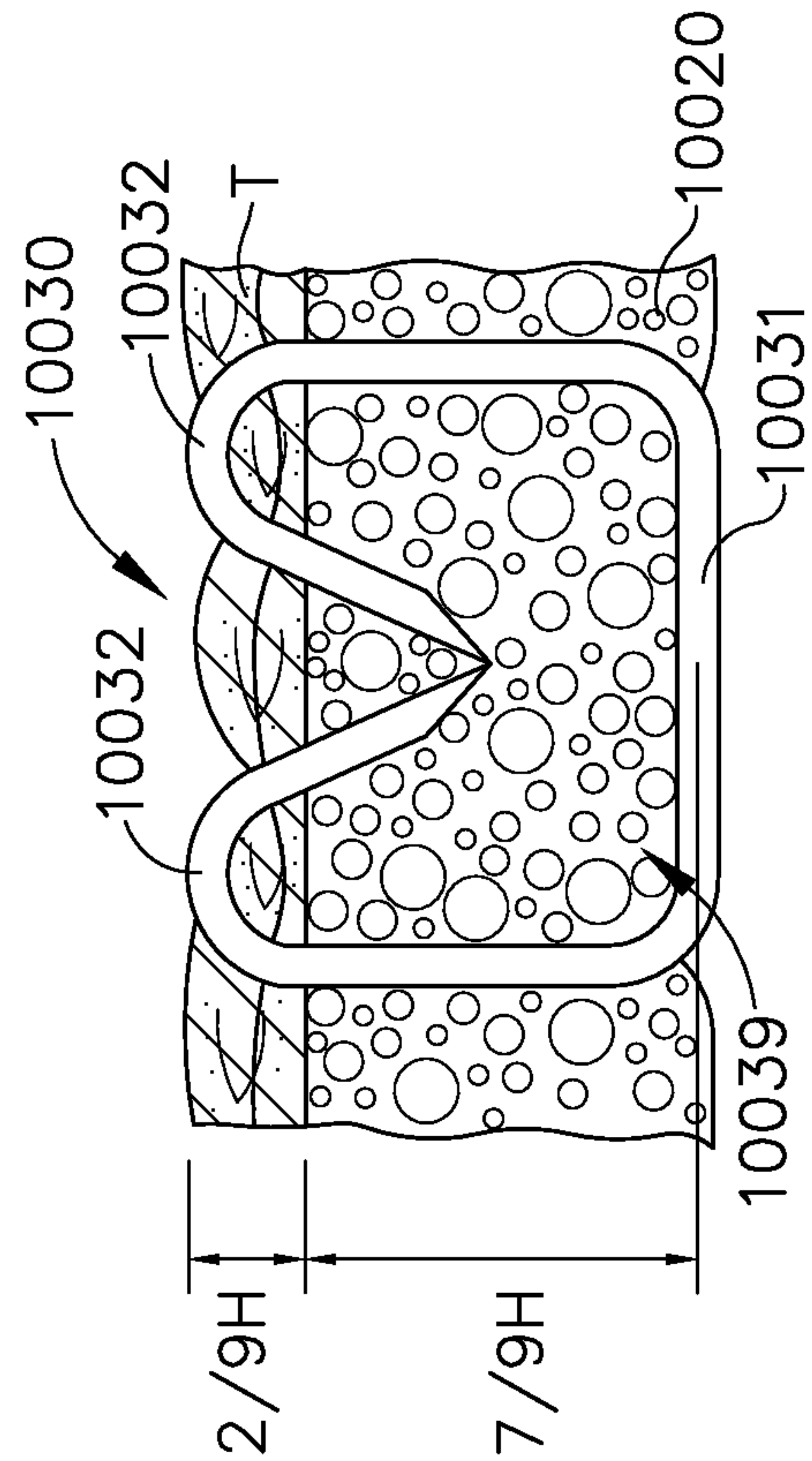


FIG. 254

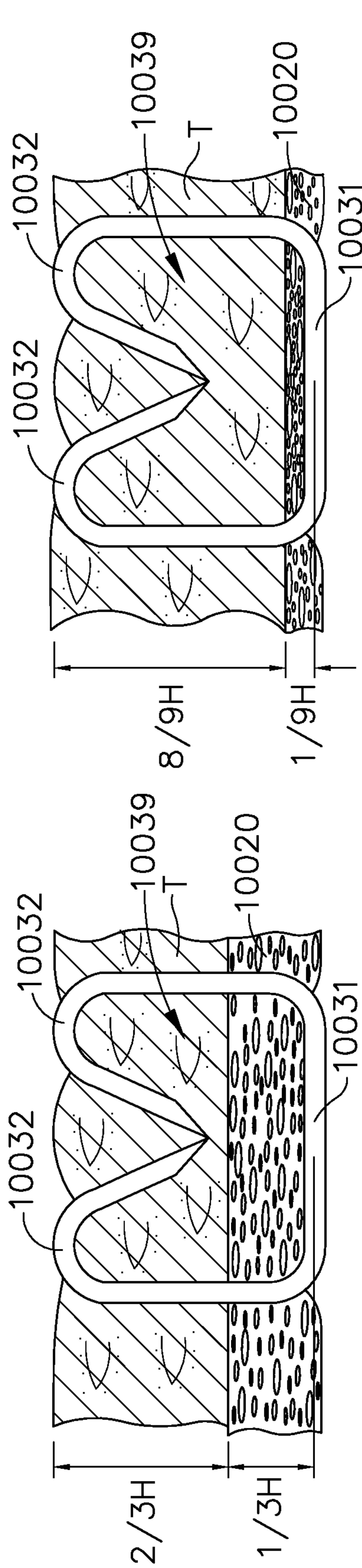


FIG. 256

FIG. 257

148/222

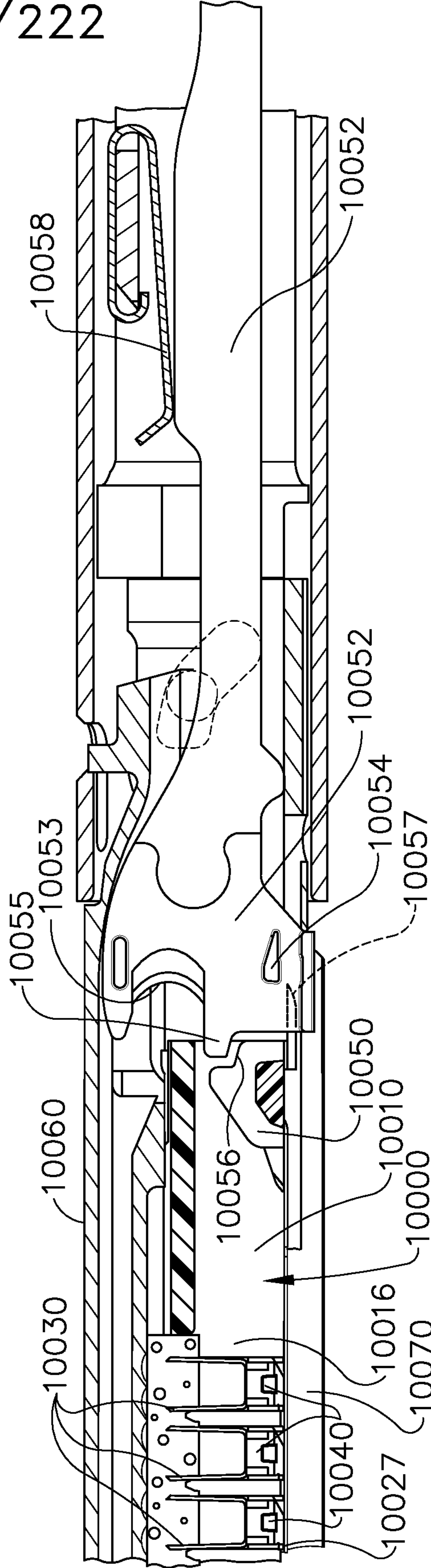


FIG. 258

149/222

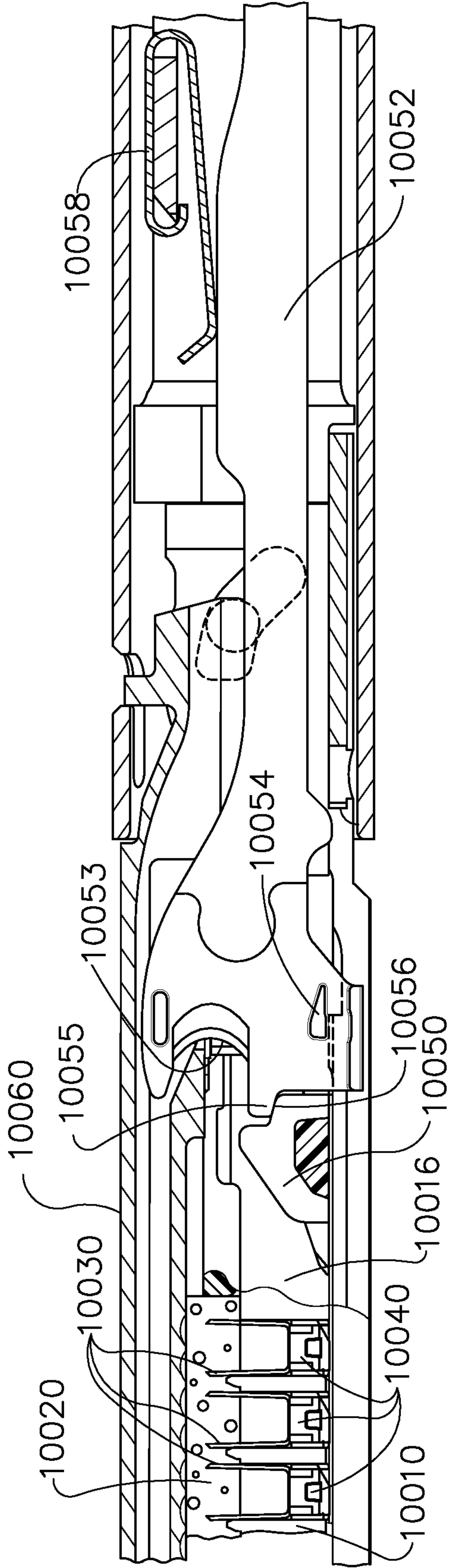


FIG. 259

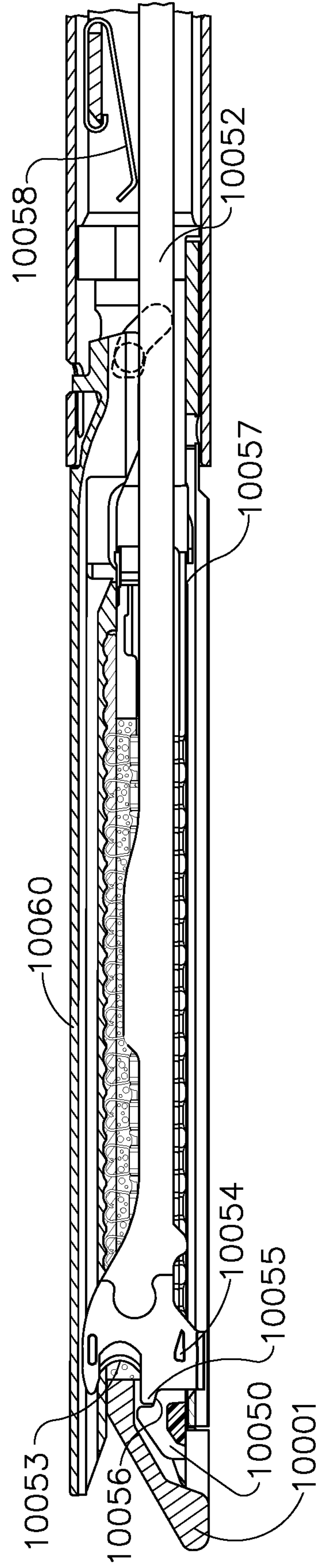


FIG. 260

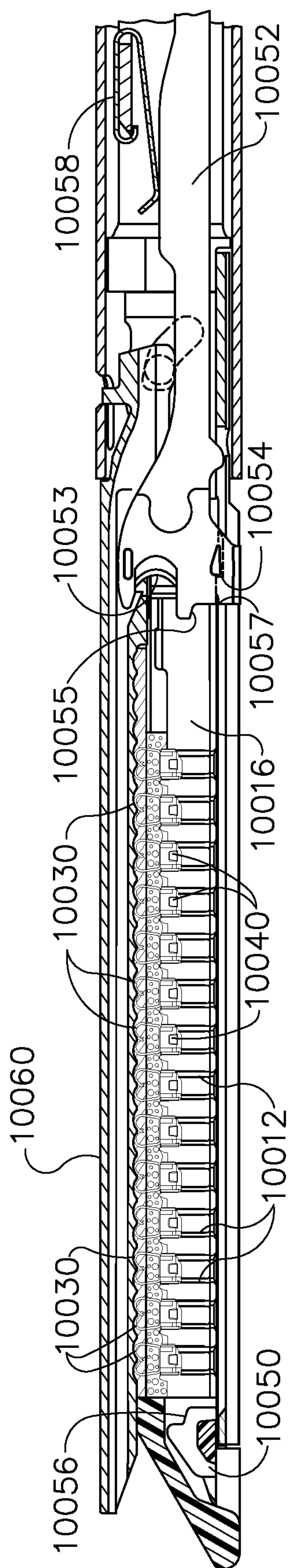


FIG. 261

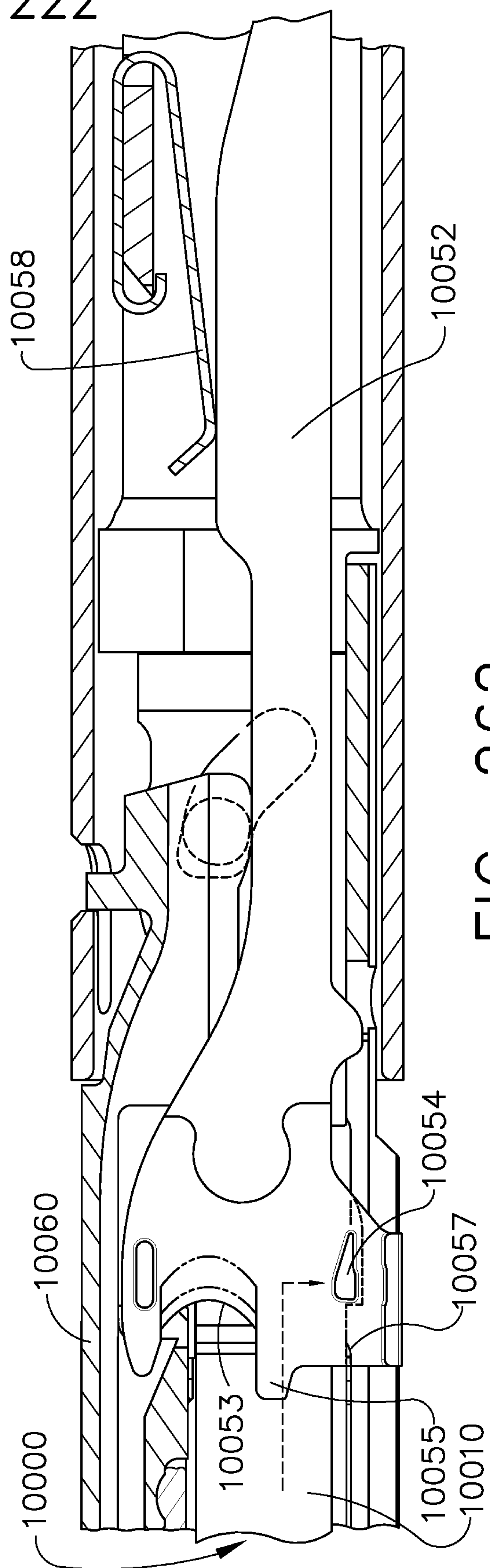
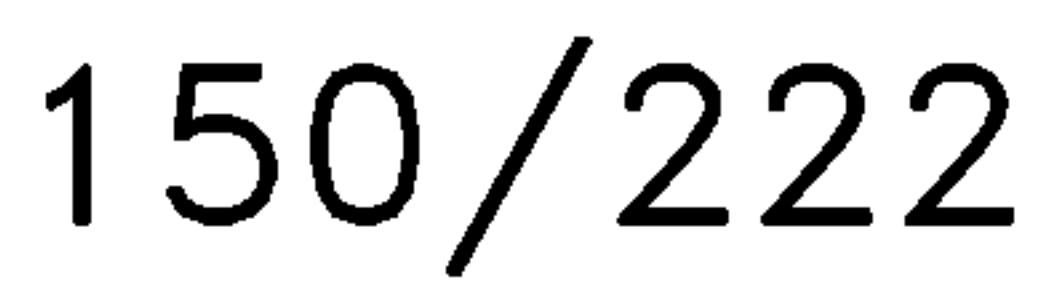


FIG. 262

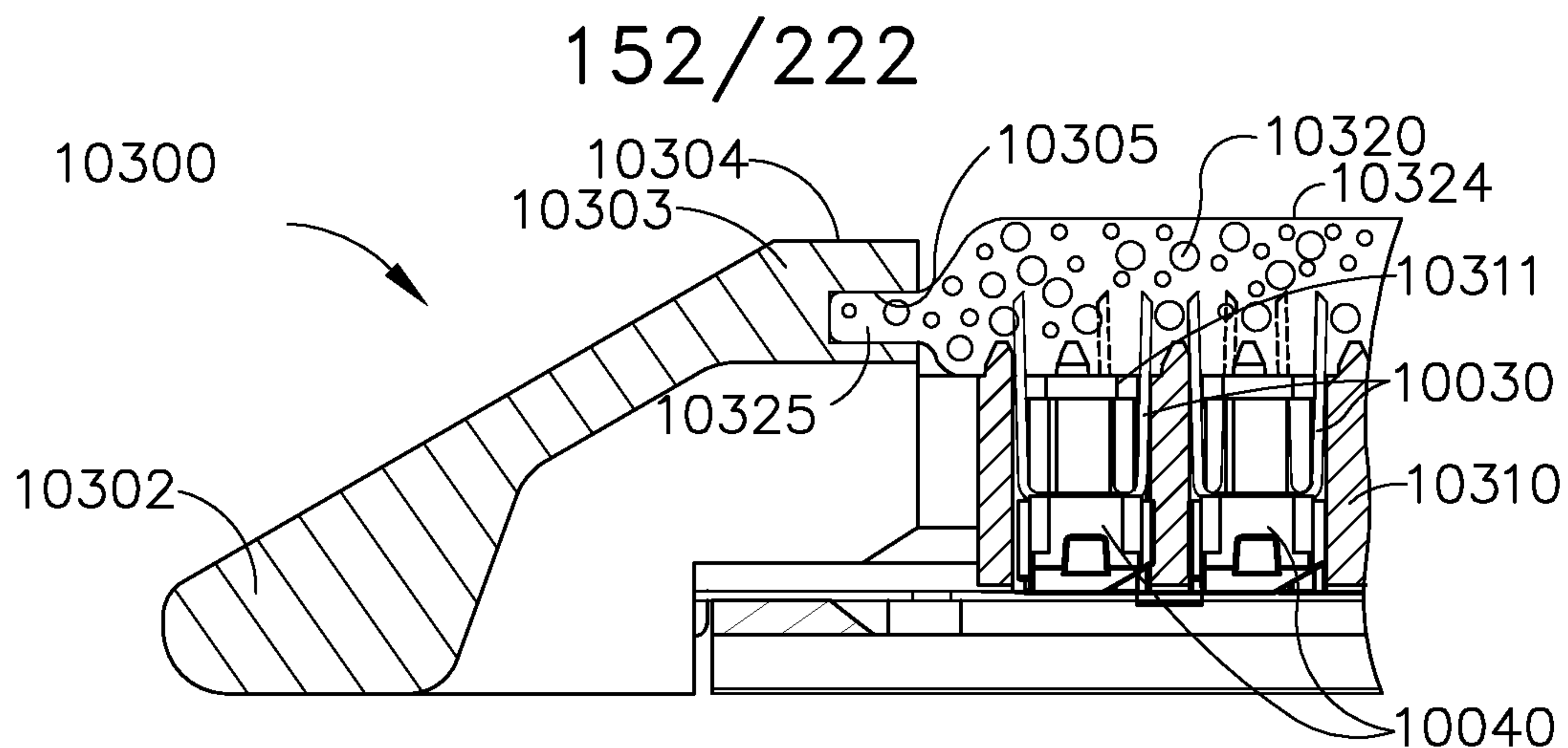


FIG. 265

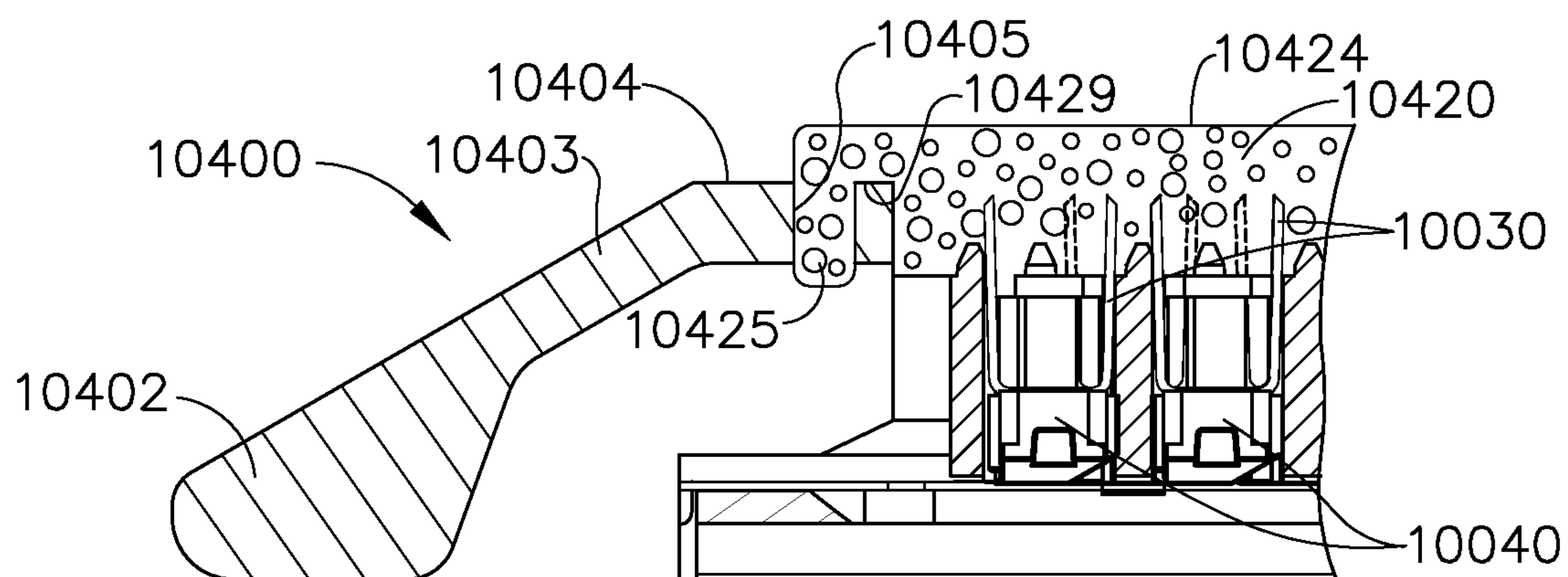


FIG. 266

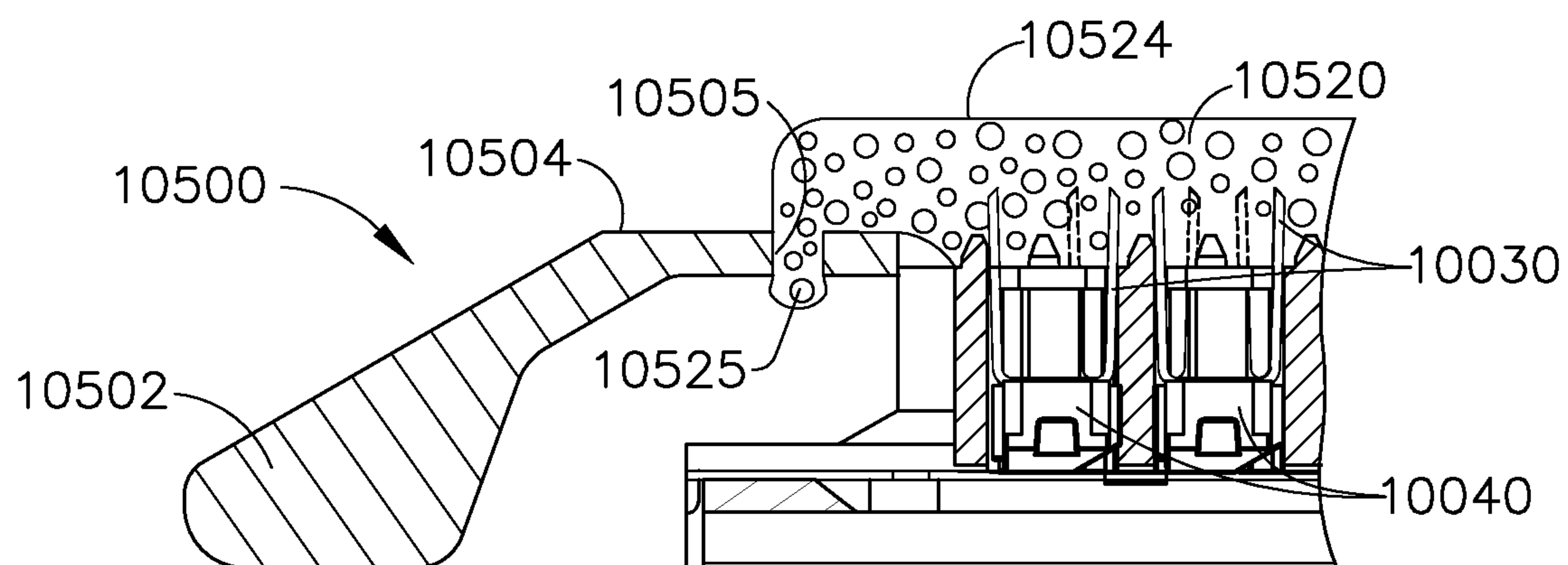


FIG. 267

153/222

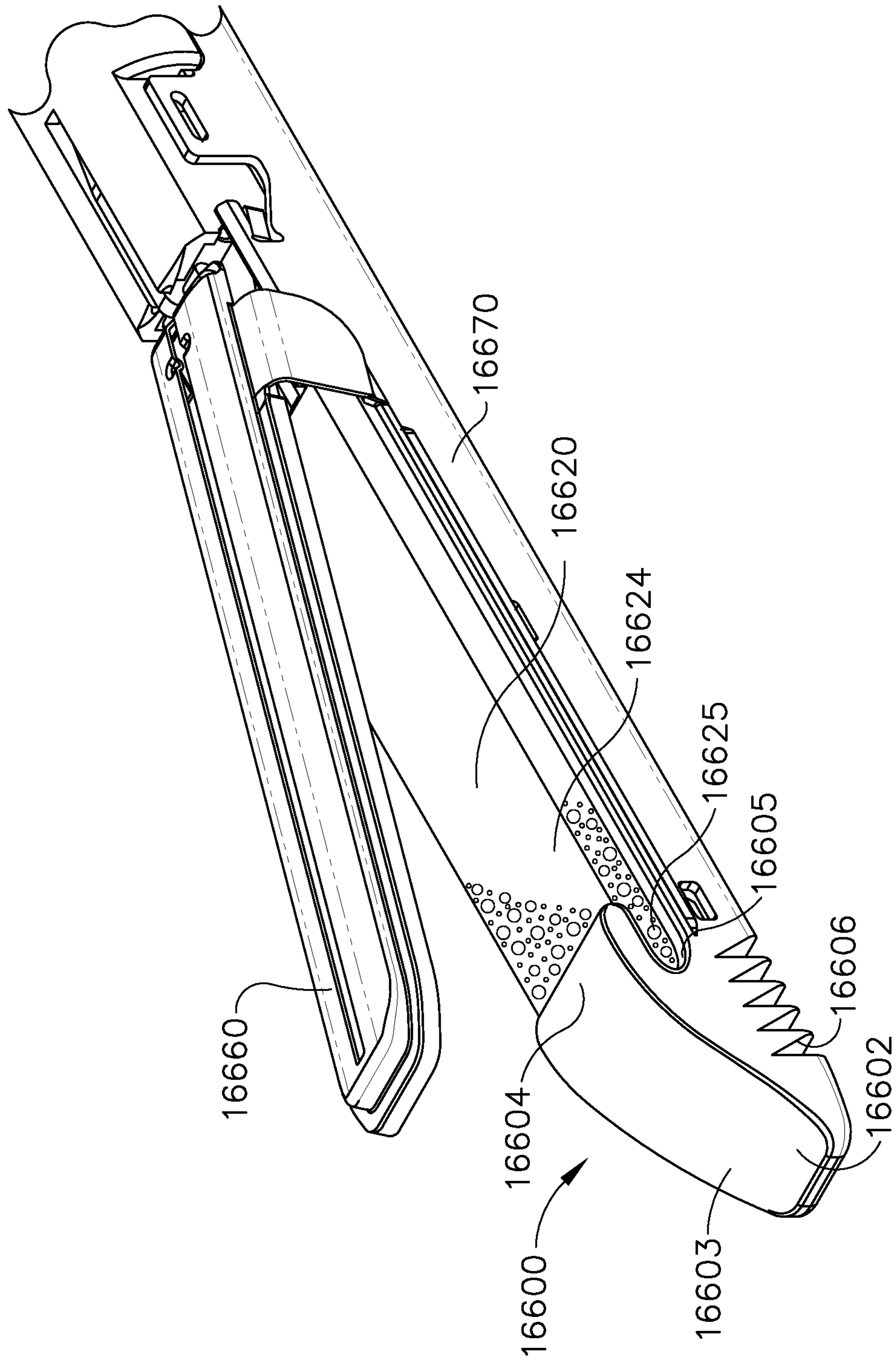


FIG. 268

154/222

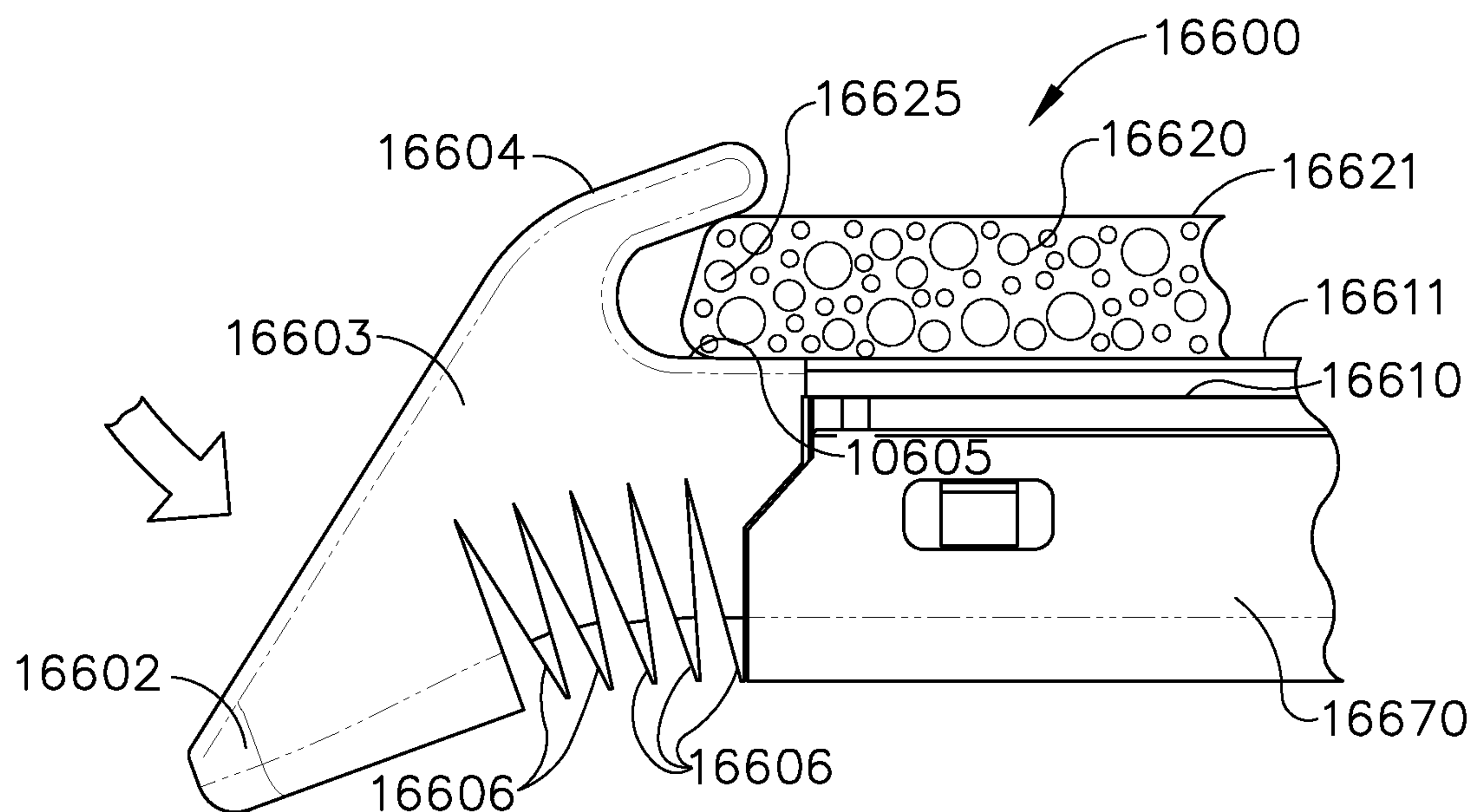


FIG. 269

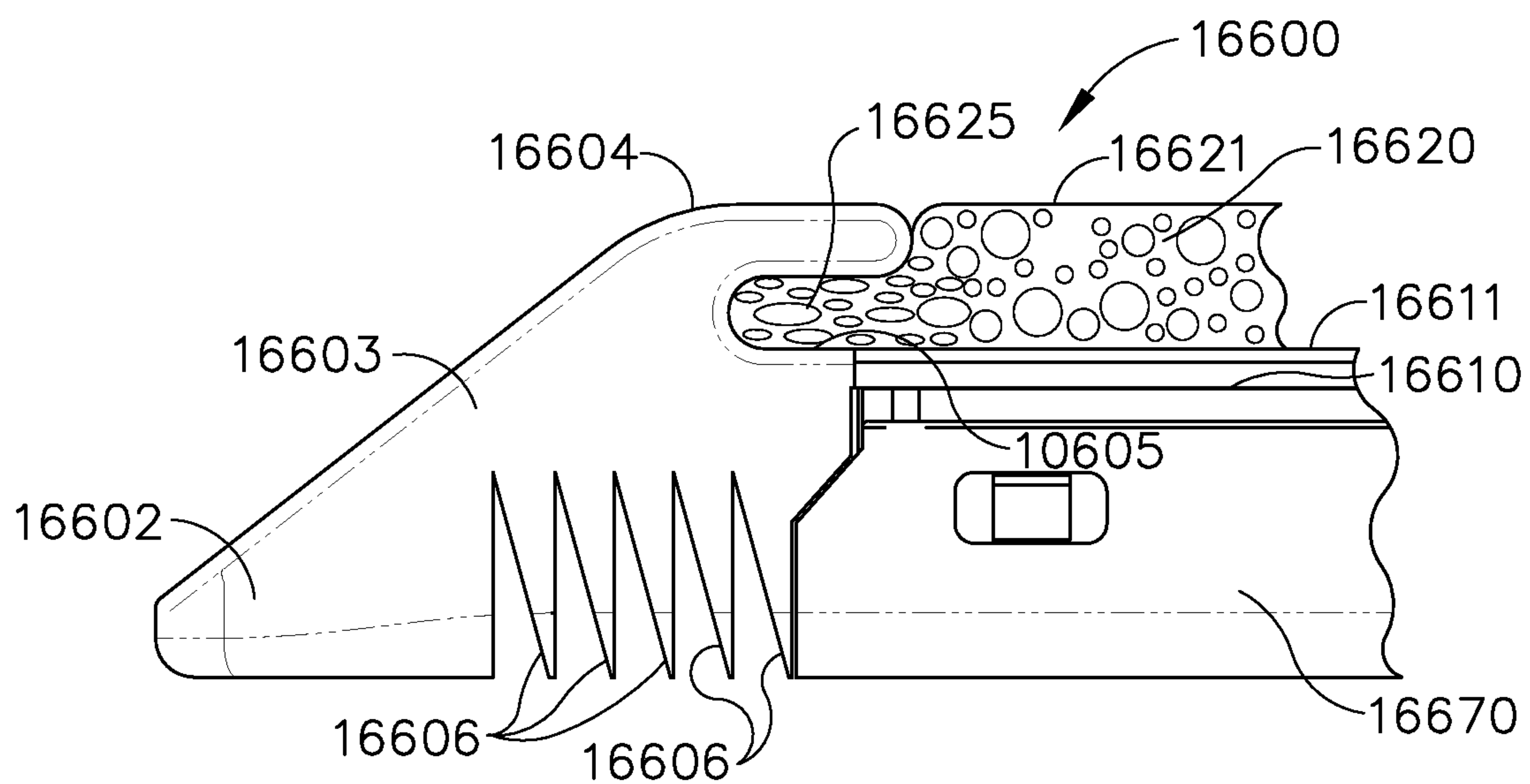
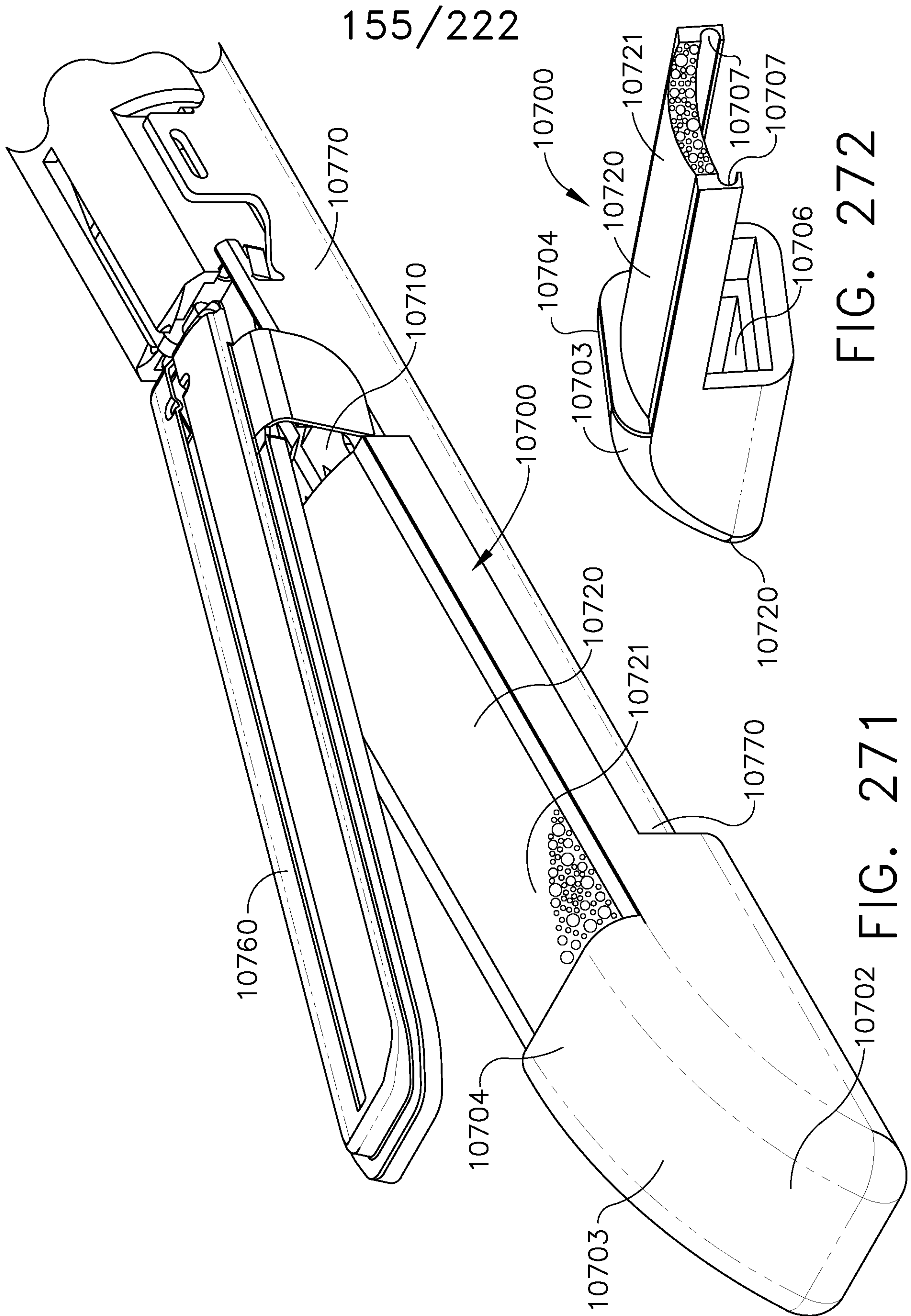


