May 6, 1958 L. NIXON 2,833,118

SPUD DRIVING RIG

Filed March 26, 1954 3 Sheets-Sheet 1

Fig. 1.

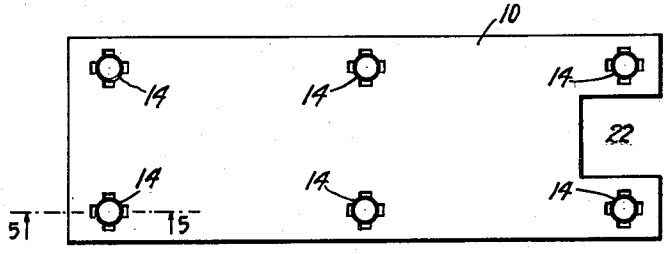


Fig. 2.

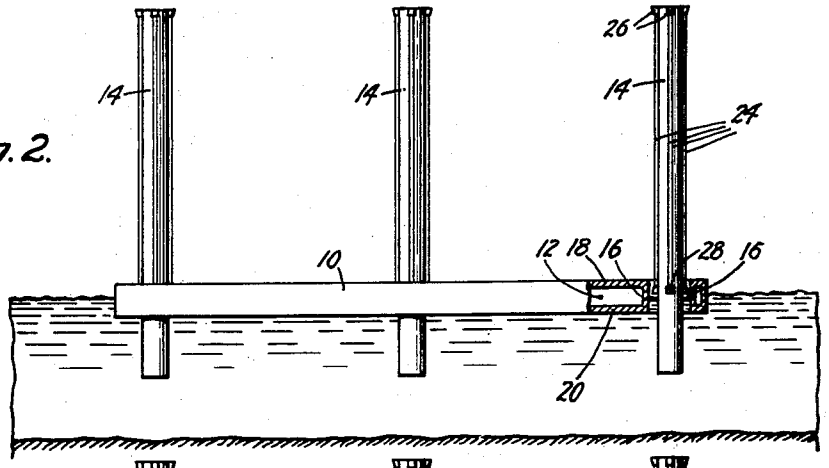


Fig. 3.

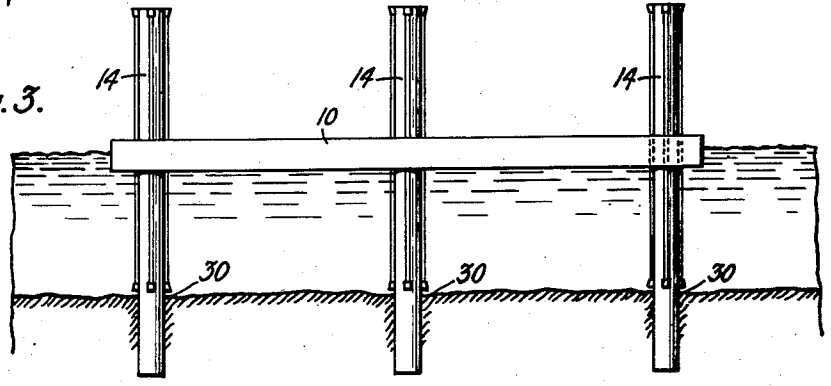
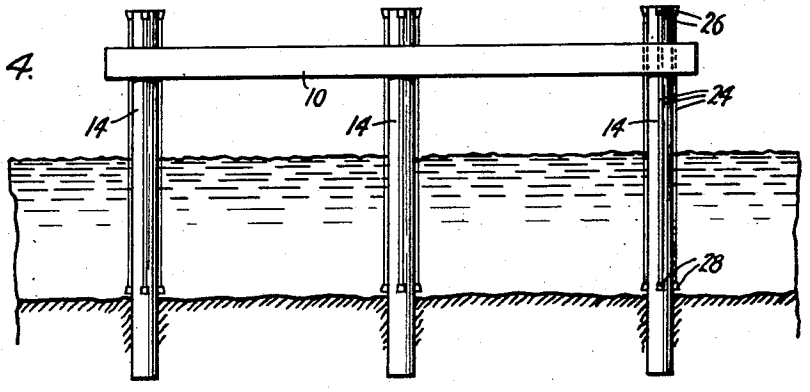


Fig. 4.



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SPUD DRIVING RIG

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Fig. 5.

