

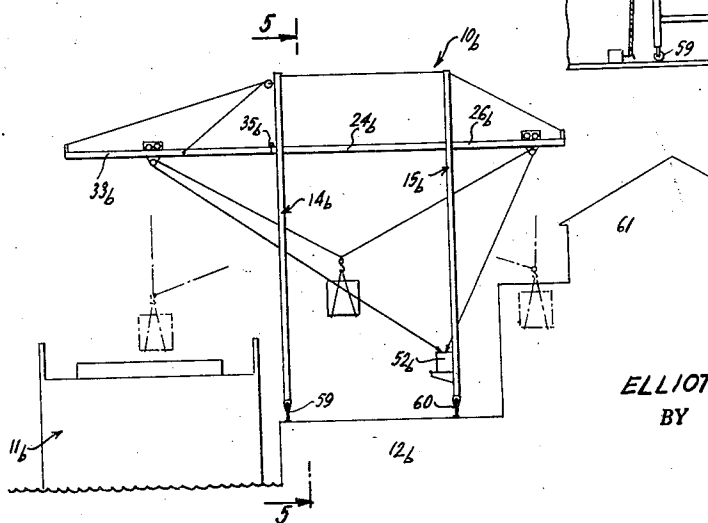
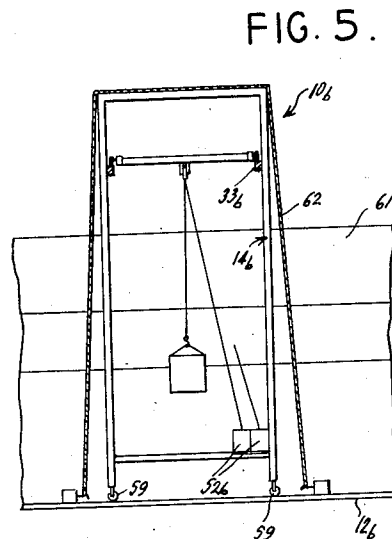
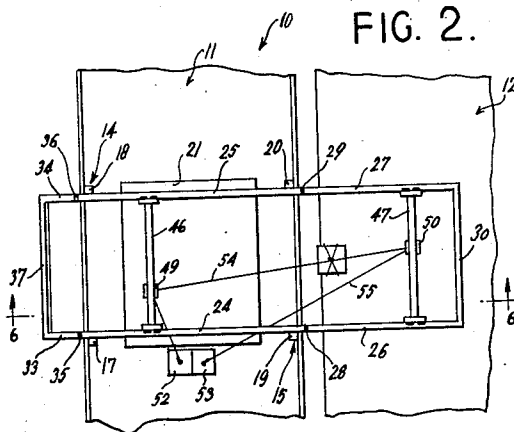
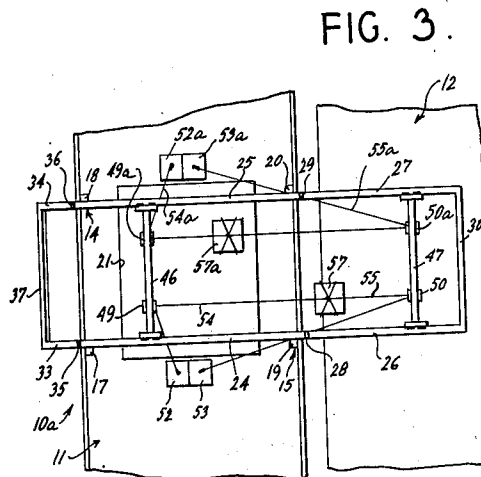
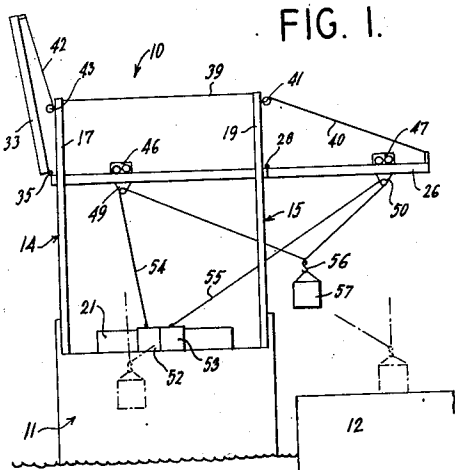
July 16, 1957

