Jan. 4, 1927. 1,613,563

J. G. GRATTAN

HYDRAULIC CONTROL DEVICE

Original Filed Nov. 6, 1923

Fig. 1.

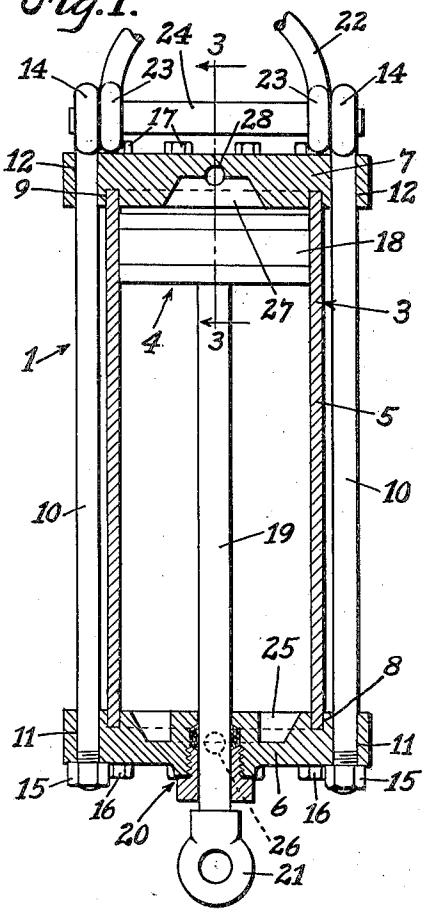


Fig. 3.

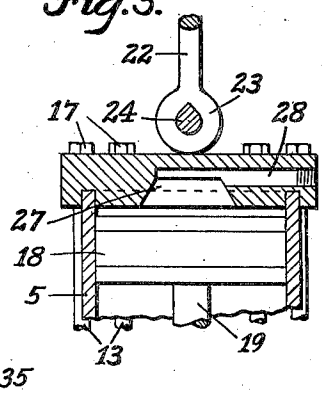


Fig. 4.

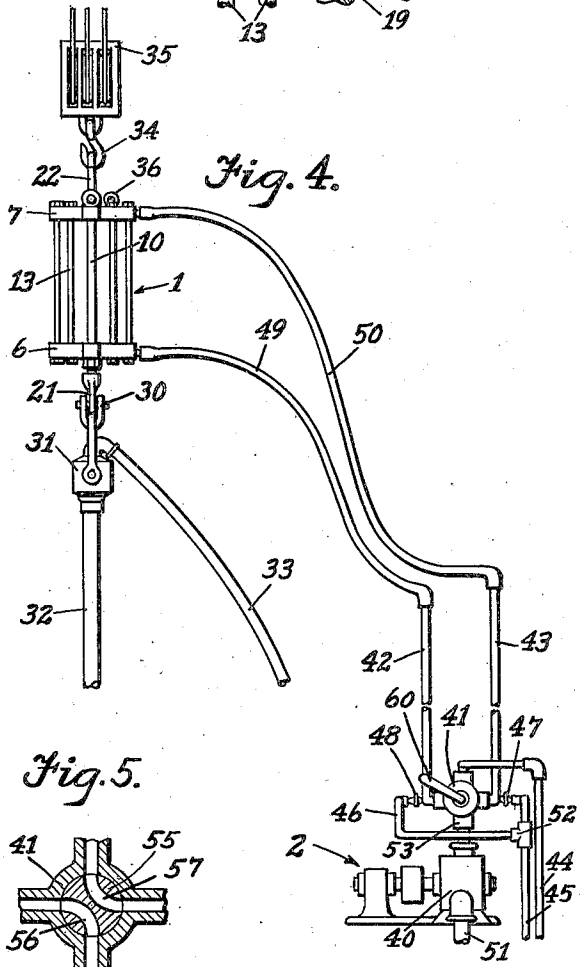


Fig. 2.

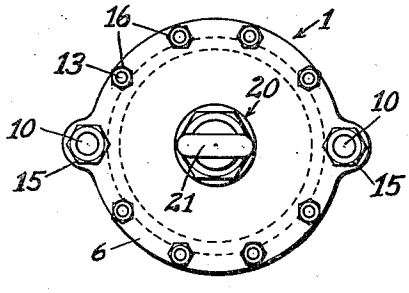


Fig. 5.

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UNITED STATES PATENT OFFICE.

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HYDRAULIC CONTROL DEVICE.

Application filed November 6, 1923, Serial No. 673,080. Renewed December 3, 1926.

My invention relates to suspended hydraulics and more particularly to a hydraulic control device for rotary drills for oil wells.

The principal objects of my invention are as follows:

To make possible the use of a diamond bit in conection with a rotary drill.

To control the feed of drill bits whether diamond, fish tail or other types.

To make possible reaming when withdrawing the bits.

When fishing to make possible feeling of pipe, bit or other object while the drill is rotated.

To enable the bit to be lifted from the bottom of the well while being rotated.

When milling to insure a uniform feed to the milling tool.

Other objects and advantages will appear hereinafter and while I show herewith and will describe a preferred form of construction, I desire to be understood that I do not limit my invention to such preferred form but that various changes and adaptations may be made therein without departing from the spirit of my invention as hereinafter claimed.

Referring to the drawing:

Fig. 1 is a vertical longitudinal section of the piston and cylinder unit of my invention.

