No. 734,365. PATENTED JULY 21, 1903.

P. REINHALTER.

ROCK DRILL.

APPLICATION FILED AUG. 1, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

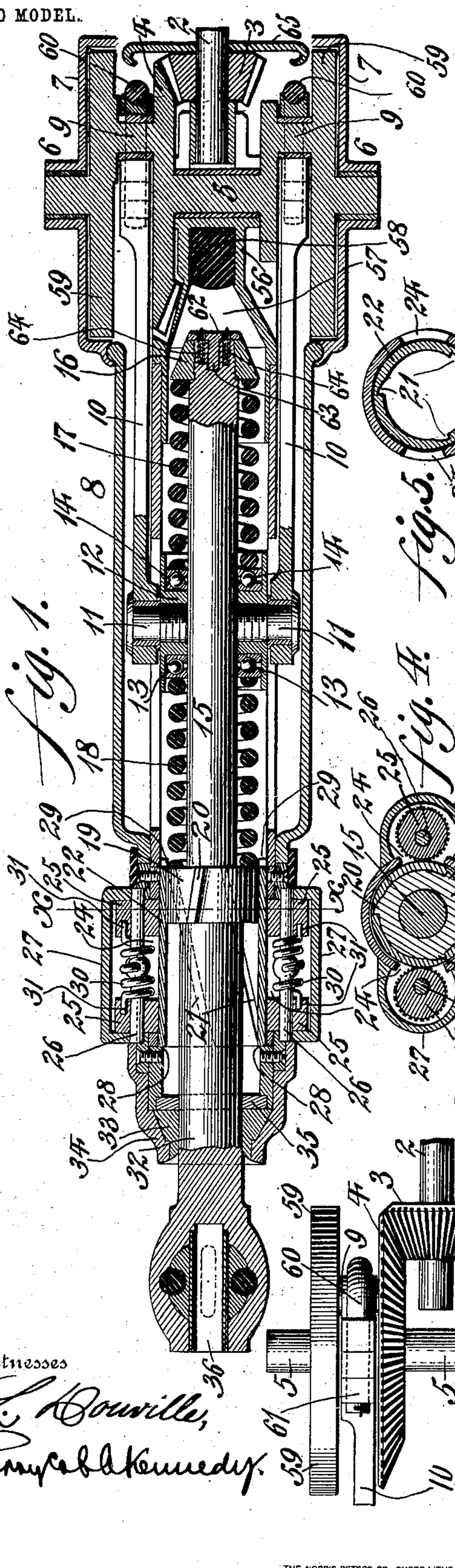

Fig. 1.

