June 13, 1961 R. E. MOONEYHAN ET AL 2,988,036

BARGE CARGO SHIP

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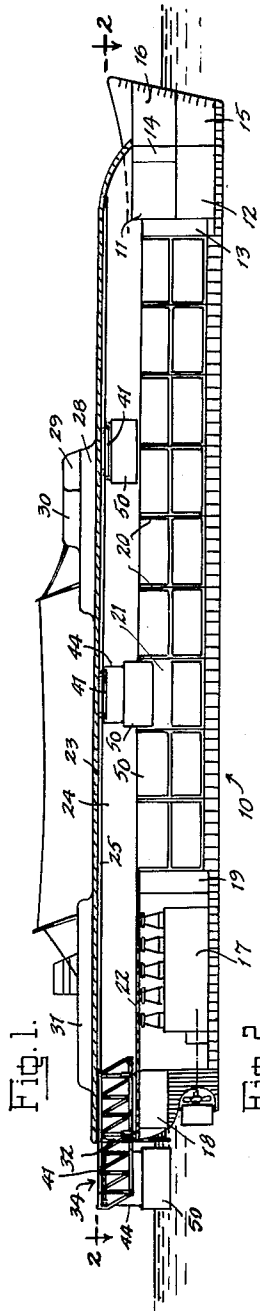

Fig. 1.

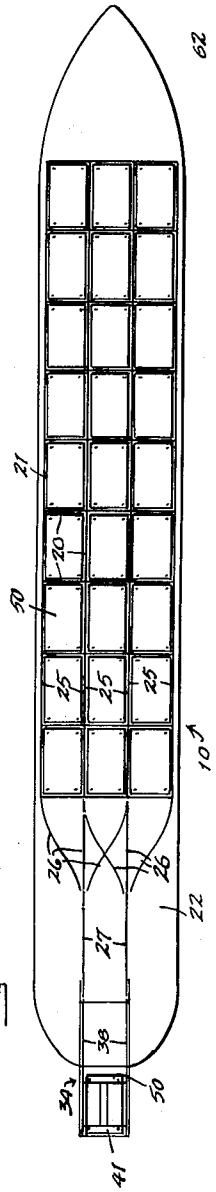

Fig. 2.

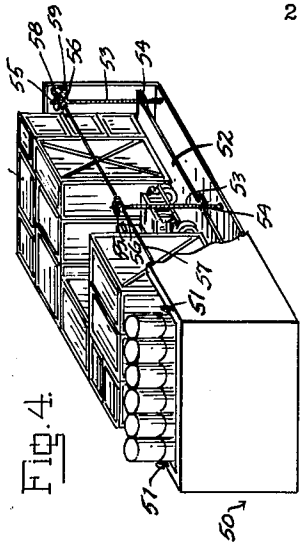

Fig. 4.

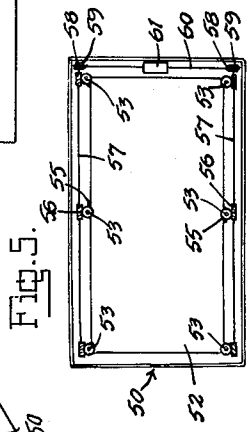

Fig. 5.

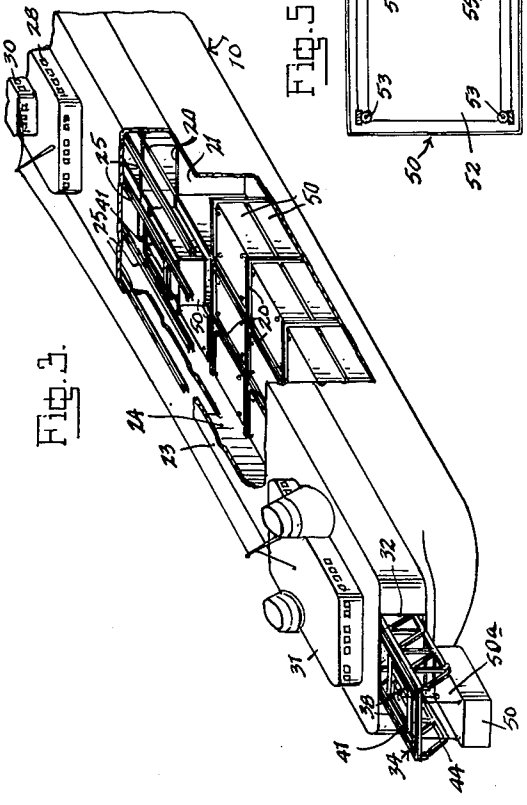

Fig. 3.

