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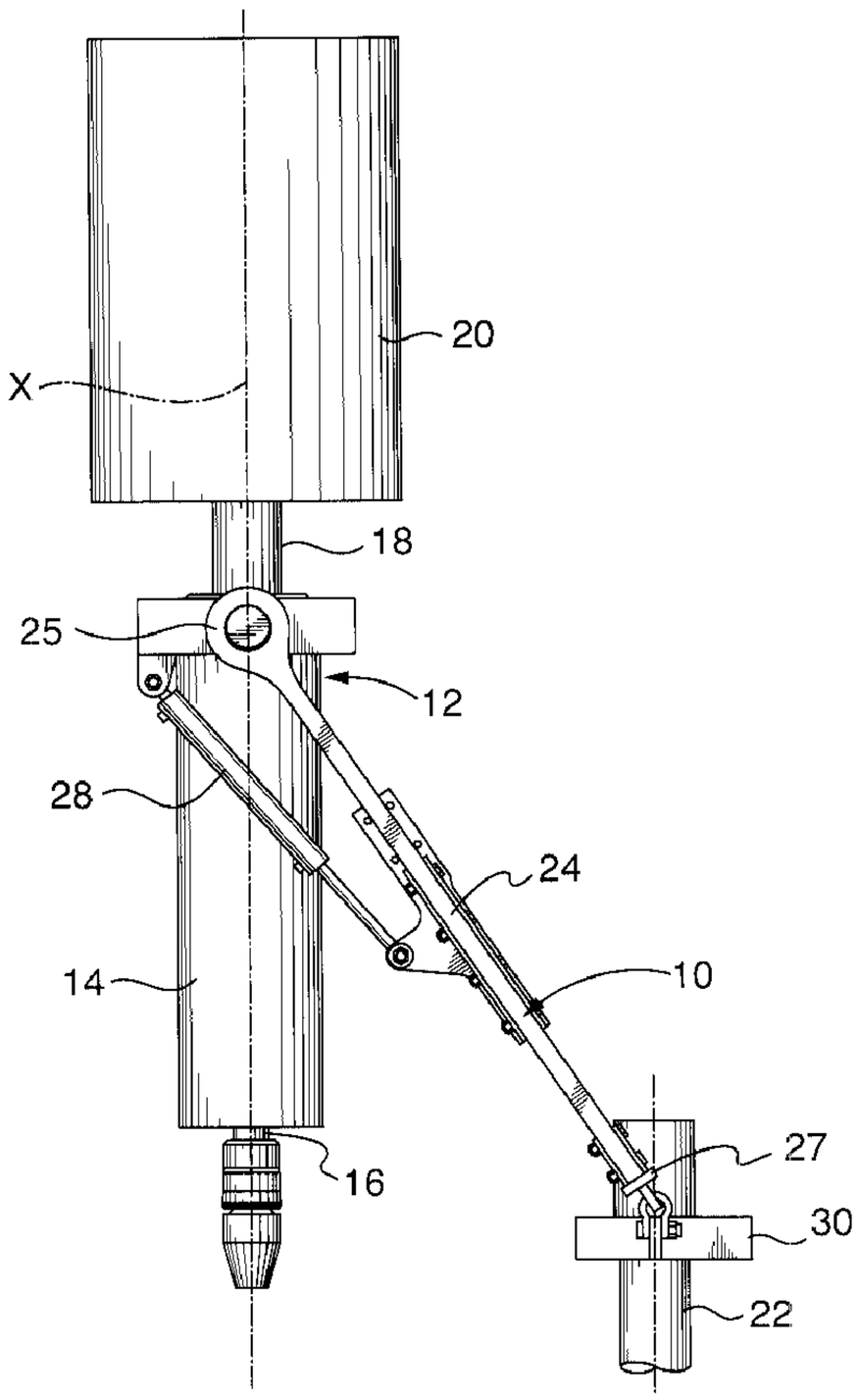

(57) Abrégé/Abstract:
A pipe handling device for mounting to use with a top drive and possibly a pipe engaging apparatus, includes a link arm having a first end pivotally connectable to move with the top drive and an outboard end pivotally connectable to a pipe elevator segment, and

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(57) Abrégé(suite)/Abstract(continued):
a drive system to drive the outboard end of the link arm at least between a lower position and a raised position. A pipe handling system and method are also described.

Abstract

A pipe handling device for mounting to use with a top drive and possibly a pipe engaging apparatus, includes a link arm having a first end pivotally connectable to move with the top drive and an outboard end pivotally connectable to a pipe elevator segment, and a drive system to drive the outboard end of the link arm at least between a lower position and a raised position. A pipe handling system and method are also described.

PIPE HANDLING DEVICE, METHOD AND SYSTEM

Field of the Invention

The invention relates to a pipe handling device, method and system and, in particular, a pipe handling device, method and system for a pipe joint used in drilling or lining a wellbore.

Background

A top drive can be used in a drilling rig for handling a pipe string during drilling or lining a wellbore. In some well operations, an engaging apparatus, including an internal or external pipe gripping mechanism, can be connected below the top drive to grip a joint of pipe, such as casing, so that the engaging apparatus and the joint of pipe can be driven axially and/or rotationally by the top drive. Some engaging apparatus for casing pipe are described in US Patent 6,311,792, issued November 2001 and International application WO00/05483, published February 2000, both to TESCO Corporation.

In a drilling rig, the top drive can be hung in the mast with the engaging apparatus connected in drive communication and in substantial axial alignment therebelow. The top drive and engaging apparatus are hung in the mast above the well center, the top drive and engaging apparatus define a main axis of the drilling rig that is aligned with well center. Joints of pipe, for connection into the drill or liner string, can be supported, for example in a V-door, adjacent the main axis of the drilling rig. For connection into the drill or liner string, the pipe joints can be engaged by an elevator and brought under the drive system for engagement and handling. Generally, the elevator is supported on link arms suspended from the top drive or cables extending from the top drive link arms.

To pick up a pipe joint, the top drive is lowered to permit the elevator, either on conventional link arms or with the cables attached to the link arms, to be manually moved over and engaged about a pipe joint on the V-door. The top drive is then hoisted to pull

the pipe joint off the V-door. Once free of the V-door, the pipe joint can be swung by gravity under the engaging apparatus so that the gripping mechanism can engage the pipe joint.

Summary

A pipe handling device and system are disclosed for handling a pipe for use in drilling and/or lining a wellbore.

In accordance with one aspect of the present invention, a pipe handling device for mounting to move with a top drive, the pipe handling device comprising a link arm having a first end and an outboard end, the first end being mounted to a support surface, moveable with the top drive, by a pivotal connection such that the link arm is rotatable in a plane about the pivotal connection at least between a lower position and a raised position and is substantially stabilized against lateral movement out of the plane when in the lower position and the outboard end of the link arm being connectable to a pipe elevator segment and positioned to grip a pipe and present the pipe to be engaged for movement with the top drive and a drive system to drive the link arm about its pivotal connection.

