June 16, 1931. E. L. BOYNTON 1,810,391

ROTARY ACTION BIT

Filed Oct. 24, 1927

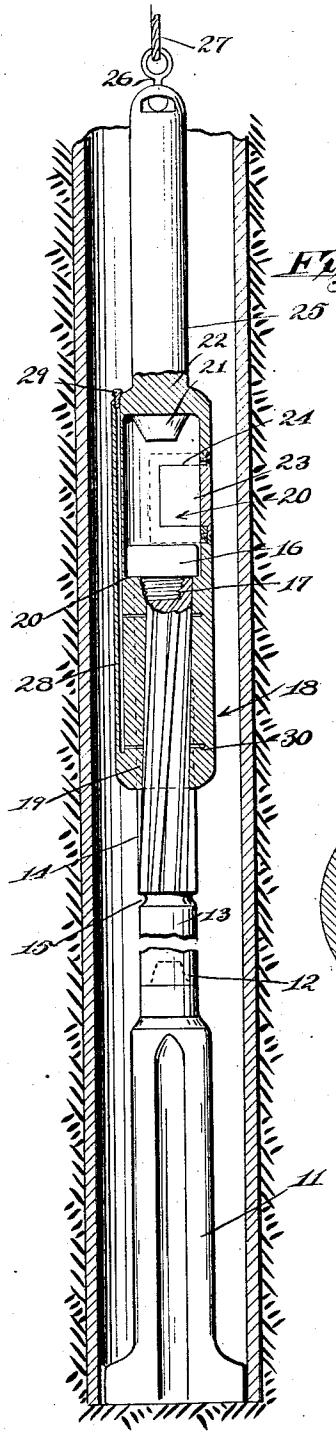


Fig. 1.

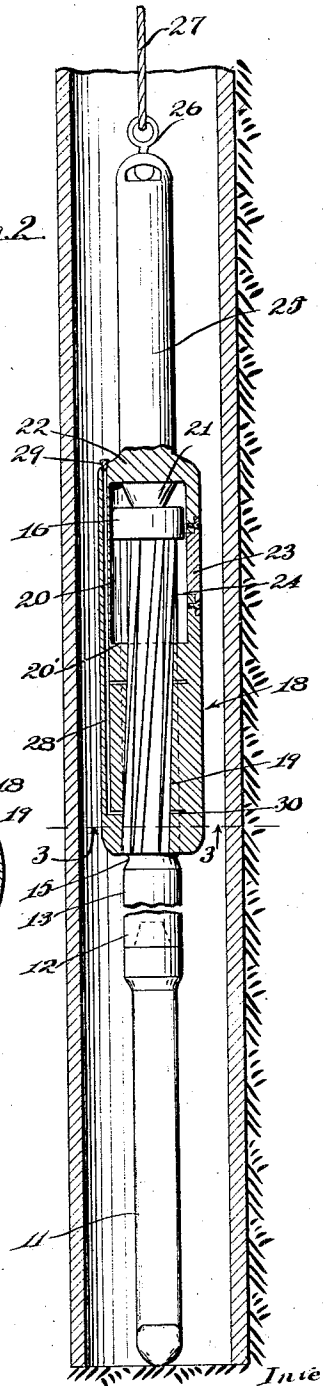


Fig. 2.

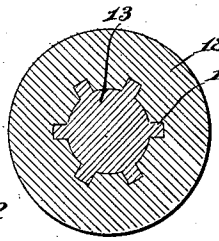


Fig. 3.

Inventor
E. L. Boynton
by Hazard & Miller
Attorneys

Patented June 16, 1931 1,810,391

UNITED STATES PATENT OFFICE

EUGENE L. BOYNTON, OF PASADENA, CALIFORNIA

ROTARY ACTION BIT

Application filed October 24, 1927. Serial No. 228,271.

My invention is a rotary action bit for deep well drilling.

An object of my invention is the development of a rotary action in a bit for deep well drilling caused by the lifting and dropping movement of a cable to which the bit is attached.

Another object of my invention is not only to give a turning action of the bit by the lifting and dropping movement of the cable, but also to give a hammer or blow action at the bottom of the stroke, and also on the upstroke to give a jar, loosening the drill from the formation.

In constructing my invention I utilize any suitable type of drill bit which preferably has a stem with helical splines at the upper end of the stem and an anvil block is secured at the upper end of the stem above the helical splines. A heavy block having internal threads engages the splines and has a clear space in the upper end to accommodate the anvil and at the top of the block-like structure there is a hammer to strike the anvil; and extending upwardly from the block-like structure I utilize a lifting bar to which the swivel of a cable is attached.