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BARGE CARGO SHIP

Filed Aug. 9, 1957 2 Sheets-Sheet 2

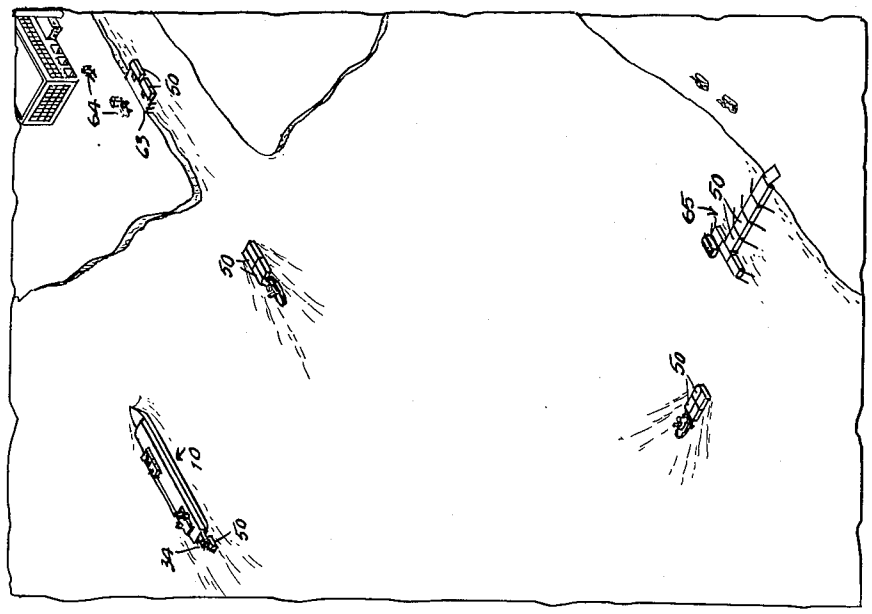

Fig. 11.

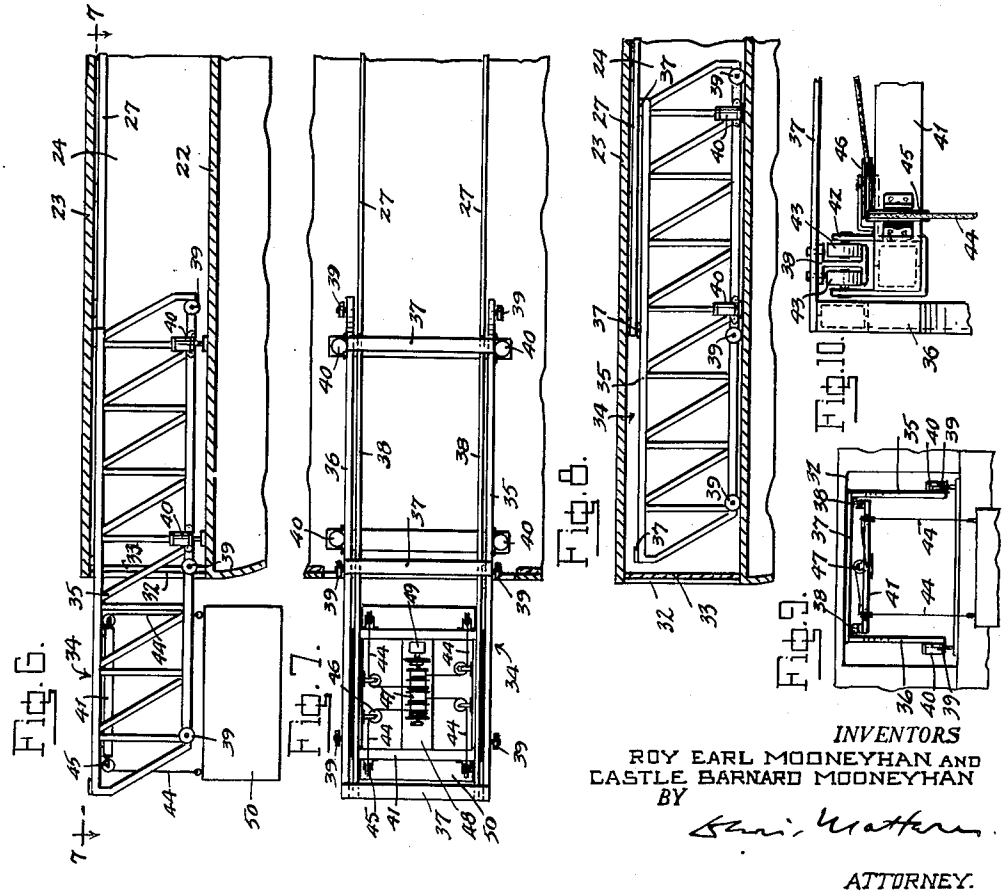

Fig. 6.

