

A. SPENCER.

ELECTRO-MAGNETIC DENTAL-MALLET.

No. 175,189.

Patented March 21, 1876.

Fig 1.

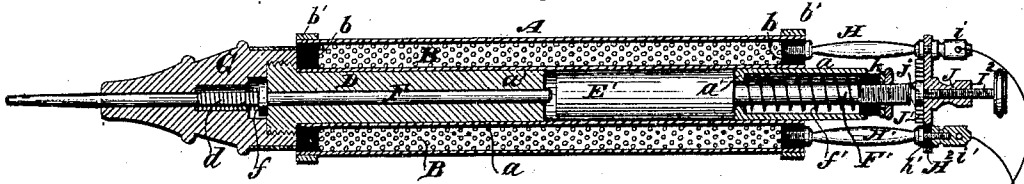
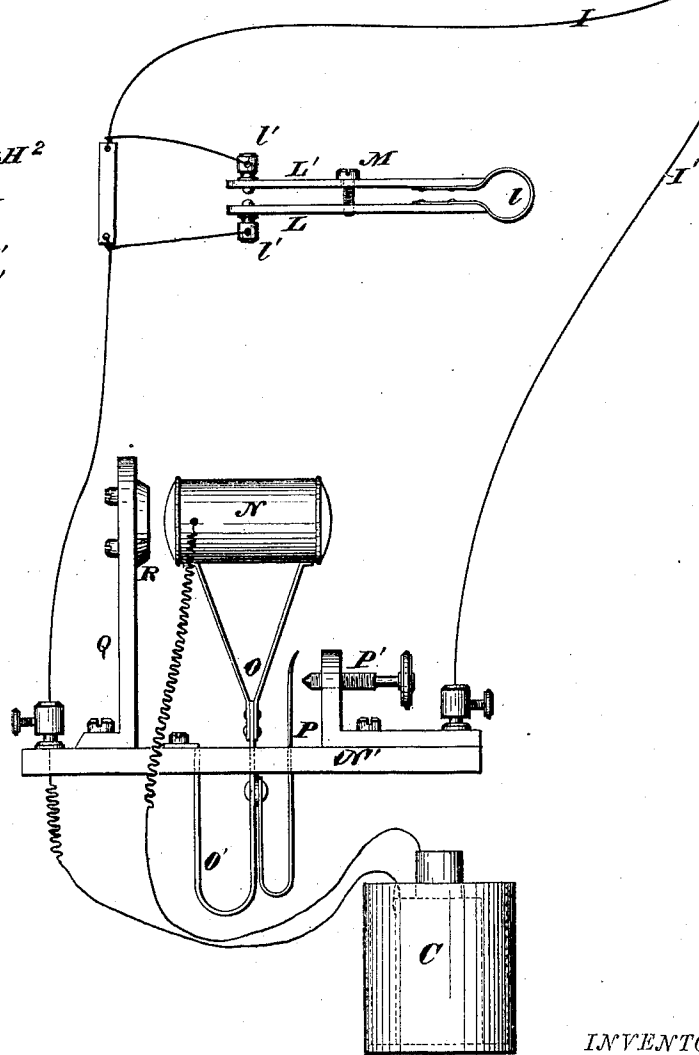
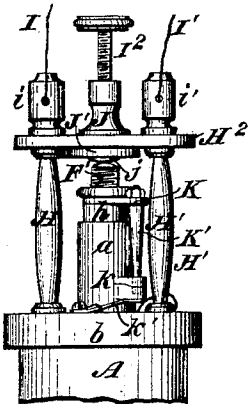


Fig 2.



WITNESSES

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ALLEN SPENCER, OF COLUMBUS, OHIO, ASSIGNOR TO SAMUEL S. WHITE,
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IMPROVEMENT IN ELECTRO-MAGNETIC DENTAL MALLET.

Specification forming part of Letters Patent No. **175,189**, dated March 21, 1876; application filed May 5, 1873.

To all whom it may concern:

Be it known that I, ALLEN SPENCER, of Columbus, in the county of Franklin and State of Ohio, have invented certain new and useful Improvements in Electric Dental-Mallet Pluggers, of which the following is a specification:

My invention relates to an electric plugger of that class in which the circuit can be established or interrupted at will. The subject-matter claimed will hereinafter specifically be designated.

In the accompanying drawings all my improvements are shown as embodied in one apparatus; obviously, however, some of my improvements might be used without the others.

