(No Model.) 2 Sheets—Sheet 1.

G. GUNTZ.

ELECTRIC ROCK DRILL.

No. 387,160. Patented July 31, 1888.

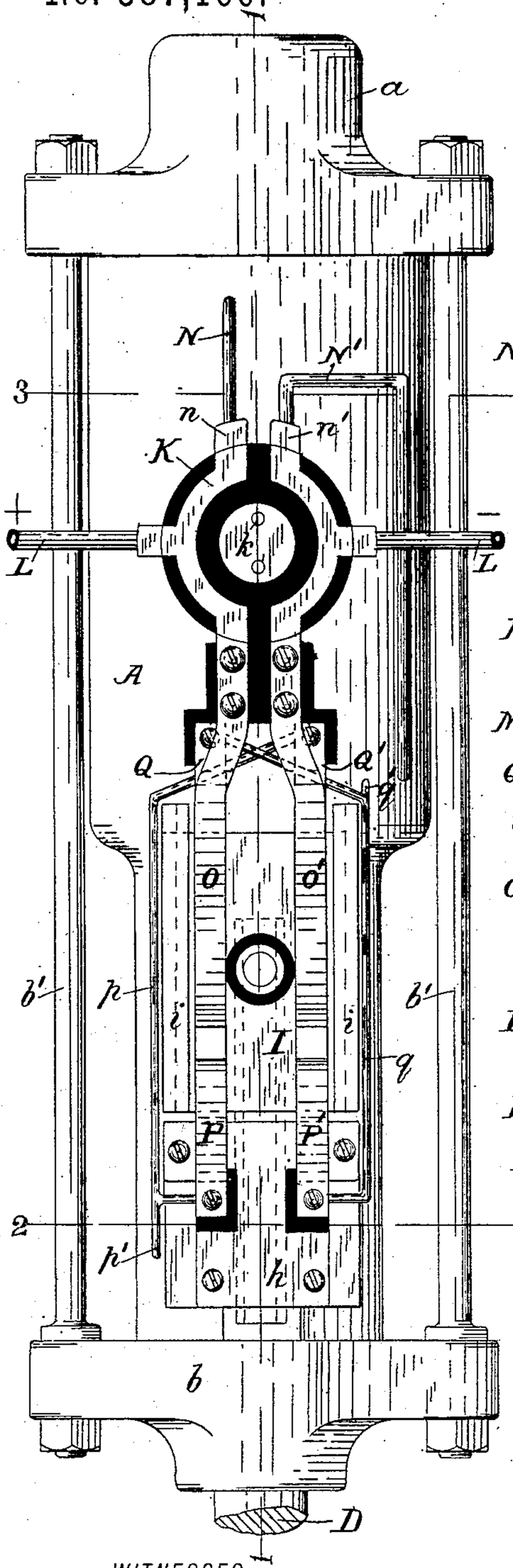

Fig. 1

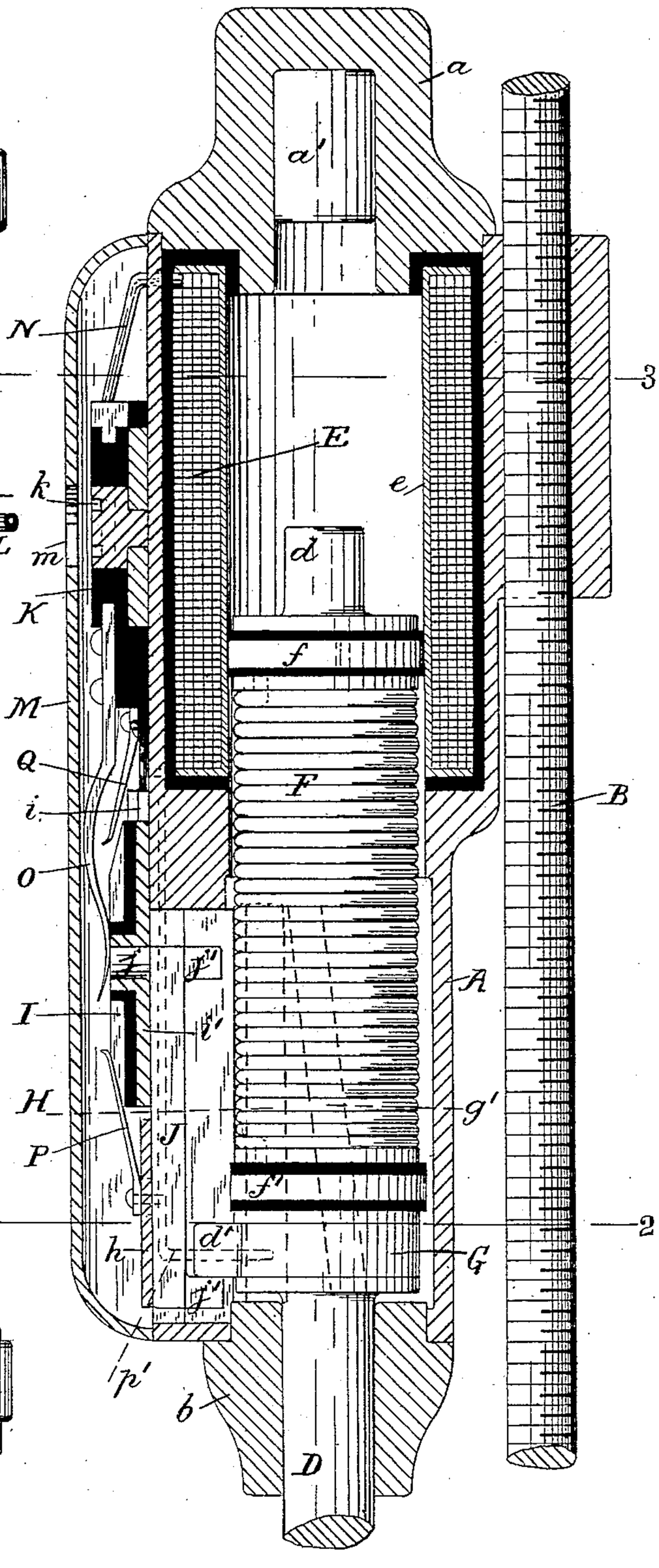

Fig. 2

WITNESSES:

W. D. Porter.

Frank Swoope.

INVENTOR,

George Guntz.

BY

Herbert W. T. Jenner.

ATTORNEY.

(No Model.) 2 Sheets—Sheet 2.

G. GUNTZ.

ELECTRIC ROCK DRILL.

No. 387,160. Patented July 31, 1888.