FIG. 270



156/222

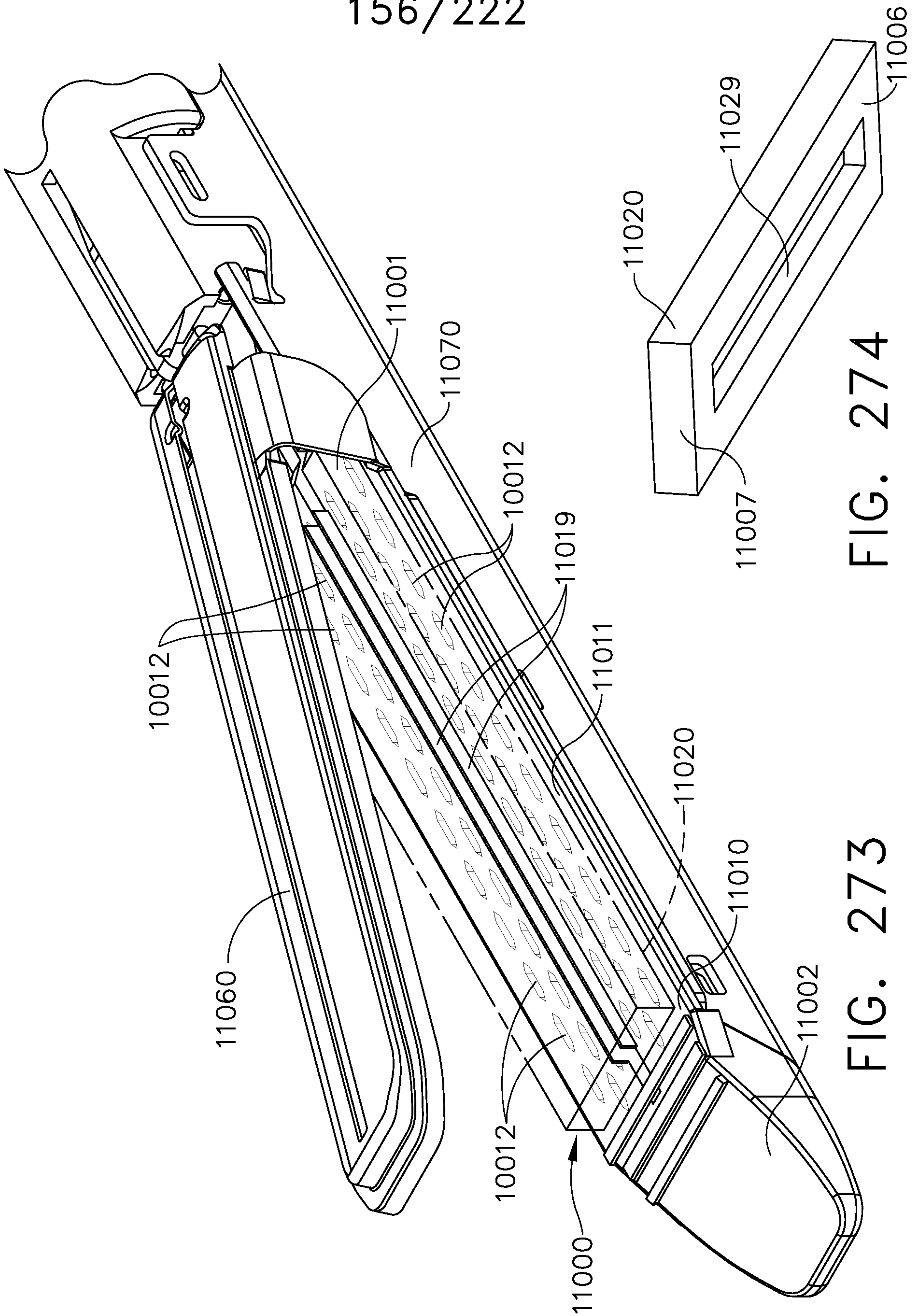
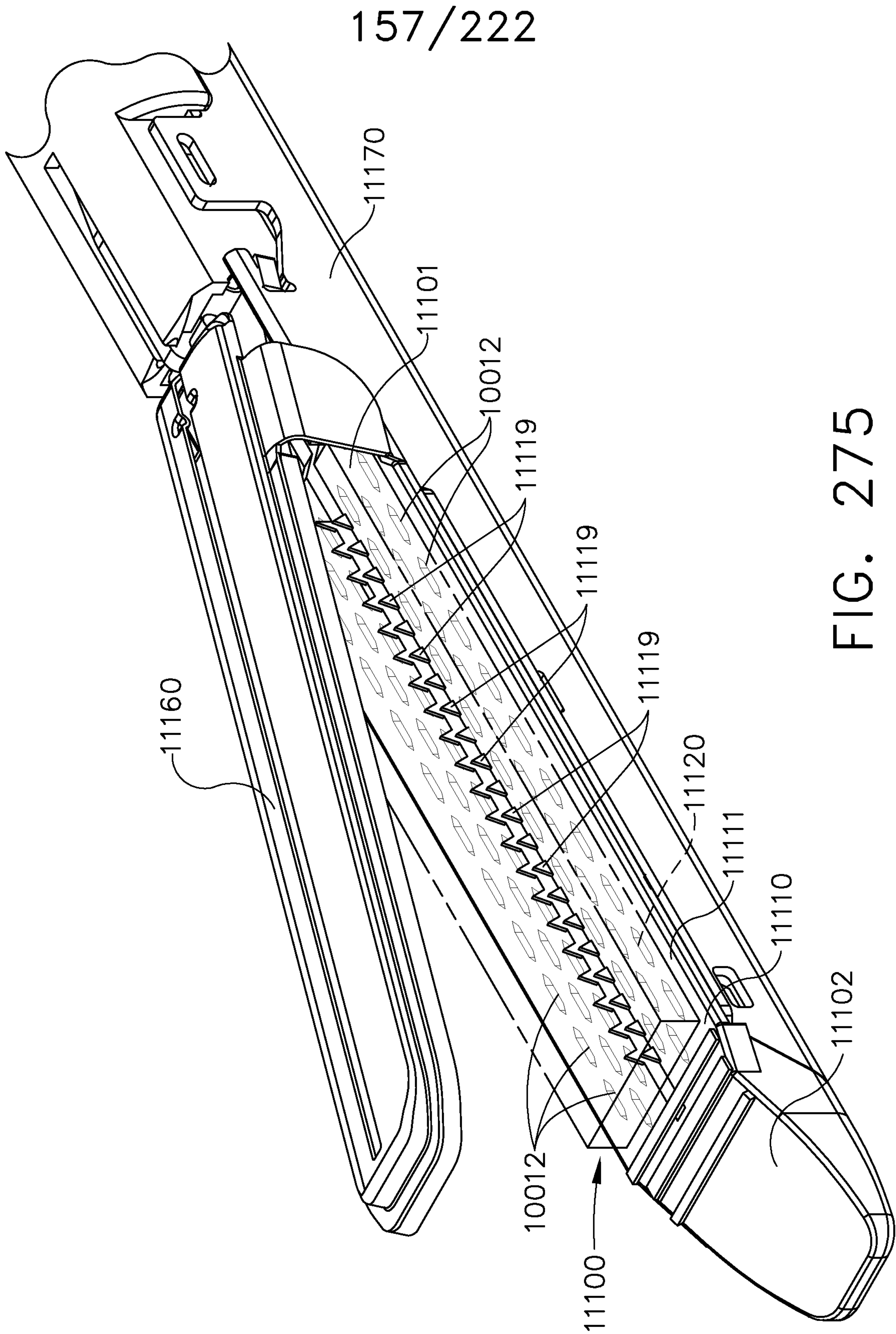
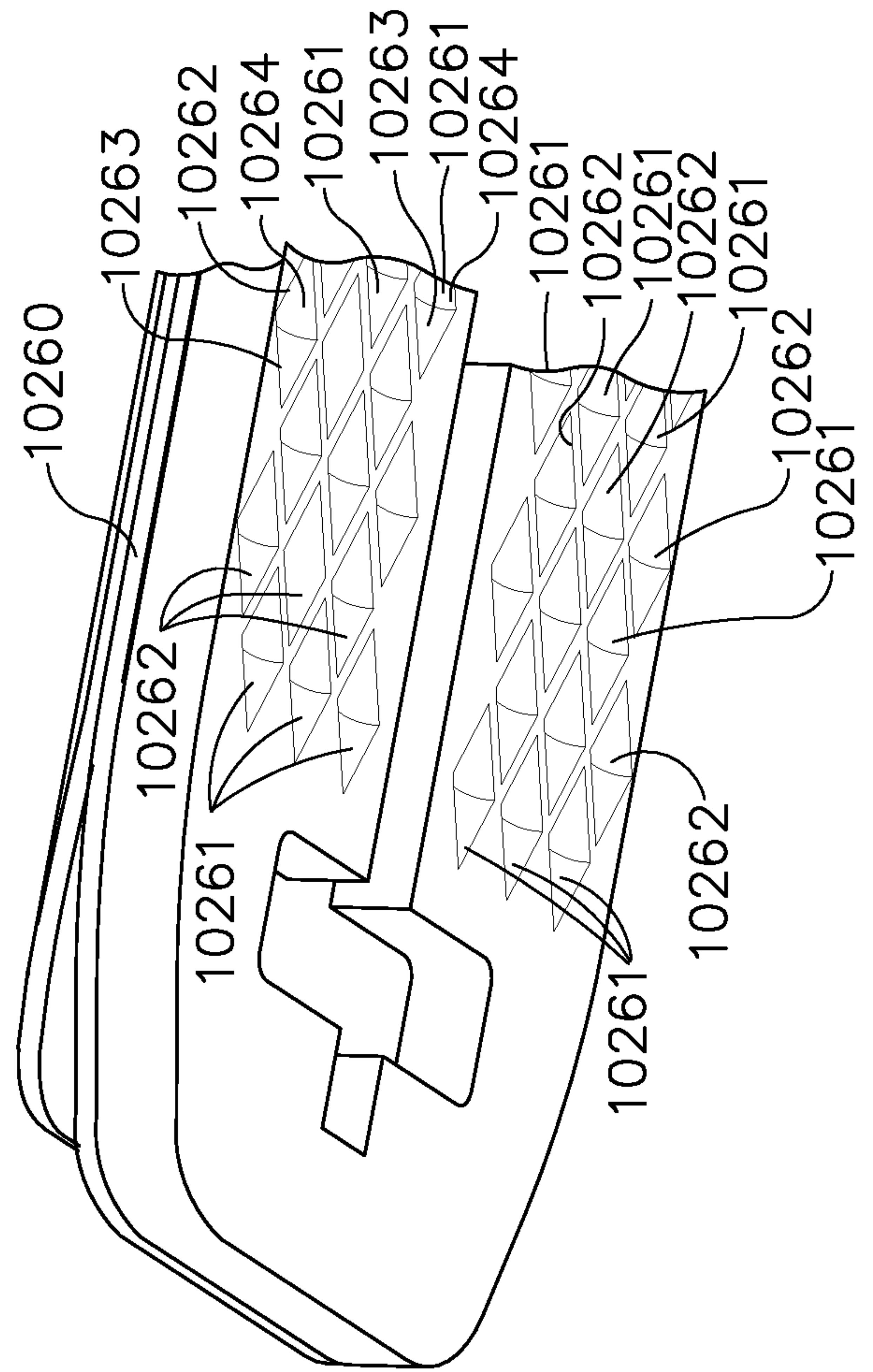
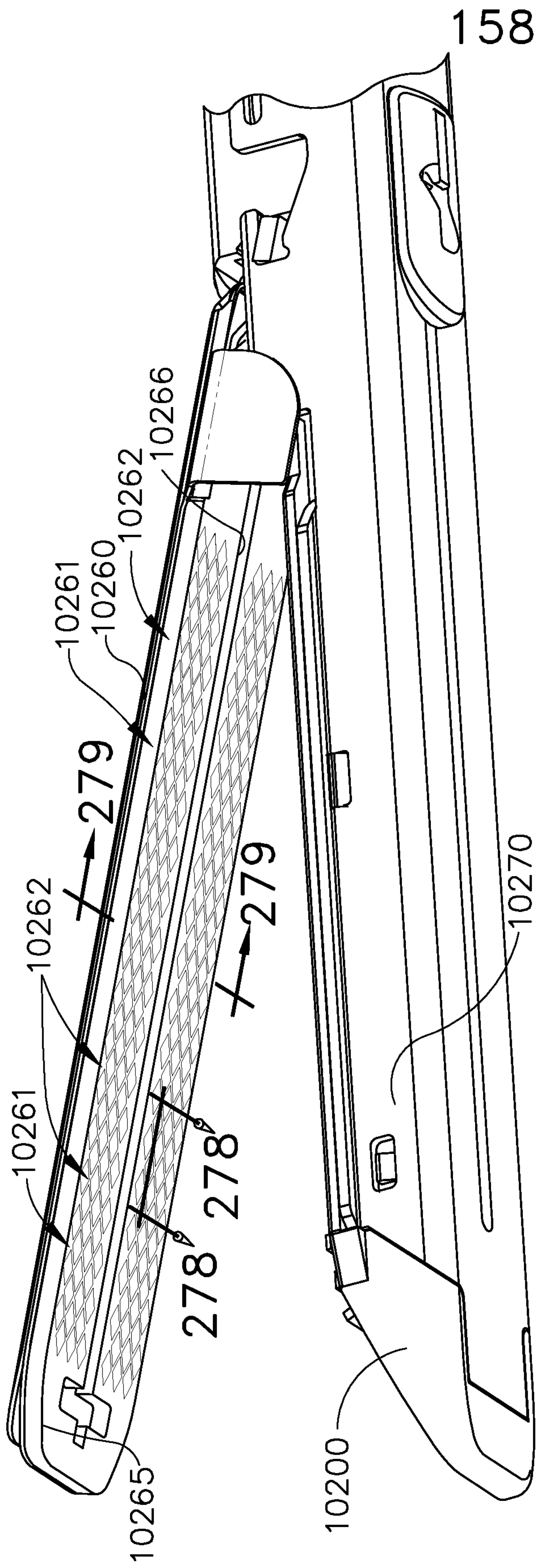


FIG. 274

FIG. 273





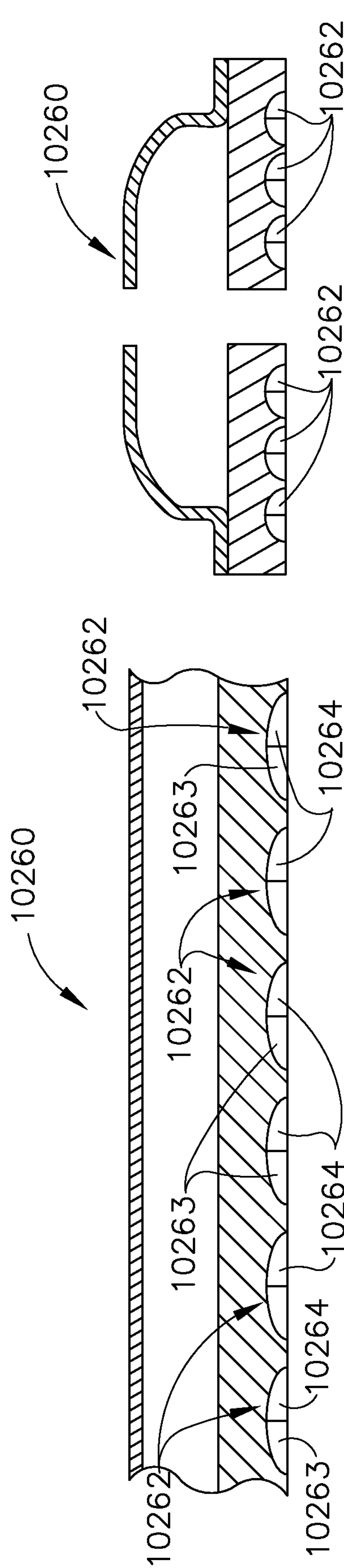


FIG. 278

FIG. 279

159/222

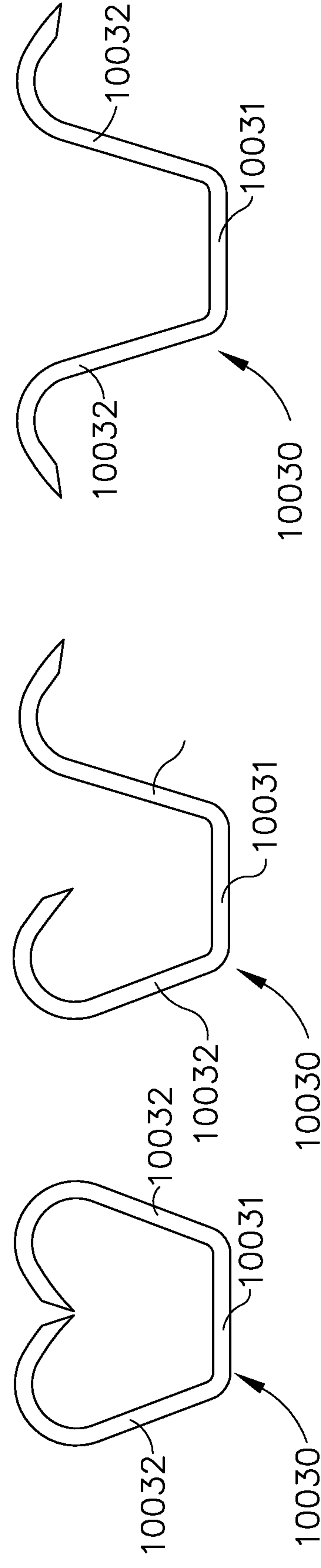
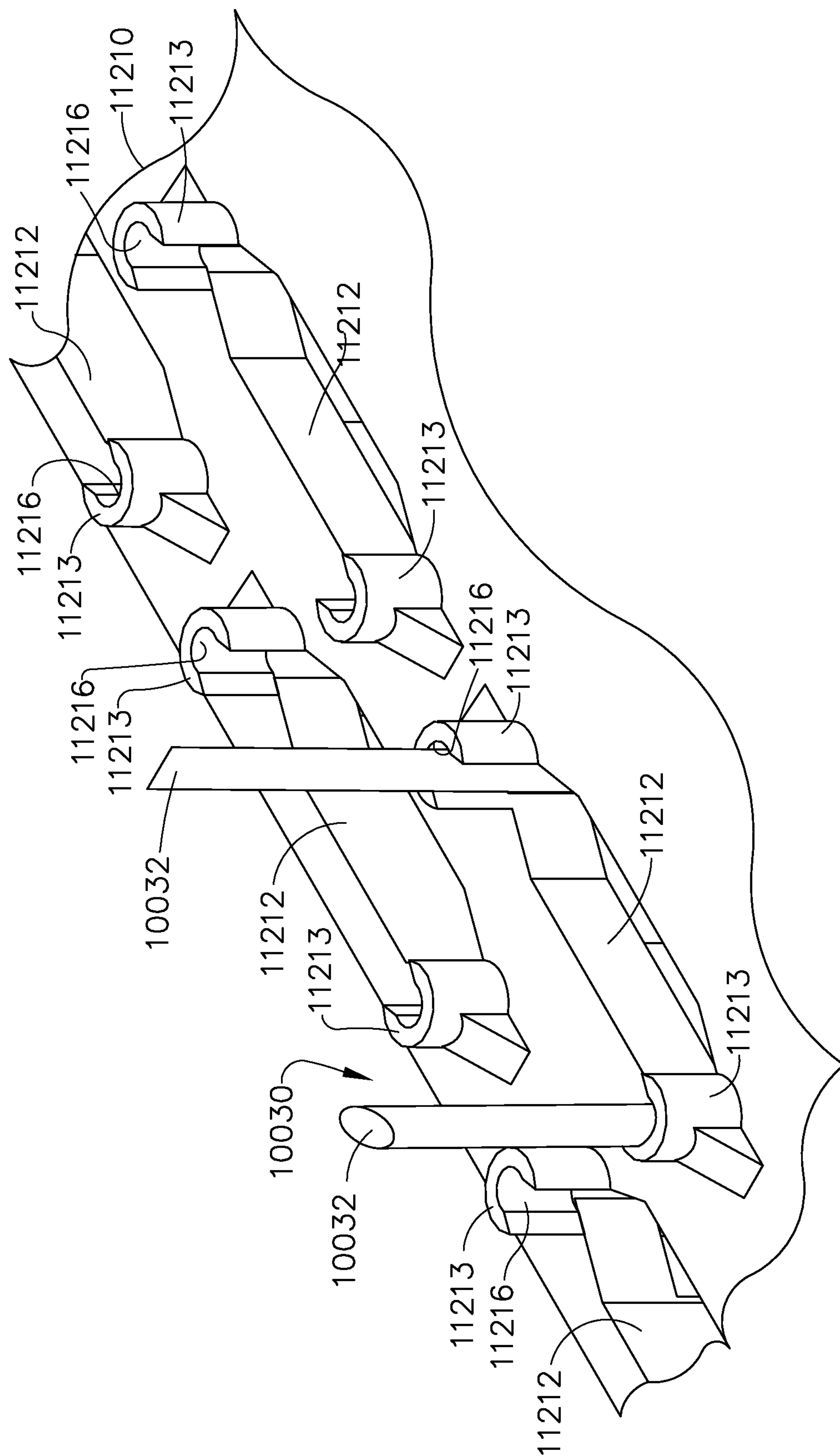


FIG. 280

FIG. 281

FIG. 282



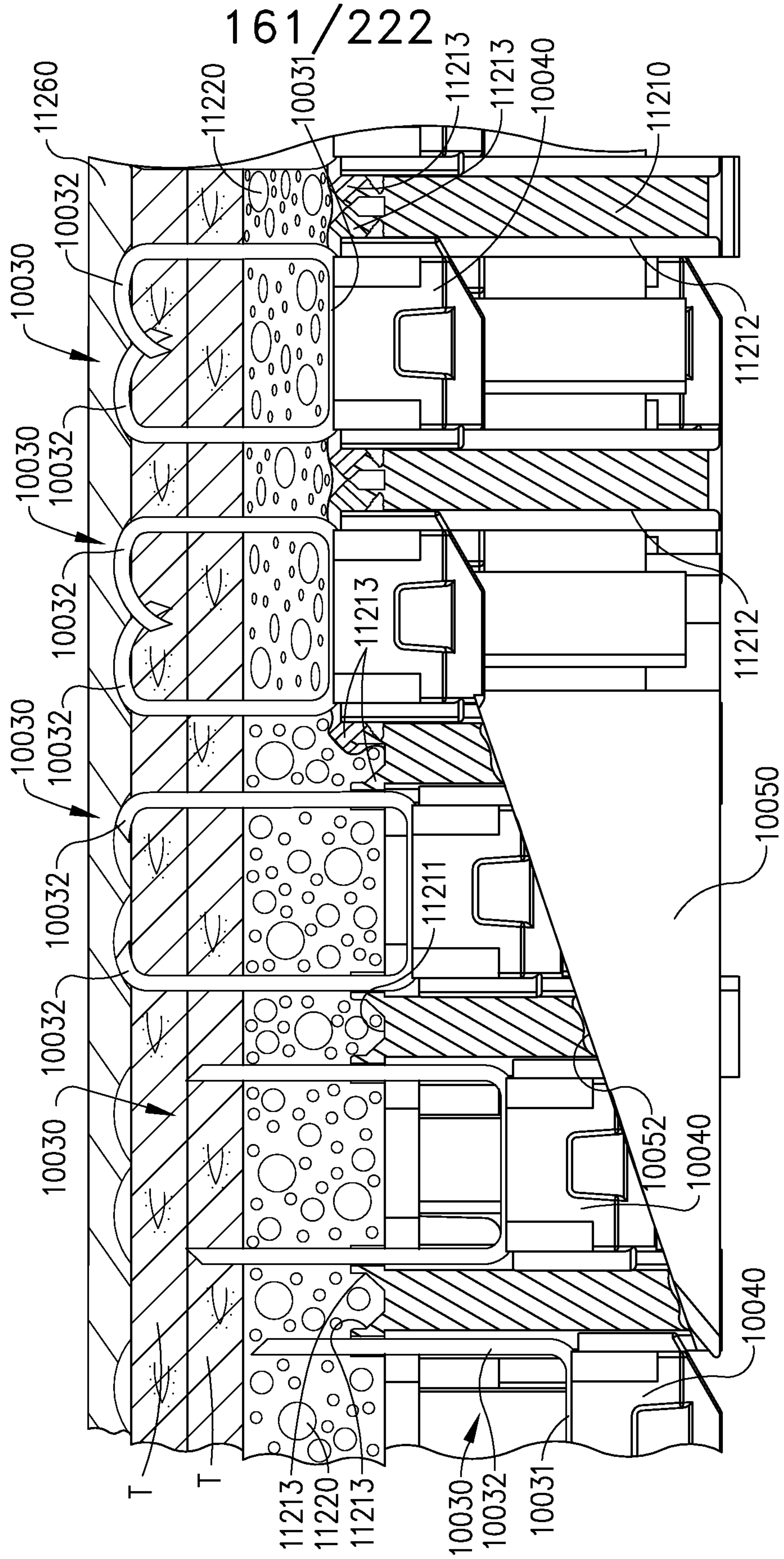


FIG. 284

162/222

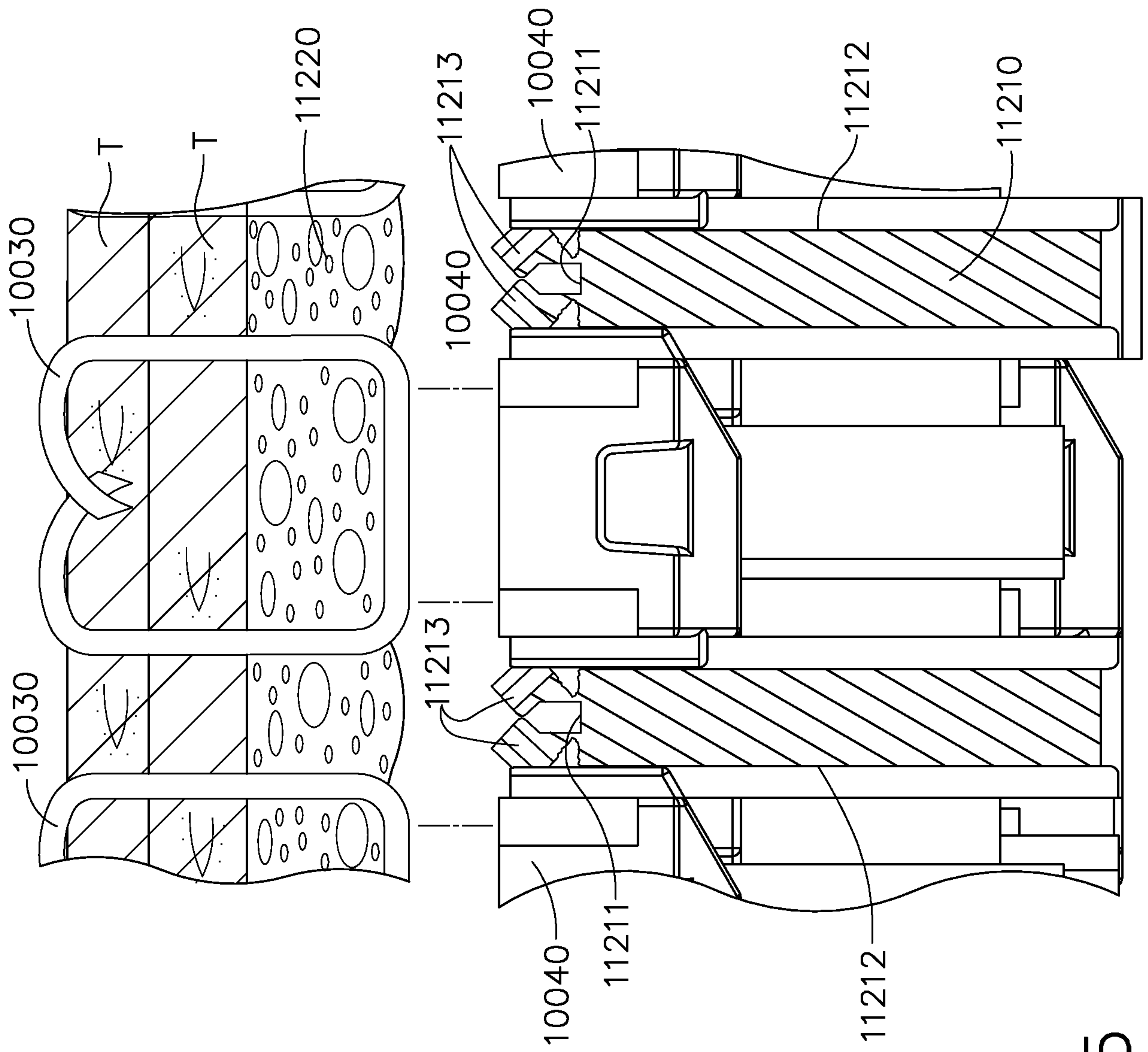
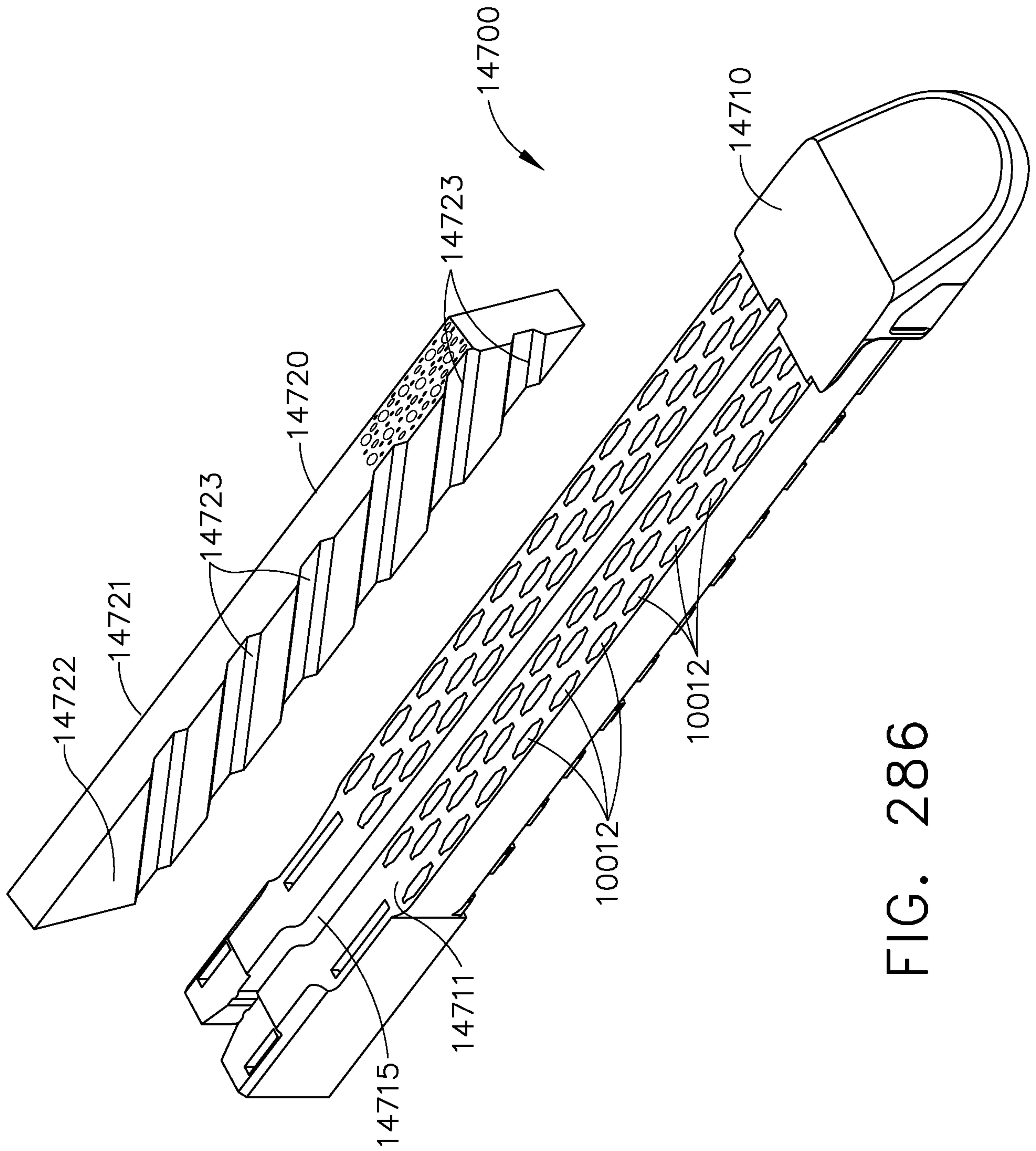


FIG. 285

163/222



164/222

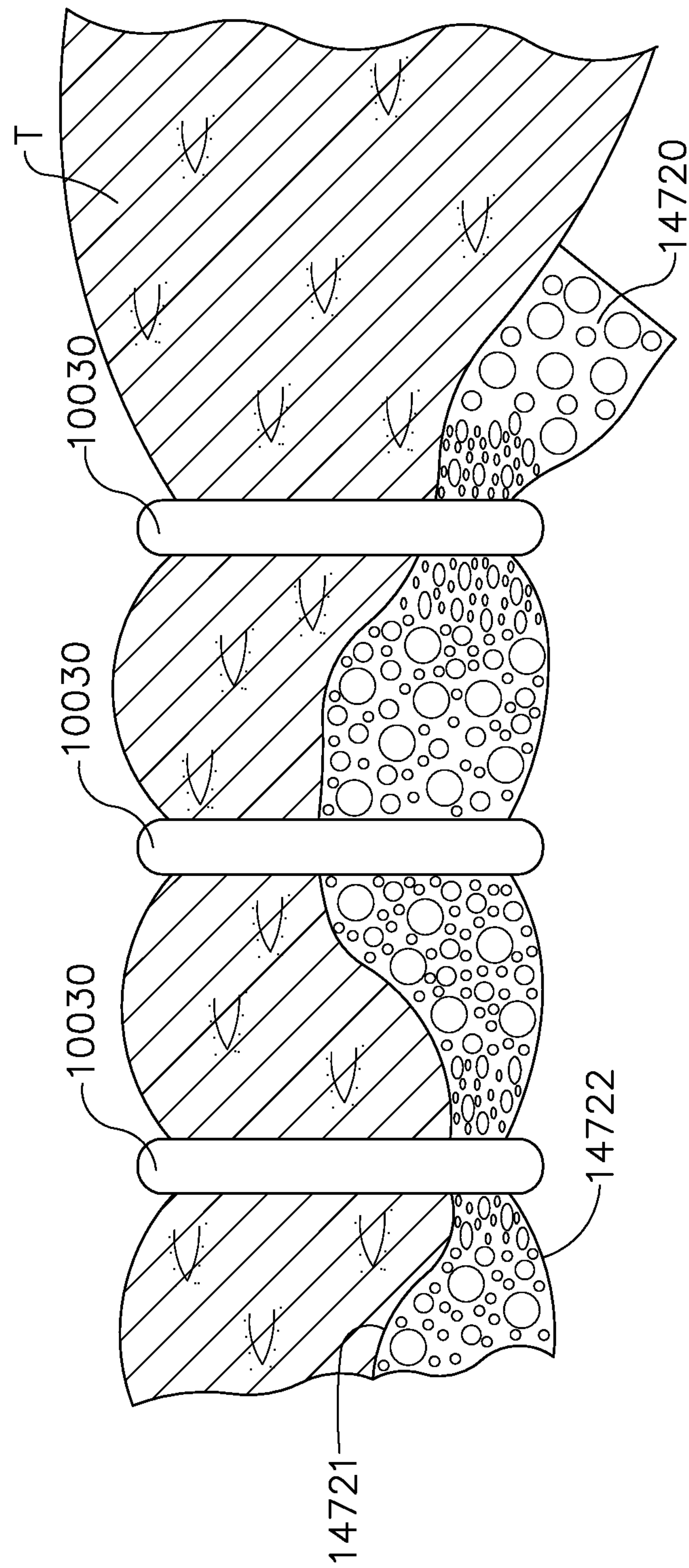


FIG. 287

165/222

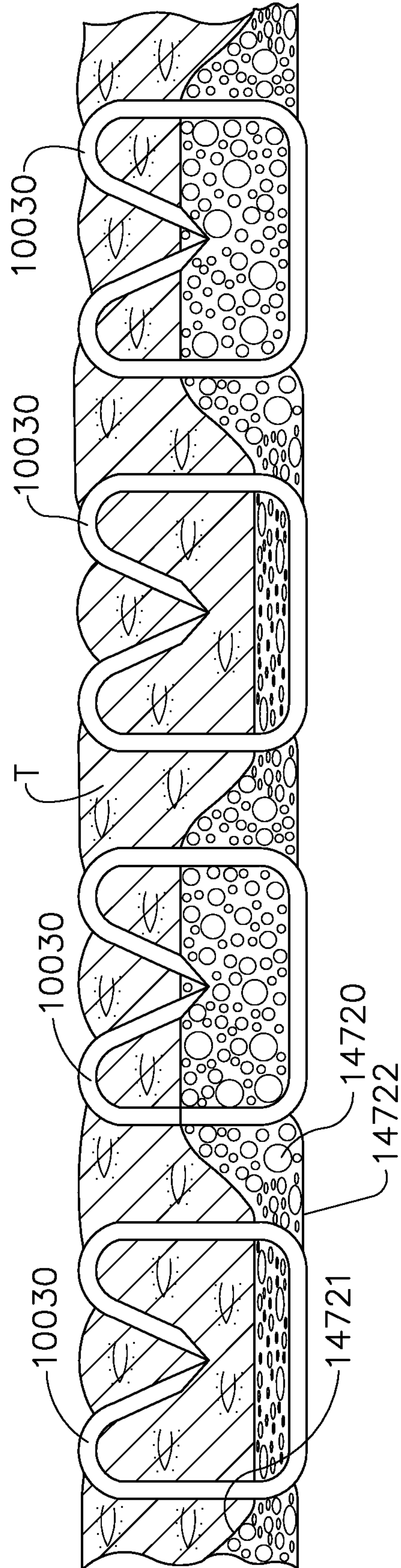


FIG. 288

166/222

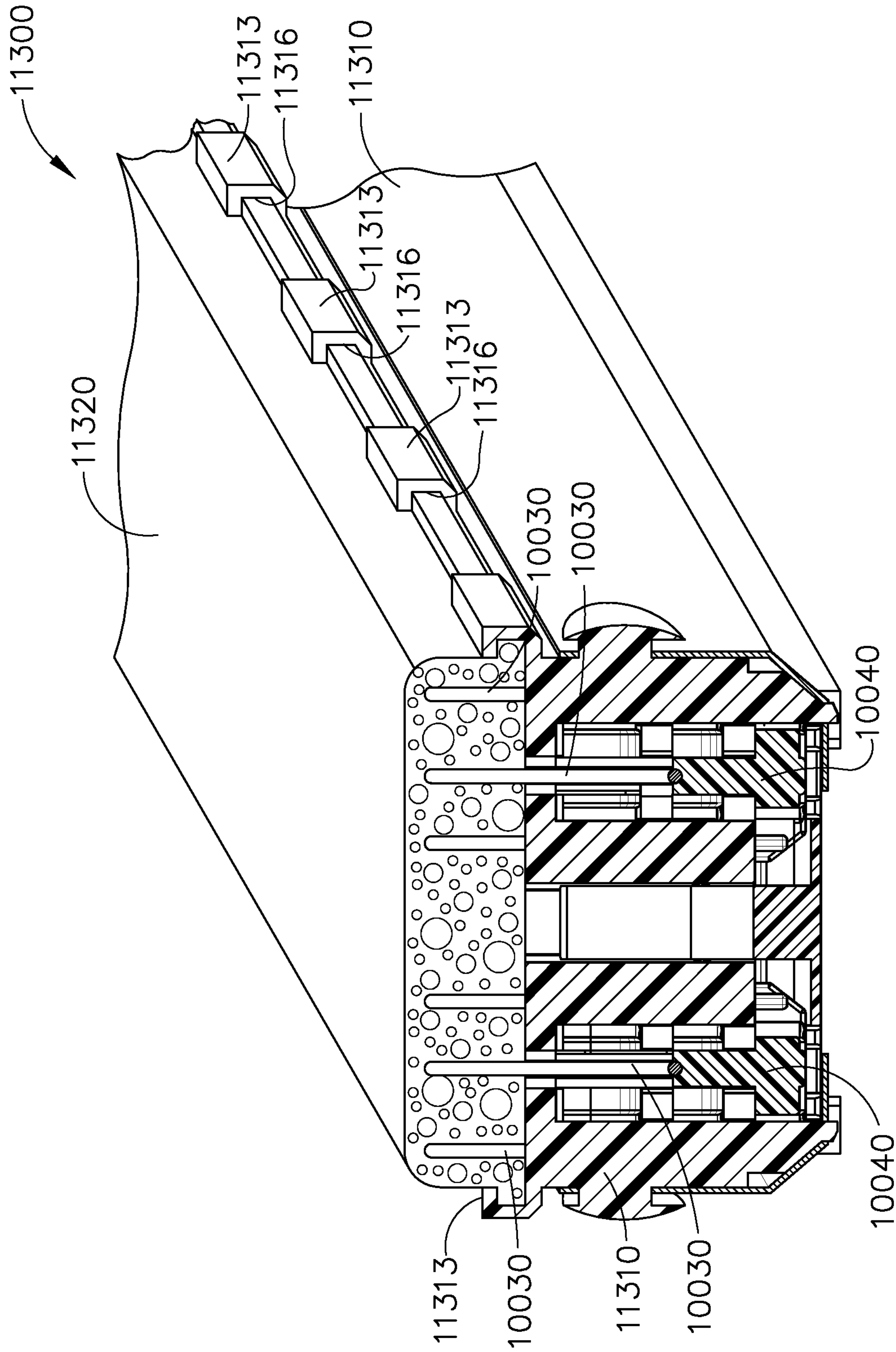


FIG. 289

167/222

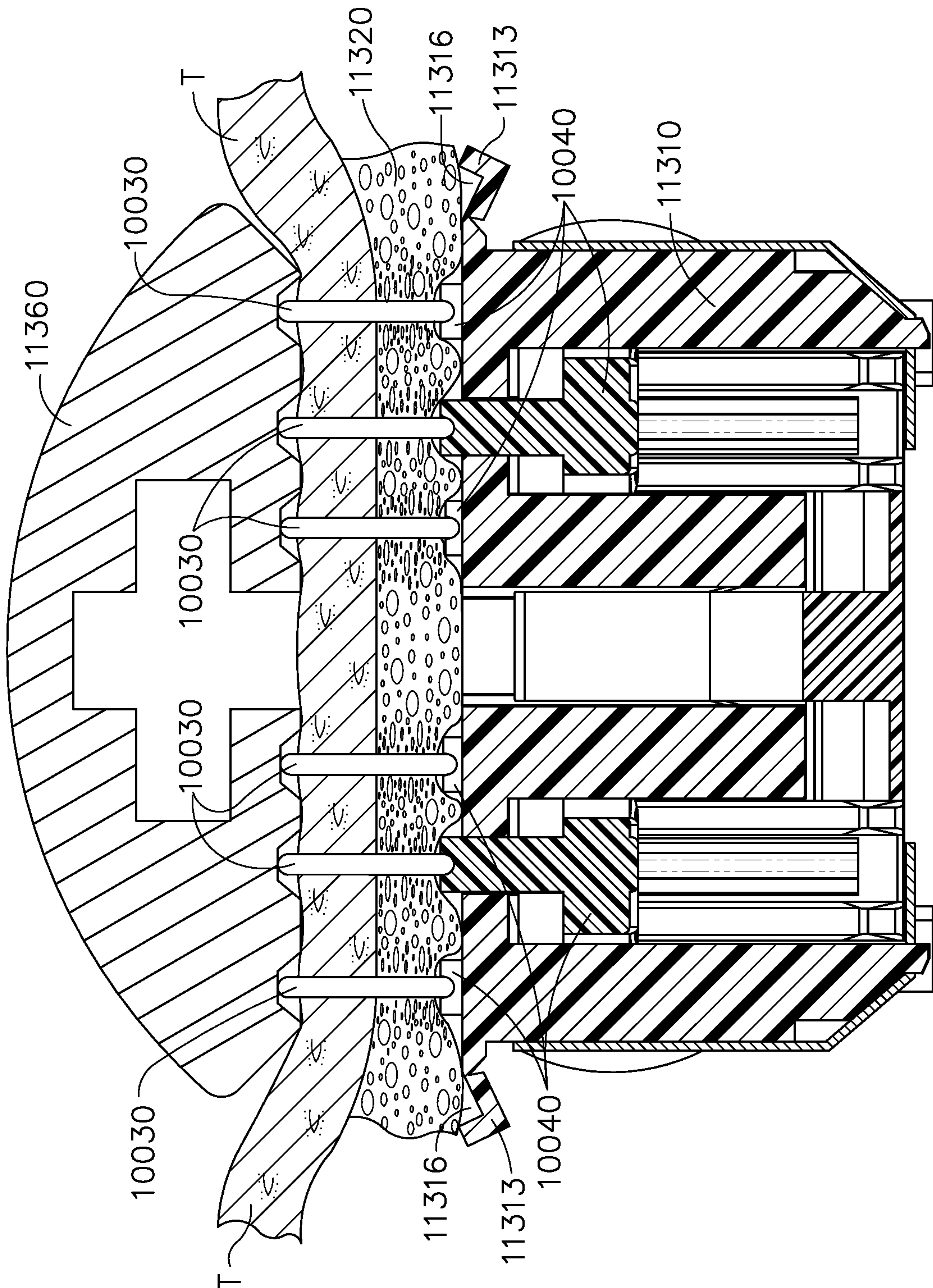
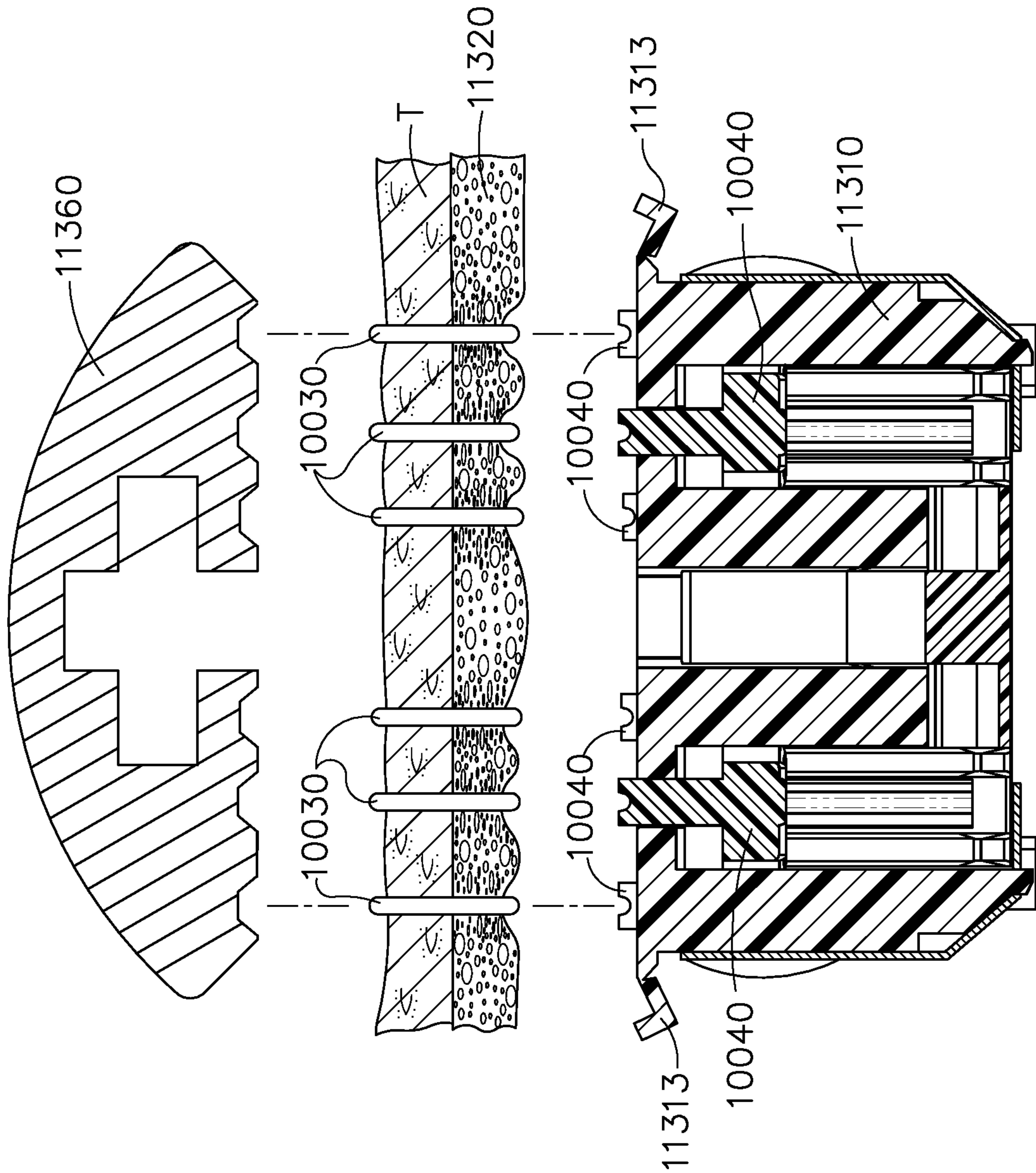


