J. E. DEXTER.

ELECTRO-MAGNETIC DENTAL-PLUGGER.

No. 186,234. Patented Jan. 16, 1877.

Fig: 1.

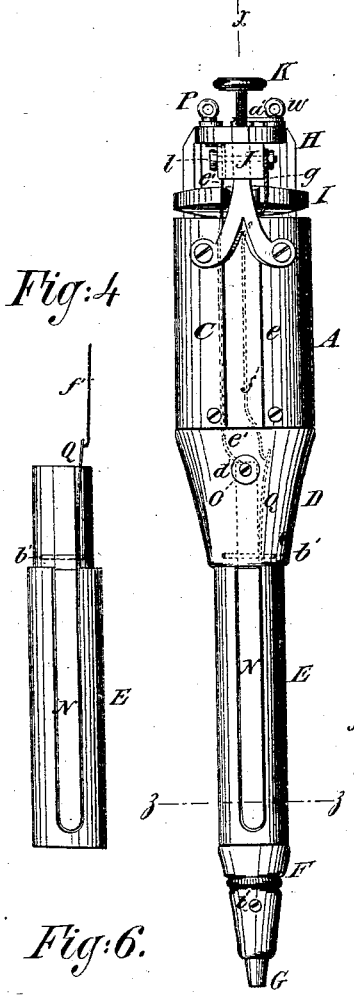

Fig: 2.

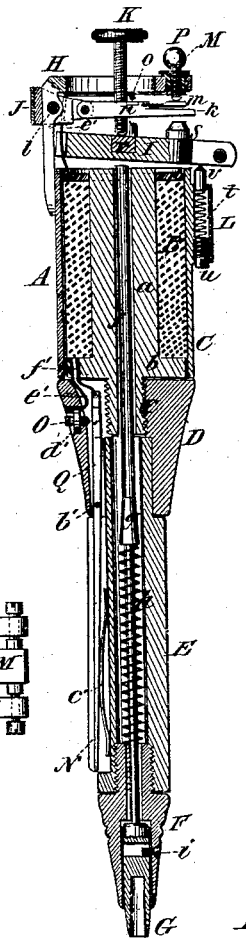

Fig: 4



Fig: 3.

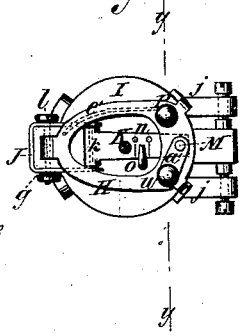

Fig: 5.

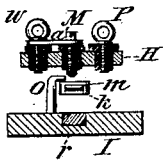

Fig: 6.

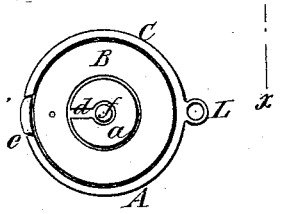

Fig: 7.

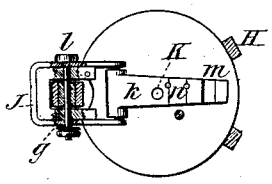

Fig: 8.

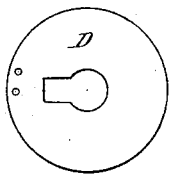

Fig: 9.

WITNESSES:

Chas. Neal

Alex F. Roberts

INVENTOR:

James E. Dexter

BY Munn & Co

ATTORNEYS.

# UNITED STATES PATENT OFFICE.

JAMES E. DEXTER, OF NEW YORK, N. Y.

## IMPROVEMENT IN ELECTRO-MAGNETIC DENTAL PLUGGERS.

Specification forming part of Letters Patent No. **186,234**, dated January 16, 1877; application filed October 23, 1876.

