(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
1 December 2011 (01.12.2011)

PCT

(10) International Publication Number
WO 2011/148184 A2

(51) International Patent Classification:
E21B 33/072 (2006.01)

(21) International Application Number:
PCT/GB2011/050997

(22) International Filing Date:
26 May 2011 (26.05.2011)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
1008845.8 26 May 2010 (26.05.2010) GB

(71) Applicant *(for all designated States except US)*: **QUALITY INTERVENTION AS** [NO/NO]; Sognefjordvegen 10, N-6899 Balestrand (NO).

(71) Applicant *(for MG only)*: **PIÉSOLD, Alexander James** [GB/GB]; St Bride's House, 10 Salisbury Square, London EC4Y 8JD (GB).

(72) Inventor; and
(75) Inventor/Applicant *(for US only)*: **ALVAERN, Jostein** [NO/NO]; Sognefjordvegen 10, N-6899 Balestrand (NO).

(74) Agent: **DEHNS**; St Bride's House, 10 Salisbury Square, London, Greater London EC4Y 8JD (GB).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *without international search report and to be republished upon receipt of that report (Rule 48.2(g))*

WO 2011/148184 A2

(54) **Title**: WELL INTERVENTION METHOD AND APPARATUS

(57) **Abstract**: A method of installing a well intervention component (54) for well intervention, comprising lowering the component towards an intervention riser or a surface flow head (200), and connecting the component to the intervention riser or surface flow head, wherein the component is guided into position by a pair of guide lines (208, 210) fixed relative to the intervention riser or surface flow head.

38.105840

Well Intervention Method and Apparatus

The invention relates to a well intervention method and apparatus. In some aspects it relates to well interventions using wireline equipment or coiled tubing equipment. In other aspects it relates to wire line interventions only. The well may be a subsea well or a land-based well.

Typically, wireline operation equipment includes a wireline blow-out preventer or WL BOP, a lubricator, a grease head and miscellaneous downhole equipment, for example measuring probes.

Normally, a drilling derrick and a top drive are disposed on a drilling rig, which also comprises a drill floor, drawworks and miscellaneous other, associated equipment types.

If wireline operations are to be carried out from a land-based structure or from a seabed-affixed structure offshore, for example from a seabed-affixed platform or a jack-up platform/rig, the wireline operation equipment is connected to a wellhead on the surface of the sea or the land. In this type of situation, a full well pressure will exist up to the wellhead. It is therefore necessary to connect the blow-out preventer, lubricator, etc. to the wellhead before allowing downhole equipment to be introduced in the well.
Such wireline operations may also be carried out from floating vessels. Such a floating vessel may be comprised of a drilling vessel, for example a floating drilling rig or a drilling ship, provided with a drilling derrick, drill floor, drawworks, top drive, heave-compensation equipment for the top drive as well as equipment connected thereto, moon pool, etc. In this context, a riser is used to connect the floating vessel to a subsea well. This riser is assembled into a pipe string from several individual pipes.

At its upper end on surface, such a riser will typically be connected to a so-called surface flow head or a surface flow tree disposed on, for example, a drilling vessel. At its lower end, the riser is typically connected to a wellhead on a sea floor. Via this wellhead, the riser may be connected to, for example, a production tubing extending down to a subterranean reservoir formation, for example an oil production formation.

In this type of situation, full well pressure will exist up through the riser and possibly onwards to a surface flow head (if mounted at the upper end of the riser). It is therefore necessary to connect said blow-out preventer, lubricator, etc. to the riser, possibly to the surface flow head, before allowing downhole equipment to be introduced in the riser and carried down into the well.

During the rigging up for a wireline operation in a well, it has been customary to use various winches and cables, including wires and chains, to lift and steer wireline operation equipment in place above a wellhead or a riser, possibly a flow head or tree mounted thereon, for connection or insertion therein.

During rigging up, the blow-out preventer is first lifted and steered in place on the wellhead or the riser, possibly on the flow tree, and is fixed thereto. Then the lubricator and the downhole equipment is lifted and steered in place on and within, respectively, the blow-out preventer, after which the wireline operation may be initiated.

Initially, derrick-mounted and air-driven winches may be used together with associated lifting wires and steering wires for lifting and steering, respectively, the equipment in place under the top drive. A chain hoist, which is mounted under the top drive, is then used to lower the equipment on a chain and vertically down towards the wellhead or the riser, possibly the flow head or tree, and along a centre line thereof.

The rigging down of such wireline operation equipment takes place in a similar manner, but in the opposite order.

If the wireline operation is to be carried out from a floating vessel, the wireline operation equipment must be compensated with respect to wave-related, vertical movements (heave) of the vessel. It is therefore customary to connect the riser, possibly an associated flow head or tree, to a heave-compensated top drive via intermediate tension elements. Typically/ such tension elements are comprised of so-called lifting bails. The riser, possibly an associated flow head or tree as well as downhole equipment inserted therein, will thus be heave-compensated. Given that heave-compensation equipment for the top drive and the system associated with the heave-compensation equipment is known, this will not be described in further detail herein.

Due to heave-movements of the vessel, the lubricator may be suspended temporarily in the top drive, for example by means of a sling connection, while the downhole equipment is lifted and inserted into the blow-out preventer. At the same time, the downhole equipment is connected to a wireline (cable) for wireline operation, and the wireline extends through the lubricator, then via a disc wheel/sheave mounted underneath the top drive, and further down to a drum with associated driving gear mounted on the vessel.

The above-mentioned vertical and horizontal movements of such wireline operation equipment are subject to a number of disadvantages.

Among other things, such movements require a relatively extensive operation of said lifting- and steering equipment. The movements also require many disconnections and connections of the wireline operation equipment to allow for the transfer thereof, as described above. Many of these disconnections and connections are carried out manually by virtue of drilling personnel being lifted, by means of so-called riding belts, up to the particular connection site in the drilling derrick. However, the latter work tasks are associated with significant danger in terms of safety for the drilling personnel located within the drilling derrick. Moreover, said movements as well as the disconnections and connections are relatively time-consuming, which results in increased rig time and thus increased rig costs.

Viewed from a first aspect the invention provides a method of installing a well intervention component for well intervention, comprising lowering the component towards an intervention riser or a surface flow head, and connecting the component to the intervention riser or surface flow head, wherein the component is guided into position by a pair of guide lines fixed relative to the intervention riser or surface flow head.

The invention also provides apparatus for installing a well intervention component for well intervention, comprising a pair of guide lines which in use are to be fixed relative to an intervention riser or surface flow head, and a pair of guide members which in use are to be fixed relative to the component and each for slidable engagement with a respective guide line, whereby in use when the guide lines are tensioned they can serve to guide the component into position above the intervention riser or surface flow head.

By providing guide lines which are fixed relative to an intervention riser or surface flow head, the component can be guided into position. It is not necessary for personnel to be lifted up to the connection site to assist with the guidance.

The method and apparatus are applicable at least to well interventions carried out using rigs on floating or semi-submersible vessels, where heave movements of the rig relative to the intervention riser or surface flow head create particular problems for man-riding operations. The method and apparatus are also applicable to well interventions carried out using rigs on a land-based structure or on a seabed-affixed structure offshore, where there is still a safety benefit in avoiding or reducing the need for personnel to be present at the connection site. The method and apparatus are applicable above the sea (or other body of water) surface in the case of an offshore intervention, or above the land surface in the case of a land-based intervention, i.e. in both cases, not sub-sea.

Although this specification describes mainly wire line interventions, the method and apparatus of the first aspect of the invention is also applicable to coiled tubing interventions.

The component may for example be a blow-out preventer or a wire line lubricator.

The guide lines are preferably spaced apart where they are fixed relative to the intervention riser or surface flow head. The use of two spaced apart guide lines can provide vertical and rotational alignment of the component as it is lowered into position. The guide lines are preferably held apart at a location above the component by a spreader member. This can provide that the guide lines are generally parallel to each other when tensioned. During lowering of the component towards the intervention riser or the surface flow head, the component is lowered away from the spreader member. In preferred embodiments, the guide lines are static during lowering. They are not driven, nor wound onto, or unwound from, a winch or the like. They may hang down from the spreader member, providing guidance for the component as it is lowered, without vertical movement of the guide lines. It is desirable that the spreader member is relatively short in the vertical direction, in order to avoid occupying too much vertical space in the region between e.g. a top drive and the intervention riser or surface flow head. The spreader member may have an upper attachment point at a central position for attachment to a lifting wire, and two longitudinally spaced lower attachment points each for attachment to a respective guide line. The spreader member is preferably shorter than the spacing between the two tension elements (such as lifting bails) typically supporting the intervention riser or surface flow head from above.

A preferred method comprises lifting the component to a height above the intervention riser or surface flow head and horizontally offset therefrom, and then bringing the component into vertical alignment with the intervention riser or surface flow head. The lifting may be carried out by a lifting mechanism. Preferably, the guide lines are kept slack during said lifting of the component to a height above the intervention riser or surface flow head and horizontally offset therefrom, and are tensioned as the component moves into vertical alignment with the intervention riser or surface flow head. These steps may also be performed by the lifting mechanism.

The component may be brought into rough vertical alignment by horizontal movement of a support position of a lifting wire or the like, and into more precise vertical alignment by tensioning of the guide lines.

In a preferred method, during guiding of the component the weight of the component is supported by a first hoisting device and the guide lines are tensioned by a second hoisting device. Thus the lifting mechanism may comprise the first and second hoisting devices. The second hoisting device may support the guide lines at a support position which is horizontally moveable. The first hoisting device may support the component at a support position which is horizontally moveable. Thus, the component may be attached to a lifting wire hanging from the first hoisting device at a position horizontally offset from the intervention riser or surface flow head, for example on a rig or vessel floor, raised by the first hoisting device to a position higher than the intervention riser or surface flow head, and then horizontally transferred into general vertical alignment with the intervention riser or surface flow head. The support position for the guide lines may be horizontally off centre, during attachment of the component to the e.g. lifting wire of the first hoisting device. It may be off centre towards the support position for the weight of the component, e.g. towards the lifting wire of the first hoisting device. This can keep all the equipment to one side of the intervention riser or surface flow head and any lifting bails, etc., helping with avoiding any entanglement of the guide lines with such centrally positioned equipment. Once the component is at a height above the intervention riser or surface flow head and is ready for horizontal transfer, the support positions for both the first and the second hoisting device can be horizontally moved to the centre.

The first and second hoisting devices may be provided on a common support member. The common support member may be part of the lifting mechanism mentioned above. In certain embodiments, the lifting mechanism is a lifting beam provided with first and second winches. These winches and the beam may be arranged so that the support position for the guide lines and the support position for e.g. a lifting wire to support the weight of the component are horizontally moveable along the beam.

In a preferred method, the component is guided into position by a pair of guide members each slideably engaging a respective guide line. The guide members may be guide tubes. They may have funnel shaped upper and lower openings to reduce abrasion during sliding engagement with the guide lines and/or during the application of horizontal forces to the guide lines or guide members. Each guide member is preferably arranged to allow a respective guide line to engage laterally therein. This will avoid the need to thread the guide line longitudinally through the guide member. The guide member may be laterally openable to allow such lateral entry and removal. It may be then closed, preferably in locking manner.

The component, for example a blow-out preventer, may be connected to the intervention riser or surface flow head via a first connector part provided on the intervention riser or surface flow head and a second connector part provided on the component. The first connector part may be an integral part of the intervention riser or surface flow head, and the second connector part may be an integral part of the component. In preferred arrangements, the connector parts belong to a connector which is provided separately of the intervention riser or surface flow head, and separately of the component. The first connector part may be a connector drum and the second connector part may be a connector stinger.

The guide lines may be fixed to the intervention riser or surface flow head. Preferably they are fixed to the first connector part. This means that known connector products, for example quick latch connectors, may be used to provide the first and second connector parts, with appropriate modification of the first connector part (e.g. a connector drum) to provide for the guide lines to be fixed thereto. The intervention riser or surface flow head need not be modified.

The fixing point for each guide line will normally be below the location to which the component is to be lowered. The guide lines may for example be fixed at diametrically opposite points on the intervention riser or surface flow head or on the first connector part.

The guide members may be provided on the second connecting part. This again allows for existing connector products to be appropriately modified by the addition of guide members. In one example, the guide members are provided on a connector stinger. Modification of the component to include the guide members can be avoided if desired. The guide members may be provided at diametrically opposite points on the second connecting part.

At least one of the first and second connector parts may be remotely controlled. This will enable connection to be effected without having to lift personnel to the connection site for manual connecting operations. The remote control may be effected via a hydraulic hose. Thus at least one of the first and second connector parts may have a hydraulic connection for connecting to a hydraulic hose. The connection may be such that it is releasable by the application of hydraulic pressure. The connection may be effected by lowering the second connector part into engagement with the first connector part, e.g. a stinging connection. The

connection may be effected using gravity as the force which brings the second connector part into engagement with the first connector part. The connection may then be provided by the connector parts latching together. The need for local manual assistance to make the connection may be avoided.
An example of a connector suitable for use in preferred embodiments of the invention is a JU74 Hydraconn (trade mark) quick latch connector as made by Texas Oil Tools.

In known wire line intervention procedures, components are connected to the intervention riser or surface flow head by a connector which requires personnel to be present at the connection site. Typically there are bolts to be tightened or other threaded connections to be made. We have recognised that the presence of such personnel can be avoided if a remotely controlled connecting arrangement is used.

Viewed from a second aspect the invention provides a method of installing a component for a wire line intervention, comprising lowering the component towards an intervention riser or a surface flow head, and connecting the component to the intervention riser or surface flow head via a first connector part provided on the intervention riser or surface flow head and a second connector part provided on the component, wherein at least one of the first and second connector parts is remotely controlled.

The invention also provides apparatus for installing a component for a wire line intervention, comprising a connector for connecting the component to an intervention riser or surface flow head, the connector having a first connector part which in use is provided on the intervention riser or surface flow head and a second connector part which in use is provided on the component, wherein at least one of the first and second connector parts is remotely controllable.

With such an arrangement a component can be connected to the intervention riser or surface flow head without the need for the presence of personnel at the connection site. This can provide safety and efficiency improvements.

The method and apparatus are applicable at least to wire line well interventions carried out using rigs on floating or semi-submersible vessels, where heave movements of the rig relative to the intervention riser or surface flow head create particular problems for man-riding operations. The method and apparatus are also applicable to wire line well interventions carried out using rigs on a land-based structure or on a seabed-affixed structure offshore, where there is still a safety benefit in avoiding or reducing the need for personnel to be present at the connection site. The method and apparatus are applicable above the sea (or other body of water) surface in the case of an offshore intervention, or above the land surface in the case of a land-based intervention, i.e. in both cases, not sub-sea.

The remote control may be effected using a hydraulic hose. Thus a connector comprising the first and second connector parts may have a hydraulic connection point for connecting to a hydraulic hose.

It will be appreciated that any of the features described above in relation to the first aspect of the invention, separately or in any combination, may also be provided as optional features with the second aspect of the invention.

Certain preferred embodiments of the invention will now be described by way of example and with reference to the accompanying drawings, in which:

Figure 1 shows a side elevation of miscellaneous equipment, including a beam according to the first embodiment of the invention, disposed above a drill floor on a floating drilling vessel during rigging up of equipment for wireline operation in a subsea well;

Figure 2 shows a front elevation of the equipment shown in figure 1;

Figure 3 shows a side perspective of the equipment shown in figures 1 and 2;

Figure 4 shows a bird's-eye view of the equipment shown in figures 1, 2 and 3;

Figure 5 is a front perspective, at a larger scale, of the beam according to the invention, among other things;

Figures 6-10 show a second embodiment of a beam having two separate, remote-controlled winches structured so as to be movable in the longitudinal direction of the beam;

Figures 11-15 show principal drawings of a third embodiment of a beam having a remote-controlled winch fixed to the beam, whereas a remote-controlled support point for a lifting line is structured so as to be movable in the longitudinal direction of the beam; and

Figures 16-20 show a fourth embodiment of a beam provided with two separate, remote-controlled winches fixed to the beam, whereas two separate, remote-controlled and winch-associated support points for a lifting line each are structured so as to be movable in the longitudinal direction of the beam.

Figures 21a and 21b are respectively front and side elevation views of apparatus for installing components at the upper end of a riser;

Figures 22a and 22b through to 32a and 32b are views similar to those of Figures 21a and 21b showing the apparatus at various stages during component installation (or rigging up);

Figures 33a and 33b, 34a and 34b, and 35a and 35b are similar views showing the apparatus during removal of the components (or rigging down);

Figure 36 is a schematic view of a connector;

Figure 37a is a schematic view of a spreader member;

Figure 37b is a schematic view of part of the apparatus of Figure 21a and 21b; and

Figure 38 is a perspective view of a blow-out preventer during installation.

In order to facilitate the understanding of the invention, some of the figures are depicted in a simplified manner and show only the most essential elements of the present beam and associated equipment. The shape, relative dimensions and mutual positions of the elements may be somewhat distorted. Hereinafter, identical, equivalent or corresponding details in the figures will be given substantially the same reference numerals.

Figures 1-5 show an assembly of miscellaneous equipment disposed within a drilling derrick (not shown) and above a drill floor 2 on a floating vessel (not shown). In this context, this equipment is used for wireline operation in a subsea well (not shown) connected to the vessel via a riser 4 extending partway above the drill floor 2. The riser 4 extends from the vessel and down to a wellhead (not shown) placed on a sea floor.

Said equipment comprises, among other things, a top drive 6 which is fixed to a heave-compensated support frame 8, and which may be raised or lowered by means of a heave-compensated drawworks comprising, among other things, a travelling block 10 and associated wires 12. Heave-compensation of this type constitutes prior art and will not be described in further detail herein.

The figures also show a first embodiment of a beam 14A disposed in a releasable manner, and in its position of use, between the top drive 6 and the drill floor 2. At its upper side, the beam 14A is provided with two first lifting lugs 16, 18, each of which is releasably connected to a lifting bail 20, 22. These lifting bails 20, 22 extend in a parallel manner up to the top drive 6 and are releasably connected to lifting lugs thereon. Midway on each of its longitudinal sides, the beam 14A is also provided with a second lifting lug 24, 26, which is releasably connected to a respective lifting bail 28, 30. These bails 28, 30 extend in a parallel manner down towards the drill floor 2 and are releasably connected to a connection sleeve 32 attached around an upper end 33 of the riser 4. In this manner, the beam 14A is structured for releasable connection to and between the top drive 6 and the lifting bails 28, 30. By so doing, the beam 14A is also structured in a manner allowing it to extend transversely relative to a centre line for the upper end 33 of the riser 4.

