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(71) **Applicant**: **ITREC B.V.** [NL/NL]; 2, Admiraal Trompstraat, 3115 HH Schiedam (NL).

(72) **Inventors**: **ROODENBURG, Joop**; 7, St. Eustatiusstraat, 2612 HA Delft (NL). **WETERINGS, Hendrikus Jacobus**; 23, Eikenlaan, 2691 DX 's-GRAVENZANDE (NL). **VAN WINGERDEN, Mike**; 2A, Verspycklaan, 2671 CR Naaldwijk (NL).

(74) **Agent**: **DE GRAVE-WOLTERINK, I.J.C.M.E.**; P.O. Box 3241, 2280 GE Rijswijk (NL).

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(54) **Title**: PEDESTAL CRANE ASSEMBLY AND HOIST BLOCK STORAGE AND EXCHANGE DEVICE

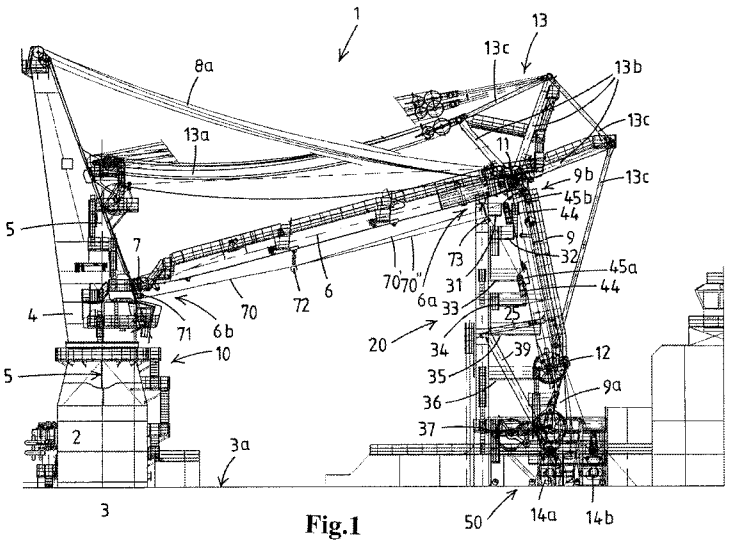


Fig.1

(57) **Abstract**: The present invention relates to a pedestal crane assembly comprising a double jib slewing pedestal crane and a boom rest with a boom support and a knuckle support. The boom support is provided with one or more platforms. The invention further relates to a hoist block storage and exchange device comprising a main hoist block receiver and an auxiliary hoist block receiver provided with a hoist block guide.

Title: **PEDESTAL CRANE ASSEMBLY AND HOIST BLOCK STORAGE AND EXCHANGE DEVICE**

A first aspect of the present invention relates to a pedestal crane assembly, comprising a double jib slewing pedestal crane comprising:

- a stationary pedestal, preferably adapted to be mounted to a vessel;
- a crane housing that is mounted to the pedestal and adapted to slew relative to the pedestal about a vertical slew axis;
- a boom comprising an outer end and an opposed inner end which is connected pivotably about a first horizontal pivot axis to the crane housing, allowing an up-and down luffing movement of the boom;
- a luffing assembly to position the boom, comprising a luffing cable extending between the boom and the crane housing and a luffing winch;
- a knuckle comprising an outer end and an opposed inner end which is connected pivotably about a second horizontal pivot axis to the outer end of the boom, allowing a pivotal movement of the knuckle with respect to the boom, wherein at the outer end a hoist cable departing sheave is provided;
- a knuckle positioning device arranged between the knuckle and the crane housing, adapted to support and position the knuckle with respect to the boom and actuate the pivotal movement of the knuckle;
- a hook to which an object is connectable;
- a hoist assembly configured to raise and lower the object, the hoist assembly comprising a hoisting winch and associated main hoisting cable having a terminal end, the hoisting cable extending from the hoisting winch via the hoist cable departing sheave to the hook.

Such a double jib pedestal crane is often referred to as a knuckleboom crane. Such cranes are commercially available, e.g. from the present applicant. Inventive concepts of a double jib pedestal crane, developed by the same applicant, have been described in WO2014/025253 and WO2014/014343.

Known pedestal crane assemblies further comprise a boom rest with a boom support for supporting the boom when the double jib slewing pedestal crane is not in operation and in a parking position, the boom rest comprising a knuckle support for supporting and positioning the knuckle with respect to the boom in the parking position, in which parking position the boom extends essentially horizontally and the outer end of the knuckle extends downwards.

According to the first aspect of the present invention an improved boom rest is provided, comprising one or more platforms which in the parking position of the knuckle are positioned adjacent the knuckle to provide access to portions of the pedestal crane assembly for installation and/ or maintenance purposes.

Such platforms are advantageous as they add functionality to the boom rest. As such, the flexibility of the crane may be improved. For example, the variety in hoist configurations of the crane may be enlarged, and/or the exchangeability between hoist configurations may be improved, e.g. made more easy and efficient.

In an embodiment, a knuckle platform of the boom rest is provided with a knuckle support which is provided with a stop sensor. The knuckle support is provided for supporting and positioning the knuckle in the parking position. Advantageously, the knuckle support comprises a tapered design, comprising a wide opening to catch the knuckle, tapering towards a support surface onto which the knuckle rests in the parking position. In embodiments, the knuckle support comprises a hard wood outer surface that contacts the knuckle. The advantage of a stop sensor is that the position of the knuckle in the parking position is confirmed electronically. As the accurate positioning of the knuckle may be advantageous for further operations, the confirmation of the accurate positioning may be a prerequisite. The knuckle platform provides access to the knuckle support and the stop sensor, e.g. enabling installation and maintenance, such as reparation of the (hard wood) outer surface of the knuckle support, or battery changing of the stop sensor.

Once the boom and knuckle are in the parking position, the tension in the luffing cable may be reduced. A signal of the stop sensor can be a trigger to reduce the tension.

In embodiments, the boom support of the boom rest is also provided with a hard wood surface structure, adapted to position and support the boom on the boom rest.

In an embodiment, the knuckle is provided with a first lock element and the boom rest comprises a knuckle lock platform provided with a second lock element, adapted to form a lock with the first lock element, wherein in the parking position of the double jib slewing pedestal crane the lock platform extends adjacent the first lock element, allowing the first and second lock element to form a lock and thereby lock the knuckle to the boom rest. For example, both the knuckle and the boom rest are provided with one or more holes. In the parking position, the lock platform is provided adjacent the first lock element of the knuckle. In the example, the holes are advantageously aligned in the parking position, allowing a pin

to extend through the holes to form a lock and thereby lock the knuckle to the boom rest. The knuckle lock platform provides access to the lock elements, and enables the installation of a lock. In alternative embodiments, the first and second lock element on the knuckle and on the knuckle lock platform are adapted to form a lock together, without the provision of additional elements such as a pin. In embodiments, two or even more knuckle lock platforms may be provided.

In embodiments, the functional elements of the knuckle platform and the knuckle lock platform are available on a single platform. Hence, the boom rest is not necessarily provided with two platforms to be able to have the two above-described functionalities.

According to the first aspect of the invention, the crane comprises a hoist assembly configured to raise and lower the object, the hoist assembly comprising a hoisting winch and associated main hoisting cable having a terminal end, the hoisting cable extending from the hoisting winch via the hoist cable departing sheave to the hook.

Depending on the weight of the object to be raised or lowered, the skilled person is aware of alternative hoist configurations. In a single fall configuration, the terminal end of the hoisting cable is connected to the hook, e.g. via a hoist cable connector.

In a double fall hoist configuration, the hoist assembly comprises a main hoist block and a dead end connector, and the knuckle is provided with a dead end mounting facility for a dead end connector. In the double fall hoist configuration the hoisting cable extends from the hoisting winch via the hoist cable departing sheave and the main hoist block to a dead end connector, wherein the terminal end of the main hoisting cable is connected to the dead end connector, and wherein the hook is connected to the main hoist block.

It is noticed that a double fall configuration can be arrived at with a single main hoist block. However, it can also be arrived at using a main hoist block and an auxiliary hoist block interconnected adjacent each other to form a double fall wide hoist configuration, as explained in relation to the second aspect of the invention. An advantage of this configuration is that the wires thus reeved are less prone to twisting. In embodiments, the main hoist block comprises at least one sheave on a main axle, a sheave defining a sheave plane, the main hoist block comprising in a bottom part thereof a hook connector for connection to the hook, the hook connector and the main axle defining a connector plane perpendicular to the sheave plane, the main hoist block further comprising one or more main block connectors for the connection to the auxiliary hoist block. The auxiliary hoist block

comprises at least one auxiliary sheave on an auxiliary axle, the auxiliary hoist block comprising one or more auxiliary block connectors adapted to be connected to the main block connectors to interconnect the main hoist block and the auxiliary hoist block adjacent each other in the double fall wide hoist configuration, whereby at least one auxiliary sheave is in a common sheave plane of the main hoist block.

According to the first aspect of the present invention, the boom rest comprises a dead end connector platform which in the parking position of the double jib slewing pedestal crane extends adjacent the dead end mounting facility. As such, the dead end connector platform enables the mounting of the terminal end of the main hoisting cable to the dead end connector, and/or of the dead end connector to the dead end mounting facility. Hence, the dead end connector platform facilitates the exchange between a single fall and a double fall configuration.

In order to change the hoist configuration from a single fall to a double fall configuration, the hook needs to be detached from the terminal end of the hoist cable and connected to the main hoist block. In embodiments, this change may occur on deck of a vessel, or in a hoist block storage. It is conceivable that a main hoist block platform is available at this level as well.

A main hoist block platform may also enable the connection of an auxiliary hoist block and main hoist block in order to obtain a double fall wide hoist configuration.

It is further noticed that multiple hoist blocks can be interconnected in a row behind one another, resulting in multiple falls. Possibly, such a row of interconnected hoist blocks is made possible by a main hoist block platform.

In embodiments, the knuckle may be provided with more than one, preferably two dead end mounting facilities. For example, a first dead end mounting facility provided close to the inner end of the knuckle, and a second dead end mounting facility provided between the inner and the outer end of the knuckle. It is also conceivable that a dead end mounting facility is provided close to the outer end of the knuckle. According to the first aspect of the invention, the boom rest may be provided with multiple dead end connector platforms, which in the parking position of the double jib slewing pedestal crane extend adjacent corresponding dead end mounting facilities.

In embodiments, the hoist assembly further comprises a main hoist highest position switch connected to the dead end connector. Such a switch forces the hoisting procedure to stop once the main hoist block in the double fall configuration is adjacent the dead end connector and contacts the main hoist highest position switch. According to the first aspect of the invention, the boom rest comprises a switch platform providing access to the main hoist highest position switch. The platform enables installation and maintenance of the switch, e.g. a change of battery. In embodiments having multiple dead end mounting facilities, a corresponding number of locations of the main hoist highest position switch is conceivable, as the switches are connected to the dead end connector, which may thus be connected to one of multiple dead end mounting facilities. Correspondingly, the boom rest may be provided with multiple switch platforms, aligned with corresponding locations of the main hoist highest position switch.

In embodiments, the functional elements of the dead end connector platform and the main hoist highest position platform are available on a single platform. Hence, the boom rest is not necessarily provided with two platforms to be able to have the two above-described functionalities.

In general, it is conceivable that distinct functional elements, described in relation to distinct platforms, are available on a single platform. Hence, the boom rest is not necessarily provided with two platforms to be able to have two distinct functionalities. It is also conceivable that platforms are interconnected to platforms on an adjacent device, such as a hoist block storage. It is further conceivable, that smaller platforms are connected to other platforms, and not to the boom rest. Furthermore, it is conceivable that a movable platform is provided. In embodiments, the movable platform is movably connected to the boom. In alternative embodiments, a movable platform is movably connected to another platform, similar to suspended platforms or cradles as used in window washing.

In a triple fall hoist configuration, the hoist assembly comprises at least two hoist cable departing sheaves, a main hoist block and a hoist cable connector connected to the main hoist block. In the double fall hoist configuration the hoisting cable extends from the hoisting winch via a first hoist cable departing sheave and the main hoist block to the second hoist cable departing sheave, and from there to the hoist cable connector, and wherein the hook is connected to the main hoist block,

According to the first aspect of the present invention, the boom rest comprises a departing sheave platform which in the parking position of the double jib slewing pedestal crane

extends adjacent the outer end of the knuckle where the hoist cable departing sheave is provided, and a hoist cable connector platform extending adjacent the main hoist block, allowing the hoist cable connector to be connected to the main hoist block. It is noticed that in embodiments, at least two hoist cable departing sheaves are provided 'standard'. Hence, it is conceivable that the departing sheave platform may be dispensed with, while maintaining the hoist cable connector platform in order to arrive at the triple fall hoist configuration. The hoist cable connector platform allows control of the interconnection of the hoist cable connector and the main hoist block. The departing sheave platform allows control of the interconnection of the hoist cable departing sheave and the knuckle. Hence, the hoist cable connector platform, possibly in combination with the departing sheave platform, facilitates the exchange between a double fall and a triple fall configuration.

In embodiments, as is common practice in such cranes, the main hoist block and/ or the auxiliary hoist block is provided with rope guards.

In embodiments, the pedestal crane assembly is further provided with a tugger hoist assembly comprising a tugger winch and a tugger wire departing from the crane housing that is connectable to the main hoist terminal end, in order to reeve the main hoist cable through different hoist configurations, such as a single hoist configuration, dual hoist configuration or triple hoist configuration. Hence, the tugger wire enables the hoist cable to be reeved according to the desired hoist configuration. The tugger wire is advantageously guided along the boom and possibly also along the knuckle. In embodiments, the boom rest comprises a tugger wire sheave to guide tugger wire.

In embodiments, the boom rest is provided pivotably or removably on a support, e.g. a deck of a vessel.

The first aspect of the present invention also relates to a pedestal crane assembly comprising a double jib slewing pedestal crane comprising:

- a stationary pedestal, preferably adapted to be mounted to a vessel;
- a crane housing that is mounted to the pedestal and adapted to slew relative to the pedestal about a vertical slew axis;
- a boom comprising an outer end and an opposed inner end which is connected pivotably about a first horizontal pivot axis to the crane housing, allowing an up-and down luffing movement of the boom;
- a luffing assembly to position the boom, comprising a luffing cable extending between the boom and the crane housing and a luffing winch;

- a knuckle comprising an outer end and an opposed inner end which is connected pivotably about a second horizontal pivot axis to the outer end of the boom, allowing a pivotal movement of the knuckle with respect to the boom, wherein at the outer end a hoist cable departing sheave is provided;
- a knuckle positioning device arranged between the knuckle and the crane housing, adapted to support and position the knuckle with respect to the boom and actuate the pivotal movement of the knuckle;
- a hook to which an object is connectable;
- a hoist assembly configured to raise and lower the object, the hoist assembly comprising a hoisting winch and associated main hoisting cable having a terminal end, the hoisting cable extending from the hoisting winch via the hoist cable departing sheave to the hook;

the pedestal crane assembly further comprises a boom rest with a boom support for supporting the boom when the double jib slewing pedestal crane is not in operation and in a parking position, the boom rest comprising a knuckle support for supporting and positioning the knuckle with respect to the boom in the parking position, in which parking position the boom extends essentially horizontally and the outer end of the knuckle extends downwards; wherein a hoist block storage is provided adjacent the boom rest, below the outer end of the knuckle, for the storage of one or more hoist blocks and/ or hoist cable connectors and/ or one or more hooks.