Fig. 2 is a bottom plan view of the unit shown in Fig. 1.

Fig. 3 is a fragmentary sectional view taken on line 3—3 of Fig. 1.

Fig. 4 is a side elevation of my invention complete.

Fig. 5 is a cross section of the controlling valve.

In the drawing 1 indicates a piston and cylinder connecting unit and 2 a pump unit. The unit 1 comprises a vertical cylinder 3 and a piston 4 reciprocatively mounted in said cylinder. Said cylinder includes a cylindrical wall 5, a lower head 6 and an upper head 7, the head 6 being provided with an annular groove 8 in which is fitted the lower end of said wall and the upper head being provided with an annular groove 9 in which is fitted the upper end of said wall.

Bolts 10 extend at diametrically opposite points through openings 11 and 12 in the lower and upper heads 6 and 7, and bolts 13 extend through said heads between said bolts 10. Eyes 14 are formed on the upper ends of bolts 10 and nuts 15 screw on the lower ends of said bolts against the under side of the lower head 6 and draw the eyes 14 against the upper face of the upper head 7. Nuts 16 screw on the lower ends of the bolts 13 against the under side of the head 6 and nuts 17 screw on the upper ends of said bolts against the upper face of the upper head 7. The piston 4 comprises a head 18 and a rod 19 which extends downwardly from said head through a packing box 20 in the lower cylinder head 6.

An eye 21 is formed on the lower end of the piston rod 19. A bail 22 is formed with eyes 23 on its lower ends which fit between the bolt eyes 14 and a pivot bolt 24 extends through said bolt eyes and bail eyes, whereby the bail is connected to the upper ends of the bolts 10. The head 6 is formed with a recess 25 in its upper side within the cylinder 3 and the head is provided with a duct 26 leading through one side thereof into said recess. The head 7 is provided with a recess 27 in its under side and with a duct 28 leading through one side thereof into said recess.

The eye 21 is connected by a clevis 30 to the upper end of a swivel 31, which connects the upper end of the rotary drill tube 32 into the upper end of which leads the water circulating tube 33. The bail 22 is engaged by a hook 34 on the lower end of the usual block 35, which is suspended within the oil well derrick (not shown).

An eye 36 is secured on the upper head 7 to be engaged by a hook on the end of a cat line (not shown) for drawing and holding the unit 1 to one side of the derrick. The pump unit 2 comprises a pump 40, a control valve 41, stand pipes 42 and 43, discharge pipes 44, 45 and 46, pet cocks 47 and 48 which control the flow of the water from valve 41 through discharge pipes 45 and 46, and flexible tubes 49 and 50, the tube 49 connecting at one end to stand pipe 42 and at its other end to duct 26, and the tube 50 connecting at one end to the stand pipe 43 and at its other end to the duct 28.

The pump intake 51 leads from a water tank (not shown) into which tank the pipes 44 and 45 discharge, the pipe 46 being connected at 52 below pet cock 47 to the pipe 45 and discharging into said pipe. The pump pressure pipe 53 connects to the lower side of the valve 41. The stand pipes 42

and 43 respectively and the pipes 46 and 45 respectively connect to the left and right sides of valve 41. The pipe 44 leads from the top of valve 41.

The plug 55 of valve 41 has two ports 56 and 57. The port 56 is adapted to connect the pressure pipe 53 and the pipes 42 and 46 or the pipe 44 and pipes 42 and 46. The port 57 is adapted to connect pipe 44 and pipes 43 and 45 or the pressure pipe 53 and pipes 43 and 45. A handle 60 is connected to the valve plug 55 for turning said plug to operate the valve 41.

When the valve 41 is in the position shown, water is pumped through valve port 56 and pipe 42, tube 49, and duct 26 into the lower end of cylinder 3 whereby the piston 4 is raised which raises the drill pipe 32, while the water in the cylinder above the piston is forced out through duct 28, tube 50, pipe 43, port 57, and pipe 44 into the water tank (not shown). When the valve plug 57 is reversed water is pumped through port 57, pipe 43, tube 50, and duct 28 into the top of cylinder 3, which forces the piston 4 and the drill pipe 32 down, while the water in the cylinder below the piston is forced by the piston out through duct 26, tube 49, pipe 42, port 56 and pipe 44 into the water tank. The pet cock 46 or 47 may be opened to allow the water to run slowly out of the bottom or top of the cylinder 3 through pipes 46 and 45 or through pipe 45 alone when slow feeding is desired in working hard formations.

Having described my invention, I claim:

A suspended hydraulic control device for use with oil well work having a vertical cylinder attached to the pulley block of the drill line comprising a cylindrical wall, upper and lower heads fitting the ends of the cylindrical wall, eye bolts extending through the heads diametrically opposite each other with the eyes at the top, clamping bolts connecting the heads between the eye bolts, a pivot bolt mounted in the eyes, a bail having eyes fitting upon the pivot bolt, there being a recess in the upper face of the lower head and a duct leading to the recess and there being a recess in the lower side of the upper head, and a duct leading to the recess, a piston head in the cylindrical wall, a piston rod extending from the piston head through the lower head of the cylindrical wall, and an eye upon the lower end of the piston rod, said eye being connected to the rotary swivel of a drill pipe, and there being means for supplying water under pressure through said ducts to the upper and lower sides of the piston head.

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