(Model.)

# W. W. EVANS.

## DENTAL PLUGGER.

No. 279,928. Patented June 26, 1883.

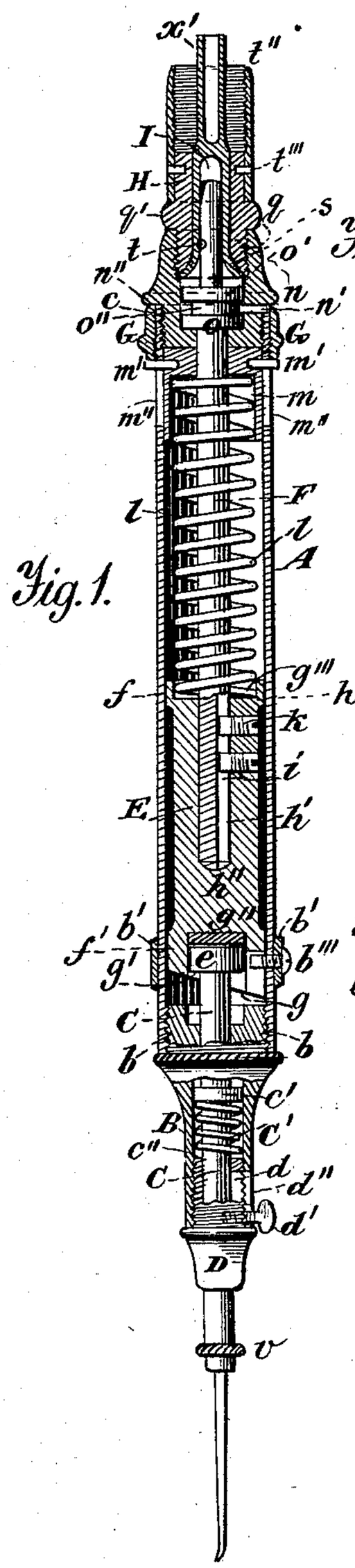


Fig. 1.

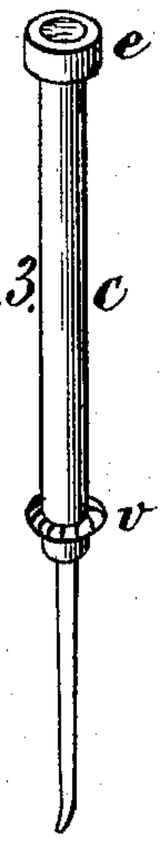


Fig. 3.

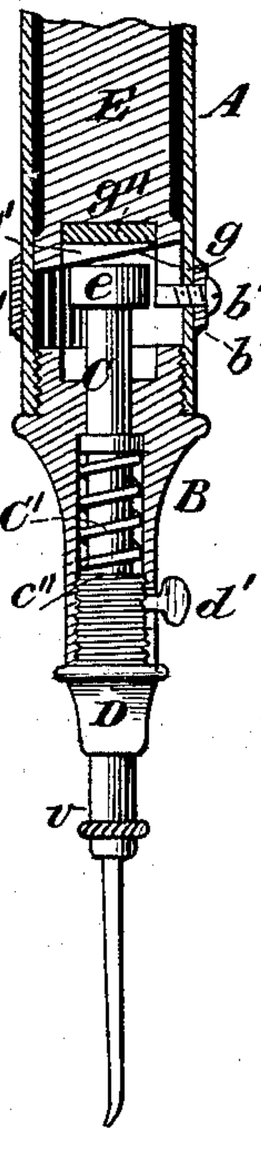


Fig. 2.

