

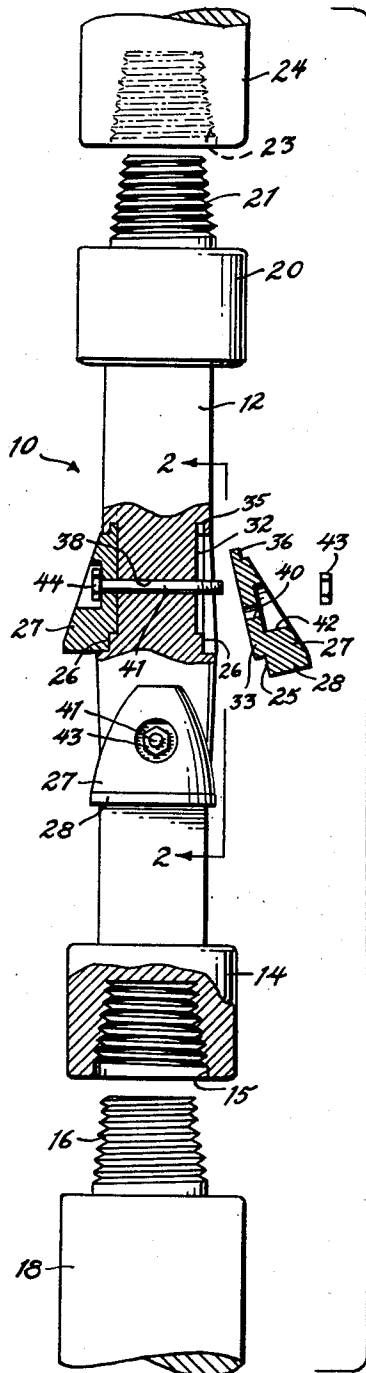
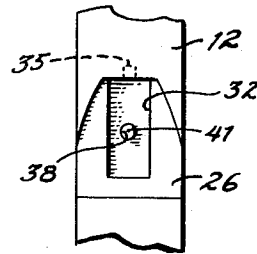
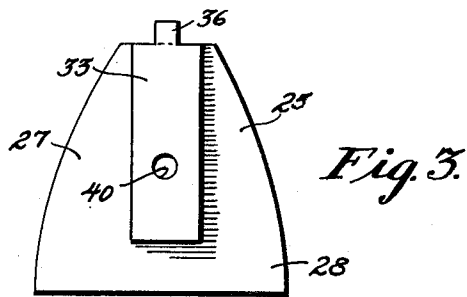
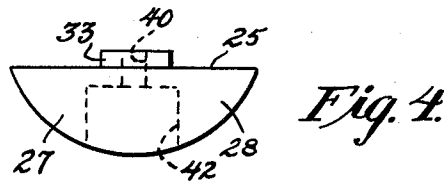
Dec. 16, 1958

L. C. BACKER

2,864,586

CABLE TYPE STRAIGHT HOLE DEVICE

Filed July 1, 1957



INVENTOR.
LEON C. BACKER
BY *Raymond Lee*
ATTORNEY.

1

2,864,586

CABLE TYPE STRAIGHT HOLE DEVICE

Leon C. Backer, Philadelphia, Pa.

Application July 1, 1957, Serial No. 669,008

4 Claims. (Cl. 255—28)

This invention relates to drilling apparatus and more particularly to a straight hole device for cable type drilling tools.

It has long been recognized that a crooked hole substantially increases the cost of deep well drilling, such as that used for drilling oil wells, since it is necessary to drill a much longer hole than the vertical distance between the upper and lower limits thereof. Furthermore, when the hole is not substantially vertical, additional wear and stresses are imposed upon the drilling apparatus, thereby increasing the cost of replacement parts and labor. It is therefore an object of the present invention to provide a straight hole device for cable type drilling equipment that may be used not only to drill a straight hole, but which may also be used to straighten crooked holes already drilled, that is simple in construction, efficient in operation, and which will substantially overcome the aforementioned difficulties.

