

G. H. CUSHING.
Dental-Engine Hand-Piece and Tool.

No. 218,239

Patented Aug. 5, 1879.

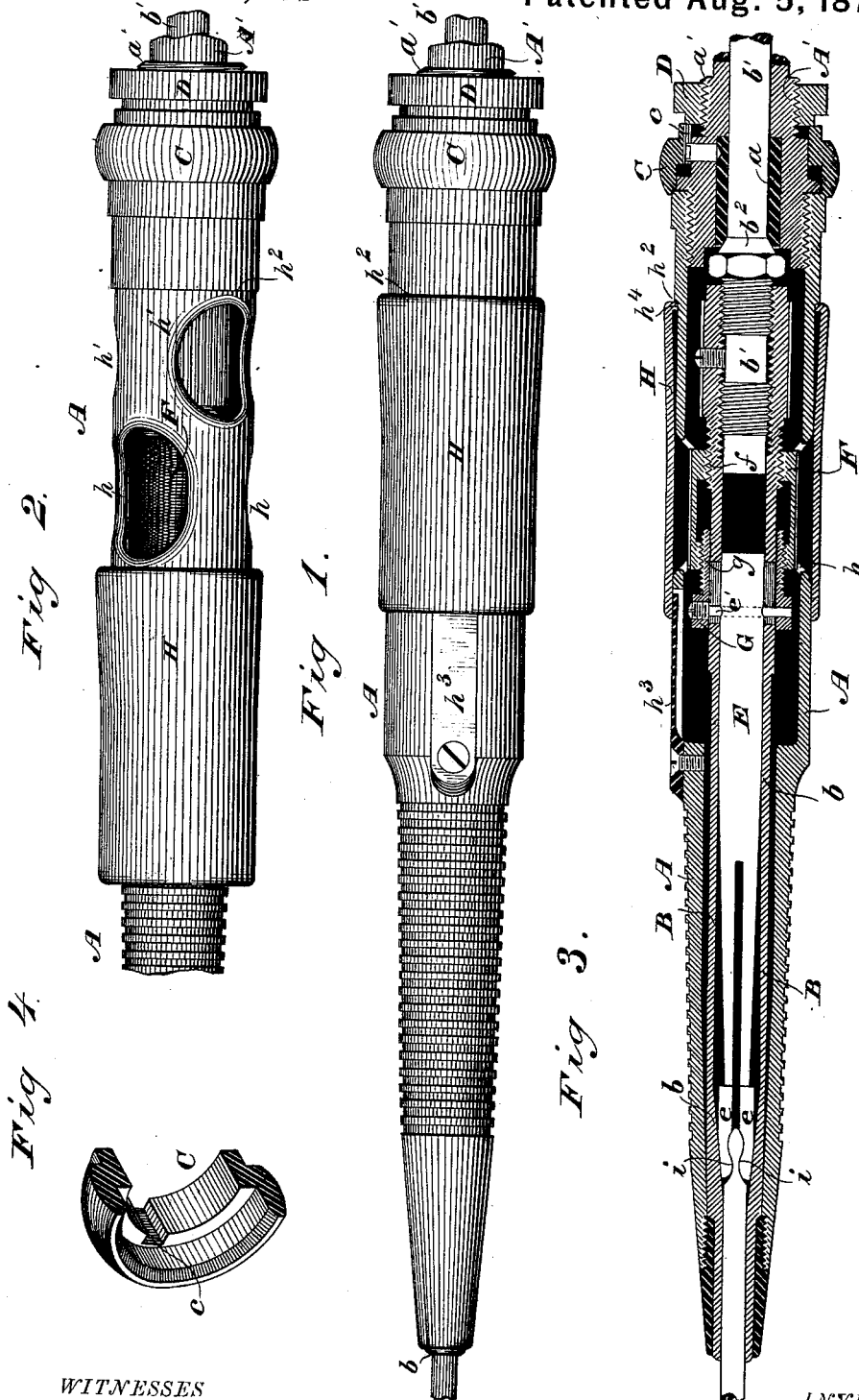


Fig 4.

