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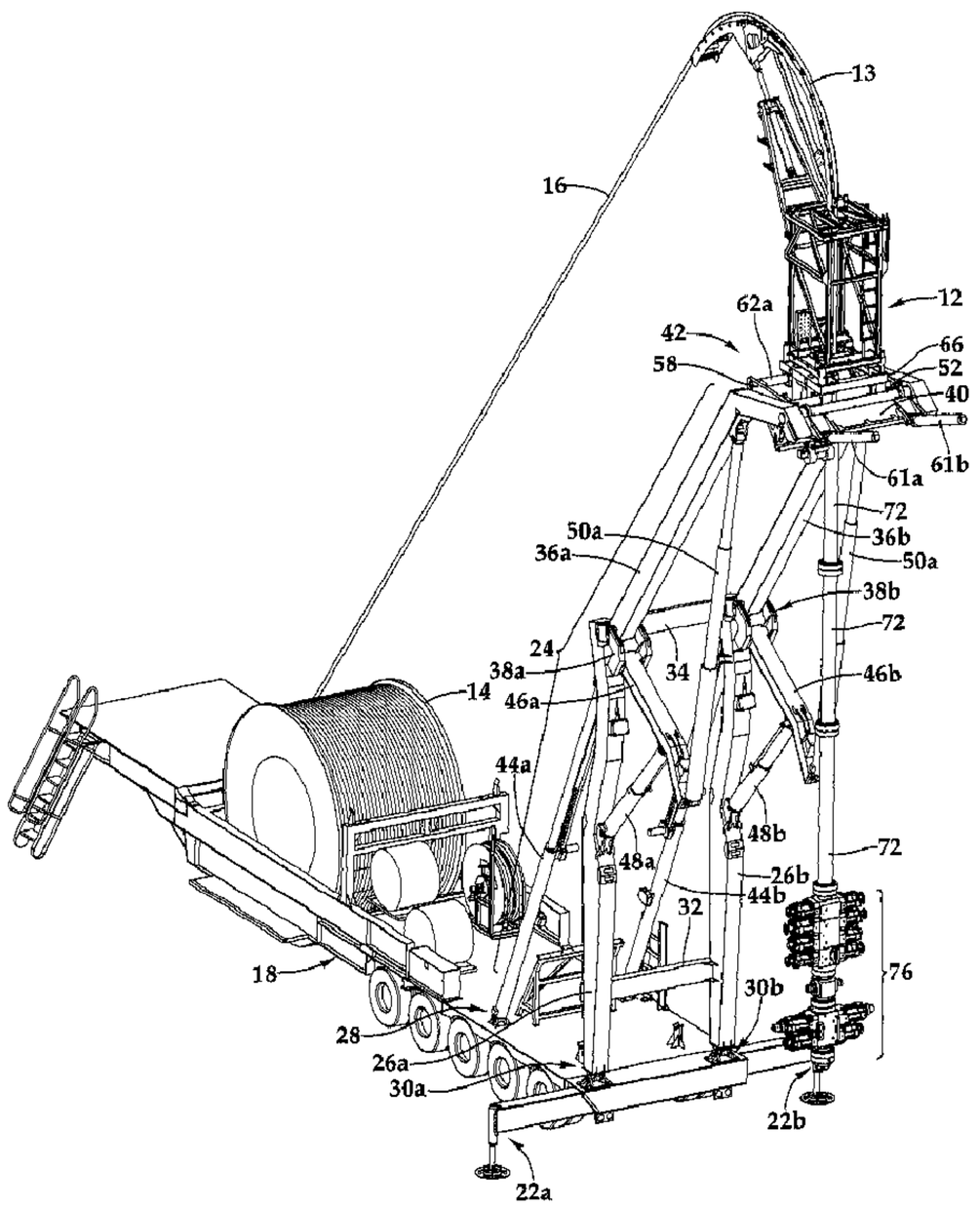
(54) **Titre : MANIPULATEUR D'INJECTEUR A TUBE SPIRALE**
(54) **Title: COILED TUBING INJECTOR HANDLER**



(57) **Abrégé/Abstract:**
A coiled tubing handler lifts a support platform upon which a coiled tubing injector is mounted, and extends the platform outwardly over a wellhead at a well site. The handler is collapsible into a compact arrangement that allows it and the coiled tubing injector to

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(57) **Abrégé(suite)/Abstract(continued):**
be transported to a well site on a vehicle or trailer. The handler can be used at the well site to raise, position, and support the coiled tubing injector, along with a BOP and riser assembly suspended from the coiled tubing injector, for connecting the BOP and riser assembly to the wellhead. The support platform may be tilted backward and forward, shifted from side-to- side, and raised and lowered.

ABSTRACT

A coiled tubing handler lifts a support platform upon which a coiled tubing injector is mounted, and extends the platform outwardly over a wellhead at a well site. The handler is collapsible into a compact arrangement that allows it and the coiled tubing injector to be transported to a well site on a vehicle or trailer. The handler can be used at the well site to raise, position, and support the coiled tubing injector, along with a BOP and riser assembly suspended from the coiled tubing injector, for connecting the BOP and riser assembly to the wellhead. The support platform may be tilted backward and forward, shifted from side-to-side, and raised and lowered.

COILED TUBING INJECTOR HANDLER

TECHNICAL FIELD

The present disclosure relates in general to apparatus for handling coiled tubing injectors at well sites.

BACKGROUND

The term "coiled tubing" refers to a continuous length of steel pipe that is continuously milled and coiled onto a large take-up reel for transportation and handling. Coiled tubing is commonly used in a wide range of oilfield services and operations. It can be run into and out of a wellbore at a higher rate than straight, jointed pipe, and, unlike wire line, it can be pushed into the wellbore. It can be used to particular advantage in highly-deviated wellbores found in extended reach drilling (ERD). It can be used for drilling, for example, but it is more often used after a well has been drilled, for logging, cleanouts, fracturing, cementing, fishing, completion, and production-related operations.

Coiled tubing is run into and out of wellbores using machines called coiled tubing injectors. The name "coiled tubing injector" derives from the fact that, in pre-existing wellbores, the tubing may need to be forced or "injected" into the well through a sliding seal to overcome the pressure of fluid within the well, until the weight of the tubing in the well exceeds the force produced by the pressure acting over the cross-sectional area of the pipe. However, once the weight of the tubing overcomes the pressure, the injector must hold the tubing.

There are a number of different types and configurations of coiled tubing injectors capable of handling coiled tubing used in oilfield operations. Most coiled tubing injectors have a head that comprises two continuous chains, each mounted on sets of spaced-apart sprockets, so that there is an extended length of chain between the sprockets. One or more motors drive or turn the chains. The motors are typically hydraulic motors, although other types of motors can be used. Each motor is connected to one or more of the sprockets. The chains are arranged so that the coiled tubing entering the injector is held between the chains by grippers mounted to each of the chains. The grippers are pressed against the outer diameter of the tubing, thereby generating a

frictional force parallel to the axis of the tubing. The frictional force is directly related to the normal force applied by the grippers.

