W. F. TROTTER.

DRILL.

APPLICATION FILED SEPT. 7, 1906.

1,087,089.

Patented Feb. 10, 1914

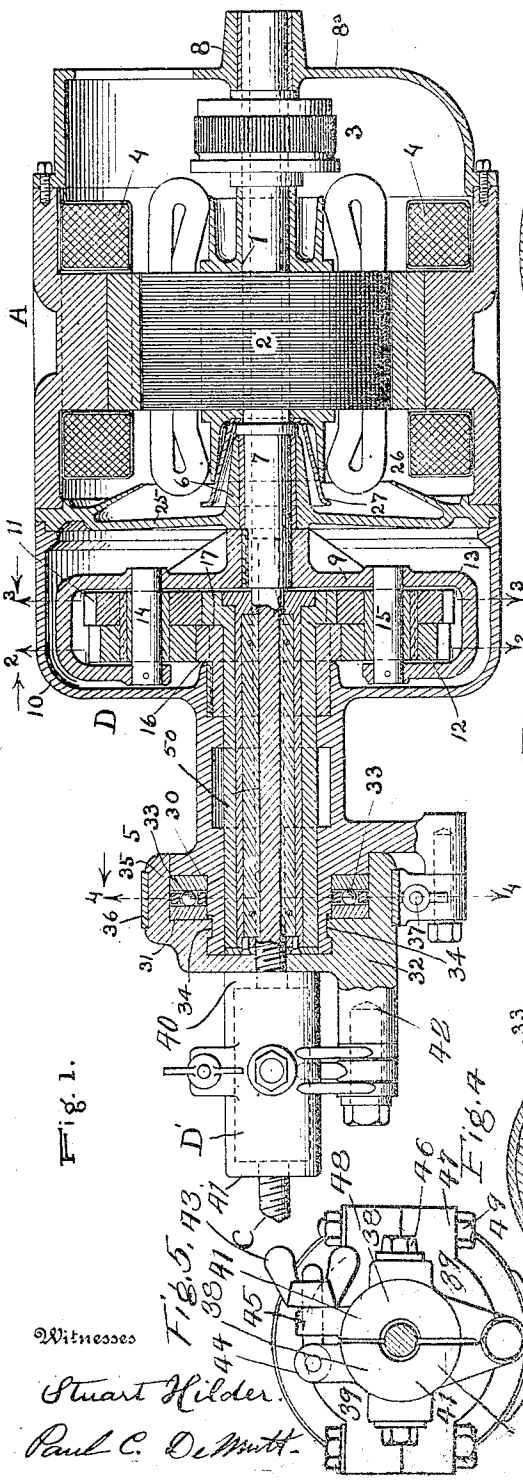


Fig. 1.

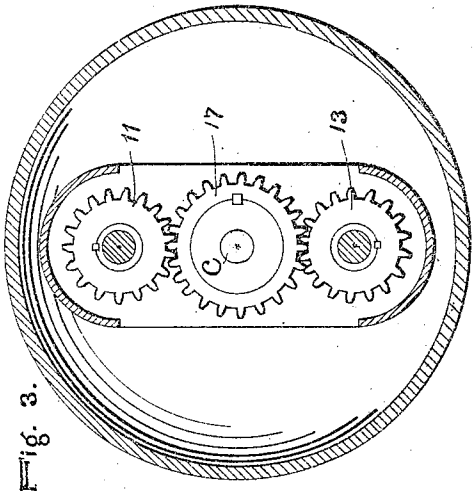


Fig. 3.

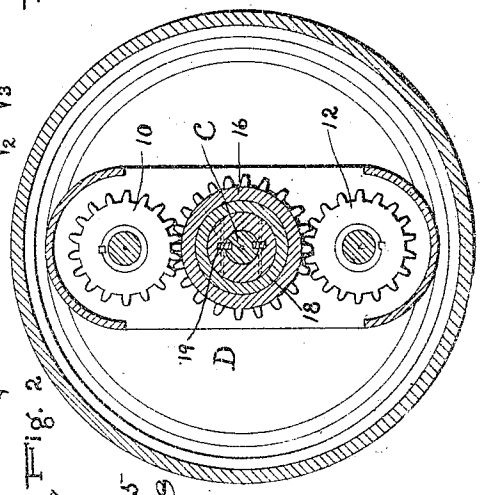


Fig. 2.

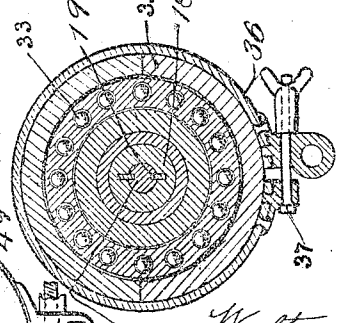


Fig. 4.

Fig. 5.

Witnesses

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UNITED STATES PATENT OFFICE.

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DRILL.

1,087,089. Specification of Letters Patent. Patented Feb. 10, 1914.

Application filed September 7, 1906. Serial No. 333,697.

To all whom it may concern:

Be it known that I, WALTER F. TROTTER, a citizen of the United States, residing at Charleston, in the county of Kanawha and State of West Virginia, have invented certain new and useful Improvements in Drills, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to improvements in electric drills of the sort used in drilling coal, rock and similar material.

The principal object of the invention is to provide in a drill of the sort referred to an improved general arrangement of parts, and especially an improved relationship between the feeding mechanism and the other elements.

Of the drawings, Figure 1 is a central longitudinal section of an apparatus embodying my invention; Fig. 2 is a section on the line 2—2 of Fig. 1, and Fig. 3 is a section on the line 3—3 of Fig. 1. Fig. 4 is a section on the line 4—4 of Fig. 1. Fig. 5 is an end view showing the feed nut and nut support.

