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HAND-PIECE FOR DENTAL ENGINES.

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To all whom it may concern:

Be it known that I, JOSÉ ROQUE, formerly of the Island of Cuba, but now residing at Philadelphia, in the State of Pennsylvania, have invented certain new and useful Improvements in Hand-Pieces for Dental Implements.

The following is a specification of my improvements, reference being had to the accompanying drawings, wherein—

Figures 1 and 2 are exterior views of the hand-piece with a burr-drill mounted therein, the points of view being at right angles to one another. Fig. 3 is a central longitudinal section through the hand-piece, the latter being in the same position as in Fig. 2, and having the same burr-drill. Fig. 4 is a similar section from the same point of view as in Fig. 3, the mechanism, however, being arranged to operate a plugging-tool instead of a drill. Figs. 5, 6, 7, 8, 9, 10, 11, 12, and 13 are transverse sections through the hand-piece, the section-line of each figure being indicated in Fig. 3 by the number corresponding to that of the figure itself.

The principal object of my invention is to permit the use of either a rotating drill or a reciprocating plugging-tool in the same hand-piece, the change from one to the other being effected in the simplest manner, and the plunger, when in action, having no rotary motion.

Other and minor features of invention consist in devices for controlling the driving mechanism and regulating the force of the blow which is given to the plugging-tool.

In the drawings, A represents the shell or casing of the hand-piece. *a'* is the tubular shaft, to the outer end of which in practice a flexible shaft is attached, said shaft being driven by any ordinary form of dental engine.

A longitudinal slot, *a*, extends from the inner end of the shaft *a'*, about one-third of its length, and the extreme inner end of the shaft *a'* is provided with an annular flange, *e'*, as shown, which, when the end cap, *a''*, of the hand-piece is screwed on, abuts against the inner end of said cap and prevents the shaft from slipping out. A coupling-piece, *c*, enters and slides freely in the tubular shaft *a'*, being provided with a pin, *c'*, which engages in the slot *a* of the latter, so as to be rotated therewith. That portion of the coupling-piece *c* which is outside of the shaft *a'*, is enlarged and provided

with a projecting annular flange, *h*, while across the extreme end of the enlarged portion is a transverse lug, *b*, which is adapted to engage with a notch which extends across the adjacent end of the hollow shaft B, and thus rotates the latter. This shaft B is constructed in a manner similar to the shaft *a'*—that is to say, it has a longitudinal slot, *e*, extending inward from one end, and a projecting flange, *d'*, at that end. A collar, *f*, fits loosely around the shaft B, and is fixed within the shell A by means of a screw, *i*. This collar *f* permits the free rotation of the shaft B, but by engaging with the flange *d'* prevents it from slipping backward or toward the coupling *c*. A coiled spring, D, is arranged between the back end of the collar *f* and the front face of the flange *h* upon the coupling *c*, and tends to press the coupling-piece *c* away from the shaft B, and thus to disengage the two, as shown in Fig. 3.

To effect the engagement of the coupling-piece *c* and shaft B by means of the lug *b* upon the former and notch in the adjacent end of the shaft, I provide a sliding catch, *j*, which extends through a slot in the shell A, and has a thumb-piece, J, moving in longitudinal guides J' on the outside thereof. This catch *j* engages with the rear face of the flange *h*, upon the coupling-piece *c*, and by sliding the thumb-piece J forward (or toward the drill) the spring D will be compressed and the coupling-piece will engage, by means of the lug *b*, with the rear end of the shaft B. The pin *c'* upon the coupling-piece remains, of course, within the slot *a* of the shaft *a'*, and thus the three pieces, *a*, *c*, and B will be coupled and rotate together. Upon releasing the pressure on the thumb-piece J, the spring D will push the coupling-piece *c* backward and disengage the latter from the shaft B. A shaft, E, is mounted at or near the longitudinal center of the shell A, and has its rear end of such diameter as to fit snugly within the tubular shaft B, being also provided with a pin, *n*, which enters the slot of said tubular shaft, so that the two must always rotate together, but permitting the free longitudinal movement of the shaft E during such rotation. The front portion of the shaft E is enlarged, forming a head, *n*, which fits snugly in the shell A. This head terminates in a double cam-surface, *o o*, the inclines being in opposite directions and ending in abrupt

shoulders parallel to the axis of the shaft. A central socket for the drill-shank *q* is formed in the end of the head *n*, and radial slots *p p* extend from the socket between the cam-inclines to receive the laterally-projecting studs *r r* on said shank, by means of which the drill is rotated. Slots *s* extend laterally from the bottom of the slots *p* for a short distance around the head *n*, as shown, in order that, when the shaft *E* rotates, the said studs *r r* may engage in the laterally-extended slots *s*, and thus prevent the drill from being drawn out of its seat, the combined operation of these parts being similar to that of an ordinary bayonet-joint.

Immediately adjacent to the cam-surfaces *o o* is a cam-piece, *K*, whose double cam-surfaces *t t* are the counterpart of the former and face them. The other side of this cam-piece *K* abuts against shoulders *F* on the interior of the shell *A*, and, while free to rotate, the piece *K*, is thus prevented from moving longitudinally in the shell. A central opening, *I*, is formed through the piece *K* to permit the passage of the drill-shank *q* and its projecting studs *r r*, so that the shank may be freely pushed home into its seat in the head *n*. A coiled spring, *L*, is arranged around the shaft *E*, pressing at one end against the head *n*, and at the other upon a ring, *M*, which slides longitudinally within the shell *A*. The ring *M* is attached to a finger, *N*, (see Fig. 1,) which extends through a slot, *P*, in the shell, and is connected with an outside ring, *M'*, adapted to slide longitudinally upon the exterior of the shell *A*.