E. A. FRIEDMAN
CRANE CONSTRUCTION

2,799,403

Filed April 11, 1955

3 Sheets-Sheet 1



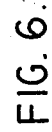
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CRANE CONSTRUCTION

3 Sheets-Sheet 2



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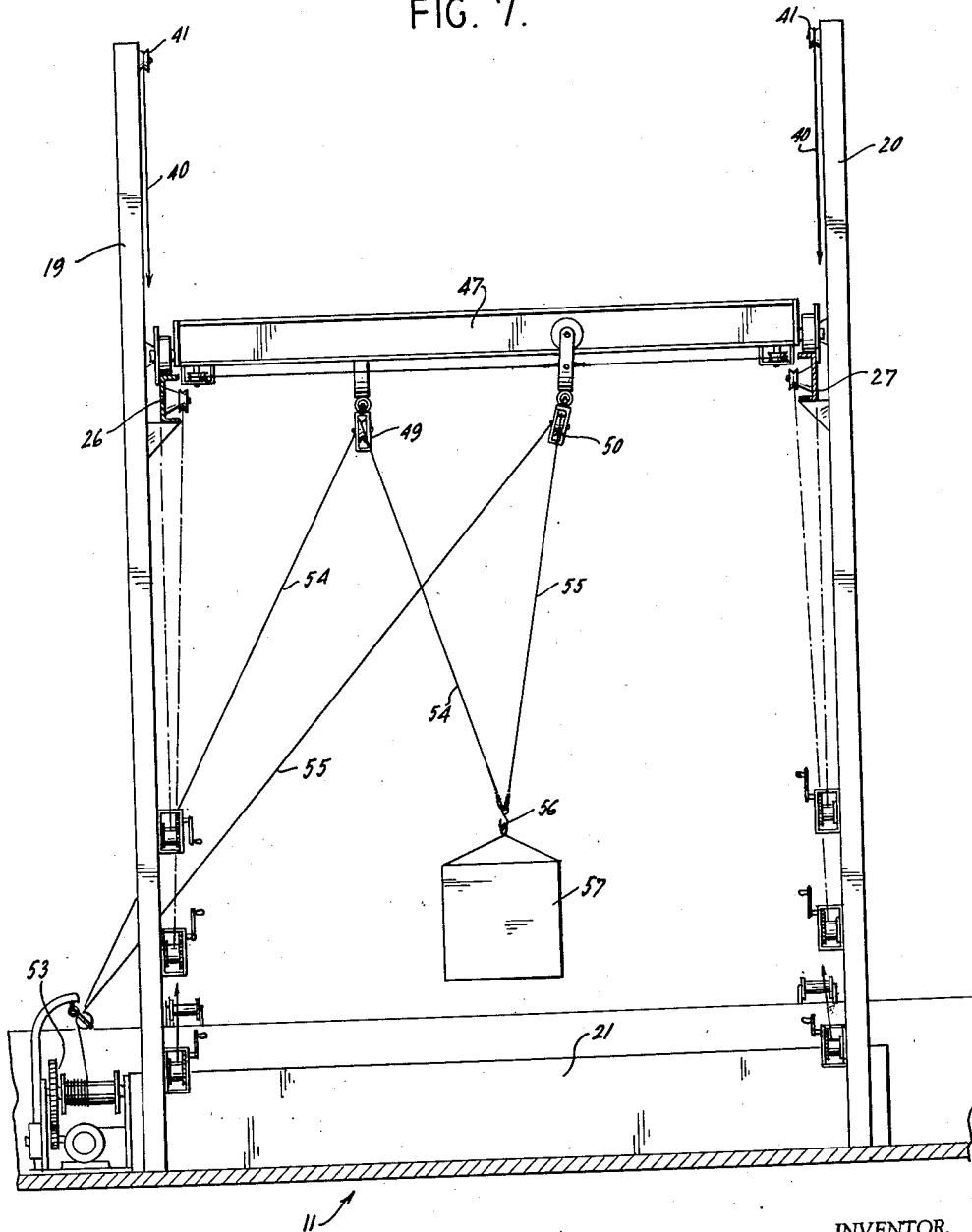
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FIG. 7.