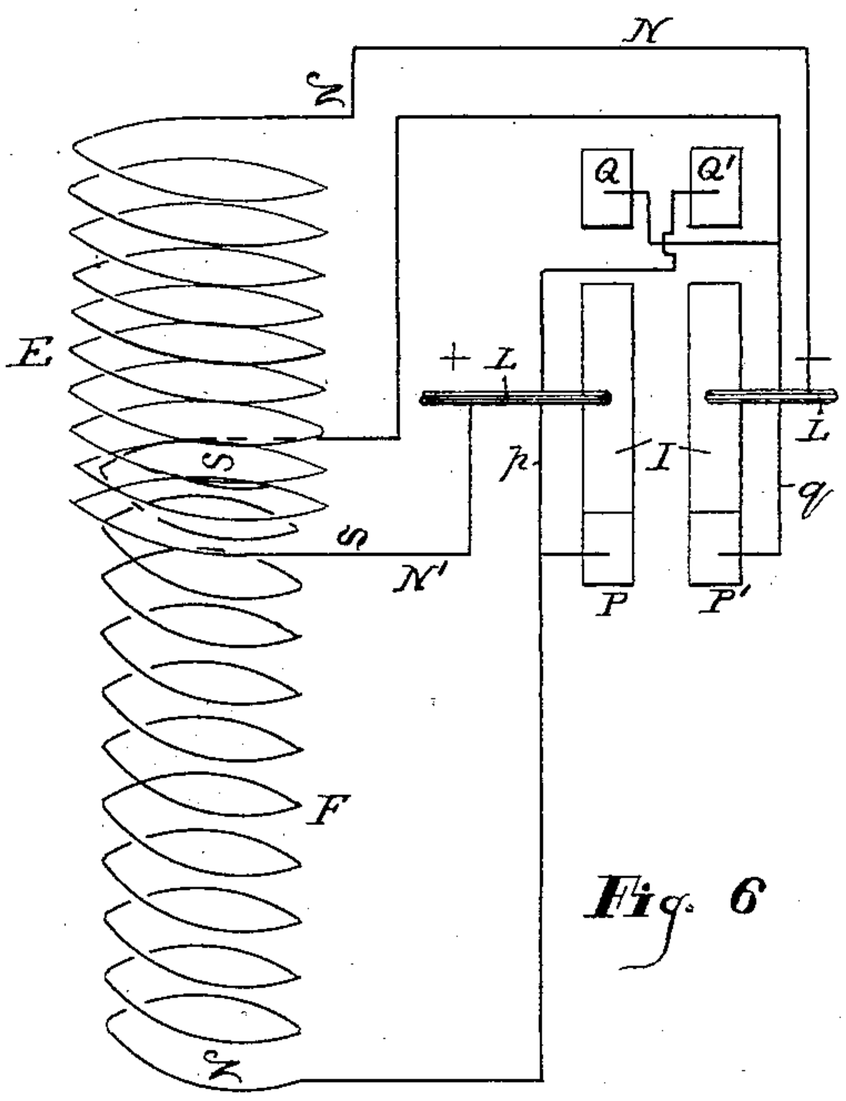

Fig. 6

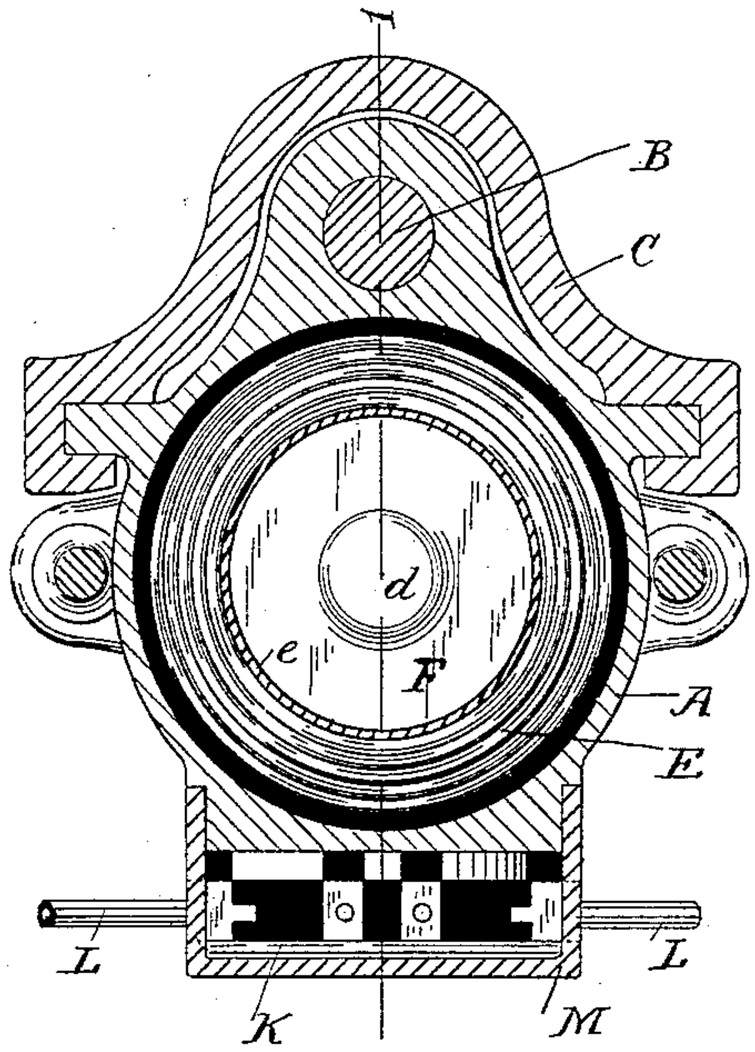

Fig. 4

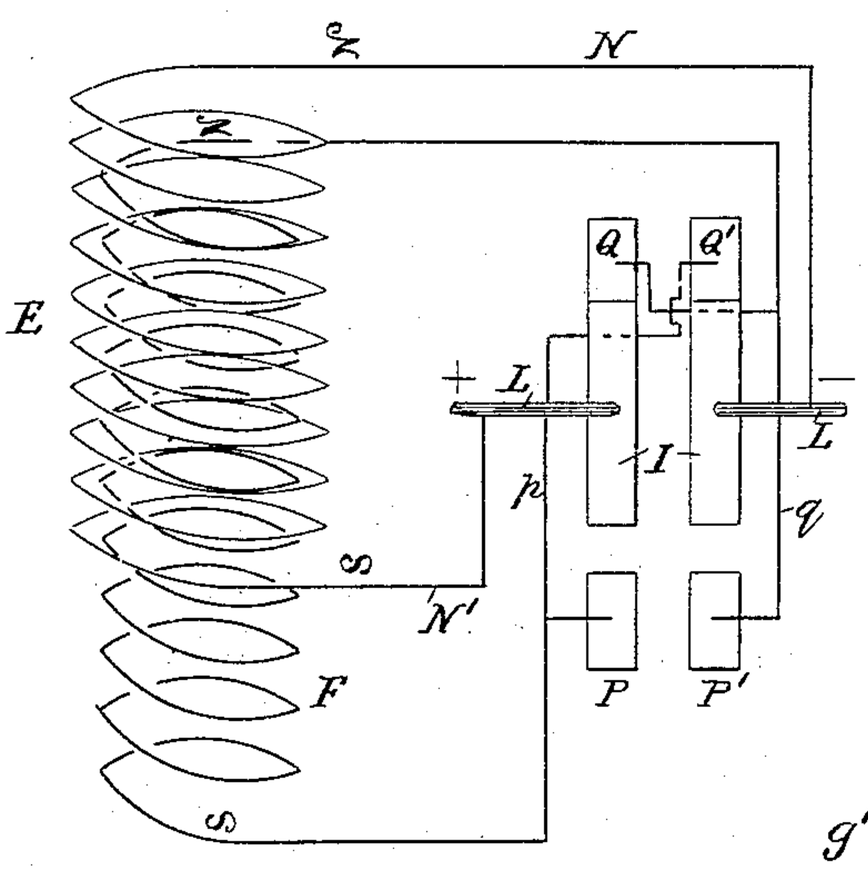

Fig. 5

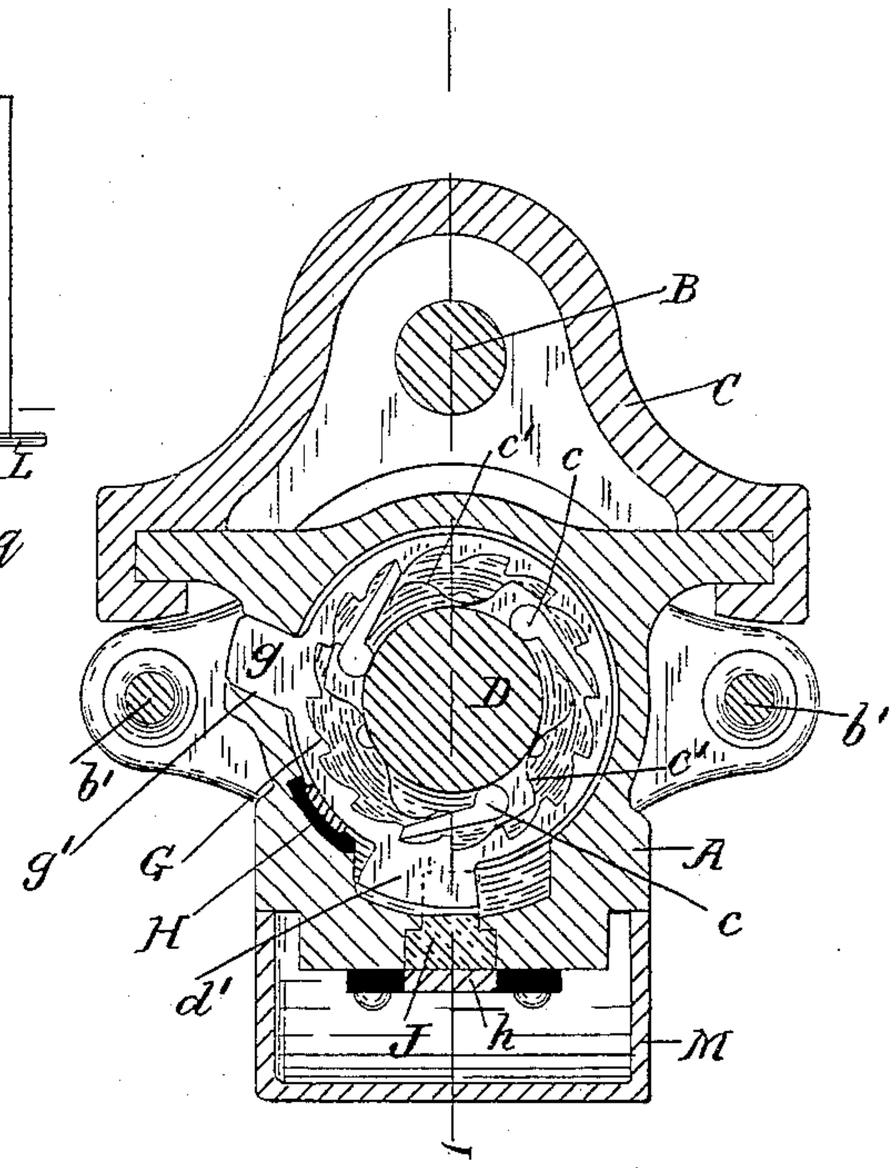

Fig. 3

WITNESSES:

W. D. Porter.

Frank Snook.

INVENTOR,

George Guntz.

BY

Herbert W. J. Jenner.

ATTORNEY.

UNITED STATES PATENT OFFICE.

GEORGE GUNTZ, OF WILKES-BARRÉ, PENNSYLVANIA.

ELECTRIC ROCK-DRILL.

SPECIFICATION forming part of Letters Patent No. 387,160, dated July 31, 1888.

Application filed June 30, 1887. Serial No. 242,987. (No model.)

To all whom it may concern:

Be it known that I, GEORGE GUNTZ, a citizen of the United States, residing at Wilkes-Barré, in the county of Luzerne and State of Pennsylvania, have invented certain new and useful Improvements in Electric Rock-Drills; and I do hereby 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.

This invention relates to electric rock-drills; and it consists in the novel construction and combination of the parts hereinafter fully described and claimed, whereby the drilling-tool is operated positively in both directions by the alternate attraction and repulsion of a single solenoid-helix.

In the drawings, Figure 1 is a front elevation of the working portions of the rock-drill embraced by this invention. Fig. 2 is a longitudinal section through the same, taken on line 1 1 in Figs. 1 and 4. Figs. 3 and 4 are respectively cross-sections taken on lines 2 2 and 3 3 in Figs. 1 and 2. Figs. 5 and 6 are diagrams which show respectively the electric connections when the armature of the solenoid is attracted and repelled.

A is the casing which incloses and supports the electric mechanism.

B is a screw by means of which the casing is adjusted with respect to the supporting-frame C, a portion of which is shown in cross-section in Figs. 3 and 4, and which, being of the ordinary construction common to most rock-drills, is not further shown or described.

