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TANK FOOTING MEMBERS FOR A COMBINED BARGE AND WORKING PLATFORM ASSEMBLY

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FIG. 1.

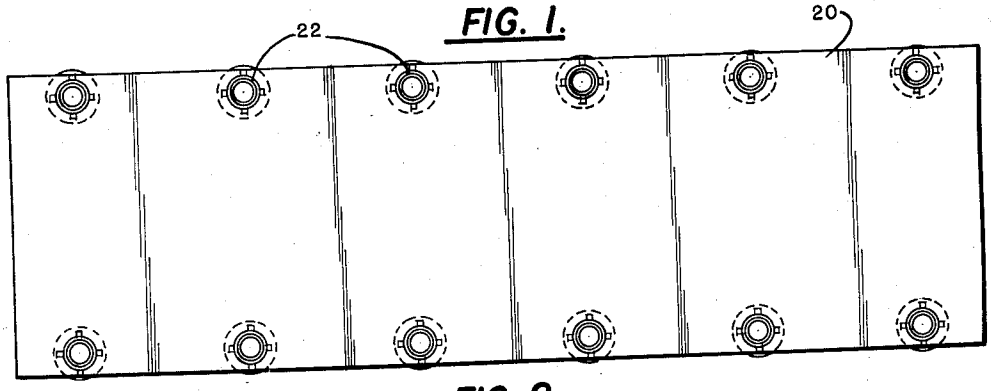
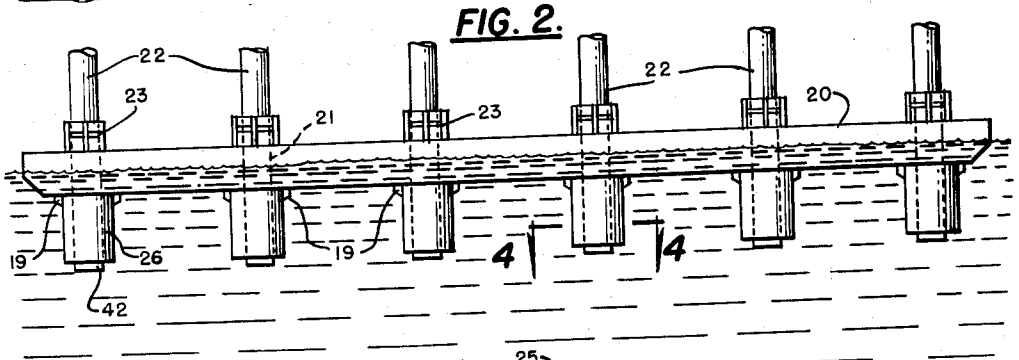


FIG. 2.



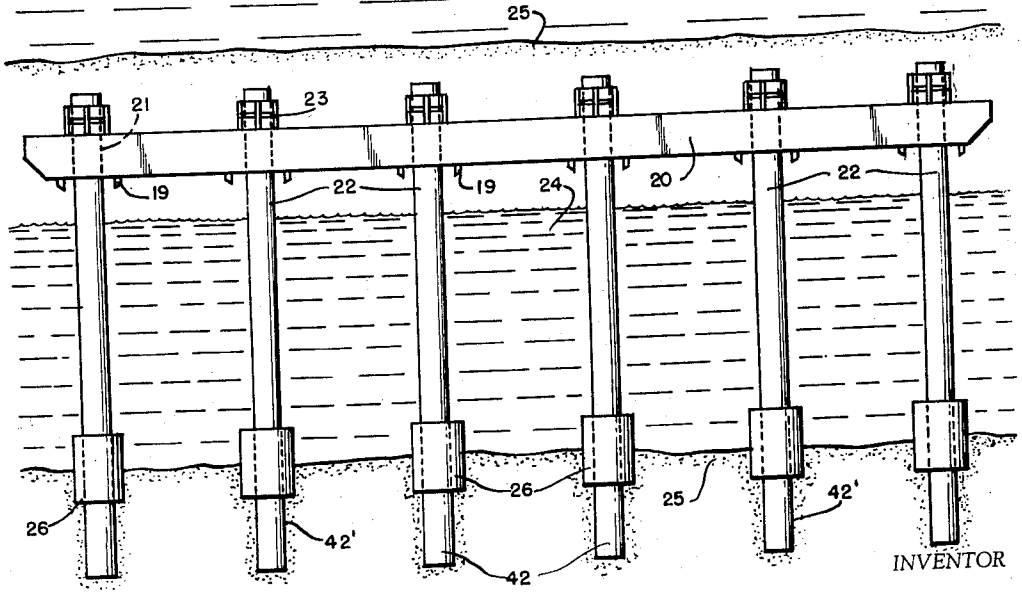


FIG. 3.

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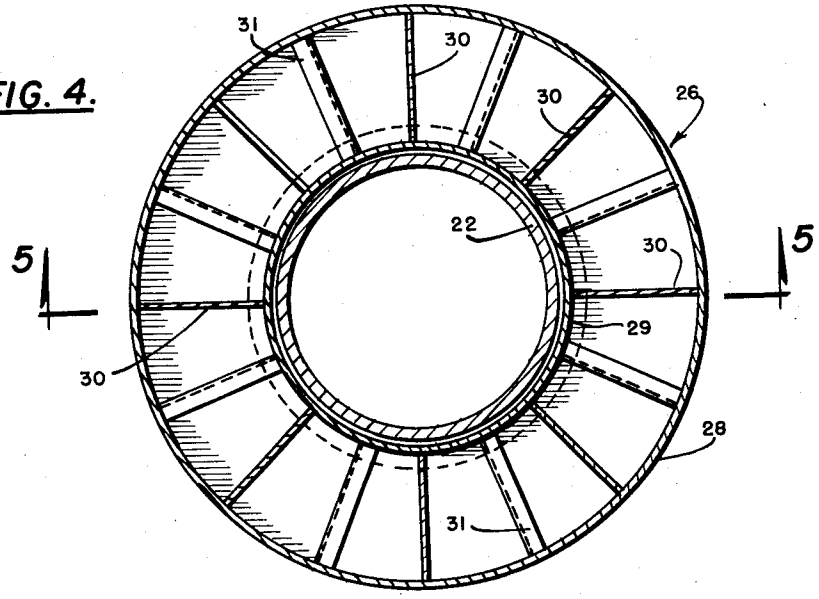
BY Cushman Darby & Cushman
ATTORNEYS

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TANK FOOTING MEMBERS FOR A COMBINED BARGE AND WORKING PLATFORM ASSEMBLY

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FIG. 4.



