(No Model.)

P. R. SKINNER.

ELECTRICAL DENTAL PLUGGER.

No. 557,159. Patented Mar. 31, 1896.

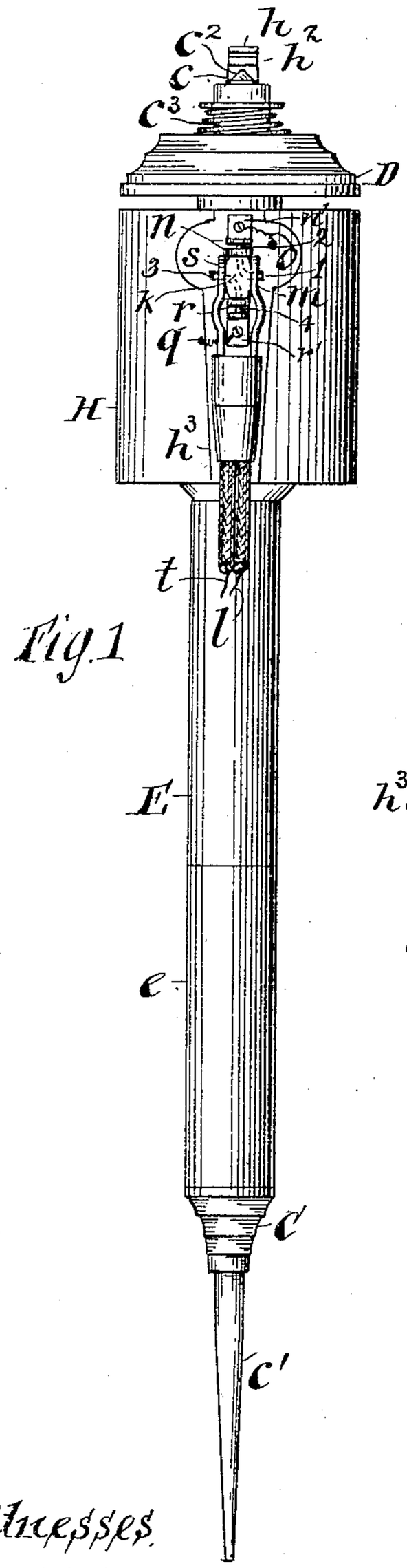

Fig. 1

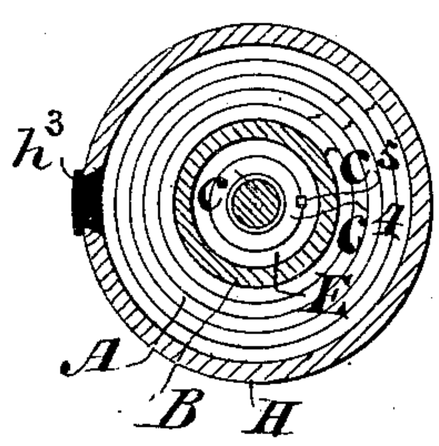

Fig. 3

Fig. 2

Witnesses.
Geo. Wadman,
Pierson L. Wells.

Inventor,
Perry R. Skinner,
by his attorney,
Edwin H. Brown

UNITED STATES PATENT OFFICE.

PERRY R. SKINNER, OF ONEONTA, NEW YORK, ASSIGNOR OF ONE-HALF TO ARTHUR S. BARNES, OF SAME PLACE.

ELECTRICAL DENTAL PLUGGER.

SPECIFICATION forming part of Letters Patent No. 557,159, dated March 31, 1896.

Application filed May 6, 1895. Serial No. 548,223. (No model.)

To all whom it may concern:

Be it known that I, PERRY R. SKINNER, a citizen of the United States, residing at Oneonta, in the county of Otsego and State of New York, have invented a new and useful Improvement in Dental Pluggers, of which the following is a specification.

My invention relates particularly to that class of electrical apparatus known as "electric hammers" or "electric mallets," in which a reciprocating armature is employed to deliver blows upon a tool held against an object.

In order to explain the principles of my invention I will describe an article embodying the same, and will then point out the novel features in the claims.

The article which I have selected for the purpose of illustration is a device combining an electromagnet having an automatically-reciprocating armature with a tool-holder provided at its lower end with a tool and designed for use in the practice of dentistry.

