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Moore et al.

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[54] **DRILLING PLATFORM**

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[73] Assignee: **The Offshore Company,** Houston, Tex.

[22] Filed: **June 8, 1973**

[21] Appl. No.: **368,236**

Related U.S. Application Data

[60] Continuation of Ser. No. 202,350, Nov. 26, 1971, abandoned, which is a division of Ser. No. 819,623, April 28, 1969, Pat. No. 3,628,336.

[52] **U.S. Cl.** **61/46.5,** 285/18, 285/141, 285/403, 403/362, 403/306

[51] **Int. Cl.** ... **E02b 17/00,** F16l 37/14, F16b 12/40

[58] **Field of Search** 285/141, 321, 18, 404, 285/403; 287/DIG. 7, 119; 61/46.5; 403/362, 306

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[57] **ABSTRACT**

A floating vessel suitable as a drilling platform in which the vessel has legs extending therethrough which in their upper position are tightly held by the vessel and each leg includes a footing which can be secured thereto or to the vessel when the legs are lowered to raise the vessel into operating position to provide the lower end of the legs with an extended bearing surface for engagement with the bottom.

3 Claims, 9 Drawing Figures

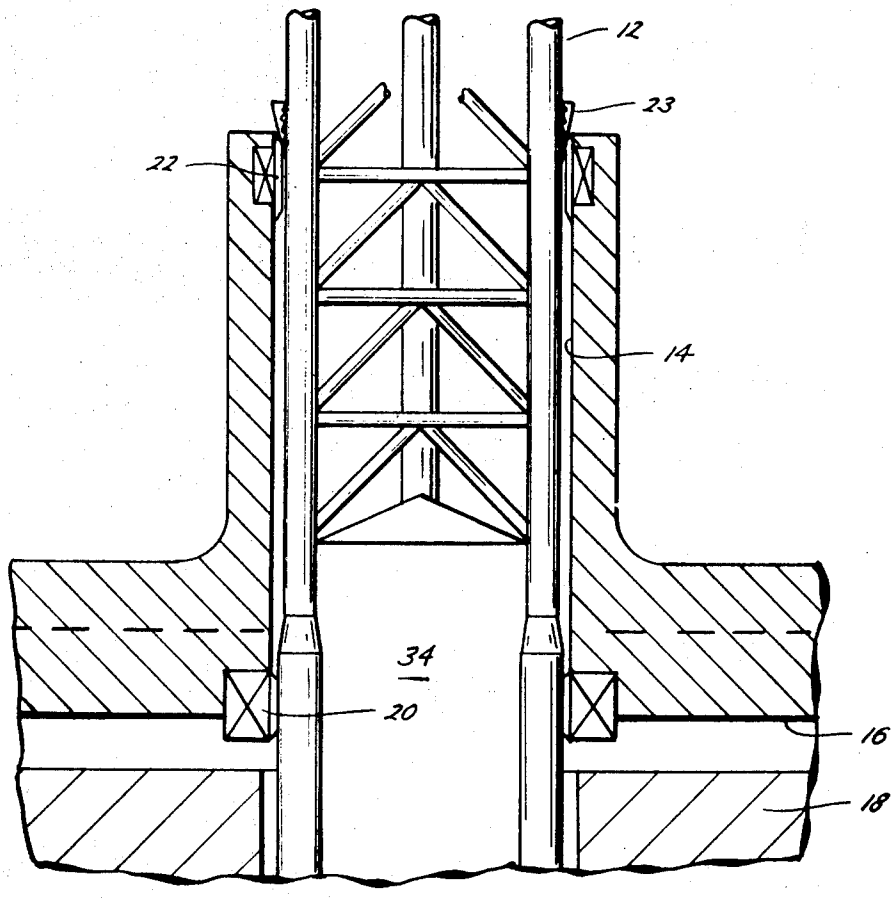


Fig. 1

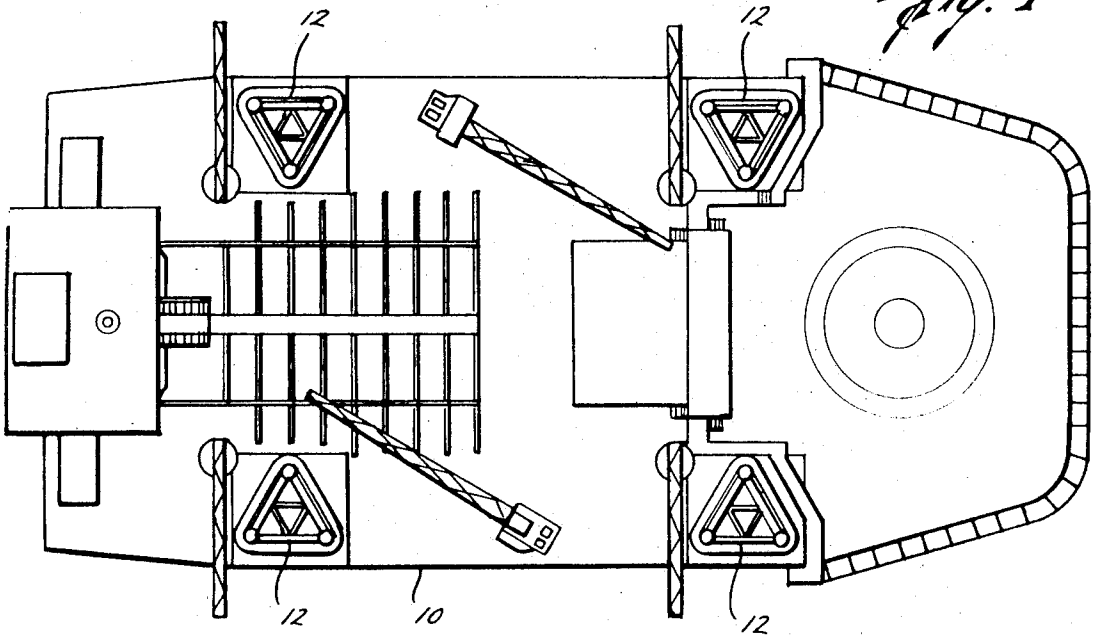


Fig. 2

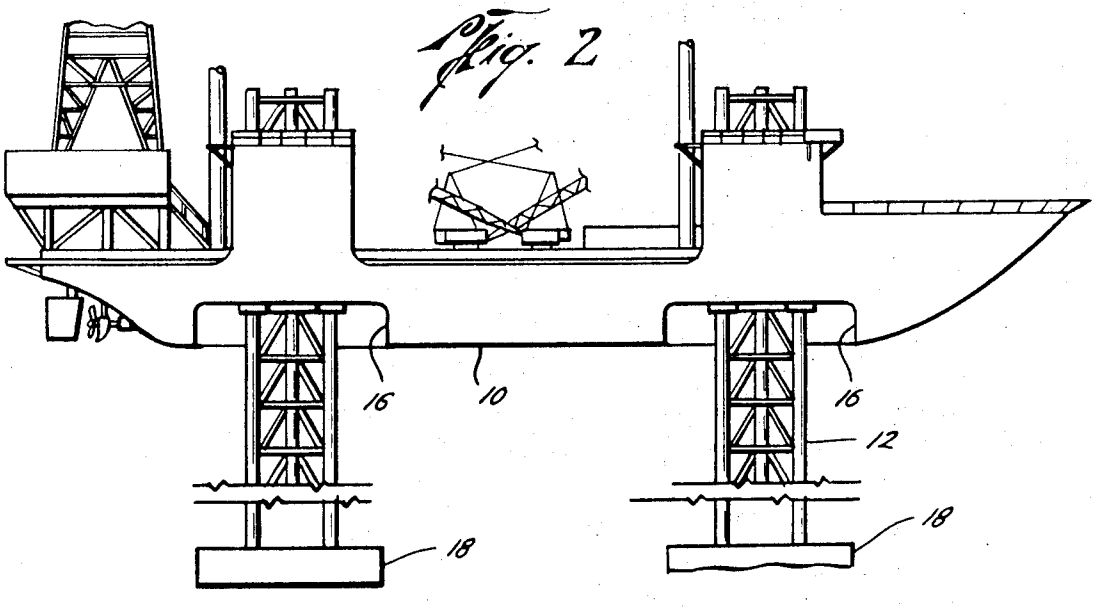
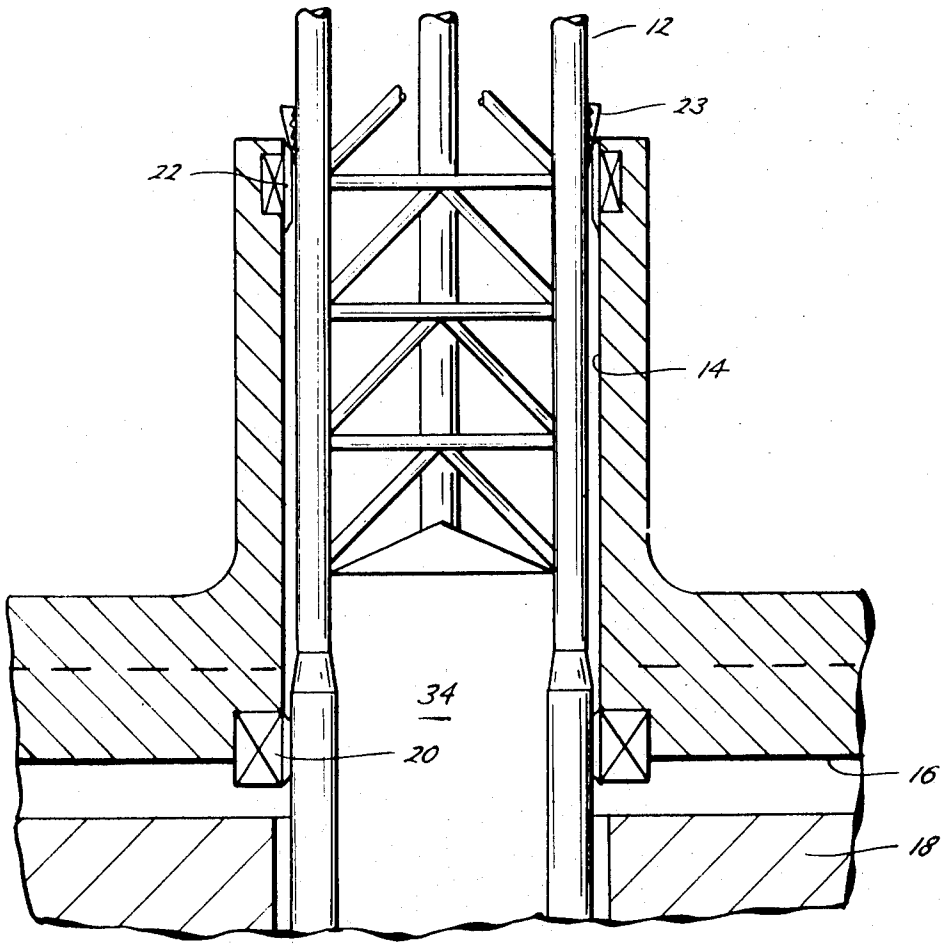


