Dec. 17, 1963 A. P. COLLIN 3,114,246

MARINE LIFT DOCKS

Filed May 3, 1960 3 Sheets-Sheet 1

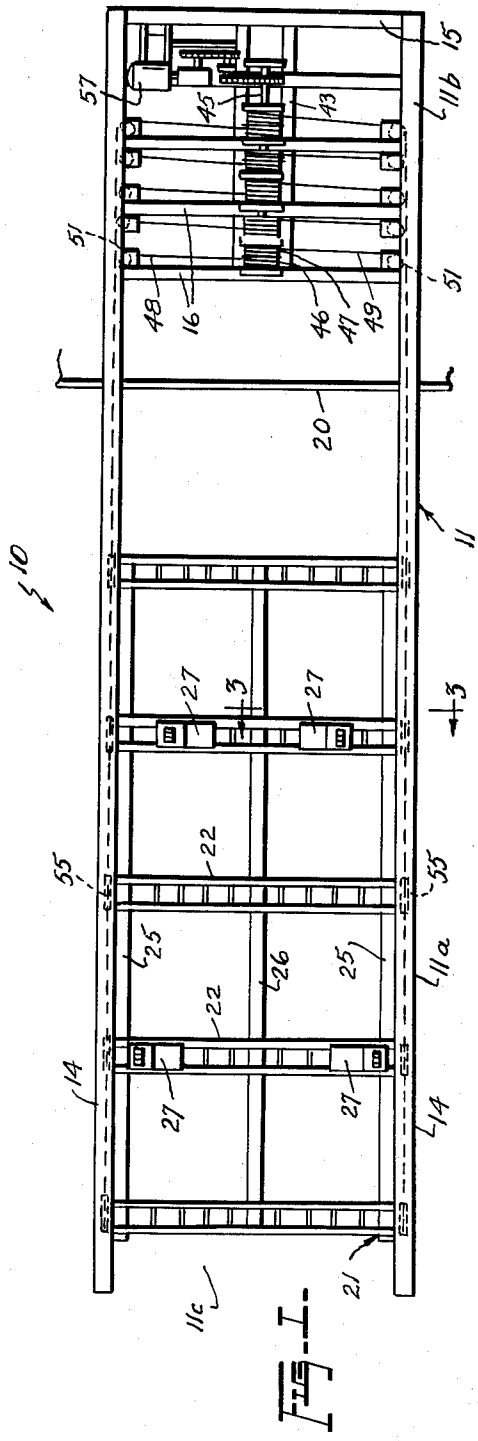


Fig. 1.

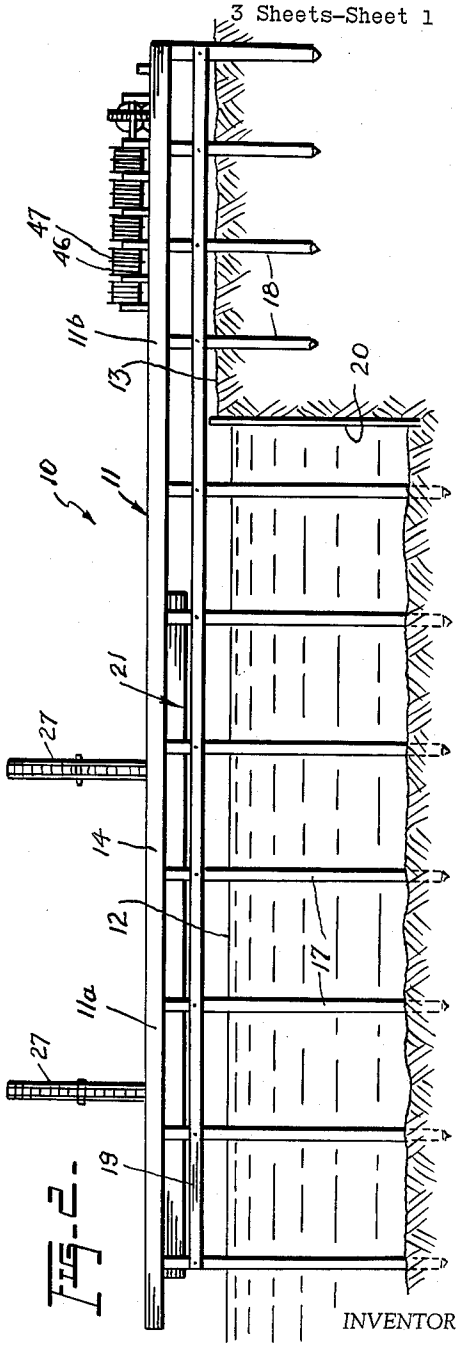


Fig. 2.