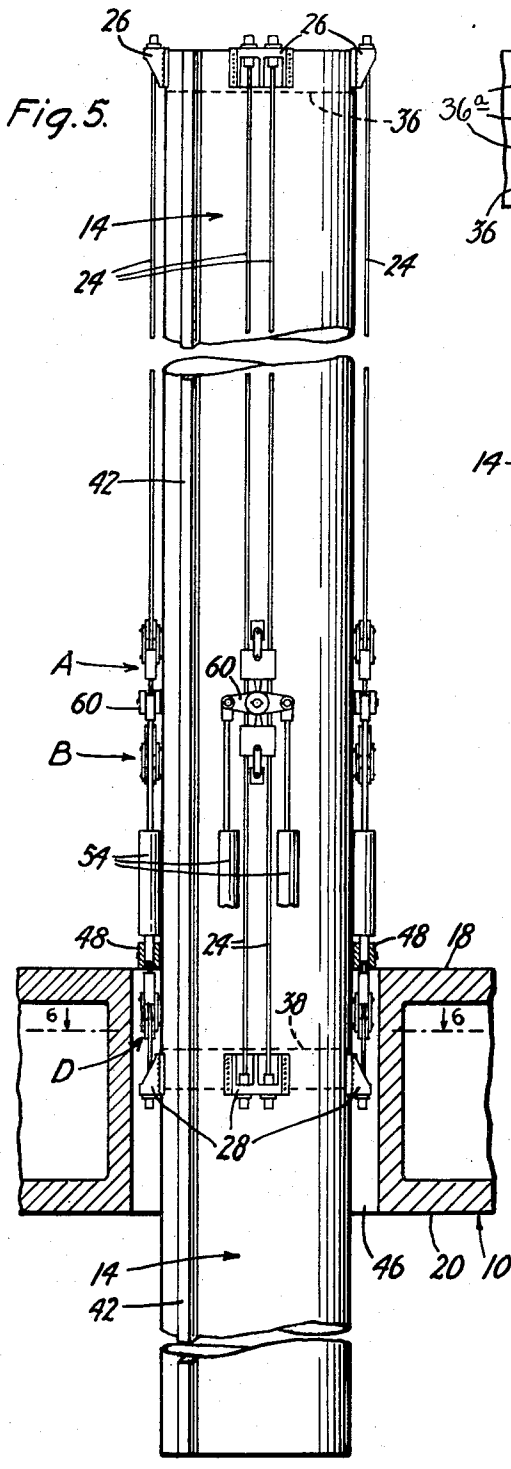


Fig. 9.

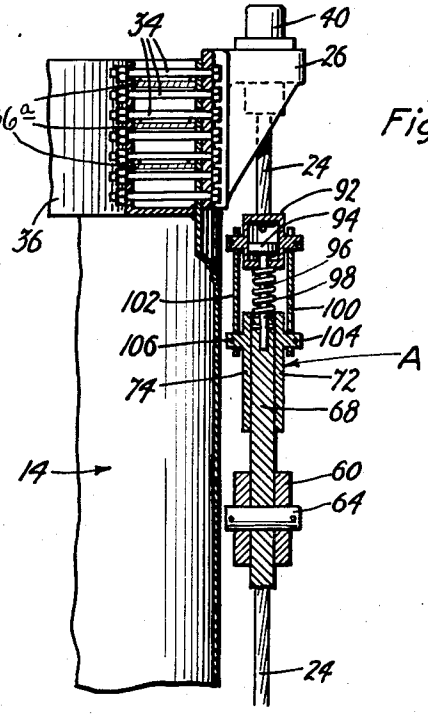
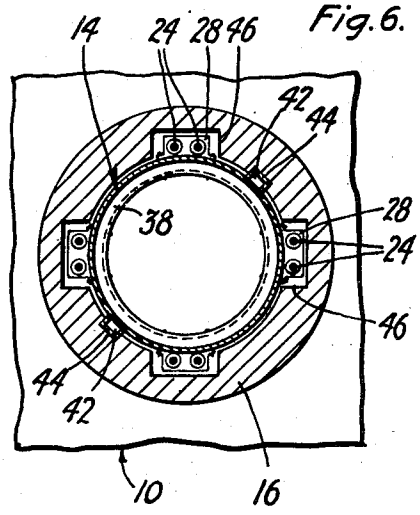


Fig. 6.



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SPUD DRIVING RIG

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Fig. 7.

