

May 11, 1943.

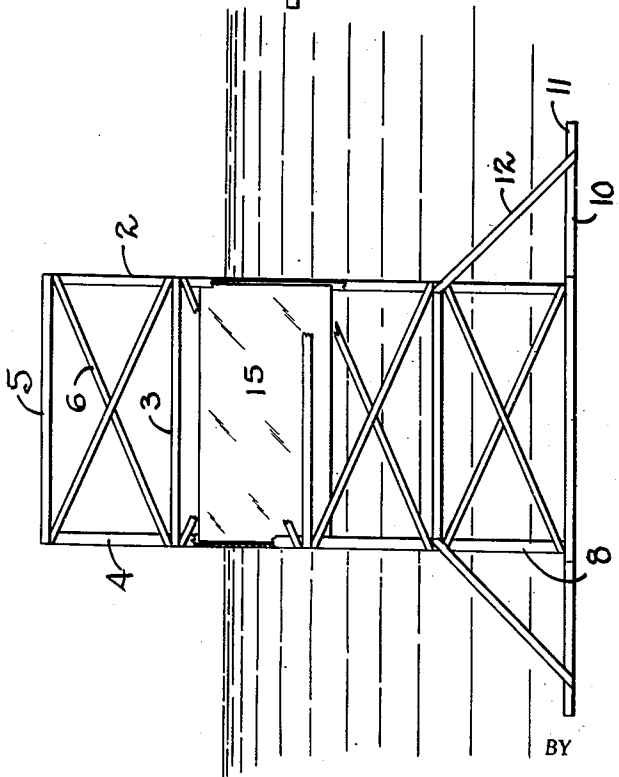
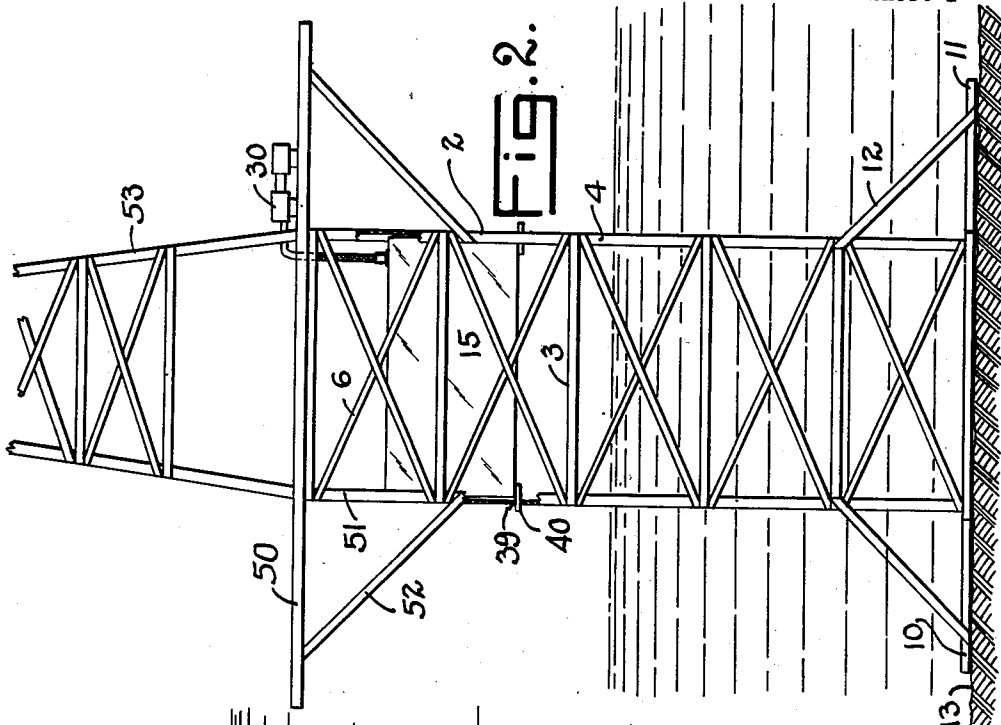
H. E. GROSS

2,318,685

PORTABLE MARINE FOUNDATION

Filed Nov. 16, 1939

4 Sheets-Sheet 1



BY

Fig. 1.

