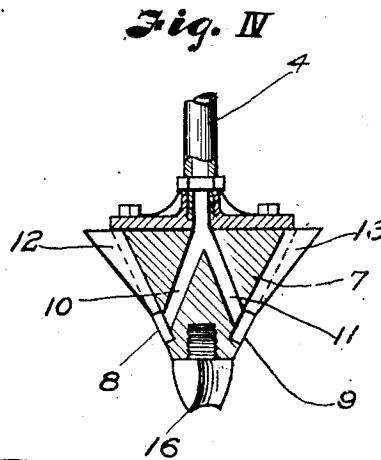
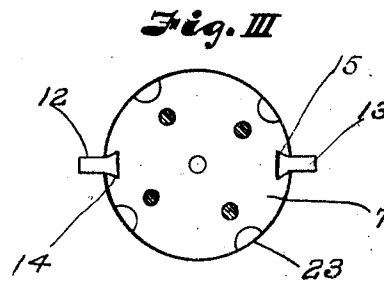
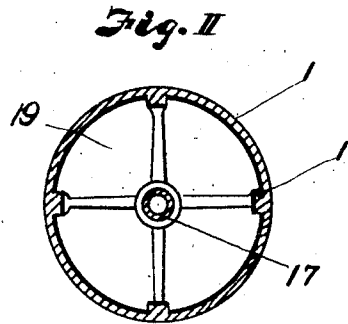
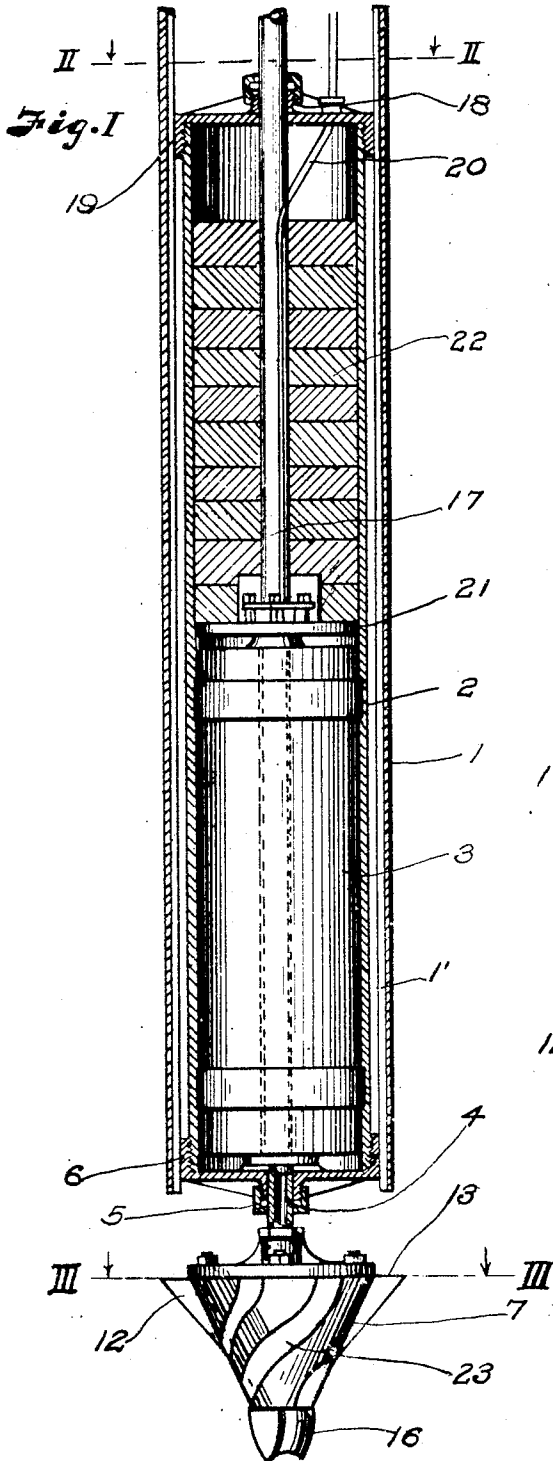


J. B. WOOLDRIDGE.
WELL DRILLING APPARATUS.
APPLICATION. FILED AUG. 25, 1919.

1,370,677.