The coiled tubing injector, a reel of coiled tubing, a control cabin, and equipment for operating the injector are typically transported to a well site as a single unit — a "coiled tubing unit" (CTU). Typically, the CTU is transported to a well site to perform well intervention work of various types, usually as components mounted on a truck, a trailer, or several trailers, depending on the CTU's configuration. Well intervention work commonly involves a pressure control equipment, such as a pressure control "stack" comprising one or more blowout preventers (BOPs) attachable to the well head, plus a riser (or riser string) extending upward from the BOPs. The riser accommodates elongate, rigid tools that are attached to the end of the coiled tubing prior to being lowered into the wellbore. The connections between these components typically comprise bolted flanges to withstand pressures above 10,000 psi (pounds per square inch) or approximately 89 MPa (megapascals). At lower pressures, connections between the components can be made with quick unions. The coiled tubing injector is connected to the riser with a stripper, through which the coiled tubing is pushed or pulled.

Because there is no derrick or platform, a mobile crane is typically driven to the site to assist with holding the coiled tubing injector high enough so that it can be attached to the top of the BOP assembly. The crane is also used to carry the weight of the coiled tubing injector and BOP assembly, as well as to counter the bending moment on the wellhead caused by the tension placed on the coiled tubing by the reel. However, a temporary structure could also be erected above the wellhead for these purposes. A mast as disclosed in U.S. Patent No. 7,077,209 could also be used.

BRIEF SUMMARY

The present disclosure teaches one or more aspects of a transportable handler for positioning a coiled tubing injector on top of a BOP assembly for connection with a wellhead of an oil or natural gas well, and supporting the injector while it is coupled with the wellhead, such as during interventional or work-over operations.

BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments of in accordance with the present disclosure will now be described with reference to the accompanying Figures, in which numerical references denote like parts, and in which:

FIGURE 1 is an isometric view of a coiled tubing unit (CTU) with a coiled tubing handler in a transport or stowed position.

FIGURE 2 is a side elevation view of the CTU of FIG. 1.

FIGURE 3 is an isometric view of the CTU of FIG. 1 with the handler extended and a blowout preventer assembly attached to the coiled tubing injector.

FIGURE 4 is a side elevation view of the CTU of FIG. 3, with the handler having maneuvered the coiled tubing injector and BOP assembly over a wellhead.

FIGURE 5 is an isometric view of a platform of the handler of FIGS. 1-4.

DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENTS

A representative embodiment of a handler for a coiled tubing injector implementing or embodying various aspects in accordance with the present disclosure comprises a linkage and a platform supporting a coiled tubing injector. This representative embodiment supports and manipulates a coiled tubing injector with the tubing always "stabbed" – i.e., with the tubing from a tubing reel extending over a tubing guide and into the top of the coiled tubing injector, ready to run. The linkage comprises at least two rigid links pivotally connected to raise the support platform and coiled tubing injector from a stowed position over a wellhead. In the representative embodiment illustrated in the Figures, each rigid link of the linkage comprises a set of spaced-apart, parallel arms, between which the support platform and the coiled tubing injector are located.

The support platform is coupled to the linkage in a manner that permits it and the coiled tubing injector to be tilted or rotated about a horizontal axis parallel to the direction in which the linkage moves the support platform. Rotation of the platform allows the injector mounted

thereon to be tilted for transport, thereby lowering its profile to facilitate transportation by road and passage under bridges and other overhead obstacles. The coupling of the platform to the linkage also permits the support platform to be rotated during extension of the linkage so that it remains oriented generally vertically after it is moved from the transport position toward a deployed position for connection to a BOP assembly associated with the wellhead.

In the illustrated representative embodiment, the coiled tubing injector is mounted on a support that is translatable side-to-side or laterally on the platform, in a direction generally perpendicular to the direction in which the linkage lifts and extends the support platform. The side-to-side movement assists with positioning the injector and a pressure control stack connected to it more precisely onto the wellhead. The rigid links forming the linkage may be manipulated in such a way that the coiled tubing injector and pressure control stack can be raised and lowered, as well as moved toward or away from the rear of a base (such as a trailer) to which the handler is mounted, to a point directly over the wellhead.

Once the rigid links have been adjusted to support the injector directly over the wellhead, the injector supported on the platform may be moved up and down relative to the platform, allowing for vertical movement of the coiled tubing injector relative to the platform without changing the position of the support arms, and thus allowing for precise control to assist with setting the coiled tubing injector and the pressure control stack onto a studded connection typically found on a wellhead. Extendable members (which by way of non-limiting example may be provided in the form of hydraulic cylinders, as in the illustrated embodiment) are used to move or pivot the links of the linkage.

Optionally, a transition arm may be provided between the two rigid links, thereby allowing for two shorter hydraulic cylinders to be used instead of a single long one. Since shorter extendable member will carry greater axial loads than a longer extendable member having otherwise similar structural properties, this alternative arrangement allows the handler to carry larger loads.

FIGS. 1-5 illustrate one example of a transportable coiled tubing unit (CTU) comprising a handler **10**, a coiled tubing injector **12**, and a reel **14** of coiled tubing **16**. The example is intended to be representative of CTUs generally, and the illustrated handler is a representative

example of an embodiment of the handler described above. In this exemplary embodiment, the CTU is mounted on a trailer **18**, with wheels **20**, for transport to a well site. It will be noted that coiled tubing injector assembly **12** shown in the Figures is actually just a frame in which a coiled tubing injector head (not shown) is mounted. The frame is intended to be representative of coiled tubing injector assemblies generally. Representative examples of coiled tubing injectors can be found in U.S. Patents No. 6,059,029 and No. 8,544,536.

Coiled tubing injector assembly **12** includes a gooseneck or arched tubing support **13** for transitioning the coiled tubing from reel **14** into the top of the injector while it is being used. Arched tubing support **13** prevents coiled tubing **16** from bending too much or kinking, thus allowing reel **14** to place tension on tubing **16** without damaging the tubing.

The CTU could also be mounted on a bed of a truck, on a skid, or on some other type of motor vehicle for transport to the well site. The CTU includes all equipment necessary to operate handler **10** and coiled tubing injector **12**, including a hydraulic power pack (not shown), hydraulic control circuits (not shown), and operator controls for allowing an operator to manipulate handler **10** and to run coiled tubing injector **12**. An operator cabin **21** (shown only in FIGS. 2 and 4) may be provided for a person operating handler **10** and coiled tubing injector **12**. Input controls and status displays would typically be located in operator cabin **21**.

A tractor (not shown) would typically be used to pull trailer **18** to a well site, close to the wellhead. A representative example of a wellhead **23** is shown in FIG. 4.

In FIGS. 1 and 2, handler **10** is shown in a stowed or transport position, and in FIGS. 3 and 4 it is shown in extended positions. In the transport position, coiled tubing injector **12** lies at an angle. Arched tubing guide **13** prevents the injector from lying completely flat. In this particular example, the overall height of injector **12**, as measured from the ground, is approximately the same as the height of handler **10** when in the stowed position, thus allowing injector **12** to be transported over public roadways and to pass under bridges.

