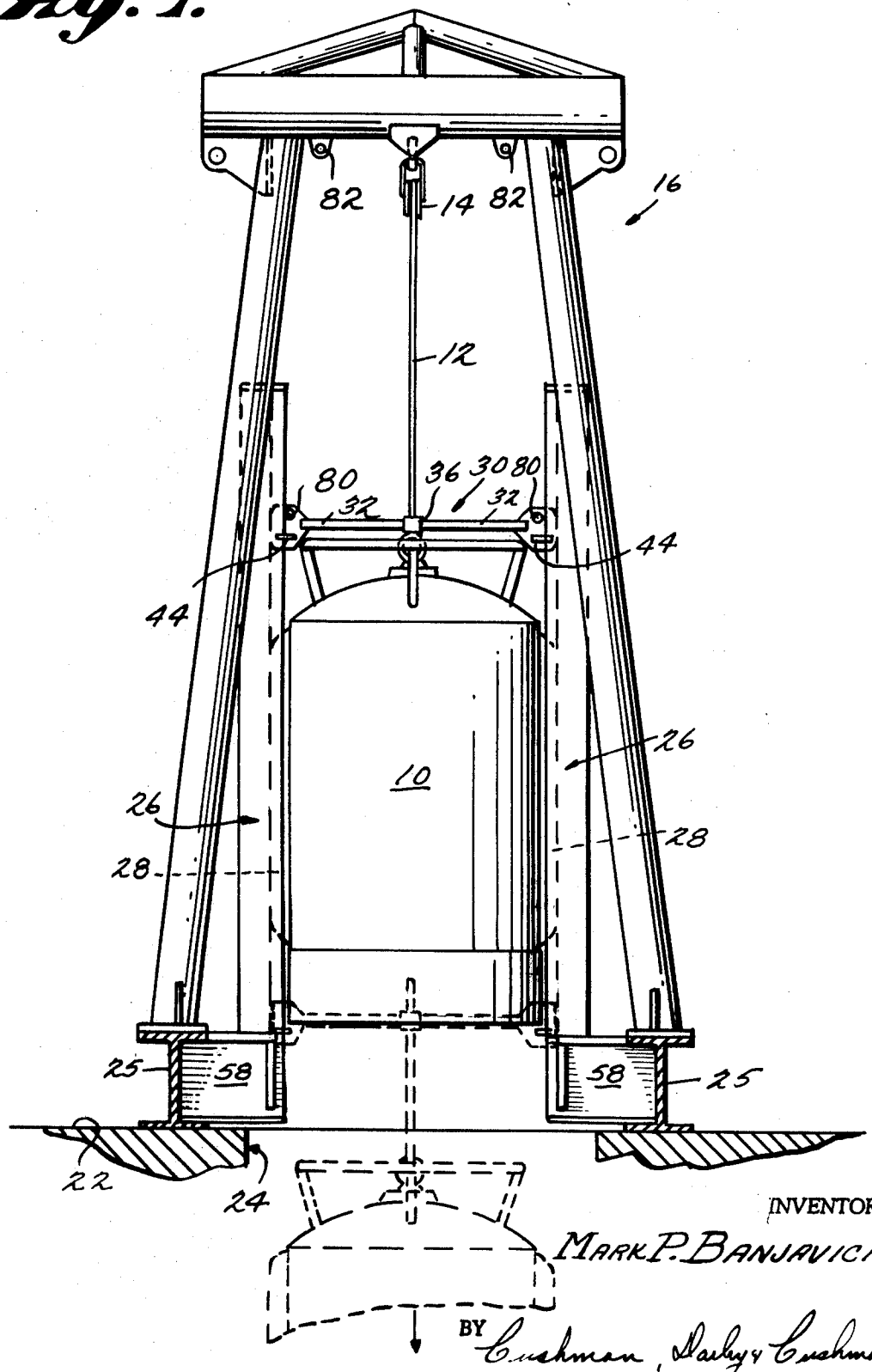
July 7, 1970 M. P. BANJAVICH 3,518,837

STABILIZING BAR FOR LIFTING AND LOWERING SYSTEMS USED WITH SUBMERSIBLE OBJECTS

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Fig. 1.



