United States Patent [19]

Whitehouse

[11] **3,844,240**

[45] **Oct. 29, 1974**

[54] **BOW LIQUID CARGO HANDLING SYSTEM**

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[22] Filed: **Nov. 17, 1972**

[21] Appl. No.: **307,751**

[30] **Foreign Application Priority Data**

Mar. 20, 1972 Great Britain 12929/72

[52] **U.S. Cl.** ..... **114/74 R,** 9/8 P, 114/230, 141/387

[51] **Int. Cl.** **B63b 25/08,** B63b 21/00

[58] **Field of Search** ..... 114/72, 73, 74, 230, .5 D, 114/.5 T; 137/615, 236, 344; 214/12–15; 9/8 P; 141/387, 388

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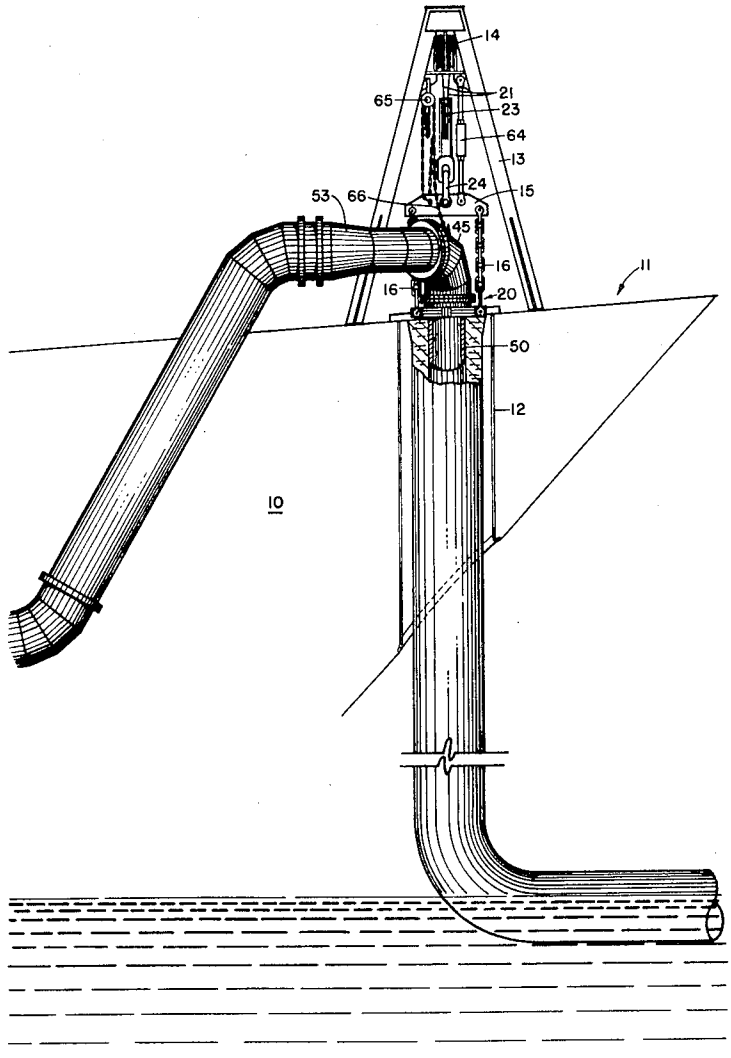
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Attorney, Agent, or Firm—William J. Miller

[57] **ABSTRACT**

A tanker bow products line handling system is adapted for connection to a mooring products line floating in the water. The bow products line includes a vertical opening in the bow of the tanker and has a winch mounted over the opening with proper handling equipment connected to the winch. The ship's bow products line terminates at the opening. The ship also has means for connecting from the ship to the products line floating in the water and for pulling the products line aboard ship through the opening for connection to the ship's products line.

