July 11, 1967 G. H. HUBBARD 3,330,427

BARGE LOADING CRANE AND METHOD

Filed April 23, 1965 3 Sheets-Sheet 1

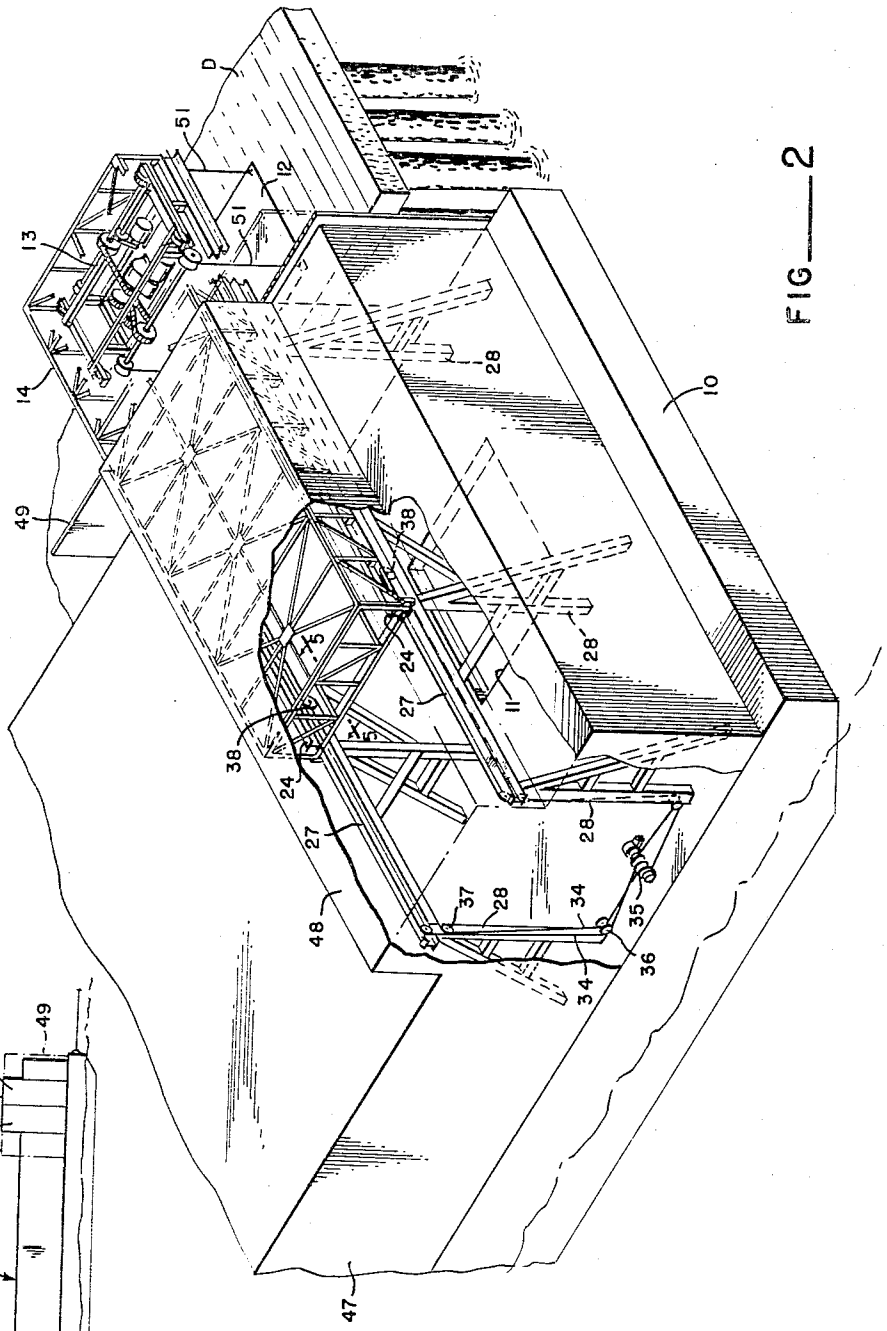

FIG. 2

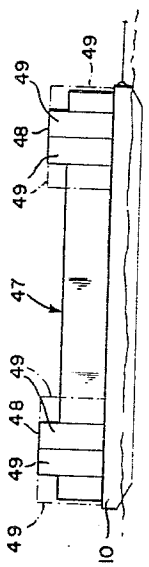

FIG. 1

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July 11, 1967 G. H. HUBBARD 3,330,427

