W. A. JOHNSTON & A. W. BROWNE.

Hand-Piece for Dental-Engines.

No. 213,662. Patented Mar. 25, 1879.

Fig. 1.

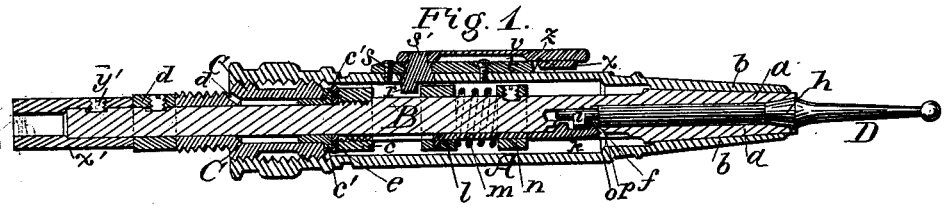


Fig. 2.

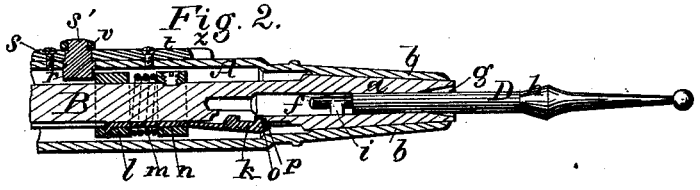


Fig. 6.

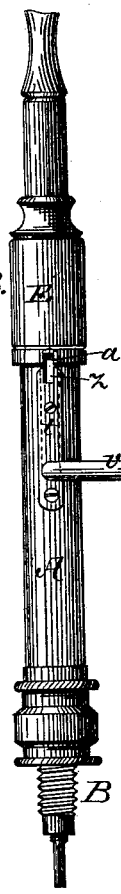


Fig. 3.

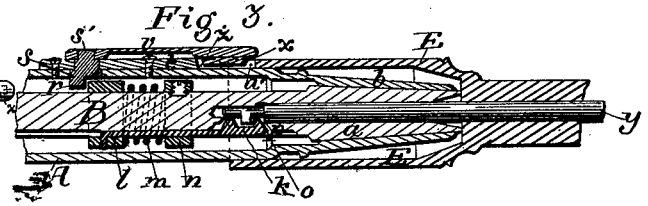


Fig. 4.

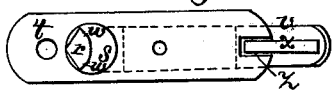
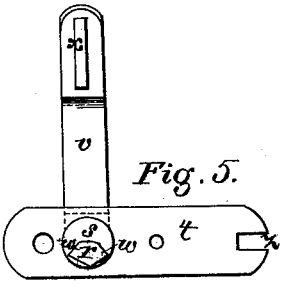


Fig. 5.



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UNITED STATES PATENT OFFICE.

WILLIAM A. JOHNSTON, OF CLIFTON, AND ARTHUR W. BROWNE, OF PLEASANT PLAINS, NEW YORK; SAID BROWNE ASSIGNOR TO SAID JOHNSTON.

IMPROVEMENT IN HAND-PIECES FOR DENTAL ENGINES.

Specification forming part of Letters Patent No. **213,662**, dated March 25, 1879; application filed February 4, 1879.

To all whom it may concern:

Be it known that we, WILLIAM A. JOHNSTON, of the village of Clifton, county of Richmond, and State of New York, and ARTHUR W. BROWNE, of the village of Pleasant Plains, county of Richmond, and State of New York, have invented certain new and useful Improvements in Hand-Pieces for Dental Engines, of which the following is a specification:

Our invention relates to the hand-pieces or tool-holders of dental engines.

The principal object we have in view is to hold the tool securely in place in the holder, so that it shall at all times be firmly seated in its socket without liability to lateral play or movement.

We have also provided improved means for operating the mechanism which locks or draws and holds the tool in its socket.

We have also improved the arrangement of the bearings which support the rotary tool-carrying spindle in the sheath of the hand-piece.

We form on some portion of the tool-shank a conical enlargement. In the tool-holder we form a correspondingly-shaped socket, and with these parts we combine a mechanism which, when the tool is inserted in the holder, engages the tool-shank and exercises a pulling or drawing action on it, with a view to, and with the effect of, drawing the conical enlargement on the tool-shank tightly down into the correspondingly-shaped part of the tool-socket, thus centering the tool, taking up all inequalities there may be, and removing liability of the tool having any play, which might produce lateral vibration or chattering when the spindle is in revolution. The mechanism which thus draws down the tool into its seat we also use as the locking mechanism. The part that engages the tool-shank is acted on to produce its drawing action by a spring, which permits the said part to accommodate itself automatically to variations in the size of the conical enlargement on the tool. The said mechanism is operated to release the tool by a cam, which is carried by the sheath, and operates therethrough upon the locking mechanism. The cam is actuated by a lever or latch on the exterior of the sheath, which also is adapted to retain in position any attachment—such, for instance, as an angle attachment—fitting over the front end of the sheath, as hereinafter described.

