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J. D. NOBLE
MAGNETIC FISHING TOOL

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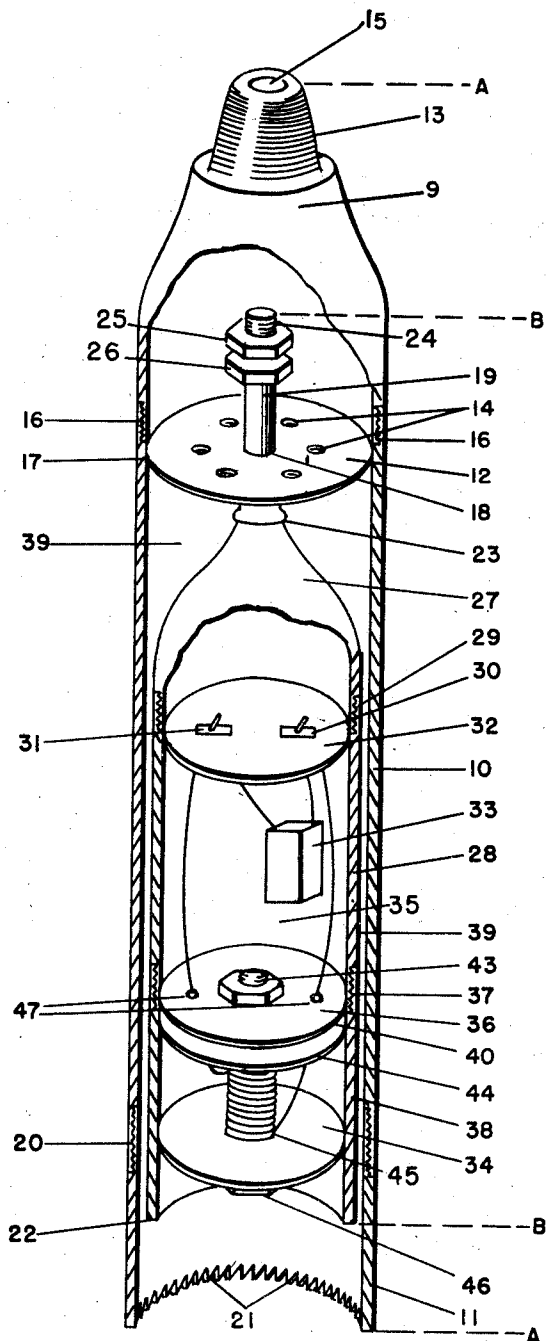


FIG. 3

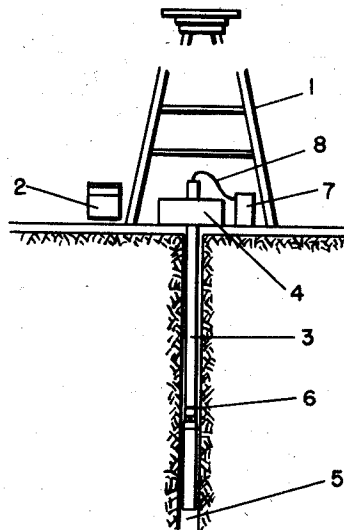


FIG. 1

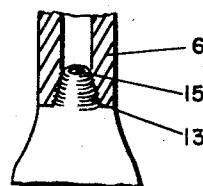


FIG. 2

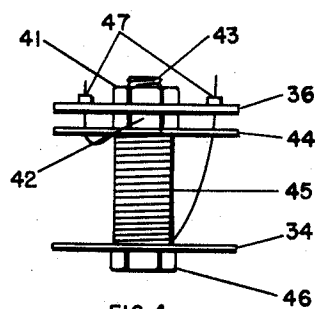


FIG. 4

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MAGNETIC FISHING TOOL

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1

This invention relates to improvements in fishing tools for wells; the object of the improvements is to provide a simplified fishing tool which will operate in conjunction with either a drilling stem, on a cable tool rig, or, in a drill collar on a rotary drilling rig.