FIG. 290

168/222



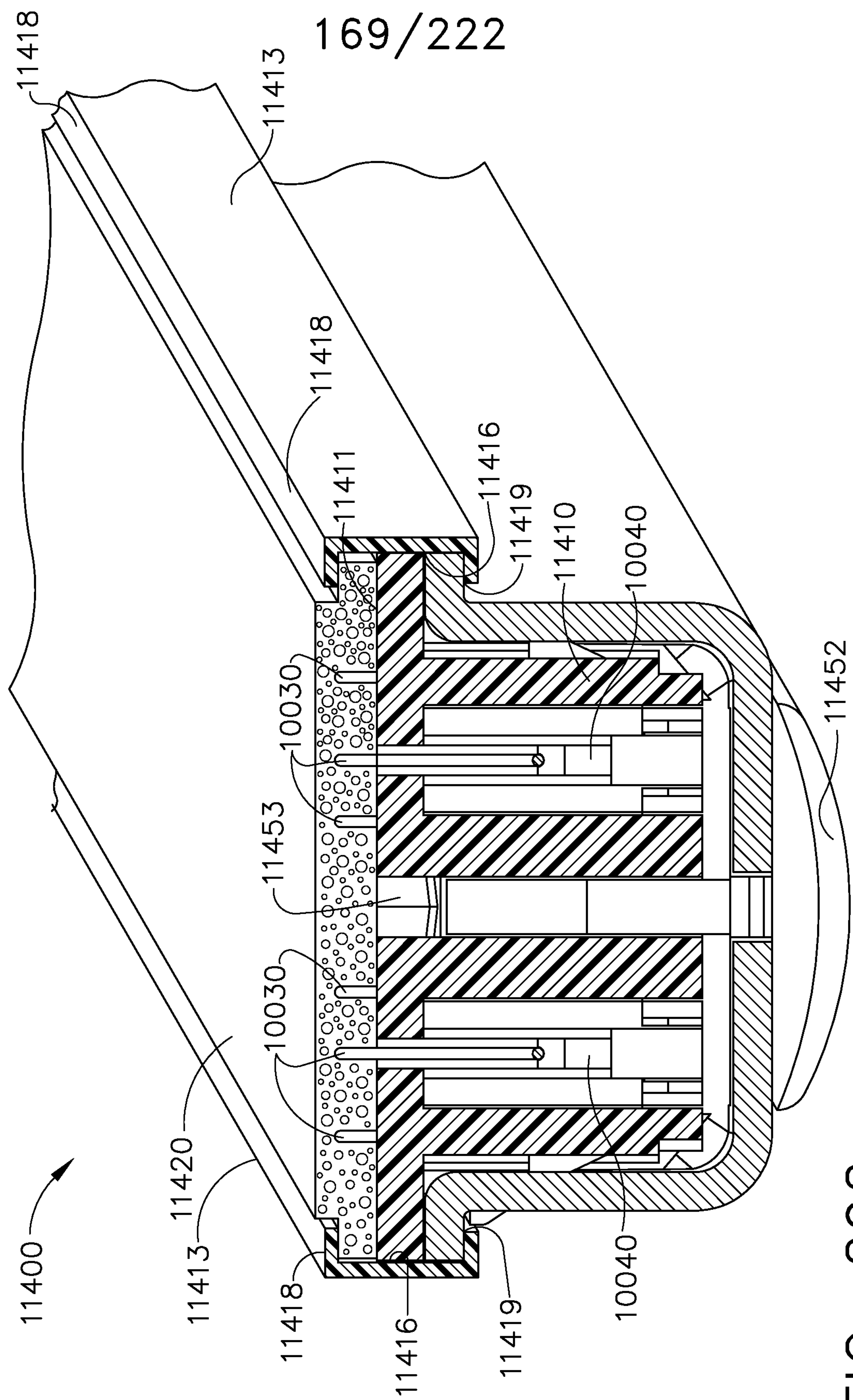


FIG. 292

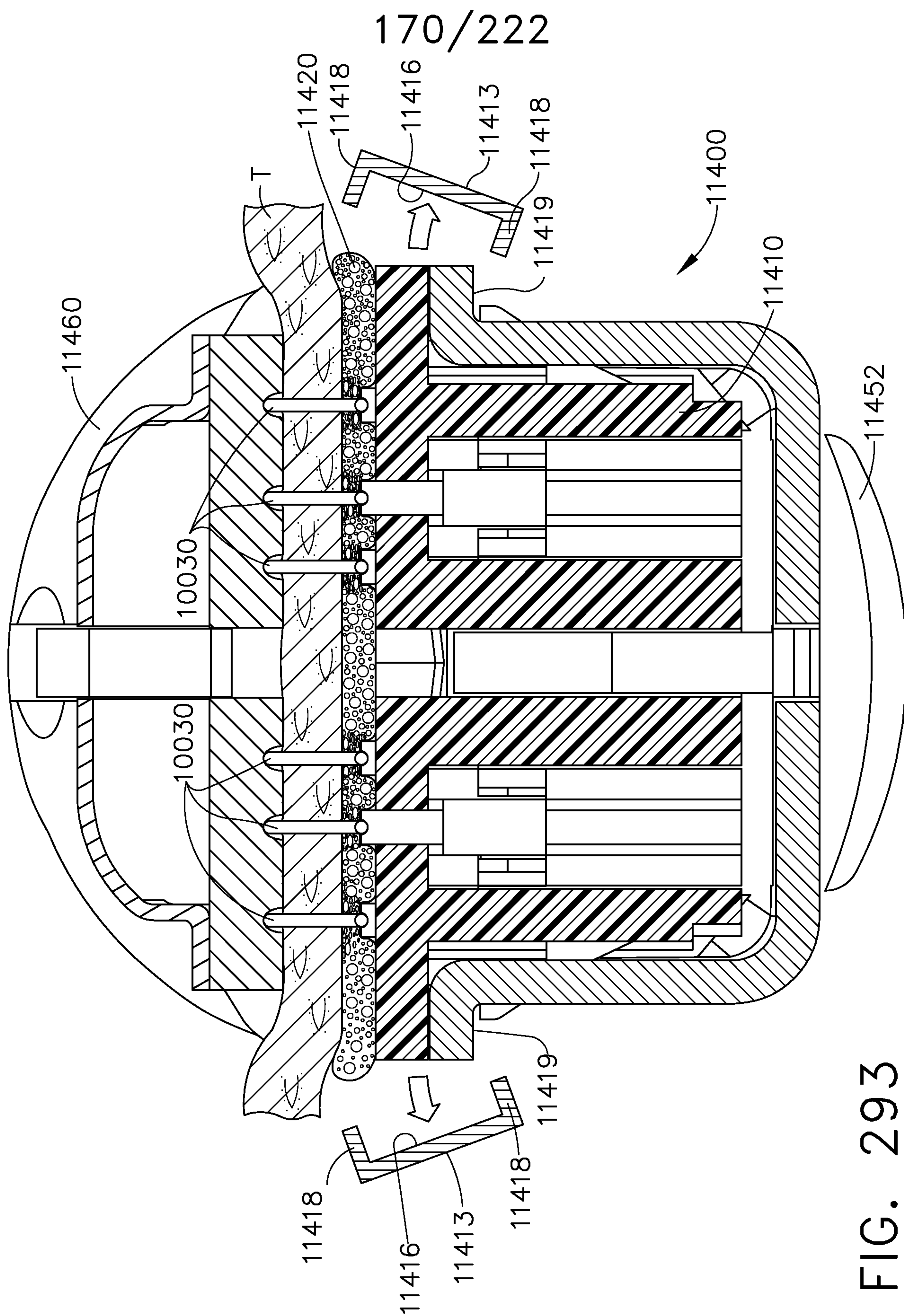


FIG. 293

171/222

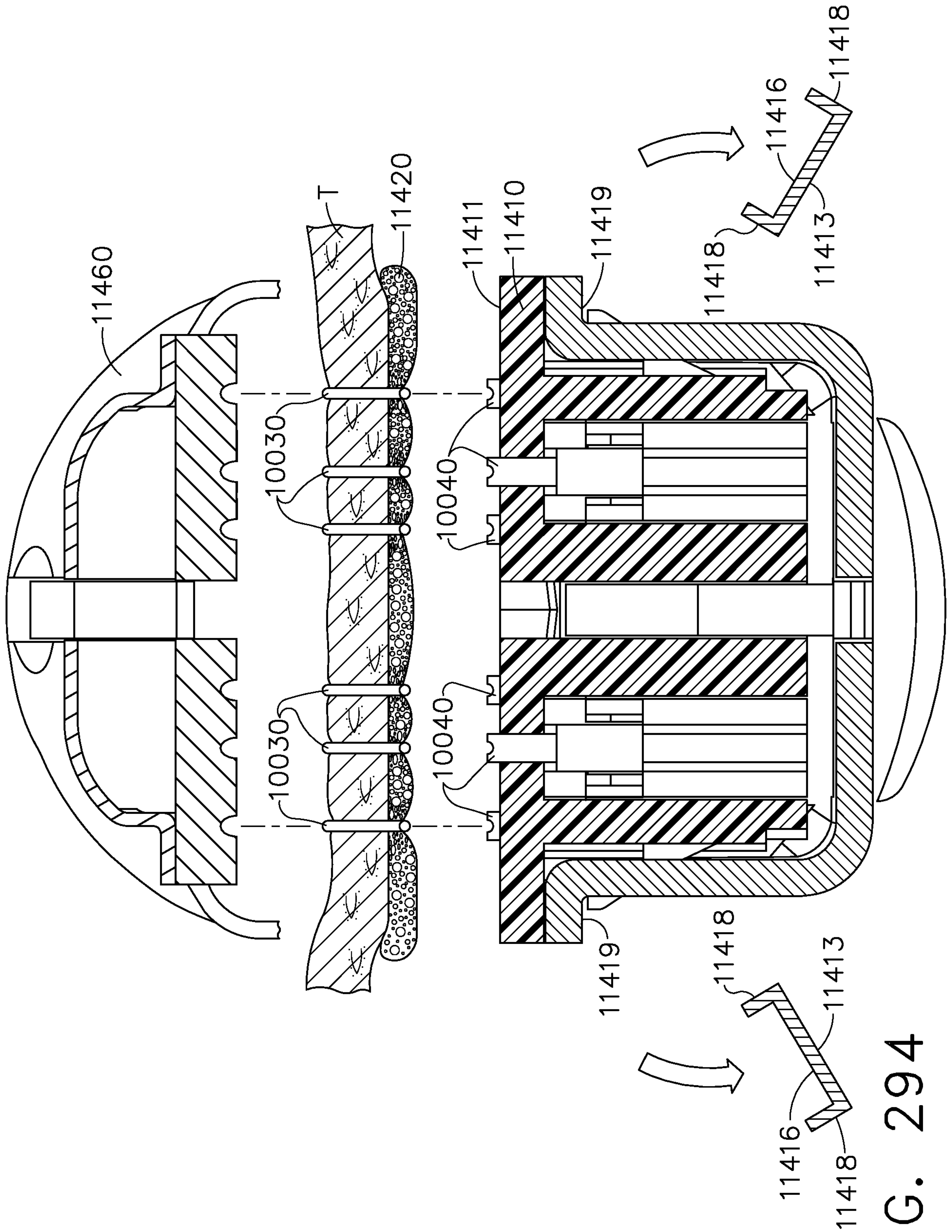


FIG. 294

172/222

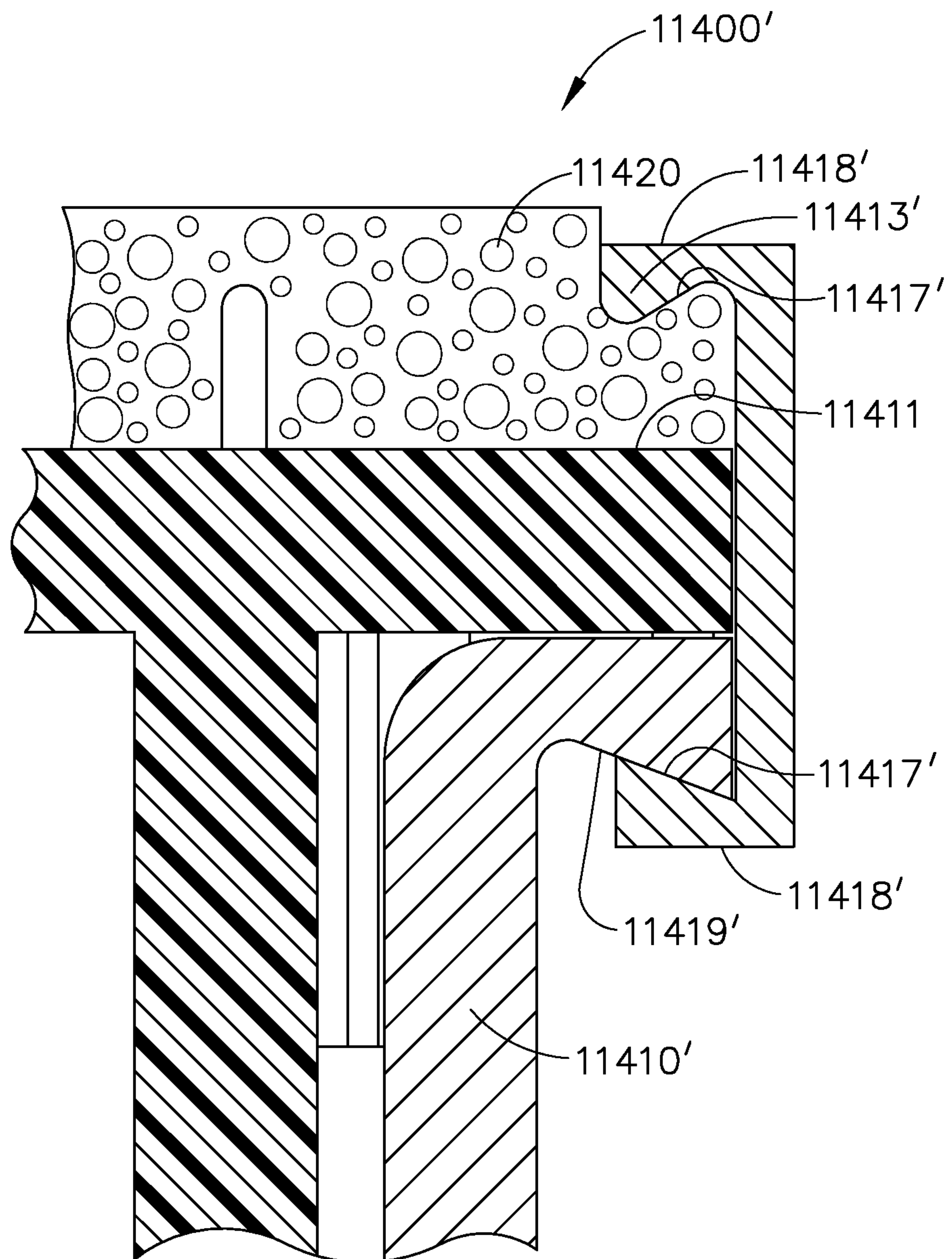


FIG. 295

173/222

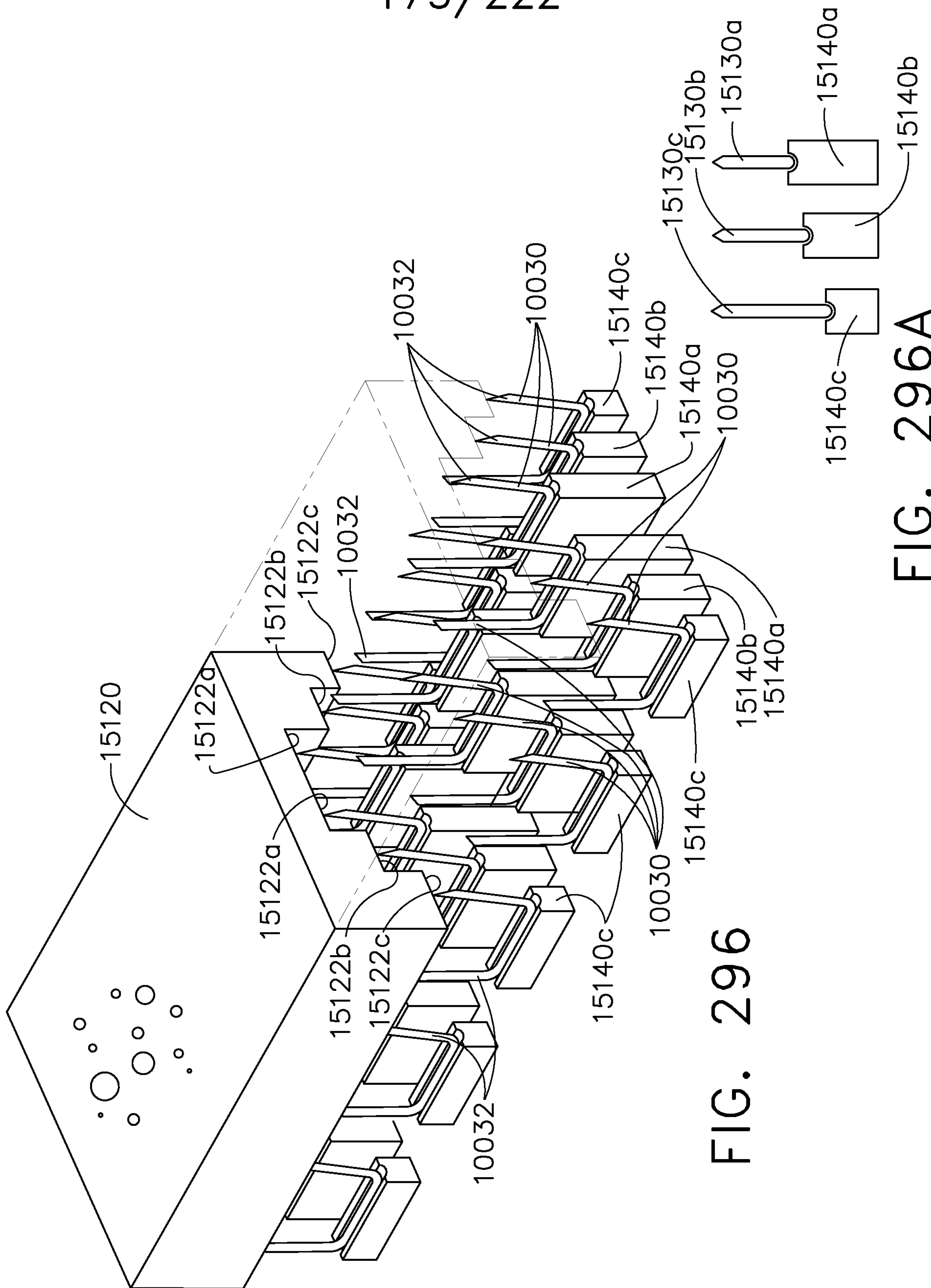


FIG. 296

FIG. 296A

174/222

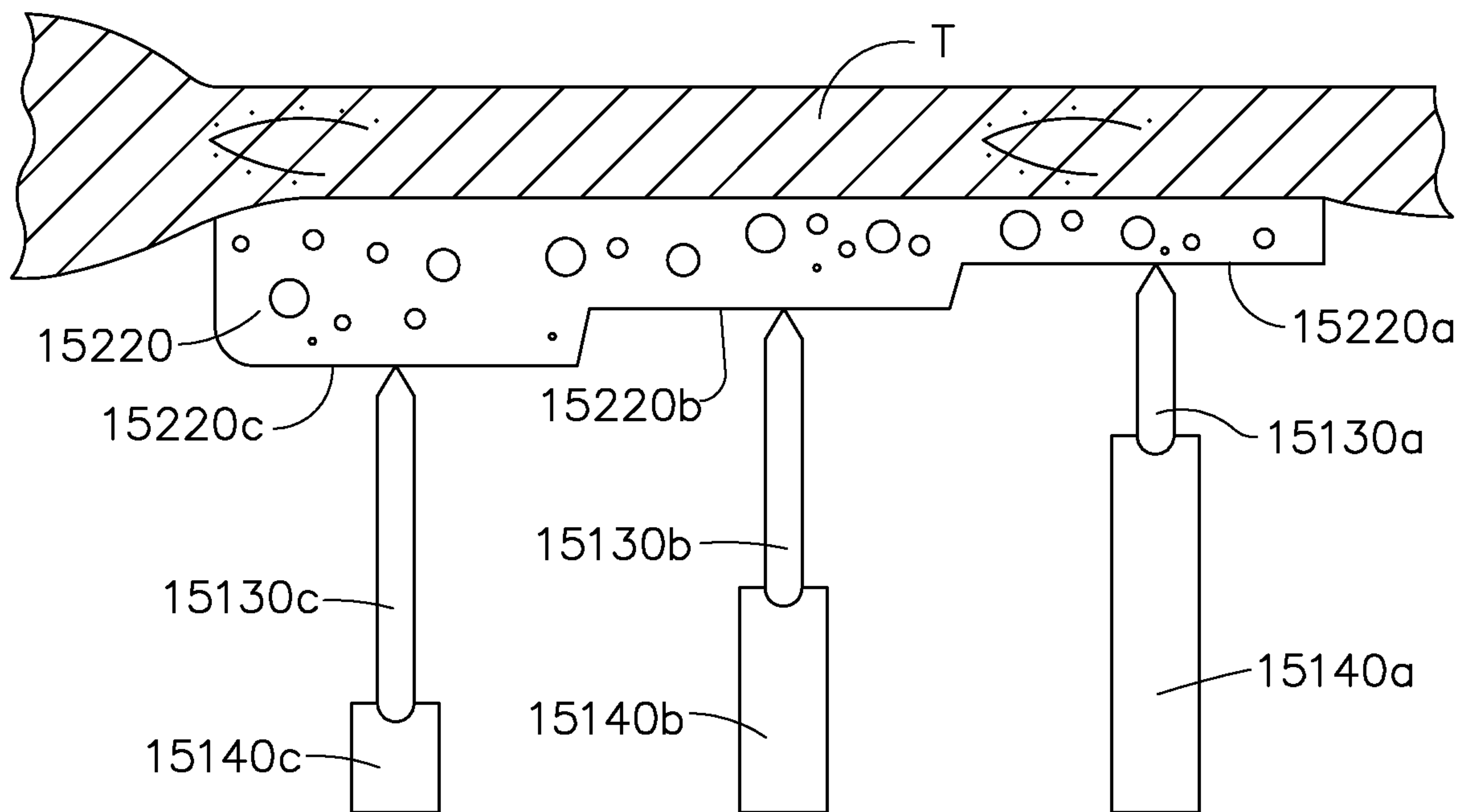


FIG. 297

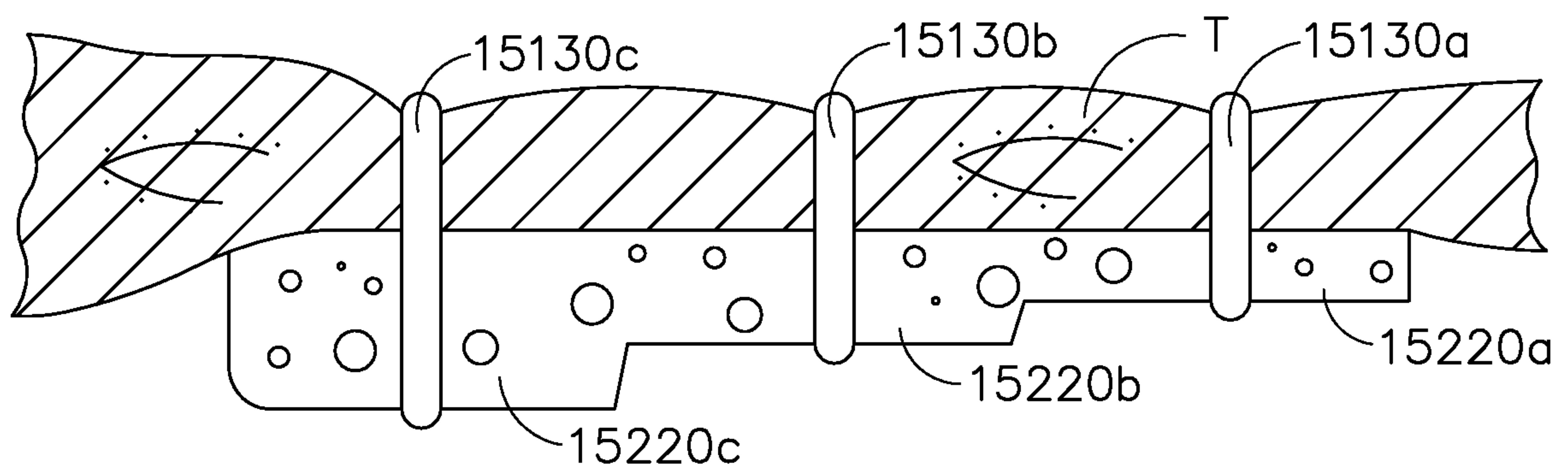


FIG. 298

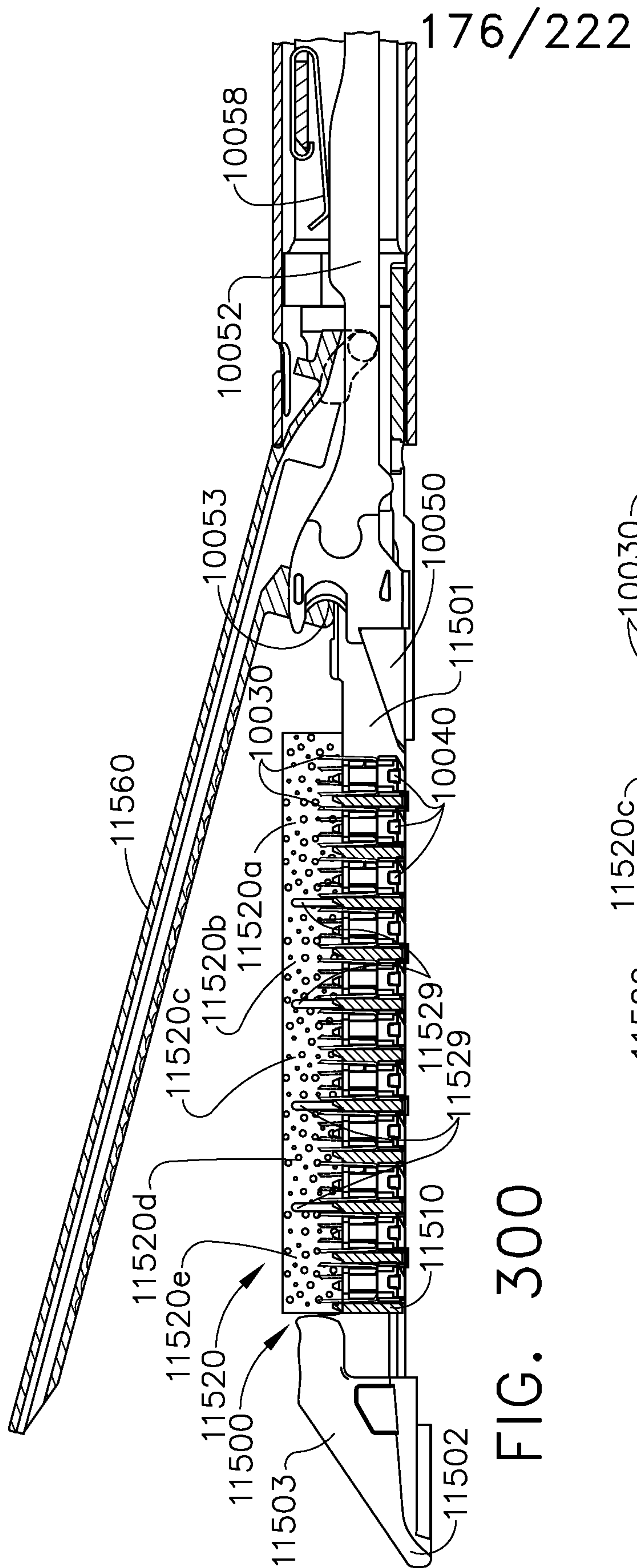


FIG. 300

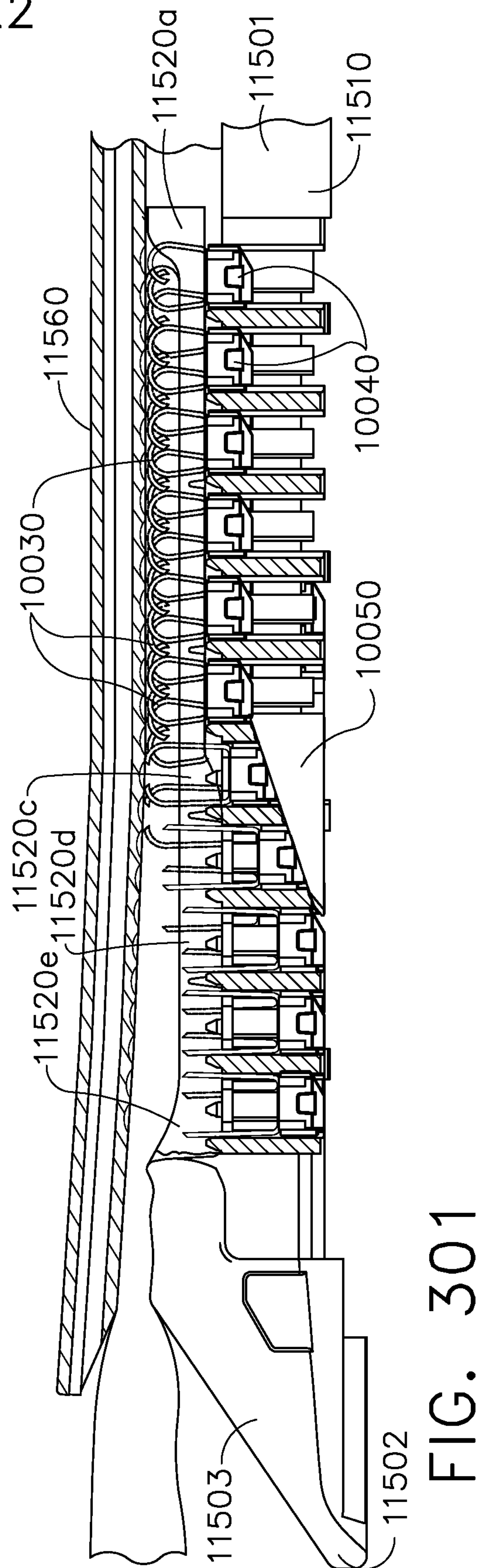


FIG. 301

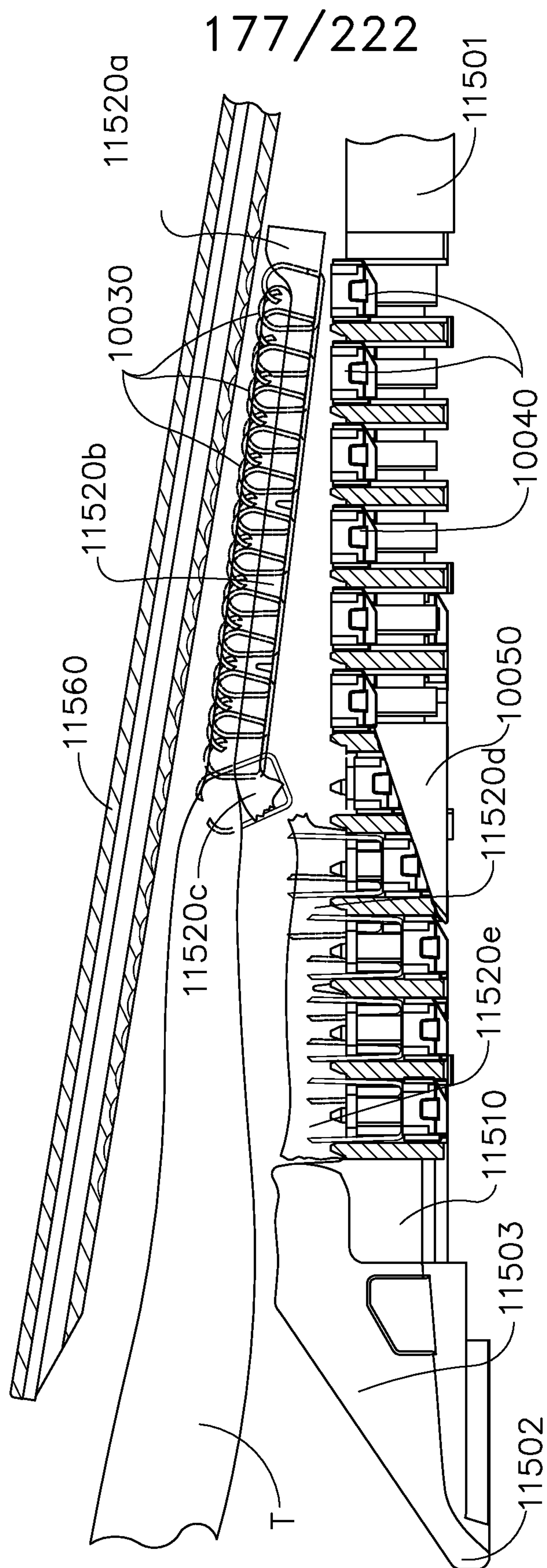


FIG. 302

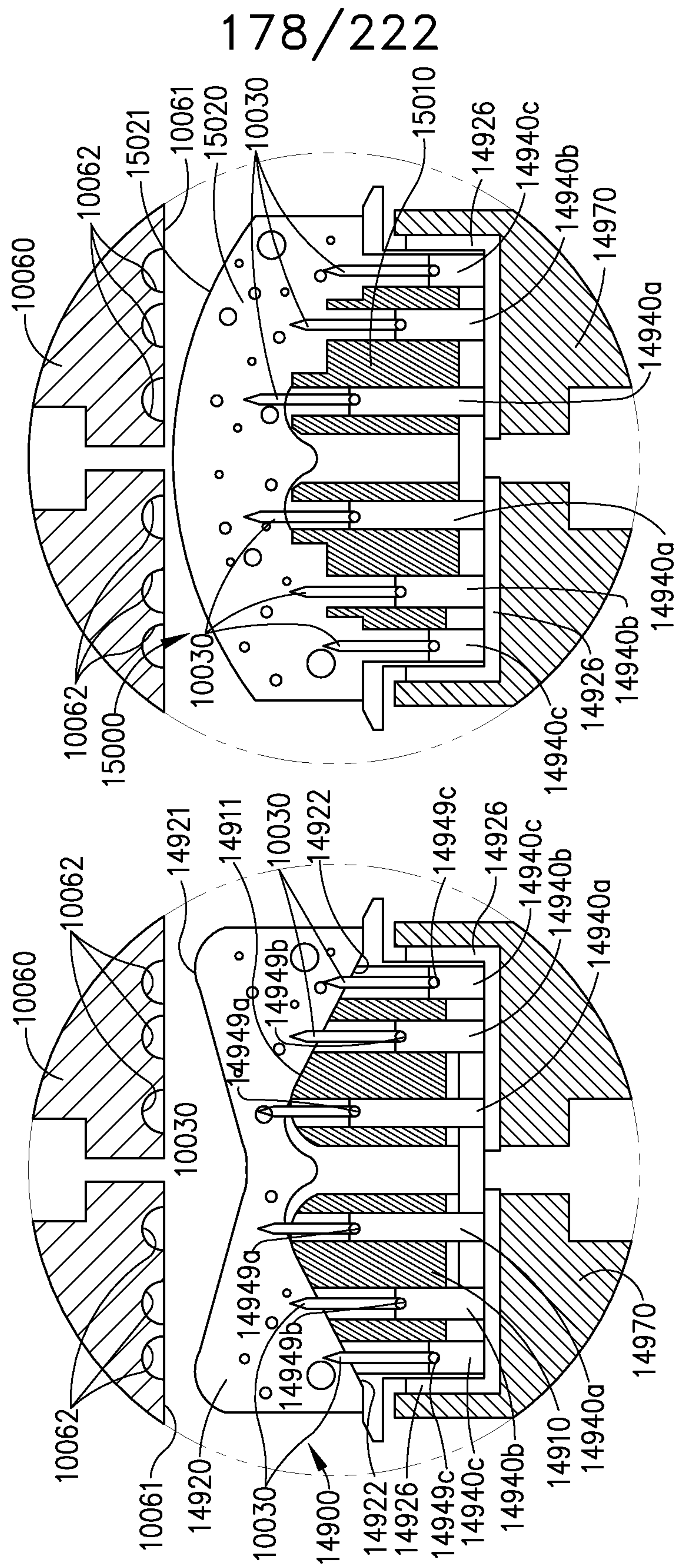
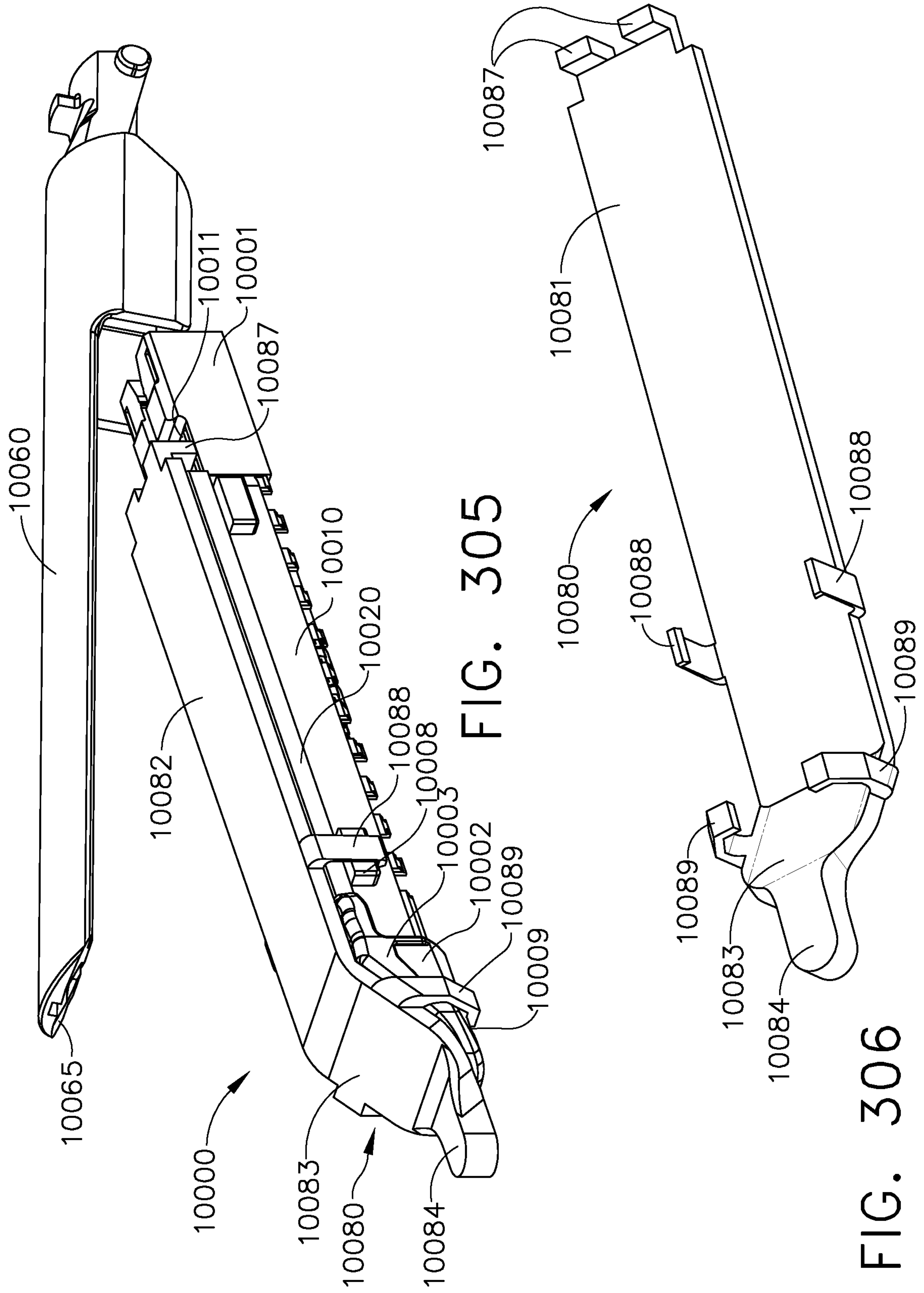


