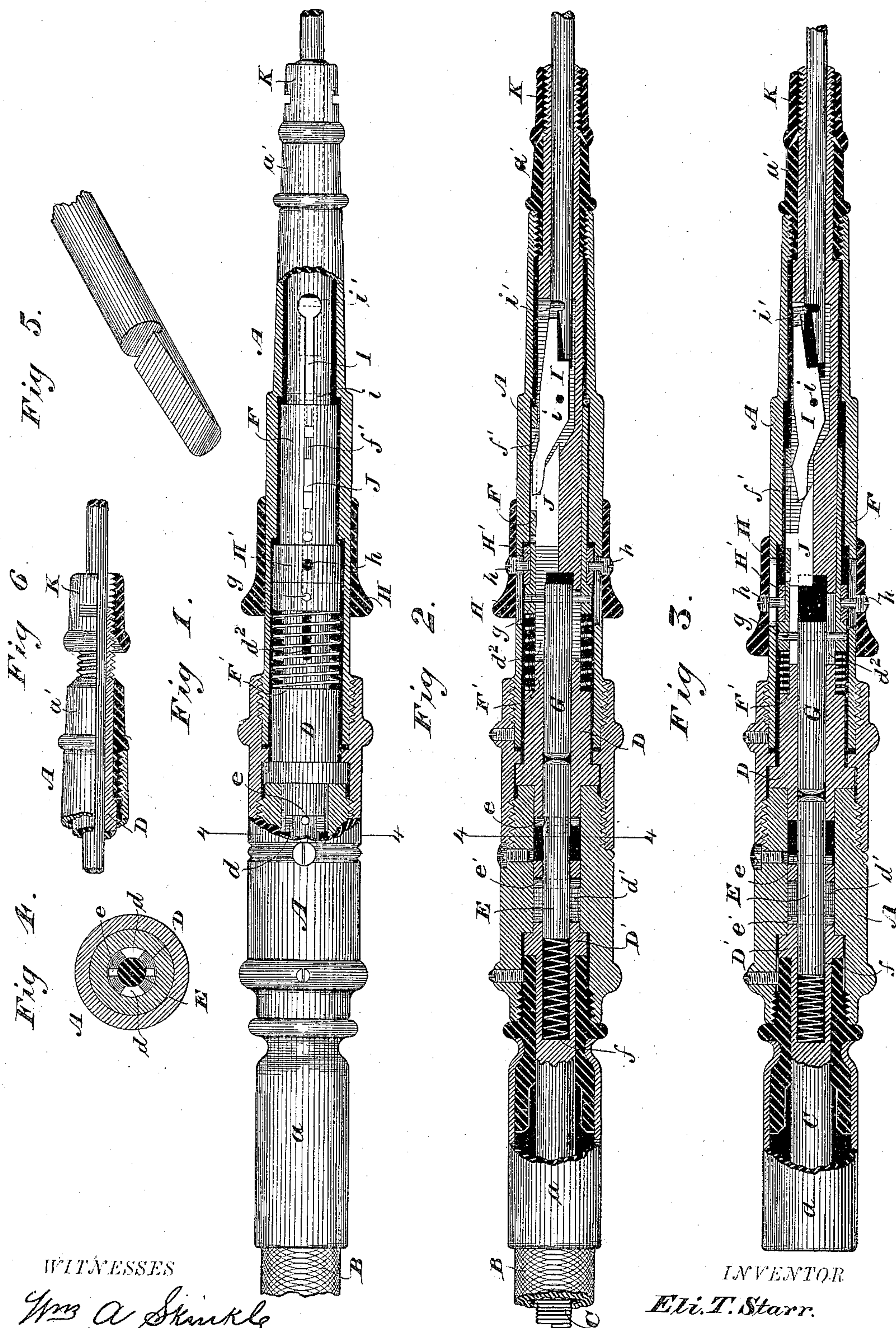


E. T. STARR.
DENTAL ENGINE HAND PIECE.

No. 302,870.

