April 26, 1960 D. M. MURPHY 2,934,220

BOAT LIFTING DEVICE

Filed May 26, 1959 3 Sheets-Sheet 1

FIG. 1

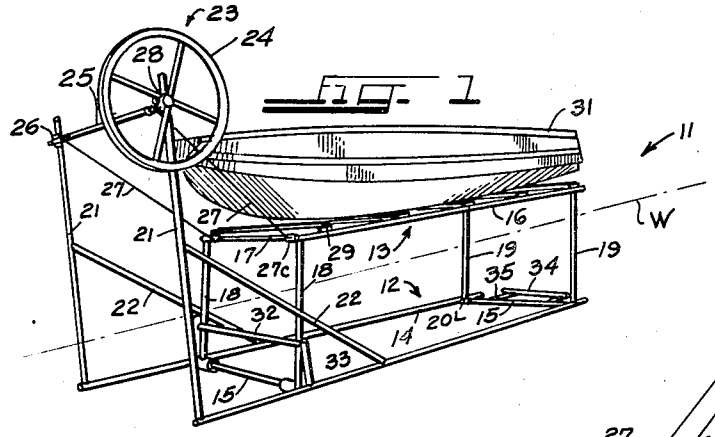
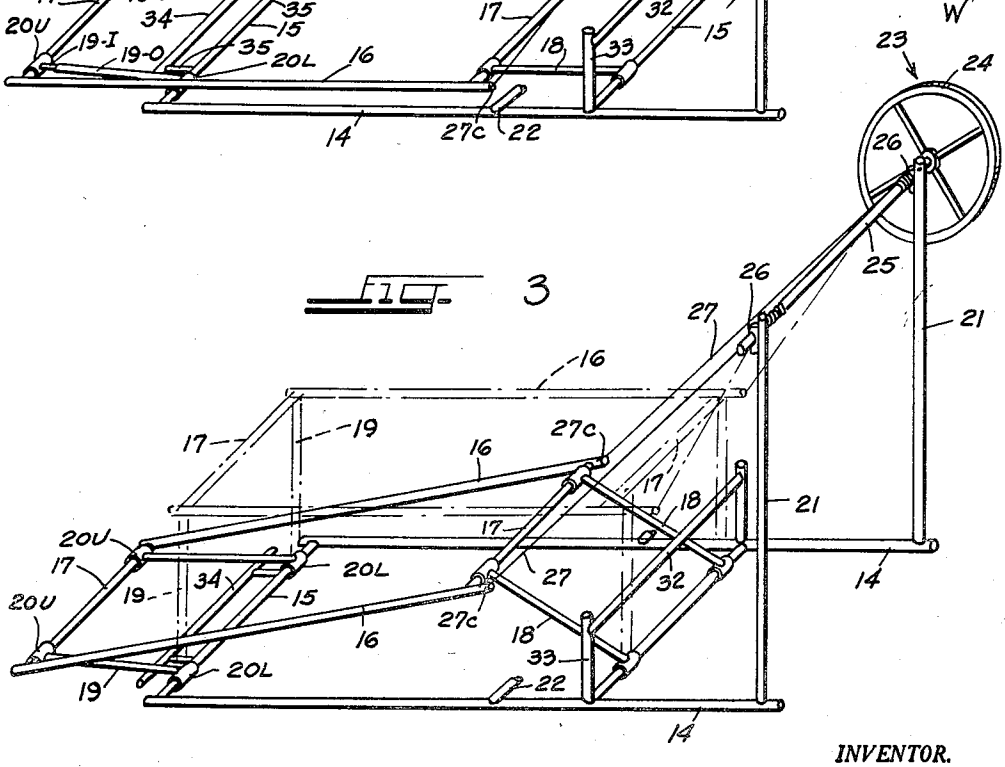


