July 15, 1924. 1,501,630

F. S. STOLL

ROTARY ROCK DRILL

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Fig. 1

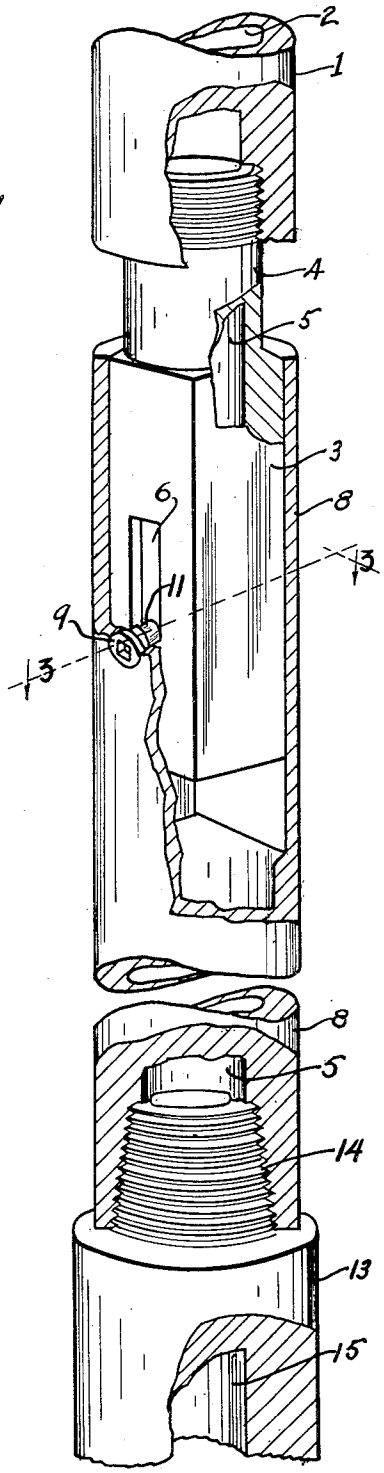


Fig. 3

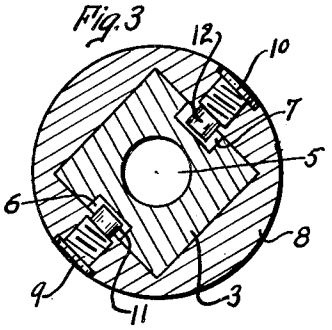
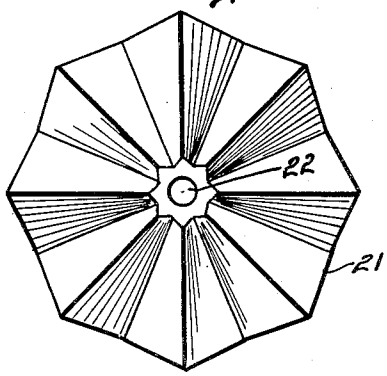


