S. W. DENNIS.

PNEUMATIC DENTAL-MALLETS.

No. 195,102. Patented Sept. 11, 1877.

Fig. 2.

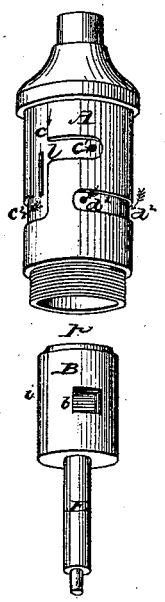


Fig. 1.

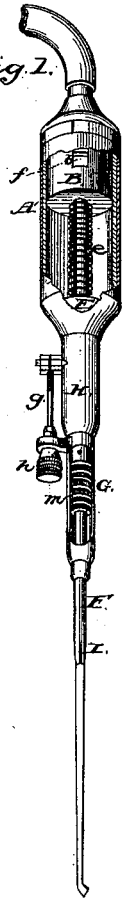


Fig. 3.

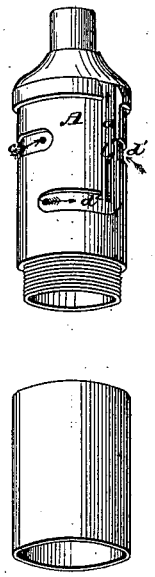


Fig. 4.

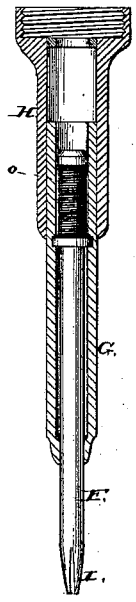


Fig. 5.

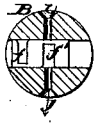
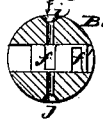


Fig. 6.



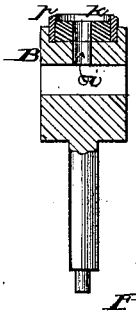


Fig. 7.

Fig. 8.

Attest:
Edward C. Adams
C. A. Smith

Inventor:
Samuel W. Dennis
By C. W. M. Smith
Attorney.

UNITED STATES PATENT OFFICE.

SAMUEL W. DENNIS, OF SAN FRANCISCO, CALIFORNIA.

IMPROVEMENT IN PNEUMATIC DENTAL MALLETS.

Specification forming part of Letters Patent No. **195,102**, dated September 11, 1877; application filed June 21, 1877.

To all whom it may concern:

Be it known that I, SAMUEL W. DENNIS, of the city and county of San Francisco, in the State of California, have invented a certain new and Improved Pneumatic Dental Mallet, which invention is fully set forth and described in the following specification and accompanying drawings.

In the said drawings, Figure 1 is a perspective view of my improved mallet, with the outer shell broken away to show the position of parts inside. Figs. 2 and 3 are views of the cylinder, with the jacket or casing removed to show the arrangement of the channels and passages, the left-hand figure showing the induction-passages, and the right-hand figure those that act as exhaust-passages. Fig. 4 is a sectional view of the stem, the reciprocating rod having the chuck on its end, and the sleeve that holds and secures them in place on the end of the cylinder. Figs. 5 and 6 are transverse sectional views through the piston or hammer at the line of the valve-seat. Fig. 7 is a detail view of the piston and its valve, the former being shown in section. Fig. 8 is a detail view of the valve.

My invention relates to that class of dental instruments used in plugging or filling teeth; and it consists in the combination and arrangement, within a suitable chamber or cylinder, of a reciprocating mallet or piston carrying its own valve or valves, and operated, by means of pneumatic pressure, to be thrown in one direction against the tool-holder, and to be reacted or moved in the opposite direction by a spring.

The object of my invention is to produce a dental mallet or plugging-instrument that shall have the capacity to deliver blows of more or less force or intensity, and with great rapidity, in any position or situation, and to work entirely automatic with a small amount or degree of pressure.

Referring to the accompanying drawing for a better understanding of the description, A, Fig. 1, represents the chamber or cylinder, having the supply and exhaust channels and passages in the inner shell covered by an outer jacket or casing. B is the reciprocating hammer, with the valve *b* moving within it and controlling the ports *i j k*. The end of the hammer carries the spindle E, which imparts the blows to the head of the rod F situated within the hollow stem G of the tool. The spindle E is surrounded by the coil-spring *e*, that rests upon the seat or shoulder in the screw-sleeve H, and moves the hammer in the direction contrary to the action of the air.

The stem G is fitted to slide within the sleeve H, and is held and adjusted by means of the screw-rod *g*, with a milled head, *h*, or by any other suitable mechanism, whereby the rod or chuck F, carrying the plugging-tool, is set more or less up into the chamber, and caused to receive a greater or less force or intensity of blow from the hammer.

The position and arrangement of the valve *b* are such that the motion is at right angles to the movement or travel of the hammer within the cylinder, and its action is entirely positive, and is independent of any springs or other operating mechanism, so that the hammer or mallet B may move rapidly without deranging the action of the valve.