In the illustrated example, trailer **18** includes a set of outriggers **22a** and **22b** for stabilizing trailer **18** when maneuvering coiled tubing injector **12**. Outriggers **22a** and **22b**, which are shown deployed in FIG. 3, can also be used to tilt trailer **18** from side-to-side. Trailer **18**

serves as a base for handler **10**. Tilting trailer **18** about its central axis with outriggers **22a** and **22b** allows handler **10** to be tilted in order to align it with a wellhead **23** that might not be perfectly vertical. Although not shown in FIGS. 1 or 3, trailer **18** will conventionally include an operator cabin **21**.

Handler **10** comprises a linkage, which is generally indicated by reference number **24** in FIGS. 3 and 4. In the illustrated exemplary embodiment, linkage **24** includes two rigid links that are connected in a series to trailer **18** (which serves as a base), with the proximal end of the first rigid link being connected to trailer **18** in a manner to allow pivoting, and with the distal end of the first rigid link being connected to the proximal end of the second rigid link in a manner that allows pivoting.

In this embodiment, each of the rigid links comprises a pair of parallel, spaced-apart arms, each in the form of a steel beam. The first rigid link, comprising arms **26a** and **26b**, has a proximal end pivotally coupled to a base (which in this example is the deck **28** of trailer **18**) by means of joints **30a** and **30b**, one for each arm. A cross-member **32** connects arms **26a** and **26b** near their proximal ends, and a cross-member **34** connects them near their distal ends, thereby creating a rigid box or square-shaped frame comprised by the first link.

The second rigid link comprises arms **36a** and **36b**, each of which is coupled to arms **26a** and **26b**, respectively, through joints **38a** and **38b**. Arms **36a** and **36b** are held parallel by joints **38a** and **38b** and by a cross-member **40**. Arms **36a** and **36b** are not straight, as can be seen in the Figures. Each is bent near a coiled tubing support platform **42**. The bend in the link allows handler **10**, with coiled tubing injector **12** mounted to it, to be folded or collapsed into a more compact arrangement when in the transport position. Arms **36a** and **36b** and coiled tubing injector **12** can be placed in a position with a lower overall height when measured from bed **28** of trailer **18**, when handler **10** is in the transport or stowed position as shown in FIGS. 1 and 2. In this example, handler **10**, and in particular arms **36a** and **36b**, are at approximately the same height (or slightly higher, for protecting coiled tubing injector **12**) as the coiled tubing injector assembly when it is tilted into its stowed position (i.e., nearly touching bed **28** of trailer **18**).

The first rigid link is pivotable relative to trailer bed **28**, between a collapsed or transport position as shown in FIGS. 1 and 2 and an upright position as shown in FIGS. 3 and 4, by an

extension means which in the illustrated embodiment comprise two extendable members in the form of hydraulic cylinders **44a** and **44b**. Hydraulic cylinders **44a** and **44b** are pivotally attached to trailer bed **28**, and to the distal ends of arms **26a** and **26b**, respectively, as best seen in FIG. 3. In alternative embodiments, a single extendable member could be used instead of two extendable members.

To pivot the second rigid link relative to first rigid link, a second extension means is used. In this example, the second extension means comprises multiple extendable members and at least one middle beam or arm. A pair of middle arms **46a** and **46b** are pivotally attached to joints **38a** and **38b**, respectively, and they pivot or rotate about the same axis as each of arms **36a** and **36b** of the second link. Alternatively, each of middle arms **46a** and **46b** could be pivotally connected to the first link at a different point, further from the distal ends of each of arms **26a** and **26b** of the first link. A pair of hydraulic cylinders **48a** and **48b** extend or retract in unison to pivot middle arms **46a** and **46b** relative to arms **26a** and **26b**.

Each of a pair of hydraulic cylinders **50a** and **50b** is connected between one of the middle arms **46a** and **46b** (nearer its distal end than where hydraulic cylinder **48a** or **48b** connects) and one of the arms **36a** and **36b**, respectively, of the second link, nearer their distal ends, where the arms bend. Hydraulic cylinders **50a** and **50b** operate in unison to pivot arms **36a** and **36b** relative to middle arms **46a** and **46b** (and thus also relative to arms **26a** and **26b** of the first link). By using a middle arm and an extendable member on each side of the middle arm, shorter extendable members can be used, which is advantageous because shorter extendable members are less susceptible to buckling than longer ones.

Instead of or in addition to a hydraulic cylinder, each extendable member mentioned herein may comprise a linear actuator, such as (be way of non-limiting example) a telescoping linear actuator with one or more telescoping segments, capable of carrying the loads and possessing the necessary stroke or length of movement. Possible alternatives include other types of hydraulic linear actuators, as well as pneumatic actuators and mechanical actuators (such as various types of screws, rack and pinion arrangements, chains, belts, and the like), including those driven by hydraulic, electric, or other types of motors.

In the representative embodiment, coiled tubing support platform **42** comprises a bottom frame **58**, plus a carriage **60** that is slidable on platform **42**. Bottom frame **58** includes a plurality of tubular members that form a track (the illustrated embodiment has two such tubular members, **62a** and **62b**). Carriage **60** includes tubular members **64c** and **64b** that surround and slide on tubular members **62a** and **62b**. Carriage **60** thus slides on the track, and is retained on bottom frame **58** by the track. Although not visible in the Figures, carriage **60** is moved by a hydraulic cylinder. Other types of extendable mechanisms can be used to move carriage **60**.

Coiled tubing support platform **42** is coupled to the second link, nearer to the distal ends of the second link's arms **36a** and **36b**, by a tubular member **52** that allows the platform to rotate about an axis **54** of tubular member **52**, tilting platform **42**, and thus coiled tubing injector **12** as well, backward and forward as indicated by arrow **56** in FIG. 5. To rotate or tilt platform **42**, the representative embodiment uses a pair of hydraulic cylinders **61a** and **61b** that are attached at one end to cross-member **40** and at the other end to a lever plate **64** that extends below bottom frame **58**.

In the illustrated embodiment, carriage **60** is configured for raising and lowering the coiled tubing injector assembly **12** mounted thereon. In the example of the illustrated embodiment, carriage **60** comprises a top frame **66** on which coiled tubing injector assembly **12** is mounted. Top frame **66**, and thus coiled tubing injector assembly **12** along with it, can be raised and lowered by a plurality of extendable members in the form of hydraulic lifts or cylinders **68a-68d**. Actuating these cylinders, when platform **42** is horizontally oriented, results in raising injector assembly **12** vertically, and retracting them lowers injector assembly **12** vertically. This movement permits injector assembly **12** and the BOP assembly (which in FIGS. 3 and 4 comprises risers **72** and BOPs **76**), after they have been attached to each other, to be raised up and correctly positioned over wellhead **23**, to then be lowered for attachment to wellhead **23** without having to operate linkage **24**; only hydraulic cylinders **68a-68d** need to be operated to do this.