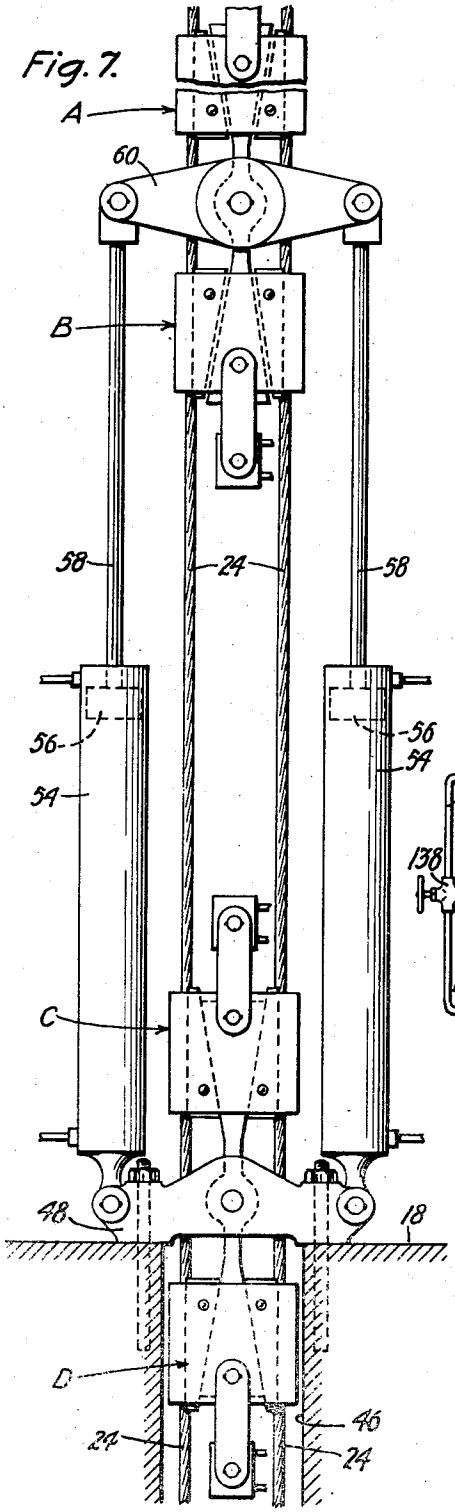
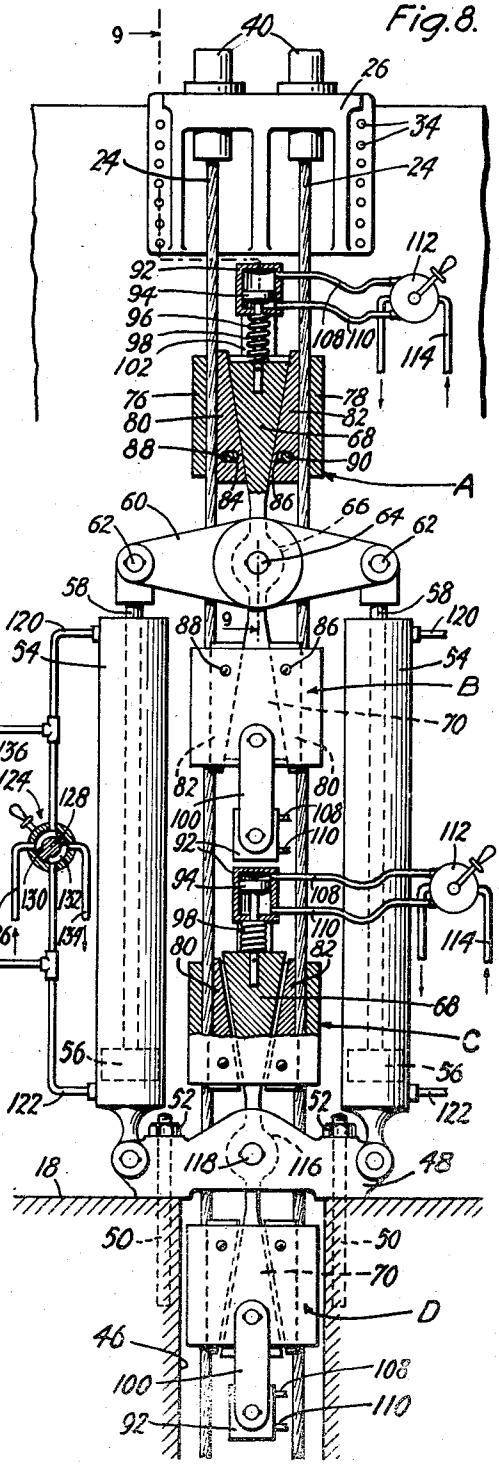


Fig. 8.



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Patented May 6, 1958

2,833,118

SPUD DRIVING RIG

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Application March 26, 1954, Serial No. 418,914

9 Claims. (Cl. 61—46.5)

The present invention relates to piles or spuds of the type which are jacked into position as, for example, the spuds carried by platforms used in off-shore drilling operations. More particularly, it relates to the provision of a plurality of circumferentially spaced relatively slender elonagted load carrying members such as rods, strands of wire or wire ropes arranged lengthwise of each spud for cooperation with mechanism adapted to grip the load carrying members to raise and lower the spuds as desired. A particular advantage of the present invention lies in the use of such elongated load carrying members of relatively small diameter inasmuch as spaced, alternatively operable gripping devices such as wedge clamps may be arranged to cooperate therewith for jacking the spuds. Gripping devices of simple and extremely reliable construction are available in many different forms suitable for use in the present invention and the resultant combination is greatly superior to arrangements in which it is attempted to grip the exterior surfaces of spuds which are frequently of very large diameter.

