(No Model.)

P. C. MORSE.

DENTAL PLUGGER.

No. 381,844. Patented Apr. 24, 1888.

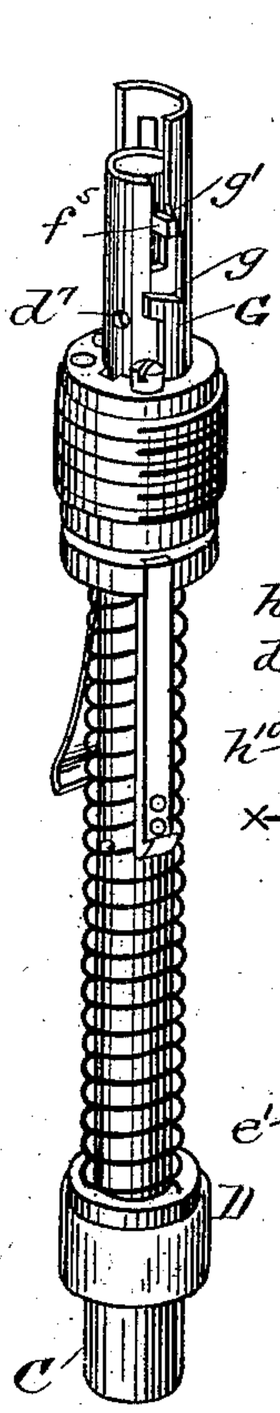

Fig. 6.

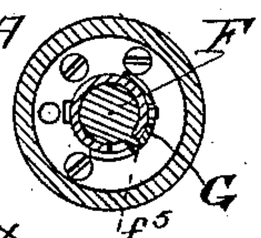

Fig. 4.

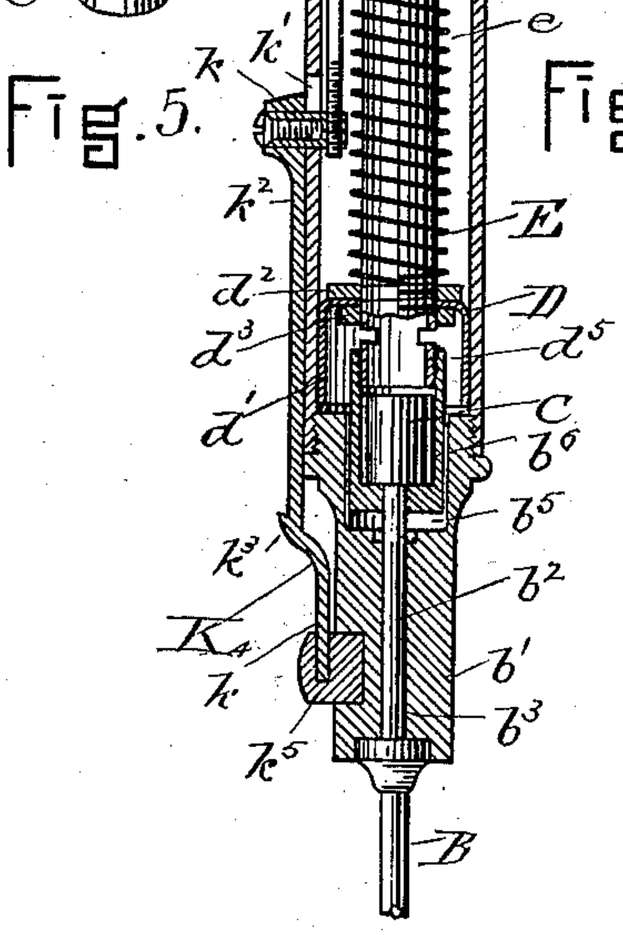

Fig. 5.

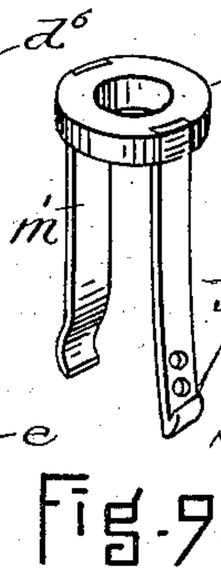

Fig. 9.