9 Claims, 7 Drawing Figures



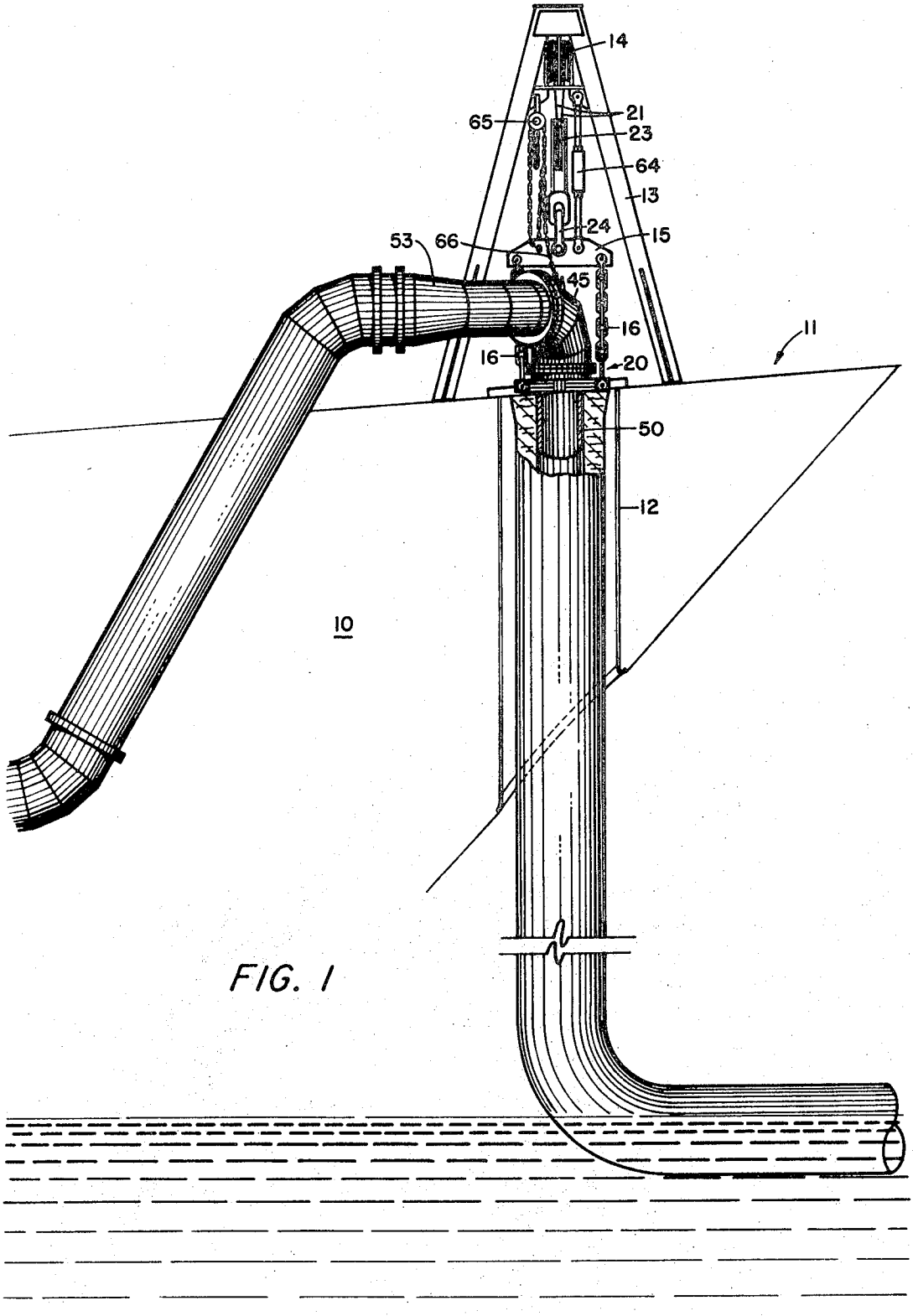


FIG. 1

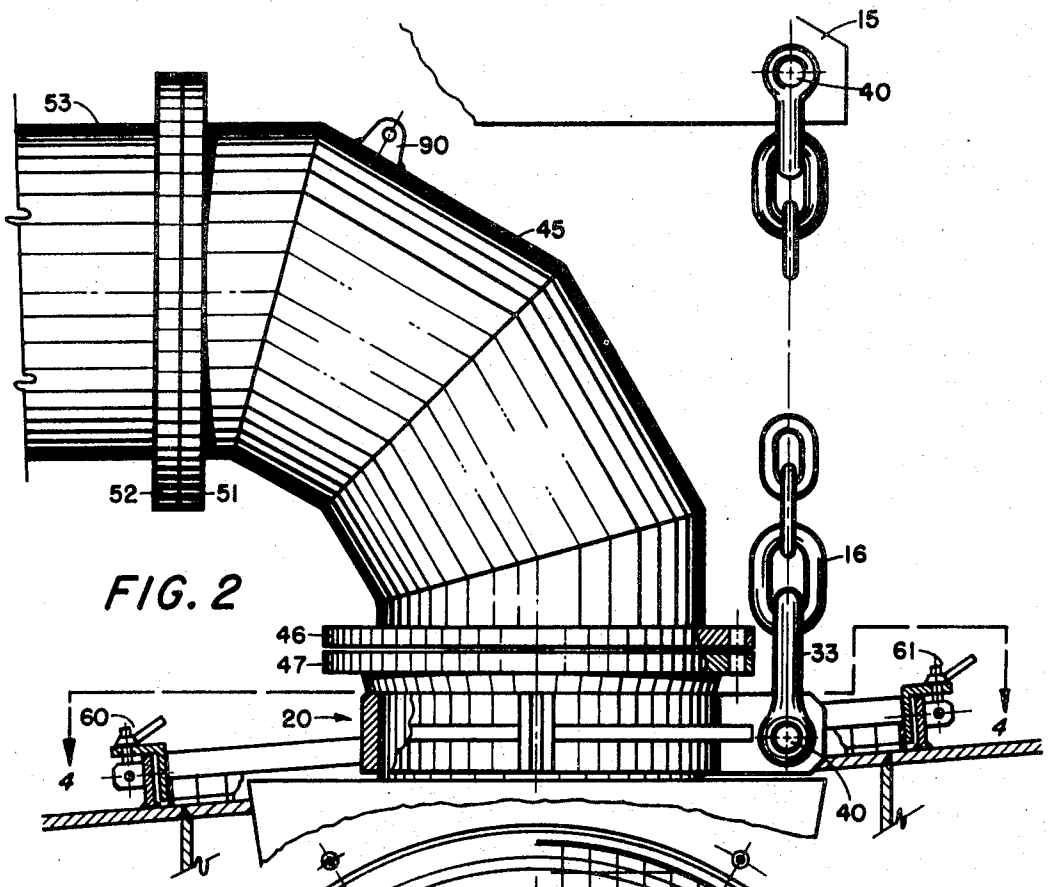


FIG. 2

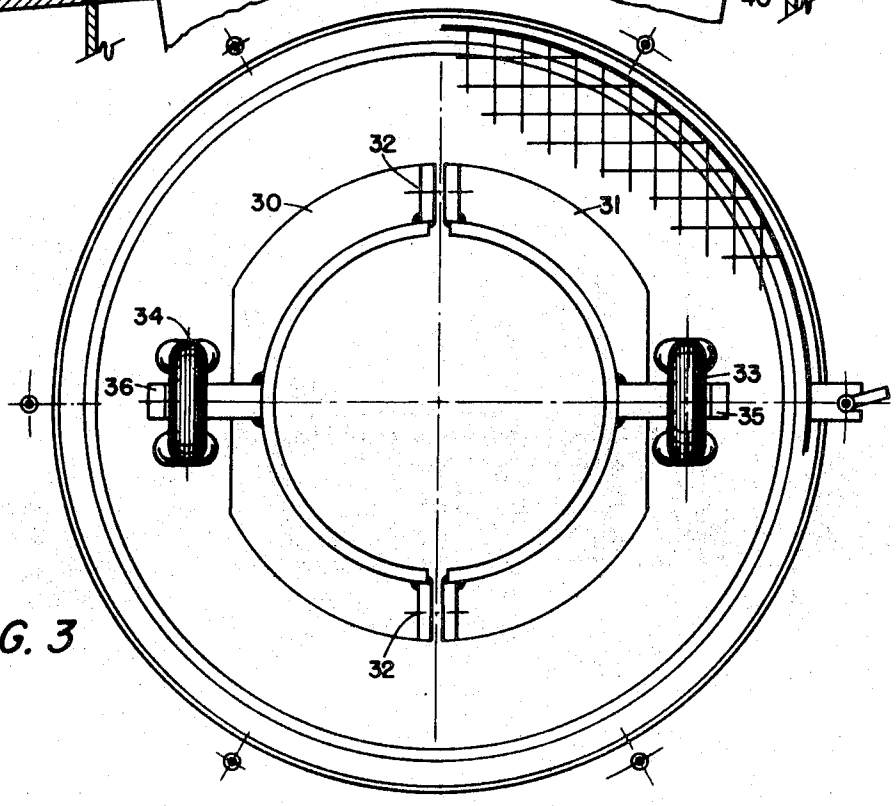


FIG. 3

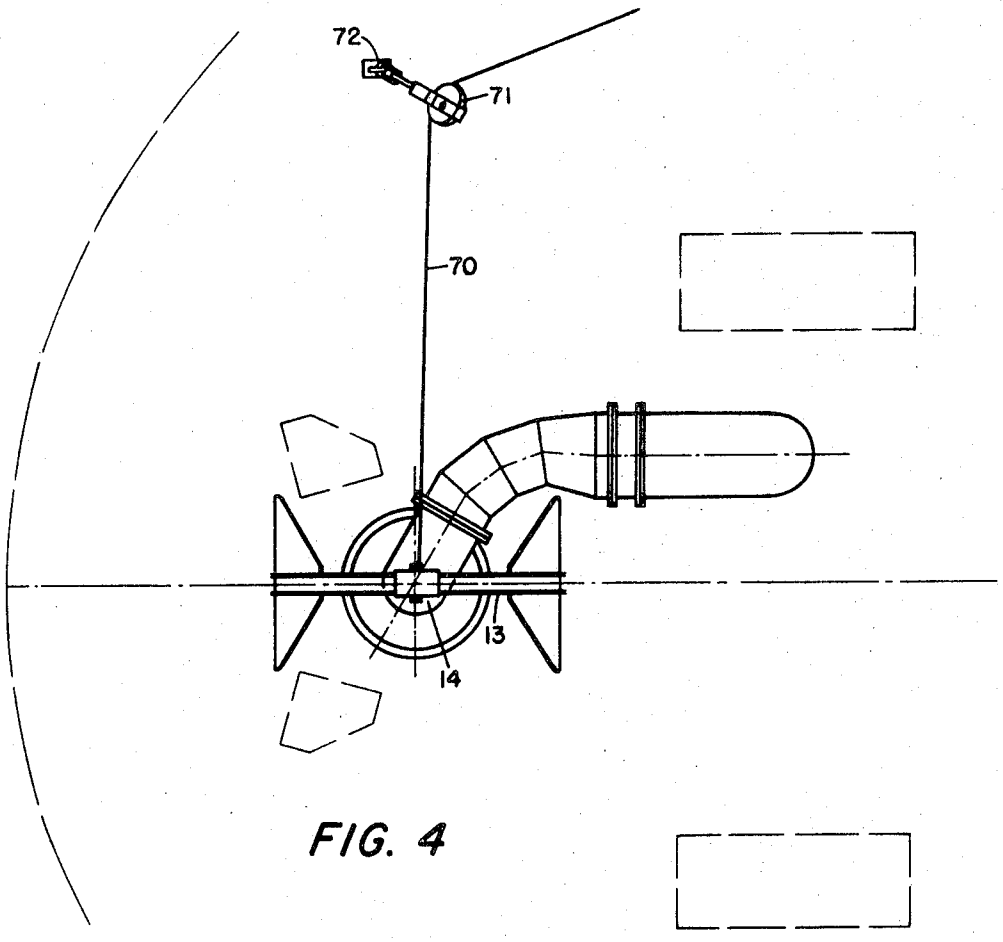


FIG. 4

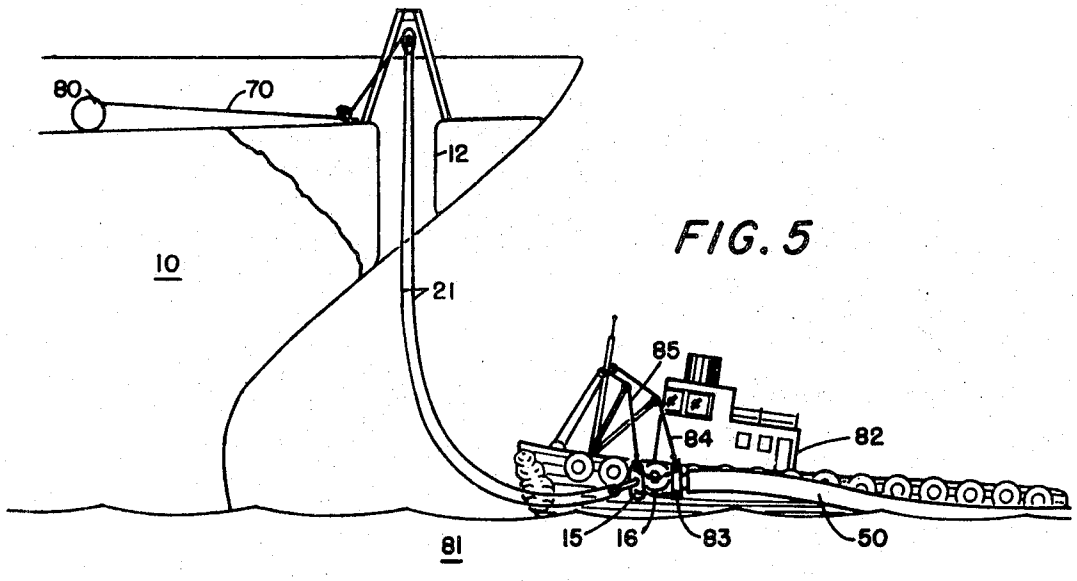


FIG. 5

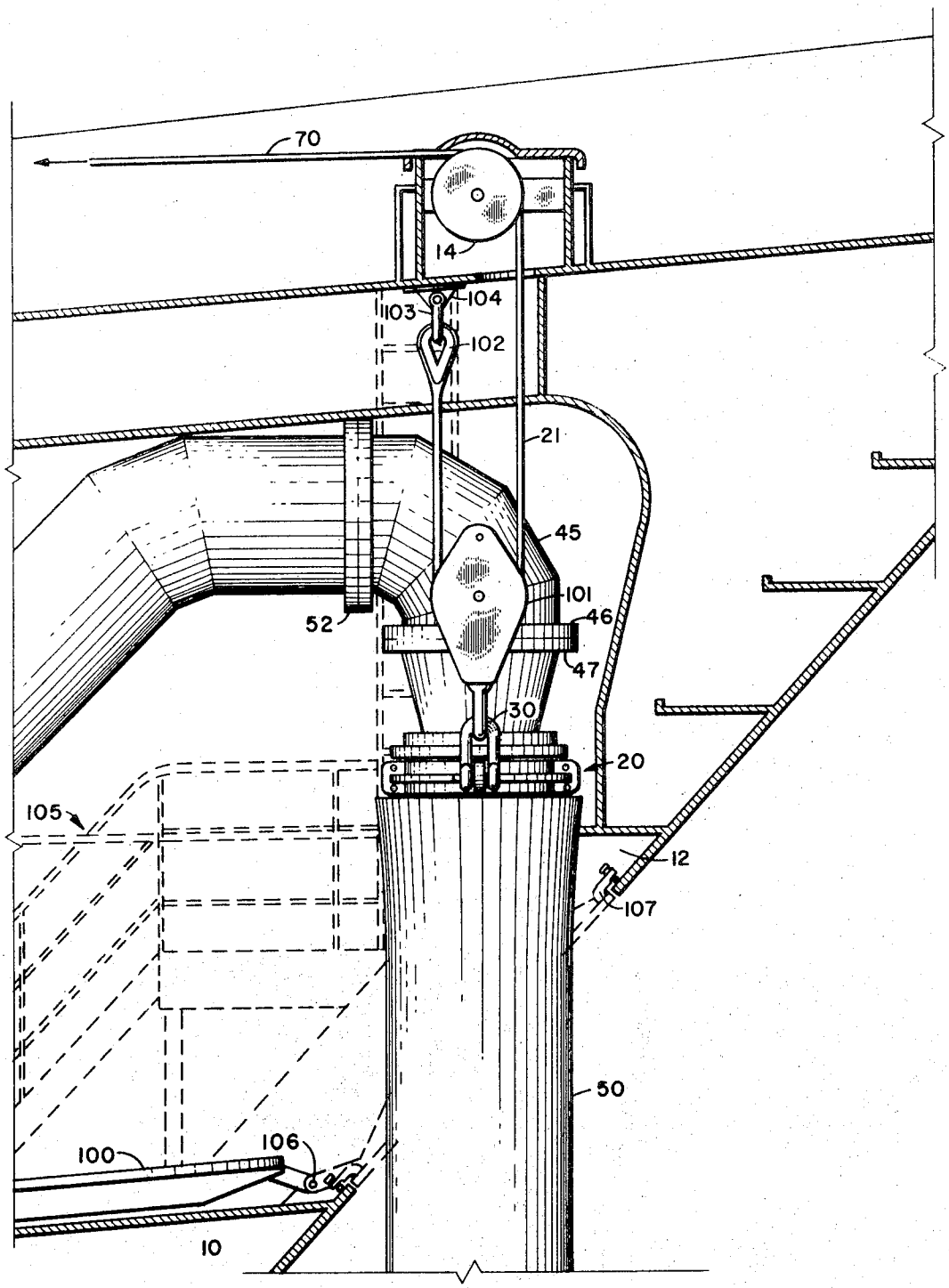


FIG. 6

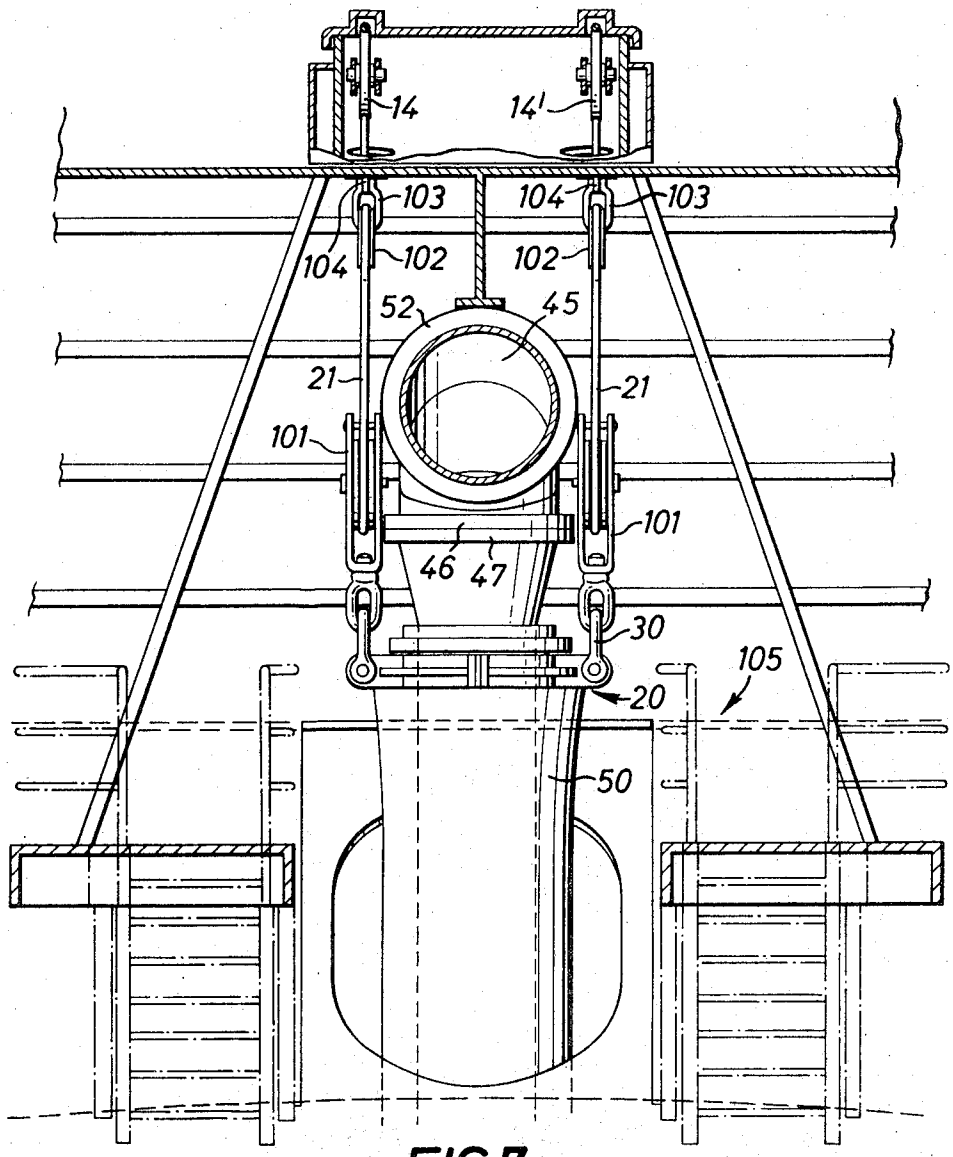


FIG. 7

BOW LIQUID CARGO HANDLING SYSTEM

BRIEF DESCRIPTION OF THE INVENTION