Such a hoist block storage is advantageous as it adds functionality to the boom rest. As such, the flexibility of the crane may be improved. For example, the variety in hoist configurations of the crane may be enlarged, and/or the exchangeability between hoist configurations may be improved, e.g. made more easy and efficient. The hoist block storage advantageously facilitates the exchange of hoist cable blocks, hoist cable connectors and hooks, and as such contribute to facilitating the exchange of hoist configuration. In embodiments, the hoist block storage is adapted to store a main hoist block and/ or an auxiliary hoist block. Possibly, hooks capable of hoisting 600 tons and 900 tons are stored.

In embodiments, the double jib slewing pedestal crane is furthermore provided with a whip hoist assembly, comprising a whip hoist winch and a whip hoist cable extending over a whip hoist departing sheave, provided between the hoist cable departing sheave and the outer end of the knuckle. The whip hoist cable may be embodied in a single fall configuration, wherein the whip hoist cable is connected to a whip hook, possibly via a whip hook connector. Alternatively, the whip hoist cable is embodied in a dual fall configuration wherein the whip hoist assembly further comprises a whip hoist block.

In embodiments, the hoist block storage is provided with a whip hoist block receiver for storage of a whip hoist block, allowing the whip hoist configuration to switch between a single and a double fall configuration. Possibly, further a whip hoist cable connector receiver is provided for the storage of the whip hoist cable connector, preferably provided above and aligned with a whip hook receiver, facilitating the whip hook connector of the whip hoist cable connector and a whip hook to be connected to each other.

Possibly, the hoist block storage further comprises a whip hook receiver for storage of at least one whip hook, provided below the whip hoist block receiver, the whip hook receiver enabling the whip hoist cable or the whip hook connector or the whip hoist block and the hook to be connected to each other. As such, the exchange between a single fall whip hoist configuration without whip hoist block and a double fall whip hoist configuration is facilitated.

In embodiments, the double jib slewing pedestal crane is furthermore provided with a sling hoist assembly, comprising a sling hoist winch and a sling hoist cable extending over a sling hoist departing sheave, provided at the outer end of the boom, adjacent the knuckle. Generally, the sling hoist cable is embodied in a single fall configuration, wherein the sling hoist cable is connected to a sling hook, possibly via a sling hook connector. In embodiments, the hoist block storage is also provided with a sling hook receiver for storage of at least one sling hook.

The hoist block storage may be combined with the presence of platforms on the boom rest. In embodiments, the hoist block storage comprises one or more platforms to provide access to the one or more hoist blocks and/ or hoist cable connectors and/or one or more hooks, for installation and/ or maintenance purposes and/ or allowing control of interconnections, such as the interconnection of a hoist cable and the main hoist block, and/ or of a hoist cable and a hoist cable connector, and/ or of a hoist cable connector and the main hoist block, and/or of a main hoist block and hook, and/ or of a hoist cable connector and hook. Possibly, platforms of the hoist block storage and of the boom rest are interconnected. Possibly, a combined access to the platforms is enabled.

In embodiments, the hoist block storage is provided removably on a support, e.g. a deck of a vessel. This enables the removal of the hoist block storage, an possibly also an exchange of distinct hoist block storages.

The first aspect of the present invention further relates to a boom rest for supporting a boom of a double jib slewing pedestal crane comprising:

- a stationary pedestal, preferably adapted to be mounted to a vessel;
- a crane housing that is mounted to the pedestal and adapted to slew relative to the pedestal about a vertical slew axis;
- a boom comprising an outer end and an opposed inner end which is connected pivotably about a first horizontal pivot axis to the crane housing, allowing an up-and down luffing movement of the boom;
- a luffing assembly to position the boom, comprising a luffing cable extending between the boom and the crane housing and a luffing winch;
- a knuckle comprising an outer end and an opposed inner end which is connected pivotably about a second horizontal pivot axis to the outer end of the boom, allowing a pivotal movement of the knuckle with respect to the boom, wherein at the outer end a hoist cable departing sheave is provided;
- a knuckle positioning device arranged between the knuckle and the crane housing, adapted to support and position the knuckle with respect to the boom and actuate the pivotal movement of the knuckle;
- a hook to which an object is connectable;
- a hoist assembly configured to raise and lower the object, the hoist assembly comprising a hoisting winch and associated main hoisting cable having a terminal end, the hoisting cable extending from the hoisting winch via the hoist cable departing sheave to the hook;

the boom rest comprising a knuckle support for supporting and positioning the knuckle with respect to the boom in the parking position, in which parking position the boom extends essentially horizontally and the outer end of the knuckle extends downwards;
characterized in that
the boom rest comprises one or more platforms which in the parking position of the knuckle are positioned adjacent the knuckle to provide access to portions of the pedestal crane assembly for installation and/ or maintenance purposes.

The first aspect of the present invention further relates to a pedestal crane parking assembly for a double jib slewing pedestal crane comprising:

- a stationary pedestal, preferably adapted to be mounted to a vessel;
- a crane housing that is mounted to the pedestal and adapted to slew relative to the pedestal about a vertical slew axis;
- a boom comprising an outer end and an opposed inner end which is connected pivotably about a first horizontal pivot axis to the crane housing, allowing an up-and down luffing movement of the boom;

- a luffing assembly to position the boom, comprising a luffing cable extending between the boom and the crane housing and a luffing winch;
- a knuckle comprising an outer end and an opposed inner end which is connected pivotably about a second horizontal pivot axis to the outer end of the boom, allowing a pivotal movement of the knuckle with respect to the boom, wherein at the outer end a hoist cable departing sheave is provided;
- a knuckle positioning device arranged between the knuckle and the crane housing, adapted to support and position the knuckle with respect to the boom and actuate the pivotal movement of the knuckle;
- a hook to which an object is connectable;
- a hoist assembly configured to raise and lower the object, the hoist assembly comprising a hoisting winch and associated main hoisting cable having a terminal end, the hoisting cable extending from the hoisting winch via the hoist cable departing sheave to the hook;

the pedestal crane parking assembly comprising a boom rest comprising a knuckle support for supporting and positioning the knuckle with respect to the boom in the parking position, in which parking position the boom extends essentially horizontally and the outer end of the knuckle extends downwards, wherein the boom rest comprises one or more platforms which in the parking position of the knuckle are positioned adjacent the knuckle to provide access to portions of the pedestal crane assembly for installation and/ or maintenance purposes, the pedestal crane parking assembly further comprising

a hoist block storage provided adjacent the boom rest, below the outer end of the knuckle, for the storage of one or more hoist blocks and/ or hoist cable connectors and/ or one or more hooks.

A second aspect of the present invention relates to a hoist block storage and exchange device for the vertical storage of a main hoist block and an auxiliary hoist block and a hook, wherein the device is adapted to facilitate the exchange between a first hoist configuration with the main hoist block and a second double fall wide hoist configuration wherein the main hoist block and the auxiliary hoist block are interconnected adjacent each other,

- the main hoist block comprising at least one sheave on a main axle, a sheave defining a sheave plane, which sheave plane(s) is (are) orientated vertically in the hoist block storage and exchange device, the main hoist block comprising in a bottom part thereof a hook connector for connection to a hook, the hook connector and the main axle defining a connector plane perpendicular to the sheave plane, the main hoist block further comprising one or more main block connectors for the connection to the auxiliary hoist block,

- an auxiliary hoist block, comprising at least one vertically orientated auxiliary sheave on an auxiliary axle, the auxiliary hoist block comprising one or more auxiliary block connectors adapted to be connected to the main block connectors to interconnect the main hoist block and the auxiliary hoist block adjacent each other in the second double fall wide hoist configuration, whereby at least one auxiliary sheave is in a common sheave plane of the main hoist block,

the device comprising:

- a main hoist block receiver for storage of the main hoist block, the receiver enabling the main hoist block to be stored in a first orientation wherein the connector plane is vertical, corresponding to the first hoist configuration, as well as in a second orientation wherein the connector plane is tilted, at an angle with the horizontal, allowing the interconnection with the auxiliary hoist block to obtain the second double fall wide hoist configuration,
- a hook receiver for storage of at least one hook, provided below the main hoist block receiver, the hook receiver enabling the hook connector of the main hoist block and a hook to be connected to each other in the first and second hoist configuration,

an auxiliary hoist block receiver for storage of the auxiliary hoist block, comprising an auxiliary hoist block guide along which the auxiliary hoist block is movable between a first position remote from the main hoist receiver and a second position adjacent the main hoist block receiver, allowing the interconnection of the auxiliary hoist block and the main hoist block into the second double fall wide hoist configuration.

It is commonly known to alter a hoist configuration, e.g. from a single fall to a double fall configuration. Hence, commonly hoist block storages are available to store one or more hoist blocks. However, such hoist block storages do not facilitate the exchange between hoist configurations, in particular between a first hoist configuration with the main hoist block and a second double fall wide hoist configuration wherein the main hoist block and the auxiliary hoist block are interconnected adjacent each other. The advantage of the second aspect of the invention is that such an exchange is facilitated by the storage device.

The hoist block storage and exchange device of the second aspect of the invention is in particular advantageous when the crane is has a relatively large hoist capacity, in the order of 400-1000 metric tons, and the dimensions of the main and auxiliary hoist blocks are as large as 2000-4500mm, e.g. 3500mm, and weigh up to 10-15 tons (without the hook).

Generally, cranes are provided with a hoist assembly which is configured to raise and lower an object, the hoist assembly comprising a hoisting winch and associated main hoisting

cable having a terminal end, the hoisting cable extending from the hoisting winch via the hoist cable departing sheave to a hook to which the object is connectable.

In embodiments, the main hoist block receiver is provided with a lock to lock the main hoist block in the main hoist block receiver. Possibly, in addition thereto or instead thereof the auxiliary hoist block receiver is provided with a lock to lock the auxiliary hoist block in the auxiliary hoist block receiver.

In a single fall configuration a hoist cable connector is provided, adapted to be connected to the terminal end of the hoist cable, comprising in a bottom part thereof a hook connector for the connection to a hook.

In a double fall configuration, the hoist assembly comprises a main hoist block and a dead end connector, and wherein the crane is provided with a dead end mounting facility for a dead end connector, adapted to form a double fall hoist configuration wherein the hoisting cable extends from the hoisting winch via the hoist cable departing sheave and the main hoist block to the dead end connector, wherein the terminal end of the main hoisting cable is connected to the dead end connector, and wherein the hook is connected to the main hoist block.

In a triple fall configuration the hoist assembly comprises at least two hoist cable departing sheaves, a main hoist block and a hoist cable connector connected to the main hoist block. In the triple fall hoist configuration the hoisting cable extends from the hoisting winch via a first hoist cable departing sheave and the main hoist block to the second hoist cable departing sheave, and from there to the hoist cable connector, and wherein the hook is connected to the main hoist block.

In an embodiment, the main hoist block receiver comprises a hook connector receiver for positioning and storing the hook connector, and wherein the hook receiver is adapted to store a hook below and aligned with the hook connector receiver. This configuration facilitates the main hoist block and the hook to be connected to each other in the first and second hoist configuration, irrespective of the orientation of the main hoist block.

In an embodiment, the main hoist block and the hook are provided with connection holes, allowing to be interconnected via a shaft. The hoist block storage and exchange device is advantageously provided with at least one shaft tray, provided between the main block receiver and the hook receiver, for the storage of a shaft and facilitating the movement of

the shaft between a remote position, wherein the main hoist block and the hook are not connected, and a connection position in which the shaft and the connection holes of the main hoist block and the hook are aligned, connecting the main hoist block and the hook.

In embodiments, the hoist block storage and exchange device is provided with one or more platforms adjacent the main hoist block receiver, hook receiver and auxiliary hoist block receiver. Such platforms provide access and allow control of the interconnection of auxiliary hoist block and main hoist block, and/or of the main hoist block and a hook, and/ or of a hoist cable and the main hoist block, and/ or of a hoist cable and a hoist cable connector, and/ or of a hoist cable connector and the main hoist block.

In embodiments, an auxiliary hoist block support surface is provided below and parallel to the auxiliary hoist support guide. Such an auxiliary hoist block support surface may further support the auxiliary hoist block between the first and second position.

In embodiments, the auxiliary hoist block guide comprises parallel guide rails along which rollers are movable. The rollers are connectable to the auxiliary hoist block via chain tackles.

According to the second aspect of the invention, the first hoist configuration involves the application of the main hoist block. In embodiments, in the first hoist configuration a hoist cable is reeved along the main hoist block, forming a double fall configuration. In alternative embodiments, in the first hoist configuration a hoist cable is reeved along the main hoist block and connected to the main hoist block, forming a triple fall configuration.

Accordingly, the hoist block storage and exchange device is adapted to facilitate the exchange between:

- a double fall configuration with the main hoist block and a double fall wide hoist configuration wherein the main hoist block and the auxiliary hoist block are interconnected adjacent each other; and
- a triple fall configuration with the main hoist block and a double fall wide hoist configuration wherein the main hoist block and the auxiliary hoist block are interconnected adjacent each other.

In possible embodiments of the triple fall configuration, the hoist cable is connected to the main hoist block via a hoist cable connector. As indicated above, in the single fall configuration also a hoist cable connector is provided, adapted to be connected to the terminal end of the hoist cable. A bottom part of the hoist cable connector is provided with a

universal connector, which in the triple fall configuration allows the hoist cable connector to be connected to the main hoist block, and in the single fall configuration allows the hoist cable connector to be connected to a hook.

Accordingly, the hoist block storage and exchange device is adapted to facilitate the exchange between:

- a single fall configuration with the terminal end of the hoist cable connected to a hoist cable connector and a double fall configuration with the main hoist block,
- a single fall configuration with the terminal end of the hoist cable connected to a hoist cable connector and a double fall wide hoist configuration wherein the main hoist block and the auxiliary hoist block are interconnected adjacent each other.

In embodiments, the hoist block storage and exchange device further comprises a hoist cable connector receiver for the storage of the hoist cable connector. Preferably, the hoist cable connector receiver is provided above and aligned with the hook receiver, facilitating the hoist cable connector and a hook to be connected to each other. Possibly, the hoist cable connector receiver comprises a universal connector receiver for positioning and storing the universal connector. In embodiments, the hook receiver is adapted to store a hook below and aligned with the universal connector receiver.

In embodiments, the universal connector of the hoist cable connector and the hook are provided with connection holes, allowing to be interconnected via a shaft. The hoist block storage and exchange device is advantageously provided with at least one shaft tray, provided between the hoist cable connector receiver and the hook receiver, for the storage of a shaft and facilitating the movement of the shaft between a remote position and a connection position in which the shaft and the connection holes of the hoist cable connector and the hook are aligned, and the hook is connected to the hoist cable connector.

In embodiments, the hook receiver comprises a hook guide along which a hook is movable between a first position below the main hoist block receiver and a remote second position Advantageously, the first position is below and aligned with a hook connector receiver of the main hoist block receiver. The remote second position is possibly below the hoist cable connector receiver, in particular below and aligned with the universal connector receiver of the hoist cable connector receiver.