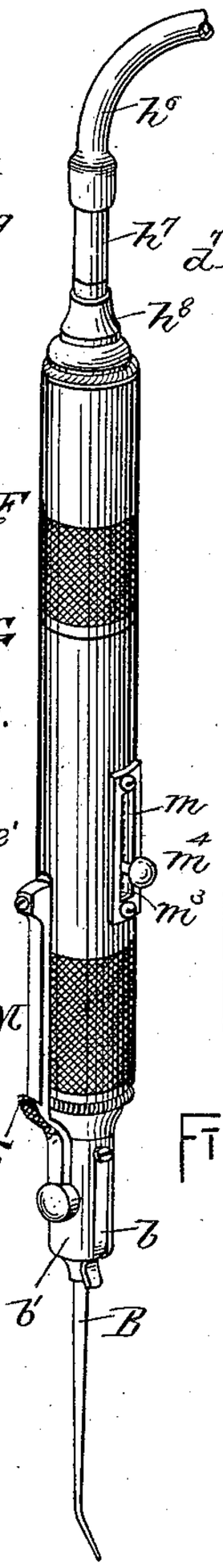

Fig. 1.

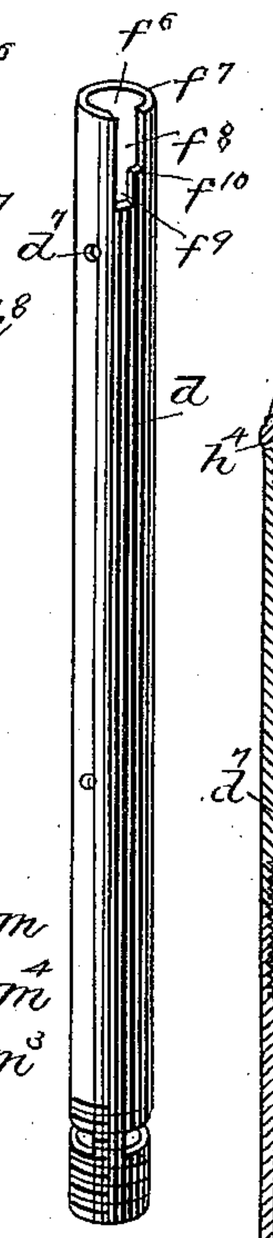

Fig. 7.

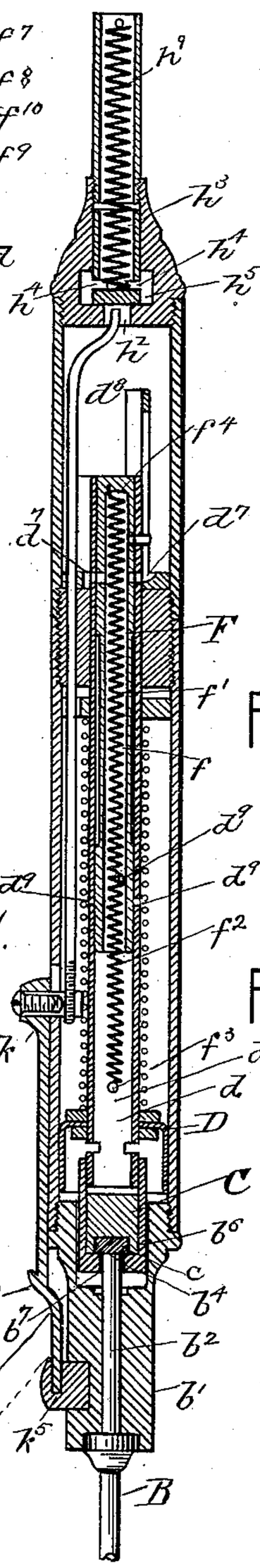

Fig. 10.