INVENTOR
MARK P. BANJAVICH

BY Cushman, Darby & Cushman
ATTORNEYS

July 7, 1970 M. P. BANJAVICH 3,518,837

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Fig. 2

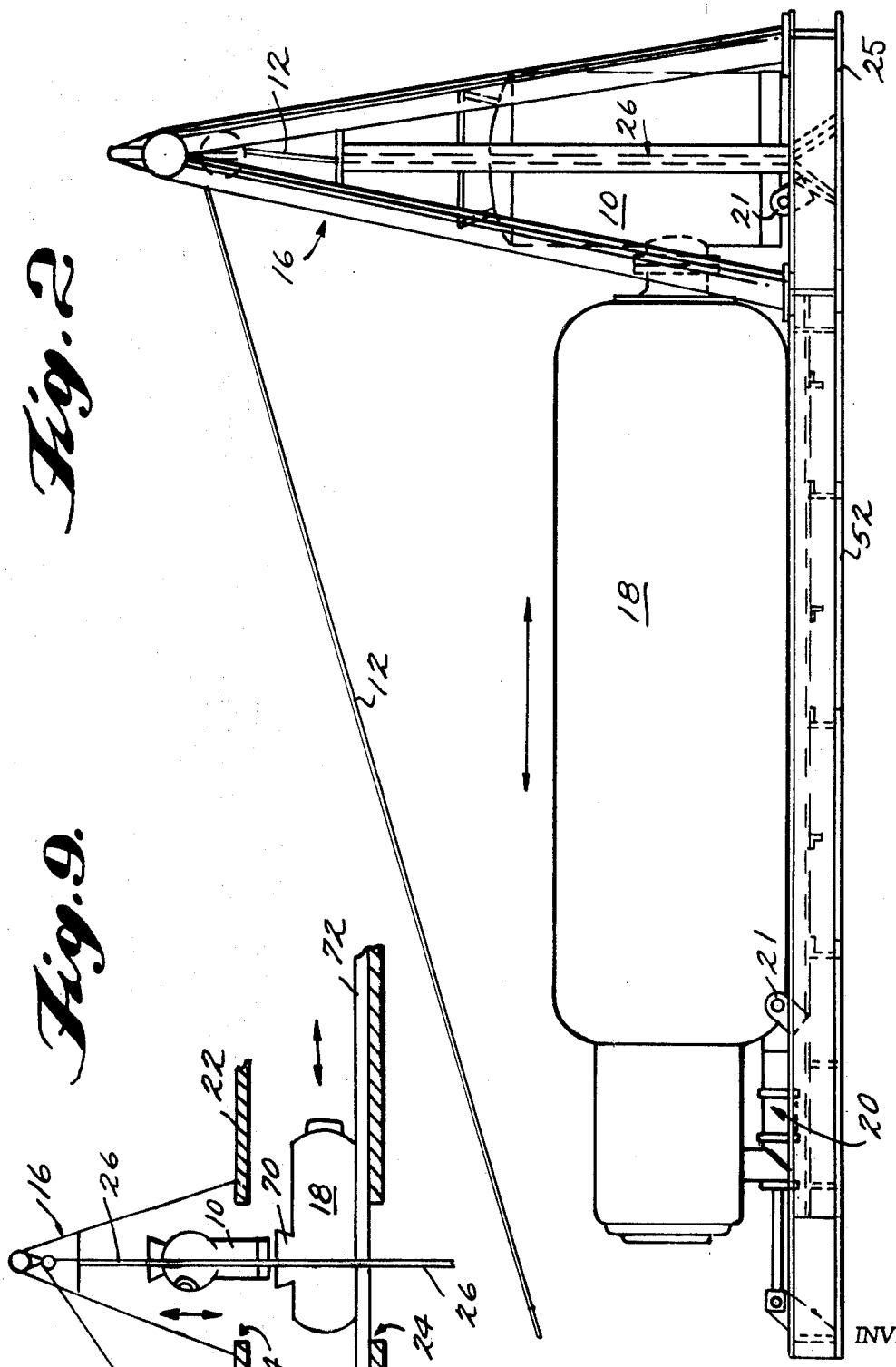


Fig. 9.

INVENTOR

MARK P. BANJAVICH

BY Cushman, Darby & Cushman

ATTORNEYS

July 7, 1970 M. P. BANJAVICH 3,518,837

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Filed Feb. 14, 1969 4 Sheets-Sheet 3

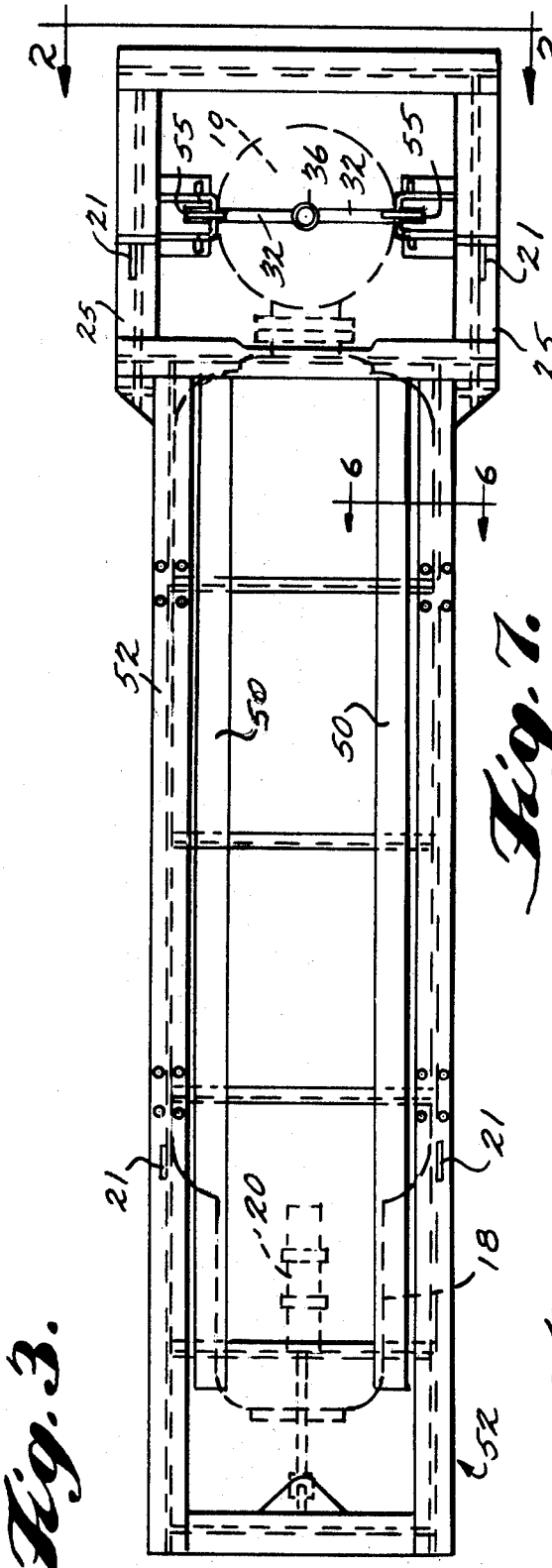


Fig. 3.

