United States Patent

Muschell

[15] **3,686,876**

[45] **Aug. 29, 1972**

[54] REMOVABLE PIER CONSTRUCTION

[72] Inventor: **James E. Muschell**, 111 N. Main St., Cheboygan, Mich. 49721

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[52] U.S. Cl. **61/48**, 114/71

[51] Int. Cl. **E02b 3/20**

[58] Field of Search 61/48, 46, 46.5; 14/71

[56] **References Cited**

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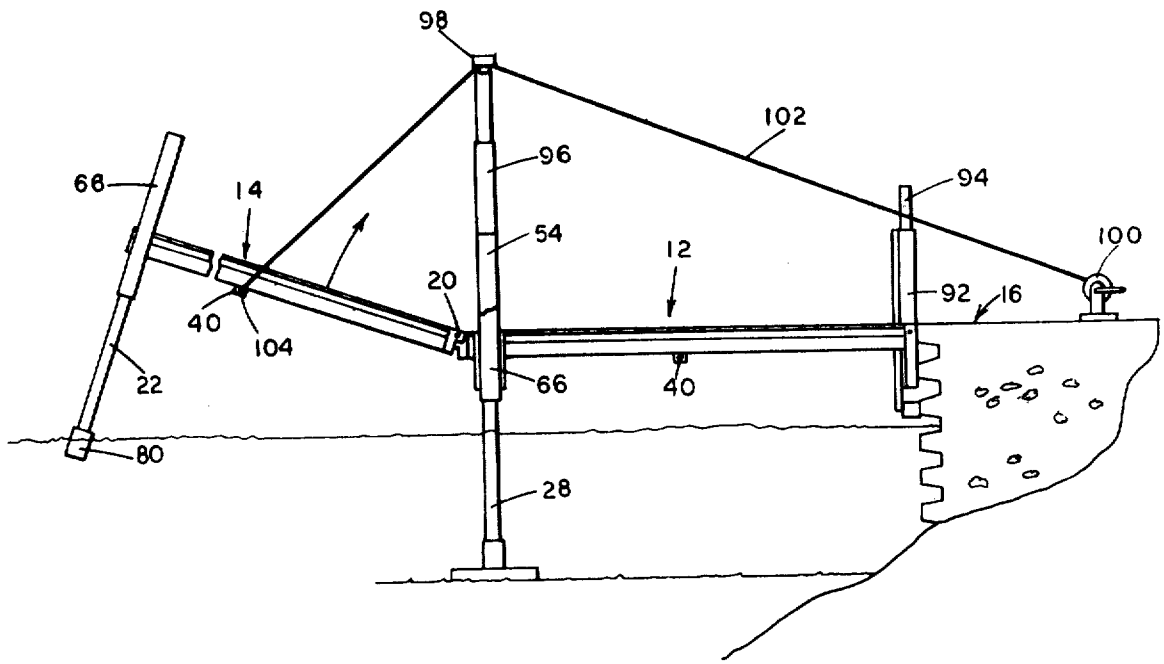
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Primary Examiner—Jacob Shapiro
Attorney—John E. McGarry

[57] **ABSTRACT**

A removable pier having at least two sections pivotably joined end to end and extending from a footing on a shore into a body of water. The pier sections are removably supported on permanent footings for stability. Booms having cable guides are removably mounted on leg extensions of the inner pier section. Cables, driven by winches, pass through the cable guides on the boom and engage the outer pier section for its removal from the water by rotation about its pivotable connection with the inner pier section. The booms are transferred to mounts on the shore at the sides of the pier for removal of the inner pier section from the water with the outer pier section in overlying position. The outer pier section is preferably slightly shorter than the inner pier section so that both pier sections can be stored in upright position on the shore ready for repositioning in the water.