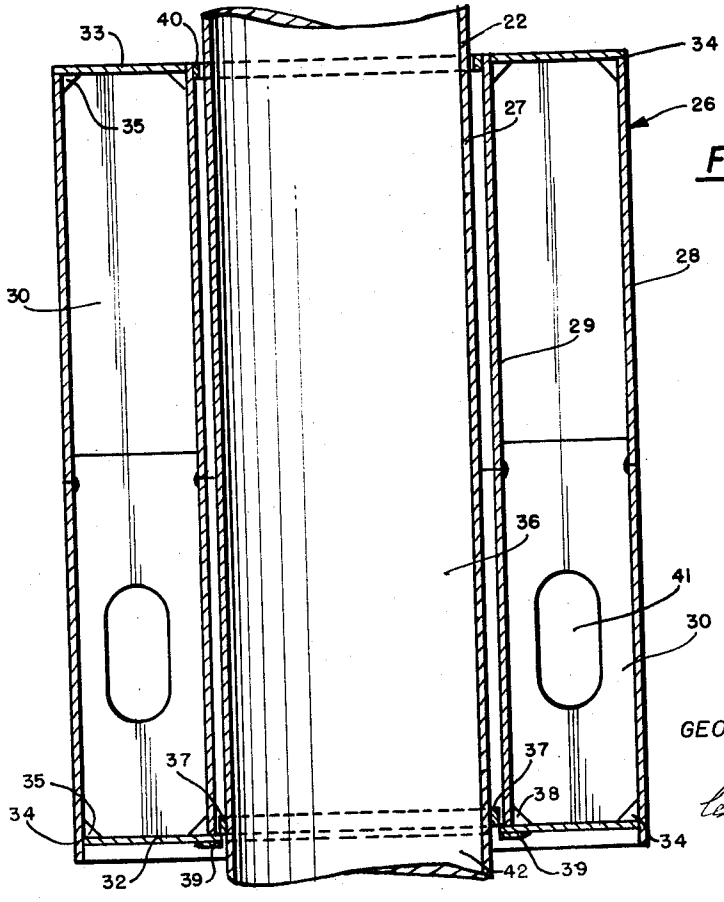


FIG. 5.

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TANK FOOTING MEMBERS FOR A COMBINED BARGE AND WORKING PLATFORM ASSEMBLY

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FIG. 6.

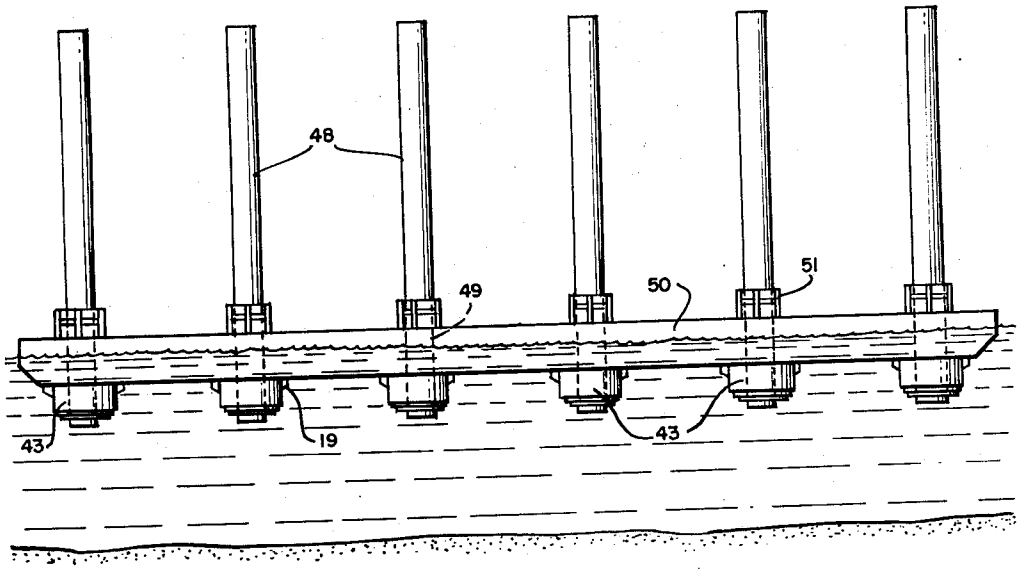
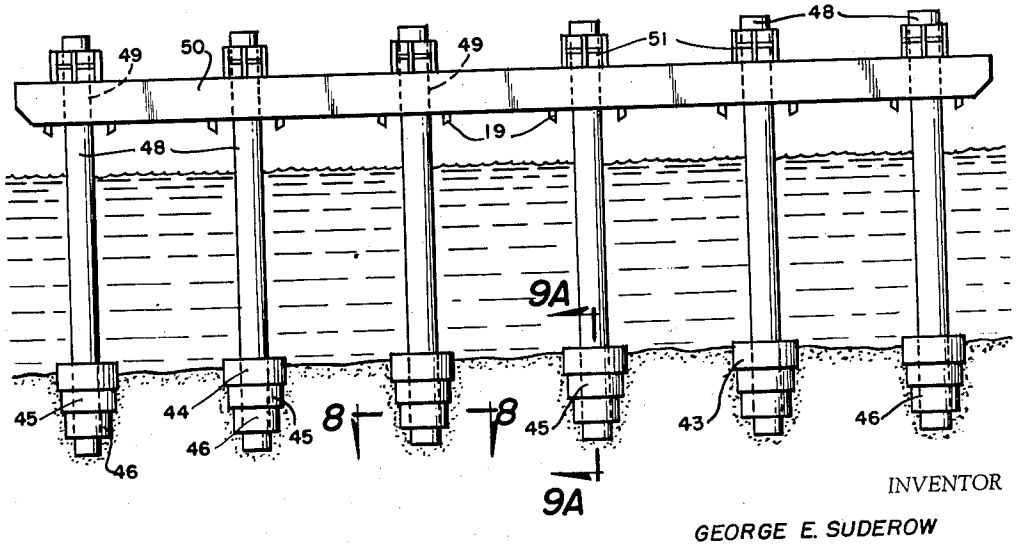


FIG. 7.



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FIG. 8.

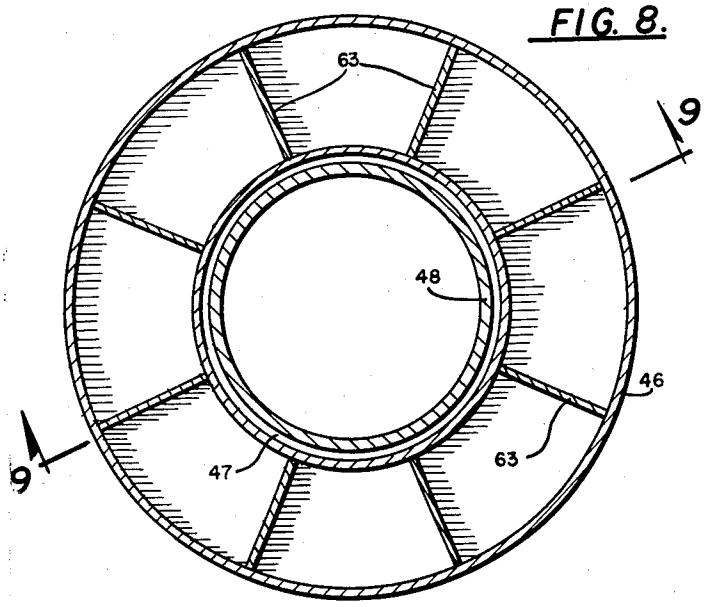
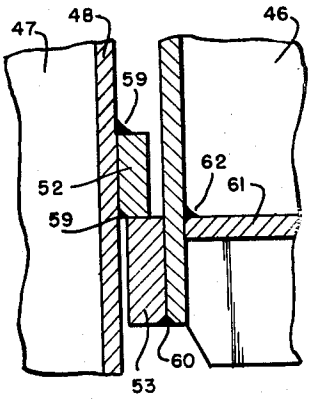


FIG. 10.