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Filed April 23, 1965 3 Sheets-Sheet 2

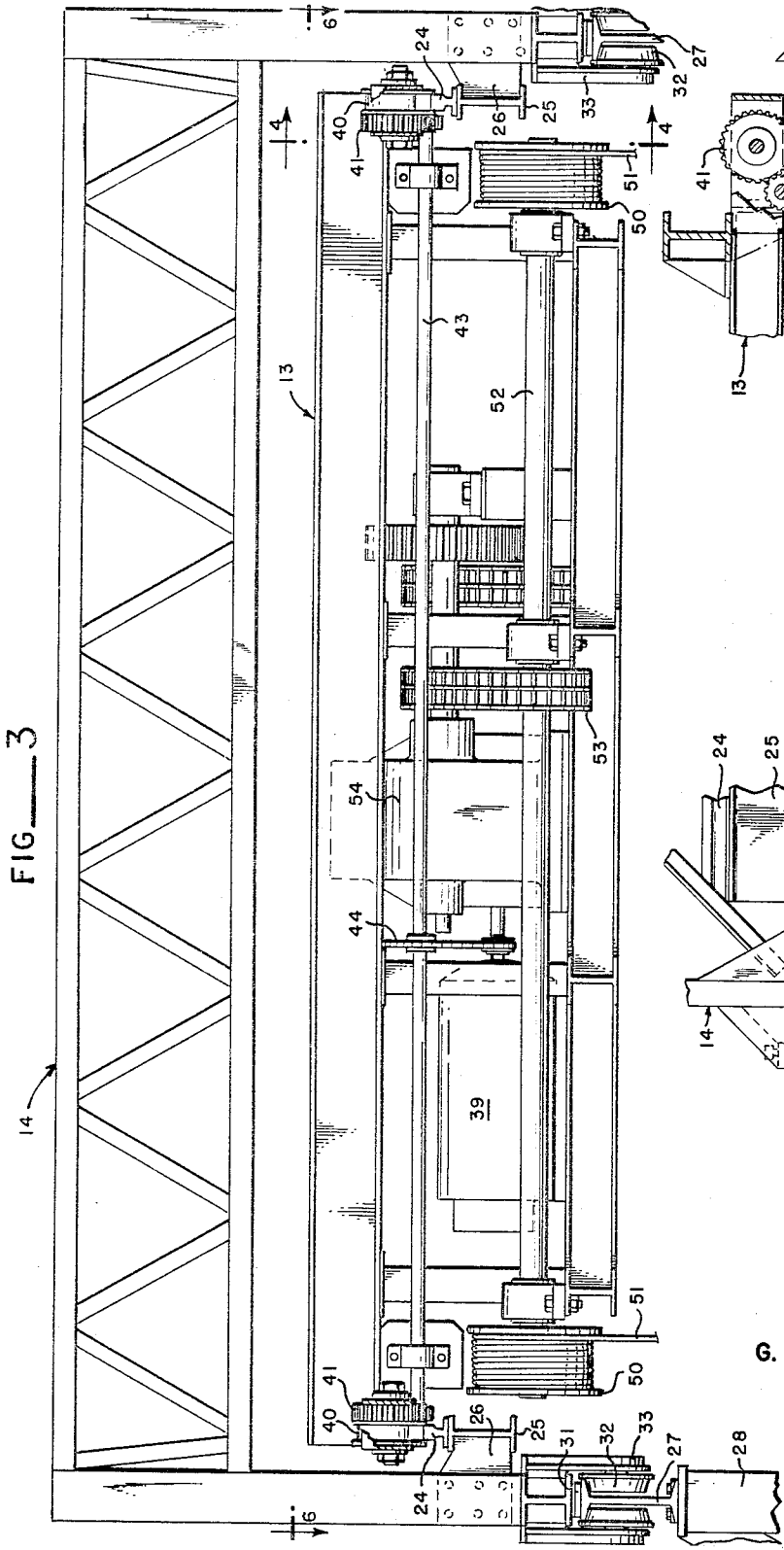

FIG. 3

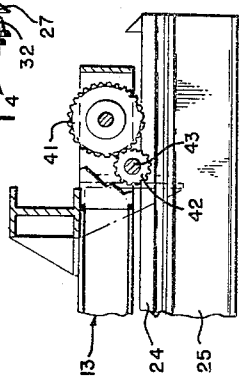

FIG. 4

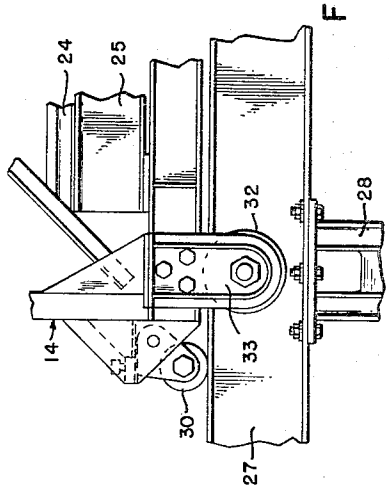

FIG. 5

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BARGE LOADING CRANE AND METHOD