The present invention may be used in connection with any sort of structure which is movable upon or which carries poles, piles or spuds. For illustrative purposes the invention is disclosed as embodied in an offshore drilling barge or platform. In such embodiments the invention is used for driving spuds into the bottom, for lifting the platform to a safe distance above the surface of the water in which position the drilling operations may proceed, for lowering the platform to the surface of the water after the drilling operation is complete and for retrieving the spuds from the bottom. The use of a plurality of load carrying members such as strands of wire associated wtih each spud contributes greatly to the safety of the apparatus. A further contribution to safety may be made by selecting gripping devices so constructed as to automatically grip the strands in the event of failure of some other part of the apparatus.

A feature of the present invention lies in the use of a plurality of elongated load carrying members spaced circumferentially of the outer surface of a spud, each member being secured adjacent the top of the spud and extending longitudinally thereof to a point appropriately spaced from the lower end of the spud where the lower end of the member is secured to the spud. Particularly when strands of wire or lengths of wire rope are used they may be preloaded, that is, placed under longitudinal tension so as to maintain them in relatively taut parallel relationship above and below the points of application of load. When embodied in a drilling platform or similar structure the members, for example, strands of wire, extend with the spud through the spud casings customarily provided in drilling platforms. In a preferred embodiment of the invention, each member or strand is arranged to cooperate with hydraulically operable jacking mechanism. The strands may be arranged to cooperate individually with separate jacking devices or they may be arranged in groups of two or more for cooperation with a particular jacking device. Appropriate hydraulic harness may be supplied for all of the jacking devices to control the jacks and gripping devices whereby the spuds may be moved individually or simultaneously or in groups, as preferred, or may be locked to maintain the platform in a fixed position when it is in use for drilling operations.

It is an object of the present invention to provide spud jacking apparatus of the type described wherein a plurality of relatively slender elongated load carrying members are secured to each spud and connection between the spuds and the structure associated therewith is made through means engageable with such members.

Other and further objects of this invention will become apparent upon consideration of the following specification taken in connection with the drawings wherein there is shown a preferred but not necessarily the only form of the present invention embodied, for illustrative purposes, in a structure of the type used for offshore drilling operations.

In the drawings:

Fig. 1 is a somewhat diagrammatic plan view of a floatable drilling platform having a plurality of spuds and embodying the present invention;

Fig. 2 is an elevational view of the platform of Fig. 1 showing the same afloat in a body of water with the spuds in the position assumed when the platform is moved from place to place;

Fig. 3 is an elevational view showing the spuds inserted in the bottom of a body of water with the platform in the position assumed during driving of the spuds into the bottom;

Fig. 4 is an elevational view showing the platform raised to a position appropriate for drilling operations;

Fig. 5 is a vertical section along the line 5—5 in Fig. 1 showing a spud in elevation;

Fig. 6 is a horizontal section taken along the line 6—6 in Fig. 5;

Fig. 7 is a detailed elevational view of one of the jacking units;

Fig. 8 is a view similar to Fig. 7 but showing the parts in a different position; and

Fig. 9 is a vertical sectional view taken along the line 9—9 in Fig. 8.

In Figs. 1 through 4 there is illustrated in somewhat diagrammatic form a floatable drilling platform 10 which may comprise a fabricated hollow body containing an interior hollow portion 12, divided into separate compartments if so desired, which may be maintained empty for floating purposes or may be flooded to any desired extent for increase in weight during spud driving operations. The platform 10 carries a plurality of vertically disposed spuds 14 which extend through spud casings of generally tubular conformation made watertight by vertical walls 16 extending between the upper deck 18 and lower deck 20 of the platform 10. The platform 10 may be notched as at 22 to accommodate a drilling rig and with such other particular conformations and equipment as may be deemed desirable. It will be understood that the spuds 14 may be of any suitable length and diameter and made of any desired material. Merely to assist in comprehension of the present invention, it may be assumed that the spuds 14 are approximately one hundred fifty feet in length and twelve feet in diameter constructed of hollow metal tubing open at both ends.