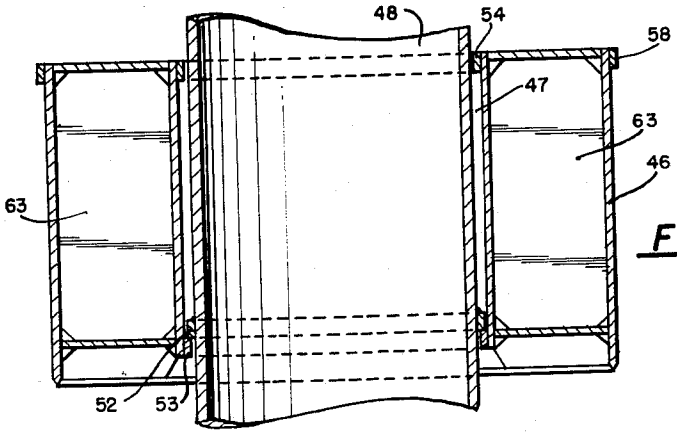


FIG. 9.

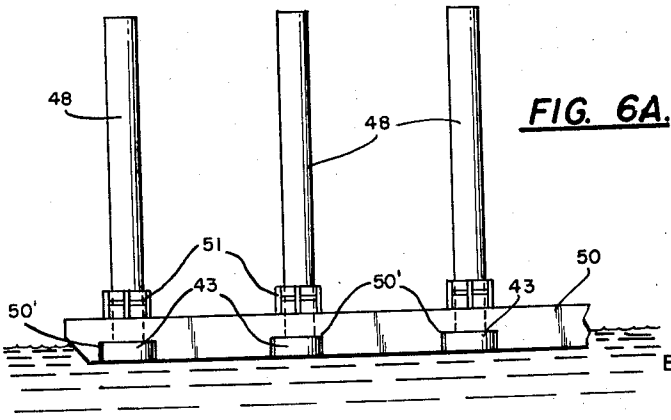


FIG. 6A.

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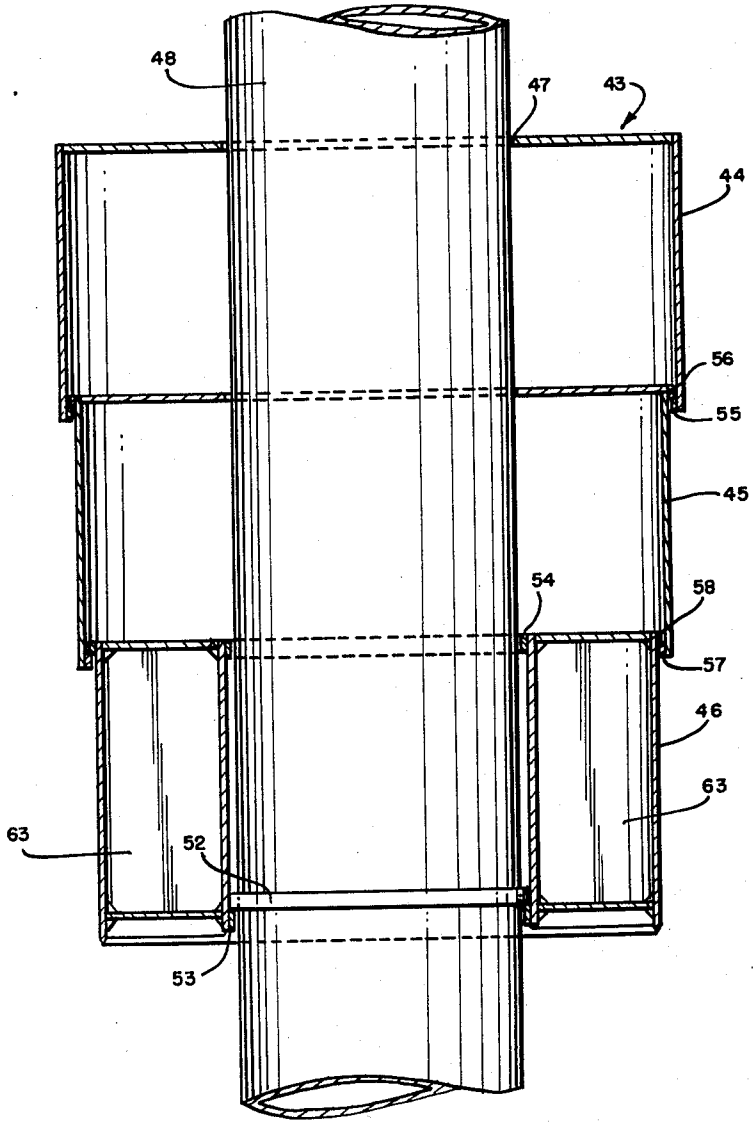


FIG. 9A.

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FIG. 11.

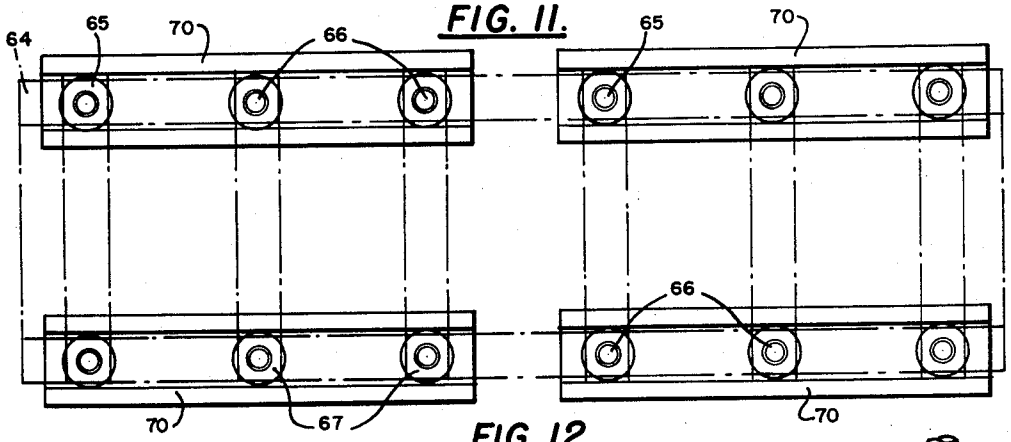
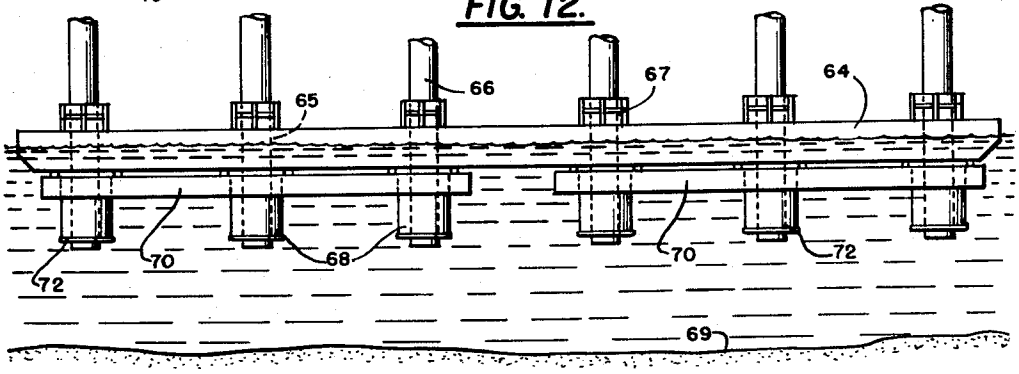


