Nov. 9, 1965 R. B. SMITH 3,216,704

BOAT HOIST

Filed Dec. 30, 1963 2 Sheets-Sheet 1

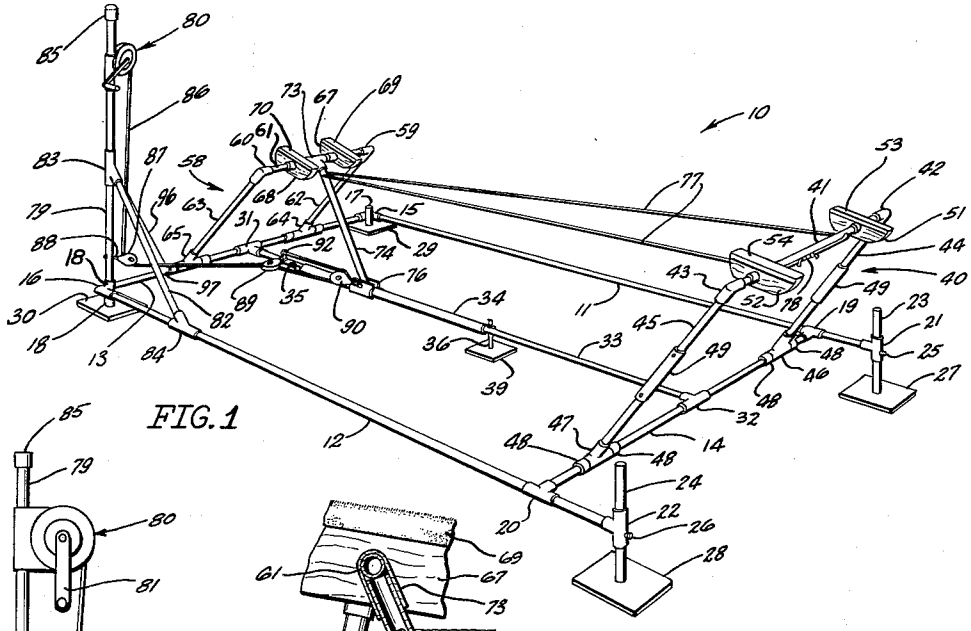


FIG. 1

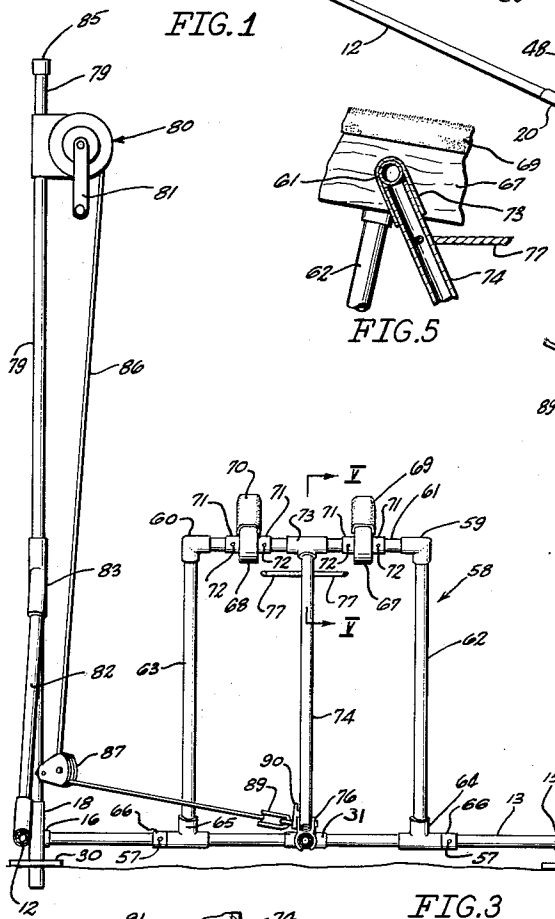


FIG. 3

FIG. 5

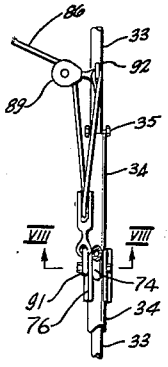


FIG. 7