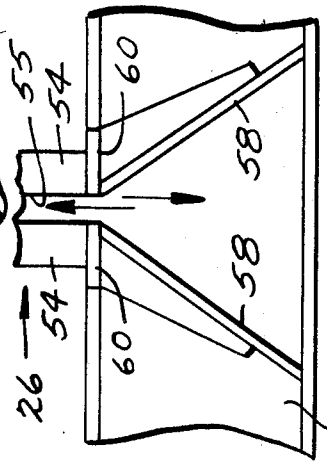


Fig. 8.

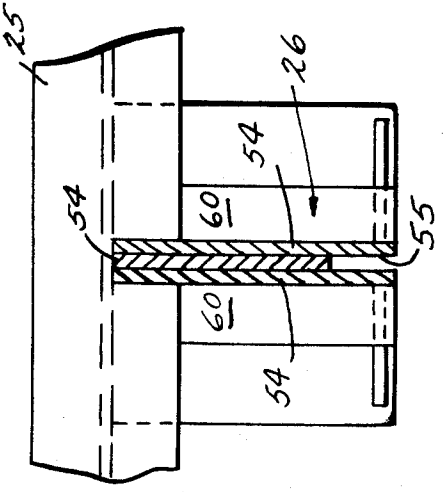


Fig. 7.

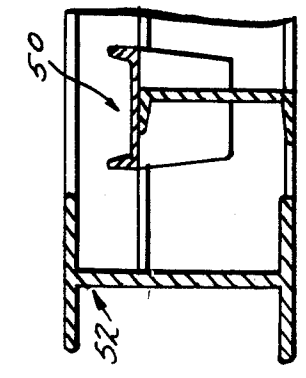


Fig. 6.

INVENTOR

MARK P. BANJAVICH

BY Cushman, Darby & Cushman

ATTORNEYS

July 7, 1970 M. P. BANJAVICH 3,518,837

STABILIZING BAR FOR LIFTING AND LOWERING SYSTEMS USED WITH SUBMERSIBLE OBJECTS

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Fig. 4.

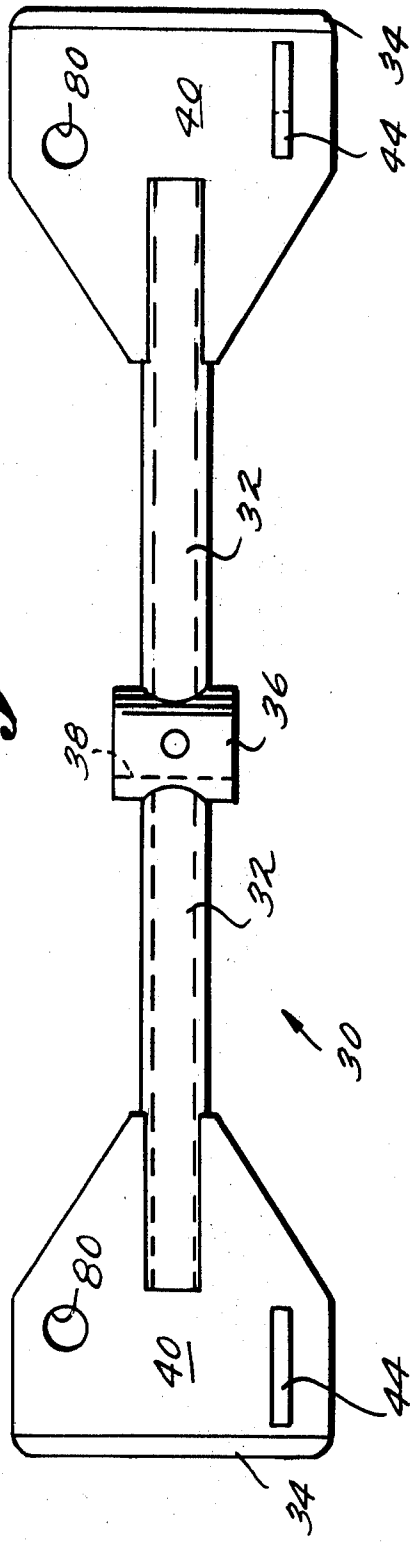
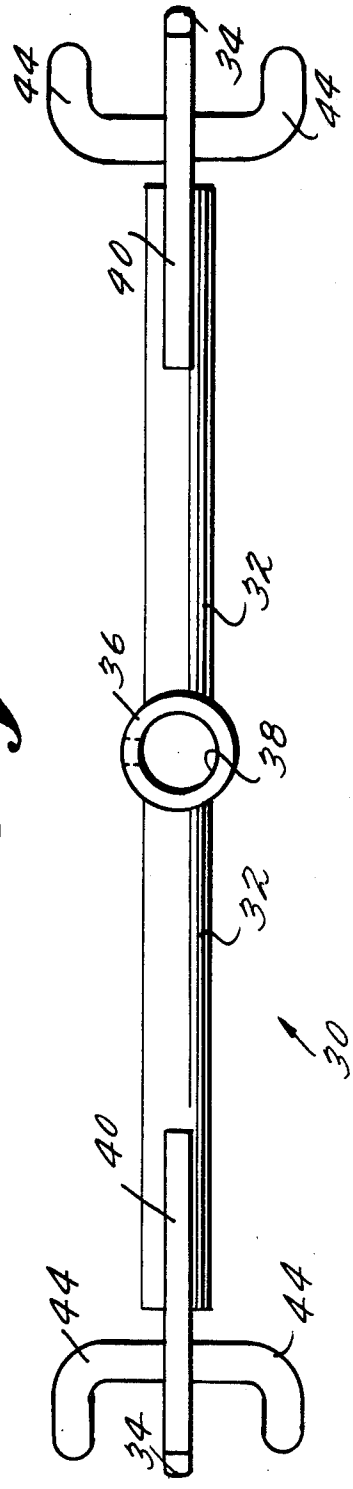


Fig. 5.



