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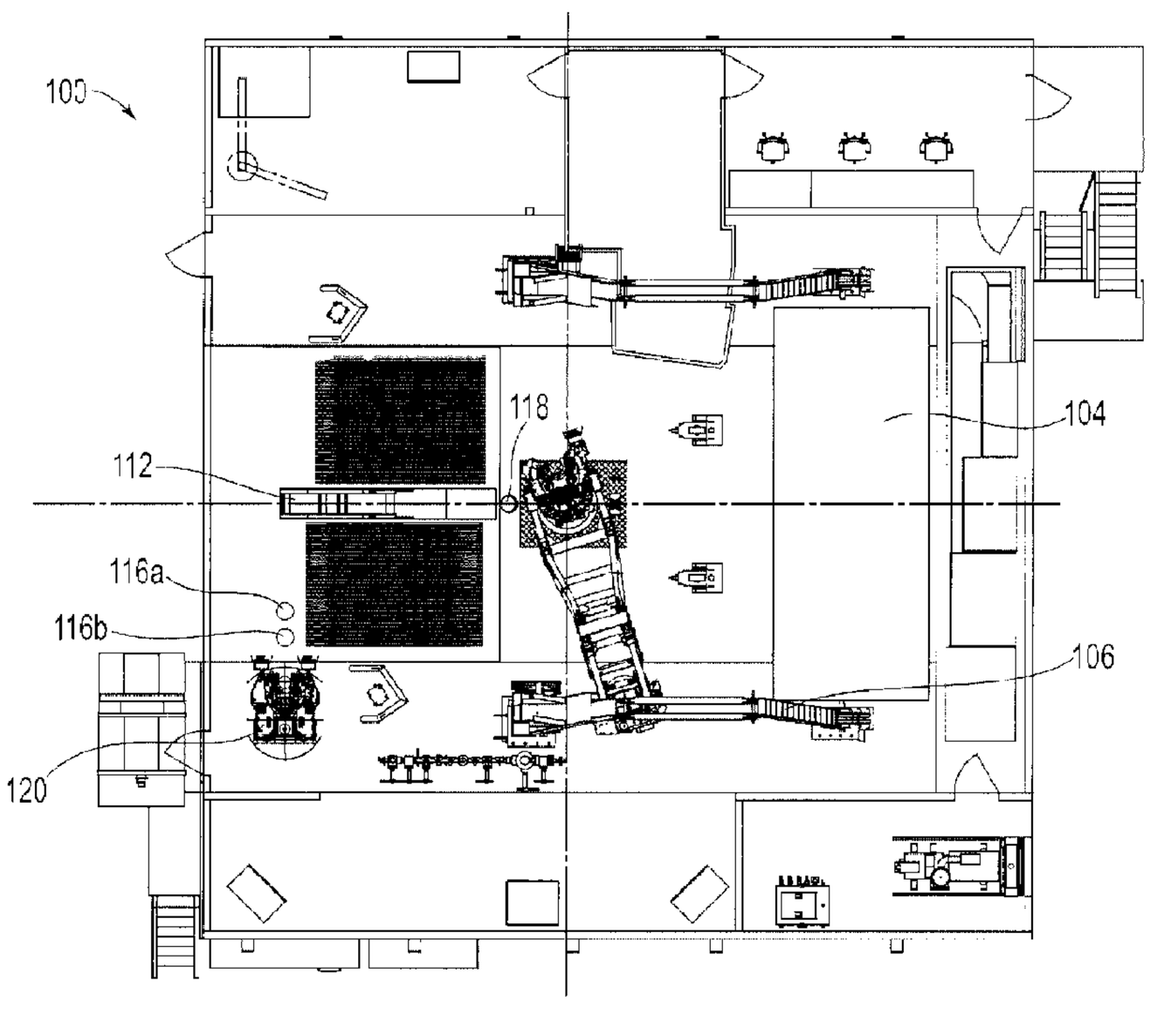

FIG. 2

(57) Abrégé/Abstract:
A drill rig having a drill pipe standbuilding system. The standbuilding system may have one or more offline mouseholes, such as two offline mouseholes, a hoist arranged on a rail system, and an iron roughneck. The rail system may be arranged on the mast, such as above a racking board. The hoist may extend from the rail system, through the racking board, and toward a drill floor of the drill rig. The offline mouseholes, rail system, hoist, and iron roughneck may allow drill pipe stands to be built without interrupting or slowing drilling operations. A method of standbuilding may include arranging a first pipe section in a first mousehole, arranging a second pipe section in a second mousehole, coupling a third pipe section to the second pipe section to form a double stand, and coupling the second pipe section to the first pipe section to form a triple stand.

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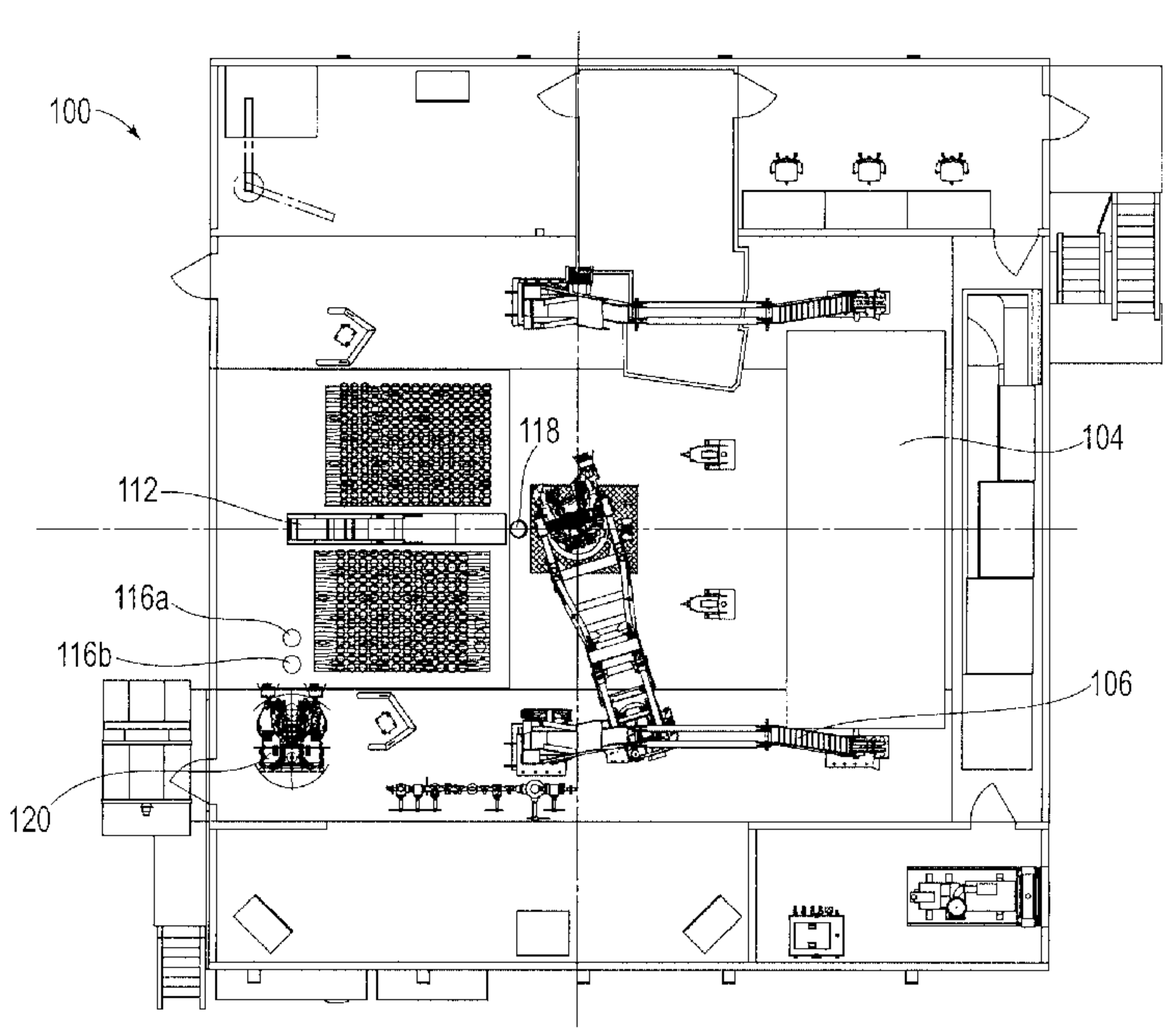

FIG. 2

(57) Abstract: A drill rig having a drill pipe standbuilding system. The standbuilding system may have one or more offline mouseholes, such as two offline mouseholes, a hoist arranged on a rail system, and an iron roughneck. The rail system may be arranged on the mast, such as above a racking board. The hoist may extend from the rail system, through the racking board, and toward a drill floor of the drill rig. The offline mouseholes, rail system, hoist, and iron roughneck may allow drill pipe stands to be built without interrupting or slowing drilling operations. A method of standbuilding may include arranging a first pipe section in a first mousehole, arranging a second pipe section in a second mousehole, coupling a third pipe section to the second pipe section to form a double stand, and coupling the second pipe section to the first pipe section to form a triple stand.

[Continued on next page]

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SYSTEM AND METHOD FOR OFFLINE STANDBUILDING

CROSS-REFERENCE TO RELATED APPLICATIONS

[001] This application claims priority to U.S. Provisional Application No. 62/335,282, filed May 12, 2016, which is hereby incorporated by reference herein in its entirety.

FIELD OF THE INVENTION

[002] The present disclosure relates to oil well drill rigs. Particularly, the present disclosure relates to drill pipe standbuilding for drill strings. More particularly, the present disclosure relates to systems and methods for offline drill pipe standbuilding for land-based oil drill rigs.

BACKGROUND OF THE INVENTION

[003] The background description provided herein is for the purpose of generally presenting the context of the disclosure. Work of the presently named inventors, to the extent it is described in this background section, as well as aspects of the description that may not otherwise qualify as prior art at the time of filing, are neither expressly nor impliedly admitted as prior art against the present disclosure.

[004] Land-based and offshore drilling operations, such as oil drilling operations, typically include the use of a drill string driven by a top drive. The drill string may include a drill bit and a plurality of drill pipe joints or lengths. As the well deepens, more lengths of drill pipe may be added to the drill string. The process of connecting each length of drill pipe to the drill string can be time-consuming. Accordingly, in some drilling operations, lengths of drill pipe are connected into double or triple stands prior to being added to the drill string, such that a longer length of pipe may be added to the drill string at once. The process of connecting single joints of drill pipe into multi-joint stands is often referred to as standbuilding. Each length of drill pipe may have a length of approximately 30 feet, such that a double stand may have a length of approximately 60 feet, and a triple stand may have a length of approximately 90 feet. Theses double or triple stands may be connected in the wellbore to form the drill string. The drill string may then be connected to a top drive and may operate to drill the well. Relatively long sections of drill pipe may be desirable for tripping operations or for other purposes.

[005] In many cases, double and triple drill pipe stands are assembled on the drill floor of the drill rig and prior to the start of drilling operations. Standbuilding can be time-consuming, and thus may add a significant amount of time to setup prior to the start of drilling operations. Typically, offline standbuilding operations are reserved for offshore drill rigs. Land-based rigs often have more limited drill floor space

BRIEF SUMMARY OF THE INVENTION

[006] The following presents a simplified summary of one or more embodiments of the present disclosure in order to provide a basic understanding of such embodiments. This summary is not an extensive overview of all contemplated embodiments, and is intended to neither identify key or critical elements of all embodiments, nor delineate the scope of any or all embodiments.

[007] The present disclosure, in one or more embodiments, relates to a drill rig having a drill floor for performing drilling operations, and an offline standbuilding system for building drill pipe stands without interrupting drilling operations. The offline standbuilding system may include a hoist, a rail system supporting the hoist, and an offline mousehole. In some embodiments, the offline mousehole may be a first offline mousehole, and the standbuilding system may have a second offline mousehole. The rig may have a mast in some embodiments, and the rail system may extend laterally from the mast. The rail system may have a pair of rails and a bridge extending between the rails. The bridge may be configured to move along the rails. Moreover, the hoist may be arranged on the bridge and may be configured to move along the bridge. In some embodiments, the hoist may include a hydraulic hoist, a wireline, and/or a pipe sling or pipe elevator. In some embodiments, the pipe sling or pipe elevator may be configured to hoist two drill pipe sections simultaneously. In some embodiments, the drill rig may have an iron roughneck arranged on the drill floor for coupling drill pipe sections together to form drill pipe stands. Additionally, in some embodiments, the drill rig may be a land rig.

[008] The present disclosure, in one or more other embodiments, relates to an offline standbuilding system for building drill pipe stands without interrupting drilling operations. The system may include a hoist, a rail system supporting the hoist, and an offline mousehole. In some embodiments, the offline mousehole may be a first mousehole, and the standbuilding system may further have a second offline

mousehole. In some embodiments, the rail system may extend laterally from a drill rig mast. The rail system may include a pair of rails and a bridge extending between the rails. The bridge may be configured to move along the rails. Moreover, the hoist may be arranged on the bridge and may be configured to move along the bridge. The hoist may include a wireline and a pipe sling or pipe elevator. In some embodiments, the standbuilding system may additionally include an iron roughneck for coupling drill pipe sections together to form drill pipe stands.

[009] The present disclosure, in one or more other embodiments, relates to a method for offline standbuilding. The method may include the steps of arranging a first drill pipe section in a first mousehole; arranging a second drill pipe section in a second mousehole; aligning a third drill pipe section with the second drill pipe section; coupling the third and second drill pipe sections together to form a double stand; aligning the double stand with the first drill pipe section; and coupling the double stand the first drill pipe section together to form a triple stand. In some embodiments, the steps of arranging the first drill pipe section in the first mousehole and arranging the second drill pipe section in the second mousehole may be performed simultaneously with a hoist. Moreover, the method may be performed during drilling operations in some embodiments.

[010] While multiple embodiments are disclosed, still other embodiments of the present disclosure will become apparent to those skilled in the art from the following detailed description, which shows and describes illustrative embodiments of the invention. As will be realized, the various embodiments of the present disclosure are capable of modifications in various obvious aspects, all without departing from the spirit and scope of the present disclosure. Accordingly, the drawings and detailed description are to be regarded as illustrative in nature and not restrictive.

BRIEF DESCRIPTION OF THE DRAWINGS

[011] While the specification concludes with claims particularly pointing out and distinctly claiming the subject matter that is regarded as forming the various embodiments of the present disclosure, it is believed that the invention will be better understood from the following description taken in conjunction with the accompanying Figures, in which:

[012] FIG. 1 is a side view of a drill rig of the present disclosure, according to one or more embodiments.

[013] FIG. 2 is a plan view of a drill floor of a drill rig of the present disclosure, according to one or more embodiments.

[014] FIG. 3 is another plan view of the drill floor of FIG. 2, according to one or more embodiments.

[015] FIG. 4 is a plan view of a portion of a drill floor and racking board of a drill rig of the present disclosure, according to one or more embodiments.

