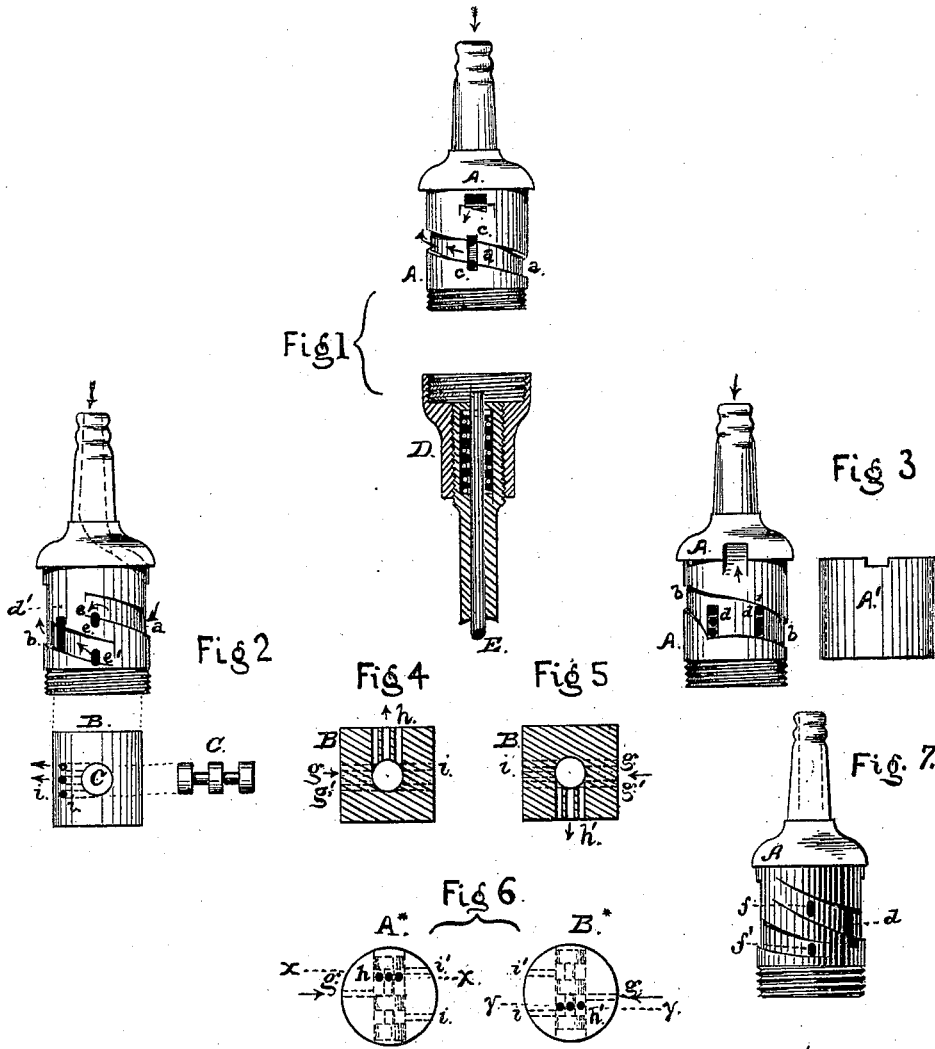


S. W. DENNIS.  
 Motor for Dental-Pluggers.

No. 205,619.

Patented July 2, 1878.



Witnesses.  
 Wm F Smith  
 Edward C. Osborn

Inventor.  
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# UNITED STATES PATENT OFFICE.

SAMUEL W. DENNIS, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR, BY  
MESNE ASSIGNMENTS, TO HIMSELF AND JOHN B. REYNOLDS, OF SAME  
PLACE.

## IMPROVEMENT IN MOTORS FOR DENTAL PLUGGERS.

Specification forming part of Letters Patent No. **205,619**, dated July 2, 1878; application filed  
October 29, 1877.

*To all whom it may concern:*

Be it known that I, SAMUEL W. DENNIS, of the city and county of San Francisco, State of California, have invented a new and useful Improvement in Pneumatic Motors for Operating Dentists' Pluggers, Excavators, and other tools, which invention is fully set forth in the following specification and the drawing forming a part thereof.

In the said drawing, Figure 1 is a view of my improved instrument for operating dentists' tools, with the outer jacket of the chamber removed to show the arrangement of the passages and ports for conducting the air or other agent to and from the piston-chamber. Fig. 2 is a detail view of the chamber, piston, and valve. Fig. 3 shows the opposite side of the chamber, with the exhaust passages and ports. Fig. 4 is a sectional view of the piston, showing the arrangement of the channels within it for leading the air to and from the chamber above the piston. Fig. 5 is a section through the piston, showing the channels or passages that conduct the air to and lead it from beneath the piston. Fig. 6 shows end views of the piston at top and bottom. Fig. 7 is an elevation of the chamber, with the valve removed therefrom, the same being taken from the side directly opposite to that shown in Fig. 2.

Similar letters of reference indicate like parts in all the drawings.

My invention has for its object to provide a motor or instrument for dentists' use, to be driven either by compressed air, which can be used with and to operate tools of different shapes and kinds, whereby the operations of drilling, excavating, plugging, and burnishing in dentistry can be performed more quickly and in a much better manner than has been heretofore done; and to this end it is constructed, after the manner herein described, to give a series of exceedingly rapid blows or vibrations against a rod or spindle held within a hollow stem or sleeve secured to the end of the motor or driving instrument, upon or at the end of which rod the tools and points for performing the different operations are situated, all which will be more fully set forth hereinafter.