The weight of the riser 4 and the associated equipment is transferred to the heave-compensated top drive 6 and drawworks via said connection sleeve 32, whereby the riser 4 is held in constant tension.

Figures 1-5 also show the beam 14A provided with two separate, remote-controlled, hydraulic winches 34, 36 having each a respective lifting wire 38, 40 with a lifting hook 38', 40' for vertical movement of miscellaneous equipment for wireline operation in the subsea well. In this embodiment, each winch 34, 36 is also structured so as to be movable along a respective longitudinal half of the beam 14A for individual, remote-controlled transfer along a joint path of motion 42 in the longitudinal direction of the beam. By so doing, each winch 34, 36 may be moved horizontally relative to said centre line when the beam 14A is in its position of use. In order to be able to carry out such an individual transfer, each winch 34, 36 is connected to a manoeuvring device in the form of a hydraulically driven piston in a hydraulic cylinder (not shown) incorporated into the beam 14A. Hydraulic motive power and control signals for the winches 34, 36 and their pistons is supplied from corresponding devices, connections and systems of types known per se, and which will not be described in further detail herein. The figures only show the respective hydraulic couplings emerging from the winches 34, 36. Moreover, each movable winch 34, 36 forms a support point for the respective lifting wire 38, 40.

Further, the figures show a disc wheel 48 connected to the lower side of the beam 14 via a wire 50. A wireline 52 for insertion of equipment in the well is carried over the disc wheel 48 and onwards down to a drum with associated driving gear (not shown) on the drilling rig.

Figures 1-5 also depict a certain transfer sequence of miscellaneous equipment for wireline operation. As such, figure 1 shows a blow-out preventer 54 for wireline operations placed on the drill floor 2 and beside the upper end of the riser 4. Figures 2-4 show various perspectives of the blow-out preventer 54 after having been lifted, steered in place and rigidly mounted on top of the upper end of the riser 4 by means of the beam 14A and one of its winches 34, 36. Figures 2-4 also show the winch 34 moved to one end of the beam 14A whilst the lifting wire 38 thereof, via suitable connection equipment, is being releasably connected to a lengthy lubricator 56 lying on the drill floor 2 with said wireline 52 inserted through it. Figure 5, however, shows the lubricator 56 with the wireline 52 upon having lifted, by means of the movable winch 34 and the lifting wire 38, this equipment up underneath the beam 14A and steered it in towards the centre line of the riser 4. The next step (not shown) is to lower the equipment down onto the blow-out preventer 54 for rigid mounting thereto. Via suitable connection equipment, the other, movable winch 36 with its lifting wire 40 may, for example, be used to lift and move a three-part downhole tool 57 (cf. figures 2-4) into the blow-out preventer 54 whilst the lubricator 56 is temporarily suspended in the lifting wire 38 of the other winch 34.

Referring to figures 6-10, a second embodiment of a beam 14B will now be shown.

Also in this second embodiment, the beam 14B is provided with two separate, remote-controlled, hydraulic winches 34, 36, each having a respective lifting wire 38, 40 and a respective lifting hook 38', 40'. Each lifting wire 38, 40 emerges from its winch 34, 36 via a support point which, in this embodiment, assumes the form of a respective wire pulley 58, 60, which forms a part or a portion of each winch 34, 36. Such a wire pulley 58, 60, however, is not a prerequisite. In other embodiments, the lifting wire 38, 40 may emerge directly from the wire drum of the winch 34, 36, whereby the wire drum forms said support point for the lifting wire 38, 40.

Each winch 34, 36 is structured so as to be movable along a respective longitudinal half of the beam 14B for individual, remote-controlled transfer along a joint path of motion in the longitudinal direction of the beam. Each winch 34, 36 may thus be moved horizontally when the beam 14B is in its position of use. For such individual transfer, each winch 34, 36 is connected to a respective trolley 62, 64 comprising parallel sets of wheels 66, 68 for movement along parallel running tracks 70, 72. These running tracks 70, 72 form said joint path of motion for the winches 34, 36. For remote-controlled propulsion along this path of motion, each winch 34, 36 is provided with a toothed gear motor (not shown) for cog wheel engagement with a corresponding cog railway (not shown) disposed underneath the beam 14B in the longitudinal direction thereof.

The beam 14B, including the winches 34, 36 etc., are incorporated in a protective beam housing 74. At the upper side thereof, the beam housing 74 is provided with a cross-shaped connector 76 with a centred, female thread portion 78 for releasable connection to a mail thread portion at the end of a connecting pipe (not shown). This connecting pipe may be connected to a pipe coupling 79 at the lower side of said top drive 6. Such a connecting pipe and connector 7 6 replace the connecting bails 20, 22 and the two first lifting lugs 16, 18, respectively, shown in the embodiment according to figures 1-5.

Furthermore, figure 9 shows the two winches 34, 36 disposed each at a respective end of the beam 14B. Figure 10, however, shows the winch 34 after having been moved along the beam 14B to a position in which the lifting wire 38 is located approximately midway on the beam 14B. Figures 9 and 10 also show fasteners in the form of eye bolts 81 releasably attached within corresponding holes on the lower side of the beam 14B. Such eye bolts 81 may, for example, be used to connect a wireline disc wheel 48 to the lower side of the beam 14B via a wire 50, as shown in figures 1-5. If potentially needed, the eye bolts 81 may also be used for suspension of, for example, an air-driven winch or a chain hoist.

Referring to figures 11-15, a third embodiment of a beam 14C will now be shown. The figures are of principal nature and show only the most essential elements of the embodiment.

In this third embodiment, the beam 14C is provided with one remote-controlled, hydraulic winch 34 fixed at one end of the beam 14C. A lifting wire 38 emerges from the winch 34 and is first carried around half the circumference of a non-movable disc wheel 80 which, via a mounting bracket 82, is fixed at the opposite side of the beam 14C. The lifting wire 38 then extends in the direction of the winch 34 and around half the circumference of a movable hook-height adjustment disc wheel 84 and further around a quarter of the circumference of a movable support disc wheel 86 disposed closer to the non-movable disc wheel 80. By so doing, the lifting wire 38 will extend vertically from the support disc wheel 86 when the beam 14 is in its position of use. Thus, the support disc wheel 86 forms a movable support point for the lifting wire 38. Furthermore, the path of the lifting wire 38 from the non-movable disc wheel 80 and onwards to the movable support disc wheel 86 is indicated with a dotted line in figures 11 and 13-15.

Both the hook-height adjustment disc wheel 84 and the support disc wheel 86 are structured so as to be movable in the longitudinal direction of the beam 14C and along a joint path of motion comprising two parallel U-rails 88, 90 having openings facing each other, as shown in figures 11 and 12.

Further, the hook-height adjustment disc wheel 84 and the support disc wheel 86 are connected to a respective trolley 92, 94 comprising parallel sets of wheels 96, 98 for movement within and along respective U-rails 88, 90, as shown in figure 12.

The trolleys 92, 94 are structured for cooperation with a motorized pitch rack guide connected to the beam 14C. Each trolley 92, 94 is fixedly connected to a corresponding nut device 100, 102, for example a ball nut, disposed around a corresponding thread portion 104, 106 of a pitch rack 108. This pitch rack 108 is arranged in the longitudinal direction of the beam 14C and is rotatably connected to two support bearings 110, 112 attached to the beam 14C. For rotation the pitch rack 108 is connected to a remote-controlled, hydraulic motor 114 disposed at the one end of the beam 14C. Such a motorized pitch rack guide 102, 108 may also be used for propulsion of the winches 34, 36 used in context of the beams 14A and 14B according to the first and second embodiment of the invention.

The thread portions 104, 106 are threaded in the same direction, whereby the trolleys 92, 94 will move in the same direction upon rotation of the pitch rack 108. The thread portion 104, however, is finely threaded, whereas the thread portion 106 is coarsely threaded having twice the thread pitch relative to that of the finely threaded portion 104. When the pitch rack 108 is rotated, this construction brings about the advantageous result that the trolley 92 (and thus the hook-height adjustment disc wheel 84) will move at half the speed along the pitch rack 108 as compared to the speed of the trolley 94 (and thus the support disc wheel 86 and its vertically extending lifting wire 38) along the pitch rack 108. This causes the lifting hook 38' to be held at a constant distance from the beam 14C when the trolleys 92, 94 are being moved horizontally, and without simultaneously carrying out any feeding of lifting wire 38 from or to the winch 34. Such movement of the trolleys 92, 94 at a constant hook-height is shown in figures 14 and 15.

In this context, it is obviously possible to omit the hook-height adjustment disc wheel 84 and associated components and to use a pitch rack having only one uniformly threaded thread portion. This, however, will bring about the effect that the lifting hook 38' will change its distance from the beam 14C when the trolleys 92, 94 are being moved horizontally without simultaneously carrying out feeding of lifting wire 38 from or to the winch 34.

Furthermore, the U-rails 88, 90, the trolleys 92, 94, the hook-height adjustment disc wheel 84, the support disc wheel 86, the pitch rack 108, the nut devices 100, 102, the support bearings 110, 112 and the hydraulic motor 114 may advantageously be assembled in a joint module, for example a replaceable cassette, for simple and quick replacement, if required.

Referring to figures 16-20, a fourth embodiment of a beam 14D will now be shown.

In this fourth embodiment, two beams 14C and 14C according to the preceding, third embodiment are assembled in parallel, but oppositely directed, within a joint beam 14D. Each of the two beams 14C, 14C contains the same components and have the same mode of operation as described in context of the third embodiment according to the invention. As such, each beam 14C, 14C will include, among other things, a respective, remote-controlled, hydraulic winch 34a, 34b with an associated lifting wire 38a, 38b and lifting hook 38a', 38b', a movable hook-height adjustment disc wheel, a support disc wheel as well as associated components (not shown in figures 16-20). The winches 34a, 34b are disposed diagonally opposite each other at their own end of the combined beam 14D.

The beams 14C, 14C with associated components are incorporated in a protective beam housing 116; this in resemblance to the beam 14B according to the above-mentioned, second embodiment of the invention. Correspondingly, the upper side of the beam housing 116 is provided with a cross-shaped connector 7 6 with a centred, female thread portion 78 for releasable connection to a connecting pipe (not shown), which may be connected to the lower side of said top drive 6.

Also figures 16, 17, 19 and 20 show eye bolts 81 releasably attached to the lower side of the beam 14D for possible suspension of, for example, a wireline disc wheel 48, an air-driven winch or a chain hoist, as shown in figures 1-5.

The method of installing components for a wireline intervention on a rig, will be described with reference to Figures 21a and 21b through to Figures 32a and 32b.

In some of these figures certain details are omitted, particularly in the "b" figures. Referring to Figures 21a and 21b, a lifting mechanism or beam 14D based on the fourth embodiment described above is supported by lifting bails 20, 22 from a top drive (not shown in these drawings). Longer lifting bails 28, 30 extend downwardly from a central position on the beam 14D and are connected to a surface flow head 200 on top of the upper end 33 of a riser 4.

The beam 14D is provided at one end with a winch 34a and at the other end with a winch 34b (corresponding to the winches of the fourth embodiment shown in figures 16 - 20). A lifting wire 38a attached to the winch 34a is supported at a horizontally movable support position 238, by a support disc wheel 86 as described in relation to the third and fourth embodiments above. Similarly, a lifting wire 38b attached to the winch 34b is supported at a horizontally movable support position 240, by another support disc wheel 86. A lifting hook 38a' is attached to the end of the lifting wire 38a, and a lifting hook 38b' is attached to the end of the lifting wire 38b.

A connector 202 is attached to the top of the surface flow head 200. The connector has a lifting/testing cap 204. A lifting line 206 is attached to the lifting/testing cap 204. A pair of guide lines 208, 210 are attached at diametrically opposite points to the connector 202. Both the lifting line 206 and the guide lines 208, 210 have been preinstalled on the cap and connector respectively before the rigging up operation. This can conveniently be done on the drill floor 2.

A hydraulic hose 212 is connected to the connector 202 to allow remote control thereof. The hydraulic hose 212 remains attached to the connector 202 during the later procedure but is not shown in the drawings. This hose is in place to provide remote control of the connector, thereby avoiding the need for a human operator to access the connector for manual connection or disconnection operations.

In Figures 22a and 22b, winch 34b has been operated to lower lifting wire 38b and lifting hook 38b', to allow lifting line 206 to be attached to the lifting hook 38b'.

The winch 34b is operated to lift the hook 38b' and the support position 240 for the lifting wire 38b is transferred horizontally along the beam 14D, to the central position shown in Figure 23a (in which lifting bails 28, 30 have been omitted for clarity).

In order to allow the removal remove of the lifting/testing cap 204 from the connector 202, the hydraulic hose 212 (see Figure 21a) which has been previously connected to the connector applies a hydraulic pressure. Winch 34b is operated to tension lifting wire 38b so as to remove the lifting/testing cap 204 from the connector 202. Figures 24a and 24b show the lifting/testing cap 204 when so removed.

The lifting/testing cap 204 is put to one side on the rig to allow winch 34b and its hook 38b' to carry out other operations. Figure 25a shows hook 38b' attached to one of the guide lines 210. This attachment is provided by the spreader bar shown in Figure 37, but not shown in Figure 25a or the other Figures.

Referring to Figure 37a this shows the spreader bar 214. Centrally located on an upper face is an eyelet 216 for receiving the hook 38b'. On the underside of the spreader bar an eyelet 218 is provided at one end for attachment of the guide line 208, and an eyelet 220 is provided at the other end for attachment of guide line 210.

Further details concerning the spreader bar and other parts of the apparatus are shown in Figure 37b. The figure shows the apparatus in the condition corresponding to Figures 26a and 26b, described further below. The surface flow head 200 is disposed on top of the upper end 33 of the riser. The surface flow head 200 is supported by the lifting bails 28, 30 which extend downwardly from the beam 14D (not shown in Figure 37b), which is itself supported by lifting bails 20, 22 from a top drive, as described above. The pair of guide lines 208, 210 are attached at opposite sides of the connector 202 which is itself attached to the top of the surface flow head 200. The guide lines 208, 210 are in tension and extend upwardly from the connector 202 to the spreader bar 214, where they are held spaced apart from each other. The spacing of the guide lines 208, 210 where they are connected to the connector 202 and where they are connected to the spreader bar 214 is the same, so that the guide lines extend parallel to each other. Each guide line 208, 210 passes through a pair of guide tubes provided on a blow-out preventer (BOP) 54 at a vertical spacing from each other. Thus two pairs of guide tubes 222 are provided, one on each side of the BOP 54.

At its lower end the BOP 54 has a connector stinger 228 for engagement in the connector 202 when BOP 54 is lowered. At its upper end, the BOP 54 has a connector 202a and a lifting cap 204 which provides an eyelet for receiving the lifting hook 38a' attached to the lower end of the lifting wire 38a. The lifting wire 38a is attached to the winch 34a provided on beam 14D (not shown in Figure 37b). Spreader bar 214 attaches via hook 38b' to lifting wire 38b, attached to winch 34b on beam 14D. The spreader bar 214 is thus located above the BOP 54 and below the beam 14D.

As can be seen in Figure 37b, when BOP 54 is lowered by lowering lifting wire 38a, it is guided by the guide lines 208, 210 down towards the surface flow head 200 and away from the spreader bar 214. The guide lines are static during the guiding process.

In Figure 25a, only the nearest guide line 210 is shown. This extends from hook 38b' through a guide member in the form of guide tubes 222 on one side of the blow-out preventer (BOP) 54. The guide line 210 extends from the guide tubes 222 to its end which is attached to connector 202. Guide line 208, which is not visible in Figure 25a, is attached at the other end of the spreader bar 214 via eyelet 218, and extends through the guide tubes 222 on the diametrically opposite side of the BOP 54 from the visible guide tubes 222, and then extends to its fixed attachment to connector 202.

A hydraulic hose 224 is attached to the connector 202a at the upper end of the blow-out preventer (BOP) 54 for remote control and operation. This connector 202a is provided with the lifting cap 204 to which hook 38a', suspended from lifting wire 38a and winch 34a, is attached.

The attachments shown in Figure 25a are carried out on the drill floor 2. The guide line 210 attachment to hook 38b', and the attachment of hook 38a' to lifting/testing cap 204 are conveniently carried out at the drill floor level by using the winches to lower the hooks. The guide tubes 222 on the opposite sides of the BOP are arranged to allow lateral insertion of the guide lines 208, 210 by being laterally openable and closable. The guide tubes are arranged to be lockable in the closed position. Because they can be opened to allow lateral entry of the guide lines 208, 210 respectively, it is not necessary to thread these lines longitudinally through the tubes.

When the BOP 54 is on the drill floor 2 a rope 226 is also attached to the BOP, to assist guiding and turning of the BOP when it is lifted off the drill floor. In addition, the connector stinger 228 is attached to the bottom of the BOP 54 when the BOP is on the drill floor.

Once the above-described preparation of the BOP 54 has been completed on the drill floor, winch 34a is operated to lift hook 38a' and raise the BOP above the drill floor 2. This is shown in Figures 26a and 26b. At this time, winch 34b is operated to raise the spreader bar 214 (not shown in Figures 26a and 26b but shown in Figures 37a and 37b) and the corresponding ends of the guide lines 208, 210. This is done so as to keep the guide lines slightly slack, but sufficiently taut to reduce the chance of them becoming entangled with other equipment.

The support beam 14D is operated to transfer horizontally the support positions 238,240 of the lifting wires 38a, 38b to the centre of the beam 14D, so that both lifting wires extend centrally between the bails 28 and 30. This is seen in Figures 27a and 27b (the bails 28, 30 are omitted from Figure 27a for clarity). Winch 34b is operated in the transition between the stages shown in Figures 26 and 27 to tension the guide lines 208, 210 and thereby stably support the BOP 54 in a central position. In case it is necessary, guide rope 226 may be used, for example, to turn the BOP 54 before the guide lines 208, 210 have been fully tensioned.

Centering of the BOP 54 over the surface flow head 200 is thus achieved by a combination of centering the support position 240 for hook 38b' on the beam 14D and tensioning the guide lines 208, 210. The guide lines are then held in tension between their attachment points to the connector 202 on top of the surface flow head 200 and their attachment to the spreader bar 214. This enables the BOP 54 to be vertically aligned without the need for any human operator to be close to the equipment being connected, which would normally require the operator to be supported in the air in a man-riding sling.