[016] FIG. 5 is a plan view of a portion of a mast, racking board, and rail system of a drill rig of the present disclosure, according to one or more embodiments.

[017] FIG. 6 is a plan view of a rail system of the present disclosure, according to one or more embodiments.

[018] FIG. 7 is a side view of a rail system of the present disclosure, according to one or more embodiments.

[019] FIG. 8 is a side view of a bridge of a rail system of the present disclosure, according to one or more embodiments.

[020] FIG. 9 is an isolation view of an engagement mechanism of a rail system of the present disclosure, according to one or more embodiments.

[021] FIG. 10 is a flow diagram of a method of the present disclosure for building a triple drill pipe stand, according to one or more embodiments.

[022] FIG. 11A is a side view of a drill rig of the present disclosure, with first and second drill pipe sections hoisted by a rail system, according to one or more embodiments.

[023] FIG. 11B is a schematic front view of the drill rig of FIG. 11A, according to one or more embodiments.

[024] FIG. 12A is a side view of a drill rig of the present disclosure, with first and second drill pipe sections inserted into first and second mouseholes, according to one or more embodiments.

[025] FIG. 12B is a schematic front view of the drill rig of FIG. 12A, according to one or more embodiments.

[026] FIG. 13A is a side view of a drill rig of the present disclosure, with a third drill pipe section hoisted by a rail system, according to one or more embodiments.

[027] FIG. 13B is a schematic front view of the drill rig of FIG. 13A, according to one or more embodiments.

[028] FIG. 14A is a side view of a drill rig of the present disclosure, with a third drill pipe section aligned with a second drill pipe section over a second mousehole, according to one or more embodiments.

[029] FIG. 14B is a schematic front view of the drill rig of FIG. 14A, according to one or more embodiments.

[030] FIG. 15 is a side view of an iron roughneck extending to a second mousehole to couple together second and third drill pipe sections, according to one or more embodiments.

[031] FIG. 16A is a side view of a drill rig of the present disclosure, with second and third drill pipe sections aligned with a first drill pipe section over a first mousehole, according to one or more embodiments.

[032] FIG. 16B is a schematic front view of the drill rig of FIG. 16A, according to one or more embodiments.

[033] FIG. 17 is a side view of an iron roughneck extending to a first mousehole to couple together first and second drill pipe sections, according to one or more embodiments.

[034] FIG. 18A is a side view of a drill rig of the present disclosure, with a triple stand hoisted by the rail system, according to one or more embodiments.

[035] FIG. 18B is a schematic front view of the drill rig of FIG. 18A, according to one or more embodiments.

DETAILED DESCRIPTION

[036] The present disclosure relates to a drill rig having a drill pipe standbuilding system. The standbuilding system may have one or more offline mouseholes, such as two offline mouseholes, a hoist arranged on a rail system, and an iron roughneck. The rail system may be arranged on the mast, such as above a racking board. The hoist may extend from the rail system, through the racking board, and toward a drill floor of the drill rig. The offline mouseholes, rail system, hoist, and iron roughneck may allow drill pipe stands to be built without interrupting or slowing drilling operations. The present disclosure additionally relates to a method of standbuilding. The method may include arranging a first pipe section in a first mousehole, arranging a second pipe section in a second mousehole, coupling a third pipe section to the second pipe section to form a double stand, and coupling the second pipe section to the first pipe section to form a triple stand.

[037] Turning now to FIG. 1, a drill rig 100 of the present disclosure is shown, according to one or more embodiments. The drill rig 100 may be configured for onshore oil drilling in some embodiments. However, in other embodiments, other drill rigs of the present disclosure may be configured for other drilling operations, including offshore drilling operations. The drill rig 100 may generally have a substructure 102 supporting a drill floor 104 and a mast 106. The drill rig 100 may be a mobile or stationary rig. In some embodiments, the drill rig 100 may have, for example, tires 108 or other moving means such as, but not limited to, walking feet or rails. In some embodiments, the rig 100 may be a drivable or towable rig.

[038] The substructure 102 may be configured to support the drill floor 104 and mast 106. The substructure 102 may comprise a plurality of housings or boxes for housing equipment and/or storing various types of equipment.

[039] The drill floor 104 may be arranged over the substructure 102 and may be configured to provide a platform for drilling operations. As shown for example in FIGS. 2 and 3, the drill floor 104 may generally provide a well center 110 opening through which a wellbore may be reached. In some embodiments, the drill floor 104 may have another opening, such as but not limited to a V-door 112, through which sections of drill pipe may be passed or raised onto the drill floor. In some embodiments, a ramp and/or pipe machine 114 may be arranged beneath the V-door 112 or other opening to facilitate movement of drill pipe sections to the drill floor 104, as shown in FIG. 1. In some embodiments, the drill floor 104 may additionally have one or more mouseholes 116, 118. For example, in some embodiments, the drill floor 104 may have two mouseholes 116, 118. In other embodiments, the drill floor 104 may have one, three, or any other suitable number of mouseholes 116, 118.

[040] Each mousehole 116, 118 may be configured to provide a holder or casing configured to receive a section of drill pipe. Particularly, a mousehole 116, 118 may be configured to position a section of drill pipe on end with its longitudinal axis vertical. Additionally, the casing or holder of the mousehole 116, 118 may be arranged beneath an opening in the drill floor 104, such when placed in the mousehole, a majority of a pipe section is arranged beneath the drill floor. The casing or holder of the mousehole 116, 118 may have a cylindrical, square, or other suitable shape, and may have a closed or capped bottom end for supporting a section of drill pipe inserted in the mousehole. A mousehole 116, 118 may have a diameter or width configured to receive a diameter or width of a drill pipe section. Additionally, a

mousehole 116, 118 may have a length or depth configured to receive a section of drill pipe, such that an end of the drill pipe may remain exposed above the drill floor 104 for connecting to a next drill pipe section. For example, in some embodiments, a mousehole 116, 118 may have a depth that is slightly shorter than the length of a drill pipe section. For example, where a drill pipe section has a length of approximately 30 feet, a mousehole 116, 118 may have a depth of between approximately 20 and 30 feet, or more particularly between approximately 22 and 29 feet, or more particularly between approximately 25 and 28 feet. In this way, the mousehole 116, 118 may be configured such that less than about 10 feet of a drill pipe section arranged in the mousehole remain exposed above the drill floor 104, or more particularly between about 1 and 8 feet, or more particularly between about 2 and 5 feet.

[041] As shown in FIG. 2, in some embodiments, one or more "offline" mouseholes 116a, 116b may be arranged at a location on the drill floor 104 toward an off-driller side of the drill floor. The one or more offline mouseholes 116 may be arranged at or near a setback area of the drill floor 104, for example, and may be off-center from the well center 110 in some embodiments. Moreover, the one or more offline mouseholes 116 may be arranged near the V-door 112. In some embodiments, the one or more offline mouseholes 116 may be arranged beneath or near a racking board 122 of the mast 106, as further described below. In some embodiments, one or more mouseholes 118 may additionally or alternatively be arranged near the well center 110 of the drill floor 104. For example, one or more mouseholes 118 may be arranged between the well center 110 and the V-door 112 in some embodiments, and may be aligned with the well center of the drill floor 104. In other embodiments, other mouseholes 116, 118 may be arranged in any other suitable drill floor 104 locations.

[042] The drill floor 104 may support a variety of equipment including, for example, one or more iron roughnecks. For example, an iron roughneck 120 may be arranged on an off-driller side of the drill floor 104, and may be configured to reach drill pipe sections arranged in one or more offline mouseholes 116, as shown in FIGS 2 and 3. The iron roughneck 120 may be configured to couple sections of drill pipe together to form stands. The iron roughneck 120 may be provided in addition to a primary iron roughneck used for drilling operations.

[043] Referring back to FIG. 1, the mast 106 may be configured to support a handling or lifting system having a cable or line reeved through, for example, a crown

block and traveling block. The mast 106 and handling system may generally support a drill for drilling the well. Moreover, the mast 106 and handling system may be configured to facilitate adding drill pipe sections to a drill string. In some embodiments, the mast 106 may have a racking board 122. The racking board 122 may be configured to vertically rack sections of drilling pipe for use in drilling operations. The racking board may extend laterally from the mast 106, and may extend out over a portion of the drill floor 104, as shown for example in the plan view of FIG. 4. In some embodiments the racking board 122 may be arranged on the mast at a height of between approximately 40 and 150 feet. Particularly, the racking board 122 may be arranged at a height of between approximately 60 and 125 feet. More particularly, the racking board 122 may be arranged at a height of between approximately 80 and 100 feet. The racking board 122 may generally have a height configured to accommodate double or triple stands of drilling pipe extending vertically from the drill floor 104 to and through the racking board. In some embodiments, the mast 106 may additionally have a windwall 124. For example, the windwall 124 may be arranged around at least a portion of the racking board 122 so as to provide a protective barrier against wind and/or other elements.

[044] In some embodiments, the racking board 122 may have a length extending from the mast 106 configured to accommodate the one or more offline mouseholes 116 on the drill floor 104. For example, as shown in FIG. 5, at least a portion of the racking board 122 length may extend outward from the mast 106 far enough to allow through access to the offline mouseholes 116 arranged below.

[045] As shown in FIGS. 1 and 5, in some embodiments, the mast 106 may additionally have a rail system 126. The rail system 126 may be configured to provide handling operations for sections of drill pipe. For example, the rail system 126 may provide handling operations whereby sections of pipe may be inserted into one or more of the mouseholes 116, 118, aligned with one another for coupling, brought to the racking board 122, and/or otherwise manipulated. In some embodiments, the rail system 126 may be arranged on the mast 106 at a height above the racking board 122. That is, the rail system 126 may be arranged above the racking board 122, and may extend across the racking board to manipulate drill pipe sections on the drill floor 104. In some embodiments, the rail system 126 may be arranged at a height of between approximately 55 feet and 175 feet. In some embodiments, the rail system 126 may be arranged at a height of between approximately 80 feet and 150

feet. Particularly, the rail system 126 may be arranged at a height of between approximately 110 feet and 120 feet in some embodiments. In other embodiments, the rail system 126 may be incorporated into or coupled to the racking board 122, windwall 124, or any other suitable structure. As shown in FIGS. 5 and 6, in some embodiments, the rail system 126 may include a pair of rails 128, a bridge 130 extending between the rails, and a hoist 132.

[046] The two rails 128 may parallel one another and may generally extend outward from the mast 106, such as above the racking board 122. The rails 128 may be configured to support the bridge 130 and hoist 132, and may generally allow the bridge and/or hoist to move laterally toward and away from the mast 106. For example, the bridge 130 may extend between the two rails 128 and may generally slide along the two rails, laterally toward and away from the mast 106. In this way, each rail 128 may provide a track along which the bridge 130 may move. In some embodiments, each rail 128 may have a gear rack configured to engage with one or more gears or a gear box of the bridge 130. In other embodiments, the rails 128 may engage with the bridge 130 with other suitable mechanisms. In some embodiments, the rails 128 may be arranged parallel to one another along the mast 106 such that a first rail is located near an off-driller side, and a second rail is arranged near a driller side. In some embodiments, the rails 128 may be welded, bolted, pinned, or otherwise secured to the mast 106 or another structure. In some embodiments, the rails 128 may have a length extending from the mast 106 sufficient to allow the hoist to reach the offline mouseholes 116. As shown for example in FIG. 5, the rails 128 may have a length extending from the mast 106 such that the bridge 130 may be arranged over the mouseholes 116.

[047] The bridge 130 may span between the two rails 128 and may be configured to support the hoist 132. The bridge 130 may additionally be configured to slide or move along the two rails 128, such as to move the hoist 132 toward and away from the mast 106. In some embodiments, the bridge 130 may have an engagement mechanism 134 at each end configured to engage with the rails 128. An engagement mechanism 134 is shown in FIG. 9, for example. As shown, the engagement mechanism 134 may have one or more gears 136 configured to engage with a gear rack arranged on the rail 128, for example. Engagement between the gears on each engaging mechanism 134 with the pair of rails 128 may allow the bridge 130 to move along the two rails. FIG. 7 shows an engagement mechanism 134

engaging a rail 128 with respect to three different positions of the bridge 130. In some embodiments, a drive motor may drive the bridge's 130 movement along the rails 128. For example, as shown in FIG. 8, a bridge drive motor 138 may be arranged on the bridge 130 itself in some embodiments. As additionally shown in FIG. 8, in some embodiments, the bridge 130 may have a gear rack 140 configured to engage with one or more gears or a gear box of the hoist 132.

[048] With reference to FIGS. 6 and 8, the hoist 132 may be arranged on the bridge 130 and may be configured to provide means for handling sections of drill pipe and generally moving drilling pipe sections to and from mousehole 116, 118 locations to build stands. The hoist 132 may be electrically and/or hydraulically controlled. The hoist 132 may have a hoist trolley 142 configured to move back and forth along the bridge 130. In some embodiments, the hoist trolley 142 may have one or more roller wheels, such as four or two roller wheels, for moving along the bridge 130. Additionally or alternatively, the hoist trolley 142 may have one or more gears configured to engage with the gear rack 140 on the bridge 130. A drive motor may drive the hoist's 132 movement along the bridge 130. For example, a hoist drive motor 144 may be arranged on the hoist trolley 142 in some embodiments, and may drive movement of the one or more gears. The hoist 132 may generally have a wireline that extends toward the drill floor 104. The wireline may extend from the rail system 126 and toward the drill floor 104. In some embodiments, a pipe elevator or lifting sling may be arranged at an end of the wireline for latching onto and moving pipe sections. In some embodiments, the hoist 132 may have a pipe elevator or lifting sling with multiple pipe attachments, such that more than one pipe section may be handled by the hoist simultaneously. In some embodiments, the multi-pipe elevator or sling may have spacing configured to align with the offline mouseholes 116, such that, for example, two pipes may be simultaneously hoisted and inserted into the mouseholes 116a, 116b.

[049] In use, a drill rig 100 of the present disclosure may provide for efficient drill pipe standbuilding operations. In some embodiments, a drill rig 100 of the present disclosure may provide for offline drill pipe standbuilding independent of at least some drilling operations. In particular, apparatuses, systems, and methods of the present disclosure may provide for double and/or triple standbuilding operations, for example, without interrupting drilling operations. Drill pipe stands may be constructed using the offline mouseholes 116 and the rail system 126, such that the

standbuilding may be performed independent of, and in some embodiments simultaneously with, drilling operations at the well center 110.

