(No Model.)

P. RUSSELL.

ELECTRIC DENTAL MALLET.

No. 591,499. Patented Oct. 12, 1897.

Fig. 1.

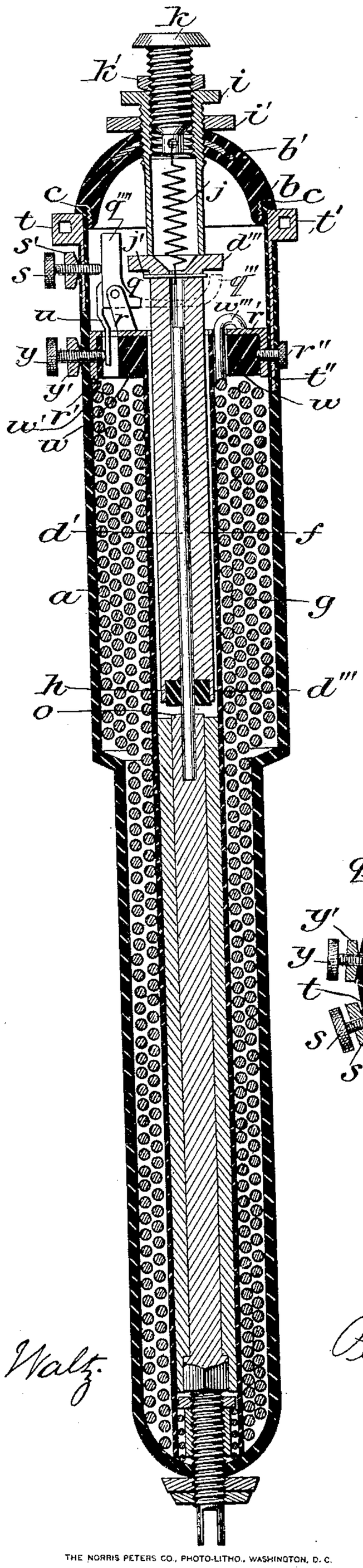
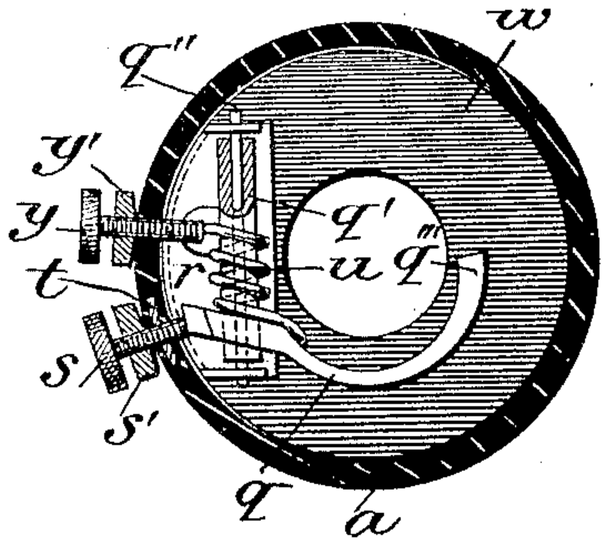


Fig. 2.



Witnesses.

Thomas H. Walz.

W. R. Hood

Inventor.

Percy Russell

UNITED STATES PATENT OFFICE.

PERCY RUSSELL, OF NEW MARKET, MARYLAND, ASSIGNOR OF ONE-HALF TO ISAAC S. RUSSELL, OF SAME PLACE.

ELECTRIC DENTAL MALLET.

SPECIFICATION forming part of Letters Patent No. 591,499, dated October 12, 1897.

Application filed October 6, 1896. Serial No. 608,069. (No model.)

To all whom it may concern:

Be it known that I, PERCY RUSSELL, of New Market, Frederick county, Maryland, have invented certain new and useful Improvements in Electric Dental Mallets, of which the following is a description, reference being had to the accompanying drawings, in which like letters refer to like parts.

The case *a* of the instrument is made of hard rubber or other suitable material. It has the cap *b*, screwed into the end *c*, as shown in Figure 1.

The coil or helix *g* is wound continuously from end to end, the two terminals *w'''* and *w'* being attached, respectively, to plate *r'* and pivot-plate *r*. These plates are secured to the annular hard-rubber head *w*.

