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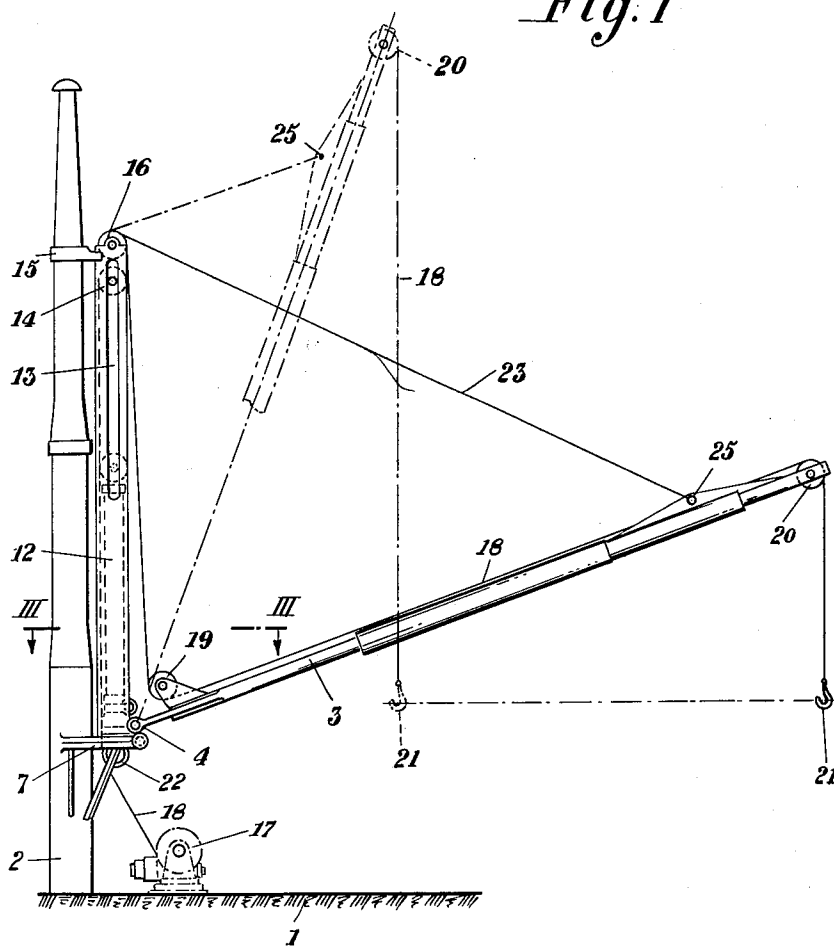
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DERRICK DEVICES FOR LIFTING THE GOODS ON THE SHIPS

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2 Sheets-Sheet 1

Fig. 1



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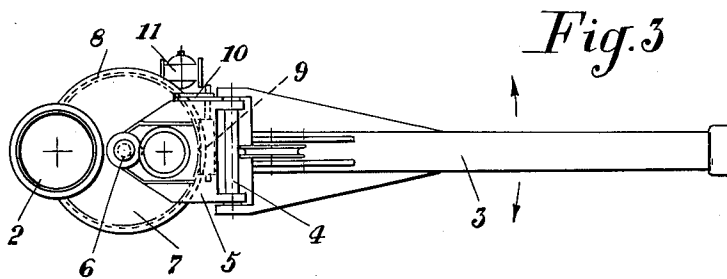
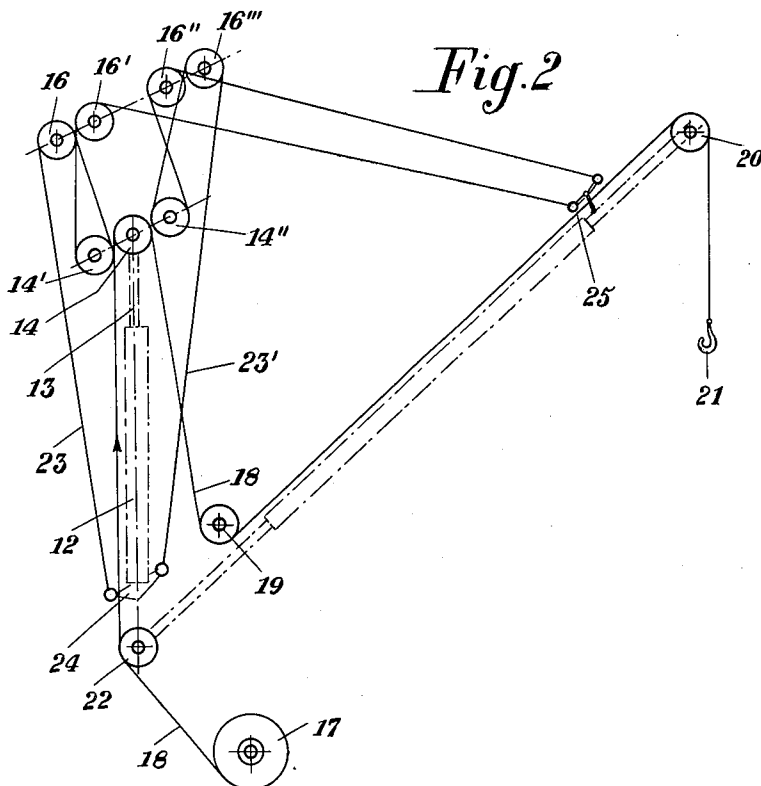
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1

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DERRICK DEVICES FOR LIFTING THE GOODS ON THE SHIPS

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The present invention relates to an improvement in the derrick devices for lifting the goods on board of the ships.