[050] A drill pipe stand of the present disclosure may be a double or triple stand, for example. In other embodiments, longer stands are contemplated as well. Each section of drill pipe may have a length of between approximately 15 and 60 feet in some embodiments. Particularly, each section of drill pipe may have a length of between approximately 20 and 55 feet. More particularly, each section of drill pipe may have a length of between approximately 25 and 50 feet in some embodiments. In particular embodiments, some drill pipe sections may have a length of approximately 30 or 31 feet, for example. In another particular embodiments, some drill pipe sections may have a length of approximately 45 feet. The drill pipe sections may be coupled together to form stands of two or more sections. That is, drill pipe sections having a length of approximately 31 feet may form a double stand of approximately 62 feet or a triple stand of approximately 93 feet. Similarly, drill pipe sections having a length of approximately 45 feet may form a double stand of approximately 90 feet. In some embodiments, drill pipe sections of different lengths may be joined together to form stands having different lengths. The drill pipe sections may be coupled together using any suitable coupling means. For example, in some embodiments, each drill pipe section may have a male end with outer threading and a female end with inner threading. The outer threading of one pipe section may be configured to engage with the inner threading of another pipe section, such that the two pipe sections may be screwed together.

[051] FIG. 10 illustrates a standbuilding method 200 of the present disclosure, according to some embodiments. The method 200 may include bringing one or more sections of pipe to the drill floor 202; inserting a first section of pipe into a first mousehole 204; inserting a section of pipe into a second mousehole 206; aligning a third section of pipe with the second section of pipe 208; coupling the third and second sections of pipe to create a double stand 210; aligning the double stand with the first section of drill pipe 212; coupling the double stand with the first section of pipe to create a triple stand 214; and arranging the triple stand in the racking board 216.

[052] As mentioned, the method 200 may generally include bringing sections of pipe to the drill floor 104. (202) In some embodiments, the sections may be brought up to the drill floor 104 through the V-door 112 and ramp or pipe machine

114. In other embodiments, the sections may be brought to the drill floor 104 by way of tugger/utility winch(es), and/or any other suitable lifting or handling means. Sections of pipe may be brought to the drill floor 104 individually. That is, for example, each section of drill pipe may be brought to the drill floor 104 just prior to being used to build the stand. In other embodiments, multiple pipes may be brought to the drill floor 104. For example, where a triple stand is to be built, three sections of drill pipe may be brought to the drill floor 104 prior to beginning building the stand. In some embodiments, each section of drill pipe may be brought to the drill floor 104 in line with the well center 110 and between the middle of the setback floor.

[053] Of the pipe sections brought to the drill floor 104, a first section of pipe may be inserted into a first offline mousehole 116a. (204) Looking for example at FIGS. 11A and 11B, in some embodiments, the hoist 132 may operate to couple with or grab the first section of drill pipe 146a via a sling or pipe elevator. The hydraulically or electrically operated hoist 132 may retract to draw the first section of pipe 146a off of the floor 104. The first section of drill pipe 146a may thus be supported by the hoist 132. The hoist 132 may move along the bridge 130, and the bridge may additionally move along the rails 128 to bring the first section of drill pipe 146a toward the first mousehole 116a. The hoist 132 may operate to lower the drill pipe 146a into the first mousehole 116a. When the first section of drill pipe 146a is arranged in the first mousehole 116a, approximately a few feet of the drill pipe may remain extended above the drill floor 104 in some embodiments, as described above. Where the drill pipe 146a has threaded ends, the first section of drill pipe may be inserted into the mousehole 116a such that an end of the pipe having inner threading is exposed above the mousehole. In some embodiments, a set of drill pipe slips, or another stabilizing or wedging tool, may be arranged in the mousehole 116a to secure the drill pipe 146a in position in the mousehole. The sling or pipe elevator may be disconnected from the first section of drill pipe 146a once the pipe is arranged in the first mousehole 116a.

[054] The hoist 132 may move along the bridge 130, and the bridge may move along the pair of rails 128 to reach a second section of drill pipe 146b, which may be arranged on the drill floor 104 near the well center 110, for example. (206) The second section of pipe 146b may be transported to and inserted into a second mousehole 116b, similarly to the first section of pipe 146a in the first mousehole 116a. As shown for example in FIGS. 11A and 11B, in some embodiments, the first

and second sections 146a, 146b of drill pipe may be simultaneously hoisted from the drill floor 104 using the hoist 132. That is, where the hoist 132 may have a pipe elevator or sling configured to lift more than one pipe section, the first and second pipe sections 146a, 146b may be simultaneously lifted and placed in the first and second mouseholes 116a, 116b, as further shown in FIGS. 12A and 12B. It may be appreciated that the pipe elevator or sling may be configured to space the two pipe sections to match the spacing of the two mouseholes 116a, 116b.

[055] The method 200 may include aligning a third section of drill pipe with the second section of drill pipe 146b in the second mousehole 116b. (208) As shown for example in FIGS. 13A and 13B, the third section of drill pipe 146c may be hoisted from its location on the drill floor 104 using the hoist 132. The hoist 132 may move along the bridge 130, and the bridge may move along the rails 128 to align the third section of drill pipe 146c with the second section of drill pipe 146b. The hoist 132 may lower the third section of pipe 146c toward the second section 146b, until threading of the two sections aligns. For example, where the third section of drill pipe 146c has outer threading, and the second section of pipe 146b has inner threading, the third section may be lowered toward the second section until the third section fits within the second section in order to align the inner and outer threading of the two sections. Alternatively, in some embodiments, the third section 146c may be aligned with the first section 146a.

[056] Once aligned, the third section 146c and second section 146b of pipe may be coupled together to form a double stand of drill pipe. (210) For example, as described above, the two sections of pipe 146b, 146c may have threading, and may thus be screwed together. In some embodiments, as shown for example in FIGS. 14A and 14B, an iron roughneck 120 may extend toward the second mousehole 116b to couple the two sections of pipe 146b, 146c together. This iron roughneck operation is additionally shown in FIG. 15. The iron roughneck 120 may spin/screw the two pipe sections 146b, 146c together, and generally apply an amount of torque sufficient to make up the connection between the two pipe sections. In other embodiments, the two sections of drill pipe 146b, 146c may be coupled together using other suitable coupling mechanisms and operations. In some embodiments, the hoist 132 may remain connected to the third section of drill pipe 146c while the third section and second section 146b are coupled together.

[057] The hoist 132 may operate to align the double stand of drill pipe with the first section of drill pipe 146a arranged in the first mousehole 116a, as shown for example in FIGS. 16A and 16B. (212) In this way, the hoist 132 may retract to pull the double stand out of the second mousehole 116b, and the hoist may move along the bridge 130 and/or the bridge may move along the rails 128 to align the double stand over the first section of drill pipe 146a in the first mousehole 116a. The hoist 132 may lower the double stand toward the first section of drill pipe 146a. For example, as described above, the hoist 132 may lower the double stand toward the first section of drill pipe 146a to align threading on the first and second sections 146b of drill pipe.

[058] Once aligned, the double stand and the first section of drill pipe 146a may be coupled together to form a triple stand of drill pipe. (214) For example, as described above, the two pipes 146a, 146b may have threading and may be threaded together using an iron roughneck 120. As shown for example in FIG. 17, the iron roughneck 120 may extend toward the first mousehole 116a to screw the double stand and first drill pipe section 146a together. In other embodiments, the double stand and first section of drill pipe 146a may be coupled together using any other suitable coupling mechanisms and operations. In some embodiments, the hoist 132 may remain connected to the third section of drill pipe 146c while the second 146b and first 146a sections are coupled together.

[059] The hoist 132 may operate to bring the triple stand to the racking board 122 in some embodiments. (216) That is, the hoist 132 may retract to pull the triple stand out of the first mousehole 116a and up to the racking board 122, as shown for example in FIGS. 18A and 18B. The hoist 132 may move along the bridge 130 and/or the bridge may move along the rails 128 to position the triple stand in the racking board 122. In other embodiments, the hoist 132 may place the triple stand in a different location to otherwise make the triple stand available to the top drive for drilling operations.

[060] It may be appreciated that, in some embodiments, double stands may be built instead of or in addition to triple stands. For example, a single mousehole may be used to build a double stand of drill pipe, which may be placed in the racking board or otherwise made available to the top drive for drilling operations. A method of building a double stand using a drill rig of the present disclosure would generally include the steps of bringing sections of drill pipe to the drill floor; inserting a first section of drill pipe into the mousehole; aligning a second section of drill pipe with

the first section of drill pipe in the mousehole; coupling the first and second sections of drill pipe together to form the double stand; and arranging the double stand in the racking board. The steps may be similar to those described above with respect to the method 200.

[061] It is to be appreciated that the apparatuses, systems, and methods of the present disclosure may provide for standbuilding operations that are agnostic to drilling operations and drilling equipment. In this way, the standbuilding operations described herein may be performed offline with respect to drilling operations, and may thus occur simultaneously with drilling operations. This may help to improve the overall efficiency of the drill rig, by providing double and/or triple drill standbuilding without delaying drilling operations. Moreover, the apparatuses, systems, and methods described herein may be suitable for both offshore and onshore rigs. For example, by arranging a rail system above the racking board, and allowing the hoist to operate through the racking board to reach the offline mouseholes, the apparatuses, systems, and methods described herein may be compatible with the relative space constraints of some onshore rigs. It may further be appreciated that apparatuses, systems, and methods of the present disclosure, including offline mouseholes and a hoist and rail system may additionally be used to disassemble a drill string in some embodiments and/or disassemble one or more drill pipe stands.

[062] Various embodiments of the present disclosure may be described herein with reference to flowchart illustrations and/or block diagrams of methods, apparatus (systems), and computer program products. Although a flowchart or block diagram may illustrate a method as comprising sequential steps or a process as having a particular order of operations, many of the steps or operations in the flowchart(s) or block diagram(s) illustrated herein can be performed in parallel or concurrently, and the flowchart(s) or block diagram(s) should be read in the context of the various embodiments of the present disclosure. In addition, the order of the method steps or process operations illustrated in a flowchart or block diagram may be rearranged for some embodiments. Similarly, a method or process illustrated in a flow chart or block diagram could have additional steps or operations not included therein or fewer steps or operations than those shown. Moreover, a method step may correspond to a method, a function, a procedure, a subroutine, a subprogram, etc.

[063] As used herein, the terms "substantially" or "generally" refer to the complete or nearly complete extent or degree of an action, characteristic, property,

state, structure, item, or result. For example, an object that is "substantially" or "generally" enclosed would mean that the object is either completely enclosed or nearly completely enclosed. The exact allowable degree of deviation from absolute completeness may in some cases depend on the specific context. However, generally speaking, the nearness of completion will be so as to have generally the same overall result as if absolute and total completion were obtained. The use of "substantially" or "generally" is equally applicable when used in a negative connotation to refer to the complete or near complete lack of an action, characteristic, property, state, structure, item, or result. For example, an element, combination, embodiment, or composition that is "substantially free of" or "generally free of" an element may still actually contain such element as long as there is generally no significant effect thereof.

[064] In the foregoing description various embodiments of the present disclosure have been presented for the purpose of illustration and description. They are not intended to be exhaustive or to limit the invention to the precise form disclosed. Obvious modifications or variations are possible in light of the above teachings. The various embodiments were chosen and described to provide the best illustration of the principals of the disclosure and their practical application, and to enable one of ordinary skill in the art to utilize the various embodiments with various modifications as are suited to the particular use contemplated. All such modifications and variations are within the scope of the present disclosure as determined by the appended claims when interpreted in accordance with the breadth they are fairly, legally, and equitably entitled.

Claims

What is claimed is:

1. A drill rig comprising:

a drill floor for performing drilling operations; and

an offline standbuilding system for building drill pipe stands without interrupting drilling operations; the system comprising:

a hoist;

a rail system supporting the hoist; and

an offline mousehole arranged in the drill floor.

2. The drill rig of claim 1, further comprising a racking board sized and arranged to allow the hoist to operate inside the racking board frame.

3. The drill rig of claim 1, wherein the offline mousehole is a first offline mousehole, and the offline standbuilding system further comprises a second offline mousehole arranged in the drill floor.

4. The drill rig of claim 1, further comprising a mast, and wherein the rail system extends laterally from the mast.

5. The drill rig of claim 4, wherein the rail system comprises a pair of rails and a bridge extending between the rails, wherein the bridge is configured to move along the rails.

6. The drill rig of claim 5, wherein the hoist is arranged on the bridge and configured to move along the bridge.

7. The drill rig of claim 1, wherein the hoist comprises a hydraulic hoist or an electric hoist.

8. The drill rig of claim 1, wherein the hoist comprises a wireline and a pipe sling or pipe elevator.

9. The drill rig of claim 8, wherein the pipe sling or pipe elevator is configured to hoist two drill pipe sections simultaneously.

10. The drill rig of claim 1, further comprising an iron roughneck arranged on the drill floor for coupling drill pipe sections together to form drill pipe stands.

11. An offline standbuilding system for building drill pipe stands without interrupting drilling operations; the system comprising:

a hoist;

a rail system supporting the hoist; and

an offline mousehole.

12. The offline standbuilding system of claim 11, wherein the offline mousehole is a first offline mousehole, and the offline standbuilding system further comprises a second offline mousehole.

13. The offline standbuilding system of claim 11, wherein the rail system extends laterally from a drill rig mast.

14. The offline standbuilding system of claim 11, wherein the rail system comprises a pair of rails and a bridge extending between the rails, wherein the bridge is configured to move along the rails.

15. The offline standbuilding system of claim 14, wherein the hoist is arranged on the bridge and configured to move along the bridge.

16. The offline standbuilding system of claim 11, wherein the hoist comprises a wireline and a pipe sling or pipe elevator.

17. The offline standbuilding system of claim 11, further comprising an iron roughneck for coupling drill pipe sections together to form drill pipe stands.

18. A method of offline standbuilding, the method comprising:

arranging a first drill pipe section in a first mousehole;

arranging a second drill pipe section in a second mousehole;

aligning a third drill pipe section with the second drill pipe section;

coupling the third and second drill pipe sections together to form a double stand;

aligning the double stand with the first drill pipe section; and

coupling the double stand and the first drill pipe section together to form a triple stand.

19. The method of claim 18, wherein the steps of arranging the first drill pipe section in the first mousehole and arranging the second drill pipe section in the second mousehole are performed simultaneously with a hoist.

