Feb. 17, 1925.

1,526,677

R. A. PAINTER

ROTARY WELL DRILL

Filed Aug. 16, 1924

2 Sheets-Sheet 1

Fig. 1.

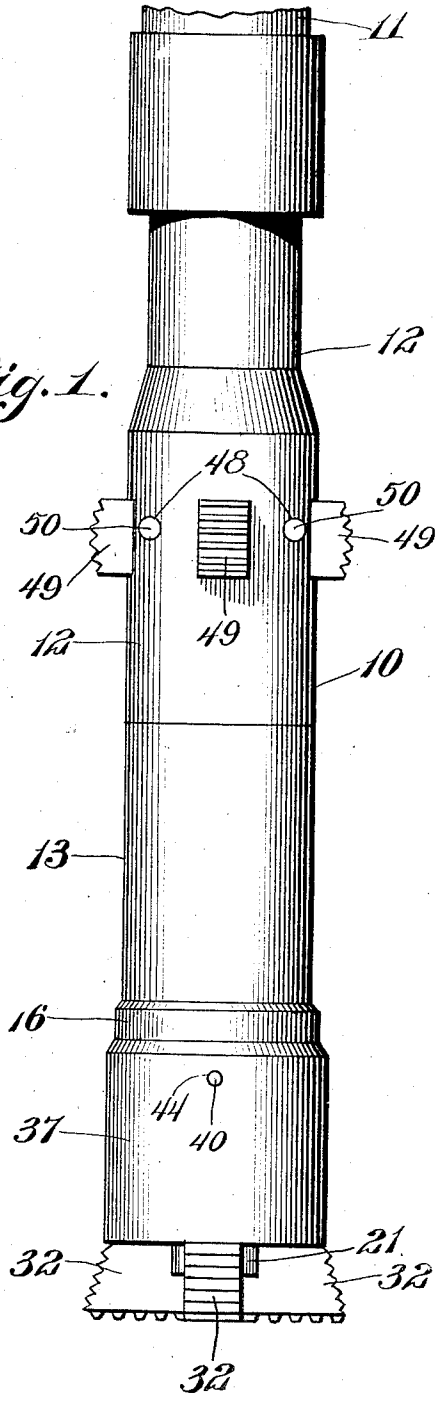


Fig. 2.

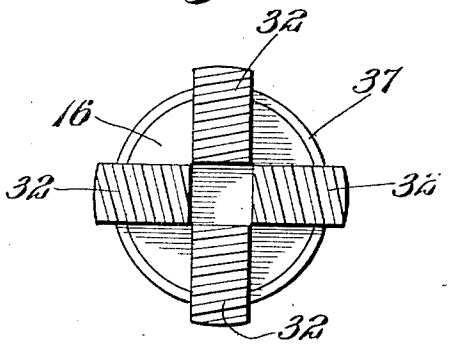
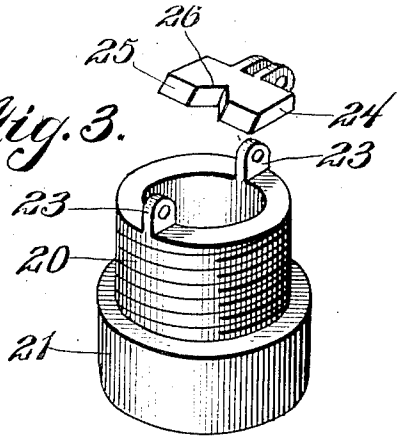


Fig. 3.