Fig. 4



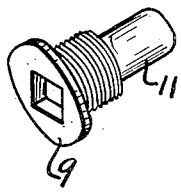


Fig. 5

INVENTOR.
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ROTARY ROCK DRILL

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Fig. 1A

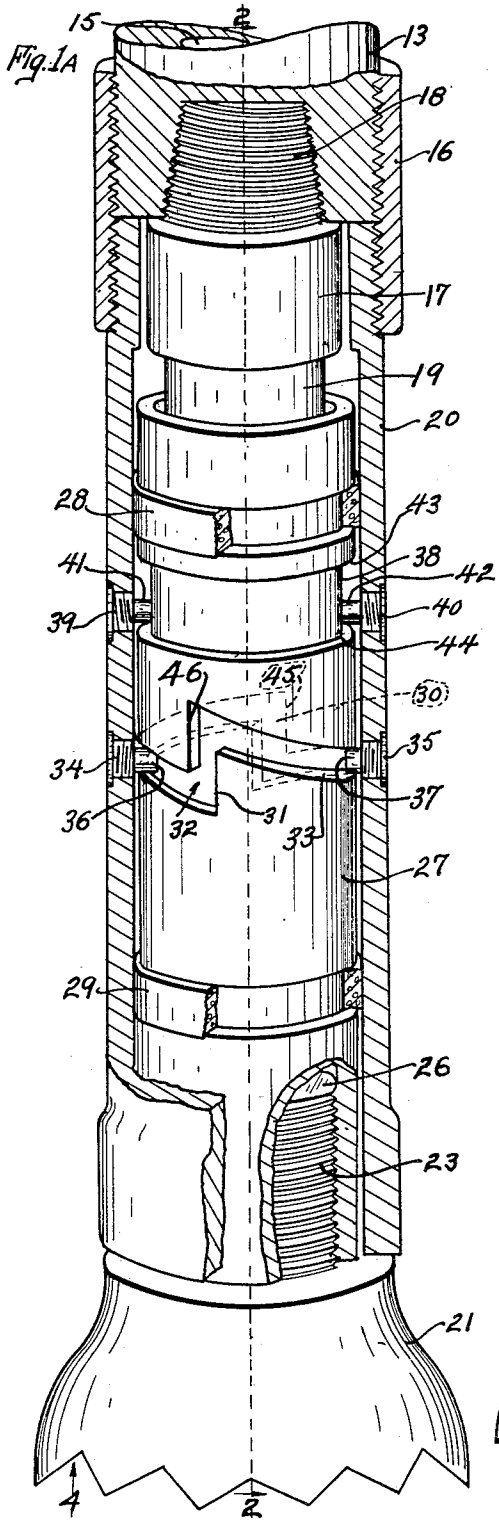
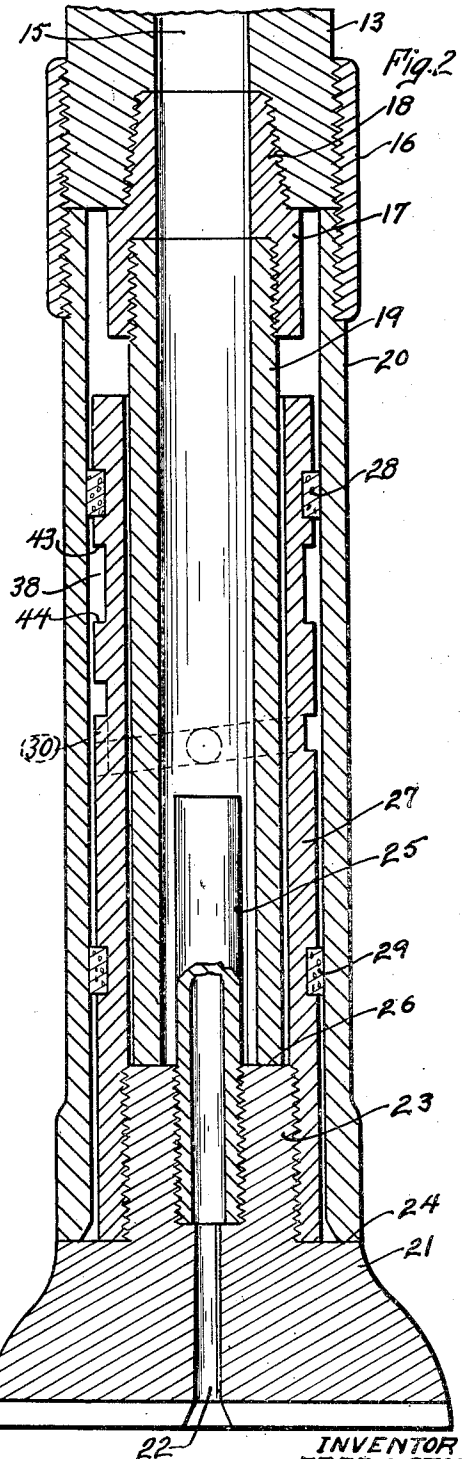


Fig. 2



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Patented July 15, 1924. 1,501,630

UNITED STATES PATENT OFFICE.

FRED S. STOLL, OF LOS ANGELES, CALIFORNIA, ASSIGNOR TO WILLIAM W. WILSON, OF LOS ANGELES, CALIFORNIA.

ROTARY ROCK DRILL.

Application filed September 9, 1919. Serial No. 322,693.

To all whom it may concern:

Be it known that I, FRED S. STOLL, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented new and useful Improvements in Rotary Rock Drills, of which the following is a specification.

My invention relates to a rotary rock drill and consists of the novel features herein shown, described and claimed.

My object is to provide a construction whereby a drill operated by a rotary stem is provided with a hammer action.

Figs. 1 and 1A together form a perspective sectional detail of a rotary rock drill embodying the principles of my invention.

Fig. 2 is a diametrical sectional detail on the line 2—2 of Fig. 1A.

Fig. 3 is a cross section on the line 3—3 of Fig. 1.

Fig. 4 is a bottom plan looking in the direction indicated by the arrow 4 in Fig. 1A.

Fig. 5 is a perspective of one of the cam screws.

The drill stem 1 has a hollow 2 for the circulation. The screw head 3 has a nipple 4 screwed into the lower end of the drill stem 1 and a hollow 5 connecting with the hollow 2. The head 3 has vertical recesses 6 and 7 formed in opposite sides and the head 3 fits slidingly in a socket 8. The socket 8 is round upon its periphery to substantially match the size of the drill stem 1 and has a square opening to receive the square head 3. Cam screws 9 and 10 are tapped through the walls of the socket 8 and have smooth pintles 11 and 12 extending into the recesses 6 and 7, so that the pintles 11 and 12 will limit the vertical movement of the socket 8 upon the head 3.