In embodiments, the hook receiver is adapted to store two or more hooks along the hook guide allowing the hooks to be changed. For example, different hooks may be applied,

depending on the crane capacity. For a 900 ton hoisting capacity, a hook having a weight of 15 ton may be applied, measuring up to 3 meters in length. For a 600 ton hoisting capacity, a hook having a weight of 12 ton may be applied, measuring up to 2,5 meters in length.

In embodiments, it is envisaged that not only a main hoist system is provided but in addition thereto a secondary hoist system, comprising a secondary winch and a secondary hoist cable. For example, the secondary hoist system is a sling hoist assembly, comprising a sling hoist winch and a sling hoist cable extending over a sling hoist departing sheave, provided at an outer end of a boom, adjacent a knuckle. Or alternatively, the secondary hoist system is a whip hoist assembly, comprising a whip hoist winch and a whip hoist cable extending over a whip hoist departing sheave, e.g. provided at an outer end of a knuckle.

The secondary hoist cable may be embodied in a single fall configuration, wherein the secondary hoist cable is connected to a secondary hook, possibly via a secondary hook connector. Alternatively, the secondary hoist cable is embodied in a double fall configuration wherein the secondary hoist assembly further comprises a secondary hoist block.

In embodiments, the hoist block storage and exchange device of the second aspect of the invention is furthermore provided with a secondary block receiver for storage of a secondary hoist block. Possibly, also a secondary hook receiver is provided for storage of at least one secondary hook, provided below the secondary hoist block receiver. This facilitates the interconnection of secondary hoist block and secondary hook. Possibly, the secondary hoist block receiver comprises a secondary hook connector receiver.

With the presence of a secondary hoist block receiver and a secondary hook connector receiver, the device is adapted to facilitate the exchange between a single fall auxiliary hoist configuration without secondary hoist block and a double fall secondary hoist configuration, wherein in the single fall secondary hoist configuration a secondary hoist cable connector is provided, adapted to be connected to the secondary hoist cable, comprising in a bottom part thereof a secondary hook connector for the connection to a secondary hook.

The invention further relates to a main hoist block (43) in combination with an auxiliary hoist block (48), the main hoist block (43) being adapted to be used in a single fall or double fall configuration, the main hoist block and auxiliary hoist block being adapted to be interconnected adjacent each other to form a double fall wide hoist configuration, wherein:

- the main hoist block (43) comprises at least one sheave on a main axle (43b), a sheave defining a sheave plane, which sheave plane(s) is (are) orientated vertically

in the double fall wide hoist configuration, the main hoist block (43) comprising in a bottom part thereof a hook connector (43d) for connection to a hook, the hook connector (43d) and the main axle (43b) defining a connector plane perpendicular to the sheave plane, the main hoist block (43) further comprising one or more main block connectors (43e, 43f) for the connection to the auxiliary hoist block (48),

- an auxiliary hoist block (48), comprising at least one vertically orientated auxiliary sheave on an auxiliary axle (48b), the auxiliary hoist block (48) comprising one or more auxiliary block connectors (48e, 48f) adapted to be connected to the main block connectors (43e, 43f) to interconnect the main hoist block (43) and the auxiliary hoist block (48) adjacent each other in the double fall wide hoist configuration, whereby at least one auxiliary sheave is in a common sheave plane of the main hoist block (43).

The advantage of such a double fall wide configuration is that hoist cables reeved in this configuration are less prone to twisting.

The invention is further elucidated in relation to the drawings, in which:

Fig. 1 is a schematic side view of a pedestal crane assembly according to the first aspect of the invention in a parking position, comprising a hoist block storage and exchange device according to the second aspect of the invention;

Fig. 2 is a more detailed schematic side view of a boom rest according to the first aspect of the invention and a hoist block storage and exchange device according to the second aspect of the invention, wherein the hoist blocks are arranged different from the arrangement in fig. 1;

Fig. 3a is a schematic top view of the pedestal crane assembly of fig. 1;

Fig. 3b is a detail of a top view of the boom rest of fig. 1;

Figs. 4a-4f are schematic representations of various hoisting configurations;

Figs. 5a-c are detailed schematic side views of a boom rest according to the first aspect of the invention and a hoist block storage and exchange device according to the second aspect of the invention, similar to fig. 2, representing different hoist configurations;

Figs. 6a-6c are side views of a hoist block storage and exchange device in distinct configurations;

Fig. 7 is a schematic top view of the hoist block storage and exchange device of fig. 6;

Fig. 8 is a detailed view of an embodiment of an auxiliary hoist block guide;

Fig. 9 is a schematic side view of a whip hoist storage;

Fig. 10a is a first schematic side view of the hoist block storage and exchange device of fig. 6, without the hoist blocks;

Fig. 10b is a second schematic side view of the hoist block storage and exchange device, perpendicular to the view of fig. 10a.

In figs. 1-3 and figs. 5a-5c a pedestal crane assembly 1 according to the first aspect of the invention is shown, comprising a boom rest 20.

The pedestal crane assembly as shown comprises a double jib slewing pedestal crane 10 comprising:

- a stationary pedestal 2, here mounted to a deck 3a of a vessel 3;
- a crane housing 4 that is mounted to the pedestal 2 and adapted to slew relative to the pedestal about a vertical slew axis 5;
- a boom 6 comprising an outer end 6a and an opposed inner end 6b which is connected pivotably about a first horizontal pivot axis 7 to the crane housing 4, allowing an up-and down luffing movement of the boom 6;
- a luffing assembly to position the boom, comprising a luffing cable 8a extending between the boom and the crane housing and a luffing winch (not shown, possibly provided in the pedestal 2);
- a knuckle 9 comprising an outer end 9a and an opposed inner end 9b which is connected pivotably about a second horizontal pivot axis 11 to the outer end 6a of the boom 6, allowing a pivotal movement of the knuckle 9 with respect to the boom 6, wherein at the outer end a hoist cable departing sheave 12 is provided;
- a knuckle positioning device 13 arranged between the knuckle 9 and the crane housing 4, adapted to support and position the knuckle with respect to the boom 6 and actuate the pivotal movement of the knuckle. In the shown embodiment, the knuckle positioning device 13 resembles the disclosure of WO2014/014343 and comprises a cable 13a, a number of spokes 13b and connecting beams 13c. In fig. 1, different degrees of tension in the cable 13a are visible: the knuckle is being lowered by paying out the cable 13a. Once in the parking position, the cable 13a may be paid out even further to relieve the tension in cable 13a, and allow the end of the cable 13a to rest upon a spoke 13b.
- a hook 14a, 14b to which an object is connectable;
- a hoist assembly configured to raise and lower the object, the hoist assembly comprising a hoisting winch (not visible, preferably provided in the pedestal of the crane) and associated main hoisting cable 15a having a terminal end 15a', the hoisting cable extending from the hoisting winch via the hoist cable departing sheave 12 to the hook, in the embodiments of fig. 1 and fig. 2 hook 14a.

The double jib slewing pedestal crane as shown is furthermore provided with a sling hoist assembly, comprising a sling hoist winch (not shown) and a sling hoist cable 52 extending over a sling hoist departing sheave 52, provided at the outer end of the boom 6a, adjacent the knuckle 9. In fig. 2, a sling hook 53 is shown.

The double jib slewing pedestal crane as shown is furthermore provided with a whip hoist assembly, comprising a whip hoist winch (not shown) and a whip hoist cable extending over a whip hoist departing sheave 54, provided at the outer end 9a of the knuckle 9. In fig. 2, hardly visible, a whip hoist dead end 55 is also shown, allowing the whip hoist to be in a double fall configuration. In fig. 5a, the whip hoist assembly is visible in a single fall configuration.

According to the first aspect of the invention, the pedestal crane assembly 1 further comprises a boom rest 20 with a boom support 21 for supporting the boom when the double jib slewing pedestal crane is not in operation and in a parking position. The boom support 21 is provided at an upper end of the boom rest 20. The boom rest further comprises a knuckle support 25, here embodied as a beam extending essentially perpendicular to the knuckle 9 in the parking position, for supporting and positioning the knuckle with respect to the boom in the parking position, in which parking position the boom extends essentially horizontally and the outer end of the knuckle extends downwards. In the shown embodiment, adjacent the boom rest 20, a hoist block storage and exchange device 50 is provided.

As can be derived from the top view of fig. 3a, due to the tapering shape of the boom 6 and the position of the boom rest 20 with respect to the crane 10, parts of the boom rest 20 and possibly also adjacent hoist block storage and exchange device 50 that can contact parts of the crane 10 are provided at an angle α.

According to the first aspect of the invention, the boom rest 20 comprises one or more platforms 31, 32, 33, 34, 35, 36, 36', 37 which in the parking position of the knuckle 9, as visible in figs. 1-3, are positioned adjacent the knuckle to provide access to portions of the pedestal crane assembly for installation and/ or maintenance purposes. Here, the platforms protrude from a vertical boom rest frame 30, possibly embodied as an A-frame, which in the shown embodiment is supported on deck 3a via a support beam 39. The platforms are preferably interconnected, e.g. via ladders 38. Platform 36' is does not protrude from the boom rest, but is suspended from platform 36, see in particular fig. 5a.

It is noticed that in the shown embodiment the adjacent hoist block storage 50 also comprises platforms 61, 62 to provide access to portions of the hoist block storage and exchange device for installation and/ or maintenance purposes and/ or allowing control of interconnections. These platforms may in particular provide access to one or more hoist blocks 43 and/ or auxiliary hoist blocks 48 and/or hoist cable connectors 41 and/or one or more hooks 14a, 14b. These platforms may overlap, here platform 37 of the boom rest and platform 61 of the hoist block storage and exchange device 50 are interconnected.

In figs. 1 and 2, and in detail in fig. 3b a knuckle lock platform 32 of the boom rest 20 is shown, which is provided with a knuckle support surface 22. The knuckle support surface 22 has a tapering frame 22a, comprising a wide opening to catch the knuckle 9, tapering towards a support surface 22b onto which the knuckle rests in the parking position. This knuckle support surface comprises a hard wood outer surface onto which the knuckle rests.

In fig. 3b it is visible that the knuckle is provided with a first lock element, in particular a cavity 23a, and the knuckle lock platform 32 is provided with a second lock element, in particular a pin 23b, adapted to form a lock with the first lock element. It is conceivable that the platform is provided with a tray 23c for the lock pin 23b. Hence, in the parking position of the double jib slewing pedestal crane as visible in figs. 1, 2 and 3, the knuckle lock platform 32 extends adjacent the first lock element 23a, allowing the first and second lock element 23a, 23b to form a lock and thereby lock the knuckle 9 to the boom rest 20. In the shown embodiment the knuckle platform 32 thus also acts as a knuckle lock platform.

In the shown embodiment, a knuckle platform 35 is provided adjacent the knuckle support 25, which is provided with a second lock element 24 adapted to form a lock with a first lock element provided on the knuckle 9. Possibly, the second lock element 24 is embodied as a hole, which is aligned with a first lock element, embodied as a cavity, on the knuckle 9, which form a lock when a pin is provided through the hole and into the cavity, similar to the situation as depicted in fig. 3b. Possibly, the knuckle platform is provided with a stop sensor, not visible.

Depending on the weight of the object to be raised or lowered alternative hoist configurations are possible. In figs. 4a-4f possible hoist configurations are schematically depicted.

In fig. 4d, a single fall configuration is shown, wherein the terminal end of the hoisting cable is connected to a hook 14b via a hoist cable connector 41. In the shown embodiment, the

hook 14b is provided with a swivel 14c, allowing the hook 14b to swivel about a vertical axis. The hoist cable connector 41 is provided with a universal connector 41a, in particular a hole, which is in fig. 4d connected to the swivel 14c via a pin 42, allowing a pivoting movement about a horizontal pivot axis. The hoist cable connector 41 is also visible in the hoist block storage and exchange device 50 in fig. 2.

In figs. 4a, 4c and 4e a double fall hoist configuration is shown, with a main hoist block 43. In the double fall hoist configuration of fig. 4a the hoisting cable 15a extends from the hoisting winch via the hoist cable departing sheave 12 and the main hoist block 43 to a dead end connector. In fig. 1, these dead end connectors 44 are visible per se. In fig. 2, the terminal end 15a' of the main hoisting cable 15a is connected to the dead end connector 44. In this double fall configuration, the hook 14a is connected to the main hoist block 43. The hook 14a is provided with a swivel 14d, allowing the hook 14a to swivel about a vertical axis. In the shown embodiment, the knuckle 9 is provided with an upper dead end mounting facility 45a for a dead end connector and a lower dead end mounting facility 45b at the inner end 9b of the knuckle 9. The main hoist block 43 for the double fall configuration of fig. 4a is visible in the hoist block storage and exchange device 50 in fig. 2.

According to the first aspect of the present invention, the boom rest comprises a dead end connector platform 31, 33, which in the parking position of the double jib slewing pedestal crane extends adjacent the dead end mounting facilities 45a, 45b. The dead end connector platforms may facilitate the connection of the dead end connectors 44 to the mounting facilities 45a, 45b, and/or the connection of the terminal end 15a' of the hoist cable to the dead end connectors. In the embodiment of fig. 1, the dead end connectors are connected to the mounting facilities, but the terminal end of the hoist cable is not (yet) connected to the dead end connectors. In fig. 2, the hoist configuration wherein the terminal end of the hoisting cable is connected to the dead end connector on mounting facility 45a, and the hoist configuration wherein the terminal end of the hoisting cable is connected to the dead end connector on mounting facility 45b are indicated.

In the shown embodiment, the hoist assembly is provided with a main hoist highest position switch 46, which is connectable to the dead end connector 44. In fig. 2, comprising two dead end connectors 44, also two main hoist highest position switches 46 are shown. According to the first aspect of the present invention, the boom rest 20 comprises a switch platform 32, 34, 35 providing access to the main hoist highest position switch. It is noticed that these platforms are here not embodied as separate platforms, but add functionality to existing

platforms. In alternative embodiments, it is both conceivable a selection of the platforms of the present embodiment is present, or that the number of platforms is increased.

The double fall configuration can also be arrived at using a main hoist block 43 and an auxiliary hoist block 48 interconnected adjacent each other, forming a so-called double fall wide hoist configuration, visible in figs. 4c and 4e.

The main hoist block 43 comprises at least one sheave 43a on a main axle 43b, here supported by a frame 43c. It is noticed that just one sheave is visible, but it is conceivable that multiple sheaves are provided adjacent each other on the same main axle 43b. The sheave defines a sheave plane, here in plane of the drawing. The frame 43c of the main hoist block 43 comprises in a bottom part thereof a hook connector 43d for connection to the hook, the hook connector 43d and the main 43b axle defining a connector plane perpendicular to the sheave plane. In the embodiments of fig. 4a and 4b, the connector plane is essentially vertical. In the double fall wide hoist configuration of figs. 4c and 4e, the connector plane extends at an angle of about 40-50º. The main hoist block 43 further comprises one or more main block connectors 43e, 43f for the connection to the auxiliary hoist block 48.

