

Feb. 18, 1969

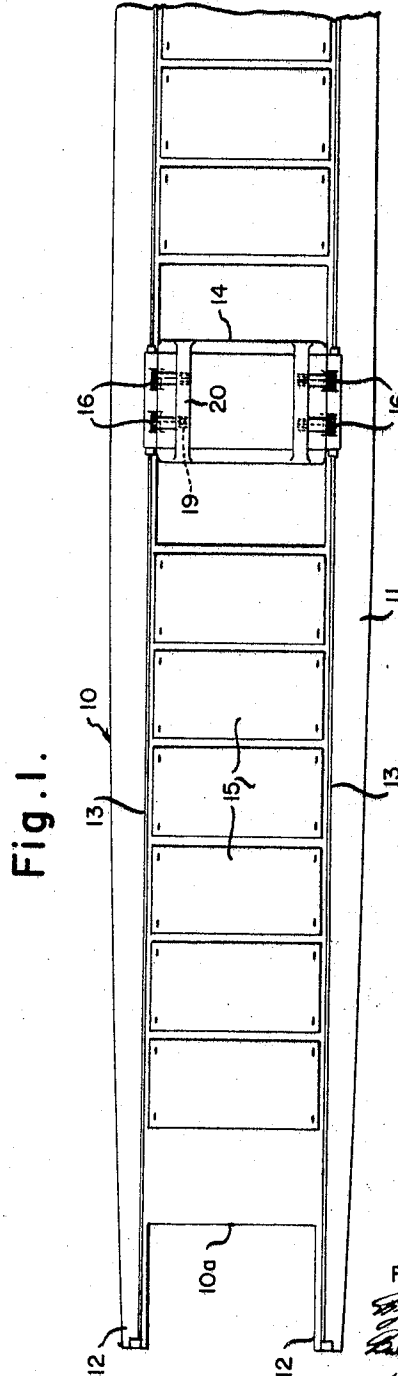
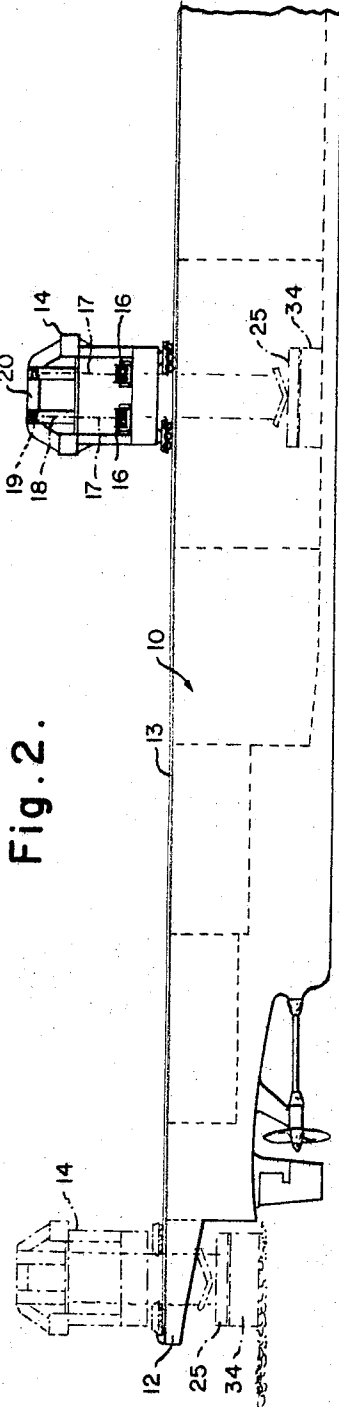
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3,428,194