INVENTOR

MARK P. BANJAVICH

BY Cushman, Darby & Cushman

ATTORNEYS

United States Patent Office

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STABILIZING BAR FOR LIFTING AND LOWERING SYSTEMS USED WITH SUBMERSIBLE OBJECTS

Mark P. Banjavich, 7600 W. End Blvd.,
New Orleans, La. 70124

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U.S. Cl. 61—69 16 Claims

ABSTRACT OF THE DISCLOSURE

A lifting and lowering system for moving a diving vehicle, or other submersible structure, from an underwater level of operation to an above-water level includes a support frame into which the diving vehicle may be received when the vehicle is suspended on the end of a line or cable. In order to eliminate or reduce a pendulum effect which might otherwise arise when the diving vehicle is tethered at the end of the cable, a stabilizing bar means in inserted into the support frame so as to limit horizontal movements of the cable from which the diving vehicle is suspended. The stabilizing bar means is carried in the support frame so as to enclose or encircle the line or cable passing down through the support frame, and the stabilizer bar moves vertically within the support frame in accordance with the position of the diving vehicle wtihin the support frame.

This application is related to the subject matter of U.S. Pat. 3,323,312.

BACKGROUND AND BRIEF DESCRIPTION OF INVENTION

This invention relates to improvements in systems for handling diving bells and other submersible chambers and structures In particular, the invention is concerned with improvements in systems for lifting and lowering such submersible objects from and to underwater levels.

In recent years, it has become increasingly important to utilize diving bells, diving vehicles and other submersible structures in various research and commercial requirements of oceanographic industries. For example, diving bells, of the geneal type disclosed in Banjavich Pat. 3,232,312, are being used to place divers at very great depths for performing work on offshore pipe lines, wellheads, and other underwater structures, as required by present day practices of offshore petroleum industries. Likewise, there has been an increased use and interest in self-propelled vehicles which can carry one or more technicians to underwater levels for purposes of observation or for performing work with grappling devices associated with such vehicles. In the context of this specification, it is intended that descriptions of diving vehicles or other submersible structures include all forms of diving bells, vessels, chambers, or vehicles, whether tethered or self-propelled. However, the invention which will be described in this specification is concerned wtih the particular problems of handling such submersible structures when they are being moved into and out of a body of water by means of a line or cable which is attached to the submersible at least during the time that it is being lifted or lowered through the interface between water and air.

The various types of diving vehicles and submersible structures which are presently in use are most often lifted and lowered through the water/air interface by means of a line or cable. In ths sense such vehicles are tethered vehicles, at least during the time they are being handled for being lifted out of the water, but the principles of this invention may be applied to diving vehicles which

are not tethered during underwater use of the vehicle as well as to vehicles which are tethered during their entire operation underwater.

It is a well known problem in the handling of tethered vehicles that a serious and violet pendulum effect may arise when the vehicle is surfaced at the end of a line or cable and when it is lifted and lowered relative to a marine platform, or other marine structure, which is located at the surface of the body of water in which the vehicle is to be used. The pendulum effect can arise when there is movement of the lifting means, as is normally experienced on a floating structure at sea or on a large body of water, relative to a submersible object which is being handled. This can occur when the submersible object is suspended at the end of a relatively long line or cable, and it can be appreciated that the sizes and weights of such submersible structures can create a serious danger to their occupants, and to handling personnel, if such a pendulum effect should develop and get out of control.

In order to reduce the pendulum effect, which might otherwise arise when handling tethered vehicles, attempts have been made to reduce the length of handling lines or cables as much as possible. However, it is necessary to provide for a certain vertical length of suspension for such vehicles so that they can be lifted entirely clear of a body of water and into a position where they can be further handled for above-deck operations which may include a loading and unloading of personnel or a transferring of personnel to pressurized chambers which are locked onto the diving vesesl, and thus there has been a practical limit to the reduction of length of handling lines or cables that can be attained. One of the prior art attempts to reduce the pendulum effect in handling a tethered object is described in the Banjavich Pat. 3,323,-312. In that patent, a gallows frame (support frame) is provided for receiving a diving bell type of vessel as soon as it surfaces from a body of water. Guide channels are provided within the support frame structure for locking the diving bell into place while it is being lifted to a desired above-deck position, and this arrangement substantially reduces any pendulum effect which might otherwise arise in suspending and handling such a vehicle at the end of a line or cable.

However, in certain diving systems, there is still substantial relative movement between a supporting and lifting structure which is intended to handle the submersible object at an above-deck level and the submersible object itself. This may be a result of having to lift the vessel for relatively high distances within a marine platform or floating vessel, or it may be the result of extreme surface activity of the body of water in which operations are being performed. The present invention provides for a much safer handling of relatively large and heavy submersible vessels as they are being lifted and lowered through the interface between a body of water and the atmosphere by reducing potential pendulum effects even more than can be accomplished with the type of gallows frame supporting structure described in Banjavich Pat. 3,323,312. Although reference will be made to the Pat. 3,323,312 throughout this specification, it is intended that the invention be used in combination with other lifting and lowering systems as well as with the type of support frame means shown in that patent.

