R. CAVERLY.

DRILL.

APPLICATION FILED NOV. 6, 1920.

1,395,091. Patented Oct. 25, 1921.

Fig. 1

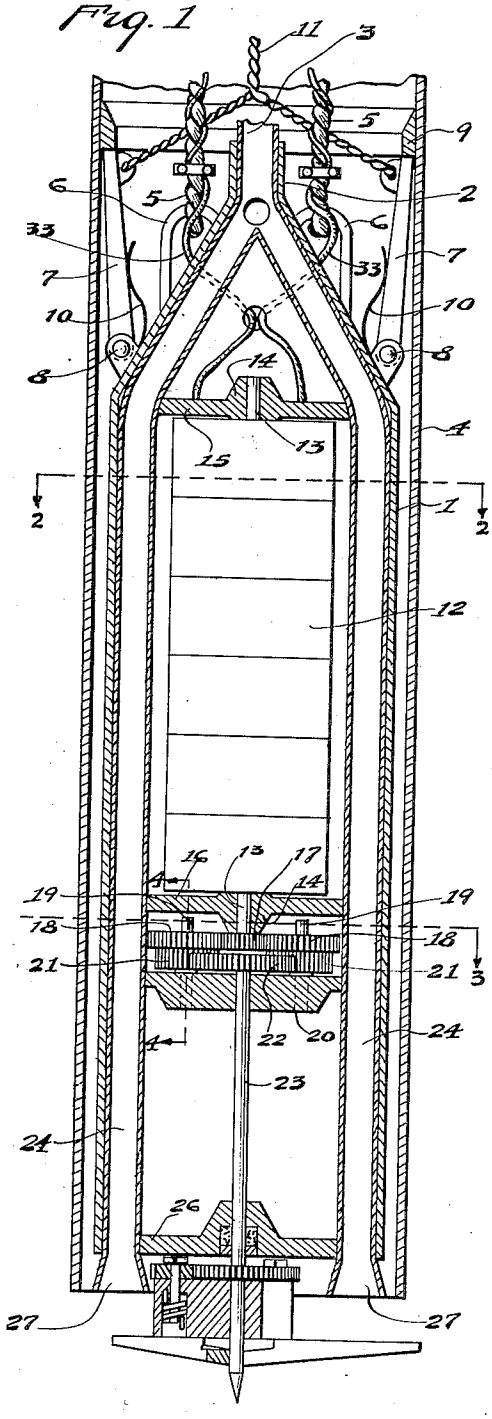


Fig. 2

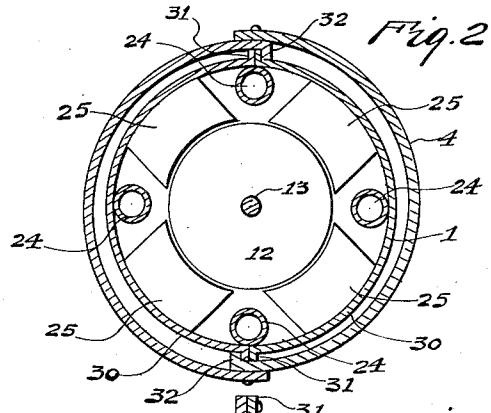


Fig. 3

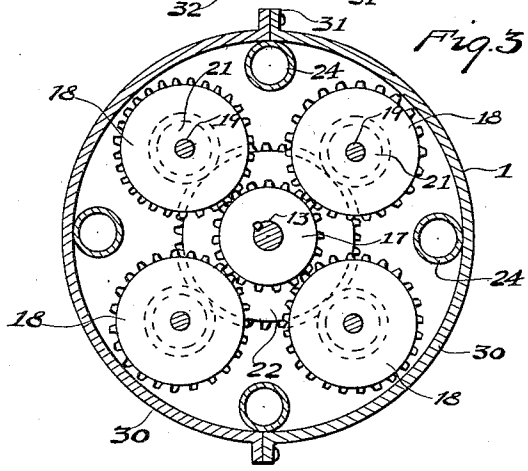
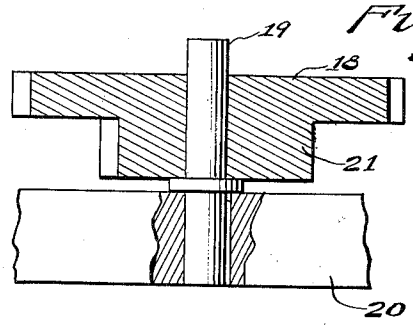


Fig. 4



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DRILL.

1,395,091. Specification of Letters Patent. Patented Oct. 25, 1921.

Application filed November 6, 1920. Serial No. 422,289.

To all whom it may concern:

Be it known that I, RALPH CAVERLY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented new and useful Improvements in Drills, of which the following is a specification.

This invention relates to drills used in deep well drilling and an object of the invention is to provide a deep well drill which embodies a suitable casing structure carrying a rotor or prime mover from which power is transmitted to a suitable drill bit of the rotary type for drilling the hole to receive the well casing or tubing.

Another object of the invention is to provide a plurality of branch suction pipes which merge into a single suction pipe for drawing water and drill cuttings upwardly through the well as it is drilled for preventing accumulation of cuttings at the bottom of the well and the resulting obstruction to efficient drilling.

Another object of this invention is to provide means for preventing upward movement of the drill structure in the well casing or tubing which means is releasable from the top of the well to permit the withdrawal of the drill structure when desired.

