March 11, 1941. G. L. KOTHNY 2,234,438

TOOL REMOVING DEVICE

Filed April 18, 1940

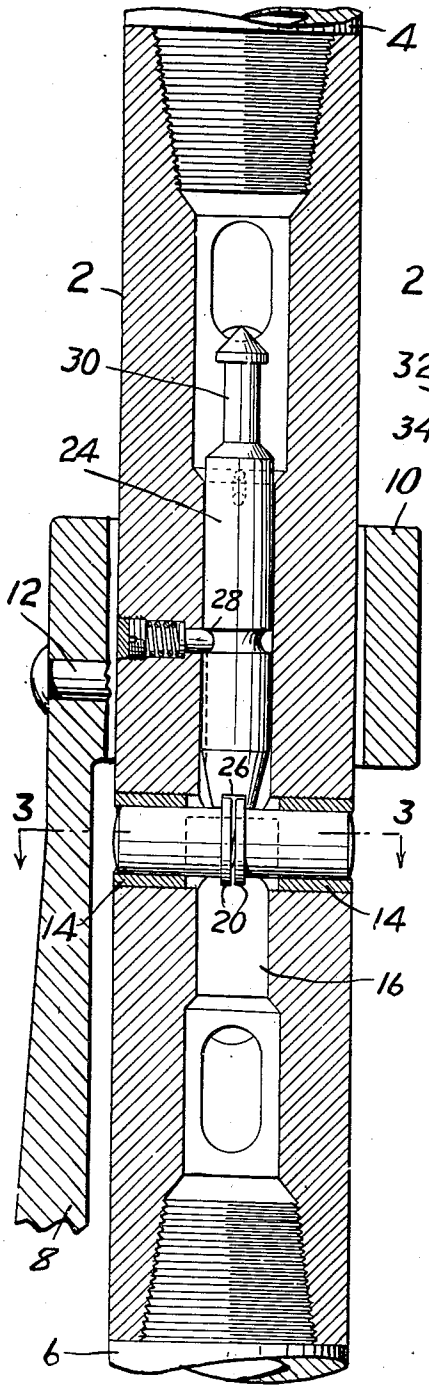


FIG. 1.

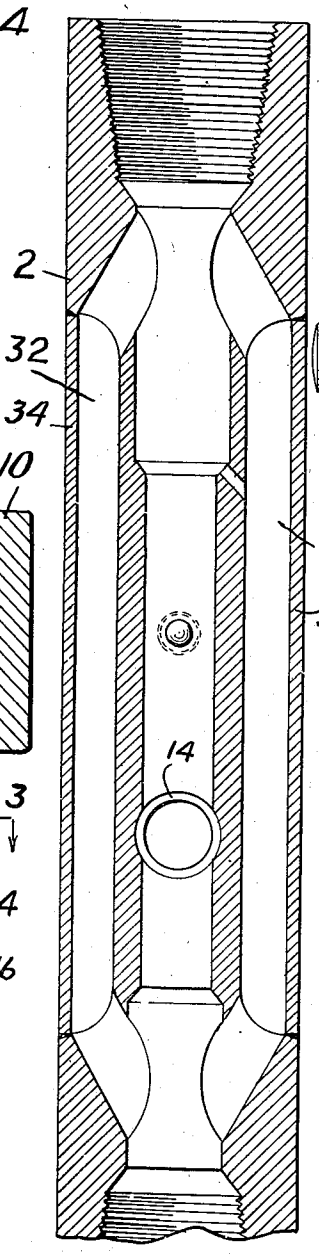


FIG. 2.

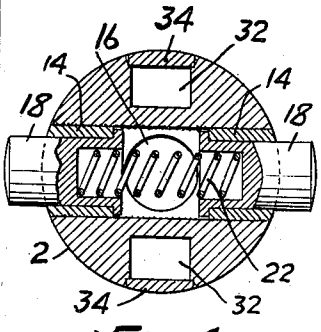


FIG. 4.