FIG. 2

FIG. 3



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FIG. 4

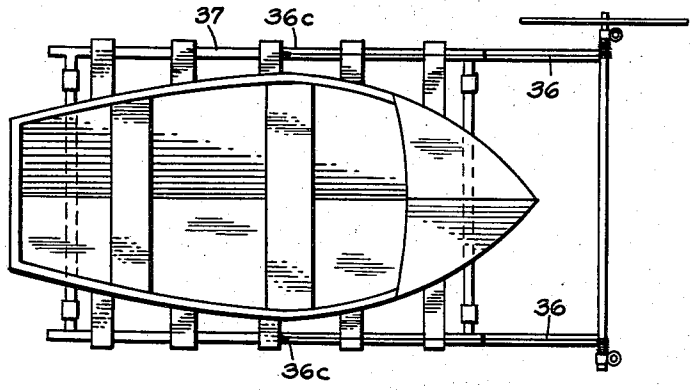


FIG. 5

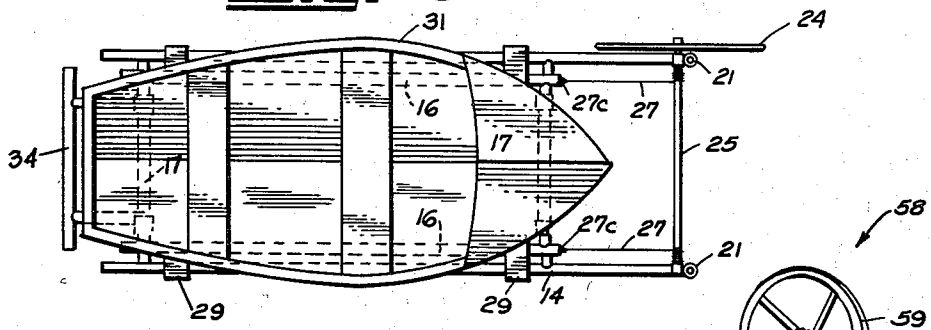
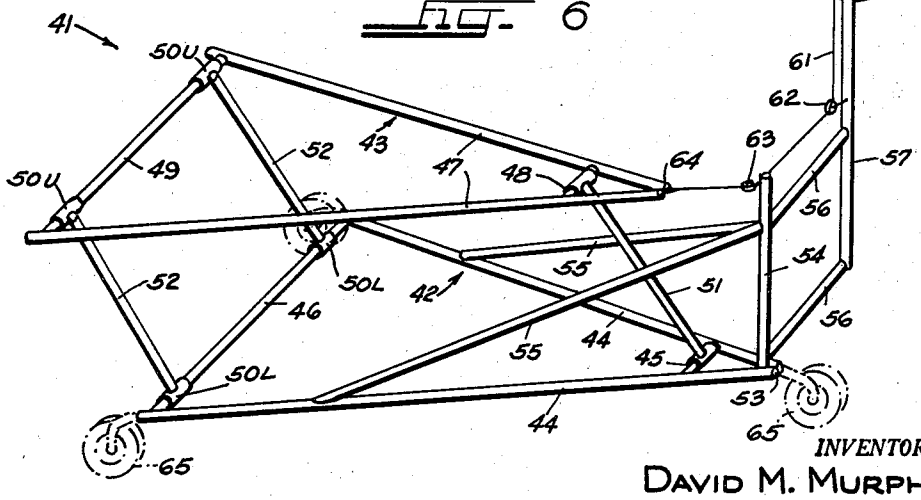


FIG. 6



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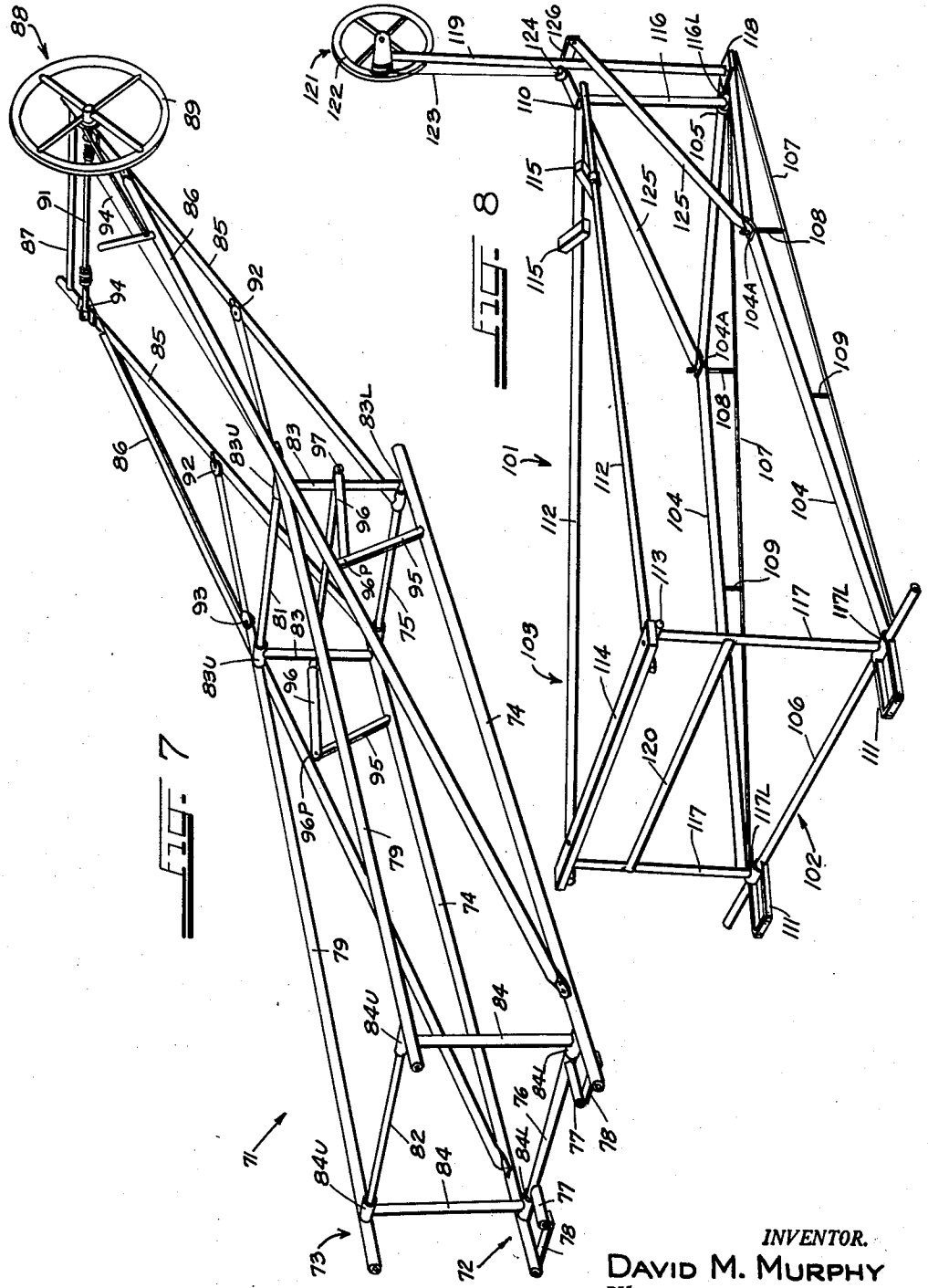


FIG. 7

FIG. 8

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United States Patent Office 2,934,220 Patented Apr. 26, 1960

2,934,220

BOAT LIFTING DEVICE

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Application May 26, 1959, Serial No. 815,942

10 Claims. (Cl. 214—1)

This invention relates to a lifting frame and more specifically relates to a manually actuated frame unit which may be utilized both to lift small to medium size boats out of the water and as a trailer unit for transporting such boats on the highway.