This invention relates to a system for loading or discharging cargo through the bow of a tanker at a single location rather than loading or unloading the cargo at manifolds located in the midship area.

This invention will reduce the time required to connect and disconnect loading lines.

This invention will also result in a substantial reduction in the length of the cargo hoses when the ship is loading or discharging from a monomooring facility. The shorter hoses will result in a substantial reduction in investment and also drastically reduce the possibility of damage caused by ships near the installation cutting into or damaging the hose and the additional length being subjected to additional wear and tear by the tankers as they come alongside.

These and other objects of this invention will become apparent by referring to the drawings wherein:

FIG. 1 is a partial cross-sectional view of the bow of a ship showing the hose from the monomooring connected to the fluid handling system on the ship;

FIG. 2 is a partial cross-sectional view of the mechanism used to hold the hose after it is brought aboard ship and also shows in full view the elbow used to connect the end of the hose to the ship fluid handling system;

FIG. 3 is a top view taken through lines 4—4 of FIG. 2;

FIG. 4 is a top view of the apparatus shown in FIG. 1;

FIG. 5 is a side view of the system in the process of connecting the pulling mechanism to the monomooring products line terminus;

FIG. 6 is a side view in partial cross-section of an inboard bow loading system; and

FIG. 7 is a rear view of the picture shown in FIG. 5.

Referring to FIGS. 1 through 5, the preferred embodiment of this invention is illustrated.

For the sake of clarity, the same numbers will be used throughout the specification for similar parts.