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CRANE CONSTRUCTION

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7 Claims. (Cl. 212—83)

This invention relates to a highly improved crane construction.

The particular embodiment of the present invention, which is illustrated in the drawings and which will be described hereinafter in greater detail, comprises generally a pair of trolleys movable on an elevated track and selectively positionable therealong, a block or pulley carried by each trolley for movement transverse of the track and adapted to be held in any selected position of its transverse movement, and winch operated lines extending through the blocks for connection to cargo, so that the latter may be moved between positions substantially directly below the trolleys by winch operation of the cargo lines.

As is well known to those versed in the art, the various types of conventional cranes, such as standard ship's gear, traveling cranes and jib cranes, are all relatively slow and laborious in operation, and subject to numerous other disadvantages. For example, the most rapid conventional crane operation is that of the standard ship's gear, employing the "yard and hatch" whip method. However, this involves considerable time and labor in positioning or "spotting" the booms, requires additional materials, such as guys and the like, to hold the booms in place, and exposes cargo to the elements, so that operations must often be halted in inclement weather. Further, the booms are extremely difficult, if not impossible to spot in certain instances; and, at certain angles the booms become unsafe.

While traveling cranes eliminate the above noted difficulties with respect to booms, they are more time consuming in operation, and require greater maintenance, especially on a ship. Jib or wharf cranes are also extremely slow in operation.

Accordingly, it is a general object of the present invention to provide an improved crane construction of the type described, which overcomes the above mentioned disadvantages of conventional cranes, while combining the advantageous features thereof, which enables cargoes to be quickly and easily loaded and unloaded with substantially less labor and a minimum of skill, and which can be operated in a completely sheltered space so that loading and unloading may be accomplished under all weather conditions, regardless of the type of cargo.

It is a further object of the present invention to provide a crane construction having the advantageous characteristics mentioned in the foregoing paragraph, which may be arranged and positioned with the ease and safety of a traveling crane, and which is capable of high speed operation in a manner similar to that of standard ship's gear, to combine the advantageous features of the prior art without the disadvantages thereof.

It is still another object of the present invention to provide a highly improved crane which is simple in construction, durable and efficient in use, and which can be economically erected, operated and maintained.

Other objects of the present invention will become ap-

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parent upon reading the following specification and referring to the accompanying drawings, which form a material part of this disclosure.

The invention accordingly consists in the features of construction, combinations of elements, and arrangements of parts, which will be exemplified in the construction hereinafter described, and of which the scope will be indicated by the appended claims.

In the drawings:

Figure 1 is a front elevational view showing a crane constructed in accordance with the present invention, as mounted on a ship, with different positions of operation being shown dot-and-dash lines;

Fig. 2 is a top plan view showing the crane of Fig. 1;

Fig. 3 is a top plan view showing a slightly modified form of crane constructed in accordance with the present invention;

Fig. 4 is a front elevational view showing another slightly modified form of crane constructed in accordance with the present invention, and mounted on a pier or wharf, with various positions of operation being illustrated in dot-and-dash lines;

Fig. 5 is a sectional view, taken substantially along the line 5—5 of Fig. 4 and showing the crane thereof as adapted for operation in inclement weather;

Fig. 6 is a section on the line 6—6 of Fig. 2 in greater detail; and

Fig. 7 is a section on the line 7—7 of Fig. 6.

Referring now more particularly to the drawings, and specifically to Figs. 1 and 2 thereof, the embodiment of the invention illustrated therein comprises a crane, generally designated 10, shown for purposes of illustration, as mounted on a ship 11 disposed alongside a wharf 12.