FIG. 12.



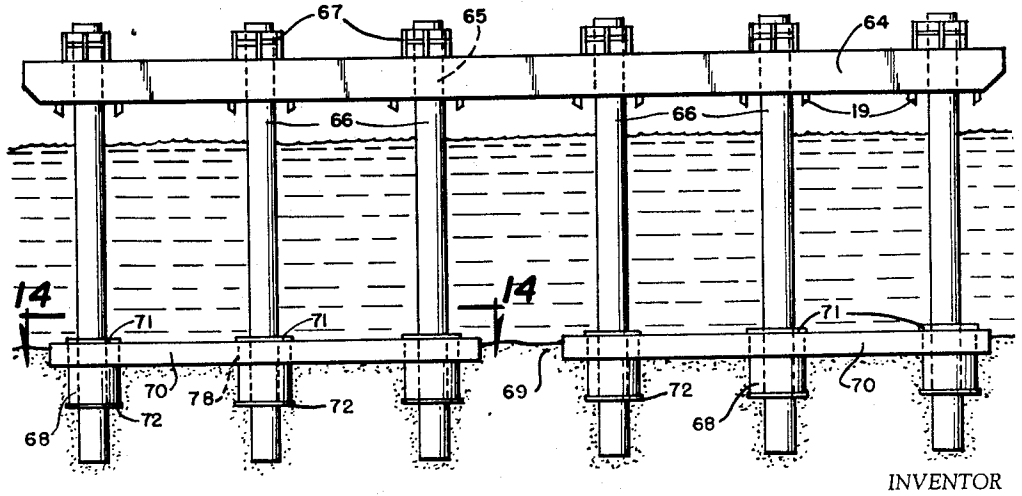


FIG. 13.

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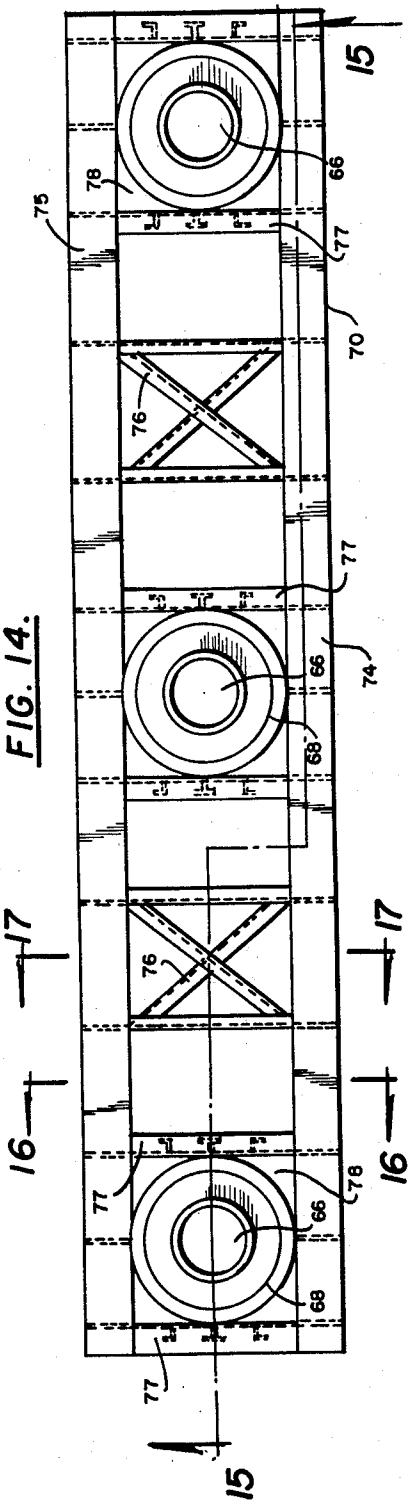


FIG. 14.

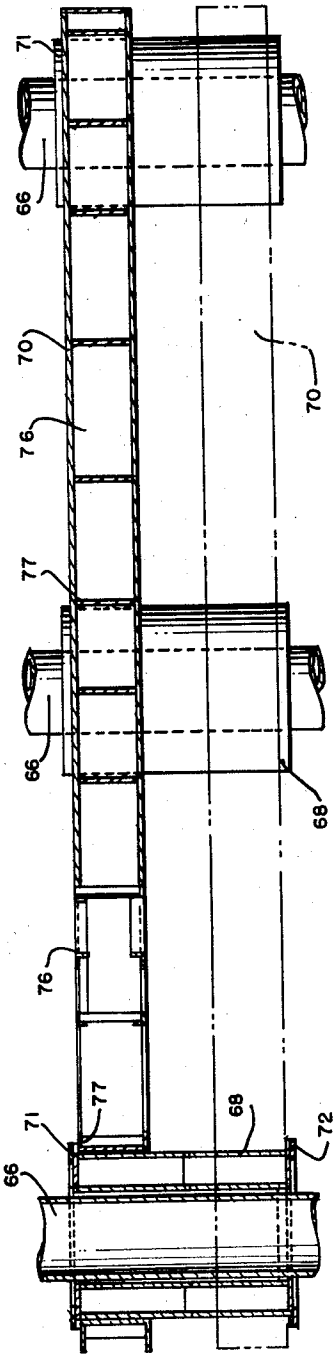


FIG. 15.