INVENTOR

Ashton P. Collin

BY Munson H. Lane

ATTORNEY

Dec. 17, 1963 A. P. COLLIN 3,114,246

MARINE LIFT DOCKS

Filed May 3, 1960 3 Sheets-Sheet 2

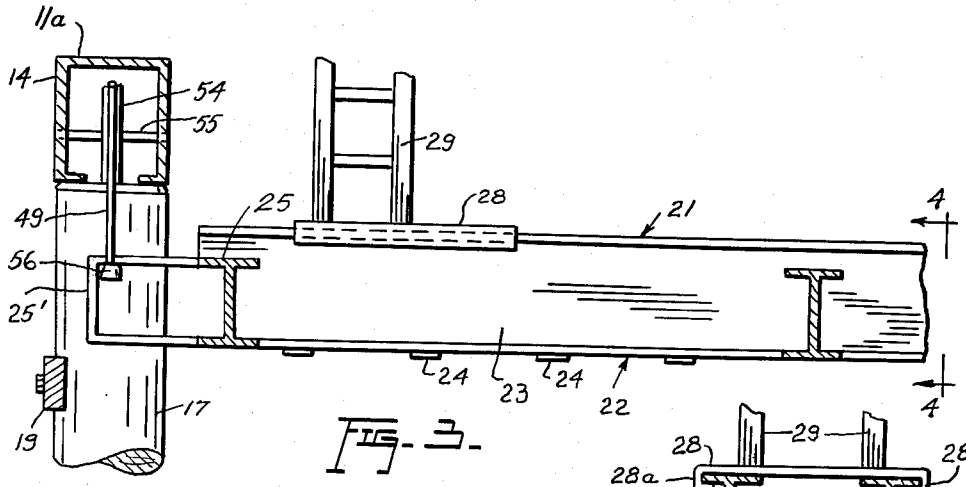


FIG. 3.

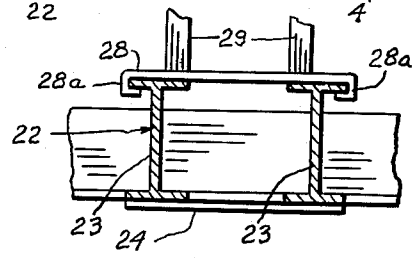


FIG. 4.

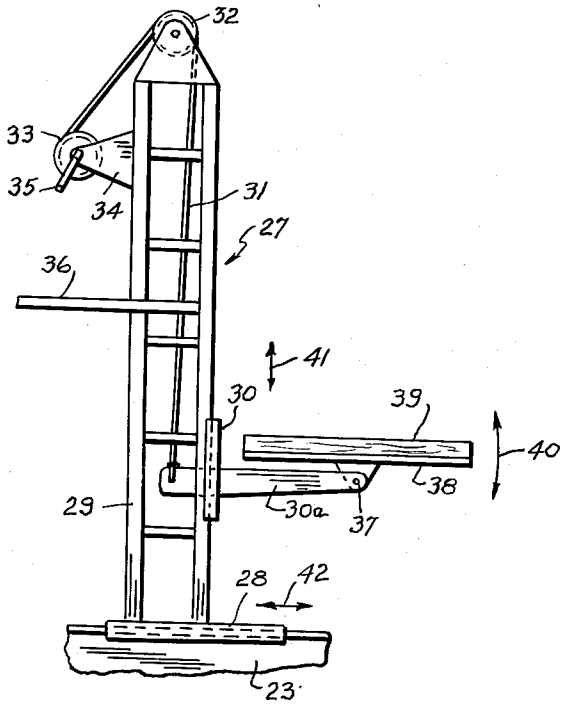


FIG. 7.

