Feb. 13, 1940. F. L. PIVOTO 2,190,434

CHANGEABLE BLADE DRAG BIT

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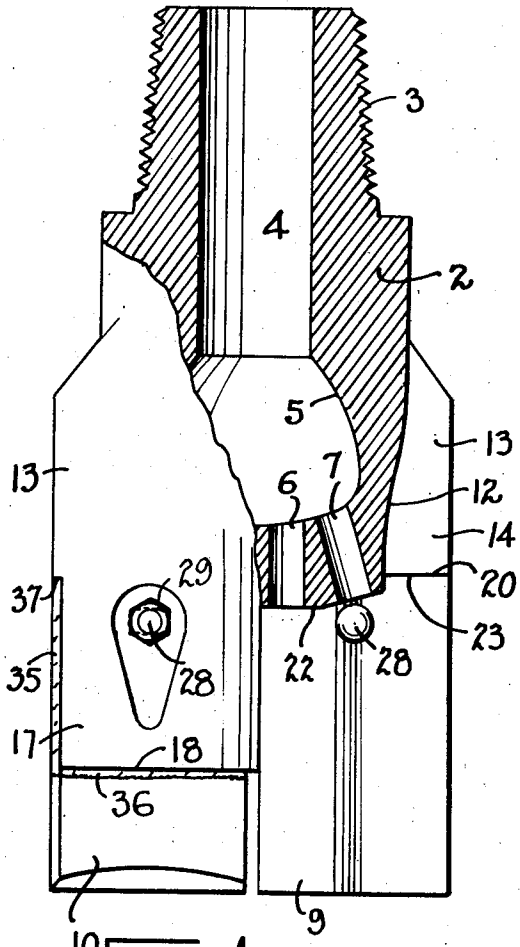


Fig. 1.

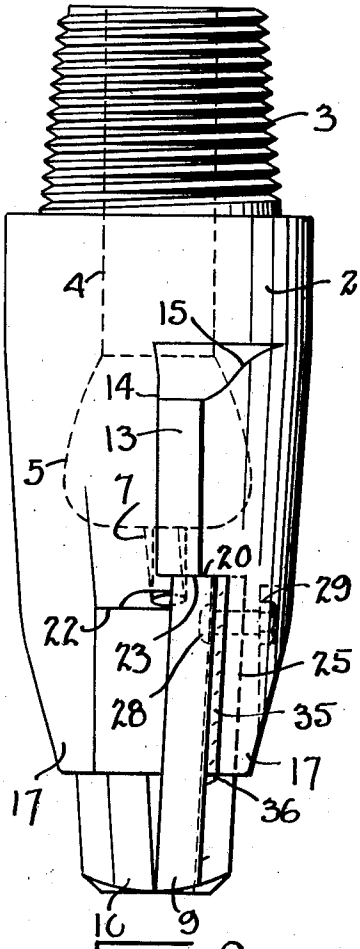


Fig. 2.

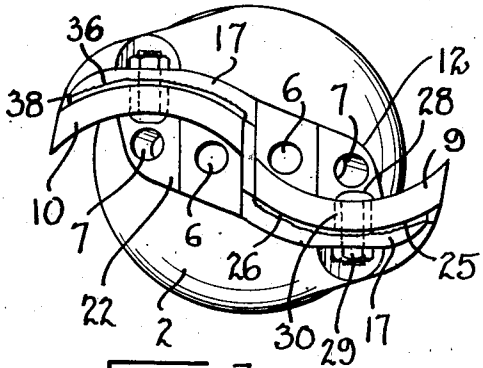


Fig. 3.

Inventor
F. L. PIVOTO
Jesse R. Stone
Lester B. Clark

By

Attorneys.

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CHANGEABLE BLADE DRAG BIT

Felix L. Pivoto, Liberty, Tex.

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4 Claims. (Cl. 255—61)

The invention relates to what is generally known as a drag or fishtail bit to be used in the rotary method of drilling wells wherein drilling fluid is pumped downward through the drill bit while it is being rotated in the well bore.

It is one of the objects of the invention to provide a drag bit with a detachable blade wherein the blade is curved and the water courses are so arranged as to flush the blade clear of cuttings.

Another object of the invention is to provide a curved blade drag bit where the blades are detachable and held in position by both bolts and beads of welding material.

Still another object of the invention is to provide a detachable blade for drag bits wherein the blade is inclined rearwardly from its base with the water courses of the bit directed along the blade.

Still another object of the invention is to provide in combination with a detachable blade drag bit a plurality of water courses and an expansion chamber in the blade.

Other and further objects of the invention will be readily apparent when the following description is considered in connection with the accompanying drawing wherein:

Fig. 1 is a front elevation of a bit constructed in accordance with the invention and showing certain of the parts in section.

Fig. 2 is an edge view of the bit.

Fig. 3 is a bottom plan view looking upwardly from the cutting edge of the bit.

A bit body is indicated generally at 2 and has the pin member or shank 3 thereon which is threaded to be received by the drill pipe or drill collar by which the bit is to be rotated. A water course 4 extends downwardly into the body of the bit and is enlarged in the form of an expansion chamber 5 so that a certain volume of liquid will be present in the bit at all times to be fed into the discharge ports 6 and 7. There are, of course, two ports 6, one of which discharges on each of the blades 9 and 10. These blades are oppositely facing on opposite sides of the bit body as customary with drag bits of this type.

