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C. E. THOMAS

2,072,320

BIT GUIDE

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Fig. 1.

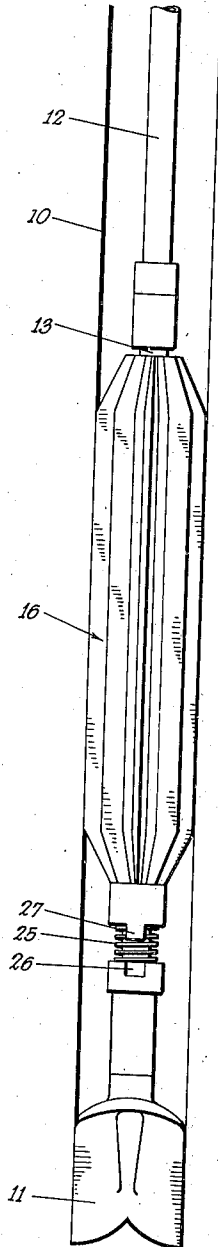


Fig. 2.

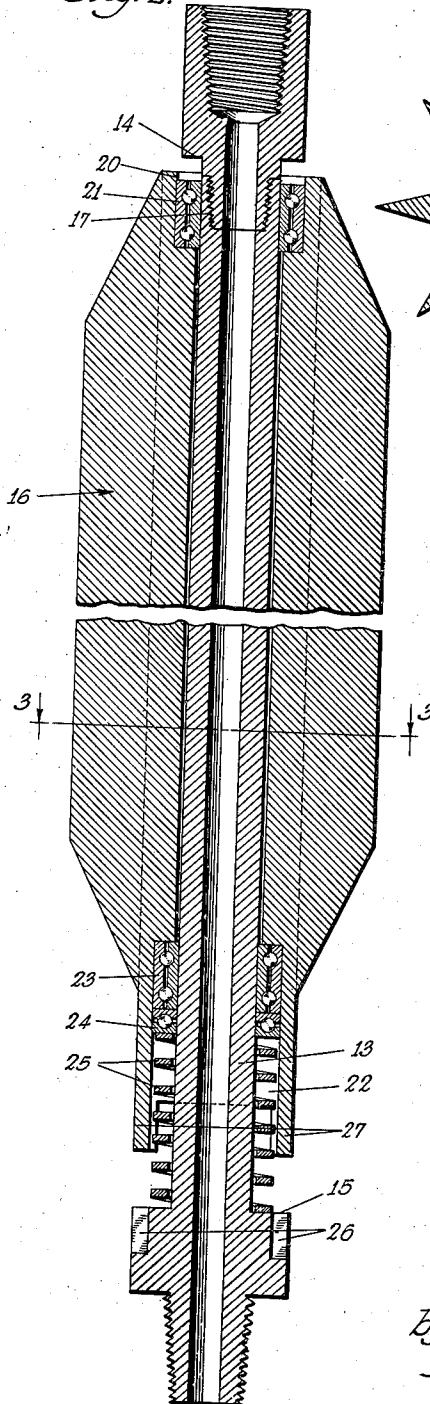
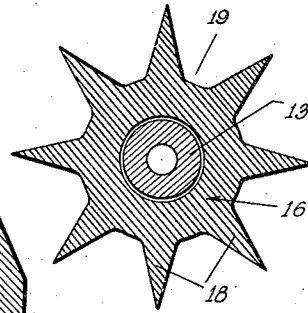


Fig. 3.



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BIT GUIDE

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3 Claims. (Cl. 255—28)

This invention relates to a bit guide for rotary drill stems.

In rotary drilling it frequently occurs that on account of the limberness of a long string of rotary drill pipe dips in the formation encountered have a tendency to deviate the bit from a truly vertical course, resulting in the drilling of crooked holes.

An object of the present invention is to provide a bit guide for rotary drill stems of such design as to effectively guide the bit during its rotation and maintain it upon a course more nearly approaching the vertical.

A further object of the invention is to provide a bit guide which is normally rotatable relatively to the drill pipe, enabling the drill stem to be rotated relatively to the guide and to provide an anti-friction bearing between the guide and the stem.

Inasmuch as the guide remains stationary in the well during a major portion of the drilling operations, opportunity is present for the bit guide to become stuck in the well hole. It is a further object of the invention to provide means for locking the guide with respect to the drill stem so that in the event that the guide should become stuck it may be rotated by the drill stem and thus freed, enabling recovery.

