E. L. CONDRA

HYDRAULIC FISHING EQUIPMENT

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Inventor;
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To all whom it may concern:

Be it known that I, Elmo L. Condra, a citizen of the United States, residing at Long Beach, in the county of Los Angeles and State of California, have invented a new and useful Hydraulic Fishing Equipment, of which a specification is set forth below.

In this specification, and the accompanying drawing, I shall describe and show a preferred form of my invention, and specifically mention certain of its more important objects. I do not limit myself to the forms disclosed, since various changes and adaptations may be made therein without departing from the essence of my invention as hereinabove claimed; and objects and advantages, other than those specifically mentioned, are included within its scope.

My invention relates to equipment employed for recovering lost tool strings and tools from the bottom of deep wells, and is particularly adapted for work of this kind when the lost material has become so thoroughly slitted into the mud at the bottom of the well that it cannot be moved by the methods hitherto employed.

My principal objects in the invention include: first, to provide means for producing a very great hydraulic pressure within the lost string for the purpose of forcing the accumulated mud out from the bottom and, by means of the bottom discharge, loosening the grip of the mud on the outside; second, to multiply the available upward pulling force by means of hydraulic pressure; and, third, to accomplish these objects by means of a very simple and practical construction that is relatively inexpensive and well adapted for its intended purpose.

My objects are attained in the manner illustrated in the accompanying drawing, in which—

Figure 1 is a central longitudinal section of my device in the lower portion of a deep well, engaging a lost tool string and in position to function; and

Figure 2 is an elevational view of a portion of the apparatus shown in Fig. 1.

Similar reference numerals refer to similar parts throughout both views.

In the drilling of deep wells the tools and tool strings are invariably hollow from end to end for the purpose of pumping circulating mud therethrough, and discharging it from the bottom end to assist in the cutting operations. The tool strings frequently become twisted off or broken at some intermediate point, as a result of the very heavy duty they have to undergo, and it then becomes necessary to recover them before drilling can be resumed. In such cases it often happens that the tool string becomes so thoroughly slitted in at the bottom of the well that it is exceedingly difficult or impossible to dislodge it.

The ordinary pump pressures of 600, or even 1200, pounds per square inch are inadequate to free the grip of the mud, since the lower end of the circulating passage through the interior of the string has become plugged for perhaps a long distance up from the bottom.

With my device, by the use of the derrick engine, I am able to produce an hydraulic pressure at the bottom of the lost tool string far in excess of any pump pressure that is ordinarily available; and, at the same time, to exert an upward pull on the string that is far beyond the pull that the engine alone is capable of exerting. These combined functions of my equipment are exceedingly effective in loosening the mud grip and recovering the string, as will clearly be evident.

Referring to the drawing, the upper end of a lost tool string is shown at 3 at the bottom of a deep well 4. Ordinarily such a string will have a female part 5 of a tool joint attached thereto. If not, it may be screw-threaded in such a manner that it may be engaged by my equipment. The ways for accomplishing this are well understood by those familiar with the drilling art, and need not be discussed herein. The lost string is shown slitted into mud 6 nearly to its upper end, and the depth of this mud is often very great and its grip exceedingly difficult to loosen.

My device has a taper “box” 7 at its upper end, by means of which it may be hung from the bottom of a fishing string 8. Below the “box” is a bell-end 9, coupled by collar 10 to the working cylinder 11. The lower end of the cylinder has a head 12 coupled thereto by collar 13. This head is provided with a central stuffing box 14, and a castellated rim 15.
Within cylinder 11 is a piston 16 having a tubular stem 17. This stem passes through stuffing box 14, and carries a tool-joint "pin" 18 at its lower end. Above this last mentioned part is a collar 19, having a castellated rim 20 adapted to engage the corresponding rim 15 of the cylinder head. A jaw coupling is constituted in this manner.

The piston stem 17 is interiorly divided by a removable partition 21; and the piston and this partition are both perforated, as at 22, and carry downwardly opening valves 23. Springs 24 normally keep the valves closed. The upper end of the piston stem has ports 25 establishing communication between the cylinder and space 26 in the stem between the piston head and partition 21.