Filed April 23, 1965 3 Sheets-Sheet 3

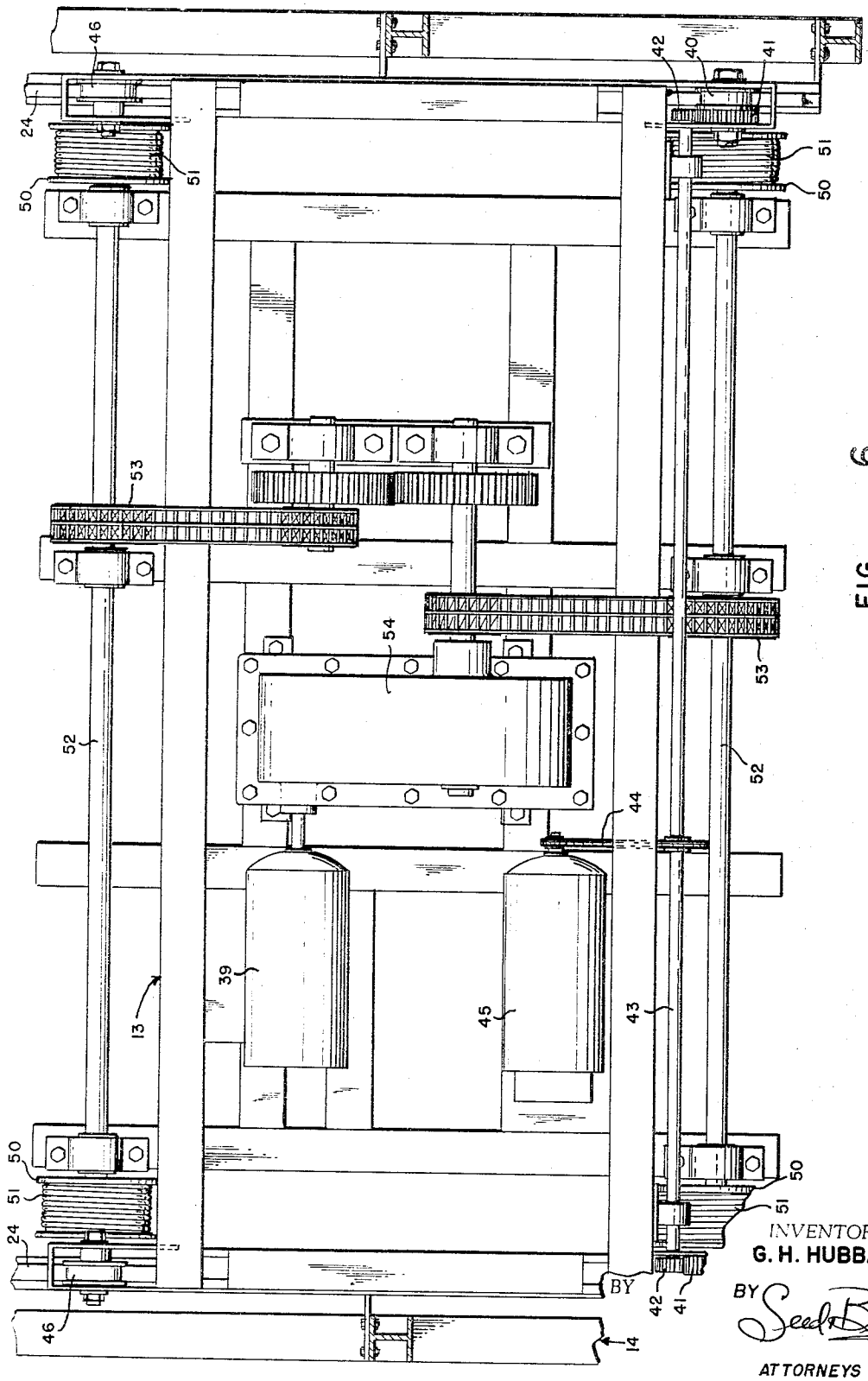

FIG. 6

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BARGE LOADING CRANE AND METHOD

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3 Claims. (Cl. 214—15)

This invention relates to barges of the type which carry general cargo. The object of the invention is to provide a barge having a built-in crane or cranes of the hammerhead type, allowing cargo to be moved on and off the barge with unusual ease and expedition and making the barge self-sufficient to speedily move cargo regardless of the facilities which any given port may offer.

This and other more particular objects and advantages of the invention will appear and be understood in the course of the following description and claims, the invention consisting in the novel construction and in the adaptation and combination of parts hereinafter described and claimed.

In the accompanying drawings:

FIGURE 1 is a small-scale elevational view showing a barge constructed according to the present invention.

FIG. 2 is a fragmentary perspective view thereof drawn to a larger scale and showing the barge in the process of moving cargo to or from a dock alongside which it is berthed.

FIG. 3 is a fragmentary front elevational view drawn to a yet larger scale on line 3—3 of FIG. 6.

FIGS. 4 and 5 are fragmentary longitudinal vertical sectional views on lines 4—4 of FIG. 3 and 5—5 of FIG. 2, respectively, and using the scale of FIG. 3 in both instances; and

FIG. 6 is a fragmentary horizontal sectional view on line 6—6 of FIG. 3.

Referring to said drawings, the reference numeral **10**, denotes a barge of the type having hatches **11** giving access to a hold. The hold is commonly divided into several cargo compartments, and there is usually a hatch or hatches at each of the two ends. The barge of the present invention provides hatches of rectangular plan configuration of a size, say 10' x 14', which will freely accommodate a large portable platform **12**, say 8' in width and 12' in length. This platform, or pallet as it will be hereinafter termed, is suspended from a carriage **13** mounted to track along the length of the jib **14** of