April 9, 1940. F. W. SHARP 2,196,944

DEFLECTING TOOL

Filed Aug. 21, 1937

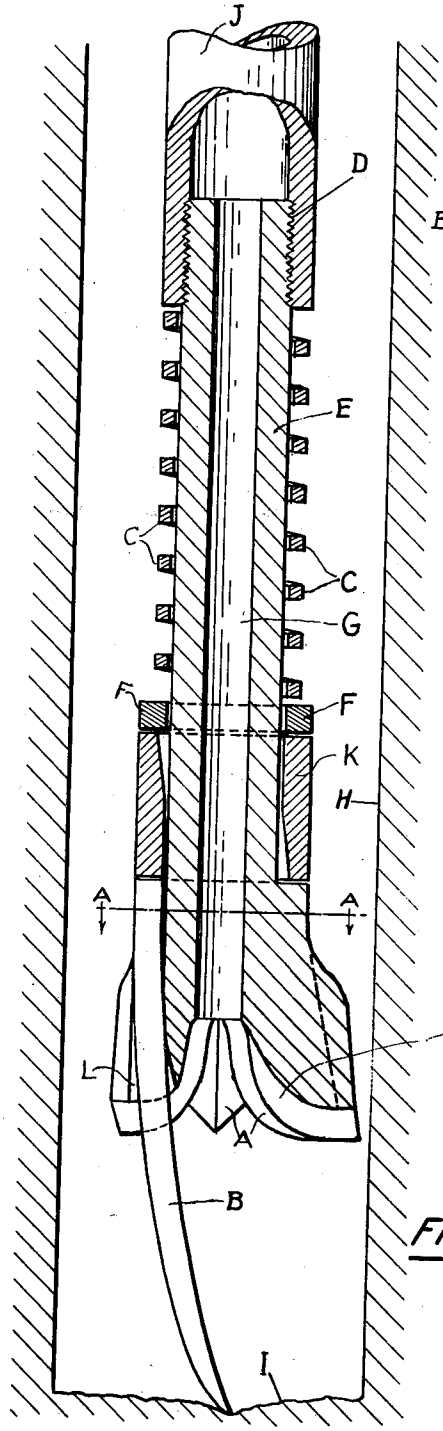


Fig. 1

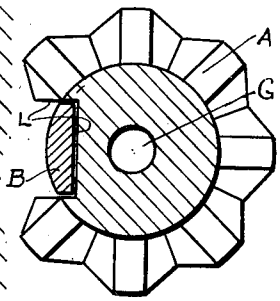


Fig. 3

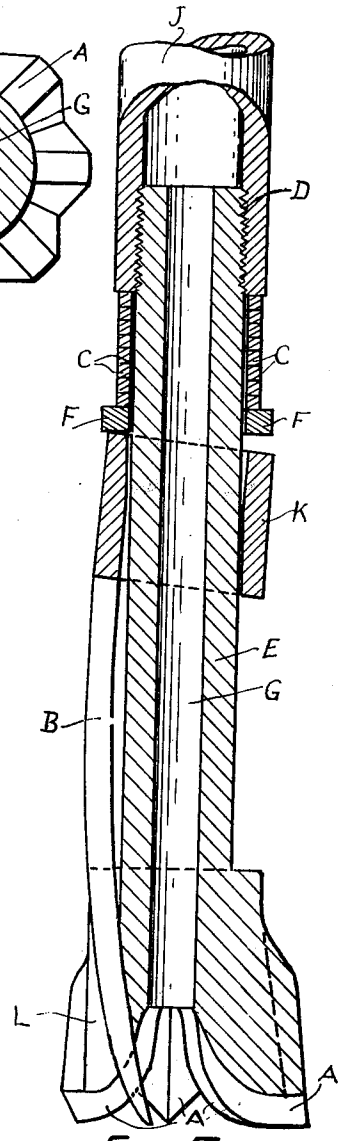


Fig. 2

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DEFLECTING TOOL

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Application August 21, 1937, Serial No. 160,335

7 Claims. (Cl. 255—1)

This invention relates to tool bits and associated apparatus used for drilling and boring wells and for deflecting the course of bore holes and wells such as oil, gas or water wells and aims particularly to provide a method and means of deflecting the course of bore holes and wells from their original direction to any other desired direction and controlling the course of the hole.

The invention provides a drilling bit to side track or deflect the direction of a hole into any other given direction by means of a guiding arm protruding from the bottom of the bit off-center forcing the bit along the line of the guiding arm thus necessitating that the bit shear or cut into the side wall of the hole thus deflecting the direction of the hole.

The special object of my invention is to provide a tool bit by which the necessary deflection of a hole may be made in a given direction and drilling continued thereafter without withdrawing the assembly from the bore hole.