In FIGS. 4 and 5, injector assembly **12** is shown in a raised position, and in FIG. 3 it is shown in a lowered position. In the illustrated embodiment, cylinders **68a-68d** are connected between a bottom carriage frame **70** (comprising tubular members **64c** and **64b**) and top frame

66. As seen in FIGS. 3 and 4, coiled tubing injector **12** is connected by a stripper (not visible) to risers **72** through an opening **74** in support platform **42**.

To operate handler **10**, a controller (not shown) operates hydraulic circuits that cause the various above-noted hydraulic cylinders to extend or retract.

The representative embodiment of handler **10** is capable of the following degrees of freedom of motion:

- up and down, or vertical movement relative to the ground;
- in and out (or back and forth relative to the base of handler **10**);
- rotation of coiled tubing injector **12** about a horizontal axis;
- movement side-to-side of coiled tubing injector **12**; and
- side-to-side tilting of handler **10** and, in turn, coiled tubing injector **12**, by controlling outriggers on a base upon which handler **10** is mounted (e.g., trailer **18** with outriggers **22a** and **22b**).

In the illustrated embodiment, all of this is done with a self-contained mechanism on a transport truck or trailer, without the use of a crane as is typical for this kind of operation.

Once the coiled tubing injector **12** and the pressure control stack have been attached to wellhead **23**, handler **10** may continue to carry the load of the injector and pressure control stack. In the exemplary embodiment illustrated in the Figures, the reel **14** on which the coiled tubing **16** is wound is located so that the tension on tubing **16** (which is necessary to keep tubing **16** wound on reel **14**) is in line with and in a favorable direction relative to linkage **24**. Therefore, the eccentric load produced by the tubing tension will be reacted by handler **10**, and no bending moment will be induced into wellhead **23**. The handler shown in the illustrated example is capable of supporting the entire weight of the injector and pressure control stack, as well as the side load imposed by the tension in the coiled tubing, without need for a crane or hoist cables.

Avoiding the need for a crane reduces cost, and it avoids the complexities and risks inherent in crane use. When using a crane, the crane must remain connected to the coiled tubing injector assembly throughout the well-servicing operation. The crane ensures stability during

rig-up, and resists the sideways pull resulting from tension on the tubing between the tubing reel and the injector and tubing guide assembly. Because the injector assembly hanging from a crane acts as a pendulum, the crane operator must swing the crane against the pull from the tension placed on the tubing to offset it. If he does not swing far enough, the tubing strains against the wellhead. If he swings too far, the crane strains against the wellhead. The tubing tension generated by the tubing reel varies, between running into or out of the well, and during tubing deployment as the spool of tubing changes diameter. Constant attention to the adjustment of the crane resisting the side pull must be made.

The handler is capable of supporting a coiled tubing injector during each of the following operational steps:

- transport to a well site on a trailer or truck bed;
- elevating the coiled tubing injector to rest on pressure control equipment;
- placing the rigged-up coiled tubing injector on the wellhead; and
- supporting the coiled tubing injector during a well servicing operation.

In alternative embodiments, aspects of the disclosed handler could be adapted for utilization in just one or in any combination of these operations. For example, in one alternative the handler need not be transported, but rather can be erected at a well site, such as on a rig. Another alternative embodiment might be to use aspects of the handler in ways suitable for raising and supporting the coiled tubing injector during rigging, with a crane or other structure being used to support the coiled tubing injector during operation. Or, conversely, a crane might be used to pull and hold up the injector during rigging, but aspects of the handler could be used to assist with maneuvering the coiled tubing injector on a BOP assembly, and/or to support the injector and BOP assembly during well servicing.

The foregoing description is illustrative of exemplary embodiments, and various modifications may be made by persons skilled in the art without departing from the present disclosure. While the disclosure is susceptible to various modifications and alternative forms, specific embodiments thereof are shown by way of example in the drawings and description. It should be understood, however, that the drawings and detailed description are not intended to

limit the disclosure to the particular form disclosed; on the contrary, the intention is to cover all modifications, equivalents, and alternatives falling within the scope of the present disclosure. Accordingly, it is to be understood that the scope of the claims appended hereto should not be limited by the embodiments described and illustrated herein, but should be given the broadest interpretation consistent with the disclosure as a whole.

The terms used in this specification are, unless expressly stated otherwise, intended to have ordinary and customary meanings, and are not intended to be limited to or restricted by the details of the illustrated structures or the disclosed embodiments.

In this patent document, any form of the word “comprise” is to be understood in its non-limiting sense to mean that any element following such word is included, but elements not specifically mentioned are not excluded. A reference to an element by the indefinite article "a" does not exclude the possibility that more than one of the element is present, unless the context clearly requires that there be one and only one such element.

Any use of any form of the terms "connect", "couple", "attach", or any other terms describing an interaction between elements is not meant to limit the interaction to direct interaction between the subject elements, and may also include indirect interaction between the elements such as through secondary or intermediary structure. Relational or relative terms (including but not limited to “horizontal”, “vertical”, “parallel”, and “perpendicular”) are not intended to denote or require absolute mathematical or geometrical precision. Accordingly, such terms are to be understood as denoting or requiring substantial precision only (e.g., “substantially parallel”) unless the context clearly requires otherwise.

Wherever used in this document, the terms “typical” and “typically” are to be interpreted in the sense of representative or common usage or practice, and are not to be understood as implying invariability or essentiality.

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

1. An apparatus for handling a coiled tubing injector at a well site and positioning it above a wellhead, said apparatus comprising:

(a) a support platform;

(b) a coiled tubing injector mounted on the support platform;

(c) a linkage pivotally coupled with a base;

wherein:

(d) the linkage comprises a plurality of links, said plurality of links comprising at least a first link and a second link, each of said first and second links having a proximal end and a distal end, wherein:

- the proximal end of the first link is pivotally connected with the base;
- the support platform is pivotally connected to the second link near its distal end;
- the proximal end of the second link is coupled through at least one joint to the distal end of the first link;
- the second link is pivotally connected to the distal end of the first link; and
- the second link is bent between its proximal and distal ends, so that its distal end, where the coiled tubing injector support platform is pivotally connected, is lower to the ground than its proximal end when the linkage is in a collapsed position; and

(e) the linkage further comprises a first extendable member for pivoting the first link relative to the base between a horizontal position and a vertical position, a second extendable member for pivoting the second link relative to the first link, and a third extendable member for pivoting the coiled tubing support platform relative to the second link, whereby extending the first and second extendable members from the retracted positions to the extended positions will move the linkage from the collapsed position to an extended position in which the support platform has been elevated and extended outward from the base.

2. The apparatus of Claim 1 wherein the third extendable member is adapted to pivot the support platform from a first orientation in which the third extendable member is retracted and the linkage is in a collapsed position, toward a second orientation in which the third extendable member is extended and the linkage is movable by extending the first and second extendable members, with the coiled tubing injector being tilted to one side in the first orientation and substantially vertical in the second orientation.