The form of the valve *b* is shown in the detail view, Fig. 8. It is a double valve, having diagonal passages *f f'*, that connect and bring the ports *i j* in line with the central passage *k* in the end of the hammer. The port *i* is the induction-port, and it is in line with the slot *l* in the channel *c*, and in working communication with it when the hammer is up. The port *j* at the opposite side of the hammer constitutes the exhaust-port, it being in line with, and opening into, the slot *l'* in the exhaust side of the cylinder when the mallet or hammer is down or at the end of its stroke.

Leading from the supply and exhaust channels *c d* are the branch passages c^1 c^2 d^1 d^2 that furnish the means for operating the valve *b*. They lead the air and exhaust it alternately from the ends of the valve, and impart to it a reciprocating movement at right angles to the motion of the hammer.

Thus the hammer is vibrated within its chamber by the combined action of the air led into and out from it and the coil-spring *e*, and its manner of operation will be clearly understood by referring to Figs. 2 and 3 of the drawing, where the plain arrows indicate the ac-

ion of the air upon the hammer, and the arbed arrows show the course of the air in orking the valves.

When the air is admitted to the instrument it fills the channel *c* and the upper and lower branch passages c^1 c^2 with an equal pressure, and after throwing the valve *b*, which at this time is against and in line with the hole in the end of the passage c^1, into proper position to bring the diagonal passage *f* in line with the port *i* and the central passage *k*, the air is caused to enter through this passage into the chamber above the piston or hammer and force it down against the rod F, giving it a quick sharp blow, and at the same time compressing its spring. But as the hammer reaches the end of its stroke the valve *b* is brought into line with the opening in the end of the lower induction-passage c^2, and the pressure at the other end of the valve being at the same moment relieved through the exhaust-passage d^2, the valve is thrown over to bring its diagonal passage *f'* in line with the exhaust-port *j*, when the pressure above the valve is relieved through the passage *k*, the exhaust-port *j*, and the slot in the channel *l'*.

When the hammer B is returned to its first position by the reaction of the spring *e*, the valve is then in line with the upper exhaust-passage d^1, and the pressure upon that end is removed to allow the air within the upper induction-passage c^1 to move the valve over in line with the supply-port *i* in the same manner as before described. A rapid vibration is thus produced, and the blows are communicated to the tool through the rod F within the adjustable stem G and the spindle E on the end of the hammer.

The rod F and its tool carried in the chuck I, after each blow, is returned by the spring *o*, which is within the sleeve H and around the stem G. The rod F has a collar, *m*, with a milled or roughened face, by which the rod and its tool can be rotated within the hollow stem G.

The delicacy of the blows given by the tool is regulated by the screw *g* that adjusts the stem G within the sleeve H, and holds it at a greater or less distance from the spindle E.

The head of the piston B is provided with an elastic cushion, *p*, to deaden the noise of the blows against the end of the cylinder and reduce the effect of the recoil of the spring.

The lower end of the cylinder below the piston may be left open, or perforated with holes, as it is not necessary to have it air-tight.

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

1. The combination and arrangement together of the piston B, with its ports and passages *i j k* and its reciprocating valve *b*, the cylinder or chamber A, with its supply and exhaust passages and channels *c* c^1 c^2 *d* d^1 d^2, communicating with the interior of the cylinder, and the coil-spring *e*, substantially as herein set forth, for producing a rapid vibration of the piston, as described.

2. The combination of the piston B, provided with the passages *i k*, with the reciprocating valve *b*, having passages *f f'*, and operating at right angles to the travel or momentum of the said piston, and acting to connect and to close the ports *i j k*, substantially as and for the purposes set forth.

3. The cylinder A, with the passages and channels *c* c^1 c^2 *d* d^1 d^2, substantially as described, and the ports therein communicating with the interior of the cylinder, in combination with the reciprocating piston B, which acts as a valve to govern the ports in the cylinder, and carries an auxiliary valve, moving at right angles to the movement of the piston, for controlling the supply and exhaust passages in the main valve or piston, substantially in the manner herein described.

4. In a dental mallet or plugging-tool, the combination, with the cylinder or chamber A, of the fixed sleeve H and the sliding and adjustable hollow stem G, holding the rod F, for the purpose of regulating and graduating the force or intensity of the blows of the instrument, substantially as herein described and set forth.

5. In a dental mallet or plugging-tool, the combination of the piston B, forced forward by pneumatic pressure, with the spring *e*, for returning such piston to its first position when the pneumatic pressure is removed, substantially as described.

6. In a dental mallet or plugging-tool, the combination, with the piston B, forced by pneumatic pressure and returned by the spring *e*, of the tool-holding rod F, adapted to be driven forward by the movement of such piston, and the spring *o* for retracting the said rod, substantially as described and shown.

In witness that I claim the foregoing I have hereunto set my hand and seal this 5th day of June, A. D. 1877.

SAMUEL W. DENNIS, M. D. [L. S.]

In presence of—
HOLLAND SMITH,
EDWARD E. OSBORN.