In accordance with another aspect of the present invention, a pipe handling device for mounting onto a pipe engaging apparatus is provided, the pipe engaging apparatus including a main body and a pipe gripping mechanism to grip a pipe for rotational and axial movement thereof and being connectable to a top drive, the pipe handling device comprising: a link arm having a first end pivotally connectable to the pipe engaging apparatus and an outboard end pivotally connectable to a pipe elevator segment, the link arm being sized to present the pipe into a position to be gripped by the pipe engaging apparatus and a drive system to drive the outboard end the link arm out from the pipe engaging apparatus.

In accordance with another aspect of the present invention there is provided a pipe handling system comprising: a pipe engaging apparatus for gripping a pipe joint and having a main body including an upper end for drive connection to a top drive and a pipe gripping mechanism, a link arm including a pivotal connection to the pipe engaging apparatus main body and an outboard end and the link arm being elongate to extend to a position below the pipe gripping mechanism and a link arm drive system for driving the link arm about its pivotal connection.

In accordance with another broad aspect of the present invention, there is provided a method for handling pipe in a rig, the rig including a top drive with a pipe engaging apparatus secured therebelow and a link arm on the pipe engaging apparatus and driven to pivot relative to the pipe engaging apparatus, the method comprising: using the link arm to pick up a pipe from a pipe supply, hoisting the top drive in the rig such that the pipe is rotated to a substantially vertical position while remaining engaged by the link arms, positioning a lower end of the pipe onto a joint positioned in the rotary table such that the pipe is supported thereby, slidably holding an upper portion of the pipe with the link arm and lowering the top drive until the upper portion of the pipe is engaged by the pipe engaging apparatus.

In accordance with another broad aspect of the present invention, there is provided a method for handling pipe in a rig, the rig including a top drive with a pipe engaging apparatus secured therebelow to define a main axis of the rig, the method including: providing a link arm mounted by a pivotal connection to move with the top drive, the link arm driven to pivot about its pivotal connection through a plane of rotation at least between a lowered position and a raised position and substantially stabilized when in the lowered position against moving out of the plane of rotation, using the link arm to pick up a pipe from a pipe supply, hoisting the top drive in the rig such that the pipe is rotated to a substantially vertical position while remaining engaged by the link arm, positioning a lower end of the pipe section onto a joint positioned in the rotary table such that the pipe is supported thereby, slidably holding an upper portion of the pipe with the link arm and

lowering the top drive until the upper portion of the pipe is engaged by the pipe engaging apparatus.

Brief Description of the Drawings

A further, detailed, description of the invention, briefly described above, will follow by reference to the following drawings of specific embodiments of the invention. These drawings depict only typical embodiments of the invention and are therefore not to be considered limiting of its scope. In the drawings:

Figure 1 is a schematic side view of one embodiment of a pipe handling device mounted on a support surface and carrying a pipe elevator.

Figure 2a and 2b are front and side elevations, respectively, of a pipe handling system.

Figure 2c is a side elevation corresponding to Figure 2b, but with the link arms extended.

Figure 3 is a front elevation of another embodiment of a pipe handling system.

Figure 4 is an exploded view of an embodiment of a pipe handling system.

Detailed Description

In one embodiment, a pipe handling device can include a link arm having a first end and an outboard end, the first end of the link arm being mounted to a support surface by a pivotal connection such that the link arm is rotatable in a plane about the pivotal connection at least between a lower position and a raised position and is substantially stabilized against lateral movement out of the plane when in the lower position. The outboard end of the link arm can be connectable to a pipe elevator segment. The pipe handling device can further include a drive system to drive the link arm about its pivotal connection. The support surface can be moveable with the top drive and can, for

example, be a portion of a top drive or a pipe engaging apparatus or another surface connected in some way to move with the top drive.

The link arm can be substantially stabilized in a number of ways to permit it to tend to remain in its plane of rotation. In one embodiment, the pivotal connection can include an axle shaft, with a long axis, and a support to retain the link arm to rotate in a plane substantially orthogonal to the long axis of the axle shaft. In another embodiment, guides can be provided into which the link arm can enter when in the lower position, the guides being formed to hold the arm against lateral movement. In another embodiment, the link arms or the support surface can include spacers to maintain at least a selected spacing therebetween, thereby stabilizing the link arms to tend to remain in their plane of rotation when in the lower position. This substantial stabilization of the link arm can provide lateral support link arms to maintain them in a parallel plane to the rig axis and, thereby to provide lateral support to a pipe joint gripped by the pipe handling device facilitating alignment of the gripped pipe with the pipe engaging apparatus.

In another embodiment, a pipe handling device for mounting onto a pipe engaging apparatus can be provided. The pipe engaging apparatus can be one including a main body and pipe gripping members and can be connectable to a top drive. The pipe handling device can include a link arm having a first end pivotally connectable to the pipe engaging apparatus and an outboard end pivotally connectable to a pipe elevator segment, and a drive system to drive the outboard end of the link arm out from the pipe engaging apparatus.

A pipe handling device 10 is shown in Figure 1. The illustrated pipe handling device can be mounted onto a pipe engaging apparatus 12 including a main body 14 and pipe gripping members 16. The pipe engaging apparatus can be connectable, directly or indirectly, at its upper end 18 to a top drive 20. The pipe engaging apparatus can be selected to grip, through pipe gripping members 16, a pipe 22 for rotational and/or axial movement thereof, as driven by top drive 20.

Pipe handling device 10, when mounted to move with a top drive such as, for example, in association with a pipe engaging apparatus 12, can be used to bring a pipe from a pipe supply into a position for engagement by the pipe engaging apparatus, for example substantially into the rig main axis x above hole center.

Pipe handling device 10 can include one or more link arms. In the illustrated embodiment, device 10 includes a first link arm 24 and a second link arm (cannot be seen). The first and second link arms can each include a first end 25 pivotally connectable to the main body of the pipe engaging apparatus and an outboard end 27. The pipe handling device further can include a drive system 28 to drive outboard ends 27 of the first link arm and the second link arm in substantial unison relative to pipe engaging apparatus 12 using the pivotal movement permitted by first ends 25. Outboard ends 27 can be connected to a pipe elevator 30 for engaging pipe 22. As such, when outboard ends 27 are driven out relative to the main body, the pipe elevator can be moved out, for example to be engaged about a pipe from a pipe supply.

Outboard ends 27 can be distanced from first ends 25 a distance to permit the pipe elevator to be brought into the rig main axis below the pipe engaging apparatus. While first link arm 24 are shown as members of fixed length, in another embodiment, these arms can each be formed of telescoping members permitting selection of the length of the link arms. The telescoping members can be driven manually or automatically, such as by hydraulics. In an automatic embodiment, link arms can be driven to pull or push, if desired, a pipe engaged thereon, for example, to facilitate conveying or positioning the pipe.