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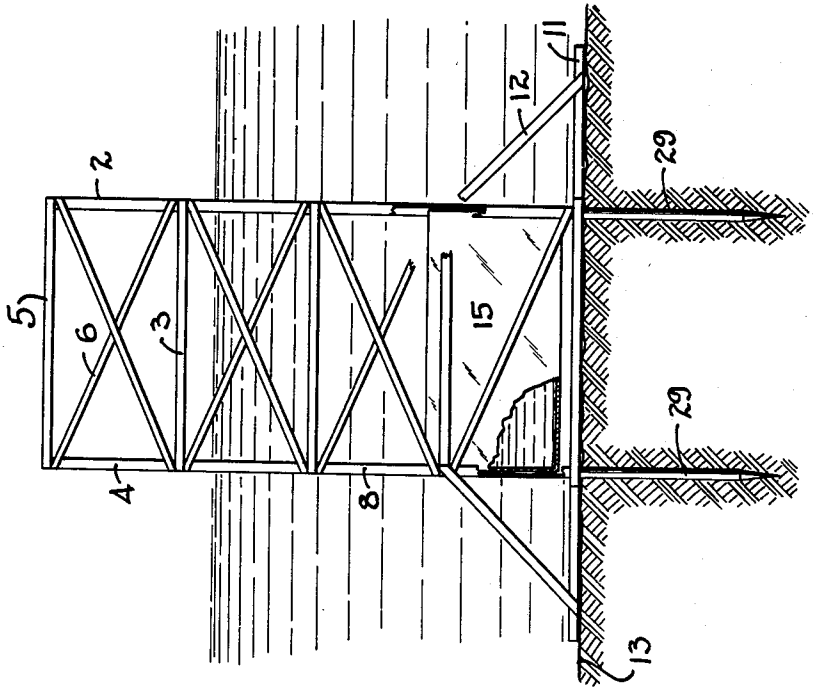


Fig. 3.

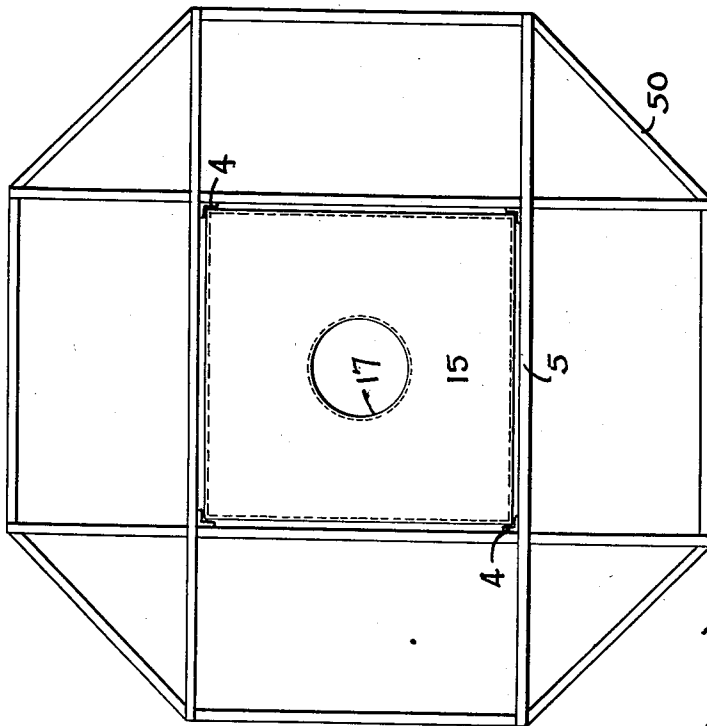


Fig. 4.