With the BOP 54 and other components centrally aligned, the winch 34a is operated to let them be lowered under their own weight. During lowering, the BOP 54 is guided by the guide lines 208, 210 which extend through the guide tubes 222 provided on the BOP 54. The guide lines 208, 210 are held apart above the component by the spreader bar 214. During lowering the BOP 54 is lowered away from the spreader bar 214 towards the surface flow head 200. The stinger 228 engages in the connector drum 203 to make the connection between the surface flow head 200 and the BOP 54.

In Figures 28 to 32 further rigging up steps are shown, but with the equipment slightly modified. In these figures, the guide lines 208, 210 additionally pass through guide tubes provided at diametrically opposite positions on the connector 202a above the BOP 54.

Figures 28a and 28b show the components after the connection via connector 202 between the surface flow head 200 and the BOP 54 has been made, and with the support position 240 for the lifting wire 38b moved off center of the beam 14D to one end thereof. The tension has been removed from the guide lines 208, 210 by lowering the hook 38b', such that they now hang down from the guide tubes of the connector 202a. The support position 238 for the lifting wire 38a and hook 38a' has also been moved off center to the other end of the beam 14D, in order to carry lifting/testing cap 204 away from connector drum 203 (after the lifting/testing cap has been released by the application of hydraulic pressure via hydraulic hose 224 shown in Figure 25a). Both the spreader bar 214 and the lifting/testing cap 204 are lowered to the drill floor 2.

Figure 29 (and Figures 30-35) show some additional well intervention components. A wireline lubricator 242 is provided at its lower end with a connector stinger 228 for eventual connection to the connector drum 203 on top of the BOP 54. The lubricator 242 has at its upper end a sheave wheel 244. A cable 246 connected to a wireline winch (not shown) passes via the sheave wheel 244, through the lubricator 242 and the connector stinger 228 to a wireline tool string 247. The lubricator 242 is provided on diametrically opposite sides thereof with guide tubes 250.

When the lubricator 242 is on the drill deck 2 the guide lines 208, 210 are laterally inserted into the guide tubes 250 which are then closed and locked. The spreader bar 214 to which the guide lines 208, 210 are connected at their ends is attached to hook 38a'. The other hook, hook 38b', is attached to an upper lifting point on the lubricator 242. This is the situation shown in Figure 29a.

Both winches 34a and 34b are then operated to lift their respective hooks 38a' and 38b'. Hook 38b' lifts up the lubricator 242 and the tool string 247, whilst raising hook 38a' takes up any slack in the guide lines 208, 210, applying a slight tension to avoid any entanglement taking place. The wireline winch pays out the wireline winch cable 246 via a sheave wheel 254, to allow the lubricator and tool string to be lifted.

Beam 14D is then operated to transfer the support position 238 for lifting wire 38a horizontally to the center of the beam. Winch 34a is operated to lift hook 38a' and thus to lift spreader bar 214 and thereby raise the ends of the guide lines 208, 210. Beam 14D is also operated to transfer horizontally support position 240 for lifting wire 38b to the center of the beam. By tensioning lifting wire 38a with winch 34a the guide lines 208, 210 are tensioned and the lubricator 242 is centered over the BOP 54, as seen in Figures 31 and 31b. In these figures it can also be seen that the wireline winch has been operated such that the cable 246 has pulled the tool string 247 into the lubricator 242. At this stage, with centering of the lubricator and other components accomplished, winch 34b is operated to lower the components and effect a stabbing connection between stringer 228 and the connector drum 203 of the connector 202a on top of the BOP 54. This is seen in Figures 32a and 32b. During lowering, the components are guided by the guide lines 208, 210. They are lowered towards the surface flow head 200 and away from the spreader bar 214 to which the guide lines 208, 210 are connected at their upper ends.

Once the connection has been made, winch 34a is operated to lower hook 38a' and thereby the lower the spreader bar 214 and the guide lines 208, 210 to the drill floor 2. The well intervention components are now rigged up and ready to be used.

The installation sequence described above does not require the presence of human operators to align the components or to manually make the connections between them. This can avoid the use of potentially dangerous man-riding operations.

Figures 33-35 show the sequence of operations for intervention component removal, i.e. rigging down. The guide lines 208, 210 are attached to hook 38a' via spreader bar 214 (not shown). The guide lines 208, 210 pass through the respective guide tubes on the lubricator 242, the connector 202a between the lubricator and BOP 54 and the guide tubes on the BOP 54. At their ends they are secured to the connector 202 above the surface flow head 200. Winch 34a is operated to lift the spreader bar 214 and the guide lines 208, 210, and the support position 238 for the lifting wire 38a is transferred horizontally on the beam 14D to the centre thereof. The winch 34a is operated sufficiently to place the guide lines 208, 210 in tension, so that the components may be lifted from the surface flow tree in a guided manner.

The hydraulic hose 212 (see Figure 21a) is used to apply hydraulic pressure to the connector 202 between the surface flow tree 200 and the BOP 54 to enable release of the stinger 228 from the connector drum 203. This is shown in Figures 34a and 34b.

The tension on guide lines 208, 210 is slackened by operation of the winch 34a and the support position 240 for lifting wire 38b is transferred away from the center of the beam 14D so as to transfer the lubricator 242, the tool string 246, the crown plug 260 and the BOP 54 horizontally away from the surface flow head 200. This is seen in Figures 35a and 35b.

Figure 36 shows schematically a hydraulically releasable connector 202. This has a connector drum 203, a connector stinger 270, an upper flange connection 272, and a lower flange connection 274. On each diametrically opposite side of the drum 203 an eyelet 276 is provided for attachment of a respective guide line 208, 210. On the connector stinger 270, on each diametrically opposite side, a guide tube 222 is provided. Each guide tube is tapered at the top and bottom to reduce abrasion when the guide lines 208, 210 are used to impose horizontal transferring forces on the connector. Although not shown, each tube is arranged to open in order to allow lateral entry or exit of a respective guide line 208, 210. This avoids having to thread the guide lines longitudinally through the tube. Once the tube is closed, it is securely locked to avoid inadvertent opening.

Figure 38 shows a perspective view of a blow-out preventer (BOP) 54 during the installation procedure. Guide lines 208, 210 are attached at their lower ends to eyelets 276 provided on a connector drum 203 above the surface flow tree 200. The BOP 54 is provided on each side with a pair of vertically spaced guide members in the form of guide tubes 278. A connector 202a above the BOP 54 has a connector drum 203 also provided with guide members in the form of guide tubes 278, on diametrically opposed sides. In this embodiment, by the provision of two guide tubes on each side of the BOP 54 and also guide tubes on the connector drum 203 above the BOP 54, a very stable guiding arrangement can be achieved.

Claims

1. A method of installing a well intervention component for well intervention, comprising lowering the component towards an intervention riser or a surface flow head, and connecting the component to the intervention riser or surface flow head, wherein the component is guided into position by a pair of guide lines fixed relative to the intervention riser or surface flow head.

2. A method as claimed in claim 1, wherein the guide lines are held apart at a location above the component by a spreader member, and wherein during said lowering of said component, the component is lowered away from the spreader member.

3. A method as claimed in claim 1 or 2, comprising lifting the component to a height above the intervention riser or surface flow head and horizontally offset therefrom, and then bringing the component into vertical alignment with the intervention riser or surface flow head.

4. A method as claimed in claim 3, wherein the guide lines are kept slack during said lifting of the component to a height above the intervention riser or surface flow head and horizontally offset therefrom, and are tensioned as the component moves into vertical alignment with the intervention riser or surface flow head.

5. A method as claimed in any preceding claim, wherein during guiding of the component the weight of the component is supported by a first hoisting device and the guide lines are tensioned by a second hoisting device.

6. A method as claimed in claim 5, wherein the second hoisting device supports the guide lines at a support position which is horizontally movable.

7. A method as claimed in claim 5 or 6, wherein the first hoisting device supports the component at a support position which is horizontally movable.

8. A method as claimed in claim 5, 6 or 7, wherein the first and second hoisting devices are provided on a common support member.

9. A method as claimed in any preceding claim, wherein the component is guided into position by a pair of guide members each slidably engaging a respective guide line.

10. A method as claimed in any preceding claim, wherein the component is connected to the intervention riser or surface flow head via a first connector part provided on the intervention riser or surface flow head and a second connector part provided on the component.

11. A method as claimed in claim 10, wherein the guide lines are fixed to the first connector part or to the intervention riser or surface flow head.

12. A method as claimed in claims 9 and 10, or claims 9, 10 and 11, wherein the guide members are provided on the second connecting part or on the well intervention component attached to the second connecting part.

13. A method as claimed in claim 10, or claims 10 and 11, or claims 10 and 12, or claims 10, 11, and 12, comprising remotely controlling at least one of the first and second connector parts.

14. A method of installing a component for a wire line intervention, comprising lowering the component towards an intervention riser or a surface flow head, and connecting the component to the intervention riser or surface flow head via a first connector part provided on the intervention riser or surface flow head and a second connector part provided on the component, wherein at least one of the first and second connector parts is remotely controlled.

15. A method as claimed in claim 13 or 14, comprising remotely controlling at least one of the first and second connector parts via a hydraulic hose.

16. Apparatus for installing a well intervention component for well intervention, comprising a pair of guide lines which in use are to be fixed relative to an

intervention riser or surface flow head, and a pair of guide members which in use are to be fixed relative to the component and each for slidable engagement with a respective guide line, whereby in use when the guide lines are tensioned they can serve to guide the component into position above the intervention riser or surface flow head.

17. Apparatus as claimed in claim 16, comprising a spreader member for holding the guide lines apart at a location above the component, and the apparatus being arranged so that in use when the component is guided into position it is lowered away from the spreader member.

18. Apparatus as claimed in claim 16 or 17, comprising a lifting mechanism arranged to lift the component to a height above the intervention riser or surface flow head and horizontally offset therefrom, and then to bring the component into vertical alignment with the intervention riser or surface flow head.

19. Apparatus as claimed in claim 18, wherein the lifting mechanism is arranged to keep the guide lines slack during said lifting of the component to a height above the intervention riser or surface flow head and horizontally offset therefrom, and to tension the guide lines as the component moves into vertical alignment with the intervention riser or surface flow head.

20. Apparatus as claimed in any of claims 16 to 19, comprising a first hoisting device for supporting the weight of the component during guiding thereof, and a second hoisting device for tensioning the guide lines.

21. Apparatus as claimed in claim 20, wherein the second hoisting device is arranged to support the guide lines at a support position which is horizontally movable.

22. Apparatus as claimed in claim 20 or 21, wherein the first hoisting device is arranged to support the component at a support position which is horizontally movable.

23. Apparatus as claimed in claim 20, 21 or 22, wherein the first and second hoisting devices are provided on a common support member.

24. Apparatus as claimed in any of claims 16 to 23, comprising a first connector part provided on the intervention riser or surface flow head and a second connector part provided on the component.

25. Apparatus as claimed in claim 24, wherein the guide lines are fixed to the first connector part or to the intervention riser or surface flow head.

26. Apparatus as claimed in claim 24 or 25, wherein the guide members are provided on the second connecting part or on the well intervention component attached to the second connecting part.

27. Apparatus as claimed in claim 24, 25 or 26, wherein at least one of the first and second connector parts is remotely controllable.

28. Apparatus for installing a component for a wire line intervention, comprising a connector for connecting the component to an intervention riser or surface flow head, the connector having a first connector part which in use is provided on the intervention riser or surface flow head and a second connector part which in use is provided on the component, wherein at least one of the first and second connector parts is remotely controllable.

29. Apparatus as claimed in claim 27 or 28, wherein the connector has a hydraulic connection point for connecting to a hydraulic hose for remotely controlling at least one of the first and second connector parts.