INVENTOR

Ashton P. Collin

BY Munson H. Lane

ATTORNEY

Dec. 17, 1963 A. P. COLLIN 3,114,246

MARINE LIFT DOCKS

Filed May 3, 1960 3 Sheets-Sheet 3

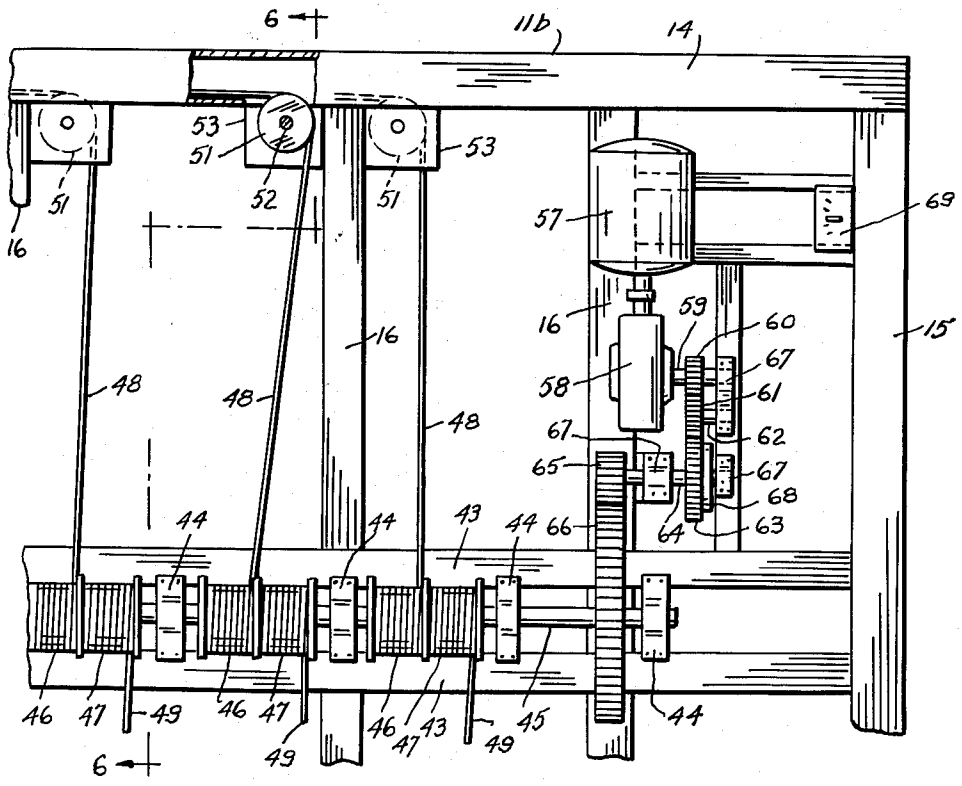


FIG. 5.

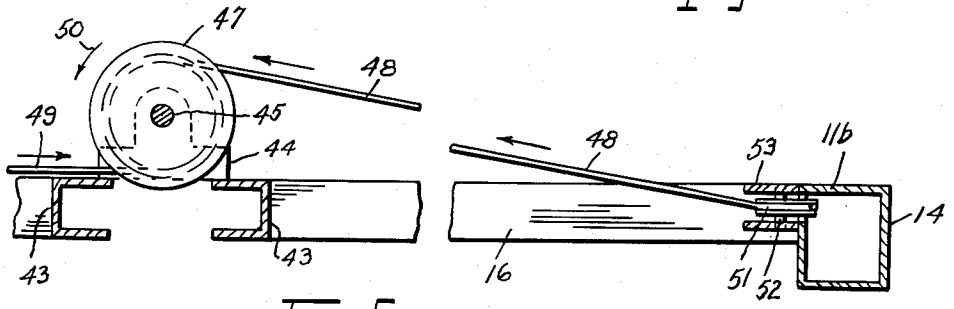


FIG. 6.

INVENTOR

Ashton P. Collin

BY Munson H. Lane

ATTORNEY

United States Patent Office 3,114,246 Patented Dec. 17, 1963

3,114,246

MARINE LIFT DOCKS

Ashton P. Collin, Cut Off, La., assignor to Leeville Shipyard Corporation, Cut Off, La.