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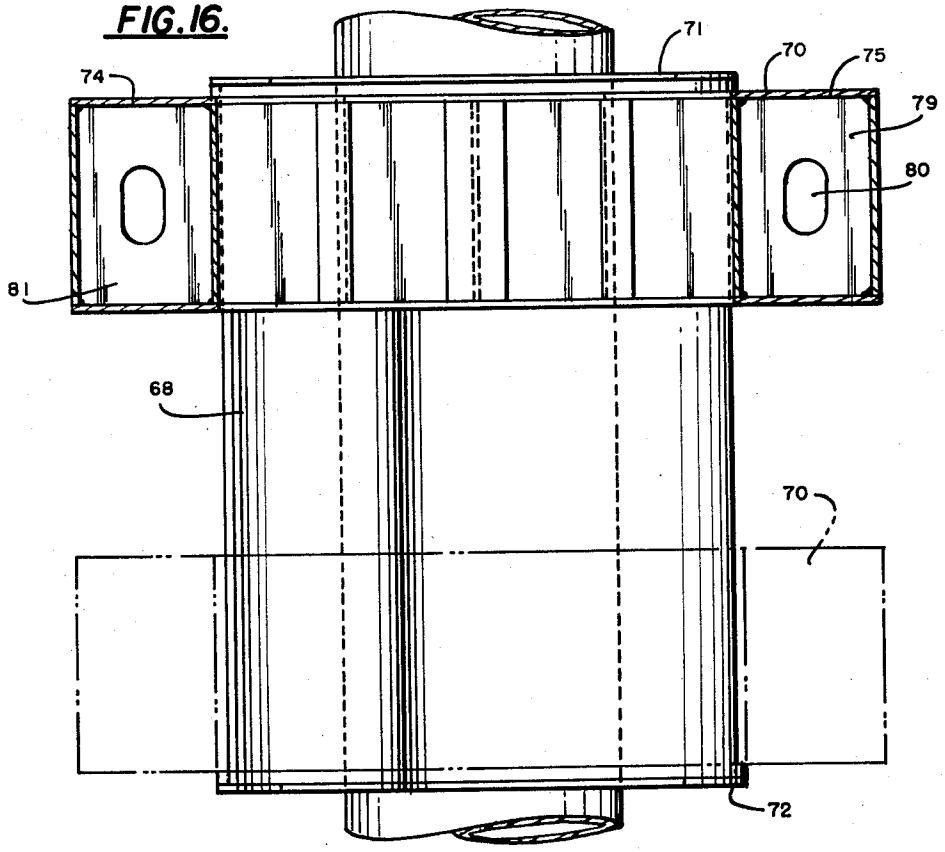
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FIG. 16.



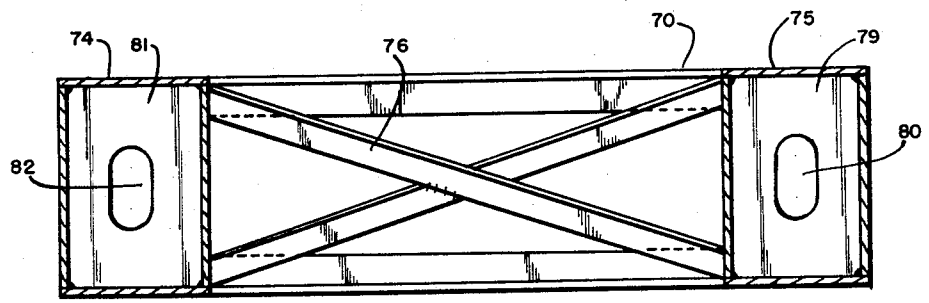


FIG. 17.

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United States Patent Office

2,909,901

Patented Oct. 27, 1959

2,909,901

TANK FOOTING MEMBERS FOR A COMBINED BARGE AND WORKING PLATFORM ASSEMBLY

George E. Suderow, New York, N.Y., assignor to De Long Corporation, New York, N.Y., a corporation of Delaware

Application November 16, 1954, Serial No. 469,092

16 Claims. (Cl. 61—46.5)

The present invention relates to a combined barge and working platform assembly which is supported in its raised position above the level of the water by caissons, columns and the like.

An important object is to provide means associated with each of the caissons for increasing the bearing surface or area for supporting the barge when it is raised out of the water and converted to a working platform.

A further object consists in slidably mounting on each of the caissons, a tank footing or base member arranged to engage the marine ground so as to provide a greater load-carrying capacity when the barge is raised above the level of the water. A lost-motion connection is provided between each tank member and its caisson so that the latter will initially project through the former and take the load prior to the tank member. Conversely, the caissons are withdrawn from the marine ground prior to the removal of the tank members therefrom in order that the caissons and tank members may be raised with a minimum of resistance and effort.

Another object consists in forming the tank members with interfitting telescopic sections, which when in their collapsed position, fit in recesses formed in the bottom of the barge or project below the bottom of the barge, and are of such compact shape as to offer little resistance to the movement of the barge being towed.

A further object consists in providing a new and improved tamping method for increasing the load-bearing qualities of the marine ground by tamping the earth around the opening formed by forcing or inserting the caissons and tank footing members into the submerged ground and alternately inserting and withdrawing the caissons and tank members before driving them firmly into the opening to provide a firm bearing surface to support the caissons and their associated tank members.

A still further object comprehends associating two or more buoyant pontoons with the caissons and the tank footing members. The pontoons are spaced from each other and are connected to two or more caissons and constitute additional means for increasing the bearing surface or area of the footing members and caissons so as to facilitate the freeing of the caissons and footing members from the marine ground, and provide additional buoyancy to the barge.

Other objects and advantages of the invention will become apparent from the following disclosure when taken in conjunction with the accompanying claims and drawings.

Referring to the drawings in which are shown several preferred embodiments of the invention:

Figure 1 is a plan view of a combined floating barge and working platform constructed in accordance with the present invention;

Figure 2 is a side elevational view of Figure 1 showing the barge in its floating position and the caissons elevated and projecting a limited distance beneath the barge and tank members;

Figure 3 is a view similar to Figure 2, showing the barge raised and converted to a working platform and the caissons penetrating the marine ground so as to support the platform;

Figure 4 is an enlarged sectional view taken substantially along the line 4—4 of Figure 2;

Figure 5 is a sectional view taken substantially along the line 5—5 of Figure 4;

Figure 6 is a side elevational view of a modified form of the invention showing the barge and its associated parts in their floating positions;

Figure 6A is a view similar to Figure 6 of another modification;

Figure 7 is a view similar to Figure 6, but showing the barge and caissons in their operative or ground-engaging position;

Figure 8 is an enlarged sectional view taken substantially along the line 8—8 of Figure 7;

Figure 9 is a sectional view taken along the line 9—9 of Figure 8;

Figure 9A is an enlarged sectional view taken along the line 9A—9A of Figure 7;

Figure 10 is an enlarged detailed sectional view showing the co-acting abutments or stops for the telescopic sections of the tank footing member;

Figure 11 is a plan view of a further modified form of the invention;

Figure 12 is a side elevational view of Figure 11 with the parts in their floating position;

Figure 13 is a view similar to Figure 12 and showing the parts in their ground-engaging positions;

Figure 14 is an enlarged sectional view taken along the line 14—14 of Figure 13;

Figure 15 is a sectional view taken substantially along the line 15—15 of Figure 14;

Figure 16 is a sectional view taken substantially along the line 16—16 of Figure 14; and

Figure 17 is a sectional view taken substantially along the line 17—17 of Figure 14.