Each of the spuds 14 is provided with a plurality of

vertically extending load carrying members **24** of very small diameter compared to the diameter of the spuds **14**. The members **24** may be rods or lengths of wire rope or strands of wire as preferred. Since, as will be made clear herein, the members **24** carry load in tension the appropriate diameter or cross-sectional dimensions thereof may be determined on the basis of their tensile strength and the weight of the platform. The strands of wire chosen for illustration are secured at or near the top of the spud by means generally indicated at **26**, to be described hereinbelow, and extend longitudinally thereof for a substantial fraction of the length of the spud. The lower ends of the strands **24** are secured toward the lower ends of the spuds by similar means **28**. The distance between the securing means **28** and extreme lower ends of the spuds **14** is a matter of choice dependent upon the depths of waters to be negotiated in moving the platform from point to point. In some instances spuds are inserted in mud bottoms for a substantial depth as illustrated in Fig. 3 and means such as gates (not shown) are used to seal each spud along the mud line **30**. Under such conditions the spuds are prevented from sinking further into the mud and the platform **10** may be elevated to drilling position. In other instances the spuds **14** may be inserted through a relatively shallow layer of mud, whereupon they come to rest upon a harder bottom stratum. In any event, the depth to which the spuds are inserted in the bottom and the depth of the water at the point where drilling is to occur are taken into account in selecting the proper length for spuds **14** as well as the strands **24**. Also, it is customary in off-shore drilling operations to raise the platform **10** approximately fifty feet above the surface of the water after the spuds have been secured in the bottom in order to protect the platform from damage by wave action in heavy storms.

In the illustrative embodiment shown in the drawings, the strands **24** are arranged in pairs disposed at 90° intervals around the external circumference of each spud **14**. Each pair of strands **24** is secured near the top of the spud **14** upon the mounting means **26** which in turn is secured to the spud **14** in any convenient manner, for example, the means **26** may be a bracket secured by a plurality of bolts **34** to a rigid ring **36** positioned inside the spud **14**. The ring **36**, as shown in Fig. 9, may be angular in cross section and welded to the inner surface of the spud **14**. To impart rigidity to the ring **36** a plurality of vertically spaced flat stiffening rings **36***a* may be welded along their inner and outer peripheries to the ring **36** and the spud **14** respectively so as to lie between adjacent bolts **34**. At their lower ends the strands **24** are secured to brackets **28** similar to the brackets **26** and secured in the same manner to the spud **14** and a rigid reinforcing ring **38**. The ends of the strands **24** may be secured to the brackets **26** and **28** in any suitable manner as, for example, by fittings **40** of any suitable type. In the embodiment shown in the drawings there are four pairs of strands **24** distributed around the spud **14** and secured in the manner just described. The individual strands within each pair are spaced from each other and from the outer surface of the spud by a distance appropriate for the particular gripping and jacking apparatus which it may be preferred to use.

The load carrying members **24** whether they be strands, ropes, rods or any equivalent are preferably pre-loaded in tension to such a degree that the slack end will not go negative upon application of maximum load in either direction. Thus, for example, the portions of the members **24** extending below the platform **10** will not go slack when the spuds are forced downwardly or the platform is lifted above the water.

Each of the spuds **14** is preferably provided with some form of guide means to prevent rotation thereof relative to the platform **10**. A convenient structure for this purpose is shown in Fig. 6 and may comprise elongated channels **42** with the open sides thereof secured to the exterior of the spud **14**, as by welding. The walls **16** of the spud casings in the platform **10** may be recessed as indicated at **44** to receive the channels **42**. The walls **16** are also recessed as indicated at **46** to clear the lower brackets **28** and the strands **24**. The intervening portions of the inner surface of the walls **16** may be cylindrical so as to serve as longitudinal guides for the spuds **14**.

Referring now to Figs. 7 and 8, each of the recesses **46** is spanned by a yoke **48** secured to the upper deck **18** as by studs **50** and nuts **52**. The yokes **48** serve as supports for one set of gripping devices to be described hereinbelow and one end of each of a pair of hydraulic jacks **54**, having pistons **56** and piston rods **58**. The hydraulic jacks **54** and associated piston rods **58** extend vertically and in spaced parallel relationship with the strands **24**. The piston rods **58** are joined at the top by a crosshead **60** which serves as a carrier for a second set of gripping devices to be described. It will be understood that similar mechanism is provided for each pair of strands **24** on each of the spuds **14** and for that reason only one such mechanism will be described in detail. It also will be understood that the gripping devices and jacking mechanism to be described are illustrative and are appropriate for strands of wire illustrated herein. When wire rope, rods or other equivalent load carrying members are used specifically appropriate mechanisms may be selected without departing from the scope of the present invention.

From a consideration of Figs. 8 and 9, it will be apparent that the crosshead **60** is made up of spaced plates receiving the opposite ends of piston pins **62** and a central pivot pin **64**. The strands **24** pass freely between the two plates forming the crosshead **60** on opposite sides of the pivot pin **64**. The pivot pin **64** carries a member having a central portion **66** and upwardly and downwardly projecting wedge-shaped portions **68** and **70**, respectively. The wedge-shaped portions **68** and **70** constitute fixed wedges in upper and lower gripping units identified generally at A and B. The units A and B are identical although oppositely disposed and include front and rear plates **72** and **74** (see Fig. 9) and end walls **76** and **78** which preferably have semi-cylindrical inner surfaces adapted to engage the strands **24**. Movable wedges **80** and **82** are disposed between the strands **24** and the fixed wedges **68** and **70**. The movable wedges **80** and **82** are carried by the plates **72** and **74** and are provided with semi-cylindrical surfaces to engage the strands **24** in opposition to the end walls **76** and **78**. Each of the movable wedges **80** and **82** is provided with suitable means for coupling the same to plates **72** and **74** for vertical movement therewith relative to the fixed wedge **68** or **70** while permitting limited horizontal movement toward and from the strands **24**. For example, each wedge **80** and **82** may be provided with a horizontally extending slot **84** and **86** respectively to receive a pin **88** or **90** fixed to the plates **72** and **74**.

