

J. B. WOOLDRIDGE,
WELL DRILLING DEVICE.
APPLICATION FILED DEC. 6, 1919.

1,376,302.

Patented Apr. 26, 1921.

Fig. I

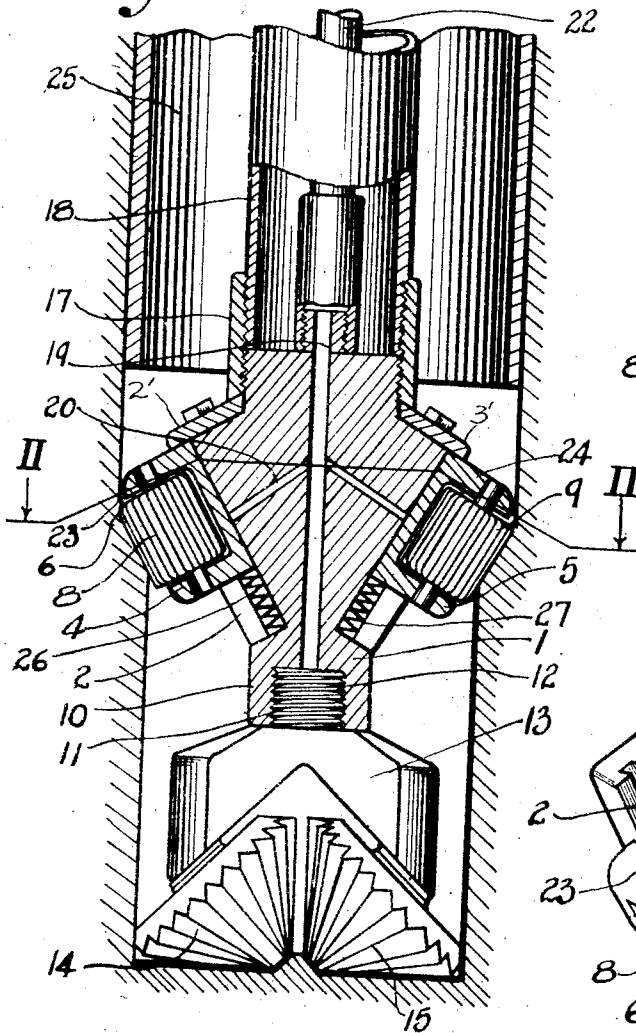


Fig. II

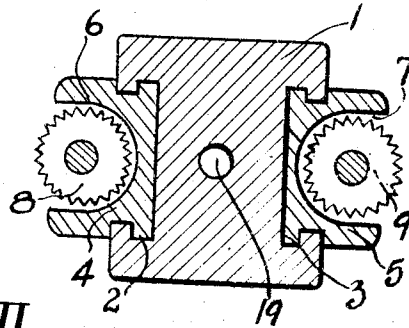


Fig. III

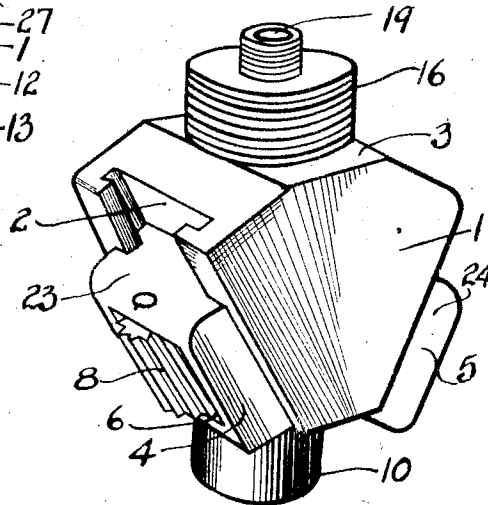
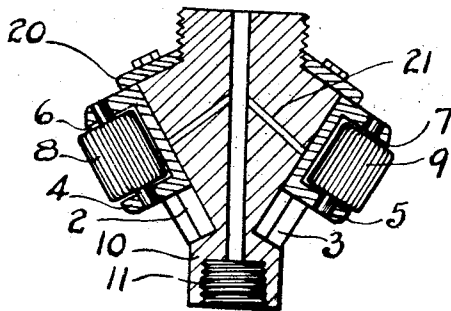


Fig. IV



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WELL-DRILLING DEVICE.

1,376,302.

Specification of Letters Patent. Patented Apr. 26, 1921.

Application filed December 6, 1919. Serial No. 842,901.

To all whom it may concern:

Be it known that I, JOHN B. WOOLDRIDGE, a citizen of the United States, residing at Kansas City, in the county of Jackson and State of Missouri, have invented certain new and useful Improvements in Well-Drilling Devices; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

This invention relates to well drilling machinery and particularly to a combined drill and reamer for simultaneously drilling and reaming wells.

One of the objects of the invention is to provide an improved drill and reamer which may be readily introduced through the well casing sections so as to preliminarily cut a hole less than the outer diameter of the tube and to enlarge the opening during the cutting operation by certain under reamers which will provide an opening at least equal to the outer diameter of the well casing, and to so construct the drill that it may be readily introduced through the sections and removed therefrom without liability of it becoming stuck in the well casing.

In the drawings,

Figure I is a vertical, longitudinal, sectional view through a portion of a well to which my invention is applied, part of the drill being shown in elevation.

Fig. II is a cross sectional view on the line II-II of Fig. I.

Fig. III is a detail perspective view of the head carrying the under reamers, and

Fig. IV is a sectional view through a modified form of drill head.

