(No Model.) 3 Sheets—Sheet 1.

J. W. GILBERT.

ELECTRICALLY ACTUATED DENTAL PLUGGER.

No. 560,315. Patented May 19, 1896.

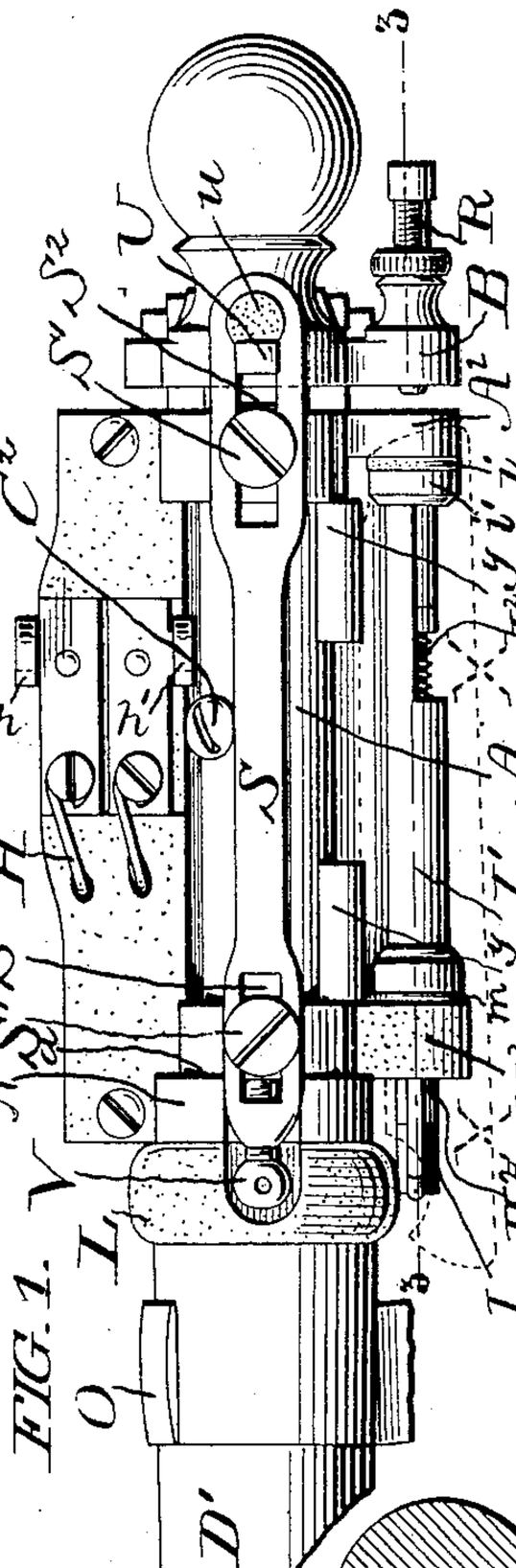

FIG. 1.