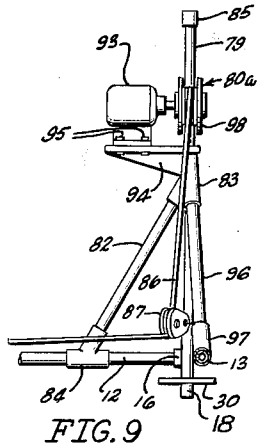


FIG. 9

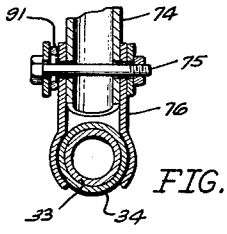


FIG. 8

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BOAT HOIST

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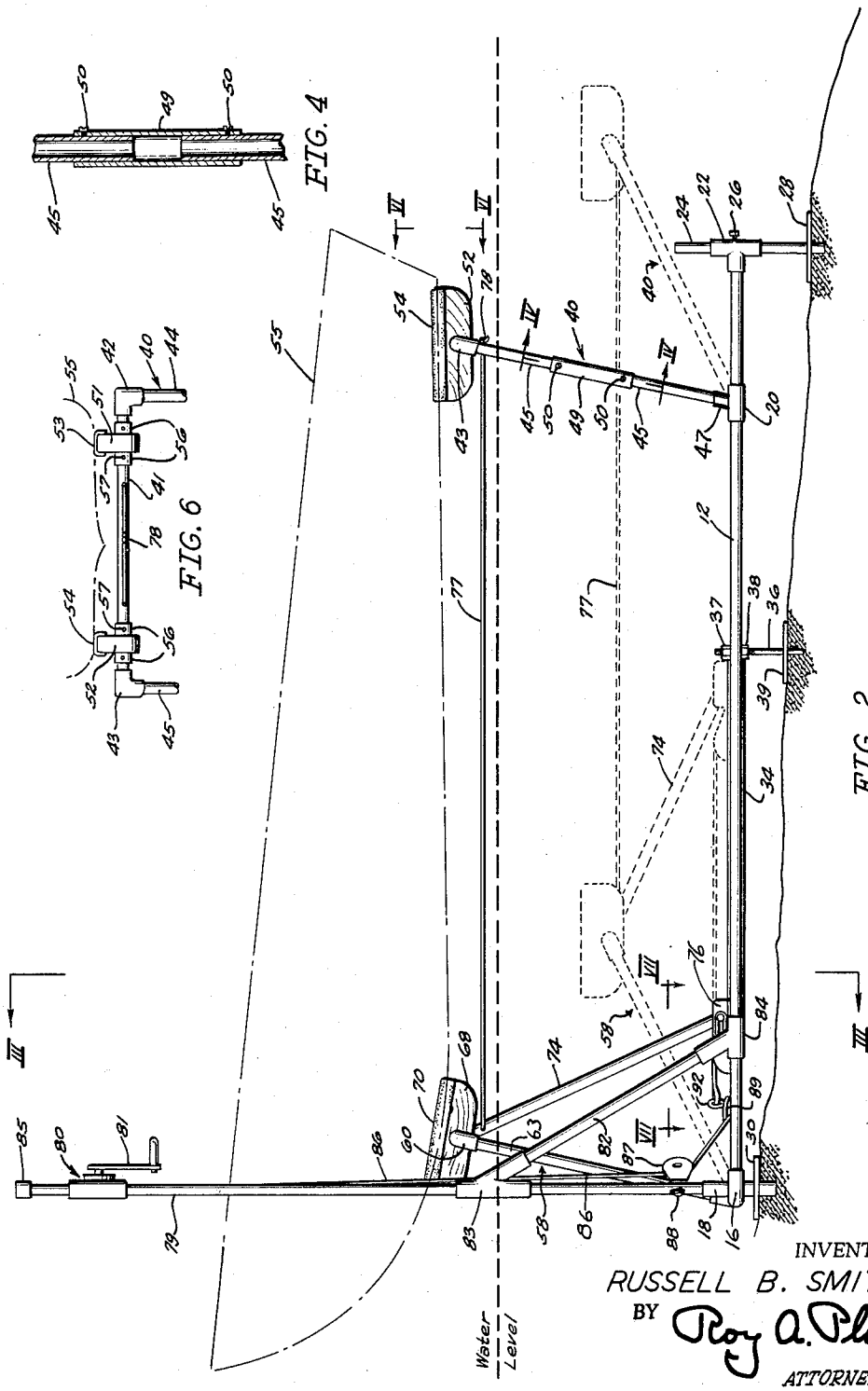