In accordance with the invention, a stabilizing bar means is inserted within a support frame means to slide up and down within the frame as a diving vessel is being lifted and lowered relative to the frame by a cable or line means. The stabilizing bar means is in the form of an elongate bar which can be received within guide channels positioned within the support frame means, and the guide channels permit the stabilizing bar means to slide up and down vertically for a desired distance.

The stabilizing bar means also includes a ring member, or other enclosing or encircling device, for limiting horizontal movements of the line or cable from which the submersible object is tethered. The ring member does not grip the line or cable, but rather permits it to move freely relative to the stabilizing bar means, however, the ring member does fix the horizontal position of the cable or line relative to the support frame means so that no substantial horizontal movement can take place. By arranging the stabilizing bar means within the support frame to move up and down within the frame, it is possible for the stabilizing bar to move to a desired lowermost level when the submersible object is in or near the interface between water and air. This places the stabilizing bar, and its control over a line or cable, as close to the surface of the body of water as is possible while a submersible vessel is being handled. Then, as the submersible object is lifted upwardly into the support frame means, the stabilizing bar rides up into the frame by a contact with the top of the submersible vessel. When the submersible object is lowered from the support frame, the stabilizing bar rides downwardly within the frame by gravity until it reaches a lowermost position where it is stopped by structures provided for limiting the downward movement of the stabilizing bar. In this manner, the stabilizing bar accompanies the submersible object for substantially all of its movements that might otherwise give rise to development of a free swinging pendulum effect.

In its preferred form the stabilizing bar means comprises an elongate bar structure having opposed terminal ends for engaging guide channels carried within a support frame. The terminal ends have bearing surfaces so that the stabilizing bar can slide relative to the guide channels of the support frame. A ring member is positioned at an approximate mid-point of the elongate bar, and the ring member functions to enclose a line or cable without gripping the line or cable. Further, the terminal end portions of the stabilizing bar may include projecting elements which function to contact limit-stop surfaces associated with the guide channels of the support frame means. The guide channels of the support frame means may be limited to the confines of the frame structure itself or they may extend downwardly for any desired distance below the base portion of the support frame means. For example, where a relatively large surface vessel is being used, it may be desirable to lift a submersible object upwardly through the vessel to a deck level where the submersible object can be loaded and unloaded or locked to another chamber. In such an arrangement, the support frame means for receiving the submersible object would be positioned at the deck level where loading or transfer is to take place, but guide channels for guiding the submersible object may extend downwardly from that deck level to a lower deck or to a level which is near the interface. Thus, the stabilizing bar means, in such a system, would ride all the way down to the lowermost level at which the guide channels are positioned so as to control horizontal movement of the line or cable at a point which is very close to (or even below) the interface between water and atmosphere.

These and other features and advantages of the present invention will become apparent in the more detailed discussion which follows, and in that discussion reference will be made to the accompanying drawings as briefly described below.

BRIEF DESCRIPTION OF DRAWINGS

FIG. 1 is an elevational end view of a support frame means with the stabilizing bar of this invention in place;

FIG. 2 is an elevational side view of the support frame means shown in FIG. 1, and illustrating a typical arrangement wherein a submersible diving chamber is locked onto a deck decompression chamber;

FIG. 3 is a top plan view of the arrangement shown in FIG. 2, with the submersible diving chamber and deck decompression chamber shown in phantom lines;

FIG. 4 is an elevational view of the stabilizing bar means of this invention, shown in larger scale from the scale of FIGS. 1–3;

FIG. 5 is a top plan view of the stabilizing bar means shown in FIG. 4;

FIG. 6 is an enlarged cross sectional view taken at line **6—6** of FIG. 3 to illustrate a detail of construction associated with means for moving a deck decompression chamber towards and away from a support frame;

FIG. 7 is an enlarged top plan view, partially in cross section, of details of a guide channel associated with the support frame means of FIGS. 1–3;

FIG. 8 is an enlarged side elevational view of a lower portion of a guide channel associated with the support frame means of FIGS. 1–3; and

FIG. 9 is a schematic view, drawn on a reduced scale, of an alternative arrangement for a lifting and lowering system which utilizes the principles of the present invention.

DETAILED DESCRIPTION OF INVENTION

FIGS. 1 through 3 illustrate a typical system for handling a diving bell or submersible diving chamber of the type described in Banjavich U.S. Pat. 3,323,312. Such a system provides for a lifting and lowering of a diving bell **10** by a cable or line means **12** which is pulled upwardly, and played out downwardly, around a sheave **14** by a conventional power-operated winch means (not shown). In the illustrated embodiment, the diving bell **10** is received within a support frame means **16** so that it can be positioned for being mated with an above-deck decompression chamber **18**. The decompression chamber **18** may comprise a chamber having two or more internal compartments which are sealed from one another so that pressure conditions can be adjusted and maintained within the individual compartments. The decompression chamber **18** is mounted on a skidway for being moved towards and away from the support frame means **16** so that the deck decompression chamber can be brought into a mating position relative to the diving bell **10** when the diving bell is lifted within the support frame to the position shown in FIG. 2. The deck decompression chamber **18** may be moved along its skidway in the directions of the arrows shown in FIG. 2 by a hydraulic ram means indicated generally at **20**. The hydraulic ram means **20** is of a conventional structure and includes means for admitting and releasing hydraulic fluid to and from opposite surfaces of a piston contained within a cylinder. The deck decompression chamber **18** and the support frame **16** may be mounted on a single base frame structure, as shown, so that the entire system can be lifted by cables fastened to lifting padeyes **21**. This arrangement permits an easy movement of the system from place to place, such as from vessel to dock, or from vessel to vessel.