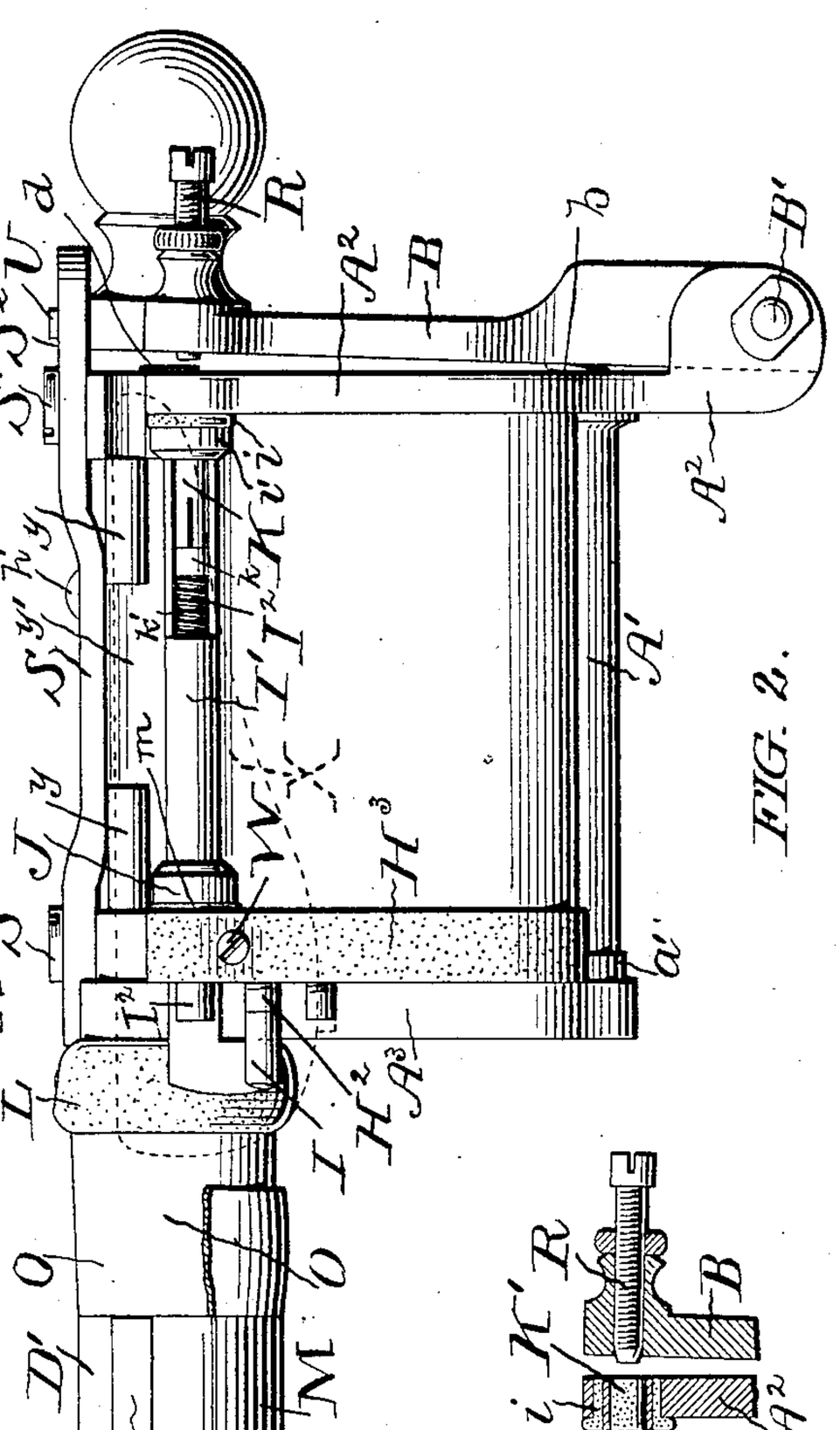

FIG. 2.