*To all whom it may concern:*

Be it known that I, JAMES E. DEXTER, of New York, in the county and State of New York, have invented a new and Improved Electro-Magnetic Dental Plugger, of which the following is a specification:

Figure 1 is a side elevation of a plugger embodying my improvements. Fig. 2 is a central longitudinal section of the same on line *x x* in Fig. 1. Fig. 3 is an end view, looking down on the upper end of the plugger. Fig. 4 is a detail view of the key which closes the circuit. Fig. 5 is a section on line *y y* in Fig. 3. Fig. 6 is a top view of the magnet with the armature and vibrator removed. Fig. 7 is a detail view of the vibrator and its insulated yoke. Fig. 8 is a view of the upper end of the magnet-support. Fig. 9 is a transverse section on line *z z* in Fig. 1.

Similar letters of reference indicate corresponding parts.

My invention relates to dental pluggers in which the electro-magnetic force is utilized in driving the tool; and it consists, first, in a magnet having a centrally-bored iron core, surrounded by a magnetic coil, which is enveloped by an iron shell that is concentric with the central core, and is attached to a flange formed on the lower end of the said central core. One side of both shell and core are split for the purpose of obviating residual magnetism. The invention also consists in combining a spring-yoke, a vibrator, and a spring contact-piece, as hereinafter particularly described. The third part of my invention consists in the arrangement of the key for completing the circuit, which is made with an insulating exterior, and is provided with a spring that is connected with one of the termini of the magnet-coil, and bears against the side of the key to insure a constant contact of the surfaces.

The various parts of the plugger are combined, so that pressing the key with the finger makes the circuit, and a succession of regular strokes is produced, the force of which may be varied by an adjusting-screw, as hereinafter more fully described.

Referring to the drawing, A is the electro-magnet, which consists of a central cylindrical iron core, *a*, which is bored longitudinally through its center, and has formed upon its lower end the flange *b* and the threaded nipple *c*, and is split longitudinally from its circumference to its center, as shown at *d* in Fig. 6. B is an ordinary magnetic coil that is wound upon the core *a*, and is enveloped by an iron shell, C, that is split throughout its length at *e*, and is attached to the flange *b* by screws. The upper ends of core *a* and shell C form the poles of the magnet. The nipple *c* of the magnet screws into a socket, D, of rubber or other non-conducting material, which is attached to the hand-piece E, in the lower end of which the point-piece F is secured. The socket D, hand-piece E, and point-piece F are all bored longitudinally to receive the driving-rod *f*, which extends upward through the center of the magnet, and projects a short distance to receive the blows of the armature. It is provided with a collar, *g*, against which the spring *h* presses for returning the driver after it has been forced down by the armature. The lower end of the point-piece is counterbored to receive the tool-holder G, which is attached to the end of the driving-rod *f*, and is bored conically to receive plugging-points, and slotted to receive the end of a screw, *i*, which prevents it from turning or being withdrawn from the hand-piece. H is a frame for supporting the armature and vibrator that is attached to the shell C, and is provided with the posts *j j*, through which the screws pass, upon which the swinging armature I is pivoted. J is a spring-yoke for supporting the vibrator *k*, which is attached to the frame H by a small bolt, *l*. The space between the spring-yoke and the frame is filled with hard rubber or other non-conductor of electricity. The bolt also is surrounded and insulated with rubber. The vibrator *k* is pivoted in the spring-yoke J, from which it receives sufficient pressure to hold it in any position in which it may be placed, but not enough to prevent it from being readily moved by the armature at each end of its stroke. The free end of the vibrator *k* is provided with a platina-tipped spring contact-piece, *m*, and an ivory bearing-piece, *n*. A screw, K, passes through the vibrator in position to touch the center of the armature I. The said screw is split, and springs outward against

the threads in the vibrator with sufficient force to prevent it from becoming accidentally loosened or unscrewing from the motion of the armature.

The armature I is provided with a tappet, *o*, that is capable of striking the ivory bearing-piece *n* in the upper surface of the vibrator. The armature is bored centrally, and a piece of ivory, *r*, is inserted, which is capable of striking the screw K. It is also provided with a facing of brass on its contact-surface, to prevent it from adhering to the magnet after the current is broken.