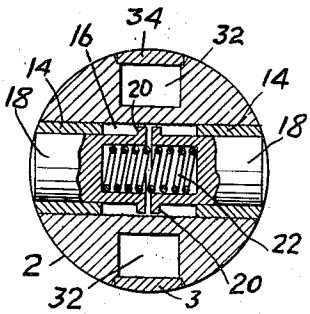


FIG. 3.

WITNESS:

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2,234,438

UNITED STATES PATENT OFFICE

2,234,438

TOOL REMOVING DEVICE

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Application April 18, 1940, Serial No. 330,291

8 Claims. (Cl. 294—93)

This invention relates to a device for removing whipstocks or other tools from bore holes, and more particularly to a device adapted to be included within a drill string above a bit for effecting such result.

In my prior Patent No. 2,107,420, dated February 8, 1938, there is disclosed means whereby a whipstock may be removed from the bore hole with the drill string, but need not necessarily be removed with the drill string, so that the latter, if need arises, may be removed from the bore hole to replace a bit or for other purposes while the whipstock remains in its original position to serve for the guidance of another bit.

It is the object of the present invention to improve the apparatus of said patent to secure a more positive type of operation and to insure longer life of the sub which contains the elements involved in the removal of the whipstock or other tool. In the arrangement of the prior patent, passages are present through which mud must pass or may pass during the drilling operation. Drilling mud is of a highly abrasive nature, and if it passes even for relatively short times through openings of limited cross-section, wear occurs with extreme rapidity. In the case of the device of the prior patent, for example, there are clearances in the vicinity of the movable members through which the mud may circulate with abrasive action. The abrasion may be such as to weaken the structure to such extent after repeated use that failure may occur, with the possible lodging of apparatus within the bore hole necessitating fishing. Thus the safe life of the apparatus of the patent may be relatively short.

In accordance with the present invention, the parts may be so arranged that only slight clearances are afforded through which no appreciable flow can take place to cause damage.

The above and other objects of the invention, relating particularly to details, will be apparent from the following description, read in conjunction with the accompanying drawing, in which:

Figure 1 is a fragmentary axial section taken through the improved sub and its associated parts;

Figure 2 is a similar section taken at a right angle to the section of Figure 1;

Figure 3 is a transverse section taken on the plane indicated at 3—3 in Figure 1; and

Figure 4 is a section similar to that of Figure 3, but showing the engaging bolt members in expanded position.

The sub 2 containing the parts involved in the removal of a whipstock forms a part of a drill string 4 above the bit to which it is connected by pipe 6, which may be of any desirable length. The sub 2, for example, may be located directly above the bit, or there may be a considerable length of drill pipe between it and the bit, as illustrated in said prior patent. The upper end of a whipstock is illustrated at 8, and includes a collar 10 of usual construction. The whipstock is originally secured to the drill stem adjacent the bit by means of a rivet or pin, so that when the drill stem is first lowered with the whipstock at its lower end, the usual lower pointed end of the whipstock may be forced into the earth to hold the whipstock in a fixed position, orientation being effected in a conventional fashion, for example, by the use of the method described in the patent to Hyer 2,120,670, dated June 14, 1938. Increase of pressure on the rivet will shear it off, leaving in the whipstock a portion such as indicated at 12. Drilling may then be effected to a desired degree. During this drilling, the drill stem will pass through the collar 10 to bring the sub 2 at least partially below this ring 10, though, of course, the drilling may be carried out so that the sub passes well down below the whipstock. The parts are illustrated in a position which they may assume just prior to the removal of the whipstock.

The sub 2 is provided with a pair of tapped openings in which are threaded bushings 14, which may be removed and replaced if desired, and may be either temporarily secured or permanently welded in position. The openings in which these bushings are located communicate with the central opening 16 of the sub.