Inventor

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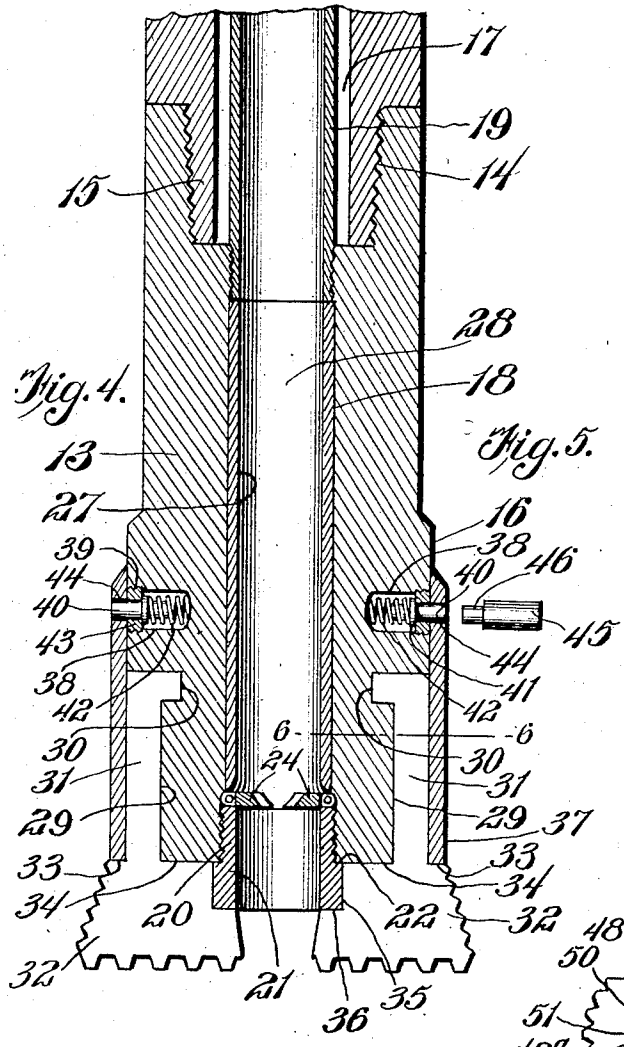


Fig. 4.

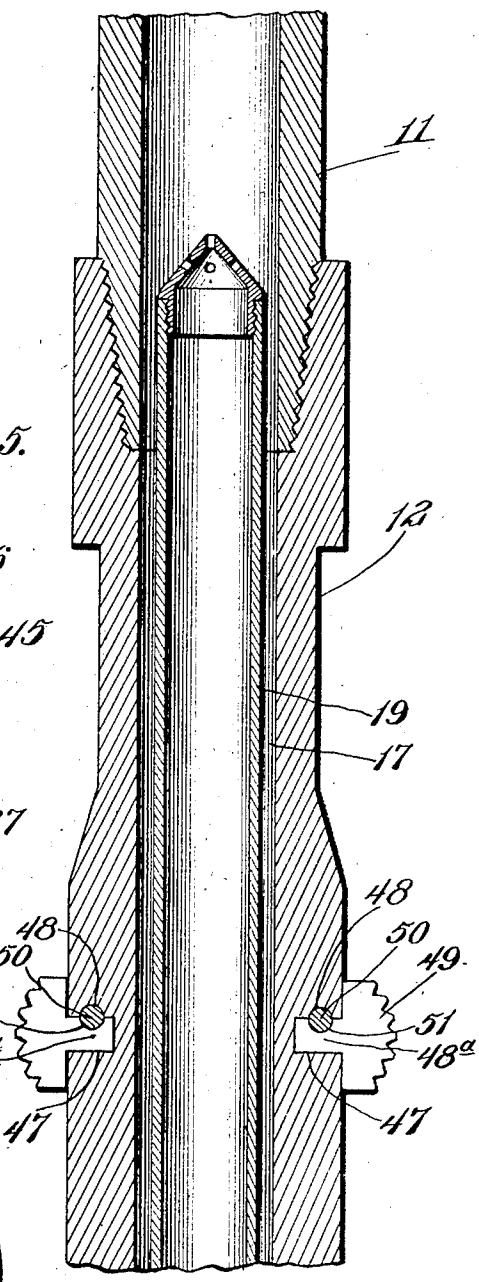


Fig. 5.

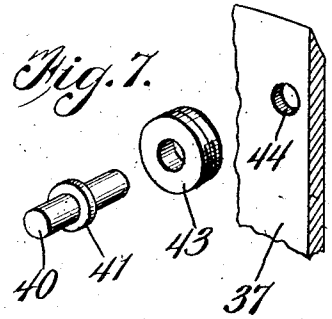


Fig. 7.