Patented July 29, 1884.



WITNESSES
Wm A Skinkley
Geo W Breck

INVENTOR
Eli T. Starr
By his Attorneys
Baldwin Hopkins & Peyton

UNITED STATES PATENT OFFICE.

ELI T. STARR, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO J. CLARENCE WHITE AND SAMUEL S. WHITE, JR., EXECUTORS OF SAMUEL S. WHITE, DECEASED.

DENTAL-ENGINE HAND-PIECE.

SPECIFICATION forming part of Letters Patent No. 302,870, dated July 29, 1884.

Application filed May 6, 1878.

To all whom it may concern:

Be it known that I, ELI T. STARR, of the city and county of Philadelphia, and State of Pennsylvania, have invented certain new and useful Improvements in Dental-Engine Hand-Pieces, of which the following is a specification.

My invention relates, more particularly, to a hand-piece of the class in which the operator may simultaneously and by a single movement stop the rotation of the tool-holder without interfering with the driving-power, and unlock or disengage the fastenings which secure the operating-tool inside the holder; and it constitutes an improvement upon the hand-piece shown in Letters Patent of the United States granted to John W. Gilbert, January 22, 1878, as No. 199,431, which is the only instance prior to my invention, so far as I am aware, in which this "simultaneous-movement" principle has been embodied. There is also a class of hand-pieces in which the unclutching of the tool-holder from the driving-power to place the instrument completely under the control of the operator is effected independently of the disengagement of the tool-locking devices, which latter devices require a different movement from that which stops the rotation of the holder to release them from engagement with the operating-tool, as shown in Letters Patent granted, respectively, to the said Gilbert, January 5, 1875, and to myself, December 5, 1876; and I contemplate the employment of some of the improvements hereinafter specified in hand-pieces of this latter class, as well as in other styles of hand-pieces not here necessary to mention.

The objects of the first part of my present invention are to improve the construction of a hand-piece embodying the principle of simultaneous disconnection of the chuck and disengagement of the tool-lock; to render such a hand-piece more efficient, perfect in its operation, and convenient in use; and, also, to adapt it to the well-known "S. S. White Dental Engine," although I am aware that the said Gilbert has suggested that his invention might be so applied.

To these ends the first part of my inven-

tion consists in combining a hand-piece casing, a sectional socketed spindle or chuck having bearings in said casing, a clutch between the chuck-sections, a rocking or laterally-moving tool-locking latch or device carried by said chuck, and a controlling-sleeve acting both upon said clutch and said rocking-latch to simultaneously disengage the chuck-sections and rock the latch, to enable an operating-tool to be inserted in or withdrawn from the chuck-socket.

The object of the next part of my invention is to provide a positively-operated pivoted latch-tool lock more especially adapted for a "simultaneous-movement" hand-piece; to which end my improvement consists in a pivoted catch or latch provided in front of its pivot with a downwardly-projecting or hooked end and an inclined or flattened surface, for engagement, respectively, with the grooved shank and inclined or flattened driving end of an operating-tool, and in rear of said pivot with an upwardly-projecting or "goose-neck" end, by which the latch is rocked upon its pivot to engage its front end with or disengage it from the tool-shank.

This part of my invention further consists in the combination, in a dental-engine hand-piece, of a rotary chuck or mandrel, a pivoted latch carried thereby, having a goose-neck end or inclined surface upon both its upper and lower edge, and an endwise-moving spring-sleeve revolving with the chuck, enveloping and controlling the pivoted latch.

This part of my invention further consists in a pivoted tool-locking latch having a projecting or goose-neck end, and controlled and rocked upon its pivot in one direction by an endwise-moving sleeve engaging the upper surface of its projecting end, and in the other direction by a wedge carried by the sleeve riding under the lower surface of said end.