The movement of this outside ring, *M'*, (and consequently of the finger *N* and inner ring, *M*,) is effected by means of the screw-ring *u*, mounted upon the outside of the shell *A*, near its rear end, and the result of such movement is to increase or diminish the tension of the spring *L*, for a purpose to be hereinafter explained. The tendency of the spring *L* is of course to hold the head *n* up against the cam-piece *K*. The cam-piece *K* has at one side a notch, *w*, (see Fig. 6,) and opposite to this notch is an opening, *S*, in the shell *A*, through which a spring-finger, *R*, (secured to the shell by the screw *i*,) enters. When this finger *R* is depressed, as shown in Fig. 4, it engages with the notch *w*, thus preventing the rotation of the cam-piece *K*. The finger *R* is provided with a runner, *U*, which slides thereon, one edge of said runner entering a longitudinal V-shaped groove in the shell *A*. By sliding the runner toward the joint attachment *i* of the finger *R*, the finger will be raised out of the notch *w*, and the cam-piece *K* will thus be free to rotate. The reverse movement of the runner *U* permits the descent of the finger and locks the cam-piece *K*. The opening *V* in the front of the shell *A*, to receive the drill *A'* or other tool, *B'*, is constructed in the ordinary manner, light springs *W* being applied on either side of the orifice to clamp the shank at the circular groove *Y* therein.

In order to use the hand-piece in connection

with a burr or other rotating drill, the shank of the drill is inserted in the opening *V*, and pushed back therein through the cam-piece *K*, until it reaches its socket in the head *n*, the lugs *r r* upon the shank passing freely through the openings in the cam-piece *K* and head *n*. The drill is then turned slightly, so as to bring the lugs *r r* within the transverse slots *s*, and thus lock the shank in position. The outside springs, *W*, also aid in preventing the longitudinal movements of the drill. The sliding runner *U* is then pushed back or toward the screw *i*, and the finger *R* is thus raised, so as to free the cam-piece *K*. This position of the parts is shown in Fig. 3. A driving-shaft having been properly attached to the shaft *a'*, and power applied thereto, said shaft and the coupling-piece *c* will be caused to rotate; but as the hollow shaft *B* is not yet coupled the drill remains stationary. It may, however, be rotated at any desired moment by pushing the thumb-piece *J* forward or toward the drill. This action, which may be readily effected by the forefinger of the operator, draws the coupling-piece *c* toward the hollow shaft *B*, which in turn drives the shaft *E*, in whose head *n* the drill-shank is held. During this action the cam-surfaces *o o* and *t t* are non-operative, since the cam-piece *K* runs free, and thus rotates, along with the head *n* and the drill-shank. When, however, it is desired to substitute for the rotating-drill, a plugger or other tool having a longitudinally-reciprocating movement, the parts are arranged as shown in Fig. 4—that is to say, the runner *U* is pushed forward or away from the screw *i*, thus permitting the spring-finger *R* to enter the opening *S*, and engage with the notch *w* in the cam-piece *K*. This holds the cam-piece *K* against any rotary movement, and the shoulders *F* prevent it from moving forward in the shell *A*. The shank of the plugging-tool *B'* has no lugs *r r* upon it, but is a smooth cylinder, which passes freely through the cam-piece *K* and into the socket in the head *n*, and does not turn when said head is rotated. The thumb-piece *J* being pushed forward so as to couple the shafts *B* and *a'* by means of the coupling-piece *c*, the shaft *E* and its head *n* will be rotated, and the cam-piece *K* being now fixed, the opposing cam-surfaces *o o* and *t t* will operate, the effect being to force the shaft *E* and head *n* backward, compressing the spring *L* until, by rotation of the head *n*, the summit of the cam-surface is reached, when the head *n* will be suddenly released and spring toward the cam-piece *K* with a force depending upon the tension of the spring *L*. As in the meantime the plugger *B'* has remained stationary, the head will strike it with a sudden hammer-like blow, and thus effect the plugging operation. The slight forward movement of the tool under the blow will, upon the retreat of the head *n*, be compensated by the action of the springs *W*, which press upon the rear incline of the groove *Y* and force the tool back into

position for the next blow. These operations will occur twice for each rotation of the head, as the cam-surfaces are double, and thus a rapid succession of blows will be delivered upon the plugger.

The tension of the spring L, and consequently the force of the blow, can be varied by means of the screw-ring *u*, whose movement toward or from the spring L causes the inner ring M to compress it more firmly or to diminish the compression.

I am aware that it is not new to so construct a hand-piece as that it can be used to operate both a drilling and plugging tool, and I therefore do not desire to broadly claim such device; but

I claim—

1. In a dental hand-piece, the combination, with an inclosing-case, of a cam-piece mounted loosely therein and having a central aperture for the free passage of the tool-shank, a stop whereby said cam-piece may be temporarily locked, a shaft having at one end a tool-socket, and a cam-surface corresponding to that of the cam-piece, and having at the other end a coupling device which permits

the longitudinal reciprocation of the shaft during its rotation, a spring normally pressing said shaft toward said cam-piece, and suitable driving mechanism connected with said coupling device, the whole operating substantially as and for the purposes set forth.

2. The combination, with the head *n*, shaft E. and spring L, of the ring M, finger N, and adjusting mechanism attached to said finger, whereby the tension of the spring may be increased or diminished.

3. The combination, with the collar *f*, rigidly secured to the case, of the shaft B, mounted freely within said ring and having an end notch, the coupling-piece *c*, having a lug upon the end adjacent to said notch, the spring D, normally pressing said coupling-piece away from said shaft, and a sliding catch, whereby the coupling-piece may be drawn toward the shaft to engage said lug with said notch, substantially in the manner set forth.

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Witnesses:

WM. H. MYERS,

I. WALTER DOUGLASS.