A short rubber stud, *s*, projects from the upper surface of the armature, so as to prevent the vibrator being accidentally forced too far inward.

L is a barrel attached to the side of the shell C, and containing a spring, *t*, that rests upon an adjusting-screw, *u*, and forces a pointed follower, *v*, against the under or contact surface of the armature, near its pivots, securing its return.

M is an insulated platina-pointed screw, that passes through the frame H in position to make contact with the spring *m*, and is connected with the insulated screw-cup *w* by the metallic strap *a'*.

N is a metallic key that is fitted in a slot in the hand-piece E, and is pivoted at *b'*. It is provided with a non-conducting exterior surface of rubber, and a platinum surface at its inner end. A spring, *c'*, is placed in the bottom of the slot in the hand-piece E, and presses the key N outward.

O is a platina-pointed screw, that passes through the metallic bushing *d'* in the socket D, and is touched by the key N, when it is pressed. The bushing *d'* is connected by the insulated wire *e'* with the insulated binding-post P.

Q is a spring that is placed at the side of the key N, and is retained in place by the pin upon which the said key is pivoted. One terminus, *f'*, of the magnetic coil is soldered to the spring Q, and the other terminus, *g*, is clamped by the nut of the bolt *l* against the spring-yoke J.

The battery-wires are connected with the binding-posts P and *w*. The insulated wire *e'* leads from the binding-post P to the screw O, and the wire *f''* leads from the spring Q to the spring-yoke J, which is in contact with the vibrator *k*. The wires pass down the slit in the shell C, and are covered with a strip of rubber that fills the slit and protects the wires. The vibrator *k*, being in contact with the screw M, the key is depressed when a circuit is established by the contact of the key and screw O. The armature is instantly drawn to the magnet, delivering a blow upon the upper end of the driving-rod *f*.

When the armature is nearly in contact with the magnet, the tappet *o* strikes the vibrator *k*, breaking the contact between the spring *m* and the screw M. The circuit being broken, the armature is thrown upward by the spring-follower *v* until it strikes the screw K, and raises the vibrator *k*, bringing the spring *m* again into contact with the screw M, and establishing the circuit when the armature is again drawn to the magnet. This operation is rapidly repeated.

When the vibrator is at the upper portion of its stroke it remains in contact with the screw M until the armature is nearly in contact with the magnet, when the tappet strikes it and breaks the circuit.

The full power of the magnet is thus utilized, and after the tappet *o* has withdrawn the vibrator *k* from contact with the screw M the circuit remains broken until the armature again strikes the screw K, thus freeing the armature from magnetic attraction during its return to the end of its upward stroke.

The spring contact-piece *m* remains in contact with the screw M, in case the rigid part of the vibrator tends to rebound when thrown up by the armature.

By turning the screw K, the length of the stroke of the armature and the rapidity of its vibration are regulated.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. An electro-magnet, having a longitudinal split-iron core, and a longitudinal split-iron shell, connected by a flange projecting from the core, and inclosing a magnetic coil between the said core and shell, substantially as herein shown and described.

2. The combination of the spring-yoke J, vibrator *k*, and spring contact-piece *m*, substantially as herein shown and described.

3. The armature I, provided with the tappet *o*, and the vibrator *k*, having the spring *m*, in combination with the magnet A, substantially as shown and described.

4. The combination of the rubber stud *s*, armature I, and vibrator *k*, substantially as shown and described.

5. The combination, in an electro-magnetic plugger, of the key N, having a non-conducting exterior spring, *c'*, contact-spring Q, and screw O, substantially as shown and described.

6. The combination of the frame H, insulated yoke J, vibrator *k*, armature I, and magnet A, substantially as shown and described.

JAMES E. DEXTER.

Witnesses:
C. SEDGWICK,
GEO. M. HOPKINS.