WITNESSES
Wm. A. Skinkle
Geo. W. Duck.

Fig 1.

Fig 3.

By his Attorneys

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INVENTOR

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IMPROVEMENT IN DENTAL-ENGINE HAND PIECES AND TOOLS.

Specification forming part of Letters Patent No. **218,239**, dated August 5, 1879; application filed March 28, 1879.

To all whom it may concern:

Be it known that I, GEORGE H. CUSHING, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Dental-Engine Hand-Pieces and Tools, of which the following is a specification.

My invention relates more especially to that class of hand-pieces in which the operating-tool is locked in the socket of a rotary chuck by means of spring clamping-jaws, which are clamped upon or released from the locking end of the tool by means of mechanism operated through an opening or slot in an enveloping casing, which casing constitutes the bearings of the rotary chuck, and enables the same to be held centrally of the fingers and thumb of the operator in manipulating the instrument.

The first part of my invention relates to the casing of the chuck, which is provided with a slot or slots, by which access is had to the tool-locking mechanism to manipulate it; and consists in providing the casing with an endwise-moving sleeve, adapted to cover and expose, as circumstances may require, the slot or slots in said casing.

The next part of my invention consists in providing the casing of the hand-piece with two or more slots or openings, in combination with tool locking and driving mechanism, one portion of which is held stationary or moved in a direction opposite to the movement of another portion in securing or releasing the operating-tool.

The next part of my invention consists in the combination of a hand-piece casing, a chuck or spindle having bearings therein, an endwise-moving split or spring-jawed tool-lock, the locking end of which is entirely enveloped by the chuck and compressed upon the tool-shank by a tapering surface in the socket of the chuck, and mechanism for reciprocating the tool-lock positively backward and forward.

The next part of my invention consists of a split or spring-jawed tool-lock provided with one or more locking lugs or projections, to fit or engage the locking groove or grooves in the shank of an operating-tool.

The next part of my invention consists in

the combination of a hand-piece casing, a chuck or spindle, and a socketed split or spring-jawed tool-lock provided with a locking-lug, to engage the groove-shank of an operating-tool.

The next part of my invention consists in the combination, with a hand-piece casing, of a rotary spindle-chuck locked from endwise movement, while free to turn in its bearings, when wear of the parts is compensated by an adjustable coupling or connection between sections of the chuck, or between the chuck and its driving mechanism.

My invention further consists of the combination of an operating-tool, the driving end of which is provided with two or more locking-grooves and two or more tapering or beveled sides or driving-surfaces, with a rotary tool chuck or mandrel and its locking mechanism, which engages the driving-surface and locking-grooves of said tool when inserted in the socket of the chuck, whereby the operating-tool is compelled to turn positively with, while locked from endwise movement in, said chuck.

In the accompanying drawings, which illustrate the best way now known to me of embodying my improvements, Figure 1 represents a plan or side view of my improved hand-piece, with the sliding cover or sleeve drawn back to prevent access to the tool-locking mechanism; Fig. 2, a similar view of a portion of the hand-piece, with the sleeve thrown forward to permit access to the tool-locking mechanism. Fig. 3 is an axial section through the hand-piece, showing the interior mechanism and the locking end of the operating-tool; and Fig. 4 is a sectional perspective of the clamping-ring connecting the hand-piece casing and rear bearing of the chuck or casing section.

The casing A is of any usual or preferred construction, and is provided with bearings, preferably at front and rear, for the reception of a rotary spindle-chuck, B, for the chuck and its driving-connections, as usual.

The hand-piece may be used in connection with the well-known S. S. White dental engine, the casing being connected with the flexible sleeve, and the rotary chuck connected with the flexible driving-shaft enveloped by

the sleeve of that engine in well-known ways, or it may be used in connection with any other engine where applicable or desirable.