a hammerhead crane. Said crane with its jib **14** and the carriage **13** are a permanent adjunct of the barge. Where the cargo compartments are loaded from both ends of the barge there are two of said cranes, each locating its jib in overhead relation to the deck of the barge for tracking movement transversely of the barge along a path placing the longitudinal median line of the jib in a vertical plane extending transversely of the barge on the approximate median line of a related loading hatch **11**.

The jib has a length only moderately shorter than the transverse width of the barge. The movement to which the jib admits is somewhat less than half its length, say a ratio of 2 to 5. Structurally considered, the jib is in the nature of an open-bottom box having its side and end walls comprised of truss beams and also employing truss work for the top wall. Respective track rails **24** extend the length of the jib placed to the inside and parallel with each side wall along the bottom edge thereof. The track rails are made integral with underlying I-beams **25** which are supported from the trussed side walls of the jib by arms **26**. The jib, for its guided slide movement, rides on horizontal I-beam rails **27**. The I-beam rails, one for each of the two sides of the jib, surmount scaffolds comprised of a row of braced pedestals **28** footing upon the deck of the barge and made rigid therewith. The hatch **11** is

centered between these rows of pedestals. Bearing engagement, as between the jib and its track, is afforded at the inner end of the jib by a roller **30** and at the other end by a slipper shoe **31**. The slipper shoes are carried upon the underside of the I-beams **25** and extend from the outer end of the jib for a distance moderately exceeding the length of the jib's permitted travel. Each roller **30** and slipper shoe **31** is complemented by a respective pair of non-rise wheels **32** carried by hanger plates **33** to occupy positions in rolling contact with the underside of the upper flanges of the rail, one at one side and the other at the other side of the web of the rail. Flanges on the non-rise wheels hold the jib against lateral displacement.