Referring to the drawings, 20 indicates a combined floating barge and working platform of any suitable size and shape and which is particularly adaptable for use in offshore drilling operations and the like. The buoyant barge 20 is provided with longitudinally spaced well openings 21 adjacent opposite sides thereof and which are arranged to loosely receive the caissons or tubular supporting members 22. Mounted on the barge 20 so as to be movable therewith and concentric with each of the openings 21, is a jack mechanism 23 for raising and lowering the caissons and for elevating the barge 20 above the level of the water 24 when the latter is converted into a working platform and supported directly by the caissons which are now embedded in the marine ground 25. Preferably, the jack mechanism 23 is substantially similar to that disclosed in the co-pending Pointer application, Serial No. 283,567, filed April 22, 1952, now Patent No. 2,775,869.

In order to provide additional bearing surface or wider area for supporting the barge when the latter is raised above the level of the water, each of the caissons 22 has slidably mounted thereon a metal tank footing member 26 (Fig. 5) which is provided with a central or axial opening 27 of slightly larger diameter than the caissons 22 so as to loosely receive the same. The tank 26 may be formed of an outer cylindrical shell 28 and a spaced inner shell 29 which are connected by the circumferentially spaced webs or plates 30 to provide a durable and sturdy construction. The top and bottom of the tank may be closed by the plates 32 and 33 which are stiffened by angles 31 and welded to the shells as at 34. Plates 30 may be provided with cuts or snipes 35 to facilitate the welding of plate 32 to shells 28 and 29 as shown at 34. Each of the plates 32 and 33 has a central opening

27 through which the caisson 22 loosely extends. In order to limit the axial movement of each of the caissons 22 relative to its associated tank 26, the portion 36 of the caisson within the opening or bore 27 and adjacent the bottom plate 32 is provided with a stop member such as the retaining collar 37 which is welded or otherwise suitably connected to the outer surface of the caisson. The wall of the opening 27 in the bottom plate 32 projects inwardly slightly beyond the inner shell 29 so as to form an annular flange or stop 38 to which may be connected a reinforcing ring 39. A stop member or ring 40 is welded or otherwise connected to the inner wall of the opening in the top plate 33 and is attached after the ring 37 is inserted into the tank opening 27,

Thus, it will be seen that the spaced stops 38 and 40 provide means which co-act with the collar 37 for limiting the axial movement of each of the caissons 22 relative to the tank member 26 so that when the caisson is moved beyond these points to cause the simultaneous movement of the tank member therewith.

The webs 30 may be provided with access holes 41 which communicate with the space between adjacent webs. Each of the tank members 26 as shown, is buoyant but may be provided with openings in the bottom 32 and top 33 so as to allow water to freely circulate therethrough.

When the barge is in its floating position as shown in Figure 2, the retaining ring 37 on each of the caissons 22 is in contact with the upper stop 40. Conversely, when it is desired to raise the barge 20 above the level of the water so as to be supported directly by the caissons 22, the hydraulic jacks 23 are operated so as to cause the caissons 22 to be lowered. Each caisson 22 moves downwardly freely until the ring 37 engages the stop 38, whereupon it causes the simultaneous downward movement of the tank member 26 therewith. The retainer ring 37 is positioned to allow the lower end portion 42 of each of the caissons 22 to project beyond the tank 26 so as to be inserted first into the marine ground, also to be withdrawn or partially withdrawn from the ground before the removal of the tank member. The axial freedom of movement of the caissons relative to the tank members allows initial displacement of the lower end 42 of the caisson when it is embedded in the ground, and acts to disturb and loosen the soil around the tank 26 so as to decrease the amount of friction of the soil on the sides of the tank member, thus allowing the tank members 26 and the caissons 22 to be raised with a minimum of resistance and more effectively and economically than would be the case if the tank members were fixed to the caissons. The tank members 26 when in their supporting positions penetrate into the submerged ground to provide additional bearing surfaces for the caissons. Thus, it will be seen that when the caissons 22 are being jacked into the marine ground 25, the tank members 22 will also be forced downwardly upon engagement of each of the retainer rings 37 with the stop flange 38 in the bottom of the tank so that the tank members will coact with the lower end portions of the caissons to provide a supporting base structure capable of withstanding the heavy loads to which devices of this character are normally subjected. Further, the tank footing members provide simple, efficient and positive means which penetrate into the marine ground to prevent any tendency of the caissons to slip, and thus insure the barge when raised above the water, to be maintained firmly in a fixed operative position. In order for the tank members to be maintained properly in position when out of engagement with the ground, guide or retaining members 19 are connected to the bottom of the barge so as to engage the tank members.

In order to obtain firm bearing surfaces for supporting the caissons 22 and the tank footing members 26, each caisson 22 and its associated tank member 26 may be initially forced into the marine ground 25 so as to provide an opening 42'. By alternately forcing the caisson and its tank footing into the marine bottom and withdrawing the same several times, it will provide a firm compact bearing surface in the ground 25. Each time the caisson and its tank footing is withdrawn from the opening in the marine ground, some earth falls into the opening formed by the caisson and the tank member. Moreover, each time the caisson and tank member is forced again into the opening or cavity, the newly placed earth is tamped or compressed by the caisson 22 and the tank footing 26 so as to compact and make the earth or material denser so as to increase the load-bearing qualities of the submerged land. Further, the amount of penetration of the caisson and tank footing member necessary to support a given load is decreased due to the increased load-bearing qualities of the tamped submerged land 25. Thus, it will be seen that a simple, efficient and economical method is provided for tamping the marine ground so as to compact the same in order to firmly support the barge and its associated parts when in their raised position above the level of the water. It will be manifest that the marine ground may be tamped by reciprocating each caisson into the opening formed by the caisson in the marine ground and without the use of a tank footing member. In certain instances, the footing member only may be used to tamp the marine ground.

In the modified form of the invention disclosed in Figures 6, 6A, 7, 8, 9, 9A and 10, each of the sliding tank members 43 is formed of telescopic sections 44, 45 and 46 (Fig. 7), which are provided with central or axial openings 47 for receiving a caisson or tubular member 48 that extends through well openings 49 in the combined barge and working platform 50. A jack mechanism 51 such as embodied in the said Pointer application, Serial No. 283,567, is associated with each of the caissons 48 to control the axial displacement thereof. As shown, the telescopic tank member 43 is formed of three sections but it will be manifested that any number of sections may be used. Each of the caissons 48 has a retaining ring or shoulder 52 (Fig. 9A) which is arranged to coact with the axially spaced stop collars or lugs 53 and 54 carried by the lower section 46 and spaced axially along the wall of the opening 47, so as to limit the axial movement of the caissons 48 relative to the telescopic tank member 43 and cause the movement of the tank member therewith, when moved beyond a predetermined distance.