With the foregoing and other objects in view, which will be made manifest in the following detailed description, and specifically pointed out in the appended claims, reference is had to the accompanying drawing for an illustrative embodiment of the invention, wherein:

Fig. 1 is a vertical section through a well, illustrating the improved guide in position therein.

Fig. 2 is a vertical section through the improved bit guide.

Fig. 3 is a horizontal section taken substantially upon the line 3—3 upon Fig. 2.

Referring to the accompanying drawing, wherein similar reference characters designate similar parts throughout, 10 designates a well hole that is being drilled by a bit 11 which is rotated by means of a drill stem or drill pipe 12. The bit guide consists of a special section of drill pipe 13 provided with a threaded pin and blocks, enabling it to be incorporated in the drill pipe at a point near bit 11. Section 13 has top and bottom shoulders 14 and 15, respectively, between which is disposed the body of the bit guide proper. This bit guide body, indicated at 16, may be formed of two parts secured together about section 13 or section 13 may be made of two parts connected as by threads 17, as shown, to enable

the body of the guide to be slipped on between the shoulders. The body has a plurality of radially extending teeth 18 defining passages or flutes 19 therebetween which provide for the upward flow of circulation fluid that is discharged through the ports in bit 11. The outer ends of the teeth are arranged on a circle substantially equal to the diameter of the hole drilled by bit 11. The top of the body 16 is recessed as at 20 to receive an anti-friction bearing 21, which may be of any preferred design, thus forming an anti-friction bearing between the drill stem and the body at the top of the guide. The bottom of the body 16 has a deep recess 22 which receives a similar anti-friction bearing 23. Beneath this anti-friction bearing there is disposed a thrust bearing 24 and this, in turn, is supported on a spring 25 which is supported on shoulder 15. Spring 25 is of sufficient strength to support the bit guide body 16. On shoulder 15 there are cut notches or recesses 26 adapted to receive projections 27 on the bottom of the body 16. These projections and recesses cooperate to form a type of clutch between the drill stem and the body 16. The clutch is normally held out of engagement by means of spring 25 supporting the body in elevated position.

The operation and advantages of the improved bit guide are as follows:

During normal drilling operations the teeth 18 engage the well walls, holding the body 16 stationary. The drill stem rotates within it with a minimum amount of friction due to the anti-friction bearings 21 and 23. The bit 11 is kept on a straight, vertical course by the steadying effect afforded by the body. As drilling progresses, shoulder 14 engages bearing 21 and forces the guide downwardly in the well behind the bit. In the event that the bit wears out of gauge the knife-like edges on teeth 18 are such as to permit the body to be readily forced downwardly in the well regardless of the fact that the hole drilled may be slightly smaller than the bit guide body. Inasmuch as the bit guide body remains stationary and affords a type of steadying bearing for the drill stem, there may be occasion for the body to become stuck. If such is the case, when it is desired to replace bit 11 with a sharp bit, an upward strain can be taken upon the drill pipe compressing spring 25. This enables the clutch formed by projections 27 and recesses 26 to engage and enables the bit guide body to be rotated by means of the drill pipe. This rotation of the body enables it to be freed in the well, whereas a mere upward strain without the application of

rotating torque might not be sufficient to remove the guide.

It will be noted that the improved guide forms a relatively long bearing immediately behind the bit so that regardless of the limberness of the drill pipe the bit will be maintained on a straight course regardless of formation dips. If desired, an additional guide may be located higher on the drill stem for increased steadying effect.

10 Various changes may be made in the details of construction without departing from the spirit or scope of the invention as defined by the appended claims.

I claim:

15 1. In combination with a drill stem, a bit guide surrounding the drill stem having teeth engageable with the walls of a well and defining passages therebetween enabling upward flow of circulation fluid, means forming a clutch between the guide and the drill stem, and spring means normally holding the clutch disengaged.

20 2. In combination with a drill stem having a bit

thereon, a bit guide surrounding the drill stem near the bit and rotatable relatively thereto, there being teeth near the guide engageable with the formation and defining passages enabling the upward flow of circulation fluid, anti-friction bearings between the guide and the drill stem at the top and bottom of the guide, means forming a clutch between the bottom of the guide and the drill stem, and spring means normally holding the clutch disengaged.

3. In combination with a drill stem, a bit guide surrounding the drill stem having spaced portions engageable with the walls of a well and providing passages therebetween enabling upward flow of circulation fluid, said bit guide being mounted for rotation on the drill stem so that the drill stem may rotate therein, and means forming a normally disengaged clutch between the guide and the drill stem enabling the guide to be rotated by the drill stem when it is desired to remove it from a well.

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