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Leyn

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[54] **SPUD CLAMPING DEVICE**

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[21] Appl. No.: **7,803**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 777,272, Nov. 20, 1968.

[52] **U.S. Cl.** **294/88,** 294/86.3, 294/113, 294/116

[51] **Int. Cl.**.....**B66c 1/00**

[58] **Field of Search**..294/86.16, 86.17, 86.26, 86.29, 294/86.3, 88, 90, 113, 116

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[57] **ABSTRACT**

An upper ring or frame having two or more gripping members hingedly depending therefrom encircles a spud. A lower ring or frame also encircles the spud and bears inwardly against the gripping members through a means for multiplying and changing the vertical force to a horizontal force so that axially raising the lower ring relative to the upper ring causes the gripping members to frictionally engage the spud. Self-clamping is achieve by connecting the lifting means to the lower ring. Release of the gripping members is effectuated by transferring the lifting force point of attachment from the lower ring to the upper ring.

18 Claims, 10 Drawing Figures

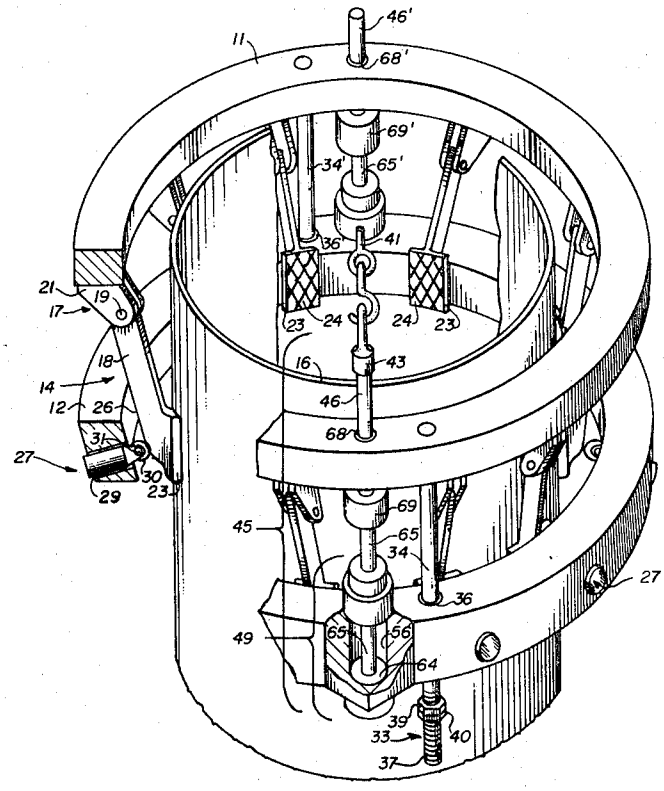


Fig. 1.

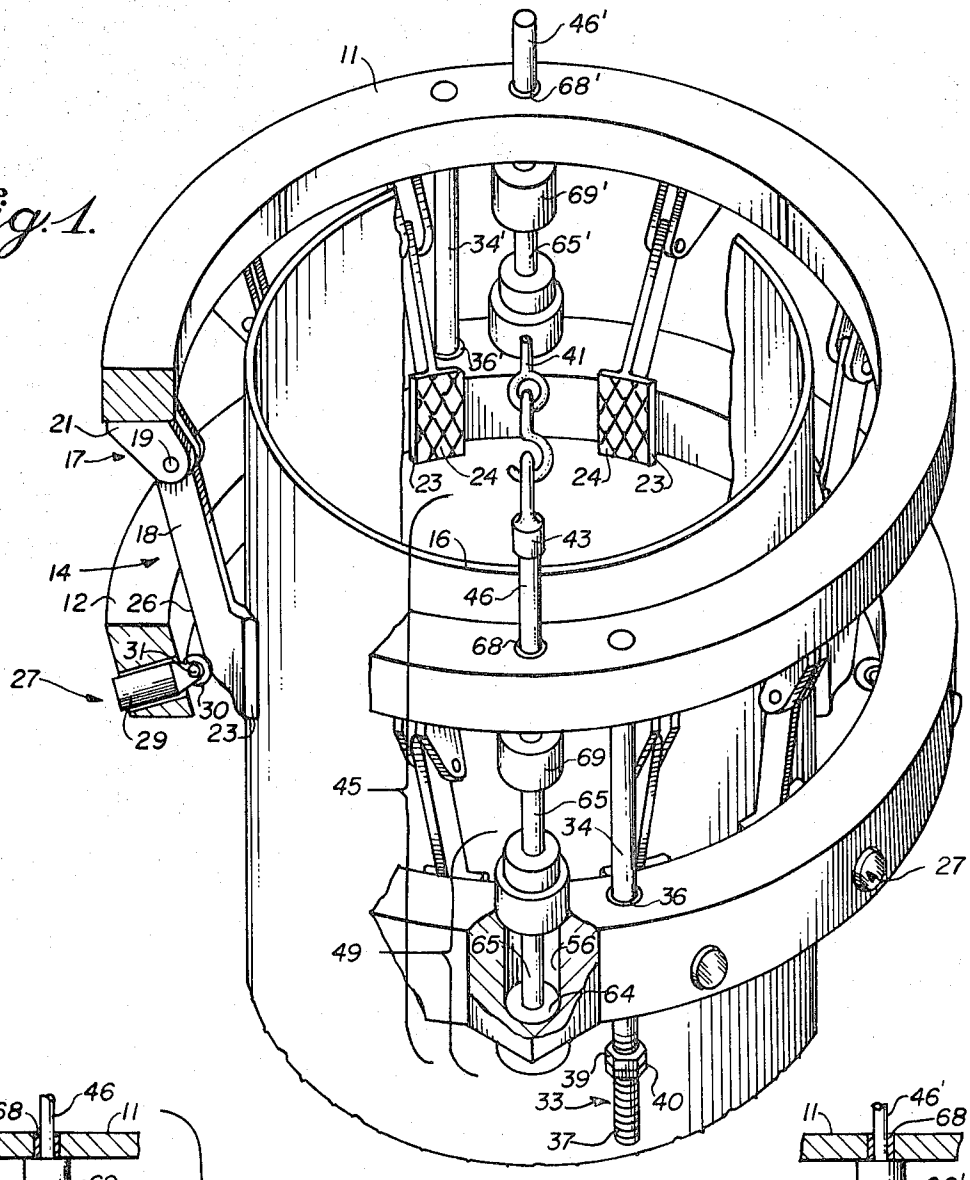
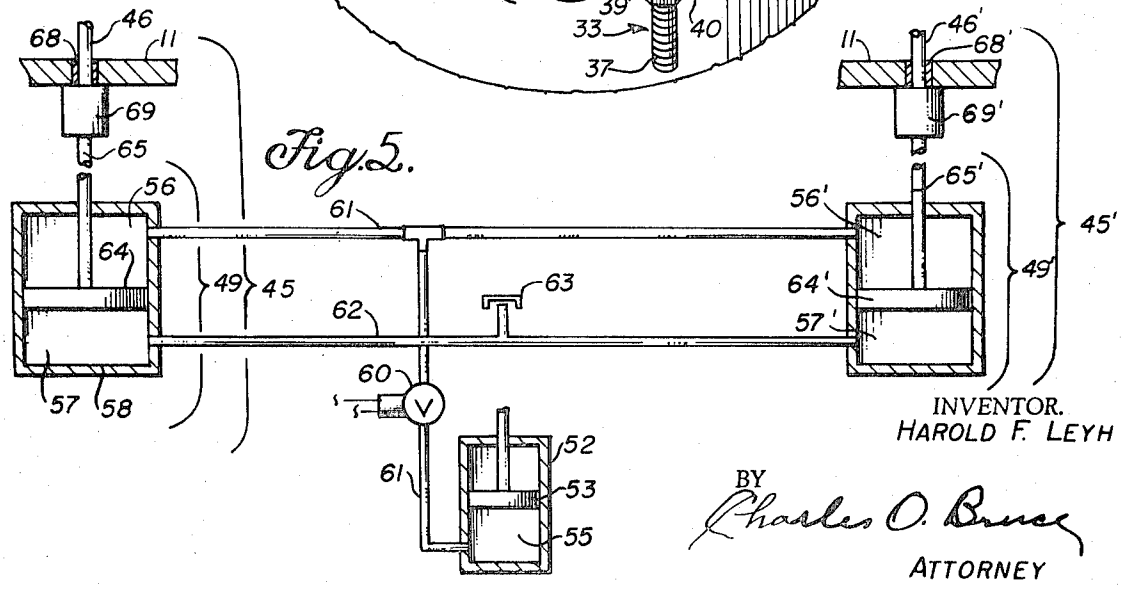