20. The method of claim 18, wherein the method is performed during drilling operations.

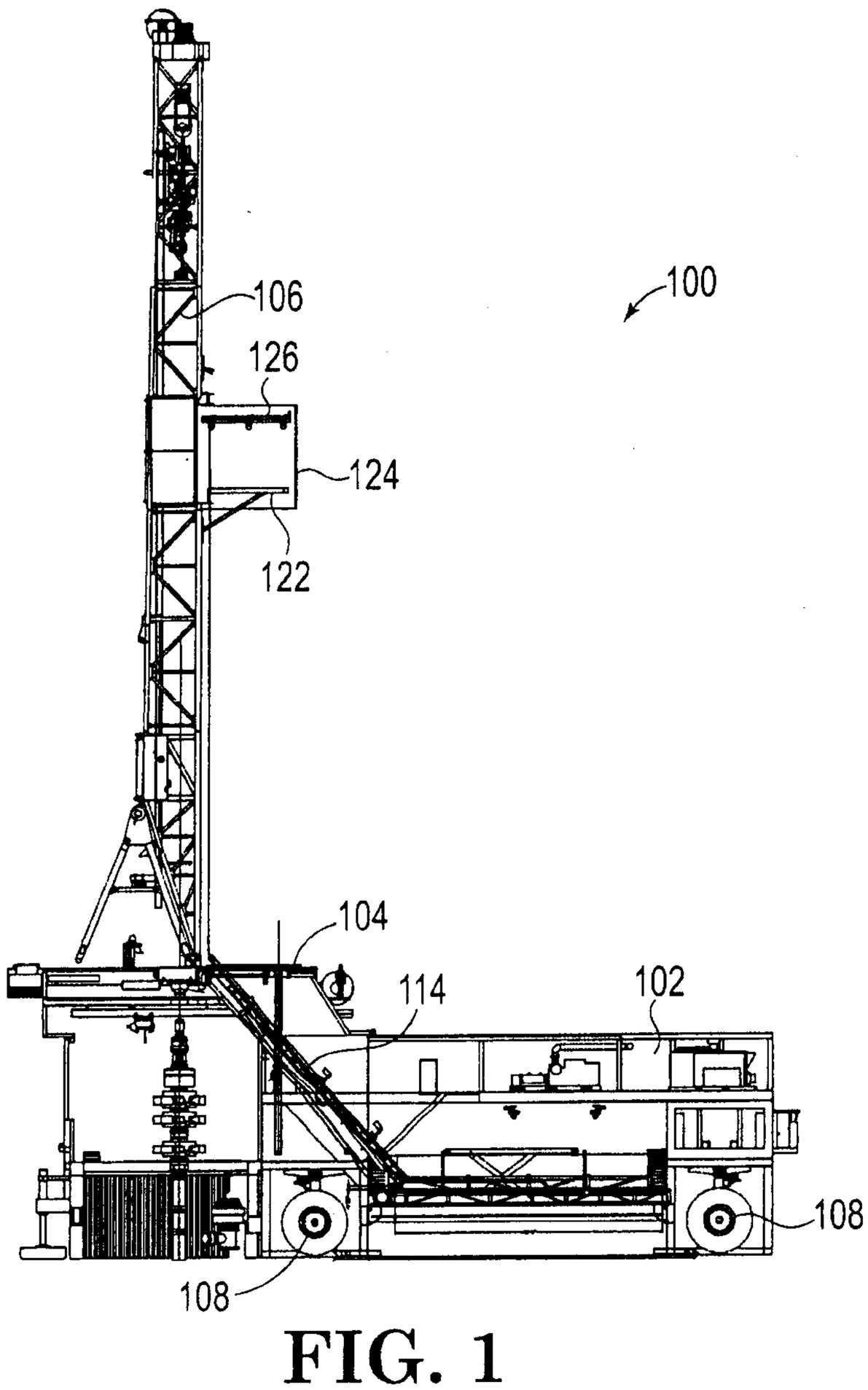

FIG. 1

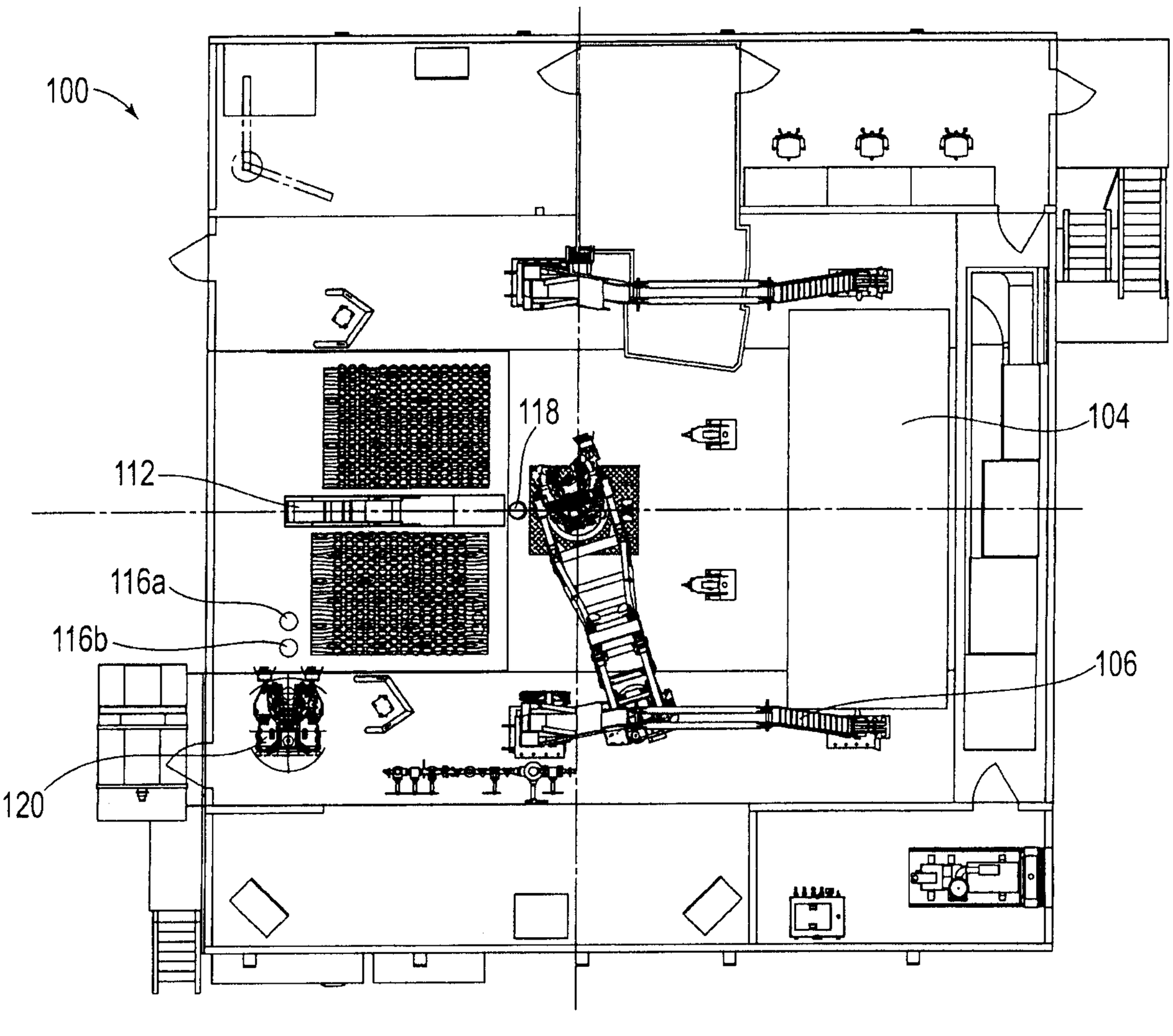

FIG. 2

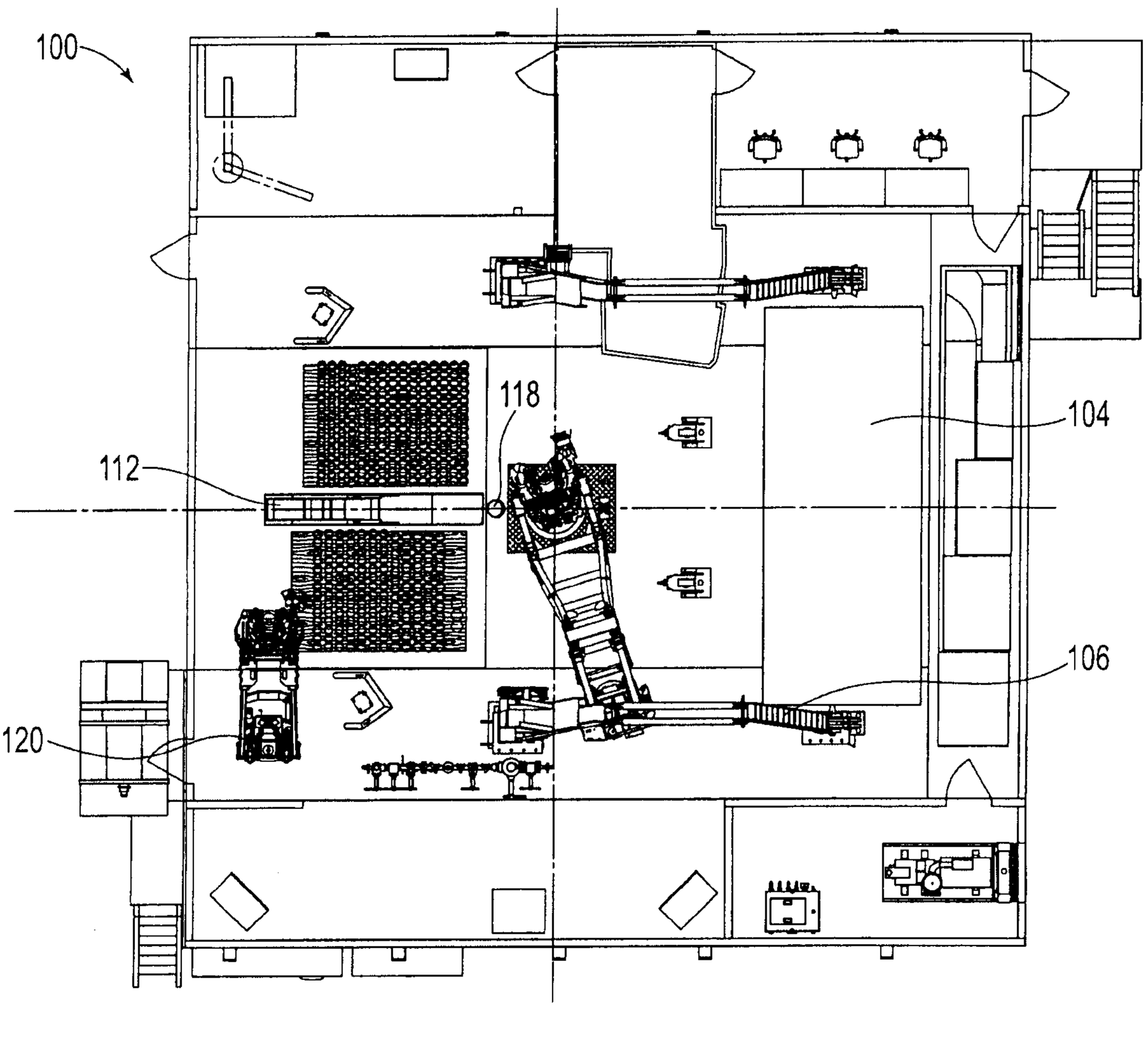

FIG. 3

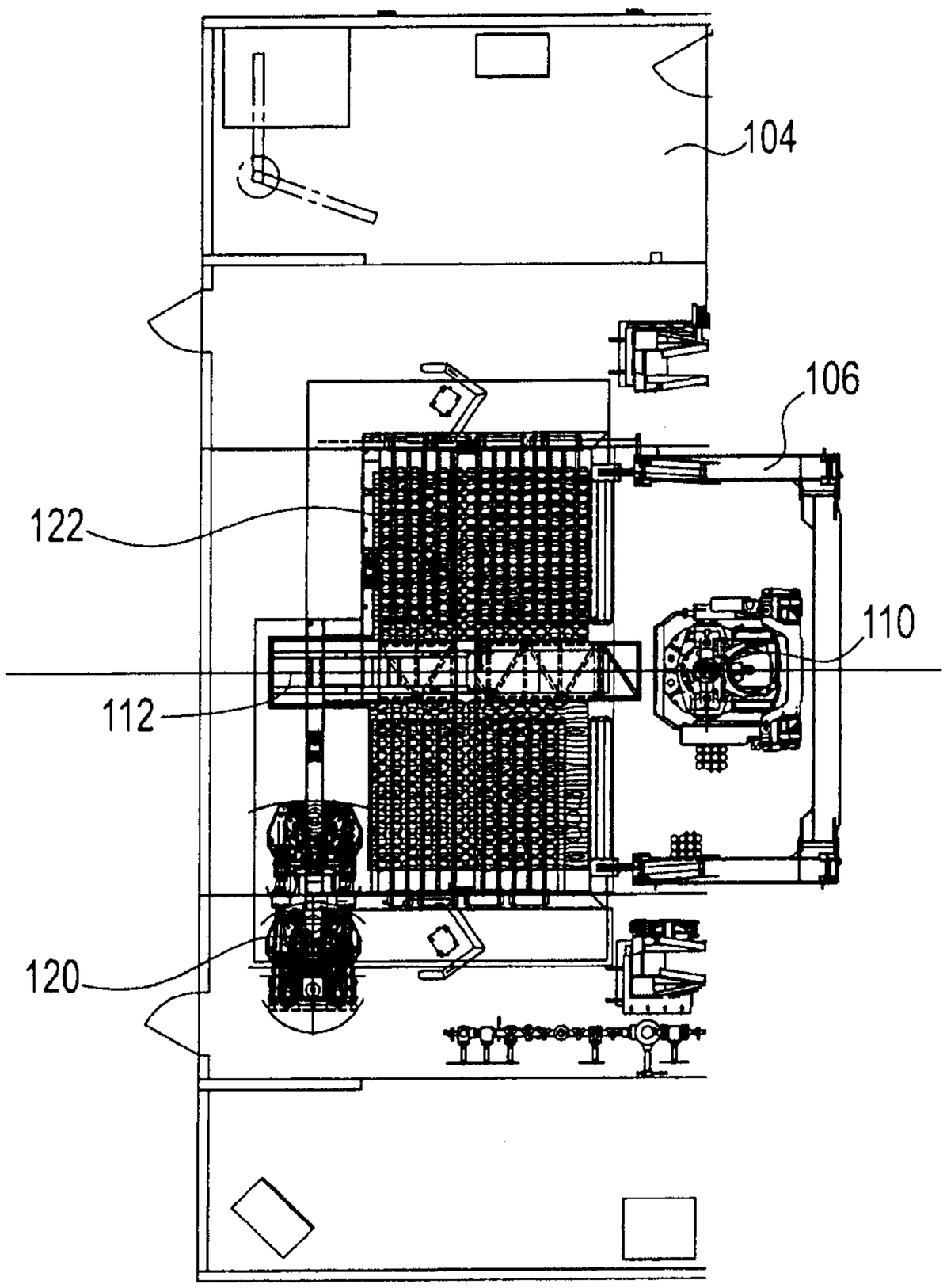

FIG. 4

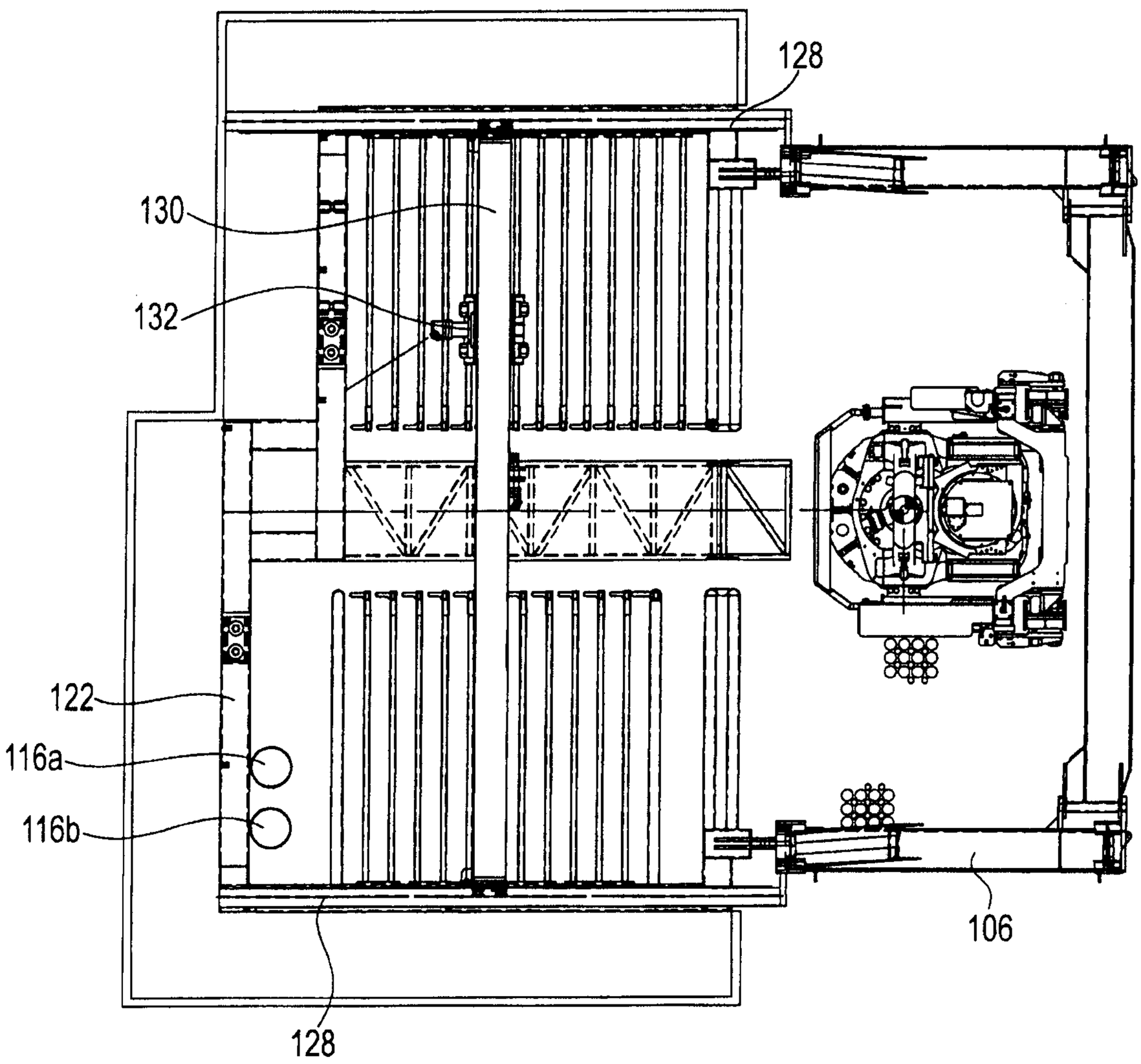

FIG. 5

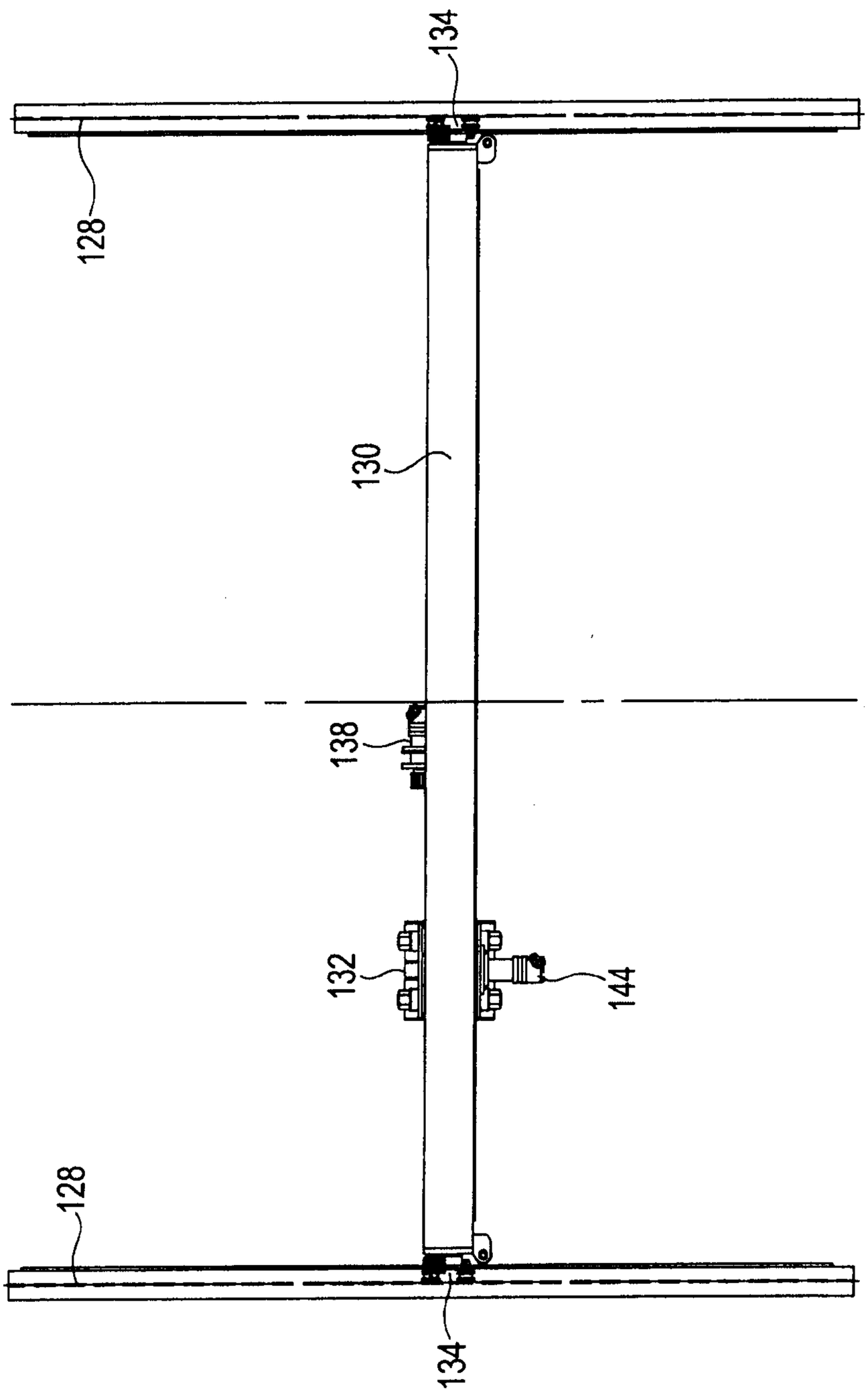

FIG. 6

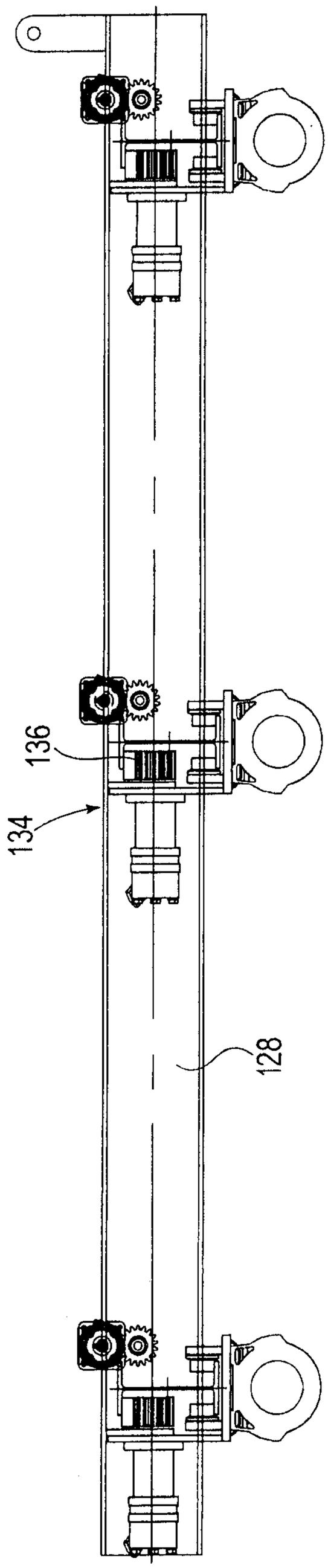

FIG. 7

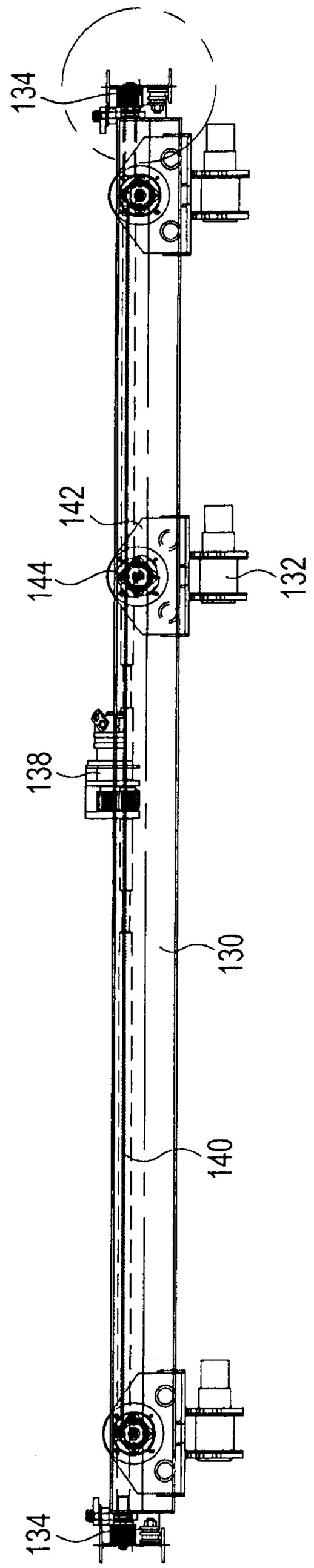

FIG. 8

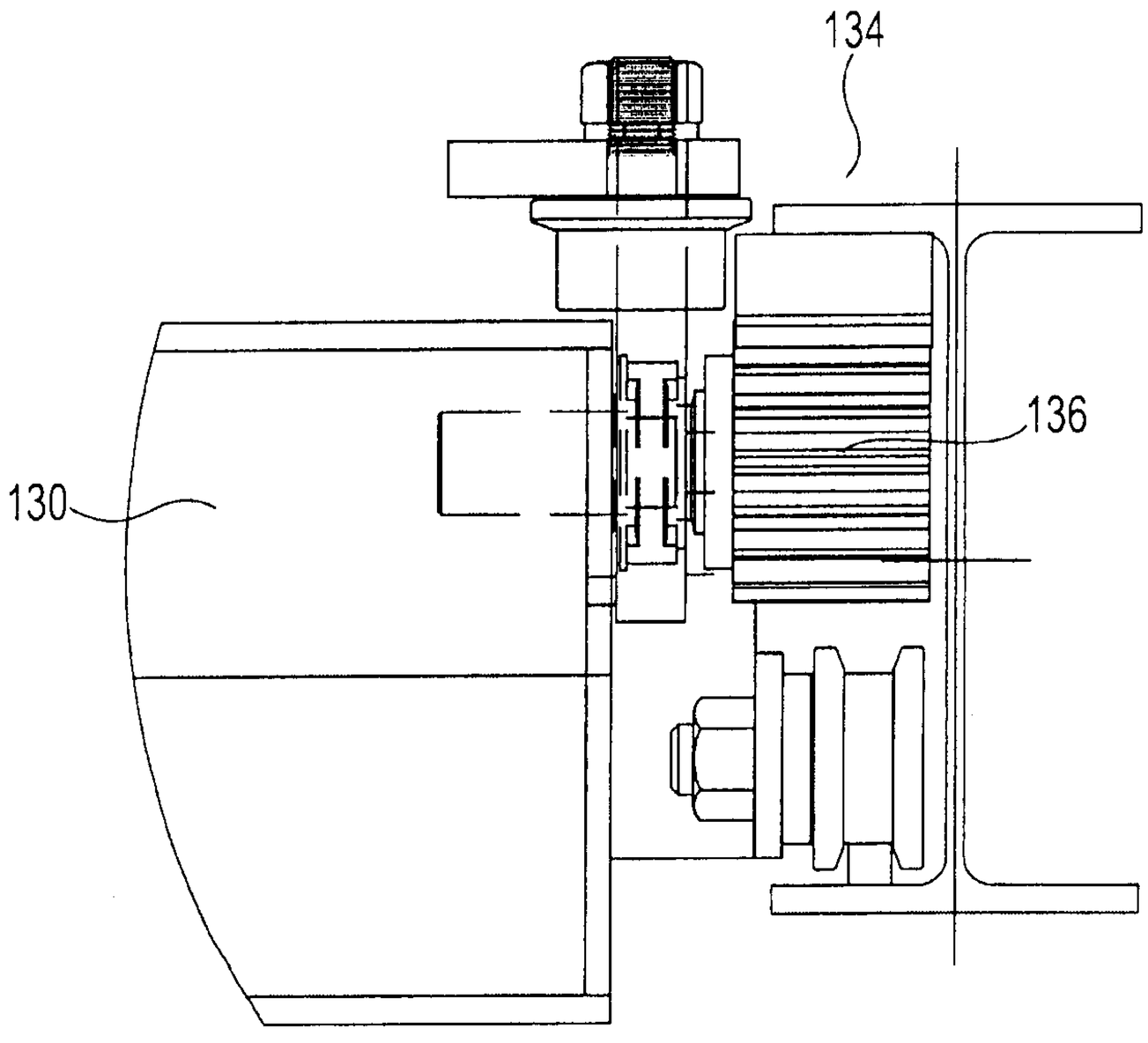

FIG. 9