Fig. 7.

Fig. 8.

Fig. 10.

Fig. 9.

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BARGE CARGO SHIP

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4 Claims. (Cl. 114—72)

The present invention relates to a barge cargo ship, particularly for the transportation of a large number of cargo containing units in the form of floatable barges, an object of the invention being to provide an integrated arrangement of ship structure, barge units, and transfer facilities for loading and unloading the barge units, whereby the maximum cargo carrying capacity of the ship may be realized, and it becomes possible to efficiently load and unload the ship under widely varying conditions. In particular the invention makes possible the loading and unloading of the ship either at dock side or in open water, the floatable barge units being capable of being towed, as by tugs, between the ship and any shoreline or up-river point of supply or delivery.

A further object is to provide a barge cargo ship suited to the needs of both commercial and military use, it being possible in either case to transfer cargo under normal conditions, as well as in areas where harbor or dock facilities are non-existent or have been destroyed.

Another object is to provide a cargo barge ship in which the barge units may be selectively and independently transferred from the ship without regard to their location in the ship.

Other objects and advantages of the invention will become apparent from a consideration of the following detailed description taken in connection with the accompanying drawings wherein sitisfactory embodiments of the invention are shown. However, it is to be understood that the invention is not limited to the details disclosed but includes all such variations and modifications as fall within the spirit of the invention and the scope of the appended claims.

In the drawings:

FIG. 1 is a profile longitudinal cross sectional view of the barge cargo ship embodying the invention;

FIG. 2 is a diagrammatic sectional plan view taken along the line 2—2 of FIG. 1, and showing the overhead track layout;

FIG. 3 is a perspective view, partially broken away, showing the internal arrangement of the ship;

FIG. 4 is a perspective view of one of the cargo barges, partially broken away, and showing the elevator type inner bottom partially elevated and supporting cargo;

FIG. 5 is a diagrammatic plan view showing the elevating mechanism of the barge;

FIG. 6 is a vertical section view, on an enlarged scale, of the stern portion of the ship, and showing the barge handling rig in projected position;

FIG. 7 is a sectional plan view taken along the line 7—7 of FIG. 6;

FIG. 8 is a vertical section view similar to FIG. 6, and showing the barge handling rig in retracted position;

FIG. 9 is a rear elevation of the stern of the ship as seen from the left in FIG. 6;

FIG. 10 is a fragmentary enlarged detailed view showing the rolling connection of the crane with the elevated track;

FIG. 11 is a perspective view of a typical harbor area showing an example of unloading of the ship and the transportation of the cargo barges to various shore destinations.

Referring to the drawings, the barge cargo ship 10, according to the exemplary embodiment of the invention, has a substantially conventional hull structure of the type

commonly embodied in a self-propelled ocean-going tanker. In the bow section there are provided suitably arranged compartments, these being for instance fuel bunkers 11 and 12, fresh water tank 13, chain locker 14, fore peak tank 15, bosun's stores 16. The stern section is also provided with suitably arranged compartments, for instance an engine room 17, machine room 18, and fresh water tank 19.

Between the bow and stern sections the major portion of the hull is in the form of a hold divided by bulkhead partitions 20 extending longitudinally and transversely into a plurality of watertight compartments 21 for receiving the cargo barges, these compartments being open at their upper sides with their upper edges in a plane flush with a stern or ship end deck 22 extending over the engine room.

A superstructure 23 having a top wall or roof deck and longitudinal side walls extends over the barge reeiving compartments and the stern deck 22 to the stern of the ship and constitutes an enclosed barge transfer tunnel 24 extending substantially the full length of the ship, and which is adapted, as will presently more fully appear, for the transport of the cargo barge units to and from the compartments.