Fig. 2.



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Fig. 2.

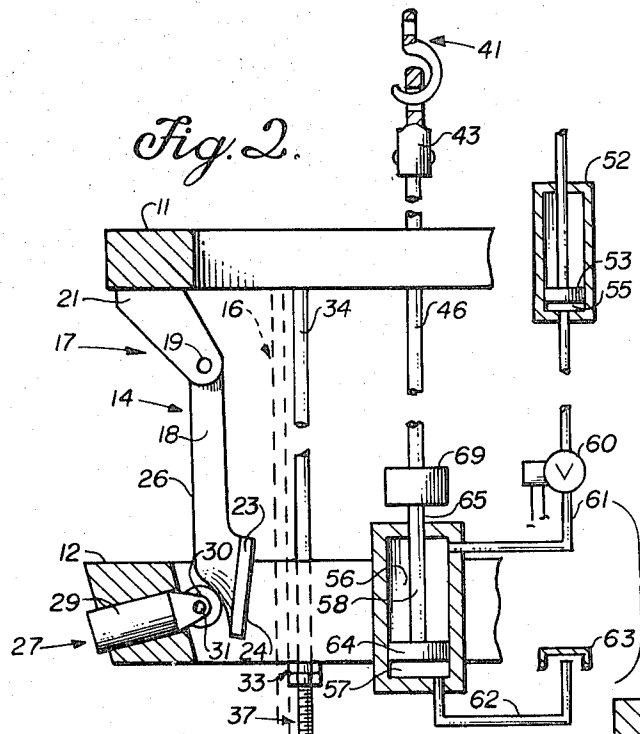


Fig. 3.

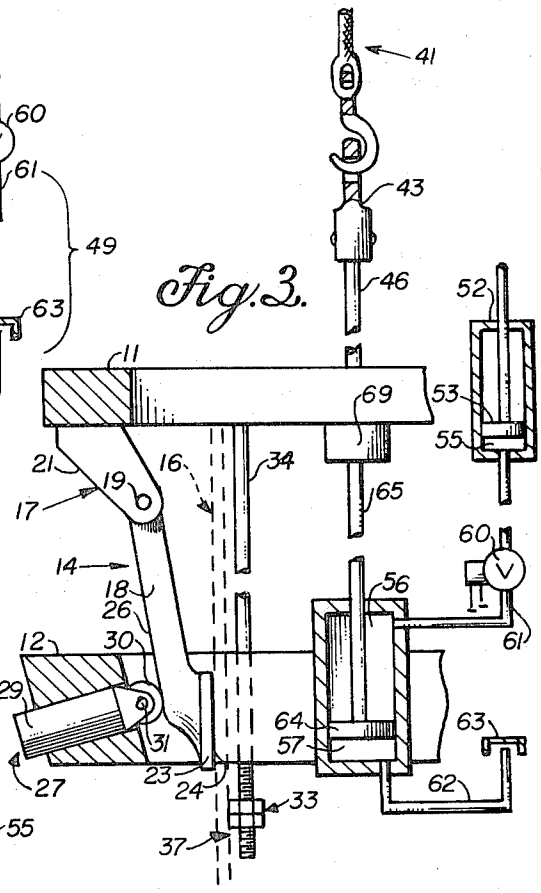
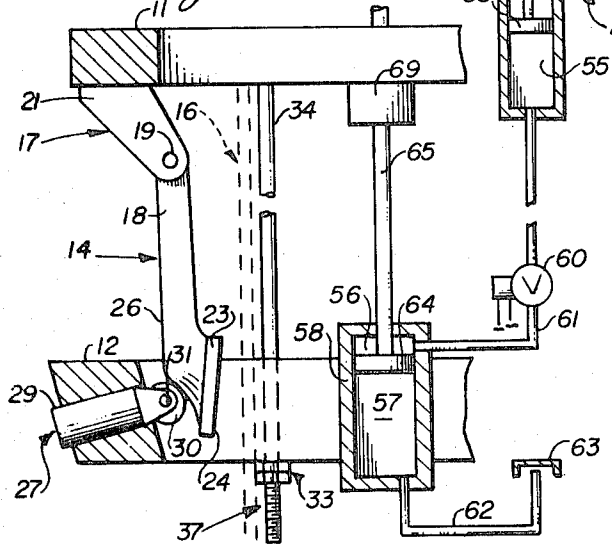