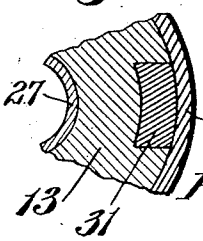


Fig. 6.

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Patented Feb. 17, 1925. 1,526,677

UNITED STATES PATENT OFFICE.

ROBERT A. PAINTER, OF FORT WORTH, TEXAS.

ROTARY WELL DRILL.

Application filed August 16, 1924. Serial No. 732,559.

To all whom it may concern:

Be it known that I, ROBERT A. PAINTER, a citizen of the United States, residing at Fort Worth, in the county of Tarrant and State of Texas, have invented certain new and useful Improvements in Rotary Well Drills, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to rotary well drills and more particularly to an improvement of the well drill shown in the Patent #1,224,509 issued under date of May 1, 1917 to T. B. Smith.

An important and more specific object of the invention is an improvement in the manner of attaching bits to the drill shoe or casing for the purpose of rendering this attachment more facile.

A further object of the invention is to provide an improvement of the general structure of the drill as illustrated in this patent, particularly in the addition of means for reaming the bore formed by the cutter bits so that it is the proper size for the reception of casing.

These and other objects I attain by the construction shown in the accompanying drawings, wherein for the purpose of illustration is shown a preferred embodiment of my invention and wherein:—

Figure 1 is a side elevation of rotary drilling mechanism constructed in accordance with my invention;

Figure 2 is a bottom plan view thereof;

Figure 3 is a perspective of the valve carrying member of the core taking apparatus;

Figure 4 is a vertical sectional view through the lower end of the drill;

Figure 5 is a similar view of the upper section of the drill;

Figure 6 is a section on the line 6—6 of Figure 4;

Figure 7 is a combined perspective showing the upper end of the locking sleeve and the associated locking elements for the sleeve.

Referring now more particularly to the drawings, the numeral 10 generally indicates a drill shoe adapted for attachment to a drill pipe 11 by means of which the shoe is rotated. The shoe is formed in upper and lower sections 12 and 13, the lower section being provided with a threaded socket 14 of a size to receive the drill pipe directly if so desired, the lower end of the upper section 12 having a pin 15 for engagement in this socket. The lower section adjacent the lower end thereof is enlarged, as at 16, to reinforce the same. The sections 12 and 13 have bores 17 and 18, the bore 18 being smaller than the bore 17.

The upper end of the reduced bore 18 is provided with screw-threads for the reception of a core barrel 19 which extends into the bore 17 and is concentrically spaced therefrom. The lower end of the bore is likewise interiorly threaded to receive the exteriorly threaded reduced upper end 20 of a sleeve 21. The reduction of the sleeve 21 is upon the exterior thereof, so that the shoulder 22 is formed upon the sleeve abutting the under surface of the lower end of the section 13 limiting the upward movement of the sleeve. The upper end of this sleeve is provided at diametrically opposed points with pairs of ears 23 to which are pivoted valve plates 24. The adjacent edges of these valve plates are spaced from each other and beveled downwardly, as indicated at 25, each of these edges being provided centrally with a V-shaped notch or recess 26. These plates normally extend transversely of the upper end of the sleeve which limits their downward movement at this point, but may swing upwardly so as to permit the passage upwardly through the bore 18 of the core barrel as hereinafter more fully set forth. The interior of this core barrel is preferably lined with a removable sleeve 27, the purpose of which will presently appear, the upper end of this sleeve abutting the lower end of the core barrel 19 and the sleeve having a bore 28 of the same size as the bore of the core barrel.

The thickened portion 16 of the shoe is provided in its periphery with diametrically opposed longitudinally extending grooves or channels 29, the base walls of which are convex and curving in concentric relation to the bore 18 as more clearly shown in Figure 6. The lower ends of these grooves open through the bottom of the section 13 and their upper ends are provided with inwardly directed coves 30. The drill bits for use in connection with the shoe are each provided with a shank 31 fitting into and conforming exactly to the shaping of the groove 29 and its cove 30, the outer surfaces of these shanks providing a continuation of the outer surface of the enlarged portion 16 of the shoe.