Upon the underside of the top wall of the transfer tunnel there are secured tracks 25 which extend longitudinally in parallel relation to the longitudinal side walls of the compartments and which are connected through suitable switches and convergent track sections 26 to a pair of centrally arranged tracks 27 provided above the stern deck 22. In the illustrated example of the invention the egg type crate arrangement of the barge receiving compartments provides three longitudinal rows of compartments and four tracks are provided above their side walls so that each row has a double overhead track extending along its sides for the transport of overhead barge carrying cranes moving through the tunnel, as will presently more fully appear.

In addition to providing an all-weather protection for the hold of the ship and a support for the transfer tracks, the transfer tunnel supports upon its top wall or roof deck quarters for the ship's company, these being illustrated as officers' quarters 28, wheel house 29, radio and chart room 30, and crew's quarters 31.

The stern end of the transfer tunnel has a door opening 32 which may normally be closed by a watertight door 33, as seen in FIG. 8, and within the stern end of the transfer tunnel there is provided a retractable barge handling rig 34, which normally is retracted within the ship, as seen in FIG. 8, and, when loading and unloading operations are in progress, is projected through the doorway, as seen in FIG. 6, to provide for the raising or lowering of the cargo barges, which are adapted to be floated into position at the stern of the ship beneath the projected rig.

The rig 34 is of conventional steel beam bridge construction, and consists of a pair of side members 35 and 36 connected at their upper sides by transverse beams 37, upon which there are supported a pair of tracks 38, adapted in the projected position of the rig to be aligned with the pair of tracks 27 so that they form a continuation theerof. Suitable rollers 39 are provided upon the sides 35 and 36 for convenient projecting and retracting movements of the rig upon the stern deck 23, and the height of the rig is such that it may be raised in the projected position as seen in FIG. 6 to align the tracks 38 with tracks 27, and may be lowered to engage the rollers 39 with the stern deck 23 and bring the tracks 38 into downwardly offset relation to the tracks 27 to allow the rig to be retracted to the position as seen in FIG. 8.

For the purpose of raising and lowering the rig hydraulic jacks 40 are provided at the outer sides of side

members 35 and 36, and in the projected position of the rig these serve to firmly engage the upper side of the rig against the under side of the top wall of the tunnel 24 to thus rigidly support the rig.

The transfer crane 41 is in the form of a rectangular frame suitably formed of steel beams, and is provided at its four corners with U-shaped hangers 42 each of which is provided at its upper end with a pair of rollers 43 adapted to engage the track. The track is of I-beam form in cross section, so that the rollers rest upon its lower horizontal section at each side of its vertical section.

Also at each of the four corners there is provided a suspension cable 44 for connection to a corner of a cargo barge, as will presently more fully appear, each of these cables being carried over pulleys 45 and 46 to a common winding drum 47 supported upon a centrally disposed platform section 48 of the crane, and which may be either manually operated or driven through suitable gearing by an electric motor 49 or other suitable motive power.

The floatable barge 50 is of rectangular box like form open at its upper side, and is adapted to have its open upper side normally closed by a watertight cover 50*a*. Suitable eye-bolts or the like 51 are provided at the four corners for attachment of the cables 44 of the transfer crane 14. Preferably the barge is provided with an inner bottom 52 provided with suitable elevating mechanism, this mechanism being illustrated as a plurality of vertical screws 53 respectively engaged with suitable nuts 54 of the inner bottom, and respectively provided at their upper ends with worm gears 55 engaged by a series of worms 56 provided upon a pair of longitudinally extending shafts 57 arranged along the longitudinal sides of the barge. The shafts 57 are respectively provided at one end with worm gears 58 engaged by worms 59 provided upon the ends of a drive shaft 60 extending transversely at one end of the barge, this shaft being driven either by a suitable motor 61 or by manual means.

In operation, the elevating screws are turned simultaneously and equally to raise or lower the inner bottom 52. When loading or unloading the inner bottom is raised so that it is substantially flush with the upper side of the barge and the cargo 62 may be loaded or unloaded by fork lift trucks or other suitable means. As shown in FIG. 11 at the upper right hand corner the barges are tied to a dock 63, and fork lift trucks 64 are shown in the process of transporting cargo to or from the barges. It will be understood that other methods of loading and unloading the cargo may be resorted to and the cargo barges may under certain circumstances be transported from the water to suitable transportation vehicles for transport over land. Also the cargo barges may be adapted for amphibious use by providing them with retractable wheels so that they are capable of being either floated on water or rolled over land.

In military usage the barges may be suitably decked to form portable landing piers by coupling together and anchoring as shown at 65 in FIG. 11. After an attack, salvage and re-installation can be completed within a few hours. The easy transfer of the piers and the cargo carrying utility of the barges enable supply lines to be short as possible at all times.