Fig. 3



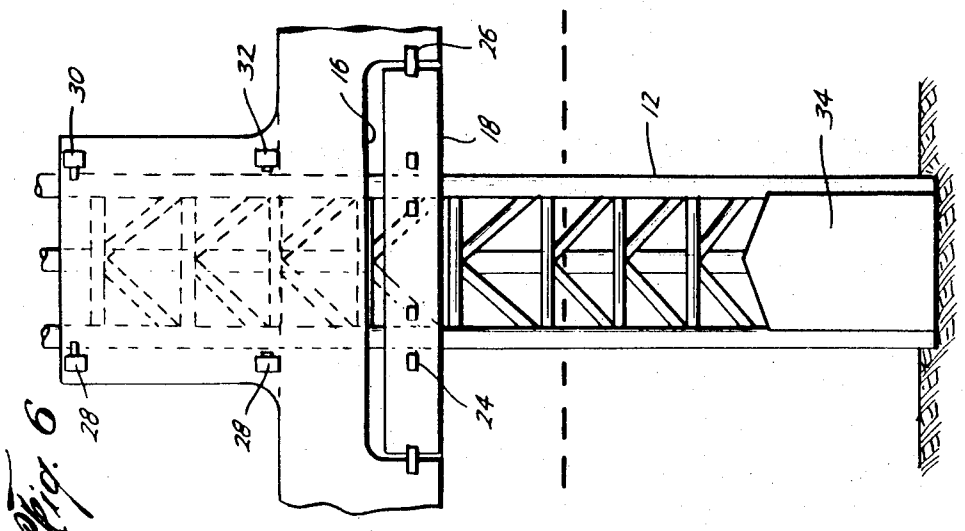


Fig. 6

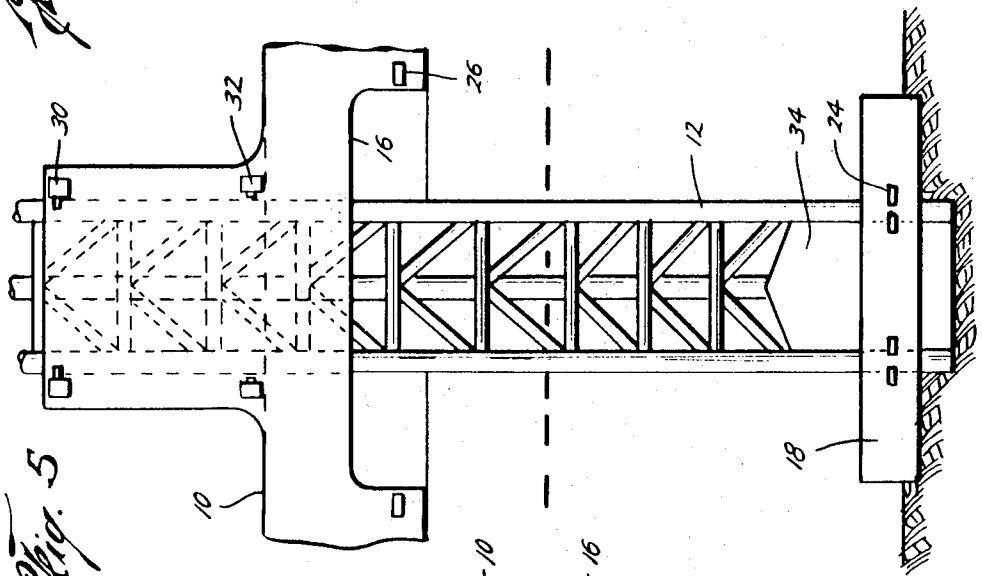


Fig. 5

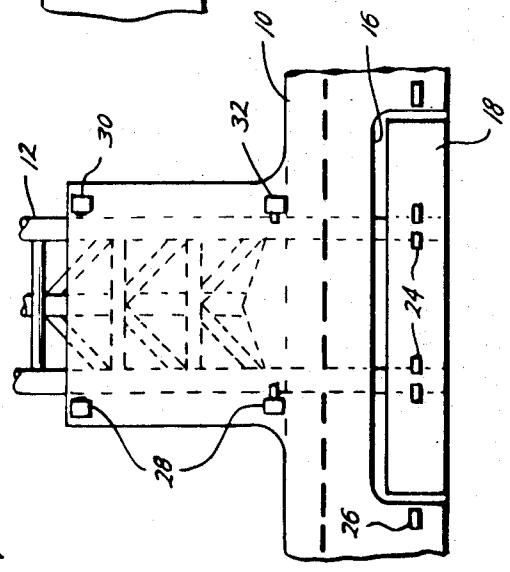


Fig. 4

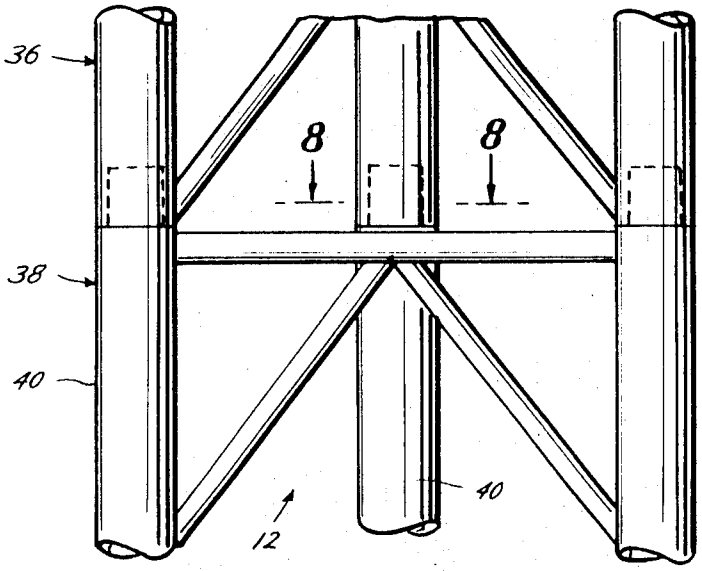


Fig. 7

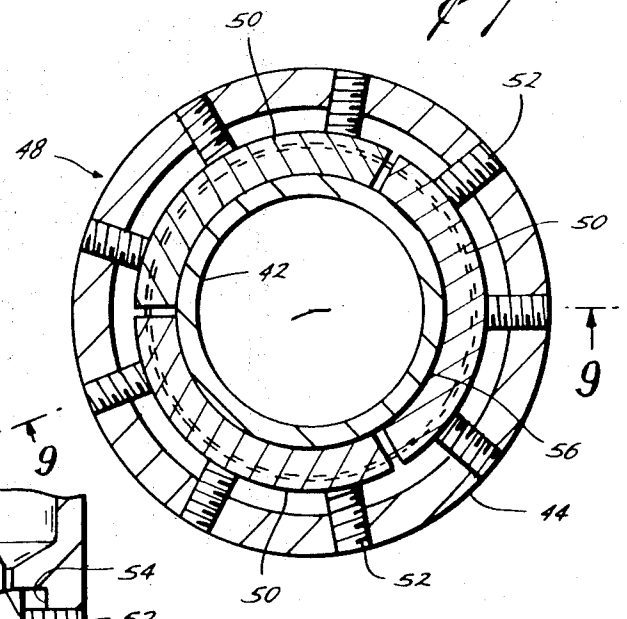


Fig. 8

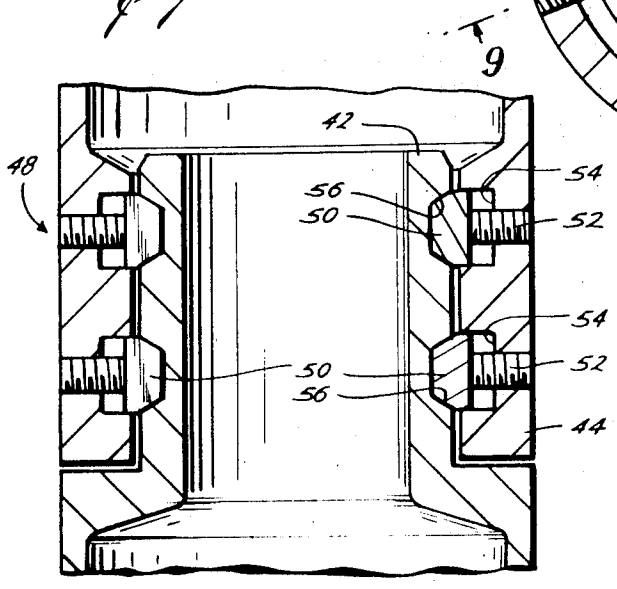


Fig. 9

DRILLING PLATFORM

This application is a continuation of application Ser. No. 202,350 filed Nov. 26, 1971, and now abandoned, which was a divisional application of Ser. No. 819,623 filed Apr. 28, 1969 now Pat. No. 3,628,336.

SUMMARY

The present invention relates to an improved structure for marine drilling which is floatable and includes legs for raising the structure to its desired position for drilling.

An object of the present invention is to provide an improved drilling platform which provides stable footing under all conditions of the bottom which may be encountered at the drilling site.

Another object is to provide an improved drilling platform having legs which are tightly secured in their upper position to prevent vibration during movement of the platform.

Still another object of the present invention is to provide an improved drilling platform having tank footings which may alternately be secured to the hull and to the legs and which when secured to the hull, provide a minimum of drag to the movement of the platform through the water.

A still further object is to provide a vessel which includes its own propulsion for movement on water to a marine drilling site and may be jacked up on its legs to provide a stable drilling platform.

A further object is to provide an improved vessel which can be supported in drilling position on legs and which has a sufficient low center of gravity to be stable when moving on the water.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other objects of the present invention are hereinafter set forth and explained with reference to the drawings wherein:

FIG. 1 is a plan view of a drilling platform vessel constructed in accordance with the present invention.

FIG. 2 is a side elevation of the drilling platform vessel shown in FIG. 1.

FIG. 3 is a detail partial sectional view of one leg showing the guides for the legs with the legs in their uppermost secured position.

FIG. 4 is a partial schematic view of the vessel and showing the improved leg and tank footing with the leg secured to the vessel and the tank footing in position for movement of the vessel on the water.