FIG. 2

FIG. 4

FIG. 6

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BOAT HOIST

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11 Claims. (Cl. 254—128)

The present invention relates broadly to lifting equipment, and more specifically to a boat rasing and lowering mechanism adapted to be placed in the water alongside a dock to which the boat would be normally moored.

It is the standard practice with small boats to either drag them out of the water onto shore or onto a dock, or else anchor them out in moderately deep water or tie them to the side of a dock for storage between times of use. These various procedures are all subject to disadvantages, such as scraping paint from the boat hull, along with the hard work involved in pulling the boat out of the water, getting to and from a boat anchored out from shore and away from a dock, and lastly, where a boat is anchored to the side of a dock there is the matter of the boat chafing and banging against the side of the dock under the wave action caused by passing boats, as well as bad weather.

In recognition of the above difficulties several devices have been proposed for use in lifting the boat out of the water alongside of a dock when the boat is to be left unattended for any period of time. This previously proposed apparatus has had many drawbacks for the ordinary small boat owner, such as being too complex and expensive, unreliable, too difficult to use, non-adjustable, or the like. It was a recognition of these shortcomings in the previously attempted solution of the problem of how to get a small boat out of the water alongside a dock which led to the conception and development of the present invention.

Accordingly, among the objects of the present invention is the provision of a highly simplified and low-cost boat hoist which can be set in the water alongside a boat dock, with all but the hoist actuating portion being under water when not in use.

Another object is to provide a hinged mechanism adapted to engage the bottom of the boat, fore and aft, for lifting purposes and with the lifting power of the mechanism increasing as the boat is lifted.

Another object is to provide a boat hoist which not only has a winch or the like for use in lifting and lowering the boat but also supplemental lifting aids such as a power increasing pulley and cable assembly and/or a semi-toggle action link arrangement.

A further object is to provide a boat hoist which has frame leveling support members so that the boat hull engaging members will substantially simultaneously engage same fore and aft when the boat is to be raised.

A further object is to provide a boat hoist wherein a major portion of same can be made from the standard parts found on the open market, and which is of moderately low cost, easily operated, and very stable in use.

Still further objects and advantages of the invention will appear as the description proceeds.

To the accomplishment of the foregoing and related ends, the invention, then, consists of the hoist means hereinafter fully described and particularly pointed out in the claims, the annexed drawings and the following description setting forth in detail certain means for carrying out the invention, such disclosed means illustrating, however, but several of various ways in which the principle of the invention may be used.

In the annexed drawings:

FIGURE 1 shows a perspective view of the boat hoist of the present invention with the boat hull contacting members in partially elevated position.

FIGURE 2 is a side elevation of the boat hoist hull contacting members in elevated position, while their lowered position is shown in dashed lines.

FIGURE 3 is a cross sectional view of the boat hoist as taken along line III—III of FIGURE 2, looking in the direction of the arrows.

FIGURE 4 is a sectional view as taken along line IV—IV of FIGURE 2, looking in the direction of the arrows.

FIGURE 5 is a sectional view as taken along line V—V of FIGURE 3, looking in the direction of the arrows.

FIGURE 6 is a fragmentary end view of the rear supporting assembly as taken along line VI—VI of FIGURE 2, looking in the direction of the arrows.