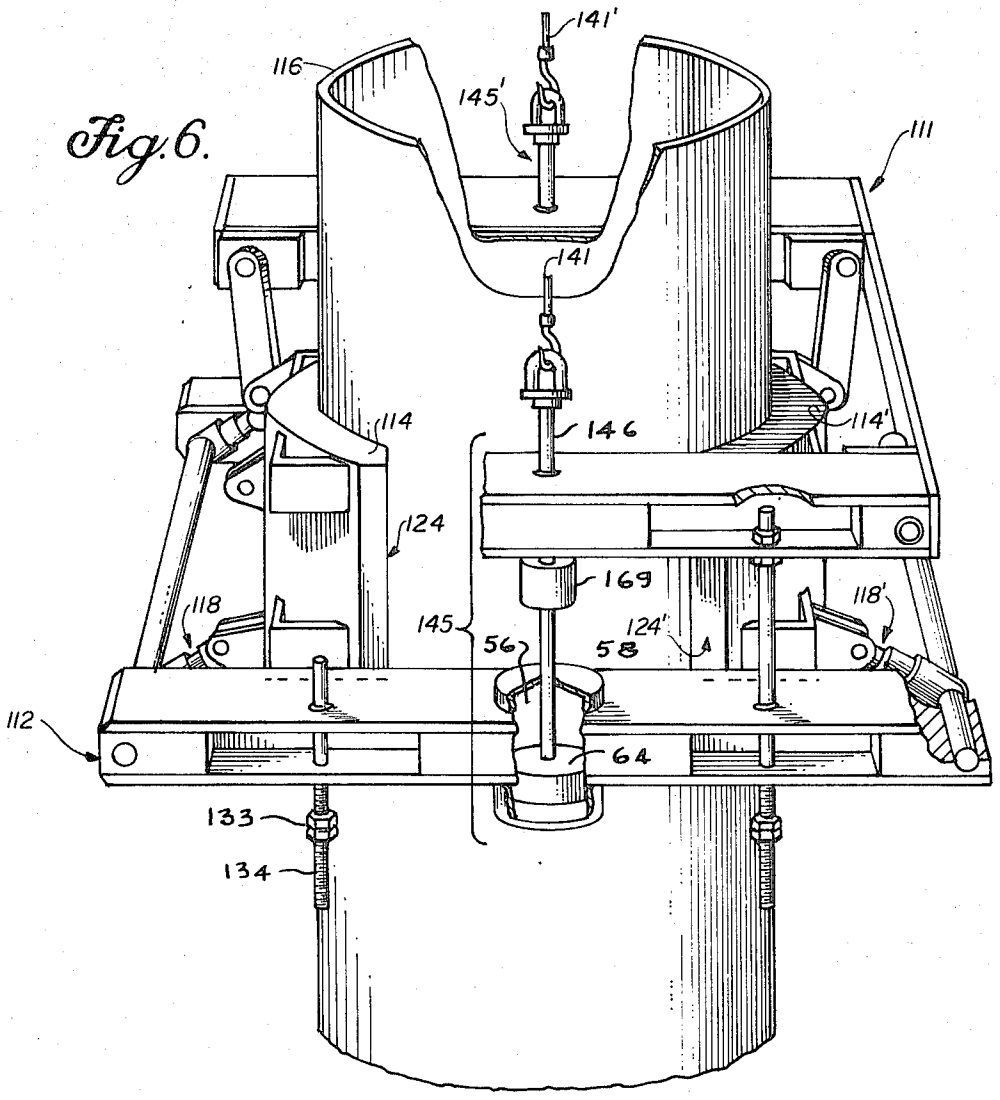
Fig. 4.



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Fig. 6.



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Fig. 7.

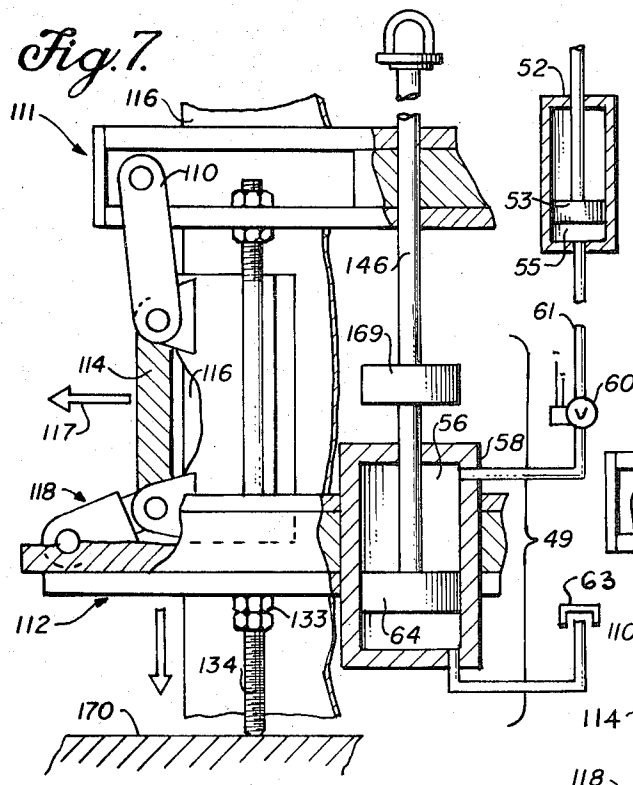


Fig. 10.