The auxiliary hoist block 48 comprises at least one auxiliary sheave 48a on an auxiliary axle 48b. Possibly, multiple auxiliary sheaves are provided adjacent each other on the auxiliary axle 48b. The shown auxiliary hoist block 48 comprises two auxiliary block connectors 48e, 48f, adapted to be connected to the main block connectors 43e, 43f to interconnect the main hoist block 43 and the auxiliary hoist block 48 adjacent each other in the double fall wide hoist configuration, whereby at least one auxiliary sheave is in a common sheave plane of the main hoist block 43, i.e. here in the plane of the drawing. In the embodiment of fig. 4c, it is visible that main block connector 43f is connected to auxiliary block connector 48f, but main block connector 43e is not yet connected to auxiliary block connector 48e. In fig 4e, main block connector 43e and auxiliary block connector 48e are also interconnected.

In the embodiment of fig. 2, a hoist block storage 50 is provided adjacent the boom rest, below the outer end of the knuckle 9a. In fig. 2, the main hoist block 43 is shown in a double fall configuration, and the combination of main hoist block 43' and auxiliary hoist block 48 is also shown in the same drawing.

Here, platform 37 of the boom rest 20 and platform 61 of the hoist block storage 50 are interconnected to form a main hoist block platform 61, extending adjacent the main hoist block 43, allowing the interconnection of main hoist block 43 and auxiliary hoist block 48.

In figs. 4b and 4f, yet an alternative hoist configuration is shown: a triple fall hoist configuration. Here, the hoist assembly comprises at least two hoist cable departing sheaves 12a, 12b, a main hoist block 43 and a hoist cable connector 41 connected to a connector 43 provided at an upper part of frame 43c the main hoist block 43.

As visible in fig. 4f, in the triple fall hoist configuration the hoisting cable 15a extends from the hoisting winch (not visible) via a first hoist cable departing sheave 12a and the main hoist block 43 to the second hoist cable departing sheave 12b, and from there to the hoist cable connector 41, and wherein the hook 14a is connected to the main hoist block 43 via hook connector 43d and a pin 49 in a bottom part thereof.

Boom rest 20 comprises a departing sheave platform 36 which in the parking position of the double jib slewing pedestal crane extends adjacent the outer end of the knuckle 9a where the hoist cable departing sheaves are provided. Furthermore, suspended from this platform 36 of the boom rest, a small platform 36' is provided which is a hoist cable connector platform 36' extending adjacent the main hoist block 43, allowing the hoist cable connector 41 to be connected to the main hoist block 43. It is also conceivable that the hoist cable connector platform 36' is provided on the hoist block storage 50.

The double jib slewing pedestal crane as shown is furthermore provided with a tugger hoist assembly, comprising a tugger winch, not shown, and preferably provided in the pedestal 2, and a tugger wire 70 departing from the crane housing via a sheave 71 and along the boom 6, here via an auxiliary sheave 72. This tugger wire 70 is connectable to the main hoist terminal end 15a', in order to reeve the main hoist cable through different hoist configurations.

In figs. 1 and 2, the tugger wire 70 is shown in a first configuration, indicated with tugger wire 70', in which the tugger wire 70' is guided along lower dead end mounting facility 45b at the inner end 9b of the knuckle 9, in order to connect the main hoist terminal end 15a' to the dead end connector 44 at this lower dead end mounting facility 45b.

The tugger wire 70 is also shown in a second configuration, indicated with tugger wire 70", in which the tugger wire 70" is guided via a tugger wire sheave 73 provided on the boom rest

20 along upper dead end mounting facility 45a between inner end 9b and outer end 9a of the knuckle 9, in order to connect the main hoist terminal end 15a' to the dead end connector 44 at this upper dead end mounting facility 45a.

In figs. 5a-5c, stills of different hoist configuration change processes are visible. In fig. 5a, the hoist configuration is a single fall configuration, wherein the hoist cable connector 41 is just positioned in the hoist cable connector receiver 85, with universal connector receiver 87. The auxiliary hoist block 48 and main hoist block 43 are interconnected to form a double fall wide hoist configuration. The terminal end of the main hoist cable 15a' can be disconnected from the hoist cable connector. The boom and knuckle can be parked in the parking position, as visible in fig. 5b.

In fig. 5b, the tugger wire 70 is shown in a first configuration, indicated with tugger wire 70', in which the tugger wire 70' is guided along lower dead end mounting facility 45b at the inner end 9b of the knuckle 9, and the interconnected auxiliary hoist block 48 and main hoist block 43, in order to connect to the main hoist terminal end 15a'. Once the tugger wire 70' is hauled in, the main hoist terminal end 15a' may be connected to the dead end connector 44 at this lower dead end mounting facility 45b. The tugger wire may subsequently be removed. Possibly, the auxiliary hoist block and main hoist block are provided with rope guards. In that case, the rope guards need to be removed to allow the passable of the main hoist terminal end 15a', in particular when this main hoist terminal end 15a' is provided with a so-called button. After the main hoist terminal end 15a' has passed, the rope guards can be applied again.

In fig. 5c, the main hoist block 43 is positioned in a 'normal' double fall position, not the double fall 'wide' configuration. The tugger wire 70 is here shown in the same configurations 70' and 70" as visible in fig. 3. Tugger wire 70' is guided along lower dead end mounting facility 45b at the inner end 9b of the knuckle 9, and the main hoist block 43, in order to connect to the main hoist terminal end 15a'. Once the tugger wire 70' is hauled in, the main hoist terminal end 15a' may be connected to the dead end connector 44 at this lower dead end mounting facility 45b. The tugger wire is subsequently removed.

In figs. 6a-6c, 7, 10a and 10b the hoist block storage and exchange device 50 is shown in distinct views and configurations.

In fig. 6a, part of a triple fall hoist configuration similar to figs. 4b and 4f is depicted. In fig. 6c, a double fall wide configuration similar to fig. 43 is shown. In fig. 6b, an intermediate

configuration is shown. In figs. 7 and 10b, the hoist block storage and exchange device 50 is shown without hoist blocks, from a top view and side view respectively. It is noticed that the top view of fig. 7 shows an angled position α of the hoist block storage and exchange device 50, similar to figs. 3a and 3b, as a result of the tapering shape of the boom 6 and the position of the boom rest 20 with respect to the crane 10.

The hoist block storage and exchange device 50 is adapted for the vertical storage of a main hoist block 43 and an auxiliary hoist block 48 and a hook 14a. The device 50 is not just a storage, but also an exchange device which is adapted to facilitate the exchange between a first hoist configuration with the main hoist block 43, as the shown triple fall hoist configuration of fig. 6a, and a second double fall wide hoist configuration wherein the main hoist block 43 and the auxiliary hoist block 48 are interconnected adjacent each other as visible in fig. 6c.

As already described above, the main hoist block 43 comprises at least one sheave 43a on a main axle 43b, sheave 43a defining a sheave plane, here in the plane of the drawing. Only one sheave is visible, but it is conceivable that multiple sheaves are positioned behind one another on the main axle 43b. The sheave is orientated vertically in the hoist block storage and exchange device. In a bottom part thereof, the main hoist block 43 comprises a hook connector 43d for connection to a hook 14a. The hook connector 43d and the main axle 43b defining a connector plane perpendicular to the sheave plane. This connector plane is vertical in fig. 6a, and angled in figs. 6b and 6c, for 40-60º. The main hoist block 43 further comprises main block connectors 43e, 43f for the connection to the auxiliary hoist block 48.

The auxiliary hoist block 48 comprises at least one vertically orientated auxiliary sheave 48a on an auxiliary axle 48b, the auxiliary hoist block 48 comprising one or more auxiliary block connectors 48e, 48f adapted to be connected to the main block connectors 43e, 43f. In the configuration of fig. 6c, the main block connectors and auxiliary block connectors are interconnected, thereby interconnecting the main hoist block 43 and the auxiliary hoist block 48 adjacent each other in the second double fall wide hoist configuration, whereby at least one auxiliary sheave is in a common sheave plane of the main hoist block 43.

According to the second aspect of the present invention, the hoist block storage and exchange device 50 comprises a main hoist block receiver 81 for storage of the main hoist block 43. In the shown embodiment, the main hoist block receiver 81 comprises a hook connector receiver 87 for positioning and storing the hook connector 43d. The hook receiver 82 is adapted to store a hook 14a below and aligned with the hook connector receiver 87.

The main hoist block receiver 81 enables the main hoist block 43 to be stored in a first orientation wherein the connector plane is vertical, corresponding to the first hoist configuration, as visible in fig. 6a, as well as in a second orientation wherein the connector plane is tilted, at an angle with the horizontal, allowing the interconnection with the auxiliary hoist block 48 to obtain the second double fall wide hoist configuration, as visible in figs. 6b and 6c.

As visible in the top view of fig. 7, adjacent hook connector receiver 87 a pin storage location 49' is provided for storage of a pin 49. The pin 49 is adapted to interconnect the hook connector 43d and hook 14a, here in particular swivel 14d of hook 14a.

The hoist block storage and exchange device 50 further comprises a hook receiver 82 for storage of at least one hook 14a, provided below the main hoist block receiver 81, the hook receiver enabling the hook connector 43d of the main hoist block 43 and a hook 14a to be connected to each other in the first and second hoist configuration.

The hoist block storage and exchange device 50 further comprises auxiliary hoist block receiver 83 for storage of the auxiliary hoist block 48, comprising an auxiliary hoist block guide 84 along which the auxiliary hoist block 48 is movable between a first position remote from the main hoist receiver , as visible in figs. 6a and 6b, and a second position adjacent the main hoist block receiver, allowing the interconnection of the auxiliary hoist block 48 and the main hoist block 43 into the second double fall wide hoist configuration, as visible in fig. 6c.

In fig. 8, the shown embodiment of the auxiliary hoist block guide 84 is shown in more detail. The auxiliary hoist block guide 84 comprises parallel guide rails 84a along which rollers 84b are movable. The rollers are connectable to the auxiliary hoist block 48 via chain tackles 84c. Auxiliary guide surfaces 84d, 84e are preferably provided.

As elucidated above, for a single fall configuration a terminal end of the hoist cable is connected to a hoist cable connector 41. The shown embodiment of the hoist block storage and exchange device 50 is further provided with a hoist cable connector receiver 85 for the storage of the hoist cable connector 41. In the shown embodiment, the hoist cable connector 41 is in a bottom part thereof provided with a universal connector 41a, in particular a hole, which in the triple fall configuration allows the hoist cable connector to be connected to the main hoist block, and in the single fall configuration allows the hoist cable connector to be connected to a hook, via a pin 42, allowing a pivoting movement about a

horizontal pivot axis. In the shown embodiment, the hoist cable connector receiver 85 is provided with a universal connector receiver 86 for positioning and storing the universal connector 41a, similar to the hook connector receiver 87. Likewise, in the top view of fig. 7 adjacent universal connector receiver 86 a pin storage location 42' is provided for the storage of pin 42.

The hoist cable connector receiver 85 is here provided above and aligned with a hook receiver 82. In the shown embodiment, the hook receiver comprises an elongated area adapted to receive two different type of hooks 14a and 14b. Possibly, the hook receiver further comprises a hook guide 82' along which the hooks are movable between a first position below the main hoist block receiver 81 and a remote second position, preferably below the hoist cable connector receiver 85.

As indicated above, the crane may be provided with a secondary hoist assembly, e.g. a whip hoist or sling hoist assembly. The secondary hoist assembly preferably comprises a secondary hoist winch, a secondary hoist cable, such as a whip cable and a secondary hoist block 91 (to provide a double fall configuration), connected to a hook 92 connected to a swivel 93. Possibly, the secondary hoist assembly further comprises a secondary hoist cable connector to provide a single fall configuration.

The shown embodiment of the hoist block storage and exchange device 50, as in particular visible in figs. 7 and 10, and in detail in fig. 9, is furthermore provided with a secondary block receiver 90 for storage of a secondary hoist block 91, and preferably also with a secondary hook receiver 95 for storage of a hook 92, provided below the secondary hoist block receiver 90, the secondary hook receiver 95 enabling a hook connector of the secondary hoist block and the hook to be connected to each other. In addition, a secondary hoist cable connector receiver 96 may be provided. As such, it is possible for the secondary hoist assembly to switch between a single fall and a double fall configuration.

CLAIMS

1. Pedestal crane assembly (1), comprising a double jib slewing pedestal crane (10) comprising:

- a stationary pedestal (2), preferably adapted to be mounted to a vessel (3);
- a crane housing (4) that is mounted to the pedestal and adapted to slew relative to the pedestal about a vertical slew axis (5);
- a boom (6) comprising an outer end (6a) and an opposed inner end (6b) which is connected pivotably about a first horizontal pivot axis (7) to the crane housing, allowing an up-and down luffing movement of the boom (6);
- a luffing assembly to position the boom, comprising a luffing cable (8a) extending between the boom and the crane housing and a luffing winch;
- a knuckle (9) comprising an outer end (9a) and an opposed inner end (9b) which is connected pivotably about a second horizontal pivot axis (11) to the outer end of the boom, allowing a pivotal movement of the knuckle with respect to the boom, wherein at the outer end a hoist cable departing sheave (12) is provided;
- a knuckle positioning device (13) arranged between the knuckle and the crane housing, adapted to support and position the knuckle with respect to the boom and actuate the pivotal movement of the knuckle;
- a hook (14a, 14b) to which an object is connectable;
- a hoist assembly configured to raise and lower the object, the hoist assembly comprising a hoisting winch and associated main hoisting cable (15a) having a terminal end (15a'), the hoisting cable extending from the hoisting winch via the hoist cable departing sheave (12) to the hook;

the pedestal crane assembly further comprises a boom rest (20) with a boom support (21) for supporting the boom when the double jib slewing pedestal crane (10) is not in operation and in a parking position, the boom rest comprising a knuckle support (25) for supporting and positioning the knuckle with respect to the boom in the parking position, in which parking position the boom extends essentially horizontally and the outer end of the knuckle extends downwards;

characterized in that

the boom rest comprises one or more platforms (31, 32, 33, 34, 35, 36, 36', 37) which in the parking position of the knuckle are positioned adjacent the knuckle to provide access to portions of the pedestal crane assembly for installation and/ or maintenance purposes.

2. Pedestal crane assembly according to claim 1, wherein a knuckle platform (35) of the boom rest (20) is provided with a knuckle support which is provided with a stop sensor.

3. Pedestal crane assembly according to claim 1, wherein the knuckle is provided with a first lock element (23a) and wherein the boom rest comprises a knuckle lock platform (32) provided with a second lock element (23b), adapted to form a lock with the first lock element, wherein in the parking position of the double jib slewing pedestal crane (10) the knuckle lock platform extends adjacent the first lock element, allowing the first and second lock element to form a lock and thereby lock the knuckle to the boom rest.

4. Pedestal crane assembly according to claim 1, wherein the hoist assembly comprises a main hoist block (43) and a dead end connector (44), and wherein the knuckle is provided with a dead end mounting facility (45a, 45b) for a dead end connector (44), adapted to form a double fall hoist configuration wherein the hoisting cable extends from the hoisting winch via the hoist cable departing sheave and the main hoist block (43) to the dead end connector (44), wherein the terminal end of the main hoisting cable is connected to the dead end connector (44), and wherein the hook is connected to the main hoist block (43), wherein the boom rest comprises a dead end connector platform (31, 33) which in the parking position of the double jib slewing pedestal crane (10) extends adjacent the dead end mounting facility (45a, 45b).