This invention has particular utility when attached to a rotary drilling rig which will enable the fishing tool to reach the object to be removed (usually a broken part or segment of a bit on a drill) even though said object be beneath the temporary bottom of the well. This is accomplished by a water-tight unit containing a battery, composed of either wet cells or dry cells, connected series parallel, to the particular magnetic strength required, said sealed unit being contained within an elongated protective case, which tapers and attaches, at the top end, to the drill collar (or drilling stem, when used in a cable tool rig) and at the lower or open end contains a detachable milling end, thereby permitting the magnetic internal part of this fishing tool to reach through any sediment or cave in and attach to the object to be extricated by means of a modified redrilling of the well with the added use of circulating water flowing through the drill pipe and between the walls of the protective case and the magnetic water-tight unit.

Referring to the drawings:

Fig. 1 is a fragmentary view of a drilling rig in position with the fishing tool of the invention herein connected thereto.

Fig. 2 is a detail of the connection of the tool to a drill collar.

Fig. 3 is an enlarged, cross-sectional view, with parts cut away, of the assembled tool, showing the external protective case with its tapered screw connection to the drill collar (or drill stem); the milling end; and the enclosed water-tight magnetic unit with its sliding connection to the said external case, shown at maximum elevated position and with part cut away from said enclosed magnetic unit to show internal mechanism.

Fig. 4 is a direct internal right angular view of winding on steel core, and connections, numbered to correspond to same sections on Fig. 3.

A drilling rig derrick 1 is shown as having power for drilling operation supplied by motor 2. Drilling pipe 3 extends through rotary table 4, into well 5 containing a drill collar 6 at its lower extremity, said drill collar having a tapered threaded opening in its lower end with an opening to permit circulation of water from pump 7

2

through hose 8 and thence down through core of drill pipe into the tool connected to drill collar 6 in place of a bit.

The tool is herein shown, consists of two main operating parts:

The external protective and drilling unit AA, and

The internal sealed magnetic unit BB.

The external protective unit consists of three detachable parts, comprising the tapered top section 9, which has a threaded hollow pin 13 which connects to the drill collar 6 or drill stem (not illustrated), whichever the case may be, and allows the flow, or circulation of water through opening 15 (when used with a drill collar). Section 9 attaches by means of threads to section 10 at point 16 on Fig. 3.

Section 10 consisting of a steel hollow tube connection to section 9 as per above, and contains a steel disk 12 welded to the inside of section 10 at 17. Disk 12 provides the support for the internal sealed magnetic unit BB hereinafter described. Said disk 12 contains six, more or less, holes or openings 14 to permit the circulation of water entering the tool at 15. At the exact center of said disk 12 is a solitary hole 18 through which passes the rod 19. Hole 18 is milled large enough to permit rod 19 to slide freely there through. Section 10 attaches by means of threads to section 11 at point 20 of Fig. 3.

Section 11 is a milling end connected to section 10 as per above and contains teeth 21 used to dig through a cave-in or other sediment covering the object to be removed by means of rotary action and circulating water (when used on a rotary rig). Section 11 also is used as a protection to the bottom or lower part of the internal sealed magnetic unit BB. When the entire tool is being lowered into the well, and before any external object or substance contacts the internal sealed magnetic unit BB, the lower extremities of BB are flush, or even with, the lower extremities of AA or 21.

The internal sealed magnetic unit BB consists of a steel tube which tapers to rod 19 which rod 19 fits through hole 18 on disk 12 which in turn is welded to the external unit AA. Rod 19 is threaded at its extremity 24, at which are screwed two locking nuts 25 and 26. Nut 26 being the lower of the two nuts, when the tool is in operating position, rests upon disk 12 and thereby provides the support for the entire internal sealed magnetic unit BB at 18. When 26 is resting against disk 12 the internal sealed magnetic unit

BB is at its maximum lowered position heretofore referred to. At maximum elevation of BB, stop-ring 23 rests against the lower surface of disk 12 and thereby prevents BB from raising to the point where the expanding portion of rod 19 might possibly cause the internal unit BB to become stuck in hole 18.