For a full understanding of the invention and the merits thereof reference is to be had to the following description and the drawing hereto attached in which:

Figure 1 is a vertical sectional view of a well bore with tool bit (in section) in position to spud and side track or deflect the direction of the hole, embodying the invention.

Figure 2 is a vertical sectional drawing of the tool embodying the invention showing the position of the tool bit for rotary drilling after the hole has been side tracked or deflected, or the position of the tool bit after the weight of the pipe has been applied when spudding.

Figure 3 shows a cross section of the tool bit along line marked A—A in Figure 11.

Corresponding or like parts are referred to in the following description and designated in the several views of the drawing by reference characters.

The main part of the tool is indicated by E in cylindrical shape surrounding the circulation passage G with numerous blades A arranged in the lower end which is the cutting and shearing part of the tool. The upper end of E is connected at D to the pipe J which is the bottom of the string of pipe extending down through the hole.

The circulation passage G extends the entire length of the tool through which the flush or circulation medium is forced to wash out the cuttings and shearings. Surrounding E is a loose fitting collar K which has on its lower end a guiding arm B which fits in groove in E marked L. Collar K is made slidable along E and is retained normally in the lower end by a compression spring C and intervening collar F. When spring C is compressed which is accomplished by guiding pressure on the drill pipe, arm B is in groove L as shown in Figure 2.

In ordinary drilling the tool is normally rotated but when necessary to deflect or side track the hole in a given direction, the tool is reciprocated or spudded up and down.

In Figure 1 the guiding arm B is resting on the bottom of the hole I after the assembly has been withdrawn from the bottom of the hole and then returned thereto without pressure so that B alone touches the bottom of the hole at a point off-center opposite the side of the bit along which arm B is located. Pressure is then applied to the drill pipe, the bit is forced downward along the guide arm B which prevents the bit from centering itself in the bore hole and forcing the bit to cut away the formation on the side of the hole opposite the guiding arm. After bit is spudded (raised and lowered to bottom) without rotation a new hole is thus made below and to the side of the starting point but off-center in the direction away from the guiding arm. When the assembly is picked up clear of the bottom and lowered again the guiding arm will assume a new position in the off-center hole made in the first operation and by pressure being applied thus forcing the assembly down along the guiding arm to deflect the bit an additional amount in the direction already started. When sufficient deflection has been achieved to assure continuation of the hole in the desired direction, weight can be applied to the bit forcing it along guiding arm B into position as shown in Figure 2 and rotary drilling thereafter may be continued without interference from arm B as arm B is then entirely in groove L and out of the way of the blades and no longer deflects the hole.

While the drawing illustrates a preferred embodiment of the invention, it is to be understood that in adapting the means to meet specific needs and requirements, the design may be varied and such other changes in the minor detail of construction may be resorted to within the scope of the invention as claimed without departing from the spirit thereof.

Having thus described the invention, I claim:

1. The combination of a rotary drill stem, a drill bit, a deflecting member slidable relative to said stem and bit to engage the earth at an angle relative to said stem, and spring means to hold said member extended in deflecting position.

2. The combination of a rotary drill stem, a drill bit fixed on said stem, a deflecting member slidable relative to said stem and bit, spring means to hold said member extended in deflecting position, and guide means on the side of said bit to direct it along said member.

3. The combination of a rotary drill stem and drill bit, a deflecting member slidable relative to said stem and bit, spring means to hold said member extended in deflecting position but yieldable as said bit advances to coincide with said deflecting member, and a guide slot in the side of said bit for said member.

4. The combination of a rotary drill stem, a drill bit fixed on said stem, a deflecting member slidable relative to said stem and bit, spring means to hold said member extended in deflecting position but yieldable as said bit advances to coincide with said deflecting member so that said bit and member may thereafter rotate as a unit, and a guide slot along one side of said bit for said member.

5. A rigid drill stem, a drill bit rigidly fixed thereon, a guide slot at one side of said bit, a deflecting member slidably disposed in said slot, means to normally urge said member to extend ahead of said bit but retractable so as to coincide with said bit, and cutting edges on the bottom and sides of said bit.

6. A deflecting tool comprising a stem, a bit thereon, a deflecting member loosely slidable on said stem, means to normally hold said member deflected at an angle relative to said stem and bit, said means being yieldable so that said bit may advance into alignment with the deflected member.

7. A deflecting tool comprising a stem, a bit thereon, a deflecting member loosely slidable on said stem, means to normally hold said member deflected at an angle with respect to said stem, said means being yieldable so that said bit may advance into alignment with the deflected member and the bit and the member thereafter drill as a unit.

FRANK W. SHARP.