Another object of the present invention is to provide a straight hole device for cable type drilling apparatus having a plurality of replaceable vertically and circumferentially spaced cutting lugs for guiding the cutting tool and cable in a straight vertical path so as to assure the drilling of a straight hole and to reduce the wear and stresses imposed upon the associated drilling apparatus.

A still further object of the present invention is to provide a straight hole device of the above type in which the replaceable cutting lugs may be quickly removed and replaced with new cutting lugs without requiring the replacement of the entire straight hole device so that substantial amounts of time and money may be effected.

A further object of the present invention is to provide a novel straight hole device for cable tools in which the main body portion thereof is provided with especially designed recesses for removably receiving cutting lugs of similar predetermined shape and configuration which may be secured therein with a minimum number of fastening elements, but which are so associated with each other as to resist substantially severe strains imposed during the drilling operation which might otherwise displace such lugs from their proper operative position.

All of the foregoing and still further objects and advantages of this invention will become apparent from a study of the following specification, taken in connection with the accompanying drawing, wherein:

Figure 1 is an exploded side elevational view, with parts broken away, showing a straight hole device made in accordance with the present invention;

Figure 2 is a side elevational view taken along line 2—2 of Figure 1;

Figure 3 is an enlarged rear elevational view of one of the replaceable cutting lugs forming a part of the present invention; and

Figure 4 is a bottom plan view of a lug shown in Figure 3.

Referring now to the drawing, and more particularly to Figure 1 thereof, a straight hole device 10 for cable type drilling rigs is shown to include a solid metallic

2

shank 12 forming a main body member having a lower end 14 of slightly larger diameter which is provided with an inwardly tapering threaded bore 15 for threaded engagement with a mating threaded stud 16, of a cutting tool 18. The upper end 20 of the device is similar to the lower end 14, but is provided with an outwardly tapered threaded stud 21 for threadingly engaging within an inwardly tapered bore 23 of a drill stem 24 to which the cable (not shown) is attached for vertically reciprocating the cutting tool and straight hole device during the drilling operation. The main body portion 12 of the straight hole device is provided with a plurality of vertically spaced sets of recesses 26, each set including a pair of diametrically opposite similar recesses, and each set of recesses being aligned in an angularly displaced position about the longitudinal axis of the main body portion relative to the next adjacent vertically spaced set of recesses. For purposes of illustration, two such sets of recesses are shown in the drawing for accommodating two sets of cutting lugs 27 in the form of frusto-conical segments corresponding in outline to the outline of the respective recesses 26. However, it will be recognized that additional such sets of recesses and lugs may be provided if desired, while for purposes hereinafter described, the number illustrated is completely adequate for the purposes described.

Each recess 26 is provided with a counter recess 32 of substantially rectangular shape which accommodates a positioning rib 33 that is of similar shape and is integral with the flat back wall 25 of the cutting lug 27. Communicating with the counter recess 32, is an undercut 35 which extends upwardly beneath the outer surface of the main body portion 12 toward the upper end 20 of the device. This undercut 35 releasably receives an upwardly extending tab 36 that is integral with the positioning rib 33 of the lug so as to secure the parts in place, as shown in Figure 1. The actual cutting surface and edges are formed by a reinforced flat base 28 of arcuate cross section that is in the form of a cylindrical segment, as shown in Figures 1 and 3. The radius of curvature of the cylindrical segment of the base 28 is substantially identical to that of the hole that is cut by the cutting tool 18 whereby the lugs 27 do not actually perform the drilling operation but merely remove excess material not properly disposed of by the cutting tool and bearing against the side walls of the hole to guide the cutting tool in a straight vertical direction. Because of the aforementioned spacing and arrangement of each set of lugs, a sufficient number of lugs are so disposed that the aggregate cutting edges correspond to the circumference of the hole being drilled so that complete coverage is obtained.