FIG. 5 is a similar schematic view of the vessel raised on the leg with the tank footing secured to the lower end of the leg to provide extended bearing surface for the lower end of the leg on the bottom.

FIG. 6 is another similar schematic view showing the vessel raised on the leg with the tank footing secured to the vessel.

FIG. 7 is an elevation view of a joint connection in one of the legs.

FIG. 8 is a sectional view taken across one of the joints of the leg along line 8—8 in FIG. 7.

FIG. 9 is a sectional view of the joint shown in FIG. 8 taken along line 9—9.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The vessel 10 may have its own propulsion system as shown in FIGS. 1 and 2. The vessel is provided with the legs 12 which are adapted to be lowered through the vessel 10 with suitable jacking mechanisms. Also, the usual platform drilling equipment such as the derrick D and the cranes C are mounted on the vessel 10. While four legs 12 are shown, the vessel 10 may have three or more of such legs without departing from the spirit of the present invention. Each of the legs 12 extends through a well 14 in vessel 10. The lower portion of vessel 10 surrounding the wells 14 defines the recesses 16 in which the tank footings 18 are positioned during movement of the vessel 10 on the water. Each of the footings 18 is designed to receive the leg 12 therein or to allow the leg 12 to move therethrough.

As shown in FIG. 3, each of the wells 14 includes the lower guides 20 and the upper guides 22. The lower end of the legs 12 are slightly larger than the remainder of the legs so that when the legs 12 are in their uppermost position they are held tightly within the wells 14. In this position the legs 12 are secured against movement and vibration during movement of vessel 10. To further secure the legs 12, suitable wedges 23 are inserted between the legs 12 and the upper guides 22.

The tank footings 18 each include the means 24 for releasably securing the footing to its associated leg 12 and the means 26 for releasably securing it to the vessel 10 within its recess 16. Additionally, the means 28 is provided to releasably secure the vessel 10 to each of the legs 12 and to positively move the legs 12 in both directions through their wells 14 in vessel 10. The means 28 includes the upper lock pins 30, the lower lock pins 32 and the usual jacking means (not shown) for moving the pins 30 and 32 relative to each other. The legs 12 each include interconnected structural members and the lower end of each of the legs 12 includes the integral tank footing 34.

The vessel 10 having its own propulsion is sailed to the drilling site with the tank footings 18 secured in the position shown in FIG. 4. The means 24 secures each tank footing 18 to the lower end of its leg 12 and the legs 12 are secured by the means 28 in their uppermost position so that the tank footings 18 are held within their respective recesses 16. If desired, the tank footings 18 may be held in their recesses 16 by the means 26 and the means 24 may be in their released position. This position of the tank footings 18 minimizes the drag which the footings cause during the movement of the vessel 10 through the water. With the vessel 10 in position over the preselected drilling site, the type of bottom determines whether the legs 12 should be lowered with the tank footings 18 as shown in FIG. 5 or without the tank footings 18 as shown in FIG. 6. When the bottom is relatively soft and has a limited bearing capacity, the tank footings 18 are secured to the legs 12 as hereinafter described to provide sufficient bearing capacity to support the vessel 10 in a raised position. If the bottom conditions are such that only a limited bearing area is needed to support the raised vessel, then the tank footings 18 are held secured to the vessel 10 in their recesses 16 while the legs 12 are lowered.

If it is desired to lower the tank footing 18 with each of the legs 12, the tank footings 18 are first secured to the vessel 10 by the means 26 and then their legs 12 are lowered a short distance to project a few feet below the lower surface of tank footing 18. Thereafter the means 24 are actuated to secure the tank footings 18 to their respective legs 12, and then the means 26 are released.

The legs may then be positively moved downwardly with respect to the vessel **10.** When the footings **34** and the tank footings **18** engage the bottom, further relative movement of the legs **12** through the wells **14** raises the vessel **10** above the water to the position shown in FIG. **5.** The projection of the lower end of the legs **12** below the lower surface of the tank footings **18** causes a greater penetration into the bottom and provides lateral stability. The extended lower surface of the tank footings **18** greatly increases the bearing area of the legs **12** in engagement with the bottom to thereby provide a greatly increased stability of the vessel **10** in its raised drilling position.