The object of the next part of my invention is to compensate wear of the chuck, or of its bearings, and enable it to run smoothly in the casing of the hand-piece, without wobbling or "chattering," which wobbling and chattering movements, if imparted to the operating-tool, cause much annoyance to the operator, owing

to the delicate work to be performed, and are also disagreeable and annoying in a high degree to the patient who is undergoing the operation; to which ends my improvement consists in the combination, in a dental-engine hand-piece, of a casing, a rotary chuck mounted therein, with a screw-threaded end projecting beyond the end or nose of the casing, an internal pull-bearing to prevent endwise movement of the chuck in the casing when a pulling-strain is exerted thereon, and an external adjustable push-bearing mounted upon the projecting screw-threaded end of the chuck bearing against and overlapping the tapering end of the nose, whereby the said tapering push-bearing may be adjusted to compensate wear of the chuck.

My invention further consists in a dental-engine hand-piece consisting of a casing, a chuck or mandrel mounted therein, separable from the driving-power, tool-locking mechanism carried by the chuck, and adjusting mechanism for compensating wear of the chuck or of its bearings in the casing.

In the accompanying drawings, which show my improvements as embodied in a dental-engine hand-piece in the best form now known to me, Figure 1 represents a view in elevation of the instrument, partly in section to show its internal parts; Fig. 2, a longitudinal central section therethrough at right angles to the line of section taken in Fig. 1, showing the parts in their normal position; Fig. 3, a section similar to Fig. 2, showing the parts as retracted with the chuck, unclutched from the driving-power, and the tool-lock raised to disengage its end from the grooved tool-shank; Fig. 4, a transverse section through the device on the line 4-4 of Figs. 1 and 2; and Fig. 5, a view in perspective of the beveled driving end of a tool-shank, with a locking-groove across the face of the beveled portion, to which form of tool-shank the locking-latch is adapted. Fig. 6 shows a detached view of the push-bearing and end of the casing and screw-threaded chuck.

The sectional casing A of the hand-piece is shown as provided with a swiveling end section, *a*, connected with the free end of a flexible non-rotating sheath, B, so as to permit the casing freely to swivel to accommodate the turning movements of the hand of the operator; and in this casing is mounted a chuck, mandrel or tool-holder, provided at its front end with the usual socket, and adapted at its rear end for connection with the free end of a flexible power-driven shaft, C, enveloped by the non-rotating sheath carrying the casing, as usual. This shaft and sheath is preferably that of the well-known "S. S. White Dental Engine." The rotary chuck is in this instance divided transversely near its rear end, and the adjacent ends of the sections D D' thus formed are normally connected by a clutch or coupling, as shown in Gilbert's and my own patents, hereinbefore mentioned, and in a pending ap-

plication for Letters Patent filed by me December 14, 1877. The rear end of the front section, D, is centrally bored and its walls provided with notches or recesses *d*, in which notches a cross-pin, *e*, carried by an endwise-movable rod, E, mounted in a central bore of the rear section, D', of the chuck, ordinarily interlocks, a spring, *f*, tending to keep the rod and its clutch-pin thrust forward. This clutch-rod is prevented from turning independently of section D' and compelled to rotate with it, while allowed to move freely endwise, by a cross-pin, *e'*, on the rod working in a longitudinal slot, *d'*, in said section. This clutch mechanism is substantially similar to that shown in Gilbert's patent of 1878, above mentioned, except that in this instance the endwise-moving clutch-rod does not carry or constitute the tool-locking devices, but projects only a short distance into the bore of the front section of the divided spindle or chuck. Upon this front section, D, is mounted an endwise-moving sleeve or thimble, F, acted upon by a spring, F', in a well-known way, which sleeve governs the movements of the tool-lock, as usual.