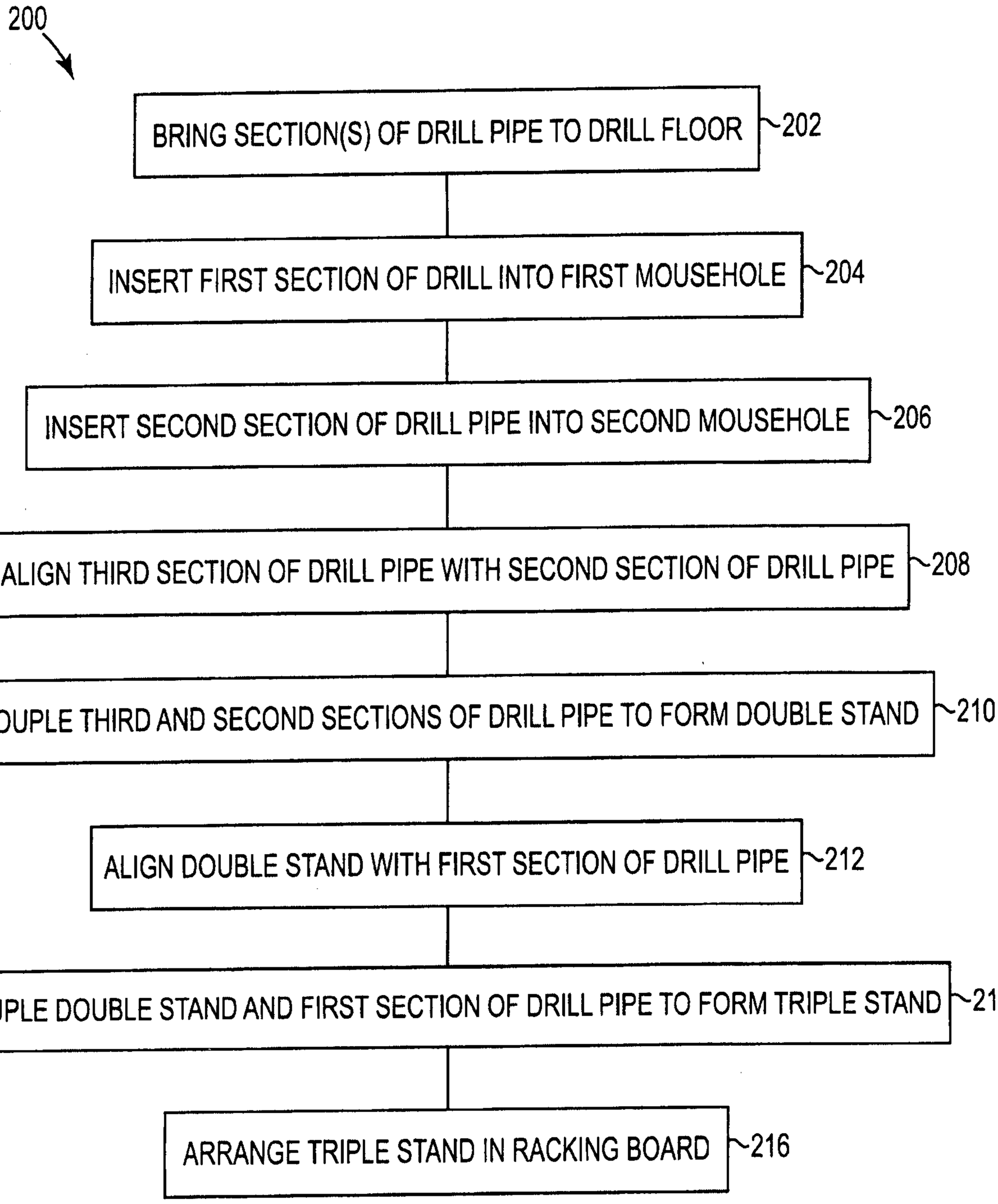
200
BRING SECTION(S) OF DRILL PIPE TO DRILL FLOOR
202
INSERT FIRST SECTION OF DRILL INTO FIRST MOUSEHOLE
204
INSERT SECOND SECTION OF DRILL PIPE INTO SECOND MOUSEHOLE
206
ALIGN THIRD SECTION OF DRILL PIPE WITH SECOND SECTION OF DRILL PIPE
208
COUPLE THIRD AND SECOND SECTIONS OF DRILL PIPE TO FORM DOUBLE STAND
210
ALIGN DOUBLE STAND WITH FIRST SECTION OF DRILL PIPE
212
COUPLE DOUBLE STAND AND FIRST SECTION OF DRILL PIPE TO FORM TRIPLE STAND
214
ARRANGE TRIPLE STAND IN RACKING BOARD
216