The support frame means **16** may be made up of a number of tubular framing elements which are connected together to form a framework which can receive and support a submersible object, such as a diving bell or other diving vehicle. As shown in FIGS. 1 and 3, the support frame means **16** is fixed to a base frame which can be lifted and carried from place to place, but the support frame may be secured to a deck or other surface **22** of a marine platform or of a floating marine vessel. The support frame means **16** straddles an opening **24** which is formed through the deck or surface **22** so that the submersible object can be lifted and lowered through the deck. The support frame means **16** may be fixed to its base frame or to the deck by any suitable means such as by bolting, or otherwise securing, lower portions of legs of the frame to structural members **25** provided in the base frame or in the deck or surface where the submersible structure is to be handled. The

deck or surface **22** may be an upper deck of a marine platform or vessel, or it may comprise an intermediate-level deck or surface within the marine platform or vessel.

The illustrated support frame means includes a pair of guiding members **26** having guiding channels of the type described in the Banjavich Pat. 3,323,312. The guiding channels are formed by structures which define vertically extending slots which face inwardly toward the center of the support frame means so that guiding fin elements **28** of the diving vessel **10** can be received within the channels of the members **26**. The guiding fin elements **28** are welded, or otherwise secured, to the diving vessel so that the entire vessel is stabilized and maintained in a known orientation once it is received within the support frame means **16**. In the illustration of FIG. 1, the diving vessel **10** is shown in a position in which it is being guided by the guiding member **26** of the supporting frame means **16**. A lower position for a diving vessel is illustrated in FIG. 1 by dotted lines to show the position of a diving vessel just prior to being received and guided by a support frame means **16**. In addition to the structures which are illustrated, the support frame means **16** and its guiding members **26** may also include locking devices of the type shown in FIGS. 9 through 13 of the above-mentioned Banjavich patent.

It can be seen from the FIG. 1 illustration that when a submersible vessel **10** is being handled by the system shown, the submersible vessel is freely suspended at the end of the line or cable **12** just prior to any contact between the guiding fins **28** of the vessel and the guiding channels in members **26** of the support frame **16**. This means that any movement of the marine platform or vessel upon which the support frame means **16** is positioned may result in relative swinging movements of the diving vessel **10** at the end of the line or cable **12**. These swinging movements can be characterized as a pendulum type of movement, and a very large and heavy diving bell, or other submersible structure, can easily develop violent and uncontrolled swinging movements while suspended freely at the end of a line or cable. The present invention prevents such violent and uncontrolled movement by providing a stabilizing bar **30** which functions to automatically control horizontal movements of a line or cable **12** when a diving or submersible structure is freely suspended from the line or cable, and this function is accomplished without interference with continuous operations of lifting or lowering the diving vehicle or structure relative to the support frame means **16**. As shown in FIG. 1, the stabilizing bar **30** functions to ride up and down within the support frame means **16** in accordance with the position of a diving structure which is being handled by the support frame means and its associated lifting system.

Referring to FIGS. 4 and 5, one embodiment of the stabilizing bar means **30** comprises an elongate member having opposed arms **32** which are provided with bearing surfaces **34** for being received within the guiding members **26** of the support frame means. The stabilizing bar is received within the support frame means so as to be freely movable, by sliding, in vertical directions as dictated by the limits of the guiding members **26**. However, separate guide channels for the stabilizing bar **30** can be provided, if desired, and in addition, the guiding members **26** may be extended downwardly below the level of the deck **22** for any desired distance so that the stabilizing bar **30** can follow the diving vessel **10** to a point near the interface of water and air through which the driving vessel must move. As shown in FIG.1, the stabilizing bar **30** rests upon upper surface portions of the diving vehicle **10** and is automatically lifted upwardly into the support frame means **16** as the diving vessel **10** is drawn upwardly into the support frame means. When the diving vehicle **10** is lowered downwardly into a body of water, the stabilizing bar means **30** follows the diving vehicle to a lower limit which is determined by structures associated with the guide members **26** and with the stabilizing bar **30**. The stabilizing bar **30** includes a centrally disposed ring portion **36** which encircles, but does not frictionally grip or engage, the cable or line means **12**, and the ring portion **36** prevents substantial horizontal (or lateral) movements of the cable or line means **12** at whatever level the stabilizing bar **30** is located relative to the cable or line. Thus, when a submersible vessel **10** is suspended from the cable or line **12** in a free position, such as is encountered when the vessel is moving through the interface between water and atmosphere, the stabilizing bar **30** is automatically placed by gravity into a position which is closely adjacent to the interface and which prevents substantial horizontal movements of the cable or line **12**. This substantially reduces any tendency for the submersible vessel **10** to develop a free swinging motion at the end of the relatively short length of cable or line which extends between the lowermost position of the stabilizing bar **30** and the free hanging position of the submersible vessel. This means that the submersible vessel can be handled with greater safety and control until it is lifted to a sufficiently high level to be actually received within the guiding members **26** of the support frame means **16**. Once the diving vessel **10** is received within the support frame means **10**, it is stabilized and maintained in a completely controlled attitude by the guiding arrangement provided in the support frame means.