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4 Sheets-Sheet 3

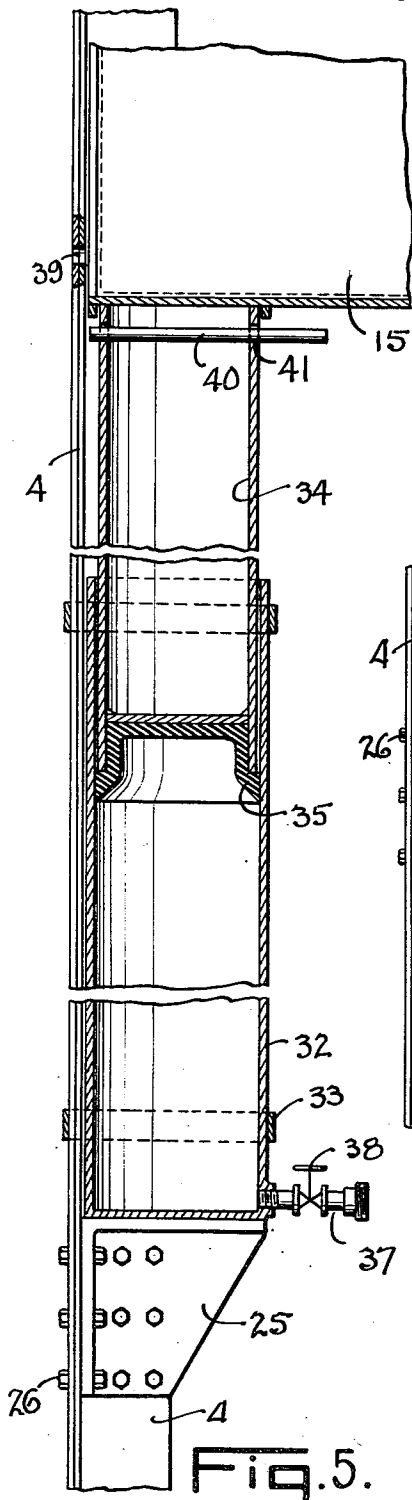


Fig. 5.

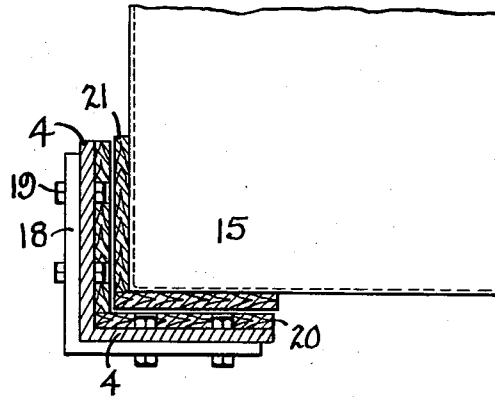


Fig. 7.

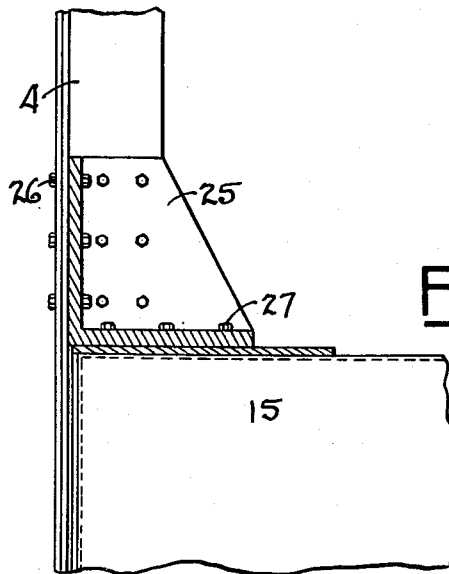


Fig. 6.