In order to fully appreciate the invention, a knowledge of monomooring terminal operation is necessary. A brief description of the system usually consists of a floating surface which is large enough to house the operating personnel for the terminal. The platform contains the necessary lights, foghorn apparatus, radio equipment, etc. Since the platform is floating, it is anchored by several chains and anchor system to the bed of the body of water. A products line connects the onshore facility with the monomooring terminal. The portion of the products line which is subjected to wave action is made of flexible material. The outlet of the ship to mooring products line is mounted on the top of the platform, usually centrally, by a swivel connection, thereby permitting free movement of the line about 360°. The platform also contains means for anchoring or securing the ship from its bow to the platform by chains, cables or other usual means. Thus the stern of the ship is normally free to swing with the wind and water currents reducing the anchoring forces necessary to hold the ship and monomooring in position. The hose or products line between the ship and the mooring is made of flexible hose of suitable diameter, covered externally with a flotation material such as plastic to

permit the hose to float throughout its length in the water. An end cap is provided for the terminus of the hose to prevent entry of water into the products line and to prevent escape of oil into the environment resulting in pollution.

A ship generally referred to as **10** has a bow **11** having a centrally and vertically located tube **12** mounted therethrough. Mounted above the tube is an "A" frame structure **13** having a pair of pulleys **14** and **14'** mounted at its apex. A yoke **15** has connected thereto chains **16** which connect between each end of yoke **15** and a stopper piece generally referred to by the number **20.**

A wire cable **21** passes from a drum of a double-barreled winch (not shown) over pulley **14,** around pulley **23,** over pulley **14,** and to the remaining drum. The frame of pulley **23** is connected through a shackle **24** to the center of yoke **15.** A stopper piece **20** (see FIG. **3**) comprises a pair of 180° rings **30** and **31** which bolt together at **32** to form a continuous ring. Stopper piece **20** is secured in place by means of clamps **60** and **61.** These clamps rigidly secure the pipe **50** to the ship bow **11** during the on-loading or off-loading of cargo. The above provides a means for preventing pollution since the pipe cannot come loose from the ship by accident.

Shackles **33** and **34** connect to arms **35** and **36,** respectively, of ring portions **30** and **31.** As seen in FIG. **2,** a shackle **33** connects a pair of chains **16** and **16'** to yoke **15** through a pair of pivots **40.** Shackle **34** connects to chain **16'** and to yoke **15** in a similar manner.

Referring to FIGS. **1** through **3,** an elbow **45** is attached through a flange **46** to a flange **47** which is connected to the end of a 24-inch hose **50.** The other end of elbow **45** is connected through a flange **51** to flange **52** which is attached to the products line **53** of ship **10.**

The flanges in all cases can be connected by means of bolts or other suitable means. It is also contemplated that hydraulic clamping systems already known in the art can be incorporated whenever the mechanical joints are mated where space will permit their installation.

A hand lift system comprising a chain hoist **65** (see FIG. **1**) permits a lifting means through chain **66** for placing or removing elbow **45.**

A turnbuckle **64** removes the tension from pulley **14** after the system is completely connected.

A top view of the system shown in FIGS. **1** through **3** is illustrated in FIG. **4** and further describes the wire cables **70** which pass from the pulleys **14** and **14'** through a pulley assembly **71** which is anchored at **72** to the deck of the ship to the anchor winch drums (not shown).

Operation

The operation of the preferred embodiment shown in FIGS. **1** through **5** is better illustrated by first referring to FIG. **5** wherein the ship **10** has, through operation of winch **80,** let out wire cables **70,** causing line **21** to drop yoke **15** through tube **12** and into water **81.** A tug **82** or similar vessel has already picked up hose **50** out of the water at its end **83** by means of a crane **84** or other similar piece of apparatus. Yoke **15** is then fished out of the water by crane **85** and the chains **16** attached to the shackle **33** (see FIG. **2**) by any suitable means such as a locking link or hook. Once the chains **16** are con-

nected (the hose end 83 still retains a plate covering the hose, thereby preventing water from entering the hose) the cranes 84 and 85 lower the hose and yoke assembly back into the water where the crane ropes are then disconnected. Winch 80 then begins reeling in wire cable 70 pulling up cables 21 along with hose 50 into tube 12 and up to the position shown in FIG. 2 whereupon the assembly is locked into place by locks 60 and 61. Once the hose is secured, the chain 16' interferring with the positioning of the elbow is disconnected. Turnbuckles 64 are connected to the yoke, and chain hoist 65 is connected to the ring 90 and used to pick up the elbow off the deck and move it into position over the terminus of pipe 50. The water protection plate (not shown) has been removed, whereupon the elbow is lowered onto the flange 47 and bolted to flange 46. Flanges 51 and 52 are then bolted together, and the system is ready for use.