3. The apparatus of Claim 1 wherein:

(a) the first link and the second link each comprises two arms that are spaced apart and parallel to each other;

(b) the support platform is positioned between the two arms of the second link; and

(c) the coiled tubing injector is positioned between the two arms of each link when the linkage is in the collapsed position.

4. The apparatus of Claim 1 wherein the coiled tubing injector is mounted on a carriage that is slidable from side to side on the support platform.

5. The apparatus of Claim 4 wherein the carriage comprises extendable members for raising and lowering the coiled tubing injector.

6. The apparatus of Claim 1 wherein the coiled tubing injector is mounted on the support platform through at least one extendable member for moving the coiled tubing injector and up and down relative to the support platform.

7. An apparatus for handling a coiled tubing injector at a well site and positioning it above a wellhead, said apparatus comprising:

(a) a support platform;

(b) a coiled tubing injector mounted on the support platform; and

(c) a linkage pivotally coupled with a base;

wherein:

(d) the linkage comprises a plurality of links, said plurality of links comprising at least a first link and a second link, each of which has a proximal end and a distal end, wherein:

- the proximal end of the first link is pivotally connected with the base;
- the support platform is pivotally connected to the second link near its distal end; and
- the proximal end of the second link is coupled through at least one joint to the distal end of the first link;

(e) the linkage further comprises:

- a first extendable member, for pivoting the first link relative to the base between a horizontal position and a vertical position;
- a second extendable member, for pivoting the second link relative to the first link; and
- a third extendable member, for pivoting the coiled tubing support platform relative to the second link;

whereby extending the first and second extendable members from retracted to extended positions will move the linkage from a collapsed position to an extended position in which the support platform has been elevated and extended outward from the base; and

(f) the linkage further comprises a third link that is pivotable at its proximal end relative to the first link, and a fourth extendable member, wherein the second extendable member extends from the third link to the second link, and the fourth extendable member extends from the first link to the third link, such that:

- extending and retracting the fourth extendable member will pivot the third link, which will then pivot the second link; and
- extending and retracting the second extendable member will pivot the second link.

8. The apparatus of Claim 7, wherein:

(a) the base comprises a bed of a truck or a trailer;

(b) the apparatus further comprises a reel of coiled tubing; and

(c) the linkage is mounted between the reel and an end of the base.

9. An apparatus for handling a coiled tubing injector at a well site and positioning it above a wellhead, said apparatus comprising:

(a) a vehicle;

(b) a reel of coiled tubing mounted on the vehicle;

(c) a support platform;

(d) a coiled tubing injector into which one end of the coiled tubing has been inserted, said coiled tubing injector being mounted on the support platform; and

(e) a linkage pivotally coupled with the vehicle;

wherein:

(f) the linkage comprises a plurality of links, said plurality of links comprising at least a first link and a second link, each of which has a proximal end and a distal end, wherein:

- the proximal end of the first link is pivotally connected with the base;
- the support platform is pivotally connected to the second link near its distal end;
- the proximal end of the second link is coupled through at least one joint to the distal end of the first link;
- the first link and the second link each comprise two arms that are spaced apart and parallel to each other;
- the support platform is positioned between the two arms of the second link;
- the coiled tubing injector is accommodated between the two arms of each of the first and the second links when the linkage is in a transport position;
- the second link is pivotally connected to the distal end of the first link; and
- the second link is bent between its proximal and distal ends, so that its distal end, where the coiled tubing injector support platform is pivotally

connected, is lower to the ground than its proximal end when the linkage is collapsed; and

(g) the linkage further comprises:

- a first extendable member for pivoting the first link relative to the base between a horizontal position and a vertical position;
- a second extendable member for pivoting the second link relative to the first link; and
- a third extendable member for pivoting the coiled tubing support platform relative to the second link;

wherein the linkage is collapsed when in the transport position, with the coiled tubing injector tilted to one side relative to its normal operating position, and moved to an extended position in which the support platform is raised and moved outwardly from the vehicle, with the coiled tubing injector in a substantially vertical orientation, while the coiled tubing remains inserted in the coiled tubing injector.

10. The apparatus of Claim 9 wherein the coiled tubing injector is mounted on a carriage that is slidable from side to side on the support platform, and is adapted to selectively raise and lower the coiled tubing injector.

11. An apparatus for handling a coiled tubing injector at a well site and positioning it above a wellhead, said apparatus comprising:

(a) a vehicle;

(b) a reel of coiled tubing mounted on the vehicle;

(c) a support platform;

(d) a coiled tubing injector into which one end of the coiled tubing has been inserted, said coiled tubing injector being mounted on the support platform; and

(e) a linkage pivotally coupled with the vehicle;

wherein:

(f) the linkage comprises a plurality of links, said plurality of links comprising at least a first link and a second link, each of which has a proximal end and a distal end, and wherein:

- the proximal end of the first link is pivotally connected with the base;
- the support platform is pivotally connected to the second link near its distal end; and
- the proximal end of the second link is coupled through at least one joint to the distal end of the first link;
- the first link and the second link each comprises two arms that are spaced apart and parallel to each other;
- the support platform is positioned between the two arms of the second link; and
- the coiled tubing injector is accommodated between the arms of the first and the second links when the linkage is in a transport position;

(g) the linkage further comprises:

- a first extendable member for pivoting the first link relative to the base between a horizontal position and a vertical position;
- a second extendable member for pivoting the second link relative to the first link; and
- a third extendable member for pivoting the coiled tubing support platform relative to the second link;

wherein the linkage is collapsed when in the transport position, with the coiled tubing injector tilted to one side relative to its normal operating position, and is movable to an extended position in which the support platform is raised and moved outwardly from the vehicle, with the coiled tubing injector in a substantially vertical orientation, and with the coiled tubing remaining inserted in the coiled tubing injector; and

(h) the linkage further comprises a third link that is pivotable at its proximal end relative to the first link, and a fourth extendable member, wherein the second extendable member extends from the third link to the second link, and the fourth extendable member extends from the first link to the third link, such that:

- extending and retracting the fourth extendable member will pivot the third link, which in turn will pivot the second link; and
- extending and retracting the second extendable member will pivot the second link.

12. The apparatus of Claim 11 wherein the coiled tubing injector is mounted on a carriage that is slidable from side to side on the support platform.

13. The apparatus of Claim 12 wherein the carriage comprises extendable members for raising and lowering the coiled tubing injector.