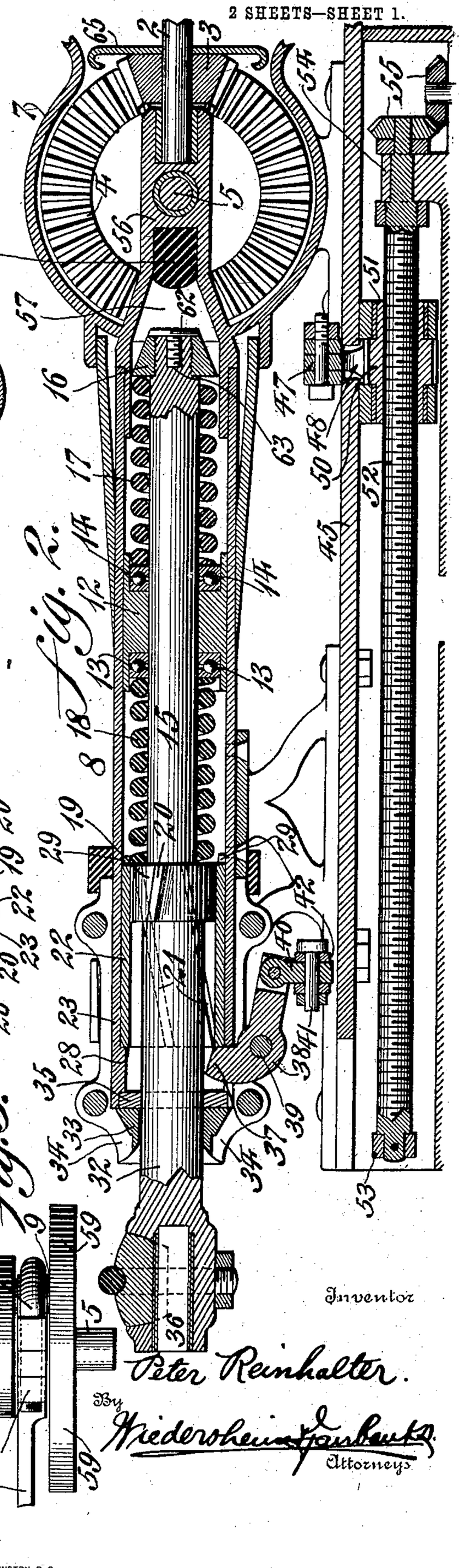

Fig. 2.

Fig. 4.

Fig. 3.

Witnesses

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NO MODEL. 2 SHEETS—SHEET 2.

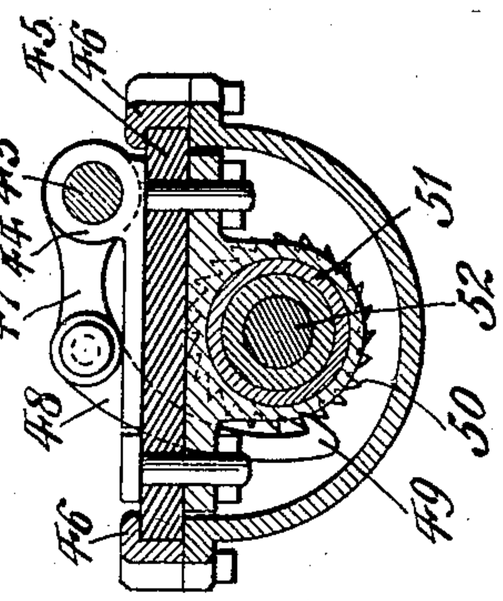

Fig. 7.