In the illustrated embodiment, the stabilizing bar **30** is formed to include two arms **32** which are arranged 180° from one another relative to a ring means **36**. The arms **32** may be formed from tubular stock material and secured to the metal ring **36** in any suitable manner. The ring may comprise a steel boss having a bronze lining, and the ring is designed to have a bore **38** of sufficient diameter to allow the ring portion to encircle a lifting cable in a very loose relationship. The arms **32** are typically welded to the ring **36**, and terminal bearing plates **40** are welded to the free ends of the two arms **32**. The bearing plates **40** preferably include bearing surfaces **34** which have been hardened (or which comprise hardened facings or separate elements secured to the plates **40**) to withstand frictional wear from sliding engagement with guide channels associated with the support frame means **16**. In addition, the end plates **40** include projecting elements **44** in the form of generally semi-circular plate elements which are welded to opposite vertical surfaces of each plate element **40**. The projecting elements **44** function as stopping elements which contact stop-limit surfaces associated with the lifting system so as to limit downward movement of the stabilizing bar **30** relative to the support frame means or the guide channels which receive the stabilizing bar.

FIGS. 6 through 8 illustrate details of the lifting system which have been shown in the previous figures. FIG. 6 is a cross sectional view of a rail structure **50** associated with the slideway of the deck decompression chamber **18**. The rails **50** extend along each side of the length of the base frame **52** which supports the deck decompression chamber. Runners, or other bearing elements, carried by the deck decompression chamber guide the chamber **18** by a sliding or rolling engagement with the rails **50**. The base frame **52**, of the illustrated embodiment, is connected to the framing elements **25** of the support frame base so as to form a single, unitary base.

FIG. 7 illustrates typical structure which makes up the guide channel members of the support frame means. It can be seen that each guide channel member **26** may be made up of three vertical plate members **54** which are sandwiched relative to one another in a parallel relationship to define a channel, or groove **55**. The vertically disposed members **54** may be secured and reinforced by additional members welded thereto so as to provide a straight and strong channel **55** which can receive and handle loads from a diving vehicle or other submersible object.

As shown in FIG. 8, the lowermost ends of the guide

channel members **26** are aligned with downwardly diverging plate members **58** which function to define a wide mouth leading into a guide channel **55**. This arrangement assists in initial alignment of the guide fins **28** of a diving vessel **10** with the guide channels of the support frame means when the diving vessel is being lifted upwardly from a body of water into the support frame means. In addition, the flared plate members **58** may function as stop surfaces which limit downward travel of the stabilizing bar **30** when the projecting elements **44** of the stabilizing bar contact outside surfaces of the two plates **58**. However, in the illustrated embodiment, horizontally disposed plate members **60** are welded to upper parts of the plate members **58** to function as stop surfaces upon which the stabilizing bar may rest when it reaches a lower limit of travel relative to the support frame **16**.

FIG. 9 is a schematic, elevational view of an alternative arrangement for lifting and lowering a submersible vessel and for moving a deck decompression chamber relative to it. In the illustration of FIG. 9, the submersible vessel **10** is in the form of a diving bell having only a bottom opening which can be mated to a deck decompression chamber **18**. Such mating is accomplished by lifting the diving vessel **10** to a sufficiently high level within or on a marine platform or vessel to allow the deck chamber **18** to be moved to a position beneath the submersible vessel **10**. Then, the submersible vessel **10** can be lowered to be coupled to a top hatchway **70** of the deck chamber **18**. In the illustrated arrangement of FIG. 9, the support frame **16** is positioned on an upper deck, and the deck chamber **18** is positioned for horizontal movement on a lower deck. However, the same type of coupling can be effected on one deck level if desired. The deck chamber **18** is moved on a skidway **72** which includes runners passing along the marginal edges of an opening **24** formed through the deck upon which the deck chamber **18** is carried. The runners **72** are positioned to allow complete freedom of movement of the submersible chamber **10** upwardly through the deck. When the submersible chamber **10** is being lifted or lowered, the deck chamber **18** is moved towards the right, as viewed in FIG. 9, so that there is no interference with vertical movements of the submersible chamber. The guiding members, which include guide members **26**, of the FIG. 9 embodiment are shown as extending downwardly below the deck level where the support frame **16** is carried. The guiding members can extend all the way down to, or into, the body of water in which the marine platform or vessel is located so that the submersible chamber is guided for its full vertical travel to the deck level where it is to be mated with the deck chamber **18**. In this arrangement, the stabilizing bar would be guided by the same members **26** as is the submersible vessel, and it can be appreciated that the stabilizing bar would follow the submersible vessel all the way down to the interface between water and atmosphere.