Small and medium size boats which are utilized primarily as pleasure boats, as contrasted to boats which are used commercially in fishing and other activities, often remain idle in the water at dockside for extended periods of time ranging from several days to several weeks. To prevent undesirable and unnecessary weathering and possible injury to the boat or the dock during rough weather, it is desirable that such boats be removed from the water during such periods of inactivity. This is especially true in the northern latitudes where it is generally desirable to remove the boat from the water during the entire winter season. In such cases it is also generally necessary that there be provided some carrying device, such as a trailer, for removing the boat to a point of winter storage. While lifting devices for lifting boats out of the water are generally known, the geometrical configuration and overall size of such units have generally precluded their being used as boat carrying units on the highway.

Previously known lifts have required lifting cables to be connected generally centrally of the lift for reasons to be described hereinafter.

Accordingly, it is a primary object of this invention to provide a lifting frame which incorporates variable length supporting elements in a novel manner to afford a smaller and more easily operated lifting frame than previously known devices.

It is another object of this invention to provide a lifting unit which incorporates a pair of telescoping members of variable length in a manner such that a lifting cable may be attached to an end of the lifting unit and a lifting force exerted in the cable to cause contracting action of the members of variable length and permit such inclination of the component parts of the lifting unit as to avoid the lifting force being transmitted directly through the pivot points of the lifting unit.

It is another object of this invention to provide a lifting unit which incorporates a pair of supporting members of variable length in a manner such that a lifting cable may be attached to an end of the lifting unit to permit a more narrow unit to be utilized than heretofore known.

It is another object of this invention to provide a frame unit which may be used interchangeably as either a lifting frame for removing a boat from the water or as a trailer for transporting the boat over land, as by towing on the highway behind an automotive vehicle.

It is another object of this invention to provide a combined lifting and carrying unit which incorporates variable length support members in a triangular-shaped frame in a manner to permit a lifting cable to be connected at the apex of the triangular frame and thereby utilize a quite narrow frame which can be easily converted for

use as a trailer by the addition of wheels at selected points on the unit.

It is another object of this invention to provide a lifting unit for lifting boats out of water that incorporates a swinging stop member rotatably mounted on the lifting unit in a manner such that the stop drops downwardly to present a minimum of vertically projecting parts in a lowered portion of the lift and thereby facilitates positioning of a boat above the lift but is automatically rotated to an operative position by raising movement of the lift.

It is another object of this invention to provide a lift that may be produced at a reduced cost as compared to conventional lifting devices.

Other and further objects of the present invention will be apparent from the following description and claims and are illustrated in the accompanying drawings which, by way of illustration, show preferred embodiments of the present invention and the principles thereof and what is now considered to be the best mode contemplated for applying those principles. Other embodiments of the invention embodying the same or equivalent principles may be made as desired by those skilled in the art without departing from the present invention.

In the drawings:

Fig. 1 is a perspective view of a lifting frame constructed in accordance with one embodiment of this invention;

Fig. 2 is a perspective view of the lifting unit illustrated in Fig. 1 and showing the unit in a lowered or collapsed position;

Fig. 3 is a perspective view of the lifting unit illustrated in Fig. 1 and illustrates in bold outline the relative disposition of the operative parts of the unit in a position intermediate to the fully erected position, and illustrates in phantom outline the position of these operative parts in the fully erected position of the lifting unit;

Fig. 4 is a plan view of a boat lifting unit and illustrates the conventional method of connecting lifting cables to a lifting unit;

Fig. 5 is a plan view of the lifting unit illustrated in Fig. 1;

Fig. 6 is a perspective view of a triangular-shaped lifting frame and trailer unit constructed in accordance with another embodiment of this invention;

Fig. 7 is a perspective view of another embodiment of a lifting frame constructed in accordance with this invention which incorporates a swinging stop; and

Fig. 8 is a perspective view of another embodiment of a triangular shaped lifting frame constructed in accordance with this invention.

Referring now to Fig. 1 there is illustrated a lifting unit indicated generally by the reference numeral 11. The lifting unit incorporates a base frame 12 and a deck frame 13. The base frame comprises a pair of parallel extending side members 14 connected together by a pair of cross members 15 which extend transversely of the side members 14. The deck frame also comprises a pair of parallel extending side members 16 connected together by a pair of cross members 17. The deck frame is supported at the forward end by a pair of members 18 of fixed length, each of which are pivotally connected at their opposite ends to the cross members 15 and 17 of the respective base and deck frames. At the rearward end the deck frame is supported on the base frame by a pair of support members 19, each of which are pivotally connected at 20U and 20L at their respective upper and lower ends to the cross members 15 and 17 of the respective base and deck frames. The support members 19 are variable length members which comprise inner and outer telescoping elements 19–I and 19–O, as illustrated

in Fig. 2, and the purpose of these variable length members will be described hereinbelow.