The apparatus comprises an electric motor A, the drill stem C, gearing D, connecting the drill stem with the motor, and a split nut D′ of well known construction, for feeding the drill and drill stem axially. However, the mounting of this feed nut is novel in some respects, and the means combined therewith for controlling its movement relative to the stem, as will be hereinafter set forth.

Referring to the parts somewhat more in detail, 1 is a sleeve or hub for carrying the armature 2, the windings of which are connected to the commutator 3 in the usual manner. The commutator brushes may be of any suitable construction and supported and arranged in any proper way.

4, 4 indicate the coils of the field magnet, they being mounted upon the peripheral central part of the motor housing or casing, this casing serving to not only inclose the interior movable parts, but also providing supports for the bearings.

The armature shaft 7 is hollow, and has secured to it the armature sleeve or spider 1 and the commutator 3, and this hollow shaft is in turn supported by the bearings 6 and 8, the latter being formed in the end wall 8^a of the motor casing, and the former being supported upon a web or partition wall 25 at the opposite end of the motor casing. The interior of the housing as a whole is divided into two compartments by this web or wall 25, one compartment containing the gearing and the other the motor. This web or wall 25 also carries an annular oil receptacle 26 in which is collected any oil that escapes from the bearing 6 or which may otherwise come from the armature shaft. An oil throwing shell 27 is secured to the shaft, it extending beyond the windings of the armature so that the latter are fully protected from oil, the latter having as is well known, deleterious effect upon the windings when it comes in contact with them.

Fixed to the armature shaft 7 upon the opposite side of the web 25 from the motor is a head 9 in which are carried the gears for communicating motion to the drill stem. In this instance these gears are shown as 10, 11, 12 and 13. 10 and 11 are secured to each other so that they turn together about the axis of the pin 14 which is supported by the head 9 and the gears 12 and 13 are similarly mounted to turn about the pin 15. The gears 10 and 12 mesh with a fixed gear 16 which is secured to the frame of the apparatus while the gears 11 and 13 mesh with a gear 17 secured to a sleeve 18 rotatably-mounted in the bushing 50 within the frame.

When the head 9 turns with the armature shaft, the gears 10 and 12 will be turned about their axes by reason of their engagement with the stationary gear 16, and that their connected gears 11 and 13 will be rotated thereby imparting movement to the gear 17 and the sleeve 18. It will further be seen that by arranging the various gears with the proper number of gear teeth in a manner as is well understood, any desired ratio of revolution of the sleeve 18 to those of the armature shaft may be secured.

Secured to the sleeve 18 are longitudinally extending keys 19 which enter slots in the drill stem C so that the drill stem is carried by the sleeve in its rotation, but relative longitudinal movement is permitted, the stem extending through the hollow armature shaft. The working point of the drill is at the end of shaft opposite to the motor.

When the armature revolves its motion is transmitted through the gears on the head

9, and the sleeve 18 to the stem C, and the latter engaging with the nut D′ will (while turning) be fed longitudinally, so long as the nut is stationary. The casing 5, at the nut end, is provided with a shoulder 30, between which and a shoulder 31 upon the abutment casting 32 supporting the nut is a ball bearing 33, whereby the nut may turn upon the casing. The nut supporting casting is held in proper relation to the casing by means of a radial flange 34 upon the nut support which enters a corresponding groove in the casing. A sleeve 35 upon the nut support incloses the ball bearing, thereby protecting it and securing it in position. With these parts are combined frictionally acting devices by which the nut is held stationary during normal operation, but which permit it to rotate more or less rapidly when great resistance is experienced by the drill.

36 is a friction band applied to the exterior of the nut support, and having its ends secured to the casing. The tension of the band may be regulated by a screw 37. If the friction band has been set sufficiently tight the nut will be normally held stationary and the drill will be fed forward with its highest speed. But if for any reason the advance of the drill is impeded the frictional connecting devices will permit a yielding and the nut will turn with the stem, thus slowing down the drill more or less without effecting the speed of the motor.

The interiorly threaded feed-nut D′ is made in two halves 38—38. These two parts of the feed nut are held in engagement with the threaded drill stem by the two surrounding supporting pieces 39 provided with semi-circular end flanges 40—41 which hold the feed-nut D′ in fixed longitudinal relation with the drill support as a whole. The supporting pieces 39 are pivotally secured to the arm 42 of the casting 32 and are held in contact with the feed nut by means of the thumb-screw 43 engaging lugs 44 and 45 of the parts 39. The feed-nut is prevented from rotating relatively to its clamping supports 39 by means of the cap screws 46. The nut-supporting casting 32 is made in two parts 47—48 held together by the bolts 49.

I do not herein present claims relating to the gearing or power-transmitting devices or motor parts, such claims being presented in my application, Ser. No. 408,756, filed December 31, 1907.

What I claim is:

In a rotary drill the combination of a main frame, a rotatable driving sleeve longitudinally fixed with respect to the frame, a motor connected with the sleeve, a threaded drill stem splined in the sleeve, a longitudinally fixed abutment rotatably engaging the frame on the side at which the drill end of the stem projects, a manually regulable brake engaging the abutment and the frame, a removable split nut engaging the stem at points adjacent the abutment and at the side thereof away from the frame, and a clamp connected with the abutment and adapted to releasably engage the nut and hold the nut in engagement with the stem and in fixed position with respect to the abutment.

In testimony whereof I affix my signature, in presence of two witnesses.

WALTER F. TROTTER.

Witnesses:

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F. C. BOZENHARD.