My invention consists in the peculiar construction of a piston, carrying a valve to control its ports and channels, and combined with a cylinder or chamber, into and from which the air is conducted through proper channels and openings in the cylinder, both above and below the piston, whereby the movement of the piston in both directions is produced by the action of the air alone, and only one valve is employed for controlling the admission and exit of the air from the cylinder, whereby greater simplicity of construction and a reduction in the vibration of the instrument in the hand is the result.

Referring to the accompanying drawing, A represents the cylinder or chamber, having the channels or passages *a b* formed in its outer surface, and covered by the shell or jacket A'. One of these passages forms an induction, and the other an exhaust, channel, the one communicating with the tube at the top of the cylinder, and the other leading to the outer air through the opening in the side of the cylinder.

B is the piston. C is the valve placed within the piston, and traveling at right angle to the reciprocation of the piston. D is the sleeve, secured to the bottom of the cylinder and holding the rod or spindle E, in and to the end of which the tools and points for excavating, drilling, plugging, or burnishing are secured.

The piston B is made to fit exactly and work smoothly within the cylinder or chamber, so that it shall act to control the ports or openings in the cylinder. These ports *c d d'* *e e' f f'* conduct and lead the air to and from the piston and its valve. Three of these ports, *c d d'*, one in the induction-channel and the others in the exhaust-channel, admit the air to and from the cylinder above and below the piston, and conduct it thence, and the others, *e e' f f'*, operate in the same manner for the valve C. Thus the port *e* supplies air to the head of the valve, to move it over in position to open the port *g* of the piston and bring it in line with the passage *h* leading from the valve-seat out through the top of the piston, and the opposite movement of the valve is produced by the air supplied through the port

*e'*, by which the valve brings the port *g'* in communication with the passage *h'* and admits the air below the piston.

Besides the induction-ports *g g'* and the passages *h h'*, which act alternately as induction and exhaust channels, the piston has two exhaust-passages, *i i'*, at the side opposite the ports *g g'*, situated in line with the ports *d d'* in the cylinder, through which the air is exhausted from the cylinder both above and below the piston.

The valve *C* travels at right angle to the movement of the piston, and covers and uncovers the ports *g g'* and *i i'*, and puts the ports or passages *h h'* alternately in line with the induction-ports *g g'* and the exhaust *i i'*; and in such manner are they located that when the passage *h* and port *g* are in line to admit air above the piston the passage *h'* and exhaust *i'* are in communication to lead the air from beneath the piston, and the valve works in such manner with relation to the ports *g h* that the air is admitted above the piston just before the termination of its upward movement, whereby the piston is caused to cushion against the incoming air, and the vibration of the instrument heretofore produced by the impact of the piston against the top of the cylinder is greatly reduced or removed.

The detail views, Figs. 4 and 6<sup>A\*</sup>, illustrate the admission of the air above the piston and its exit from below; and the adjoining view, Figs. 5 and 6<sup>B\*</sup>, shows the action of the air in passing to the bottom of the cylinder and from above the piston.

It will be readily understood that the air is admitted alternately above and beneath the piston to produce a rapid reciprocation, and the air is controlled in its passing into and out from the cylinder by one valve alone, without the aid of any auxiliary mechanism.

Greater simplicity of construction is the result of my improvement, and a much more rapid action of the piston is produced.

The instrument can be operated as well by exhaust as by compressed air, for by connecting the channel *b* with the proper means for exhausting the air the piston will reciprocate quite as well as by the use of compressed air, though, perhaps, not quite as rapidly.

The tool-holding rod or spindle is provided with a chuck in its end, to hold tools and points of various shapes; or the tool is formed di-

rectly on the end of the rod, and a separate sleeve or stem, *D*, can be used to hold each tool, and serve as the means for connecting together the tool and the motor or instrument giving the proper movement to the operating-tool, whereby the several operations of excavating, drilling, plugging, and burnishing can be performed in a perfect, more rapid, and thorough manner, by virtue of the rapidity and uniformity of motion produced by the instrument.

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

1. The combination together in one machine or instrument of the following parts or elements, viz: a cylinder or chamber, *A*, having induction-passage *a* and induction-ports *e e f* and exhaust-ports *d d' e' f'* in its shell, the piston *B*, having induction-ports *g g'*, passages *h h'*, and exhaust-ports *i i'*, and the valve *C*, traveling within the piston at right angle to its reciprocation, and acting to control the piston-ports, substantially as herein described, for the purpose of producing a vibration of the piston by the action of compressed or exhaust air, as set forth.

2. The combination, with the piston *B*, having induction-ports *g g'*, exhaust-ports *i i'*, and passages *h h'* in its top and bottom, of the valve *C*, traveling within the piston at right angle to the reciprocation thereof, and operated to control the admission and exit of the air to and from the cylinder both above and below the piston, substantially as and for the purpose set forth.

3. In motors for operating dentists' instruments, the combination, with the cylinder *A*, of the piston *B*, a single valve, *C*, carried by the piston and moving at right angles to the reciprocation of the same, and passages and ports operating in connection with the said valve to move the piston in both directions by compressed air, and to cushion it on the upward stroke, substantially as described.

In testimony that I claim the foregoing I have hereunto set my hand this 18th day of September, 1877.

SAMUEL W. DENNIS.

Witnesses:

WILLIAM HARNEY,  
EDWARD E. OSBORN.