Filed May 3, 1960, Ser. No. 26,642
7 Claims. (Cl. 61—65)

This invention relates to new and useful improvements in what may be generally referred to as dry docks, and the principal object of the invention is to provide a simple, quickly and easily operable device for raising boats, small ships or other vessels out of water for purposes of inspection, maintenance or repair.

Unlike conventional dry docks from which water requires to be drained or pumped out, the present invention contemplates bodily lifting the vessel above water level, this being attained by the provision of a berth into which the vessel is floated over a submerged cradle adapted for raising and lowering movement by power means, so that upon raising of the cradle the vessel is bodily raised or lifted out of water.

The cradle raising and lowering means comprises a winch arrangement employing a set of drums and cables windable thereon, the cables being connected to the cradle, and a feature of the invention resides in the particular winch arrangement whereby the several cables are simultaneously and equally wound and unwound on their respective drums, so that the cradle is at all times level.

Another feature of the invention resides in the arrangement of the cradle, the same including a plurality of hull engaging and supporting members which may be readily adjusted so that the cradle may accommodate various sizes and shapes of hulls.

With the foregoing objects and features in view and such other objects and features as may become apparent as this specification proceeds, the invention will be understood from the following description taken in conjunction with the accompanying drawings, wherein like characters of reference are used to designate like parts, and wherein:

FIGURE 1 is a top plan view of the marine lift dock in accordance with the invention;

FIGURE 2 is a side elevational view thereof;

FIGURE 3 is a fragmentary sectional view on an enlarged scale, taken substantially in the plane of the line 3—3 in FIGURE 1;

FIGURE 4 is a fragmentary sectional detail, taken substantially in the plane of the line 4—4 in FIGURE 3;

FIGURE 5 is an enlarged fragmentary plan view of the winch means and power means for actuating the same;

FIGURE 6 is a fragmentary sectional view, taken substantially in the plane of the line 6—6 in FIGURE 5; and

FIGURE 7 is an elevational view on an enlarged scale, showing one of the hull engaging and supporting members of the cradle.

Referring now to the accompanying drawings in detail, the marine lift dock in accordance with the invention is designated generally by the reference numeral 10 and embodies in its construction an elongated berth 11 which, as is best shown in FIGURE 2, has an outer portion 11*a* extending over a body of water 12 and an inner

end portion 11*b* extending over land 13. The berth 11 has an open outer end 11*c* whereby a vessel on the body of water 12 may be floated into the berth, as will be apparent. The berth comprises a pair of spaced parallel side members 14 connected by an inner cross member 15 and by a plurality of additional cross members 16 disposed in spaced parallel relation on the inner end portion 11*b* of the berth. The side members 14 are supported above the level of water 12 by a plurality of piles 17, 18, driven into the bottom of the body of water and into the ground 13, as shown, the upper end portions of these piles being secured together by longitudinal reinforcing members 19, spaced downwardly somewhat from the berth members 14. A vertical wall or panel 20 may be provided at the inner end of the body of water 12 in the berth to serve as a retainer for the earth mass 13.

An elongated vessel supporting and raising ship cradle designated generally by the numeral 21 is provided for raising and lowering movement relative to the outer portion 11*a* of the berth and is movable vertically from a lowered position below water level to a raised position above water level, by means hereinafter described. The cradle 21 embodies in its construction a plurality of cross members 22 each comprising a pair of spaced parallel beams 23 rigidly secured together by a set of tie bars 24. The outer ends of the cross members 22 are rigidly secured to a pair of longitudinal side members 25 of the cradle, while the center portions of the cross members are rigidly secured to a longitudinal center member 26.