The lifting unit 11 illustrated in Fig. 1 also includes a pair of vertically extending uprights 21 attached at their lower ends to the base frame members 14. A pair of inclined reinforcing braces 22 additionally connect the uprights 21 to the base frame members 14. The uprights 21 furnish a supporting frame for a winch unit 23 which comprises a handwheel 24 for rotating a shaft 25 journaled in suitable bearings mounted in supports 26 formed on the uprights 21. A pair of cables 27 are provided, each having one end attached to the shaft 25 and an opposite end connected at 27C to the side members 16 of the deck frame adjacent the forwardmost extremities of these side members. The lifting winch 23 may preferably be provided with a conventional ratchet arrangement 28, the details of which are not illustrated, and the uprights 21 are preferably connected by additional horizontally extending reinforcing members which are not illustrated.

The deck frame 13 is provided with a plurality of boat supporting planks 29 which extend across the side members 16. As illustrated in Fig. 1 a boat 31 rests on these plank members. The planks 29 have been omitted from several of the figures of the drawings to permit better illustration of the operating frames of the boat lifts.

In the fully erected position of the lifting unit 11 as illustrated in Fig. 1, the forward support members 18 abut a horizontally extending bar 32 which is fixed with respect to the base frame 14 by means of a pair of vertically extending rods 33. Thus the member 31 provides a stop for determining the upright position of the lifting unit. At the rearward end of the base frame 12 a horizontally extending member 34 is attached to the rear cross member 15 by a pair of rods 35. As is shown more clearly in Fig. 2 the member 34 provides a stop for engaging the variable length support members 19 in the let-down or collapsed position of the lifting unit 11.

In the operation of the lifting unit 11 the unit is partially submerged in the water so that with the lifting frame unit in the let-down position, as illustrated in Fig. 2, the base and deck frames lie beneath the surface of the water a sufficient distance for the boat to float freely above the deck frame. Thus, the water level may be as indicated by the phantom lines W. It should be noted in Figs. 2 and 3 that the plank members 29 have been omitted and that portions of the braces 22 have been broken away for clarity in showing the operative relationships of the movable parts of the lifting unit. Upon positioning the boat above the deck frame 13, the handwheel 24 is rotated in a direction to initiate the lifting action through the cables 27. The initial effect of this rotation of the handwheel is to lift the forward end of the deck frame to the position illustrated in bold outline in Fig. 3 by rotation about pivots 20U while causing the entire deck frame to move in a forward direction to contract the variable length support members 19 by telescoping the inner members 19–I within the outer members 19–O prior to angular rotation of the support members 19 about the pivot points on the cross member 15. This contracting action of the variable length members 19 is a very important feature of this invention in that it permits the deck frame to be rotated about the pivot points 20U to a position wherein the side members 16 of the deck frame are spaced a considerable distance above the pivot points 20L. By reason of this angular inclination of the deck frame with respect to the base frame a substantially dead center pull of the lifting force through the pivot points 20L is avoided. That is, in the normal let-down position the pivots of the base frame and deck frame are displaced from the dead center only by the diameter of the tubing or other structure of the frame. Thus, with the angularity of the deck as shown in bold outline in Fig. 3, the force exerted by the lifting cable has a relatively large component which acts in perpendicular relation to the support member 19 and tends to rotate the support members 19 about the pivot point 20L. In comparison, a lifting frame incorporating members of fixed length at 19 and incorporating a cable connection at the forward end of the deck frame in the manner illustrated in Figs. 2 and 3 cannot be rotated to the initial angular position illustrated in Fig. 3, but necessarily requires the deck frame and base frame to be maintained in parallel relation throughout all phases of the lifting operation. Such a lifting unit incorporating fixed length supporting members, is virtually impossible to raise to the erected position with the lifting cables connected to the forward end of the deck frame as illustrated in Figs. 2 and 3. The reason for this is that the forward end cable connection causes substantially the entire lifting force to be developed through the dead center of the lower pivot points 20L which, of course, cannot cause any rotational movement of the support members to move the lifting frame to an erected position. Thus, the conventional method of attached lifting cables to the lifting frame has been that illustrated in Fig. 4 wherein lifting cables 36 are attached at 36C to the central portion of a frame 37 to permit the lifting cables to exert a more pronounced lifting effort and avoid the dead center difficulties which are encountered in connecting such cables at the more forward portions of the frame. Connecting the lifting cables to the central portion of the frame necessarily requires that the frame be of considerable width, at least of greater width than that of the boat, so that the cables may straddle the boat and avoid any obstruction thereby. Such a frame unit has been too large and unwieldy for transport along the highways so that it has been generally necessary to transfer the boat from the lifting frame to a separate trailer to transport the boat to a different location.

A lifting frame constructed in accordance with this invention, however, can be constructed to be as narrow as desired since the lifting cable can be connected to the forwardmost portions of the lifting frame, and thereby avoid obstruction by the boat or other object being lifted, by reason of the novel lifting action obtained with the variable length rear supporting members.