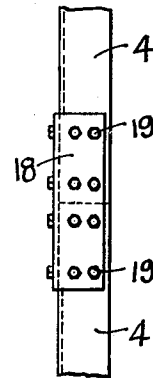


Fig. 8.

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4 Sheets-Sheet 4

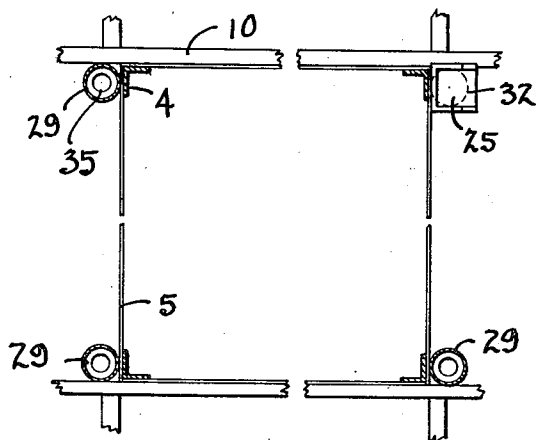
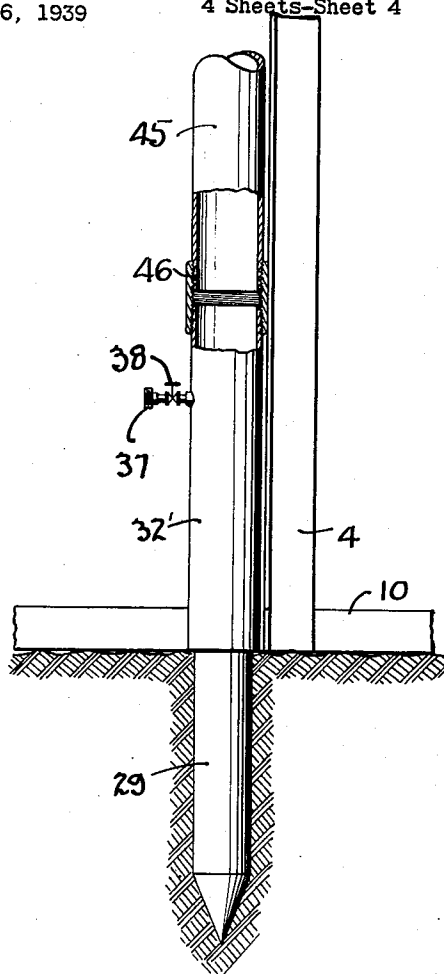
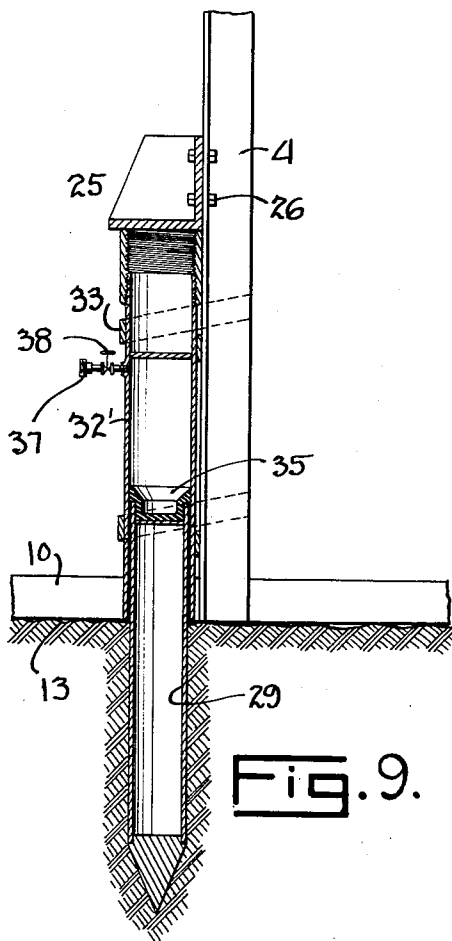


Fig. 11.