Having described the structural details of the lifting and lowering system, with its stabilizing bar means, it can be seen that a substantially improved system is provided for eliminating or reducing any pendulum effect which might develop in the handling to a tethered object. The stabilizing bar is automatically lifted within the guiding structures associated with a support frame as a submersible object is lifted upwardly to a desired position. When the submersible object is to be lowered into a body of water, the stabilizing bar follows the submersible object downwardly to a limit point which is established within the guiding structure of the support frame, and thus, there is direct control over the lifting and lowering cable for all levels of operation. This control is accomplished without requiring a stopping and restarting of lifting and lowering operations inasmuch as the stabilizing bar automatically follows the submersible vessel for all levels at which the submersible vessel is in a condition to become free swinging if no control were effected. As suggested above, the stabilizing bar may be guided in the same guiding channels which receive and guide submersible vessel itself, or alternatively, separate guiding channels may be provided for vertical movement of the stabilizing bar. The stabilizing bar is guided by a sliding contact of terminal end portions of the bar with a guiding channel or guiding rail. A ring portion of the stabilizing bar encloses the lifting and lowering cable in such a way as to limit horizontal movements of the cable, and of course, if more than one cable is to be used in any given system, there could be provided a corresponding number of ring members to limit horizontal movements of all cables which are to be controlled during the lifting or lowering of a tethered object. The described stabilizing bar is provided with projecting members **44** which engage stops for limiting vertical movement of the bar, but equivalent stopping means can be substituted, if desired. For example, lines may be interconnected between an upper portion of the support frame and the stabilizing bar so as to limit downward movement of the bar when the lines are in their fully extended condition. Openings **80** may be formed in the stabilizing bar for receiving the ends of lines (not shown) which are fastened to padeyes **82** of the support frame (see FIGS. 1 and 4). Likewise, substitutions of fully equivalent structures can be made in the bar itself and in the guiding arrangement for the bar without departing from the principles of this invention.

What is claimed is:

1. A lifting system for moving a diving vehicle, or other submersible structure, from an underwater level to an above-water level, comprising:

a support frame means positioned at an above-water level for receiving the diving vehicle, or other submersible structure, at the above-water level,

line means suspended through said support frame means for being connected to said diving vehicle, or other submersible structure,

lifting means for drawing said line means upwardly through said support frame means,

a stabilizing bar means carried within said support frame means for vertical movement along said line means, said stabilizing bar having a portion which receives said line means and which limits horizontal movements of said line means so as to reduce the pendulum effect which might otherwise develop when said diving vehicle, or other submersible structure, is lifted out of the water.

2. The lifting system of claim **1** wherein said support frame means includes guiding means for guiding said stabilizing bar means for vertical movement within the support frame means.

3. The lifting system of claim **2** wherein said guiding means includes a pair of parallel guide channels which are vertically disposed and spaced apart to receive opposite ends of said stabilizing bar means.

4. The lifting system of claim **3** wherein said stabilizing bar means includes a bore through its central portion for enclosing said line means and for limiting horizontal movements of the line means.

5. The lifting system of claim **4** wherein said stabilizing bar means is freely movable for a limited vertical distance within said support frame means, and including stop means for limiting downward travel of said stabilizing bar so that said stabilizing bar does not fall out of guided relationship with said guide channels.

6. The lifting system of claim **5** wherein said diving vehicle comprises a submersible diving chamber which can be mated to an above-water decompression chamber, and including means for moving said chambers relative to each other to effect a coupling and uncoupling of the chambers.

7. A stabilizing bar for use in lifting a tethered object

and for reducing a pendulum effect which might otherwise develop when such an object is hanging on the end of a line or cable, comprising:

an elongate bar means having opposed terminal ends for engaging a guiding means which carries said stabilizing bar for limited vertical movements, and

a ring member positioned at an approximate mid-point of said elongate bar means for enclosing said line or cable when said object is being lifted or lowered.

8. The stabilizing bar of claim **7** wherein each of said terminal ends has a bearing surface which can be slidably received into a guide channel associated with a support frame means.

9. The stabilizing bar of claim **8** wherein each terminal end further includes projecting means for contacting a limit-stop surface associated with said support frame means.

10. A stabilizing bar for use in lifting a tethered object into a support frame means and for reducing a pendulum effect which might otherwise develop when such an object is suspended on the end of a line or cable which extends downwardly through a central portion of the support frame means, said stabilizing bar comprising

a ring-like member for enclosing said line or cable so that the stabilizing bar can function to limit horizontal movements of the line or cable at points of contact with the ring-like member,

arm members extending radially outwardly from said ring-like member for engaging portions of said support frame means so that said stabilizing bar can slide up and down within said support frame means.

11. The stabilizing bar of claim **10** wherein said arm members comprise two arms extending radially outwardly in opposite directions from said ring-like member, and including bearing surfaces at terminal end portions of the two arms for being received in sliding engagement with guide channels associated with said support frame means.

12. The stabilizing bar of claim **11** wherein guide channels, which are associated with said support frame means, include limit-stop surfaces for limiting downward vertical movement of the stabilizing bar relative to the support frame means.

13. The stabilizing bar of claim **12** wherein the terminal end portions of the two arms of the stabilizing bar include projecting means for contacting said limit-stop surfaces when the stabilizing bar is in a lowermost position relative to said support frame means.

14. The stabilizing bar of claim **13** as used in a system for lifting and lowering a diving or submersible structure, and including means for drawing up and for playing out said line or cable relative to said support frame means.

15. A diving system for handling divers under pressure and for lowering and lifting divers to and from an underwater level from an above-water marine platform or other vessel, comprising

a diving vessel for carrying diving personnel,

a support frame positioned on said marine platform or vessel for receiving said diving vessel when the diving vessel is lifted to an above-water level, said support frame having a guiding means for engaging and guiding the diving vessel at the above-water level,

a cable or line means which can be connected to said diving vessel and which extends downwardly through said support frame when connected to the diving vessel, and including means for lifting and lowering the cable or line means relative to the support frame, and

a stabilizing bar means which is fitted within said support frame so as to be in sliding engagement with the guiding means of the support frame, said stabilizing bar means being positioned above the diving vessel when the diving vessel is tethered to said cable or line means, and said stabilizer bar means further having means for limiting horizontal movements of said cable or line means.

16. The system of claim **15** wherein said stabilizing bar rides freely up and down within said support frame so as to automatically adjust its vertical position in accordance with the level of the diving vessel within said support frame.

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