Figure 1 represents a longitudinal central section of my improved electric dental-mallet plugger, showing its connection with the battery and the key for establishing and interrupting the circuit; Fig. 2, a side elevation of the battery end or butt-end of the mallet, and automatic break mounted thereon.

The mallet hand-piece or handle is shown as composed of an inner tube, *a*, of brass or other suitable material, mounted, by means of hard-rubber caps or centrally-perforated disks *b b* at its ends, in a casing or covering-tube, *A*, of leather, brass, or other suitable material. Clamping-bands *b' b'* over the caps *b b* serve to securely unite the inner and outer tubes of the mallet-handle. The wire of the helix *B* is confined in the handle between the inner and outer tubes and insulating end caps, the ends of the wire passing through the inner or butt cap, and connecting with a suitable battery, *C*, as will hereinafter be described.

Armatures *D E'*, formed of two cylindrical cores of soft iron, are mounted in the inner tube *a* of the mallet-handle. The core *D* is fixed in the outer end or front part of the handle, and the core *E'* movable endwise in the inner or butt end thereof. A metallic rod or shaft, *F*, passes loosely, so as to play endwise, through the fixed core or armature *D*, and projects slightly beyond its inner end. A spring, *d*, pressing on a shoulder, *f*, on this rod, protrudes its inner end beyond the armature *D*, so that it may be acted upon by the movable core *E'*. The spring *d* surrounds the

shaft, and is located in a recess or cavity in an end casing, *G*, shown as screwed to the outer end of the stationary core *D*. The shouldered part of the shaft *F* reciprocates in an enlargement of this recess, as shown. A suitable socket or tool-holder attached to or formed in the outer end of the shaft *F* serves for the insertion of different plugger-points. The movable core or armature is pressed toward the butt of the handle, against an inwardly-projecting shouldered portion or collar, *a'*, shown as formed on an extension of the tube *a*, by a spiral spring, *f'*. This spring surrounds a neck or shaft, *F'*, of the movable core, and bears at one end upon the collar *a'*, and at the other against an insulating or non-conducting ring or washer, *h*, upon the neck or shaft *F'*, beyond the end of the handle. A nut holds the washer in place, while admitting of its adjustment.

Two posts, *H H'*, of brass or other suitable material, are screwed into the butt-cap *b*, and connected by a cross-head or plate, *H²*. The post *H¹* is insulated from the connecting-plate by a suitable non-conducting bushing or washer, *h'*. Binding-screws *i i'* connect the posts *H H'* and battery-wires *I I'*, as well as secure the cross-head or connecting-plate in place. A set-screw, *I²*, works in a threaded socket or stud, *J*, on the plate *H²*, through which stud the screw projects against a disk, *j*, of soft iron, around which, and between the posts *H H'*, is coiled a thin band-spring, *J'*, of copper. One end of the spring is connected to the disk beneath the plate, and the other end to the post *H*. The disk which is in contact with the neck *F'* of the armature *E'* may be adjusted by means of the screw *I²*, to lengthen or shorten the stroke. A ring or collar, *K*, on the neck of the movable core or armature *E'*, carries an insulated break, consisting of a rod, *K'*, of wood or other non-conducting substance, which is guided in its reciprocations with the movable core by a guide loop or staple, *k*, on the extended portion of the inner tube *a*. The end of the break-rod, in its movement parallel with the core *E'*, acts on a plate-spring or yielding bar, *k'*, secured at one end in the butt-cap *b* by a screw communicating with one end of the helix-wire, the

other end of the helix-wire being connected with the post H¹. The outer end of the spring k' abuts against the guide k, which forms a contact-stop.

A circuit break or key, which may be operated by the mouth, or preferably by the foot, is connected with one of the battery-wires, sufficient length of wire being employed, as shown, when the key is used, to admit of its ready manipulation by the operator. This key may be composed of two wooden or rubber sides, L L', connected by a spring, l, at the rear, so as to admit of the sides of the key being pressed toward each other at their outer ends, which are provided with binding-screws l' l', to which the wire is connected. The inner ends or points of these screws, when in contact, close the circuit, which is broken by removing the pressure and allowing the contact-points to be automatically separated by the force of the spring l. The circuit may thus be established or interrupted at will. The play of the sides of the key may be controlled in any suitable way, as by means of a headed screw, M, working in a slot in one of the sides, and in a female screw in the other side. By tightening this screw the points of the screws l' l' may be kept in contact and the circuit remain uninterrupted, or be broken automatically by the break mounted upon the mallet-handle.