FIGURE 7 is a fragmentary central top section view as taken along line VII—VII of FIGURE 2, looking in the direction of the arrows.

FIGURE 8 is a fragmentary sectional view as taken along line VIII—VIII of FIGURE 7, looking in the direction of the arrows.

FIGURE 9 is a fragmentary sectional view of a modified form of the winch actuating mechanism wherein an electric motor is used to supply the boat hoist operating power.

Referring to FIGURE 1 of the drawings, it will be noted that the boat hoist assembly **10** has bottom side rails **11** and **12** with a front cross rail **13** and a rear cross rail **14** joining said bottom side rails together. Said front cross rail **13** is threadedly or otherwise connected at its ends to elbow fittings **15** and **16** with the opposite end of each of said elbow fittings, respectively, threadedly or otherwise joined to the corresponding ends of said bottom side rails **11** and **12**. Welded or otherwise fastened to said elbow fittings **15** and **16** are tubular members **17** and **18** which extend substantially perpendicular to the plane of said elbow fittings. The rear cross rail **14** is joined at its ends to side rails **11** and **12** by means of T-fittings **19** and **20** which are preferably slid onto and then anchored in place to said side rails in any suitable manner such as by welding or brazing. At the outer end of bottom side rails **11** and **12**, adjacent rear cross rail **14**, they are provided with T-fittings **21** and **22** mounted in planes perpendicular, respectively, to that of T-fittings **19** and **20**. Said T-fittings **21** and **22** may be anchored in place on the ends of bottom side rails **11** and **12** in any conventional manner, such as by threading, welding or brazing.

In order to provide good bottom support for the rear cross rail end of the boat hoist assembly **10**, endwise adjustable tubular members **23** and **24** are mounted on and pass through T-fittings **21** and **22** for endwise adjustment and anchoring by means of setscrews **25** and **26** as shown in FIGURE 1. Adjacent the lower end of said tubular members **23** and **24**, they are provided with supporting plates **27** and **28** perpendicular thereto and anchored to same in any conventional manner, such as by welding or brazing. The lower end of said tubular members **23** and **24** preferably extends below supporting plates **27** and **28**, FIGURE 2, so as to resist shifting of the boat hoist assembly **10**. The tubular members **17** and **18** at the ends of front cross rail **13** are also preferably provided with an extended through supporting plates **29** and **30**, FIGURE 3, and may be anchored to same in any conventional manner, such as by welding or brazing.

Connecting the central portion of front cross rail **13** to the central portion of rear cross rail **14**, by means of T-fittings **31** and **32** conventionally anchored thereto,

is a tubular connecting member **33**. Closely fitting on connecting member **33** is a stiffening and reinforcing tubular member **34**, the forward end of which is preferably positioned by a stop pin **35**, FIGURE 7, while the rearward end may be stopped by a threaded rod **36** with adjusting nuts **37** and **38**, FIGURE 2. The lower end of threaded rod **36** is prefrably provided with a supporting plate **39** to support the central portion of connecting member **33** under conditions of use of the boat hoist assembly **10**, as will be hereinafter described.

Mounted on rear cross rail **14** is rear supporting assembly **40** which has a top rail **41** with elbow mounting members **42** and **43** on its ends, FIGURES 1 and 6. Supporting arms **44** and **45** threadedly engage said elbow mounting members **42** and **43** and extend down to T-fittings **46** and **47**, FIGURE 1, rotatably mounted on rear cross rail **14**. These T-fittings **46** and **47** are held in suitable position, as shown in FIGURE 1, by means of adjustable position stop collars **48**, preferably of the type shown in FIGURE 6. Supporting arms **44** and **45** are preferably made adjustable in length to meet varying requirements of the boat hoist, for instance, by cutting them in two, FIGURE 4, and fitting a sleeve **49** over the cut ends and providing this sleeve **49** with setscrews **50** adjacent each end of same for anchoring the cut ends at predetermined spacing from each other.

