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CRANE ARRANGEMENT FOR USE ON BOARD A SHIP

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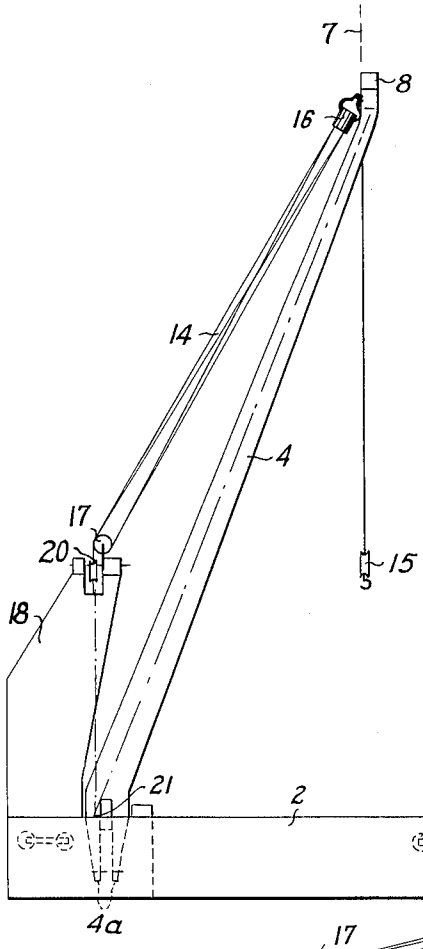