The binding-post *t'* has its base *t''* embedded in the substance of the case *a*, and the screw *r''* is threaded through *t''* and impinges upon or is threaded through plate *r'*, to which is attached one of the terminals *w'''* of the helix, thus making electrical connection between the binding-post *t'* and the helix-wire *w'''*, and also serving to fix the helix firmly within the case *a*. The other binding-post *t* has its base similarly embedded in the case *a*, and has threaded through it the adjusting-screw *s*, which is secured firmly in whatever position desired by the lock-nut *s'*. The pivot-plate *r* supports the tubular sleeve *q'*, Fig. 2, to which sleeve the curved lever *q* is attached. The sleeve *q'* is journaled upon the pin or fulcrum *q''*, and attached to the sleeve or lever by one end is the spring *u*, which may be coiled around the sleeve *q'* and impinge at the other end against the screw *y*, as in Fig. 2, or said spring may be straight or curved and pass directly from its attachment with the sleeve or lever through the hole in hard-rubber head *w* into contact with the screw *y*, as shown in Fig. 1. The screw *y* passes loosely through the case *a* and is threaded through the lower portion of the pivot-plate *r*, and by its adjustment serves to increase or diminish the tension or pressure of the spring *u*, the lock-nut *y'* securing *y* in the desired position.

The spring *u*, by a constant tendency to rotate the sleeve *q'* upon the pin or fulcrum *q''*, raises the end *q'''* of lever *q* and brings the part *q''''* in contact with the screw *s* after this contact has been broken in the manner hereinafter described. The curve in the lever *q* and the thinness of the middle portion of the long arm, as shown in Fig. 2, serve to impart to the lever a degree of elasticity, and the weight of the end *q''''*, Fig. 1, gives to this part of the lever the requisite inertia for the purposes hereinafter described.

The parts of lever *q* and screw *s* which come in contact with each other are faced with platinum, and when held in contact with each other by the spring *u* the electrical circuit is complete from the terminal *w'* of the helix through pivot-plate *r*, lever *q*, and screw *s* to binding-post *t*.

Fixed in the smaller part of the helix in the position shown in Fig. 1 is the hollow core of iron *e*. Sliding within this core is the iron shaft *d*, the part *d''* of the shaft and the part *e'* of the core being square to prevent the shaft from rotating. The outer end of *d* carries the plugger-point, file, or other tool. The coiled spring *p* around the shaft *d*, acting against the inside of case *a* and the collar *p'*, forces the shaft *d* inward beyond the end of core *e*, so that the end *o* of the shaft *d* may receive the impact of the movable core or hammer *f*, the amount of this projection being regulated and fixed as desired by the nut *m*, which is threaded on shaft *d* and impinges against the outside of the case *a*. The nut *m* is locked securely by the nut *m'*.

Within the coiled spring *p* is a sleeve *p''*, which is threaded on shaft *d* and may be adjusted to limit the thrust of the plugger-point when the end *o* of shaft *d* is struck by the core or hammer *f* by *p''* coming in contact with inside of case *a*. The collar *p'* also serves to lock the sleeve *p''* in position.

Through the cap *b* is threaded the adjustable hollow or tubular screw *i*, the inner end of which limits, as desired, the upward movement of the core-hammer *f*. Axially through this screw *i* is threaded the adjusting-screw *k*. To the inner end of *k* is attached one end of the tension-spring *j*, the other end of *j* being attached to the core-hammer *f*. By the adjustment of the screw *k* the desired tension

may be given to the spring *j*. The screws *i* and *k* are both secured in the desired position by the lock-nuts *i'* and *k'*.

Threaded or otherwise secured axially in the end *o* of the shaft *d* is the spindle *d'*, which carries loosely the hollow movable iron core-hammer *f*. Spindle *d'* is made of brass or other non-magnetic material to prevent the friction of the core-hammer *f* upon the spindle *d'*, which would result from constructing the spindle of a magnetic material. The core-hammer *f* is recessed at *d''''* to receive the cushion of hard rubber or other suitable material *h* to modify the force of impact of the core-hammer *f* upon the end *o* of the shaft *d* and upon the contiguous end of core *e*, which latter serves as a stop to the motion of the core-hammer *f* in its downward direction. The upper end of the core-hammer *f* is provided with a collar *d'''* for the purpose of imparting motion to the curved lever *q* in the manner hereinafter described.