The procedure for disconnecting the hose from the ship is the reverse from that described for the connection of the hose.

Cable 21, which, of course, also constitutes cable 70, may be a ¾-inch wire stranded cable for a 24-inch diameter terminal products line.

If regulations require, a keystone valve can also be installed at the elbow in order to prevent accidental dumping of cargo, for example, if the hose should be severed.

Internally Mounted Embodiment

An apparatus operating in substantially the same way as the system described in FIGS. 1 through 5 but mounted inside the bow of the ship is illustrated in FIGS. 6 and 7. Ship 10 has a tunnel or tube 12 into the bow of the ship but not passing completely through the bow as in the preferred embodiment. Since the interior of the ship is exposed to water, a cover plate 100 shown in the open position is necessary to close the opening by rotating the cover plate 100 about hinges 106 and locked by latches 107. As in the previous embodiment a hose 50 has mounted thereto a stopper piece 20 which has attached thereto a shackle 30 connected through a pulley 101 to wire rope 21 which passes over a spaced double pulley 14 to the anchor winch, not shown. Wire 21 is secured internally in the ship through a ring 102, shackle 103, and pivotal mounting 104. A ladder and platform arrangement 105 shown in dotted line may be used to permit a crew member or members to make the necessary connections and disconnections of the elbow 45 to hose 50. In the embodiment shown here, however, it is not necessary that elbow 45 be disconnected from flange 52, since the hose 50 can be pulled straight into the bow of the ship or axially in line with the centrally mounted elbow 45. Flanges 46 and 47 are then bolted in place, and the system is ready for use.

The operation of the embodiment shown in FIGS. 6 and 7 is similar to the embodiment shown in FIGS. 1 through 5 in that the hose is lifted out of the water by tug 82 and pulley 101 connected to the shackles 30. The entire assembly is then pulled up through hole or tube 12 into the ship so that flange 47 mates with flange 46. The water protection plate (not shown) has previously been removed. Once the flanges are bolted, the system is ready for operation.

It is obvious, of course, in the two embodiments shown that other embodiments are contemplated that are well within the skill of the art, and these are likewise intended to be covered by the claims of this application.

I claim:

1. A tanker bow products line handling system adapted to be connected to a flexible mooring products hose floating in the water comprising:

a. a vertical opening in the bow of said tanker;

b. winch means mounted over said opening and having a hauling rope therein;

c. a ship's product line pipe having a terminus at said vertical opening;

d. means connected to said hauling rope for pulling said mooring products hose out of the water and up said vertical opening into a securable position; and

e. means on said bow nonrotatably securing said mooring products hose to said ship and to said ship's product line.

2. A system as described in claim 1 wherein said means connected to said hauling rope comprises a pulley block, a yoke, means for connecting said block to said yoke, and means for connecting said yoke to said terminal products line terminus.

3. A device as described in claim 1 wherein said vertical opening comprises a tube passing through the hull to the deck of said tanker.

4. A device as described in claim 1 wherein said vertical opening comprises a door on the underside of said bow and means for opening said door to expose the interior of said bow having the ship's products line thereover.

5. A device as described in claim 1 wherein said vertical opening has positioned thereover a pulley support means, a hauling rope passing over said pulley support means and having one end connected to a winch and the remaining end connected to said means for securing said flexible mooring products hose.

6. A device as described in claim 1 wherein said ship's products line consists of a pipe connected to the hold of said ship and the remaining end positioned over said vertical opening so that the opening surface in said pipe is normal to the axis of said vertical opening and facing toward the water.

7. A system as described in claim 1 wherein said pulling means comprises an "A" frame having a plurality of blocks at its apex, a yoke having a block connected to midpoint of said yoke, said hauling rope passing through said plurality of blocks and said block to form a pulley system, a turnbuckle connectable between said apex and said yoke, and a plurality of chains depending from each end of said yoke for connecting to said flexible mooring products hose terminus.

8. A system as described in claim 1 1 wherein said pulling means comprises a first pair of pulleys axially aligned and spaced at least the diameter of said flexible mooring products hose, a pair of pulleys having means on their frames to connect to each side of the terminus of said flexible mooring products hose and where the said hauling rope consists of two ropes each passing through one of the first pair of pulleys and then passing through the second of said pulleys to a point of anchor.

9. A system as described in claim 8 wherein the means for pulling said flexible mooring products hose out of the water additionally consists of a split ring, means for receiving said split ring around the terminus of said flexible mooring products hose, and connection means spaced around said split ring for attachment of said pulling means.

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