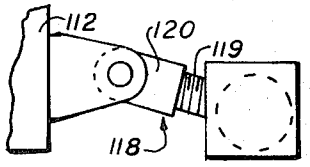


Fig. 8.

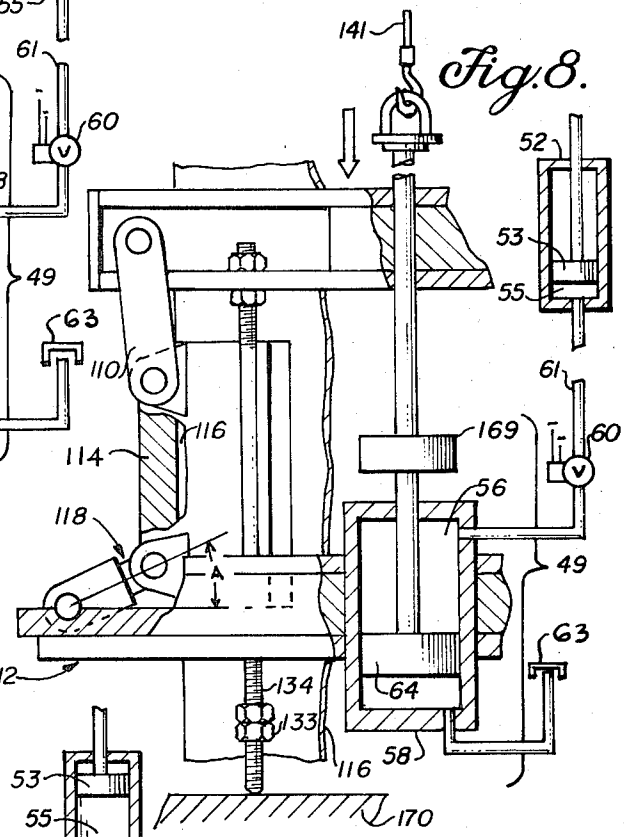
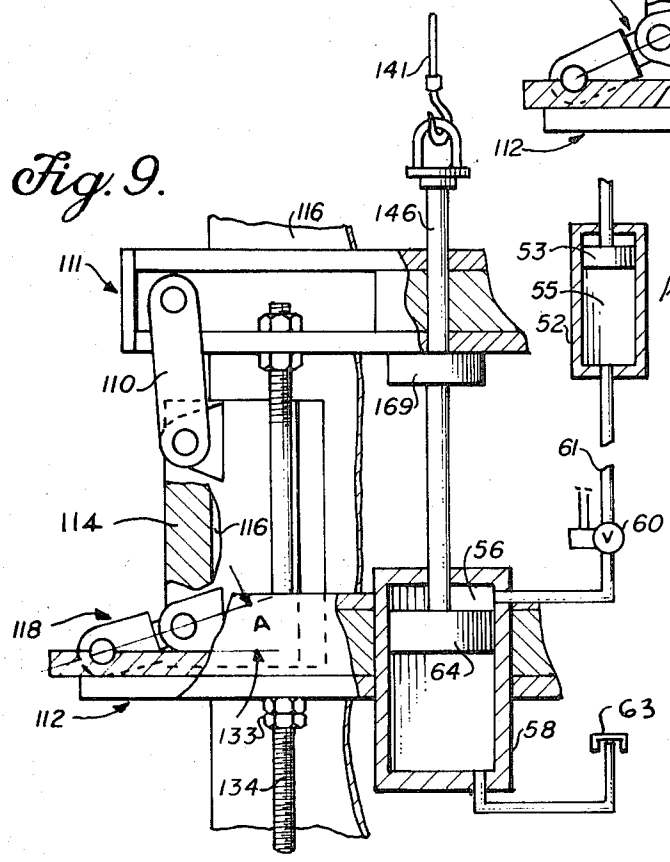


Fig. 9.



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SPUD CLAMPING DEVICE

CROSS REFERENCE TO RELATED APPLICATIONS

This application is a continuation-in-part of the application titled SPUD CLAMPING DEVICE, Application Ser. No. 777,272, filed Nov. 20, 1968.

BACKGROUND OF THE INVENTION

This invention relates to handling hand and hoist-line implements, and in particular, to grapples having pivot jaws.

The apparatus of the present invention is for the purpose of raising or lifting vertically disposed poles, spuds, or other cylindrical objects.

The devices of the prior art which perform this function use either a hydraulic piston, a rack and pinion arrangement, or a clamp which has jaws that clamp or grip the object in a self-clamping action when the clamp is raised.

For operation on a dredge, it is necessary to be able to lift the spud which is used to anchor the dredge and allow it to drop freely under the full force of gravity to obtain the best penetration of the bottom and best anchoring possible for the dredge. It is also necessary to perform this operation rapidly and conveniently in order to avoid delay in moving the dredge as the underwater excavation progresses.

The prior art devices all require that the hoisting mechanism remain connected to the spud during its fall. In the case of clamps with self clamping jaws, the clamp remains gripped to the object as long as there is tension in the lifting cable. When the spud falls, the drag from the hoisting mechanism usually maintains such tension so that the spud pulls the hoisting cable with it as it falls. It can be seen that the hoisting mechanism of these prior art devices, since they remain connected to the spud during its fall, are at a disadvantage due to the inertia of the hoisting mechanism, piston and oil mass or rack, and pinion friction which causes a drag on the spud to prevent its reaching the maximum possible acceleration from gravity.