The invention aims to provide a particular arrangement of the usual equipment means of the ships, in order to handle the goods to be loaded or unloaded, whereby said means will become able to carry on the function of an adjustable jib crane, said means being capable of rotating on a wide area of training and with a large variation of the served radius, while the load will be kept on a practically horizontal path.

In other words, the invention provides a derrick with independent mechanical controls for the rotation and the variation of the served radius, said derrick being provided with particular contrivances both constructive and of mounting, either electrically or by an oil pressure device operated, suitable to ensure the lifting service at variable continuously controllable distances, either in the hold and on land, and the quick transfer of the goods from the ship or thereonto.

More specifically, according to this invention, a derrick is provided with combined means whereby it will be possible to obtain the rotation of the derrick about the mast and whereby it will be possible simultaneously to move the return idler means of the lift rope for the derrick, and of the rope for the lifting hook, so that when changing the inclination of the derrick, the hook, if its operative winch will not be operated for handling or paying out will move along a horizontal or practically horizontal plane.

Said means in one preferred embodiment can be made by an oil operated piston vertically located, parallel to the axis of the mast whereon the derrick is mounted, and controlled continuously by the operator.

In this case, the mast of the ship is provided with a single derrick and the piston increases or decreases the served radius of the derrick, changing the inclination thereof with respect to the horizontal plane; in the meantime the piston adequates the length of the lifting rope for the load so that, as aforesaid, said load, due to the change of the served radius of the derrick will move along a practically horizontal path.

Thus the power necessary to operate the change of the served radius, i.e. to operate the lift rope for the derrick will be limited to that power strictly necessary to overcome the weight of the same derrick and the passive resistances determined by the pivotal connections and the deformations of the moving ropes and members.

The unit according to this invention aims to replace, with a little expense and with no radical transformation, the present deck equipments of the ships, particularly in case of little and medium tonnage ships. Presently the equipment of these ships in many cases is limited to a sole derrick for each hold. This arrangement originates difficult and slow operations, as the ship will be compelled to work on a predisposed and non variable vertical of the hook, and to carry out the training movement towards outboard by means of lift ropes which are operated by means of tackles which are almost always hand operated. According to this invention, the derrick is pivoted on a pivot pin located on a bracket eccentric with respect to the mast, said bracket being externally provided with a straight or helical toothed rack. The whole unit for the movable support for the derrick will bear on gliding rollers or bearings, and a suitable mechanical reduction gear operated by a rotary motor, either oil pressure or

2

electrically operated causes the support system for the derrick to rotate about its pivot pin.

It is to be noted that also the ships having two derricks for each hold, and which can use, accordingly the funicular system between the two verticals, will obtain a large advantage from the adoption of the device according to this invention, as said derricks have always their taking and paying out positions for the loads located at compelled points and require a long and attentive manoeuvre for the horizontal displacement of the load, said manoeuvre being of course largely simplified by the device according to this invention. Also the equipment with a double derrick for each hold requires a remarkable mounting expense and a double maintenance cost as the whole equipment thereof, consisting of winches, blocks, ropes and hooks, besides the derricks, will be doubled. One preferred embodiment of this invention will be disclosed with reference to the attached drawings wherein:

FIGURE 1 is a side elevation view of a derrick according to this invention, shown in two characteristic positions (one of which has been shown in dot and dash lines) said positions being destined to illustrate the horizontal path of the lifting hook, during the passage from one another of the positions;

FIGURE 2 is a diagrammatic view of the rope system of the derrick lift and the hook lift, the various pulleys being shown all in the same drawing plane in order to clearly show the path of the ropes moving around them and the operation of the unit, and

FIGURE 3 is a cross-sectional view of FIGURE 1 taken along the line III—III.

With reference to the drawings and particularly to FIGURE 1, 1 denotes the deck of the ship wherefrom rises the mast 2 whereon the derrick 3 is mounted. The derrick is pivoted at 4 so as to be able of changing its inclination with respect to the deck and therefore its served radius. As better shown in FIGURE 3, the pivot pin 4 of the derrick 3 is supported by a bracket 5 which can rotate about the axis 6 which in turn is fixed at the center of a substantially disc shaped member 7 which is steadily connected to the mast 2. The peripheral edge of the element 7 is provided with teeth 8 which can be engaged by a toothed member 9 the shaft of which is operated by a gear 10 by a motor 11, either electric or oil actuated, carried by the bracket 5. Of course, the rotation of the toothed element 9 engaged by the peripheral teeth of the stationary disc 8 causes the bracket 5 to rotate about the pivot pin 6 and therefore the derrick changes its training direction.