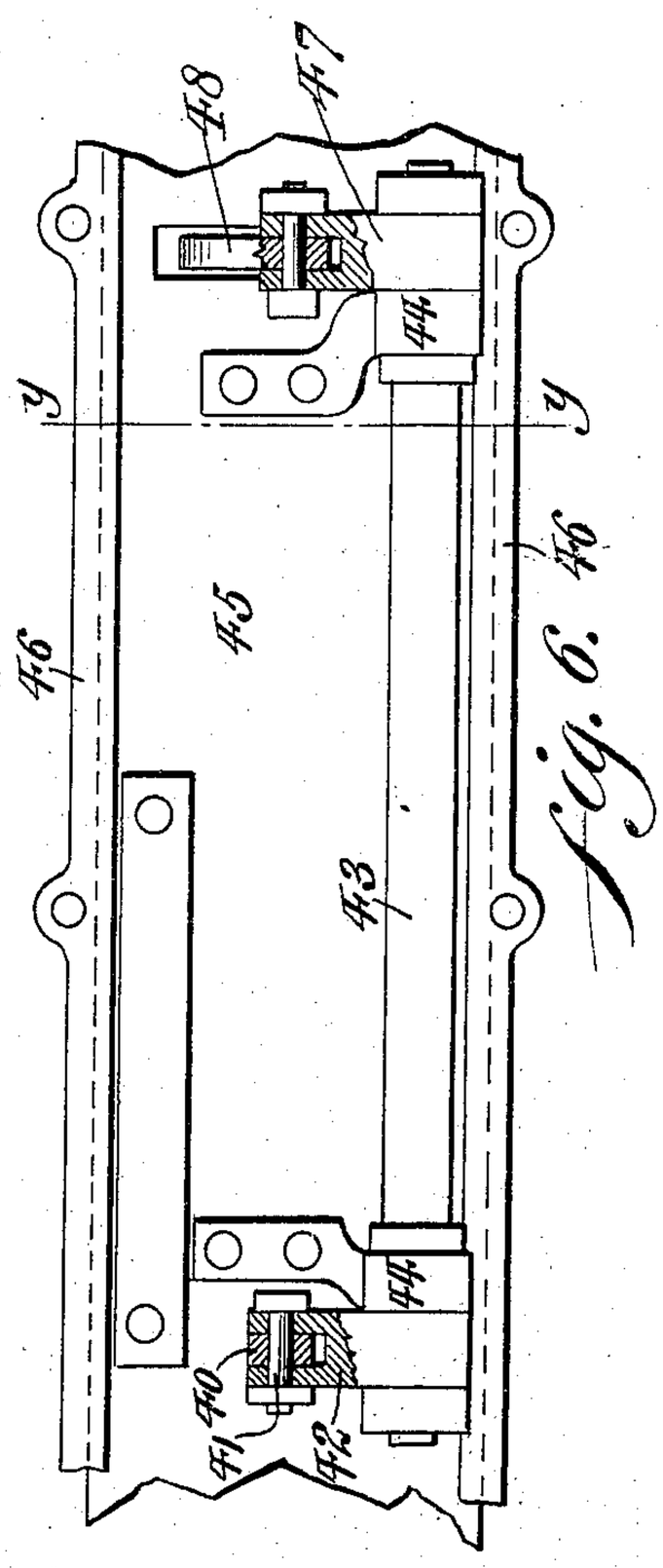

Fig. 6.

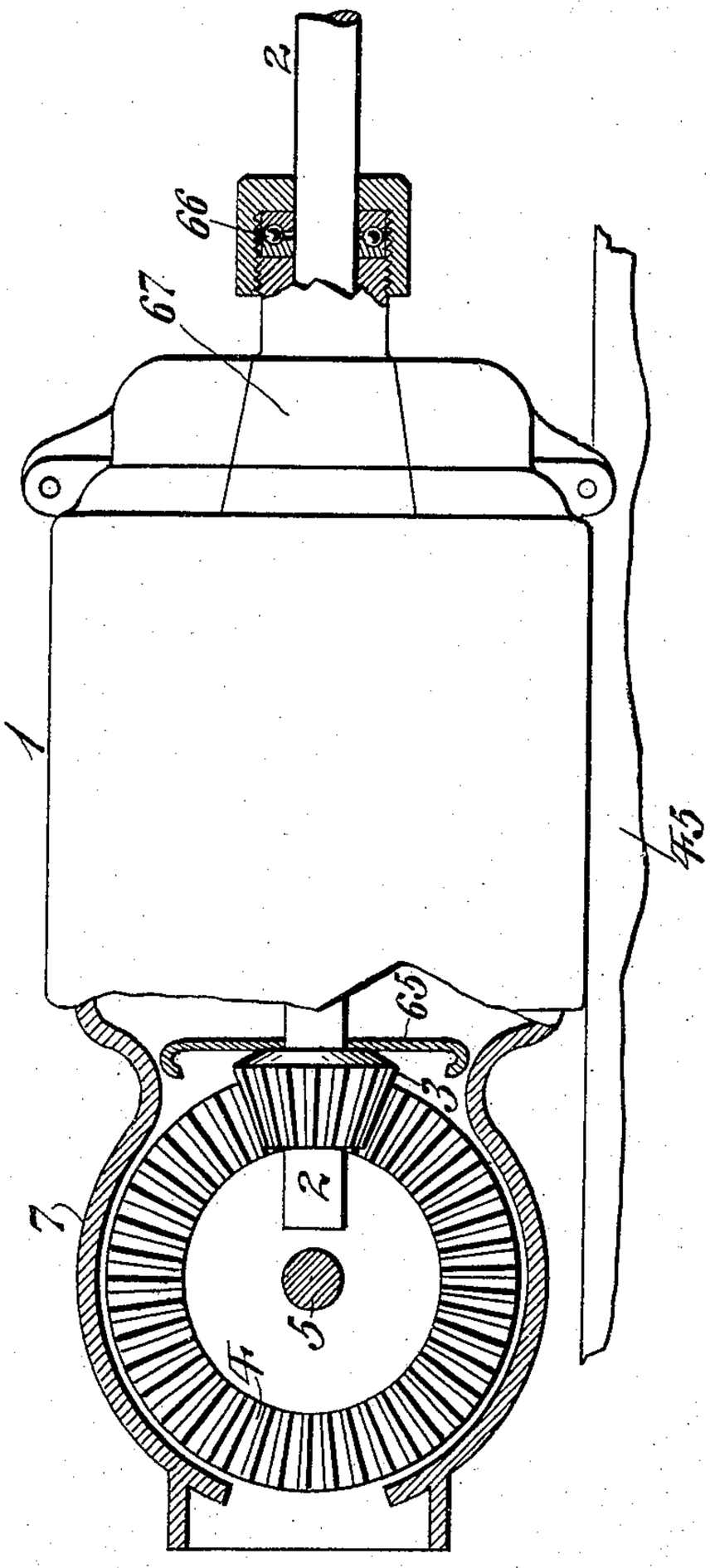

Fig. 8.