Mounted on top rail **41**, FIGURES 1 and 6, are a pair of boat keel supporting members **51** and **52** which are preferably provided on the boat keel contacting face of same with suitable fiber or rubber padding **53** and **54**. The rear end of these keel supporting members are preferably made slightly heavier than the front end of same so that they will tilt slightly as shown in FIGURE 1 to facilitate the passage of a boat **55** thereon. These keel supporting members **51** and **52** are preferably held in predetermined position on top rail **41** by means of stop collars **56**, FIGURE 6, having setscrews **57**.

Mounted on front cross rail **13**, FIGURES 1 and 3, is a front supporting assembly **58** which has a top rail **61** with elbow mounting members **59** and **60** threadedly fastened on its ends. Supporting arms **62** and **63** threadedly engage said elbow mounting members **59** and **60** and extend down to T-fittings **64** and **65** rotatably mounted on front cross rail **13**. These T-fittings **64** and **65** may be held in suitable position, as shown in FIGURE 3, by means of conventional adjustable position stop collars **66**. Mounted on top rail **61** are a pair of boat prow supporting members **67** and **68** which are preferably provided on the prow contacting face of same with suitable fiber or rubber padding **69** and **70**. The rear end of these prow supporting members are also preferably made slightly heavier than the front end of same so that they will tilt slightly as shown in FIGURE 1 to facilitate the passage of the boat **55** thereon, FIGURE 2. These prow supporting members **67** and **68** are preferably held in predetermined position on top rail **61** by means of stop collars **71**, FIGURE 3, having setscrews **72**.

Freely mounted for rotation on top rail **61**, between prow supporting members **67** and **68**, is a T-fitting **73** with the side connecting portion of same threadedly connected to an operating link **74**, the lower end of which has pivotally mounted thereon as by means of a bolt **75**, FIGURE 8, a slide fitting **76** which slidably engages tubular reinforcing member **34** carried by connecting member **33** with said slide fitting **76** being freely slidable on said reinforcing member **34**.

In order that front supporting assembly **58** will pivotally move substantially in unison with rear supporting assembly **40**, the two are connected together, for instance, by cable means **77**. This cable means is preferably connected in a generally V-pattern as shown in FIGURE 1, with the wide end of the "V" being joined to the rear supporting assembly **40** near the inside faces of supporting members **51** and **52**. If desired, the top rail **41** of rear supporting assembly **40** may be suitably perforated so that the two ends of cable means **77** can be threaded therethrough and then anchored, for instance, by tying them together with a clamp or knot **78**. The front end of cable means **77**, FIGURE 1, instead of being connected direct to top rail **61** of front supporting assembly **58**, is preferably connected to operating link **74** near to T-fitting **73** on the upper end of same and conventionally anchored against shifting on same to stabilize top rail **41** of rear supporting assembly **40** from shifting out of substantial parallelism with rear cross rail **14**. Connecting cable means **77** in this manner to operating link **74** has the further advantage of putting a rearward pulling force on operating link **74** so that slide fitting **76** is normally urged to slide rearward on tubular reinforcing member **34** to thus facilitate the simultaneous pivotal movements of front supporting assembly **58** and rear supporting assembly **40**.

The pivotal raising and lowering of front supporting assembly **58** and rear supporting assembly **40** in unison to raise and lower boat **55** may be readily accomplished, for instance, as shown in FIGURE 1. Here tubular member **18** has fitted into the top of same a tubular upright **79** carrying, adjacent its upper end, a winch **80** of conventional releasable latch type having a drum **98** rotatable by an operating crank **81**. To stabilize upright **79** there is provided a brace member **82** connected at its upper end to tubular upright **79** by means of a Y-fitting **83** and at its lower end to bottom side rail **12** by means of a second Y-fitting **84**. The upper end of tubular upright **79** may be closed, if desired, by means of a cap **85**. An operating cable **86** is fastened to drum **98** of winch **80** so that same may be wound and unwound therefrom as boat **55** is being either raised or lowered as will now be described.

