

J. M. ROBERSON.
POWER DRILL.
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1,315,422.

Patented Sept. 9, 1919.

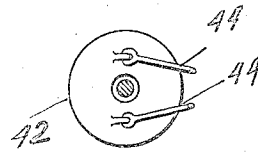
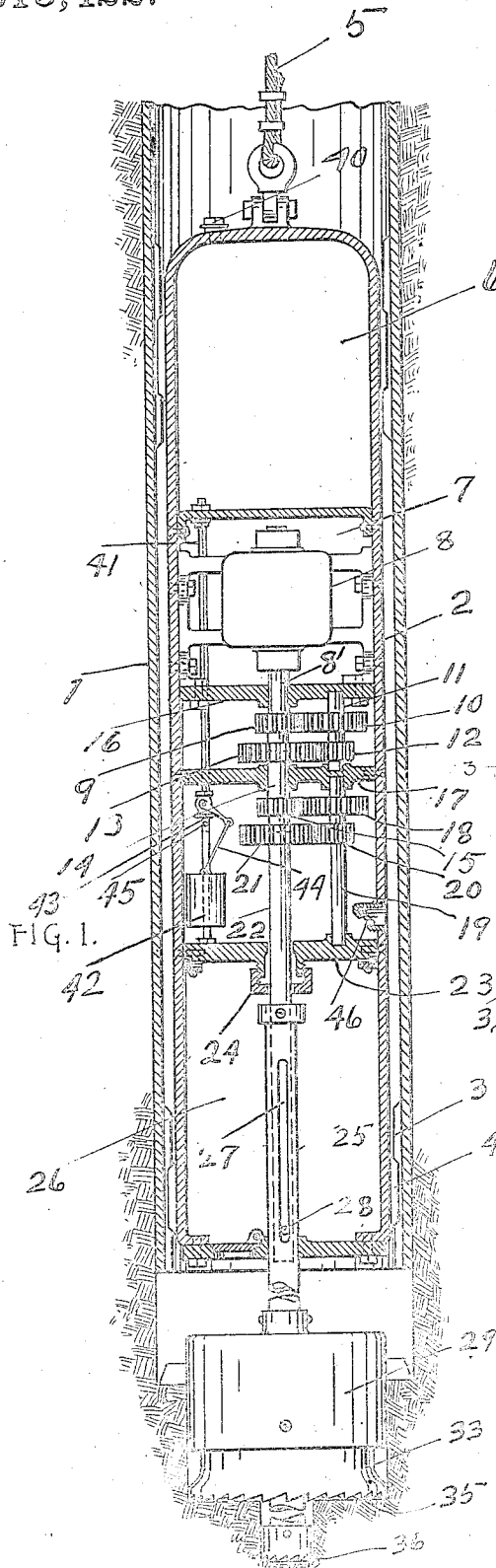


FIG. 4.

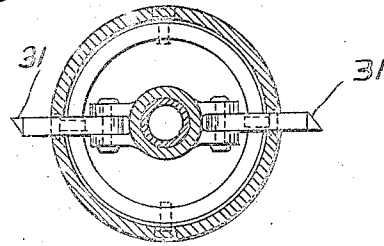


FIG. 3.

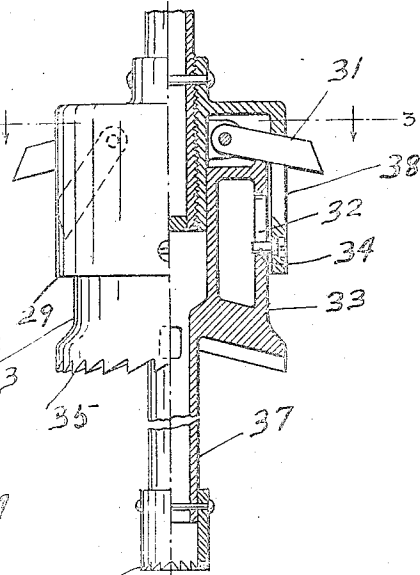


FIG. 2.

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POWER-DRILL.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, JOHN M. ROBERSON, a citizen of the United States, residing at Seattle, in the county of King and State of Washington, have invented a new and useful Improvement in Power-Drills, of which the following is a specification.

This invention relates to improvements in drills, and more particularly to oil well drills, and the object of this improvement is to provide a drill for shaping the walls of the cut to the same diameter as the outer shell or casing.

A further object resides in the provision of a motor for actuating the drill housed within the drill casing.

A still further object resides in the provision of an automatically actuated compressed air chamber having communicating means with the reduction gear compartment for expelling liquid therefrom forced within the chamber by the high atmospheric pressure from without.

Still further objects will appear from the following specification, reference being had to the accompanying drawings wherein is sought to be illustrated only an embodiment of such operable mechanism as may be employed to carry into effect the functions and aims of the invention, the scope of which being more clearly pointed out in the appended claim.

In the drawings, Figure 1 is an elevation of the drill and associated mechanism; Fig. 2 is an elevation of the drill proper in part section, showing the application of the reamer attachment; Fig. 3 is a plan view of the drill drawn along lines 3-3 of Fig. 2; and Fig. 4 is a plan detail of the hollow float chamber.

Referring more particularly to the drawings, in which like numerals indicate like parts in all the figures, the numeral 1 represents an ordinary outer casing shell as employed in oil drilling, and 2 is an inner chamber wherein is disposed the associated drill mechanism. The outer casing 1 is herein designed to freely telescope the inner chamber 2 which is sustained against circular movement by ribs 3 which engage similar ribs 4 provided on the outer walls of the chamber 2. These ribs 3 and 4 serve as a means for centering the inner chamber 2 equidistant from the walls of the outer casing and permit of longitudinal movement only therebetween.