Witnesses

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No. 734,365. Patented July 21, 1903.

UNITED STATES PATENT OFFICE.

PETER REINHALTER, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO QUINCY ELECTRIC DRILL COMPANY, A CORPORATION OF NEW JERSEY.

ROCK-DRILL.

SPECIFICATION forming part of Letters Patent No. 734,365, dated July 21, 1903.

Application filed August 1, 1902. Serial No. 117,929. (No model.)

To all whom it may concern:

Be it known that I, PETER REINHALTER, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Improvement in Rock-Drills, of which the following is a specification.

My invention consists of a new construction of a rock-drill which is especially adapted to be operated by means of power taken from an electric motor or other source of energy, whereby the great expense heretofore incurred in the installation of rock-drills and plants wherein steam-engines, hydraulic, pneumatic, or similar apparatus are employed is obviated, as is also the expense ordinarily incurred in connecting the drills with their motors and in providing for the frequent changes of position thereof and their distance from the prime motors because of the costly and cumbersome appliances usually necessary to transmit the power from the motors to the operative parts of the drills.

My invention also consists in novel means for reciprocating and imparting the necessary rotary movement to the drill-rod simultaneously with the reciprocation of the latter.

It also consists of novel means for feeding the entire rock-drill forward bodily at the desired intervals.

It also consists of a novel construction of a sleeve which is immovable longitudinally, but capable of rotary movement and adapted after being rotated slightly to be locked in position by a novel construction of roller-clutch, provision being also made for restoring the cams of said clutch to their original or normal position during the reciprocation of the drill-rod.

It also consists of novel details of construction, all as will be hereinafter set forth, and pointed out in the claims.

Figure 1 represents a longitudinal sectional view of a rock-drill embodying my invention, several of the parts being shown in elevation. Fig. 2 represents a longitudinal sectional view of my novel construction of rock-drill, showing also means employed for feeding the same forwardly at the desired periods. Fig. 3 represents a plan view showing the beveled gearing and its adjuncts whereby the drill is operated. Fig. 4 represents a section on line $x\,x$, Fig. 1, showing relative positions of the roller-clutch and its adjuncts. Fig. 5 represents a section on line $x\,x$, Fig. 1, showing the drill-rod and roller-clutch removed. Fig. 6 represents a plan view of a portion of Fig. 2, showing the devices for feeding the drill forwardly. Fig. 7 represents a section on line $y\,y$, Fig. 6. Fig. 8 represents a side elevation, partly in section, of the motor-casing and the gearing whereby the drill is operated.

Similar numerals of reference indicate corresponding parts in the figures.

Referring to the drawings, 1 designates a casing of an electric or other motor, upon the shaft 2 of which is mounted the bevel-pinion 3, which meshes with the bevel-gear 4, which is secured to or mounted on the crank-shaft 5, which is mounted in suitable bearings 6 in the casing 7 of the rock or other drill 8.

9 designates cranks or crank-pins, upon which are mounted the connecting-rods 10, whereby the pins 11 are actuated or reciprocated, said pins being secured to the cross-head 12, which is provided with the ball-bearing devices 13 and 14 on opposite sides thereof.

15 designates the drill-rod, the latter having on one extremity thereof the nut or equivalent device 16, which may be secured to said drill-rod by any suitable means, the spring 17 being retained in position between said nut 16 and the ball-bearing devices 14.

18 designates a spring having one end abutting against the ball-bearing devices 13, while its other end contacts with the head 19, which is carried by or secured to the drill-rod 15, said head 19 having the inclined tongues 20 thereon, which are adapted to coact with the inclined grooves 21 in the sleeve 22, which is capable of rotary movement to a limited extent, as will be explained, said sleeve being prevented from longitudinal movement by its contact with the shoulders 28 and 29. The sleeve 22 is partly surrounded by the case 23, which has the opposite openings 24, adjacent to which are located the cams or rollers 25 of the roller-clutch, which are arranged in pairs, as will be apparent from Figs. 1 and 4, said

cams or rollers being rotatable and mounted on the rods 26, which latter are supported in the casings 27 or by any other suitable means, it being understood that said cams or rollers are rotatable to a certain extent freely upon said rods 26, but that the latter are fixed or non-rotatable in said casings 27.