Operating cable **86** extends down from winch **80** to a pulley **87** conventionally fastened to tubular upright **79**, for instance, by means of an eye-bolt **88**, FIGURE 1, near the lower end of upright **79**. This cable **86** then extends inward to a second pulley **89** fastened in similar manner to connecting member **33** adjacent T-fitting **31**, from whence the cable **86** passes through a third pulley **90** fastened by means of an eye-bolt **91**, FIGURE 8, to bolt **75** which mounts slide fitting **76** on the lower end of operating link **74**. After passing through third pulley **90**, FIGURE 1, the end of cable **86** is fastened to another eye-bolt **92** connected to connecting member **33** adjacent T-fitting **31**. Since the run of cable **86** from the second pulley **89** to the third pulley **90** is substantially parallel to the run of cable **86** from the third pulley **90** to eye-bolt **92**, the movement of cable **86** as it is being wound on drum **98** of winch **80** is twice as fast as the movement of slide fitting **76** on reinforcing member **34**. This alone provides a mechanical advantage of two which added to the mechanical advantage of winch **80** and the toggle action obtained through moving the lower end of operating link **74** toward T-fitting **31** is such that a moderate operating force on winch **80** will lift a moderately heavy small boat out of the water, as shown in FIGURE 2.

While a hand-operated winch utilizing an operating handle **81** has been described above, the invention is not limited to that particular construction since, as shown in FIGURE 9, the winch **80***a* may be driven by a suitable reversible and geared down electric motor **93** mounted on a shelf member **94** conventionally supported on tubular upright **79** by means of bolts **95**. In preferred form the Y-fitting **83** is in the form of a double "Y" so that a second brace member **96**, FIGURE 9, may be used and connected by a Y-fitting **97** to front cross rail **13**.

Referring now to FIGURE 2, when the front and rear supporting assemblies **58** and **40**, respectively, are in the lowered dashed-line position, they are ready to have a boat **55** floated thereonto. Then, by operating winch **80** to wind operating cable **86** thereon, this cable will move

slide fitting **76** to the left along reinforcing member **34**, and through the movement of slide fitting **76** and its connection to operating link **74**, the front and rear supporting assemblies are moved to the solid line position, with the boat **55** elevated above normal water level as shown.

To install the boat hoist, it is preliminarily assembled as shown in FIGURE 1 and then carried out and lowered into suitable depth water alongside the conventional small boat dock, with the winch carrying portion of same preferably at the shore end of the boat hoist and adjacent the side of the dock with side rail **12** likewise extending along the dock and close to same. With the boat hoist thus in the water, the tubular members **23** and **24**, respectively, having supporting plates **27** and **28** on the lower ends of same, are adjusted through T-fittings **21** and **22** to approximately level the main frame of the boat hoist assembly, and then setscrews **25** and **26** are tightened to hold the assembly in that position, and with the lower ends of the tubular members **23** and **24** extending down into the ground under supporting plates **27** and **28** which firmly rest on the latter.

The threaded rod **36** carrying supporting plate **39** is then adjusted downward and anchored so that supporting plate **39** firmly rests on the ground under same. Adjusting nuts **37** and **38** are then tightened to hold supporting plate **39** in this position. The forward end of the boat hoist assembly has its supporting plates **29** and **30** also firmly resting on the ground under same. With the assembly thus in place as shown in FIGURE 2, the front and rear supporting assemblies **58** and **40** are then lowered to the dashed-line position shown. A boat **55** may then be moved onto the thus lowered front and rear supporting assemblies **58** and **40** and lifted by conventionally operating the winch **80** to pivotally move said supporting assemblies and raise the boat out of the water tentatively to the position shown in FIGURE 2.

When it is time to use the boat again, it is only a matter of operating the winch **80** to lower said front and rear supporting assemblies **58** and **40** together with the boat, and then leave said front and rear supporting assemblies lowered ready for use again when the boat is returned to elevating position over same. It is thus to be seen that a boat hoist assembly has been provided which is simple and positive in construction, and meets the objectives set forth. While directional terms such as "upper," "lower," et cetera, have been used in connection with this invention, it is to be understood that they have been solely used to facilitate description of the invention in the position illustrated, and are not to be considered as a limitation of the invention.