Fig. 3

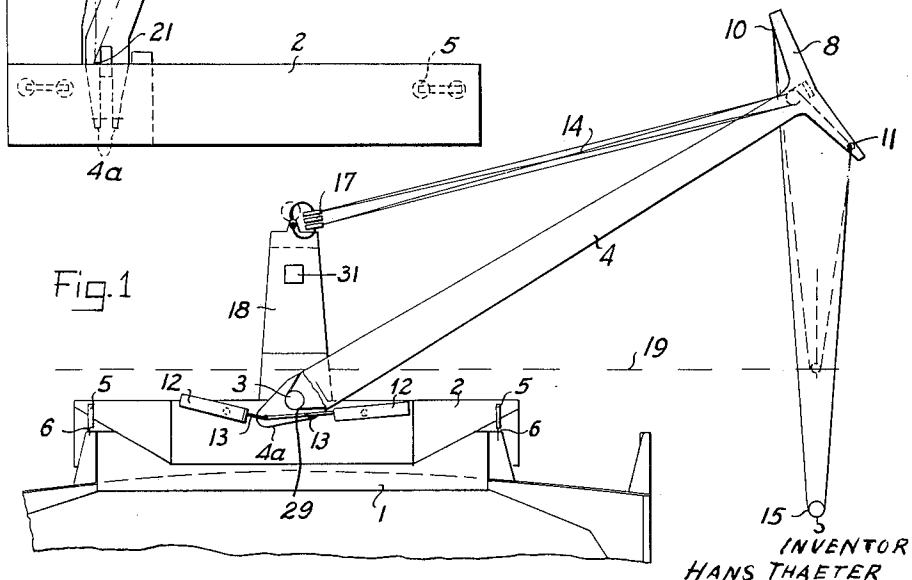

Fig. 1

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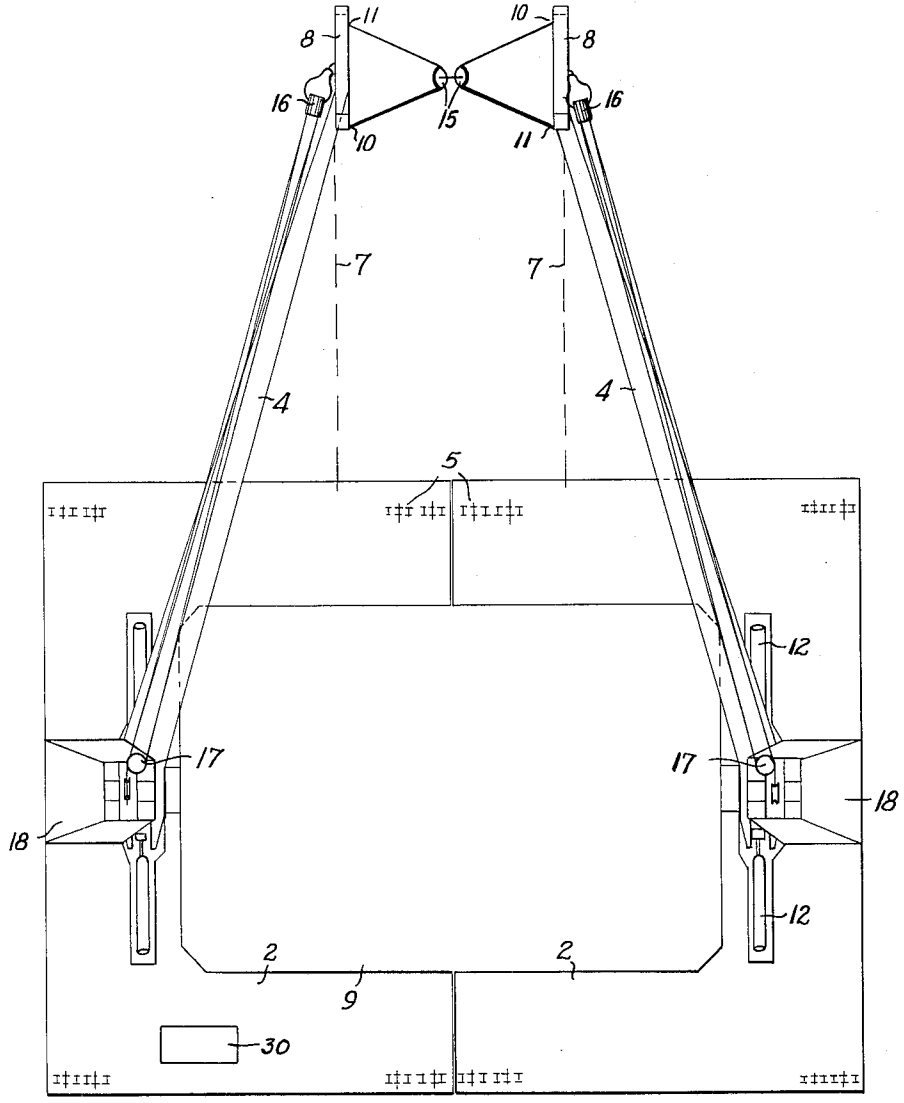
Fig. 2



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CRANE ARRANGEMENT FOR USE ON BOARD A SHIP

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5 Claims. (Cl. 212—3)

The invention relates to a crane arrangement, and more specifically to a crane arrangement for use on board a ship.

It is known to use shipboard jib cranes when loading cargo into ships. These have the disadvantage that they cannot be used when the ship is rolling, and moveover shipboard jib cranes do not allow rapid travelling movements owing to the danger of pendulum-like swinging of the load. Loading arrangements have been proposed which are used for bulk cargo or for the loading of motor vehicles and containers. These are formed as loading bridges and can be used for high loads and high working speeds but have the disadvantage of being inherently very heavy and are thus not suitable for being built into existing ships, as they require greater supporting than the rigidity of the ship superstructure offers.

It is an object of the invention to provide a crane arrangement for use on board a ship.

It is a further object of the invention to provide a crane arrangement for the loading of ships, said crane arrangement comprising a boom for swinging movement on a horizontal axis, a car carrying said boom being supported for movement in a travelling direction transverse to the swinging direction of the boom, a pulley block being provided on a head of said boom and a further pulley block on a formation provided on said car, a winding mechanism for a load supporting cable being provided, the cable extending from the winding mechanism and over the first and further pulley blocks. Such an arrangement can be used for almost any type of cargo and has a high operating efficiency. Its weight lies within limits which also allow it to be readily built into existing ships.

It is yet another object of the invention to provide such a crane arrangement in which the head of the boom is so arranged that its plane of movement is displaced relative to a vertical plane passing through the foot of the boom. By this means a symmetrical working on both sides is possible.

It is another object of the invention to provide such a crane arrangement in which the car is arranged for extending over a loading hatch of a ship and mounted on rails arranged longitudinally of the hatch. An especially wide-tracked support of the car is thus achieved so that a wide reach can be obtained with sufficient stability even without additional supporting means. In order to ensure a high inherent stability also in the travelling direction of the car, the car advantageously extends beyond the vertical swinging plane and is provided with an opening for the passage therethrough of the cargo.

Pendulum-like swinging movements of the load when using high working speeds can be effectively reduced if the load hangs on two points of the boom head arranged spaced apart in the plane of movement of the boom head. For this purpose the head of the boom may be of T-shape.

It is a further object of the invention to provide a crane arrangement in which two similar cars with oppositely inclined booms are provided. The two cars with their booms and lifting mechanisms can be driven in synchronism with the aid of a common control device. By switching on or switching off this device it is then possible to use the cars individually or jointly. The two

cars are advantageously arranged for being coupled with each other, in which case only one of the two cars is provided with a travelling mechanism.

These and other objects and advantages of the invention will be clear from the following description with reference to the accompanying drawings illustrating a specific embodiment given by way of example, and in which:

FIG. 1 is an elevational view of a crane arrangement according to the invention;

FIG. 2 is a plan view of FIG. 1;

FIG. 3 is a side elevation of part of the crane arrangement of FIGS. 1 and 2.

The crane arrangement illustrated comprises two cars 2 which bridge a cargo hatch 1 of a ship, the cranes having booms 4 which are swingable about horizontal axes 3. The cars have supporting wheels 5 by means of which they can travel in the longitudinal direction of the ship, on rails 6 arranged longitudinally of the hatch.