The bits 32 attached to the shanks may be of varied forms but in each construction will have the stem attached to the bit at a point spaced slightly inwardly from the outer edge of the bit, thus providing an upwardly facing shoulder 33 and inwardly from the bit providing an upwardly facing shoulder 34. The shoulder 34 abuts against the under surface of the section 13 when the bit is in applied position. The inner edges of the bits are notched, as at 35, to receive the enlarged portions of the sleeve 21, the notch providing an upwardly directed shoulder 36 against which the lower end of the sleeve rests to thereby prevent accidental disengagement of the sleeve.

As a means for retaining the bit shanks in position, I provide a retaining sleeve 37 closely fitting the exterior of the enlarged portion 16 and section 13. In this enlarged portion I provide a plurality of sockets 38, the outer ends of which are enlarged and screw-threaded as at 39. In this socket is seated a locking stem 40 having secured thereto a collar 41, between which collars and the inner ends of the bores springs 42 extend normally urging the locking stems outwardly. The outward movement of the locking stems is limited by a perforated plug 43 through which the locking stem may extend, but through which the collar 41 will not pass. The sleeve is provided with a plurality of openings 44, these openings corresponding in number and arrangement to the sockets and into these openings the outer ends of the locking stems extend when the sleeve is in applied position, preventing movement of the sleeve upon the enlargement 16. When it is desired to change the bits, these stems are forced inwardly by a tool, such as illustrated, comprising a body 45 having a reduced end portion 46 of less size than the openings 44 and of the same length as the thickness of the sleeve. The body 45 is of too great size to enter the openings 44 and accordingly the extensions will simply shift the locking stems inwardly until they clear the sleeve to permit a primary movement thereof. After such primary movement, where the openings are thrown out of alignment with the pins, the sleeve may, of course, be shifted to any desired point. After the sleeve has been elevated to clear the upper ends of the shanks, the pins will spring outwardly beneath the lower end of the sleeve, preventing accidental downward movement of the sleeve, which in a tool of the size ordinarily used in drilling operations would be of considerable weight.

It is well known that bits of this construction do not ordinarily form a bore of the proper size, this being accomplished by withdrawing the primary drilling tool and substituting a reamer for enlarging the bore. In accordance with this invention, the upper section 12 of the shoe 10 has formed therein radially extending sockets 47 and is provided with transverse bores 48 intersecting the sockets 47. These sockets receive the shanks 48^a of reamer cutters 49, the shanks being held in position by pins 50 inserted in the bores 48 and extending into notches 51 formed in the shanks 48^a of the reamer cutters. It will, of course, be obvious that the particular type of bit or reamer cutter employed is capable of a considerable range of change and modification, as is likewise the general detail structure of the tool as above described, and I accordingly do not limit myself to such specific structure as hereinbefore set forth except as hereinafter claimed.

I claim:—

1. In combined drilling and coring apparatus, a drill bit carrying shoe having a longitudinal bore, bits carried by the shoe, a core barrel arranged within the bore, a sleeve threaded in the lower end of the bore, means carried by the sleeve and adapted to sever and support a core on a predetermined movement of the barrel, means for locking the bits in position in the shoe, and shoulders formed on said bits extending beneath the lower end of the sleeve to prevent downward movement thereof.

2. In combined drilling and coring apparatus, a drill bit carrying shoe having a longitudinal bore, bits carried by the shoe, a core barrel arranged within the bore, a sleeve threaded in the lower end of the bore, shiftable valves carried by the sleeve and adapted to sever and support a core on a predetermined movement of the barrel, means for locking the bits in position in the shoe, shoulders formed on said bits extending beneath the lower end of the sleeve to prevent downward movement thereof, said core barrel embodying a part threaded in the upper end of the bore of the shoe, and a second sleeve loosely fitting the bore between said part and the first named sleeve.

In testimony whereof I hereunto affix my signature.

ROBERT A. PAINTER.