Figure 1 is a front view of this device. Fig. 2 is a vertical cross-sectional view of Fig. 1 as cut by a plane passing through its axis and perpendicular to the plane of the paper, some of the parts not being in section. Fig. 3 is a top view of the section *x x* of Fig. 2.

Similar letters and numerals refer to corresponding parts throughout the several views.

The electromagnet consists of a coil of wire A, placed on a soft-iron core B, formed in the shape of a hollow cylinder having a flange *b* on its lower end. A disk *b'* similar to the flange *b* is fastened on its upper end and holds the coil in place. A cylindrical inclosing case H surrounds the coil and is suitably connected with the flange *b*. Into the lower end of the core B is screwed a hollow arm E, in which works a tool-holder in the form of a rod *c*, terminating at its lower end in a head C, in which any desired kind of tool, as *c'*, may be held. The rod *c* passes up through the hollow center of the core B and carries at its extreme upper end a contact-point c^2, preferably of platinum.

The armature D of the electromagnet extends over the top of the same and partly projects into the hollow center of the core B, and is supported and carried by a sleeve *d*, loosely surrounding the rod *c* above the hollow arm E and within the center of the core. This armature is normally held away from the pole of the magnet by means of a retracting-spring *d'*, surrounding the sleeve *d* and interposed between the armature and the top of the hollow arm E. The armature is prevented from rising above the top of the rod *c* by means of a nut c^3 on the latter, and is freed from jarring in its movements by a spring surrounding the nut c^3 and held against the upper surface of the armature.

At the point where the rod *c* enters the hollow arm E it carries a collar c^4, the lower edge of which by striking the shoulder e^4 in the hollow arm limits the downward movement of the rod. This collar is provided with a feather c^5, which works in a groove in the hollow arm and prevents the rod *c* from rotating about its axis, but leaves it free to reciprocate parallel to the same. Below the collar c^4 and surrounding the rod *c* is a loose sleeve c^6, which is prevented from rising in the arm E by means of the shoulder e^5. A helical spring c^7, surrounding the rod and interposed between the sleeve and the head C, forces the rod downward. The shoulder e^6 above the head C limits the upward movement of the rod. The space therefore through which it is free to reciprocate is equal to the distance, when the rod is in its lowest position, between the shoulder e^6 and the head C. The arm E is suitably insulated at *e* from the hand of the operator.

An arm *h*, overhanging the upper end of the rod *c*, is attached to the inclosing case H and suitably insulated therefrom and adjustable thereon, so as to be moved away from or toward the end of the rod. A spring *h'* is carried by the overhanging arm *h* and is provided with a contact-plate h^2, preferably of platinum, placed directly above the platinum point c^2, so that by forcing the rod *c* upward against the spring an electrical connection will be established.

The overhanging arm in the drawings is held in a strip h^6 of suitable insulating material rendered adjustable on the inclosing case H by an adjusting-screw h^5, working in a projection h^4 on the case and bearing against the end of the insulating-strip. A set-screw h^7 passing through the slot h^8 in the strip secures the same when adjusted.

The inclosing case H is preferably constructed of soft iron and is closely fitted around the flange *b*, so as to form with the hollow core B a single magnet, of which the upper edge of the inclosing case constitutes one pole and the upper end of the hollow core constitutes the opposite pole. It will thus be seen that both poles act directly upon the armature D.

The positive and negative wires *l* and *t*, leading to a battery or other source of electrical supply, are properly insulated from each other and are connected to a universal joint *m n*, carried by the inclosing case H and insulated therefrom by a strip h^3 of any suitable insulator, electrical connections being made by the frictional contact of the bearings.

The special form of universal joint shown in the drawings is obtained by means of four pivot-pins 1, 2, 3, and 4, arranged diametrically opposite and so embedded in a mass *k* of insulating material as to be electrically connected in the pairs 1 2 and 3 4, each pair, however, being insulated from the other. The pins 1 and 3 work in the bearings *m* and *s*, which form the terminations of the wires *l* and *t*, respectively, while the pins 2 and 4 work in the bearings *n* and *r* attached to the insulating-strip h^3. In order to obtain a better electrical connection than would be secured by the frictional contact between the pivot-pins and their respective bearings, pressure-pieces *n'* and *r'* are shown attached to the bearings *n* and *r* and pressing against the ends of their respective pivot-pins.