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UNITED STATES PATENT OFFICE

2,318,685

PORTABLE MARINE FOUNDATION

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Application November 16, 1939, Serial No. 304,646

4 Claims. (Cl. 61—46)

The invention relates to a portable marine foundation which is of particular advantage in moderately deep bodies of water where it is desired to provide a foundation which can be floated into position and removed after it has served its purpose so as to avoid the expense and delay of providing a piling structure to form a permanent foundation.

One of the principal occasions for a foundation of this sort is in connection with the drilling of wells along the shore lines and in bays where it is desirable to perform drilling operations over a body of water.

It is one of the objects of the present invention to provide a foundation which may be floated to position by means of a pontoon and wherein the pontoon can be submerged to anchor the foundation or where the pontoon may be emptied and utilized as a reservoir.

Another object of the invention is to provide a marine foundation with an adjustable pontoon so as to either float or anchor the foundation.

Another object of the invention is to provide an adjustable pontoon in connection with a marine foundation so that the pontoon may be positioned above the center of gravity to float the foundation and where the tower may be lowered around the pontoon to anchored position and the pontoon thereafter raised to be used as a reservoir.

Another object of the invention is to provide a pontoon for floating a foundation which can be utilized as a base upon which to erect a derrick or other structure.

Another object of the invention is to provide a portable marine foundation having a pontoon thru which drilling operations may be conducted.

Another object of the invention is to provide a marine foundation which may be floated into position, suitably anchored in place and adjusted as to elevation.

Another object of the invention is to provide an apparatus for preventing lateral movement of a marine foundation.

Another object of the invention is to provide a hydraulic jack construction for use in portable marine foundation legs.

Another object of the invention is to provide a mechanism for adjusting a pontoon relative to erecting a portable marine foundation.

Still another object of the invention is to provide a mechanism for adjusting the elevation of a marine foundation relative to a pontoon which is utilized to float the foundation.

Other and further objects of the invention will

be readily apparent when the following description is considered in connection with the accompanying drawings wherein:

Fig. 1 is a diagrammatic view of the marine foundation being floated in position with the pontoon.

Fig. 2 shows the foundation as having been deposited on the earth surface and the pontoon raised to a position for use as a reservoir and with a derrick as having been erected upon the foundation.

Fig. 3 shows a view of the foundation located in position with the pontoon submerged.

Fig. 4 is a top plan view looking down on the foundation, and illustrates the configuration of the base which may be provided but may also illustrate the platform configuration.

Fig. 5 shows an enlarged detail view partly in section of the mechanism for adjusting the pontoon relative to the foundation.

Fig. 6 shows a bracket or clamp to be attached to the leg of the foundation to anchor the pontoon in position to float the foundation.

Fig. 7 is a transverse section of one of the foundation legs to illustrate the manner of forming a trackway for the pontoon.

Fig. 8 is a side elevation of the outside of the leg of Fig. 7.

Fig. 9 shows a construction for forcing a locating spike into the earth formation by hydraulic pressure.

Fig. 10 shows the manner of removing the locating spike.

Fig. 11 is a transverse view of the equipment illustrating the location of the leg spikes.

In Fig. 1 the marine foundation is illustrated generally at 2 and is made up of a framework 3. This frame is in turn made up of the vertical legs 4, the transverse members 5 and the cross bracing 6, so as to form a rectangular framework which will be rigidly braced. It seems clear from Fig. 1 that this framework is made up of a plurality of sections 8, four of which are shown mounted one upon the other in Fig. 1. The legs 4 may be of any desired length to extend thru a plurality of sections or they may be of a length equal to the height of only one section.

The base of the foundation has a spread footing 10 which is in the form of horizontal beams 11 which are reenforced by the diagonal braces 12. This footing may extend in all directions from the framework 3 so as to provide a secure footing upon the earth surface at 13 and may take the configuration shown in Fig. 4.