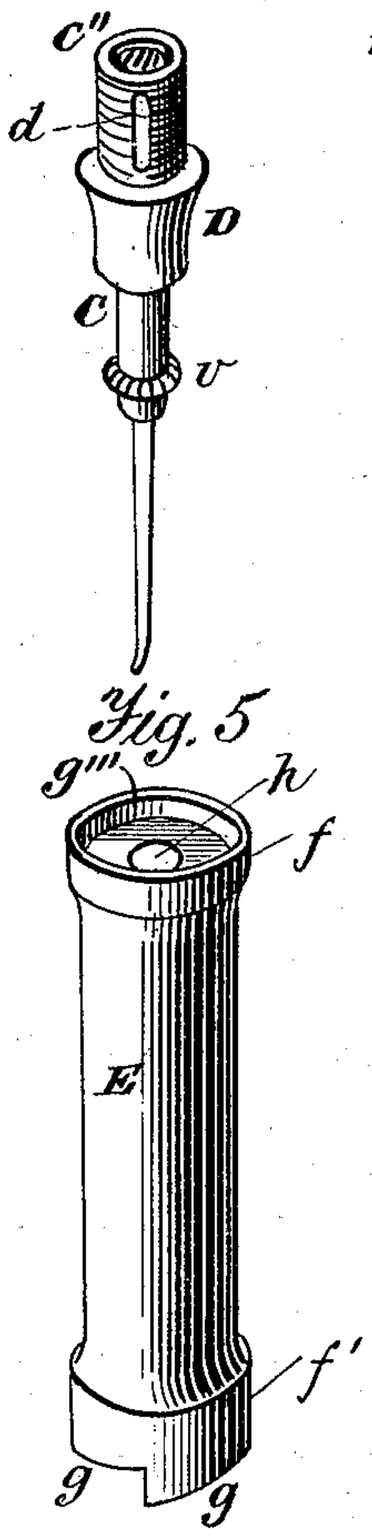


Fig. 4.



Fig. 5.

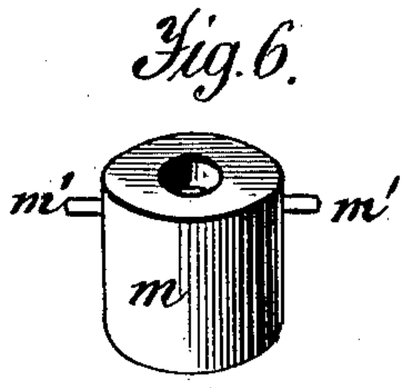


Fig. 6.

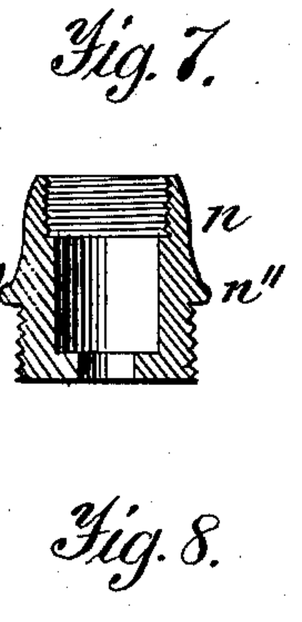
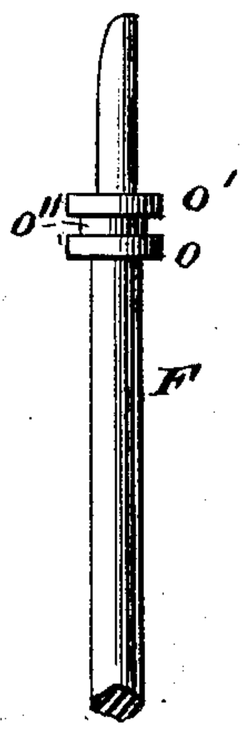


Fig. 7.



Fig. 8.



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# UNITED STATES PATENT OFFICE.

W. WARRINGTON EVANS, OF WASHINGTON, DISTRICT OF COLUMBIA.

## DENTAL PLUGGER.

SPECIFICATION forming part of Letters Patent No. 279,928, dated June 26, 1883.

Application filed July 1, 1882. (Model.)

*To all whom it may concern:*

Be it known that I, W. WARRINGTON EVANS, of the city of Washington, District of Columbia, have invented certain new and useful Improvements in Dental Pluggers, of which the following is a specification, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

My invention relates to improvements in that class of instruments in which the blow for condensing the gold or filling material is given by a mallet placed within the case and operated by the attachment of the instrument to a dental engine or other motive power.

The object of the invention is to improve the character of the blow given and to condense the gold or other filling substance more effectually than is ordinarily done, and with less inconvenience to the patient.

A further object is to enable the operator to conveniently control the force of the blows, as also to discontinue them temporarily without the necessity of stopping the engine.

A further object is to obtain simplicity, strength, and cheapness in construction.

In the drawings, Figure 1 represents a longitudinal section of the instrument. Figs. 2, 3, 4, 5, 6, 7, and 8 are details of the invention, hereinafter particularly described.

Similar letters of reference indicate similar parts in the respective figures.

A is the outer tubular casing of the instrument, made of any suitable material. Each end of the casing A is internally threaded, as at *b c*. At the operative or tool end of the instrument is formed on or attached to the casing a ring or projection, *b'*, which gives strength thereto and receives a pin or set-screw, *b'''*, which projects within the casing A, for a purpose hereinafter described.

B is the tubular bearing or support for the tool-holder or reaction-shaft C, Fig. 3, which bearing is screwed into the end *b* of the casing A. The bearing B is provided with a cylindrical bore, which receives a spring, C', surrounding the shaft C and confined between the collar *c'* of the shaft C and the end *c''* of the tip D, which tip is screwed into the threaded outer extremity of the bearing B. The tip D, Fig. 4, is slotted at one side at *d*, which slot receives a pin or screw, *d'*, projecting from a side of the tool support or shaft C. The inner end of the shaft C is provided with a cylindrical hard-rubber or lead nut, *e*.