The large cylindrical upper section 44 of the telescopic tank is provided with an opened lower end having an annular stop 55 arranged to abut a complementary stop or shoulder 56 on the upper portion of the intermediate telescopic section 45. The lower open end of the section 45 is similarly provided with a stop shoulder 57 arranged to abut an annular stop or shoulder 58 on the top of the lower section 46 when the sections are moved to their extended position. The retaining ring 52 is preferably welded as at 59 (Fig. 10) to the outer surface of the caisson 48 so that when in its distended position it abuts the stop member 53 on the lower telescopic section 46. Each of the stop members 53, 56 and 58 is welded to the tank as at 60 (Fig. 10). The lower end of the tank section 46 is preferably closed by a transverse plate 61 welded thereto as at 62 (Fig. 10). The section 46 instead of being buoyant may be provided with openings in the top and bottom thereof for allowing water to flow therethrough. Each of the lower telescopic sections is preferably provided with circumferentially spaced radial webs 63 (Fig. 8) for reinforcing the same.

The convertible barge and working platform 50 is shown in Figure 6 in its floating position with the caissons 48 and the tank sections elevated. In this nested position, the caissons project a short distance below the bottom of the tank 43. Thus, it will be seen that as compared with the slidable tank previously described, the telescopic tank structure extends below the bottom of

the barge only about one-third the distance of the slidable tanks so as to substantially reduce the drag or water resistance to the barge when being towed.

The modification disclosed in Figure 6A is substantially similar to the form shown in Figure 6 with the exception that the floating barge **50** is provided on the underside or bottom thereof with spaced recesses **50'** of slightly larger size or diameter than the telescopic tank footing members **43** so as to receive the same when the caissons **48** are raised to float the barge **50**. Thus, it will be seen that the tank members **43** and the lower ends of the caissons **48** are positioned so as to offer little or no resistance to the barge **50** when being towed.

In installing the assembly, the retainer ring **54** is welded to the top of the lower section **46**. The caisson is then laced into the tank **43**. Then the retainer ring **52** is welded to the caisson **48** and the caisson **48** is retracted into the lower section **46** a sufficient amount to enclose retainer ring **52**. Retainer ring **53** at the lower end of the lower section **46** is welded in place. It will be seen that by reason of the spacing of the stops **53** and **54**, the caisson **48** is allowed to move axially a predetermined distance so as to free itself from the marine ground before the tank member is withdrawn. Moreover, the telescopic sectional tank provides less resistance to withdrawal from the marine ground since only one-third of the tank is being freed at one time.

When the barge is in its floating position as shown in Figure 6, each retaining ring **52** is in contact with the stop **54** on the lower section **46**. When it is desired to raise the barge **50** above the level of the water (Fig. 7), the jacks **51** are operated causing the retainer ring **52** on the caisson to be moved in contact with the stop **53**. As the caissons continue to be lowered, the telescopic tank sections are caused to move therewith and be extended. As the lower end of each caisson projects beyond the section **46** of the tank, the caisson will first penetrate the marine ground and then the lower section **46** will be brought into contact with the soil and embedded therein. As the caisson and lower section **46** continue to move downwardly, the stop **58** on the lower section **46** contacts the stop **57**, thus causing the intermediate section **45** to also penetrate into the ground. Upon further movement downwardly of the caisson **48**, the stop **55** abuts the stop **56** which forces the upper section **44** to also be inserted into the ground so as to insure a firm and wide bearing surface being provided for maintaining the barge **50** in its raised position above the level of the water. When the telescopic tank members and the lower ends of the caissons **48** are firmly fixed into the marine ground, the jacks are operated so as to raise the barge **50** to its working position above the level of the water (Fig. 7).

In the modification shown in Figures 11 to 17, inclusive, the combined barge and working platform **64** is provided on opposite sides thereof with longitudinally spaced openings **65** through which extend the caissons **66**. Mounted on the barge **64** and arranged to releasably engage the caissons **66** are jacks **67** which preferably are similar in construction and operation to the jack mechanism embodied in the said Pointer application, Serial No. 283,567. Slidable tank footing members **68** similar in construction and operation to the tank members **26** previously described, are mounted on the lower ends of the caissons so as to be inserted into the marine ground **69** when the barge **64** is raised by the jack **67** out of the water.

In order to provide additional buoyancy to the tank footing members **68** when they are embedded in the marine ground, two or more pontoons **70**, four of which are shown for the purpose of illustration, are spaced from one another and connected to two or more caissons in groups. As shown, each pontoon **70** is connected to three caissons but this number may be varied as operating conditions require. Each of the pontoons **70** is

provided with openings which register with the openings **65** in the barge **64** and through which extends a tank member **68**. The upper end of the tank member **68** has a flange or collar **71** arranged in abutment with the top of the pontoons **70** and also is provided with a spaced stop lug **72** below the pontoon **70** so as to limit the downward movement thereof. Thus, means are provided for limiting the vertical movement of the buoyant pontoon **70** relative to its associated tank members **68**. The spaced stops **71** and **72** also coact with the pontoons **70** to constitute means for either raising or lowering the pontoons upon axial displacement of the caissons **66**. The tanks **68** and the pontoons **70** when the barge is in its floating position are adjacent the bottom of the barge (Fig. 12). When it is desired to raise the barge **64** to its working position, the jacks **67** fixed to the barge **64**, are operated to move the caissons **66** downwardly so as to penetrate the ground **69**. After the caissons move a predetermined distance they cause the tank members **68** to move therewith and likewise to be forced into a firm engagement with the marine ground. At the same time, the pontoons **70** are moved downwardly, so as to firmly rest on the marine ground. The jack mechanisms **67** are then operated to raise the barge **64** above the water level and to its working platform position (Fig. 13).

Each of the pontoons **70** comprises longitudinally spaced side members **74** and **75** (Fig. 14) which are connected at spaced points by cross braced members **76**. Transversely spaced reinforcing webs **77** are also provided, which form openings **78** through which extend the tank footing members **68**. Transverse webs **79** (Fig. 16) are associated with the pontoons **70** so as to provide additional reinforcing means, and these webs may be formed with access openings **80**.

It will be noted that each of the pontoons **70** is axially slidable on a tank footing member **68** as shown in dotted and full lines in Figures 15 and 16, and that the stops **71** and **72** serve to limit the vertical movement of the pontoons relative to the tank footing members **68**.

Thus, it will be seen that the pontoons **70** not only provide additional buoyancy for the tank members **68** but also increase their bearing surface and provide means for insuring the barge when converted to a working platform above the level of the water to be firmly and securely maintained in a fixed position.

It will be understood that the caissons and footing members shown in Figures 7 and 13 may with equal efficiency be used to carry out the tamping method, so as to increase the load-bearing qualities of the submerged land which supports the caissons and their associated parts when the barge is raised above the level of the water.

Thus, it will be seen that in all forms of the invention, simple, efficient, and positive means are provided for increasing the load-carrying capacity of the barge when converted into a working platform and for insuring the barge when raised above the level of the water, to be maintained firmly in a fixed position. Further, due to the fact that the lower ends of the caissons are inserted into the marine ground before the tank footing members and also removed from the ground before these members, means are provided for facilitating the withdrawal of the caissons and tank members with less resistance than would be encountered if the tanks were fixed directly to the caissons. Due to the tank members being locked to the lower ends of the caissons, they not only add additional bearing surfaces but cause the caissons to be pinned or maintained in a fixed position when embedded in the marine ground. Moreover, each of the caissons may be initially withdrawn from the submerged land before removal of the tank members therefrom. The association of the axially slidable tank members with the caissons substantially reduces the skin friction resistance as compared with a single fixed tank assembly of the same depth. The pontoons not only add additional bearing surfaces but also provide

means for facilitating the freeing of the caissons and the tanks from the submerged land so that the barge may be handled at a minimum expenditure of time, labor and cost.