In Fig. 6 there is illustrated an embodiment of this invention which incorporates such variable length support members in a triangular-shaped lifting frame to obtain the maximum benefit of the small and compact configuration obtainable by the use of such variable length members. Thus, in Fig. 6 there is illustrated a frame unit 41 which incorporates a base frame 42 and a deck frame 43. As in Figs. 2 and 3 the plank members for the deck frame have been omitted for clarity of showing. The base and deck frames are generally shaped like isosceles triangles with the apex of the triangle at the forward portion of the frame. The base frame includes a pair of inclined side members 44 which are connected at their forward portion by a short cross member 45 and are connected at their rearward portions by a longer cross member 46. The deck frame includes a pair of inclined side members 47 which are connected at their forward portions by a short cross member 48 and which are connected near the rearward ends by a longer cross member 49. A forward support member 51 of fixed length is pivotally connected at its opposite ends on the cross members 45 and 48 of the respective base and deck frames. A pair of support members 52 of variable length, which may preferably be formed with telescoping inner and outer tubular elements like the elements 19–L and 19–O of the embodiment of the invention illustrated in Fig. 2, are pivotally connected at their opposite ends 50L and 50U to the cross members 46 and 49 of the respective base and deck frames.

The side members 44 of the base frame extend forwardly beyond the cross member 45 and abut together at 53. An upright 54 is welded or otherwise suitably attached at this point and is further connected to the

base frame by a pair of diagonally extending braces 55. A pair of horizontally extending frame members 56 are connected to the upright 54 and support a second upright 57 at the ends opposite those connected to the upright 54. The frame members 54 to 57 thus constitute a support frame for a hand winch 58. The winch 58 includes a handwheel 59, which is mounted at the upper end of the upright 57, and a cable 61, which is connected to the apex 64 of the triangular deck frame 43. A winch cable 61 is passed through a pair of blocks 62 and 63, which are supported on the respective uprights 57 and 54, and is connected to the apex 64 of the triangular deck frame 43.

The operation of the lifting unit illustrated in Fig. 6 is essentially that described in relation to the embodiment illustrated in Figs. 1 and 3. Thus, starting from a lower, collapsed position of the lifting unit, the boat to be raised out of the water is positioned above the deck frame 43. Rotation of the winch 58 in a deck frame raising direction first causes the apex of the deck frame to be raised upwardly by rotation about pivots 50U while the entire deck frame is slid forwardly through the telescoping action of the variable length members 52. Continued rotation of the winch in a deck frame raising direction then causes the fully contracted support members 53 to rotate in a clockwise direction, as viewed in Fig. 6, about the lower pivot point 50L until the deck frame is positioned in or moved to the upright position of the lifting unit. While the rearward support members in their contracted position are necessarily somewhat shorter than the forward support member, as is true also with respect to the embodiment of the invention illustrated in Figs. 1–3, the amount of telescoping action of the rear support members need be relatively small to provide the desired inclination of the deck frame which permits the forward cable connection in accordance with this invention. Thus, in the fully erected position the deck frame is substantially parallel with the base frame.

The lifting units may preferably be a tubular construction as illustrated. With the tubular construction it is a relatively simple matter to add wheels to the extremities of the base frame to adapt the lifting frame for use as a mobile trailer. Thus in Fig. 6 a plurality of wheels 65, shown in phantom outline, are mounted on the base frame by means of a pin connection or other suitable connecting device.

In Fig. 7 there is illustrated an embodiment of a lifting frame constructed in accordance with this invention which incorporates a swinging stop which is automatically lowered to minimize any danger of the stop damaging the bottom of the boat in the let-down position of the lift and which is automatically raised by a lifting movement of the lifting frame to provide a more positive stopping action than a fixed permanent stop. Referring to Fig. 7 it is seen that the lifting unit, designated generally by the reference numeral 71, comprises a base frame 72 and a deck frame 73. The base frame includes a pair of parallel extending side members 74 joined by forward and rearward cross members 75 and 76. The rearward portion of the base frame is provided with a pair of stops formed by short stubs 77 which are attached to the rear cross member 76 and which extend rearwardly therefrom and parallel to the side members 74. A pair of short flat strips 78 are attached to the under side of the stubs 77 and the side members 74 for limiting the letdown position of the lifting frame in a manner to be described hereinafter.

The deck frame comprises a pair of parallel extending side members 79 connected together at their forward and rearward end portions by cross members 81 and 82. The deck frame is supported from the base frame by a pair of support members 83 at the forward end and by a pair of support members 84 at the rearward end of the lifting unit. The support members 83 are of fixed length and are pivotally connected to the cross member 75 at

pivots 83L and pivotally connected to the cross member 81 at 83U. The support members 84 are of variable length and may preferably comprise inner and outer telescoping elements like those illustrated in Figs. 1–3. The support members 84 are pivotally connected to the cross member 76 at pivots 84L and are pivotally connected to the cross member 82 at pivots 84U.

A pair of braces 85 and 86 are provided at each side of the lifting unit. The braces 85 and 86 are inclined upwardly in a forward direction and are joined together at their forwardmost end portions. The lower end of each brace 86 is attached to the base frame side member 74 at the rearward end of the base frame. The lower end of each brace 85 is mounted on the forward cross member 75 of the base frame. A cross bar 87 extends between the forwardmost end portions of the braces 85. Braces 85 and 86 and the bar 87 provide a support frame for a winch designated generally by the reference numeral 88. A winch 88 comprises a handle wheel 89 which is mounted on one end of a shaft 91 which in turn is journaled for rotation on the braces 85. A pair of blocks 92 are connected to the medial portions of the braces 85 and an additional pair of blocks 93 are connected to the forwardmost extremities of the side members 79 of the deck frame. A pair of cables 94 each have one end attached to the shaft 91, are passed successively through the blocks 93 and 92 and have another end attached to the blocks 93.

