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AUTOMATICALLY ORIENTING WHIPSTOCK

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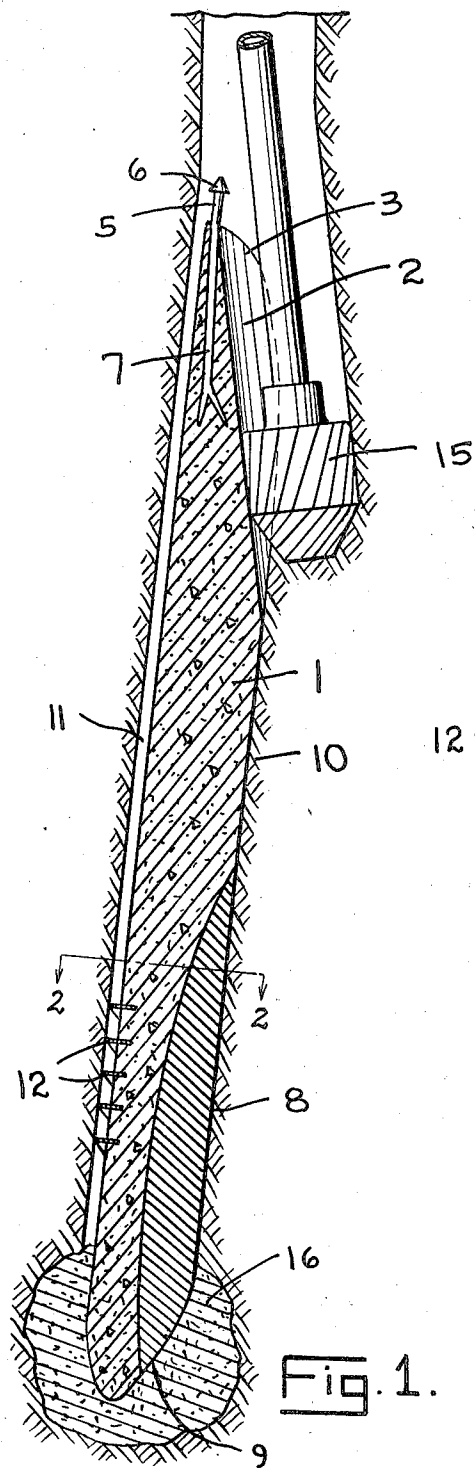


Fig. 1.

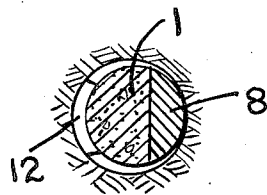


Fig. 2.

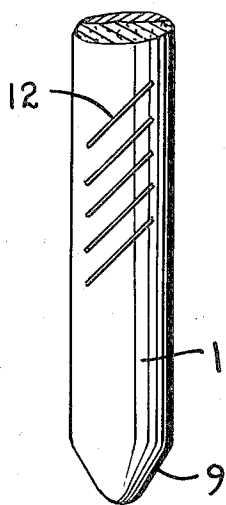


Fig. 3.

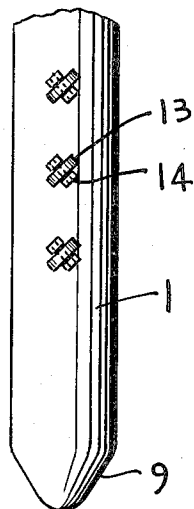


Fig. 4.

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AUTOMATICALLY ORIENTING WHIPSTOCK

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4 Claims. (Cl. 255—1)

My invention relates to whipstocks to be employed in deep well drilling operations to deflect the cutting member in changing the direction of the well bore or in sidetracking operations to work by junk accumulated in the hole.

My invention is designed particularly for use in straightening crooked holes. Where it is found that the bore of the well has changed its direction from a true vertical and at an angle therefrom, it is customary to take steps to straighten the hole and direct the bit as nearly as possible in a vertical direction. To do this a whipstock is introduced into the hole at a point where the curve or bend in the hole is found to direct the bit at the proper angle so as to straighten the well bore. In order to do so, the deflecting portion of the whipstock which is used must be oriented on the proper side of the well bore.

It is an object of the invention to provide a whipstock which may be lowered into the well and which is provided with a deflecting upper end in the usual manner, and to so position the deflecting portion that it will direct the cutting member in the proper direction to straighten the hole. I desire to provide a whipstock which will have a pendulum action while going into the well bore, one side of said whipstock being heavier than the other so as to lie against the wall of the hole where it is inclined.

It is another object to provide a whipstock one side of which is of heavier material than the other so as to act by gravity to lie against the lower side of the inclined well bore.

It is another object of the invention to provide deflecting means upon the whipstock which tend to rotate the whipstock to assist the whipstock in assuming a position with the heavier side against the lower wall of the bore.

It is another object of the invention to provide a streamline form for the whipstock which enables it to be lowered more effectively into the well bore so as to assume the proper position therein.

In the drawing herewith Fig. 1 is a central longitudinal section through my improved whipstock shown in position in a crooked hole.

Fig. 2 is a transverse section thereof on the plane 2—2 of Fig. 1.

Fig. 3 is a side elevation of the lower portion of the whipstock showing deflecting vanes which may be used to assist in orienting the whipstock.

Fig. 4 is a similar view showing a slightly different deflecting means which may be employed.