For the powered movement of the jib between two limits of slide movement, each prescribed by a stop (not shown), there is provided for each of the two sides of the jib two oppositely moving cables **34** trained from deck-mounted spooling drums **35**. The cables pass from the spooling drums over a lower set of sheaves **36**, thence over an upper set of sheaves **37**, and from these latter sheaves extend one directly to the inner end of the jib and the other looped over a sheave **38** before returning upon itself to said inner end of the jib. The extremities of the two cables are each deadened to the jib.

Reverting to the carriage **13**, the same has a rectangular plan configuration much the same size as the pallet **12** and has its tracking wheels mounted at each of the four corners. The two tracking wheels **40** which lie at the outer end of the carriage are each fixed to one end of a respective live axle. A respective gear wheel **41** is fixed to the other end of each axle. In mesh with these gear wheels are pinions **42** driven from a cross-shaft **43** powered by a chain **44** from a reversible electric motor **45**. The two tracking wheels **46** which lie at the inner end of the carriage are or may be idlers. Such wheels **40** and **41** are flanged to hold the carriage against lateral displacement.

Also provided by the carriage at each of the four corners is a respective spooling drum **50**. Cables **51** run from the spooling drums to the four corners of the pallet. Cross-shafts **52** carry the spooling drums. The shafts are driven in opposite directions at a corresponding speed by chains **53** powered from the output end of a train of reduction gears housed in a gear box **54**. The armature shaft of a reversible electric motor **39** powers the input end of the reduction gear train.

The deck of the barge is completely covered by a house **47**. Other than for bonnets **48** which rise above the roof proper and contain the jib **14** and carriage **13** of a respective crane, the roof of the house is located at or about the level of the I-beam rails **27**. In one side wall of the house a respective opening is provided for each crane. These openings are of a width sufficient to accommodate the jib **14** and the pallet **12**, and are unobstructed between the deck of the barge and the ceiling of the concerned bonnet **48**. Doors **49**, swing-mounted by preference, normally close the openings. Excepting for door-ways allowing convenient movement by the crew when the barge is being berthed, or under way between ports, the other side wall and the end walls of the house are solid.

I have described the box body of the jib as having an open bottom. This is technically incorrect from the fact that I provide a cat-walk (not shown) extending the full length of the jib on the substantial longitudinal median line thereof. This cat-walk, which is for servicing purposes, underlies the travel path of the carriage and receives terminal support from cross-members which extend between the I-beams **25** at the two ends thereof. Longitudinal slots, unobstructed between the cross-members which support the cat-walk, are defined at each side of the cat-walk to accommodate the cables **51** as the carriage moves between its two limits of horizontal travel.

The ease with which loads may be moved between the barge and a dock D alongside which the barge is berthed will be apparent from an inspection of FIG. 1. The crane, and its pallet, have been presently engineered to give the pallet an 8-ton load capability. The desirable procedure is to load a fork truck, drive the loaded truck onto the pallet, carry the loaded truck from dock to barge or from barge to dock, as the case may be, and then drive the fork truck off the pallet for unloading. Fork trucks are carried by the barge as a part of its equipment so that loads may be moved with expedition to or from docks which either do not have fork trucks or the trucks available are in poor repair.

By way of comparison it can be pointed out that I have been enabled to unload 4000 tons of baled pulp and rolls of newsprint from a barge equipped with two of my cranes in 13½ hours. The same load, worked by power equipment in the previously accepted manner, requires in the neighborhood of 40 hours.

No limitations are to be implied from the foregoing detailed description of my now-preferred illustrated embodiment, it being my intention that the hereto annexed claims be given the broadest interpretation to which the employed language fairly admits.