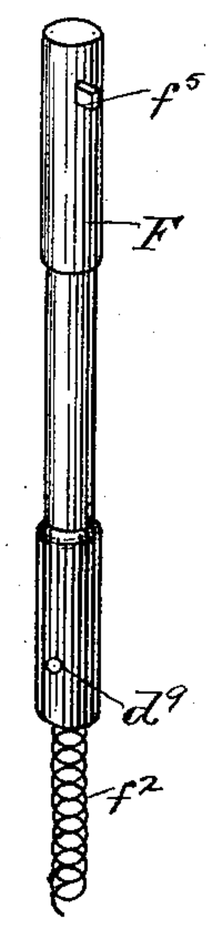

Fig. 8.

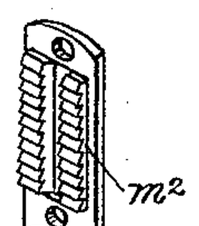

Fig. 3.

Fig. 2.

WITNESSES:

J. M. Dolan.

J. B. Gardner.

INVENTOR.

Parkin C. Morse,

by his attys

Clarke & Raymond

UNITED STATES PATENT OFFICE.

PRESTON C. MORSE, OF NATICK, MASSACHUSETTS.

DENTAL PLUGGER.

SPECIFICATION forming part of Letters Patent No. 381,844, dated April 24, 1888.

Application filed June 18, 1887. Serial No. 241,691. (No model.)

To all whom it may concern:

Be it known that I, PRESTON C. MORSE, of Natick, in the county of Middlesex and State of Massachusetts, a citizen of the United States, have invented a new and useful Improvement in Dental Pluggers or Mallets, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification, in explaining its nature.

It is desirable in dental pluggers and instruments of a like nature to vibrate the plugging tool or instrument very rapidly, and with a graded or variable power or touch, and to confine the operating devices in very small compass, and my device embodies the employment, as an actuating power, of compressed air and of spring-pressure acting in opposition to each other upon the tool or instrument. I prefer to use the compressed air to store power in the spring and to use the spring for delivering the striking-blow of the hammer. Aside from the broad features of the invention as above indicated, the invention further comprises various details of organization and construction, all of which will hereinafter be described.

In the drawings, Figure 1 is a view in perspective of an instrument containing the features of my invention. Fig. 2 is a view, part in longitudinal section and part in elevation, enlarged, to represent the construction thereof. Fig. 3 is a view in vertical central section, enlarged, to further illustrate its construction. Fig. 4 is a view in cross section upon the dotted line *x x* of Fig. 2. Fig. 5 is a view in perspective of certain of the operating devices. Fig. 6 is a view in perspective, enlarged, of a part of the valve-operating mechanism. Fig. 7 is a view, enlarged, of the piston-rod. Fig. 8 is a view in perspective, enlarged, of the cylindrical valve and its operating-spring. Fig. 9 is a view in perspective, enlarged, of the device for adjusting the tension of the actuating-spring. Fig. 10 is a view in perspective of a ratchet-plate attached to the case of the tool, to which reference is hereinafter made.

A is the cylindrical case, which has a long cylindrical chamber, *a*, containing the principal operative parts of the device.

B is the tool or instrument. It is detachably secured by the spring-latch *b* to the holder *b'* at the forward end of the instrument, the tool or instrument having a shank, b^2, which fits the vertical hole b^3 in the holder *b'*, and extends inward sufficiently to receive upon its inner end, b^4, the impact of the hammer C. The shank of the tool or instrument B is free to move a limited distance longitudinally in the hole b^3, in order that it may receive and transmit to the end of the tool a short quick reciprocating movement or blow.

The holder *b'* is fastened to the case A by a screw-thread, and it also has the enlarged hole b^5 at its inner end, in which is movable a sleeve, b^6, having a hole, b^7, into which the inner end, b^4, of the spindle or shank extends. (See Fig. 3.) This sleeve holds the hammer C to the end of the piston-rod, and the hammer preferably is not secured to the end of the piston-rod *b*, but is free in its holder b^6 to transmit the impact or blow from the piston-rod and to deliver it to the end b^4 of the spindle or shank b^2 of the tool. In some instances I prefer that the striking part of the hammer C—that is, the portion of it which comes in contact with the end of the shank or spindle—should be lead, and I have represented in Fig. 3 the lead block *c* set into a hole formed therein.