In making up my whipstock, the body 1 thereof may be made of any desired rigid material, the specific gravity of which is not great. I have shown the body 1 as being made up of cement. The whipstock is cylindrical on its outer surface between its ends, its upper end being provided with a deflecting surface 2. This surface is of the usual contour and is concaved to conform to the shape of a bit or cutter which may be used in straightening the hole. The upper end of the body is rounded off, as shown at 3, to provide a streamline contour which assists in the easy introduction of the tool while being lowered into the well.

The upper end also may be provided with a means of attachment thereto of an overshot, not shown, by means of which the device may be lowered on a cable into the well. I have shown a short post 5 having a head 6 thereon below which the grabbing device on the overshot may engage. This post is anchored in any suitable way as by embedding the same in the cement, as shown at 7. It is to be understood that while this type of connection is shown, any other suitable attachment for a releasable overshot may be employed.

In order to cause the whipstock to assume the proper position with the inclined surface 2 directed toward the lower portion of the inclined well bore I weight the whipstock on the same side as the inclined surface 2 and toward the lower end of the whipstock. I have shown my whipstock as being weighted by heavy material such as lead or other high gravity material, which will tend through the force of gravity to assume the position lying against what might be called the lower side of the inclined bore, as shown in Fig. 1. The lower weighted end of the whipstock is rounded as shown at 9 so that it may be more easily oriented in the well. At the lower end the point or apex is toward the side away from the weight 8, thus assisting in turning the whipstock to a position with the weight on the lower side of the bore. It will be seen that due to a sort of pendulum action the weighted side of the whipstock will tend to lie against the wall of the inclined portion of the well bore 11, due to the fact that where the well bore is deflected in this manner from the vertical the heavier portion of the whipstock lies against the lower side of the inclined bore. The words "lower side" as employed in this relation refer to the side which would be intersected by the downward extension of the vertical axis of the well bore above the portion of the bore where deflection takes place,

and it will be seen that the heavier portion of the whipstock will tend to lie on the lower side 10 and against that portion of the wall of the well.

In case the whipstock while entering the inclined portion of the well bore does not easily rotate so as to allow the heavier portion to lie against the lower wall, I employ deflecting means on the side of the whipstock opposite the weighted portion to assist in turning it into position with the weight side down. These deflecting means may assume the form of vanes 12, shown in Fig. 3. These vanes are plates curved to conform to the curvature of the periphery of the whipstock and lie in an inclined direction as shown in Fig. 3. They tend to rotate the whipstock as it is moved downwardly giving it a sort of screwing movement and turning the whipstock into position such that the vanes 12 will be on the upper side of the inclined bore and out of deflecting contact with the wall of the well.

I may, if desired, use rollers 13 instead of vanes, as will be obvious. These rollers may be supported upon side supports 14 fixed in the cement of the whipstock and holding the rollers in an inclined direction so as to cause the rotation of the whipstock where these rollers lie against the lower side of the bore. When the whipstock has been rotated to a position with the heavy portion 8 on the lower side these deflecting means will be out of contact with the bore to the extent that no further rotative tendency is communicated by the deflecting means to the whipstock.

When the whipstock is lowered into the well to correct the inclination which has occurred in the well bore, the whipstock will be of such length as to project upwardly in the well with the upper end thereof lying in a position where the hole first became crooked. In order to straighten the well the deflecting portion 2 must be presented toward what I have termed the lower side of the inclined bore. This is done in the manner described and it will be seen that when a cutter such as is shown at 15 is lowered to correct the crooked direction of the well it will engage the inclined surface 2 and be deflected in such manner as to tend to straighten the hole. This showing has been somewhat exaggerated in Fig. 1, the idea being, however, to so orient the whipstock that the bit will be changed in direction so as to correct the deflection which has occurred. This operation will be clear to those skilled in the art.

I have shown the whipstock as being fixed in

the well by being held there by a bond of cement 16. This occasionally becomes desirable where the whipstock tends to rotate in the use of the cutter 15. To prevent this rotation other means may be employed to hold the whipstock against rotation. I prefer, however, to introduce cement at the lower end of the well and lower the whipstock into the cement, allowing the whipstock to become fixed when the cement sets. I wish it understood, however, that any desired anchoring means may be employed.

What I claim as new is:

1. A whipstock for use in an inclined well bore, including a cylindrical body having its ends rounded to form a streamline contour thereto one side being rounded sharply to taper toward the opposite side, a deflecting surface inclined downwardly at one side of the upper end of said body on the side opposite the rounded side, means for engagement by a lowering device, and means in addition to said taper on said body acting in response to the force of gravity to hold said deflecting surface toward the lower side of said inclined well bore.

2. A whipstock for use in wells having its bore inclined, including an elongated body of smaller diameter than the well bore, a deflecting surface at one side of the upper end thereof, a weighted section in said body on the side below said deflecting surface, and inclined outwardly projecting vanes on the side of said body opposite said weighted section to assist in orienting said body.

3. A whipstock for use in wells having its bore inclined, including an elongated body of smaller diameter than the well bore, a deflecting surface at one side of the upper end thereof, a weighted section in said body on the side below said deflecting surface, and means on the side of said body opposite said weighted section to assist in moving said weighted section to the lower side of said well bore.

4. A whipstock for use in wells having its bore inclined, including an elongated body of smaller diameter than the well bore, a deflecting surface at one side of the upper end thereof, a weighted section in said body on the side below said deflecting surface, and means on the side opposite said weighted section to contact with the wall of the well and tend to rotate said means to the upper side of said bore.

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