D is the spindle of the armature, to which the drilling-tool is connected.

A cap, *a*, is secured at the top of casing A, and is provided with a buffer of india-rubber, *a'*, for the projection *d* of the armature to strike against. A cap, *b*, is also secured to the lower end of the casing, and forms a guide for the armature-spindle. Rods *b'* connect the two caps securely together and to the casing.

E is the solenoid-helix, which is wound upon the cylinder *e* and insulated within the upper end of the casing. All the insulating material is shown black in the drawings, for clearness, whether in section or not.

F is the armature, consisting of a coil of wire wound upon a central spindle, and *f f'* are insulated metallic rings mounted upon the spindle above and below the coil, respectively, and having the opposite ends of said coil connected to them. The ring *f* works freely in the cylinder *e* and in contact with its surface. An internal ratchet-wheel, G, is loosely journaled on the lower part of the armature-spindle below the ring *f'*, and reciprocates with the spindle. Pawls *c* are pivoted to the said spindle and pressed outward into the ratchet-teeth by the springs *c'*. A projection, *g*, is formed on the ratchet-wheel and slides within the slanting groove *g'* in the lower part of the casing. When the armature is attracted within the solenoid-helix, the ratchet-wheel partly revolves the armature-spindle, being connected to it by the spring-pawls; but when the armature is repelled the pawls disengage and the spindle descends vertically without turning back with the ratchet-wheel.

H is an insulated metallic strip secured within the casing, and which is always in contact with the ring *f'*. A second projection, *d'*, is also formed on the ratchet-wheel for operating the commutator or circuit-breaker I, which consists of an insulated plate of metal working between the guides *i* and mounted on the back plate, *i'*.

J is a vertically-sliding bar having a pin, *j*, for carrying the commutator and lugs *j'* for the projection *d'* to strike against. A plate, *h*, serves to retain the lower end of the bar J in position.

K is an insulated switch pivoted to the casing and connecting the terminals of the main wires L with the mechanism of the drill. Two holes, *k*, are formed in the switch, into which a key can be inserted for turning it.

M is an outer casing covering the contact-brushes and provided with the hole *m*, through which the switch-key may be inserted. This outer casing prevents the wet from short-circuiting the various parts when the drill is working in exposed places.

N and N' are wires provided with contact-plates *n* and *n'*, and which are permanently connected to the upper and lower ends, respectively, of the solenoid-helix. These wires are connected with the main wires by the switch, and the current passing through them

is obtained from any approved generator of electricity.

O and O′ are insulated brushes which are always in contact with the commutator I, and which are also connected to the main wires by the aforesaid switch.

P P′ and Q Q′ are also brushes with which the commutator is alternately brought in contact. The lower brush, P, and the upper brush, Q′, are connected together by the wire *p*, a continuation, *p′*, of which also connects with the metallic strip H inside the casing. The lower brush, P′, and the upper brush, Q, are connected together by the wire *q*, a continuation, *q′*, of which is connected to the cylinder *e*. The current in the armature-coil is reversed at each end of its stroke, but the current in the solenoid-helix is always constant in one direction. Of course this condition might be reversed, and the current made continuous through the armature and reversed in the solenoid-helix.

When the parts are in the position shown in Figs. 2 and 6, the positive current passes through the switch, down brush O, through the positive side of the commutator into brush P, thence through the wires *p* and *p′*, through strip H into ring *f′*, and through the armature-coil, thence through ring *f* and cylinder *e*, down wires *q′* and *q*, through brush P′ into the negative side of the commutator, which is connected to the negative end of the main wire by the brush O′ and the switch. When the armature is attracted within the solenoid-helix, the projection *d′* strikes the upper lug, *j′*, and puts the brushes Q and Q′ into contact with the commutator. This position of the parts is illustrated in Fig. 5. The positive current now passes from the positive side of the commutator through brush Q and wires *q q′* into the cylinder *e*, thence through the armature coil and strip H, down wires *p′* and *p*, through brush Q′ to the negative side of the commutator. This mechanism is simple and effective, and it will be seen that the armature is free to move up and down and revolve without any danger of twisting off wires, there being no movable wires connected to it.