No attempt has been made herein to show in full detail the construction of the gripping units A and B. It will be understood that such units are normally of hinged construction to facilitate assembly upon the strands, ropes or rods with which they are used and that they are usually equipped with anti-friction bearings and guides for facilitating relative movement of parts for gripping and releasing operations.

The operation of the cable gripping units A and B may be controlled by any suitable means. For illustrative purposes hydraulic means has been chosen. Thus, as shown in Figs. 8 and 9 a cylinder **92** is provided with a piston **94** having a rod **96** which is secured to the fixed wedge **68**. An expansive spring **98** is disposed between the fixed wedge **68** and the lower end of the cylinder **92** serving constantly to urge the cylinder to move upwardly. As clearly shown in Fig. 9, the cylinder **92** is attached to vertically disposed legs **100** and **102** which are perforated at their lower ends to receive studs **104** and **106** fixed respectively upon the plates **72** and **74**. In the case of

the gripping unit A the spring 97 thus urges the cylinder 94 upwardly and in turn urges the plates 72 and 74 to move upwardly with respect to the fixed wedge 68. Since the movable wedges 80 and 82 are attached through pins and slots with the plates 72 and 74, such upward movement will force them into gripping engagement with the strands 24. The hydraulic cylinder 92 is connected through lines 108 and 110 with a control valve 112 which may be manipulated to admit hydraulic fluid under pressure from a supply line 114 to the upper line 108 or the lower line 110, as desired. When fluid is admitted to the upper line 108 the reaction against the relatively fixed piston 94 will be effective to raise the cylinder and thus to supplement the spring 98 in urging the wedges 80 and 82 against the strands. Admission of hydraulic fluid through the lower line 110 and thus beneath the piston 94, while exhausting the upper chamber, will lower the cylinder 92 compressing the spring 98 and forcing the plates 72 and 74 downwardly whereby to release the movable wedges 80 and 82 from gripping engagement with the strands 24. It will be apparent that this illustrative form of gripping device and hydraulic control mechanism tends constantly to grip the load carrying members or strands 24 and can be moved to releasing position only by the action of hydraulic fluid. Thus in the event of failure of the hydraulic system the gripping device will automatically engage the strands.

The gripping device B is similar in all respects to the gripping device A although it is oppositely disposed and the action of the hydraulic cylinder 92 pulls the movable wedges 80 and 82 downwardly to grip and pushes them upwardly to release. The units A and B serve to couple the crosshead 60 and jacks 54 with the strands 24 at any desired time.

Gripping units indicated generally at C and D may be identical in all respects with the units A and B just described but they are disposed below the units A and B and the fixed wedges thereof are formed upon a member 116 pivoted upon a pin 118 extending through the yoke 48. Thus the fixed wedges of the units C and D are fixed with respect to the cylinders of the hydraulic jacks 54 and with respect to the top deck 18 of the platform 10.

From an inspection of Fig. 5, it will be apparent that the yokes 48 span the recesses 46 and are provided with a central opening through which the strands 24 and the fixed wedge member 116 extend.

The hydraulic jack cylinders 54 are provided with upper and lower lines 120 and 122 respectively, which communicate through suitable ports with the interior of the cylinder above and below the piston 56. A valve 124 is provided to supply hydraulic fluid under pressure from a supply line 126 to either the upper or the lower portions of the cylinders 54. As shown in Fig. 8, the valve 124 is provided with a rotatable core 128 having a recess 130 through which hydraulic fluid may be conducted from the supply line 126 to the upper line 120. Another recess is provided which, in the position shown in Fig. 8, connects the lower line 122 with a return line 134. When the valve is in the position shown in Fig. 8, hydraulic fluid is admitted above the pistons 56 to retract the piston rods 58 from the position shown in Fig. 7 to the position shown in Fig. 8 while the lower portion of the cylinder exhausts through valve 124 to the return line 134. The valve 124 may be moved to another position in which the recess 132 connects the lower line 122 with the supply line 126 while the upper recess connects the upper line 120 with the return line 134. This results in upward movement of the pistons 56. In a third position of the valve 124 the core 128 closes both of the lines 120 and 122.