These and other features of our invention can, however, best be explained and understood by reference to the accompanying drawings, in which—

Figure 1 is a longitudinal central section of a hand-piece embodying our invention, the tool being represented as locked in place in the holder. Fig. 2 is a like section of the front portion of the same hand-piece, the tool being partly withdrawn from the holder. Fig. 3 is a section of the hand-piece similar to the section in Fig. 2, representing, also in section, the rear part of an angle attachment fitted upon the sheath and engaging the rotary tool-holding spindle therein. Figs. 4 and 5 are views, on an enlarged scale, of the cam and latch mechanism for operating the locking device. Fig. 6 is an elevation of the hand-piece with an angle attachment mounted thereon.

The sheath of the hand-piece is represented at A. B is the tool-carrying spindle, formed or provided at or near its front end with a conical or tapering journal, *a*, which takes a bearing in a correspondingly tapering or conical portion, *b*, of the sheath.

The rear bearing of the spindle is furnished by an externally screw-threaded thimble, C, through which the reduced rear end of the spindle passes. The thimble is provided with a steel face or front end, *c'*, and is held on the spindle between two end bearing-pieces, *c d*, thereon. Between the bearing-piece *c* and the front end of the thimble is a loose friction-ring, *e*. Under this arrangement the rotary tool-spindle has its bearings in the thimble C and the conical or tapering part *b* of the sheath.

The spindle is set up into its conical front bearing by screwing the thimble forward into the sheath, which has the effect of carrying forward the spindle until it finds its proper bearing in the front end of the sheath.

The piece *c* furnishes a square thrust-bear-

ing for the spindle, and the friction-ring *e*, between said piece and the flat end of the thimble, prevents wear of the parts. The steel face to the collet or thimble C (the body of which is usually brass) prevents wear.

The thimble or collet C, as shown, is at its front end of enlarged internal diameter, to afford space for lubricating material supplied to it through the hole *d'*. The steel face *c'* is provided with a tubular neck, which enters and fits tightly in the front end of the thimble, closing the lubricating-space at this end, and forming a substantial and durable bearing for the spindle.

As a convenient and ready means of connecting the spindle to the engine flexible driving shaft or cable, I provide a socket-piece, *x'*, permanently attached to the front end of the cable, adapted to fit upon the rear end of the spindle, and provided with a set-screw, *y'*, by which it may be tightly held to the spindle when desired.

The spindle is formed at its front end with a socket, *f*, for receiving the shank of the tool. This socket is formed with a conical part, *g*, adapted to receive a corresponding conical or tapering enlargement, *h*, on the shank of the tool D. The tool is also formed with one or more shoulders or projections, *i*, adapted to engage with the locking mechanism in the holder or spindle.

This mechanism consists in the present instance of a spring hook or detent, *k*, whose hook end works through an opening in the holder into the tool-socket, and whose shank is fastened to a sleeve, *l*, adapted to slide lengthwise on the holder. The sleeve is pressed backward by a spring, *m*, between the sleeve and a flange or annular projection, *n*, fixed to the holder. The front end of the hook proper is beveled or inclined, as shown at *o*, and this beveled part is contiguous to a like beveled surface, *p*, at the front end of the opening through which the hook works. Consequently, when the hook, by means of its sleeve *l*, is pushed forward, the beveled part *o* of the hook rides up on the incline *p*, and the hook or detent is raised out of the tool-socket, as seen in Fig. 2. When, on the contrary, the sleeve is released the spring *m* moves it back, and the hook returns or springs back to place, having, in conjunction with its downward movement, a backward movement as well, which has the effect (when the hook engages the tool-shank, as shown in Fig. 1) of bringing the tool down into its place, drawing the conical enlargment on the tool-shank down into its conical seat in the holder, thus centering the tool and preventing it from any lateral play. There is sufficient range of movement to the hook to allow it to move far enough to compensate for slight differences in the size of different tool-shanks, or to take up wear. In all cases it exercises a drawing action on the tool, with the effect of pulling the conical or tapering enlargement thereon into its corresponding seat in the holder.

The rear end of the tool-shank, and also that part of the socket into which it fits, are so shaped that the tool cannot rotate in its socket, as will be understood without further explanation. Any suitable arrangement for prevention of rotary movement of the tool independently of the holder may be employed.

The instrumentality employed to push the sleeve *l* forward consists of a cam, *r*, on the under side of a disk, *s*, which is carried by a plate, *t*, in which its shank *s'* is pivoted; and to this shank is attached the spring lever or latch *v*, by moving which the cam is operated.