Within the casing A is placed the cylindrical mallet E, Fig. 5, having bearings *f f'* at its ends only, which parts are neatly fitted to the inner surface or bore of the casing, the greater part of the length of the mallet not having contact with the casing, whereby there is but little friction caused by the longitudinal movement of the mallet within the casing. The outer end of the mallet is provided with a cam-face, *g*, which face is also cylindrically bored or socketed, as shown by *g'*, a lead or rubber washer, *g''*, being inserted within and at the bottom of the cavity thus produced. The end of the shaft or tool holder C, with its rubber or lead nut *e*, is adapted to enter the cavity *g'*, the nut impinging upon the lead washer in the operation of the instrument, as hereinafter described. The other end of the mallet is also provided with a cylindrical socket or cavity, *g'''*, and with a longitudinal bore, *h*, concentric therewith and of smaller diameter, extending from *h'* to *h''*.

The shaft which connects the instrument with the dental engine is represented by F, the outer end of the shaft entering the longitudinal bore *h* of the mallet E. That part of the shaft F which enters the mallet is slotted or key-seated at *i*, which seat or slot is entered by one or more keys, *k*, which project within the bore *h*. These keys are attached to the mallet by being screwed into it from the outside or perimeter thereof, their heads being turned or filed flush with it, and the inner projections, constituting the keys, being shaped to accurately fit the keyway *i* of the shaft F. I prefer to use two or more keys, *k*, in order to secure a better or longer connection between the mallet E and the shaft F, in order to resist the torsional strain to which the parts are subjected in operation.

It will be understood that by the connection formed between the mallet E and shaft F by the keyway and keys *i* and *k*, respectively, a rotary motion given to the shaft F is also imparted to the mallet, but that the mallet is capable of longitudinal movement independently of the shaft. Surrounding the shaft F is placed a helical spring or springs, *l*, the outer end of the spring resting within the cylindrical cavity *g'''* of the mallet, and the opposite end abut-

ting against the face of a sliding thimble, *m*. (Shown in perspective in Fig. 6.) The thimble *m* is provided with pins *m'*, projecting from its periphery, which pins rest in slots *m''* cut in the sides of the casing. By this construction the thimble *m* is made capable of movement longitudinally of the casing, thereby acting, when moved toward the mallet, to compress the spring or springs *l*. The extended sides or hollow cylindrical portion of the thimble *m* serves to cover the slots *m''* in the casing and exclude dust, dirt, &c., from the interior thereof, and to prevent the passage of the oil or lubricant therefrom. The longitudinal movement of the thimble *m* is effected in a manner described hereinafter. A cap, *n*, Fig. 7, screws within the end of the casing A. The central portion of the cap *n* is bored longitudinally to receive and serve as a bearing for the outer end of the coupling-shaft F. The part of the shaft which is supported by the cap *n* is shown in Fig. 8, there being on the shaft collars *o o'*, having a space, *o''*, between them. A pin, *n'*, is inserted from the outer part of the cap *n*, the inner end of the pin extending into the space *o''*. The cap *n* is provided with a milled outer surface, *n''*, by means of which it is screwed into the end *c* of the casing A. G is an internally-threaded tension-adjuster, which screws upon a thread formed upon the outside of the casing A, which tension-adjuster is in contact with the pins *m'* of the thimble *m*, so that the forward travel of the tension-adjuster G effects the compression of the spring or springs *l*, while its backward movement allows their expansion, the pins *m* moving in the slots *m''* of the casing A.

The cylindrical internally-screw-threaded part of the cap *n* receives the screw end *q* of the flexible shaft-support H, having a milled outer surface, *q'*. Within the support H is placed longitudinally thereof the shaft-coupling I, which has the conical flange *s*, which rests or has a bearing in a correspondingly-shaped cavity formed in the end of the support H. The end of the shaft F is of the ordinary construction, enabling it to connect with the shaft-coupling I, whose connecting end is provided with a socket appropriate for the purpose, whereby the rotary movement of the shaft-coupling may be communicated to the shaft F. The union between the end of the shaft F and the socket of the shaft-coupling I may be effected by means of a cross-pin, *t*. The opposite end, *x'*, of the shaft-coupling I is cylindrically bored to receive and hold the end of the flexible shaft of the dental engine, and the adjacent end, *t''*, of the support H is cylindrical and internally threaded to receive and secure the non-rotatory part of the flexible shaft. I prefer to make the part *t''* separate from the rest of the support H and secured thereto by pins or screws *t'''*; but it may be made homogeneous therewith.

