ROCK BIT GUIDE

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1 Claim. (Cl. 175—408)

This invention relates generally to well drill bits and more particularly to a guide for a drill bit having a plurality of roller cutters.

In deep wells, such as oil and gas wells, the bore hole might be crooked and non-vertical, and may contain offset portions. When a drill bit on the lower end of a drill string is lowered into a well, it may engage the wall of the crooked or non-vertical portions of the bore hole thereby breaking away or scoring portions of the earth formation, also, the drill bit itself may thereby be damaged by the loss of a cutter or cutter teeth, or be otherwise impaired, thereby reducing the useful life of the drill bit.

It is a general object of this invention to provide a new and improved drill bit guide that will facilitate the lowering of a drill bit into a bore hole.

Another object is to provide a drill bit guide that will alleviate damage to the drill bit when the bit is lowered into a bore hole.

A further object is to provide a drill bit guide which has new and improved guiding surfaces thereon.

Another object is to provide a drill bit guide which is not easily displaced from the drill bit during the lowering thereof into a bore hole.

Another object is to provide a new and improved drill bit guide which may be easily installed and which is easily registered into proper operating position on the drill bit.

Another object is to provide a drill bit guide that will center a drill bit in a bore hole during the lowering thereof.

Another object is to provide a drill bit guide which may be readily drilled or broken up by the bit when the bit is put into operation at the bottom of a bore hole.

Another object is to provide a drill bit guide which has portions adapted to fit in spaces between lower portions of adjacent drill bit cutters, and which portions extend substantially above the lowermost portions of the cutters to effect new and improved guidance of the drill bit, and to prevent the drill bit guide from being readily displaced from the drill bit during the lowering thereof into a bore hole.

Other objects will be apparent from the following description and accompanying drawings.

FIG. 1 is a side elevation view of the invention positioned on a conventional cone-type drill bit.

FIG. 2 is a bottom plan view of the invention in operating position.

FIG. 3 is a side elevation view, partly in section, of the invention.

In FIGS. 1 and 2 a cone-type roller drill bit is illustrated with the guide of the invention in place. The bit comprises a head 1 having a threaded shank 2 which is adapted to be screwed into the lower end of a drill string (not shown). The head 1 has three bearing extensions 3 that extend downwardly and upwardly from the central portion 6. Each of the legs 7 may have a hole 8 substantially vertically therethrough.

The guide 5 is placed on the said drill bit so that the central portion 6 is substantially below cutters 4, and the legs 7 are positioned in the spaces defined by and between the lower portions of the adjacent cutters 4. As shown in FIG. 1, the upper portion 9 of the legs 7 extends upwardly to a distance substantially above the lowermost portions of the cutters 4. Thus the guide 5 is adapted to be easily registered into proper operating position. The outermost portions 10 of the legs 7 may describe a diameter substantially equal to, or slightly larger than, that of the said drill bit.

Straps 11 are passed through the holes 8 and are doubled over ring 12 and secured thereto by crimp clips 13 at the bottom of the guide 5, or the straps 11 may be secured together in any other suitable manner. The other ends of the straps 11 are doubled over retaining ring 14 on the bit head 1, and secured to the ring 14 by crimp clips 15, or secured to the bit in any other suitable manner.

The guide 5 may be made of material which is fragile or easily drillable by the drill bit, and somewhat resilient, such as a mixture of paper pulp and plastic which may be molded under pressure and heat.

In operation, the guide 5 is secured to the drill bit, as previously described, and the drill bit is secured to the lower end of a drill string (not shown). The drill string with the bit having the guide secured thereto is lowered into the well. As the bit descends, the outer portions 10 of the guide 5 slide along the wall of the well guiding and centering the bit in the bore hole. The legs 7 of the guide 5 being positioned in the spaces defined by and between the lower portions of adjacent cutters 4, and also extending substantially vertically between the outer portions of adjacent cutters 4 to a point where the upper portions 9 are substantially above the lowermost portions of the cutters 4, provide ample guiding surfaces 10 and provide a guide that is not easily displaced transversely of the bit during the lowering operation.

When the drill bit with the guide 5 secured thereto is set upon the bottom of the well, drilling may then commence. Since the guide 5 is made of easily drillable material, it is soon broken up by the drill bit, and the pieces of the guide are carried upwardly out of the well by entrainment in drilling fluid which is circulated through the drill string and bit in the conventional manner, whereupon the drill bit commences to drill the earth formation being encountered.

The invention is not limited to the embodiment herein disclosed. Various changes, within the scope of the following claim, will occur to those skilled in the art.

We claim:

In a drill bit having a head having bearing extensions in the lower portion thereof and a plurality of roller cutters rotatably mounted on the said bearing extensions, a guide comprising a central portion with legs extending radially therefrom, the said central portion being disposed below the said cutters, each of the said legs being disposed between the lower portions of adjacent cutters and extending outwardly substantially to the gage of the bit and upwardly to a point substantially above the lowermost portions of the said cutters, the said guide being formed of a drillable material, each of the said legs having a hole therethrough, a strap extending through each of said holes, the lower ends of said straps being secured to a ring at the lower surface of said central portion, and the upper ends of said straps being secured to a retaining ring disposed on the drill bit.

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