5. Pedestal crane assembly according to claim 4, wherein the hoist assembly further comprises a main hoist highest position switch (46) connected to the dead end connector (44), and wherein the boom rest comprises a switch platform (32, 34, 35) providing access to the main hoist highest position switch.

6. Pedestal crane assembly according to claim 4 or 5, wherein the hoist assembly comprises a main hoist block (43) and an auxiliary hoist block (48) adapted to form a double fall wide hoist configuration wherein the main hoist block (43) and the auxiliary hoist block (48) are interconnected adjacent each other,

- the main hoist block (43) comprising at least one sheave on a main axle (43b), a sheave defining a sheave plane, the main hoist block (43) comprising in a bottom part thereof a hook connector (43d) for connection to the hook, the hook connector (43d) and the main axle (43b) defining a connector plane perpendicular to the sheave plane, the main hoist block (43) further comprising one or more main block connectors (43e, 43f) for the connection to the auxiliary hoist block (48),
- an auxiliary hoist block (48), comprising at least one auxiliary sheave on an auxiliary axle (48b), the auxiliary hoist block (48) comprising one or more auxiliary block connectors (48e, 48f) adapted to be connected to the main block connectors (43e, 43f) to interconnect the main hoist block (43) and the auxiliary hoist block (48)

adjacent each other in the double fall wide hoist configuration, whereby at least one auxiliary sheave is in a common sheave plane of the main hoist block (43),

wherein in the parking position of the double jib slewing pedestal crane (10) a main hoist block platform extends adjacent the main hoist block (43), allowing the interconnection of main hoist block (43) and auxiliary hoist block (48).

7. Pedestal crane assembly according to claim 1, wherein the hoist assembly comprises at least two hoist cable departing sheaves (12a, 12b), a main hoist block (43) and a hoist cable connector (41) connected to the main hoist block (43), adapted to form a triple fall hoist configuration, wherein the hoisting cable extends from the hoisting winch via a first hoist cable departing sheave (12a) and the main hoist block (43) to the second hoist cable departing sheave (12b), and from there to the hoist cable connector (41), and wherein the hook (14a) is connected to the main hoist block (43),

wherein the boom rest comprises a departing sheave platform (36) which in the parking position of the double jib slewing pedestal crane (10) extends adjacent the outer end of the knuckle where the hoist cable departing sheaves (12a, 12b) are provided, and a hoist cable connector platform (36') extending adjacent the main hoist block (43), allowing the hoist cable connector (41) to be connected to the main hoist block (43).

8. Pedestal crane assembly according to any of the preceding claims, further comprising a tugger hoist assembly comprising a tugger winch and a tugger wire (71) departing from the crane housing (4) that is connectable to the main hoist terminal end (15a'), in order to reeve the main hoist cable (15a) through different hoist configurations, wherein possibly the boom rest (20) comprises a tugger wire sheave (73) to guide tugger wire.

9. Pedestal crane assembly according to the preamble of claim 1, preferably according to claim 1, wherein a hoist block storage (50) is provided adjacent the boom rest, below the outer end of the knuckle, for the storage of one or more hoist blocks (43, 48) and/ or hoist cable connectors (41) and/ or one or more hooks (14a, 14b).

10. Pedestal crane assembly according to claim 9, wherein the hoist block storage comprises one or more platforms (61, 62) for installation and/ or maintenance purposes and/ or allowing control of interconnections.

11. Boom rest for supporting a boom (6) of a double jib slewing pedestal crane (10) comprising:

- a stationary pedestal (2), preferably adapted to be mounted to a vessel (3);
- a crane housing (4) that is mounted to the pedestal and adapted to slew relative to the pedestal about a vertical slew axis (5);
- a boom (6) comprising an outer end (6a) and an opposed inner end (6b) which is connected pivotably about a first horizontal pivot axis (7) to the crane housing (4), allowing an up-and down luffing movement of the boom;
- a luffing assembly to position the boom, comprising a luffing cable (8a) extending between the boom and the crane housing (4) and a luffing winch;
- a knuckle (9) comprising an outer end and an opposed inner end which is connected pivotably about a second horizontal pivot axis (11) to the outer end of the boom, allowing a pivotal movement of the knuckle with respect to the boom, wherein at the outer end a hoist cable departing sheave (12) is provided;
- a knuckle positioning device (13) arranged between the knuckle and the crane housing (4), adapted to support and position the knuckle with respect to the boom and actuate the pivotal movement of the knuckle;
- a hook (14a, 14b) to which an object is connectable;
- a hoist assembly configured to raise and lower the object, the hoist assembly comprising a hoisting winch and associated main hoisting cable (15a) having a terminal end (15a'), the hoisting cable extending from the hoisting winch via the hoist cable departing sheave (12) to the hook;

the boom rest comprising a boom support (21) for supporting the boom when the double jib slewing pedestal crane (10) is not in operation and in a parking position, the boom rest further comprising a knuckle support (25) for supporting and positioning the knuckle with respect to the boom in the parking position, in which parking position the boom extends essentially horizontally and the outer end of the knuckle extends downwards;
characterized in that
the boom rest comprises one or more platforms (31, 32, 33, 34, 35, 36, 36', 37) which in the parking position of the knuckle are positioned adjacent the knuckle to provide access to portions of the pedestal crane assembly for installation and/ or maintenance purposes.

12. Pedestal crane parking assembly for a double jib slewing pedestal crane (10) comprising:

- a stationary pedestal (2), preferably adapted to be mounted to a vessel (3);
- a crane housing (4) that is mounted to the pedestal and adapted to slew relative to the pedestal about a vertical slew axis (5);

- a boom (6) comprising an outer end and an opposed inner end which is connected pivotably about a first horizontal pivot axis to the crane housing (4), allowing an up- and down luffing movement of the boom (6);
- a luffing assembly to position the boom, comprising a luffing cable extending between the boom and the crane housing (4) and a luffing winch;
- a knuckle (9) comprising an outer end and an opposed inner end which is connected pivotably about a second horizontal pivot axis to the outer end of the boom, allowing a pivotal movement of the knuckle with respect to the boom, wherein at the outer end a hoist cable departing sheave (12) is provided;
- a knuckle positioning device (13) arranged between the knuckle and the crane housing (4), adapted to support and position the knuckle with respect to the boom and actuate the pivotal movement of the knuckle;
- a hook (14a, 14b) to which an object is connectable;
- a hoist assembly configured to raise and lower the object, the hoist assembly comprising a hoisting winch and associated main hoisting cable having a terminal end, the hoisting cable extending from the hoisting winch via the hoist cable departing sheave to the hook;

the pedestal crane parking assembly comprising a boom rest (20) with a boom support (21) for supporting the boom when the double jib slewing pedestal crane (10) is not in operation and in a parking position, the boom rest comprising a knuckle support (25) for supporting and positioning the knuckle with respect to the boom in the parking position, in which parking position the boom extends essentially horizontally and the outer end of the knuckle extends downwards;

wherein the boom rest comprises one or more platforms (31, 32, 33, 34, 35, 36, 36', 37) which in the parking position of the knuckle are positioned adjacent the knuckle to provide access to portions of the pedestal crane assembly for installation and/ or maintenance purposes,

the pedestal crane parking assembly further comprising

a hoist block storage (50) is provided adjacent the boom rest, below the outer end of the knuckle, for the storage of one or more hoist blocks (43, 48) and/ or hoist cable connectors (41) and/ or one or more hooks (14a, 14b).

13. Hoist block storage and exchange device for the vertical storage of a main hoist block (43) and an auxiliary hoist block (48) and a hook (14a, 14b), wherein the device is adapted to facilitate the exchange between a first hoist configuration with the main hoist block (43) and a second double fall wide hoist configuration wherein the main hoist block (43) and the auxiliary hoist block (48) are interconnected adjacent each other,

- the main hoist block (43) comprising at least one sheave on a main axle (43b), a sheave defining a sheave plane, which sheave plane(s) is (are) orientated vertically in the hoist block storage and exchange device, the main hoist block (43) comprising in a bottom part thereof a hook connector (43d) for connection to a hook, the hook connector (43d) and the main axle (43b) defining a connector plane perpendicular to the sheave plane, the main hoist block (43) further comprising one or more main block connectors (43e, 43f) for the connection to the auxiliary hoist block (48),
- an auxiliary hoist block (48), comprising at least one vertically orientated auxiliary sheave on an auxiliary axle (48b), the auxiliary hoist block (48) comprising one or more auxiliary block connectors (48e, 48f) adapted to be connected to the main block connectors (43e, 43f) to interconnect the main hoist block (43) and the auxiliary hoist block (48) adjacent each other in the second double fall wide hoist configuration, whereby at least one auxiliary sheave is in a common sheave plane of the main hoist block (43),

the device comprising:

- a main hoist block receiver (81) for storage of the main hoist block (43), the main hoist block receiver enabling the main hoist block (43) to be stored in a first orientation wherein the connector plane is vertical, corresponding to the first hoist configuration, as well as in a second orientation wherein the connector plane is tilted, at an angle with the horizontal, allowing the interconnection with the auxiliary hoist block (48) to obtain the second double fall wide hoist configuration,
- a hook receiver (82) for storage of at least one hook, provided below the main hoist block receiver (81), the hook receiver (82) enabling the hook connector (43d) of the main hoist block (43) and a hook to be connected to each other in the first and second hoist configuration,
- an auxiliary hoist block receiver (83) for storage of the auxiliary hoist block (48), comprising an auxiliary hoist block guide (84) along which the auxiliary hoist block (48) is movable between a first position remote from the main hoist receiver and a second position adjacent the main hoist block receiver (81), allowing the interconnection of the auxiliary hoist block (48) and the main hoist block (43) into the second double fall wide hoist configuration.

14. Hoist block storage and exchange device according to claim 13, wherein the main hoist block receiver (81) comprises a hook connector receiver (87) for positioning and storing the hook connector (43d), and wherein the hook receiver (82) is adapted to store a hook (14a) below and aligned with the hook connector receiver.

15. Hoist block storage and exchange device according to claim 13 or 14, further comprising a hoist cable connector receiver (85) for the storage of the hoist cable connector (41), preferably provided above and aligned with a hook receiver (82).

16. Hoist block storage and exchange device according to any of claims 13-15, wherein the hook receiver (82) comprises a hook guide (82') along which a hook is movable between a first position below the main hoist block receiver (81) and a remote second position.

17. Hoist block storage and exchange device according to any of claims 13-16, furthermore provided with a secondary block receiver (90) for storage of a secondary hoist block, and preferably also with a secondary hook receiver for storage of at least one secondary hook, provided below the secondary hoist block receiver.

18. Crane assembly, comprising a crane having a boom (6), preferably a double jib pedestal crane (10) according to the preamble of claim 1, the crane assembly comprising a boom rest (20) for supporting the boom when the crane is not in operation and in a parking position, and a hoist block storage and exchange device (50) according to any of the preceding claims 13-17 adjacent the boom rest.

19. Method for exchanging a hoist configuration, e.g. between a single hoist configuration and a dual hoist configuration or between a dual hoist configuration and a triple hoist configuration, wherein use is made of a hoist block storage and exchange device according to any of the preceding claims 13-17.

20. In combination a main hoist block (43) and an auxiliary hoist block (48), the main hoist block (43) being adapted to be used in a single fall or double fall configuration, the main hoist block and auxiliary hoist block being adapted to be interconnected adjacent each other to form a double fall wide hoist configuration, wherein:

- the main hoist block (43) comprises at least one sheave on a main axle (43b), a sheave defining a sheave plane, which sheave plane(s) is (are) orientated vertically in the double fall wide hoist configuration, the main hoist block (43) comprising in a bottom part thereof a hook connector (43d) for connection to a hook, the hook connector (43d) and the main axle (43b) defining a connector plane perpendicular to the sheave plane, the main hoist block (43) further comprising one or more main block connectors (43e, 43f) for the connection to the auxiliary hoist block (48),
- an auxiliary hoist block (48), comprising at least one vertically orientated auxiliary sheave on an auxiliary axle (48b), the auxiliary hoist block (48) comprising one or more auxiliary block connectors (48e, 48f) adapted to be connected to the main block

connectors (43e, 43f) to interconnect the main hoist block (43) and the auxiliary hoist block (48) adjacent each other in the double fall wide hoist configuration, whereby at least one auxiliary sheave is in a common sheave plane of the main hoist block (43).

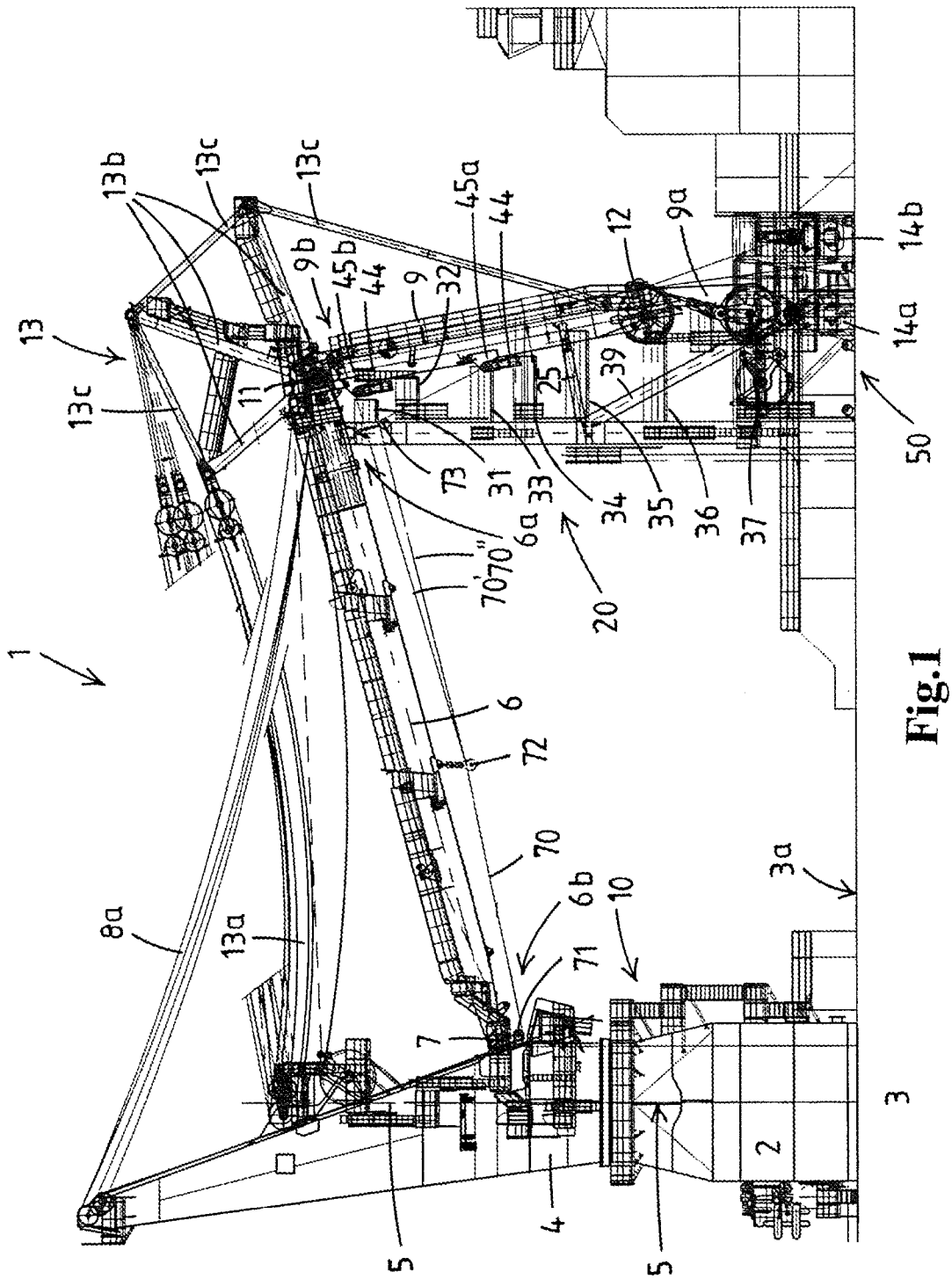

1
13
13b
13c
13c
13c
45a
44
12
9a
14b
14a
50
9b
45b
44
9
32
11
25
39
73
31
33
34
35
36
37
6a
70"
70'
20
6
72
70
3a
8a
13a
6b
10
71
7
5
4
5
2
3