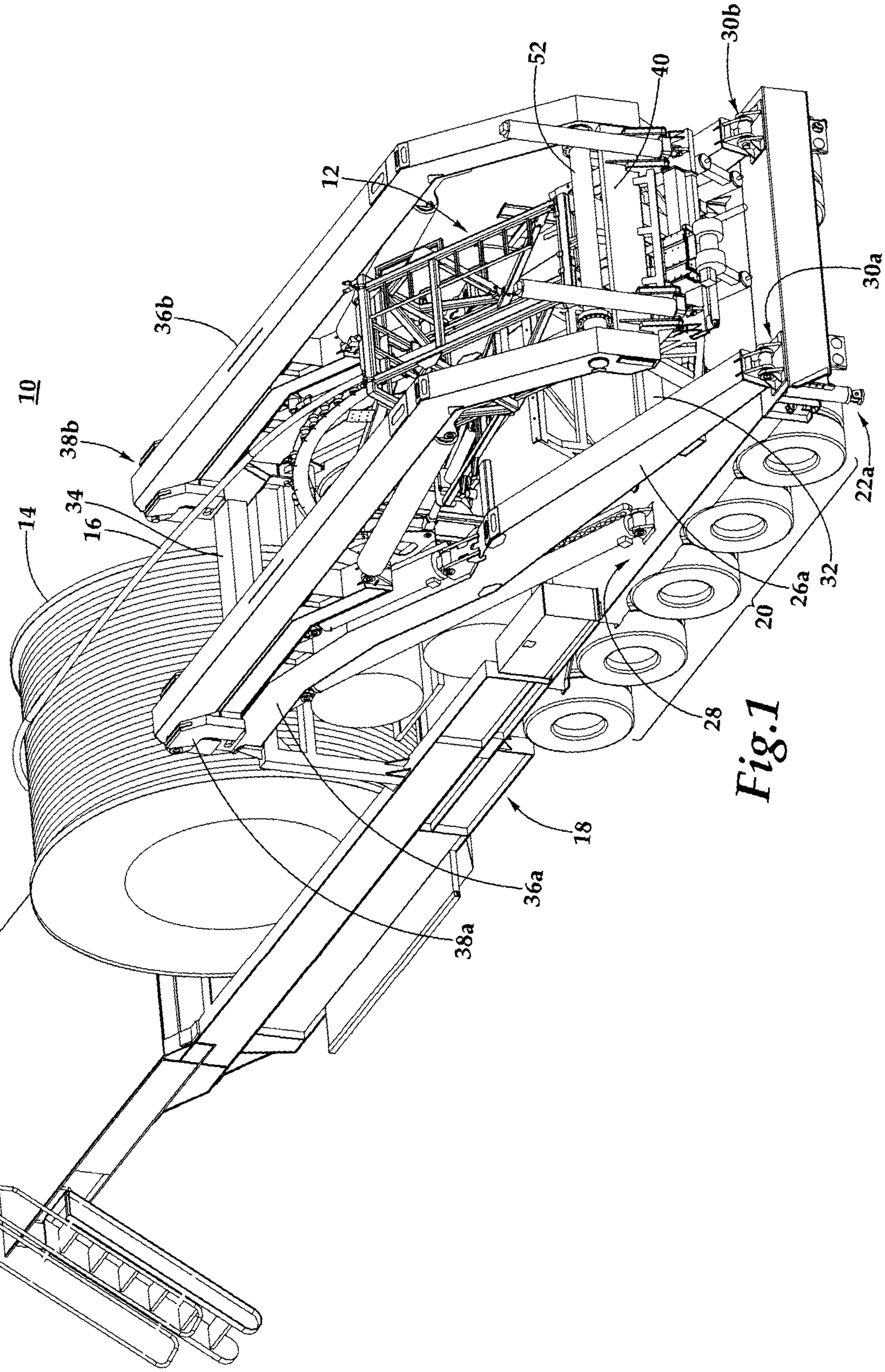

Fig.1

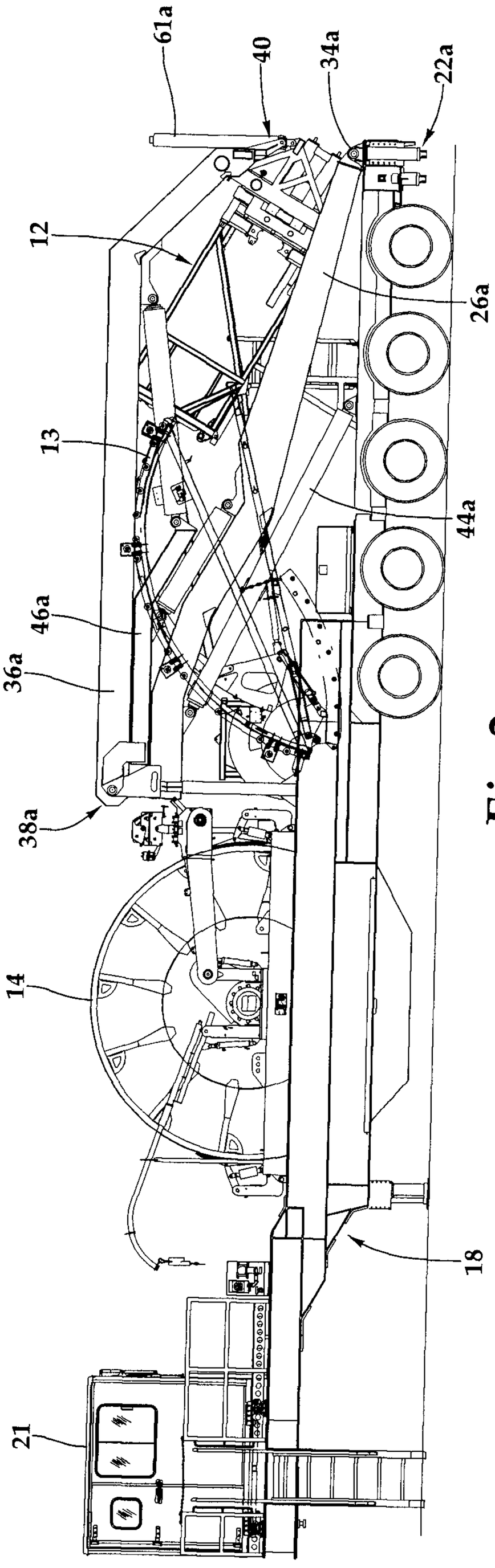

Fig.2

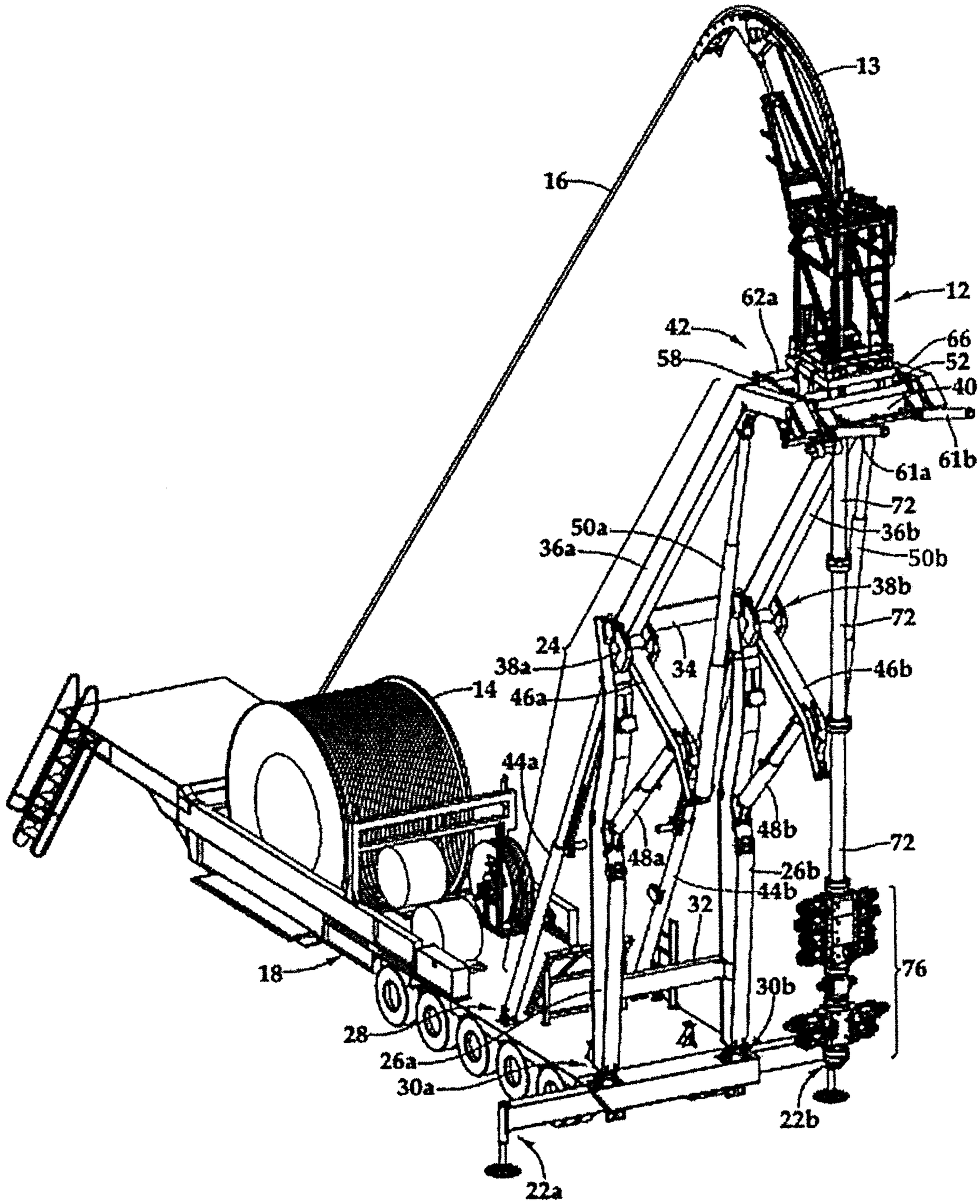