It will be understood that the forms of the invention shown are merely illustrative and that such changes may be made as come within the scope of the following claims.

I claim:

1. A floating assembly including a combined barge and working platform having well openings, caissons extending through said openings, means for imparting vertical movement to the caissons and the barge relative to each other, tank footing members slidable vertically on the caissons and engageable with the marine ground to provide additional bearing surface for the caissons, and means defining interengaging stop surfaces on each member and caisson to limit upward movement of the former relative to the latter to a relative position therebetween wherein the caisson extends below the member a predetermined distance and to limit downward movement of the member relative to the caisson to a relative position therebetween wherein the caisson does not project substantially below the member, whereby each caisson can extend below its tank members and penetrate into the marine ground a predetermined distance before its tank member has a load imposed thereon and can be withdrawn said distance before upward movement of its member therewith.

2. A floating assembly including a combined barge and working platform having vertical well openings, caissons extending through said openings, means for imparting vertical movement to the caissons and to the barge relative to each other, tank footing members, each including a shell having an axial opening through which a caisson slidably extends, each caisson having a stop collar positioned within said axial opening, said shell having spaced stop flanges above and below said collar arranged to engage said collar alternatively for limiting relative movement between the associated tank member and the caisson, said caissons being projectionable below the tank members for penetration into the marine ground before the tank members have a load imposed thereon and to be partially withdrawn from the marine ground prior to upward movement of the tank members therewith.

3. A floating assembly as called for in claim 1 in which each of the tank members includes telescopic sections having lost-motion connections therebetween so as to be nested when the barge is afloat and the caissons are pulled up out of engagement with the marine ground and to be extended and penetrate into the marine ground when the caissons are moved down into engagement with the marine ground and the barge is raised above the water level on the caissons.

4. A floating assembly as called for in claim 1 including spaced buoyancy pontoons extending between, horizontally connecting, and vertically slidable on groups of tank members, and means for limiting vertical relative movement between each member of a group and the associated pontoon so as to provide additional bearing surfaces for the working platform when the caissons are engaged with the ground and the barge raised above the water level on the caissons.

5. A floating assembly as called for in claim 2 in which each of the tank members includes telescopic sections having lost-motion connections therebetween so as to be nested when the barge is afloat and the caissons are pulled up out of engagement with the marine ground and to be extended and penetrate into the marine ground when the caissons are moved down into engagement with the marine ground and the barge is raised above the water level on the caissons.

6. A floating assembly as called for in claim 2 in which spaced buoyancy pontoons are vertically slidable on groups of the tank members and including means for limiting relative vertical movement between each of the pontoons and the tank members of the associated group.

7. A floating assembly including a combined barge and working platform having vertical well openings, caissons extending through said openings, means for imparting vertical movement to the caissons and to the barge relative to each other, tank footing members slidable on the lower end of each caisson, each of the tank members including telescopic sections extensible downwardly from a nested arrangement, each of said sections having coacting stop means for limiting their extension, and each of said caissons having stop means thereon coacting with complementary stop means on the inner section of the corresponding member for limiting the extent of slidable movement between each caisson and its member.

8. A floating assembly including a combined barge and working platform having well openings, caissons extending through said openings, means for imparting vertical movement to the caissons and the barge relative to each other, tank footing members vertically slidable on the caissons and engageable with the marine ground to provide additional bearing surface for the caissons, means for limiting vertical movement of each of the members relative to its associated caisson, buoyancy pontoons having spaced well openings, said caissons and tanks extending through said well openings, and vertically spaced stop means on each of the said tank members for limiting the vertical movement thereof relative to said pontoons, the lower ends of said caissons being extendable below the pontoons and tank members for penetration into the marine ground in advance of the tank members.

9. In combination with a buoyant base having spaced vertical openings, supporting marine-ground-penetrating columns extending through said openings, means for imparting vertical movement to said columns relative to the base, tank footing members slidable vertically on the columns adjacent the lower ends thereof so as to engage the marine ground to provide an additional bearing surface for the columns, and means for limiting vertical movement of each footing member in both directions relative to its column so that the latter can project below its member on penetration of the ground and will retrieve its tank member on withdrawal from the ground without projection of said column substantially below said tank member.

10. A vertically-movable marine-bottom-engaging and penetrating supporting leg for a mobile above-water marine platform, comprising: an elongated column; an enlarged footing member slidably mounted on said column adjacent the lower end thereof for vertical movement relative thereto, said member including outer and inner telescopically arranged sections with said inner section movable downwardly relative to said outer section from a nested position therewithin and a lost-motion connection between said sections effective to limit said inner section movement in both directions; and a lost motion connection between said inner section and column to limit said member movement in both directions, said last-mentioned connection being effective to permit movement of said member to an upper position relative to said column wherein said lower column end projects a predetermined distance below said member and to a lower position wherein said lower end does not project substantially below said member.

11. A mobile marine platform comprising: a platform-like buoyant body; a plurality of substantially upright supporting legs for said platform; guide means on said platform mounting said legs for substantially vertical movement relative to said platform; power-operated means carried by said platform and engaged with said legs for selectively lifting or lowering said legs relative to said platform when the latter is afloat, or selectively lifting or lowering said platform on said legs when the latter are engaged with the marine bottom; an enlarged

footing member slidably mounted on each of said legs adjacent the lower end thereof for vertical movement relative thereto; and a lost-motion connection between each of said members and its corresponding leg to limit said movement of said member in both directions, said connection being effective to permit movement of said member to an upper position relative to its corresponding leg wherein the lower end of the leg projects a predetermined distance below the member, and to a lower position wherein said lower end does not project substantially below said member.

12. The structure defined in claim 11 wherein the lost-motion connection includes a pair of vertically-spaced stop elements on the member and a third stop element on the column disposed between the elements of said pair and alternatively engageable therewith.

13. The structure defined in claim 11 wherein the column is a tubular caisson and the member is an annular tank.

14. The structure defined in claim 13 wherein the tank is buoyant.

15. A marine-bottom-engaging support for a mobile above-water marine platform, comprising: a plurality of spaced parallel columns; a first enlarged footing member slidably mounted on each said column adjacent the lower end thereof for vertical movement relative thereto; a lost-motion connection between each said member and its corresponding column to limit said movement in both directions, said connection being effective to permit movement of the corresponding member to an upper position relative to the corresponding column wherein the lower end of the column projects a predetermined distance below the member; a second enlarged footing member extending between and horizontally connecting at least two of said first members and vertically movable relative to the latter; and a lost-motion between said second member and each of said two first members to limit the extent of relative vertical movement in both directions between each of said two first members and said second member.

16. The structure defined in claim 15 in which the second member is a buoyant pontoon.

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