13 Claims, 7 Drawing Figures



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SHEET 1 OF 3

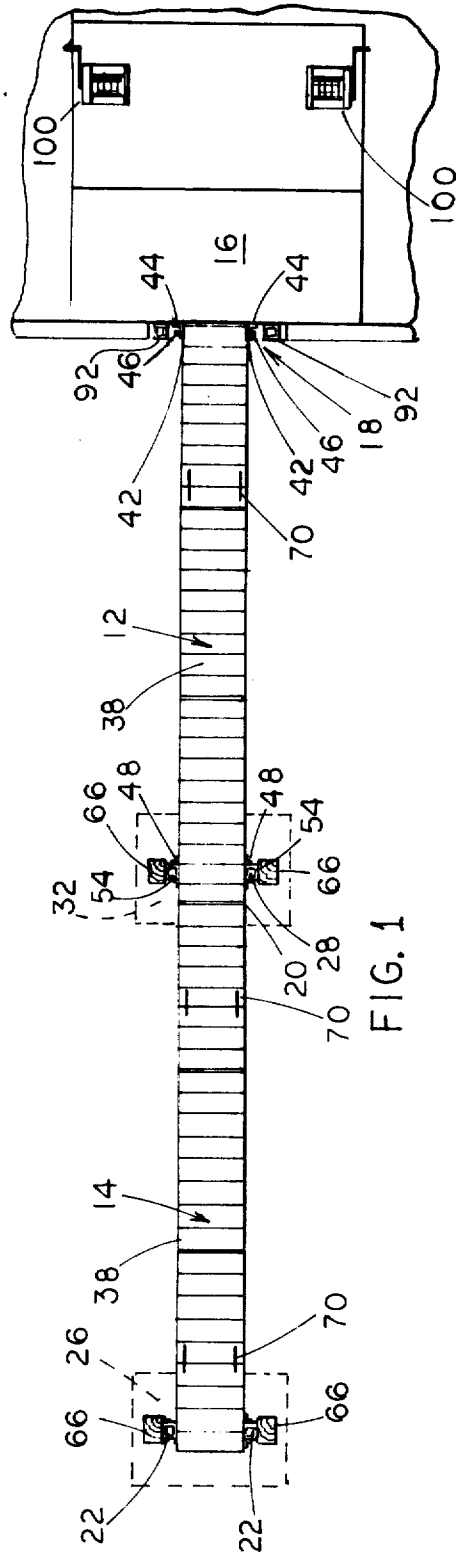