D is the piston, and I have represented it as formed by the cup-packing *d'*, preferably of leather, and of a size to fit the bore of the case A. This packing is fastened to the piston-rod by the nuts d^2 d^3. The piston-rod *d* is hollow, its bore forming a passage, d^4, for the flow of compressed air from the inlet or supply ports to the chamber or cylinder d^5. This piston-rod extends upward through the holding-block d^6, and has the supply or inlet holes d^7 at its upper end, (see Figs. 5 and 7,) which establish connection between the chamber d^8, into which compressed air is admitted, as will hereinafter appear, the holes d^7 forming a portion of the inlet-ports of the valve. To control these ports so that the compressed air shall be admitted to the chamber d^5 at the end of the forward or striking movement of the actuating-spring E, I have arranged in the passage d^4 of the piston-rod a cylindrical valve, F, (see Fig. 8,) which serves to alternately open and close the inlet-ports d^7 and also the exhaust-ports d^9. (See Figs. 3 and 7.) This cylindrical valve is closed at its outer end and is hollow, opening into the passage d^4 in the

piston *d*, and forming a passage, *f'*, from the inlet-ports *d*⁷, and it has a turning or torsional movement given it by means of the long coiled spring *f*², which is fastened at its end *f*³ to the piston *d*, and at its opposite end, *f*⁴, to the valve F, and which is under sufficient tension to turn the cylindrical valve F in one direction, and also to cause it to have a longitudinal movement in the piston passage *a*⁴.

In order that the inlet and exhaust passages may be opened and closed at the proper interval, it is necessary that the valve F travel with the piston-rod a limited distance, and that it then have a movement independent of the piston-rod—in other words, it is provided with a four-motion movement; and this is obtained by the movement of the piston-rod itself, which moves it outward to close the exhaust and open the supply passages and into a position to enable the spring *f*², acting torsionally, to turn the valve F into a position which brings its pin upon a lug or holding device, and the valve-rod then remains in that position—that is, with the exhaust-passages closed and the inlet-passages open—until the valve is again turned and the spring *f*² caused to draw or return it to a position to close the inlets and open the exhaust-passages. To provide the valve F with these movements, I have formed thereon, to project laterally, a pin or projection, *f*⁵, and I have formed in the end of the piston-rod *d* a longitudinal recess, *f*⁶, extending from its end *f*⁷, and having the comparatively wide portion, *f*⁸, and narrower portion, *f*⁹, extending therefrom, there being a shoulder, *f*¹⁰, at the end of the narrower portion of the recess. (See Fig. 7.) This recess receives the pin or projection *f*⁵, extending from the valve F. (See Figs. 2, 3, and 5.) There is also attached to the block *d*⁶ a stationary curved plate, G, which has a tripping shoulder or stop, *g*, arranged to extend across the line of movement of the pin *f*⁵.

The operation of the valve is as follows: The compressed air is admitted to the chamber *d*⁸, the piston *d* then being at the end of its forward stroke, having been forced there and being held there by the actuating-spring E, which is contained in the chamber *e* in the case, and which bears against a movable collar, *e'*, at one end and against the piston D at the other. The inlet or supply ports are then open, and the projection or pin *f*⁵ of the valve rests upon the shoulder *f*¹⁰ of the piston-rod. The piston is immediately moved backward, compresses the actuating-spring E, moves the piston-rod and the valve F, the inlet-ports remaining open, and the pin or projection *f*⁵ upon the shoulder *f*¹⁰, until the pin *f*⁵ is brought into contact with the tripping-incline *g'* on the stationary plate G, when it is caused to be moved laterally off the shoulder, thus causing the valve F to be turned and moved off the shoulder *f*¹⁰, which is then, by the action of the spring *f*², drawn into the narrow section *f*⁹ of the recess to the inner end thereof. This causes the inlet-ports to be closed and the exhaust-ports to be opened. The compressed air in the cylinder then escapes through the passages *d*⁹ into the chamber *e*, which opens to the outer air, and the actuating-spring E then serves to return the piston and piston-rod to their respective positions. Upon the reverse movement of the piston-rod the valve F moves with it a limited distance until the pin or projection *f*⁵, which is now at the inner end of the recess *f*⁹, comes in contact with the shoulder *g*, and is arrested thereby, while the piston-rod continues to move forward, and the projection *g* continues to hold the pin *f*⁵, and consequently the valve F, stationary until the shoulder *f*¹⁰ comes in line with the upper surface of the projection G, when the spring *f*², acting torsionally, throws or turns the valve F. The projection *f*⁵ then rests upon the shoulder *f*¹⁰. This causes the exhaust-ports to be closed and the inlet-ports to be opened, and the piston and piston-rod to be moved backward by compressed air, as before.