A by-pass line 136 provided with a shut-off valve 138 extends between the upper lines 120 and the lower lines 122. When the hydraulic fluid is shut off from both ends of the cylinders 54 by positioning the valve 124 in the third position described above, the pistons 54 will be effectively locked against movement in either direction. However, when the shut-off valve 138 in by-pass line 136 is opened the piston 54 may be moved relatively freely within the cylinder 54. Obviously the by-pass system just described is merely illustrative inasmuch as the valve 124 might be constructed to include a fourth position permitting circulation of the fluid between opposite ends of the cylinder while the same is cut off from the supply of fluid under pressure.

It will be understood that each pair of strands 24 on each of the spuds 14 will be provided with gripping and jacking mechanism such as that described in connection with Figs. 7, 8 and 9. Also while the valves 112, 124 and 138 have been illustrated as individually provided for the various cylinders, it will be recognized that such valves may be centrally located or harnessed together to provide convenient access and to provide operations in predetermined sequences if that be deemed advisable.

When it is desired to lower one or more of the spuds 14 from the position shown in Fig. 2 into engagement with the bottom and to drive the same into the bottom as illustrated in Fig. 3, the gripping and jacking apparatus for all of the strands on the spuds to be moved will be so operated as to move the strands downwardly in increments established by the stroke of the hydraulic jacks 54. To start this operation the lower clamps or grippers C and D (see Fig. 7) are moved to gripping position, if they are not already in such position, by suitable manipulation of a valve such as the valve 112. The grippers C and D will thereupon hold the members 24 against downward movement and the upper grippers A and B may be released. Hydraulic fluid is admitted to the lower ends of the jack cylinders 54 to raise the crossheads 60 and the released grippers A and B to the position shown in Fig. 7. Grippers A and B are then operated to grip the strands 24 whereupon grippers C and D may be released. The valve 124 for controlling the hydraulic jacks is then moved to a position wherein fluid flows from the lower chambers to the return line and fluid from the supply line 126 flows into the upper chambers thereby permitting a controlled lowering of the spud or spuds relative to the platform 10. When the pistons 56 have completed their stroke, grippers C and D are again engaged with the strands 24 and grippers A and B are released for a repeated cycle of operation. Obviously, during the period that the spuds 14 are being lowered toward the bottom, no downward force will be required. However, after the spuds engage the bottom it may be necessary to utilize the weight of the platform 10 to force the spuds into the bottom. In such event the cycle of operation described above is merely continued inasmuch as the pressure of the hydraulic fluid on the upper surfaces of pistons 56 will be transmitted to the strands 24 tending to lift the platform 10 relative to the spuds, thus applying the weight of the platform to force the strands and the spuds downward.

As stated above, the spuds 14 may be lowered and driven into the bottom simultaneously or individually or in small groups dependent upon the desires of the operator and the nature of the bottom into which the spuds are to be sunk. After each spud has been lowered into the position shown in Fig. 3, it may be preferred to place the jacking mechanism for such spud in a particular condition permitting limited vertical movement of the platform 10 relative thereto, particularly if additional spuds must be driven. The gripping devices C and D are operated to engage the strands 24 and the grippers A and B are released. The hydraulic jacks 54 are then operated to move the pistons 56 approximately to the mid-point in their stroke. The gripping devices A and B are then engaged and grippers C and D are released. The by-pass valves 138 for all of the units on that particular spud are then opened so as to permit relatively free vertical movement of the platform 10 with respect to that spud.

After all of the spuds are in position, the jacking mechanism may be used to elevate the platform to drilling

position. To elevate the platform **10** to the position shown in Figs. 5 and 8 the by-pass valves **138** for all of the hydraulic jacks **54** are closed to lock the platform **10** in level position upon the spuds **14**. All of the jacking and gripping devices are then operated simultaneously and in synchronism in the same sequence used for lowering the spuds **14**.

When the platform reaches the top of the spuds **14**, as shown in Fig. 8, the hydraulic jacks will be in retracted position at the end of the last stroke and the gripping devices A and B will remain engaged with strands **24**. The gripping devices C and D are then engaged with the strands **24** and the by-pass lines **136** are closed by manipulation of the valves **138** to lock the jacks in position with all four grippers engaged with the strands. The platform **10** is thus securely held in a position wherein the drilling operation may be performed.

When it is desired to move the platform **10** to a new location, it may be lowered to floating position by simultaneous and synchronized operation of all of the jacking and gripping devices. Starting from the position shown in Fig. 8, the grippers C and D are released from strands **24**. Hydraulic fluid is admitted to the lower chambers of the jacks **54** to lower the platform **10** a distance equal to the stroke of the jacks **54**. At the end of such stroke the grippers C and D are engaged and grippers A and B are released whereupon the jacks **54** are retracted. The grippers A and B are again engaged and the cycle is repeated. After the platform **10** reaches the water the same cycle of operation may be continued to withdraw the spuds from the bottom either individually or by small groups or simultaneously as desired. When the spuds have been lifted to the position shown in Fig. 2 or at least to a position in which they are clear of the bottom, the entire assembly may be moved to another location.