Elevator 30 can be manually actuable to be secured about or release a pipe. Alternately, the elevator can be mechanized to be automatically openable/closable by a tool operator, who, for example, can be positioned remote from the elevator. The automatic actuation of the elevator can be provided, for example, by hydraulics acting between the elevator parts.

Referring to Figures 2, a pipe handling system is shown including a pipe handling device 10a and a pipe engaging apparatus 12a including a main body 14a and a housing 32 carrying, for example, inwardly directed grapples, which can't be seen in this drawing, formed to engage about the outer surface of a pipe, such as a section of casing 33, to be gripped. The pipe engaging apparatus can, for example, include a stabbing guide 34 and packer arrangement 35 for insertion into the inner diameter of the pipe to be gripped. Pipe engaging apparatus 12a can be, for example, an external casing drive assembly as is available from TESCO Corporation.

The pipe engaging apparatus can be formed at its upper end 18a as a pin for connection to a top drive, indicated in part at 20. The pipe engaging apparatus can be selected to grip, through the grapples, section of casing 33, for rotational and/or axial movement thereof, as driven by the top drive. The section of casing can be one or more joints of casing to be added to or removed from a casing string for drilling or lining a wellbore, the section of casing can include couplers and/or other internally or externally connected tools or devices.

Pipe handling device 10a can be used to bring section of casing 33 from a pipe supply into a position for engagement by pipe engaging apparatus 12a.

Pipe handling device 10a can include a first link arm 24a and a second link arm 26a. The first and second link arms can each include a first end 25a pivotally connectable to the main body of the pipe engaging apparatus and an outboard end 27a.

The pipe handling device further can include a drive system 28a, including, for example, hydraulic cylinders, air cylinders, screw drives, gear drives etc., to drive outboard ends 25a of the first link arm and the second link arm relative to pipe engaging apparatus 12a, as permitted by the pivotal connections at first ends 25a. Outboard ends 27a can be connected to a pipe elevator 30a for engaging casing section 33. As such, when outboard ends 27a are driven out relative to the main body, the pipe elevator can be moved out to

pick up the casing section from, or move the casing section to, a V-door or other pipe supply (not shown).

The outboard ends can include or have secured thereto an apertured block 36 for accepting a clevis link 38 for connection to the elevator. Thus pivotal movement is permitted at this connection and elevators can be changed out to correspond to the pipe outer diameter to be handled.

The link arms can be formed as telescoping parts for length adjustment. For example, the link arms can each include a first section and a second section connected by a sleeve or channel section including alignable apertures 40 in the sections and the sleeve for pinning therethrough to lock the link arm length.

The pivotal connection at first end can be selected to tend to hold the link arms from lateral movement, maintaining rotation of the link arms in planes parallel to each other. In one embodiment, the connection holds the link arms equidistant from the drilling rig main axis x, which passes through the long axis of the pipe gripping apparatus. These features of the pipe handling device can facilitate connection of the pipe engaging apparatus to the casing, by holding the casing aligned and stationary with the pipe engaging apparatus.

In one embodiment, the link arms can be positioned on either side of the pipe gripping apparatus and in a plane passing through the long axis of the pipe gripping apparatus and the link arms.

In operation, the pipe handling system components including, pipe engaging apparatus 12a and elevator 30a, can be selected for the pipe size to be handled. The pipe handling system is assembled and pin end 18a can be installed on the bottom of a top drive in a rig. To pick up a section of casing, the top drive is lowered to move the pipe handling system down toward the rig floor. Link arms 24a, 26a are then rotated out (Figure 2b), by drive system 28a (as controlled by, for example, a tool operator) toward a casing section 33

supported in the V-door. A person on the rig floor connects elevator 30a about casing section 33 so that elevator can catch on its upset. Alternately, where the elevator is mechanized, the elevator can be remotely connected about the casing section, without requiring handling by a rig hand. Drive system 28a can be used to facilitate positioning of the link arms and the elevator, for example, to minimize efforts required by rig floor personnel.

The top drive is then hoisted in the rig and carries the pipe handling system with it. When moving up, drive system 28a can be disengaged so that the link arms are free to pivot about their upper ends 25a, as driven by their weight and the weight of the casing section supported in elevator 30a.

Once the casing section is clear of the V-door it will hang in the elevator and can be positioned over the well center (Figures 2a, 2b) and set down in the stump of pipe string supported on the rig floor. Once the casing section is located and supported in the stump at hole center, the top drive can be lowered. This will bring the pipe engaging apparatus down onto or into the casing section upper end so that the grapples can be driven into engagement with it. If necessary to facilitate alignment and engagement, drive system 28a can be driven to bring or maintain the casing section into alignment with stabbing guide 34 of the pipe engaging apparatus. When the casing section is supported in the stump and the top drive is lowered, elevator 30a slides down away from the upset, but continues to hold and remains connected, albeit loosely, about the casing section.

Once engaged by the pipe engaging apparatus, the casing section can be driven by the top drive. For example, it can be driven to thread into the connection of the stump. Thereafter, the casing section and the string now connected thereto can be lowered by the top drive into the rig center hole. As the casing section is lowered to the rig floor by the pipe engaging apparatus, the elevator can be disconnected and rotated out in preparation to accept another casing section.

When the top of the casing section is supported in the rig floor, the elevator can be engaged onto the next casing section, thereby picking it up as the top drive and pipe engaging apparatus are hoisted.

In Figure 3 another pipe handling system is shown. This pipe handling system is as described in Figures 2, except it includes an internally gripping pipe engaging apparatus 12b. Pipe engaging apparatus 12b includes a main body 14b and a mandrel 44 carrying grapples 46 formed to engage in the inner diameter of a pipe, such as a section of casing 33a, to be gripped. The mandrel further carries a stabbing guide 34 and a packer arrangement 35 for insertion into the inner diameter of the pipe to be gripped. Pipe engaging apparatus 12b can be, for example, an internal casing drive assembly as is available from TESCO Corporation.

While specific pipe engaging apparatus are illustrated, it is to be understood that the casing handling device as claimed herein can be used with other types of pipe engaging apparatus, such as those employing bladders, packers, etc. rather than grapples, those omitting, or using other, stabbing guides or those omitting, or using other, packer arrangements.

Another pipe handling system is shown in exploded configuration in Figure 4. The pipe handling system includes a pipe handling device 110 and a pipe engaging apparatus 112 including a main body 114 and a mandrel 144 carrying grapples 146 formed to engage in the inner diameter of a pipe to be gripped, a stabbing guide 134 and a packer arrangement 135 for insertion into the inner diameter of the pipe to be gripped. Main body 114 includes hydraulically driven piston for driving grapples 146 over cam surfaces on the mandrel to expand and retract the grapples.

The pipe engaging apparatus can be formed at its upper end 118 as a pin 119 for connection to a top drive. Pipe engaging apparatus 112 can be selected to grip, through the grapples, a section of pipe for rotational and/or axial movement thereof, as driven by

the top drive. The section of casing can be one or more joints of casing or drill pipe to be added to or removed from a casing string for drilling or lining a wellbore.