FIG. 1

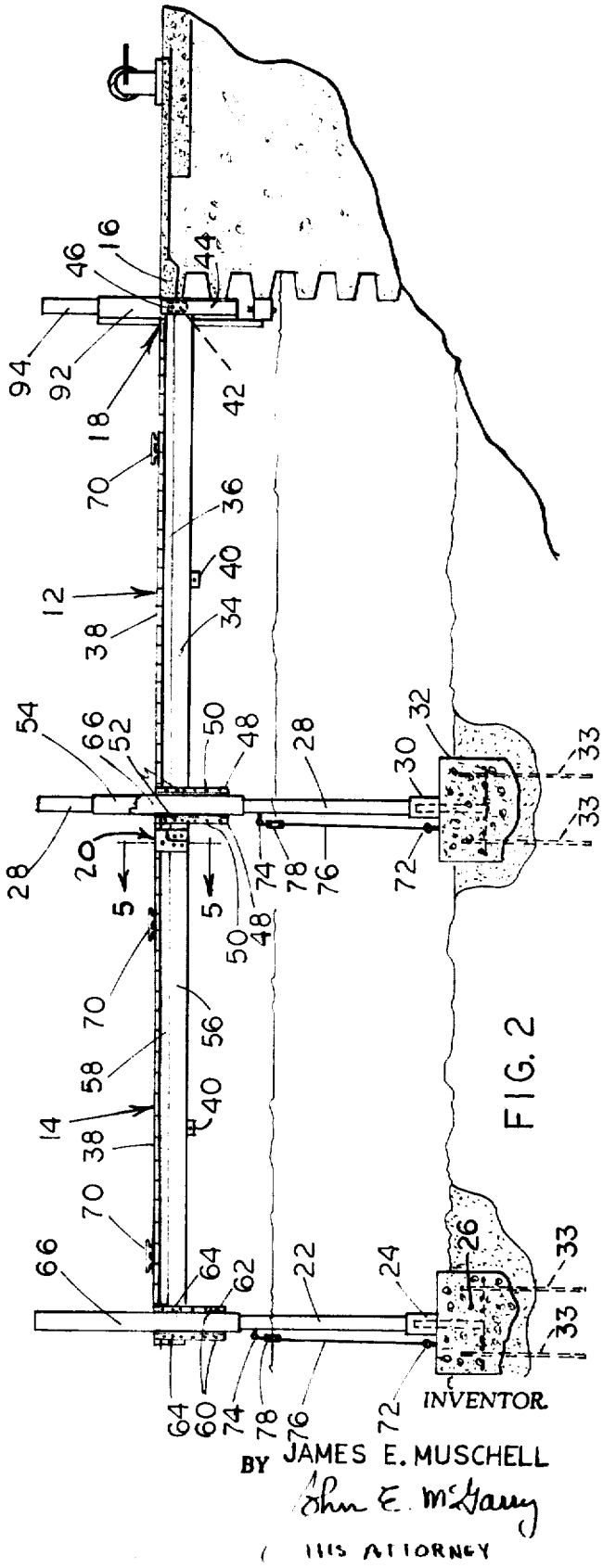


FIG. 2

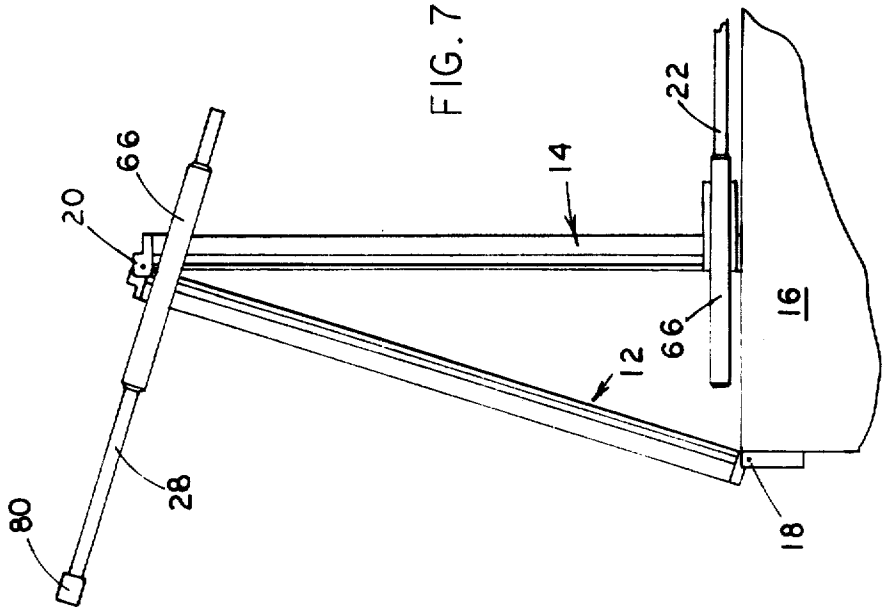
INVENTOR.