The particular modes of operation as well as the particular application to drilling platforms is not intended to be limiting upon the present invention. It will be apparent that spuds or piles equipped with load carrying members as taught herein may be used in various manners in many different applications such as in the erection or positioning of structures in the nature of docks, storage platforms and the like. Also, it will be apparent that the load carrying members such as strands, rope, bars or rods associated with spuds or piles in the practice of this invention may be engaged by gripping devices or clamps designed to operate upon such members individually, in pairs as illustrated herein or upon groups of three or more members without departing from the scope of the invention.

I claim:

1. A marine foundation structure including a platform, a plurality of spud casings in said platform, a plurality of spuds adapted to support said platform, each of said spuds being positioned in one of said spud casings for vertical movement relative to said platform, a plurality of elongated members adapted to carry loads in tension disposed exteriorly of and arranged in spaced relation about the periphery of each of said spuds, means securing each of said elongated members by its opposite ends to upper and lower portions of the associated spud to extend parallel with the longitudinal axis of the spud, and jacking mechanism mounted on said platform, said jacking mechanism comprising gripping means engageable with the elongated members secured to a particular spud to cause relative vertical movement between said spud and said platform.

2. A marine foundation structure including a platform, a plurality of spud casings in said platform, a plurality of spuds adapted to support said platform, each of said spuds being positioned in one of said spud casings for vertical movement relative to said platform, a plurality of lengths of wire rope disposed exteriorly of and arranged in spaced relation about the periphery of each of said spuds, means securing each of said wire ropes by its opposite ends to upper and lower portions of the associated spud to extend parallel with the longitudinal axis of the spud, and jacking mechanism mounted on said platform, said jacking mechanism comprising gripping means engageable with the wire ropes secured to a particular spud to cause relative vertical movement between said spud and said platform.

3. A marine foundation structure including a platform, a plurality of spud casings in said platform, a plurality of spuds adapted to support said platform, each of said spuds being positioned in one of said spud casings for vertical movement relative to said platform, a plurality of elongated members adapted to carry loads in tension disposed exteriorly of and arranged in spaced relation about the periphery of each of said spuds, means securing each of said elongated members by its opposite ends to upper and lower portions of the associated spud to extend parallel with the longitudinal axis of the spud, and jacking mechanism mounted on said platform, said jacking mechanism comprising at least one gripping device releasably engageable with each of the elongated members secured to a particular spud, means for moving each of said gripping devices vertically with respect to said platform to produce relative vertical movement between said platform and said spud when said gripping devices are engaged with said members, and at least one gripping device fixed against vertical movement relative to said platform and releasably engageable with each of said members to prevent relative movement between said platform and said spud.

4. A marine foundation structure including a platform, a plurality of spud casings in said platform, a plurality of spuds adapted to support said platform, each of said spuds being positioned in one of said spud casings for vertical movement relative to said platform, a plurality of lengths of wire rope disposed exteriorly of and arranged in spaced relation about the periphery of each of said spuds, means securing each of said wire ropes by its opposite ends to upper and lower portions of the associated spud to extend parallel with the longitudinal axis of the spud, and jacking mechanism mounted on said platform, said jacking mechanism comprising at least one gripping device releasably engageable with each of the wire ropes secured to a particular spud, means for moving each of said gripping devices vertically with respect to said platform to produce relative vertical movement between said platform and said spud when said gripping devices are engaged with said wire ropes, and at least one gripping device fixed against vertical movement relative to said platform and releasably engageable with each of said wire ropes to prevent relative vertical movement between said platform and said spud.

5. A marine foundation structure as set forth in claim 1 wherein each of said spuds is cylindrical, each of said spud casings has a circular opening to receive one of said spuds, each of said spuds has a radially projecting guide element extending lengthwise of said spud, and each of said spud casings is provided with a recess to receive the guide element of a spud positioned therein to prevent relative rotation between said spud and said platform.

6. A marine foundation structure as set forth in claim 1 wherein said elongated members are preloaded in tension whereby to remain taut throughout their lengths when supporting the spud to which they are secured as well as when supporting said platform upon said spuds.

7. A marine foundation structure as set forth in claim 3 wherein said elongated members are preloaded in tension whereby to remain taut throughout their lengths when supporting the spud to which they are secured as well as when supporting said platform upon said spuds.

8. A marine foundation structure as set forth in claim 2 wherein said wire ropes are preloaded in tension whereby to remain taut throughout their lengths when supporting the spud to which they are secured as well as when supporting said platform upon said spuds.

9. A marine foundation structure as set forth in claim

4 wherein said wire ropes are preloaded in tension whereby to remain taut throughout their lengths when supporting the spud to which they are secured as well as when supporting said platform upon said spuds.

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