The operation of the instrument is as follows: Rotary motion having been given to the flexible shaft of the dental engine, corresponding rotation is imparted to the shaft F, and by reason of the key-connection between said shaft and the mallet E the same movement is given thereto. The adjustment of the spring *l* is such that the cam end of the mallet impinges with some degree of force on the fixed pin *b'''* passing through the ring *b'* and projecting into the casing. In each revolution of the mallet the contact between its cam-face and the pin *b'''* causes the mallet to be forced back a distance equivalent to the pitch of the cam. When the termination of the cam-face is brought opposite the pin, the force of the spring or springs *l* effects the sudden projection forward of the mallet, its washer *g''* striking against the hard-rubber nut *e* of the shaft C, compressing its spring C' and imparting the blow to the plugger. As the mallet recedes again by contact being renewed between the spiral of the cam-face and the pin *b'''* the shaft C is left free to be retracted, and its return is effected by the action of the spring C', which carries back the shaft to a position somewhat beyond the pin *b'''*, to a position adapting the nut *e* to receive in a proper manner the next blow of the mallet. The relative positions occupied before the blow is struck by the nut *e*, pin *b'''*, and cam-face are such as to regulate and definitely determine the length of the stroke given to the plugger, which it will be seen must invariably be the same unless the adjustment of the parts is changed. Fig. 1 shows the plugger at its downward stroke, while Fig. 2 represents the mallet at its backstroke or limit of movement, and the plugger retracted by the action of the spring C'.

The effect of the contact between the hard-rubber nut *e* and the lead washer *g''* is to soften the character of the blow by deadening the sound or making the blow practically noiseless to the ear of the patient.

Near the outer end of the tool-holder or reaction-shaft C is the ordinary locking-ring, *v*. Should the operator desire to temporarily discontinue the strokes, he can do this by pressing his finger against the ring *v*, or, should he prefer it, the pin *d'*, whereupon the nut end of the shaft C will be made to push the cam-face of the mallet back out of contact with the pin *b'''*, so that the mallet in its revolutions will be inoperative to give movement to the plugger. The pin *d'* slides within the slot *d''* of the tubular support B and the corresponding slot, *d*, in the screw end of the tip D.

The shaft-support H is applicable to a drilling-instrument on the plugging-instrument being detached, thus dispensing with an unnecessary amount of mechanism.

I am aware that heretofore the force of the spring effecting the blow has been varied in accordance with end-pressure on the tool, and disclaim, generally, the invention of means for accomplishing such result. I also disclaim, generally considered, a sliding cam as an element in a dental plugger.

Having described my invention, I claim—

1. In a dental plugger, the combination of a tubular casing, a fixed pin extending thereinto, a mallet adapted to rotate and slide within the casing and having a cam-face to operate on or against said pin, and a spring for maintaining contact between the cam-face and pin, substantially as set forth.

2. In a dental plugger, a tubular casing, fixed pin, and a spring-operated mallet having a cam-face and adapted to revolve and slide in said casing, combined with a tubular support, a shaft or tool-holder capable of sliding movement therein, and a spring for retracting the sliding shaft, substantially as set forth.

3. The combination of a tubular casing, a fixed pin, a revolving and sliding mallet with a cam-face, a slotted tubular support, a spring sliding shaft or tool-holder, a slotted tip, and a pin projecting from the sliding shaft or tool-holder, whereby the cam-face of the mallet may be pushed back by the shaft out of contact with the fixed pin, substantially as and for the purposes set forth.

4. The combination of the tubular casing, the mallet, slotted coupling-shaft loosely keyed to the mallet, tension-spring, and means for adjusting the same, substantially as set forth.

5. The combination of the slotted casing, mallet, coupling-shaft loosely keyed to the mallet, tension-spring, sliding thimble having pins extending through the slots of the casing, and a tension-adjuster screwed upon the outside of the casing and engaging with the pins of the thimble, substantially as set forth.

6. The combination of the casing, screw-cap *n*, pin *n'*, coupling-shaft, with collars *o o'*, and space *o''*, substantially as set forth.

7. The combination of support H and shaft-coupling I with conical flange having a bearing in the support H, substantially as set forth.

8. The combination of cap *n*, support H, and shaft-coupling I, substantially as set forth.

9. A shaft-support having an outer male thread and an internally-threaded cylindrical extension, and provided, further, with a suitable interior bearing adapted to receive a revoluble shaft-coupling, said support constituting a device detachable from the instrument, substantially as and for the purposes set forth.

10. The combination, in a dental plugger, of a casing with a cylindrical mallet, the latter having annular bearings which only are in contact with the interior of the casing, thereby lessening friction in the operation of the mallet, substantially as set forth.

In testimony whereof I have hereunto set my hand this 24th day of June, 1882.

W. WARRINGTON EVANS.

Witnesses:

GEORGE H. HOWARD,

W. T. COLE.