Fig.1

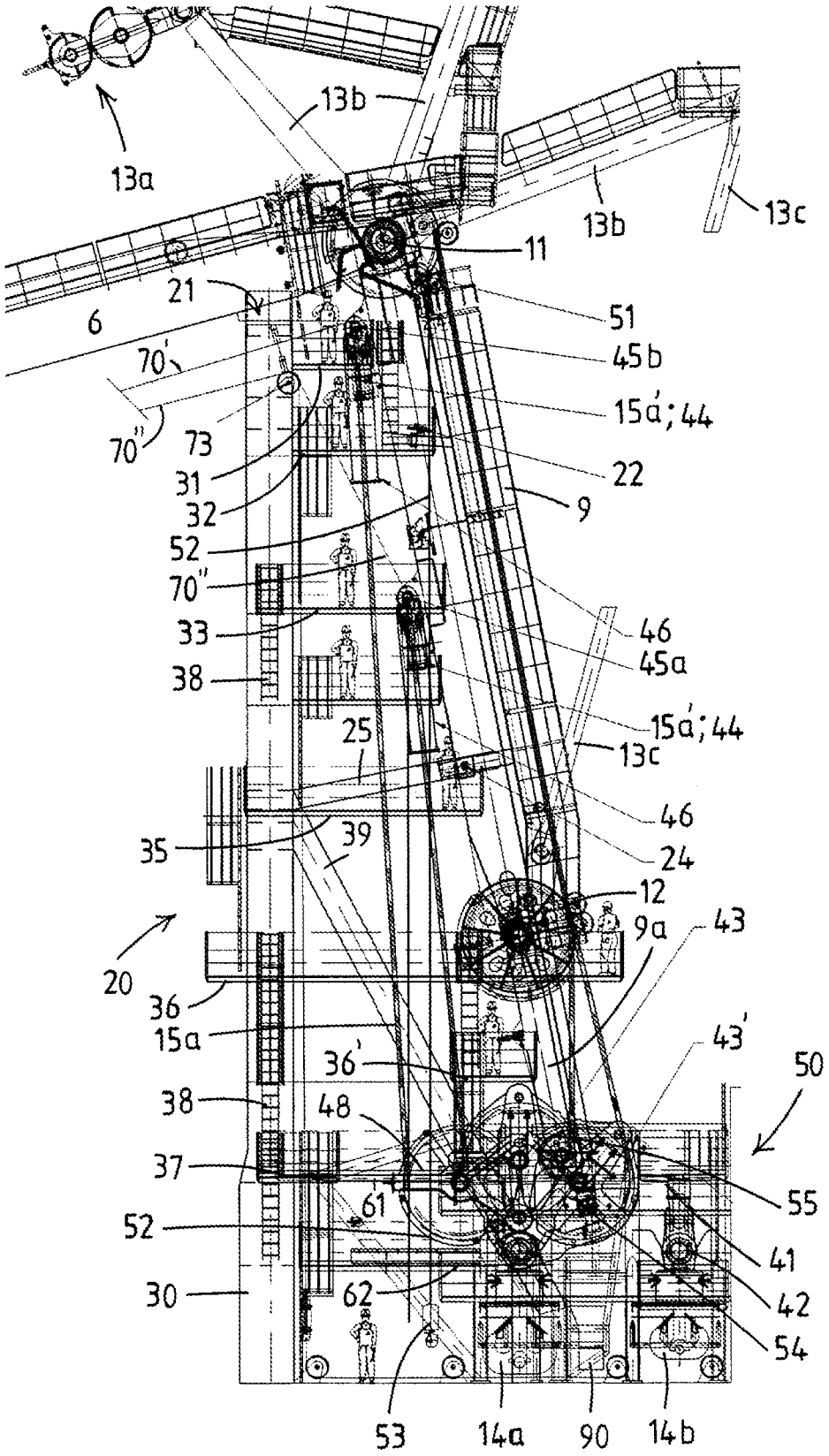

13a
13b
13b
13c
11
21
6
70'
70''
73
31
32
52
70''
33
38
25
35
39
20
36
15a
38
37
52
30
51
45b
15a';44
22
9
46
45a
15a';44
13c
46
24
12
9a
43
43'
50
36'
48
61
62
55
41
42
54
53
14a
90
14b