The chamber 5 is of advantage because the velocity of the liquid is retarded somewhat on entering this chamber and the discharge is then through the ports but it does not have the abrasive effect which would otherwise occur if there were no chamber 5.

The port 6 is preferably vertical with respect to the axis of the bit and extends directly downward, as distinguished from the port 7, which, as seen in Fig. 1, extends downwardly and outwardly so that the discharge therefrom is directed along the center and toward the edge of the bit blade 9. As seen in Fig. 2, however, this port 7 also is inclined rearwardly to some extent so that the water is positively directed onto the bit blade in order to keep the blade washed clear of cuttings.

The bit body is reduced in size somewhat at 12 and has the wings 13 projecting laterally therefrom. These wings indicate the gauge of the hole which is being drilled and have a flat forward face 14 while the rear face 15 is inclined to merge with the bit body 2, as best seen in Fig. 2.

This wing 13 is seen in rear elevation in the left-hand side of Fig. 1 and has a downwardly extending portion 17 which is generally known as a back-up portion in that it serves as a support or back-up for the blade 10. This back-up extends down a substantial distance below the lower end of the bit body and has a transverse end portion 18 thereon. There is a sharp shoulder 20 between the face 14 of the wing 13 at an elevation slightly above the lower end 22 of the bit body 2. This shoulder is provided so as to form a seat for the end 23 of the blade 9. The upper end 23 is cut away somewhat so as to fit around the lower end 22 of the bit body, as best seen in the righthand side of Fig. 1.

Attention is directed to the fact that the blade 9 is curved or dished, as best seen in Fig. 3. This curve is preferably on the arc of a circle whose center is close to the lower end of a diagonal through the center of the bit. The blade, as seen in Fig. 3, is preferably of substantially uniform thickness and has its rear face curved at 25 in order to fit the curved forward face 26 of the back-up 17. In this manner a secure seat is provided for the blade and it is preferably held in position by a bolt 28, which is secured in position by a nut 29 after it has passed through the back-up 17. The opening 30 through the bit which receives the bolt 28 is preferably enlarged in a horizontal direction to provide a slot so that the blade can be properly positioned on the back-up.

After the blade has been positioned a bead of welding material 35 is placed along the edge of the blade and the back-up, as seen in Fig. 1, and also there is a bead at 36 along the lower edge of the back-up so that the blade is securely held in position on the bit body. It will be observed that the back-up is cut away below the shoulder 37 so that there is a groove such as 38 in Fig. 3

provided to receive the bead 35 of welding material.

The curved configuration of the bit blade when considered with the fact that it is inclined rearwardly from its base upwardly presents a construction which is arranged to cut the formation at an exceptionally high rate of speed because the base is inclined forwardly a sufficient amount to obtain a shaving or cutting action and as the cuttings begin to curl upwardly on the blade they are broken by the transverse curved surface of the blade so that no real large cuttings will move away from the blade. At the same time the outward and backward inclination of the port 7 causes a flow of flushing fluid to pass along the bit and displace the cuttings so that it will flow upwardly in the well bore, whereas the port 6 directs a stream of fluid downwardly toward the center of the bit to dislodge any cuttings which move upwardly along the bit blade. The ports 6 and 7 discharge directly from the base 22 of the bit body and their relative spacing and inclination can best be seen in Fig. 3.

What is claimed is:

1. A drag bit of the character described comprising a bit body, a forwardly inclined blade thereon, a water course therein, an enlarged chamber at the base of said course, a laterally and rearwardly inclined discharge port to direct a flow of liquid against the bit blade, a second port disposed axially of the bit, a blade backup extending downwardly at opposite sides of said body, a curved blade of uniform width and uniformly arched transversely disposed on each backup, a bolt to hold said blade in position, and a bead of welding material along the side and bottom of the backup to affix said blade to said body, the top of each of said blades being inclined rearwardly from its base.

2. A drag bit of the character described comprising a bit body, a water course therein, an enlarged chamber at the base of said course, a laterally and rearwardly inclined discharge port to direct a flow of liquid against the bit blade, a second port disposed axially of the bit, a radially curved blade backup extending downwardly at each side of said body, a radially curved blade disposed on each backup, a bolt to hold said blade in position, and a bead of welding material along the side and bottom of the backup to affix said blade to said body, the top of each of said blades being inclined rearwardly from its base and curved transversely.

3. A drag bit comprising a body, a blade backup portion projecting below the body, a forward face on said backup to receive a bit blade, said face being curved transversely and inclined upwardly and rearwardly toward said body, a shoulder at the top of said face, a plurality of discharge ports in said shoulder, and a bit blade of uniform width and uniformly arched transversely welded on said backup portion, one of said ports being inclined to discharge outwardly and rearwardly against said blade.

4. In a drag bit having a body and a blade, a discharge port inclined laterally and rearwardly upon the face of said blade, said blade being of uniform width and uniformly arched transversely throughout its length.

FELIX L. PIVOTO.