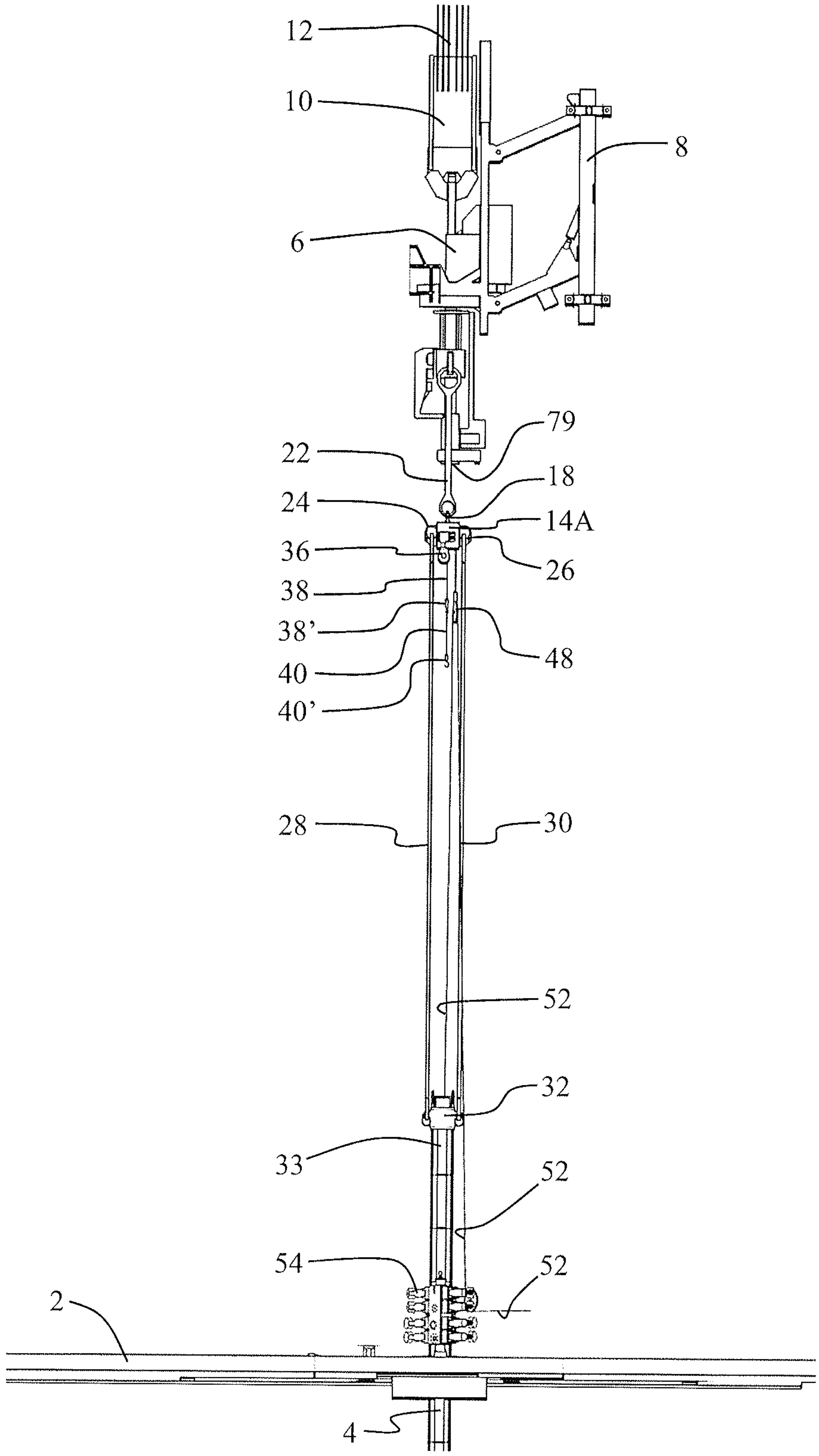


Fig. 1

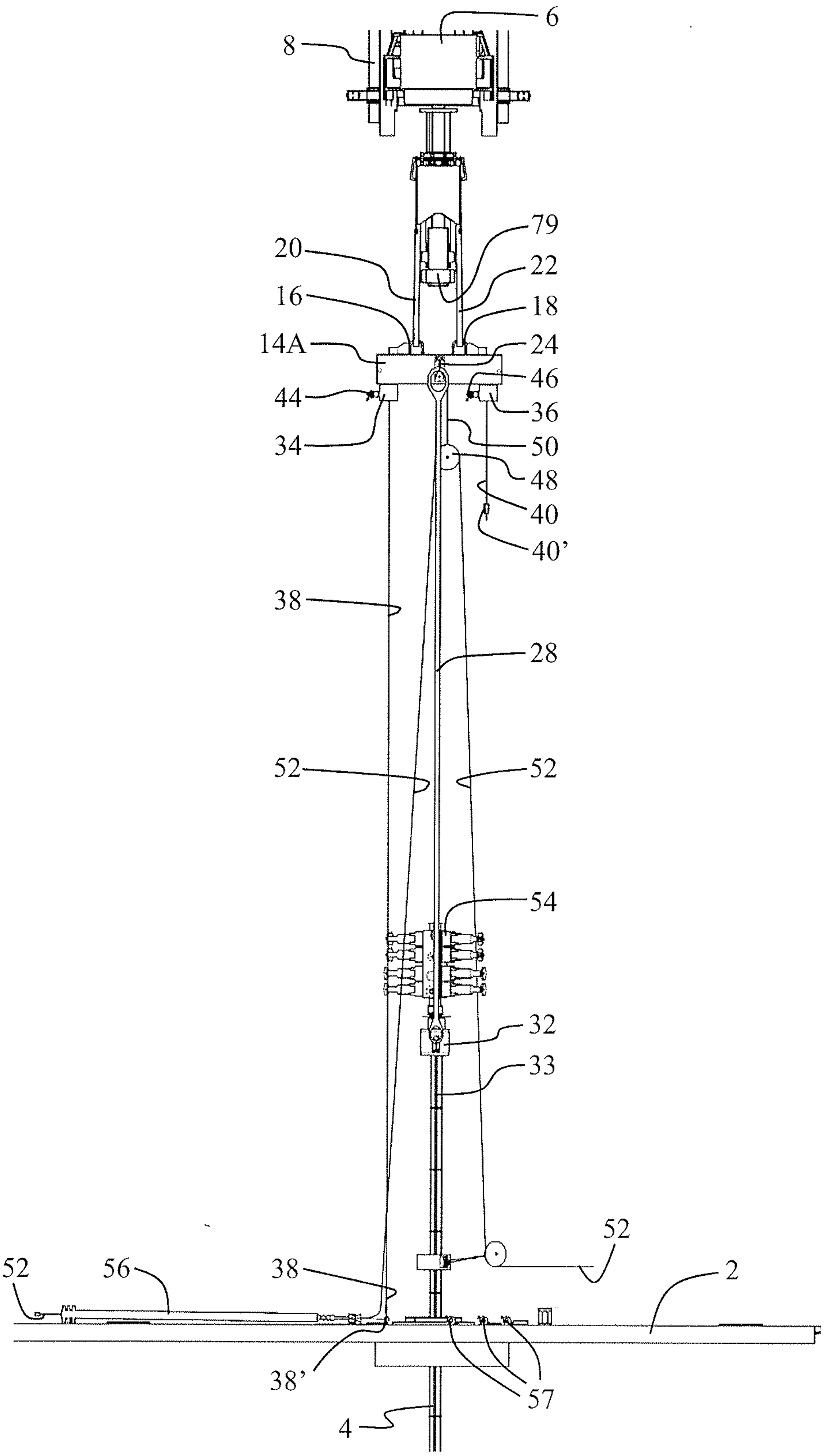

6
8
79
20
22
16
18
14A
24
46
44
36
34
50
48
40
40'
38
28
52
52
54
32
33
52
52
56
38
2
38'
57
4

Fig. 2

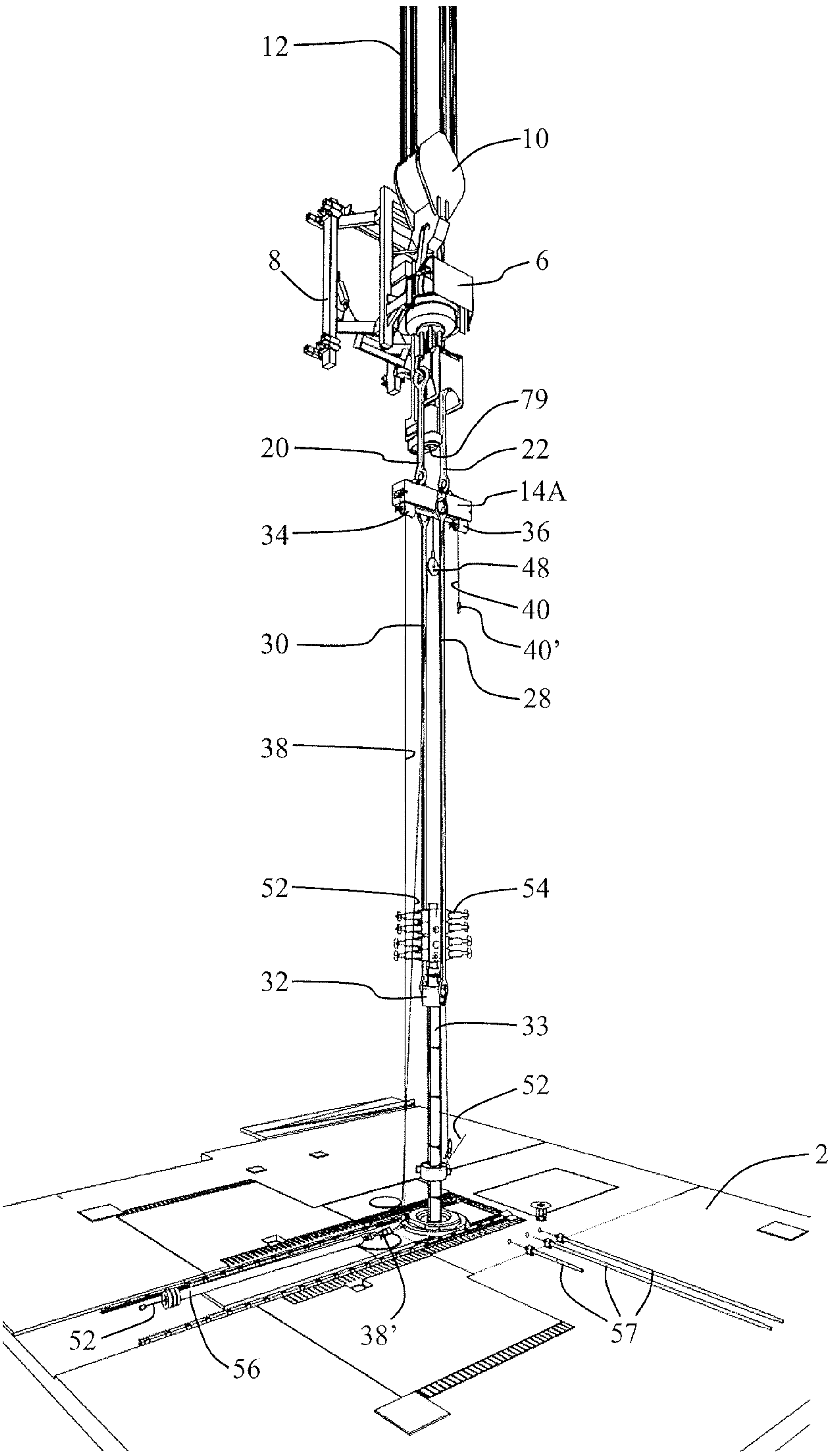

12
10
8
6
79
20
22
14A
34
36
48
40
40'
30
28
38
52
54
32
33
52
2
52
38'
57
56

Fig. 3

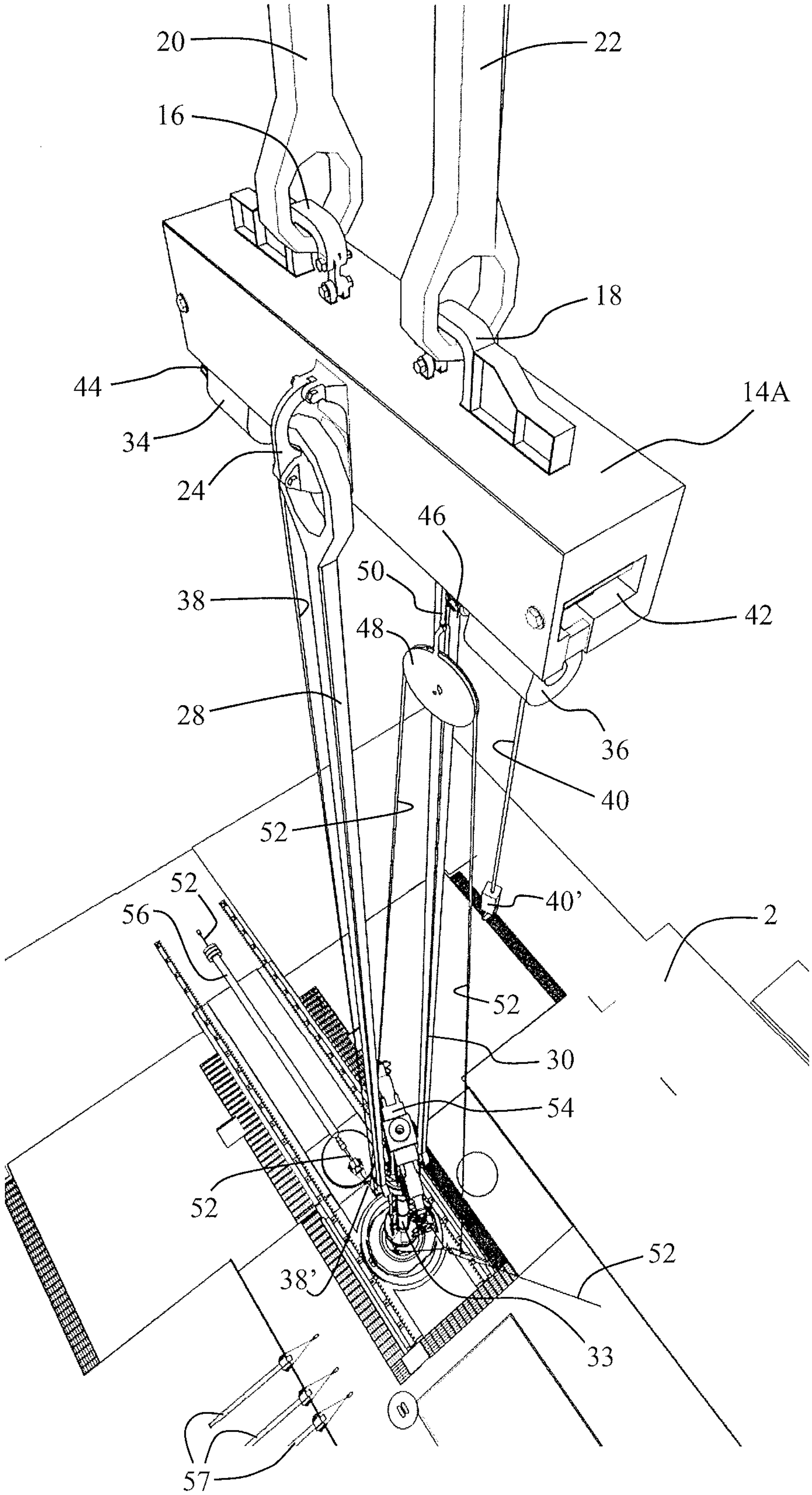

20
22
16
18
44
14A
34
24
46
50
38
42
48
28
36
40
52
52
56
40'
2
52
30
54
52
52
38'
33
57

Fig. 4

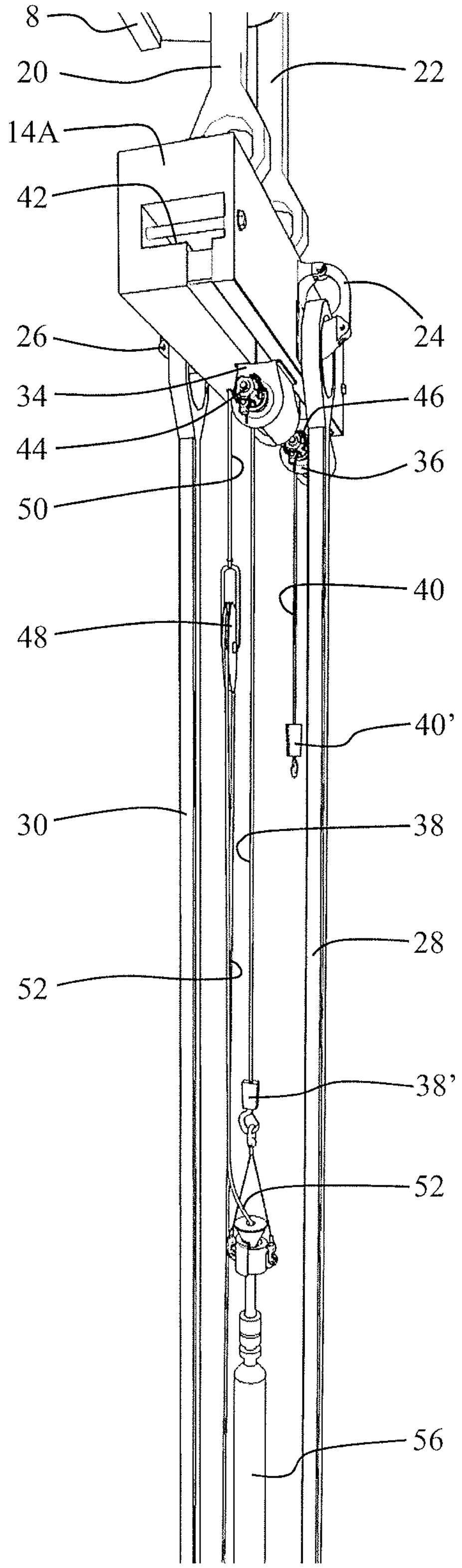


Fig. 5

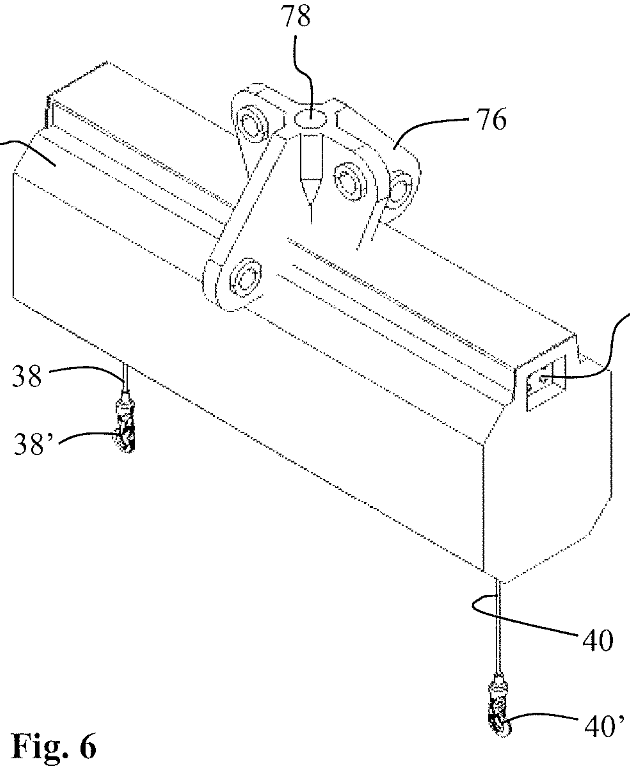


Fig. 6

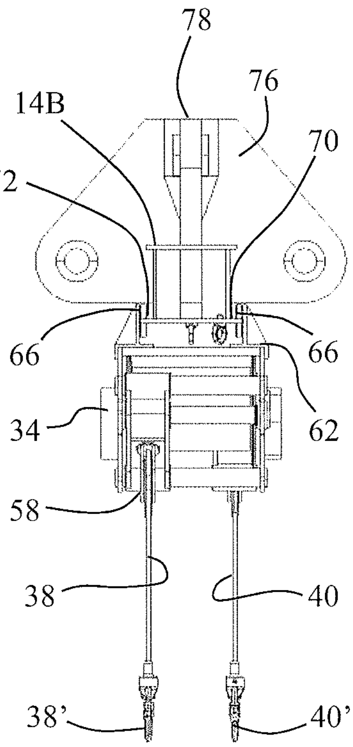


Fig. 8

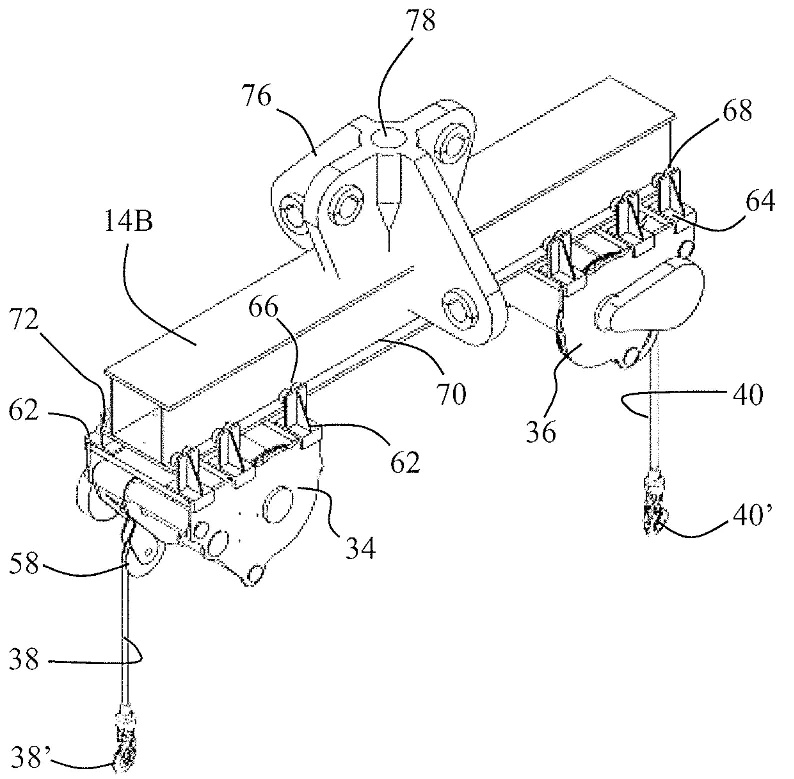
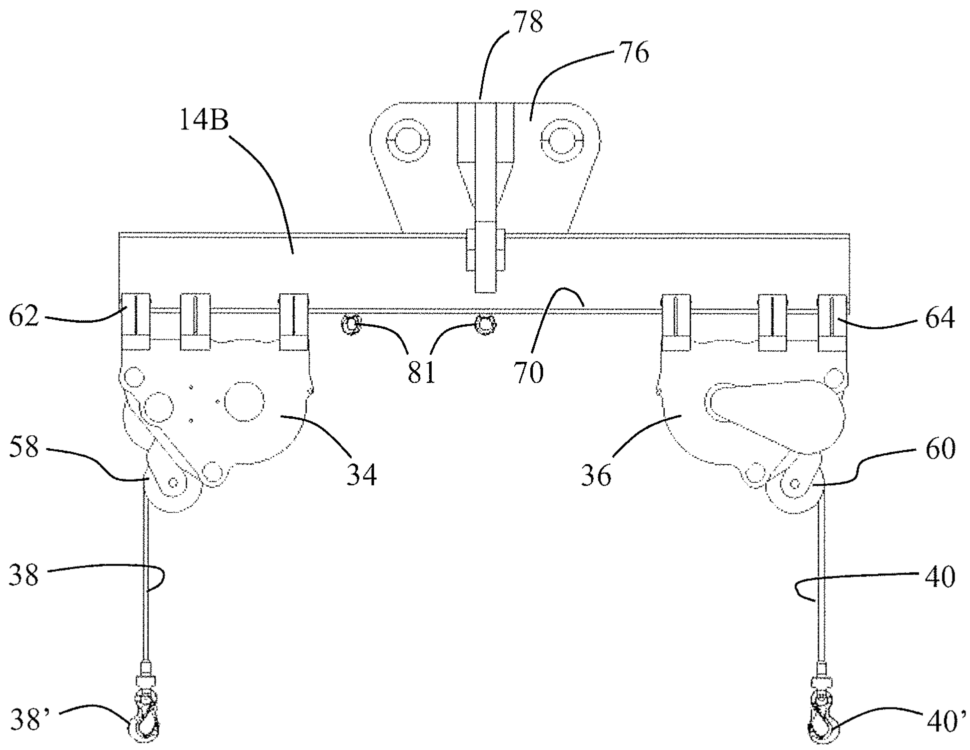
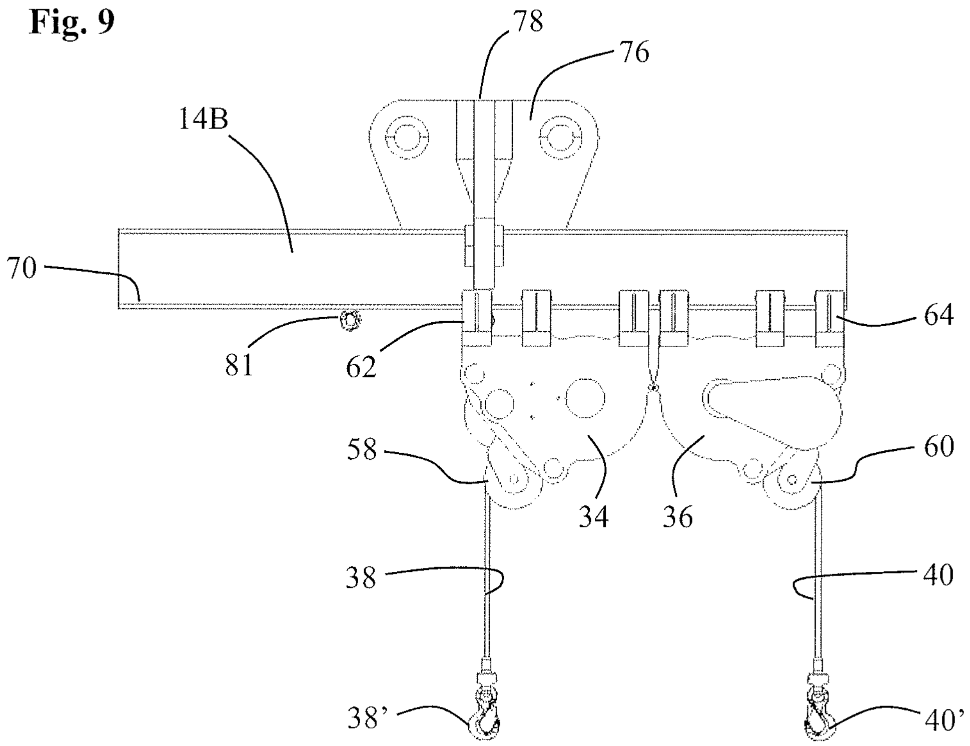


