Dec. 16, 1941. H. J. QUINTRELL 2,266,383

WELL BORE DEFLECTING TOOL

Filed Jan. 2, 1940

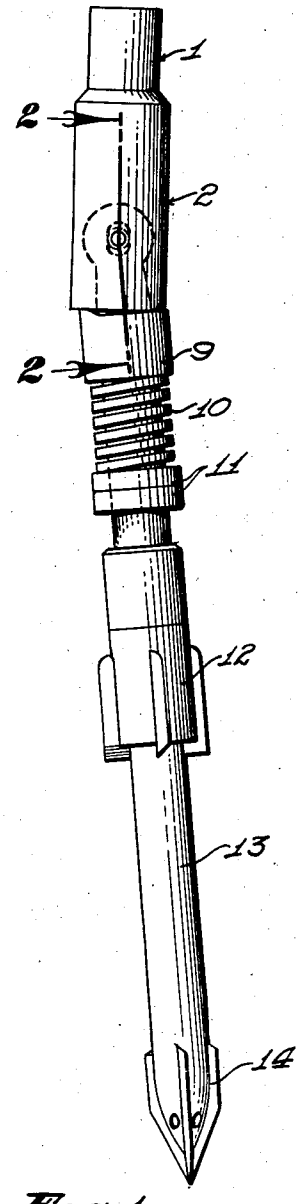


FIG. 1

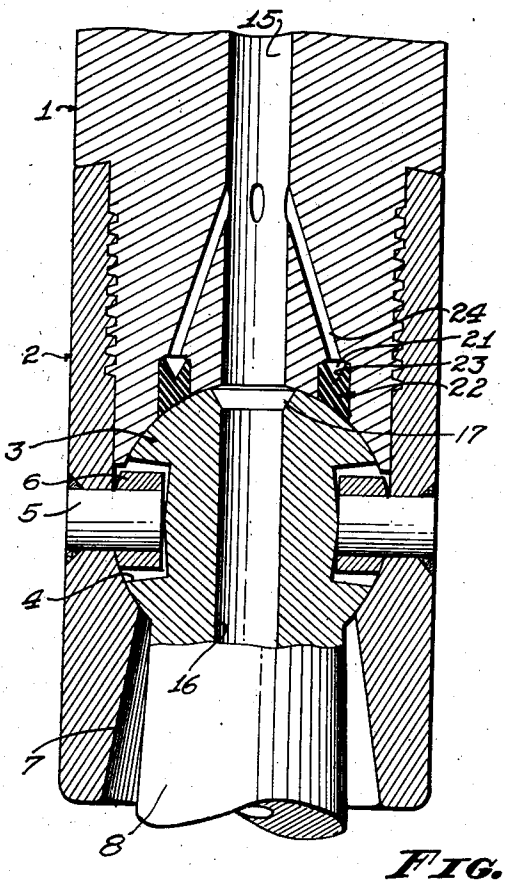


FIG. 2

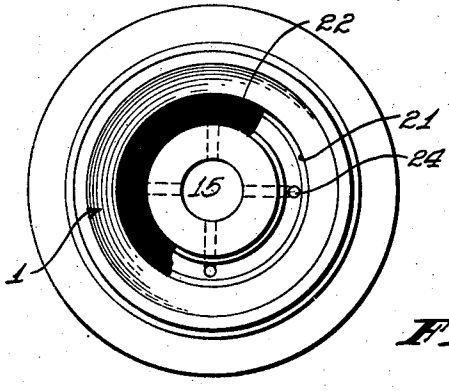


FIG. 3

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Patented Dec. 16, 1941 2,266,383

UNITED STATES PATENT OFFICE

2,266,383

WELL BORE DEFLECTING TOOL

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Application January 2, 1940, Serial No. 312,025

3 Claims. (Cl. 255—1.6)

My invention relates to well bore deflecting tools; more specifically, to that type of deflecting tool commonly referred to as a "knuckle joint." Among the objects of my invention are:

First, to provide a deflecting tool of this character which is an imporvement on the Lewis Patent 2,016,042 issued October 1, 1935;

Second, to provide a deflecting tool of the knuckle joint type wherein the knuckle joint is protected from the cutting action of the mud or circulation medium which is pumped downwardly through the drill string in the course of operating the knuckle joint;

Third, to provide a special sealing means for the ball and socket connection of a knuckle joint type deflecting tool in which the pressure of the circulation fluid holds the sealing means in place;

Fourth, to provide a sealing means of this character for knuckle joints in which practically no loss of fluid or pressure occurs at the knuckle joint, so that the full volume of circulation fluid at full pressure may be discharged through the deflection tool bit in order to facilitate its operation; and

Fifth, to provide, on the whole, a novelly constructed knuckle joint type deflecting tool having a sealing means in which the life of the knuckle joint is materially increased.