To regulate the admission of compressed air to the chamber *d*⁸, I use the hollow valve H, which has the closed inner end, *h*, arranged to shut upon the valve-seat *h'*, surrounding the hole *h*². The valve H has a passage, *h*³, which opens through the side openings, *h*⁴, at its end into the valve-chamber *h*⁵, about the valve H, (see Figs. 2 and 3,) and the compressed air is supplied by means of the flexible tube *h*⁶ and pipe *h*⁷, which screws into the end *h*⁸ of the instrument. This end *h*⁸ contains the valve H, and screws into the case A. The valve H has a lengthwise movement in its chamber, and is adapted to be held closed by the actuating-spring *h*⁹, and to be opened by the push-rod *h*¹⁰, which extends into the opening *h*² from the valve-chamber *d*⁸, (see Fig. 2,) and is adapted to be moved against the seat or solid end *h* of the valve. It is caused to be moved from a point near the forward end of the instrument, in order that it may be operated from the most advantageous position for movement by the operator, which is at the point K, (see Figs. 1, 2, and 3,) and the push-rod *h*¹⁰ is extended in the chamber *a* of the case A, through the block *d*⁶ into the section *e* of the chamber, where it is connected by a stud, *k*, which passes through a slot, *k'*, with the end of the push-bar *k*². This push-bar has a thumb-rest, *k*³, and its end *k*⁴ extends into a guide-hole in the block *k*⁵, fastened to the end *b'*.

As it is desirable to vary the tension of the actuating-spring E, to change the force of the blow delivered by the tool or instrument, I have made the collar *e'*, against which it bears, adjustable longitudinally in the case, and it is adapted to be locked in any desired position by means of the pawl or hook M, which extends into the slot *m* in the case, and is pressed by the spring *m'* against the ratchet-plate *m*². A stud, *m*³, extends from the arm carrying the pawl or hook M through the slot *m*, and has a knob,

m^4, by which the collar is moved and the pawl or hook engaged or disengaged from the teeth of the ratchet.

The joint use of compressed air and an actuating spring for delivering blows in rapid succession I have found to be very advantageous.

I would say that I do not limit the use of the invention to dental instruments, but may employ it wherever it is desired to obtain or give rapid strokes to any tool or instrument.

Having thus fully described my invention, I claim and desire to secure by Letters Patent of the United States—

1. The combination, in an instrument for dentistry and other purposes, of a hammer adapted to have a reciprocating movement imparted to it by a piston-rod, a piston carried by said rod and movable in a cylinder, said cylinder, and valves for controlling the admission and escape of compressed air thereto, and an actuating-spring for bearing against the piston-rod, whereby the piston-rod is moved in one direction by the compressed air and in a reverse direction by the actuating-spring, as and for the purposes specified.

2. The combination, in an instrument for dentistry, of a loose or free hammer, C, adapted to receive and deliver blows by impact, with a piston-rod moved in one direction by a piston actuated by compressed air, and in a reverse direction by an actuating-spring, as and for the purposes specified.