The rotary spindle-chuck consists, in this instance, of a hollow shell or sleeve, *b*, suitably formed at its forward end to fit the front bearing of the casing and prevent endwise movement in that direction, which front bearing is preferably constructed of hardened steel, in a manner similar to that patented to Eli T. Starr, November 16, 1875, as No. 170,125.

The rear end of the chuck-sleeve *b* is internally threaded or provided with a female screw, for the reception of the threaded end of a driving-connection, shaft, or section, *b'*, of the rotary chuck. These screw-threads form an adjustable connection or coupling between the sections, which permits of their adjustment to compensate or take up wear of the chuck, as well as of its bearings; and to prevent accidental movement of the two sections relatively to each other, a set-screw is passed through the sleeve *b* and forced against the section *b'* to lock the two together.

This shaft or rear chuck-section, *b'*, is provided with a tapering enlargement, *b²*, which constitutes the rear-bearing shoulder of the chuck, and fits snugly in a correspondingly-formed end of a preferably hardened steel bushing, *a*, locked in or forming part of the rear section or bearing, *A'*, of the casing. This rear section, *A'*, is connected to the casing *A* by screw-threads or equivalent means; and in order to prevent accidental separation or movement of the casing and rear bearing or section, *A'*, relatively to each other, I employ a clamping or securing ring, *C*, to connect the two, the ring having a groove, *c*, therein for the reception of a feather, pin, or projection on the section *A'*, and being provided with a serrated or ratcheted edge to clamp upon the rear end of the casing *A*, on which it fits. To prevent accidental movement of the clamping-ring, and to press or force it firmly in place, I employ a screw-nut, *D*, working upon the screw-threaded portion *a'* of the bearing or section *A'*.

The tool-locking mechanism, or that by which the operating-tool is locked in the socket of the rotary chuck, so as to be compelled to turn therewith, consists of an endwise moving or reciprocating rod or spindle, *E*, the front end of which is provided with spring-clamping jaws *e*, of well-known construction. This locking-clamp is fitted in the socket of the rotary chuck, its front clamping end being preferably slightly tapering to correspond with the similarly-tapered socket at the front end of the chuck, by which means when the locking-clamp is moved forward its jaws are forced together or upon the locking end of the tool, should such be inserted in the chuck, and when moved backward the jaws are permitted to spring apart or open to release and permit of the withdrawal of the tool. This reciprocating movement is imparted to the tool-locking clamp by means of a thumb or screw nut,

F, working upon threads *f*, formed upon the chuck-sleeve *b*, and upon threads *g*, (running in a direction opposite to those on the chuck-sleeve,) formed upon a sliding ring or portion, *G*, connected to the locking clamp or spindle *E* by a pin or screw, *e'*, passing through the ring from side to side and through the chuck-sleeve *b*, which sleeve is slotted longitudinally to permit of the sliding or reciprocating movements of the ring *G*, the pin or screw *e'*, and the locking-clamp.

Access is had to the thumb-nut *F*, to manipulate it in locking an operating-tool in or releasing it from the chuck, through a slot or opening formed in the casing *A*, such a slot being a well-known expedient in dental-engine hand-pieces.

For greater ease and rapidity in turning the thumb-nut, I provide the casing with two slots or openings, *h*, upon opposite sides; and to enable the operator to hold the chuck while manipulating the tool-lock, which chuck might otherwise yield slightly when driven by flexible connections, I provide another set of openings or slots, *h'*, preferably at right angles to the first set, for that purpose, the surface of the chuck-sleeve opposite these last-mentioned openings being suitably prepared for the action of the fingers.

It will be obvious, however, that in some cases the second set of slots, *h'*, by which to hold or turn the chuck, will not be necessary; and that, if desired, a long or continuous slot upon opposite sides may be employed, instead of the two sets above described, and other changes made; but the form shown is preferred.

In order to cover up or shield the slots above mentioned, so as to present a neat appearance and smooth exterior of casing, as well as to prevent entrance of dust or extraneous and injurious matter to the inside of the hand-piece, while permitting ready access to the slots when it is desired to manipulate the tool-locking mechanism, I mount upon the casing an endwise-movable sleeve, *H*, which, when in a forward position, exposes the slot or slots in the casing, and when in a backward position covers said slot or slots, or vice versa.