BY JAMES E. MUSCHELL

John E. McGarry

HIS ATTORNEY

FIG. 7



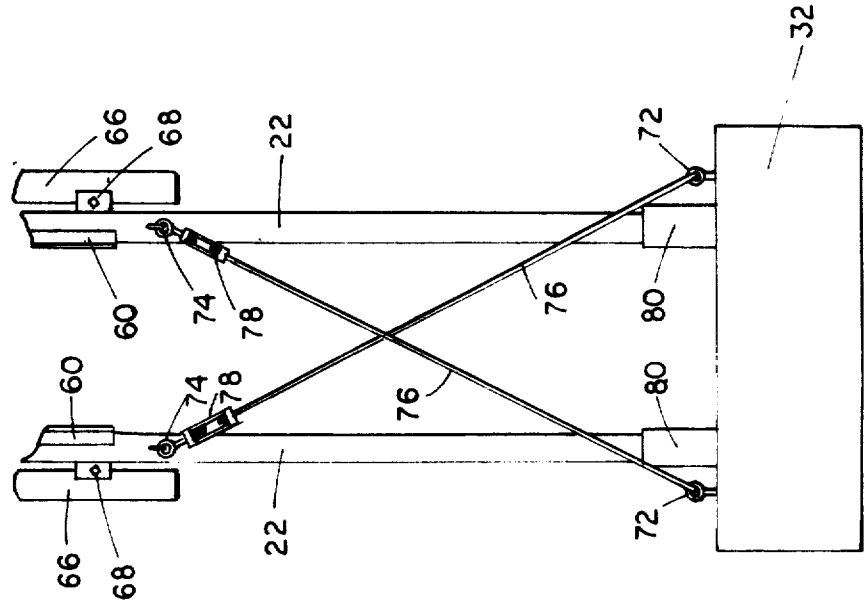


FIG. 3

INVENTOR.
JAMES E MUSCHELL
BY John E McGarry
ATTORNEY

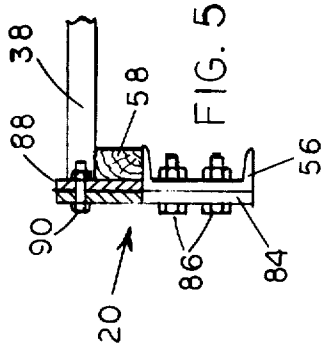


FIG. 5

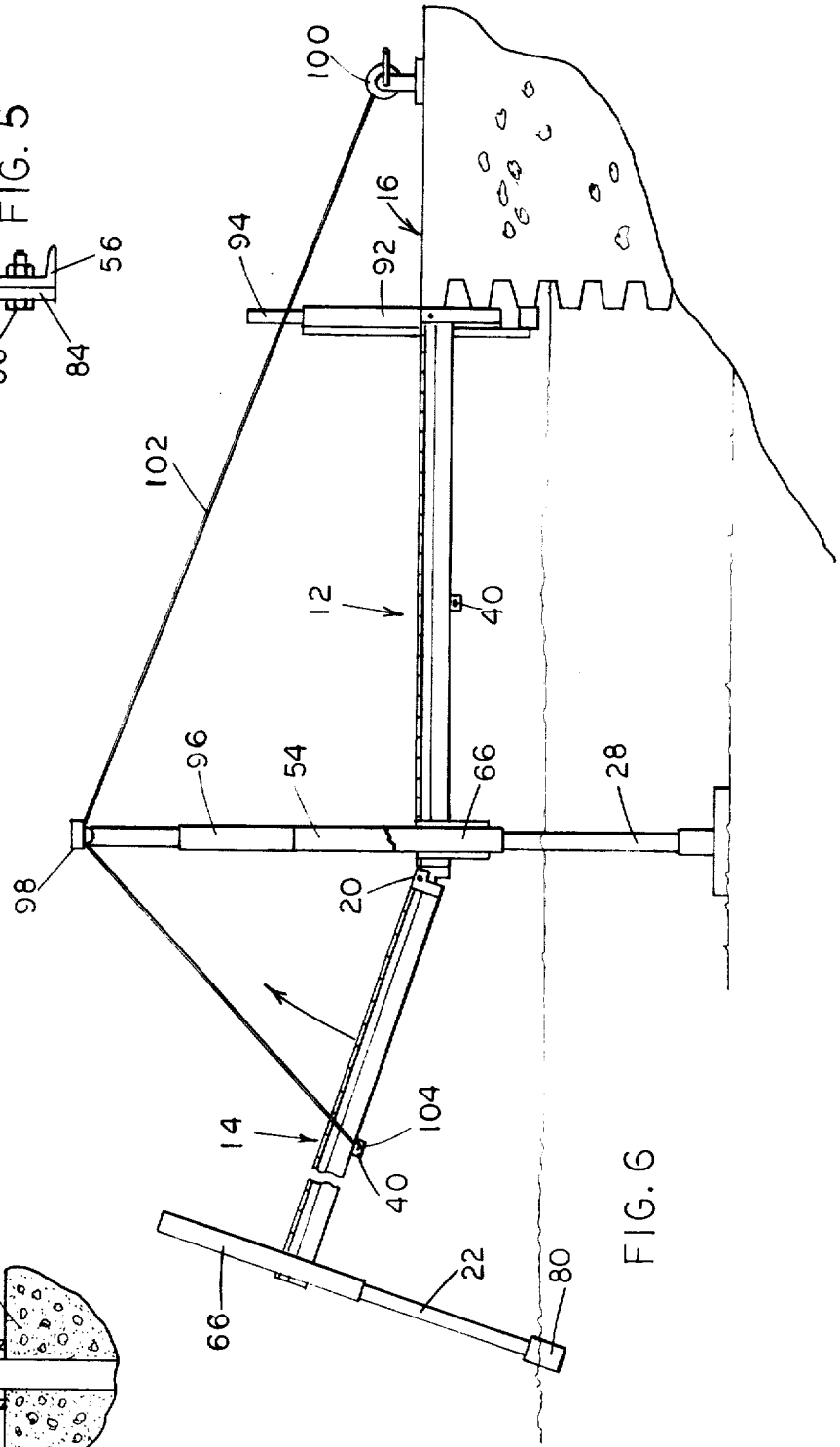


FIG. 6

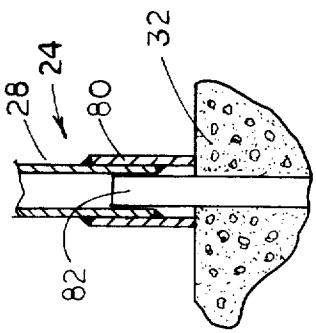


FIG. 4

INVENTOR.
JAMES E MUSCHELL
BY John E. McGarry
HIS ATTORNEY

REMOVABLE PIER CONSTRUCTION

BACKGROUND OF THE INVENTION

Field of the Invention

This invention relates to piers which are stabily positioned in the water for normal use and are easily removable from the water for winter storage. More specifically, the invention relates to a movable pier construction with improved support means for stability and means for easily removing the pier from the water.

State of the Prior Art

In colder climates of the world where lakes and other bodies of water freeze over in the winter or otherwise have large accumulations of ice, it is necessary to remove piers and docks from the water to prevent damage thereto from ice. It has been heretofore proposed that piers be formed in sections which are pivotably joined together at their ends for ease in installing and removing from the water. For example, see U.S. Pat. No. 1,358,951, Helmich, and U.S. Pat. No. 3,043,109, Erickson. These structures have pier sections which are supported on legs which engage the bottom of the lake or stream and support the outer ends of each pier section. Of necessity, however, the bottom of the legs must be easily removed from and easily repositioned in the bottom of the lake in order to facilitate the removal of the pier sections from the water. This removability feature has made these piers of light construction and easily shiftable with respect to the lake bottom so that larger boats cannot be accommodated without the likelihood of damaging the piers.

Another problem with the piers is that it is often difficult to remove the piers from the water. The removal usually requires the assistance of many people, at least some of which must enter the water at cold times of the year. One solution to this problem has been suggested by Karst in U.S. Pat. No. 2,948,121. In the Karst structure, pier sections are pivotably and removably mounted with respect to each other. Placement and removal of each pier section is assisted with a winch and a crane arrangement. However, the structure cannot be used for removal of the section closest to shore. In addition, the crane is positioned in the central longitudinal area of each pier section which placement inhibits the ability of workmen to assist in the removal of the pier sections. In the Karst structure, each section is disengaged from its succeeding section as it is removed from the water.