Fig. 10

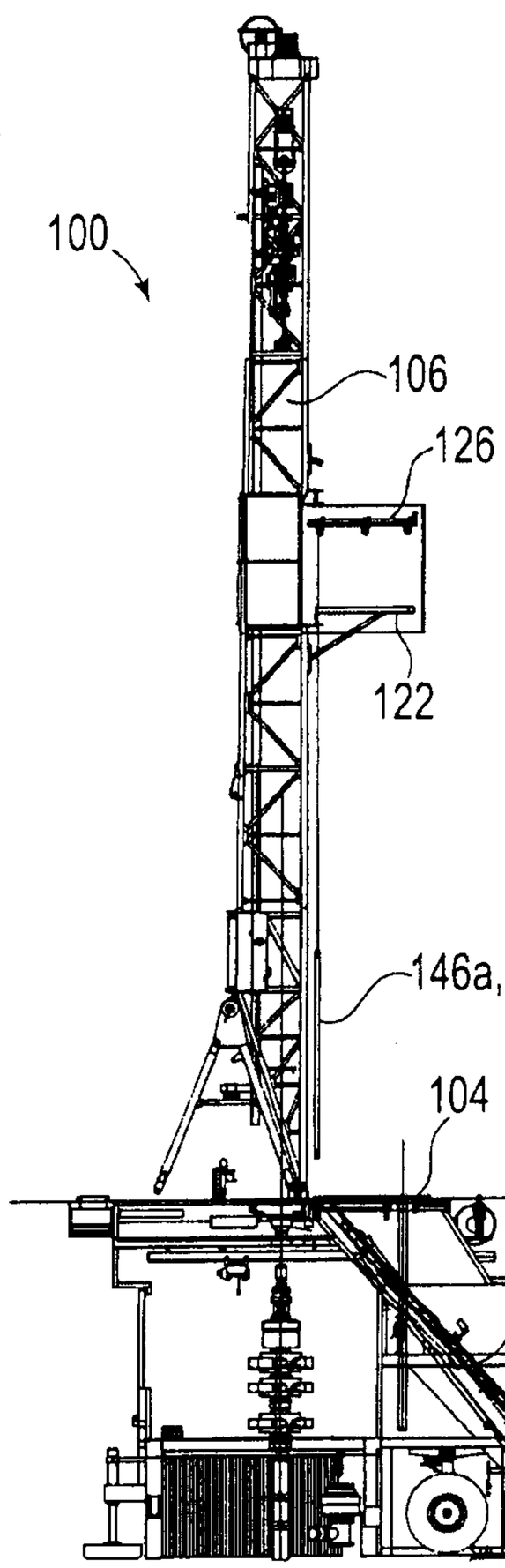

Fig. 11A

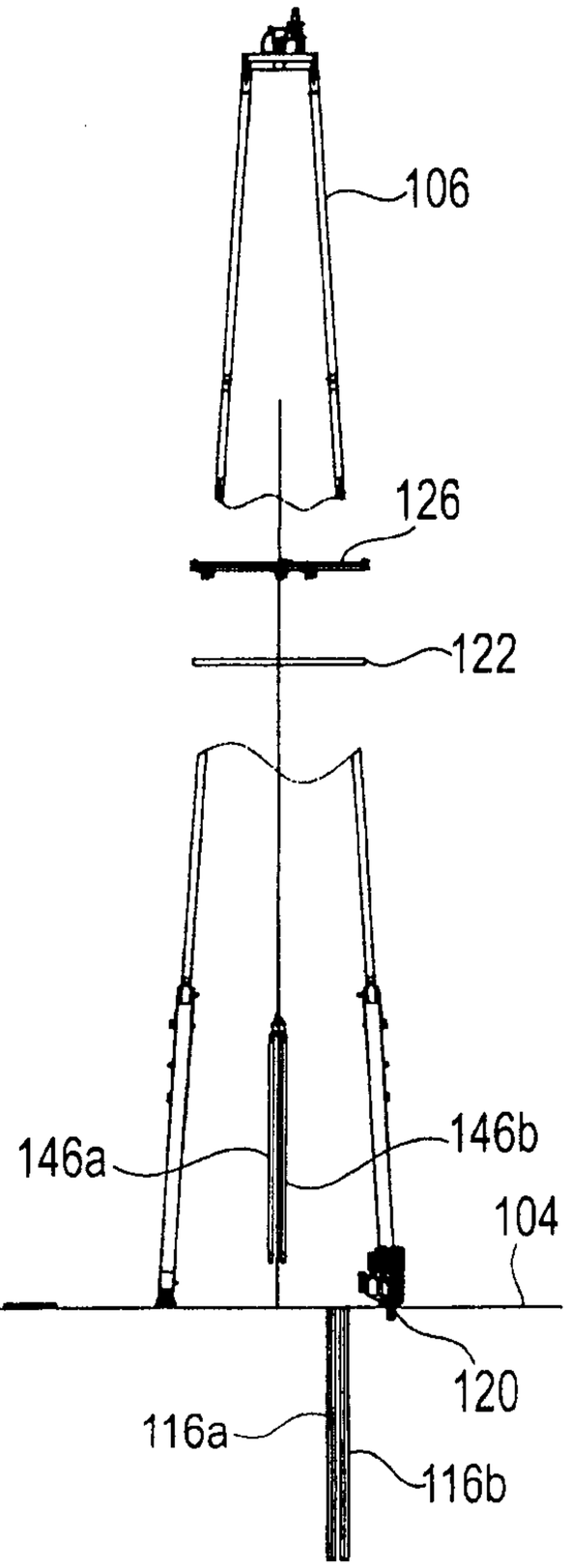

Fig. 11B

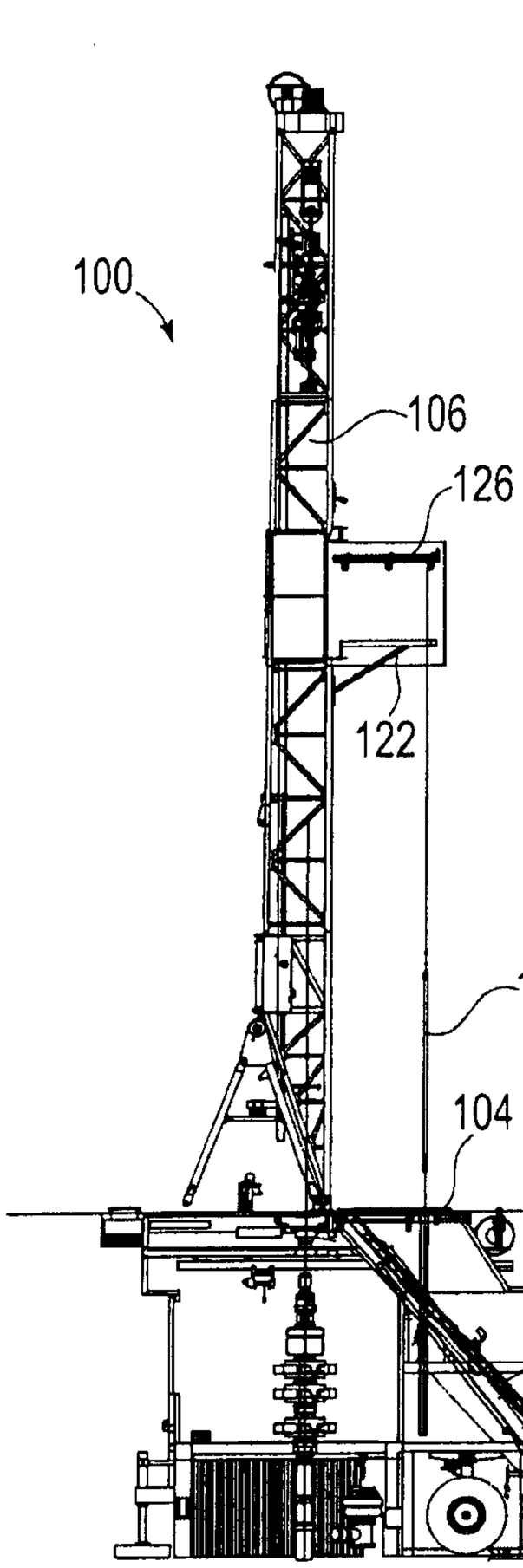

FIG. 12A

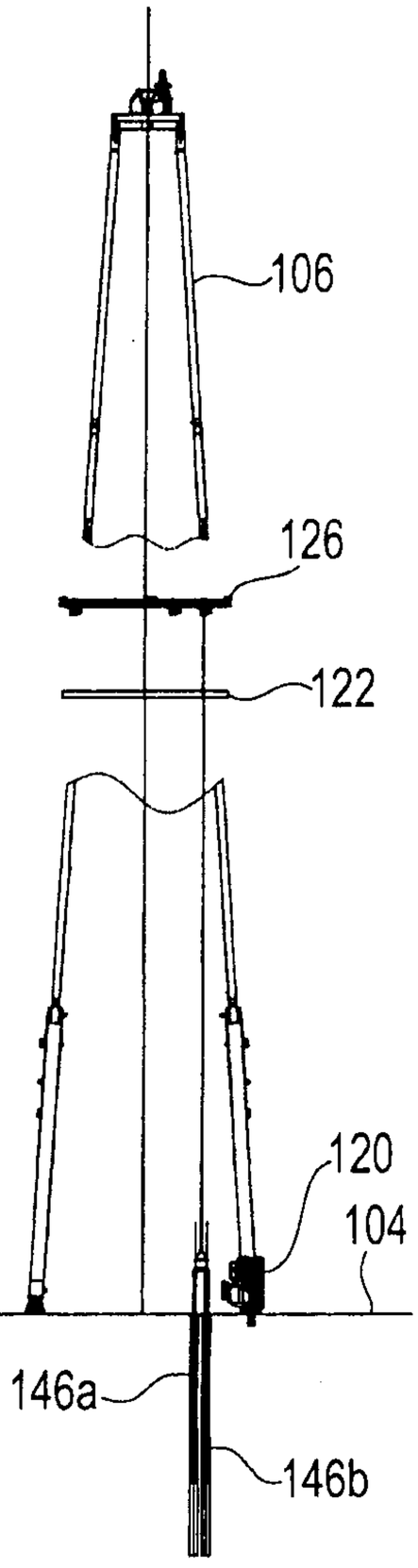

FIG. 12B