SUMMARY OF THE INVENTION

The clamping device of the present invention does not require any of the hoisting mechanism to fall with the spud, but rather, it is self-clamping and includes a separate release means as a part of the self-clamping means to permit the spud to fall freely upon reaching the desired height. It is basically a device which encircles the spud or cylindrical object and when raised, clamps itself to the object with a force that is proportional to the lifting force and which can release the spud while in the raised position without the need for releasing the tension on the lifting cable. The clamp is also arranged to reclamp the spud while in the suspended position.

It is therefore an object of this invention to provide a device for lifting poles, spuds, piles, or other cylindrical objects.

It is a further object of this invention to provide a device for lifting cylindrical objects in which the gripping force is proportional to the lifting force.

It is another object of this invention to provide a device for lifting cylindrical objects which is releasable while the object is being lifted.

It is another object of this invention to provide a device for lifting cylindrical objects in which the apparatus for releasing the object is a part of the self-clamping apparatus.

It is a further object of this invention to provide a device for lifting cylindrical objects in which the lifting force can be shifted from one part of the clamp to another part of the clamp whereby the lifting force may be used to clamp or release the object.

Other and more particular objects of this invention will be manifest upon study of the following detailed description when taken together with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a partial cut-away isometric illustration of the clamping device showing the particular arrangement of the parts.

FIG. 2 is an elevation of a partial section through one side of the clamp showing the relationship of the parts when the clamp is resting on a supporting surface.

FIG. 3 is an elevation of a partial section through one side of the clamp showing the relationship of the parts when the clamp is being lifted and gripping the spud.

FIG. 4 is an elevation of a partial section through one side of the clamp showing the relationship of the parts when the clamp is being lifted but in the released position, i.e., not gripping the spud.

FIG. 5 is a diagram illustrating the hydraulic circuit for controlling the releasing and clamping action.

FIG. 6 is a partial cut-away isometric illustration of a second embodiment of the clamping device using two semi-circular shoes and its particular arrangement of parts.

FIG. 7 is a partial cross sectional elevation view taken of FIG. 6 at lines 7—7 showing the relationship of the parts where the clamp is resting on a supporting surface.

FIG. 8 is a partial cross sectional elevation view showing the relationship of the parts of the second embodiment of the clamps when the clamp is being lifted and gripping the spud.

FIG. 9 is a partial cross sectional elevation view showing the relationship of the parts of the second embodiment of the clamp where the clamp is being lifted, but in the released position.

FIG. 10 is a detail of adjustible link hinge connections for connecting of the gripping shoe to the lower support frame.

DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference to FIG. 1, the clamping device of the present invention comprises basically, an upper ring 11 and a lower ring 12 with a plurality of gripping members 14 hingedly connected to upper ring 11 so that the moving or raising of lower ring 12 toward upper ring 11 causes gripping members 14 to grip, i.e., frictionally engaged spud or pole 16.

In detail, upper ring 11 is adapted to encircle spud 16 and have distributed circumferentially thereabout and hingedly connected thereto a plurality of gripping members 14. Each gripping member 14 comprises a lever arm 18 having one end hingedly connected to a first support or upper ring 11 by means of hinges 17 which includes hinge pin 19 and hinge bracket 21 at-

tached to upper ring 11. Hinge 17 is arranged to permit gripping member 14 to swing radially in or out with respect to upper ring 11.

At the other end of lever arm 18 is gripper shoe 23 having a serrated or gripping surface 24 facing radially inwardly with respect to upper ring 11 and adapted to frictionally engaged the outside surface or wall of spud 16.

On the back or radially outward side of lever arm 18 is cam race 26 whose contour or shape depends upon the desired variation of radial movement of gripping member 14 with respect to upper ring 11 and the force it must exert against spud 16 for the variations in movement of a second support or lower ring 12 toward or away from upper ring 11.

Lower ring 12, which is parallel to and axially aligned with upper ring 11 is also adapted to encircle spud 16. In addition, lower ring 12 is provided with a plurality of cam followers 27 equal in number to gripping members 14 and located circumferentially about lower ring 12 in corresponding positions such that each cam follower 27 on lower ring 12 bears against or guides on cam race 26 on the back of lever arm 18.

Each cam follower comprises a roller bearing 30 which is retained in a bearing holder 29 by means of pin or shaft 31. Each cam follower 27 is individually adjustable by means of threads around the outside of bearing holder 29. By rotating bearing holder 29 clockwise, for a right hand thread, cam follower 27 can be moved radially inward. Since bearing 31 is attached to holder 29, each adjustment must be made in 180° increments. Radial adjustment is desirable, not only to compensate for wear of both cam race 26 and cam follower 27, but also to take care of any variation in shape of cam race 26 among the gripping members 14, or in some cases, the shape of the spud itself.

Lower ring 12 is free to move axially up or down, i.e., axially toward or away from upper ring 11. Maximum downward movement of ring 12, i.e., movement away from upper ring 11, is limited by stop 33 on support rod 34.

It will be noted that two identical support rods are used in the present embodiment. For the purpose of this disclosure, a reference to one will also be a reference to the other. The numerals identifying the elements of the second support rod are primed to distinguish between the two.

Support rods 34 and 34' are provided not only to limit the downward movement of lower ring 12 and hold the clamping device above supporting surface 70 (FIG. 2) but also to maintain ring 12 in axial alignment with upper ring 11.

Support rods 34 and 34' are attached to the underside of upper ring 11 diametrically opposite each other, depending therefrom and passing through vertical support rod guides 36 and 36' in lower ring 12. Rod 34 is made long enough so that when the assembled clamping device is lowered to a supporting surface, support rods 34 and 34' support the entire weight of the device. Stop 33 is adjustable by means of threaded portion 37 on the lower end of rod 34 so that no other parts of the clamping device will rest on the supporting surface and cam follower 27 may be set to contact the lower end of cam race 27. In the present embodiment, stop 33 comprises a support nut 39 and a lock nut 40.

Axial movement of lower ring 12 relative to upper ring 11 is achieved through ring actuating device 45 whose lower end is attached to a lower ring 12 and whose upper end is attached to lifting cable 41 through clevis 43.

In general terms, the upward force of lifting cable 41 can, by means of actuating device 45, be transferred from lower ring 12 to upper ring 11 or back to lower ring 12.