At stopring 23 rod 19 expands into the hollow tube section of BB 27. Section 27 attaches to section 28 at 29 by means of threads to make a watertight seam. Section 27 unscrews from section 28 to enable the operator of the tool to have access to two switches 30 and 31 set in a fiber disk 32. Disk 32 is milled to fit a slot or insert just below the connecting point 29 which connects 27 to 28.

Switches 30 and 31 control the flow of electric current stored in the batteries 33 (either wet cells or dry cells—connected series parallel), when said electric current is flowing it sets up magnetic flux beneath fiber disk 34, being the grasping section of the tool. Section 28 attaches to section 38 by means of threads forming a water tight seam.

Section 38 is the lower extension of the steel tube of section 28. Said steel tube fits within the outer protective unit tube AA with approximately 1/2 inch of space 39 between the walls of the two tubes to allow for the circulation of water entering the tool through opening 15. At point 40 just below the seam 37 is welded steel disk 36 which acts as support for batteries 33 and a water tight seal to area 35 and the space above disk 32. Above and directly below disk 36, in the exact center of said disk, are two water tight nuts 41 and 42 on Fig. 4 which hold steel rod 43 separate steel disk 36 from fiber disk 44. Fiber disk 44 and fiber disk 34 act as spool ends to winding 45 on rod 43. Nut 46 holds disk 34. Winding 45 connects with batteries 33 and switches 30 and 31 by connecting wires running through water tight packing-boxes 47.

Tool is set in operation by manually throwing switches 30 and 31 sealing BB at 23, inserting rod 19 through hole 18 in disk 12, attaching nuts 25 and 26 sealing AA at 16, connecting tool to drill collar, or drill stem, depending upon the type of rigging in use, and finally in lowering the tool into the well.

The electromagnetic fishing tool herein is a self-contained unit, conforming to drilling requirements, and can be substituted for a bit on either a rotary rig or a cable tool rig to remove by magnetic action, cones, bearing, bits or parts thereof, and other magnetizable objects of relative similar size.

The electromagnetic fishing tool herein is of particular utility in its ability to engage mag-

netizable objects which are resting beneath sediment or a cave-in. This is accomplished when the tool is employed on a rotary rig thereby enabling the pick up face to contact said buried objects by use of the revolving cutting action of the milling end of the tool in conjunction with the use of circulating water pumped through the tool to said milling end.

What is claimed and it is desired to secure by Letters Patent is:

1. An electromagnetic fishing tool, comprising an electromagnetic unit contained within an outer casing, said casing terminating in a rotary milling end, means connected to the outer casing, means connected to the electromagnetic unit, the connection between the casing means and electromagnetic means allowing rotatable and limited slidable movements of the said electromagnetic unit within the said outer casing, said connecting means permitting the electromagnetic unit to remain in contact with and ride on the material at the bottom of the well when the rotary milling end is in cutting position and operation.

2. An electromagnetic fishing tool as in claim 1, said outer casing having means at its upper end for connection with a drilling stem, said means including a passage for washing fluid from the drilling stem, the connection of the electromagnetic unit and the outer casing allowing the flow of the washing fluid to the said milling cutters.

3. An electromagnetic fishing tool as in claim 1, said connection between the electromagnetic unit and the said outer casing comprising a disc fixed into the outer casing at the upper end thereof and having a central aperture and apertures for the passage of washing fluid, a rod mounted in said central aperture for rotative and limited slidable movement, said electromagnetic unit being rigidly connected to and suspended from said rod.

4. An electromagnetic fishing tool as in claim 1, said electromagnetic unit comprising a watertight casing in which are mounted an electromagnet, and source of current connected thereto.

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The following references are of record in the file of this patent:

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