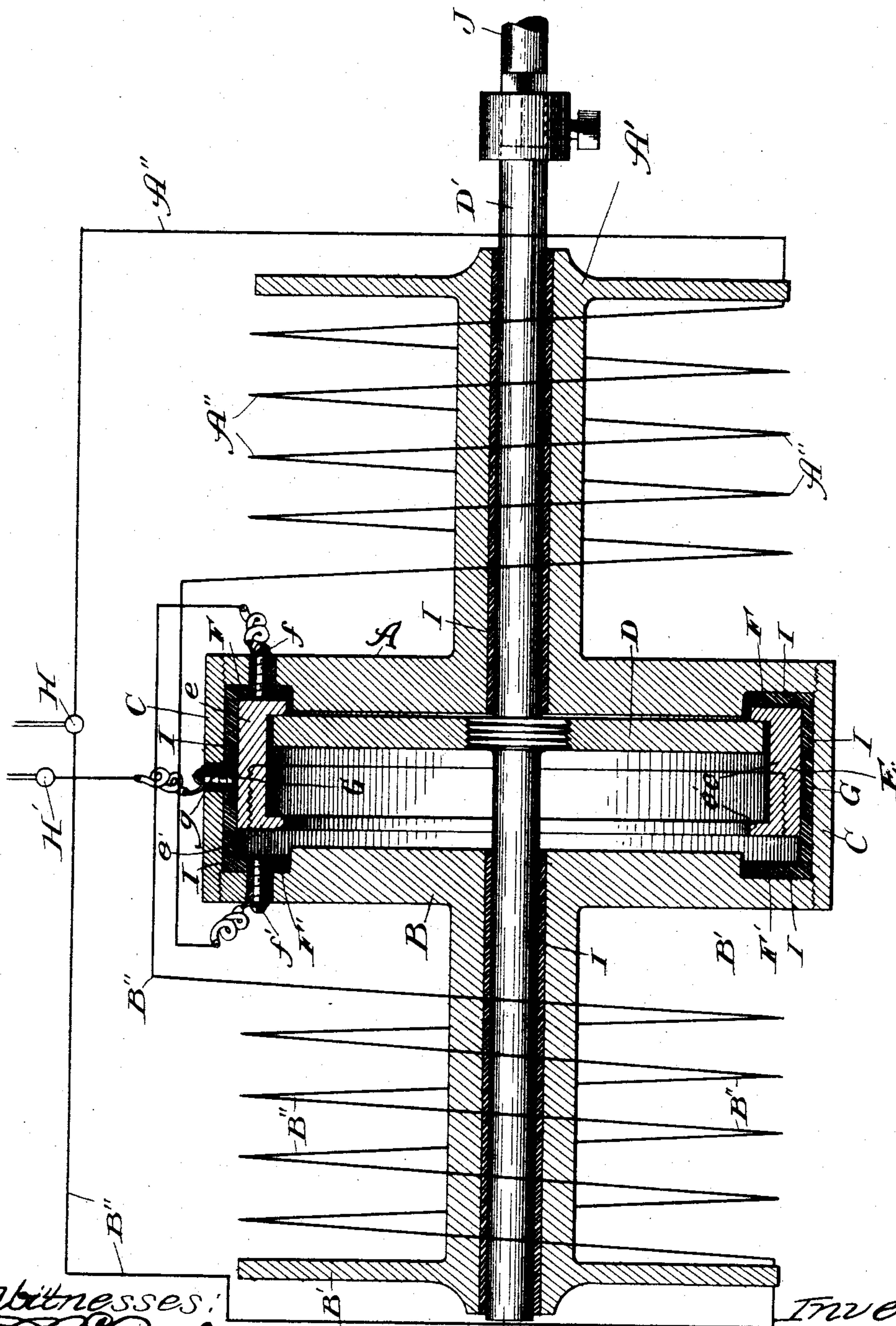


(No Model.)

G. BUCHANAN.
ELECTRIC DRILL.

No. 438,837.

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UNITED STATES PATENT OFFICE.

GORDON BUCHANAN, OF CHICAGO, ILLINOIS.

ELECTRIC DRILL.

SPECIFICATION forming part of Letters Patent No. 438,837, dated October 21, 1890.

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To all whom it may concern:

Be it known that I, GORDON BUCHANAN, a citizen of the United States, residing at Chicago, Illinois, have invented a new and useful Improvement in Electric Drills, of which the following is a specification.

The object of this invention is to provide a simple and efficient drill operated by means of electricity and adapted for use in coal-mines and other places where a drill may be employed; and the invention consists in the features and details of construction hereinafter described and claimed.

The drawing represents a central sectional view of my improved drill, the wire of the magnets being merely shown in a general way.

A and B are two electro-magnets; A' and B', the spools thereof; A'' B'', the wires with which the same are wound.

C is a ring connecting the spools A and B; D, an armature; D', the drill-stock attached thereto; E, a circuit-closer; F F', contact-rings; f, the binding-post connecting with the contact-ring F, and to which the wire B'' is attached. f' is a similar binding-post connecting with the contact-ring F' and the wire A''; G, a contact-ring inclosing the circuit-closer E; g, a binding-post connecting with such plate and with the wire leading from one pole of the dynamo; H, a binding-post connected with the other pole thereof, and I is suitable insulating material.