SHIP BARGE HANDLING CRANES AND BEAMS

Filed Dec. 26, 1967

Sheet / of 3



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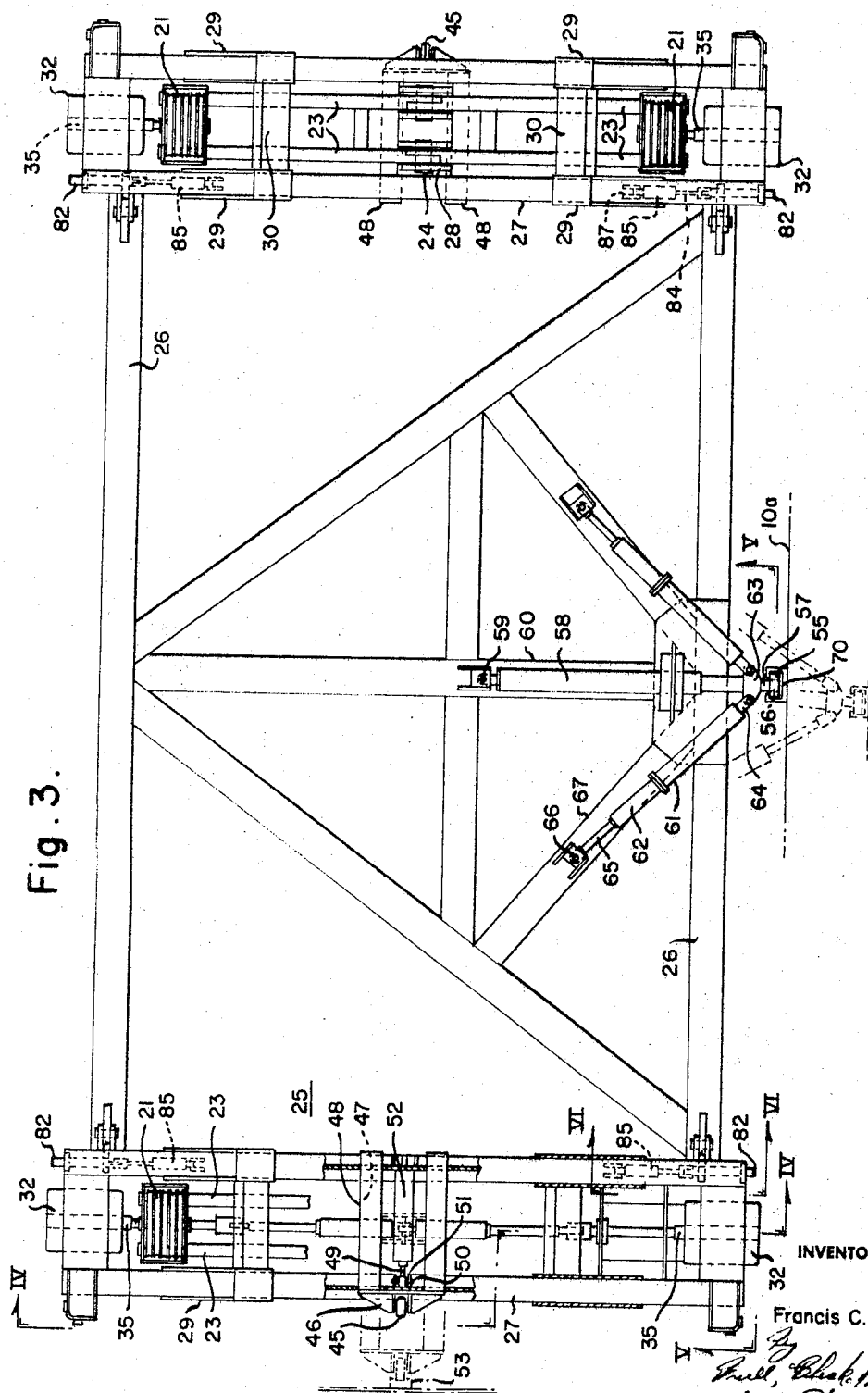


Fig. 3.

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Fig. 4.

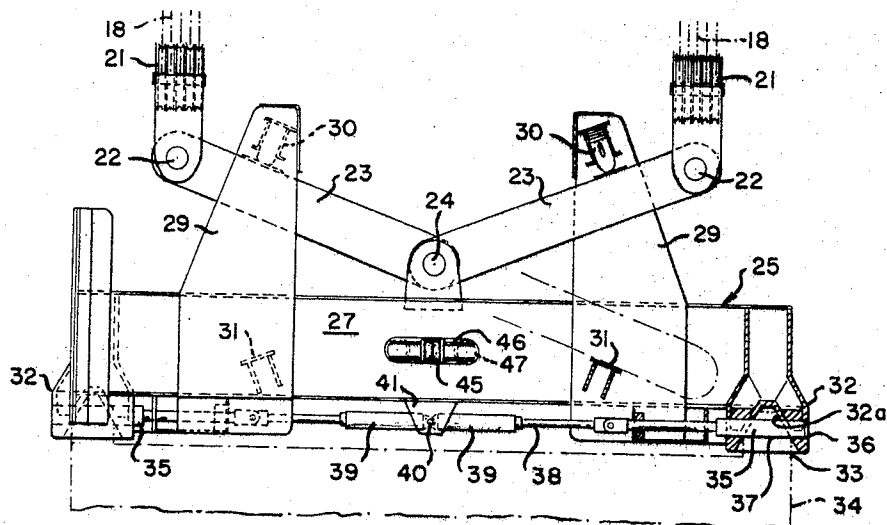


Fig. 5.