My invention will be more readily understood from the following description and drawings, in which:

Figure 1 is a vertical section partly in elevation of my invention at the instant of engagement or disengagement of the bit with the formation.

Fig. 2 is a view similar to Fig. 1 at the bottom of the stroke showing the bit partly turned.

Fig. 3 is a section on the line 3—3 of Fig. 2 in the direction of the arrows.

Referring to the drawings, I utilize any suitable type of bit 11 which has a sub 12 connected thereto, and above this, a stem 13. The stem has a series of helical splines 14 having a slight pitch. The stem below the splines is slightly cut away, as indicated at 15, to allow material to clear out of the grooves of the splines. The upper end of the stem has an anvil 16 secured thereto, this being illustrated by a pin and box joint 17, but it is to be understood that the anvil may be secured in any other way, such as by welding, if desired.

The block 18 has a lower part with internal helical threads 19 to match those of the splines and there is a hollow upper section 20 with a shoulder 20′ at the top of the threaded section 19. A hammer 21 depends from the top 22 of the block and is adapted to strike the anvil, as hereunder described. A hand hole plate 23 is secured to an opening 24 in the hollow part of the block, giving access to the anvil to secure it in place. A lifting bar 25 extends upwardly from the top of the block and has a swivel 26 connected thereto, and attached to the swivel there is a lifting cable 27. An oil duct 28 leads downwardly through the metal of the block, there being a closure plug 29 at the upper end and lateral ducts 30 lead from the duct 28 to lubricate the connection of the splines and the threads of the block in the operation of drilling.

My rotary action bit is used and functions substantially as follows:

It is to be understood that the block 18 is of considerable weight compared to the drill and the drill stem, so that in the lifting and dropping motion it has considerable momentum. Presuming the bit is lowered in the well until it strikes the bottom: In this lowering action the anvil rests against the shoulder 20′ and on striking the formation, the downward movement of the block causes the turning of the bit, due to the interaction of the threads 19 on the block and the splines 14 on the bit stem. This gives a slight turning action to the bit, and at the conclusion of the stroke, the hammer 21 forcibly strikes the anvil 16, thereby jarring the bit further into the formation.

The lifting cable is then given a reciprocating motion, that is, being elevated to a certain extent and dropped. In the lifting action of the cable there is a reverse turning motion communicated to the bit, or if this is firmly embedded in the formation, the block 18 may be partially rotated, the block turning on the swivel 26 or the cable being given a partial twist. The anvil then comes in contact with the shoulders 20′ in the block, giving a jarring action upwardly which releases the bit from the formation. The bit is lifted to a

sufficient elevation so that on its downward movement it strikes the formation with a forcible blow. Each time it strikes the formation it is given a slight rotation, and at the end of the down stroke is given a hammer blow by the hammer on the anvil. The lifting stroke gives an upward jar, such action being repeated as desired.

The oil duct 28 is filled with oil before the bit is lowered into the well, and the plug 29 inserted, thus lubricating the splines. Each time the bit is raised to the surface of the well the duct 28 is refilled with oil, thus giving suitable lubrication.

From the above description, it will be seen that I have developed a simple type of rotary action bit which is rotated merely by the lifting and dropping action of the cable, and also that a heavy blow is given to the bit on the down stroke and a releasing jar on the up stroke.

I have shown and described the rotary action bit as reciprocated by means of a cable 27 which would ordinarily be used in connection therewith, however, I desire it to be understood that in place of a cable I may use a tubing, pipe or solid rod, and that the means for reciprocating the rotary action bit is of minor or no importance though, as stated above, a cable would be ordinarily preferred.

I have shown the apparatus to be used in connection with a bit for drilling a hole, however, it will be understood any tool or device, whether it be a jar or fishing tool or similar device in which a rotary or partially rotary movement is desired, may be substituted for my bit.

Various changes may be made in the principles of my invention without departing from the spirit thereof, as set forth in the description, drawings and claim.

I claim:

In the art described, a drill bit having a stem with helical splines, a block having a small lower bore and a large upper bore defined from each other by a shoulder, the lower bore having threads complementary to the splines, an anvil attached to the top of the stem adapted to engage the shoulder, and a hammer extending downwardly from the top of the upper bore adapted to engage the anvil, there being a reduced portion formed in the stem at the bottoms of the splines as and for the purpose described.

In testimony whereof I have signed my name to this specification.

E. L. BOYNTON.