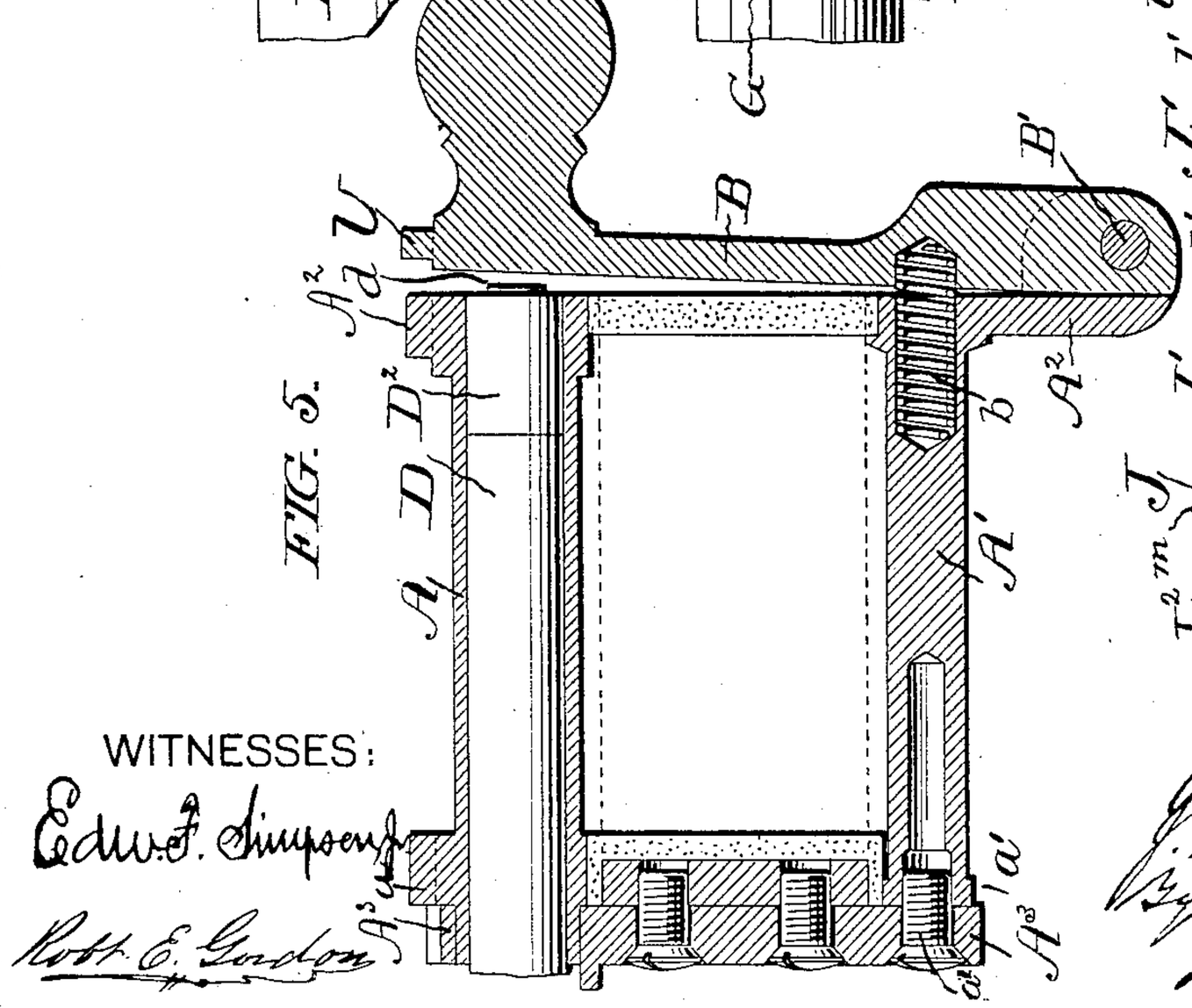

FIG. 5.

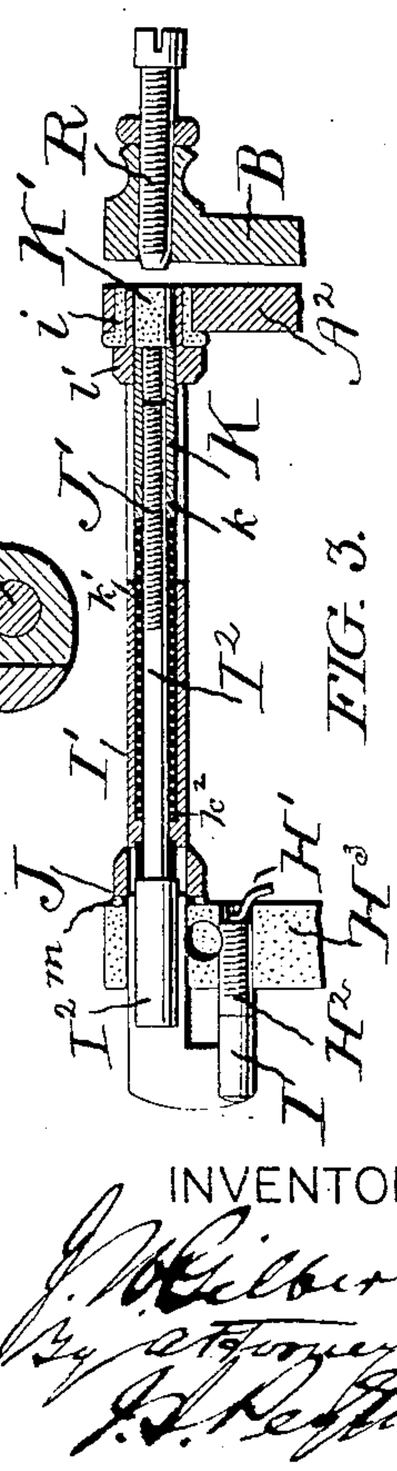

FIG. 3.

WITNESSES:

Edw. F. Simpson

Robt. E. Gordon

INVENTOR:

J. W. Gilbert

By Attorney

F. D. Lefford.

(No Model.) 3 Sheets—Sheet 2.