FIG. 304

FIG. 303

179/222



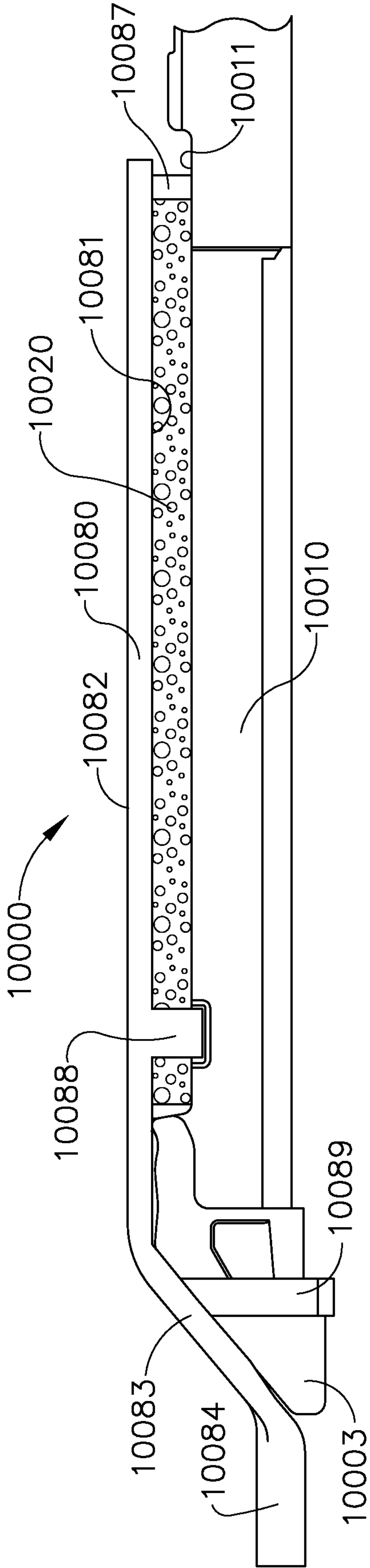


FIG. 307

180/222

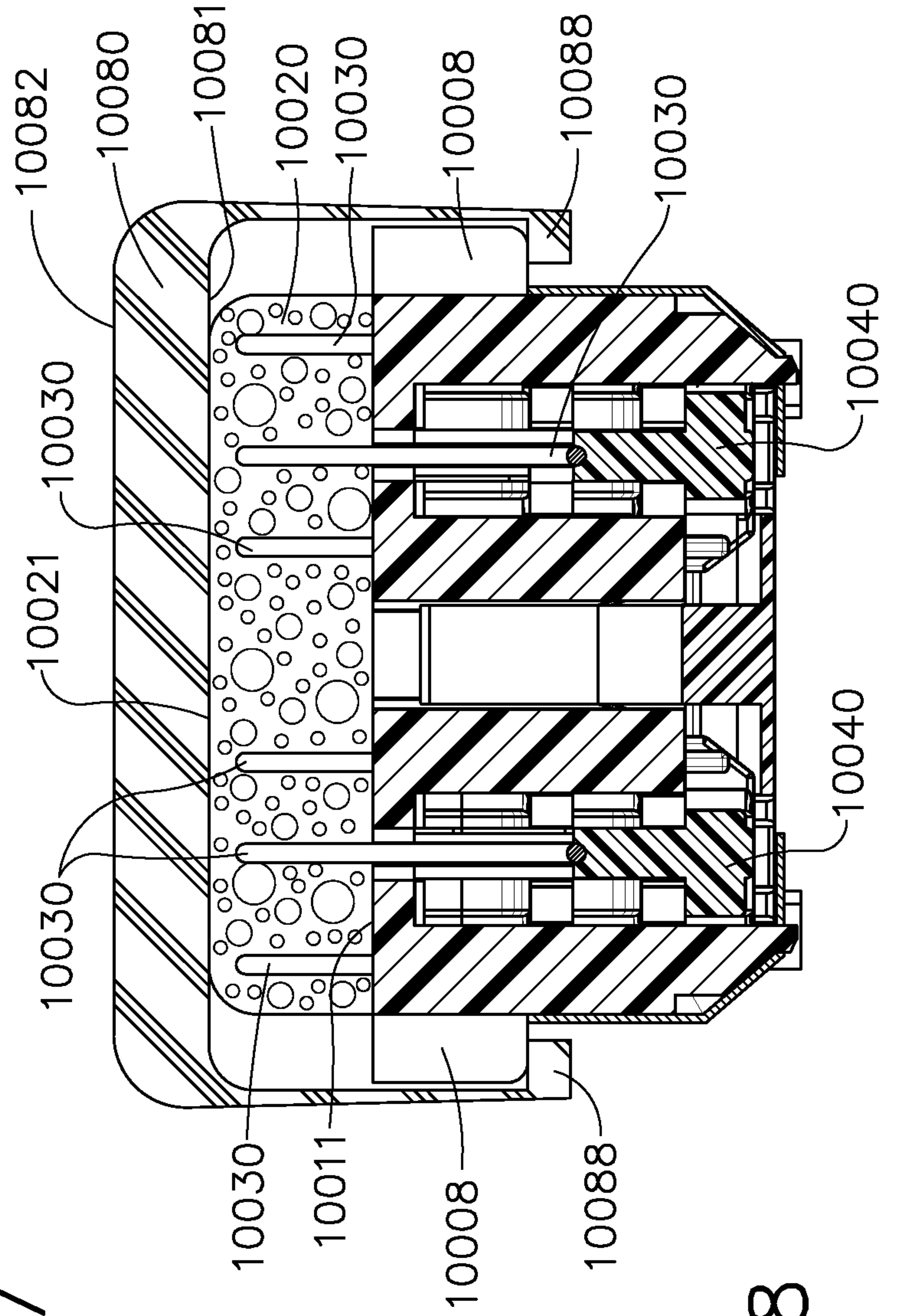


FIG. 308

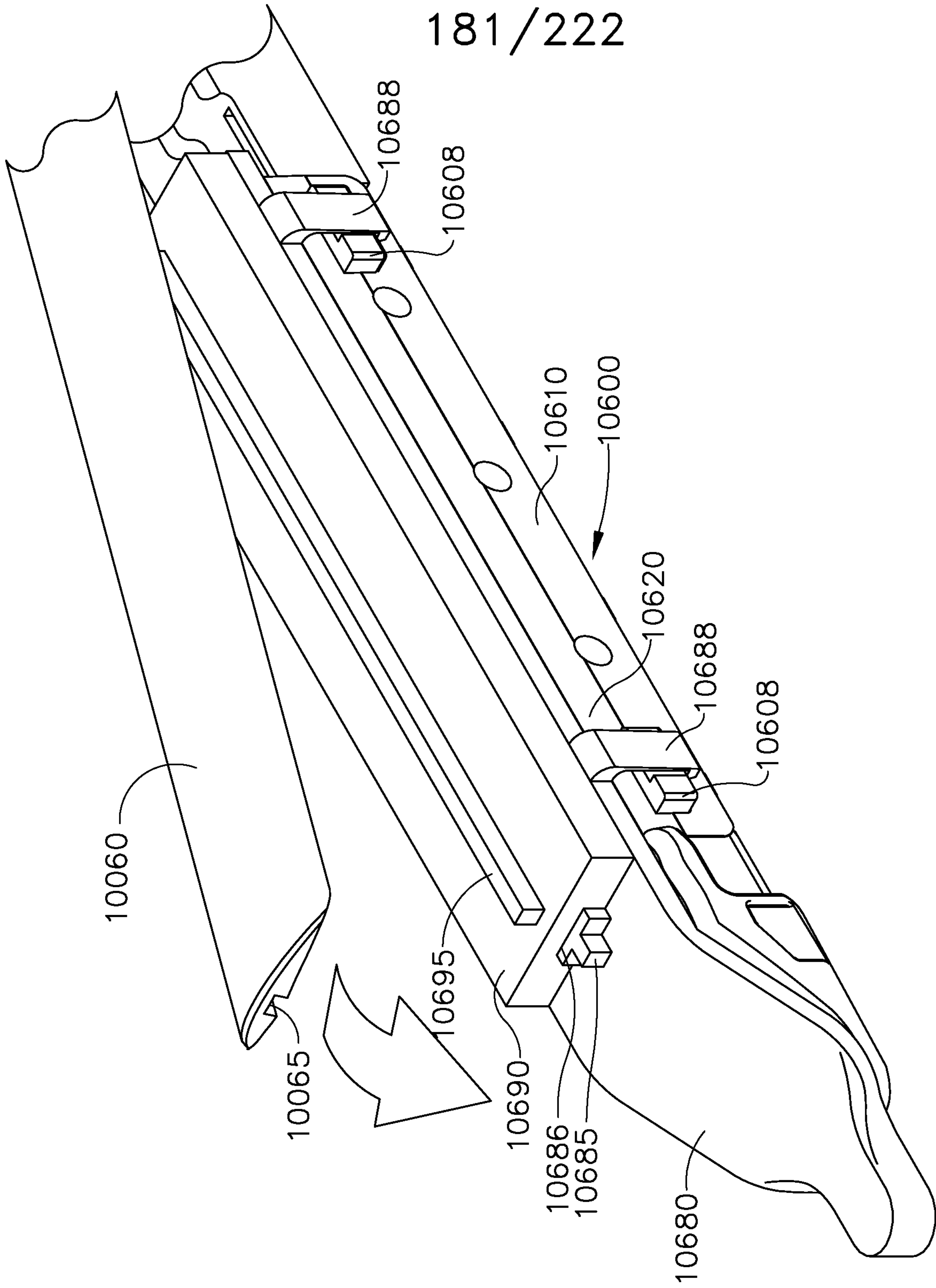


FIG. 309

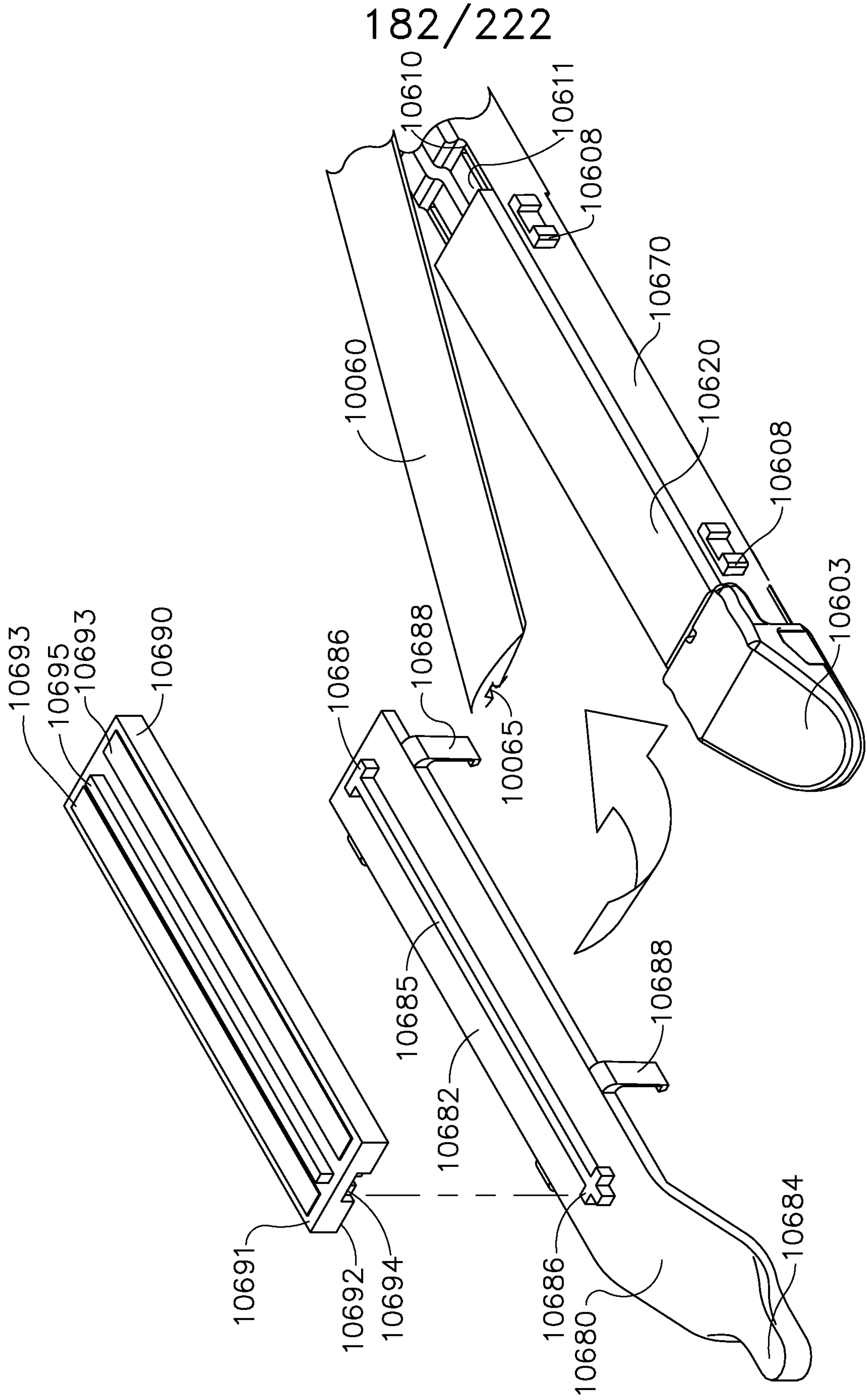


FIG. 310

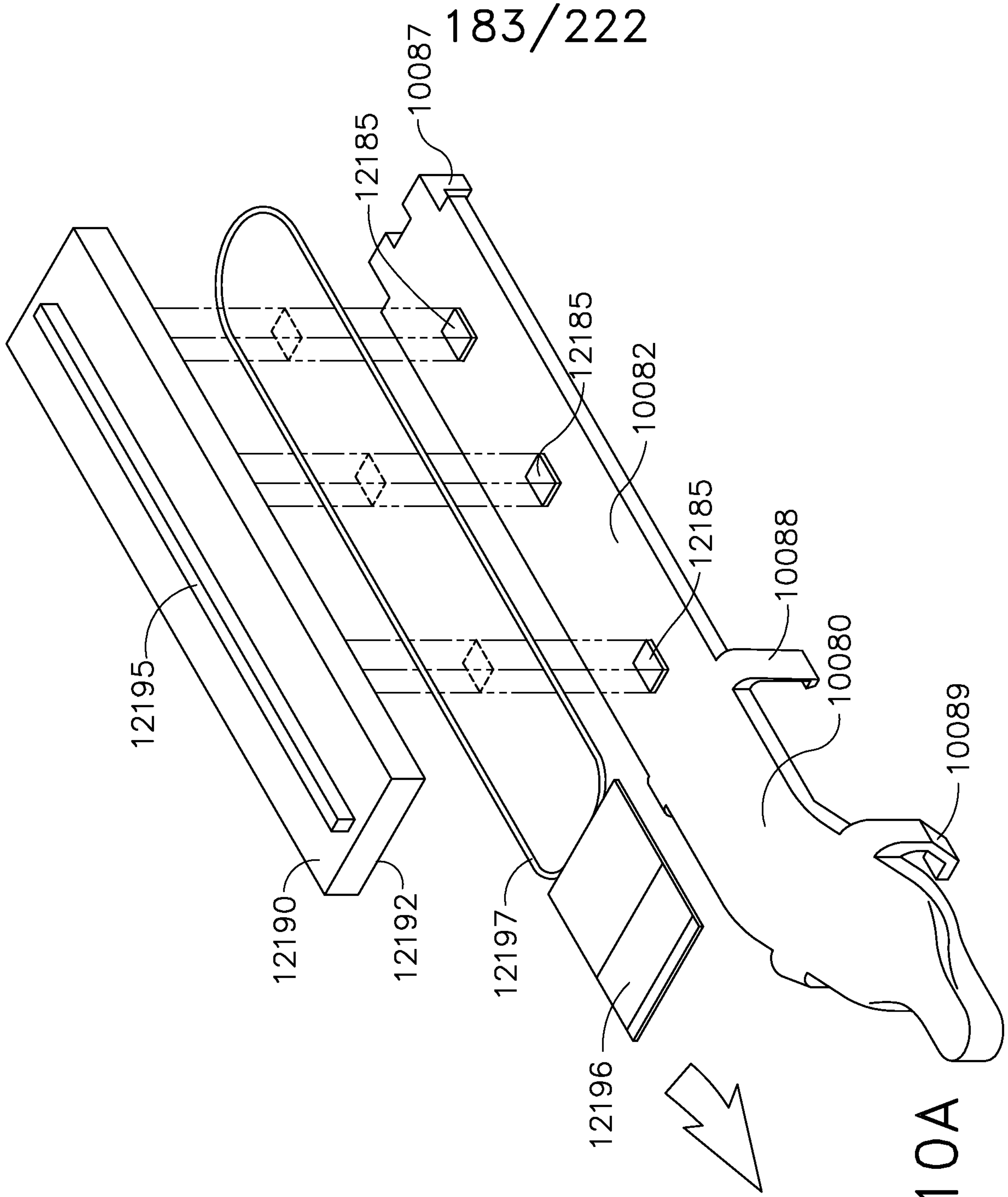


FIG. 310A

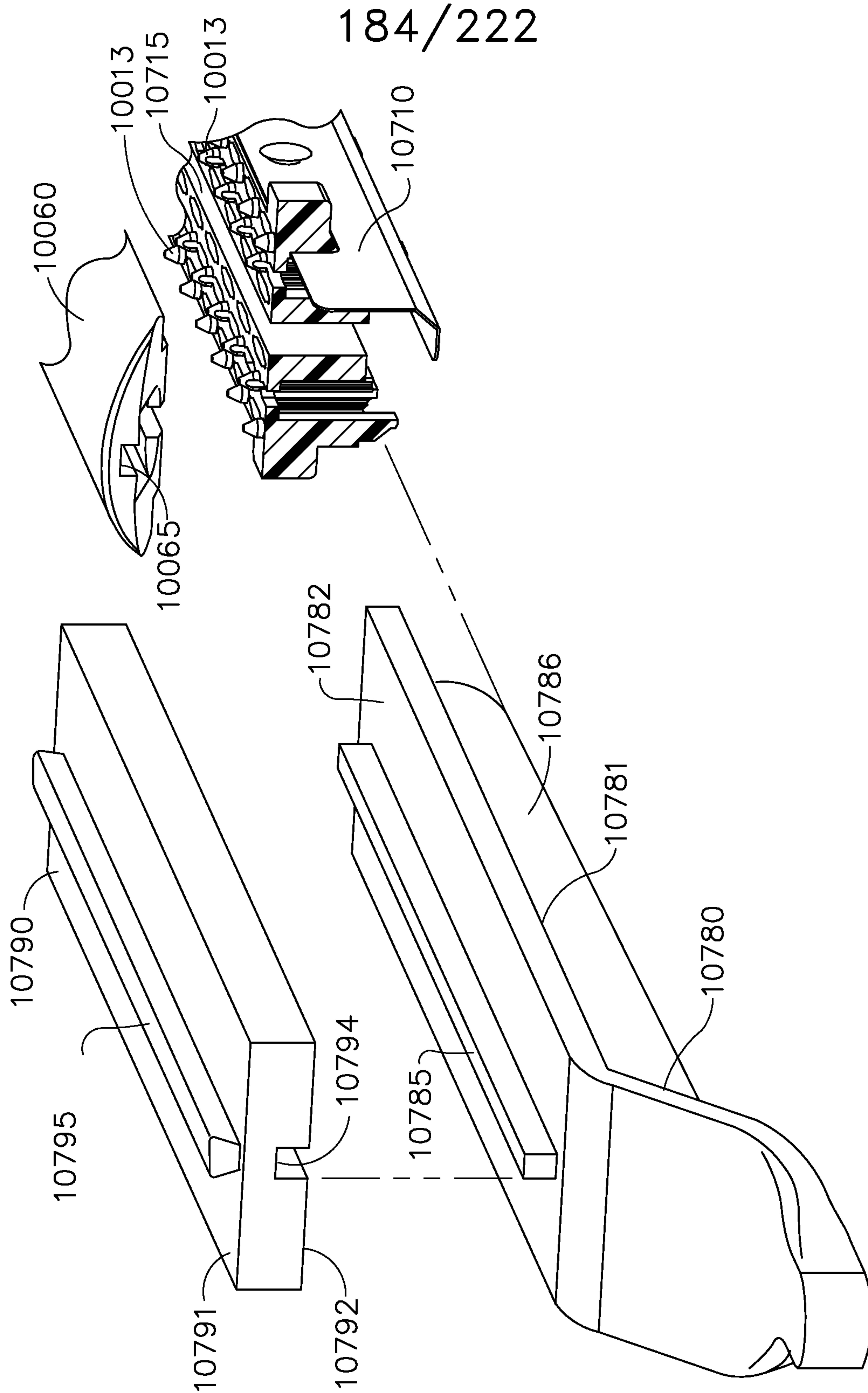
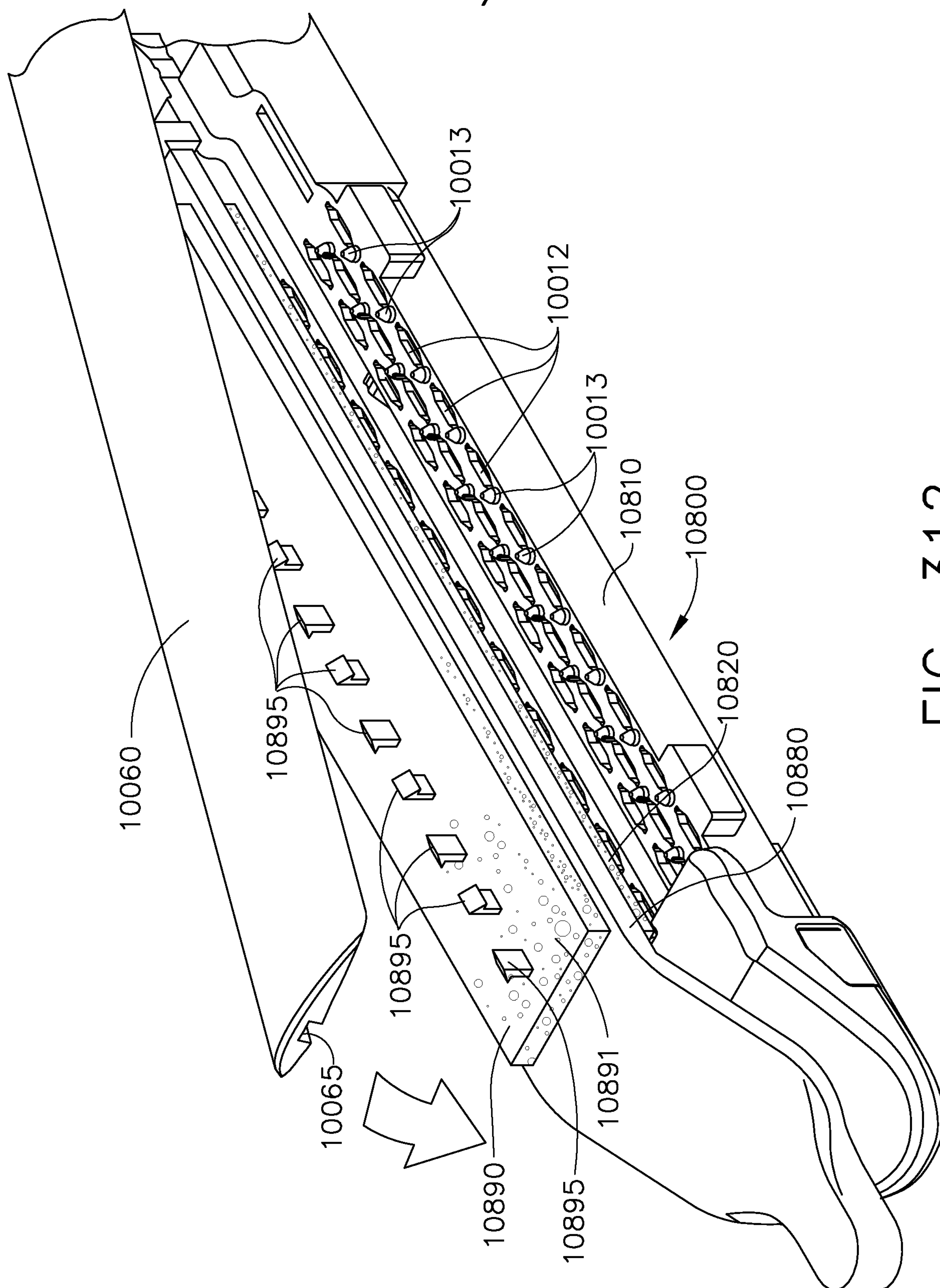
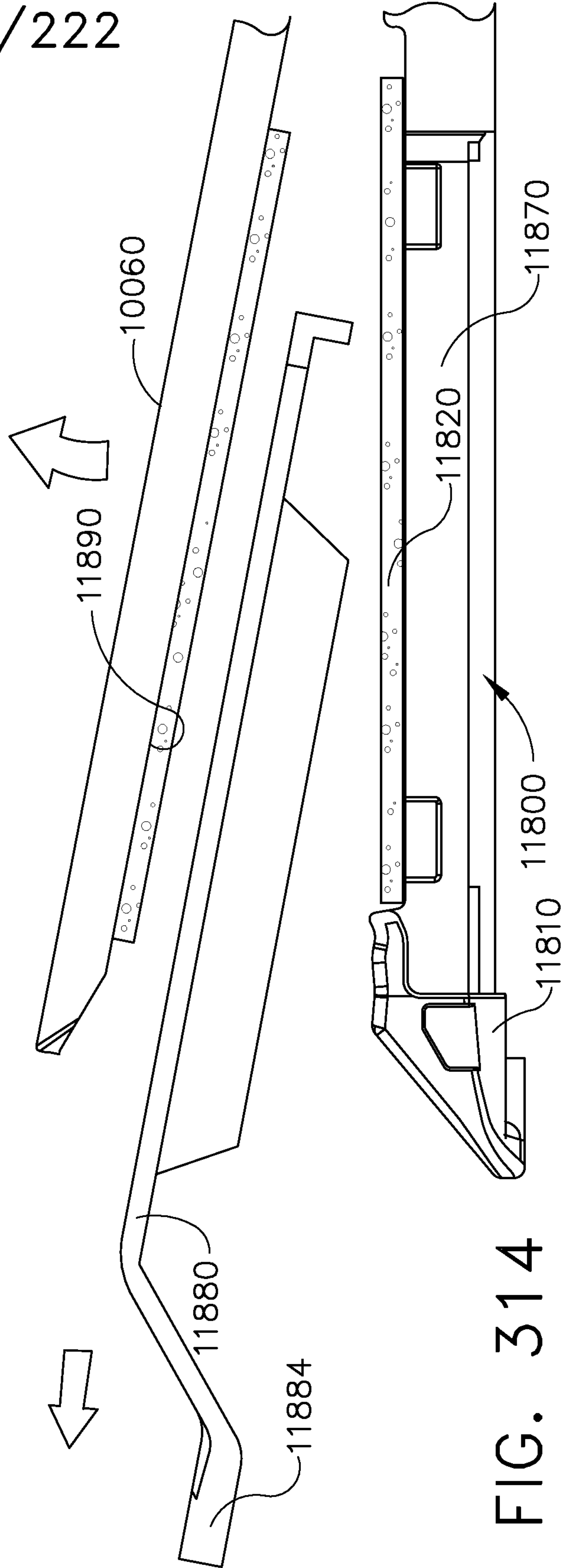
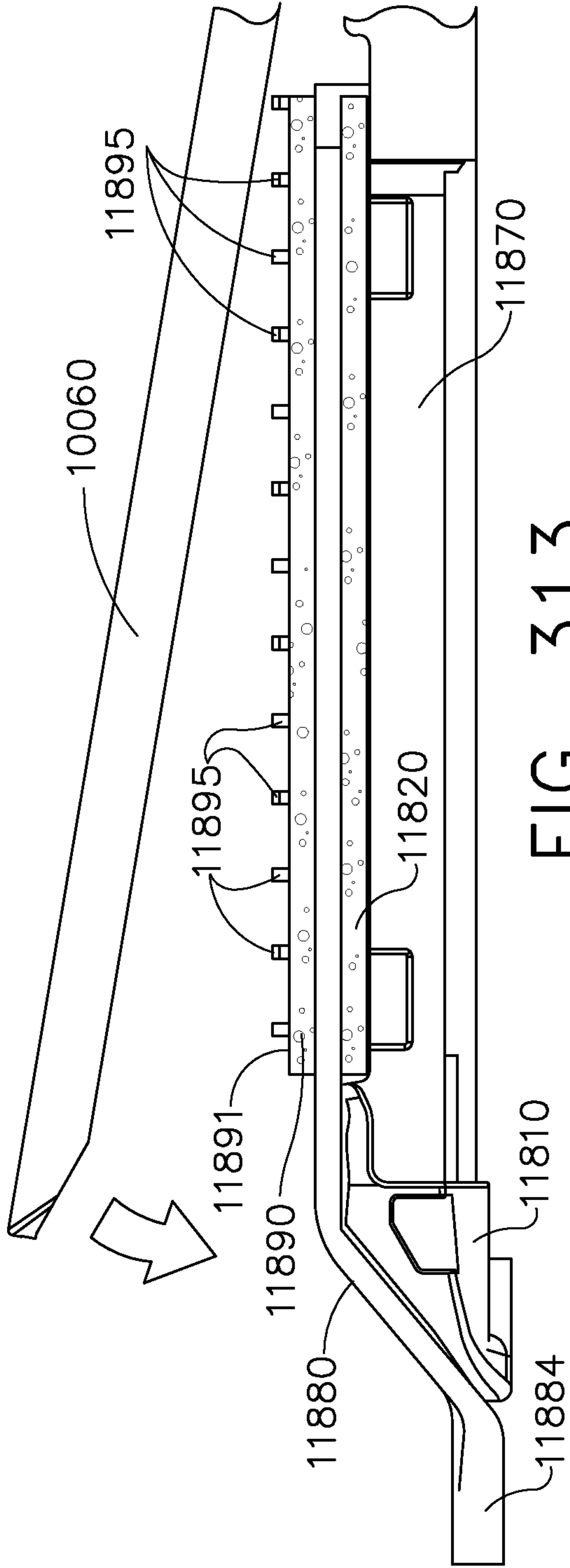


FIG. 311



186/222



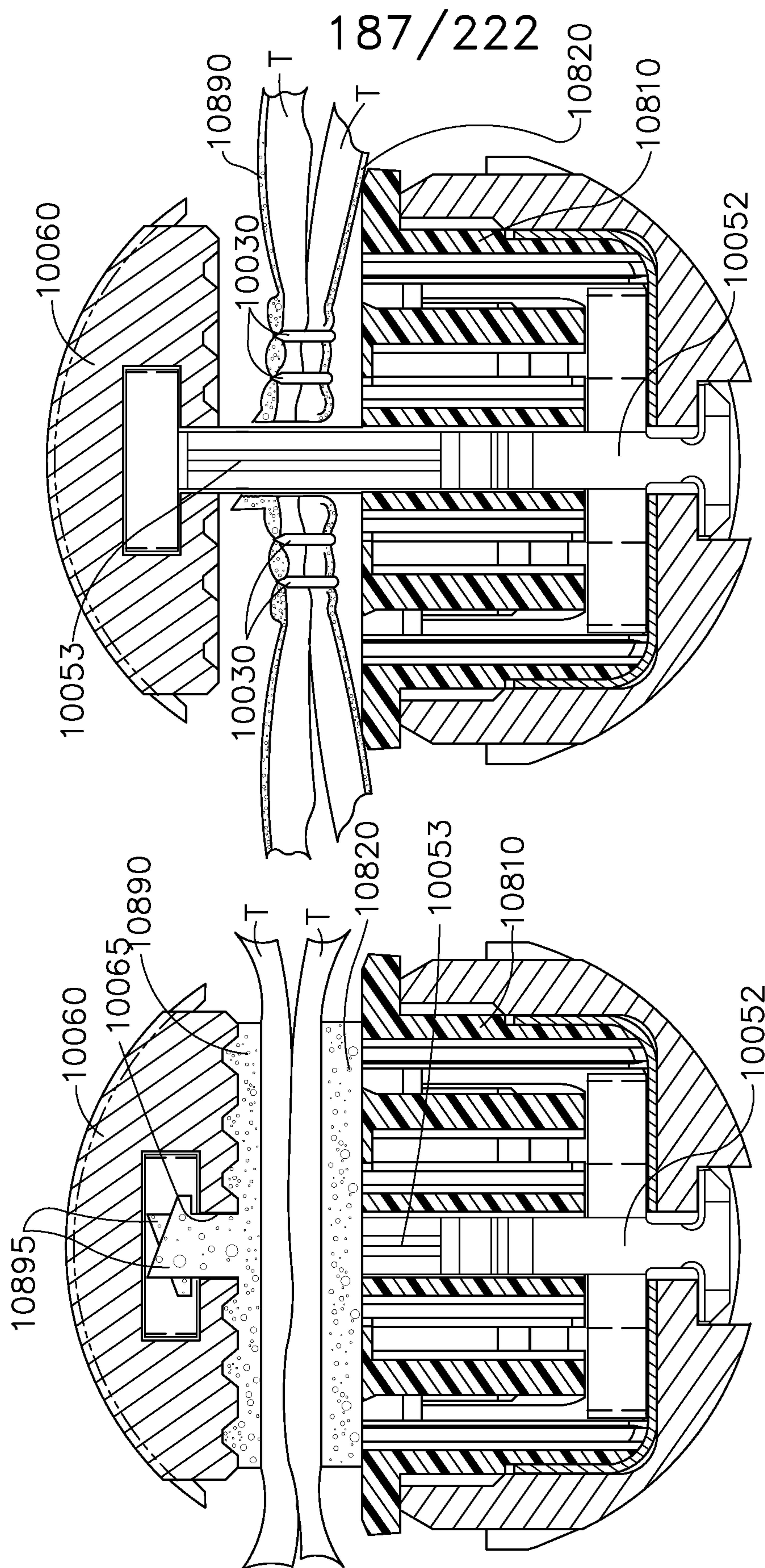
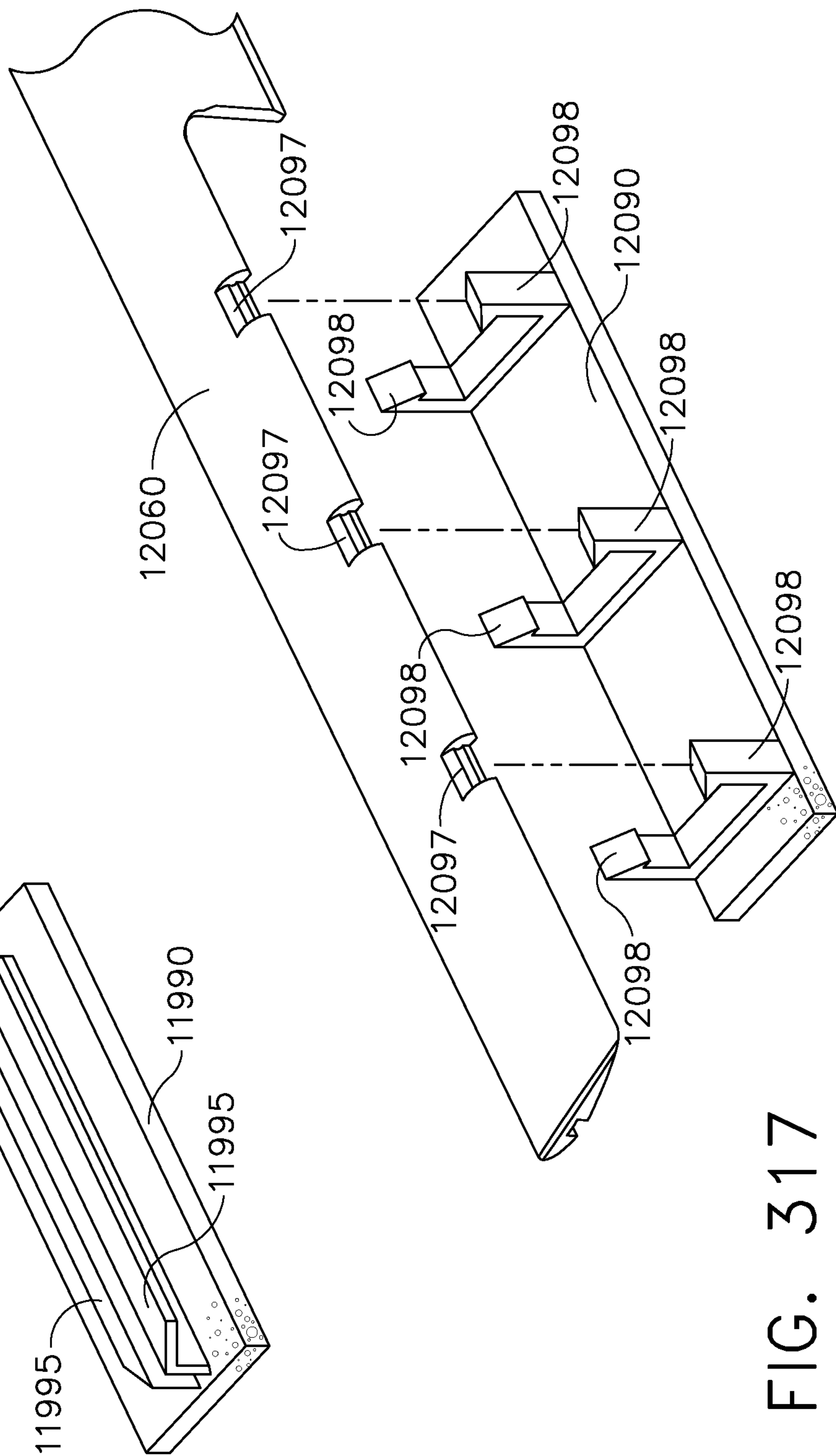
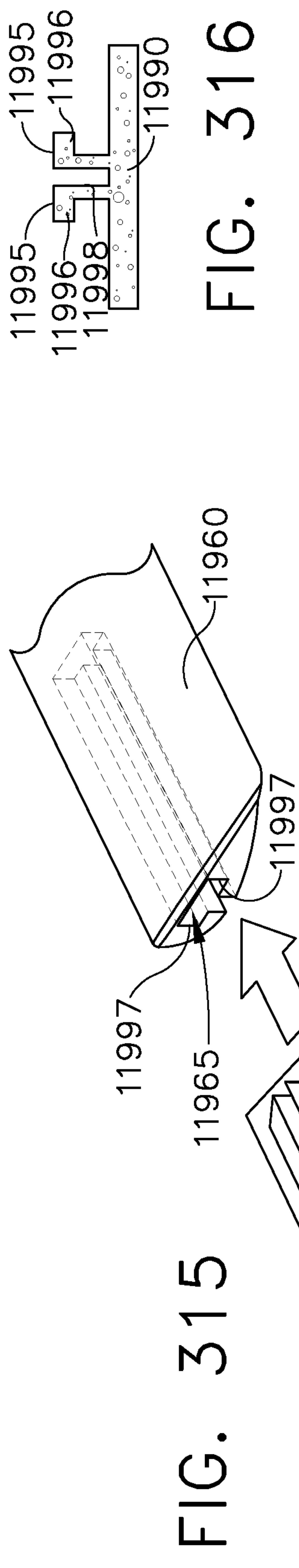
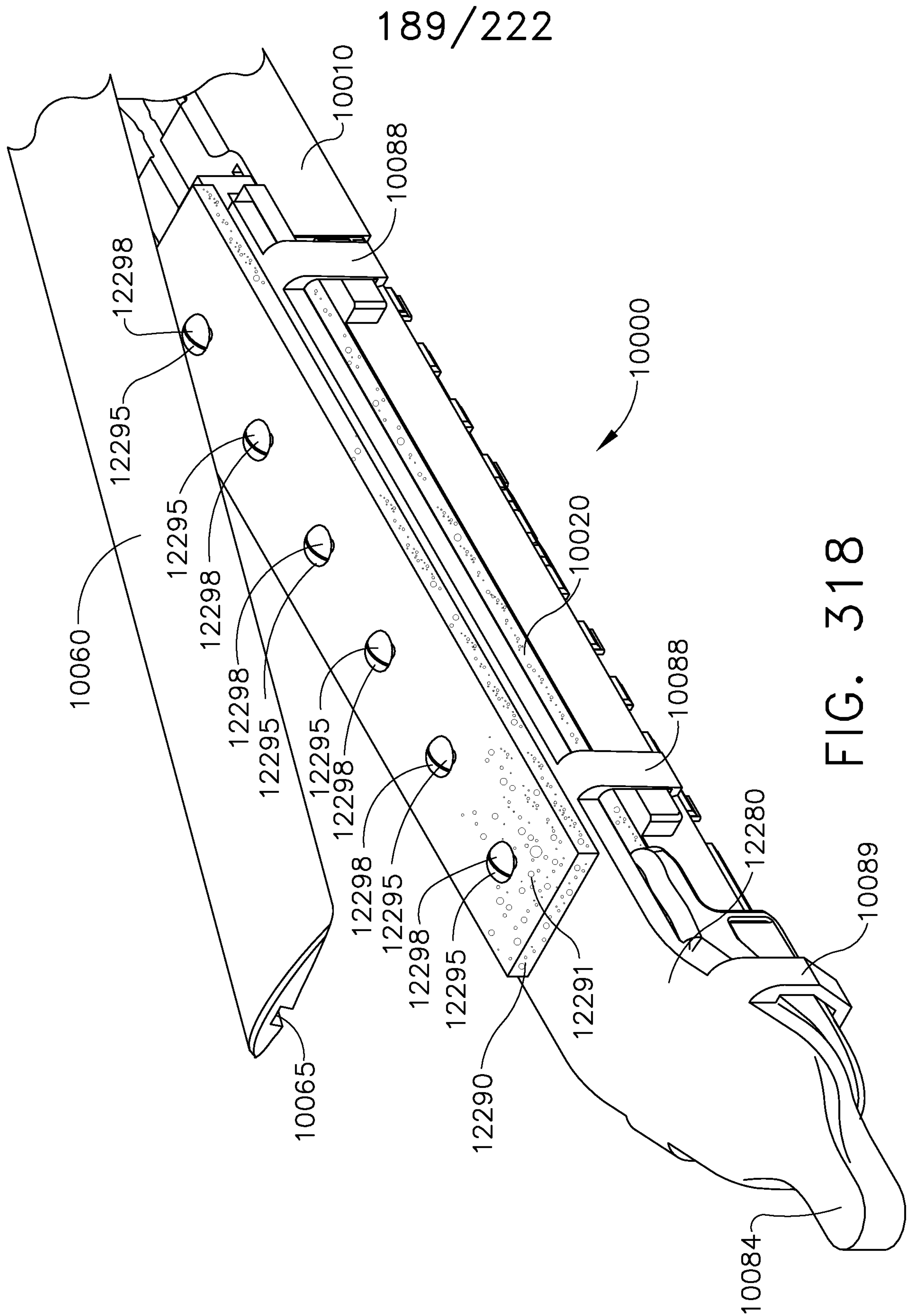


FIG. 314B

FIG. 314A

188/222





190/222

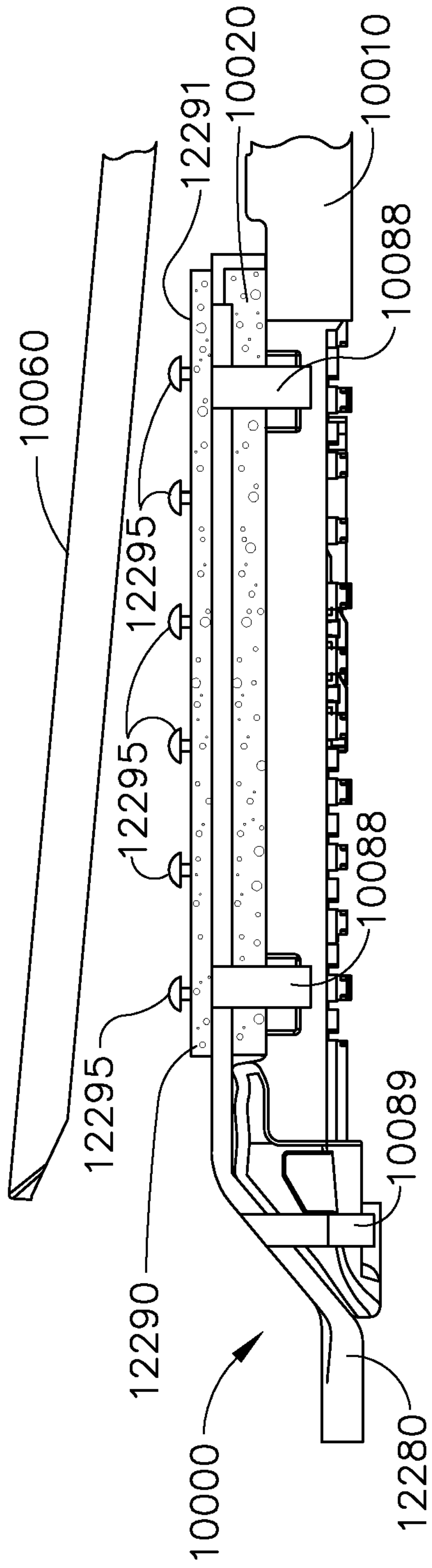


FIG. 319

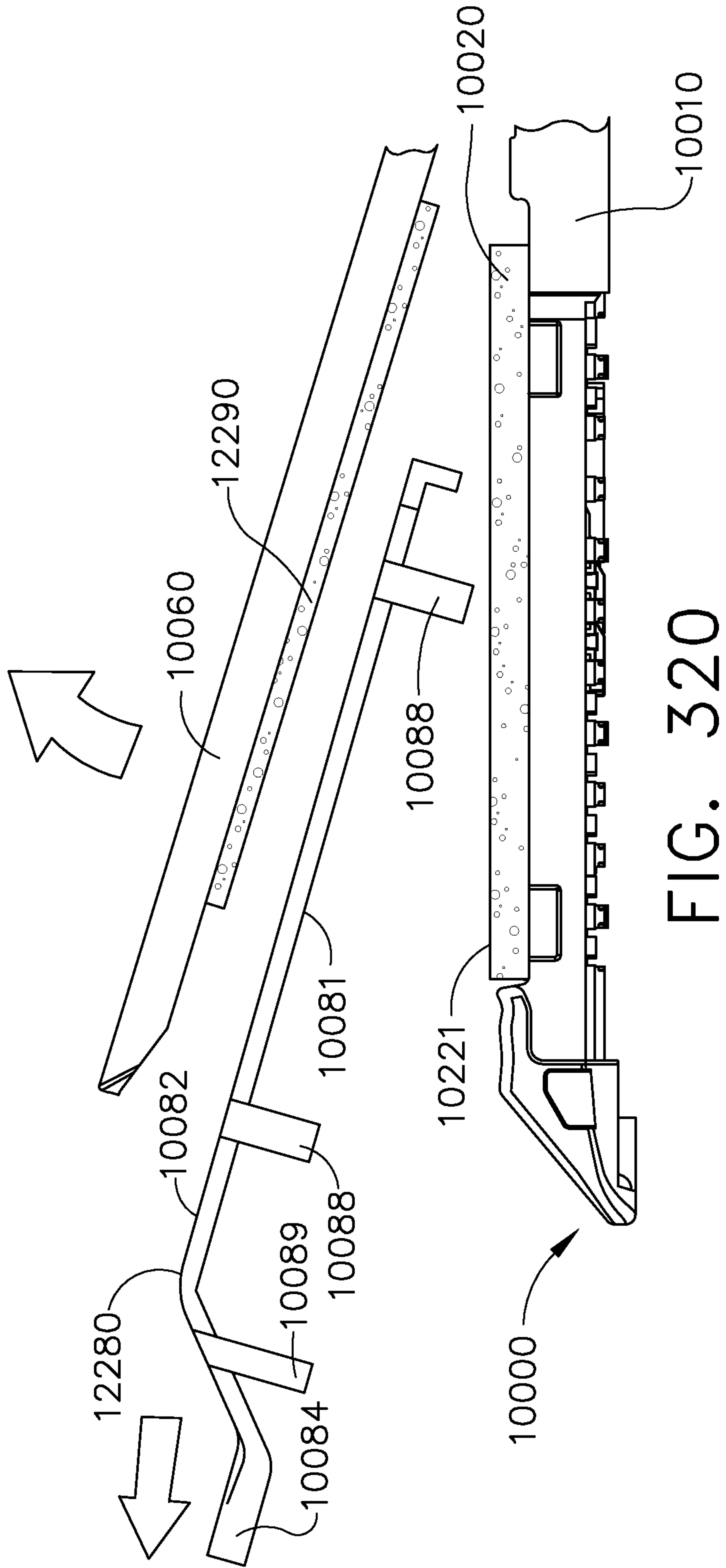


FIG. 320

191/222

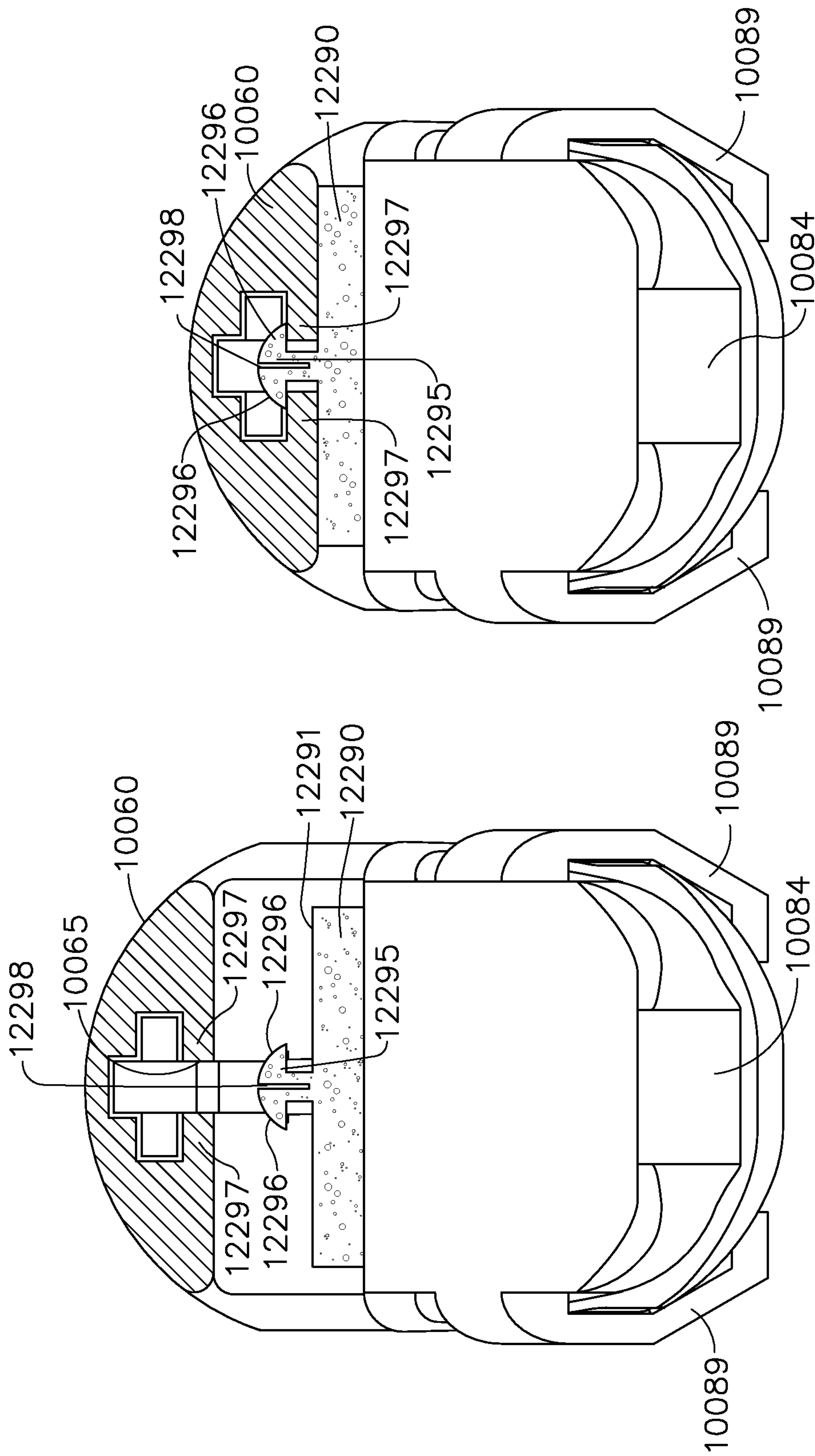
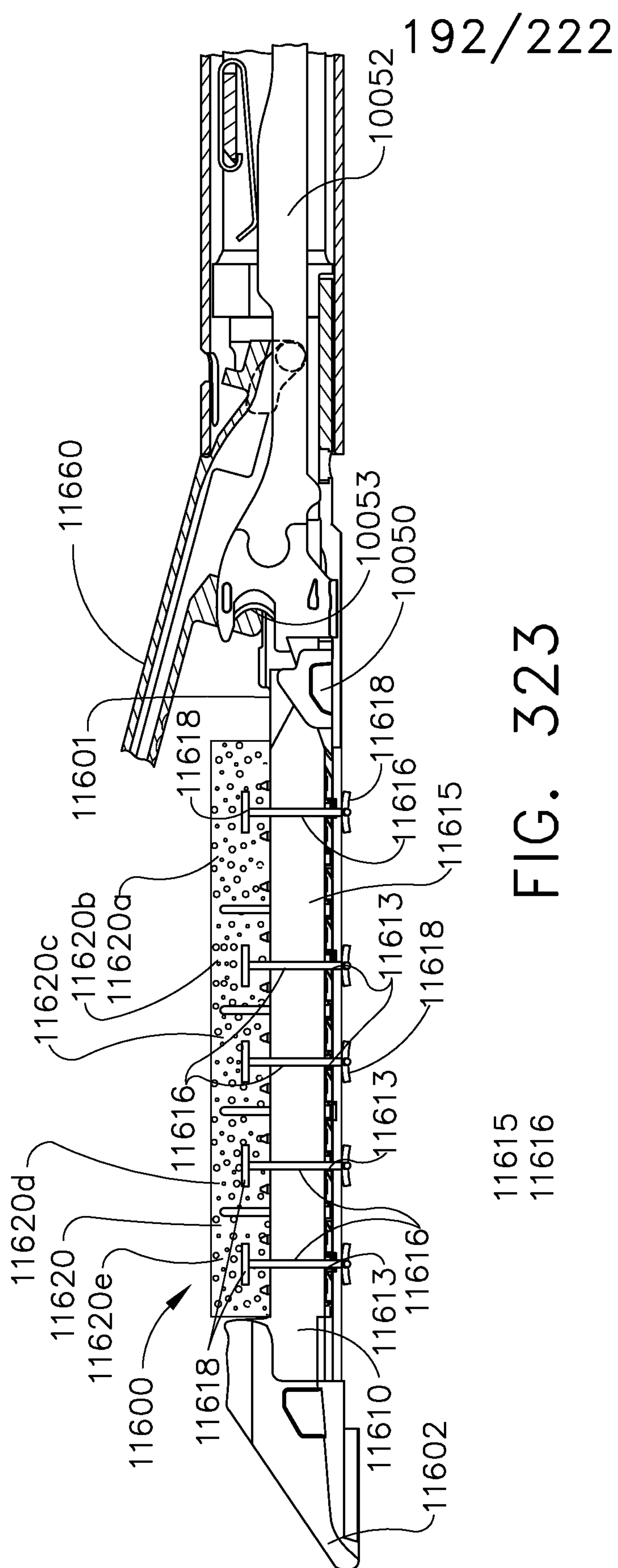