When the drilling site is over a bottom which is relatively hard, the extended bearing area of the tank footings **18** may not be desired. Under such conditions, the means **26** are actuated to secure the tank footings **18** to the vessel **10** in their respective recesses **16** and then the means **24** are released to allow the legs **12** to be positively moved downwardly through the wells **14** of vessel **10** and the tank footings **18.** As shown in FIG. **6,** when the footings **34** of legs **12** have firmly engaged the bottom, further jacking of the legs **12** through the vessel **10** raises the vessel **10** above the water surface to provide a stable platform from which drilling operations may be conducted.

The legs **12** normally are very long with a length of **350** feet being expected. Since the projection of the legs **12** below the vessel **10** would cause drag on the movement of the vessel and may even ground the vessel and the extension of the legs upwardly decreases the stability of the vessel, a portion of the legs **12** is made to be removable. This removable portion may be secured on the deck during movement of the vessel **10.** FIGS. **7, 8** and **9** illustrate a joint between the removable section **36** and the main section **38.** Each of the longitudinal members **40** of the main section **38** has a pin end **42** adapted to be received in the box end **44** on the longitudinal members **46** of the removable section **36.** The pin end **42** is an upstanding tubular portion having a reduced external diameter from member **46** and the box end **44** is a tubular section of increased thickness and an internal diameter slightly larger than the pin end **42.** Securing means **48** is provided to maintain the pin end **42** in its desired position within the box end **44.** When the removable section **36** has been secured to the main section **38,** the whole structure functions as a unitary leg for supporting the vessel **10** as previously described.

The securing means **48** includes the arcuate locking segments **50,** the screws **52** which control the position of the segments **50,** the grooves **54** defined around the interior of the box end **44** and the grooves **56** defined around the exterior of the pin end **42.** When the segments **50** are retracted completely within grooves **54,** then the securing means **48** is released and the section **36** may be removed from section **38.** Actuation of screws **52** to move the segments **50** inwardly so that they are partially within grooves **56** and partially within grooves **54** locks the sections **36** and **38** together. The upper and lower edges of segments **50** are beveled to match with the tapered shape of grooves **56.** Thus when the segments **50** are forced into the grooves **56,** the bevels and tapers coact to bring the pin end **42** and box end **44** into the desired secured relationship with each other.

By having the removable sections **36** on the legs **12,** the stability of vessel **10** can be improved by storing the removable section **36** on the deck which lowers the center of gravity of vessel **10.** Also this reduces the dynamic loading on legs **12** during movement of vessel **10.**

From the foregoing description, it can be seen that the improved structure of the present invention provides a stable marine drilling platform in varied conditions of the bottom of the body of water at the drilling site. This structure makes available an extended bearing area which may be secured around the lower end of the legs to engage the bottom and thereby increase the stability of the structure. Additionally, the tank footings which provide this extended bearing area are releasably secured within recesses defined in the vessel so that drag during movement through the water is minimized and may be releasably secured to the recesses when the legs are lowered through the vessel. The vessel has its own propulsion and is provided with wells having guides for the movement of the legs therethrough and the legs are slightly enlarged at their lower ends to fit tightly into the lower guides so that the legs and tank footings are held secure during movement of the vessel to prevent vibration of the legs.

What is claimed is:

1. A floatable structure suitable for drilling, comprising

a floating vessel,

a plurality of legs,

each of said legs including a plurality of connectible sections, and means for releasably connecting said sections together,

each of said sections including a plurality of tubular members and a plurality of bracing members securing said tubular members in generally parallel relationship to each other throughout the length of said tubular members,

said vessel defining a plurality of holes through which said legs are adapted to extend,

means associated with each of said holes for jacking said legs through said holes, and

means associated with each of said holes for guiding said legs in their movement through said holes,

said connecting means between sections releasably connecting the tubular members of said sections together and being of a diameter not larger than the diameter of said tubular members whereby said connecting means allows desired coaction of said jacking and guiding means throughout the movement of said legs through said holes.

2. A floatable structure according to claim **1** wherein said tubular members terminate in pin and box ends for mating between said tubular members of adjacent sections and said connecting means includes

at least one mating annular groove in each of said pin and box ends,

a plurality of segments adapted to be wholly contained within the grooves of one of said pin and box ends, and

means for moving said segments into a position partially in each of the two mating grooves to secure the pin and box ends together.

3. An elongate structure according to claim **2,** wherein said moving means includes

at least one threaded screw secured to each of said segment members and extending through the wall of said box end for rotation from the exterior thereof to positively move said segment members to their desired position.

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