Fig. 7



78
76
14B
62
64
81
70
58
34
36
60
38
40
38'
40'

Fig. 9



78
76
14B
70
64
81
62
58
34
36
60
38
40
38'
40'

Fig. 10

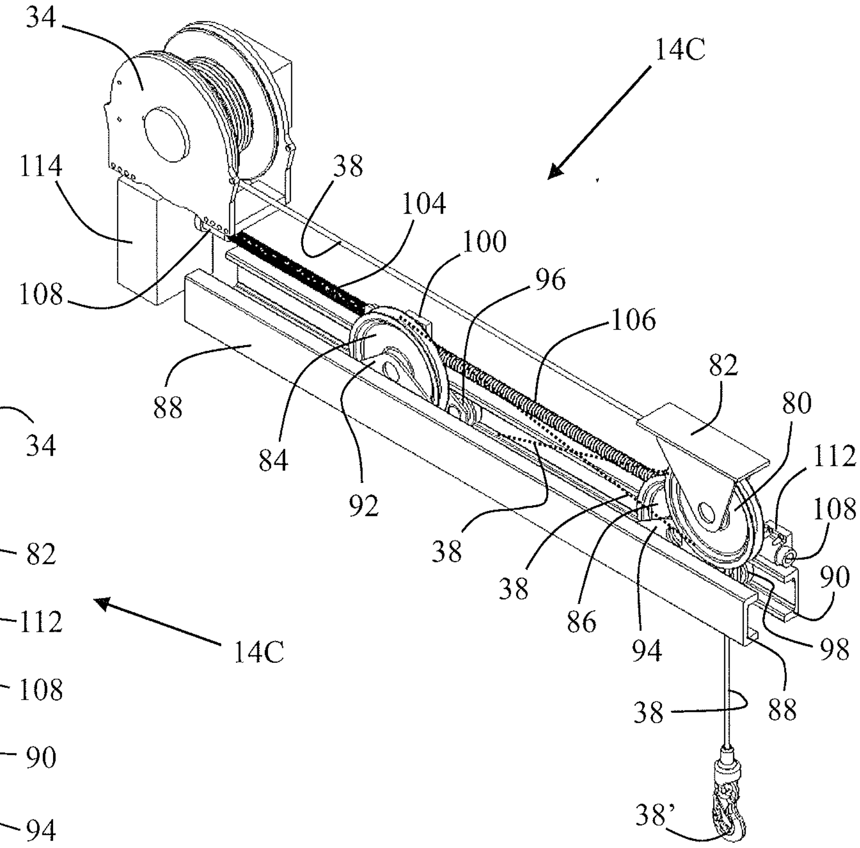


Fig. 11

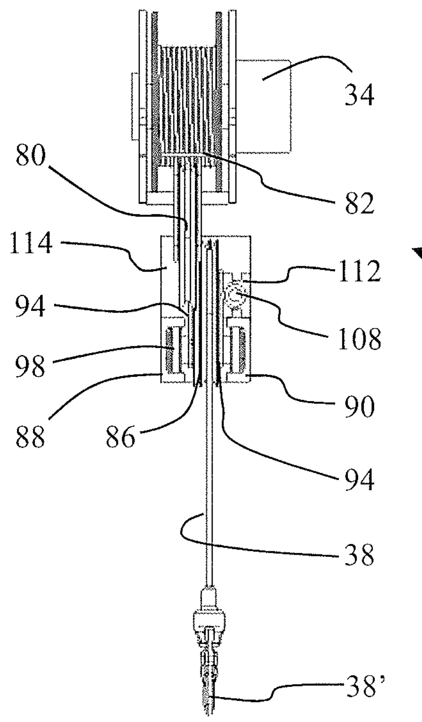


Fig. 12

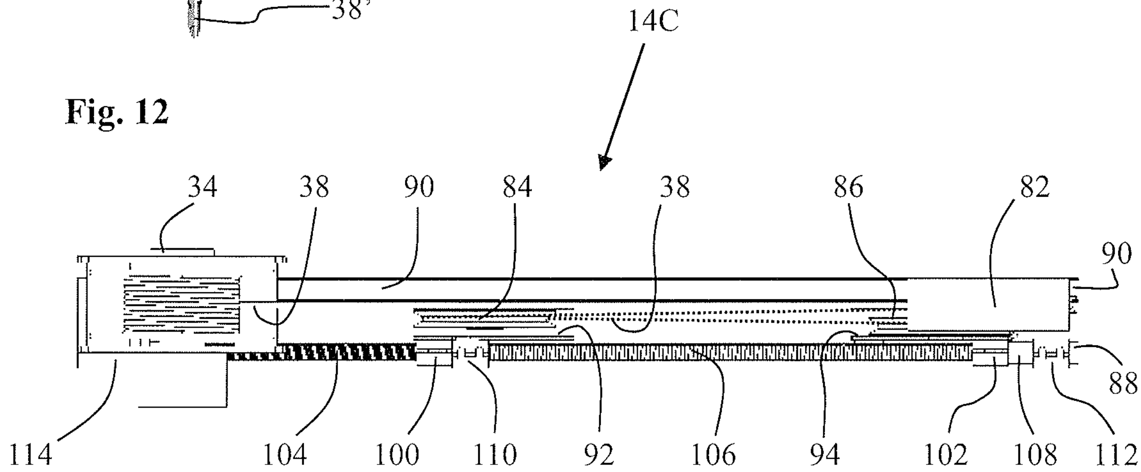


Fig. 13

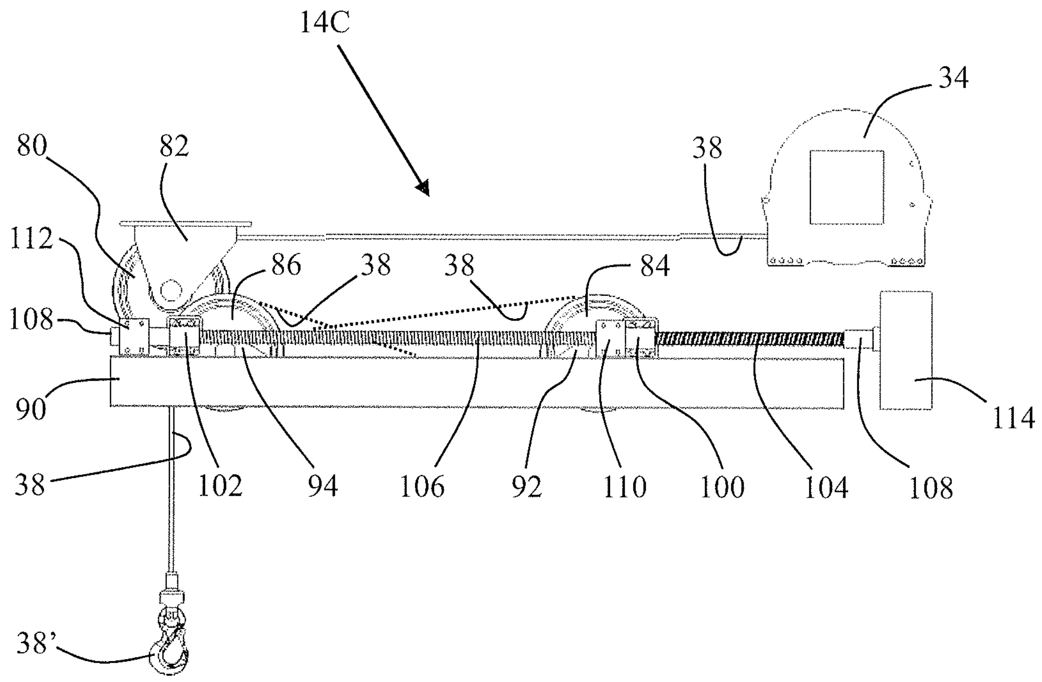

14C
34
38
80
82
112
86
38
38
84
108
90
114
38
102
94
106
92
110
100
104
108
38'

Fig. 14

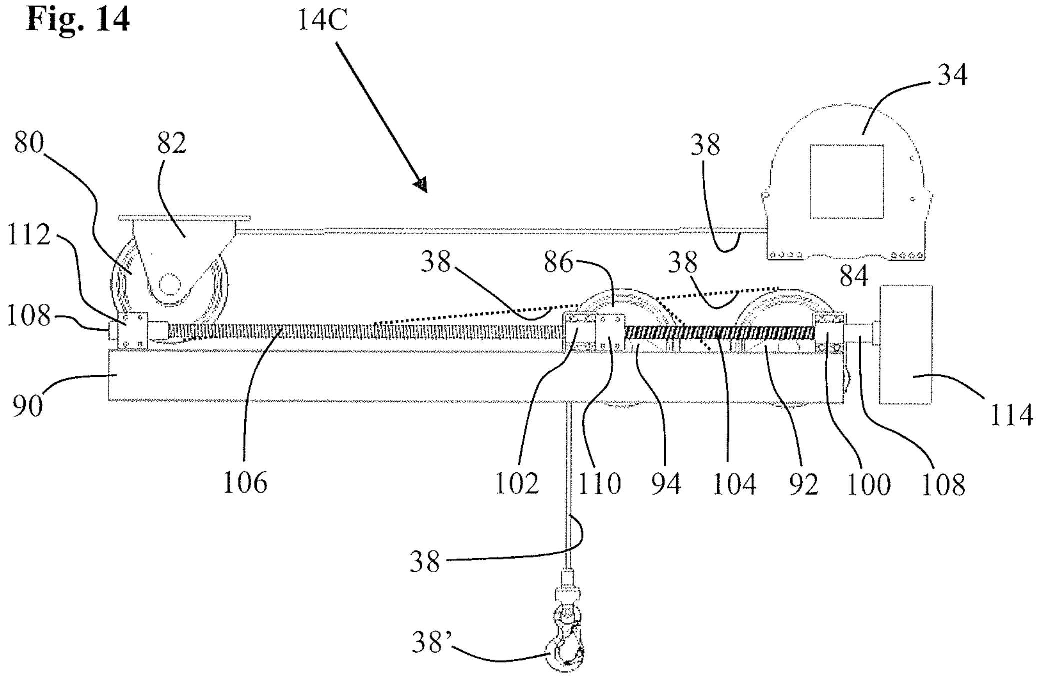

14C
34
38
80
82
112
38
86
38
84
108
90
114
106
102
110
94
104
92
100
108
38
38'

Fig. 15

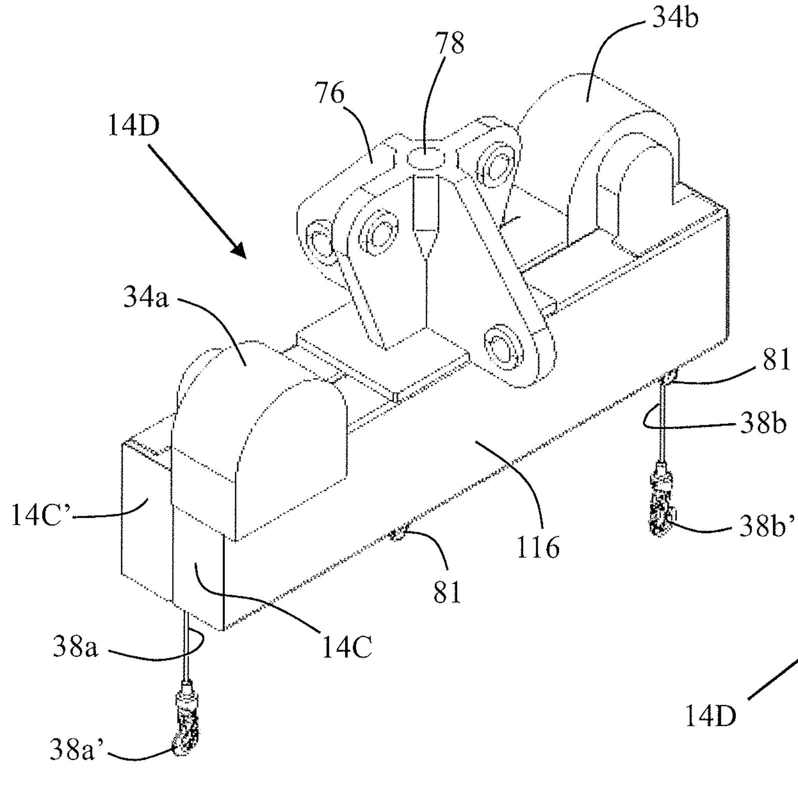


Fig. 16

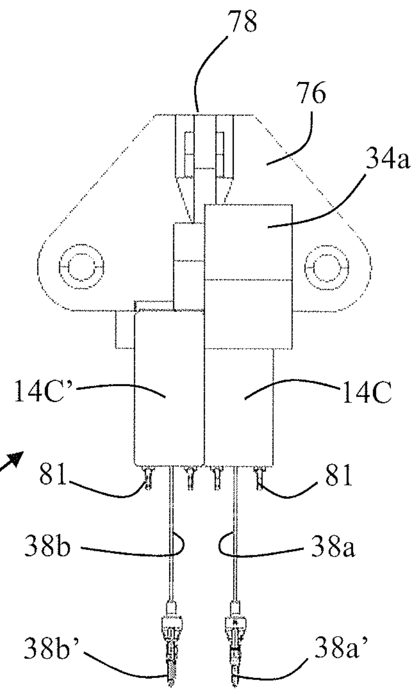


Fig. 17

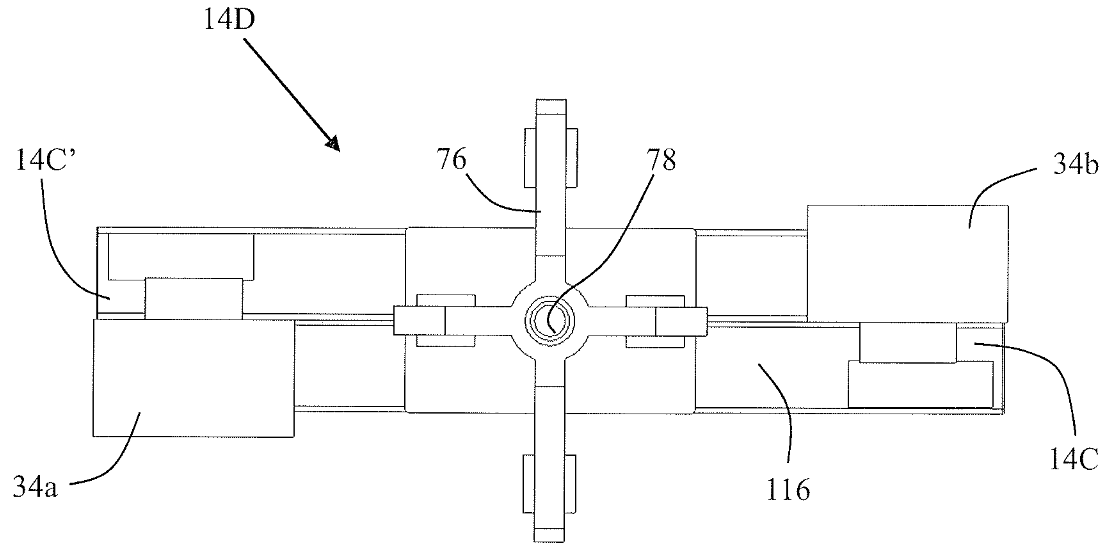
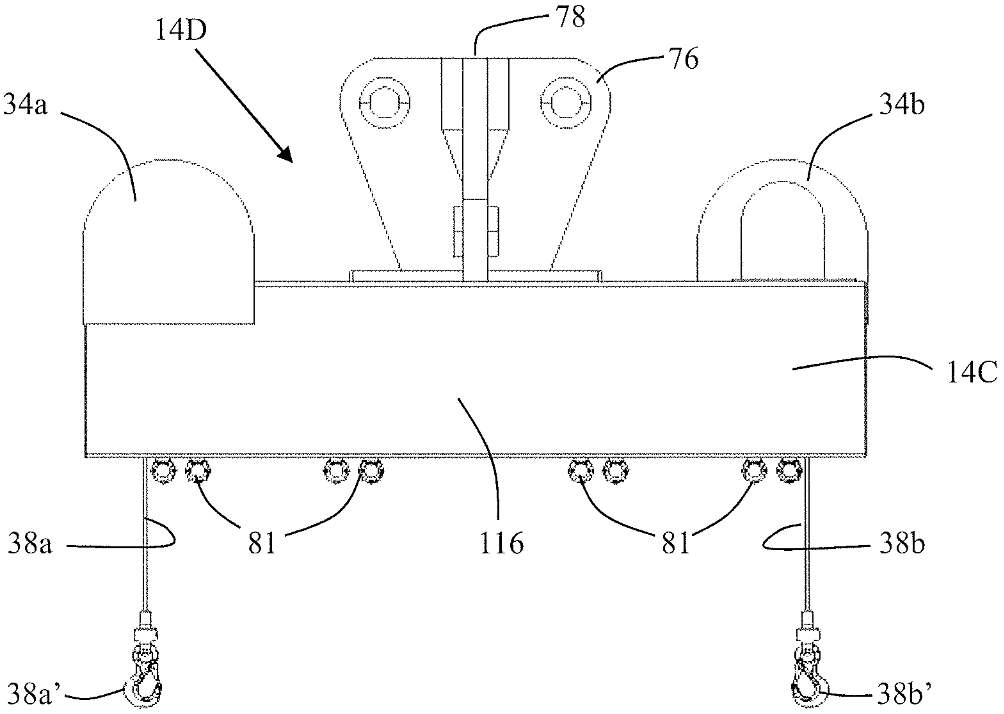
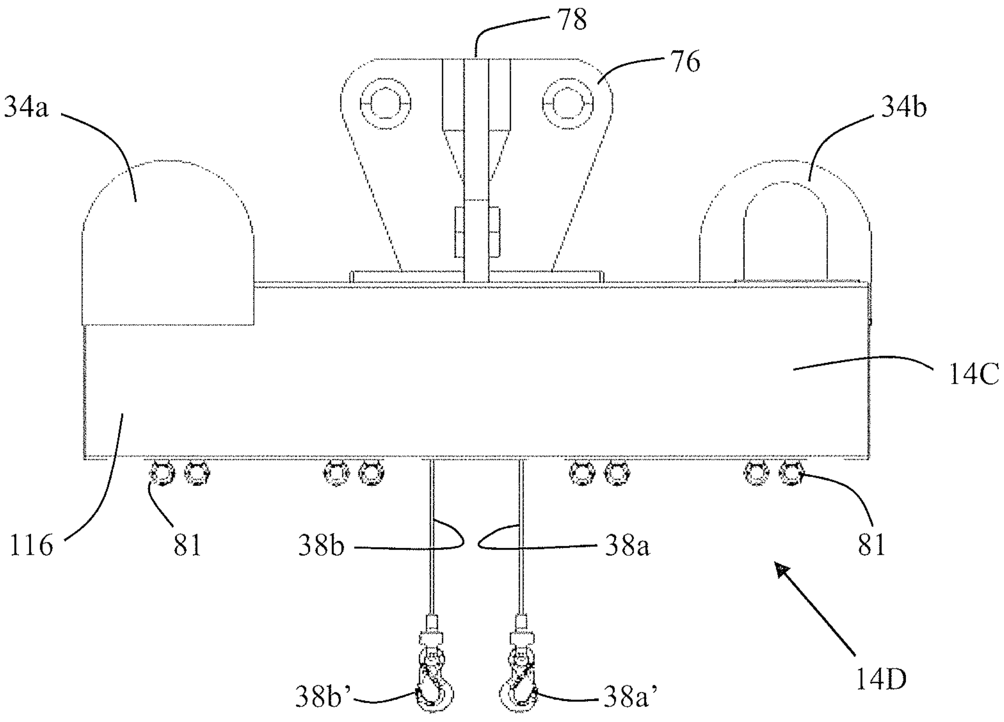