J. W. GILBERT.

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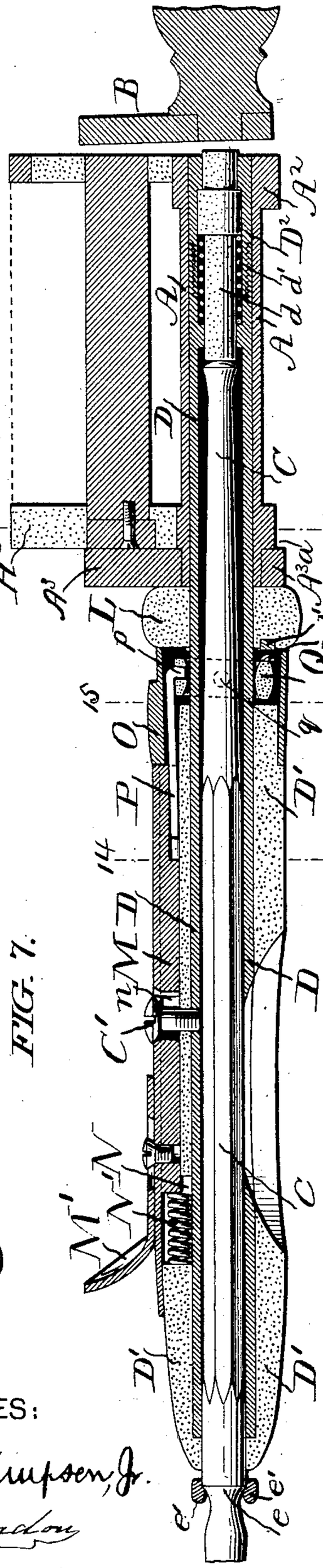

FIG. 4.

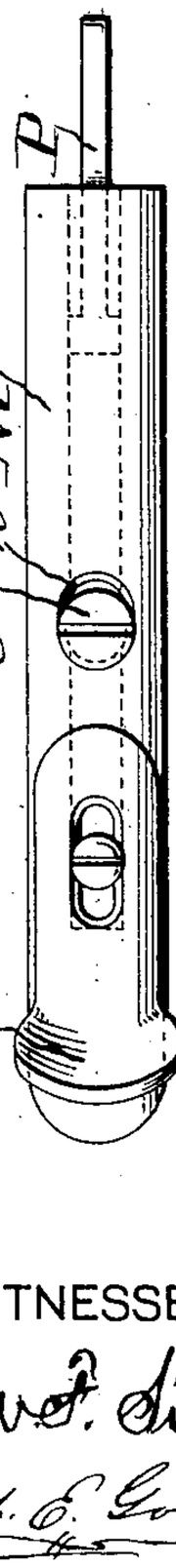

FIG. 7.

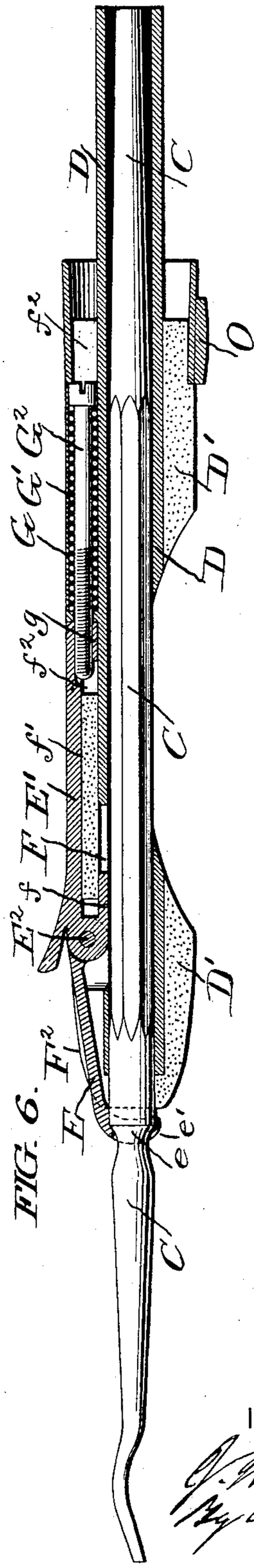

FIG. 6.

FIG. 8.

WITNESSES:

Edw. F. Simpson, Jr.