If the surface 13 is soft any type of additional

spread footing may be provided such as girders or planks across beneath the base 10.

Arranged inside of the frame 3 is a pontoon 15 which is in the form of a tank or reservoir which as seen in Fig. 4 fits into the legs 4 which are in the form of angle irons having the flanges extending along the sides of the foundation. The pontoon may be of any desired height but must be so designed so as to have sufficient flotation effect to support the foundation in water so that it may be transported from one location to another as indicated in Fig. 1. The pontoon is preferably made of metal and has an opening 17 in the center thereof to permit drilling operations to be conducted thru the pontoon.

If desired the base of the foundation framework may be loaded with pig iron or other heavy material so as to lower the center of gravity of the tower in order to assure verticality while it is being floated out to sea.

The detailed construction of the leg 4 is best seen in Fig. 7 where an angle iron coupling 18 has been fixed to the angle iron leg sections 4 by the bolts 19. In order to cover the inner heads of the bolts 19 a lining or trackway 20 preferably of wood has been placed in position so as to form a smooth trackway and a similar protective liner 21 may be placed on the corner of the tank or pontoon 15. In this manner the pontoon will slide smoothly in the legs of the pontoons as guide members when the foundation is to be moved relative to the pontoon.

Fig. 8 shows the coupling 18 and the bolts 19 as connecting the leg sections 4.

In order to place the pontoon in any desired anchored elevation relative to the foundation a bracket 25 is seen in Fig. 6. This bracket is in the form of a gusset plate which is affixed to the angle iron legs 4 by the bolts 26 and to the body of the pontoon by the bolts 27. In this manner the pontoon can be anchored as seen in Fig. 1 just above the center of gravity of the frame or foundation and the foundation can then be towed to the desired location.

When the desired location is reached and the foundation is to be submerged, it seems obvious that the pontoon 15 can be filled with water so as to allow the entire foundation to settle on the earth surface 13 and the foundation will assume the position as shown in Fig. 3 if the pontoon is completely filled with water and allowed to settle to the bottom of the foundation. Fig. 3 shows a plurality of lag spikes 29 which have been forced into the earth formation so as to locate the foundation and prevent lateral swaying or creeping movement due to wave action or currents in the body of water. These spikes may or may not be used as circumstances require.

The tank 15 may be used as a submerged storage tank as seen in Fig. 3 or it may be elevated as seen in Fig. 2. A suitable pumping mechanism 30 is shown in Fig. 2 by which the pontoon may be loaded or unloaded with a suitable fluid or liquid. In case the device is used for drilling operations the pontoon may be used for a storage of drilling mud or fuel oil or chemicals as desired.

Fig. 2 shows the pontoon 15 as having been elevated above the water level so as to make it convenient for other uses while Fig. 5 shows the mechanism by which the pontoon may be moved. In this construction the gusset plate such as 25 in Fig. 6 has been reversed and attached to the leg 4 some distance beneath the pontoon 15. A pressure cylinder 32 is then deposited upon the bracket 25 and held in place by the clamps 33.

This pressure cylinder carries the piston cylinder 34 which has a sealing member 35 thereon to form a seal with the inside of the cylinder 32. A suitable pressure connection 37 controlled by a valve 38 is arranged so that fluid under pressure may be introduced into the cylinder 32. There are preferably four of these cylinders, one arranged at each corner in the legs 4 of the frame 3. When fluid under pressure is introduced in the cylinder it will cause the piston 34 to rise and this piston abuts the under side of the pontoon 15. The same fluid pressure can be introduced into all four cylinders so that the pontoon may be raised uniformly. At spaced intervals in the legs 4 are the openings 39. These openings are arranged to receive the stop bar 40 which passes thru the openings 41 in the piston cylinder 34. When the piston cylinder arrives at such an elevation with the bar 40 at the elevation of the opening 39 then the bars can be moved into the opening to support the pontoon as seen in Fig. 2.