The spools A and B are made of soft iron, and preferably in the form shown in the drawing. They are preferably connected, as shown, by means of a ring C, one of the spools screwing into each end of such ring. Inside of the case thus formed is placed the movable circuit-closer E. This consists of a ring of metal of the form shown, and preferably made in two pieces e e', screwing together to facilitate the assembling of the parts. The circuit-closer is kept from contacting with the ring C by means of suitable insulating material I.

The contact-rings F F' are made of any suitable conducting material and held out of contact with the ends of the spools A B by means of insulating material interposed between them. Surrounding the circuit-closer, in contact therewith, and preferably embedded in insulating material, is a ring G of suitable conducting material. Binding-posts f, f', and

g are provided, connecting with these contact-plates. The purpose of making these contact-plates F, F', and G in the shape of rings is in order to insure more uniform working of the parts, since these rings will be in contact with the circuit-closer E throughout its whole circumference, instead of at a single point, thus insuring contact between circuit-closer and ring, even though the parts of the device wear so as to cause the circuit-closer to move unevenly.

The armature D consists of a circular disk of soft iron of any suitable dimensions, adapted to contact, as shown, with the flanges on the circuit-closer E. This disk is secured by screw-threads or otherwise to the drill-stock D', which passes, as shown, through each of the spools, which are cored out to afford a bearing for it. A layer of insulating material I is placed between this drill-stock and the inner surface of the spools. In one end of this stock is secured the drill J, of any suitable form, and which, being well known, need not be further shown or described.

The wire A'' is connected with the binding-post f', then passes to and is wound around the spool A' in the well-known manner, and then passes to the binding-post H. In the drawing I have merely shown four or five coils of wire wound around the spool; but it will of course be understood that the spool is to be wound in the ordinary manner. The wire B'' is connected with the binding-post f, then passes to and is wound around the spool B', and thence to binding-post H, which, as above stated, is connected with one of the poles of the dynamo. From the binding-post H', which is connected with the other pole, a wire runs to the post g.

The parts may be put together in the following manner: The spool B' is screwed into the ring C, and the ring F', together with its insulating material, is secured in a channel, preferably formed in the end of the spool, and the contact-ring G, with its insulating material secured inside of the ring C. The part e' is then screwed out of the circuit-closer and the part e passed over the armature. Such part e' is screwed back again, after which the circuit-closer and armature may be placed inside of the ring C. The drill-stock may then be secured to the armature, or this may be

done before the armature is put inside of the ring C. The ring F, with its insulating material, may then be attached to the spool A', and the latter passed down over the drill-stock 5 and screwed into the ring C. The wires are then connected as above described, and the device is then ready for operation, the mode of which is as follows:

The parts being in the position shown in the 10 drawings, the current from one pole of the dynamo flows in through post *g*, passing through the ring G, circuit-closer E, ring F, and binding-post *f* into the wire B'', magnetizing the spool B'. The spool then attracts 15 the armature D. As this moves toward the right it strikes during the latter part of its stroke against the flange on the part *e'* of the circuit-closer and moves the latter toward the right, breaking the contact with the plate F 20 and bringing it into contact with the plate F'. The instant this contact is made the current flows through the post *g*, plate G, circuit-closer E, plate F', binding-post *f*, and wire A'', magnetizing the spool or core A'. This in turn 25 attracts the armature, breaks the contact with the ring F', and renews it with the plate F, when the core B' becomes magnetized and acts as before. In this way a constant and rapid motion is given to the drill-stock. Each 30 time the armature moves toward the left it carries the drill with it, striking the blow, and then moves toward the right to get ready for a new blow. The drill may be used in any position and in any place desired.

35 From the form of the circuit-closer it will be evident that the armature will not move it to break contact until the latter part of its stroke. This leaves the circuit-closer in connection with one magnet until the armature 40 approaches nearly to the other magnet, when the circuit-closer will be moved to break such connection and make connection with the other magnet.

I do not of course desire to limit myself to 45 the exact forms herein shown—as, for instance, the contact-plates F, F', and G need not be made in the form of rings, but may be simple plates adapted to contact with the circuit-

closer E, and similar changes may be made without departing from the spirit of my invention. Furthermore, the form of the circuit-closer may be altered in any way desired, the only requisite being that this circuit-closer shall be operated by the movement of the armature, and any other form that will allow 55 of this comes within the spirit of my invention.

I claim—

1. In an electric drill, the combination of two electro-magnets, connected substantially 60 as shown and provided with hollow cores or spools, a movable armature placed between such magnets, a drill-stock attached to such armature and passing through the hollow cores or spools, and a circuit-closer adapted to 65 be moved by the armature to close the circuit with each of said magnets in alternation, substantially as described.

2. In an electric drill, the combination of two electro-magnets A and B, having hollow 70 cores and connected by means of a ring C, an armature D, a drill-stock D', attached thereto, a circuit-closer E, surrounding such armature, contact-plates F F', connected with the wire of the magnets B and A, respectively, 75 and contact-plate G, connected with the dynamo, all combined and operating substantially as described.

3. In an electric drill, the circuit-closer E, made in two flanged portions *e e'*, screwing 80 together, as shown, substantially as described.

4. In an electric drill, the combination of an electro-magnet A and contact-plate F, magnet B and plate F', plate F being connected with magnet B and plate F' with magnet A, 85 an armature placed between and actuated by such magnets, and a circuit-closer operated by means of such armature, whereby as the armature is attracted by one magnet it moves the circuit-closer to break connection there- 90 with and make connection with the other magnet, substantially as described.

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Witnesses:

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