Robt. E. Gordon

INVENTOR:

J. W. Gilbert

By Atty

F. F. Peyton

(No Model.) 3 Sheets—Sheet 3.

J. W. GILBERT.

ELECTRICALLY ACTUATED DENTAL PLUGGER.

No. 560,315. Patented May 19, 1896.

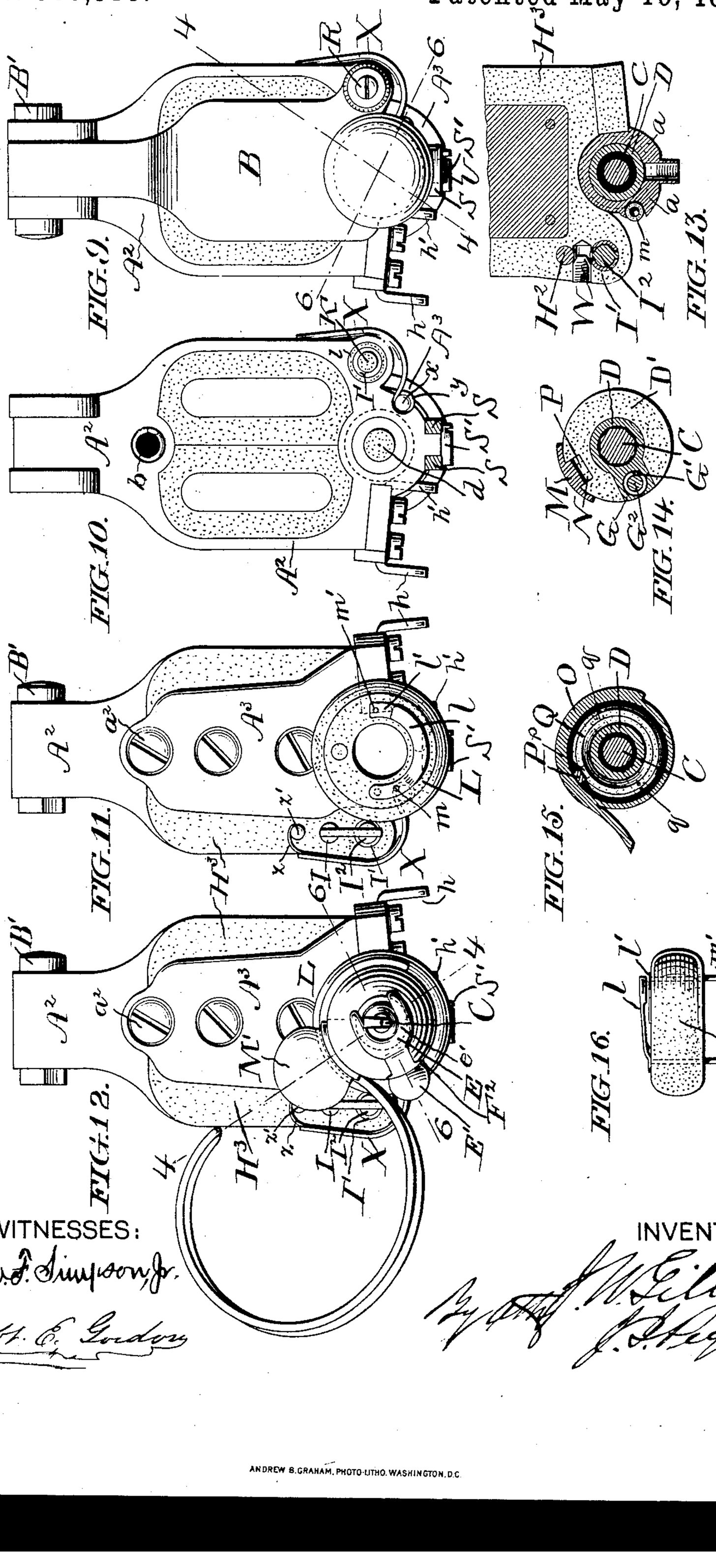

FIG. 9. FIG. 10. FIG. 11. FIG. 12. FIG. 13. FIG. 14. FIG. 15. FIG. 16.

WITNESSES:

Edw. F. Simpson, Jr.

Robt. E. Gordon

INVENTOR:

By J. W. Gilbert

F. P. Fenton.

UNITED STATES PATENT OFFICE.

JOHN W. GILBERT, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE S. S. WHITE DENTAL MANUFACTURING COMPANY, OF SAME PLACE.