FIG. 321

FIG. 322



193/222

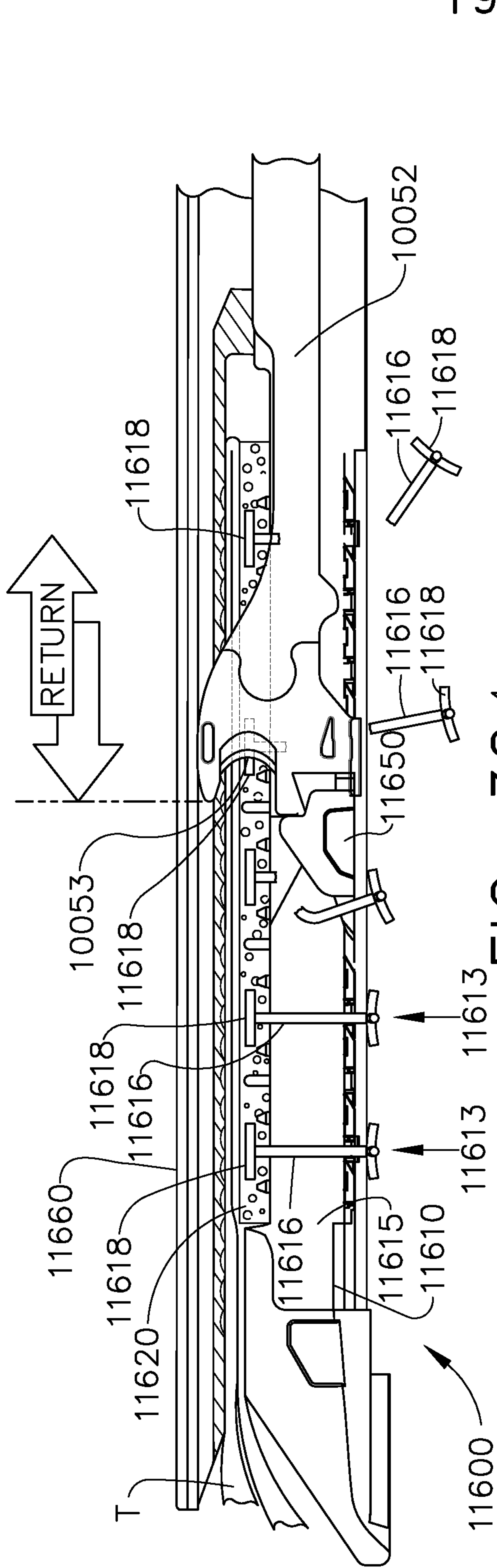


FIG. 324

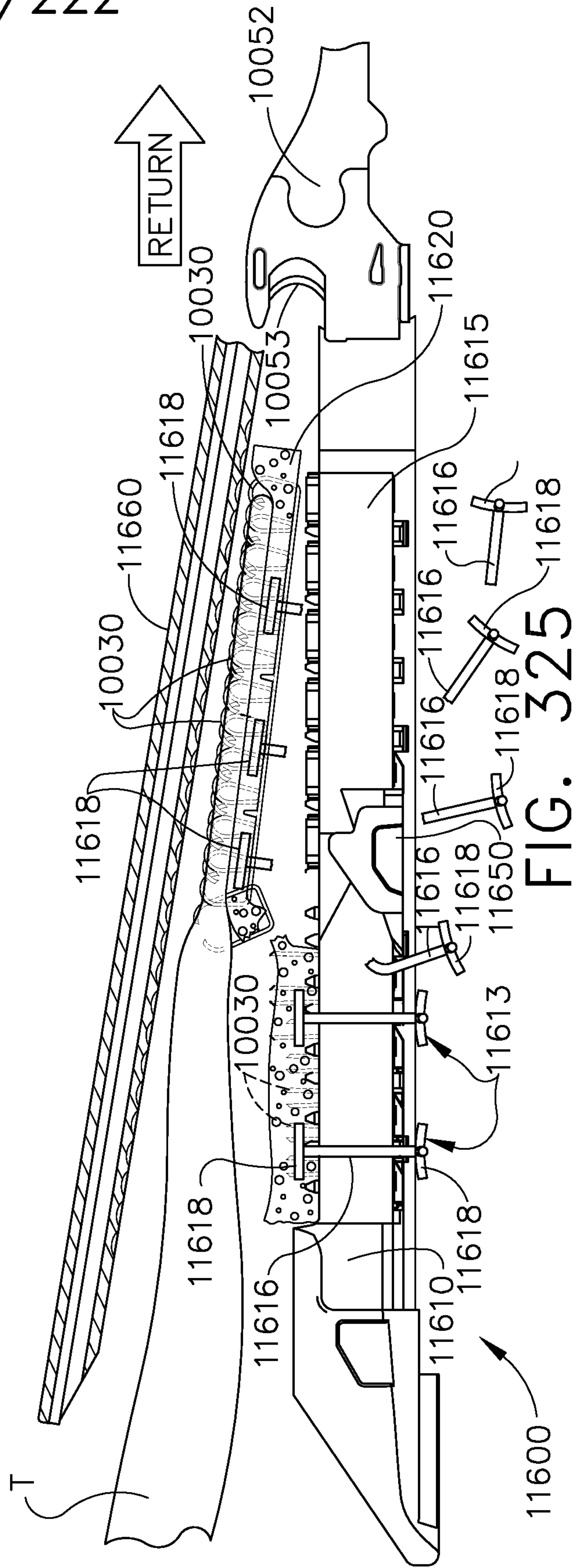


FIG. 325

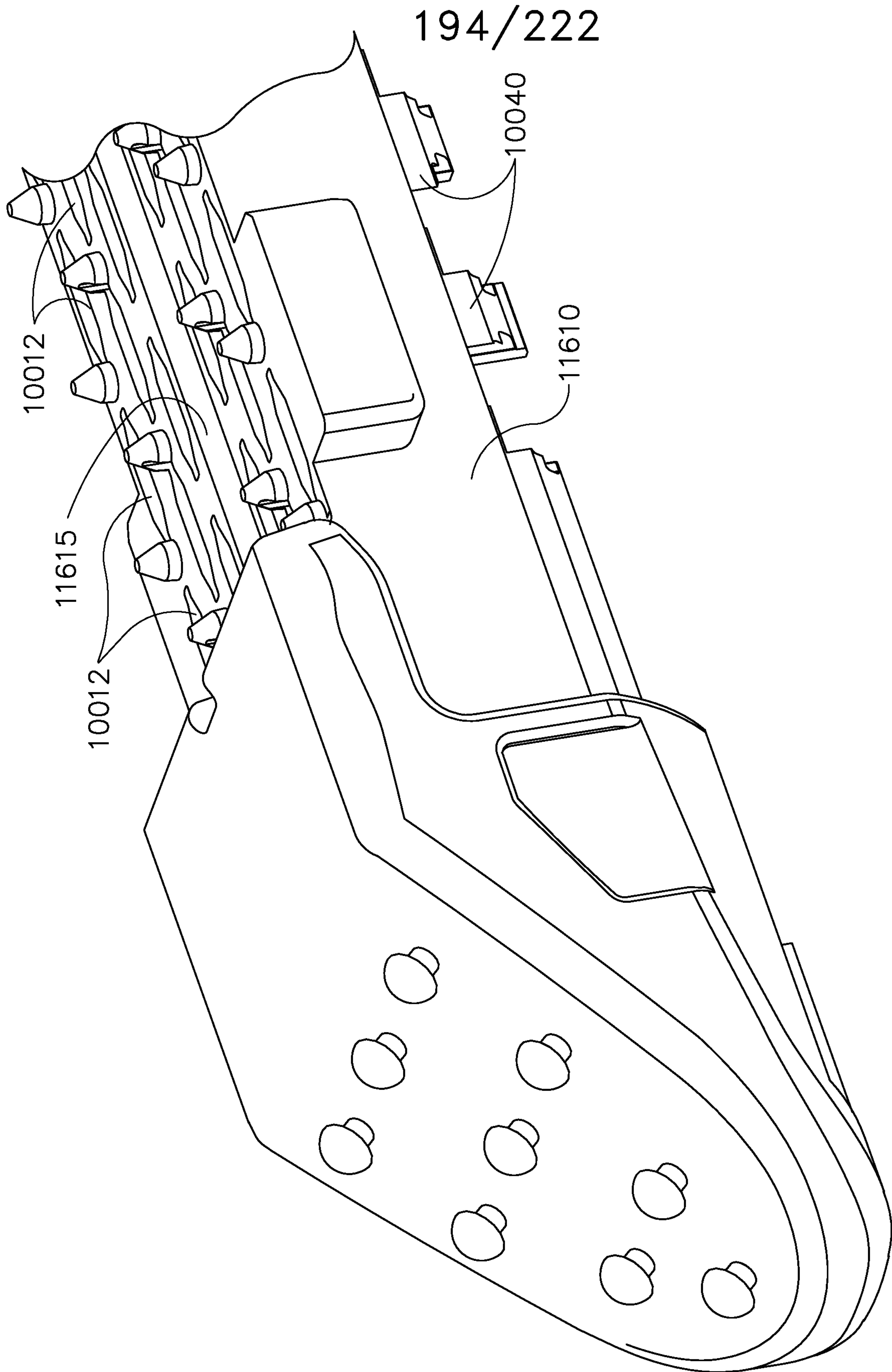


FIG. 326

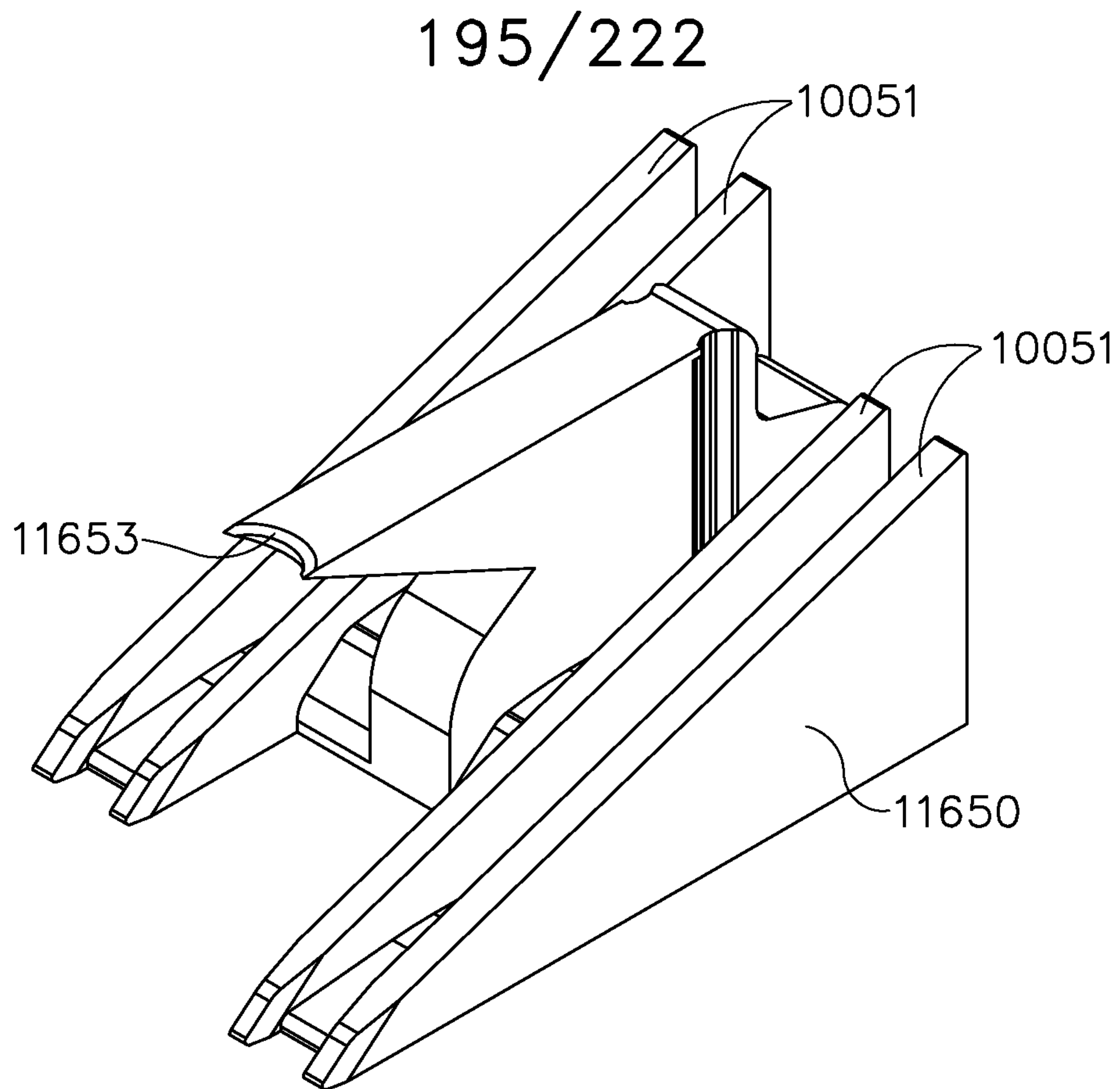


FIG. 327

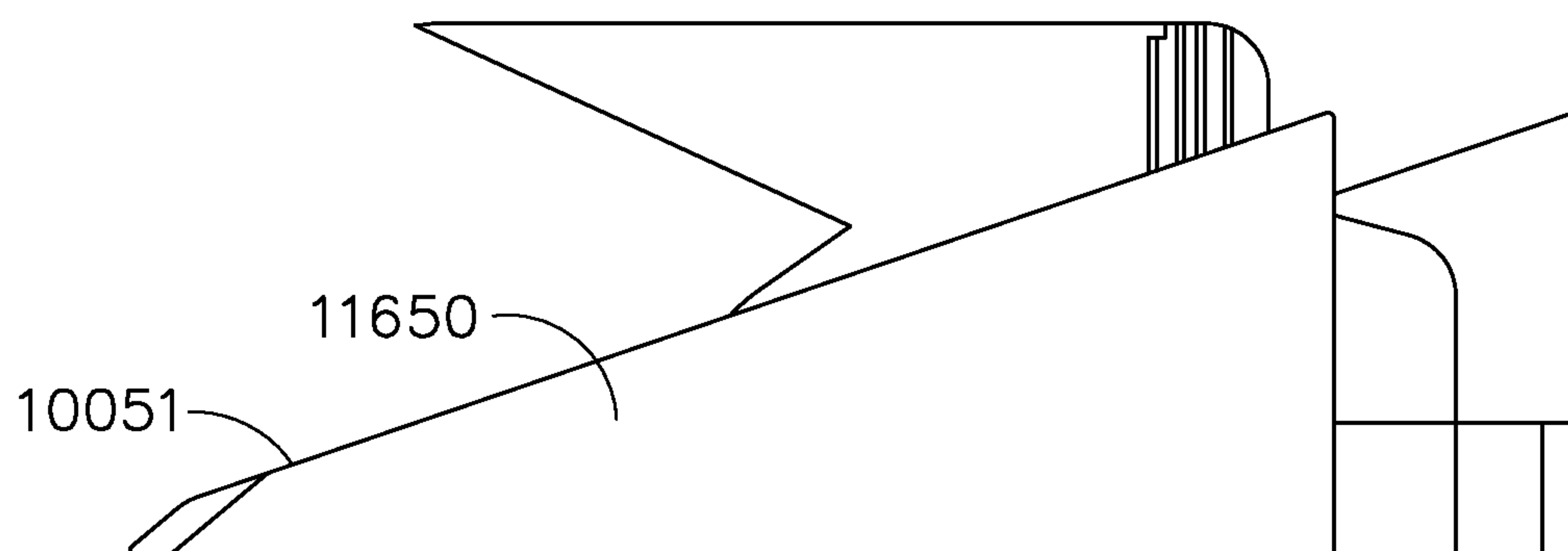
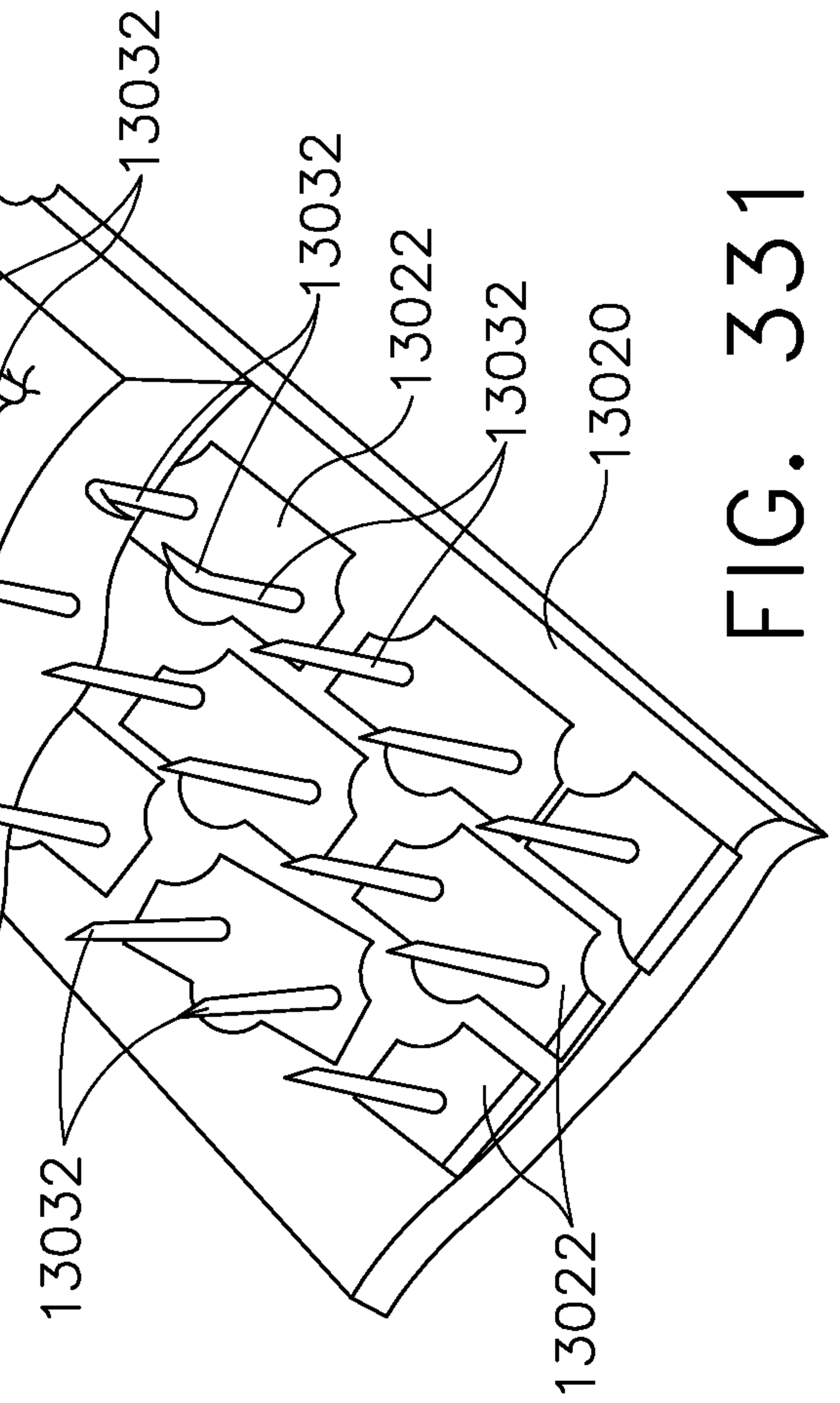
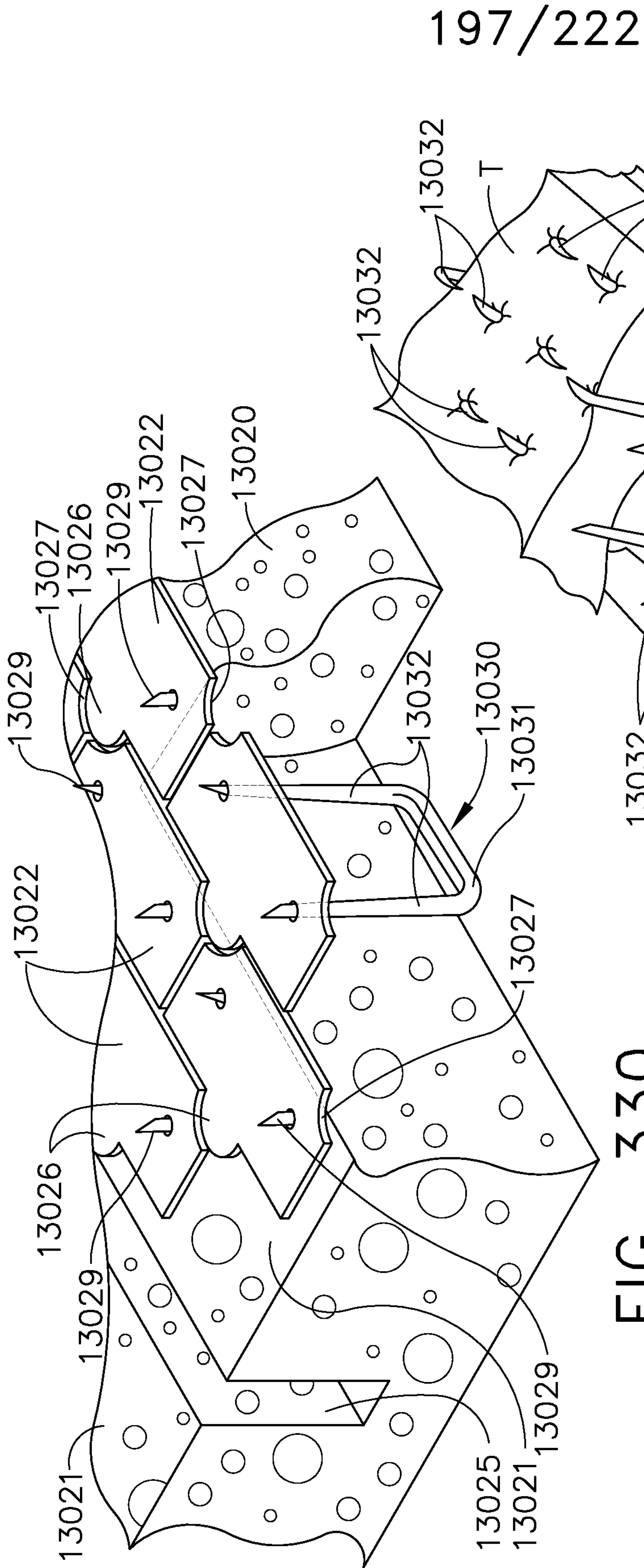


FIG. 328



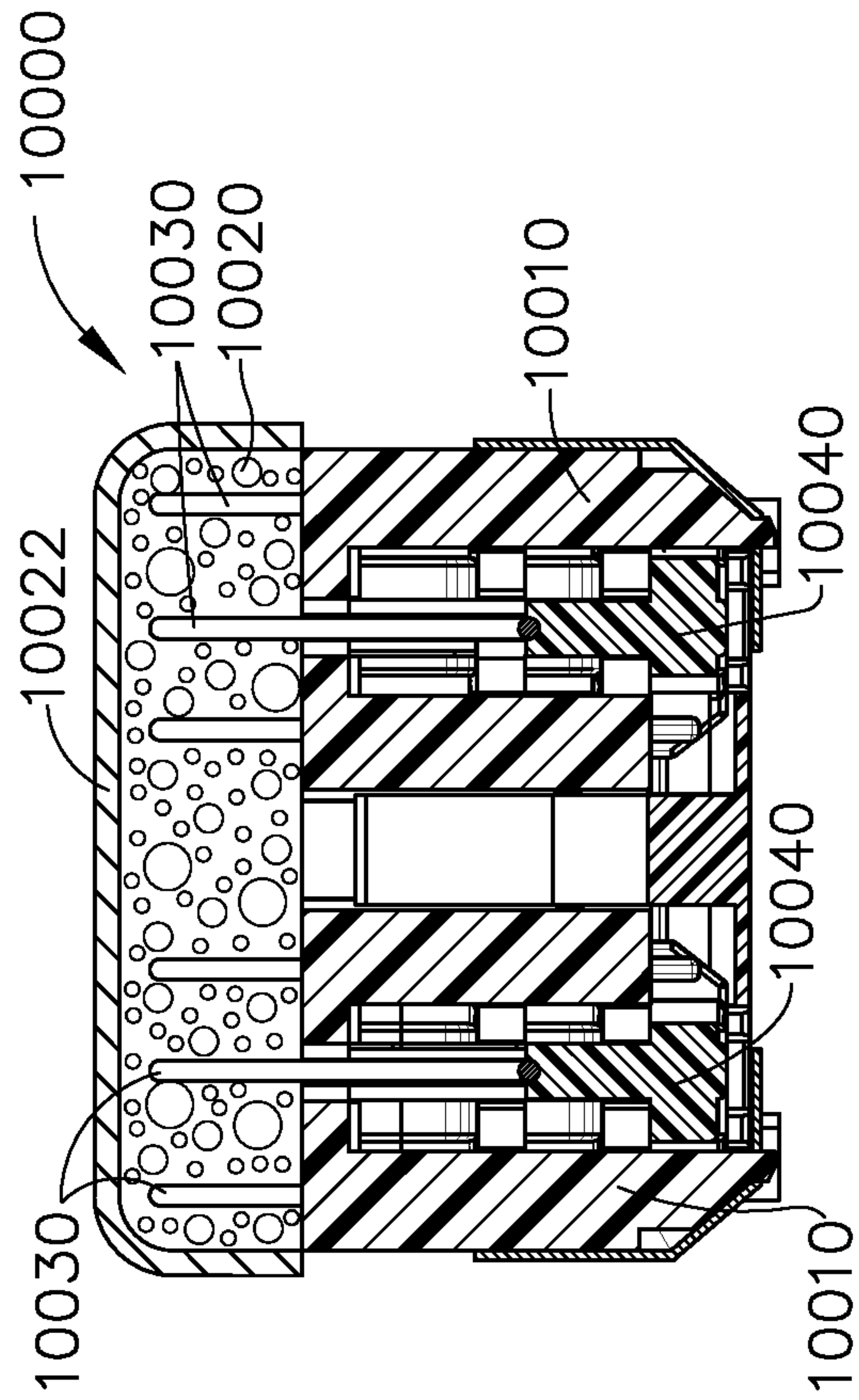


FIG. 332

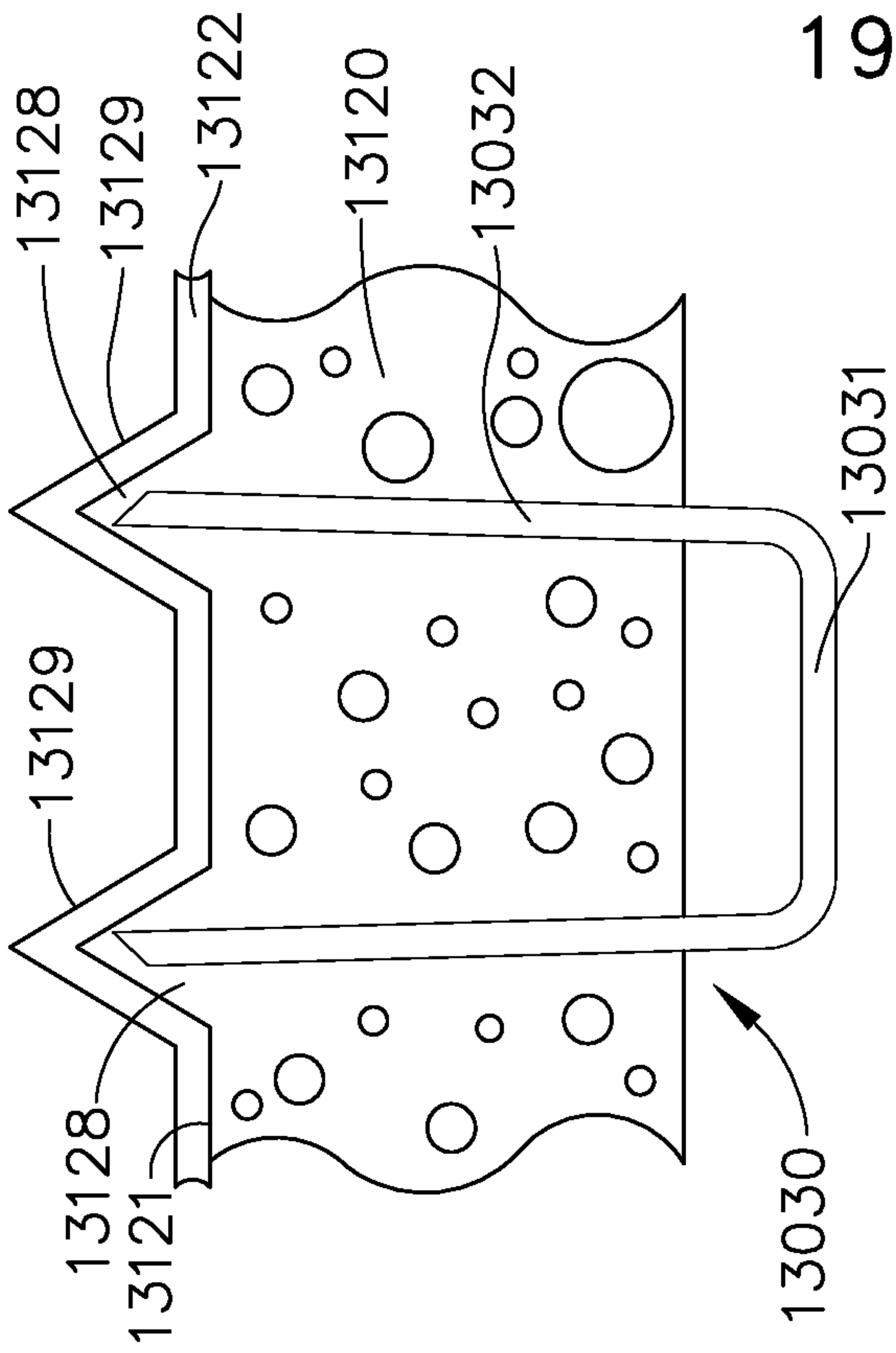


FIG. 333

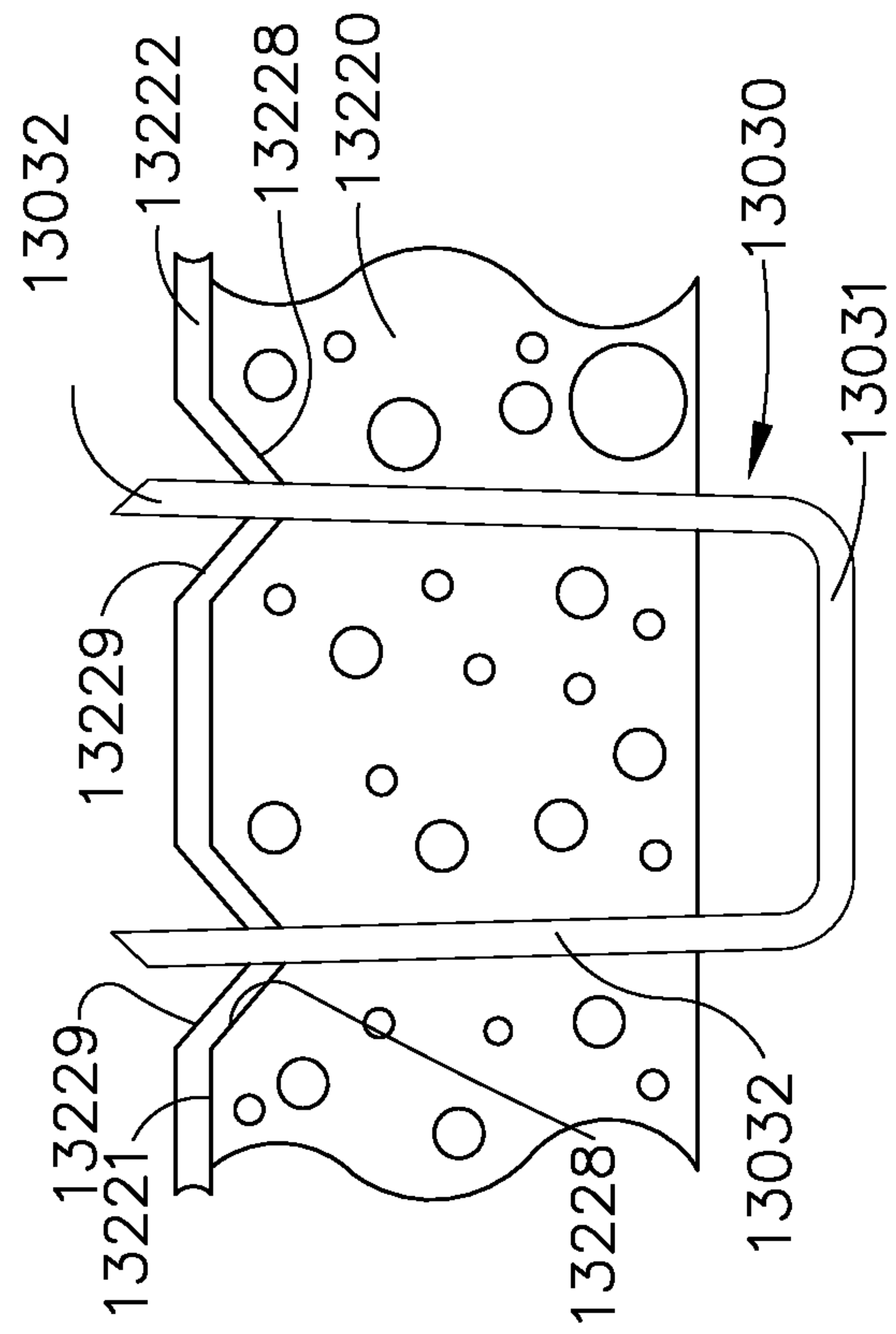


FIG. 334

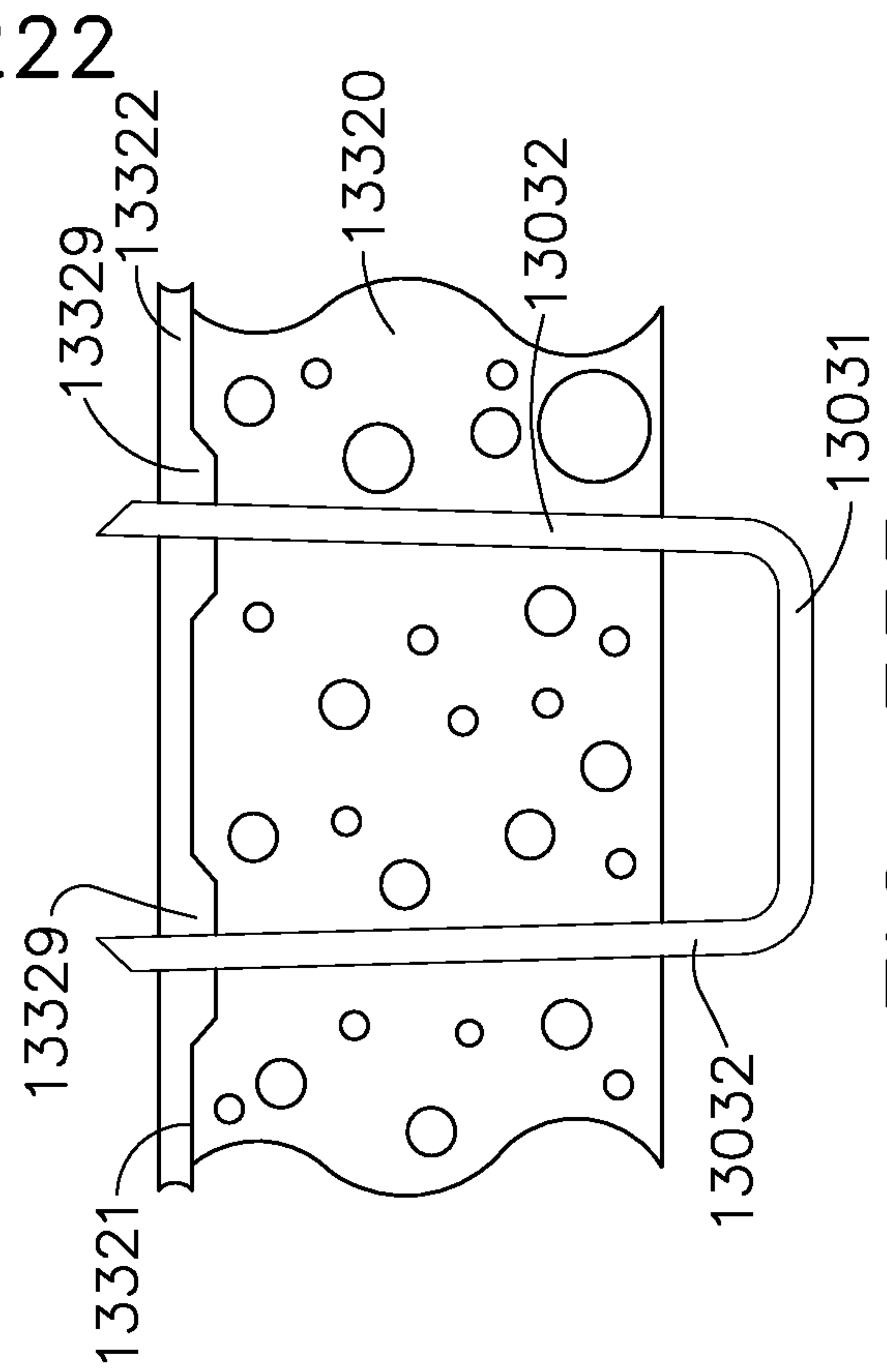
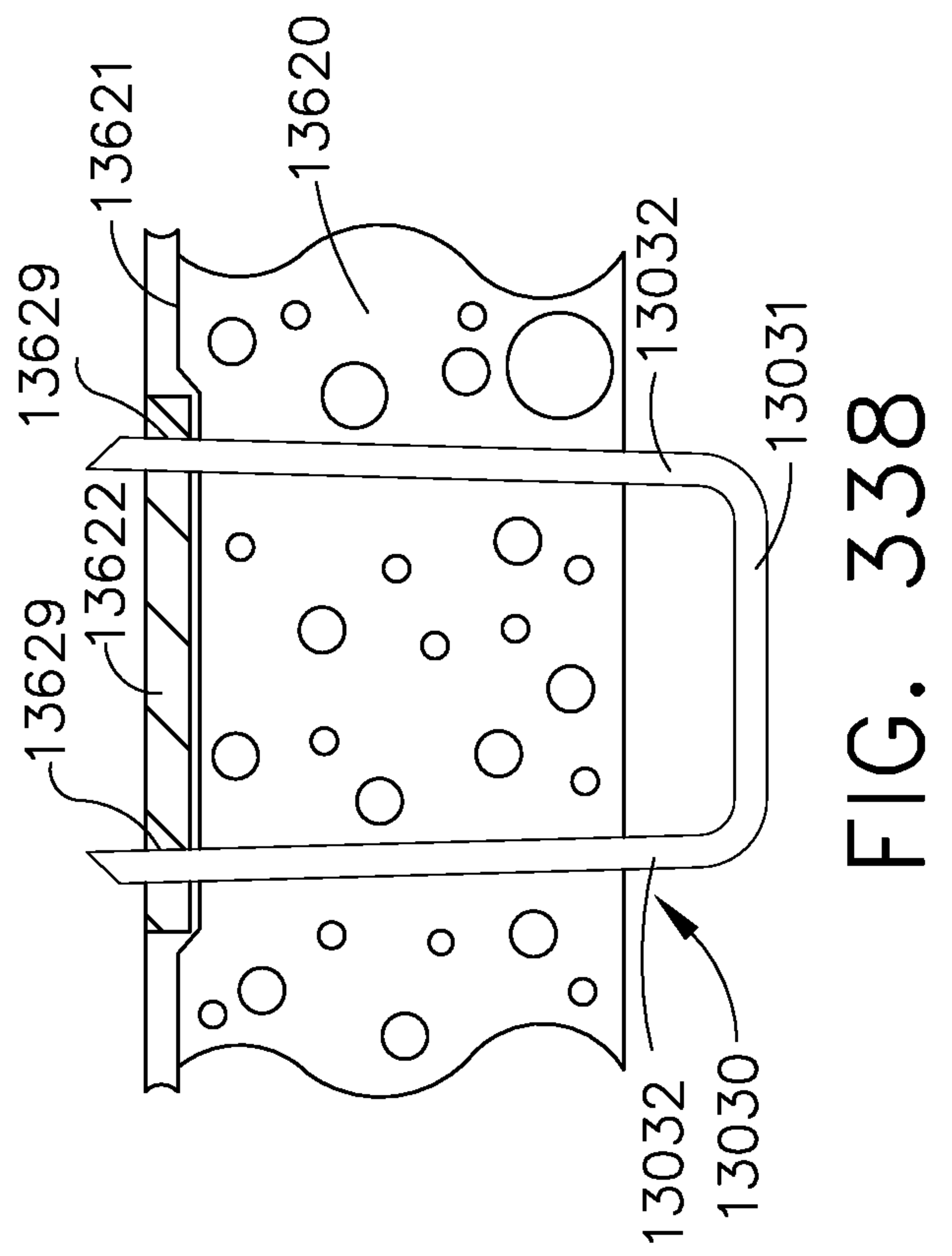
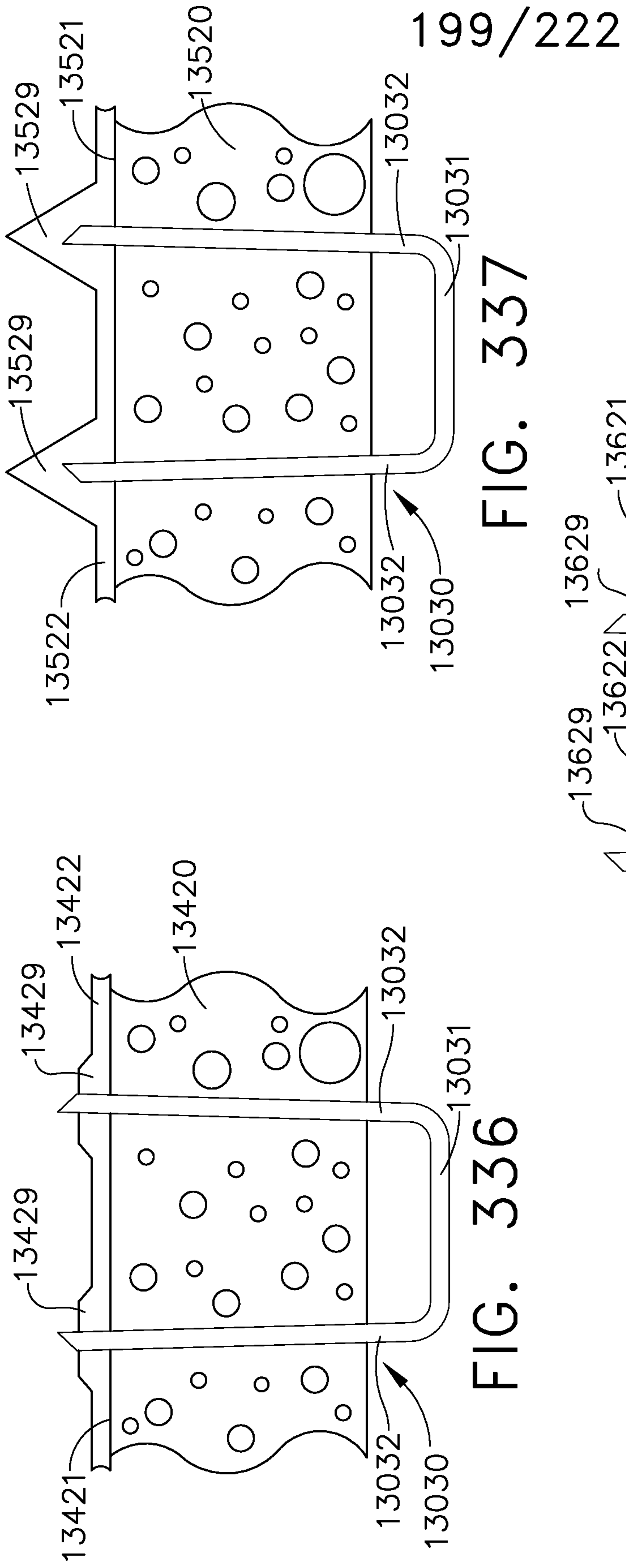