As before stated, in the present invention, the tool-locking devices and the clutch mechanism for controlling the rotation of the chuck are not directly connected, as in Gilbert's patent; and in order to operate the two mechanisms simultaneously and by a single movement, I employ an intermediate independent mechanism, consisting in this instance of a rod or plunger, G, somewhat similar to the clutch-rod E, against which latter the rear inner end of the plunger G abuts, or nearly so. This plunger is movable endwise in the rear bore of section D of the chuck, and is connected with the controlling-sleeve F, with which it moves by means of a cross-pin, *g*, working in a longitudinal slot, *d''*, of said section D. This pin and slot, while allowing the plunger to move freely endwise with the controlling-sleeve, prevents it from turning independently of the sleeve and the chuck-section upon which it is mounted. It will thus be obvious that when the sleeve is retracted to disengage the tool-locking device from the tool-shank the plunger G will be caused to move backward, and its rear end be brought in contact with the front end of the rod carrying the clutch-pin, and thereby move said rod backward against the tension of its impelling-spring, thus disengaging the clutch-pin from the recessed end of section D of the chuck and stopping the rotation of said section as long as the sleeve is retracted, as the two sections of the chuck will no longer be connected or coupled, while the rear section, D', of the chuck will still be free to revolve continuously and unimpeded. This method of operation avoids the necessity of stopping the motive power when it is desired to insert an operating-tool in or remove it from the chuck, or for any other purpose, and the

two devices—clutch and tool-lock—are thus operated by a single movement without necessitating the release of the operator's grasp upon the instrument. The instant the controlling-sleeve is released its spring throws it forward, engaging the tool-lock with the tool-shank, if such there be inserted in the socket, and carrying the clutch-disengaging plunger out of contact with the clutch-rod, which rod is immediately thrown forward by its impelling-spring to reclutch the chuck-sections. The chuck-sections, when properly coupled, owing to the formation of their bearings and the construction shown, work as perfectly as a solid chuck, which, in fact, it may be considered to be.

The controlling-sleeve F is shown in the drawings as operated by an external sliding ring or finger-piece, H, of well-known construction, mounted upon the casing, the proper connection between the sleeve and ring being secured by an internal annulus, H', enveloping the sleeve and acting upon a shoulder thereof, the annulus being held from rotation by suitable screws, h, moving in longitudinal guide-slots in the casing when the finger-piece is manipulated. This controlling-sleeve might, however, be operated in other well-known ways; but I prefer the construction shown as more convenient.

A tool-locking latch, I, is pivoted at *i* in a longitudinal slot in the chuck, and is provided in front of its pivot with a hooked end or downward projection, *i*, and an inclined surface for engagement, respectively, with the grooved shank and beveled or inclined driving end of an operating-tool, and in rear of its pivot is provided with an upwardly-projecting or goose-neck end, which fits in a longitudinal slot, *f'*, in the spring-controlling sleeve, as clearly indicated in the drawings. In rear of the pivoted latch in the longitudinal slot in the chuck (which slot, however, is not so deep at this point as at the point where the latch is pivoted) is mounted a sliding wedge, J, connected with the controlling-sleeve, and provided with an inclined end adapted to ride under the goose-neck of the latch when thrust forward. This wedge also has an oblique shoulder or projection extending into the longitudinal slot of the thimble, in which slot the goose-neck end of the catch lies when the wedge is thrust forward.

The operation of the tool-lock is as follows: Supposing the parts to be in their normal position, as shown in Fig. 2, and a tool is to be inserted or removed, it is necessary to retract the controlling-sleeve to withdraw the wedge from beneath the neck of the latch, which latch is then rocked upon its pivot to raise its front end by the abutting or contact of the end wall of the slot in the sleeve against the upper surface of the projection or goose-neck end, thereby throwing the latch into the position shown in Fig. 3. This allows a tool-shank to be inserted in or removed from the