Other objects of the invention will appear in the following detailed description taken in connection with the accompanying drawings wherein:

Figure 1 is a longitudinal section through the drill.

Fig. 2 is a cross section through the drill taken on line 2—2 of Fig. 1.

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

Fig. 4 is a detailed vertical section on the line 4—4 of Fig. 1.

Referring more particularly to the drawing, the improved drill includes a casing 1 formed of suitable sheet material having its upper end substantially conical in shape and terminating in a sleeve 2 into which the main suction pipe 3 extends. The casing 1 of the drill structure is suspended in the well casing or tubing 4, by means of suitable cables 5, the lower ends of which are connected to rings 6 carried by the drill casing 1, and the drill structure is held against upward movement in the casing or tubing 4 during the operation by pivoted latches 7 which are pivotally connected, as shown at 8, to the drill casing 1 and the upper ends of which are held beneath the under surface of a ring 9 which is attached to the inner surface of the well casing 4 by springs 10. A trip rope 11 is connected to the latch levers 7 so that when the trip rope 11 is pulled upwardly the latch levers 7 will be moved inwardly against the tension of the springs 10 and from beneath the under surface of the ring 9 to permit the withdrawal of the drill structure.

An electric motor 12, of any conventional form, is placed within the drill casing 1, and the drive shaft 13 of the motor is rotatably supported in suitable bearings 14 formed in bearing disks 15 and 16 positioned at the upper and lower ends of the motor 12 respectively. The lower end of the drive shaft 13 projects through the disk 16 and has a pinion 17 mounted thereon which meshes with a plurality of gears 18. The gears 18 are rotatably mounted upon the shafts 19 which are rigidly carried by the bearing disk 20. The pinions 21 are formed integrally with the gears 18 and they mesh with the drive gear 22 of the drill bit structure 23. The drill bit structure 23 may be of any conventional type, however, it is preferable to use the improved drill bit disclosed in my companion application filed November 6, 1920, Serial No. 422,288.

A plurality of suction pipes 24 extend vertically within the drill casing 1, and are positioned between adjacent sides of the field magnets 25 of the motor structure 12, as clearly shown in Fig. 2 of the drawings. The lower ends of the suction pipes 24 extend through the spider 26 mounted in the lower end of the drill casing 1, and secured in fluid tight connection with the casing, and have their lower terminals flared as shown at 27. These suction pipes 24 terminate at their upper ends in the main suction pipe 3 through which suction is maintained by any suitable structure for drawing water or other liquid as well as drill cuttings upwardly out of the well to permit free and unimpeded drilling action of the drill bit structure 23.

The drill bit structure is preferably constructed to drill a hole slightly larger than the well casing or tubing 4 which permits the well casing or tubing and also the drill to move downwardly, under gravity action.

As clearly shown in Figs. 2 and 3 of the drawings, the drill casing 1 is composed of a plurality of sections 30 connected by out-

wardly extending ears 31, and the well casing or tubing 4 is also formed, preferably, of a plurality of sections certain of which have inturned flanges 32 which engage against the ears 31 to prevent rotary movement of the drill structure within the well casing or tubing 4.

Electric current for operating the motor 12 may be supplied from any suitable power source, through the wires 33.

It is, of course, to be understood that the invention may be constructed in various other manners and the parts associated in different relations and, therefore, I do not desire to be limited in any manner except as set forth in the claims hereunto appended.

Having thus described my invention what I claim is:

1. In a drilling apparatus, a casing, a rotary drill bit carried by said casing, a prime mover carried by said casing for rotating said drill bit, a plurality of suction pipes in said casing and opening out through the lower end of the drill casing, the upper ends of said suction pipes merging.

2. In a drilling apparatus, a fluid tight sealed drill casing, a rotary drill bit carried by said casing, an electric motor in said casing, a gear train connecting said motor and drill bit, and a plurality of suction pipes extending longitudinally through said drill casing to permit the drawing of liquid and drill cuttings upwardly out of the well as drilled.

3. In a drilling apparatus, the combination with a well casing, of a drill casing therein, a rotary drill bit carried by said drill casing, an electric motor in said drill casing, and a gear train connecting said motor and rotary drill bit, and a main suction pipe extending upwardly in said well casing, and a plurality of branch suction pipes communicating with said main suction pipe and extending longitudinally through said drill casing in spaced relation.

4. In a drilling apparatus, the combination with a well casing, of a drill casing therein, a rotary drill bit carried by said drill casing, an electric motor in said drill casing, and a gear train connecting said motor and rotary drill bit, a main suction pipe extending upwardly in said well casing, and a plurality of branch suction pipes communicating with said main suction pipe and extending longitudinally through said drill casing in spaced relation, a ring in said well casing, means carried by said drill casing for engagement with said ring to prevent upward movement of the drill casing in said well casing, and releasing means for said last named means.

5. In a drilling apparatus, the combination with a well casing, of a drill casing therein, a rotary drill bit carried by said drill casing, an electric motor in said drill casing, and a gear train connecting said motor and rotary drill bit, a main suction pipe extending upwardly in said well casing, and a plurality of branch suction pipes communicating with said main suction pipe and extending longitudinally through said drill casing in spaced relation, a ring in said well casing, means carried by said drill casing for engagement with said ring to prevent upward movement of the drill casing in said well casing and releasing means for said last named means, ears formed on said drill casing, inturned flanges on said well casing engaging the said ears to prevent rotary movement of the drill casing in the well casing.

In testimony whereof I affix my signature.

RALPH CAVERLY.