What I claim is:

1. In combination with a barge providing a hatch in its deck giving access to a cargo hold, a load-handling hammerhead crane therefor comprising: a pair of permanent trestleworks rising from the deck of the barge in vertical planes which are transverse to the barge one located fore and the other located aft of the hatch, said trestleworks extending approximately the full width of the deck, a respective one of two parallel rails surmounting each of said trestleworks, a crane jib supported by said rails for reciprocal horizontal movement between a retracted position whereat the two ends of the jib lie between the side edges of the barge and an extended operating position in which an end of the jib projects beyond one of said side edges so as to overhang a dock alongside which the barge is moored, a carriage supported by the jib for reciprocal movement endwise thereto between inner and outer ends of the jib, a pallet suspended from the carriage, and power-operated means for raising and lowering the pallet, for shifting the carriage in its endwise movement, and for extending and retracting the jib, the path travelled by the pallet as the carriage moves relative to the jib coinciding with the transverse median line of the hatch, the pallet being of a size such that an industrial fork-lift truck can be driven thereon, the hatch allowing said pallet, with the truck thereon, to pass freely therethrough when the pallet is brought into registration with the hatch so that loads may be moved between barge and dock to any given point of stowing destination with no more than terminal handling, the barge having a house thereon protecting deck cargo and the crane by side and end walls and a covering roof, at least one of the side walls having an opening accommodating said extension of the jib and the horizontal movement of the pallet as the same travels with the carriage, the house including a bonnet which overlies the crane, the level of the roof other than for said bonnet approximately coinciding with the horizontal plane occupied by said rails which surmount the trestleworks.

2. The combination of a barge providing a hatch in its deck giving access to a cargo hold, and a load-handling hammerhead crane therefor comprising: a jib, a framework made a permanent part of the barge and supporting the jib for transverse movement in a plane elevated above the deck between a retracted position whereat the jib is wholly contained between the side edges of the barge and an extended position in which an end of the jib projects beyond one of said side edges so as to overhang a dock alongside which the barge is moored, a carriage supported by the jib for reciprocal movement endwise thereto between inner and outer ends of the jib, a pallet suspended from the carriage, and power-operated means for raising and lowering the pallet, for shifting the carriage in its endwise movement, and for extending and retracting the jib, the path travelled by the pallet as the carriage moves relative to the jib coinciding with the transverse median line of the hatch, the pallet being of a size such that an industrial fork-lift truck can be driven thereon, the hatch allowing said pallet, with the truck thereon, to pass freely therethrough when the pallet is brought into registration with the hatch so that loads may be moved between barge and dock to any given point of stowing destination with no more than terminal handling, the barge having a house thereon protecting deck cargo and the crane by side and end walls and a covering roof, at least one of the side walls having an opening accommodating said extension of the jib and the horizontal movement of the pallet as the same travels with the carriage, the house including a bonnet which overlies the crane, the level of the roof other than for said bonnet approximately coinciding with the horizontal plane occupied by said rails which surmount the trestleworks.

3. The method of loading and unloading cargo to and from a sea-going barge having a cargo hold accessible through a hatch, comprising erecting upon the barge as a permanent part thereof a hammerhead crane having as its head component a reciprocally movable jib elevated a substantial distance above the deck of the barge and mounted for movement transversely of the barge between an extended position in which an end thereof projects a substantial distance outboard from the barge and a retracted position in which said jib lies within the side limits of the barge and overlies very nearly the entire width thereof, mounting upon the jib for reciprocal horizontal movement along the underside thereof and endwise to the jib's length in a travel path which coincides with the transverse median line of the hatch a carriage having suspended for vertical movement therefrom a pallet of a size which will accommodate an industrial fork-lift truck thereon and allow free movement of said pallet and truck through the hatch upon being brought into registration with the hatch, and while the barge is moored alongside a dock, incident to taking cargo either on or off the barge, employing the crane to transport the pallet, with the truck thereon, between the cargo hold and the dock, the loaded truck being driven onto the pallet before, and off the pallet after, said transfer is made so that the load can be moved to any given point of stowing destination with no more than terminal handling.

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