The exterior periphery of each of the cams or rollers 25 is roughened or milled, so that there is a frictional contact between their outer surfaces and the contiguous surfaces of the sleeve 22, it being noticed that the cams or rollers and their adjuncts normally appear as seen in Fig. 4, so that a slight rotation of said cams or rollers and sleeve 22 is permitted when the drill-rod moves forward or to the left until the contact of the thicker portions of the cams or rollers prevents further rotation of said sleeve. When the drill-rod moves backwardly or to the right, the torsional effect of the springs 30 will cause said cams or rollers to assume the position seen in Fig. 4 again, said springs having their extremities 31 secured in said cams or rollers, as will be apparent from Fig. 1.

It will be understood that it is the torsional effect of the springs 30, together with the eccentric mounting of the rollers 25, that prevents locking of the sleeve on the backward movement of the drill-rod, the said springs taking effect to throw the cams or rollers 25 out of engagement with the sleeve as soon as the drill-rod starts on its backward movement.

32 designates the forward extension of the drill-rod, which projects through the packing 33, contained within the nose-piece 34, said packing being held in position by the plate 35, which latter is secured in place within the case 23, said extension having the socket 36 therein for the reception of the shank of the drill, cutter, or other tool.

When the head 19 reaches its extreme forward or left-hand position, it will contact with and depress the nose 37 of the dog 38, which is pivotally mounted on the pin or other support 39, whereby the link 40, which is pivotally attached by the pin 41 to the rock-arm 42, will be actuated, and with it said rock-arm, thereby oscillating the shaft 43, which is mounted in the bearings 44, attached to the plate or bed 45, which is longitudinally mounted in the ways 46, as will be understood from Figs. 6 and 7.

47 designates an arm mounted on the shaft 43 and having the pawl 48 pivoted thereto, said pawl having the nose 49, adapted to engage the teeth of the ratchet-wheel 50, which latter is mounted on the follower 51 of the feed-screw 52, which is supported in suitable bearings 53 and 54 below the plate or bed 45.

55 designates bevel-gearing, whereby the movement of the feed-screw can be reversed by hand or otherwise, if desired. In practice I support the crank-shaft 5 in a suitable bearing 56, wherein I locate also the bearing for the shaft 2, opposite to which is the pocket or chamber 57, wherein I locate the buffer of rubber or other material 58.

The operation is as follows: The rotation of the shaft 2 by the electric or other motor causes the rotation of the gear 4 and through the intermediate connections the reciprocation of the connecting-rods 10 and the cross-head 12, the movement of which latter is imparted to the drill-rod 15 by means of the cushioning devices or springs and their adjuncts, as will be apparent to those skilled in the art. The forward movement of the head 19 of the drill-rod will at first impart a rotary movement to the sleeve 22, which rotation will be imparted to the cams or rollers 25 until the latter are locked tightly against said sleeve and further rotation of said sleeve is prevented. It will, however, be apparent that during the continued forward movement of said head the latter and the drill-rod will be rotated by the coaction of the tongues and grooves 20 and 21, as is evident. When the drill-rod, head, and their adjuncts move backwardly or to the right, the springs 30 will cause the cams or rollers 25 to resume their normal positions, as seen in Fig. 4. When the head 19 reaches its extreme forward position, it will contact with the nose 37 of the dog 38, whereby the shaft 43 will be rocked, thereby actuating the feed-screw by means of the intermediate mechanism, (seen in Figs. 2, 6, and 7,) whereby the bed or plate 45, which supports the drill and its adjuncts, will be fed forwardly, as is evident.

It will be apparent that I have omitted from certain views certain parts clearly seen in other views for the sake of clearness of illustration and that changes may be made in the manner of locating and assembling the feeding devices and the mechanism for rotating the drill-rod which will come within the scope of my invention, and I do not, therefore, desire to be limited to the exact construction I have herein shown and described.