FIG. 335

198/222



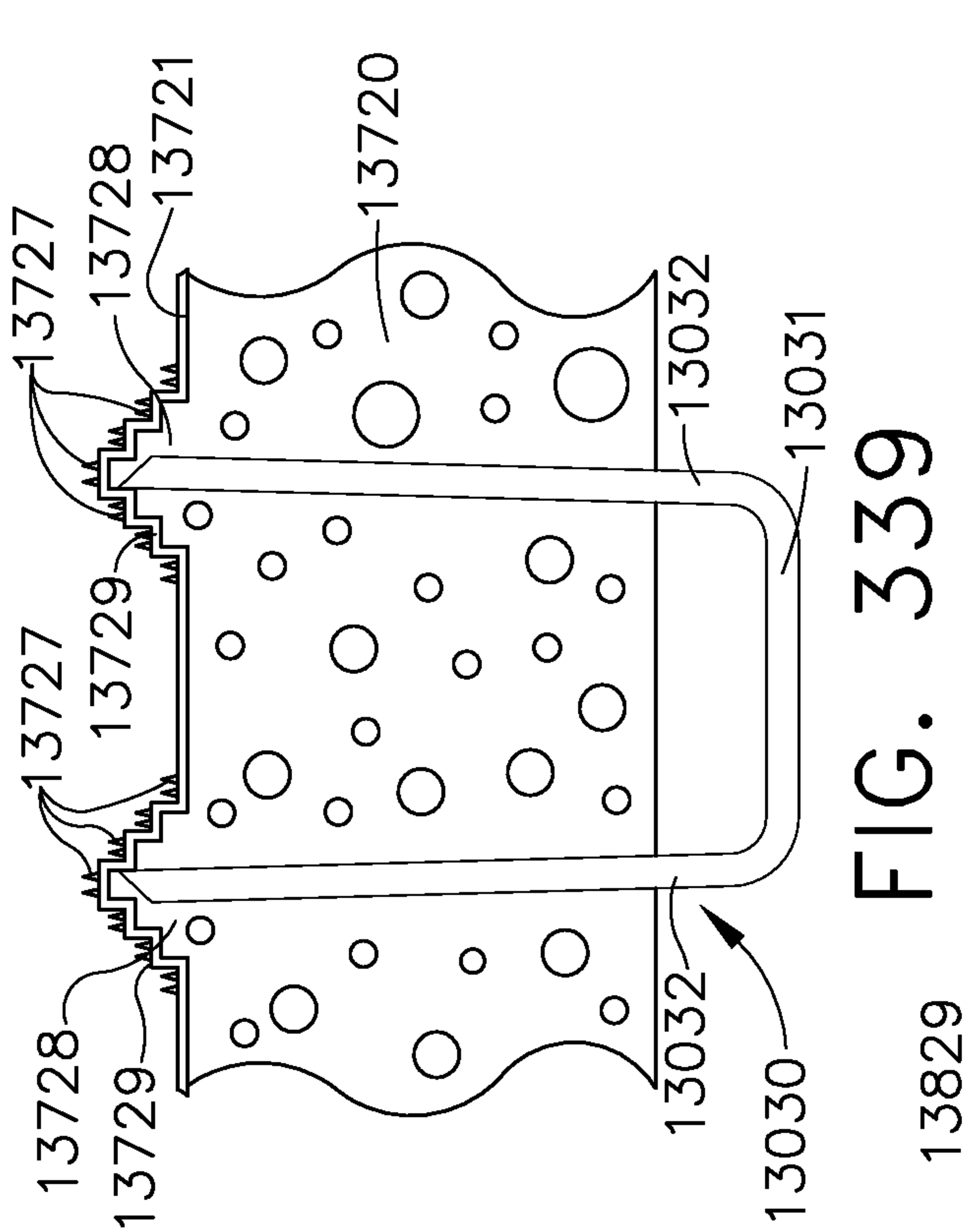
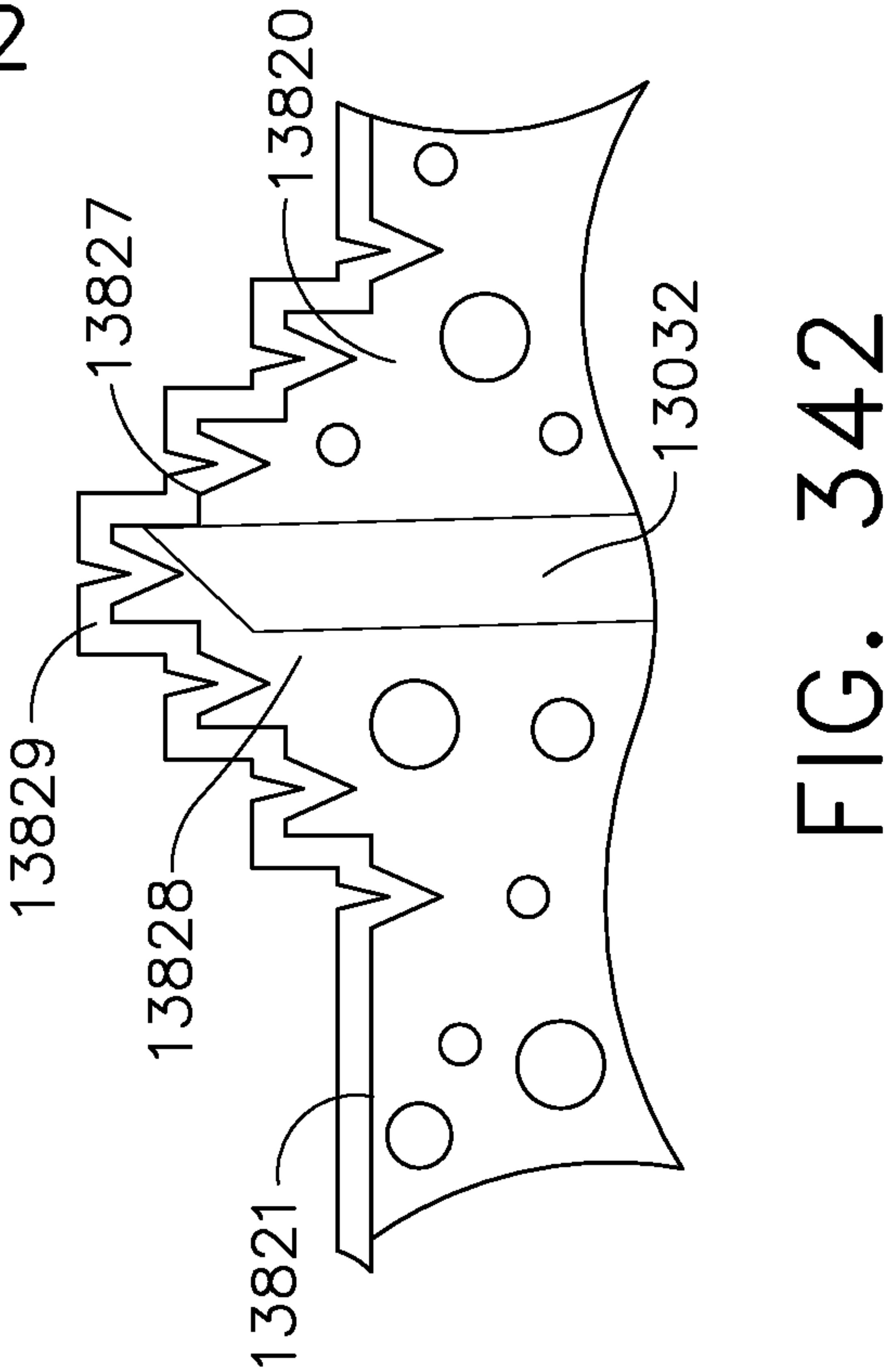
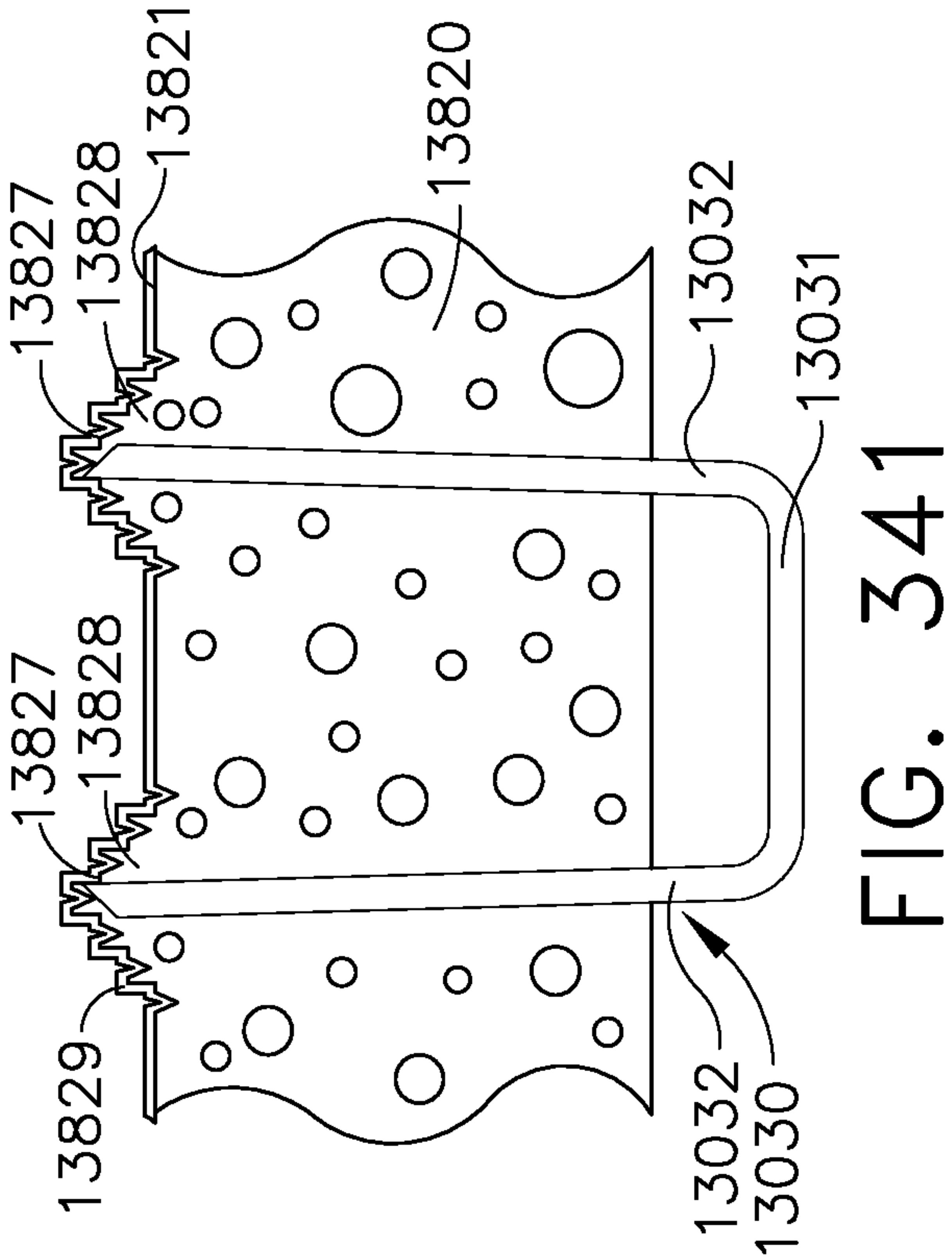
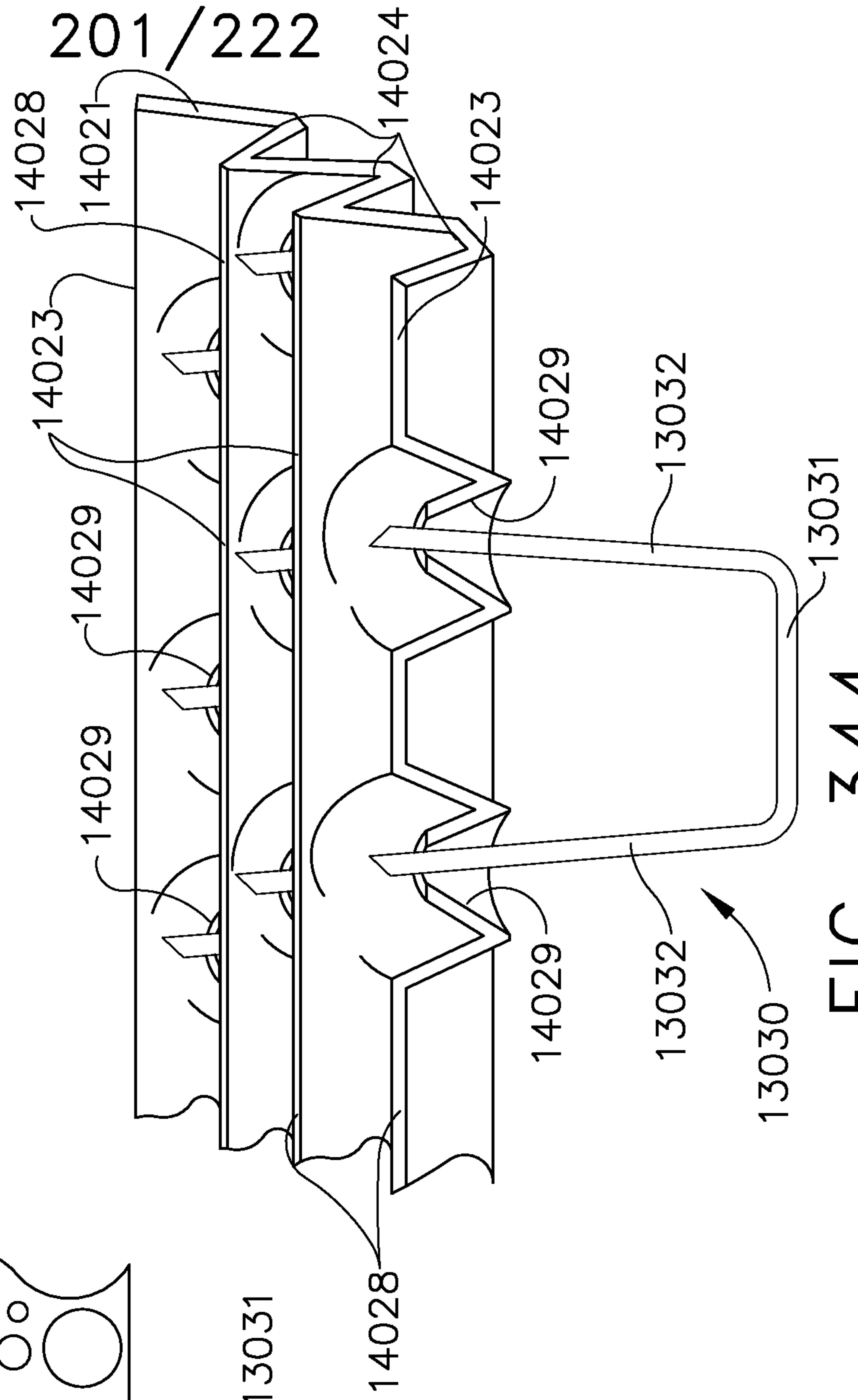
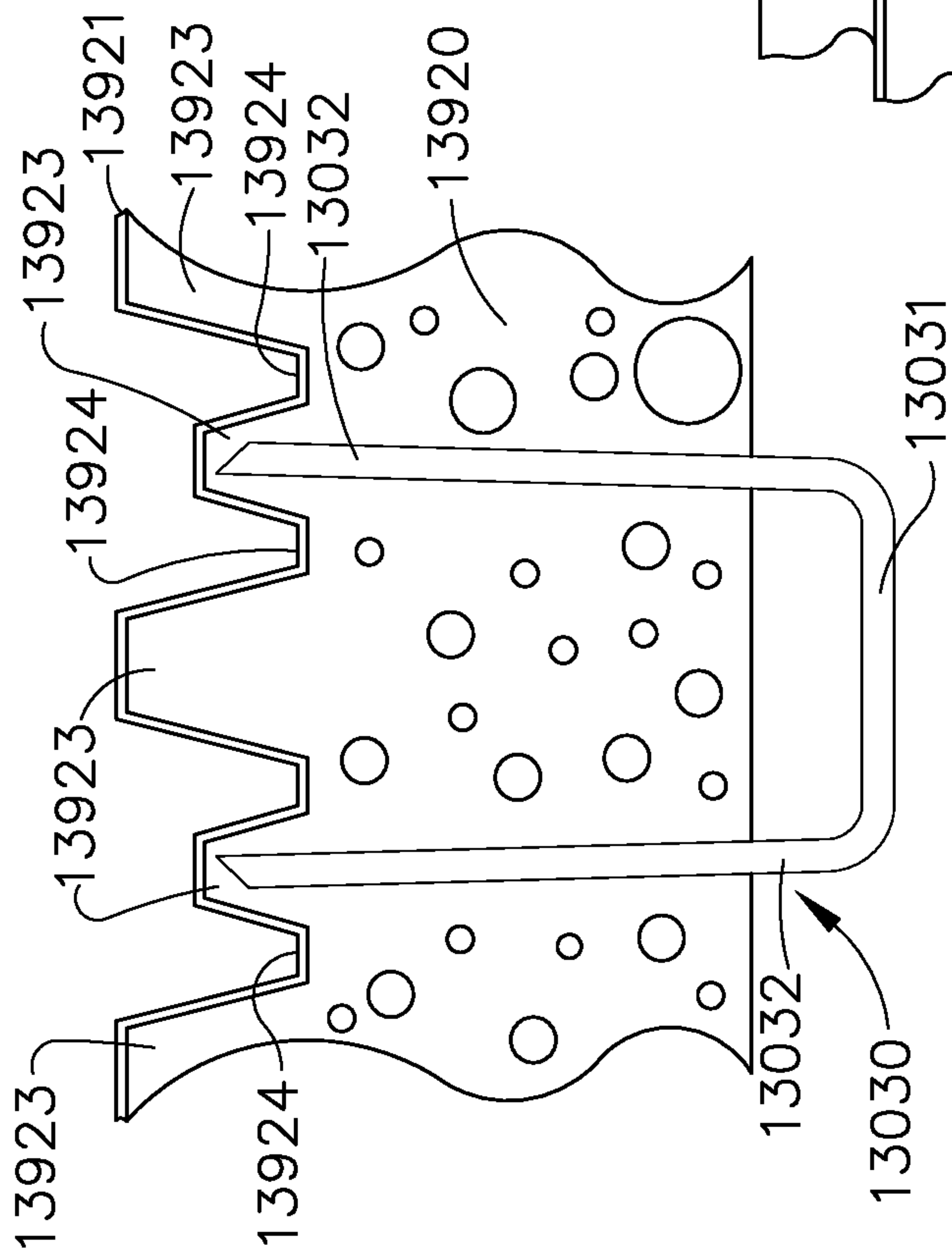


FIG. 340

200/222





202/222

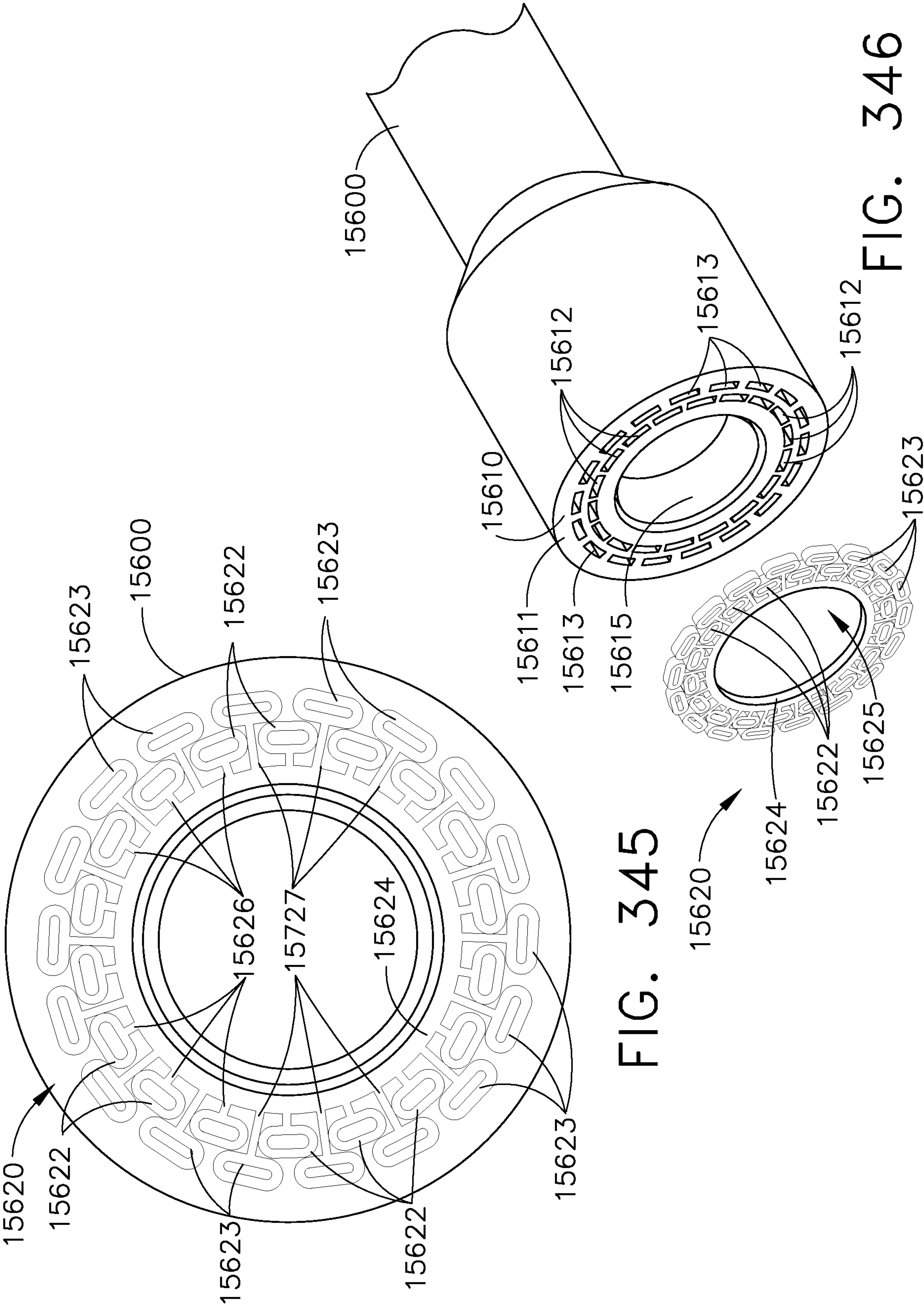
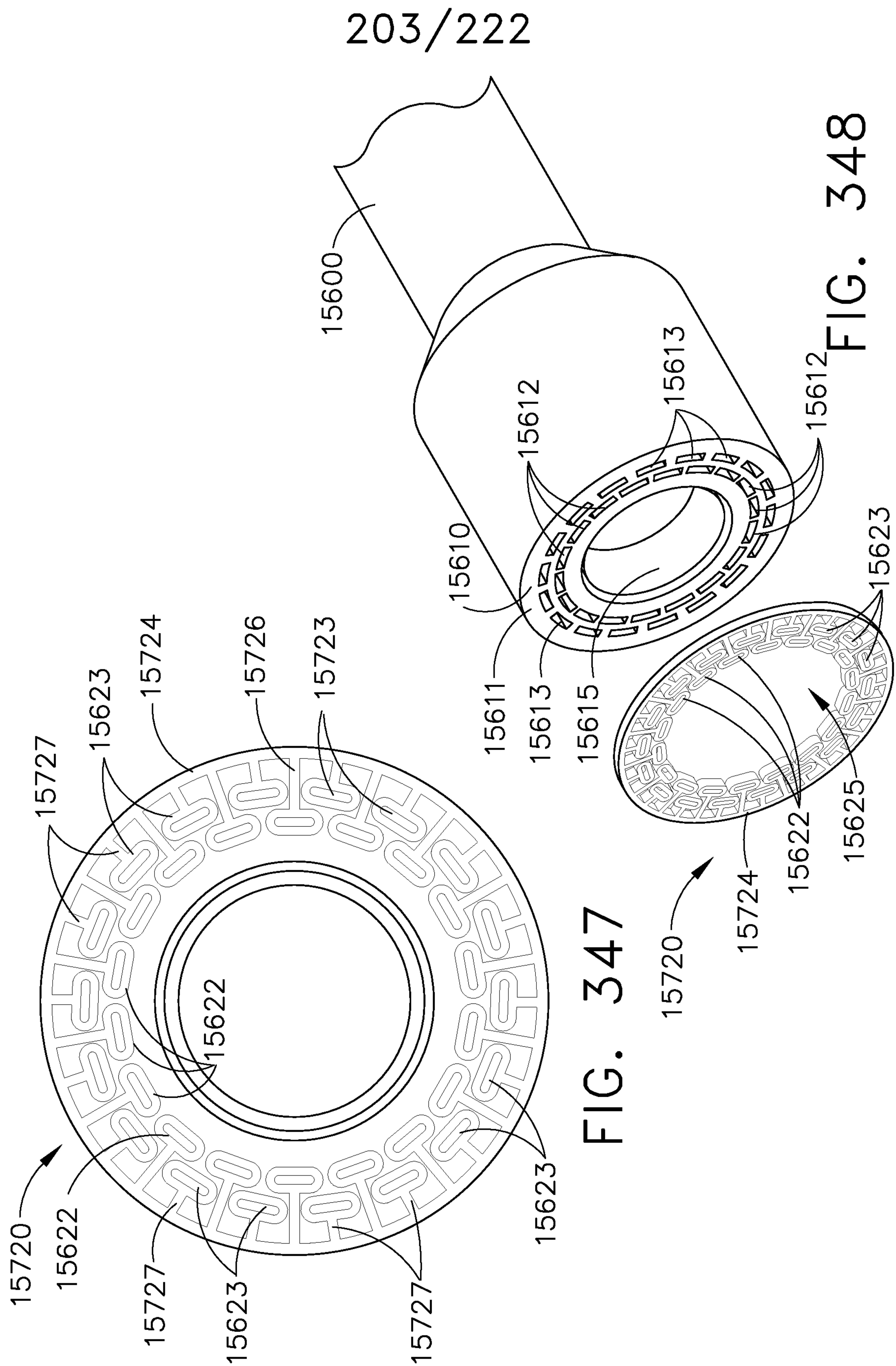