The wire *l* is electrically connected with one end of the coil A through the bearings *m* and *n* of the universal joint *m n* and through the wire *o*, and the other end of the coil is connected by the wire *p* with the overhanging arm *h*.

The frictional contact between the rod *c* and the hollow arm E and the contact between the latter and the inclosing case electrically connects these parts, and by the short wire *q* attached to the inclosing case and the contact of the bearings *r* and *s* of the universal joint they are connected with the wire *t*.

The operation of the device is as follows: The tool *c'* is pressed against an object, which forces the rod *c* with its contact-point c^2 against the contact-plate h^2 and completes the circuit. The armature is drawn toward the magnet and the sleeve *d* strikes the collar c^4, delivering a blow to the tool-holder. By the movement thus imparted to the rod *c* relative to the magnet and its inclosing case the point c^2 and the plate h^2 separate and break the circuit, the armature returning to its upper position by the action of the spring *d'*. As the tool is held pressed against the object, contact is immediately restored, and the operation is repeated, a succession of blows being imparted to the tool-holder.

Having now described a device embodying my invention, and without limiting myself to this particular construction, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination of an electromagnet, an armature, a tool-holder whose reciprocations are controlled by the movements of the armature, supply-wires leading to and from the electromagnet, and a device for maintaining the continuity of the electric circuit between the terminals of the supply-wires and the coil of the electromagnet comprising a swivel connection, substantially as specified.

2. The combination of an electromagnet, a vibratory armature, a tool-holder whose reciprocations are controlled by the vibration of the armature, means for making and breaking the circuit through the coil of the electromagnet, supply-wires leading to and from the electromagnet, and a device for maintaining the continuity of the electric circuit between the terminals of the supply-wires and the coil of the electromagnet comprising a swivel connection having two axes of motion at right angles to each other, substantially as specified.

3. The combination of an electromagnet having an interior bore or cavity, a tool-holder extending through said cavity and mounted to have a lengthwise movement therein, a sleeve encircling said tool-holder and movable independently of the latter, a stop against which said sleeve impinges to cause a movement of the tool-holder, an armature whose movements control the movements of the sleeve, and means for making and breaking the circuit through the coil of the electromagnet to cause the vibration of the armature substantially as specified.

4. The combination of an electromagnet having an interior bore or cavity, a tool-holder extending through said cavity and mounted to have a lengthwise movement therein, a sleeve encircling said tool-holder and movable independently of the latter, a stop against which said sleeve impinges to cause a movement of the tool-holder, an armature whose movements control the movements of the sleeve, and a make-and-break device interposed in the electric circuit through the coil of the electromagnet, comprising an arm supporting a contact-piece and a contact-piece moving simultaneously with the tool-holder, substantially as specified.

5. The combination of an electromagnet comprising an inner and an outer cylindrical shell, a tool-holder extending lengthwise through the bore of the inner shell and mounted to have a lengthwise movement therein, a piece comprising an armature movable toward and away from the electromagnet, a stop against which this piece impinges to move the tool-holder, and means for causing the vibration of said piece to impart a reciprocating movement to the tool-holder, substantially as specified.

6. The combination of an electromagnet, a tool-holder, a piece comprising an armature, movable independently of the tool-holder and

adapted to impart to the latter a number of rapidly-succeeding blows, and a circuit-breaker interposed in the circuit comprising the coil of the electromagnet, and consisting of a contact-piece movable with the tool-holder, and an adjustable arm supporting a second contact-piece adapted to coact with the first-mentioned contact-piece, the circuit through the circuit-breaker being closed by pressure upon the tool-holder and opened by the forward movement of the same, substantially as specified.

7. A swivel connection for attaching electrical supply-wires, comprising a mass of insulating material, pivot-pins which are in electrical communication with said supply-wires, embedded in said insulating material and having ends projecting therefrom, and pieces in which said pivot-pins are journaled and through which the continuity of the electric circuit is maintained, substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

PERRY R. SKINNER.

Witnesses:
J. LEE FRISBEE,
ARTHUR S. BARNES.