Pipe handling device 110 can be used to bring a section of casing from a pipe supply into a position for engagement by pipe engaging apparatus 112.

Pipe handling device 110 is mounted to the pipe engaging apparatus through a bracket 119 clamped by bolts 119a about an upper portion of main body 114. Bracket 119 can replace a bracket normally secured about the pipe engaging device and, therefore, can include a key 121 for fitting into the anti-rotation guide slot extending down from the top drive.

Bracket 119 can further include axles 123, formed as shafts, on which a first link arm 124 and a second link arm 126 are mounted for pivotal movement. The first and second link arms can each include a link eye end 125 mountable onto the axles 123. Washers 129 can be mounted on axles 123 on either side of the link arm link eye ends 125 to maintain alignment of the arms on the axles and to tend to maintain the arms in a laterally stable position, stabilized to rotate substantially only in a plane substantially orthogonally to axles 123. In the illustrated embodiment, axles 123 are coaxial such that arms 124, 126 rotate in planes parallel to each other. The use of lateral stabilizers, such as washers 129, can tend to hold link arms equidistant from the main axis of the drilling rig, with which for example, mandrel 144 is aligned. A guard 131 is secured to the bracket at either end of each axle 123 to secure the arms 124, 126 to their axles and tightly between washers 129.

Each link arm includes an outboard end 127 that can have a block 136 attached thereto by bolts. Each block includes a pad eye 137 for retaining a clevis 138 for connection to an elevator.

Pipe handling device 110 further can include a drive system for driving link arms 124, 126 to rotate about axles 123. The drive system can include hydraulic cylinders 128 each

connected between a bracket, formed from parts 131a, 131b, on their associated link arm and a support 133 formed from bracket 119. Supports 133 can be offset horizontally from vertical axis of axles 123 to facilitate control of the link arms with the cylinders. Cylinders 128 are driven by fluid through lines 135. Cylinders 128 can be double acting to provide drive force to move the link arms both clockwise and counterclockwise about their axle shafts. Double acting cylinders and the offset of supports 133 assist in driving the link arms to appropriate positions, for example to bring a pipe section into alignment with, or through in both directions, the rig main axis in which the stabbing guide of the pipe engaging apparatus is aligned. The cylinders can be locked in any desired position, again useful in pipe alignment, and can be unlocked to permit substantially unrestricted movement of the arms.

Pads 141, can be detachably connected, by for example, brackets 142a, 142b and shims 143, to link arms 124, 126 to maintain a desired spacing between the link arms and the pipe engaging apparatus and to stabilize the arms, when they are in their lower position, extending down substantially with their long axes parallel to the long axis of mandrel 144. Pads 141 can be formed of a material softer than main body 112 so that they do not damage the main body by contact therewith. In one embodiment, for example, the pads can be formed of polymeric material that is softer than the material of the pipe engaging apparatus against which the pads bear. To act to maintain the spacing and to stabilize the arms in their lower position, the pads can be replaced when they become overly worn.

In operation, the pipe handling system is assembled and connected to a top drive in a rig and an elevator is connected to clevises 138. If the elevator is mechanized, it can be placed into communication with a connection 145 to an elevator control mechanism, which can for example, be a connection to an electrical and/or hydraulic line. A pipe can be picked up from a V-door by powering cylinders 128 to drive link arms 124, 126 and thereby the elevator carried thereon to a position beneath the pipe so that the elevator can be connected up around the elevator. The pipe is rotated to the vertical position by hoisting the top drive with the cylinders unlocked. The pipe is stabbed into the stump in the rotary table, or if there is not yet a string in the rotary table, is positioned in the rotary

table, and the cylinders are driven to align and maintain alignment of the pipe section while the top drive is lowered until the top of the pipe is engaged by the grapples of the pipe engaging apparatus. When lowering the top drive, the elevator, which catches on an upset on the outer diameter of the pipe, will slide down the outside of the pipe, while continuing to hold the pipe upright.

While bracket 119 is shown and described, it is to be understood that the pipe handling device can be secured in other ways to the pipe engaging device and, if used, bracket can take other forms than that shown. For example, bracket 119 need not be combined with key 121 and bracket can be formed in parts, rather than as one part defining axles 123, extensions 133. Also, bracket can be attached to pipe engaging device by means other than bolts 119a. While bolts have been shown as fasteners it is to be understood that other fastening approaches can be used, such as welding or forming parts integral to others. Although, many component assemblies have been shown such as for brackets 131a, 131b, pads 141, etc., other approaches can be taken, such as forming the components integral with the parts on which they are supported, or increasing or reducing the number and/or configuration of parts.

It will be apparent that many other changes may be made to the illustrative embodiments, while falling within the scope of the invention and it is intended that all such changes be covered by the claims appended hereto.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. An apparatus for handling well pipe, comprising:

a support member;

a pair of link arms, the arms having upper ends that are rotatably mounted to opposite sides of the support member;

a pair of fluid-powered cylinders, each having one end pivotally mounted to one of the arms between the upper and the lower ends;

an actuator assembly mounted directly to and extending downward from the support member;

a tubular connector having a threaded upper end above the support member that is connectable to a top drive assembly of a drilling rig for rotation by the top drive assembly, the tubular connector being rotatable relative to the support member and supporting a weight of the support member;

a gripping assembly mounted to the actuator assembly, the gripping assembly being movable in response to the actuator assembly between a gripping position in engagement with a pipe and a disengaged position; and

a pipe elevator pivotally mounted to lower ends of the link arms below the gripping assembly.

2. The apparatus according to claim 1, further comprising an anti-rotation device on the support member that prevents rotation of the support member when the top drive assembly rotates the tubular connector.

3. The apparatus according to claim 1, wherein each of the link arms is adjustable in length.

4. The apparatus according to claim 1, wherein the gripping assembly comprises:

a mandrel rotated by the tubular connector and having exterior cam surfaces; and

a plurality of grapples being carried on the mandrel and movable along the cam surfaces between the gripping and disengaged positions in response to the actuator assembly.

5. The apparatus according to claim 1, wherein the gripping assembly is adapted to slide over and engage an exterior surface of the pipe.

6. The apparatus according to claim 1, further comprising:

a seal carried with the gripping assembly and above the elevator, the seal adapted to seal an inner diameter of the pipe.

7. The apparatus according to claim 1, wherein each of the fluid-powered cylinders has an upper end pivotally mounted to the support member.