BRIEF STATEMENT OF THE INVENTION

According to the invention, there is provided a pier construction in which pier sections are pivotably joined to each other for ease of placement in and removal from a body of water. The construction provides a permanent footing arrangement for the legs, yet one which permits easy and quick removal of the each pier section from the water. In addition, means are provided to assist in the removal of and placement of each pier section, including the pier section closest to the bank, from the water without disconnecting each pier section. The removal assisting means is simple in construction, easily installed and does not interfere with the ability of workmen to assist in the insertion and removal of the pier sections from the water.

Briefly, at least two pier sections are pivotably joined together in end to end relationship with one of the pier sections being pivotably joined to a footing on the shore. Means removably support the outer end of each pier section above the surface of the water and means are provided for removing the pier sections from the water. The pier section removal means comprises a boom support extending upwardly from at least one side of the pier section outer end closest to the shore, and the next adjacent pier having cable engaging means spaced outwardly from its inner end. A winch is provided on the shore footing and a cable is wound around the winch, the cable having means to engage the cable engaging means of the outer pier. A boom is removably mounted on the boom support means, the boom being spaced outwardly of the side edges of the pier. Guide means are mounted on the boom for the cable which extends through the guide means and engages the outer pier section. The winch then raises the outer pier section so that it rotates about its pivotable connection with the inner pier section. The placement of the boom permits the outer pier section to rotate through an angle of about 180°so that the outer pier overlies the inner pier. Boom supports are provided at the shore for the boom so that the boom can be transferred to the shore boom supports and the inner pier can be removed from the water with the aid of the winch in a similar manner with the outer pier overlying the inner pier. The pier sections are preferably stored on the shore with the inner end of the inner pier still pivotably joined to the shore footing. The stored pier sections are thus ready for instant replacement in the water with the assistance of the winch and boom.