ELECTRICALLY-ACTUATED DENTAL PLUGGER.

SPECIFICATION forming part of Letters Patent No. 560,315, dated May 19, 1896.

Application filed November 7, 1895. Serial No. 568,157. (No model.)

To all whom it may concern:

Be it known that I, JOHN W. GILBERT, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Electrically-Actuated Dental Pluggers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to certain improvements, as hereinafter claimed, in dental pluggers of the class adapted to be actuated by electricity, particularly that type of such class shown in Letters Patent No. 558,153, dated April 14, 1896, to simplify, cheapen, and increase the durability of which are my chief objects.

In the accompanying drawings, Figure 1 is a longitudinal view of portions of the implement, and Fig. 2 a similar view at a right angle with Fig. 1. Fig. 3 is a view showing parts in longitudinal section on the line 3 of Fig. 1. Fig. 4 is a view, partly in side elevation and partly in longitudinal section, on the lines 4 of Figs. 9 and 12. Fig. 5 is a central longitudinal section through the supporting-frame; and Fig. 6 a longitudinal view, with parts shown in section, on the lines 6 of Figs. 9 and 12. Fig. 7 is a view showing, detached, the finger-actuated controller of the circuit making and breaking devices. Fig. 8 is a view showing the plugger-retainer detached. Fig. 9 is a view in elevation of the implement as seen from the hammer end thereof; and Fig. 10 shows an elevation, as seen from the same end, with the hammer and interrupter-regulating screw detached. Fig. 11 is a view in elevation, looking from the plugger-point end of the implement, with the plugger-handle and parts carried by it detached; and Fig. 12 is a view of the complete instrument as seen from the plugger-point end thereof. Fig. 13 is a transverse section on the line 13 of Fig. 4. Fig. 14 is a transverse section on the line 14 of Fig. 4. Fig. 15 is a transverse section on the line 15 of Fig. 4. Fig. 16 is a view showing, detached, the contact-carrier which surrounds the plugger-handle adjacent to the supporting-frame.

A frame for supporting the plugger and the field-coils and their soft-iron cores constituting the electromagnets usually employed in this class of devices is shown as constructed as follows: Two parallel tubes A A′ are each rigidly connected at one end with a frame end piece A^2. The opposite end piece A^3 of the supporting-frame has detachable connection with the other ends of the frame-tubes. The frame-tube A has a shoulder at *a*, and this shoulder rests against the inside of the frame-piece A^3, (see Fig. 4,) into a hole in which the end of the tube fits. The frame-tube A′ is shouldered at *a′* at its end, and the shoulder fits against the frame-piece A^3. A screw a^2 passes through this frame-piece A^3 and engages the internally-threaded end of the tube A′, thus serving to draw together and hold in position the different parts of the supporting-frame.

The armature B, pivoted at B′ to the end A^2 of the supporting-frame, constitutes the mallet or hammer for actuating the plugger. A coiled spring *b* in the frame-tube A′, which serves as a housing to protect the spring, serves to retract the armature-hammer or restore it to its normal position after being attracted by the electromagnets.

A tubular handle for the plugger C is composed of a main or inner section D, of metal, and an outer or enveloping section D′, of hard rubber, shorter than the main section which it surrounds for a portion only of the length thereof. A screw C′ detachably connects the two sections of the plugger-handle. The handle at its inner or rear portion, which is constituted by the main or inner section alone, enters the tubular portion A of the supporting-frame, with which it is detachably connected by a screw C^2. The handle is provided at its rear end with the screw-attached cap D^2 and carries a plunger *d*, acted upon by a spring *d′* and serving to impart the blow of the hammer to the plugger.

The plugger-shank is provided with the shoulder *e* to be engaged by the forked end *e′* of a retainer E, carried by the slide E′, to which it is pivoted at E^2, so as to rock toward and away from the plugger. The retainer-slide has guideway connection with the plugger-handle and is provided with a lip or flange