A diametrical bore 38 extends through the main body portion 12 into communication with each set of recesses 26. Centrally located bores 40 are also provided in the lugs 27 in alignment with the bore 38 in the shank for removably receiving a connecting bolt 41. Enlarged counter bores 42 adjacent to the outer side of each lug 27 accommodates the associated nut 43 or bolt head 44 so as to recess all of the securement elements below the outer conical surface of the cutting lugs. At the same time, this manner of assembly permits simple replacement of one lug so that a minimum amount of time and labor is necessary for repairs. The manner in which the cutting lugs are properly positioned within the provided recesses of the main body portion of the device will now become apparent. In use, the greatest forces are imposed against the bottom surface of the reinforced flat base 28 of each cutting lug 27 in a substantially vertical direction. This vertical force is transmitted to the main body portion 12 of the device through the substantially flat upper and lower surfaces of the ribs 33

3

that extend substantially normal to the longitudinal axis of each lug. Any incidental twisting action which might otherwise displace the cutting lugs from their seated position is also resisted by the substantially rectangular positioning rib 33 that is disposed within the counter recess 32, while any forces tending to pull the lugs outwardly of the associated recesses is effectively resisted by the action of the tab 36 within the undercut 35 and, of course, the nut and bolt assembly 43, 41.

It will also be noted that there are no sharp edges or corners on any of the lugs or main body portion which would restrict or otherwise impede upward movement of the device. As a matter of fact, all edges and surfaces are feathered so as to substantially prevent any cutting action on the upward movement, whereas the entire straightening function is performed during the downward movement of the cutting tool and straight hole device such that the reinforced flat base 28 and the edges associated therewith are responsible for all of the cutting action.

While this invention has been described with particular reference to the construction shown in the drawing, it is to be understood that such is not to be construed as imparting limitations upon the invention, which is best defined by the claims appended hereto.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. A cable type straight hole drill device comprising, in combination, a shank having a threaded lower end for engagement with the upper end of a drill bit and a threaded upper end for attachment to the lower end of a drill stem, said shank intermediate said lower and upper ends including a straight circular cylindrical main body portion, a plurality of segmental spheroidal lugs, a plurality of sets of vertically spaced diametrically opposite recesses in said main body portion, each said set of recesses being angularly spaced about the longitudinal axis of said main body portion, and each one of said lugs being detachably supported within each one of said recesses, each said lug including a segmental spheroidal front wall and a substantially flat back wall, each said recess being partly defined by a correspondingly shaped flat bottom wall for flat face engagement with said flat back wall of said lug, each said lug further comprising a longitudinal rib projecting outwardly from

4

said back wall, each said rib having flat upper and lower surfaces extending normal to the longitudinal axis of said lug, said main body portion further including a counter-recess for receiving said rib of said respective lug, whereby longitudinal forces acting in either longitudinal direction upon said lug is transmitted directly to said main body portion through said rib, each said lug further comprising a discrete tab extending outwardly from the center of the upper flat surface of said rib coextensive with said rib and offset rearwardly from said wall of said lug, and said main body portion further comprising a longitudinally upwardly extending undercut of substantially identical size and shape as said tab in communication with the upper extremity of each said counter-recess for receiving said respective tab of said lug.

2. A straight hole device as set forth in claim 1, wherein said main body further comprises a separate diametrical bore extending centrally through each set of said recesses, and bolt means extending through each said lug of each set and through said associated diametrical bore in said main body for detachably securing each set of said lugs in said respective recesses.

3. A straight hole device as set forth in claim 2, wherein the frusto-conical front surface of each lug opposite said respective back wall defines a counter bore for enclosing enlarged portions of said bolt means therein.

4. A straight hole device as set forth in claim 3, wherein said lugs further comprise frusto-cylindrical segments extending radially outwardly from said main body, each of said frusto-cylindrical segments having an outer surface in the form of an arc of a circle having a radius of curvature substantially equal to the diameter of the hole being drilled, the combined frusto-cylindrical segments of at least certain ones of said lugs defining an aggregate circumferential cutting edge corresponding in circumference to the circumference of the hole being drilled by the associated drill bit.

References Cited in the file of this patent

UNITED STATES PATENTS

1,375,094	Humason	Apr. 19, 1921
1,941,790	Davis	Jan. 2, 1934
2,194,631	Backer	Mar. 26, 1940