The pier construction also provides for an improved footing construction for the pier section so that the pier is firmly and solidly positioned in the water for accommodation of larger boats, and yet is easily removable from the water for storage purposes. A permanent footing construction is installed beneath the legs or pier supports. Tubular sockets are provided on the top of the pier supports for removably receiving the legs which support the pier sections. Fastening means extend between the legs and the permanent footings for securely holding the legs within the footing sockets.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be described with reference to the accompanying drawings in which:

FIG. 1 is a plan view of the pier construction;

FIG. 2 is a side elevational view of the pier construction illustrated in FIG. 1;

FIG. 3 is a partial front elevational view of the pier illustrated in FIGS. 1 and 2;

FIG. 4 is an enlarged sectional view of a pier leg and socket arrangement;

FIG. 5 is an enlarged view of a pivot joint, taken along lines 5—5 of FIG. 2;

FIG. 6 is a view like FIG. 2 showing the manner in which the end pier section is removed from the water; and

FIG. 7 is a view of the pier construction with the pier completely removed from the water for storage purposes during winter.

DETAILED DESCRIPTION OF THE DRAWINGS

Referring now to the drawings, there is illustrated a pier extending from a shore out into a body of water.

The pier is formed from sections 12 and 14. Pier section 12 is pivotably joined to a shore footing 16 at the shore through a hinge 18. Pier sections 12 and 14 are pivotably joined together through a hinge 20. A pair of tubular legs are secured to the outer end of pier section 14 and extend down into the water into sockets 24 in a permanent footing 26. A pair of tubular legs 28 are secured to the outer end of pier section 12 and extend downwardly into the water and engage sockets 30 in a permanent footing 32 at the bottom of the water. Each footing 32 is concrete and at least partially buried beneath the bottom of the water. Steel dowels 33 embedded in the footings 32 are driven further down into the ground to securely anchor the footings in the ground beneath the water.

The pier section 12 is constructed from a pair of steel channels 34 which extend longitudinally along the pier section 14. The steel channels can be braced by cross members (not shown) in conventional fashion. Wood nailer members 36 are secured above the channels 34. Deck members 38 are nailed to the wood nailer members 36 to form the top or deck of the pier section 12. Cable hooks 40 are secured beneath the bottom of the steel channels 34 by welding or other suitable means.

The hinge 18 between the footing 16 and the deck section 12 is formed from pivot plates 42, angle irons 44 and pivot pins 46. Pivot plates 42 are secured to the outer sides of the steel channels 34. Angle irons 44 are secured to the footing 16. Pivot pins 46 extend through the angle iron 44 and the pivot plates 42 so that the plates rotate with respect to iron 44 about pins 46. The axis of rotation of the hinge is at the top surface of the pier section 12.

Angle irons 48 are welded to either side of each of the tubular legs 28. Each of these angle irons 48 contains a plurality of vertically spaced holes 50. Bolts 52 extend through some of the holes 50 and through the steel channels 34 to secure the tubular legs 28 to the steel channels 34. Adjustment of the relative position between the legs 28 and the steel channel 34 is provided by changing the position of the bolts 52 in the holes 30 on the angle irons 48. Boom supports are formed from upward extensions of the tubular legs 28. A sleeve 54 is received on the tubular legs and welded thereto beneath the top of the legs 28.

Pier section 14 is of similar construction to pier section 12. It is formed by steel channels 56, wood nailer members 58 and deck members 38. Likewise, the tubular legs 22 are secured to the outer end of the pier section 14 by similar means. For example, angle irons 60 are welded to the upper portions of the tubular legs 22 and contain a plurality of holes 62 for securing the angle irons to the steel channels 56 through bolts 64.

Desirably, timber fenders 56 are secured to the tubular legs 22 and 28 through brackets 68 and suitable fastening members.

Each of the tubular legs 22 and 28 are secured to the footings on which they rest. Each footing has a pair of eye bolts 72 and each tubular leg has an eye bolt 74. A steel rod 76 extends between the eye bolts on the legs and the eye bolts on the footings. As illustrated in FIG. 3, the steel rods 76 are crossed for increased rigidity. Tightening members 78 are provided on the rods 76 to draw the steel rods taut. Such tightening members are commonly known as turnbuckles and are well known.

A tubular shore mount 92 is affixed to the edge of the footing 16 through suitable fastening means (not shown) on either side of the pier section 12, i.e., outside of the sides of pier section 12 and 14. Each of these shore mounts 92 is of similar construction to the sleeve 54 and has a tubular extension 94 of cross sectional dimension smaller than the mount for a boom support. The extension 94 is received within and secured to the mount 92.

The socket arrangement between each of the legs and its footing on which it rests is illustrated in FIG. 4. Each of the tubular legs has a sleeve 80 welded to the outer portion thereof for telescoping over a positioning rod 18 which extends down into the footing.