Patented Mar. 8, 1921.



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WELL-DRILLING APPARATUS.

1,370,677.

Specification of Letters Patent.

Patented Mar. 8, 1921.

Application filed August 25, 1919. Serial No. 319,810.

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 Apparatus; 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 apparatus and one of the objects of the invention is to provide a conveniently constructed apparatus which may be easily introduced into the well casing for the purpose of drilling the well at a diameter at least equal to the outer circumference of the casing, the parts being so arranged that the mechanism may be withdrawn after the drilling operation has been finished, or whenever found expedient.

The invention contemplates the provision of means whereby the drill bit may be driven by an electric motor and whereby a stream of water may be introduced in proximity to the cutting edges of the drill bit, the motor shaft being hollow for that purpose.

The invention also contemplates means whereby cutting blades may expand beyond the inner circumference of the well casing during the cutting operation but which may automatically be retracted when it is desired to remove the device from the well.

Other objects and advantages will be apparent by reference to the following description.

In the drawings,

Figure I is a vertical longitudinal sectional view through a well casing equipped with my invention, the drill bit being shown in elevation.

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

Fig. III is a sectional view on the line III—III of Fig. I, and

Fig. IV is a vertical longitudinal sectional view through the drill bit.

Referring now to the drawings by numerals of reference:

1 designates the well casing which may be of ordinary construction with guide ribs

1' and introduced into the well in the usual way. The drilling mechanism may consist of a casing 2, containing an electric motor 3 therein and provided with a hollow shaft 4 which extends through a stuffing-box 5 in a removable cap 6 threaded to the casing 2. The lower end of the hollow shaft is preferably threaded to engage an inverted truncated conical bit head 7 having longitudinal grooves 8 and 9 in its sides which are adapted to communicate with channels or openings 10 and 11 in the head, as shown in Fig. IV. The channels 10 and 11 are adapted to receive fluid from the hollow shaft 4, as will be presently explained, and in the inclined grooves 8 and 9 are cutting blades 12 and 13 adapted to freely slide therein and preferably dove-tailed, as indicated at 14 and 15, Fig. III. The lower end of the head 7 is provided with a fish-tailed bit point 16 of approved construction.

The upper end of the shaft 4 of the motor is connected to a hollow shaft or conduit 17, 80 projecting through a stuffing box 18 in a removable cap 19 threaded to the casing 2. 20 are conductors to convey current to the motor 3. Within the casing 2 is a support 21 on which weights 22 may rest, these preferably being threaded upon the shaft 17 so as to add weight to the drilling device and assist the point 16 to obtain a purchase against the material to be drilled. The head 7 is provided with spiral grooves 23 to permit the removed material in liquid form to flow up past the head 7 and between the casings 1 and 2, this being possible since the casing 2 is of less diameter than the casing 1. 95

When the parts are assembled, as shown in Fig. I, and current is applied to the motor 3, the bit head may be rotated so that the point 16 and cutters 12 and 13 will cut into the earth and rock to be removed. The pressure of the earth against the sliding cutting blades 12 and 13 will force them upwardly so that their upper outer points will extend beyond the periphery of the casing 1 so as to make the well of sufficient diameter to admit the casing sections. 105

When, however, it is desired to withdraw the drilling apparatus, an upward pull will permit the cutting edges 12 and 13 to move downwardly and inwardly against the inclined sides of the grooves 8 and 9 so that they will be retracted within a circle of 110

less diameter than the inner diameter of the casing 1. Therefore, difficulty in removing the device will be avoided.

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

1. In a well drilling machine, a casing, a motor driven shaft passing through the casing, a cutting head on the end of the shaft, and removable weights in the casing.
- 10 2. In a well drilling machine, a closed casing, a motor therein, a tubular shaft passing through said motor and casing, a head

on the lower end of the tubular shaft, cutting members carried by the head, channels in the head communicating with the tubular shaft, and removable weights in the casing.

3. In a well drilling machine, a casing, a motor in the casing, a cutting head driven by the motor, and removable weights in the casing.

In testimony whereof I affix my signature.

JOHN B. WOOLDRIDGE.