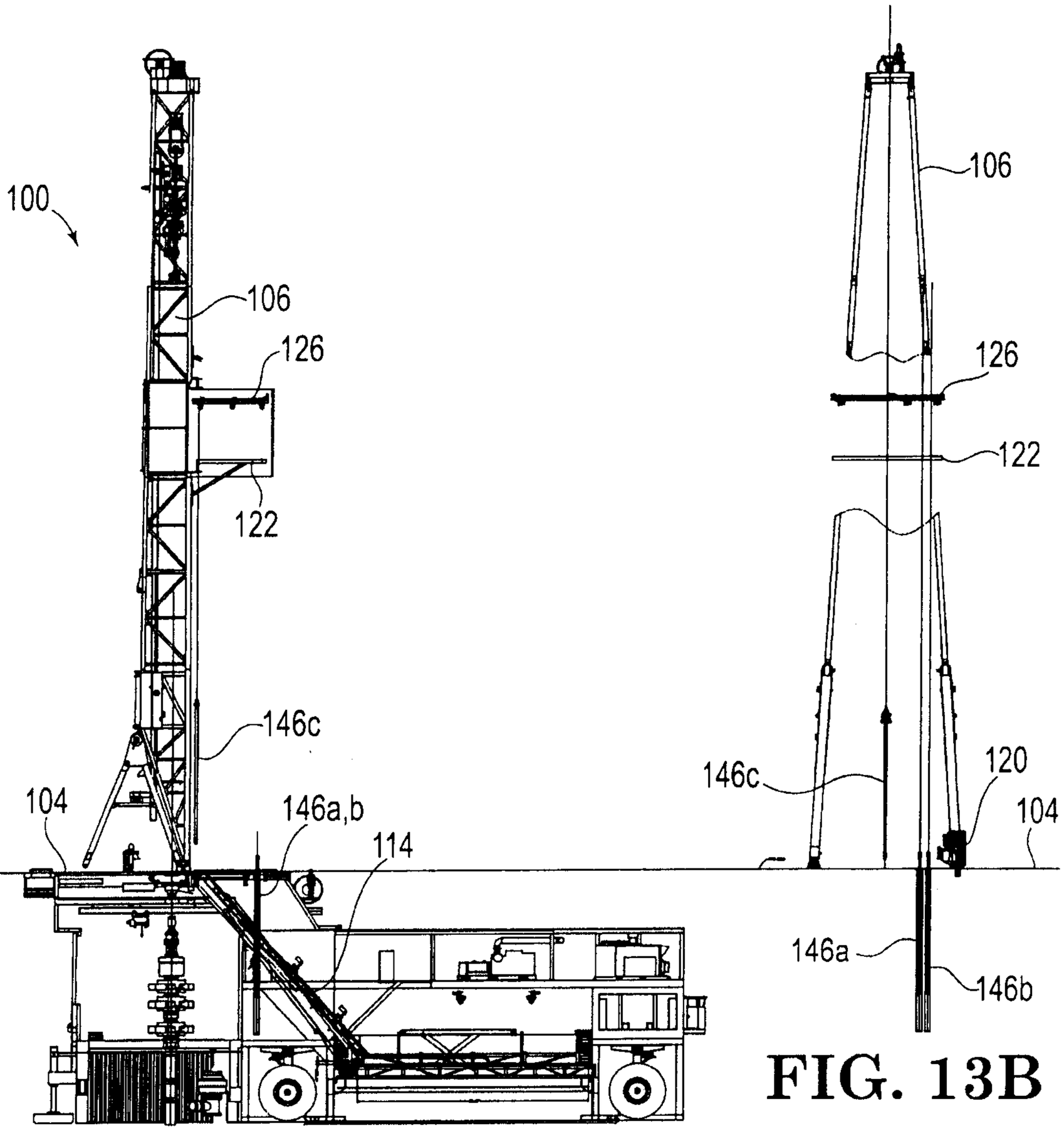

FIG. 13A

FIG. 13B

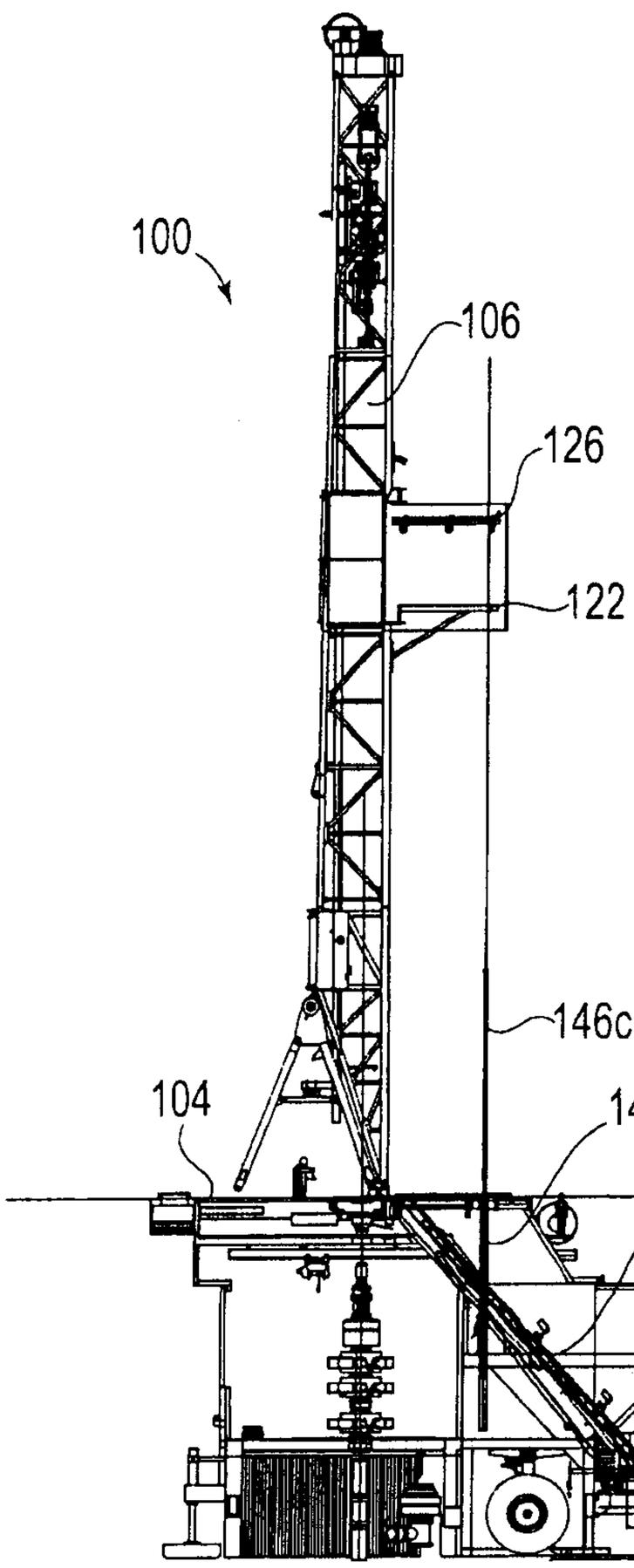

FIG. 14A

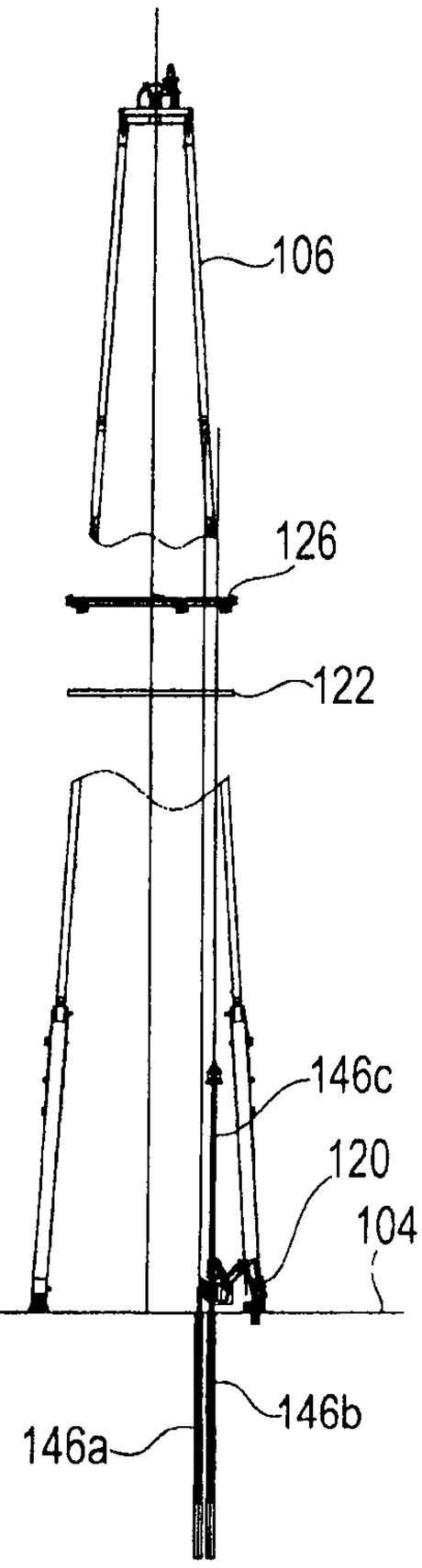

FIG. 14B

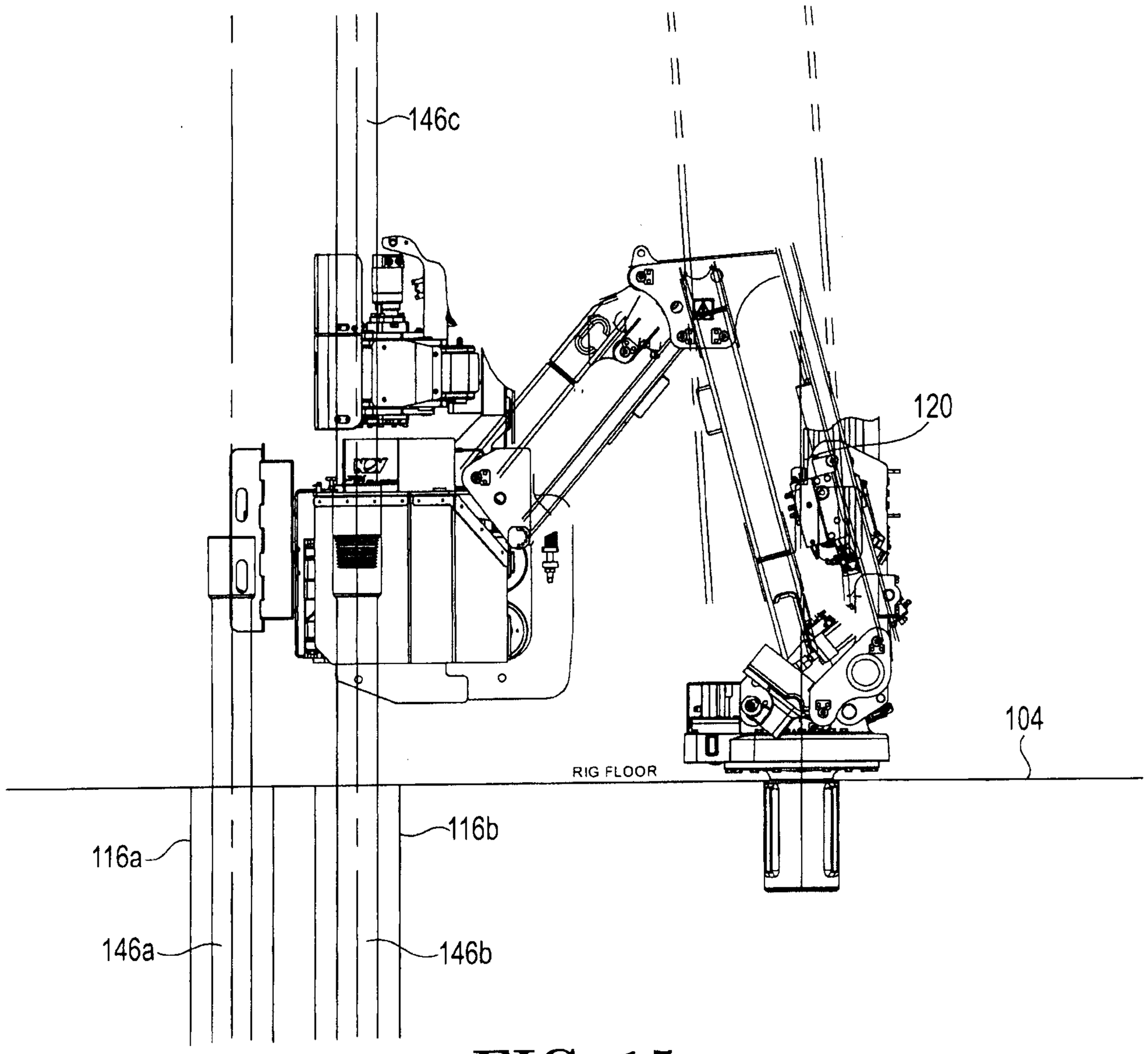

FIG. 15

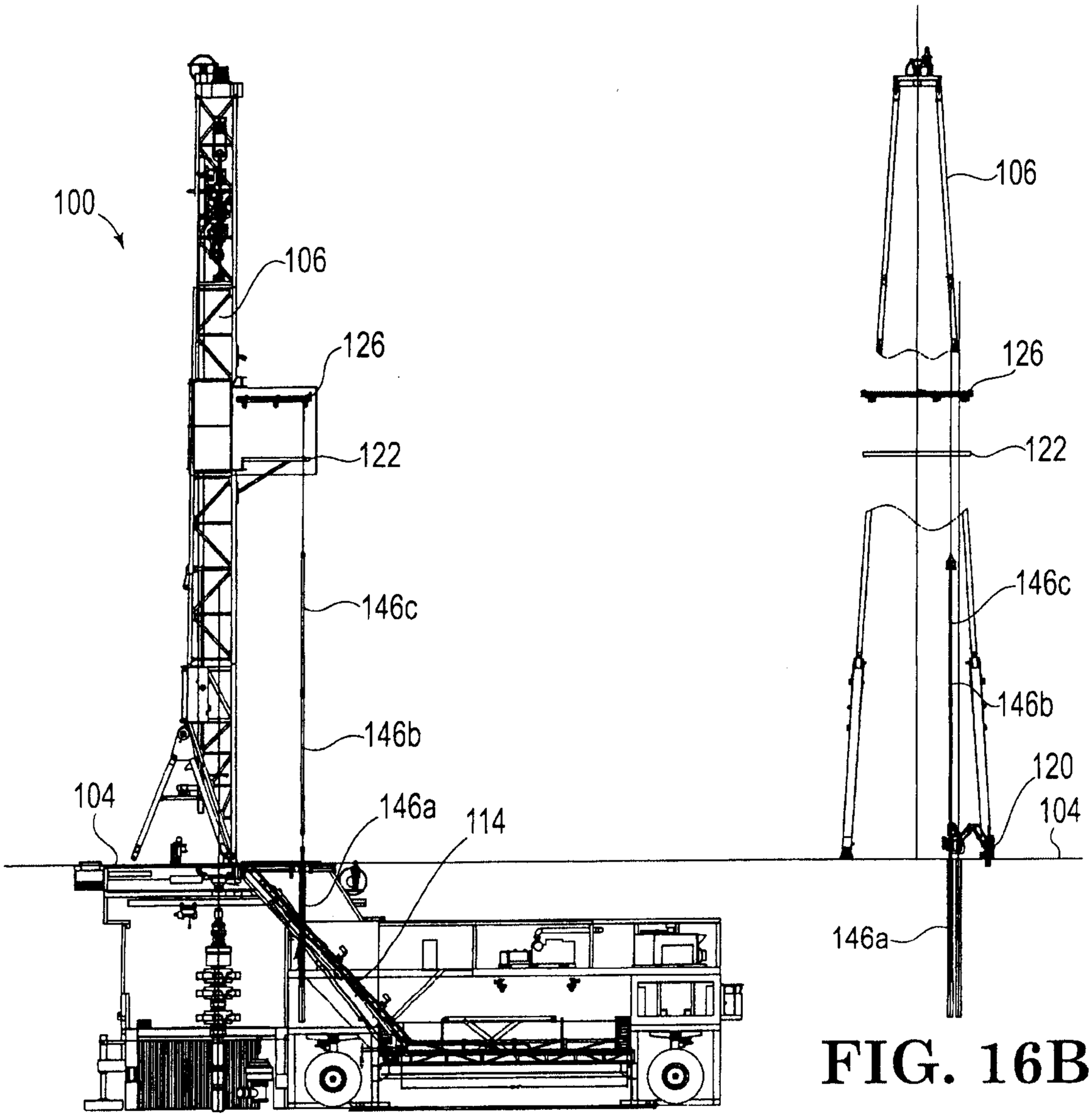