8. An apparatus for handling well pipe, comprising:

a support member;

a pair of link arms, the arms having upper ends that are rotatably mounted to opposite sides of the support member;

a pair of fluid-powered cylinders, each having one end pivotally mounted to one of the arms between the upper and the lower ends;

an actuator assembly mounted to and extending downward from the support member;

a tubular connector having a threaded upper end above the support member that is connectable to a top drive assembly of a drilling rig for rotation by the top drive assembly, the tubular connector being rotatable relative to the support member and supporting a weight of the support member;

a gripping assembly mounted to the actuator assembly, the gripping assembly being movable in response to the actuator assembly between a gripping position in engagement with a pipe and a disengaged position;

a pipe elevator pivotally mounted to lower ends of the link arms below the gripping assembly

a pair of axles extending outward from opposite sides of the support member; and

a bushing at the upper end of each of the link arms that mounts rotatably on one of the axles.

9. An apparatus for handling well pipe, comprising:

a top drive assembly adapted to be mounted to a derrick of a drilling rig;

a tubular connector carried by the top drive assembly for rotation by the top drive assembly;

a support member carried by the tubular connector and spaced below the top drive, the tubular connector supporting a weight of the support member, the tubular connector being rotatable relative to the support member;

a pair of link arms, the arms having upper ends that are pivotally mounted to opposite sides of the support member for rotation relative to the support member about an axis perpendicular to an axis of the tubular connector;

a pair of fluid-powered cylinders, each having a lower end pivotally mounted to one of the arms between the upper and the lower ends;

an actuator assembly mounted to and extending downward from the support member;

the tubular connector being rotatable relative to the actuator assembly;

a gripping assembly connected to the actuator assembly, the gripping assembly having a plurality of grapples and being rotatable in unison with the tubular connector; and

a pipe elevator pivotally mounted to lower ends of the link arms below the gripping assembly.

10. The apparatus according to claim 9, further comprising:

a pair of cylindrical axles extending outward from opposite sides of the support member; and

a cylindrical bushing at the upper end of each of the link arms that mounts rotatably on one of the axles.

11. The apparatus according to claim 9, wherein each of the link arms is adjustable in length.

12. The apparatus according to claim 9, further comprising:

a seal carried below the gripping assembly and above the elevator, the seal adapted to seal an inner diameter of the pipe.

13. The apparatus according to claim 12, further comprising a nose member having a fluid port and mounted below the seal.

14. The apparatus according to claim 9, wherein the gripping assembly comprises:

a mandrel connected to the actuator for rotation by the tubular connector and having exterior cam surfaces, the grapples being carried on the mandrel and movable along the cam surfaces between the gripping and disengaged positions in response to the actuator assembly.

15. The apparatus according to claim 9, wherein the gripping assembly is adapted to slide over and engage an exterior surface of the pipe.

16. The apparatus according to claim 9, wherein each of the fluid-powered cylinders has an upper end pivotally mounted to the support member.

17. A method for running pipe into a well, comprising:

providing a pipe handling and engaging apparatus comprising: a tubular connector extending upward from and rotatable relative to a support member, a pair of link arms attached to the support member; power cylinders connected to the link arms; a pipe gripping device secured to and extending downward from the support member; and a pipe elevator pivotally mounted to lower ends of the link arms below the pipe gripping device;

suspending the tubular connector below a top drive assembly of a drilling rig such that the support member is spaced below the top drive assembly and a weight of the support member is supported by the tubular connector;

supplying power to the cylinders to pivot the link arms;

placing an end of a pipe into the elevator, moving the top drive upward to lift the pipe and allowing the pipe to swing into axial alignment with the pipe engaging device;

gripping an upper end of the pipe with the pipe gripping device;

placing a lower end of the pipe on a string of pipe suspended at a rig floor;

with the top drive assembly, rotating the tubular connector and preventing rotation of the support member, which causes the pipe to rotate about its axis to connect the pipe to the string of pipe; then

lowering the pipe into the well while connected to the string of pipe.