Mounted in the bushings 14 are bolt members 18 provided with flanges 20 and urged apart by a spring 22 housed in counterbores therein. Prior to the time when removal of a whipstock is to be effected, the bolts 18 are held in retracted position by means of an element 24, which is provided at its lower end with a notch 26 adapted to engage the flanges 20 of the bolts 18 and hold them inward against the force of the spring 22. To insure that the element 24 does not accidentally become loose due to vibration, a detent 28 is provided in the form of a spring pressed pin entering a groove in the element 24, the engagement being such that release will not occur until a positive upward force is applied to the element 24 by an overshot device adapted to engage its upper end 30, which is formed to be grasped by the overshot. To insure free circulation of mud

during drilling, mud passages 32 are provided, as illustrated, being closed by strips 34 welded to the sub.

The bolts 18 are arranged to fit rather closely the bores in the bushings 14, and consequently the flow of mud is substantially prevented at any velocities which may cause appreciable abrasion. If anything, only a slight trickle of liquid may pass these bolts. In similar fashion, the element 24 closely fits the portions of the bore 16 above the bolts, so that here again there is substantially no abrasive action on the bore or the element 24. Thus a long life for these movable parts is afforded.

The operation of this device will be readily understood. So long as the drilling takes place or it is not desired to remove the whipstock, even if the bit is removed, the element 24 is permitted to remain in position to hold the bolts 18 in their inner position so that they can pass freely through the collar 10 of the whipstock. When it is desired to remove the whipstock, however, an overshot is lowered through the drill stem to engage and lift out of it the element 24 while the bolts 18 are located below the collar 10. The bolts are accordingly moved outwardly by the action of the spring 22 into the position illustrated in Figure 4, their outward movements being limited by engagement of their flanges with the bushings 14. If the drill stem is now raised, one or both of the bolts will engage the collar 10, whereby the whipstock will be removed with the drill stem.

Owing to the fact that the sub and its elements are fully assembled at the surface, there is no possibility of jamming which would prevent the removal of the whipstock, i. e., there is nothing to prevent, for example, the lowering of a go-devil or the like to a position to render the sub operative. Certainty of operation and long life of the sub are insured by its construction.

What I claim and desire to protect by Letters Patent is:

1. Means for effecting removal of a tool such as a whipstock or the like from a bore hole comprising a body arranged to be included in a drill string above the bit, means carried by said body and yieldingly urged outwardly to engage and lift a tool with the drill stem, and means restraining the last named means from outward movement.

2. Means for effecting removal of a tool such as a whipstock or the like from a bore hole comprising a body arranged to be included in a drill string above the bit, means carried by said body and yieldingly urged outwardly to engage and lift a tool with the drill stem, and means for normally maintaining said engaging means within the perimeter of said body.

3. Means for effecting removal of a tool such as a whipstock or the like from a bore hole comprising a body arranged to be included in a drill string above the bit, means carried by said body and yieldingly urged outwardly to engage and lift a tool with the drill stem, and means restraining the last named means from outward movement, said restraining means being movable by an overshot to release the engaging means.

4. Means for effecting removal of a tool such as a whipstock or the like from a bore hole comprising a body arranged to be included in a drill string above the bit, means carried by said body and expandible outwardly to engage and lift a tool with the drill stem, and means for bypassing fluid about said engaging means.

5. Means for effecting removal of a tool such as a whipstock or the like from a bore hole comprising a body arranged to be included in a drill string above the bit, and means slidably carried by said body to move outwardly to engage and lift a tool with the drill stem.

6. Means for effecting removal of a tool such as a whipstock or the like from a bore hole comprising a body arranged to be included in a drill string above the bit, and a bolt member slidably carried in a bore in said body to move outwardly to engage and lift a tool with the drill stem.

7. Means for effecting removal of a tool such as a whipstock or the like from a bore hole comprising a body arranged to be included in a drill string above the bit, and a plurality of diametrically opposed bolt members slidably carried in said body and spring urged outwardly to engage and lift a tool with the drill stem.

8. Means for effecting removal of a tool such as a whipstock or the like from a bore hole comprising a body arranged to be included in a drill string above the bit, means carried by said body and expandible outwardly to engage and lift a tool with the drill stem, means for controlling the engaging means, and means yieldingly holding the last mentioned means against accidental movements.

GOTTDANK L. KOTHNY.