What I claim is—

1. In an electric rock-drill, the combination, with a solenoid-helix, of an armature provided with a coil, one of the said elements being stationary and having its current constant in one direction and the other element having its current reversible at each end of its stroke, a connection-piece at each end of the armature-coil, a metallic surface inside the solenoid-helix in constant contact with one of the said pieces, a strip of metal in constant contact with the other piece, and a commutator for reversing the current of the reciprocating element at each end of its stroke.

2. In an electric rock-drill, the combination, with a stationary solenoid-helix, of a reciprocating armature, a connection-piece at each end of the armature, a metallic surface inside the solenoid-helix in constant contact with one of the said pieces, a strip of metal in constant contact with the other said piece, and a commutator for reversing the direction of the current through the armature at each end of its stroke.

3. In an electric rock-drill, the combination of a single solenoid-helix, an armature provided with a coil working within the said helix for actuating the drill positively in both directions, insulated upper and lower rings connected to the ends of the said coil, a cylinder within the said helix and always in sliding contact with the upper ring, a metallic strip always in sliding contact with the lower ring, and a commutator for reversing the current through the armature-coil at each end of its stroke.

4. In an electric rock-drill, the combination of a single solenoid-helix, an armature provided with a coil working within the said helix for actuating the drill positively in both directions, the insulated rings *f* and *f′*, the cylinder *e* in contact with ring *f*, the metallic strip H in contact with ring *f′*, the projection *d′*, connected to the armature, and a commutator reciprocating between electric contact-brushes and provided with lugs for the said projection to strike against, whereby the current through the armature-coil may be automatically reversed at each end of its stroke.

5. In an electric rock-drill, the combination of a solenoid-helix and an armature for reciprocating the drill, a switch connecting the terminals of the main wires with the actuating mechanism of the drill, and one or more casings wholly inclosing the said actuating mechanism and the switch, protecting them from wet, and provided with a small aperture, through which the said switch may be operated.

6. In an electric rock-drill, the combination of the solenoid-helix provided with wires N and N′, connecting it continuously with the main-circuit wires, the armature provided with the coil and with the rings *f* and *f′* in contact with the ends of the coil, the cylinder *e* and the metallic strip H, always in contact with the rings *f* and *f′*, respectively, the contact-brushes P P′ and Q Q′, connected to the strip and to the cylinder, substantially as set forth, and the commutator connected to the main-circuit wires and reciprocated between the said brushes by the armature, whereby the current passing through the armature-coil may be automatically reversed at each end of its stroke.

7. In an electric rock-drill, the combination of the solenoid-helix provided with the wires N and N′, connecting it continuously with the main-circuit wires, the armature provided with the coil and with the rings *f* and *f′* in contact with the ends of the coil, the cylinder *e*, and the metallic strip H, always in contact with the rings *f* and *f′*, respectively, the contact-brushes P P′ and Q Q′, connected to the strip and to the cylinder, substantially as set forth, the brushes O and O′, connected with the main

circuit, the commutator in constant sliding contact with the brushes O and O′ and reciprocating between brushes P P′ and Q Q′, and a sliding bar provided with lugs and actuated by a projection on the armature-spindle for carrying the commutator, whereby the said commutator may be reciprocated and the current passing through the armature-coil reversed at each end of its stroke.

8. In an electric rock-drill, the combination of an inclosing-case provided with the slanting groove *g′*, a solenoid supported in the case, a reciprocating armature provided with a spindle projecting from the case for actuating the drill, an internal ratchet-wheel reciprocating with the armature and provided with a projection engaging with said groove *g′*, and a spring-pawl pivoted to the spindle and engaging with the ratchet-wheel, whereby the drill will be revolved, substantially as set forth.

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

GEO. GUNTZ.

Witnesses:
WM. C. PRICE,
GEO. H. MONTGOMERY.