FIG. 345

FIG. 346



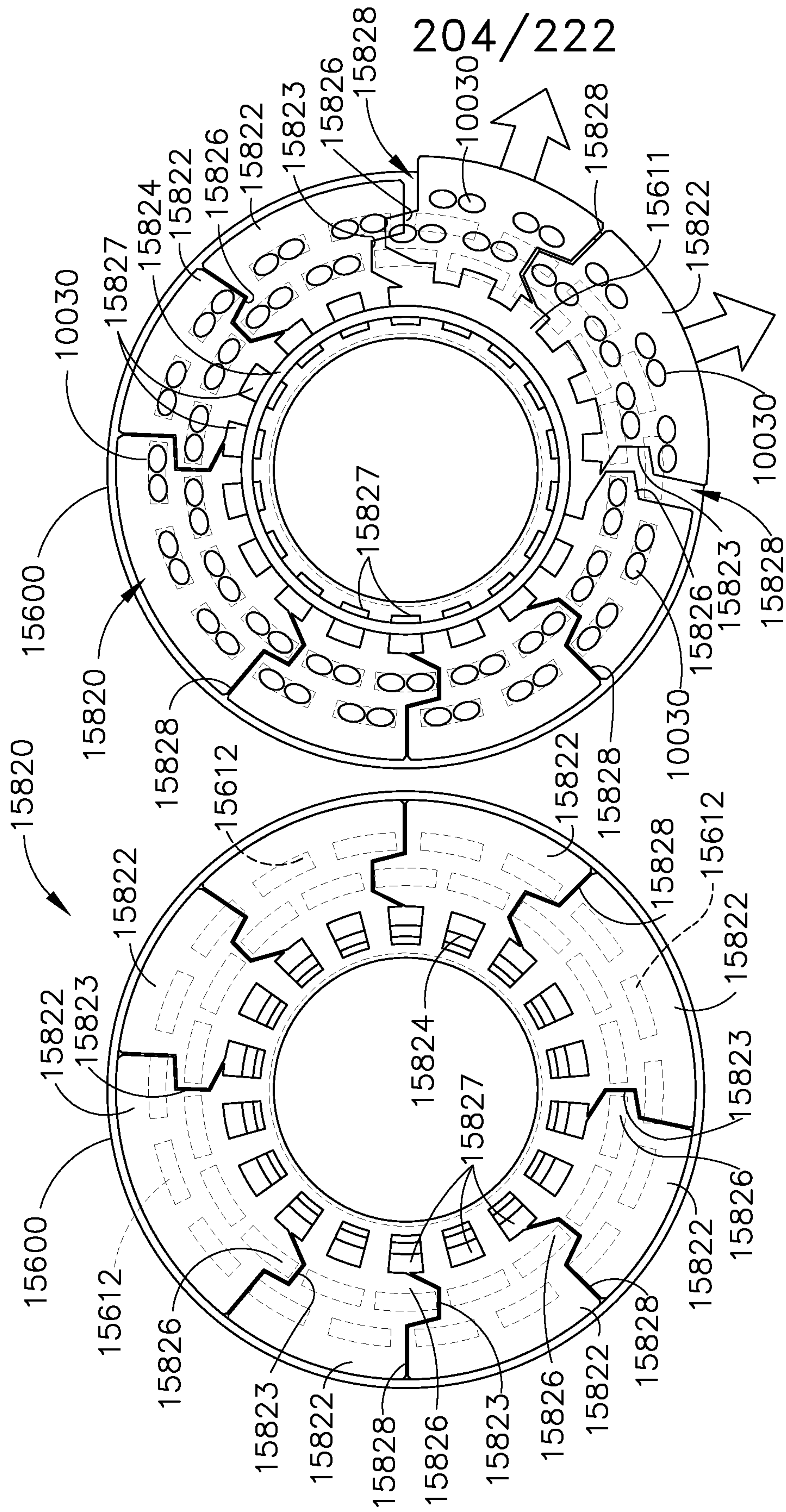


FIG. 349

FIG. 350

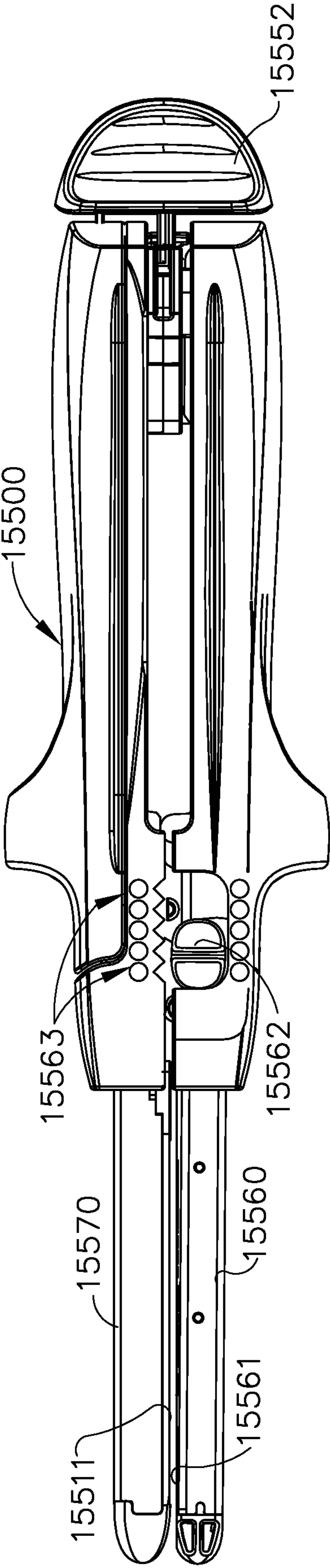


FIG. 351

205/222

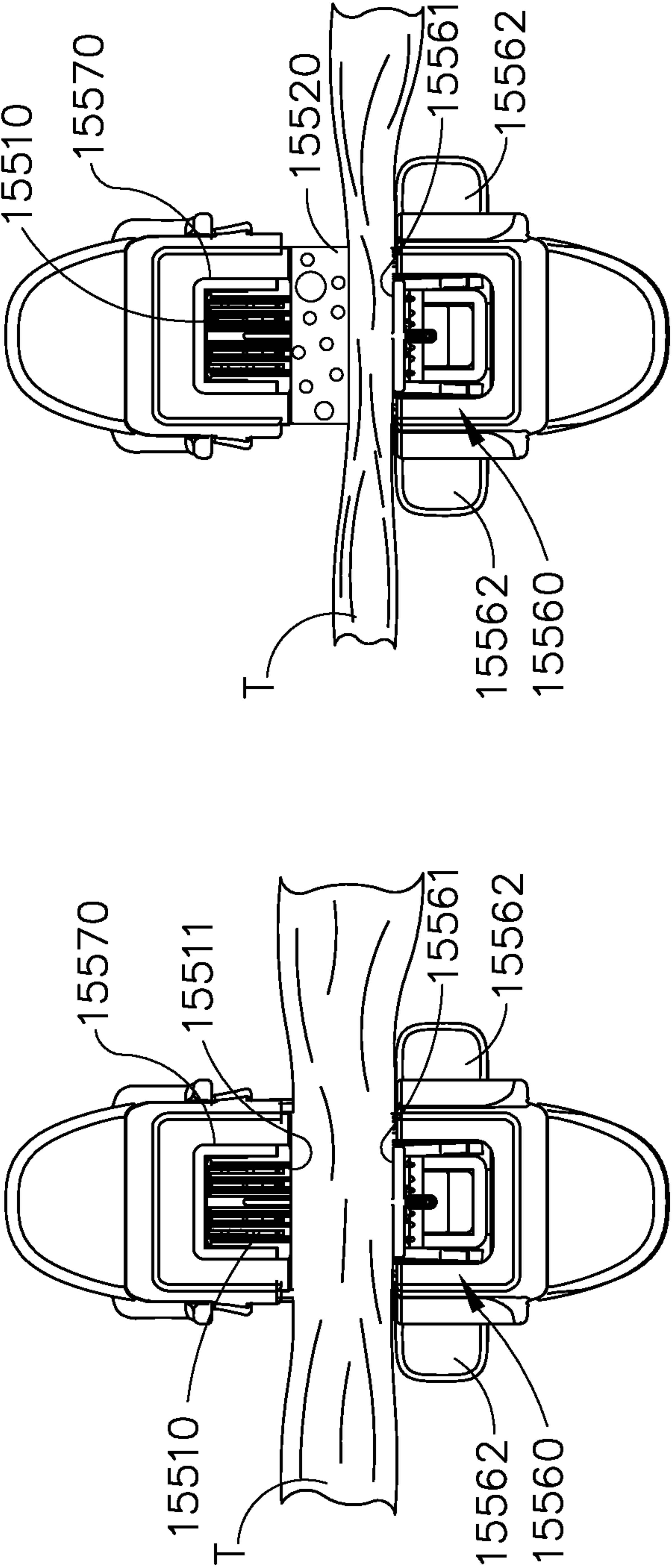


FIG. 352

FIG. 353

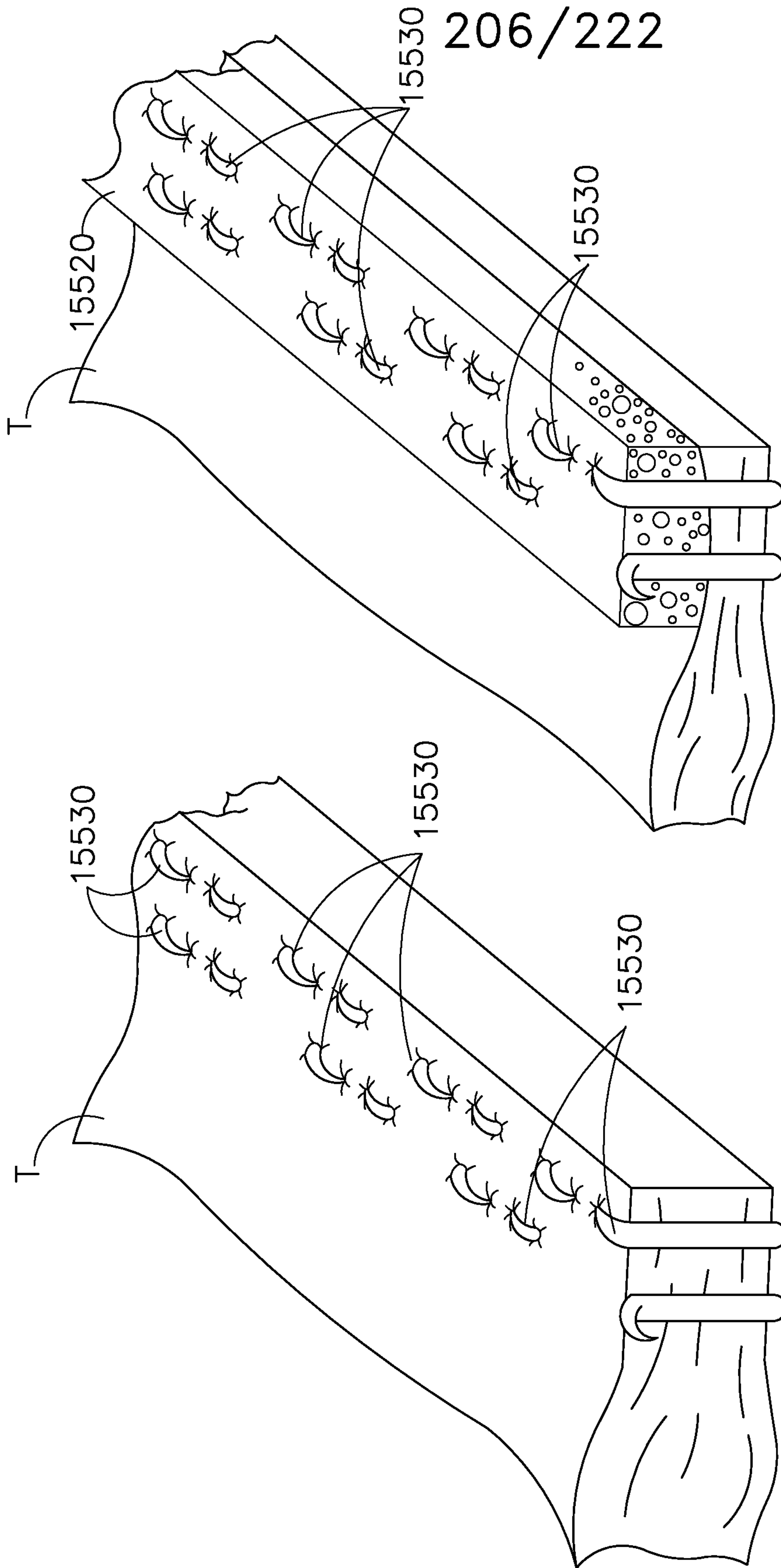


FIG. 355

FIG. 354

207/222

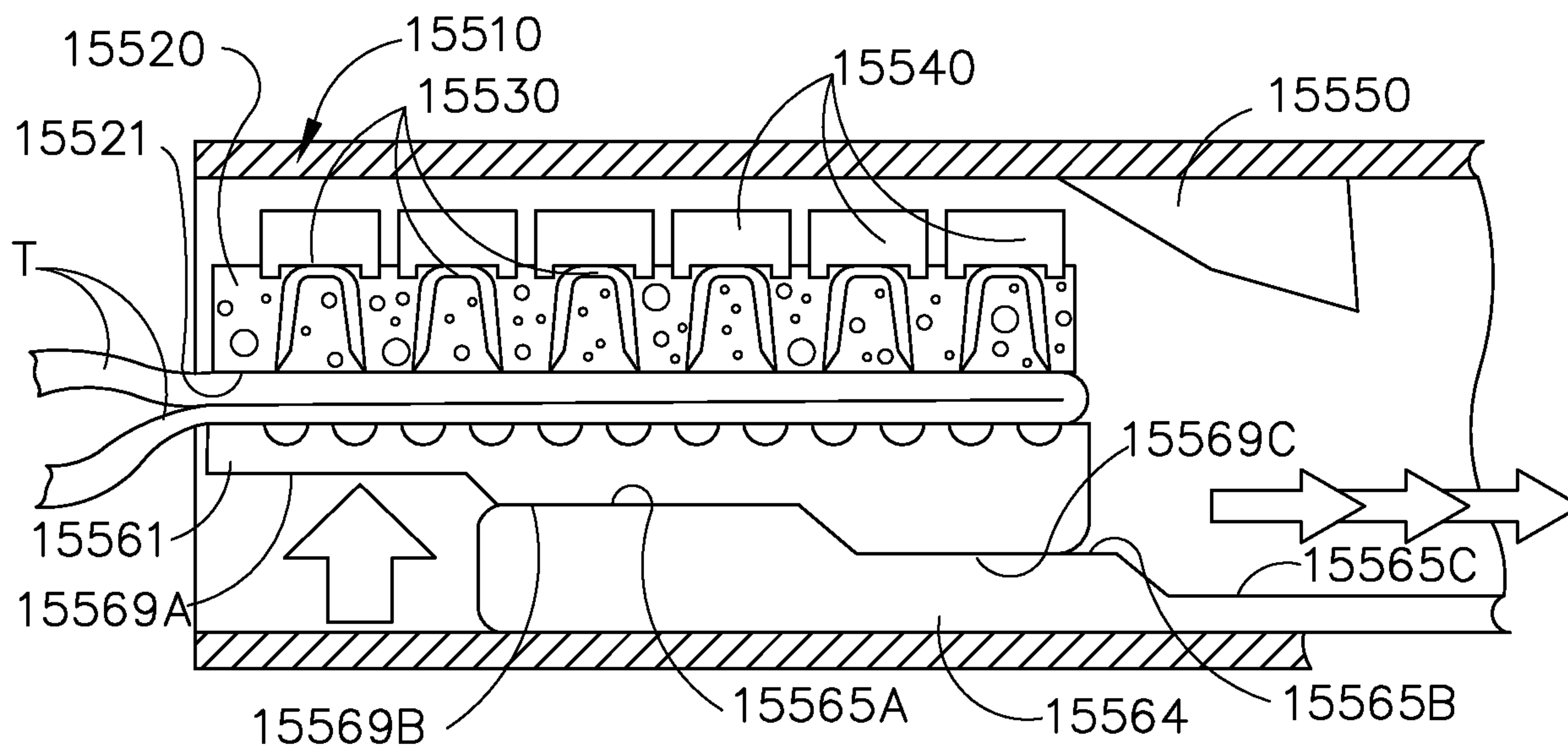


FIG. 356

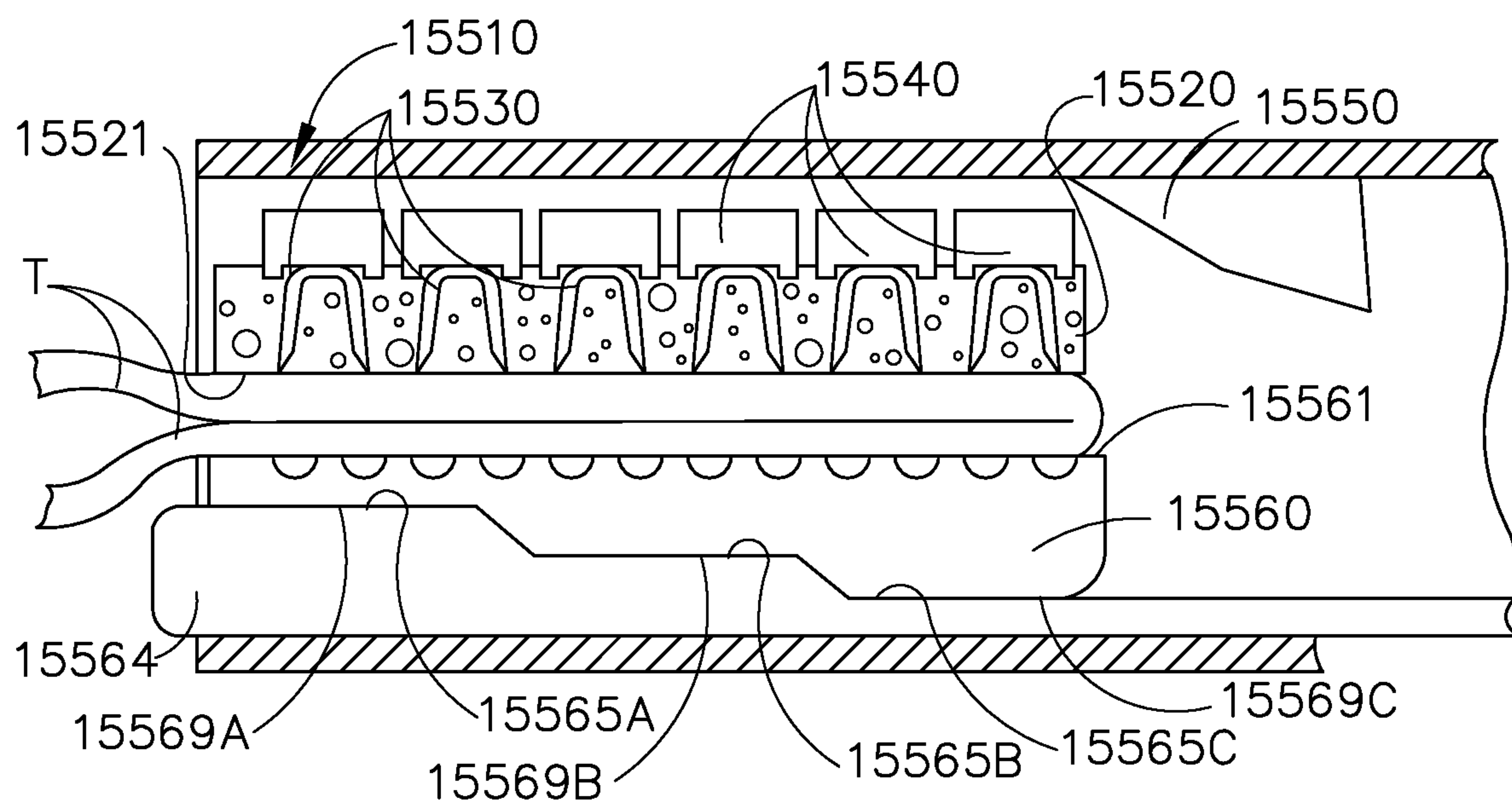
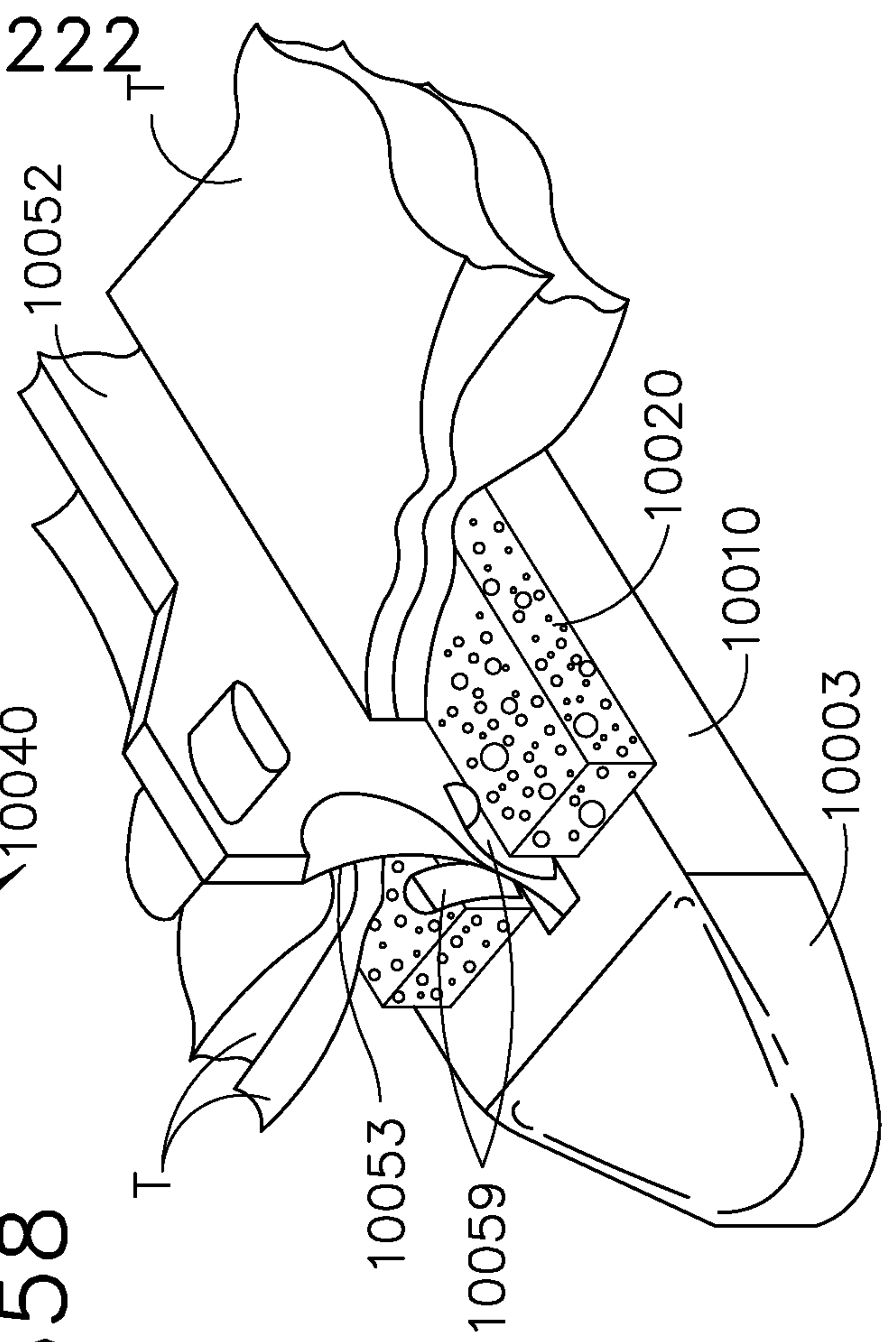
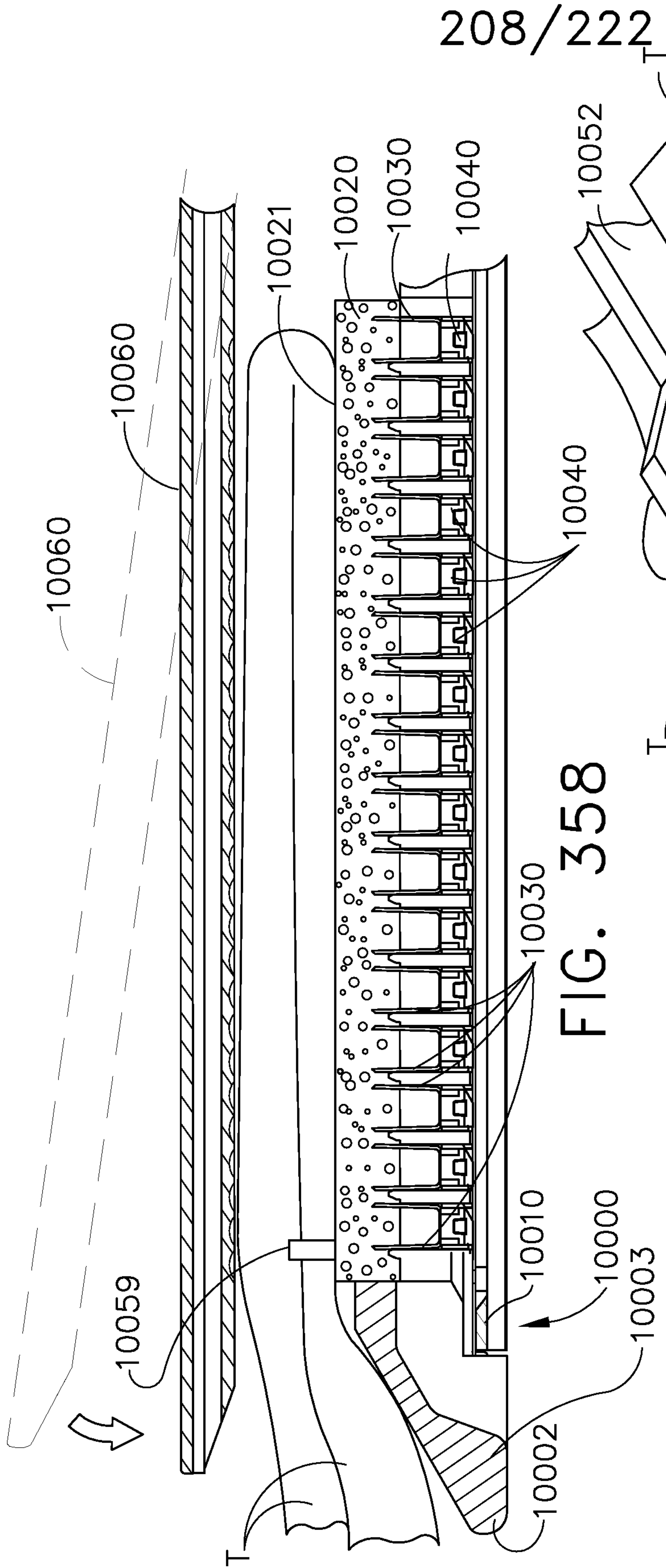
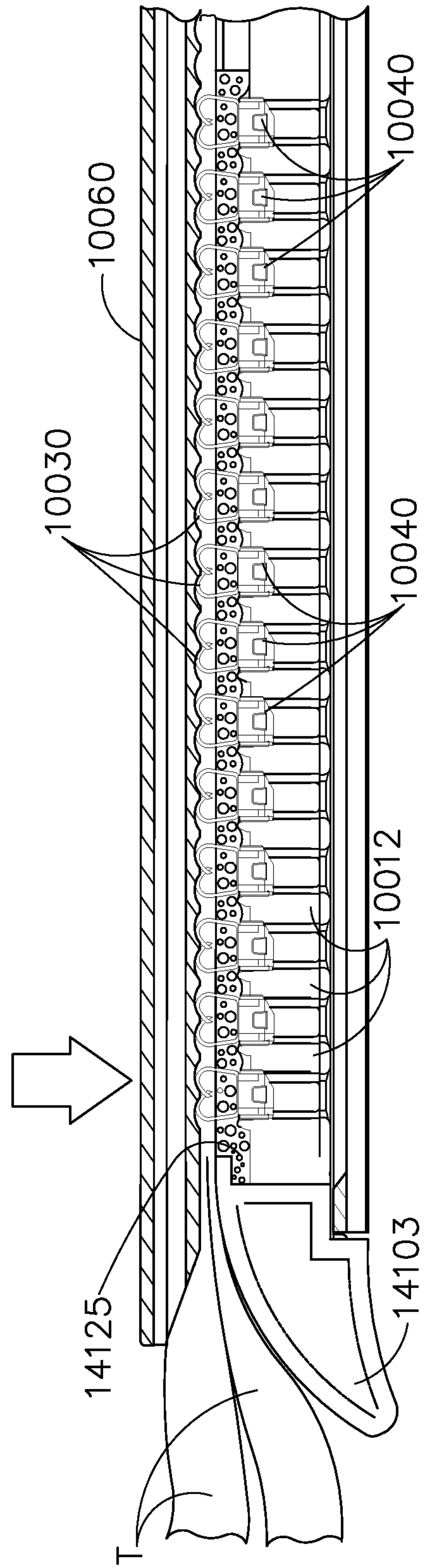
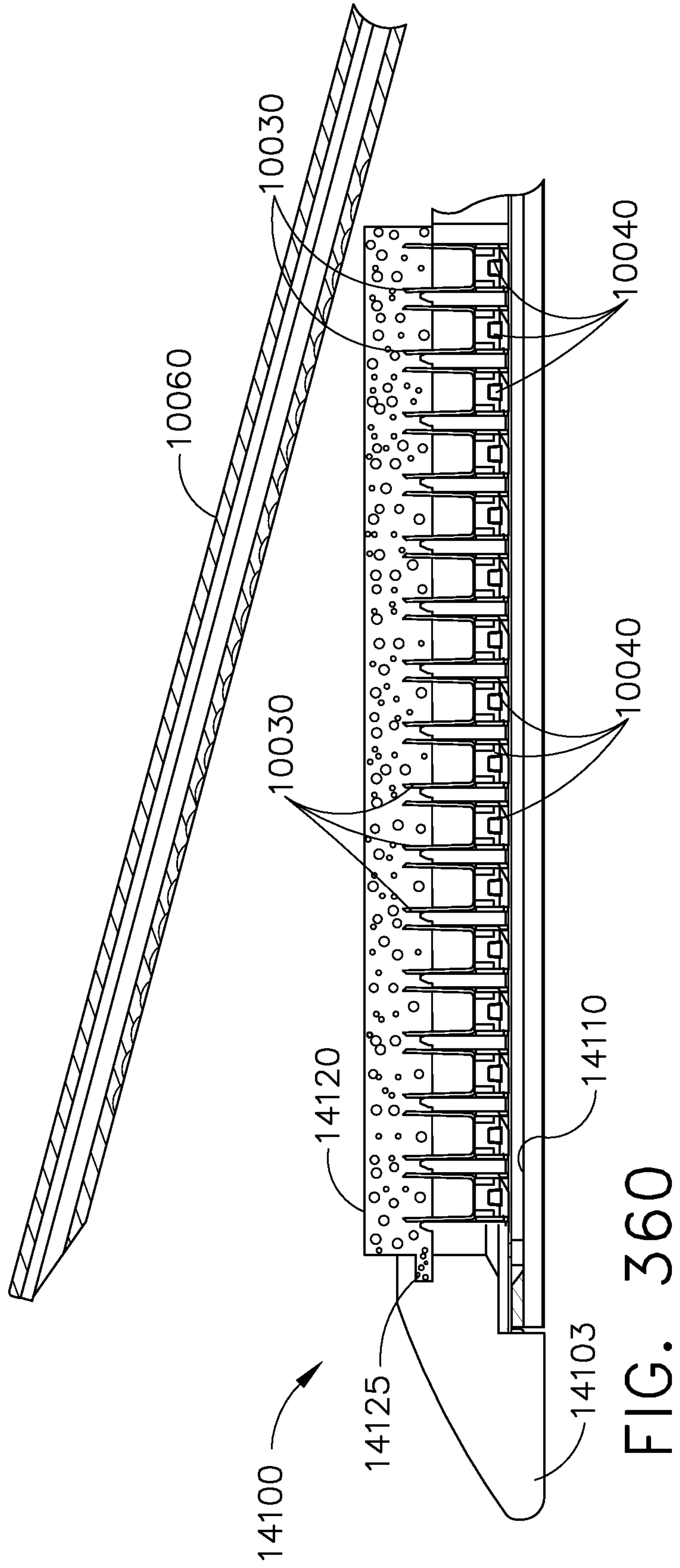


FIG. 357



209/222



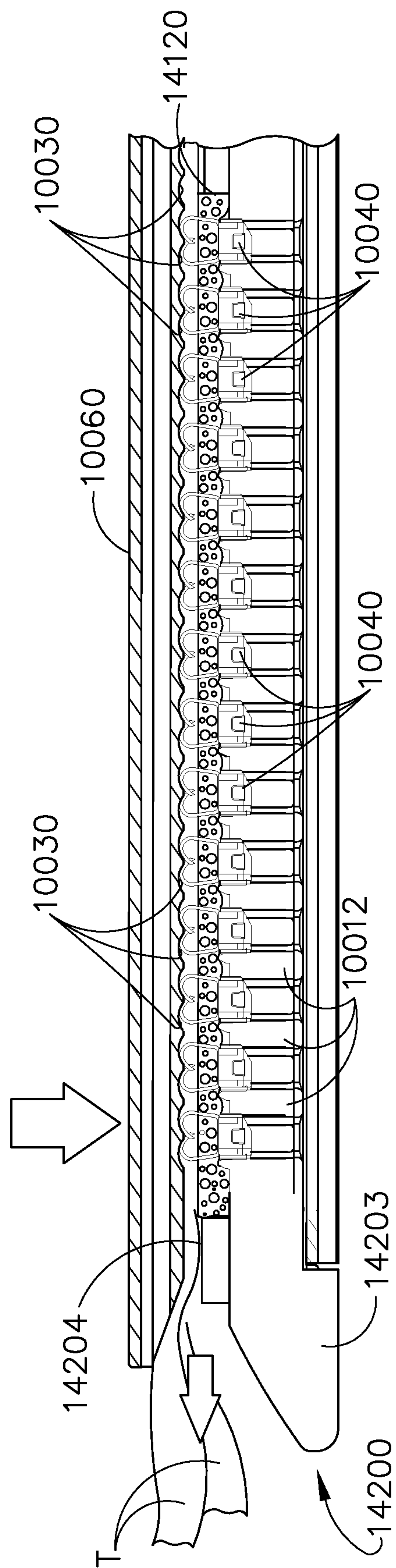
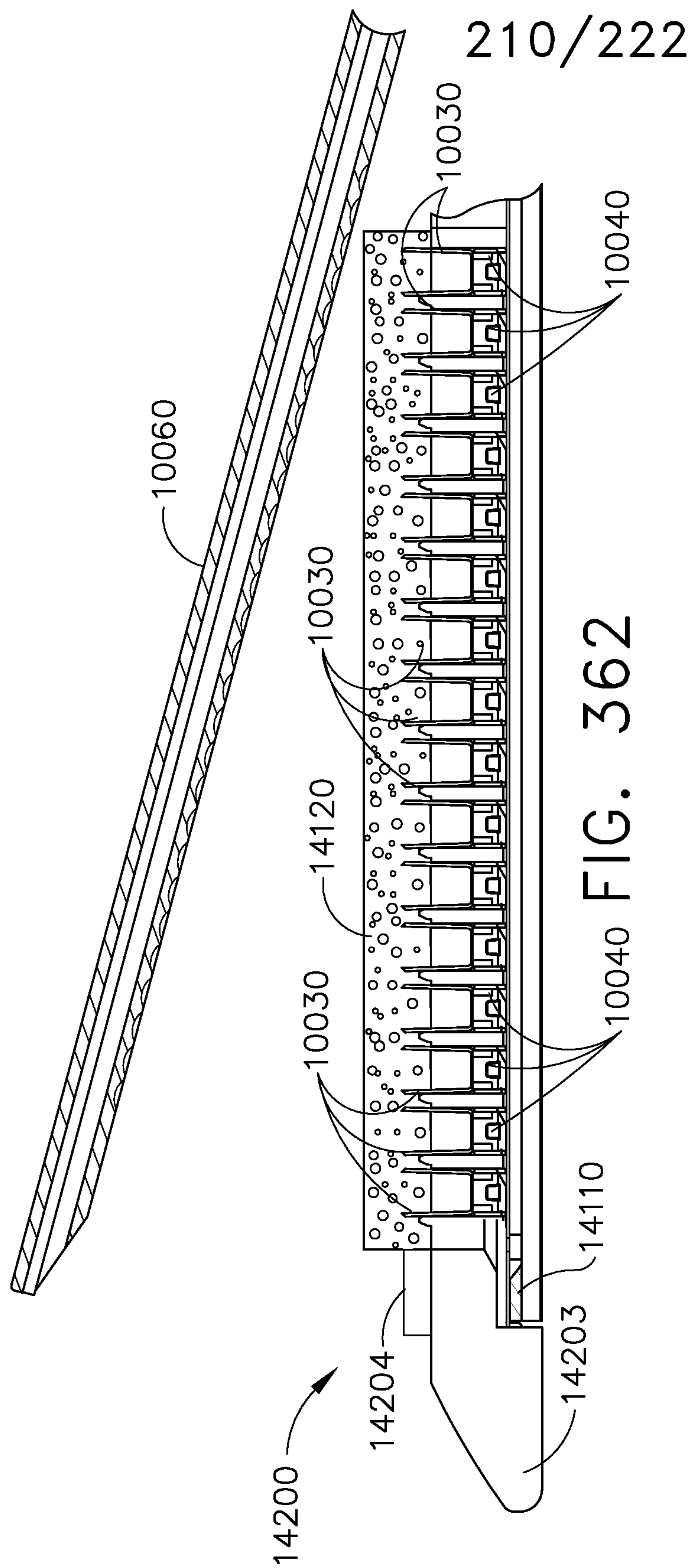
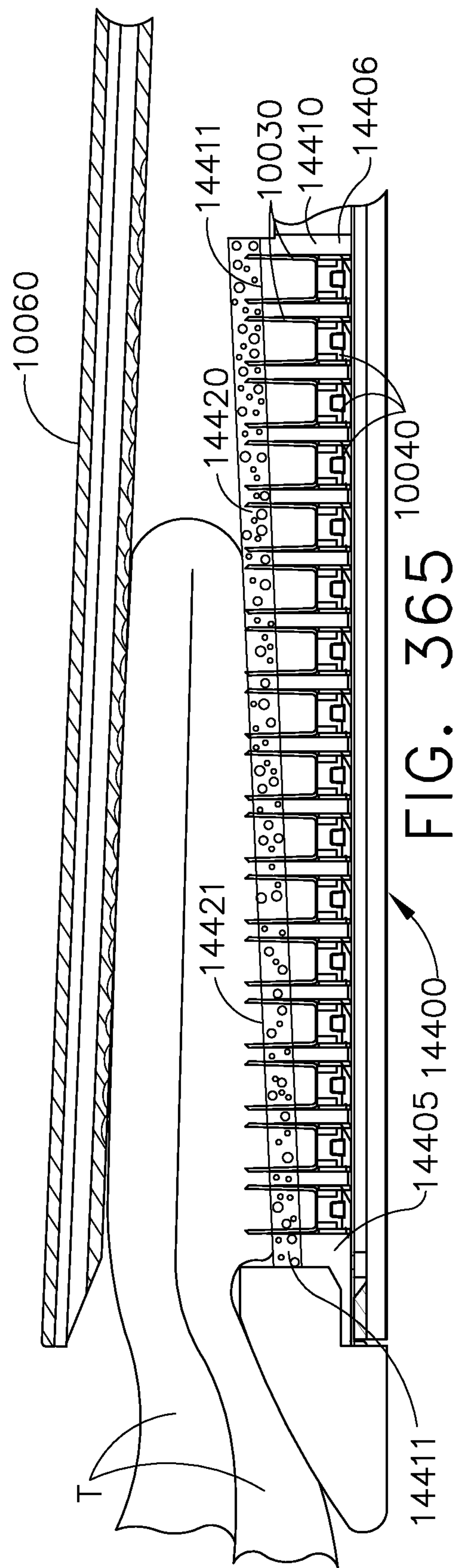
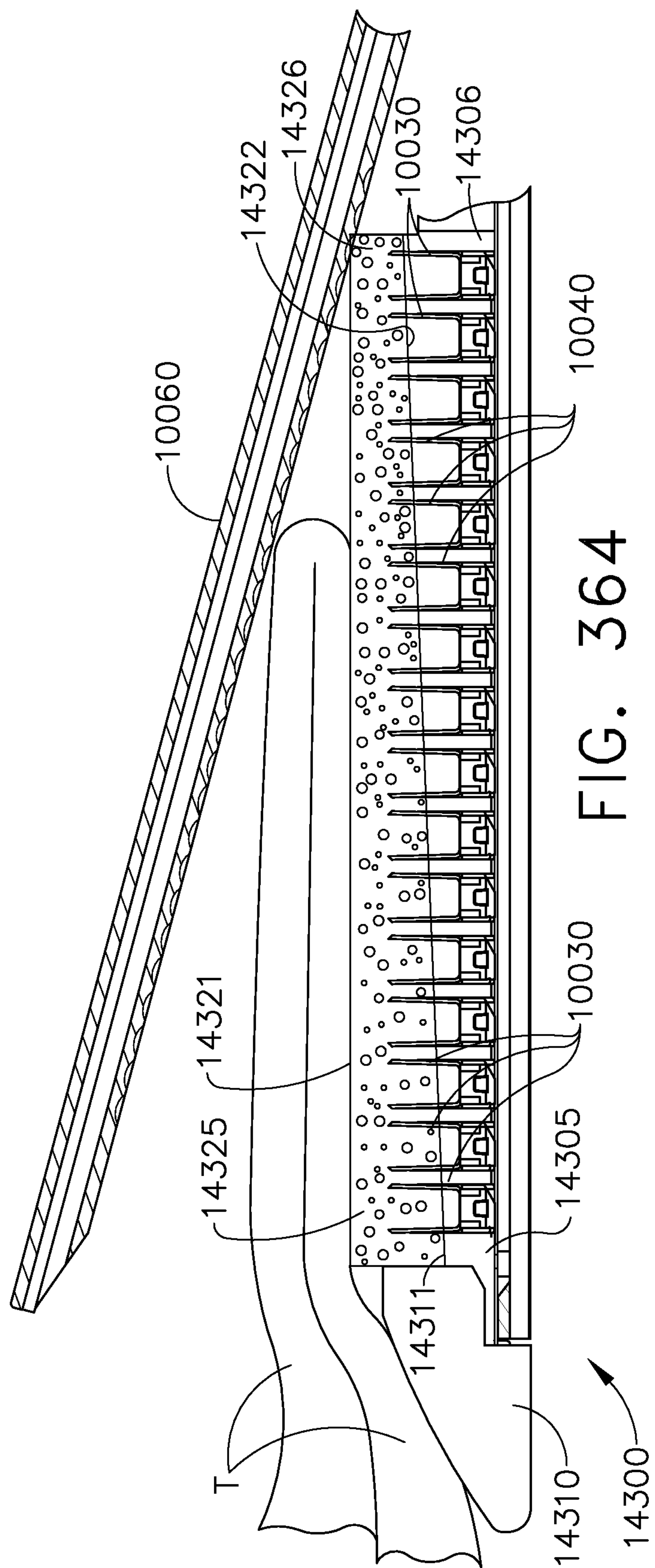


FIG. 363

211/222



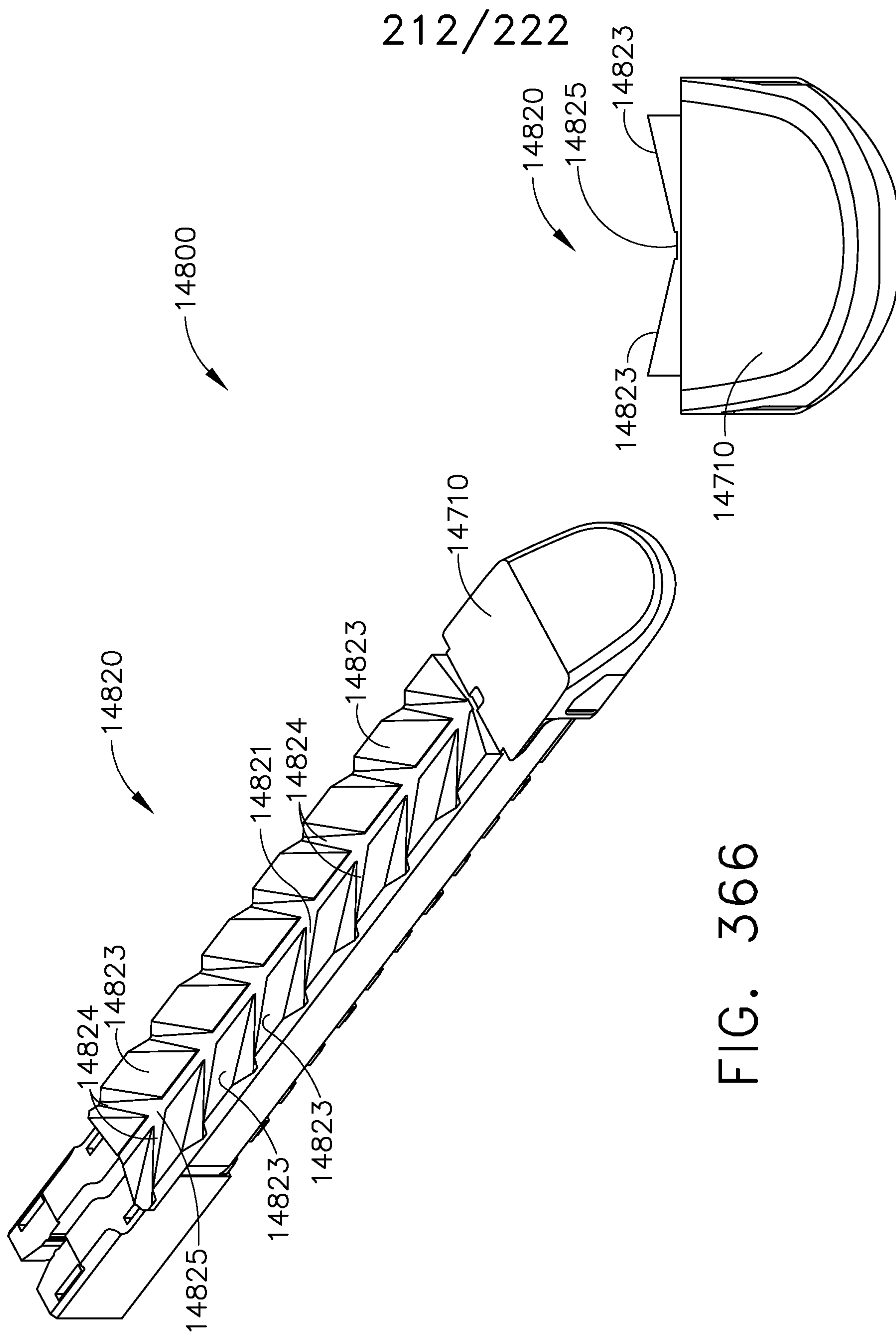


FIG. 366

FIG. 367

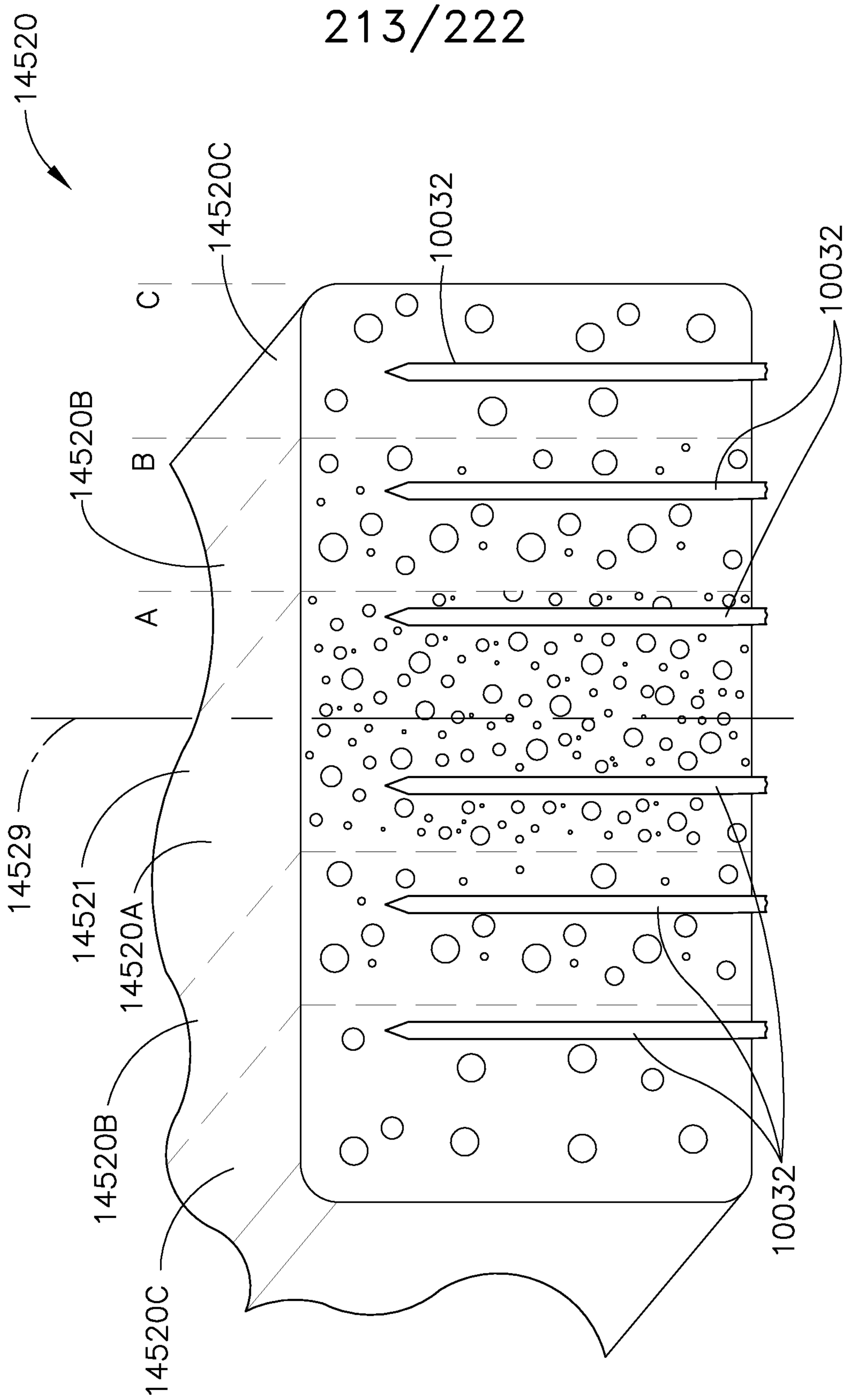
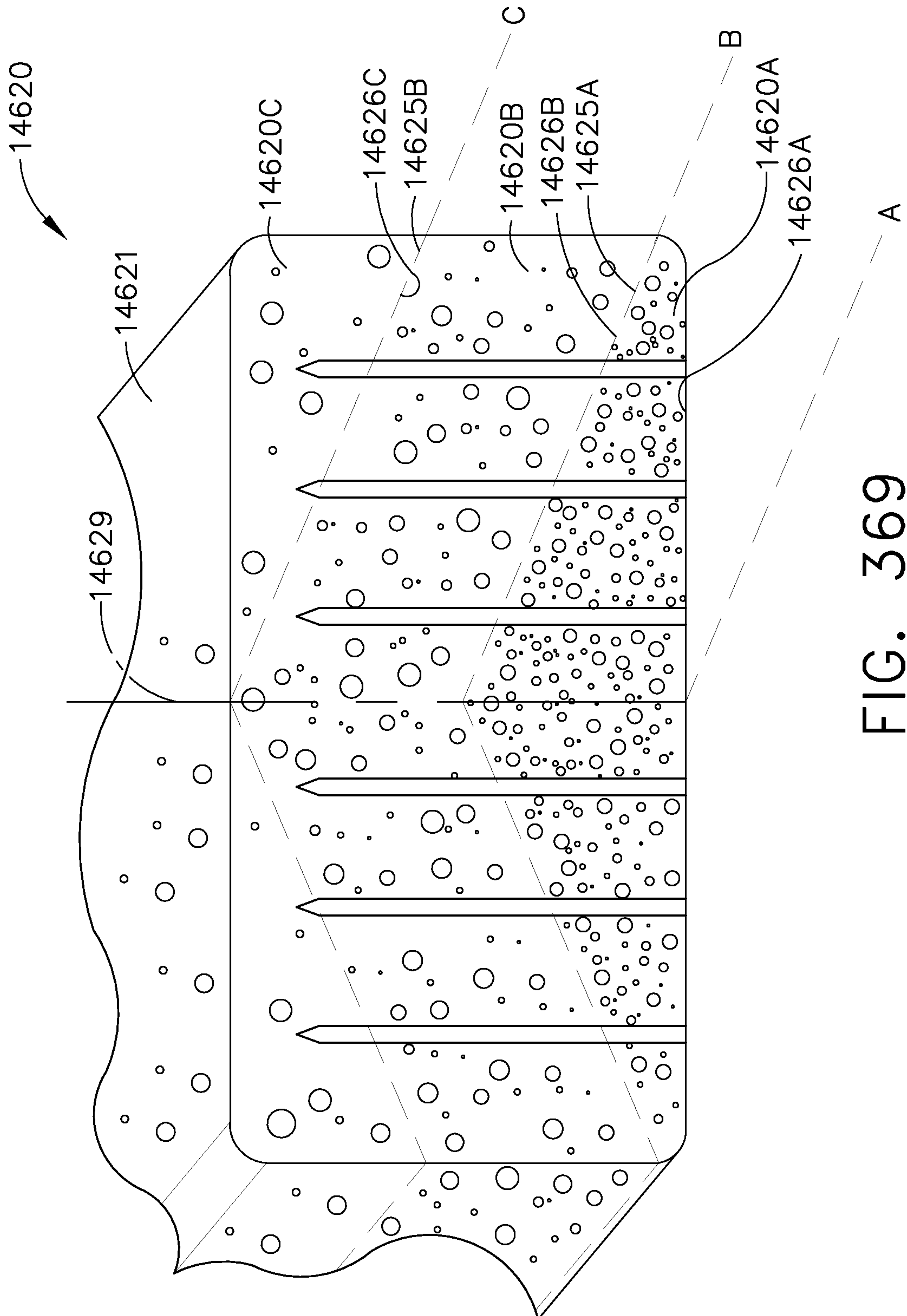