Fig.2

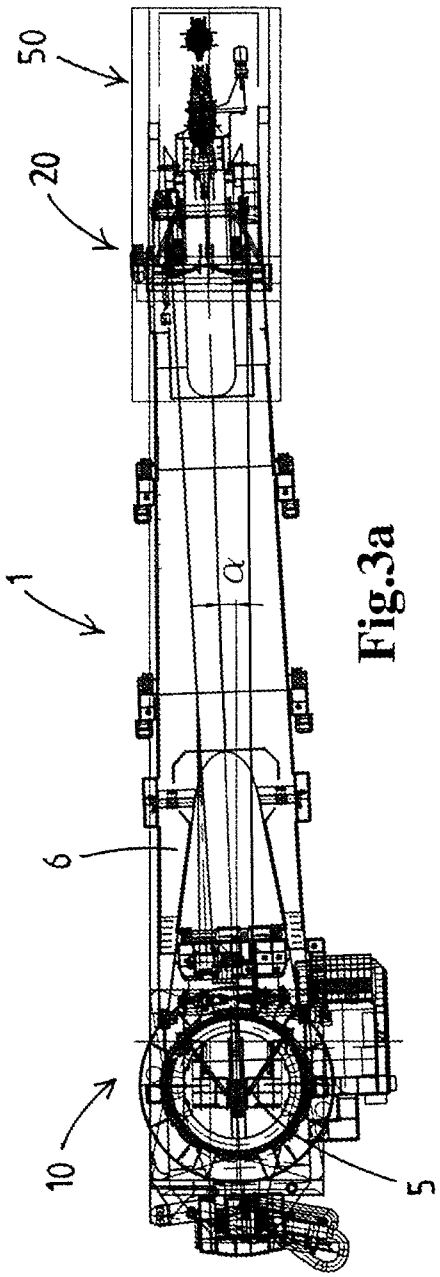


Fig.3a

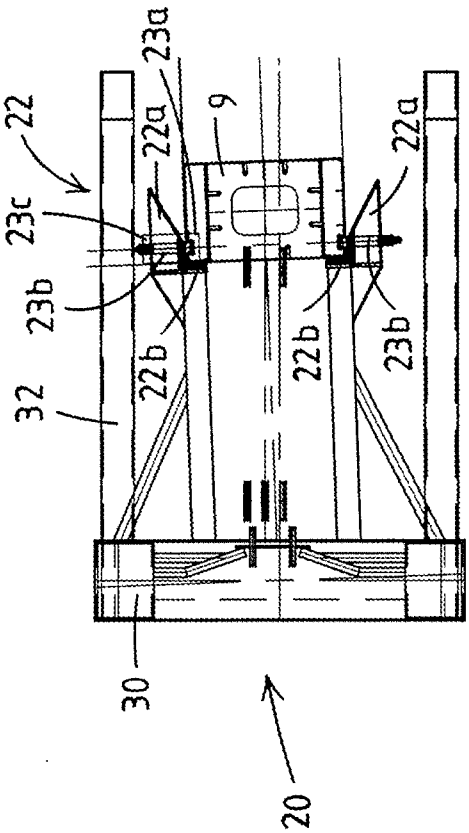


Fig.3b

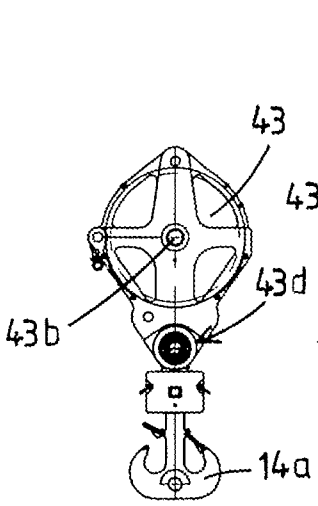


Fig.4a

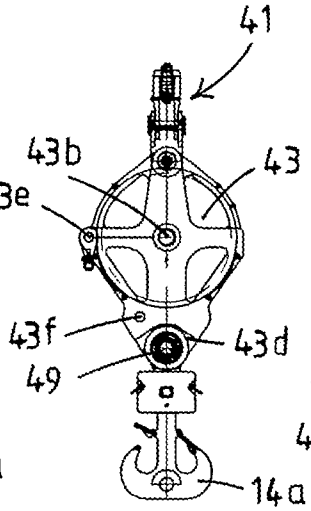


Fig.4b

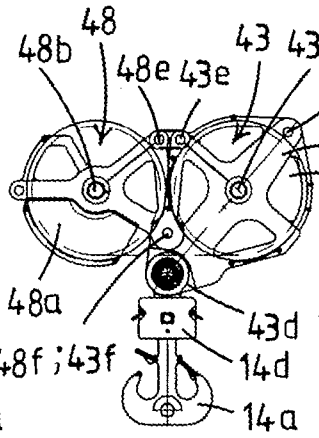


Fig.4c

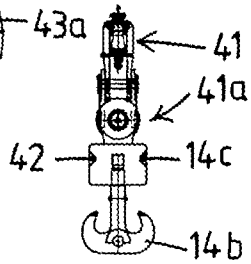


Fig.4d

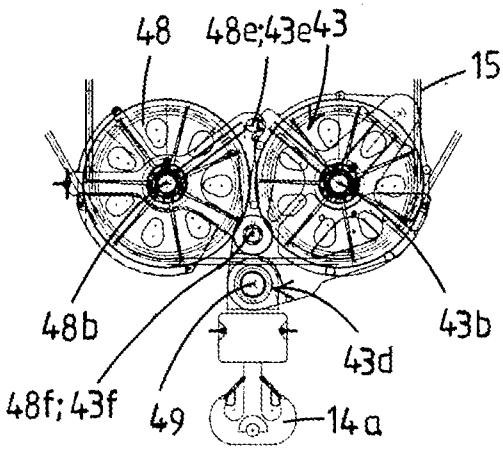


Fig.4e

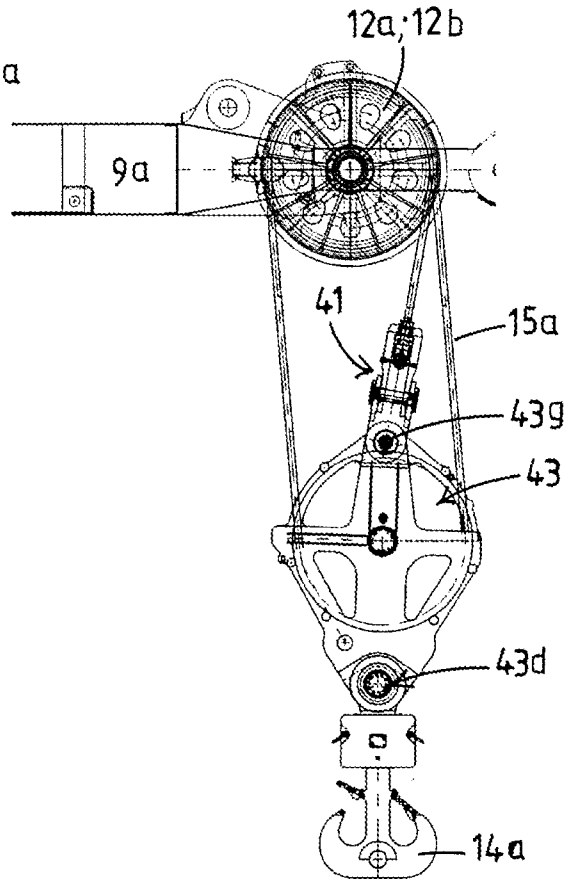


Fig.4f

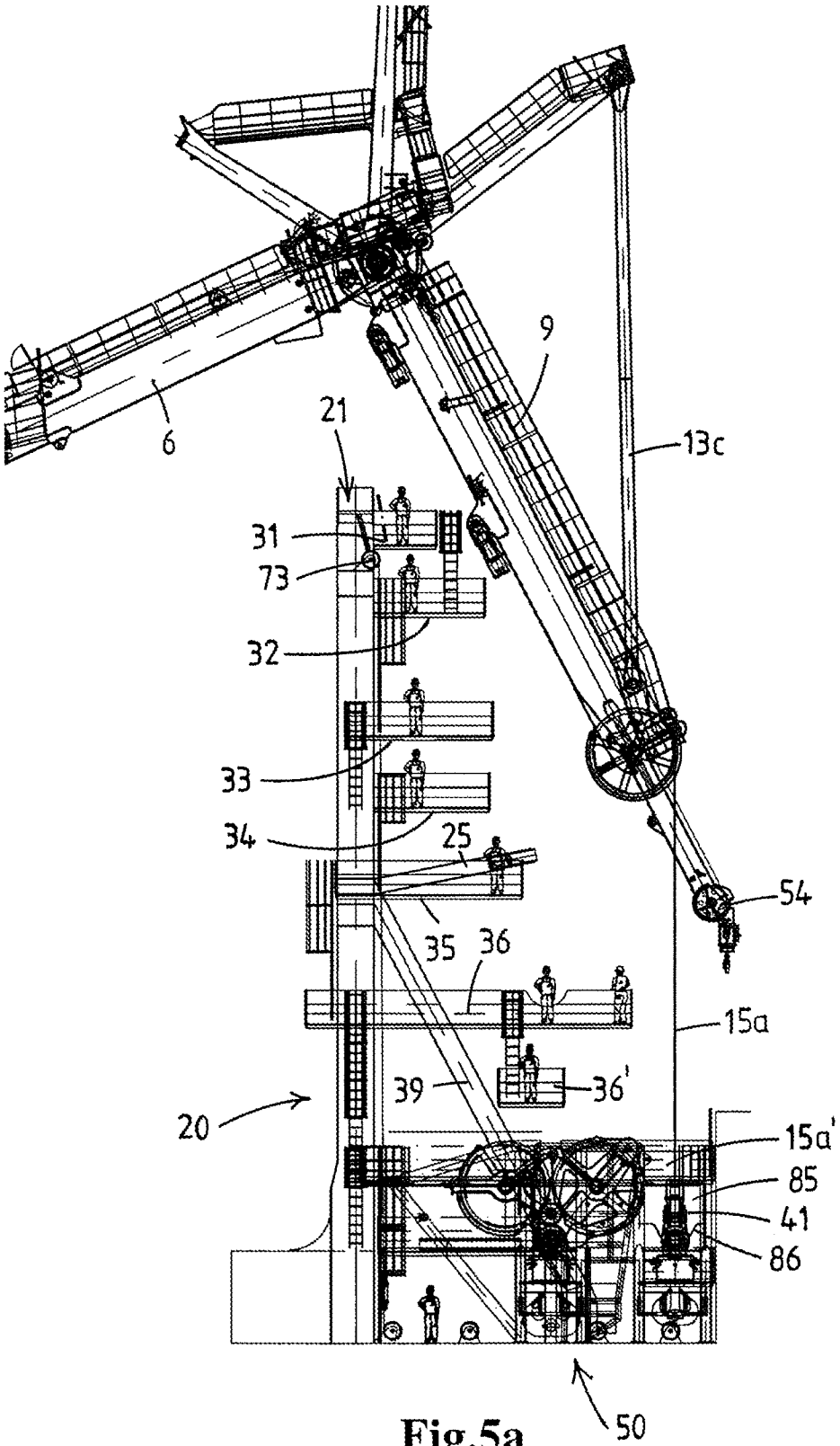


Fig.5a

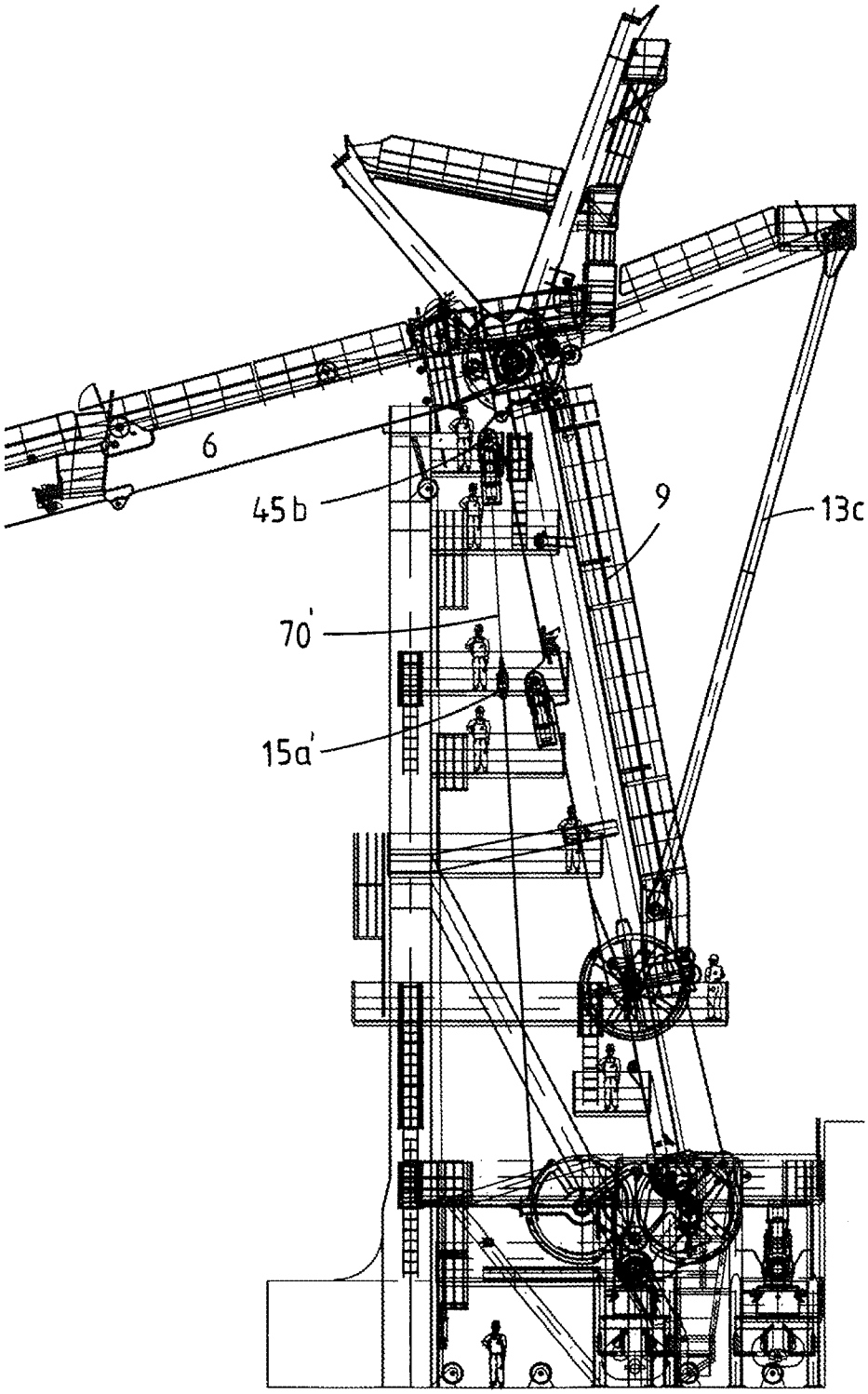


Fig.5b

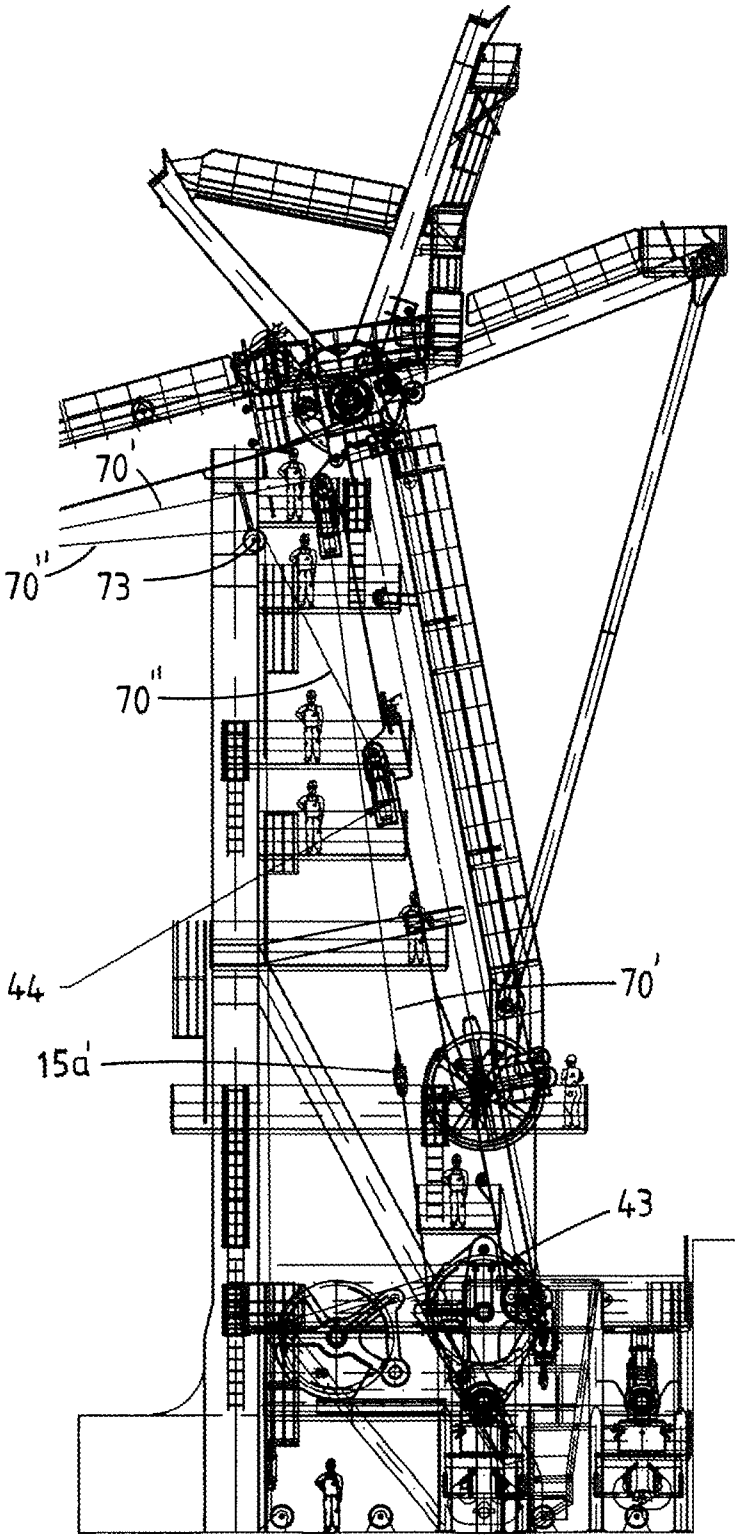
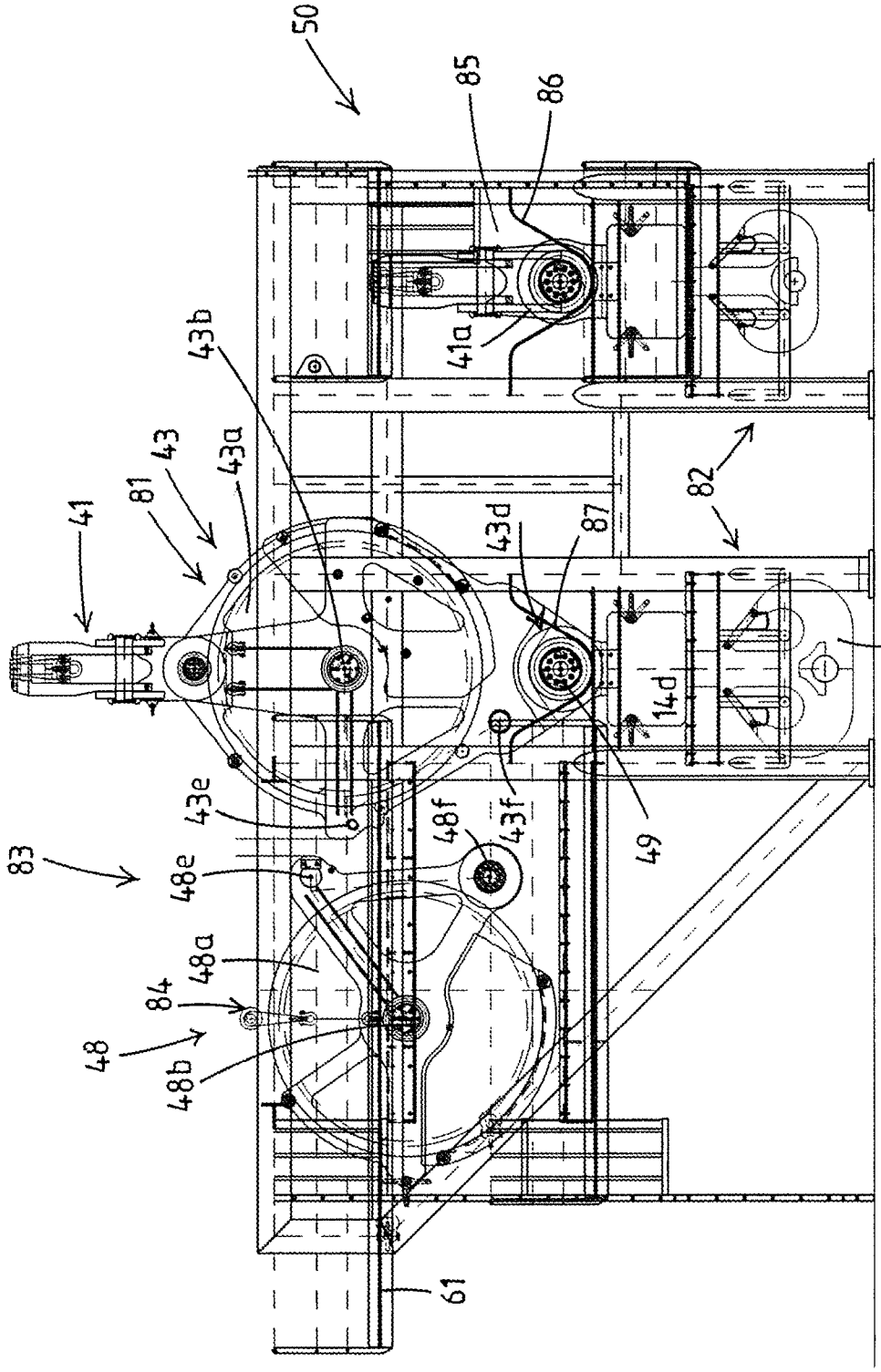


Fig.5c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85
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41a
43b
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43a
81
41
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43d
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14d
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48f
43f
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48e
48a
84
48
48b
61