Fig. 18



78
76
14D
34a
34b
14C
116
38a
81
81
38b
38a'
38b'

Fig. 19



78
76
34a
34b
14C
116
81
38b
38a
81
14D
38b'
38a'

Fig. 20

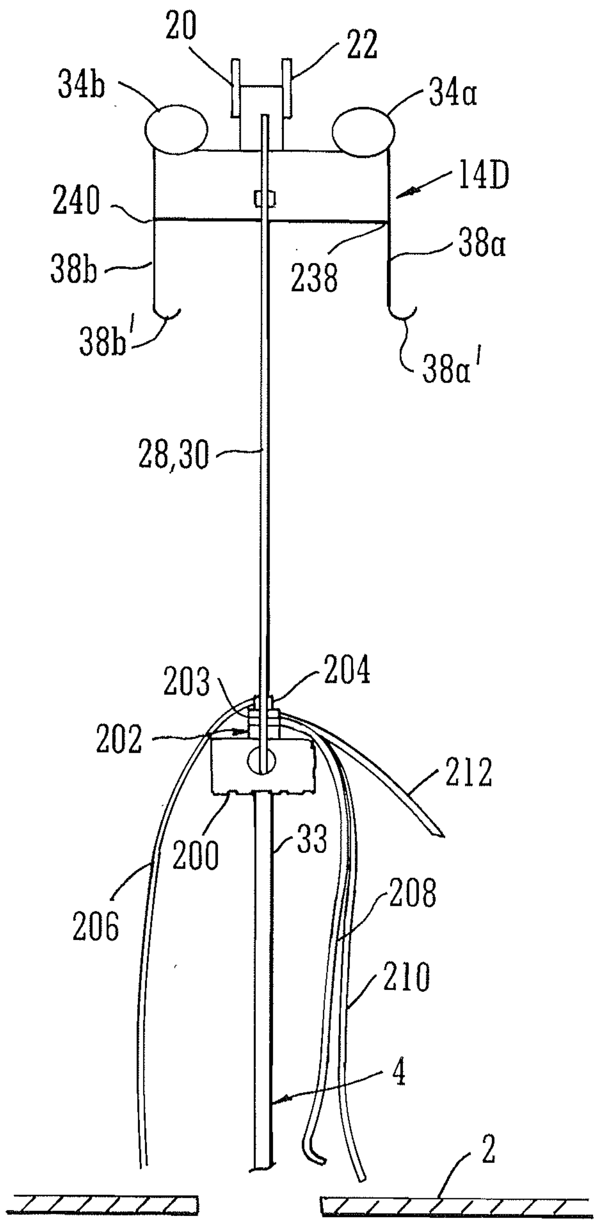


FIG. 21a

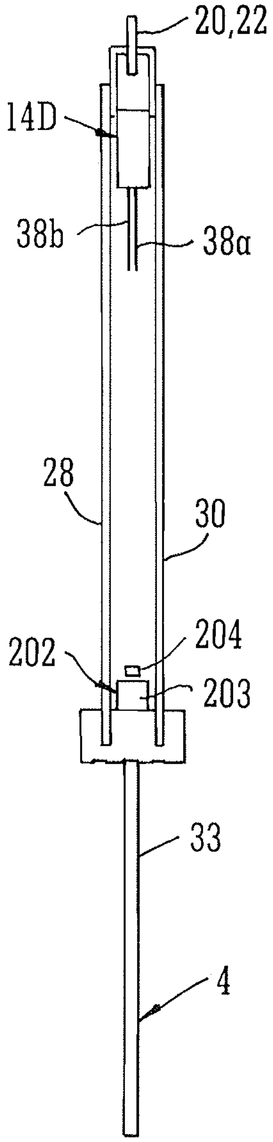


FIG. 21b

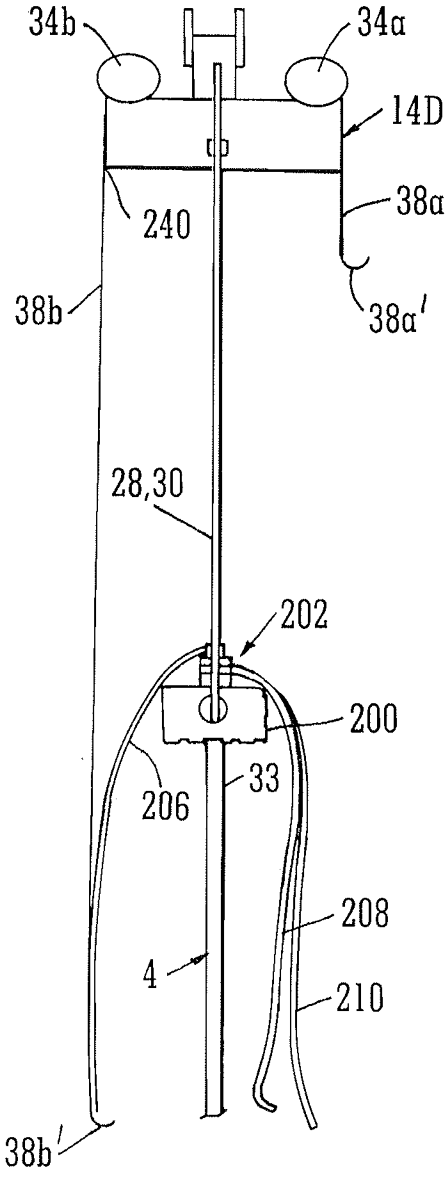


FIG. 22a

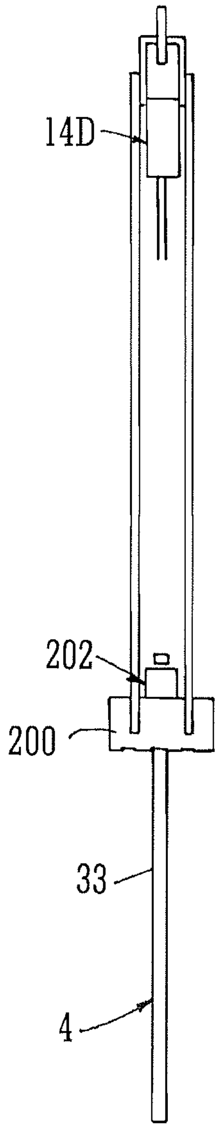


FIG. 22b

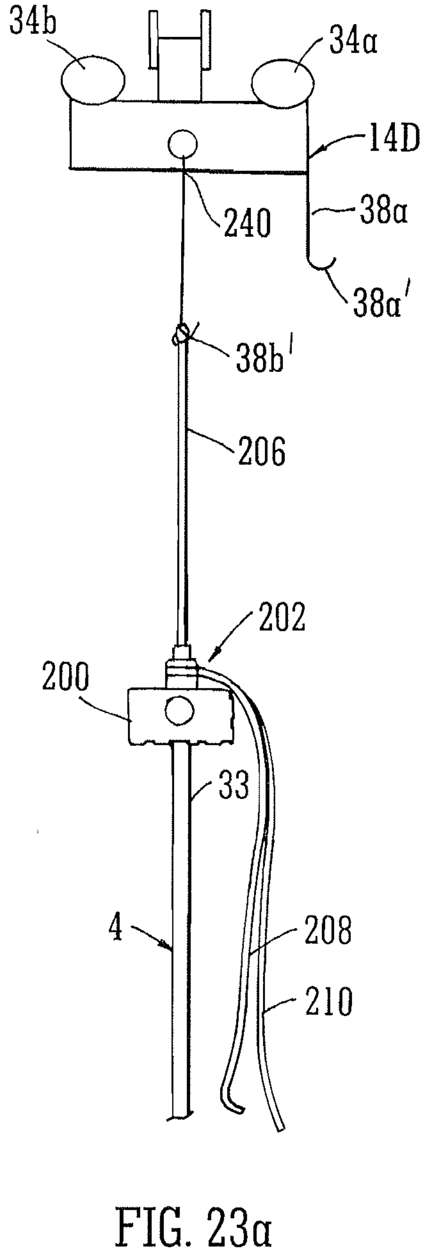


FIG. 23a

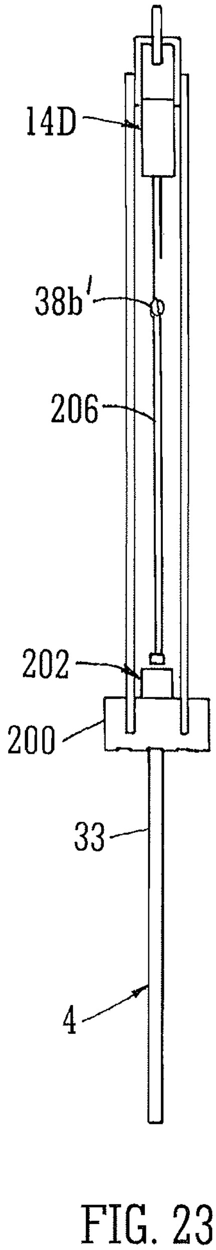


FIG. 23b

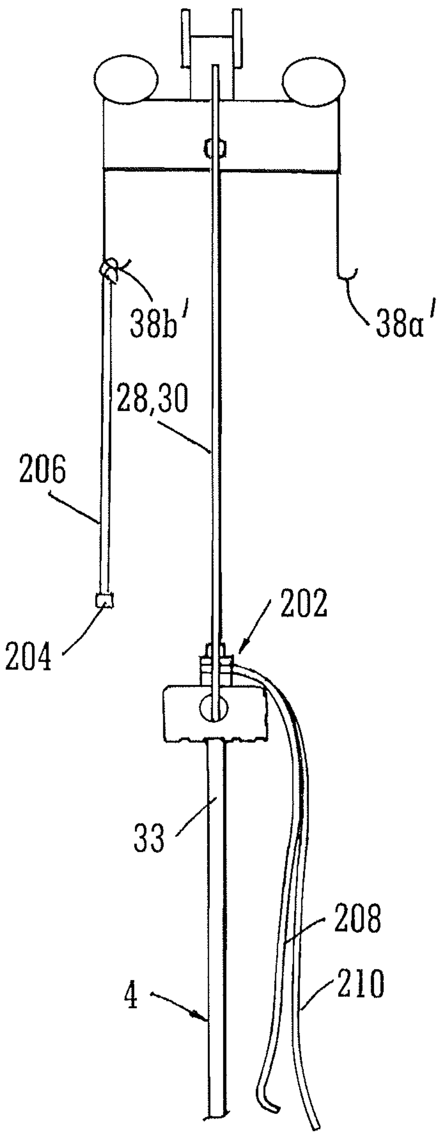


FIG. 24a

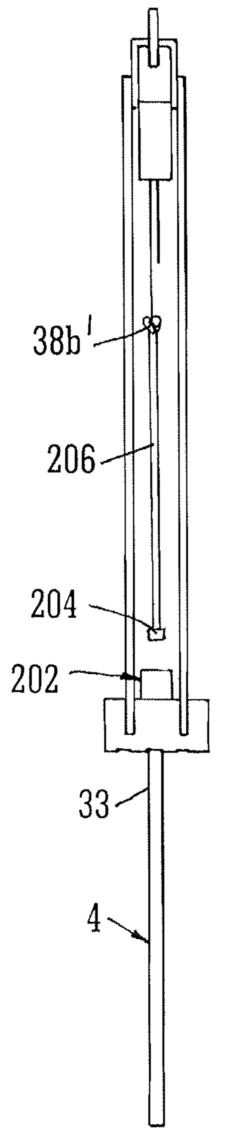


FIG. 24b

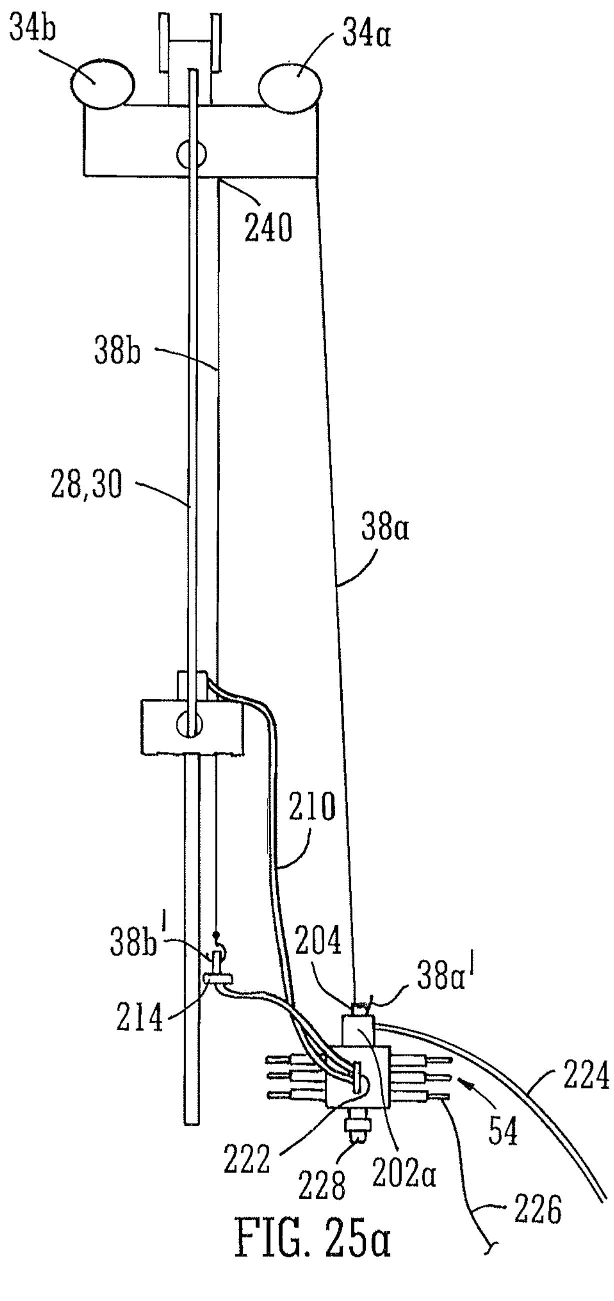


FIG. 25a

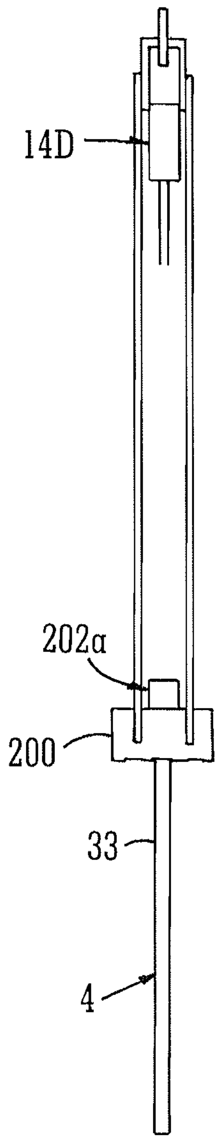


FIG. 25b