The hinge 20 between the pier sections 12 and 14 is illustrated in FIG. 5. The hinge comprises a hinge plate 84 which is secured to the steel channel 56 through bolts 86. A second hinge plate 88 is secured to the steel channel 34 through similar means (not shown in FIG. 5). A pivot pin 90 extends through each of the hinge plates 84 and 88 to permit rotation of hinge plate 88 with respect to hinge plate 84 about pivot pin 90. As illustrated in FIG. 5, the axis of rotation of the pier section 14 about the pivot pin 19 is at or near the top surface of these pier sections.

The manner of removing the pier sections from the water for storage is illustrated in FIGS. 6 and 7. A tubular boom 96 has a pulley wheel 98 at the top portion thereof. The boom 96 is telescopingly received over each of the legs 28 in abutment with sleeve 54 as illustrated in FIG. 6. A pair of such booms preferably are employed, one on either side of the pier section 12. Winches 100 are mounted at a back portion of the footing 16. A cable 102 is wound around each winch 100 at one end and extends through a pulley wheel 98 on top of a boom 96. A hook 104 on the other end of each cable 102 engages a cable hook 40 beneath the pier section 14. Winding of the winches 100 will thereby raise the outer end of the pier section 14 about the hinge 20. The winch is wound until the pier section 14 is "over center" with respect to the pivot 20 and then the pier section 14 continues to rotate in a clock-wise direction as illustrated in FIG. 6 with the winch being unwound until the pier section 14 comes to rest in overlying position on top of the pier section 12. Note that the position of the booms 96 outside of the side edges of the pier sections 12 and 14 permits the pier section 14 to swing through a complete 180° without interference from the cables 102 and booms 96. In addition, the boom position permits the winch to assist in the lowering of the pier section 14 to the overlying position on pier section 12. Still further, the side position of the booms permits a person to stand on the pier section 14, if such assistance is necessary while pier section 12 is being lowered.

The hooks 104 are removed from the cable hooks 40 of the pier section 14, and the tubular booms 96 are removed from the pier legs 28. The tubular booms are then placed on the extensions 94 and the hooks 104 are placed in the cable hooks 40 beneath the pier sections 12. The winches are then wound to raise the outer end of the pier section 12 around the hinge 18. This clockwise rotation of the pier section 12 continues until the piers reach the position illustrated in FIG. 7. Preferably the pier section 14 is slightly shorter than the pier sec-

tion 12 so that the pier can be stored in the position illustrated in FIG. 7 with the outer pier section 14 substantially vertical and the pier section 12 at a slight angle to the vertical away from the water.

Whereas the invention has been illustrated with reference to a pier having two sections, it is obvious that similar arrangements could be made with a single pier section or with three or more pier sections. In the broader aspects of the invention, one or more pier sections can be employed. In addition, the length of each pier section can vary to suit the purpose for which it is intended.

The novel arrangement between the footings 32, 26 and the legs 28, 22 provide easy removal and installation of the pier sections. The fastening means 76 between the legs and the footing securely hold the legs in the footing sockets so that the pier functions as a permanently installed pier. Because of this pier stability, large boats, up to 42 feet in length, can be satisfactorily accommodated with the pier.

The inventive pier removal means makes the installation and removal of the pier a relatively fast and simple operation. In addition, the number of people required for the operation is relatively small and little, if any, exposure in the water by the people is required during these operations.

Reasonable variation and modification are possible within the scope of the foregoing specification, the drawings, and the claims without departing from the spirit of the invention.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. In a pier construction extending outwardly from a shore into a body of water, said pier construction comprising:

a footing on said shore adjacent said body of water;

a first elongated pier section having an inner end and an outer end;

means hinging said first pier section inner end to said shore footing;

means for removably supporting said outer end of said first pier section above the surface of the water;

a second elongated pier section having an inner end and an outer end;

means for hinging said inner end of said second pier section to said outer end of said first pier section so that said second pier section can rotate on its inner end about said outer end of said first pier section;

means for removably supporting said outer end of said second pier section above the surface of water; and

means for removing said first and second pier sections from the water, the improvement in said pier section removal means comprising:

boom support means extending upwardly from at least one side of said first pier section outer end;

cable engaging means on said second pier section spaced outwardly of said second pier section inner end;

a winch on said shore footing;

a cable wound by said winch and having on its outer end means to engage said cable engaging means;

a boom removably supported on said boom support means, said boom being spaced outwardly of the side edges of said first pier section;

guide means mounted on said boom for said cable, and said cable extending through said guide means and secured to said cable engaging means on said second pier section;

whereby said second pier section can be removed from the water by winding said winch, thereby rotating said second pier section about said hinging means at said inner end of said second pier section until said second pier section is substantially vertical, and by thereafter unwinding said winch until said second pier section overlies said first pier section.