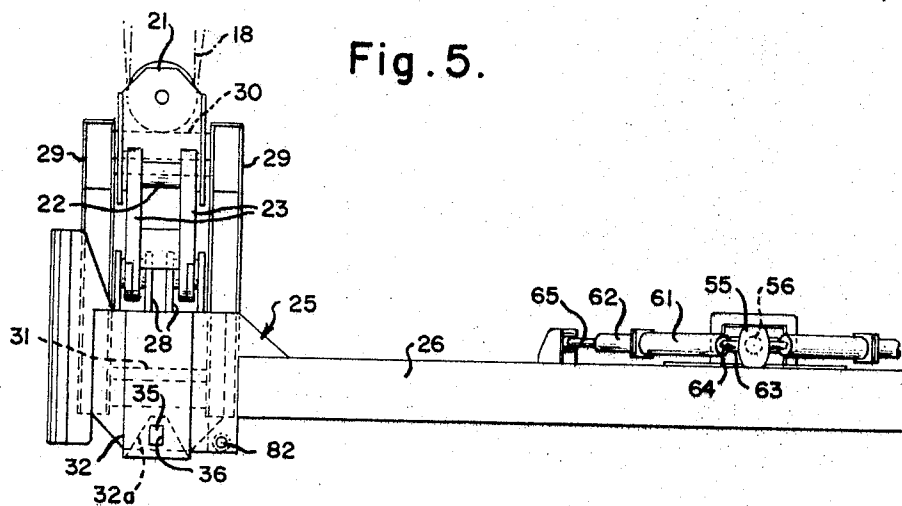
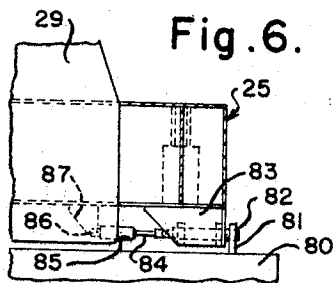


Fig. 6.



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SHIP BARGE HANDLING CRANES AND BEAMS

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6 Claims

ABSTRACT OF THE DISCLOSURE

The improvement in seagoing vessels having a hull and hatches adapted to receive loaded barges or lighters consisting in providing a pair of cantilever arms at the stern of the vessel carrying trackway which continues along the deck on each side of the ship, a gantry crane and hoisting means on the trackway, a lifting beam for engaging in barge to be lifted, a pair of lift arms adjacent each end of the beam, one end pivoted on the lift beam and the other end engaged by the hoist means and stop means on the beam engaging the lift means at a point spaced from the beam to define a path of vertical movement for the end of the lift arm engaged by the hoist.

This invention relates to ship barge handling cranes and beams and particularly to barge handling cranes and beams for stern loading loaded and sealed barges on ocean-going ships.

The handling of cargo at various ports in the world has become an expensive and high risk operation because of high labor costs and excessive and uncontrolled pilferage of cargo going to and coming from ships. As a result of these high cost, high loss operations, there have been many proposals made for handling cargo onto and off of ships in sealed containers. One such practice has been the use of containers in the form of a semi-trailer body, removable from its wheels and stored in the hold of the ship. There are, however, areas and ports where the cargo is more readily and expeditiously handled by barges.

The present invention provides a structure in which loaded barges, sealed if desired, may be placed in the ship's hold and carry their cargo to the final destination.

There are many problems in handling and loading such barges. One of the most difficult of these problems is that of maintaining lift ropes taut and in shape during relative movement of ship and barge while the barge is still in the water. Another is maintaining relative alignment of the barge and ship during loading, particularly when the ship has a list or the seas are rough.

The present invention solves these problems of handling of barges and permits safe, efficient and economical handling of cargo in barges. By the present invention changes in relative position of the barge and shape are promptly compensated for without expensive electronic equipment or controls by the use of simple mechanical links. This eliminates the problem of twisted and slack cables on the hoisting mechanism.