A plurality of adjustable members designated generally by the numeral 27, which for convenience of reference may be called bilge block carriers, are provided on the cross members 22 having means for engaging and supporting the hull of a vessel so as to keep the same on an even keel when raised out of water. As is best shown in FIGURE 7, each of the members 27 comprises a slidable base 28 which is movable along the cross member 22 toward and away from the center of the cradle and carries an upright standard or tower 29 having a carrier 30 slidable vertically thereon. The carrier 30 includes a support arm 30*a* to which is connected a cable 31, the latter passing over a pulley 32 at the top of the standard and being windable on a winch 33 rotatably mounted in a bracket 34 at one side of the standard. The winch 33 may be rotated manually by a hand crank 35 whereby the carrier 30 may be raised and lowered on the standard, a suitable pawl and ratchet mechanism being associated with the winch to prevent undesired unwinding from the winch. Also, a platform 36 is provided on the standard 29 on which the operator of the winch may stand. The outer end of the carrier arm 30*a* has pivoted thereto as at 37 a plate 38 equipped with a wooden pad or bilge block 39 for engaging the hull, it being noted that the plate and pad 38, 39 are tiltable about the pivot 37 as indicated at 40 so as to assume a flat lying position against the hull regardless of hull slope. As already stated, the entire carrier 30 may be raised and lowered as indicated at 41 by actuation of the winch 33, while the entire member 27 may be moved toward and away from the hull by adjustment of the base 28 on the member 22, as indicated at 42. As shown in FIGURE 4, the base 28 is provided with side flanges

28*a* which slidably engage the beams 23 of the member 22 and if desired, suitable winch means may be used for sliding the member 27 along the beams and/or for locking the same in a preadjusted position. Although in FIGURE 1 the members 27 are shown only on two of the cross members 22 for illustrative purposes, they may be provided on all of the cross members, as desired.

Means for raising and lowering the cradle 21 relative to the berth 11 comprise a winch assembly mounted on the inner end portion 11*b* of the berth, as is best shown in FIGURE 5. Apart from the cross members 15, 16, the berth portion 11*b* also includes a pair of spaced, central longitudinal frame members 43 which carry a plurality of coaxial bearing blocks 44 having a shaft 45 rotatably journalled therein. The shaft 45 extends longitudinally of the berth, centrally between the side members 14 and is provided with a set of double drums 46, 47. Cables 48, 49 are windable on the respective drums 46, 47, so that they extend in relatively opposite directions as is best shown in FIGURE 6, whereby when the shaft 45 is rotated, for example, in the direction of the arrow 50, both sets of cables 48, 49 are simultaneously wound on the drums and conversely, when the shaft is rotated in the opposite direction, the cables are simultaneously unwound.

The cables 48 extend laterally from the drums 46 to one side of the berth where they pass around guide pulleys 51 into the adjacent side member 14, while the cables 49 extend from the drums 47 to the opposite side of the berth where they pass around similar guide pulleys into the side member 14 adjacent thereto. The guide pulleys 51 are rotatably mounted on vertical pins 52 in brackets 53 carried by the members 14, it being noted that the members 14 are hollow and that the cables 48, 49 extend longitudinally in these hollow members to additional guide pulleys 54 which are rotatably mounted on shafts 55 provided at longitudinally spaced points in the members 14, as is best shown in FIGURE 3. The outer portions 11*a* of the members 14 are open at their bottom and after passing over the pulleys 54 the cables 48, 49 extend downwardly from the members 14 and are anchored to brackets 25′ projecting from the members 25 of the cradle 21 as indicated at 56. The pulleys 51 and 54 may be slightly offset to permit passage of the operating cables.

It will be apparent from the foregoing that when the cables 48, 49 are wound on the drums 46, 47, the cradle 21 will be raised and, conversely, when the cables are unwound, the cradle will be lowered. The drums 46, 47 are preferably of such size that the cables are wound thereon in a single layer without overlapping, so that even winding and unwinding of the cables is attained and the cradle remains level during raising and lowering. Accordingly, a vessel on the cradle also remains on an even keel even when raised out of water, and consequently, it is not necessary to empty fuel or other liquids from the vessel to prevent spilling.

Power means are provided for actuating the winch assembly, the same comprising a suitable motor 57 connected to a reduction gear box 58 having a driven shaft 59 provided with a pinion 60 which meshes with an idler gear 61 on a shaft 62. The gear 61, in turn, meshes with a gear 63 on a shaft 64 which also carries a pinion 65 meshing with a gear 66 secured to the shaft 45. The shafts 59, 62 and 64 are journalled in suitable bearings 67 and a suitable brake 68 is provided on the shaft 64 for reducing the speed of rotation and/or locking against rotation the entire winch assembly. The operation of the motor 57 is regulated by a suitable control 69.