The crane includes a pair of upright, open frames or supports 14 and 15 disposed in facing relation with respect to each other and fixed at their lower ends to laterally spaced points on the deck of ship 11. The open frame 14 includes a pair of vertical standards or uprights 17 and 18 spaced longitudinally of the ship 11 and fixed at their lower ends to the deck of the ship. Similarly, the open frame 15 is formed of a pair of vertical standards or uprights 19 and 20 having their lower ends fixed to the ship deck, and preferably disposed in laterally spaced relation with respect to the standards 17 and 18, respectively. Thus, as best seen in Fig. 2, the frames 14 and 15 are spaced apart laterally of the ship 11, and disposed on opposite sides of a deck opening or hatch 21.

A pair of parallel spaced, horizontally disposed rails or rail sections 24 and 25 extend between and are fixedly secured to the frames 14 and 15, interiorly thereof. Further, the rails 24 and 25 are preferably disposed in the same horizontal plane and spaced below the upper ends of the open frames 14 and 15, as seen in Fig. 1. In particular, the rail section 24 extends between and is fixedly secured to the inner sides of the uprights 15 and 17, while the rail section 25 extends between and is fixedly secured to the inner sides of the uprights 18 and 20. Additional rail sections or end extensions 26 and 27 are disposed, respectively, in end to end aligned relation with one pair of adjacent ends (the right hand pair in the drawings) of the rails 24 and 25, and are hingedly connected to their respective rails for swinging movement about a horizontal axis. Thus, the rail extensions 26 and 27 are disposed in parallel spaced relation with respect to each other and have their inner ends hingedly connected, respectively, as at 28 and 29 to one pair of adjacent ends of the rails 24 and 25. The outer ends of the rail extensions 26 and 27 are rigidly connected together by a beam or bar 30, so that the rail extensions are simultaneously swingable about their hinged connections as rigid unit.

On the other ends of the rails 24 and 25 (the left side

in the drawings) are connected, respectively, additional rail sections or end extensions 33 and 34. That is, the extension rails 33 and 34 are connected to the rails 24 and 25 in respective end to end relation by horizontally disposed, axially aligned hinges 35 and 36. Rigidly connecting the outer ends of the rail extensions are constrained to simultaneous, swinging movement as a unit about their hinged connections.

The upstanding, open frames 14 and 15 may be rigidified by any suitable structure, if desired, and guy wires, as at 39 in Fig. 1 may extend between the upper frame ends to steady the same. In addition, draw lines 40 may be connected to the rail extensions 26 and 27, and windable on a drum 41 for effecting swinging movement of the right hand extension rails between their laterally projecting, horizontal position (as illustrated) and a retracted, inoperative position swung upwards into adjacent relation with respect to the upper ends of the standards 19 and 20. Draw lines 42 may similarly be connected to the rail extensions 33 and 34, and a drum 43 provided on the frame 14 to coil and uncoil the draw lines for raising and lowering the left hand rail extensions between a laterally projecting, horizontal position and an inoperative, retracted condition adjacent to the upper ends of the standards 17 and 18 (as illustrated).

The rails 24 and 25, with their end extensions 26, 27, 33 and 34 disposed in lowered, horizontally extending condition, thus define an elevated track extending between the frames, and projecting through and beyond the latter. In operation, as will appear presently, at least one pair of rail end extensions is disposed in its horizontal, outwardly projecting position.

A pair of independent trolleys or carriages 46 and 47 extend between the track rails, and are mounted thereon, as by rollers or the like, for movement longitudinally along the track. In Fig. 2 it will be observed that the trolley 46 extends between the rail sections 24 and 25, while the trolley 47 extends between the extension rail sections 26 and 27. The trolleys are provided with suitable means (not shown), preferably power operated and remotely controlled to effect trolley movement longitudinally along the rails, and also to releasably lock the trolleys at any selected position of their movement along the rails. The trolleys 46 and 47 are illustrated, respectively, in operative positions over the hatch 21 and wharf 12.

A block or pulley 49 depends from the trolley 46, and a similar block or pulley 50 depends from the trolley 47. The blocks are mounted in their respective trolleys, by any appropriate means (not shown) for movement relative to the trolleys transverse of the rails or track; and, suitable means are provided (not shown) for locking the blocks relative to the trolleys at any selected position of their transverse movement. The block drive and locking means is preferably powered and remotely controlled for maximum speed and ease of operation.