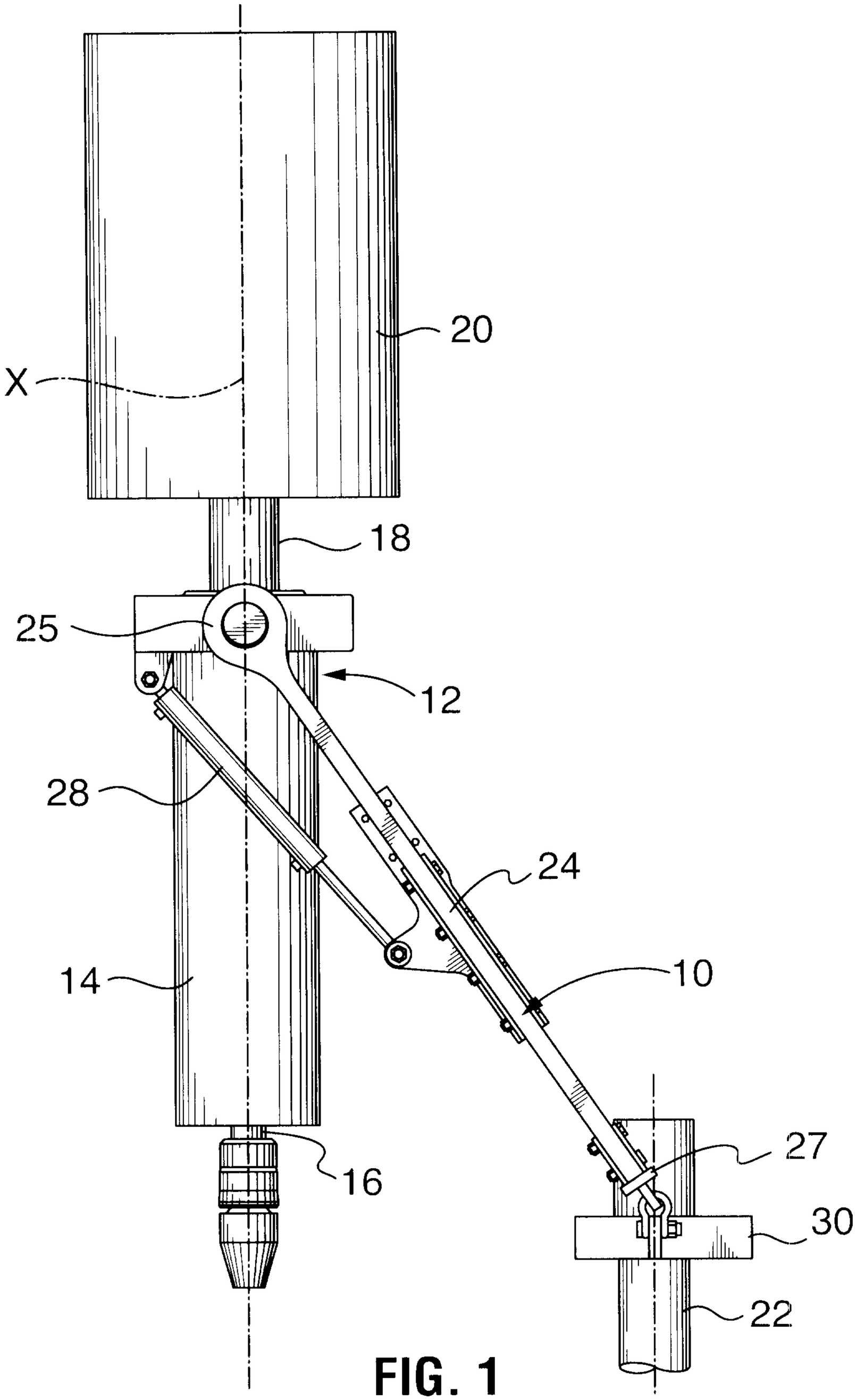


FIG. 1

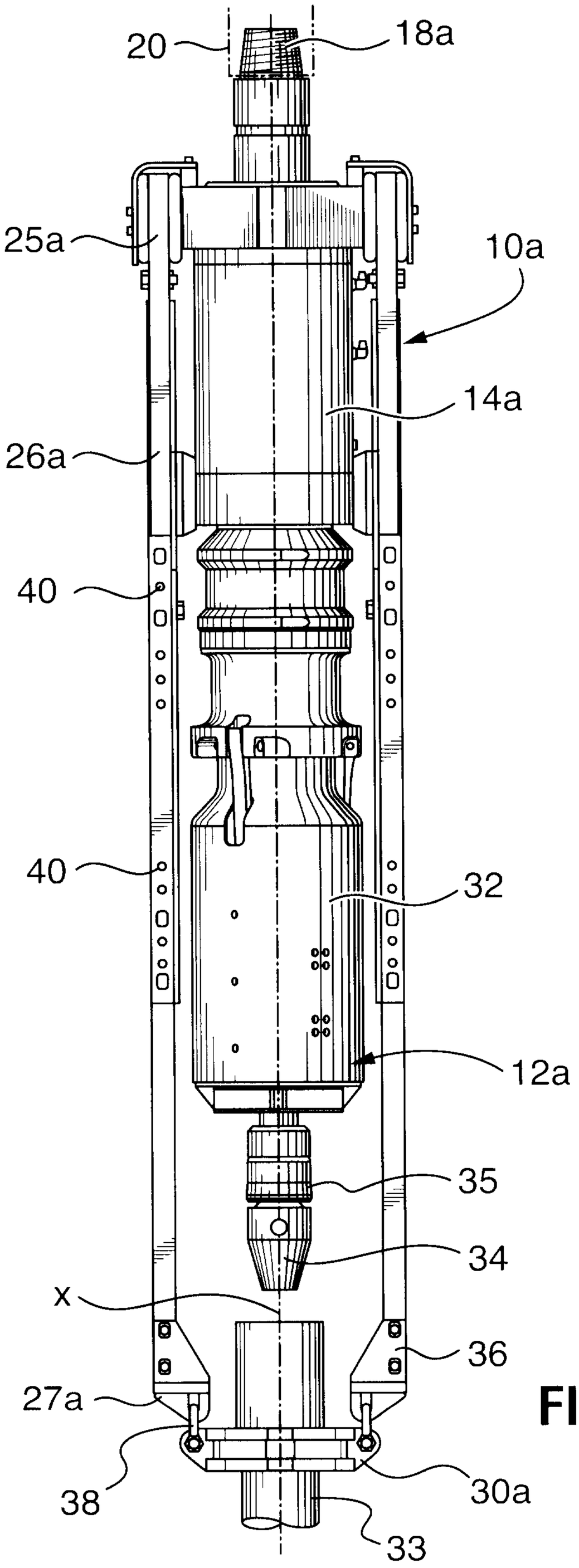


FIG. 2a

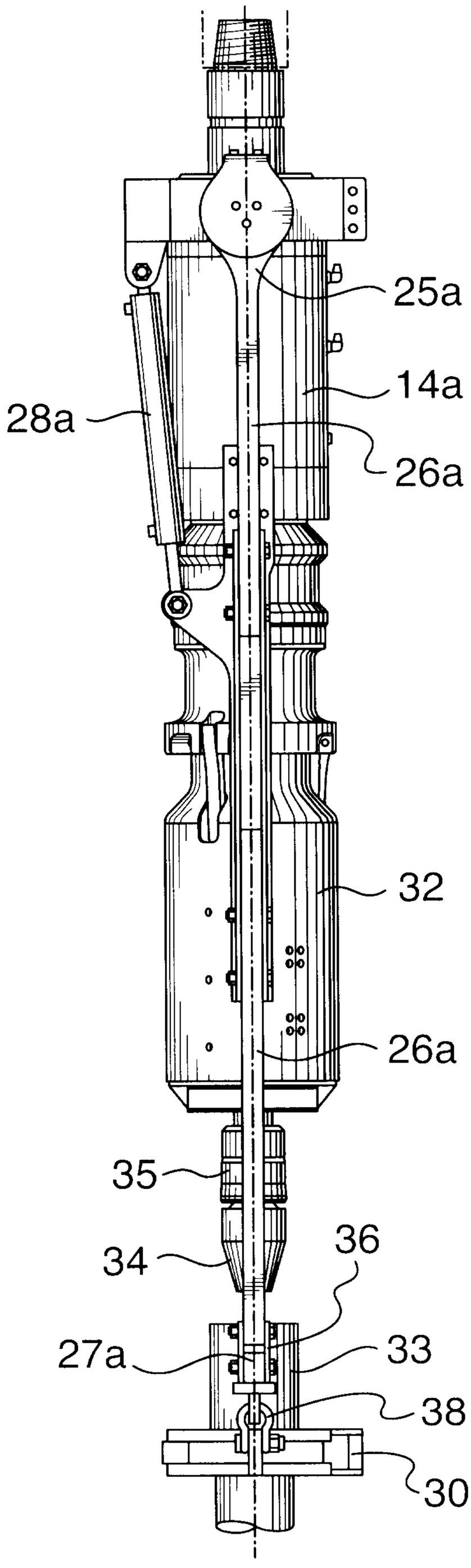