With the above and other objects in view, as may appear hereinafter, reference is directed to the accompanying drawing, in which:

Figure 1 is an elevational view of a knuckle joint embodying my invention;

Figure 2 is an enlarged fragmentary, longitudinal sectional view taken through 2—2 of Figure 1, showing particularly the sealing means; and

Figure 3 is an end view of the ball cap forming the upper end of the knuckle joint with the other parts removed so as to expose the sealing means, said sealing means being shown fragmentarily.

The knuckle joint type deflection tool to which my invention pertains comprises a ball cap member 1, the upper end of which is provided with suitable means for attachment to a drilling string. The lower portion is externally threaded to receive a ball bowl 2. The end of the ball cap and the ball bowl define a spherical seat for a ball member 3.

The ball member is provided on its diametrically opposite sides with sockets 4, into which extend pins 5 carrying rollers 6. The pins 5 are welded or otherwise secured in the ball bowl 2 so that rotation of the drill stem is transmitted to the ball 3, the ball being capable of a limited amount of universal movement. The lower end of the ball bowl has a tapered opening 7 through which a stem 8 extending from the ball 3 passes. The stem 8 has mounted thereon a suitable cam collar 9, a spring 10 tending to urge the cam collar toward the ball bowl, and adjustable locking rings 11. The lower end of the stem is suitably attached to a reamer 12, and the reamer 12 is attached through a stem 13 to a pilot bit 14.

The ball cap 1 and ball 3 have registering passages 15 and 16, respectively, the end of passage 15 being flared, as indiacted by 17, to insure full opening when the ball 3 is in an angular position. Passage 16 extends through the ball 3 to discharge ports in the bit 14.

So far, the construction described is conventional. My invention relates particularly to a sealing means between the ball cap 1 and the ball member 3. Formed in the end of the ball cap 1 is an annular groove 21 surrounding the passage 15. The groove 21 confronts the ball member and receives an annular sealing ring 22. The annular sealing ring 22 is shaped at its outer side to conform to the ball member 3, while the inner side or end of the ring is provided with an annular V-shaped groove 23. The inner end of the channel 21 communicates with the circulation bore 15 through a plurality of equalizer passages 24.

The sealing ring functions as follows: During operation of the knuckle joint, circulation fluid (commonly referred to as mud) is forced under high pressure downwardly through the circulation passages 15 and 16 so as to pass out through openings in the pilot bit 14. The pressure of this fluid is exerted by reason of the passages 24 upon the back or inner end of the ring 22 so as to urge it into contact with the ball member 3. Thus, the greater the pressure the more the ring is forced into contact with the ball member. The contact pressure of the sealing ring is thus automatically maintained higher than the pressure that might be exerted by the drilling fluid tending to pass between the ball cap 1 and the ball member 3, thereby preventing any loss of drilling fluid from the connection between the ball cap and ball member, and eliminating the attendant erosion and cutting away of the parts. In actual practice, the sealing ring more than doubles the life of the knuckle joint in which it is incorporated.

Various changes and alternate arrangements may be made within the scope of the appended claims, in which it is my intention to claim all

novelty inherent in the invention as broadly as the prior art permits.

I claim:

1. In a knuckle joint deflecting tool: a ball and socket member capable of limited relative movement, and having registering circulation passages therethrough; one of said members having an annular channel formed therein around its circulation passage and confronting the other of said members, said channel being in close proximity to said circulation passages but embracing, for all positions of the knuckle joint, the confronting end of the circulation passage in the other of said members; connecting passages from said channel to said circulation passages; a resilient sealing means fitting said channel and urged by the pressure of fluid in said circulation passages and connecting passages against said other member; and torque-transmitting means connecting said members at the outer sides of said joints with respect to said sealing means, whereby deleterious matter passing in said circulation passages is prevented from circulation from said passages around said torque-transmitting means.

2. In a means for sealing a hollow flexible joint against the escape of fluid passing through said joint: a ball and socket member capable of limited relative movement, and having registering circulation passages therethrough; one of said members having an annular channel formed therein around its circulation passage and confronting the other of said members; said channel being in close proximity to said circulation passages but embracing, for all positions of the knuckle joint, the confronting end of the circulation passage in the other of said members; connecting passages from said channel to said circulation passages; a resilient sealing means fitting said channel and urged by the pressure of fluid in said circulation passages and connecting passages against said other member; and torque-transmitting means connecting said members at the outer sides of said joints with respect to said sealing means, whereby deleterious matter passing in said circulation passages is prevented from circulation from said passages around said torque-transmitting means.

3. In a knuckle joint deflecting tool: a ball and socket member capable of limited relative movement, and having registering circulation passages therethrough; one of said members having an annular channel formed therein around its circulation passage and connecting passages from said channel to said circulation passage, said channel confronting the other of said members; and an annular resilient ring fitting said channel, one side of said ring being shaped spherically in conformity with the curvature of the confronting face of the other member, and its other or inner side having annular pressure lips adapted to seal against the passage of fluid around the ring, said ring being subjected to pressure of fluid in said circulation passage as applied through said connecting passages to said channel.

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