f, working inside the outer section of the handle, which is properly cut away at F to admit the lip, and the inner section of the handle is also cut away, as at F, for the lip. The handle is longitudinally grooved at F^2 to allow proper movement of the pivoted retainer. The guideway-groove in the outer section of the handle for the retainer-slide to reciprocate in is shallow for a portion of its length, as indicated at *f'*, and deepened in rear of this shallow portion, as at f^2, so as to extend to the inner section of the handle to accommodate the lug *g*, in which the retainer-slide terminates at its rear end. This deepened portion f^2 of the groove extends to the rear end of the outer section of the handle, and a portion of the length of this groove is occupied by a tubular flange G of the inner section of the handle. This tubular flange constitutes a housing for a coiled spring G', which surrounds a headed adjusting-screw G^2, which engages the lug *g* of the retainer-slide. The spring bears at its opposite ends against the head of the adjusting-screw and against an internal shoulder of the flange G of the inner section of the handle. It will readily be seen that the tension of the spring may be adjusted so as to exert the proper pull upon the retainer to cause it to draw back the plugger into proper working contact with its plunger.

The coupling contact-lugs *h h'* serve to make connection by way of the usual conducting-cord with the source of electrical supply. Electrical connection between the magnets and the contact-lugs *h h'* and the manner of making and breaking the circuit are as next to be described. The current entering at *h* passes directly to one end, H, of the feed-coils of the magnets, and the other end, H', of the field-coils of the magnets has direct electrical connection with a fixed contact H^2, screwed into the usual magnet-tailpiece H^3, of non-conducting material.

Automatic circuit-interrupting devices are provided as follows: A movable contact I is adapted for engagement with and disengagement from the fixed contact H^2 to make and break the plugger-circuit. The contact I has permanent electrical connection with a casing I', in which slides a stem I^2, carrying this contact. The contact-stem is prevented from turning in its casing by groove-and-rib connection therewith, (shown in Figs. 3 and 13,) as will readily be understood. The casing I' is secured in fixed position in the supporting-frame, one end of the casing being secured to the frame end piece A^2 into a hole in which it projects and from which it is insulated by a rubber washer *i*, against the flanged end of which a shoulder *i'* on the casing abuts. The opposite end of the casing is received in a hole in the magnet-tailpiece H^3, and a shoulder J is provided on the casing adjacent to this tailpiece. The stem I^2 is screw-threaded at J' and an internally-threaded sleeve K is screwed to the stem at the end thereof opposite that provided with the contact I. A hard-rubber head K' is attached to the stem by means of a screw engaging the sleeve K of the stem. A nut *k* on the stem receives the thrust of a spring *k'*, surrounding the stem in its casing and bearing against an internal shoulder k^2 of the casing. The contact I is normally engaged with the contact H^2 by the action of the spring *k'*, it will be seen, and the tension of the spring may be regulated by adjustment of the nut *k*. The sleeve K is split and adapted to have a clamping action on the stem to hold it against turning and accidental change of adjustment.

A contact-carrier L is detachably fitted upon the plugger-handle in advance of the supporting-frame. This contact-carrier consists of a ring of hard rubber embracing the inner section of the plugger-handle and resting against the end piece A^3 of the frame. A conducting-wire *m* in contact with the shoulder J of the contact-casing I passes through insulated openings in the shoulder *a* of the frame-tube A and in the end piece A^3 of the frame and also through the contact-carrier L, and is permanently connected with a spring-contact *l* on this contact-carrier, which is also provided with a fixed contact *l'*, connected by conducting-wire *m'* with the terminal contact *h'* of the plugger-circuit.

A controller for the circuit-interrupting devices consists of a finger-actuated slide M, adapted to reciprocate in a suitable guideway-groove N in the outer section of the plugger-handle. The finger-rest M' of this slide is adjustably secured in position. The screw C', which unites the two sections of the handle, passes through a slot *n* in the slide, and the head of this screw is adapted to engage the slide, so as to prevent its displacement while not interfering with the needed endwise movement thereof. A coiled spring N' in the guideway-slot of the handle acts upon the slide with a tendency to hold it in its retracted position while admitting of the advance movement of the slide when actuated by the finger. Rearward movement of the slide is arrested by its contact with a stop formed by a detachable ring or ferrule O, embracing the handle. An arm P, having a bent or hook-like end *p*, is made separate from the slide, with which it is suitably connected, so as to partake of its movements. This slide-arm engages a socket in a rocking contact-adjuster, shown as formed by a ring Q of insulated material, as hard rubber, which loosely surrounds the inner section of the plugger-handle and is adapted to have a rocking motion about the pivot *q*, which secures it to the handle. It will be seen that when the circuit-controller slide is moved outward or against the force of its spring by finger-pressure the contact-adjuster Q is rocked in a direction to force the spring-contact *l* into engagement with the fixed contact *l'* and complete the plugger-circuit.