Other modes of applying the principle of my invention may be employed instead of those explained, change being made as regards the boat hoist apparatus herein disclosed, provided the means stated by any of the following claims or the equivalent of such stated means be employed.

I therefore particularly point out and distinctly claim as my invention:

1. A boat hoist comprising a main frame having sides and front and rear ends, a front supporting means having upper and lower ends, means pivotally mounting the lower end of same on said front end of said main frame, a rear supporting means having upper and lower ends, means pivotally mounting the lower end of same on said rear end of said main frame, means connecting said front and rear supporting means for simultaneous movement of same, said front and rear supporting members having boat supporting means on the upper end of same remote from their pivot mounting means, a connecting means, said connecting means being substantially centered between said main frame side members, means joining said connecting means to said main frame at the front and rear portions of same, an operating link pivotally joined at one end to the upper end portion of said front supporting means, means slidably joining the other end of said operating link to said connecting means for movement in a direction lengthwise of same, said movement of the end of said operating link along said connecting means toward said front end of said frame pivotally moving said front and rear supporting means to elevate the boat supporting members mounted thereon, and means for moving the end of said operating link along said connecting means, wherein said means connecting said front and rear supporting means for simultaneous movement of same is fixedly joined at one end to the upper end portion of said rear supporting means and at its front end to said front supporting means through said operating link at a point below where the latter is pivotally connected to the upper end portion of said front supporting means and remote from the lower end of said operating link to facilitate operating movement of said lower end of the operating link on said connection means.

2. A boat hoist comprising a main frame having sides and front and rear ends, a front supporting means having upper and lower ends, means pivotally mounting the lower end of same on said front end of said main frame, a rear supporting means having upper and lower ends, means pivotally mounting the lower end of same on said rear end of said main frame, means connecting said front and rear supporting means for simultaneous movement of same, said front and rear supporting members having boat supporting means on the upper end of same remote from their pivot mounting means, a connecting means, said connecting means being substantially centered between said main frame side members, means joining said connecting means to said main frame at the front and rear portions of same, an operating link pivotally joined at one end to the upper end portion of said front supporting means, means slidably joining the other end of said operating link to said connecting means for movement in a direction lengthwise of same, said movement of the end of said operating link along said connecting means toward said front end of said frame pivotally moving said front and rear supporting means to elevate the boat supporting members mounted thereon, and means for moving the end of said operating link along said connecting means, wherein said connecting means, along which said operating link is movable, has an adjustable supporting means substantially midlength of same.

3. A boat hoist comprising a main frame having sides and front and rear ends, a front supporting means having upper and lower ends, means pivotally mounting the lower end of same on said front end of said main frame, a rear supporting means having upper and lower ends, means pivotally mounting the lower end of same on said rear end of said main frame, means connecting said front and rear supporting means for simultaneous movement of same, said front and rear supporting members having boat supporting means on the upper end of same remote from their pivot mounting means, a connecting means, said connecting means being substantially centered between said main frame side members, means joining said connecting means to said main frame at the front and rear portions of same, an operating link pivotally joined at one end to the upper end portion of said front supporting means, means slidably joining the other end of said operating link to said connecting means for movement in a direction lengthwise of same, said movement of the end of said operating link along said connecting means toward said front end of said frame pivotally moving said front and rear supporting means to elevate the boat supporting members mounted thereon, and means for moving the end of said operating link along said connecting means, wherein said main frame has supporting means for same at each end thereof, and means at least at one end of said frame adjustably carrying and releasably anchoring said supporting means thereon for operatively positioning and leveling said main frame, and wherein said connecting means, along which said operating link is movable, has an

adjustable supporting means substantially midlength of same.