In the present embodiment, two identical actuating devices are used which are mounted on lower ring 12 diametrically opposite each other. For the purpose of this disclosure, a reference to one will also be a reference to the other. The numerals identifying the elements of the second activating device are primed to distinguish between the two.

In detail, ring actuating device 45 comprises lifting rod 46 and hydraulic actuating system 48 (FIG. 5) whose hydraulic release means 49 is connected at its lower end to lower ring 12 and at upper end to stop 69 of lifting rod 46.

FIG. 5 is a diagrammatic illustration of hydraulic actuating system 48. In the illustrated embodiment, a master cylinder or accumulator 52 having a piston 53 slidably retained therein has its lower chamber 55 communicating through solenoid valve 60 and conduit 61 with upper chamber 56 in cylinder 58 of hydraulic release device 49.

The lower chamber 57 in cylinder 58 is filled with air at atmospheric pressure and communicates with the atmosphere through conduit 62 and vent 63.

Hydraulic release device 49 comprises, simply, hydraulic cylinder 58 containing piston 64 which is attached to stop 69 of lifting rod 46 through connecting rod 65. Each lifting rod 46 is adapted to be slidably retained in rod guide 68 in upper ring 11 and include at its lower end stop 69 which limits the upward movement of rod 46. When stop 69 supports upper ring 11, bearing the full weight of said ring, the point of application of upward force by cable 41 is thus transferred from lower ring 12 to upper ring 11. Stop 69 also provides a support, against which hydraulic release means 49 may push, should force be required to move lower ring 12 away from upper ring 11. In the present embodiment, the use of such force is not contemplated, but it can be seen that air or hydraulic fluid may be introduced into lower chamber 57 through conduit 62 in order to exert such force.

Operation of the clamping device of this invention is best illustrated by FIGS. 2, 3, and 4. FIG. 2 is an elevation and partial cross section of the clamp when it is resting on a supporting surface 70 and lifting cable 41 is slack. In this position, the bottom of support rod 34 is resting on supporting surface 70, such as the top of the upper spud gate (not shown) and lower ring 12 is resting on stop 33. Separate guides (not shown), which do not constitute a part of this invention, may be used to maintain the clamping device in the upright position or a third support rod 34 may be used.

Stop 33 is adjusted to place cam follower 27 at the bottom or lower end of cam race 26. Cam race 26 is designed so that at this position, gripping member 14 swings radially away and does not frictionally engage the outside surface of spud 16 shown, in phantom, in FIGS. 2, 3, and 4.

Also, in the position illustrated in FIG. 2, piston 64 is at its lowest position in cylinder 58 of release device 49 with master piston 53 in a corresponding position in its master cylinder or accumulator 52. Stop 69 at the bottom of lifting rod 46 is also at its furthest distance away from upper ring 11.

To cause the clamping device to grasp or grip spud 16 and pull it up, solenoid valve 60 is closed and tension is applied to lifting cable 41 to raise lower ring 12 to the position shown in FIG. 3. In this position, stop 69 at the lower end of lifting rod 46 has moved closer to upper ring 11. Piston 64 in cylinder 58 of release device 49 is held at its lowest position, as in FIG. 2, by hydraulic fluid in upper chamber 46 which is prevented from escaping due to the fact that solenoid valve 60, as mentioned above, is closed.

As lower ring 12 is raised to its position shown in FIG. 3, cam follower 27 is caused to move along cam race 26 on the back side of lever arm 18. The contour of cam race 26 is designed so that gripping member 14 is moved radially inward, pivoting about hinge 17 as cam follower 27 moved up cam race 26. Serrated surface 24 of gripper show 23 is thus caused to bear against and frictionally engage spud 16. Since gripping members 14 are a plurality in number and distributed circumferentially about upper ring 11, and therefore also spud 16, the gripping forces of the clamp are distributed about spuds 16 affording a more secure grasp on the spud.

When the clamping device of this invention is raised, the gripping force of the clamp, at first, will depend upon the weight of upper ring 11, including gripping members 14 and support rod 34, the shape of cam race 26, and the ratio of the distance cam follower 27 is away from hinge pin 19 to the distance between hinge pin 19 and serrated surface 24. As gripping member 14 frictionally engages spud 16, the lifting force required is increased so that the resulting gripping force against spud 16, which is transmitted to gripper shoe 23 through lower ring 12, cam follower 27 and cam race 26 will again depend upon the shape of cam race 26 and the ratio of the distance cam follower 27 is away from hinge pin 19 to the distance between hinge pin 19 and serrated surface 24. In general, the gripping force against spud 16 will be directly proportional to the lifting force. It can also be seen that by using various shaped cam races 26, the lifting force can be multiplied vectorially to produce a high gripping force.

FIG. 4 illustrates the manner in which the grip of the clamp is released while it is lifting or gripping spud 16. With reference to FIG. 3, piston 64 in cylinder 58, as described above, is at its lowest position and is maintained in that position due to the fact that the hydraulic fluid in chamber 56 cannot escape because solenoid valve 60 is closed. Since lifting cable 41 is connected to piston 64 through lifting rod 46 and connecting rod 65, the hydraulic pressure in chamber 56 will, of course, be directly proportional to the lifting force. Therefore, when solenoid valve 60 is opened, and since the pressure in lower chamber 55 of master cylinder or accumulator 52 is less, the hydraulic fluid will flow from chamber 64 to chamber 55 resulting in piston 64 rising to its highest position, i.e., cylinder 58 and attached lower ring 12 lowering to its lowest position and resting on stop 33, as shown in FIG. 4. Upper ring 11 will then come to rest on stop 33, as shown in FIG. 4. Upper ring 11 will then come to rest on stop 69 thus transferring the point of support of the clamping device from lower ring 12 to upper ring 11. As described previously in connection with FIG. 2, when lower ring 12 is in its lowest position and resting on stop 33, cam follower 27 is at its lowest position along cam race 26. When at this position, gripping member 14 is permitted to swing back to its furthest radial distance away from spud 16, thus releasing the grasp of the clamp on the spud as shown in FIG. 4. Spud 16 will then fall free of the clamp.