The action of the instrument is as follows: The battery-wires being attached to binding-posts *t* and *t'*, the electric circuit is completed through screw *s*, lever *q*, pivot-plate *r* to terminal *w'* of the helix and from the other terminal *w'''* of helix through plate *r'*, screw *r''* to binding-post *t'*. The current thus passing through the helix magnetizes the fixed core *e*, shaft *d*, and movable core-hammer *f*, causing the latter to slide upon the spindle *d'* toward the fixed core *e*. By adjusting the contact-screw *s* the lever *q* is held in such position that the end *q''''* is reached by the collar *d'''* in the downward movement of the core-hammer *f* just before the hard-rubber face *h* impinges upon the end of shaft *d*. By virtue of the elasticity of the thin part of the lever *q*, the inertia of the end *q''''*, and the pressure of the spring *u* the circuit is maintained unbroken between the screw *s* and lever *q* and the magnetism of the parts is maintained, while the core-hammer *f* continues its downward movement till the cushion *h* impinges upon the end of shaft *d*, the collar *d'''* carrying with it the end of lever *q'''*, slightly distorting lever *q*. At this moment the elastic force of the now-distorted lever *q*, restoring the lever to its normal form, draws away the end *q'''* from contact with the screw *s*, thus breaking the circuit and demagnetizing all the parts. The lever having been struck a sharp blow by the collar *d'''* and so set in motion, its inertia causes it to leave its position of contact with the collar *d'''* and to continue its downward movement until the core-hammer *f* has been started upon its upward movement by the spring *j* and the force of recoil after having come to rest against the ends of shaft *d* and core *e*. The spring *u* now overcomes the inertia of the lever *q*, stops its downward movement, and begins to move it upward. The core-hammer *f* and lever *q* are now both returning to their initial positions, and by the time the lever *q* has come in contact with the screw *s* and reëstablished the circuit and has thereby remagnetized the parts the core-hammer *f* has reached its upward limit. The action is then repeated.

By the proper adjustments of the screw *s*, the screw *y*, the screw *k*, the nut *m*, and the sleeve *p''* the action just described is produced with the utmost accuracy whatever may be the length of stroke of the core-hammer *f* as regulated by the back stop-screw *i* or whatever may be the strength of the electric current.

It will be observed that no means have been provided within the instrument itself for stopping and starting it after having set it in action by attaching the proper electric conductors, as described. This is done in some machines by means of a switch controlled by the thumb or finger of the operator; but in the instrument above described the stopping and starting and also a variation of the current strength is very expeditiously effected by the use of a suitable switch or switch and rheostat actuated by one foot of the operator. Thus the hands are entirely relieved of a burden which seriously interferes with the easy and proper manipulation of this class of instruments.

I am aware that much that is specified in the foregoing description of my improved electric dental mallet has long been known and used in other instruments, but by the use of certain parts and combinations hitherto unknown I am enabled to produce an action impossible to any other instrument of its class. In others the electric circuit is broken either before the hammer delivers its blow or at the instant of its coming into contact with the part upon which the blow is received; but in my instrument the parts are easily and quickly adjusted, so that the hammer not only impinges upon the plugger-stem, but, if so desired, continues to act against it under the full magnetic force till the end of the fixed core is reached. Thus the action of my instrument is more definite and under better control than others.

It is obvious that this instrument, constructed of suitable size and substantially as described, may be used as an electric pen by attaching a suitable stylus, and that it is also applicable to pile-driving, rock-drilling, forging, and other analogous uses.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In an electromagnetic dental mallet or similar tool having a helix surrounding a hollow iron core, the combination of the mallet-stem passing axially through said core and consisting of the magnetic part, *d*, and the non-magnetic part, *d'*, with the iron core-hammer, *f*, surrounding the part, *d'*, substantially in the manner described and for the purposes set forth.

2. In an electromagnetic dental mallet or similar tool, the combination of the contact-screw, *s*, the elastic lever, *q*, mounted upon the pivot-plate, *r*, the helix, *g*, the core-ham-

mer, *f*, the spring, *u*, and the screw, *y*, substantially in the manner and for the purposes described.

3. In an electromagnetic dental mallet or similar tool the combination of the annular head, *w*, the plate, *r'*, the helix-terminal, *w'''*, the screw, *r''*, and binding-post, *t'*, substantially in the manner described and for the purposes set forth.

PERCY RUSSELL.

Witnesses:
M. P. WOOD,
HENRY RUSSELL.