In accordance with this invention swingable stop means are provided at the forward end of the lifting unit. The stop means comprise a pair of generally vertically extending struts 95, each of which is connected at its lower end to the side member 74 of the base frame. Each strut 95 is connected at its upper end to the brace 86 of the winch support frame. The stop means further comprise a pair of swinging arms 96, each of which are pivotally connected at a pivot 96P to the upper ends of the struts 95. A stop bar 97 is mounted on the forwardmost ends of the swinging arms 96 so as to be disposed forwardly of the support members 83.

The operation of the lifting unit 71 is basically the same as the lifting unit 11 illustrated in Figs. 1–3 with the exception that the swinging stop arms 96 and the stop bar 97 coact with the support members 83 to provide a novel stopping action. Assuming that the deck frame is in a let-down position wherein the strips 78 of the rearward stops engage the variable length support members 84, the forward support members 83 are disposed generally parallel to the side members 74 of the base frame like the corresponding support members 18 and side members 14 as illustrated in Fig. 2. In this let-down position the weight of the arms 96 and stop bar 97 cause the swinging stop members to drop downwardly about the pivots 96P, to a position wherein the bar 97 resides on the side members 74. In this position the stop presents a minimum of vertically projecting parts and offers much less danger of damaging the bottom of the boat than a fixed permanent stop such as the stop bar 32 as illustrated in Fig. 2. Upon rotation of the hand wheel 89 in a frame elevating direction the variable length support members 84 are contracted to permit the deck frame 73 to be upwardly inclined in a forward direction to avoid a dead center pull through the lower pivot points 84L in the manner set out in detail with respect to the embodiment of the invention illustrated in Figs. 1–3. Such lifting movement of the winch 88 causes the forward support members 83 to rotate upwardly in a clockwise direction, as viewed in Fig. 7, and engage the stop bar 97 and swing the stop bar 97 upwardly by causing the swinging arms 96 to rotate in a counterclockwise direction, as viewed in Fig. 7, about the pivot points 96P. When the swinging arms 96 have been rotated to the substantially horizontal position as illustrated in Fig. 7, the stop bar 97 is effective to limit any further movement of the support members 83 and thus provide a stop

for the upright position of the lifting unit. It is an important feature of this swinging stop that the stop rises higher on the support members **83** to provide a more positive stopping action than a fixed, permanent stop, which must necessarily be of low height to permit the boat to be positioned above the lifting unit in the let-down position of the unit.

In Fig. 8 there is illustrated another embodiment of a triangular-shaped lifting unit constructed in accordance with this invention. The lifting unit **101** comprises a base frame **102** and a deck frame **103**. The base frame comprises a pair of inclined side members **104** which are connected at their forward end portions by a relatively short cross member **105** and are connected at their rearward end portions by a longer cross member **106**. The side members **104** are each angled in an upward direction to provide apexes **104A** slightly forward of the medial portions of the side members. A pair of tension rods **107** extend beneath the side members **104** and are attached to the forward and rearward ends of the side members. Interconnecting links **108** and **109** may be provided for connecting the rods **107** to the side members **104** at spaced intervals along the length of the rods. A pair of horizontally extending brackets **111** are attached to the rearward edge of the cross member **106** and provide stops for the let-down position of the lifting unit.

The deck frame **103** comprises a pair of inclined side members **112** which are joined together at their forwardmost ends by a short cross member **110** and which are interconnected by a cross member **113** at their rearward ends. A supporting plank **114** is attached to the cross member **113** and a pair of inclined support blocks **115** are mounted on the forward portions of the side members **112**. At the forward end of the lifting unit a support member **116** of fixed length is pivotally connected at pivot **116L** to the cross member **105** and is pivotally connected at its upper end to the cross member **110**. At the rearward end of the lifting unit a pair of variable length support members **117** are each pivotally connected at their lower ends at pivot **117L** to the cross member **106** and are pivotally connected at their upper ends at pivot points, which are not visible in Fig. 8, to the cross member **113**.

A mounting pad **118** is provided at the forwardmost end portions of the side members **104** of the base frame. An upright **119** is supported and mounted on the mounting pad **118**. A winch **121**, which includes a hand wheel **122**, is mounted on the upper end of the upright **119** and is provided with a lifting cable **123** which passes through a block **124** connected to a medial position of the upright **119**. The lifting cable **123**, after passing through the block **124** is attached to the forward end of the deck frame **103**. The upright **119** is further supported from the base frame by a pair of braces **125** which are connected at their lower ends to the side members **104** at the apexes **104A** of these angled side members. A mounting plate **126** interconnects the forward and upward ends of the braces **125** and is attached to the upright **119** so that the upright is supported from the base frame in a rigid manner. The angularity of the side members **104** of the base frame and the tension rods **107** permit the forces transferred to these members by the lifting action of the winch to be taken up by the base frame with very little deflection of the base frame.

The operation of the embodiment of the invention illustrated in Fig. 8 is like that set out in detail with respect to the embodiment illustrated in Fig. 6.

As with the triangular-shaped lift illustrated in Fig. 6 the embodiment illustrated in Fig. 8 can easily be made into a trailer by the addition of wheels and a hitch. In the embodiment illustrated in Fig. 8 a pair of wheels can be attached to the projecting ends of the cross member **106** either directly or with pivoted arms so that the wheels can be let-down or raised up. Springs can be incorporated with such wheels if desired. The hitch is preferably attached to the base of the upright **119**.