To reset the clamping device in preparation of repeating the cycle of gripping - lifting - releasing spud 16, the clamping device is lowered until support rods 34 are again resting on supporting surface 70 as shown in FIG. 2. The tension on cable 41 is released, solenoid valve 60 is left open so that hydraulic fluid from lower chamber 55 of master cylinder 52 will flow into upper chamber 56 of cylinder 58 through conduit 61. The flow of hydraulic fluid is assisted by the combined weight of lifting rod 46, connecting rod 65, and piston 64, as well as any downward force which might be exerted on master piston 53. With piston 64 at its lowest point and lower ring 12 at its lowest point, the clamping device, upon closing of solenoid valve 60, is ready to regrip spud 16 upon raising lifting cable 41.

A second embodiment of the apparatus of the present invention is illustrated in FIG. 6. The general configuration of parts is similar to that of FIG. 1 with a first or upper support frame 111, corresponding to upper ring 11 of FIG. 1, encircling spud 116 and second or lower support frame 112, corresponding to lower ring 12 of FIG. 1, also encircling spud 116 immediately below ring 111.

Actuating devices 145 and 145' corresponding to actuating devices 45 and 45' of FIG. 1 are attached to lower support frame 112 and arranged in a similar manner relative to upper support frame 112 as device 45 is related to support ring 11.

Thus, lower support frame 112 can be axially raised and lowered similar to the action of ring 12 relative to ring 11 of FIG. 1, to transfer the lifting force of cable 141 from lower support frame 112 to upper support frame 111 and back to frame 112.

In the second embodiment, however, only two gripping shoes are used. Each shoe 114 and 114' is curved to match the outside diameter of spud 116 and span as large an area as possible to obtain as large a gripping surface as possible against the spud.

At each end of gripper shoe 114 and 114', a mechanical linkage 116 and 116' is respectively provided which is hingedly connected at its lower end to the upper side of shoe 114 and hingedly connected at its upper end to support frame 111. This configuration permits the faces 124 and 124' respectively of shoes 114 and 114' to remain generally parallel to spud 116 as the shoes are moved toward or away from the spud. In addition, the hinge point or upper ring 111 is located radially outward of the hinge point on shoe 114 so that the lifting of support frame 111 will tend to pull shoe 114 away from spud 116.

At each end and hingedly connected to the lower side of shoes 114 and 114' is respectively an adjustable linkage member 118 and 118' whose opposite end is hingedly connected to lower support frame 112.

Adjustable linkage member **118**, typically shown in FIG. **10**, comprises a shoe link **119** threadably engaged in axial alignment with a support frame link **120**. The length of member **118** is adjusted by rotating either of the threaded links **119** or **120** relative to each other about the longitudinal axis of member **118**.

As shown in FIG. **6**, since each end of adjustable link **118** is hinged, each adjustment must be made in 180° increments.

FIGS. **7**, **8**, and **9** respectively illustrate the relative position of the parts when the clamp is resting on a supporting surface **170** such as the top of the upper spud gate (not shown) when the clamp is raised and lifting a spud, and when the clamp is raised but has released its grip on the spud.

In the second embodiment, the hydraulic actuating system is identical to the hydraulic actuating system of FIGS. **2**, **3**, and **4** and since they are identical the same reference numerals will be used.

For operation of the clamping device of the second embodiment, reference is made to FIG. **7** in which lower support frame **112** is at its lowest position relative to upper frame **111**. The chain of hingedly connected parts comprising linkage **116**, shoe **114**, and adjustable link **118**, are all placed in tension and pulled back from spud **116** to define roughly either a straight line or catenary between the points of connection to upper frame **111** and lower frame **112**. Arrow **117** indicates the direction of motion of shoe **114** away from spud **116**.

In the position for FIG. **7**, as in FIG. **2**, piston **64** is at its lowest position in cylinder **58** of release device **49** with master piston **53** is a corresponding position in its master cylinder or accumulator **52**. Stop **169** at the bottom of lifting rod **146** is also at its furthest distance from upper support frame **111**.

With reference to FIG. **8**, in order to cause the clamping device of the second embodiment to grasp or grip spud **116**, solenoid valve **60** is closed and tension is applied to lifting cable **141** to raise lower support frame **112** to the position shown. Stop **169** is now closer to upper ring **111**. Piston **64** in cylinder **58** of release device **49** is held at its lowest position by hydraulic fluid in upper chamber **56** which is prevented from escaping due to the fact that solenoid valve **60** is closed.

As lower support frame **112** is raised to its position shown in FIG. **8**, compression of the series connected linkage system defined by mechanical linkage **116**, shoe **114** and adjustable link **118** causes shoe **114** to move inwardly and clamp against spud **116**.

The compressive force exerted by shoes **114** and **114'** is determined both by the weight of spud **116** and the angle that adjustable link **118** makes with the vertical axis of spud **116**. The resulting force against spud **116** is the vector sum of all the forces acting on link **118**. It can be seen that as the angle A that link **118** and **118'** makes with the vertical axis of spud **116** approaches 90° when measured from below, the greater will be the multiplication of the vertical force due to the weight of spud **116** to horizontal force executed by shoes **114** and **114'** against the spud. When the longitudinal axis of link **118** makes an angle of 75° with the vertical axis of spud **116**, the horizontal force against the spud is approximately 3.7 times the weight of the spud.

For this reason, links **118** and **118'** are made adjustable to first, allow for small changes in diameter of spuds and second, to control the amount of horizontal pressure executed against the wall of the spud.

FIG. **9** illustrates the manner in which the grasp of the clamp is released while it is lifting spud **116**.

Similar to FIG. **4**, when solenoid valve **60** is opened, since the pressure in lower chamber **55** of master cylinder or accumulator **52** is less, the hydraulic fluid will flow from chamber **64** to chamber **55** resulting in piston **64** rising to its highest position, i.e., cylinder **58** and attached lower support frame **112** lowering to its lowest position and resting either on stop **133** or hang from the chain of link **116**, shoe **114** and link **118** connected to upper frame **111**. Upper support frame **111** then rests on stop **167** thus transferring or shifting the point of support of the clamp from lower support frame **112** to upper support frame **111**.