4. A boat hoist comprising a main frame having sides and front and rear ends, a front supporting means having upper and lower ends, means pivotally mounting the lower end of same on said front end of said main frame, a rear supporting means having upper and lower ends, means pivotally mounting the lower end of same on said rear end of said main frame, means connecting said front and rear supporting means for simultaneous movement of same, boat supporting members mounted on said front and rear supporting members remote from said pivot mounting means of same, a connecting means, said connecting means being substantially centered between said main frame side members, means joining said connecting means to said main frame at the front and rear portions of same, an operating link pivotally joined at one end to the upper end portion of said front supporting means, means slidably joining the other end of said operating link to said connecting means for movement in a direction lengthwise of same, said movement of the end of said operating link along said connecting means toward said front end of said frame pivotally moving said front and rear supporting means to elevate the boat supporting members mounted thereon, an upright member at one corner of said main frame at the front end of same, means stabilizing said upright member on said main frame, a winch mounted on said upright member at a point remote from said main frame, means connecting said winch to the lower end of said operating link for pulling same toward said front cross rail and elevating said front and rear supporting means, and means for operating said winch.

5. A boat hoist as set forth in claim 4, wherein said means connecting said inch to the lower end of said operating link is in the form of a cable and pulley system, and said means for operating said winch is in the form of a crank.

6. A boat hoist as set forth in claim 4, wherein said main frame has supporting means for same at each end thereof, and means at least at one end of said frame adjustably carrying and releasably anchoring said supporting means thereon for operatively positioning and leveling said main frame.

7. A boat hoist as set forth in claim 5, wherein said main frame has supporting means for same at each end thereof, and means at least at one end of said frame adjustably carrying and releasably anchoring said supporting means thereon for operatively positioning and leveling said main frame.

8. A boat hoist as set forth in claim 4, wherein said means connecting said front and rear supporting means for simultaneous movement of same is fixedly joined at one end to the upper end portion of said rear supporting means and at its front end to said front supporting means through said operating link at a point below where the latter is pivotally connected to said front supporting means and remote from the lower end of said operating link to facilitate operating movement of said lower end of the operating link on said connecting means.

9. A boat hoist as set forth in claim 4, wherein said connecting means, along which said operating link is movable, has an adjustable supporting means substantially midlength of same.

10. A boat hoist as set forth in claim 5, wherein said connecting means, along which said operating link is movable, has an adjustable supporting means substantially midlength of same.

11. A boat hoist comprising a main frame having sides and front and rear ends, a front supporting means having upper and lower ends, means pivotally mounting the lower end of same on said front end of said main frame, a rear supporting means having upper and lower ends, means pivotally monuting the lower end of same on said rear end of said main frame, means connecting said front and rear supporting means for simultaneous movement of same, boat supporting members pivotally mounted on said front and rear supporting members remote from said pivot mounting means of same, a connecting means, said connecting means being substantially centered between said main frame side members, means joining said connecting means to said main frame at the front and rear portions of same, an operating link pivotally joined at one end to the upper end portion of said front supporting means, means slidably joining the other end of said operating link to said connecting means for movement in a direction lengthwise of same, said movement of the end of said operating link along said connecting means toward said front end of said frame pivotally moving said front and rear supporting means to elevate the boat supporting members mounted thereon, an upright member at one corner of said main frame at the front end of same, brace means connecting said upright member to a bottom side rail and to the front cross rail, a winch of conventional releasable latch type mounted on said upright member at a point remote from said main frame, said winch having a drum, a cable and pulley system connecting the drum of said winch to the lower end of said operating link for pulling the latter toward said front cross rail when said cable is wound on the drum of said winch, a crank for rotating the drum of said winch, said means connecting said front and rear supporting means for simultaneous movement of same being fixedly joined at one end to the upper portion of said rear supporting means and at its front end to said front supporting means through said operating link at a point below where the latter is pivotally connected to the upper end portion of said front supporting means and remote from the lower end of said operating link so as to apply a rearward pull on said operating link in opposition to the pull of said cable, and an adjustable supporting means for said connecting means located substantially midlength of the latter.

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