(No Model.)

I. E. STOREY.

ELECTRIC DRILL.

No. 420,500. Patented Feb. 4, 1890.

Fig. 1

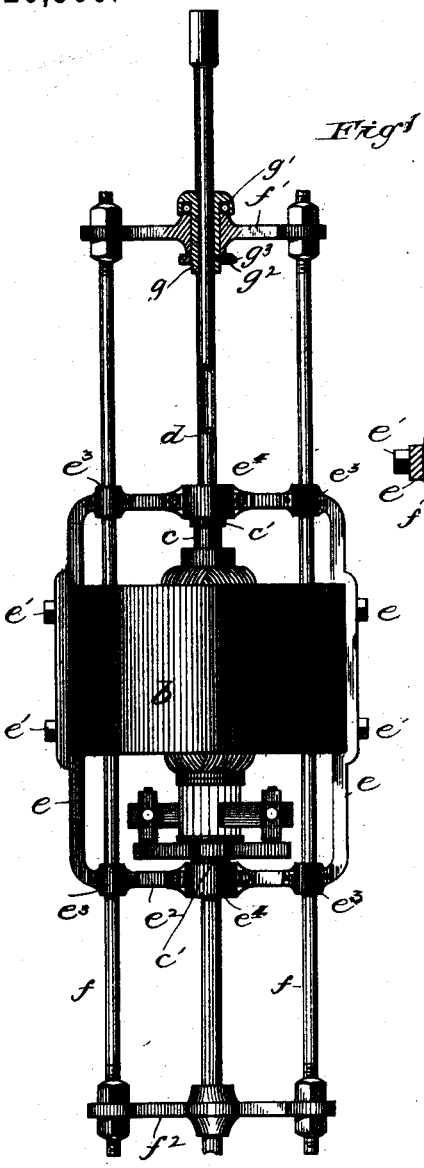


Fig. 2

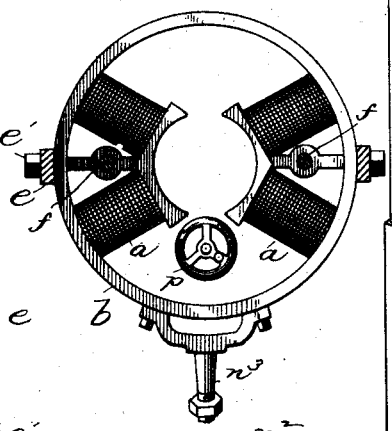


Fig. 4.

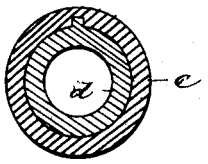
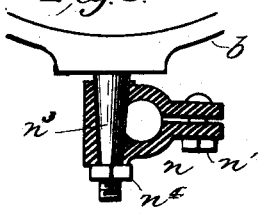


Fig. 3.

Fig. 5.



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ELECTRIC DRILL.

SPECIFICATION forming part of Letters Patent No. 420,500, dated February 4, 1890.

Application filed April 16, 1889. Serial No. 307,417. (No model.)

To all whom it may concern:

Be it known that I, IMLE E. STOREY, a citizen of the United States, residing in Boulder, in the county of Boulder and State of Colorado, have invented certain new and useful Improvements in Electric Drills, of which the following is a specification.

My invention relates to electric drills. It has particular reference to the general form of drill shown and described in my application serially numbered 281,609, filed August 1, 1888.

The object of the present invention is to improve the construction of the frame of the drill and the means for manipulating it.

The invention consists in the details of construction, which will now be described with reference to the accompanying drawings, in which—

Figure 1 represents a side elevation of the drill. Fig. 2 represents a lateral section through the frame, showing the motor in plan. Fig. 3 is a perspective view of the standard or holder with universal-joint mechanism used in the manipulation of the drill. Fig. 4 is an enlarged section of the armature and drill shafts; and Fig. 5 is a detail section of the universal joint, showing my improved compound clamping arrangement.

This is a rotary diamond drill, the drill-point being shown at the upper end of Fig. 1. The drill is driven by an electric motor of the same general construction as shown in my application above referred to—that is to say, the field-magnets *a* are bolted to an annulus *b*, while the armature occupies a central position within the annulus, and its shaft *c* connects directly with the drill-shaft *d*.