This invention preferably provides in a sea going ship having a hull with hatches adapted to receive a plurality of loaded barges, a cantilever arm extending from the stern of the vessel on each side, a trackway extending along each of said cantilever arms and the deck of the vessel, a gantry crane on said trackway adapted to move therealong, a hoisting means on said gantry, a lifting beam, cooperating locking members on said lift beam, and a barge to be lifted, a pair of lift arms adjacent each end of said lift beam, said lift arms being pivoted at one end on the lift beam and engaged at the other end by said hoisting means and stop means spaced from and connected to said lifting beam engaging each

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of said lift arms at a selected point spaced from said beam whereby said other end of said lift arms is free to move generally vertically around the point at said one end. Preferably the lifting beam is a quadrilateral beam and the lift arms are pivoted at one end on its longitudinal center line and are slidable in vertical guideways in a combination guide and stop member adjacent each corner of the beam. A stern guide is preferably provided in the form of a vertical guideway on the stern of the vessel and a guide arm pivoted at one end on the lifting beam and slidably engaging the guideway at the other end. Preferably the guide arm is telescopic in form and is provided intermediate its ends with fluid pistons acting thereon at an angle to the guide arm to urge the arm to a centered position. End guides are preferably provided on the lifting beam and gantry to center the beam and barge on the gantry prior to moving the barge to a hatch for lowering into the hold of the boat.

In the foregoing general description of this invention certain objects, advantages and purposes have been set forth. Other objects, advantages and purposes will be apparent from a consideration of the following description and the accompanying drawings in which:

FIGURE 1 is a top plan view of a ship embodying this invention;

FIGURE 2 is a side elevational view of the ship of FIGURE 1;

FIGURE 3 is a top plan view of a lift beam according to this invention;

FIGURE 4 is an end elevation partly in section of the beam taken on line IV—IV of FIGURE 3, attached to a barge;

FIGURE 5 is a segmental side elevation of the beam taken on line V—V of FIGURE 3; and

FIGURE 6 is a segmental section on the line VI—VI of FIGURE 3 showing the beam attached to a hatch cover.

Referring to the drawings there is illustrated a ship hull 10 having a deck 11 and parallel cantilevered deck arms 12 extending rearwardly from the stern of the hull. A pair of rails 13 extend along the top of arms 12 and deck 11 to form a trackway carrying a gantry crane 14 over hatches 15 in the deck. The gantry is provided with two rope take up drums 16 on each side connected to ropes 17 forming four sets of reeving 18 over sheaves 19 on beams 20 on the gantry and over sheaves 21 suspended on the reeving. Each of the four sheaves 21 is pivotally connected to a pin 22 in one end of a lift arm 23, the other end of which is pivoted on pins 24 on lift beam 25.

The lift beam 25 is of generally rectangular shape having side beams 26 and end beams 27. The end beams 27 are provided with clevises 28 extending above the beam and receiving pins 24. Intermediate the clevises 28 and the side of the lift beam there are provided two spaced vertical guide members 29 having stop members 30 adjacent their top. The lift arms 23 move between the guide members 29 from a lower limiting position against stop 31 within the end beams (chain line in FIGURE 4) to an upper limiting position against stop member 30 (shown in solid line in FIGURE 4). The end beams 27 are provided at each end with lift lugs 32 having V-shaped pockets or recesses 32a which receive mating lift lugs 33 on each corner of a barge or lighter 34. A sliding lock pin 35 is adapted to pass through matching holes 36 in the pockets 32 and holes 37 in lugs 33. Each of the lock pins 35 is mounted on the end of a piston 38 in a cylinder 39 pivoted on pin 40 in a depending clevis 41 on the bottom of end beam 27.

End guide rollers 45 are mounted centrally of each end beam 27 in yoke 46 mounted on cylindrical guide pistons 47 movable in guide cylinder 48 mounted on the end beams. An actuating piston 49 is pivoted at its free end

on pin 50 in clevis 51 on yoke 46 and is operated by cylinder 52 pivoted on the end beam 27. The end guide rollers 45 run in guideways 53 in the ends of the gantry.

A side guide shoe 55 is mounted on a spherical head 56 on piston 57 mounted in cylinder 58 pivoted at its end on pin 59 on intermediate longitudinal beam 60 of the lifting beam. A pair of diagonally connected cylinders 61 and 62 are provided with a piston 64 in cylinder 61 connected to yoke 63 on piston 57 adjacent head 56 and with a piston 65 in cylinder 62 pivotally connected to a pin 66 on diagonal bracing beam 67 of the lift beam. The cylinders 61 and 62 and their associated pistons act to control the centering of head 56 and shoe 55. The guide shoe 55 is adapted to run in vertical guide slot 70 on the stern 10a of the boat hull so as to center the lifting beam and thereby the barge attached thereto as it rises out of the water and approaches the cantilever arms and gantry.

The lift beam may be used to remove and replace hatch covers 80 having vertical lug 81 adjacent each corner. The beam is provided with horizontally moving pins 82 mounted in guides 83 depending from the end beams adjacent the lift lugs 32. Each pin 82 is connected to a piston 84 operated in cylinder 85 pivoted on pin 86 in clevis 87 on the end beam.