3. The combination, in an instrument for dentistry and other purposes, of a piston-rod for communicating a blow to a hammer or other instrument, a piston carried thereby, a cylinder or piston-chamber, a valve for automatically controlling the inflow and escape of compressed air thereto, and an actuating-spring, E, as and for the purposes specified.

4. The combination, in an instrument for dentistry and other purposes, of a hollow piston contained in a case, a cylinder or piston-chamber, a hollow piston-rod opening into said piston-chamber and provided with supply-ports d^7 and escape-ports d^9, and the valve F, to open and close said ports contained in said hollow piston-rod, and provided with endwise and turning movements therein, as and for the purposes specified.

5. The combination, in an instrument for dentistry and other purposes, of a case having a piston-chamber, a piston movable therein, a hollow piston-rod having inlet-ports d^7 and escape-ports d^9, a compressed-air-supply chamber, d^8, a hollow valve, F, contained in said chamber, and having holes which register with the inlet and exhaust ports, the pin or stud f^5, extending from the valve, the valve-actuating spring f^2, the shoulder f^{10} upon the hollow piston-rod, and the stop g and incline g', as and for the purposes specified.

6. The combination, in an instrument for dentistry, of a piston adapted to be moved in one direction by compressed air and in a reverse direction by an actuating-spring, a piston-chamber in which said piston is moved, an air-supply chamber connected with the piston-chamber by inlet-ports, a valve controlling said inlet-ports, and a valve controlling the air-supply passage to the said chamber, as and for the purposes specified.

7. In an instrument for dentistry and other purposes, a piston adapted to be moved in a piston-chamber in one direction by compressed air, and a valve for regulating the supply of compressed air furnished the piston-chamber through a supply tube or passage, and a valve-actuating device having an arm or push-rod extended to a location near the operating end of said instrument, as and for the purposes described.

8. The combination, in an instrument for dentistry and other purposes, of a case, A, supporting a tool, B, said tool B, and a reciprocating piston-rod contained in said case and arranged to strike the end of said tool B in each reciprocation, adapted to be moved in one direction by compressed air and in the opposite direction by an actuating-spring, a piston carried by said rod, a tube for supplying compressed air to the piston-chamber, and a valve for controlling the air-supply passage, as and for the purposes described.

9. The combination, in an instrument for dentistry and other purposes, of a tool, B, loosely attached to its holder, a loose or free hammer interposed between the end of the tool and the reciprocating piston-rod, a reciprocating piston-rod having a piston contained in a piston-chamber in a case, said piston-chamber, an automatic valve for opening and closing the inlet and exhaust passages to permit the compressed air to act to move the rod in one direction, and a spring to move the rod in a reverse direction, as and for the purposes specified.

10. The combination, in an instrument for dentistry and other purposes, of a tool, B, loosely attached to its holder, a loose or free hammer interposed between the end of the tool and the reciprocating piston-rod, a reciprocating piston-rod having a piston contained in the piston-chamber, said piston-chamber, an automatic valve for opening and closing the inlet and exhaust passages to permit the compressed air to act to move the rod in one direction, and a spring to move the rod in a reverse direction, a chamber connected with the compressed-air supply pipe, and a valve for opening and closing the supply-passage, whereby upon the admission of compressed air to said chamber the said piston-rod is immediately caused to be automatically reciprocated to deliver blows in rapid succession to the hammer, as and for the purposes described.

11. The combination, in an instrument for dentistry and other purposes, of the case A, having a compressed-air passage or chamber, d^8, the air-supply tube h^6, pipe h^7, valve-chamber h^5, valve-seat h', valve H, spring h^9, and push-rod h^{10}, as and for the purposes described.

12. The combination, in an instrument for dentistry and other purposes, of the reciprocating rod d^4, adapted to be moved in one direction by compressed air, an actuating-spring, E, and a tension-regulating device for varying the tension upon the spring E, comprising the collar e', the spring pawl or hook M, the ratchet-plate m^2, and a stud, m^3, as and for the purposes described.

PRESTON C. MORSE.

In presence of—
F. F. RAYMOND, 2d,
J. M. DOLAN.