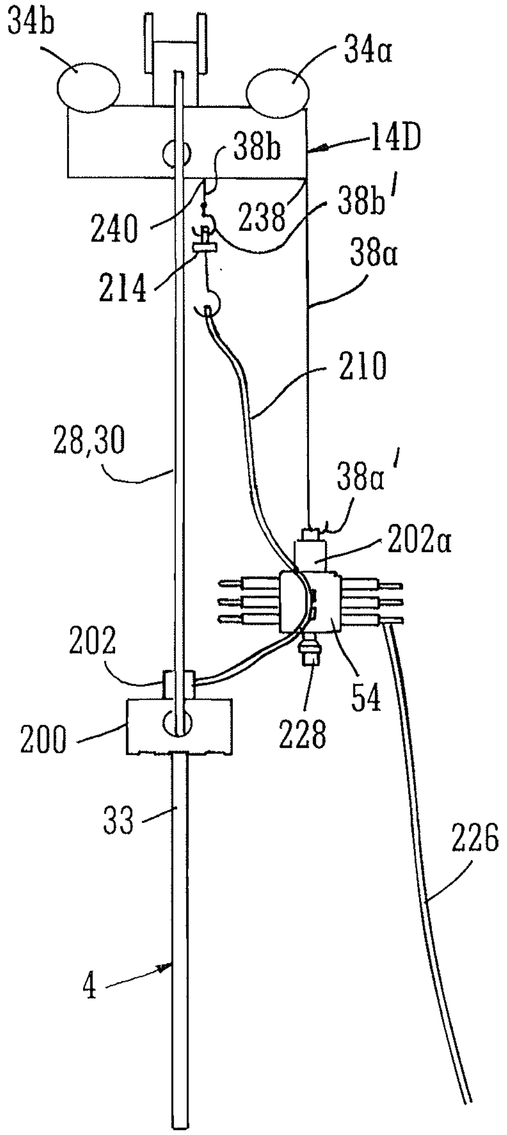


FIG. 26a

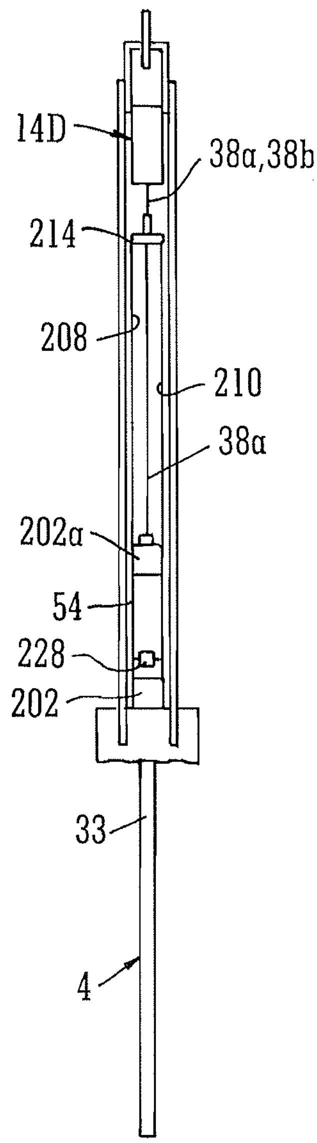


FIG. 26b

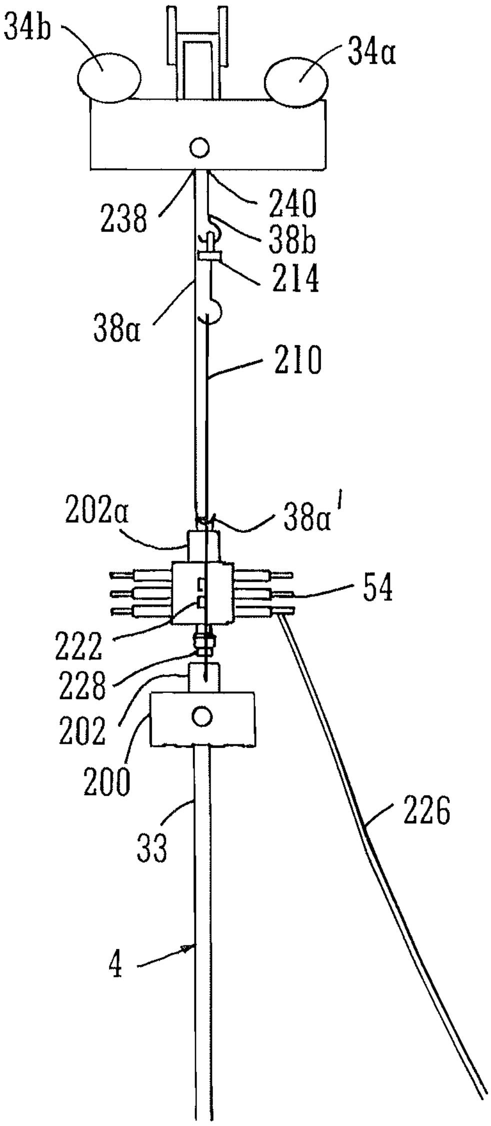


FIG. 27a

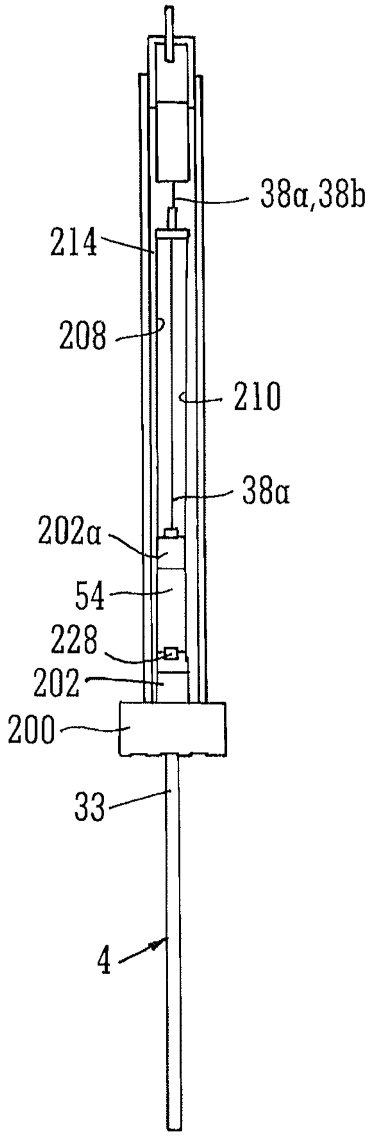


FIG. 27b

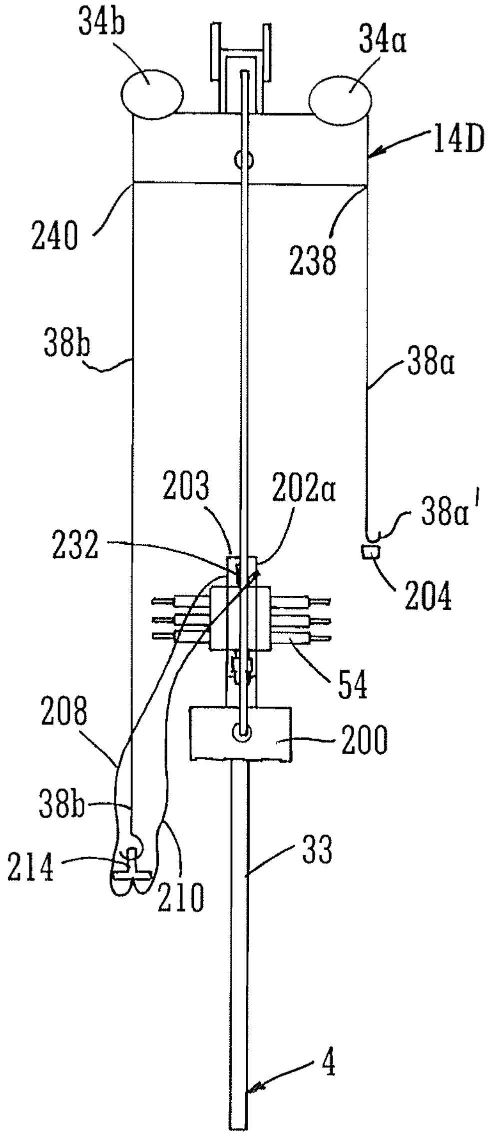


FIG. 28a

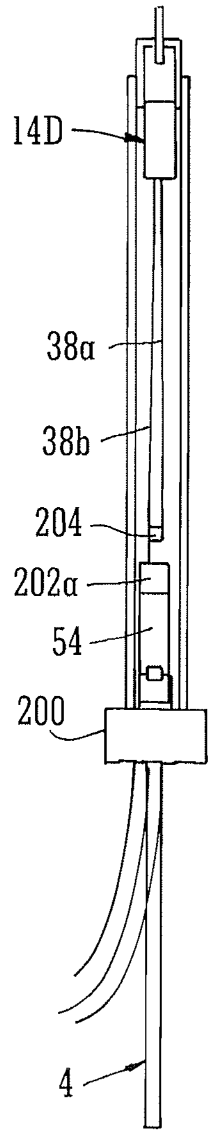


FIG. 28b

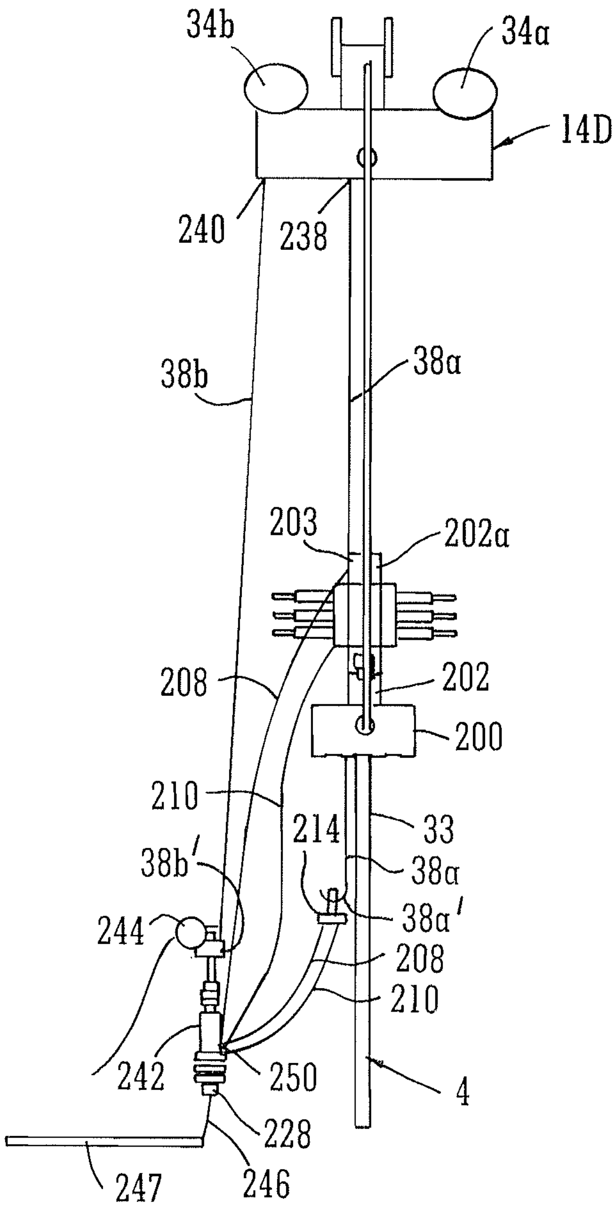


FIG. 29a

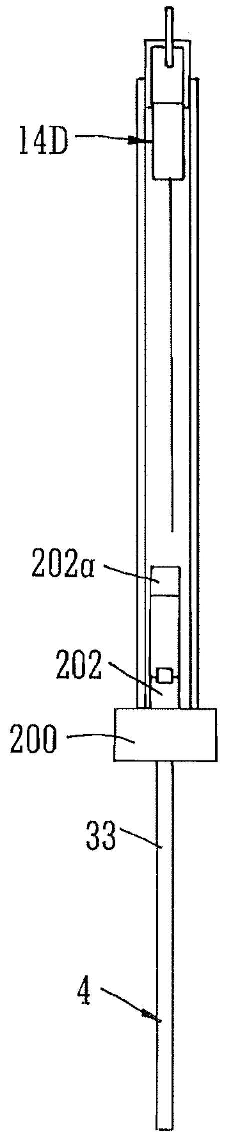


FIG. 29b

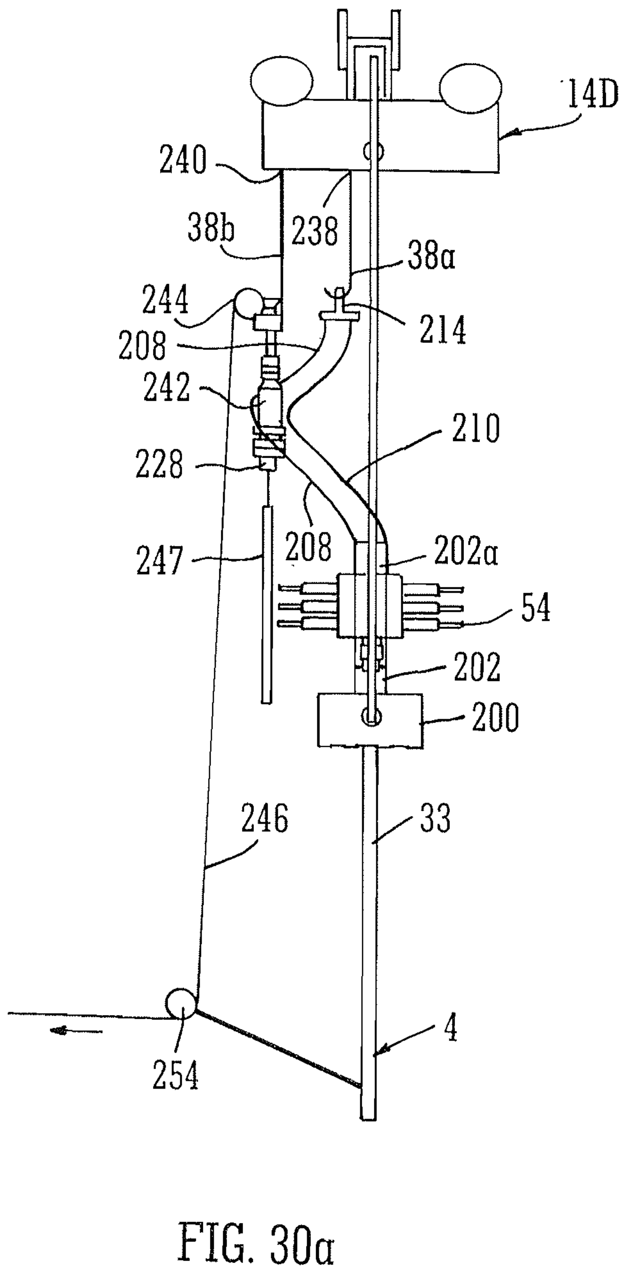


FIG. 30a

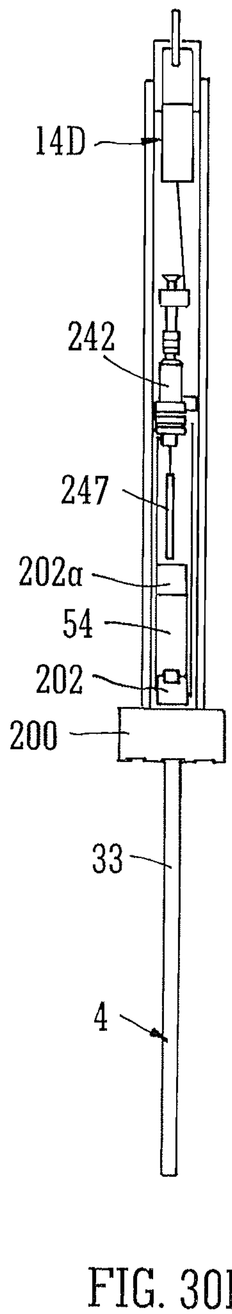


FIG. 30b

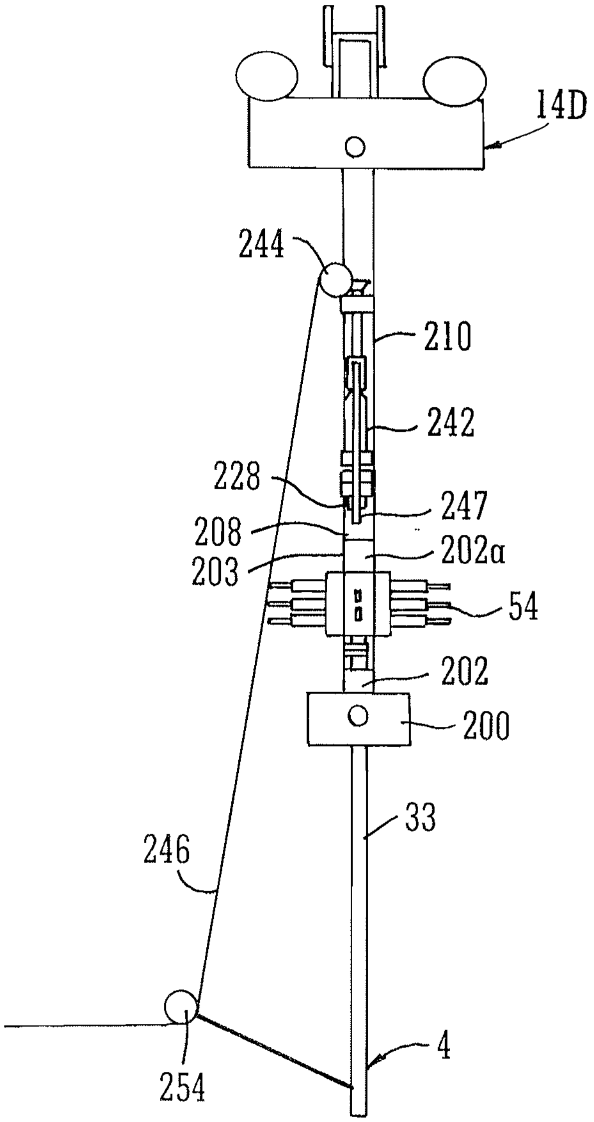


FIG. 31a

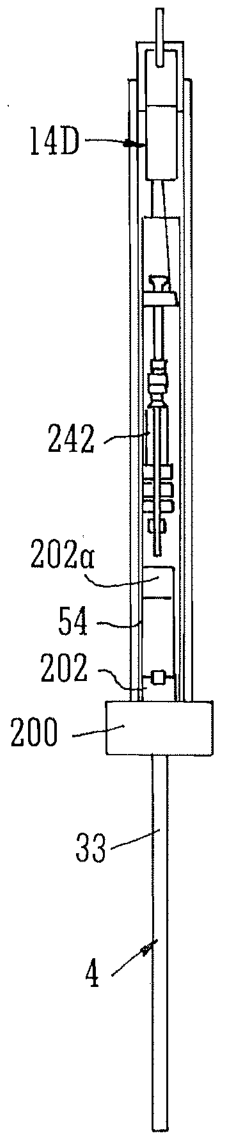


FIG. 31b

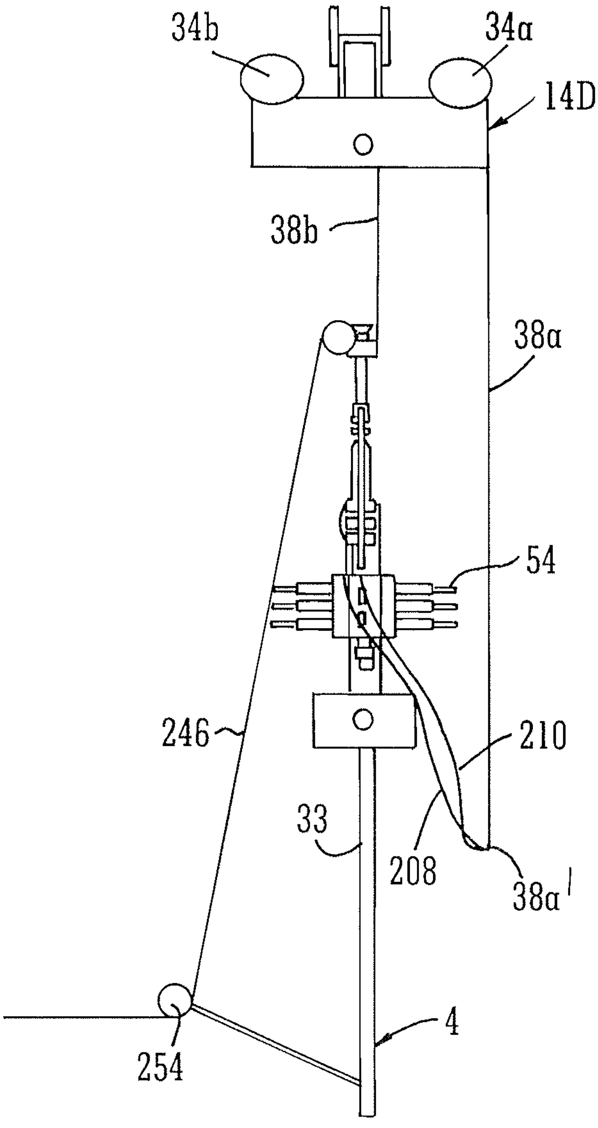