Fig.6a

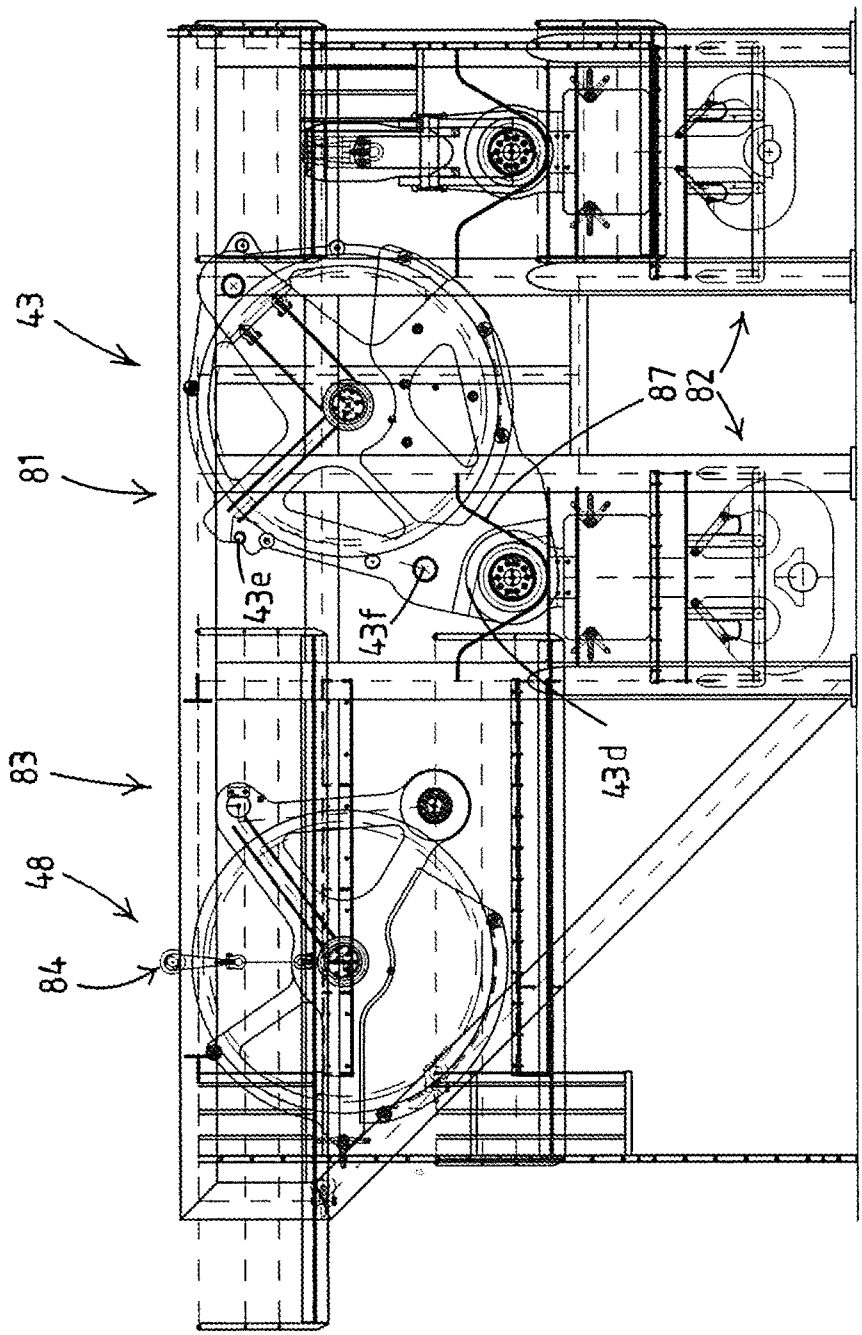

Fig.6b

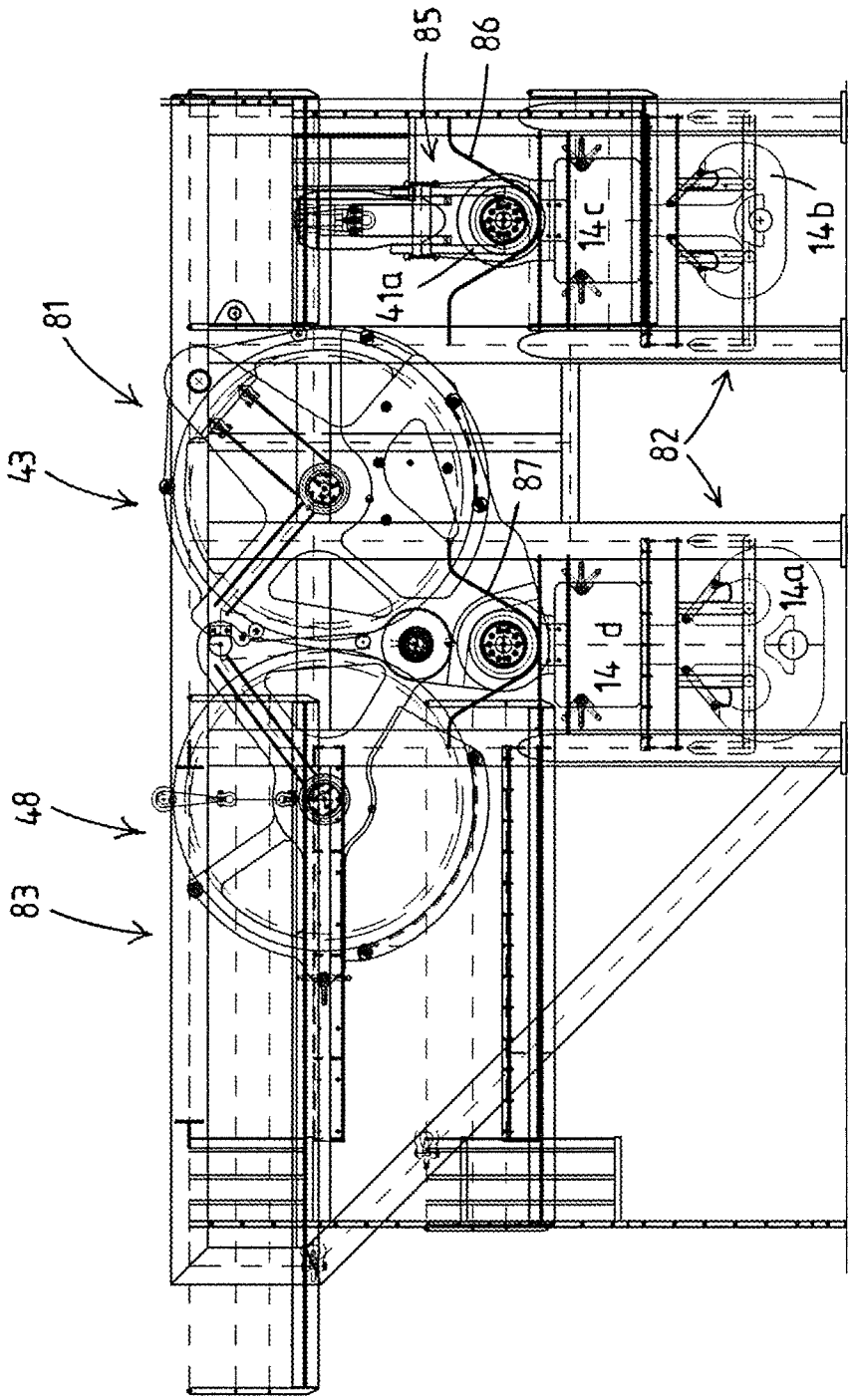

Fig.6c

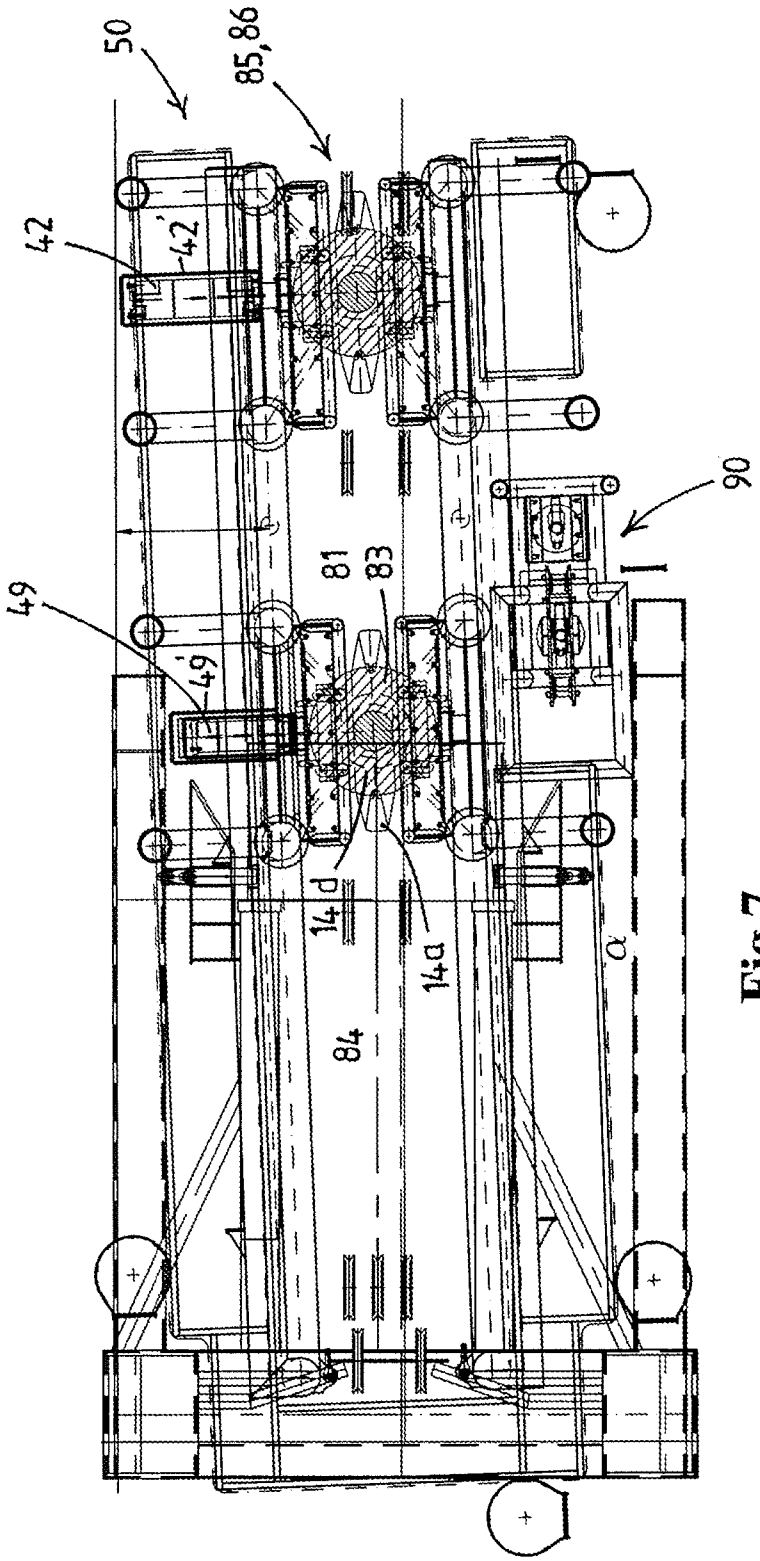

Fig.7

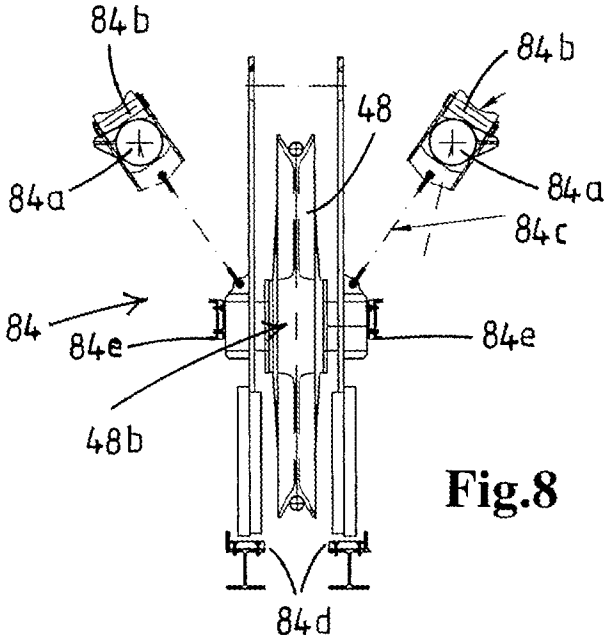

Fig.8

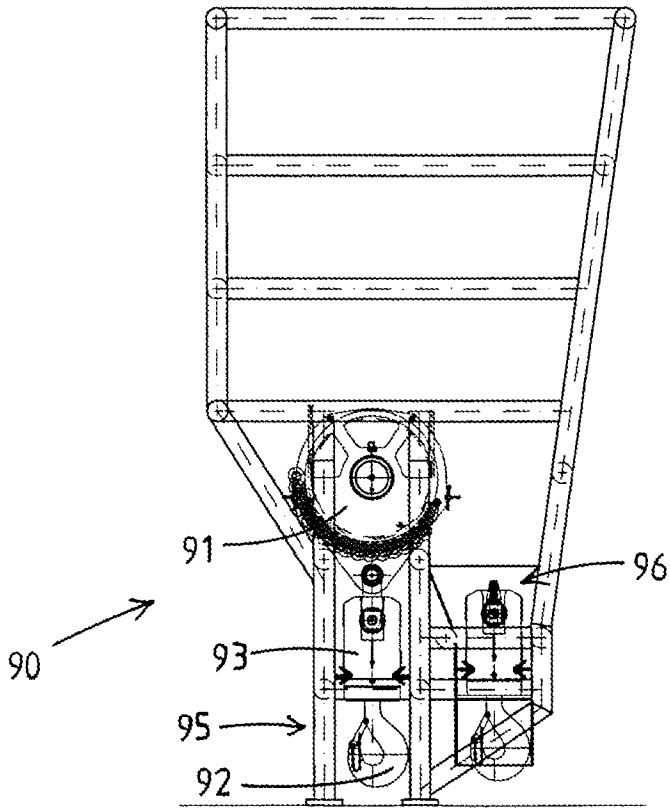

Fig.9

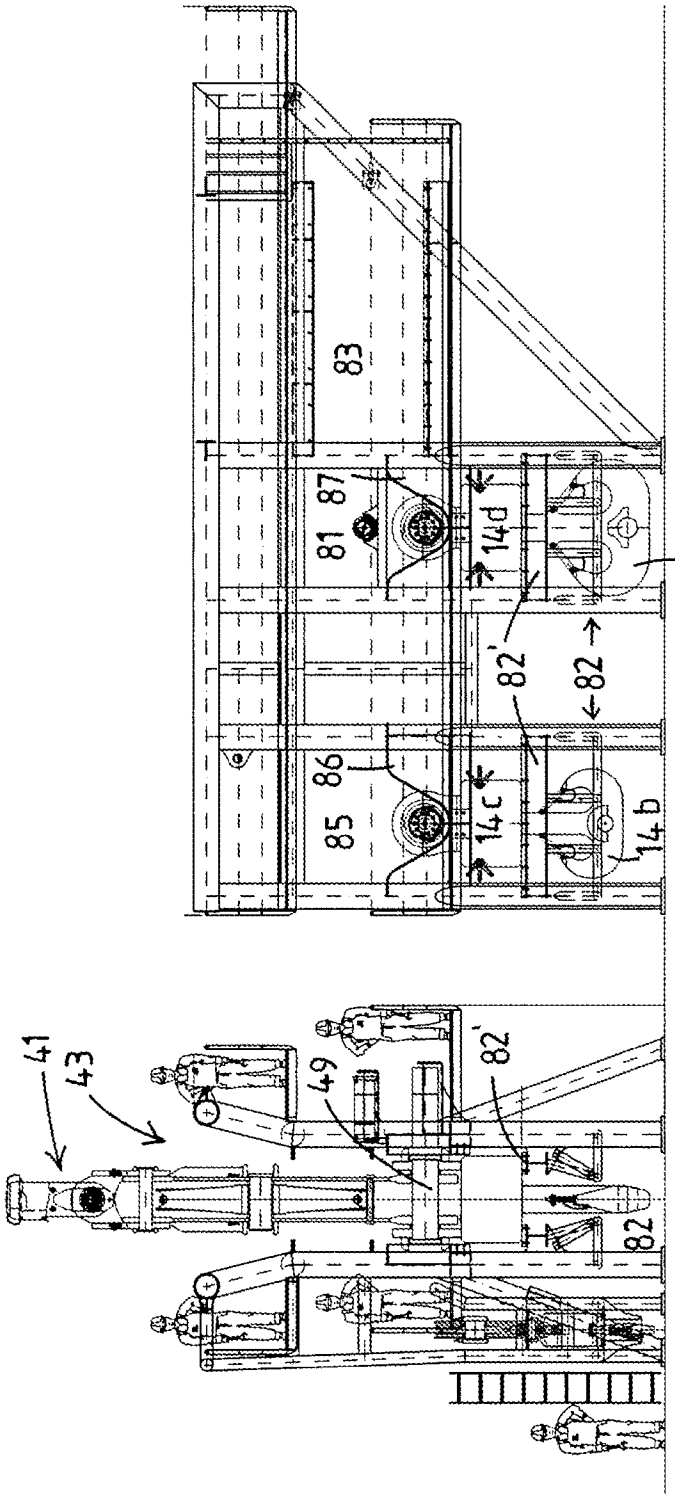

Fig.10b

Fig.10a