FIG. 368

214/222



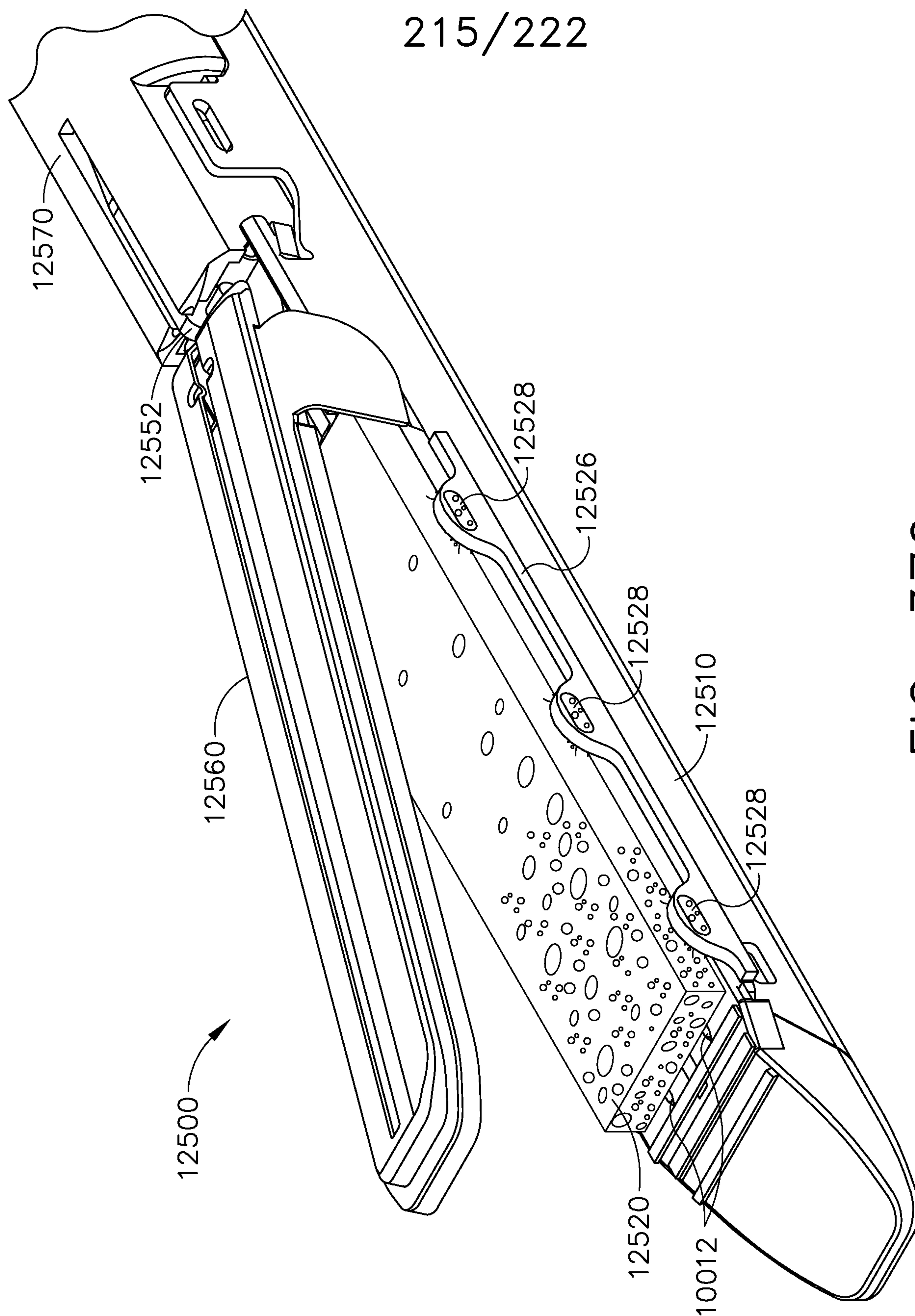


FIG. 370

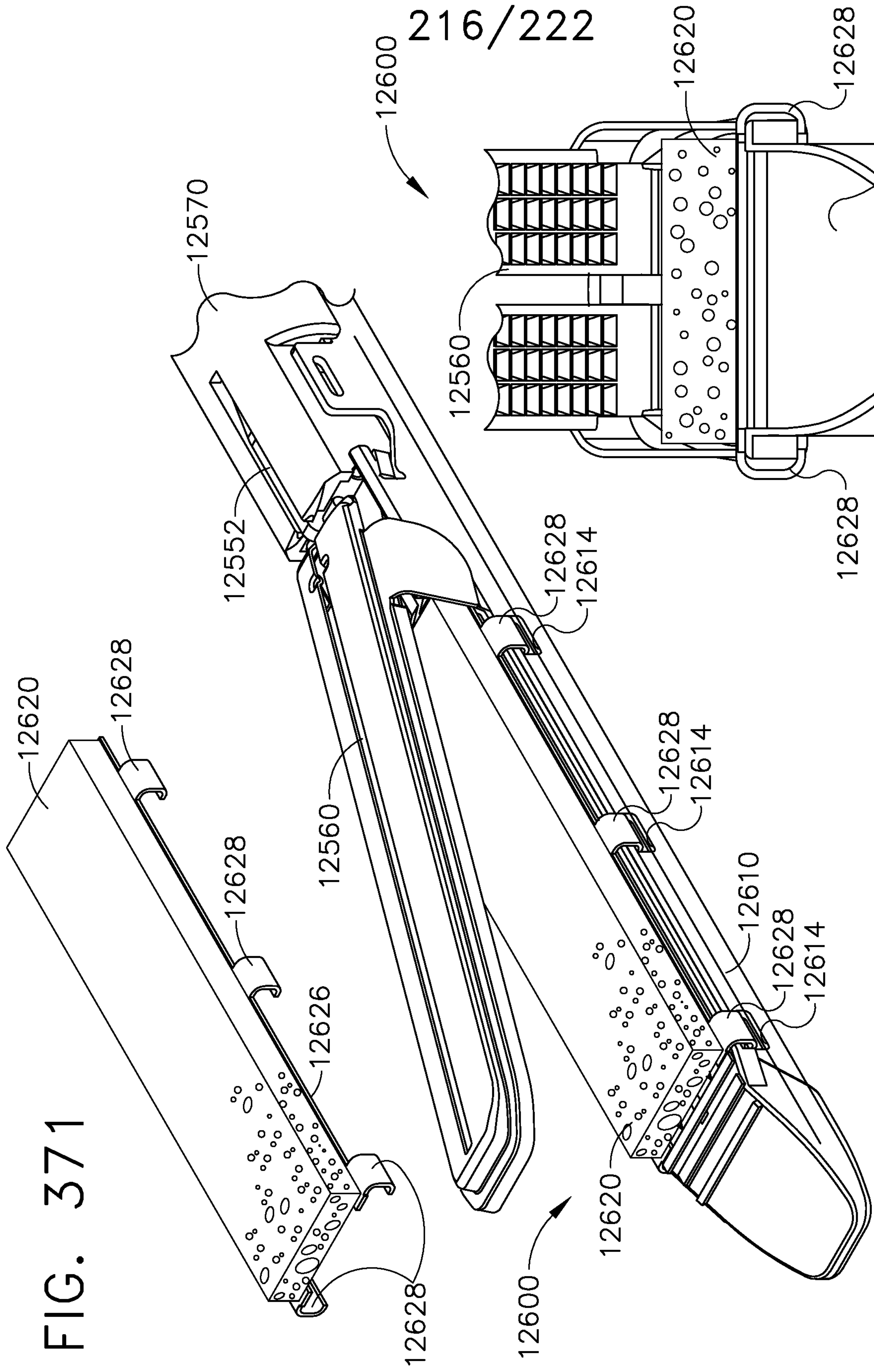
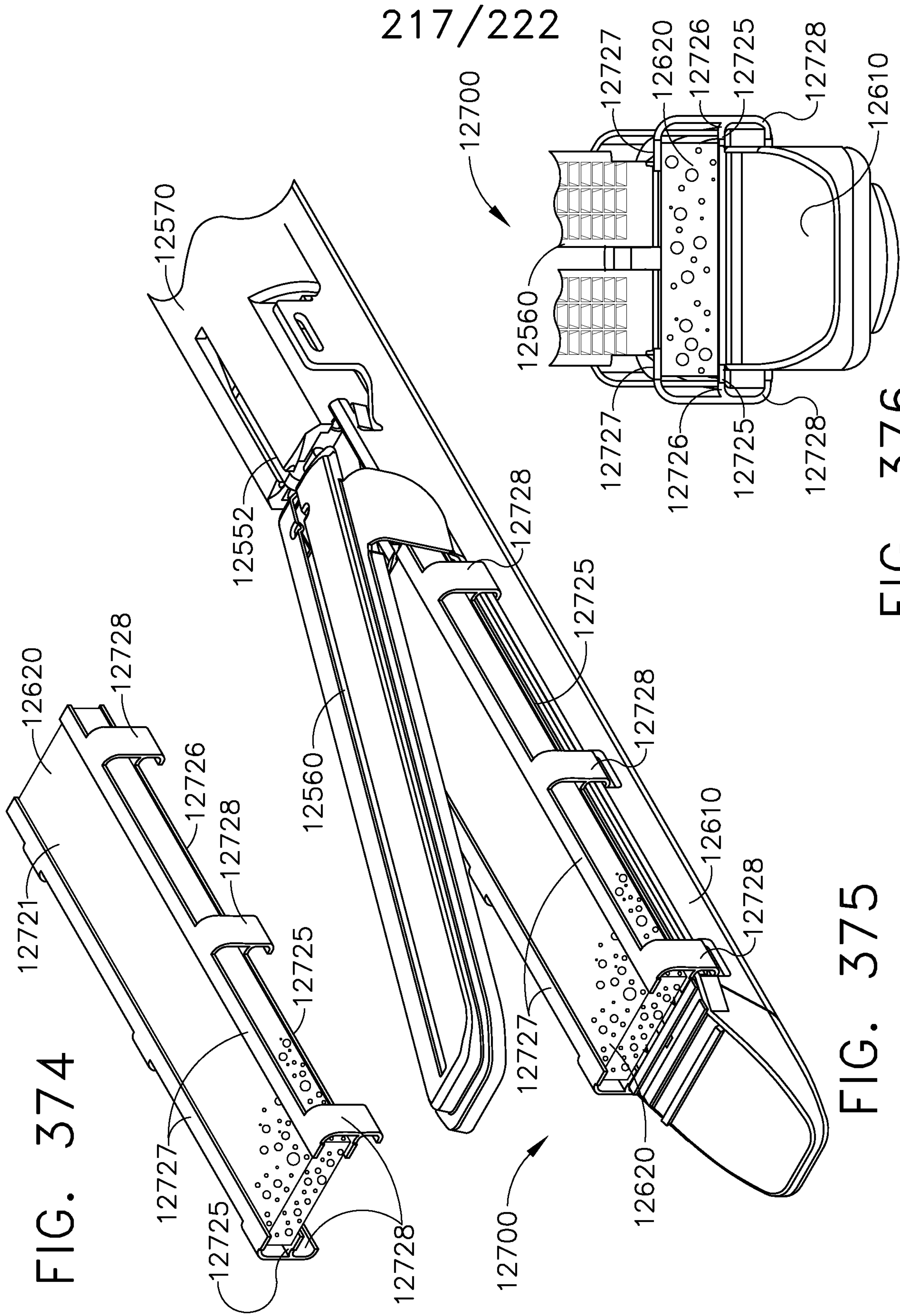
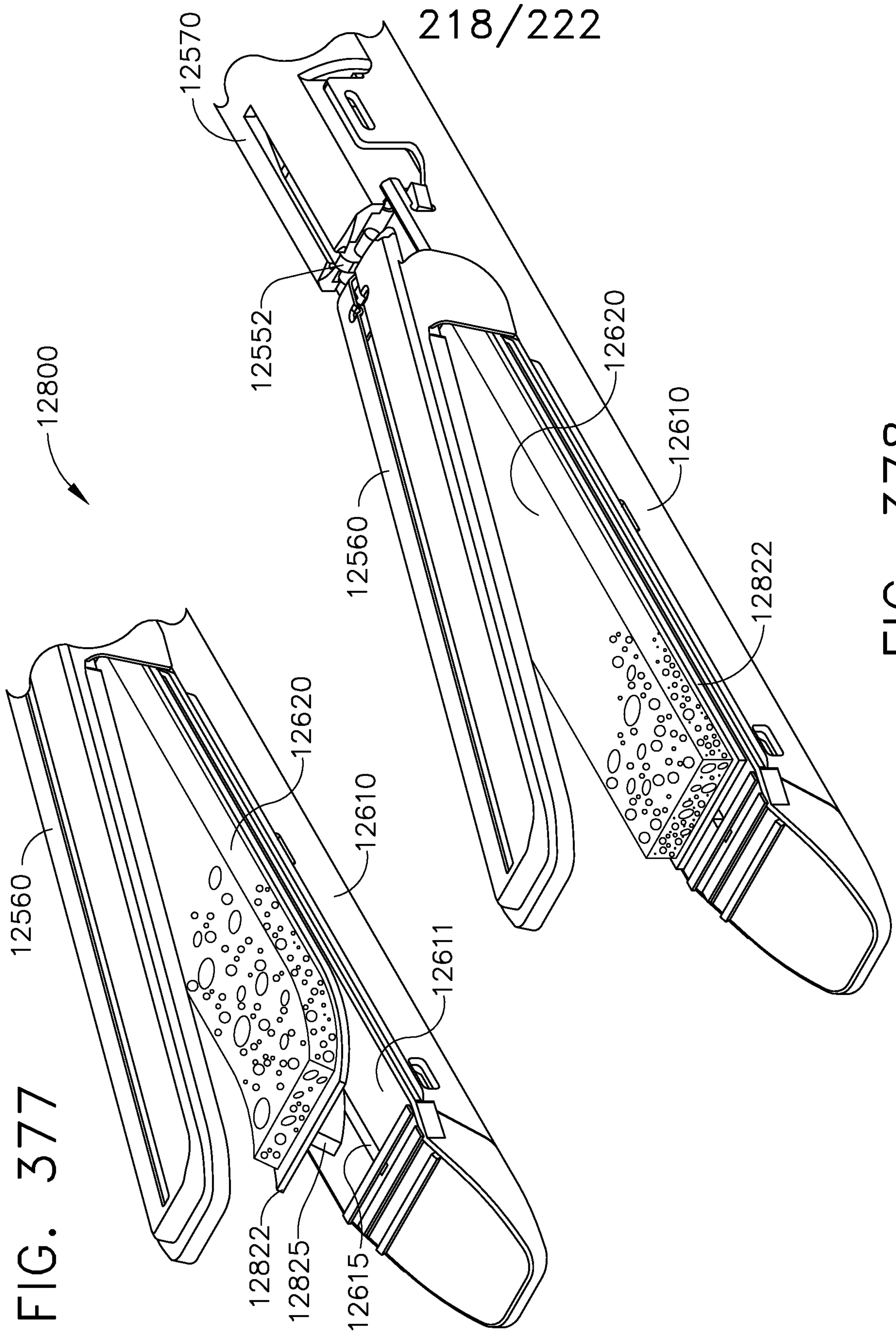


FIG. 371

FIG. 372

FIG. 373





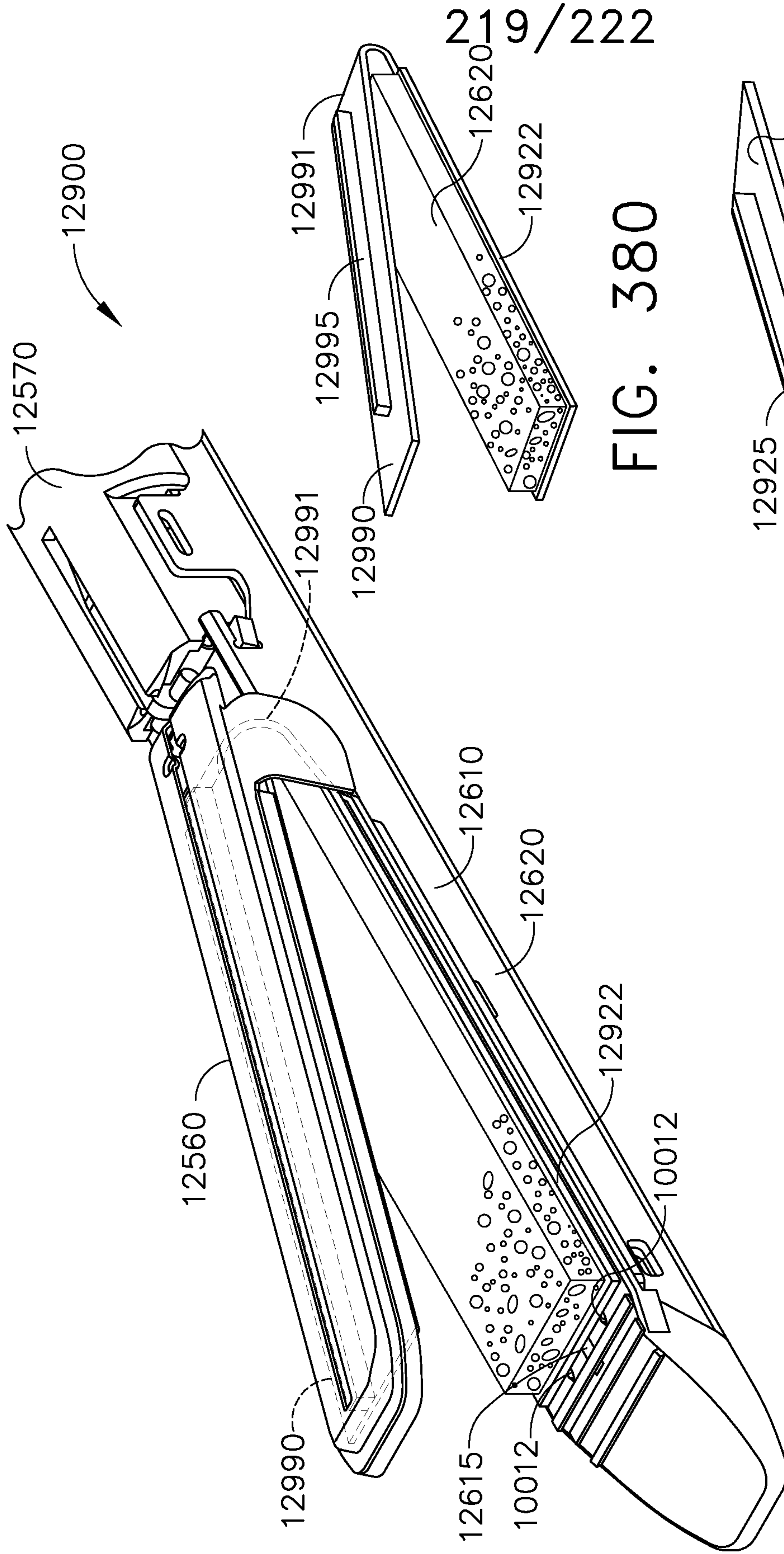


FIG. 380

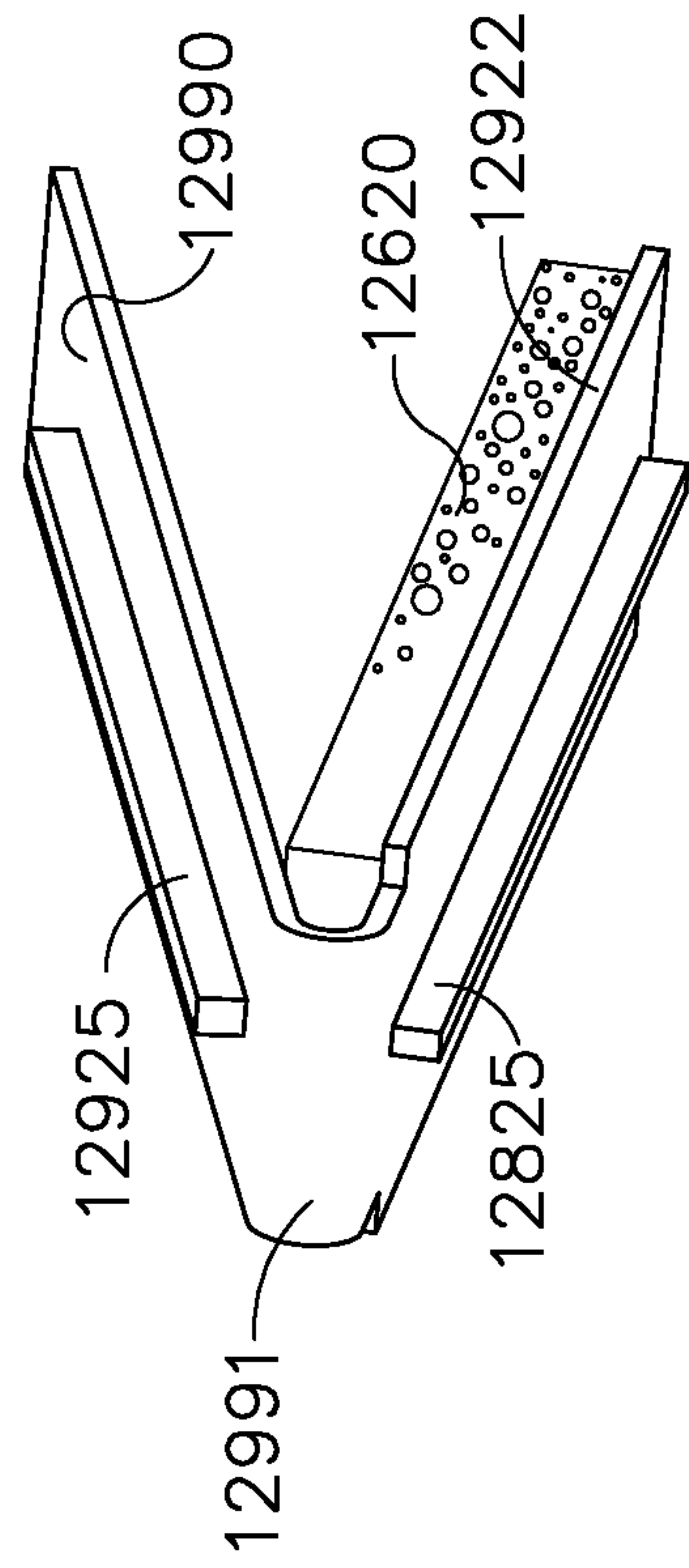


FIG. 381

FIG. 379

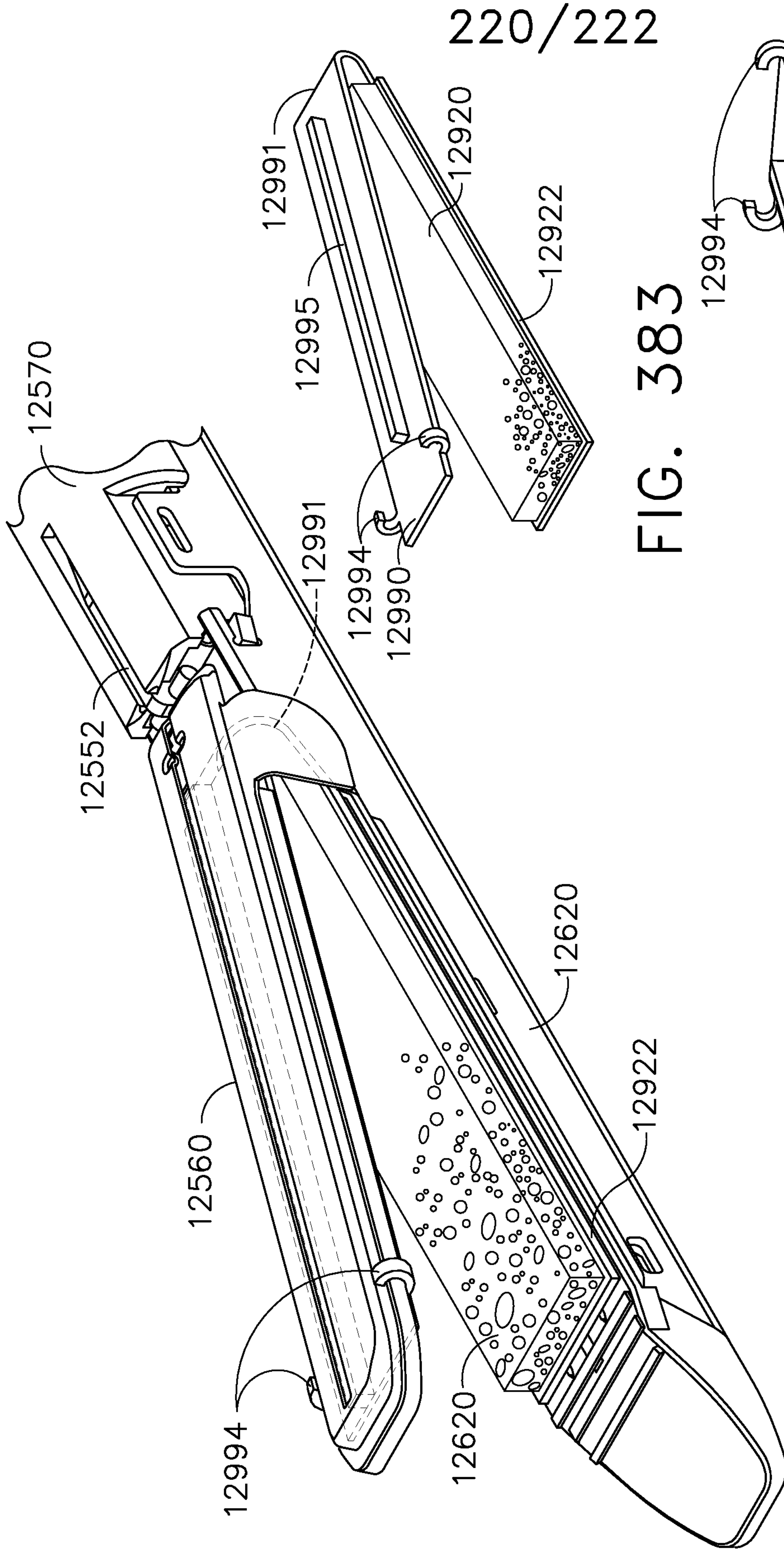


FIG. 382

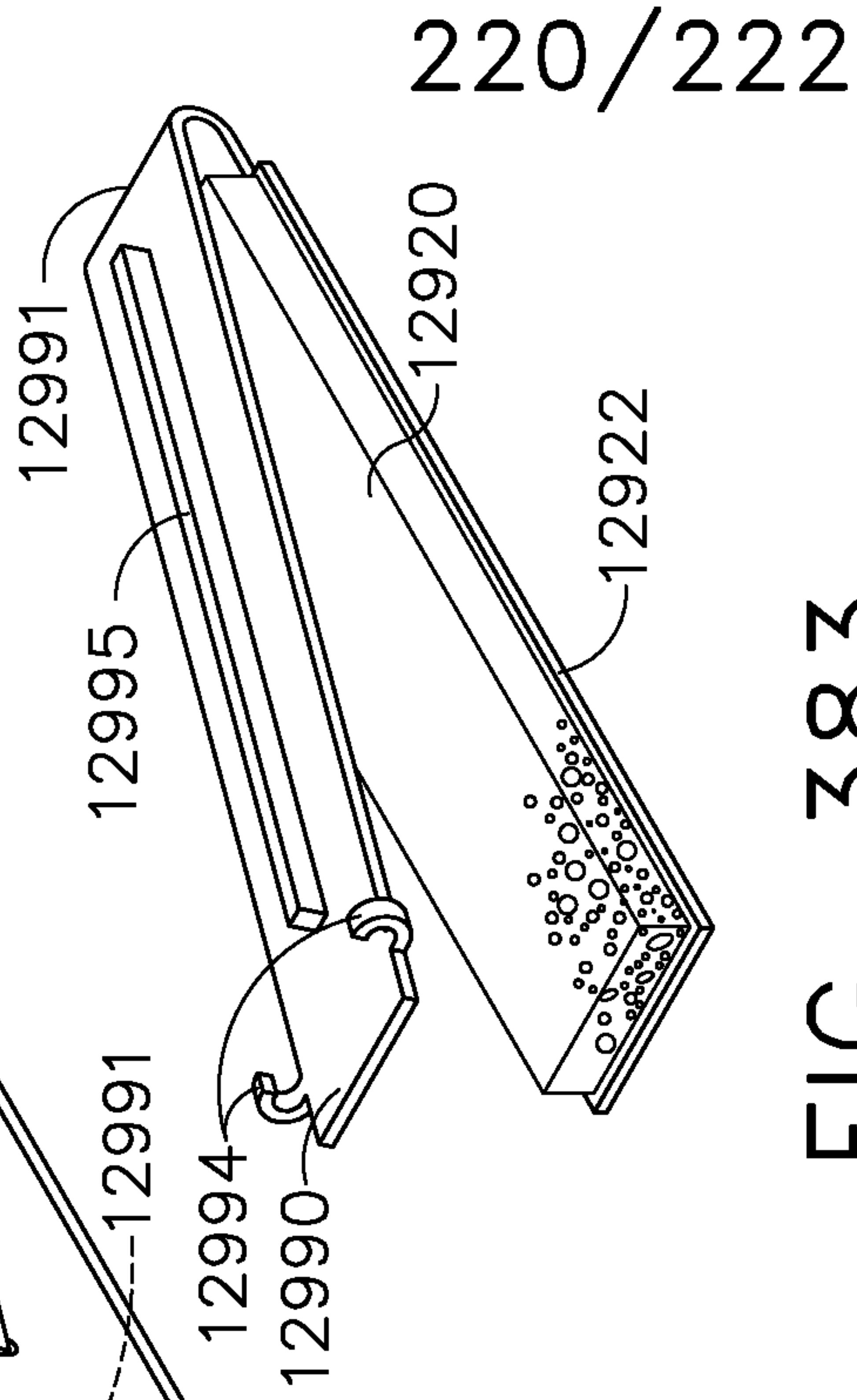


FIG. 383

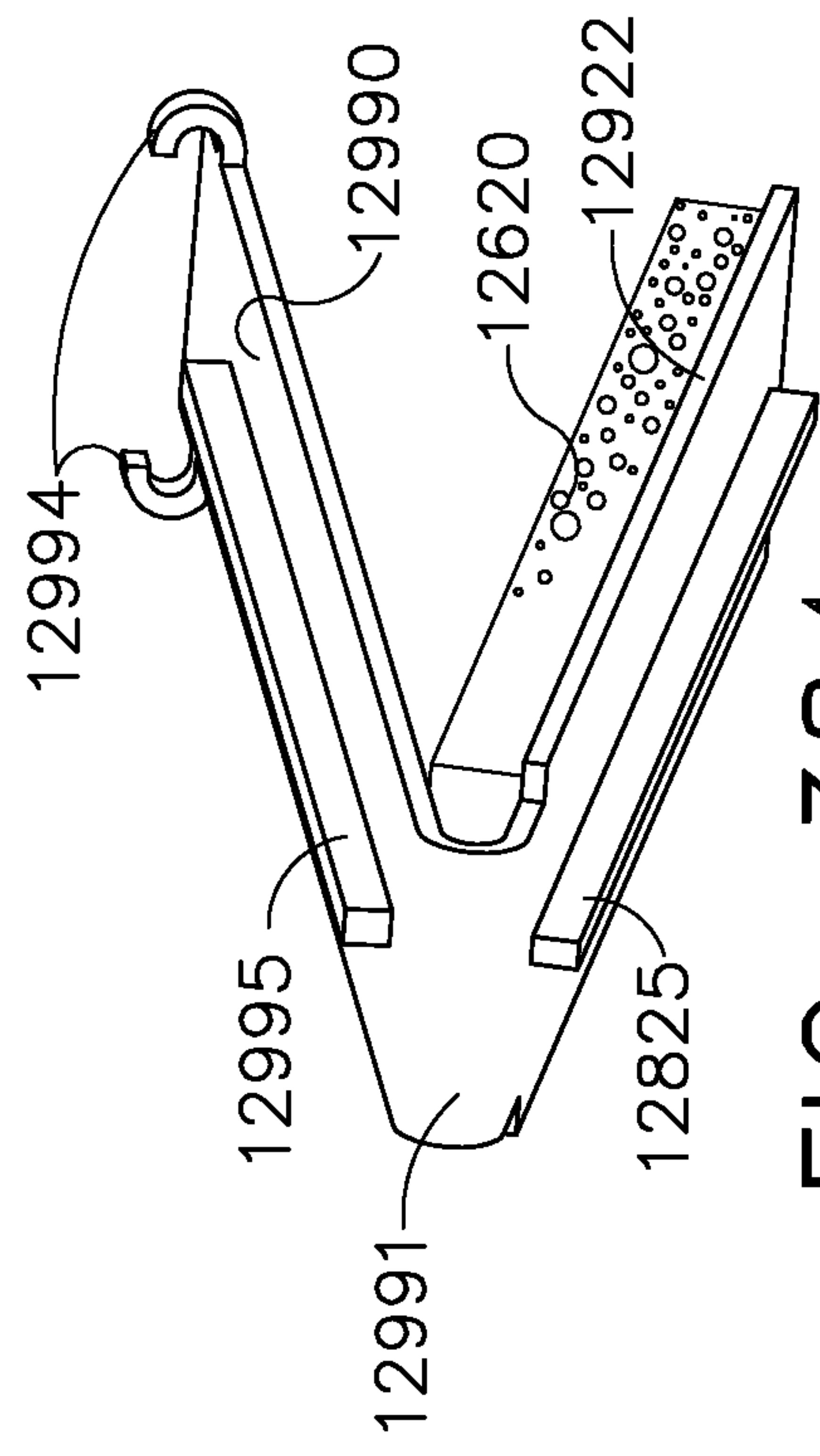


FIG. 384

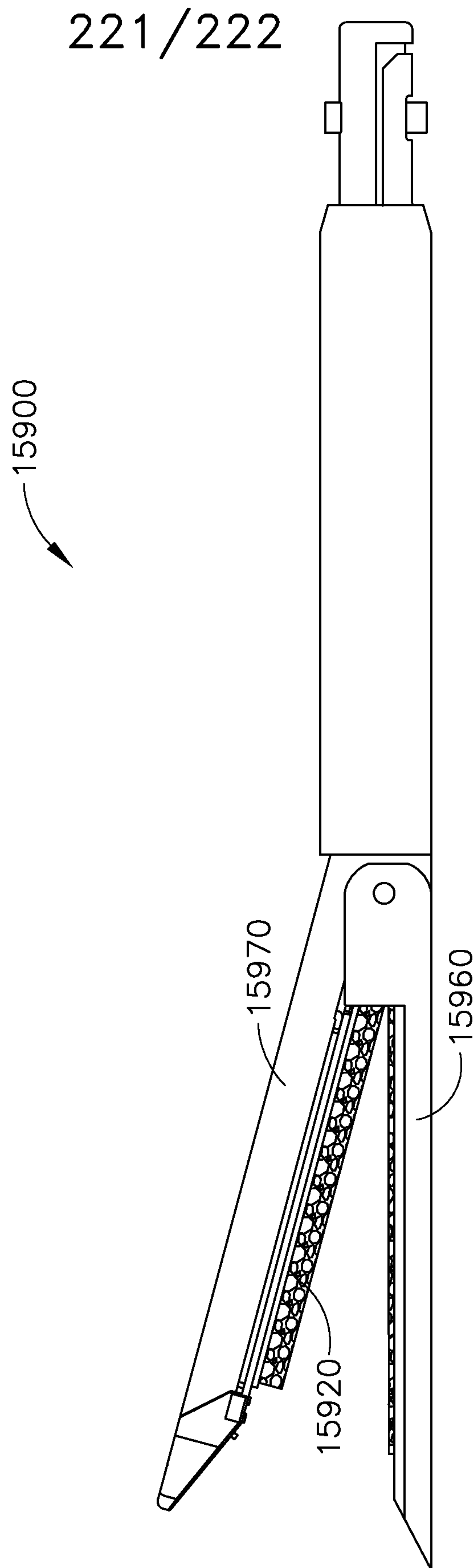


FIG. 385

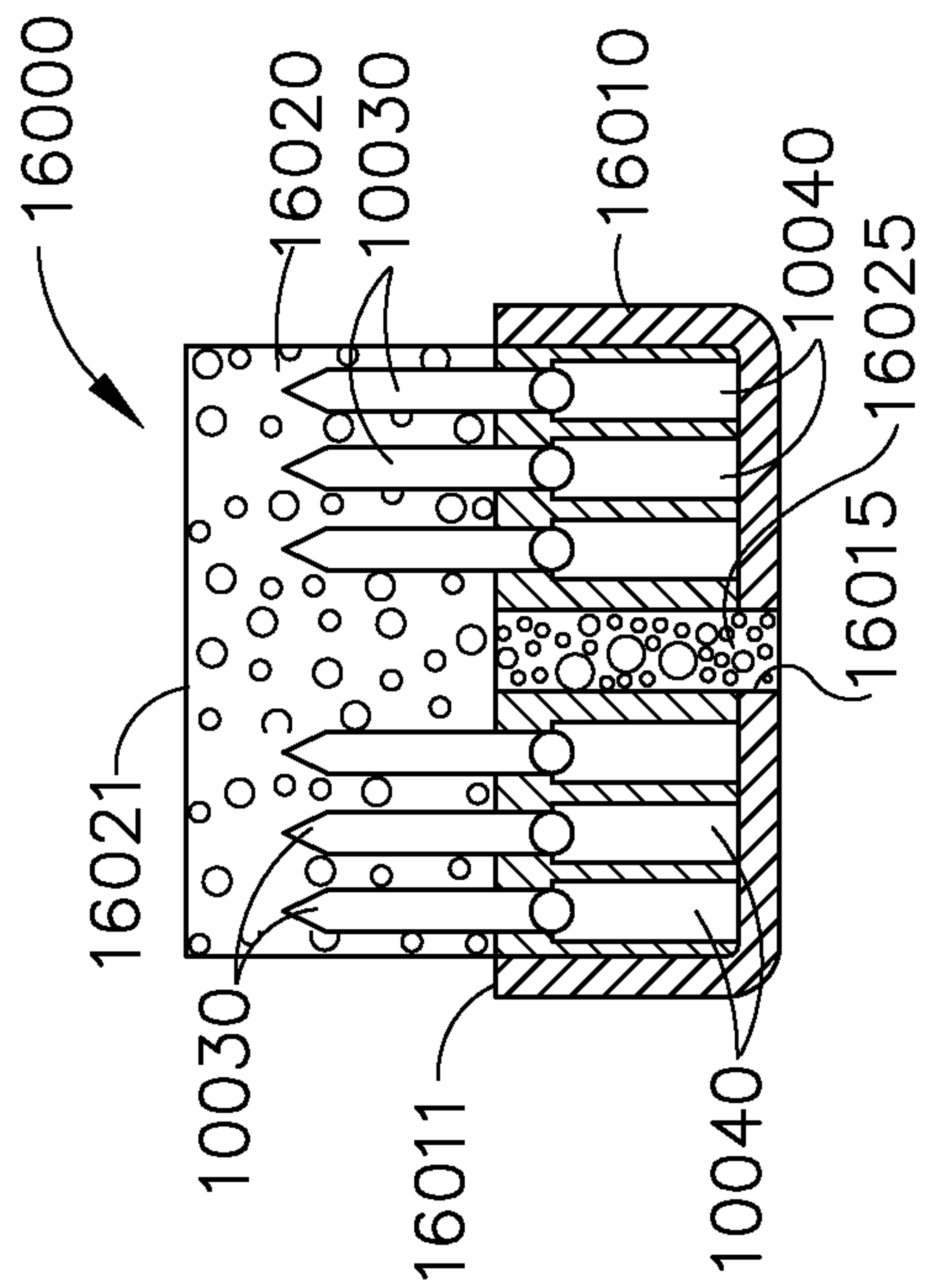


FIG. 386

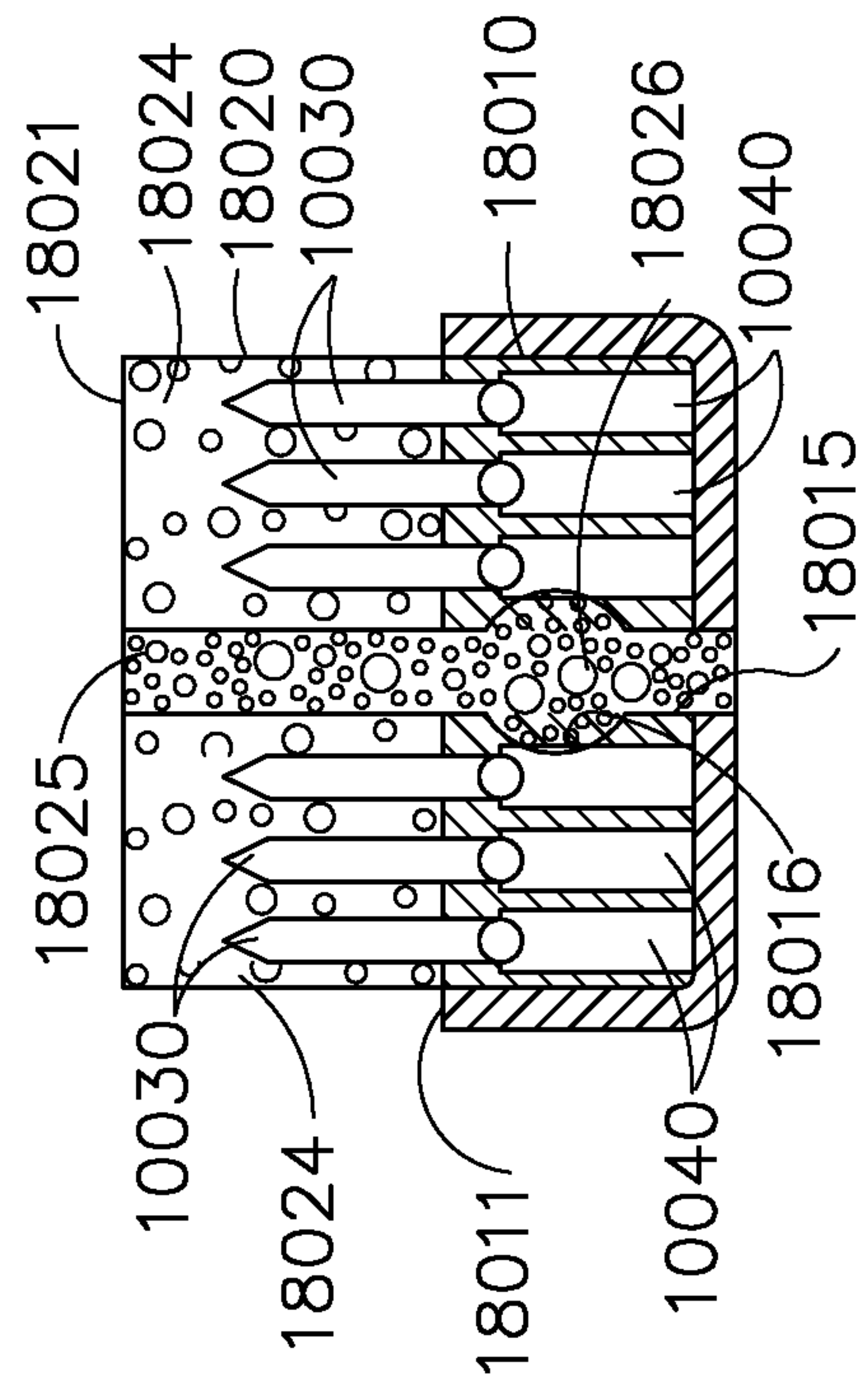


FIG. 388

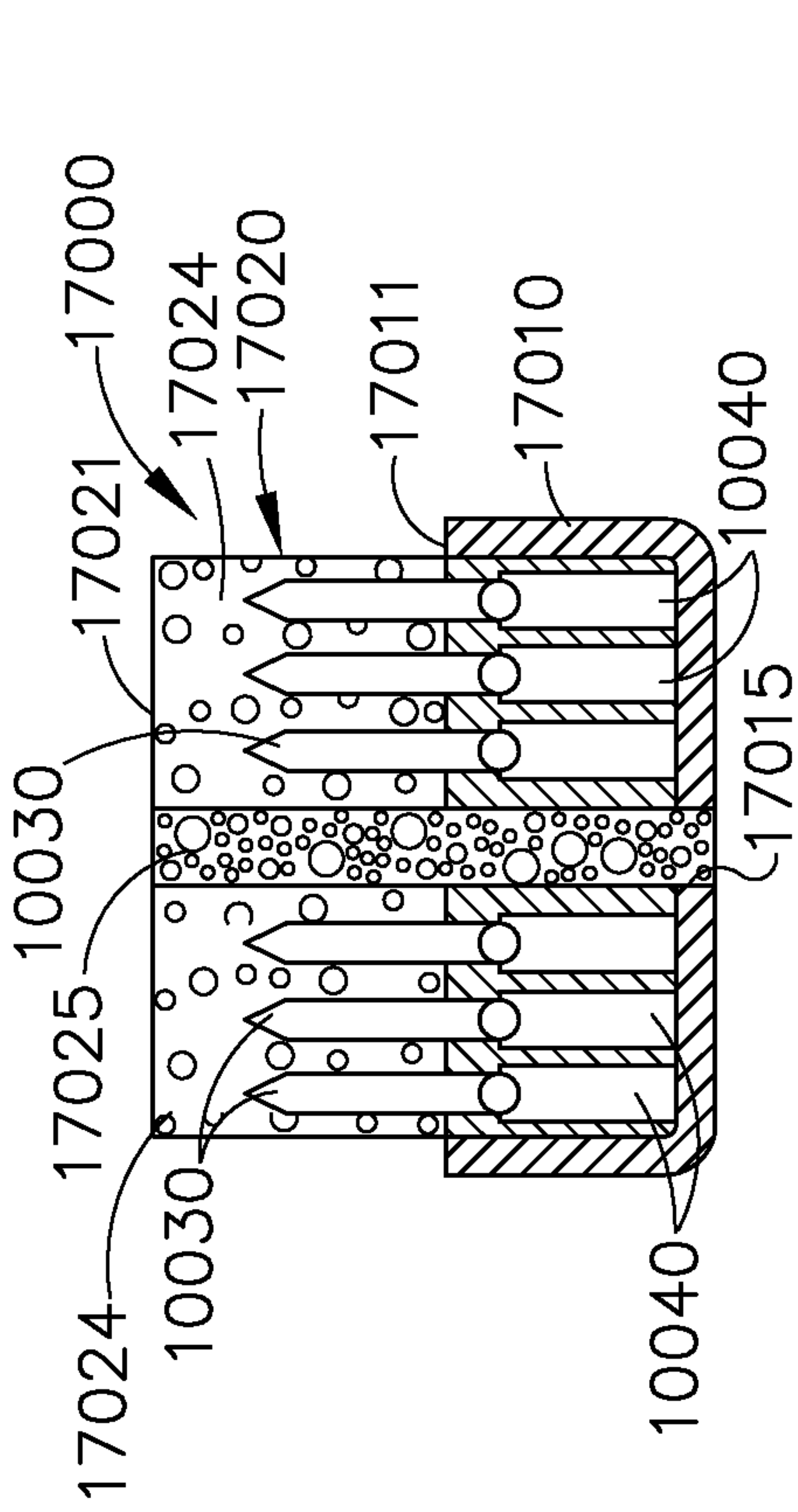


FIG. 387

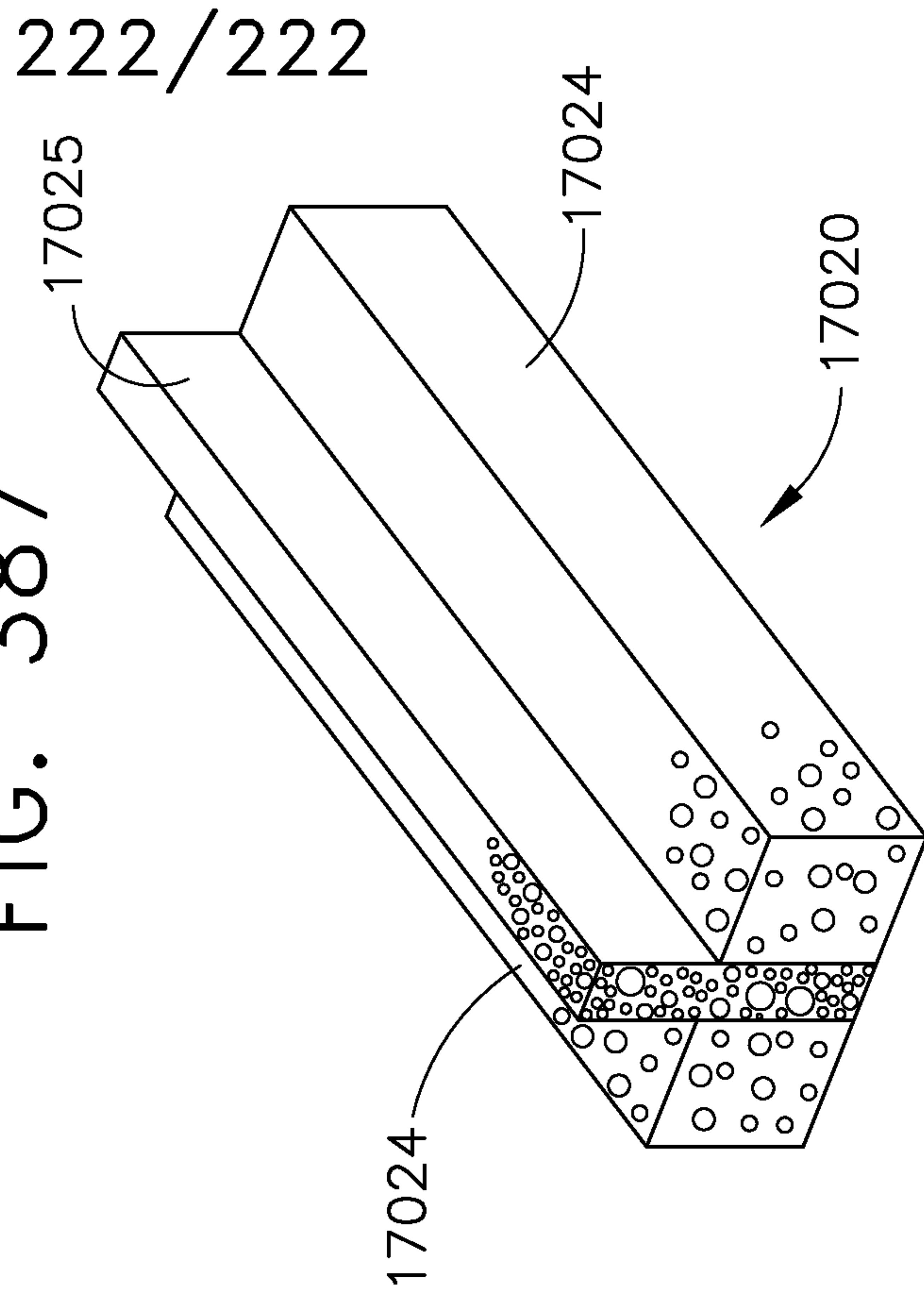


FIG. 389

222/222