In the operation of loading the ship the cargo barges are propelled by tugs to a position beneath the projected rig 34; the cables 44 are connected, and the crane 41 is operated to elevate the barge from the water into line with the transfer tunnel, whereupon the crane is moved along the tracks and through the switch tracks 26 is propelled along the desired row of barge receiving compartments where the crane lowers the barge into its particular compartment. It will be understood that the crane may be propelled by any suitable means, such for instance as a self-carried motor drive, capstans, chains or belts, and the like.

In the illustration two barges are fitted into each compartment. However, it will be understood that under certain requirements a single barge may be designed to fit one compartment, while under certain other requirements more than two barges may be fitted into one compartment. The several track ways extending respectively over the several rows of barge receiving compartments enables the use of several cranes, so while one crane is operating at the rig, the other cranes may be moving to and fro along the several rows of compartments. A particular advantage of the overhead tunnel is that a barge may be transferred to or from any one of the compartments without interference with or the necessity for moving other loaded barges to make way for the barge being transferred.

What is claimed is:

1. In a ship for transporting a plurality of cargo containers, each of predetermined maximum width, a hold open at its upper side and extending longitudinally for a substantial part of the ship's length and partitioned to provide a plurality of longitudinally extending parallel hold spaces, each adapted to receive a longitudinally arranged row of said cargo containers, a ship end deck at one end of said hold substantially flush with the open upper side of said hold, a superstructure having side walls and a roof deck spanning said side walls and defining a transfer tunnel longitudinally overlying said hold and said ship end deck; overhead suspension trackway means supported upon the underside of said roof deck within said tunnel comprising a plurality of longitudinally extending parallel trackways respectively above and coextensive with said plurality of longitudinally extending parallel hold spaces, a longitudinally extending single trackway above said ship end deck having its inner end toward said hold, switch trackways above said ship end deck connecting said inner end of said single trackway to said plurality of trackways, and switch means operable to connect said single trackway through a selected switch trackway to a selected one of said plurality of parallel trackways; and transfer crane means comprising a frame having rollers engaging said trackway means for to and fro transfer movement of said frame through said tunnel, suspension means carried by said frame and connectable to a cargo container to suspend said cargo container from said frame during said to and fro transfer movement through said tunnel, and means for raising and lowering said suspension means to raise and lower said cargo container with respect to said ship end deck and with respect to said hold whereby said cargo container can be positioned at any given point longitudinally of said hold spaces.

2. The invention as defined in claim 1, further characterized by trackway means constituting a longitudinal continuation of said single trackway extending outboard of said ship end deck.

3. In a ship for transporting a plurality of cargo containers, each of predetermined maximum width, a hold open at its upper side and extending longitudinally for a substantial part of the ship's length and partitioned to provide a plurality of longitudinally extending parallel hold spaces, each adapted to receive a longitudinally arranged row of said cargo containers, a ship end deck at one end of said hold substantially flush with the open upper side of said hold, a superstructure having side walls and a roof deck spanning said side walls and defining a transfer tunnel longitudinally overlying said hold and said ship end deck; overhead suspension trackway means supported upon the underside of said roof deck within said tunnel comprising a plurality of longitudinally extending parallel trackways respectively above and coextensive with said plurality of longitudinally extending parallel hold spaces, a longitudinally extending single trackway above said ship end deck having its inner end toward said hold, switch trackways above said ship end

deck connecting said inner end of said single trackway to said plurality of trackways, and switch means operable to connect said single trackway through a selected switch trackway to a selected one of said plurality of parallel trackways; transfer crane means comprising a frame having rollers engaging said trackway means for to and fro transfer movement of said frame through said tunnel, suspension means carried by said frame and connectable to a cargo container to suspend said cargo container from said frame during said to and fro transfer movement through said tunnel, and means for raising and lowering said suspension means to raise and lower said cargo container with respect to said ship end deck and with respect to said hold; a cargo container handling rig longitudinally movable within said tunnel above said ship end deck to retract it entirely within said tunnel and to project it partially outboard from said ship end deck, and a longitudinally extending trackway carried by said rig adapted to provide an outboard continuation of said single trackway.

4. The invention as defined in claim 3, wherein said rig is vertically movable within said tunnel to align its trackway with said single trackway in its projected position and to downwardly offset its trackway with respect to said single trackway to permit its retraction beneath said single trackway.

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