A pair of winches, schematically illustrated at 52 and 53, are located on the ship deck in the embodiment of Figs. 1 and 2, for coiling and uncoiling lines 54 and 55, respectively. The line 54 extends from the winch 52 through the block 49, while the line 55 extends from the winch 53 through the block 50. After passing through their respective blocks, the lines are connected together by a cargo hook 56.

In operation, say to unload the vessel 11, the winches are operated to drop the cargo hook into the hatch 21 for connection to a piece of cargo disposed within the hatch. The winches are then operated, as by proper winding and unwinding of the cargo lines on the winch drums to pick up or raise the cargo 57 transport it to a position over the wharf 12, and deliver it on the wharf substantially directly below the block 50. This operation is repeated as often as necessary to completely unload the ship, movement of the trolleys 46 and 47, and their blocks 49 and 50 being made only when necessary to

change the cargo pick-up and delivery positions. In practice, it may not be necessary to move the trolleys and blocks throughout the entire unloading procedure. Of course, the end extension rails 34 and 35 will be employed in the same manner as the end extension rails 26 and 27 when the wharf is disposed on the other side of the ships, the left hand side in the drawings. In its condition of non-use, as when at sea, both rail extension units will be raised to their retracted positions.

In Fig. 3 is shown a slightly modified form of crane, generally designated 10a, which is the same in all respects as the crane 10, but with the provision of additional cargo blocks 49a and 50a on the trolleys 46 and 47, respectively. The cargo blocks 49a and 50a may be identical to the cargo blocks 49 and 50, and are preferably mounted on their respective trolleys for movement in directions transverse of the track rails. Additional winches 52a and 53a are mounted on the ship deck and lines 54a and 55a extend from the respective winches through the blocks 49a and 50a for connection to a piece of cargo 57a. The blocks 49 and 49a are spaced from each other along the trolley 46, and the blocks 50 and 50a are spaced along the trolley 47, so that the blocks 49 and 50 may work on one part of the ship's hatch while the blocks 49a and 50a work on another part of the hatch, all without interference. Thus, the slight modification of Fig. 3 serves to substantially double the speed of operation of the embodiment of Figs. 1 and 2.

While the cranes 10 and 10a have been illustrated and described as being mounted on a ship's deck, it is of course appreciated that such cranes may also be mounted on a dock, or at other desired locations, and may be employed in a great variety of handling operations, not limited to the loading and unloading of ships.

In Fig. 4 is another slightly modified form of crane 10b constructed in accordance with the present invention, is illustrated as mounted on a wharf or dock 12b. The crane includes a pair of facing, spaced upstanding open frames 14b and 15b which have their lower ends provided with wheels or rollers 59 and 60, respectively, to mount the crane for movement along the dock. By this construction, a single, dock-side crane may be employed to work on all the hatches of a ship.

A double rail, elevated track section 24b extends generally horizontally between the open frames 14b and 15b, and is secured to the frames interiorly thereof. A dock-side track end extension 26b projects horizontally from the track section 24b through and beyond the frame 15b, so as to overhang a warehouse or shed 61. If there is no obstruction to movement of the crane 10 along the dock, the projecting track extension 26b may be fixed relative to the track section 24b. A ship-side track extension 33b is however, preferably hinged, as at 35b to the ship-side ends of the intermediate track section 24b, for swinging movement between a horizontal, outwardly projecting working position, and an upwardly extending, retracted inoperative position. This of course permits movement of the crane 10b along the dock 12b unimpeded by a ship super structure.

Suitable winch means 52b, in the modification of Fig. 4, is preferably mounted on the crane 10b, so as to move with the latter. As illustrated, the crane 10b can operate to transport cargo directly from a ship 11b into a warehouse or shed 61b; and, the cargo may of course be picked up from the warehouse and delivered to the ship, as required.