FIG. 32a

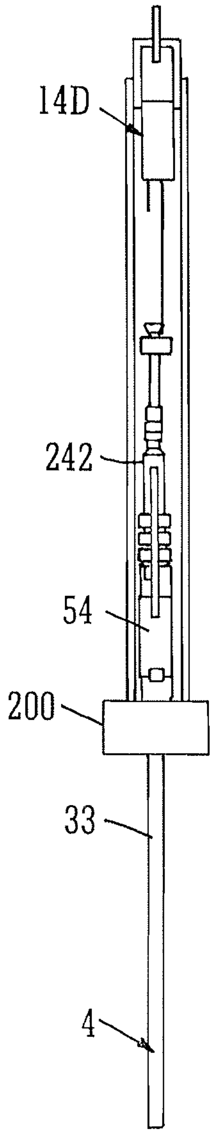


FIG. 32b

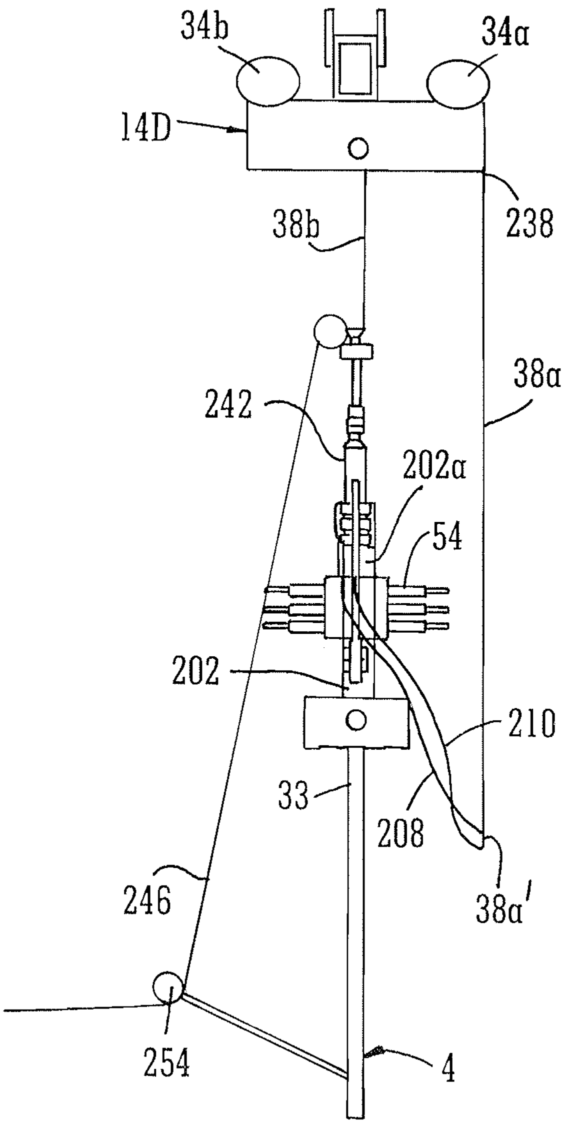


FIG. 33a

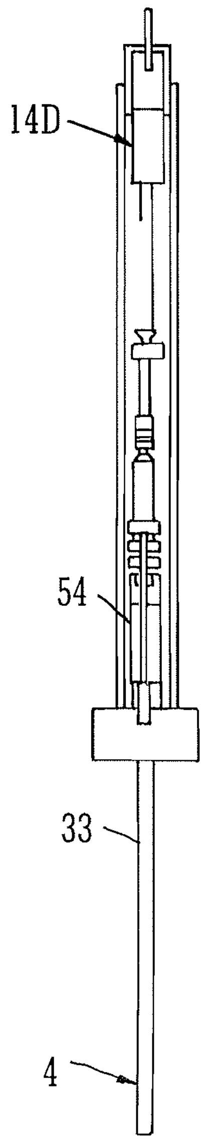


FIG. 33b

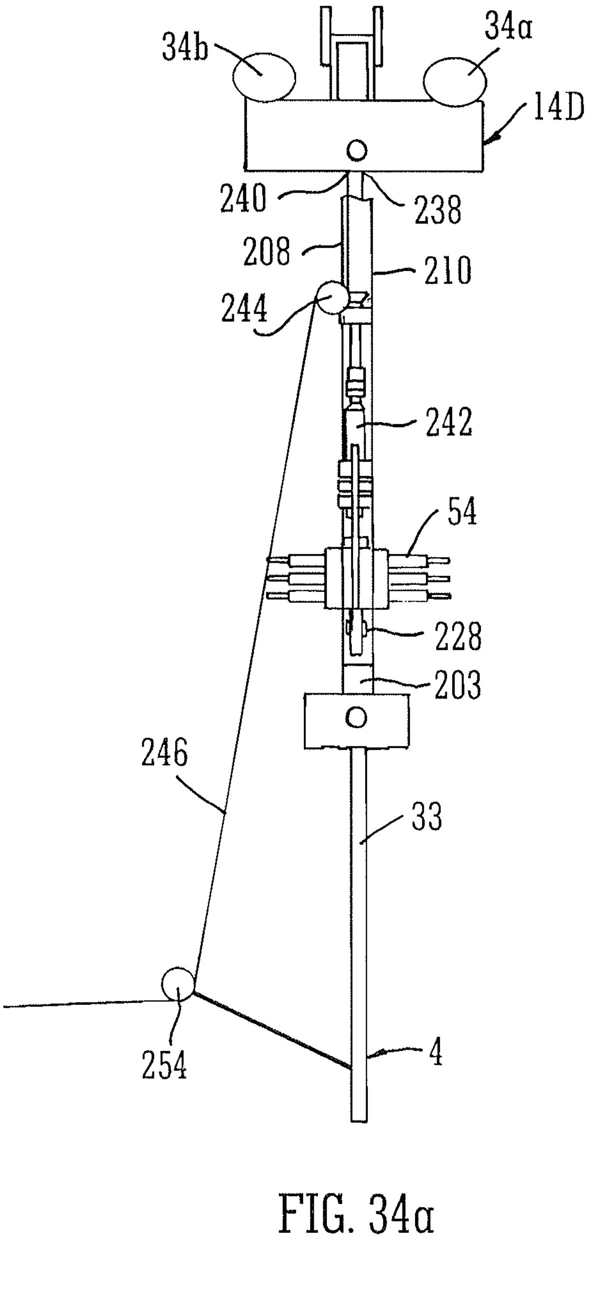


FIG. 34a

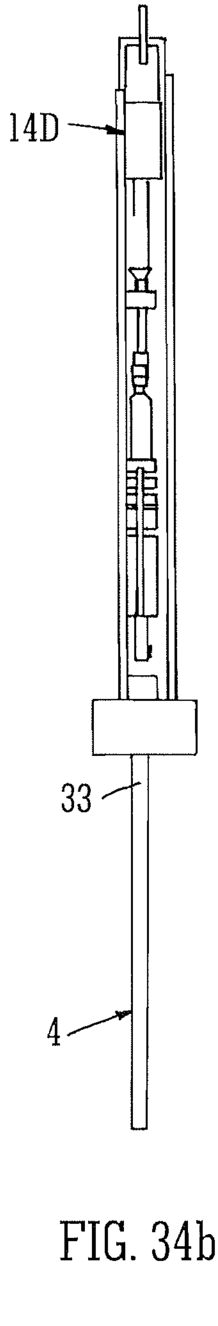


FIG. 34b

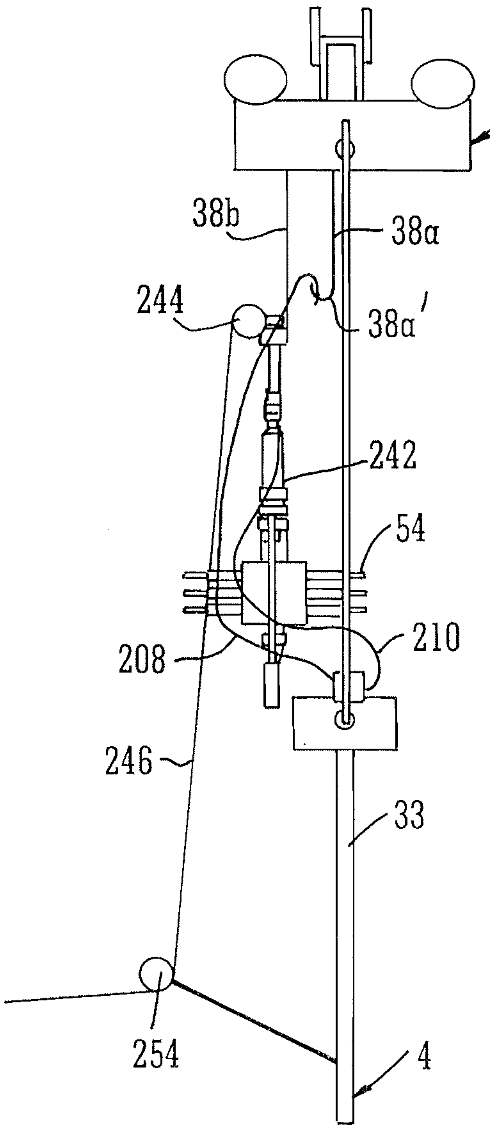


FIG. 35a

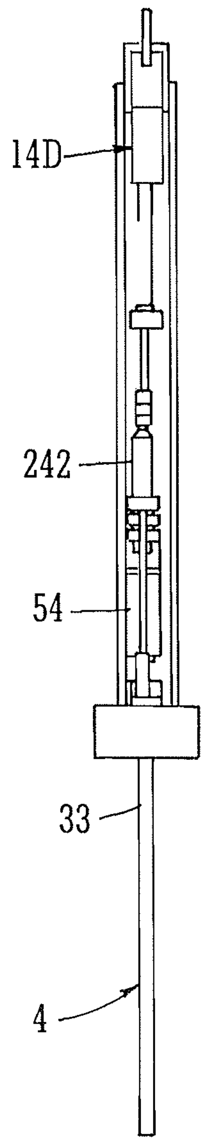


FIG. 35b

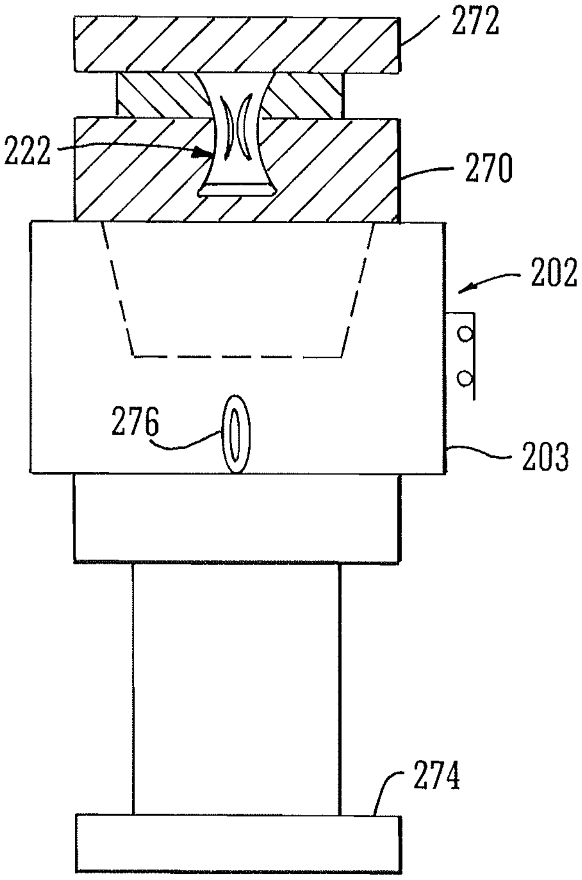


FIG. 36

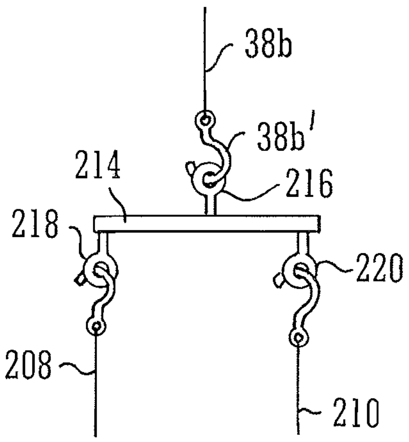


FIG. 37a

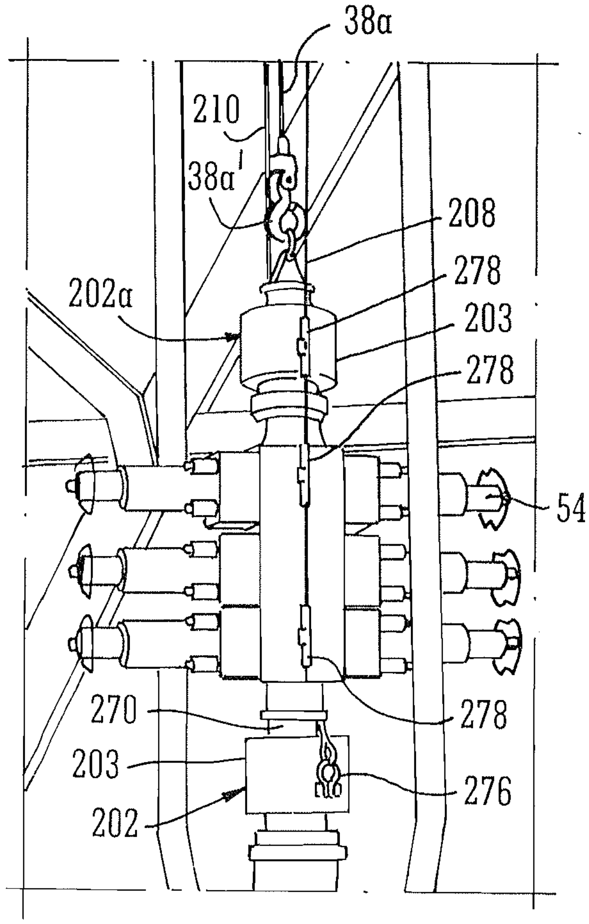


FIG. 38

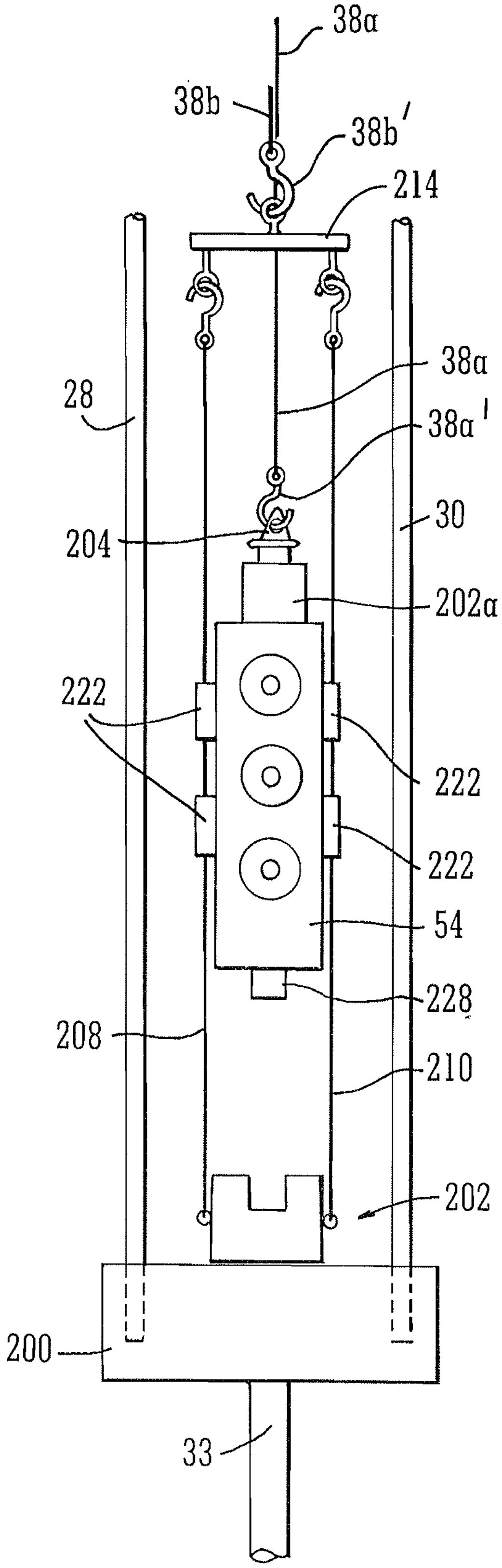

38a
38b
38b'
214
38a
38a'
28
30
204
202a
222
222
222
54
228
208
210
202
200
33

FIG. 37b