2. A pier construction according to claim 1 wherein said boom support means extends upwardly from said removable support means for said outer end of said first pier section above said first pier section.

3. A pier construction according to claim 2 wherein said boom has a tubular bottom portion which telescopes over said boom support means.

4. A pier construction according to claim 2 and further comprising at least one boom support means extending upwardly from said shore footing between said body of water and said winch, and outside of the side edges of said first pier section; cable engaging means on said first pier section spaced outwardly of said inner end thereof; whereby said boom can be removably mounted on said footing boom support means, said cable can be secured to said cable engaging means on said first pier section for removal of said first and second pier sections after said second pier section has been positioned to overlie said first pier section by raising said first section about said hinge means at said inner end of said pier section.

5. A pier construction according to claim 1 and further comprising at least one boom support means on said shore footing between said body of water and said winch, and outside of the side edges of said first pier section; cable engaging means on said first pier section; whereby said first and second pier sections can be removed from the water with said second pier section overlying said first pier section by securing said cable to said cable engaging means on said first pier section, placing said boom on said shore footing boom support means and winding said winch.

6. A pier construction according to claim 5 wherein said shore footing boom support means extends upwardly of said shore footing; and said boom has a tubular bottom portion which telesclopes over said boom support means.

7. A pier construction according to claim 1 wherein said removable supporting means for said first and second pier sections comprises: legs extending downwardly from said first and second pier sections; a permanent footing at the bottom of said body of water beneath said legs; sockets on the top portion of said footing for receiving said legs.

8. A pier construction according to claim 7 and further comprising fastening means between said legs and said footings for releasably securing said legs in said sockets.

9. A pier construction according to claim 7 wherein said legs are rigidly fixed to said first and second pier sections.

10. In a pier construction extending outwardly from a shore into a body of water, said pier construction comprising:

an elongated pier section having an inner end and an outer end;

means supporting said inner end of said pier section above said body of water for rotation of said pier section about its inner end;

means for removably supporting said outer end of said pier section above the surface of water;

the improvement in said removably supporting means comprising:

legs extending downwardly from said outer end of said pier section; the bottom portion of said legs being open and forming sockets;

a permanent footing at the bottom of the water beneath said leg;

positioning rods extending up from the top portion of said footing for engaging the open bottom of said legs, and

fastening means between said legs and said footing for releasably and rigidly securing said legs to said footings.

11. A pier construction according to claim 10 wherein said legs are rigidly fixed to said outer end of said pier section.

12. A pier construction according to claim 10 and further comprising a second elongated pier section having an inner end and an outer end; means for hinging said inner end of said second pier section to said outer end of said first pier section so that said second pier section can rotate on its inner end about said outer end of said first pier section; a pair of legs fixed to said outer end of said second pier section and extending downwardly to the bottom of the body of water; a second permanent footing beneath said legs of said second pier section; said second footing having sockets engaging bottom portions of said legs of said second pier section.

13. In a pier construction extending outwardly from a shore into a body of water, said pier construction comprising:

an elongated pier section having an inner end and an outer end;

means supporting said inner end of said elongated pier section above said body of water for rotation about said inner end;

means for supporting said outer end of said pier section above said body of water; and

means for removing said first and second pier section from the water, the improvement in said pier section removal means comprising:

boom support means fixed to and extending upwardly from at least one side of said support means adjacent to said inner end of said pier section;

a winch mounted on said support means;

a cable wound by said winch and having on its outer end means to engage an outer portion of said pier section;

a boom removably supported on said boom support means, said boom being spaced outwardly of the side edges of said pier section;

guide means mounted on said boom for said cable, and said cable extending through said guide means and secured to an outer portion of said pier section;

whereby said pier section can be removed from the water by winding said winch, thereby rotating said pier section about said support means at said inner end of said pier section until said pier section is substantially vertical, and by thereafter unwinding said winch until said pier section overlies at least a portion of said support means.

* * * * *