The booms 4 are swingable on the axes 3 so that the boom heads 8 move in vertical planes 7. The plane 7 for each boom head 8 is offset relative to the vertical plane passing through the boom foot 29. The cars 2 extend beyond the vertical swinging plane 7 and are provided with a joint opening 9 for passage therethrough of the cargo being loaded.

The load on each boom hangs on two points which are separated from each other in the swinging direction, one point 10 being a fixed suspension point on the boom head 8 and the other being constituted by a cable pulley guide 11. For providing these suspension points, the boom head 8 is formed as a T-shaped transverse head, which lies in the swinging plane 7.

The two cars are so arranged relative to each other that their booms 4 are inclined towards each other. Each boom is provided at its mounting end with a short lever arm 4*a* on which a hydraulic drive for effecting the rotation of the boom about the axis 3 engages, the hydraulic drive comprising two pivotally mounted cylinders 12 with piston rods 13.

The load cable 14 extends from the fixed point 10 on the boom head, over a load supporting pulley 15 to the guide pulley 11 on the transverse head of the boom and from there to and fro in a plurality of passes over pulley blocks 16, 17 provided on the head of the boom and on a column 18 of the car, and finally over a last pulley of the pulley block 17 on the car column to the winding mechanism diagrammatically shown at 31 which is provided in the column of the car. Due to this arrangement of the load cable 14, a horizontal path of moveemnt for the load is achieved on swinging of the boom, as is indicated in FIG. 1 by the broken line 19.

In order to stress the boom as little as possible torsionally, the point 20 of intersection of the line of the cable 14 with the axis of the pulley block 17 is arranged perpendicularly above the point 21 of intersection of the centre line of the boom and the axis of rotation of the boom.

During loading operations, the two cars and booms can be operated independently or alternatively commonly driven. Joint operation of the cars and booms is illustrated in FIG. 2. In this case the two load supporting pulleys 15 are coupled together and the two crane arrangements are driven in synchronism. For this purpose a common control device illustrated diagramatically at 30 in the drawing is provided. The two cars simply abut against each other by their ends which face one another, or may alternatively be coupled together. Each car is provided with a brake (not shown). For travelling movements of the cars, separated travelling mechanisms may be provided, but alternatively, one

travelling mechanism may be dispensed with so that one of the cars can only be displaced with the aid of the travelling mechanism of the other car.

With combined operation of the two cars and booms the advantage is given that the load is suspended on four points and thus inclines less towards pendulum-like swinging, and larger loads can moreover be carried.

Many modifications, omissions and alterations may be made within the scope and spirit of the invention as defined in the appendant claims. For example, depending on the conditions present in any specific application of the crane arrangement, various kinds of drives of the swinging mechanism and also of the lifting mechanism and travelling mechanism may be provided. Furthermore, the transverse head provided on the head of the boom may be arranged rockable about a horizontal axis and connected with the boom in such manner that in all positions of the boom the head maintains a horizontal position.

We claim:

1. In a ship crane having a movable car and a boom,
said car being mounted for movement longitudinally of a ship,
said boom having a foot, a head and a body portion and being mounted on said car for movement with said car and for pivoting about a substantially horizontal axis extending longitudinally of said ship,
said boom body portion being inclined with respect to said axis whereby said boom head portion has a plane of movement displaced longitudinally of and substantially parallel to a vertical plane passing through said foot of said boom perpendicular to said axis.

2. In a ship crane having a movable car and a boom mounted on said car,
said car being mounted for movement fore and aft of a ship,
said boom having a foot, a head and a body portion and being mounted on said car for movement with said car and for pivoting about a substantially horizontal axis extending fore and aft of said ship,
said boom body portion being inclined with respect to said axis whereby said boom head portion has a plane of movement displaced in the direction of travel of said car and substantially parallel to a vertical plane passing through said foot of said boom perpendicular to said axis,
loading means for lifting a load on said boom,
said loading means comprising a pulley block on said boom head,
a further pulley block mounted on a column provided by said car,
a load supporting cable,
a winding means for said cable,
said cable extending in a path from said winding means over said first and further pulley block,
and an intersection point of said cable path and said axis of the further pulley block being in vertical alignment with an intersection point of the center line of said boom body section and said horizontal axis.

3. An arrangement as set forth in claim 1 wherein said car is mounted on longitudinally extending rails whereby said car can be moved to positions extending over a loading hatch of said ship.

4. An arrangement as set forth in claim 1 wherein a load cable is suspended from two laterally spaced points provided on the boom head whereby pendulum-like swinging movements of a load carried by the cable can be effectively reduced.

5. An arrangement as set forth in claim 1 wherein two cars are provided in side by side relationship for longitudinal movement,
the boom of each of said cars being synchronously driven by a common control means whereby said cars cooperate to lift a single load therebetween.

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