The under-reamer head is shown as consisting of a wedge-shaped body 1 having diametrically opposite under-cut grooves 2 and 3 and inclined sides to carry T-headed blocks 4 and 5, which are provided with recesses or cut-out portions 6 and 7, in which are mounted the reamer wheels or tools 8 and 9, the blocks being slidable in an upward direction against the upwardly inclined walls of the slots 2 and 3 so that the under reamers may move outwardly during the operation of the drill.

The lower end of the head is provided with a cylindrical portion 10 having an in-

teriorly threaded recess 11 to receive the shank 12 of a drill bit 13, carrying the conical tools 14 and 15, which are rotatably secured thereto. The head is also provided at its upper end with a cylindrically threaded portion 16, upon which a collar or coupling 17 may be threaded to connect the shaft 18 by means of which the drill may be rotated, the shaft 18 receiving power from any suitable source.

Extending axially through the head is a lubricating port 19, having branches 20 and 21, by means of which lubricant can be supplied to the under reamer blocks 4 and 5, and the upper end of the head is connected to a lubricant supply conduit 22 connected to any suitable source of lubricant supply. The blocks are shown as having curved upper ends 23 and 24 adjacent to the tools 8 and 9 so that the curved portions reduce the liability of the blocks becoming wedged in the well casing.

When it is desired to assemble the parts, the bit 13 may be screwed in its socket 11 and the blocks 4 and 5 may be introduced into the slots 2 and 3 from the top so that they may fall by gravity to the bottoms of the slots 2 and 3.

The removable stop plates 2' and 3' are then secured to the top of the head 1 with their outer ends overlapping the floors of the grooves 2 and 3 so that the top ends of the grooves are closed, thereby preventing accidental displacement of the blocks 4 and 5 with respect to the head.

The coupling 17 is then screwed onto the threaded portion 16 and to the shaft 18 to couple the drill to the shaft. When the coupling 17 is in place, it bears upon the stop plates 2' and 3' to hold them in place.

After the parts are assembled, they may be introduced into the well casing so that the bit tools 14 and 15 may drill the bottom of the well and as the drill proceeds into the ground, the resistance of the ground will force the blocks 4 and 5 upwardly and outwardly so as to cause the under reamers to ream the sides of the well drilled by the tools 14 and 15 and enlarge the same to a size at least equal to the outer diameter of the tube or well casing 25, and the drilling may proceed until the proper depth has been reached, the under reamers providing an opening large enough for the introduction of the sections of the well casing.

When it is desired to withdraw the drill,

an upward pull on the shaft 18 will move the head 1 in an upward, vertical direction while the under reamer blocks will be drawn inwardly by means of the slots 2 and 3 so that the outer edge of the blocks and their under reamers 8 and 9 will not extend beyond the edges of the tools 14 and 15, the withdrawal being sufficient to permit the under reamers to be easily removed through the tube sections 25.

It will, therefore, be seen that the drill is so constructed that although it may be readily introduced to and removed from the sections 25, in actual practice it will drill a hole in excess of the inner diameter of the well casing or tube.

In Fig. IV, I have shown a slightly modified form in which the springs 26 and 27 are omitted from the slots 2 and 3. Otherwise, the construction shown in Fig. IV is like that shown in Figs. I to III, both inclusive.

What I claim and desire to secure by Letters-Patent is:

1. In a reamer and drill, a rotary head having a threaded upper end and provided with slotted, upwardly and outwardly inclined sides, the slots extending to points adjacent to the threaded upper end, rotary under-reamers slidably secured in said slots, the upward longitudinal movement of the under-reamers being effective in extending them radially with respect to the head so that they will ream a hole of progressively increasing diameter, a rod coupling receivable on the threaded end of the head, and means closing the upper ends of the slots.

2. In a rotary reamer and drill, a rotary head having upwardly and outwardly inclined sides provided with slots, blocks slidable in said slots, and rotary under-reamers journaled in the blocks, the upward and outward movement of the blocks being effective in extending the under-reamers radially with respect to the head.

3. In a rotary reamer and drill, a rotary head having upwardly and outwardly inclined sides provided with slots; blocks slidable in said slots, rotary under-reamers mounted in the blocks, and springs in the slots, one end of each spring bearing against

the bottom of the block and the other against the lower end of the slot to normally exert pressure upwardly against the blocks to impart upward and outward movement thereto whereby the under-reamers may ream a hole of progressively increasing diameter.

4. In a rotary reamer and drill, a head comprising a member having upwardly and outwardly inclined sides provided with slots open at their upper ends, blocks slidable in the slots, under-reamers rotatable in the blocks, the upward and outward movement of the blocks extending the rotary reamers radially to ream a hole of progressively increasing diameter; and removable plates closing the upper ends of the slots.

5. In a rotary reamer and drill, a head comprising a member having upwardly and outwardly inclined sides provided with slots, blocks slidable in said slots, rotary under-reamers carried by the blocks and having rotary movement independent thereof as the blocks rotate with the head, the upward movement of the blocks being effective in extending the rotary under-reamers radially with respect to the head so that the rotary under-reamers will ream a hole of progressively increasing diameter, means on one end of the member to receive a bit mounting, and a rod-engaging means on the other end of the member.

6. In a rotary reamer and drill, a reamer head, a rotary drill bit at the lower end of said head, said head having upwardly and outwardly inclined sides provided with slots, longitudinally slidable blocks in said slots, rotary under-reamers carried by the blocks and having rotary movement independent of the blocks as the blocks are rotated with the head whereby continuously changing cutting faces are presented to the side of the well as the head rotates, the upper longitudinal movement of the blocks being effective in extending the rotary under-reamers radially with respect to the drill and under-reamer head so that the rotary under-reamers will ream a hole of larger diameter than that drilled by the drill bit, and means for rotating said head.

In testimony whereof I affix my signature.

JOHN B. WOOLDRIDGE.