Each of the cylinders hereinabove identified is hydraulically operated from the gantry through hydraulic lines in the usual manner and the details will not be set out herein, but will be obvious to those skilled in the art.

The operation of the apparatus of this invention is as follows. A hatch cover over a hatch to be filled is removed by lowering the lift beam into position on the cover and energizing cylinders 85 to extend pins 82 through holes 88 in lift lugs 81 on the hatch covers. The drums 16 are energized and the covers raised. The gantry is then moved on the rails 13 to a position where the hatch cover is to be stored. The beam is lowered and the pins 82 withdrawn from lugs 81. The beam is raised and the gantry moved onto the cantilever arms 12 over a barge 34 to be stowed. The drums 16 are operated to lower the lift beam until shoe 55 enters guide 70 and then downwardly onto the barge with the recesses 32 engaging over lugs 33. The cylinders 39 are energized to force pins 35 through passages 36 and 37. When the beam is lowered onto the barge the arms 23 are without load. At this point the arms act to maintain tension on the reeving as the barge rises and falls with the action of the water, rising and falling in guideways 29 so that the pivot pins 22 are always in the same plane for all sheaves although the lift beam itself may be moving and twisting with the barge. When the pins 35 are in place the drums 16 are operated to raise the barge. This brings lift arms 23 against stops 30 and carries the barge upwardly out of the water. Cylinders 61 and 62 are now energized to bring the lift beam into alignment with the stern of the ship and guideway 70. This centers the barge and permits it to move vertically between the cantilever deck arms and between the side frames of the gantry. As the lift beam rises between the side frames of the gantry the guides 45 take over and shoe 55 leaves guideway 70. The barge is then carried to the open hatchway and lowered through the hatchway into position in the hold. The pins 35 are withdrawn, the lift beam is raised out of the hold and the apparatus is ready to repeat the cycle. Unloading is carried out in the reverse order.

In the foregoing specification certain preferred embodiments and practices of this invention have been set out.

I claim:

1. In a sea going ship having a hull with hatches adapted to receive a plurality of barges, the improvement

comprising a pair of parallel cantilever arms extending from the stern of the vessel, a trackway extending along each of the cantilever arms and the deck of the vessel, a gantry crane on said trackway adapted to move therealong, a hoisting means on said gantry, a lifting beam, cooperating locking members on said lifting beam and a barge to be lifted, a pair of lift arms adjacent each end of said lift beam, said lift arms being pivoted at one end on the lift beam and engaged at the other end by said hoisting means each of said arms being pivotable relative to the other arms and stop means on said lifting beam engaging said lift arms at a point spaced from said beam and defining a path of vertical movement for said arms whereby said other end of the arms is free to move generally vertically around the pivot at said one end.

2. In a ship improvement as claimed in claim 1 wherein the lifting beam is a rectangle and the lift arms are pivoted at one end on the longitudinal center line of the beam.

3. In a ship improvement as claimed in claim 1 a stern guide extending vertically on the ship hull, extensible guide arm means pivoted on the lifting beam engaging said stern guide and means biasing said extensible guide arm means onto the transverse center line of the lifting beam.

4. The improvement as claimed in claim 3 wherein the extensible guide arm means is a fluid cylinder and piston, one of said cylinder and piston being pivotally attached to the beam, the other carrying a shoe mounted for generally universal movement and the biasing means include two fluid cylinders and pistons, one on each side of the guide arm means and connecting said guide arm means and beam at an angle to the line of said guide arm and normally biasing said guide arm in a bisecting position between them.

5. The improvement as claimed in claim 1 wherein the lift beam is a rectangle, said lift arms are pivoted in pairs at one of their ends on a common pivot point, adjacent the two ends of the lift beam the other end of each said lift beams being slidably engaged between two vertical guide members on said beam adjacent each corner and having stop means therebetween spaced vertically from the beam, said arms being free to travel from a position on the beam to a position against the stop and the hoisting means are separate rope reeving engaging each of said other ends of each said lift beam.

6. A lift beam for lifting a load in conjunction with rope reeving to provide a slack rope balancing means comprising a lift beam, cooperating locking members on said lifting beam and a load to be lifted, a pair of lift arms adjacent each end of said lift beam, said lift arms being pivoted at one end on the lift beam and engageable at the other end by rope lift reeving, each of said arms being pivotable relative to the other arms and stop means on said lifting beam engaging said lift arms at a point spaced from said beam and defining a path of vertical movement for said arms whereby said other end of the arms is free to move generally vertically around the pivot at said one end.

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