FIG. 16A

FIG. 16B

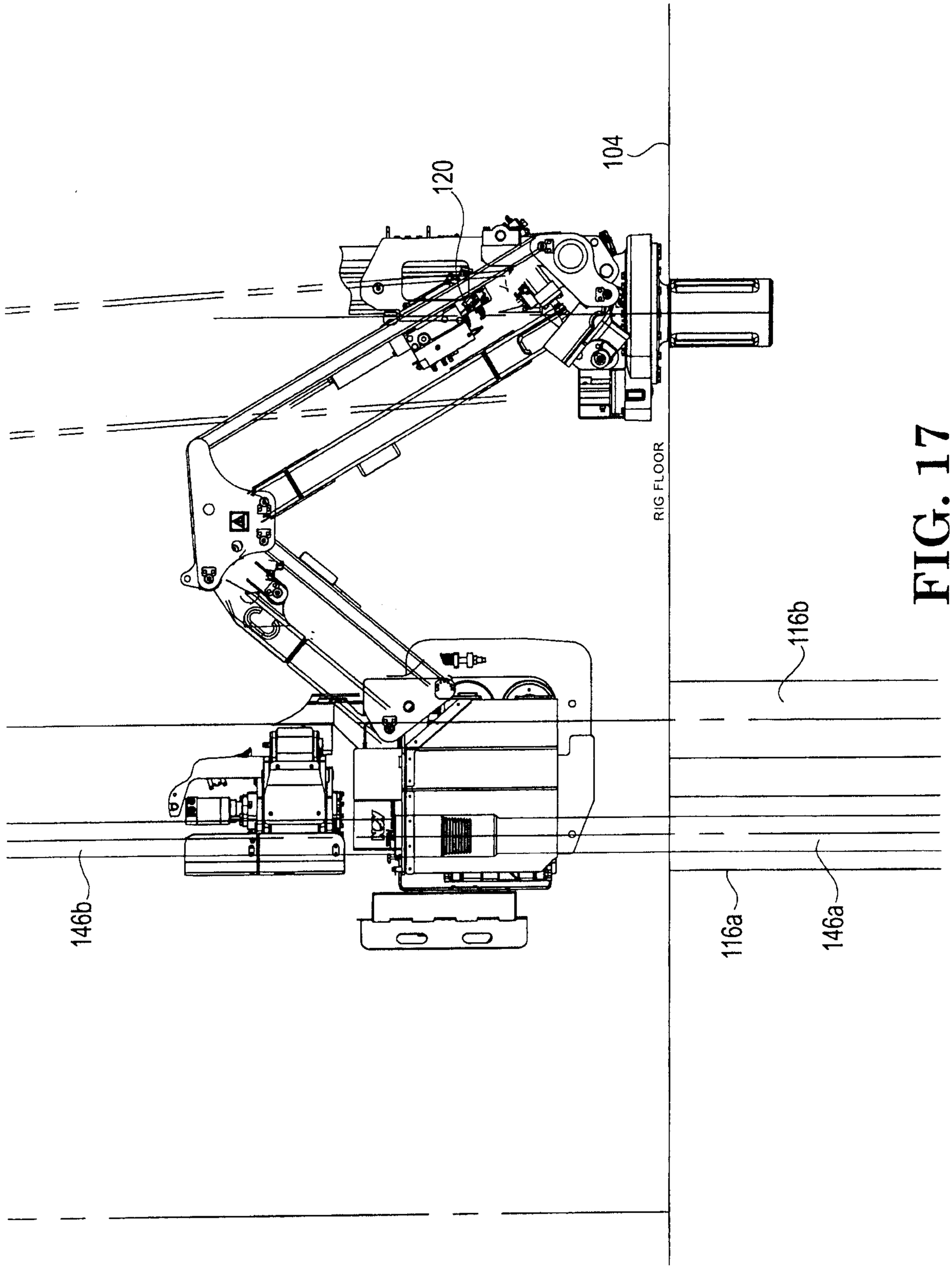

FIG. 17

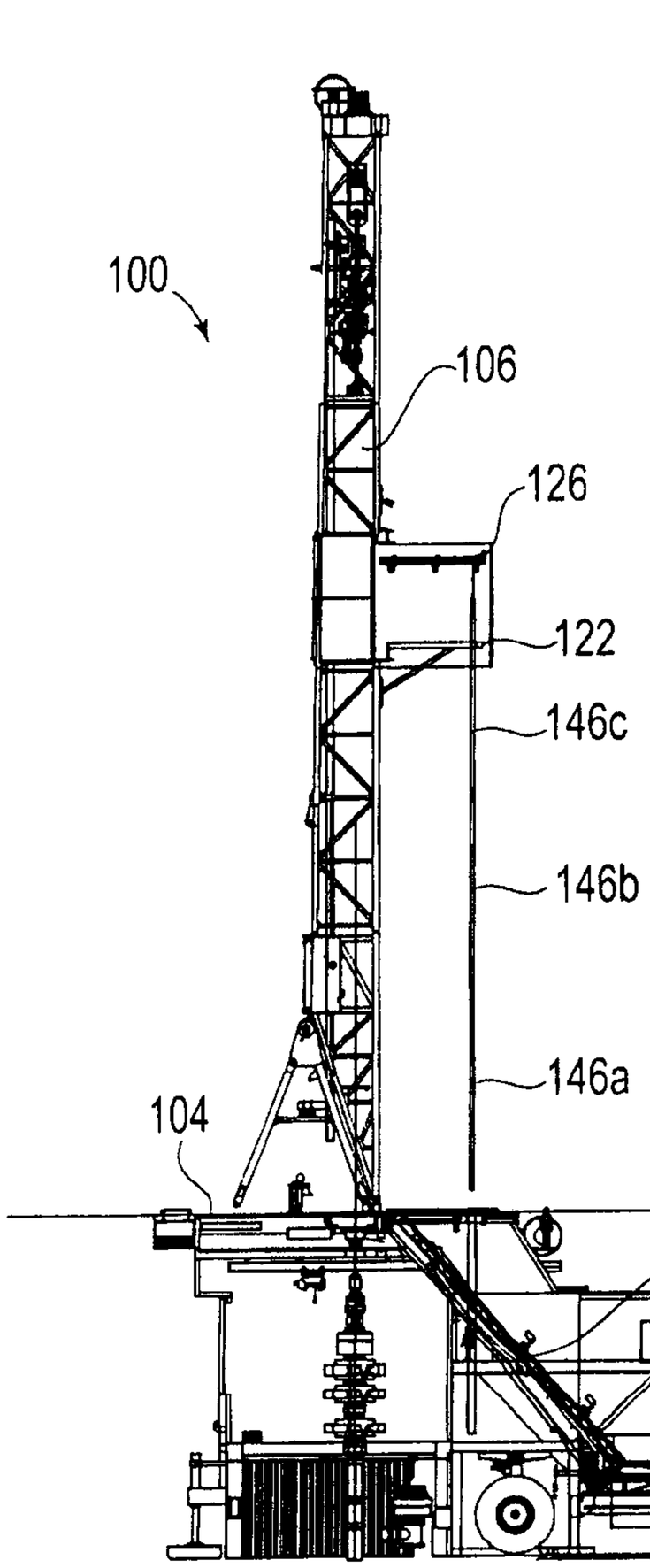

FIG. 18A

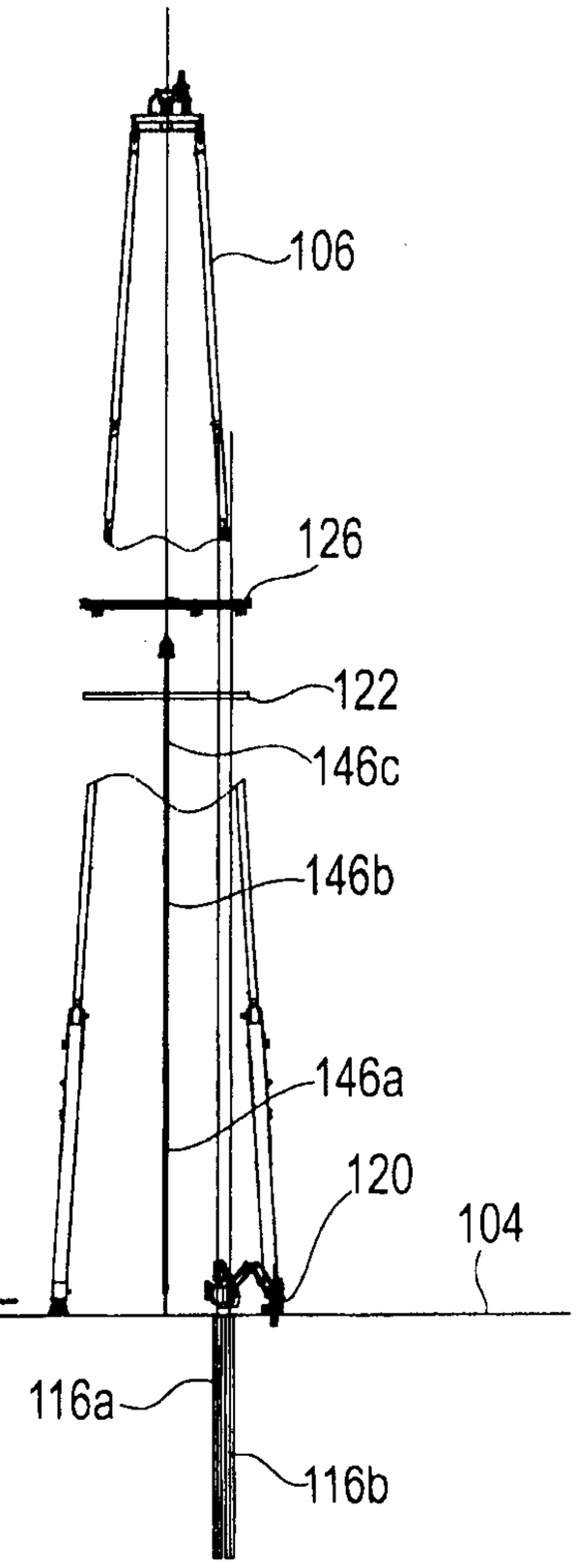

FIG. 18B

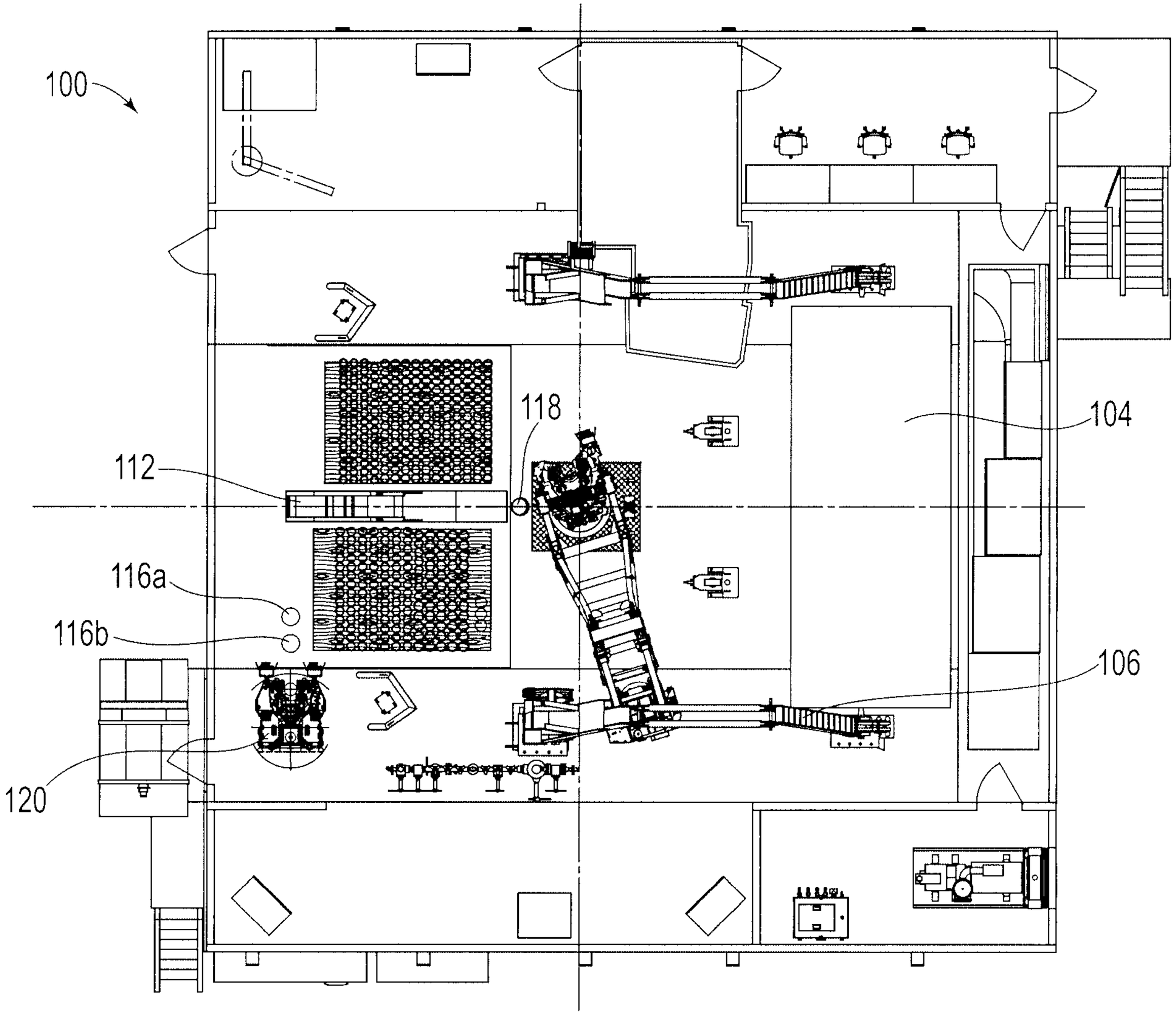

FIG. 2