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Fig.3

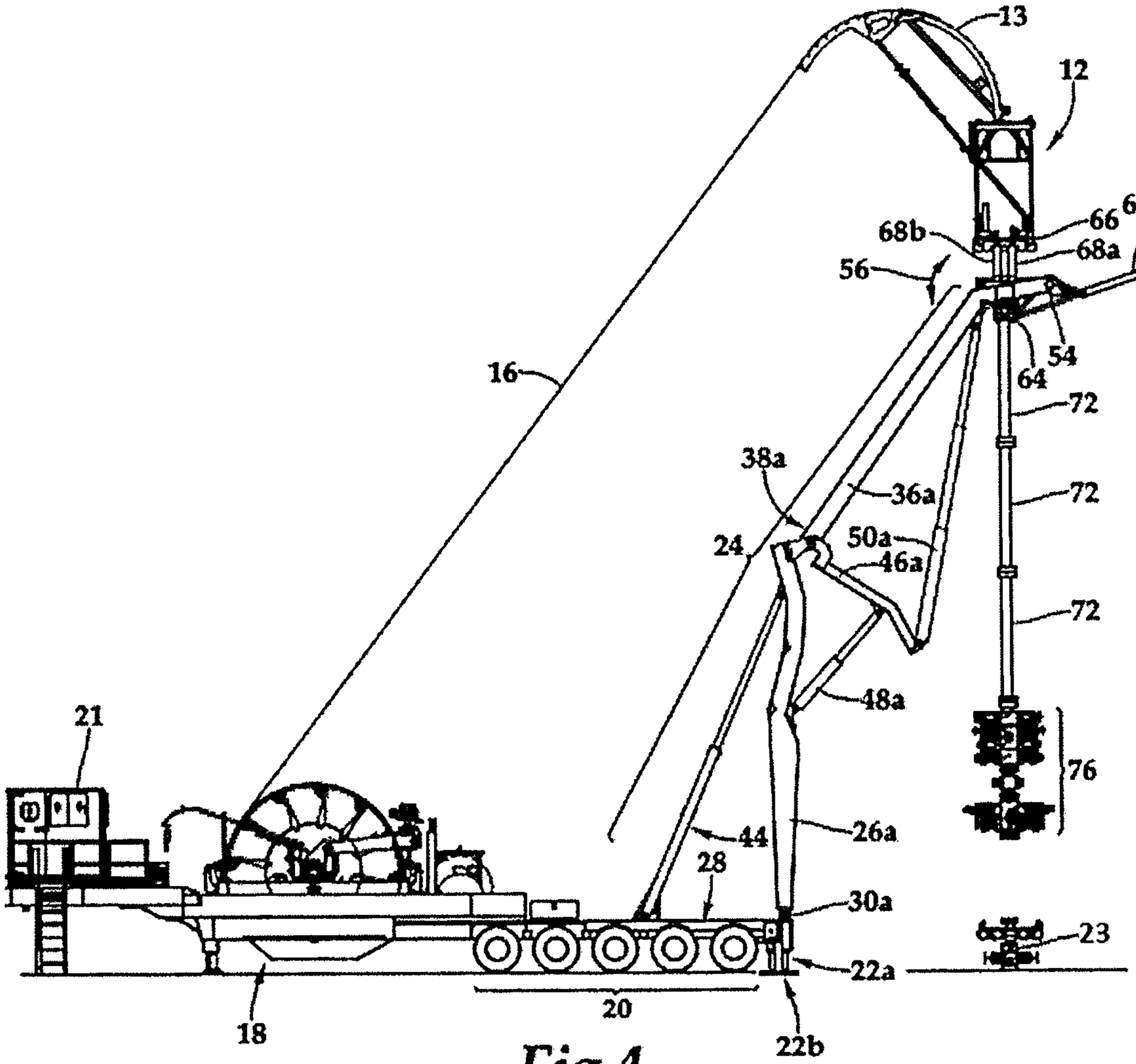
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Fig.4