5 is a cable which is fixedly attached to the upper end of the inner chamber 2 for elevating or lowering the same within the outer casing.

6 is a compartment within the chamber 2 for retaining compressed air or gases, and 7 is a similar closed compartment within the chamber 2 wherein is disposed the motor 8 securely anchored to the sides of the chamber in any well known manner.

The motor 8 receives its electrical energy through wire (not shown) which may follow the cable 5 upwardly to the source of supply on the surface.

8' is the drive shaft from the motor which carries a gear 9 keyed thereto and this gear meshes with larger gear 10 keyed upon the counter shaft 11. Power from the motor is transmitted through these gears to the smaller gear 12, which in turn transmits the power through meshed gear 13 of the secondary drive shaft 14 to the small gear 15 on the lower end thereof. The gears 9, 10, 12 and 13 are herein shown as partitioned off within the chamber 2, by partition walls 16 and 17, and these partitions serve as a bearing for the drive and counter shafts 8' and 11 respectively.

Further reduction of the power is transmitted from the gear 15 to the larger gear 18 with which it meshes, keyed on the secondary counter shaft 19, thence through smaller gear 20 of the secondary counter shaft to the larger gear 21, keyed to the shaft 22 connected directly with the drill.

The latter gears 15, 18, 20 and 21 are likewise partitioned off within the chamber 2, and the partition walls 17 and 23 thereof serve as a bearing for the shafts 22 and 19 respectively.

The partition wall 23 is provided with a stuffing box 24 for the drill shaft 22 which extends therethrough and is telescoped by the elongated sleeve 25 within the lower partition 26 of the inner chamber. This sleeve is provided with a longitudinal slot 27 for the reception of a pin 28 keyed to the drill shaft 22. However, it is to be understood that many obvious means for precluding rotary movement of the shaft 22 within the sleeve 25 can be provided. It is further obvious that many well known forms of gear reduction can be employed to perform the functions necessary for actuating the drill.

The sleeve 25 is extended through the

lower portion of the inner chamber 22 and upon the end thereof is rigidly secured the cylindrically shaped outer casing 29. Within this casing is disposed the drill which is adapted to be longitudinally movable therein primarily to actuate the reamers 31 to be more fully hereinafter described.

32 are longitudinal slots provided in the inner casing 33 of the drill core for the reception of pins 34 secured to the outer casing 29. This provision is to securely lock the two casings together against independent rotary movement.

35 are cutting teeth provided on the flange portion of the inner casing 33, and 36 are similar cutting teeth provided on an elongated extension 37 of the inner core. The provision of this lower drill serves to center the apparatus against rotary oscillation.

The reamers 31, above referred to, of which there may be two or more, are pivotally attached to the inner core of the casing 29 and are adapted to extend outwardly through longitudinal slots 38 provided in the walls of the casing 29 to a point flush with the outer telescoping shell 1.

The provision of these reamers is for the purpose of enlarging the diameter of the hole previously cut by the teeth 35 of the drill to equal the diameter of the shell 1 whereby the same can be lowered to follow the drill.

These reamers are held in operative position by the core of the inner casing 33 which comes in contact therewith when the same is urged upwardly by the pressure of the rotary drilling operation.

When it is desired to withdraw the drill upwardly through the outer shell 1, the pins 34 are caused to come in contact with the rim at the upper end of the slots 32. The reamers are thus permitted to swing downwardly within the slots 38 as shown by dotted line in Fig. 2, so that the drill can be drawn upwardly through the telescoping shell 1 without the ends of the reamers coming in contact therewith.

It is to be understood that various mechanical constructions can be designed that will permit the reamers to be withdrawn upwardly within the shell when not engaged. The construction as illustrated is simply to illustrate an operative combination of the

function of reamers as an element in the combination of my invention.

6 is a compressed air receptacle within the chamber 2 and is provided with a supply port 40, and 41 is an outlet pipe that terminates in the reduction gear compartment. Upon the lower end of this pipe is slidably disposed a float chamber 42 connected with a valve 43 by toggle joint 44.

In boring for oil it has been found that with the drill operating below certain depths from the earth's surface, external pressure forces water through the stuffing boxes into the gear mechanism. That difficulty is overcome by the provision of the compressed air receptacle 6 having greater atmospheric resistance than the atmospheric pressure from without, and all water that seeps through the stuffing boxes will be expelled from the chamber by the automatic action of the valve 43, which is caused to be opened or closed by the water raising the float chamber and actuating the toggle joint 44, which actuates the valve and opens the port 45 and admits the air into the compartment having the water. This pressure forces the valve 46 to open, and the water in the compartment is expelled through the valve.

It is to be understood that various mechanical constructions can be designed to automatically open and close the compressed air receptacle and expel the water from the chamber.

What I claim as new, and desire to protect by Letters Patent, is:

A drill comprising an outer shell, an inner chamber adapted to be longitudinally movable within said outer shell, a compressed air receptacle and a motor disposed within said inner chamber, a drill operatively connected with said motor exteriorly of said inner chamber, and means for automatically permitting the escape of air from said receptacle into said chamber for expelling water therefrom forced within by external atmospheric pressure.

Signed by me at Seattle, Washington, this 29 day of January, 1918.

JOHN M. ROBERSON.

Witnesses:

DORA C. KUHS,
RICHARD J. COOK.