If it is desired to raise the pontoon a greater distance than the length which the piston can travel in the cylinder 32 then an additional length of cylinder 32 may be added while the pontoon is supported by the bar 40 or the bracket 25 may be removed and moved upwardly one section so as to again telescope the piston 34 into the cylinder 32. In this manner the pontoon may be raised step by step by this hydraulic jack construction.

Fig. 2 shows an arrangement for driving the lag spikes 29 into the earth formation 13 and constitutes the same structure that has just been described in connection with the movement of the pontoon 15. In this form of Fig. 9 the cylinder 32' has been inverted and its upper end is based against the bracket 25 attached to the leg 4 and the upper end of the lag spike 29 carries the sealing member 35. Thus the entire weight of the foundation is utilized in supplying hydraulic pressure to force the lag spikes into the earth formation.

When these lag spikes are to be removed a pipe such as 45 may be threaded into the couplings 46 on the upper end of the spike and any suitable mechanism from the top of the foundation utilized to exert a pull on the cylinder 32' so that the entire spike and cylinder would be withdrawn in this manner.

Fig. 11 shows a view of the lag spikes and the bracket in transverse section.

Figs. 2 and 4 show a platform 50 which has been built upon the upper section 51 of the foundation. This platform may of course take any desired configuration and is shown as octagonal in Fig. 4. The braces 52 support the outer edge of the formation and it may be utilized as the derrick floor where the foundation is to be used for a drilling operation. Under such circumstances the derrick 53 would be erected on this platform or floor and the drilling equipment carried on the platform.

It is to be understood that the invention may take various forms and is of particular advantage in marine drilling operations. It may be used as a temporary or portable foundation for a pile driver in deeper water and removed as soon as it has served its purpose. Where rough water is encountered several such foundations may be anchored together and sunk as a unit or deposited independently and thereafter anchored together. In other instances it may operate as a service unit for servicing a well which has been previously drilled and from

which production is piped to the shore under the surface of the water.

The pontoon may be raised to the elevation of the platform or floor 50 and utilized as a portion of such floor as seen in Fig. 4 or it may be utilized in any desired manner.

When the foundation is to be removed the pontoon may be submerged as seen in Fig. 3 and then the water or liquid partially discharged from it with compressed air. In this manner some buoyant effect might be obtained, then the pontoon could be raised to the position above the center of gravity so as to properly float the foundation when the lag spikes were removed as shown in Fig. 10.

It is to be understood that this foundation may be transported as a complete unit with any desired number of sections or it may even be transported with the platform 50 and derrick 53 in place.

Broadly the invention contemplates a portable foundation which has a pontoon therein for use for floating the foundation and for use as a reservoir as a storage unit.

What is claimed is:

1. A portable marine foundation including a framework, a footing thereon to support said framework, a pontoon within said framework, and hydraulically operable means to pump liq-

uid or fluid into and out of said pontoon so as to move said pontoon upwardly relative to the framework so as to float the framework or to deposit it as a foundation, said framework comprising detachable section having legs to serve as a trackway for said pontoon.

2. In a portable marine foundation, comprising a framework having leg portions, a pontoon disposed in said framework, a trackway for said pontoon comprising said leg portions, and means to effect relative movement between the frame and the pontoon.

3. In a portable marine foundation, comprising a framework having leg portions, a pontoon disposed in said framework, a trackway for said pontoon comprising said leg portions, and means to effect relative movement between the frame and the pontoon, said means including an hydraulic jack construction.

4. In a portable marine foundation, comprising a framework having leg portions, a pontoon disposed in said framework, a trackway for said pontoon comprising said leg portions, and means to effect relative movement between the frame and the pontoon, said means including an hydraulic jack construction, and anchor means for the pontoon on the frame so that the pontoon may be moved step by step.

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