As described previously for FIG. **7**, where lower support frame **112** is at its lowest position, the chain of hingedly connected parts comprising linkage **116**, shoe **114**, and adjustable link **118** are all placed in tension and pulled shoe **114** away from spud **116** thus releasing spud **116** and permitting it to free fall through the clamp.

To reset the clamp in preparation of repeating the cycle of gripping - lifting - releasing spud **116**, the clamp is lowered until rods **134** are again resting on supporting surface **170** as shown in FIG. **7**, the tension in cable **41** is released and solenoid valve **60** is left open so that hydraulic fluid from lower chamber **55** of master cylinder **62** will flow into upper chamber **56** of cylinder **58** through conduit **61**. Upon closing of solenoid valve **60**, the clamping device is again ready to regrip spud **116** upon raising of lifting cable **141**.

It can be seen that by applying a force to piston **57** sufficient to overcome the lifting force of cable **141**, lower ring **12** (FIG. **4**) and lower support frame **112** (FIG. **9**) may be raised and thus force gripping member **14** (FIG. **4**) and gripping member **114** (FIG. **9**) to grip the spud without having to be lowered to a supporting surface.

Thus, in both embodiments of the clamping device of the present invention, operation of the clamp is achieved basically by transferring the lifting force between the parts which actuate the means for gripping the spud and the parts which release the means for gripping the spud.

I claim:

1. An apparatus for handling a generally cylindrical object comprising a means for applying a lifting force to said apparatus, at least two gripping members adapted to frictionally engage said object, a first support adapted to encircle said object, means connected to said first support for releasing said gripping member when said lifting force is applied to said first support, a second support adapted to encircle said object and axially displaced from said first support, means connected to said second support for causing frictional engagement of said gripping members against said object when said lifting force is applied to said second support, and means for transferring said lifting force from said first support to said second support, and from said second support to said first support.

2. The apparatus as claimed in claim 1 wherein said means for causing frictional engagement of said gripping members against said object comprises a link member hingedly connected to said gripping member at one end, hingedly connected to said second support at its opposite end and disposed with its longitudinal axis making a vertical angle of less than 90° with the longitudinal axis of said object when measured from below.

3. The apparatus as claimed in claim 1 wherein said means for releasing said gripping member from said object comprises a linkage member hingedly connected at one end to said first support and hingedly connected at its opposite end to said gripping member.

4. The apparatus as claimed in claim 1 wherein said means for transferring said lifting force from said first support to said second support comprises a lifting rod connected at one end to said means for applying a lifting force, means for axially moving said lifting rod attached to said second support, and a stop attached to said lifting rod and adapted to support said first support when said lifting rod is in the raised position.

5. The apparatus as claimed in claim 1 wherein said means for causing frictional engagement of said gripping members against said object comprises a cam follower connected to said second support, a cam race on said gripping member adapted to receive said cam race, said gripping member hingedly connected to said first support whereby the lifting of said second support relative to said first support engages said cam with said cam race forcing said gripping members to engage said object.

6. The apparatus as claimed in claim 4 wherein said means for axially moving said lifting rod comprises a cylinder attached to said second support, a piston slidable in said cylinder and connected to said lifting rod, a master accumulator in communication with said cylinder and containing a hydraulic fluid, a master piston slidable in said master accumulator, and means for controlling the flow of said fluid into and out of said cylinder.

7. An apparatus for handling an elongated object comprising upper and lower rings adapted to encircle said object, a plurality of gripping members distributed circumferentially about and depending from said upper ring and hingedly connected thereto, said lower ring disposed parallel to and axially aligned with said upper ring and including means for moving said lower ring axially up and down relative to the first ring and means carried by said lower ring contacting said gripping means to move said gripping members radially for gripping said elongated object.

8. The apparatus as claimed in claim 7 further comprising means for releasing said gripping members while said elongated object is being handled.

9. The apparatus as claimed in claim 7 further comprising a support rod guide in said lower ring, a support rod attached to and depending from said upper ring and passing through said guide and means for stopping the downward movement of said lower ring connected to said support rod.

10. The apparatus as claimed in claim 8 wherein said means for releasing the gripping members comprises a release device connected at one end to said lower ring and at its other end to a lifting rod, which is slidably disposed in a lift rod guide formed in said upper ring.

11. The apparatus as claimed in claim 7 wherein each gripping member comprises a lever arm having a hinged connection at one end thereof connected to said upper ring, a gripper shoe at the other end of said lever arm and a gripper surface disposed on the face of said shoe facing said elongated object.

12. The apparatus as claimed in claim 7 including a plurality of cam followers connected to said lower ring and equal in number and corresponding in position to said gripping members, and a cam race on each of said gripping members for receipt of said cam followers whereby, the lifting of said lower ring with respect to said upper ring engages the cam followers with the cam races forcing said gripping members to engage the elongated object.

13. The apparatus as claimed in claim 12 further comprising means for adjusting the radial position of said cam followers.

14. The apparatus as claimed in claim 12 wherein said lower ring includes a release device connected at one end to said lower ring, means for actuating said release device and a lifting rod connected to the other end of said release device.

15. The apparatus as claimed in claim 14 wherein said release device comprises a cylinder attached to said lower ring, a piston slidable in said cylinder and connected to said lifting rod.

16. The apparatus as claimed in claim 15 further including a master accumulator in communication with said cylinder and containing a hydraulic fluid, a master piston slidable in said master accumulator and means for controlling the flow of said fluid into and out of said cylinder.

17. The apparatus as claimed in claim 16 wherein said means for controlling the flow of said fluid is a solenoid valve.

18. The apparatus as claimed in claim 14 wherein said lifting rod is slidably disposed in a lift rod guide formed in said upper ring and further comprises a means for stopping the upward movement of said lift rod relative to said upper ring.

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