As far as the change of inclination of the derrick is concerned, on the bracket 5 a fluid pressure cylinder 12, is mounted, for instance oil actuated, and the piston of said cylinder (not shown in the figure) carries a rod 13 the upper end of which carries a group 14 of pulleys consisting of three pulleys 14, 14' and 14'' which in the diagrammatical view of FIG. 3 have been shown, for clearness of illustration, as located in a single plane.

To the mast 2, in a position higher than the highest position which can be reached by the group of pulleys 14, a collar 15 is applied, and said collar supports a group 16 of pulleys consisting of the four pulleys, 16, 16', 16'' and 16'''. The group of pulleys 16 forming the last idle passage for the lift rope of the derrick, towards the rope terminal on the derrick is of course fixed.

The load lifting rope, or rope of the hook 18 runs from the operation winch 17, moves on a guide pulley 22, from said glide pulley 22 runs about the central pulley 14 of the top group of the rod 13, reaches then the pulley 19 at the root of the derrick, runs then along the derrick up to the head pulley 20, and terminates by the hook 21.

The double lift rope of the derrick, consisting of the ropes 23 and 23' starts from the cross member terminal 24. The rope 23 moves about the stationary pulley 16,

3

then on the movable pulley 14', comes back to the stationary pulley 16' and therefrom reaches the terminal cross member 25 fixed to the derrick near its end. The other lift rope for the derrick 23' starts also from the terminal 24, passes around the pulley 16'' then around the pulley 14'', then around the pulley 16''' and therefrom to the terminal 25. This being the arrangement, it is obvious that if the unit is for instance at the position shown in full line in FIG. 1, when the operating cylinder 12 will be actuated so as to move down the group of pulleys 14, the increase of the distance from the group of stationary pulleys 16 to the group of movable pulleys 14 carried by the end of the rod 13 pulls the two parallel lift ropes of the derrick and lifts the derrick. In the meantime the length of the rope between the two idler pulleys 22 and 19 and the movable pulley 14 diminishes, and therefore the hook 21 will move downwards through a distance equalling that upward moved by the pulley 20 so that while said hook moves horizontally due to the change of inclination of the derrick 3, its level does not change as shown in FIG. 1.

Obviously, when the derrick will be downwards moved, the movements will occur in reverse direction and the hook 21 moves upwards with respect to the pulley 20.

The vertical and horizontal displacement manoeuvres of the derrick are operated at such a speed as to maintain the cycle of each complete operation within suitable limits as necessary to ensure a good execution of the work.

Only by way of information it may be said that at rest the derrick 3 will be caused to rest on a bracket located on the deck of the ship. For this manoeuvre, the cross member 24 of the rope terminals will be disconnected from its operative position as shown in FIG. 2, and slackened as necessary to bring it at the desired position, for instance by a capstan suitably arranged.

This invention has been shown and described in one preferred embodiment, being however understood that constructive variations might be practically adopted without departing from the scope of this industrial privilege.

I claim:

1. An improvement for increasing the operation capacity of derrick devices of ships having a mast and a derrick, comprising a circular rack element secured to the lower portion of said mast, a gear engaging said rack element, a bracket supporting said gear pivoted at the

4

center point of said rack element, a motor supported by said bracket for operating said gear, said derrick being pivoted to said bracket for pivoting in the vertical plane, a hydraulic cylinder rigidly secured in vertical position on said bracket, a piston sliding in said cylinder, a piston rod on said piston, a first pulley means secured to the free end of said piston rod, a second pulley means rigidly mounted above the highest position of said first pulley means, a collar supporting said second pulley means, a winch fixed to the ship deck, a first pulley pivoted on the inner end portion of said derrick, a second pulley pivoted on the outer end portion of said derrick, a guiding pulley pivotly secured to said mast beneath said bracket, a first rope fixed at one end to said winch and passing through said guiding pulley, said first pulley means, and said first and second pulleys, a hook secured to the other end of said rope, second and third lift ropes passing through said first and second pulley means, a first cross member terminal disengageably arranged on said bracket, a second cross member secured to the outer end of said derrick, the ends of said two lifting ropes being secured to said first and second cross-members respectively.

2. An improvement as claimed in claim 1, wherein said first movable pulley means consists of three parallel pulleys and said second stationary pulley means consists of four parallel pulleys, said second lift rope passing through the first stationary pulley, first movable pulley and then through the second stationary pulley and said third lift rope passing through the fourth stationary pulley, third movable pulley and then through the third stationary pulley, whereby operating said hydraulic cylinder to move down said first movable pulley means it will increase the distance thereof from said second stationary pulley means causing said derrick to lift and said hook to move downwardly through a distance corresponding to the lifting distance of said derrick, without changing the level of said hook.

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