The coupling member 13 has a pin 14 screwed into the lower end of the socket 8 and a hollow 15 connecting with the hollow 5. A coupling 16 is screwed upon the lower end of the coupling member 13. A third coupling member 17 has a pin 18 screwed into the coupling 13. The inner hammer member 19 is screwed into the coupling member 17 and the outer hammer member 20 is screwed into the coupling 16.

The bit 21 has a central bore 22 for the passage of water and an internally and externally screw-threaded nipple 23 extending upwardly from the hammer shoulder 24. A tube 25 is screwed down into the nipple 23 and the inner hammer member 19 normally hits upon the upper face 26 of the nipple 23, and at the same time the outer hammer member 20 hits upon the upper face 24 of the bit.

The cam guiding member 27 is screwed upon the nipple 23 and fits loosely in the hammer member 20 there being packing rings 28 and 29 around the ends of the cam member 27 to make close joints with the hammer member 20. Vertical recesses 30 and 31 are formed diametrically opposite each other in the periphery of the cam member 27. A groove 32 connects the lower end of the recess 31 with the upper end of the recess 30, and a similar groove 33 connects the lower end of the recess 30 with the upper end of the recess 31. The grooves 32 and 33 are spiral and form cams.

Cam screws 34 and 35 are tapped through the hammer member 20 and have smooth pintles 36 and 37 extending into the cam grooves 32 and 33 and the recesses 30 and 31. An annular recess 38 is formed in the outer face of the cam member 27 just below the packing ring 28, and cam screws 39 and 40 are tapped through the hammer member 20 and have smooth pintles 41 and 42 extending into the recess 38, so that if the pintles 36 and 37 become broken, the pintles 41 and 42 will sustain the load and pull the parts out of the well.

In the practical operation the stem 1 will be lowered to bring the bit 21 at the bottom of the hole and then the stem will be suspended with the pintles 11 and 12 at or near the bottoms of the recesses 6 and 7, so that the weight of the bit and the co-operating parts below the head 3 will be upon the bottom of the hole; then as the stem 1 rotates the pintles 36 and 37 will travel in the grooves 32 and 33 and raise the hammers 19 and 20 from the faces 26 and 24 until the pintles 36 and 37 reach the vertical recesses 30 and 31; then the pintles 36 and 37 will pass downwardly in the recesses thereby allowing the hammers to drop, and at the same time the pintles 36 and 37 will strike the further sides 45 and 46 of the recesses 30 and 31 and rotate the bit slightly. Continued operation will make a reciprocating motion of the hammer construction and a rotating motion of the bit.

The water coming through the hollows 2,

5 and 15 passes through the coupling member 18, the inner hammer member 19 and the tube 25 to the bore 22, and the packing ring 28 holds the water from passing downwardly between the cam 27 and the outer hammer 20. Oil may be placed between the packing rings 28 and 29 to lubricate the recesses 30 and 31 and the grooves 32 and 33.

Thus I have produced a rotary rock drill comprising a bit, a cam member secured to the bit, a socket, hammer members secured to the socket, a connection between the hammer members and the cam member for providing a reciprocating and rotating motion, and a sliding connection between the socket and the drill stem; so that as the drill stem is rotated the bit will bear upon the bottom of the hole and the hammer will reciprocate and strike the bit and rotate the bit intermittently.

The parts may be made to strike a blow of one ton or ten tons or any desired force and the sliding socket may be placed anywhere in the line.

Various changes may be made without departing from the spirit of my invention as claimed.

I claim:

1. A drill comprising a drill stem adapted to be rotated, a bit, means carried by the drill stem and engaging means carried by the bit for connecting the bit to the drill stem and for causing the rotation of and hammering on the bit as the stem is rotated, the hammer action being effective both inside of and outside of the means on the bit.

2. A drill comprising a bit, a cam member connected to the bit and having vertical recesses and spiral recesses connecting the same, a hammer member slidingly and rotatably mounted upon the cam member and having pintles extending into the recesses, a socket connected to the hammer member, and a drill-stem connected to the socket; so that as the drill stem rotates the hammer will reciprocate and rotate the bit step my step.

3. A drill comprising a bit, a cam member connected to the bit, an inner hammer member sliding inside of the cam member and striking the bit, an outer hammer member outside of the cam member and striking the bit, a cam connection between the outer hammer member and the cam member whereby rotation of the outer hammer member reciprocates and rotates the bit, and means for connecting the hammer members to a drill stem.

4. A drill comprising a drill stem adapted to be rotated, a bit, a hammer for striking said bit, and an operating connection arranged to reciprocate said hammer and intermittently rotate said bit through the rotation of said drill stem, and means for inclosing said operating connection to exclude foreign material from the same.

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

FRED S. STOLL.