The cam is formed, as shown in Figs. 4 and 5, (which are under-side views of the plate *t* and the parts which it carries detached,) with one or more flat surfaces, *w*, on its periphery, which, when brought to a position opposite to and in contact with the sleeve *l*, furnish a flat bearing, which will maintain the latch in the position to which it has been brought in so moving the cam.

It will be seen that by swinging the latch to the right or left the cam will be rotated in such manner as to operate to push forward the sleeve, and so unlock the tool, as shown in the drawings. When the latch is parallel with the sheath a projection, *x*, on its under side snaps into a notch, *z*, in the plate *t*, and thus serves to assure the latch in position. This projection *x* serves also as a means of retaining in position any attachment fitting over the sheath. This is shown in Figs. 3 and 6, which represent so much of a "right-angle attachment" as needed for purposes of illustration. The central shaft, *y*, of the attachment enters the socket and engages the hook or locking mechanism of the tool-holder, as shown, while the end of the sheath E of the attachment fits over the sheath of the hand-piece. In the part E is formed a notch, *a'*, which, when the attachment is in proper position on the hand-piece, comes opposite to the projection *x*; and the latter is of a length to snap into said notch *a'* also, thus holding the attachment on the sheath in such manner as to prevent the part E from rotating independently of the hand-piece.

The swinging of the latch to one side, as indicated in full lines in Fig. 6, not only releases the part E, but also unlocks the shaft *y*, thus leaving the attachment free to be withdrawn.

We have described what we deem the best way of carrying our invention into effect. We wish it to be understood, however, that we do not restrict ourselves to the details herein shown and specified, for it is manifest that the same may be considerably varied without departure from our invention.

What we claim, therefore, and desire to secure by Letters Patent, is—

1. A tool for a dental engine or for a dental instrument adapted for continuous rotary motion having in some portion of its length a conical enlargement adapted to enter a correspondingly-shaped socket in the instrument, and also one or more shoulders adapted to en-

gage with locking mechanism in the instrument, substantially as set forth.

2. In a tool-holder or hand-piece of a dental engine, the combination, with the sheath, of a tool-holding rotary shaft or spindle having a conical front-end bearing and a square thrust-bearing back of said front bearing, substantially as set forth.

3. In the tool-holder of a dental engine, a shaft or spindle having a square thrust-bearing and an interposed loose friction-ring, substantially as set forth.

4. In combination with the tool-holding spindle or shaft of a dental hand-piece, a locking mechanism, movable lengthwise of said spindle, and adapted to engage and draw or pull upon the tool entered in the socket of said spindle, substantially as set forth.

5. A tool-holding spindle provided with a socket which has in one part of it a conical or tapering enlargement to receive a corresponding enlargement on the tool-shank, in combination with a longitudinally-moving spring-locking mechanism, acting to engage and draw said tool into said conical seat, substantially as set forth.

6. The combination, substantially as set forth, with the tool-holding spindle and its tool-socket, of the locking hook or detent, the longitudinally-moving sleeve carrying said hook, and the spring acting to move the sleeve in the direction requisite to cause the hook to engage the tool inserted in the holder, substantially as set forth.

7. The combination, with the tool-holding spindle and the longitudinally-moving spring-locking device, of means attached to and carried by the sheath or case for pushing forward said locking device against the stress of its spring, substantially as set forth.

8. The longitudinally-moving spring hook or detent formed or provided with an incline or bevel, in combination with the tool-holding spindle having a corresponding incline or bevel, whereby the longitudinal movement of the detent to release the tool will cause that part of the detent which engages the tool to rise out of engagement with the same, substantially as set forth.

9. In a tool-holder or hand-piece for dental engines, the combination, with the tool-holding shaft and the inclosing-sheath, of a cam or eccentric carried by the sheath and operating therethrough on the tool-locking mechanism carried by the shaft.

10. In combination with the sheath and the cam carried by and operating through said sheath on the locking mechanism, a spring latch or lever on the sheath for actuating said cam, substantially as set forth.

11. The spring latch or lever provided with a lug or its equivalent to engage and retain in position an attachment fitting over the sheath of the hand-piece or tool-holder, substantially as shown and set forth.

12. As a means of attaching a cable, a socket-piece permanently fastened to the cable, adapted to fit upon the spindle of the hand-piece, and provided with a set-screw, whereby it may be detachably connected therewith, substantially as set forth.

In witness whereof we have hereunto set our hands this 28th day of January, A. D. 1879.

WILLIAM A. JOHNSTON.
ARTHUR W. BROWNE.

Witnesses:
E. M. WHITE,
IRVING E. BOND.