Fig. 5 illustrates the crane of Fig. 4 as employed under inclement weather conditions. As the track sections 24b, 26b and 33b extend interiorly of the frames 14b and 15b, a flexible sheet covering or tarpaulin 62 may be arranged completely over the upstanding frames and extend over the projecting track ends, all without impeding movement of the cargo between its pick-up and delivery points. Thus, the open frames 14b and 15b, with the elevated track extending interiorly therethrough and

spaced below the upper ends thereof, provides a structure below the upper ends thereof, adapted to support the covering sheet 62 without hampering cargo movement. Of course, the crane structures of Figs. 1 and 3 will also support a sheltering, flexible sheet in the same manner. As seen in Fig. 5, it is preferred to provide hooks 63, or other suitable means adjacent to the dock surface for anchoring the protective cover 62 in position.

From the foregoing, it is seen that the present invention provides a crane construction which fully accomplishes its intended objects, and is well adapted to meet practical conditions of erection, operation and maintenance.

Although the present invention has been described in some detail by way of illustration and example for purposes of clarity of understanding, it is understood that certain changes and modifications may be made within the spirit of the invention and scope of the appended claims.

What is claimed is:

1. A crane comprising a pair of spaced upstanding supports, a pair of elevated track rails extending between and fixedly mounted on said supports, said track extending beyond at least one of said supports, a pair of trolleys each extending transversely between and movable longitudinally along said track rails and positionable respectively over cargo pick-up and delivery points, a block depending from each of said trolleys and mounted on its respective trolley for movement relative thereto transverse of said track rails, means for releasably fixing each of said blocks at any selected position of its transverse movement relative to its respective trolley, a pair of lines each extending through a respective one of said blocks one end of one of said lines being attached to one end of the other of said lines and adapted for connection to a piece of cargo, and a pair of independently operable winches each connected to a respective one of said lines for selectively winding and unwinding the latter to move said piece of cargo between said pickup and delivery points.

2. A crane according to claim 1, wherein said supports are mounted for movement transverse of said track.

3. A crane comprising a pair of upstanding open frames disposed in facing spaced relation, a pair of elevated parallel track rails extending between and fixedly secured to said frames interiorly thereof, at least one pair of adjacent rail ends projecting through and beyond one of said frames, a pair of trolleys each extending between said pair of rails and movable therealong, means for releasably locking each of said trolleys at any selected position of its movement along said rails, a block depending from each of said trolleys and mounted on its respective trolley for movement therealong transverse of said rails, means for releasably fixing each of said blocks at any selected posi-

tion of its movement relative to its respective trolley, lines extending through said blocks for connection to a piece of cargo, and winch means connected to said lines for selectively winding and unwinding the latter to move said piece of cargo between points substantially directly below said trolleys.

4. A crane according to claim 3, said one pair of rail ends being pivoted to the remainder of said rails for upward swinging movement into an inoperative position adjacent to said one frame, to thereby conserve space when not in use.

5. A crane according to claim 3, said lines comprising two in number each having one end adapted for connection to said piece of cargo, and said winch means comprising a pair of winches each connected to the other end of one of said lines for selectively winding and unwinding its respective line.

6. A crane comprising a pair of upstanding open frames disposed in facing spaced relation, a pair of elevated parallel track rails extending between and fixedly secured to said frames interiorly and spaced below the upper ends thereof, at least one pair of adjacent rail ends projecting through and beyond one of said frames, a pair of trolleys each extending between said pair of rails and movable therealong, means for releasably locking said trolleys at any selected positions of their movement along said rails, a block depending from each of said trolleys and mounted on its respective trolley for movement therealong transverse of said rails, means for releasably fixing said blocks at any selected position of their movement relative to their respective trolleys, lines extending through said blocks for connection to a piece of cargo, winch means connected to said lines for selectively winding and unwinding the latter to move said piece of cargo between points substantially directly below said trolleys, and a flexible sheet covering said frames and extending over said projecting rail ends to shelter the working area of said crane without impeding movement of said cargo.

7. A crane according to claim 6, wherein the other pair of adjacent rail ends projects through and beyond the other one of said frames, said sheet extending over said other rail ends to shelter the working area therebelow without impeding movement of said cargo.

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