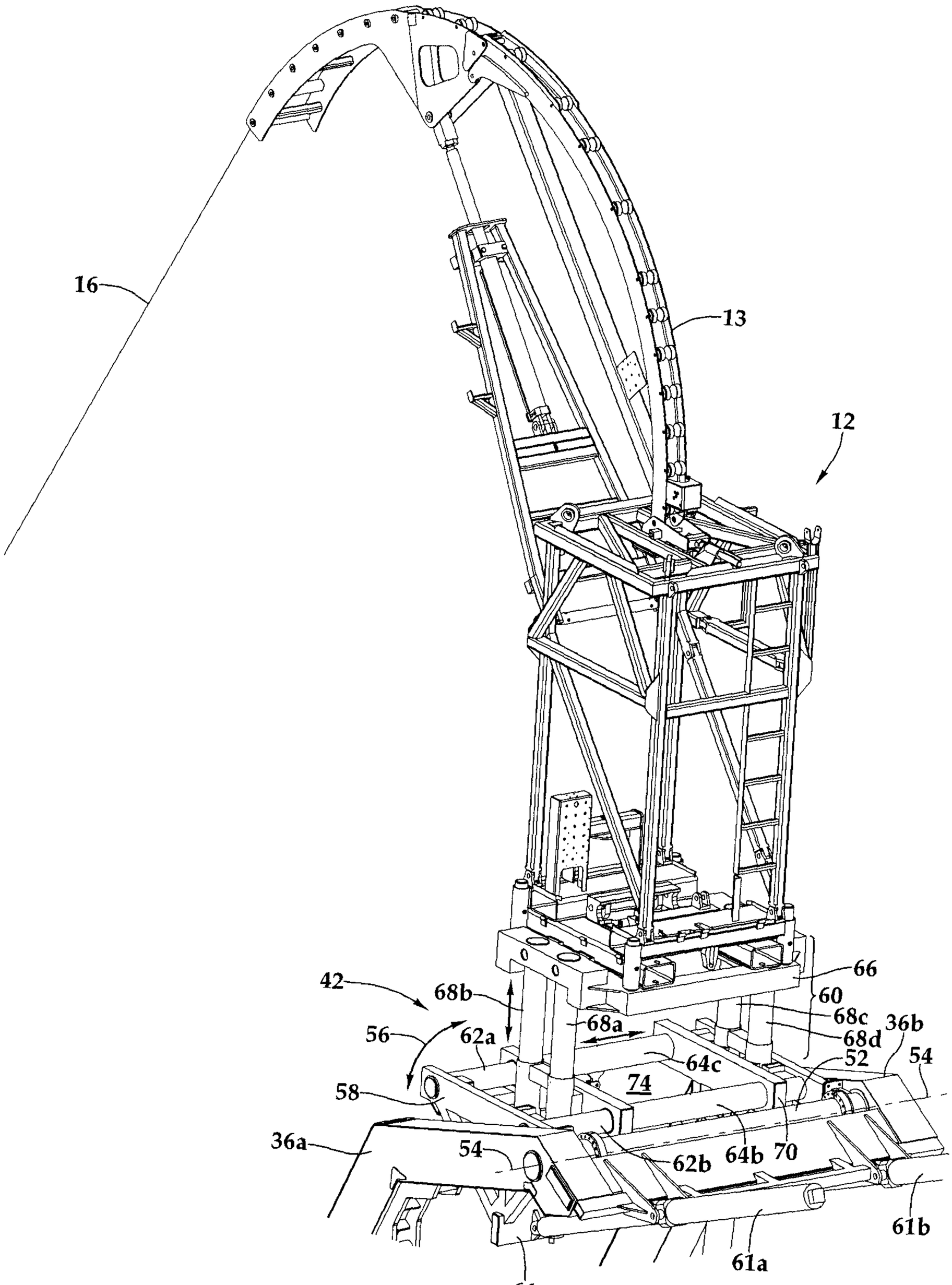
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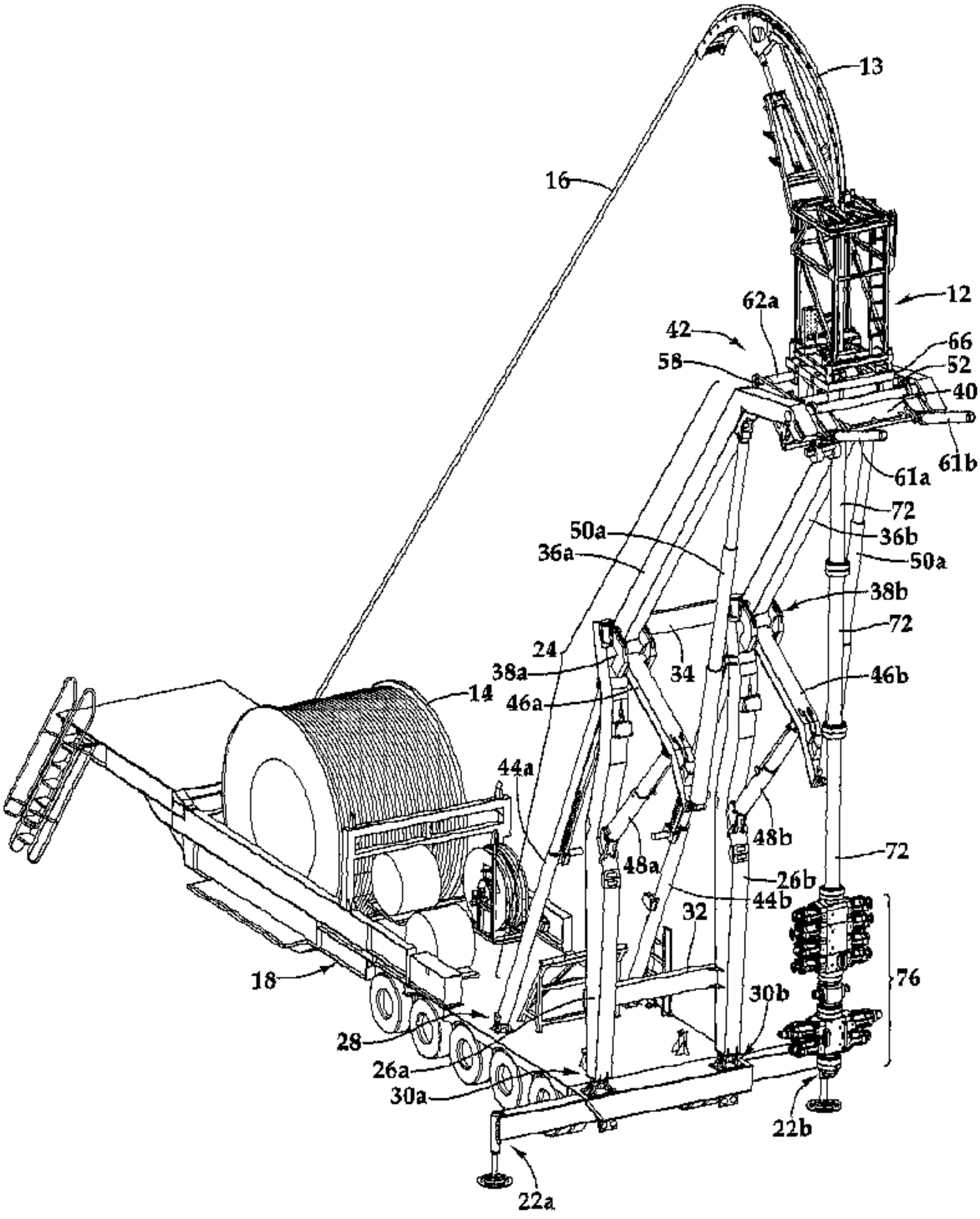
Fig.5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