FIG. 2b

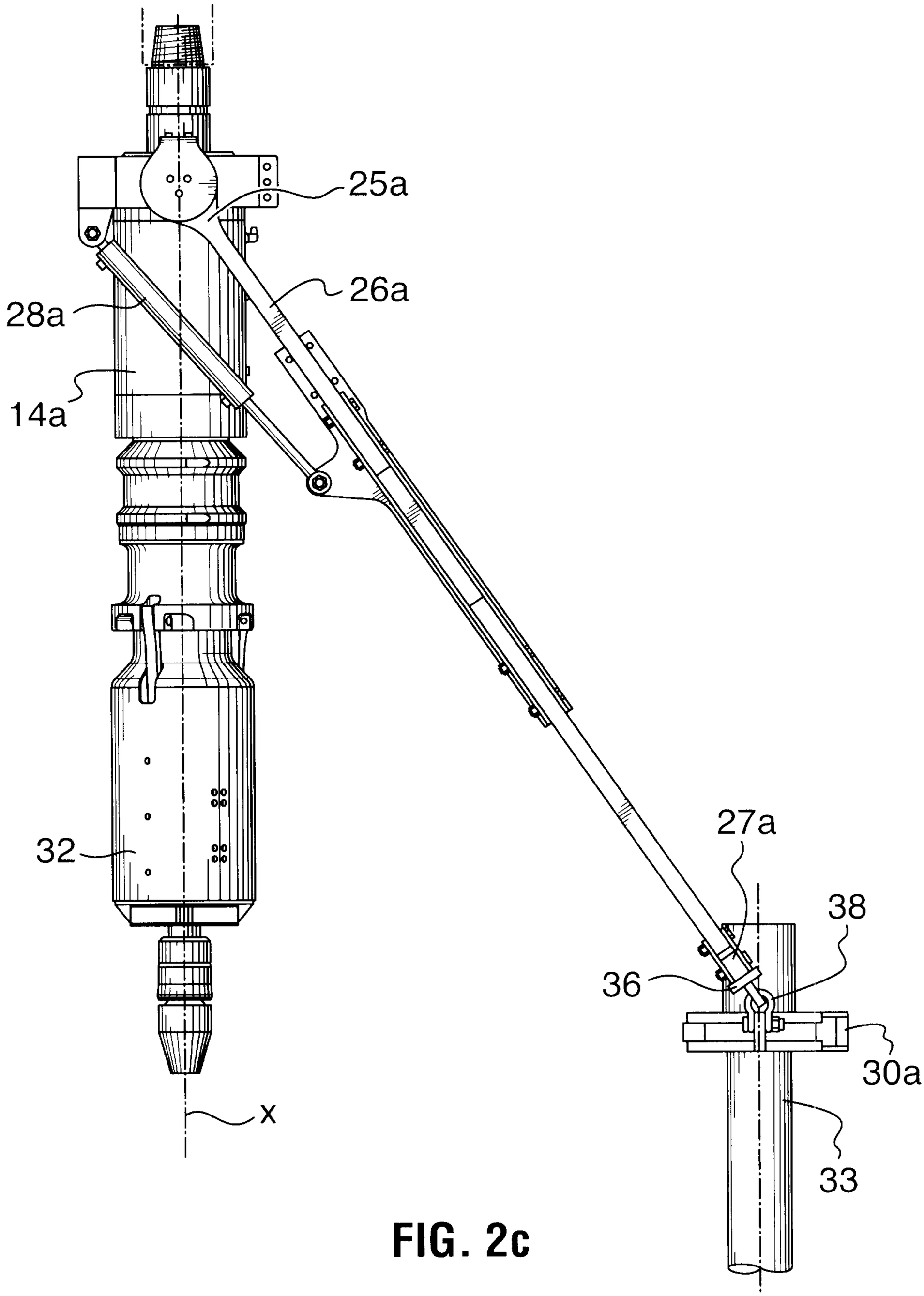


FIG. 2c

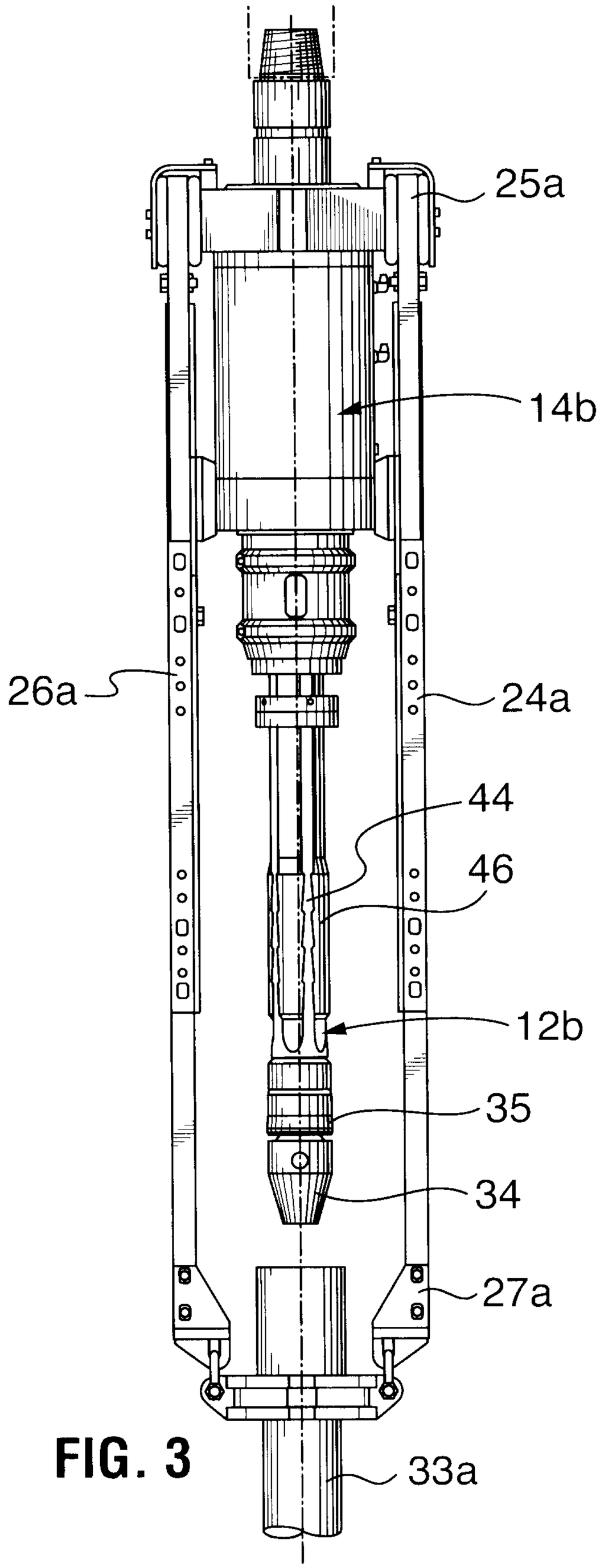
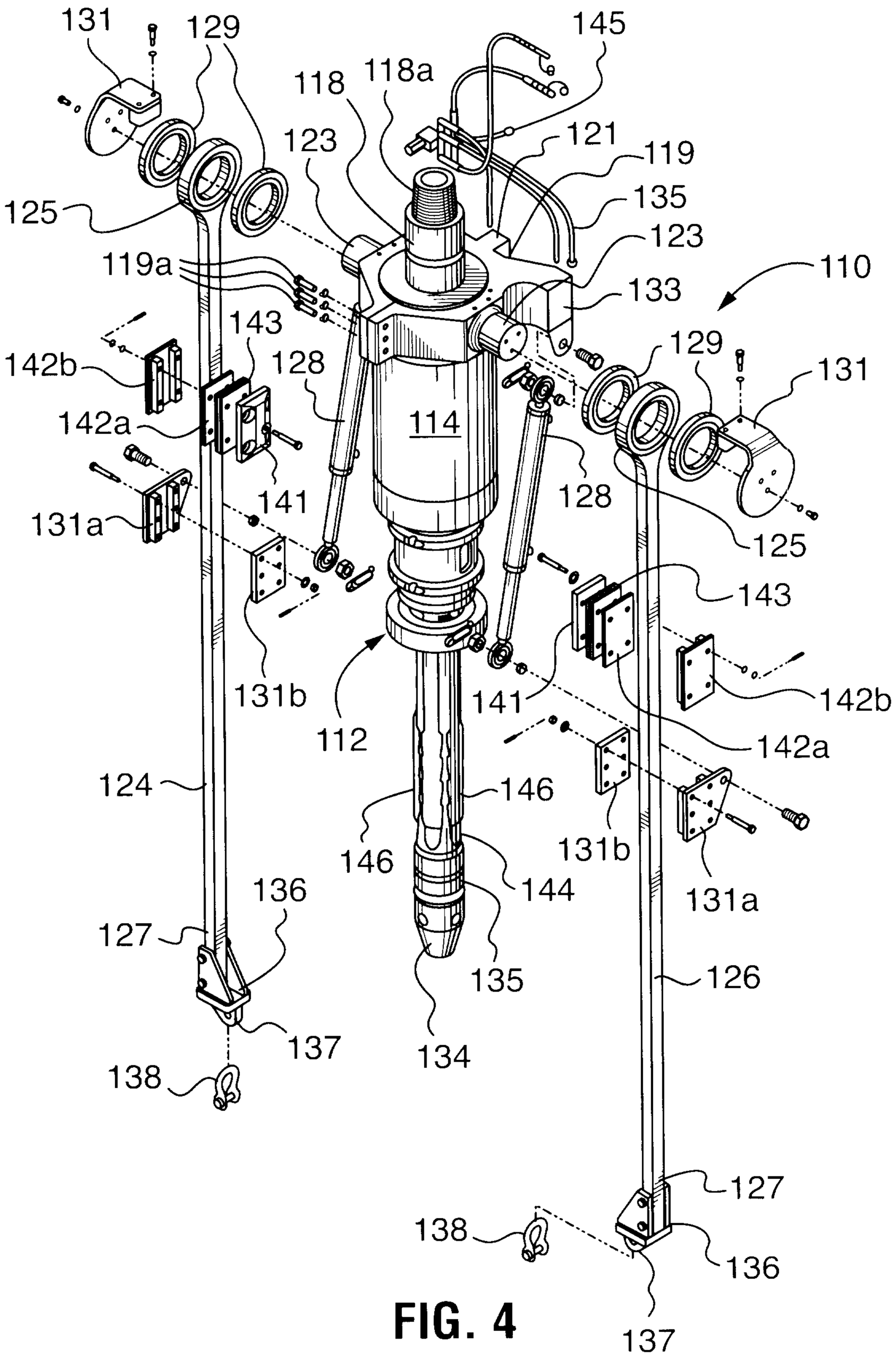