The armature-hammer is provided with a screw R, the point of which is adjusted to strike against the head K' of the circuit-in-

terrupting devices before described when the hammer strikes its blow, and so disengage the contact I from contact H^2 and break the circuit, thus allowing the hammer to be retracted by the action of its spring. The screw R may be adjusted as desired to compensate for wear of parts.

To adjust the length of stroke of the hammer and the force of its blows, regulating devices are provided as follows: A rod S is slotted at its opposite ends and securing-screws S′ S′, passing through the slots, serve to adjustably secure the rod to the end pieces A^2 A^3 of the supporting-frame. A lug U on the hammer engages the rear slot S^2 in the regulating-rod, and when the hammer is in its retracted position its lug U is in contact with a cushion or rubber buffer *u*, secured in the slot. To lengthen or shorten the stroke of the hammer, the screws S′ S′ are loosened, an adjusting-screw V screwed in or out, so as to project more or less into the slot S^3, and the securing-screws S′ S′ again tightened to fix the adjusting-rod in position, with the screw V bearing against the screw-engaging lug in the slot S^3.

From the above description the operation of the apparatus will readily be understood without further explanation.

When an alternating current passes through the plugger-circuit, the circuit-interrupting devices herein described are cut out by short-circuiting the current by means of a contact-screw W, making fixed electrical connection between the contact H^2 and casing-contact I′, as will be understood by reference to Figs. 2, 3, and 13.

To prevent contact of the hand of the operator with the charged circuit-interrupting devices, I provide a guard X, adapted to cover these devices without coming in contact with them. This guard (see Figs. 9, 10, 11, and 12 and dotted lines, Figs. 1 and 2) is carried by the supporting-frame, to the tubular portion A of which it is hinged by a pivot *x*, passing through knuckles *y y* on said frame portion and through the knuckle *y′* of the guard. This guard can be swung into position to expose and allow access to the mechanism which it is adapted to cover and prevent it from coming in contact with the hand. The guard is secured in its operative position by a spring-catch *z*, snapping over a pin *z′*.

It is an important feature of my invention that the finger-actuated controller of the circuit-interrupting devices is completely insulated from the plugger-circuit, thus rendering it impossible to shock a patient being operated on by the passage of a ground-circuit.

I claim as my invention—

1. In an electrically-actuated dental plugger, the supporting-frame consisting of the two parallel tubes serving, respectively, to receive the plugger-handle and as a housing for the spring of the armature-hammer, and the end pieces with which said tubes are connected, substantially as set forth.

2. The combination of the plugger-handle composed of the inner section having the tubular flange, and the outer section having a groove entered by said flange, the plugger having the shoulder in advance of the handle, the pivoted retainer engaging said shoulder, the retainer-slide having guideway connection with the handle, the screw having adjustable connection with the retainer-slide and housed in the tubular flange of the inner section of the handle, and the spring acting on the retainer-slide by way of said screw, substantially as and for the purpose set forth.

3. The combination of the plugger-handle, the contact-carrier on the handle, the fixed and spring contacts on this carrier, their connected wires by way of which to complete the plugger-circuit, the rocking contact-adjuster on the handle, and the finger-actuated controller by way of which the contact-adjuster is operated to engage the spring-contact with the fixed contact of the carrier, substantially as and for the purpose set forth.

4. The combination of the plugger-handle, the finger-actuated circuit-controller slide having guideway connection with the handle, the spring acting on the controller, and the rocking contact-adjuster on the plugger-handle operated by connection with the controller, substantially as and for the purpose set forth.

5. The combination of the supporting-frame, the plugger-handle carried thereby, the contact-carrier of non-conducting material on the plugger-handle, the contact-adjuster of non-conducting material on the plugger-handle, and the finger-actuated circuit-controller on the plugger-handle having connection with said contact-adjuster, whereby the controller-slide is completely insulated from the plugger-circuit, substantially as set forth.

6. The combination of the supporting-frame, the interrupting devices of the plugger-circuit carried by the frame, and the hinged guard covering said devices without coming in contact with them, substantially as and for the purpose set forth.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN W. GILBERT.

Witnesses:
H. E. HANKWETT,
R. DALE SPARHAWK.