With both of the triangular-shaped lifting units as illustrated in Figs. 6 and 8, it is possible to utilize only a single lifting cable, whereas the conventional lifting units heretofore known require double cables. The single cable offers the advantages of a lifting unit which is more economically constructed and troublefree in its operation than the conventional double cable lifting devices. As pointed out in the descriptions of operation of the various embodiments of the boat lifting units constructed in accordance with this invention, the telescoping action of the rear support members of the various embodiments of this invention permit an angular inclination of the deck frame during the lifting operation which avoids a pull through substantially the dead center of the pivots of the base and deck frames, and thus permits a lifting cable to be connected to a forward portion of the deck frame rather than requiring dual, boat straddling connections at a central portion of the deck frame as in conventional lifting devices.

It should be noted also that the tubular frame, as illustrated in various figures of the drawings, also permits convenient attachment of auxiliary leveling devices or other types of standards for installing the unit at dockside.

Another advantage provided by the variable length support members lies in the manner in which the variable length members permit the forward end of the deck frame to rise before the rearward end to facilitate the positioning of the boat on the lift. Thus, the forward end of the boat may be positioned first and then the rearward end a bit later. This is especially an advantage in rough weather when it may be difficult for one person to hold the boat in place while cranking the lift up enough to make contact with the boat.

Thus in accordance with this invention there is provided a lifting unit which incorporates support members of variable length which are contracted in the process of lifting the frame from a lowered to an erected position to permit a portion of the lifting unit to assume an intermediate inclined position with respect to the base unit to thereby avoid transmission of the lifting force directly through the pivot points. By reason of the contracting action of the support members, a lifting cable can be attached to the extreme forward end of the lifting unit and thereby enabling utilization of a more narrow lifting unit than previously known devices, which have required a cable connection to the central portion of the lifting unit. This reduced width, in combination with the preferred tubular construction, enables the lifting unit to be quickly and simply converted for use as a trailer by the addition of wheels to selected points on the lifting unit. A swinging stop may be incorporated to minimize any danger of damaging the boat and to provide a more positive stopping action at the fully erect position. A boat lift constructed in accordance with this invention can be produced at a lower cost than previously known lifting units.

Hence, while I have illustrated and described the preferred embodiments of my invention, it is to be understood that these are capable of variation and modification.

I claim:

1. A boat lifting unit comprising, a base frame having a forward and a rearward end, a deck frame for supporting a boat and having a forward and a rearward end, means connecting the deck frame to the base frame and comprising at least one member of fixed length pivotally connected to both the base and deck frames at points adjacent the forward ends thereof and a pair of members of variable length each pivotally connected to both the base and deck frames at points adjacent the rearward ends thereof, lifting means for lifting the deck

frame from a first position wherein the deck frame resides on the base frame to a second position wherein the deck frame is supported above the base frame by said members of fixed and variable length, said lifting means acting on the variable length members to contract said members during movement of said deck frame from the first position to the second position.

2. A boat lifting unit comprising, a base frame having a forward and a rearward end, a deck frame for supporting a boat and having a forward and a rearward end, means connecting the deck frame to the base frame comprising at least one member of fixed length pivotally connected to both the base and deck frames at points adjacent the forward ends thereof and a pair of members each having telescoping tubular elements and each pivotally connected to both the base and deck frames at points adjacent the rearward ends thereof, lifting means for lifting the deck frame from a first, lower position wherein the deck frame resides on the base frame to a second, upper position wherein the deck frame is supported above the base frame by said member of fixed length and said telescoping tubular members, and said lifting means acting on the telescoping members to telescope said members from an extended to a retracted position during movement of said deck frame from the first position to the second position.

3. A boat lifting unit comprising, a base frame and a deck frame each comprising a pair of spaced parallel extending side members interconnected by cross members at the forward and rearward ends thereof, means connecting the deck frame to the base frame comprising a pair of parallel members of fixed length pivotally connected at the ends thereof to the forward cross members of both the base and deck frames and a pair of parallel members of variable length each pivotally connected at the ends thereof to the rearward cross members of both the base and deck frames, lifting means for rotating the deck frame from a first position wherein the deck frame resides on the base frame to a second, upright position wherein the deck frame is supported above the base frame by said members of fixed and variable length, said lifting means acting on the variable length members to contract said members during rotation of said deck frame from the first position to the second position.

4. A boat lifting unit comprising, a base frame and a deck frame each shaped generally like an isosceles triangle and each having a forward end at the apex of the triangle and a rearward end at the base of the triangle, means connecting the deck frame to the base frame comprising a member of fixed length pivotally connected to both the base and deck frames at points adjacent the forward ends thereof and a pair of members of variable length each pivotally connected to both the base and deck frames at points adjacent the rearward ends thereof, lifting means for rotating the deck frame from a first, let-down position of the lifting unit wherein the deck frame resides on the base frame to a second, upright position of the lifting unit wherein the deck frame is supported above the base frame by said members of fixed and variable length, said lifting means acting on the variable length members to contract said members during rotation of said deck frame from the first position to the second position.