The sleeve *H* is limited in its backward movement, in the present construction, by the shoulder *h²*, formed on the casing, and in its forward movement by the spring *h³*, the free end of which, when the sleeve is moved outward, springs up and abuts against an annular flanged shoulder, *h⁴*, formed on the sleeve for the purpose.

A suitable spring might be employed, if desired, to keep the sleeve *H* normally in the position to cover the slots.

The locking end of the round-shanked operating-tool is preferably constructed, as shown in Fig. 3, with two locking-grooves, *i i*, upon opposite sides, which formation produces a sort of head or enlargement, two sides, preferably, of which are beveled or tapered off for the more easy insertion of the tool in the chuck-socket, the clamping-jaws of the chuck, in the

present instance, being formed for operation in connection with such a tool.

It will be seen that my improved split or spring-jawed tool-lock is entirely enveloped at its front or locking end by the rotary chuck, which is locked from endwise movement, the socket of the chuck being tapering in front to compress the jaws together when forced forward; and also that the tool-lock is reciprocated or moved positively backward and forward in the chuck-socket.

This construction possesses obvious advantages over such a spring-jawed tool-lock as is shown, for instance, in Requa's Patent No. 199,469, of January 22, 1878, where the front end of the chuck itself is split or jawed, whereby, of course, when compressed upon a tool the front end of the chuck is rendered incapable of running steadily and without wobbling in its bearing; or over a spring-jawed tool-lock in which the locking end is not entirely enveloped by the chuck, although movable endwise in a socket thereof, and in which the lock is moved in one direction positively to release the tool, while moved in the other direction by a spring to compress the jaw upon the tool-shank.

I claim as my invention—

1. The combination, substantially as hereinbefore set forth, of the slotted casing, the rotary tool-chuck mounted therein, the tool-locking mechanism carried by the chuck, and the endwise-movable sleeve having no connection with the tool-locking mechanism, but adapted to cover or uncover the slot through which said mechanism is operated, whereby when said sleeve is in one position access to the tool-lock to manipulate it is prevented, while in another position access to the tool-lock is permitted to operate it.

2. The combination, substantially as hereinbefore set forth, of the hand-piece casing provided with two or more slots or openings with tool locking and driving mechanism, one portion of which is held stationary or moved in a direction opposite to the movement of another

portion in securing or releasing the operating-tool.

3. The combination, substantially as hereinbefore set forth, of the casing, the chuck, the endwise-moving split or spring-jawed tool-lock, the locking end of which is entirely enveloped by the chuck and compressed upon the tool-shank by a tapering surface in the socket of the chuck, and the mechanism for reciprocating the tool-lock positively to compress or release its jaws.

4. The split or spring-jawed tool-lock, constructed substantially as hereinbefore set forth, having a locking lug or projection to engage the locking-groove in the shank of an operating-tool.

5. The combination, substantially as hereinbefore set forth, of the hand-piece casing, the chuck, and the socketed split or spring-jawed tool-lock provided with a locking-lug to engage the grooved shank of an operating-tool.

6. The combination, substantially as hereinbefore set forth, of the hand-piece casing, the rotary spindle-chuck locked from endwise movement while free to turn in bearings therein, and an adjustable coupling or connection between sections of the chuck to take up or compensate wear.

7. The combination, substantially as hereinbefore set forth, of the operating-tool constructed with a driving end having two or more tapering or beveled sides or driving-surfaces and two or more locking-grooves with a rotary tool-chuck and its locking mechanism, which engages the driving-surface and locking-grooves of the tool, whereby the operating-tool is compelled to turn positively with, while locked from endwise movement in, the chuck.

In testimony whereof I have hereunto subscribed my name.

GEORGE H. CUSHING.

Witnesses:

HENRY M. BACON,
C. F. GUNDELL.