In my application referred to above the motor and its frame were mounted to slide within the main frame of the drill, while in this case the motor and its frame are stationary, and the main frame of the drill carrying the drill-point is movable or adapted to slide within the motor-frame. The motor is supported in a rectangular frame *e*, the annulus being inclosed by and bolted to it, as shown at e' e'. The cross-bars e^2 are provided with babbitted boxes e^3 and journal-boxes e^4. In the boxes e^4 the armature-shaft *c* has its bearings. The armature-shaft is prevented from partaking of a longitudinal motion by means of collars c' c', adjusted upon the shaft against the journal-boxes. The drill-shaft proper *d* is hollow to allow of the passage of water to the drill-point, and it extends through the armature-shaft and is feathered thereto in the manner shown in Fig. 4. This admits of longitudinal motion of the drill-shaft independently of the armature-shaft, but they rotate together.

The main frame of the drill consists of the side rods *f f* and the end pieces f' f^2. The rods *f* are adapted to slide through the boxes e^3, and they are rigidly connected by means of binding-nuts to the cross-pieces f' f^2. These rods instead of passing on the outside of the motor, pass directly through the annulus *b*, between bobbins of the field-magnets of the motor. By this construction the drill is made much more compact and quite as strong as the construction of my other drill referred to.

The box through which the drill-shaft *d* passes in the cross-piece f' is fitted with peculiar form of ball-bearing. It consists of a sleeve *g*, feathered to and surrounding that portion of the shaft within the bearing, and one end of the sleeve is formed with an annular groove g', containing the steel balls. The balls rest against the shoulder of the box in the manner shown, and the sleeve is held in its position by nut g^2 on the side of the bearing opposite the balls. The nut g^2 and sleeve *g* are locked to the drill-shaft by means of a small screw g^3 passing through the same and into the shaft. This necessitates the rotation of the sleeve and nut with the drill. By removing the screw g^3, I am enabled to withdraw the drill-shaft entirely from the frame without removing or taking apart the ball-bearing.

The drill described in the above-referred-to application was supported by means of a tripod. This drill it is designed to support upon a single standard, which may be rigidly bolted to the floor and roof of the mine or to any suitable frame-work. I mount upon the standard a spring-clip *m*, provided with finger or bracket m'. This clip is adjustably secured to the standard by means of tightening-bolts m^2. Upon the finger m' there is supported a second spring-clip *n*, which may be rigidly fastened thereto by tightening-bolts n'. The clip *n* may be rotated to any

position on the finger m'. This clip is provided with a socket n^2, which is adapted to receive a conical pin n^3, projecting from the side of the annulus b of the drill or from a bracket secured thereto. The construction of the socket n^2 with respect to the clip n is such that the opening of the socket and the opening for the pin m' run together, as shown in Fig. 5. The purpose of this construction is to secure additional binding-leverage to prevent vibration of the drill as far as possible. When the bolts n' are tightened, the pin m' is forced against the pin n^3, thus clamping the two pins together besides clamping the clip upon the pin m', and when the nut n^4 on the lower end of pin n^3 is screwed up tightly a very stiff connection is maintained between the drill and the standard.

The feeding mechanism is substantially of the same form as that described in my application hereinbefore referred to, but it may be of any suitable design.

The hand-wheel p (shown in Fig. 2) is intended to represent the mechanism for manipulating the feed.

Having thus described my invention, I claim—

1. The combination, with a drill and its rectangular frame, of an electric motor whose field-magnets are connected by a metallic ring, two of the side pieces of the drill-frame passing through said metallic ring and occupying positions between the bobbins of the field-magnets.

2. The combination, with a drill and its rectangular frame, of an electric motor whose field-magnets are connected by a metallic ring, a frame connected with the ring and supporting the armature-shaft, two of the side pieces of the drill-frame passing through said metallic ring and through bearings in the motor-frame and occupying positions between the bobbins of the field-magnets.

3. The combination, with a drill and its frame, of a motor inclosed within a ring, the frame of the drill passing through the ring.

4. The combination, with a drill and its frame, of a motor inclosed within a ring, bearings attached to said ring, the drill-frame being arranged to slide in said bearings and through the ring.

5. The combination, with a drill having attached to some portion of its frame the conical pin n^3, spring-clip n, provided with conical socket n^2, and a second straight socket at right angles thereto, the two sockets or openings communicating with each other on the inside, for the purpose described.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

IMLE E. STOREY.

Witnesses:
WM. A. ROSENBAUM,
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