5. A boat lifting unit comprising, a base frame and a deck frame each having forward and rearward ends, means connecting the deck frame to the base frame comprising at least one member of fixed length pivotally connected to both the base and deck frames at points adjacent the forward ends thereof and a pair of members of variable length each pivotally connected to both the base and deck frames at points adjacent the rearward ends thereof, lifting means including a winch mounted on the base frame and a cable extending from the winch and connected to the deck frame at the forwardmost portion thereof for rotating the deck frame from a first, let-down position of the lifting unit wherein the deck frame resides on the base frame to a second, upright position of the lifting unit wherein the deck frame is supported above the base frame by said members of fixed and variable length, said lifting means acting on the variable length members to contract said members during rotation of said deck frame from the first position to the second position.

6. A boat lifting unit comprising, a base frame and a boat carrying deck frame each having forward and rearward ends, means connecting the deck frame to the base frame comprising at least one member of fixed length pivotally connected to both the base and deck frames at points adjacent the forward ends thereof and a pair of members of variable length each pivotally connected to both the base and deck frames at points adjacent the rearward ends thereof, stop means at both the forward and rearward ends of the base frame, lifting means for rotating the deck frame from a first, let-down position of the lifting unit wherein the deck frame resides on the stop means at the rearward end of the base frame to a second, upright position of the lifting unit wherein the deck frame is supported above the base frame by said members of fixed and variable length and the fixed length member abuts the stop means at the forward end of the base frame, said lifting means acting on the variable length members to contract said members during rotation of said deck frame from the first position to the second position.

7. A boat lifting unit comprising, a base frame and a deck frame each having forward and rearward ends, means connecting the deck frame to the base frame comprising at least one member of fixed length pivotally connected to both the base and deck frames at points adjacent the forward ends thereof and a pair of members of variable length each pivotally connected to the both base and deck frames at points adjacent the rearward ends thereof, winch means for lifting the deck frame from a first, let-down position of the lifting unit wherein the deck frame resides on the base frame to a second, upright position of the lifting unit wherein the deck frame is supported above the base frame by said members of fixed and variable length, movement of the winch means in a deck frame raising direction being operative first to cause contracting movement of the variable length members to permit the winch means to raise the forward portion of the deck frame to a position intermediate the first and second positions wherein the deck frame is inclined with the base frame, and continued movement of the winch means in a deck frame raising direction being operative to raise the deck frame to said second position.

8. A boat lifting and carrying unit comprising a triangular shaped base frame and a triangular shaped boat carrying deck frame each having a front cross member extending transversely of the frame adjacent the apex of the frame and a rear cross member extending transversely of the frame adjacent the base of the triangular frame, a rigid member of fixed length pivotal at opposite ends on the front cross members of the base and deck frames, a pair of spaced, parallel extending, variable length members each having telescoping elements and each pivotal at opposite ends on the rear cross members of the base and deck frames, winch means mounted on said base frame for lifting said deck frame and including a cable connected to a forward portion of said deck frame for rotating said fixed and variable length members about the pivotal connections to said base frame cross members to lift the deck frame from a first position wherein the deck frame resides on the base frame to a second position wherein the deck frame is supported above the base frame by said members of fixed and variable length, said variable length members being telescoped from a first, extended position to a

second, contracted position by movement of said winch means in a deck frame lifting direction, and wheels detachably mounted on the base frame for permitting overland transporting of said boat lifting and carrying unit.

9. A boat lifting unit comprising, a base frame having a forward and rearward end, a deck frame having a forward and rearward end, means connecting the deck frame to the base frame and comprising members of fixed length pivotally connected to both the base and deck frames at points adjacent the forward ends thereof and a pair of members of variable length, each pivotally connected to both the base and deck frames at points adjacent the rearward ends thereof, lifting means for lifting the deck frame from a first, let-down position wherein the deck frame resides on the base frame to a second, upright position wherein the deck frame is supported above the base frame by said members of fixed and variable length, said lifting means acting on the variable length members to contract said members during movement of said deck frame from the first position to the second position and stop means pivotally mounted on the lifting unit and swingable from a lower, inoperative position to a raised, operative position by lifting movement of the fixed length members.

10. A boat lifting unit comprising, a base frame and a deck frame each having forward and rearward ends, means connecting the deck frame to the base frame comprising at least one forward support member pivotally connected to both the base and deck frames at points adjacent the forward ends thereof and at least one rearward support member pivotally connected to both the base and deck frames at points adjacent the rearward

ends thereof, means including telescoping elements incorporated in said boat lifting unit for providing a tilting of the deck frame with respect to the base frame during raising of the deck frame from the base frame, lifting means for lifting the deck frame from a first, let-down position of the lifting unit wherein the deck frame resides on the base frame to a second, upright position of the lifting unit wherein the deck frame is supported above the base frame by said support members, movement of the lifting means in a deck frame raising direction being operative first to cause telescoping movement of the telescoping elements to permit the winch means to raise the forward portion of the deck frame to a position intermediate the first and second positions wherein the deck frame is inclined with the base frame, and continued movement of the winch means in a deck frame raising direction being operative to raise the deck frame to said second position.

References Cited in the file of this patent

UNITED STATES PATENTS

1,080,581	Preece	Dec. 9, 1913
1,369,194	Sarver	Feb. 22, 1921
1,370,002	Barret	Mar. 1, 1921
1,622,201	Little	Mar. 22, 1927
1,906,403	Nolan	May 2, 1933
2,230,014	Raven	Jan. 28, 1941
2,271,071	Haber	Jan. 27, 1942

FOREIGN PATENTS

17,243	Great Britain	July 21, 1914
476,157	Italy	Nov. 29, 1952