United States Patent [19]

Farris

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[54] **OPTIONALLY STABILIZED DRILLING TOOL, AND METHOD OF USE**

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Related U.S. Application Data

[62] Division of Ser. No. 291,129, Sept. 25, 1972, Pat. No. 3,799,279.

[52] **U.S. Cl.** **175/61**; 175/73

[51] **Int. Cl.** **E21b 7/04**; E21b 7/18

[58] **Field of Search** ..... 175/61, 57, 325, 73, 76, 175/87, 317; 166/173, 308 4 A

[56] **References Cited**

UNITED STATES PATENTS

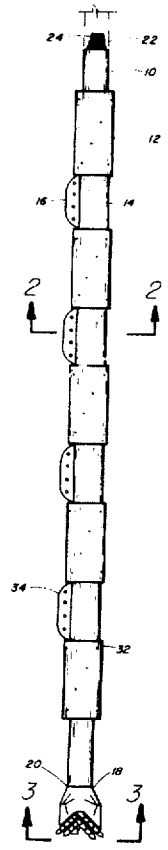
2,324,102	7/1943	Miller et al.	175/61 X
2,745,635	5/1956	Zublin	175/76
2,873,092	2/1959	Dwyer	175/61
3,087,558	4/1963	Dougherty	175/317 X
3,142,347	7/1964	Barnes	175/61 X
3,154,156	10/1964	Moore et al.	175/76
3,306,387	2/1967	Williams	175/76 X
3,352,370	11/1967	Livingston	175/73
3,363,704	1/1968	Farris et al.	175/61 X
3,746,108	7/1973	Hall	175/61

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[57] **ABSTRACT**

A hollow shaft is tapped and threaded at respective ends for engaging between a drill stem and a conventional cripple bit. A plurality of radially and longitudinally extending stabilizers are spaced longitudinally apart on said shaft. Each stabilizer is fixed to a collar mounted for rotation on the shaft, and retained thereon by fixed collars secured to the shaft overlapping end flanges of rotational collars. The shaft is recessed under each stabilizer to reduce friction of rotation thereon. Transverse holes are defined through the respective stabilizers to equalize pressures on the sides thereof. In rotational drilling, the stabilizers are randomly misaligned around the shaft to stabilize the drilling end portion of the drill string in its bore. If the bit changes direction to a side for any reason, the stabilizers are all aligned by a near side of the bore and cease to act as stabilizers. Rotational drilling is stopped and percussion drilling is begun with the crippled bit oriented by well known methods and equipment to correct to original direction. By resuming rotational drilling when correction is made the stabilizers become misaligned and stabilization is resumed.

1 Claim, 4 Drawing Figures



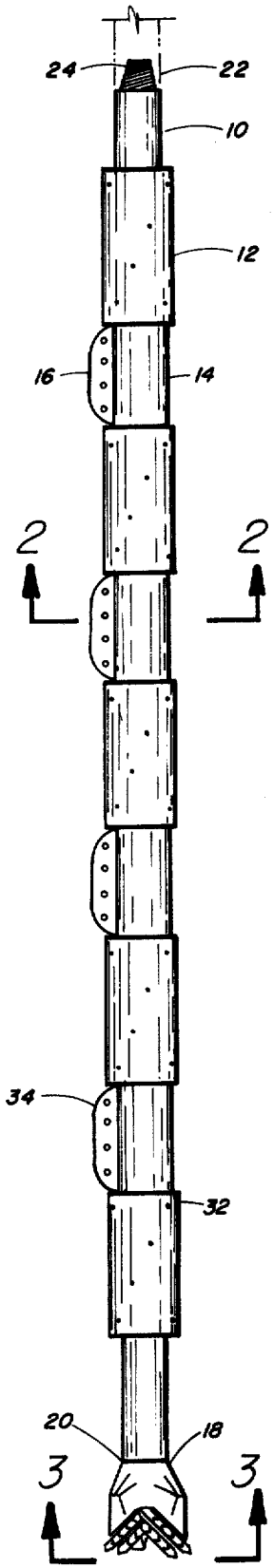


FIG. 1

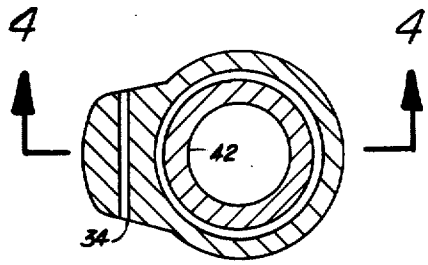


FIG. 2

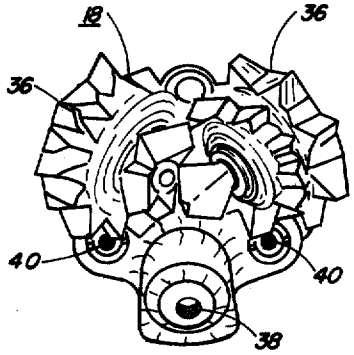


FIG. 3

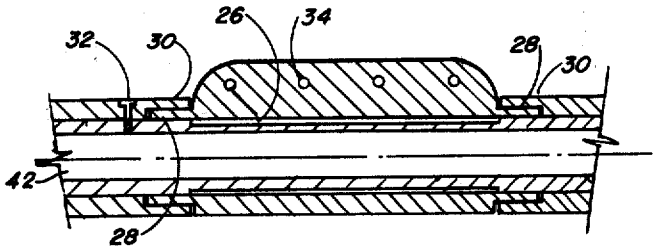


FIG. 4

OPTIONALLY STABILIZED DRILLING TOOL, AND METHOD OF USE

This is a division, of application Ser. No. 291,129, filed 9/25/72, now U.S. Pat. No. 3,799,279.