When the invention is placed in use, the winch assembly is operated so as to lower the cradle 21 to the bottom of the body of water 12 and the vessel to be dry docked is floated into the berth 11. Thereupon, the members 27 are adjusted as necessary so that their pads 39 properly engage and support the hull, and by actuating the winch assembly so as to wind the cables 48, 49 on the drums 46, 47, the entire cradle 21 together with the vessel thereon will be raised out of the water. Lowering of the vessel into water is, of course, effected by reversing the foregoing procedure.

While in the foregoing there has been shown and described the preferred embodiment of the invention, various modifications may become apparent to those skilled in the art to which the invention relates. Accordingly, it is not desired to limit the invention to this disclosure, and various modifications may be resorted to, such as may lie within the spirit and scope of the appended claims.

What is claimed as new is:

1. A dry dock having an open end through which marine vessels may enter comprising: elongated side members forming a fixed frame adapted to be secured in fixed positions; pairs of oppositely disposed guide pulleys mounted at spaced intervals on said members along the entire length thereof; a ship cradle within the confines of said members, and instrumentalities for raising and lowering said cradle, said said instrumentalities including (*a*) pairs of lifting cables, (*b*) a plurality of aligned winding drums, and (*c*) power means connected to said drums for driving them simultaneously at the same angular velocity, the said drums being at the rear of and between said side members and mounted for rotation about a common axis extending longitudinally of said members, one of the cables in each pair of cables being attached to one side of said cradle and the other cable in such pair being attached to the opposite side of the cradle, each pair of cables being attached to one of said drums and extending transversely at right angles thereto over selected pairs of oppositely disposed pulleys on said side members, said cables further extending from said previously mentioned pulleys along said side members over selected pairs of oppositely disposed pulleys and downwardly to points of attachment to said cradle, the arrangement being such that the top of the dock is left open and unobstructed and also such that the drums are rotated at the same speed and the cables constituting each pair of cables are wound on the drums in the same direction and extend from the drums in opposite directions to thereby elevate the cradle while maintaining the cradle in a substantially horizontal plane at all times.

2. The combination set forth in claim 1 wherein the power means for driving the drums constitutes a single power plant for simultaneously driving all of the drums.

3. The combination set forth in claim 1 wherein the said drums are mounted on the same shaft and said shaft is parallel with and disposed between the side members.

4. The combination set forth in claim 1 wherein the cradle includes spaced transversely extending cross beams and bilge block carriers slidably mounted on said beams, each of said carriers comprising (*a*) an upstanding framework, (*b*) a pulley pivoted at the top thereof, (*c*) a winch mounted on a bracket secured to one side of said framework, (*d*) an arm extending inwardly from and slidably mounted on said framework, and (*e*) a bilge block pivoted on one end of said arm, the other end of the arm having a cable secured thereto, the said cable passing over said pulley and being secured to said winch whereby upon operating the winch the bilge block may be raised and lowered and tilted on its pivot to engage the sides of a boat.

5. A marine lift dock as set forth in claim 1 wherein the sides of the fixed frame each includes a hollow longitudinal member at the upper portion thereof to permit passage of the lifting cables therethrough, said longitudinal members having bottom openings at spaced longitudinal intervals, the said cable guide pulleys being located one adjacent each of said bottom openings.

6. A marine lift dock as defined in claim 1 wherein the cradle includes longitudinally spaced transverse members and hull engaging and supporting members adjustably positioned on said transverse members.

7. The device as defined in claim 6 wherein each of said hull engaging and supporting members includes a base movable transversely of said cradle, an upright standard provided on said base, a carrier movable upwardly and downwardly on said standard, and a hull engaging plate pivoted to said carrier for tilting about an axis extending longitudinally of the cradle.

References Cited in the file of this patent

UNITED STATES PATENTS

481,411 Moran ---------- Aug. 23, 1892
604,235
704,358
779,600
786,840
1,515,435
2,357,511
2,687,814

Jordan ---------- May 17, 1898
McCullough ---------- July 8, 1902
Hickler ---------- Jan. 10, 1905
Prochazka ---------- Apr. 11, 1905
Glover ---------- Nov. 11, 1924
French ---------- Sept. 5, 1944
Romick ---------- Aug. 31, 1954

FOREIGN PATENTS

7,517 Great Britain ---------- of 1837
13,330 Great Britain ---------- of 1850