FIG. 3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131b
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142b
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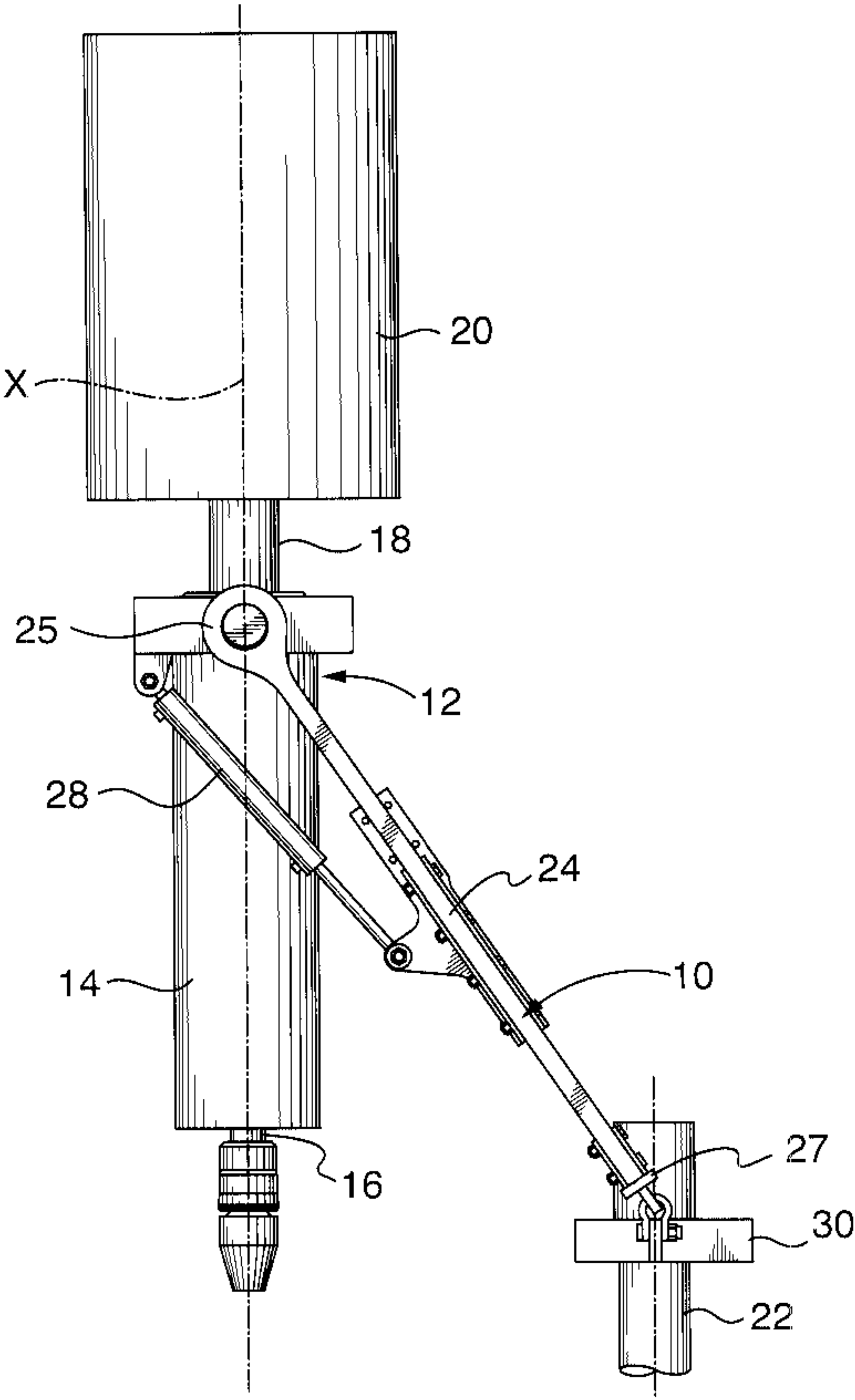
FIG. 4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