The invention relates generally to apparatus for and method of drilling wells, and more particularly to drill-stabilizers that are deactivated when drilling is off course and reactivated when drilling is back on course.

It is old in the art to provide a plurality of stabilizers fixed rigidly to a tool in one or more rows spaced vertically apart, the tool being engaged in a drill-string between the drill-bit and the rest of the string. The fixed stabilizers resist any transverse movement of the drill either in leaving or returning to a desired drilling direction.

It is an object of the invention to provide apparatus for and method of drill stabilization in drilling a well when on drilling course that destablizes when off drilling course.

Another object of the invention is to provide means for quickly changing a direction of drilling a well without pulling the string to remove stabilizers.

Other objects and a fuller understanding of the invention may be had by referring to the following specification claims and drawings, in which:

FIG. 1 is a side elevation of the invention shown engaged between a cripple bit and a drill stem and with stabilizers aligned.

FIG. 2 is a cross-sectional view taken along section line 2—2 of FIG. 1.

FIG. 3 is an end view of a cripple bit taken along transverse line 3—3, and

FIG. 4 is a cross-sectional view taken along section 4—4 of FIG. 2.

Referring to FIGS. 1 and 2, the invention comprises a hollow shaft 10 on which are alternately mounted fixed collars 12 and rotatable collars 14. Stabilizers 16 are fixed to movable collars 14 and rotate therewith around shaft 10. A cripple bit 18 of conventional design is fixed to the lower end 20 of shaft 10, the upper end 24 of which is fixed to a drill stem 22.

Referring additionally to FIG. 4, shaft 10 defines a circumferential recess 26 under each rotatable collar 14 that extends longitudinally for the length of the associated stabilizer 16 to reduce rotational friction. Flanges 28 extend from both ends of each rotatable collar 14 to overlap and rotatably engage shaft 10. Flanges 30, defined in the ends of fixed collars 12, are adopted to overlap adjacent flanges 28 to retain rotatable collars and associated stabilizers on shaft 10. Bolts 32 engage in congruent holes tapped in fixed collars 12 and shaft 10 for rigidly securing them together. Stabiizers 26 define holes 34 extending transversely therethrough for equalizing pressures on their respective sides.

A conventional cripple bit 18, recommended for use with the invention, comprises two toothed-drill-cones 36 mounted in the bit for rotation about axes spaced 120° apart. A pressure nozzle 38, connected with a supply of drill mud mixture through hollow shaft 10, is spaced 120° in the bit from each of the drill cones. Supplementary nozzles or outlets are spaced between said high pressure nozzles 38 and drill cones 36.

To use the invention in drilling, the invention is mounted in the drill-string as hereinbefore described, and the drill-string rotated in rotational drilling. The stabilizers 16, fixed to their respective rotatable collars 14, tend to turn therewith on shaft 10, in the direction of string and shaft rotation, actuated by a difference in friction between flanges 28 and said shaft and between flanges 28 and 30, to arrange themselves randomly about said shaft and space it equally from the walls of the bore, thereby stabilizing it in the bore. Mud pressure from nozzles 38 and 40 tending to initially move the stabilizers is quickly equalized on both sides of the stabilizers by holes 34 transversely defined therein.

If the drill bit moves off a drill course in spite of its stabilization, or for any reason it is desired to change the direction of drilling, the crippled bit is oriented in the bore with large nozzle 38 oppositely aligned from the desired direction for the bit to move. Rotational drilling having been halted for said orientation, percussive drilling is begun to pound the crippled bit up and down in its bore. The toothed drill cones 36 will fracture material at the bottom of the bore on the side and in the direction to which said cones are oriented. Circulating mud under pressure carries this material to the surface. If the drill bit moves off course, outer edges of stabilizers 16 contact a near side of the bore and are brought into alignment as shown in FIG. 1. As stabilization depends on the random misalignment of the stabilizers around shaft 10, the bit is thus destabilized to change direction by the full diameter of the bore rather than by only a minor fraction thereof between stabilizer edges and bore wall. When the well bore hs been established in the new desired direction, the bit can be centered therein by reversing the orientation of cripple bit 18 briefly to bring it there, then percussive drilling is discontinued and rotational drilling is recommenced to thereby rotate the centered stabilizers out of alignment thereby stabilizing the drill bit in its drilling course.

What is claimed is:

1. Method of using an optionally stabilized drilling tool comprising the steps of: engaging a tool, having a plurality of non-symetrical stabilizer means mounted rotatably thereon, adjacent a non-symetrical drill bit in a drill string; stabilizing said drill string by randomly displacing around said tool said plurality of stabilizer means by rotational drilling; and destabilizing said drill string by aligning said plurality of stabilizer means by percussive drilling with said bit.

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