It will be apparent that the crank-wheels 59 are in practice counterbalanced and made in one piece or integral with the crank-shaft and that the connecting-rods 10 are secured to the cranks by means of the bolts 60, which are secured in position by the nuts 61.

The nut 16 is locked upon the rod 15 by means of the head 62 of the screw 63, and, if desired, a dowel pin or pins 64 may be employed for further security, as seen in Fig. 1. I also locate in practice an oil shield or plate 65 on the shaft 2, whereby oil is prevented from being thrown or discharged upon the motor. All the shaft and motor bearings are self-lubricating, and the motor within the casing 1 is provided with the ball-bearing thrust 66, (seen in Fig. 8,) whereby all undue strains are taken up or equalized, and I also provide the motor with a plurality of openings 67.

Having thus described my invention, what

I claim as new, and desire to secure by Letters Patent, is—

1. In a rock-drill, a drill-rod, means for reciprocating the latter, means on said drill-rod for rotating a sleeve, means for locking said sleeve after its initial rotation, whereby the continued forward movement of said drill-rod will cause its rotation and torsional means for automatically unlocking said sleeve as the drill-rod moves in the reverse direction.

2. In a rock-drill, a drill-rod, means for reciprocating the latter, a head on said drill-rod, inclined tongues on said head, a sleeve surrounding said head, inclined grooves in said sleeve, cams located oppositely to said sleeve and torsional devices for rendering said cams inoperative as the drill-rod moves in a backward direction.

3. In a rock-drill, a drill-rod, means for reciprocating the latter, a head on said drill-rod, inclined tongues on said head, a sleeve surrounding said head, inclined grooves on said sleeve and cams located oppositely to said sleeve, in combination with torsional devices for rendering said cams inoperative as the drill-rod moves in a backward direction, devices for restoring said cams to their normal position and feed mechanism automatically controlled by the movement of said sleeve.

4. In a rock-drill, a drill-rod, means for reciprocating the latter, a head on said drill-rod, inclined tongues on said head, a sleeve surrounding said head, inclined grooves in said sleeve and cams located oppositely to said sleeve, in combination with torsional springs coacting with said cams mounted to be actuated as the drill-rod moves backward, to restore the cams to their normal positions.

5. In a rock-drill, a drill-rod, means for reciprocating the latter, a head on said drill-rod having inclined tongues, a sleeve surrounding said head and having inclined grooves therein coacting with said tongues, rods mounted in proximity to said sleeve, cams rotatably mounted on said rods, and springs connected with said cams to serve as torsion devices for restoring said cams to normal position.

6. The combination of a rock-drill and drill-rod, a bed or plate upon which said drill-rod is supported, a rock-shaft on said bed, extending longitudinally thereof, substantially parallel with said drill-rod, a dog adapted to be actuated by the movement of said drill-rod, a connection from said dog to said drill-rod and mounted for positive engagement with said dog to actuate the same as the drill-rod moves forward, a feed-screw located in proximity to said bed, and connections from said rock-shaft to said feed-screw for operating the latter.

7. In a rock-drill, a motor, a crank-shaft, a suitable bearing for said crank-shaft, a bevel-gear mounted on said crank-shaft, a bevel-pinion meshing with said gear, a shaft upon which said pinion is mounted, a bearing for the extremity of said shaft located in proximity to the bearing for said crank-shaft, a chamber located oppositely to said bearings and provided with a buffer, a drill-rod, and connections from said crank-shaft to said drill-rod for reciprocating the latter.

8. In a rock-drill, a motor, a crank-shaft, a bearing for the latter, a bevel-gear mounted on said shaft, a bevel-gear meshing with said gear, a shaft upon which said gear is mounted, a bearing for the extremity of said shaft located in proximity to the bearing for the crank-shaft, a chamber located oppositely to said bearings and provided with a buffer, a drill-rod, connections from said crank-shaft to said drill-rod for reciprocating the latter, and an oil-shield located between said gearing and motor.

9. In a rock-drill, a cross-head, ball-bearing devices on said cross-head, a drill-rod passing through said cross-head, a head on the forward extremity of said drill-rod, a nut on the rear end of said rod, means for locking said nut in position, springs interposed between said head and nut and said ball-bearing devices respectively, a shaft-bearing having a pocket, a buffer in said pocket in line with said nut, means coacting with said head for rotating said drill-rod, and connections to said cross-head for reciprocating the latter.

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