socket. By releasing the sleeve, its spring throws it and the wedge forward, the incline of the latter riding under the goose-neck and forcing it upward into its seat in the longitudinal slot in the sleeve, and thereby bringing its front end down into engagement with the tool-shank, as clearly shown in Fig. 2, in which position of the latch the tool is firmly locked in the socket of the chuck, and prevented from endwise or turning movements independently thereof, and can only be released by retracting the sleeve. Thus it will be seen that the latch is worked positively in both directions. The tool-lock, in the present instance, is adapted to the form of tool-shank shown in Fig. 5, which has a beveled or flattened driving end, with a locking-groove running across the face of the beveled portion, between it and the round portion of the shank. The end of the chuck which is socketed for the reception of the operating-tools projects beyond the nose of the casing proper, and is provided with screw-threads, upon which is secured a push-bearing, K, having a flaring mouth to overlap and abut against the tapering end or nose of the casing. This push-bearing is thus rendered adjustable on the chuck to compensate any wear thereof or of its bearings, whereby I am enabled, in an easy and convenient manner, to prevent wobbling and chattering of the chuck and tool mounted therein. The chuck, of course, has a suitable internal pull-bearing, and is locked from endwise movement in either direction.

The nose or end section, *a'*, of the hand-piece casing is by preference constructed of hardened steel, as described and claimed in Letters Patent granted to me November 16, 1875, as No. 170,125, and the external push-bearing is likewise by preference constructed of hardened steel, the more effectually to resist wear between them when adjusted. I am enabled, also, by the construction shown, to furnish a long bearing in the chuck for the tool-shank, which is desirable.

The mode of operation and advantages of a dental-engine hand-piece constructed as hereinbefore described will be obvious without further description.

I claim as of my own invention—

1. The combination, substantially as hereinbefore set forth, of the casing, the sectional spindle or chuck, the clutch between the chuck-sections, the pivoted rocking tool-locking latch, and a controlling-sleeve acting both upon the clutch and pivoted latch to simultaneously disengage the chuck-sections and rock the latch upon its pivot to free it from the tool-shank.

2. A pivoted tool-locking latch or catch for dental-engine hand-pieces, provided in front of its pivot with a projecting or hooked end and an incline or flattened surface, and in rear of its pivot with an upwardly-projecting or goose-neck end, by which the latch is controlled or rocked upon its pivot to engage its front end with or disengage it from the tool-shank.

3. The combination, substantially as here-
inbefore set forth, in a dental-engine hand-
piece, of a rotary chuck or mandrel, a pivoted
latch carried thereby, having a goose-neck end
5 or inclined surface upon both its upper and
lower edges, and an endwise-moving sleeve
revolving with the chuck enveloping and con-
trolling the pivoted latch.

4. A pivoted tool-locking latch for dental-
10 engine hand-pieces, having a projecting or
goose-neck end, in combination with an end-
wise-moving sleeve carrying a wedge, whereby
the latch is positively rocked or operated in
one direction by contact of the sleeve with the
15 upper surface of the latch and in the other di-
rection by the wedge riding under the neck or
lower surface of the latch.

5. The combination, in a dental-engine hand-
piece, of a casing, a rotary chuck mounted
20 therein, with a screw-threaded end projecting
beyond the end or nose of the casing, an in-
ternal pull-bearing to prevent endwise move-
ment of the chuck in the casing, and an ex-
ternal adjustable push-bearing mounted upon
25 the projecting screw-threaded end of the chuck,
bearing against and overlapping the tapering

end of the nose, whereby the said tapering
push-bearing may be adjusted to compensate
wear of the chuck.

6. The combination of the casing, the sec- 30
tional or divided chuck mounted in bearings
in said casing, the clutch between said chuck-
sections, consisting of a rod movable endwise
in one of said chuck-sections, and carrying a
clutch pin or lug engaging a notch in the end 35
of the opposite chuck-section, and an inde-
pendent rod or connection and operating mech-
anism therefor to operate said clutch-rod, sub-
stantially as described.

7. The combination, substantially as here- 40
inbefore set forth, of the slotted chuck, the
pivoted goose-neck latch, the sliding wedge,
and the slotted endwise-moving spring-con-
trolling sleeve for governing the movements
of the latch, whereby the latch is positively 45
operated in both directions.

In testimony whereof I have hereunto sub-
scribed my name.

ELI T. STARR.

Witnesses:

J. A. B. WILLIAMS,
F. L. HISE.