Piston 16 is packed in the cylinder by a suitable cup leather 27, and a collar 28 on the piston stem limits its motion and protects the cup leather. The packing in stuffing box 14 is made tight by gland 29 in the manner indicated in the drawing.

My invention is employed in the following manner:

The string to be fished is first made ready, by threading it or otherwise, for screw engagement by my device. The latter is then sent down in the well suspended from fishing string 8, and is screwed into the "fish". For this purpose castellated rims 15 and 20 are used in the manner of a jaw coupling to tighten up the engagement, using the turning power of the drilling engine above ground for the purpose. When this has been done, water is supplied to cylinder 11 through the fishing string, and an upward pull on the latter is exerted by the derrick engine.

It is well known that an enormous pull can be exerted in this manner, due to the compound gearing of the engine and the multi-part cable suspension. This pull develops a corresponding heavy pressure in entrapped water 30 in the cylinder. This pressure is communicated through ports 25 and stem 17 to bore 31 in the "fish", and may be made sufficient to force out the accumulated mud in the bore from its lower end. This in turn acts to force upward the exterior mud 6, and free its grip upon the fish.

As already indicated, the upward force exerted upon the fish is much greater than the pull of the engine alone, although the latter may be very great. The full engine pull is exerted upon the fish by means of the hydraulic pressure upon the under side of piston 16 acting upon the annular area external to stem 17. This same developed pressure, however, also acts upon the piston area within stem 17, and partially re-acts against the water in bore 31. The amount of this reaction is effectively added to the amount of the engine pull in forcing the fish upward.

It will be clear from the foregoing description that I have provided a very simple way of producing an enormous hydraulic pressure in the bore of the fish for freeing it from the mud grip, and that I have also afforded facilities for actually multiplying the pulling power of the derrick engine exerted upon the fish. These two functions of the device, cooperating as they do, produce results not hitherto attainable, and will be found to be of very great value in the deep well drilling art.

I claim as my invention:

1. A fishing device comprising an hydraulic cylinder; and a piston therein having a hollow stem projecting through the cylinder head adapted for making a water-tight engagement with a tubular fish; said stem having ports establishing communication between its interior and that of the cylinder.

2. A fishing device comprising an hydraulic cylinder depending from a fishing string; a piston therein having a hollow stem projecting through the cylinder head adapted for making a water-tight engagement with a tubular fish; and non-return means for introducing water into said cylinder through said string; said stem having ports establishing communication between its interior and that of the cylinder.

3. A fishing device comprising an hydraulic cylinder having a bottom head with a central stuffing box and a clutch face around its periphery; a piston in said cylinder having a stem projecting through said stuffing box and carrying at its extremity a flange with a clutch face thereon adapted to engage the face on said head; means for making an engagement between said extremity and a fish; and non-return means for introducing water in said cylinder below said piston.

4. A fishing device comprising an hydraulic cylinder having a bottom head with a central stuffing box; a piston in said cylinder having a stem projecting through said stuffing box carrying means for engaging a fish at its extremity; means for holding said stem in fixed angular relation to said cylinder; and non-return means for introducing water in said cylinder below said piston.

5. A fishing device comprising an hydraulic cylinder having a bottom head with a central stuffing box; a piston in said cylinder having a hollow stem projecting through said stuffing box carrying means for making a water-tight engagement with a tubular fish; a valve in said piston opening downward within said stem; an intermediate partition in said stem with a downwardly opening valve therein; and means for holding
said stem in fixed angular relation to said cylinder; said stem having ports near said piston for establishing communication between said cylinder and the space in said stem between said valves.

6. A fishing device comprising an hydraulic cylinder depending from a fishing string; a piston therein having a hollow stem projecting through the cylinder head adapted for making a water-tight engagement with a tubular fish; means for introducing water into said cylinder through said string; and non-return valvular means whereby an upward pull upon said string will produce an hydraulic pressure upon said water communicated through ports in said stem to the interior of said fish.

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