In operation, when the circuit is closed, the current passes, through the uninsulated post A, spring J', disk j, core-neck F', tube a, guide k, plate spring or yielding bar h', helix, and post H¹, to the battery. The armatures D E' being magnetized, the sliding one, E', carries down the disk j until the endwise-moving break-rod K' strikes the spring k', breaking the circuit and interrupting the current at the same time that the hammer-like stroke of the moving core upon the shaft F operates the plugger-point. The cores being demagnetized by the breaking of the circuit, the moving one is quickly returned by its spring j' to its normal position, closing the circuit, and the shaft also, at the same time, is protruded beyond the end of the fixed core D, retracting the plugger-point with it.

The above operation is repeated and continues as long as the break-key closes the circuit. In this way the operator has complete control over the instrument.

The battery is, by preference, provided with a vibrator to cause the current to pulsate, and the plunger-hammer or movable armature E' to strike blows at regular intervals. The vibrator is shown as mounted in a cylinder, N, supported upon the battery cover or box N'. The vibrator is composed of a spool-magnet of usual construction; the wire with which the spool is wrapped being secured at one end to the core of the spool, and its opposite end passes out through an opening in the cylinder, without touching the cylinder, and is then carried to the battery in a spiral form, as shown, so as to be flexible.

The vibrator-cylinder is preferably composed of tin, and mounted on a V-shaped frame, O, of tin or brass. A bent plate-spring, O', passing down through the cover N', holds the frame in an upright position, the end of the spring being fastened at one side of the frame O by a screw to the cover, as shown. A spring, P, on the opposite side of the frame, operates against a thumb-screw, P'; this screw and spring form the contact-points. The cylinder and spool therein touch, so that the current can pass freely. A standard, Q, upon the battery-cover supports an iron disk, R, near one end of the spool-magnet, as shown.

When the connections are all made and the vibrator is started by hand, the motion becomes self-sustaining because of the impulse given the spool-magnet by its attraction toward the disk R at every pulsation of the current, and as the pulsations pass by the wires through the cores D E' of the mallet, they become magnetized, and the plugger-point strikes its blow. The speed of the pulsations is controlled by the thumb-screw P'; when the screw is set toward the spring P the vibrations are more rapid, and when set farther off they become slower. The set-screw of the vibrator serves, also, to regulate the force of the blow by determining the instant at which, with reference to the stroke of the mallet, the circuit shall be broken; whereas the set-screw P² of the automatic break, serves merely to regulate the frequency of the blows. By my improvements the most complete control is obtained over the instrument, as the number, rapidity, and force of the strokes may be varied at will by means of the foot-key, the automatic break, and the vibrator.

What I claim as of my own invention is—

1. The combination of the outer casing or handle, the inner casing, and the helix inclosed between the two, substantially as specified.

2. The combination of the mallet-handle, the inner tube thereof, the movable core, its neck, and the spring for retracting the core after striking a blow.

3. The combination, substantially as hereinbefore set forth, in an electric dental-mallet plugger, of the mallet-handle, outer case or covering, the perforated caps, the inner tube extending beyond the butt-cap, and the removable end casing, through which the plugger-operating shaft passes.

4. The combination, substantially as hereinbefore set forth, of the mallet, the battery-wires, and the break-key connected with one of the wires.

5. The key consisting of the yielding-connected adjustable sides, the binding-screws, and contact-points, substantially as set forth.

6. The combination, substantially as set forth, of the mallet-handle, its inner tube, the movable core therein, the helix, the spring or yielding plate, connected with one end of the helix-wire, and limited in its play by a stop

on the inner tube, and the endwise-moving break-rod, connected with the core and acting upon the yielding plate to break the circuit.

7. The combination, substantially as hereinbefore set forth, of the mallet-handle, the inner tube projecting therefrom, the posts at the sides of the projecting end of the tube, the cross-plate, the spring, its disk, the movable core, the break-rod, and the yielding bar.

8. The combination of the posts, the cross-

plate, the set-screw, the disk, the spring, and the movable core-neck, substantially as set forth.

9. The combination of the mallet-handle, the battery-wires, and the vibrator, substantially as set forth.

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Witnesses:

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