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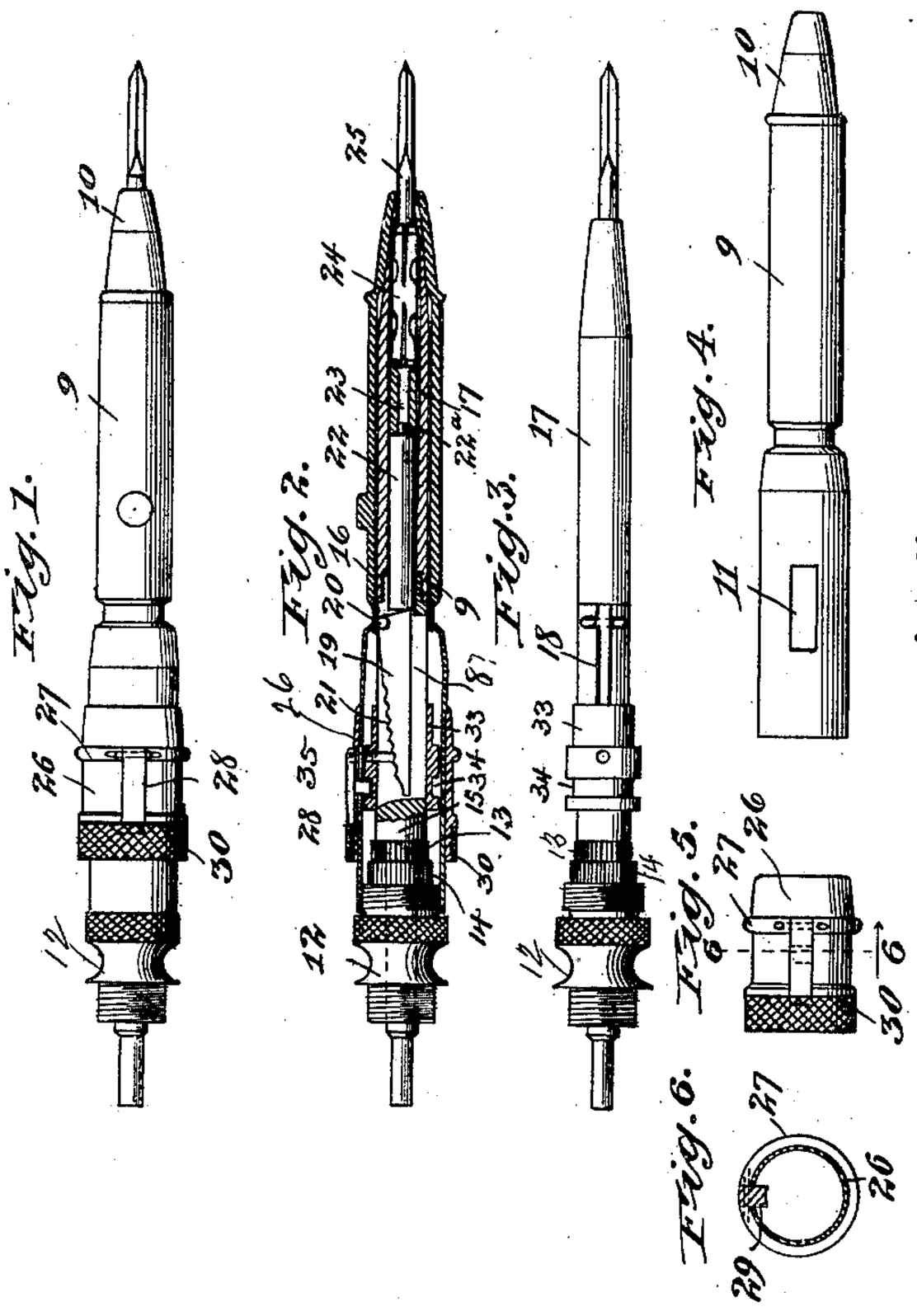
J. D. WILKENS.

DENTAL HANDPIECE.

(Application filed Nov. 7, 1901.)

(No Model.)



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UNITED STATES PATENT OFFICE.

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DENTAL HANDPIECE.

SPECIFICATION forming part of Letters Patent No. 713,826, dated November 18, 1902.

Application filed November 7, 1901. Serial No. 81,375. (No model.)

To all whom it may concern:

Be it known that I, JOHN D. WILKENS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Dental Handpieces, of which the following is a specification.

My invention relates to certain improvements in handpieces for dental engines of that class having a rotating hollow spindle containing a sliding chuck; and it consists in certain novel features of construction of those parts which are manipulated to clamp and release the tool carried by the handpiece.

My invention in its preferred form is illustrated in the accompanying drawings, in which—

Figure 1 is a side elevational view of the handpiece complete with the tool carried thereby. Fig. 2 is a central longitudinal sectional view, partly in elevation, of the tool viewed in a plane at right angles to that of Fig. 1. Fig. 3 is a view similar to Fig. 1, showing the rotating spindle with the outer casing removed. Fig. 4 is a detail elevational view of the stationary outer casing. Fig. 5 is a detail view of the outer non-rotatable slidable locking-sleeve and its pivoted locking device carried by the outer casing. Fig. 6 is a transverse section of the same on the line 6 6 of Fig. 5 looking in the direction of the arrow. Fig. 7 is a fragmentary detail view, considerably enlarged, illustrating the means for securing in operative relation the locking device carried by said outer locking-sleeve; and Fig. 8 is a detail view of the rear section of the rotating spindle.

The handpiece shown in the accompanying drawings belongs to that class wherein the tool-driving spindle is revolubly mounted within a non-rotating casing or sheath, the spindle being adapted for connection at its rear end to a flexible shaft or other means for rotating it, such as is well known in connection with the dental engine of ordinary use.

Referring to the drawings, 9 indicates an inclosing sheath or casing, which is provided with the usual hard-metal nose-piece 10 and a longitudinal aperture 11, formed through its wall toward its rear end.

12 indicates a sheath-collet having threaded ends, the forward one of which threaded ends engages with the internal threads of the rear end of the casing 9 and the rear of which threaded ends engages with a coupling-section. (Not shown.) Within the sheath-collet 12 is an internal spindle-collet 13, having a jam-nut 14.

At 15 is shown the rear section of a divided spindle, which has its forward end externally threaded at 16 for engagement with the rear end of the front spindle-section, (shown at 17.) The forward end of the rear spindle-section 15 is longitudinally slotted centrally thereof, as shown at 18, and within the slot thus formed is contained a wedge-shaped cam-lever 19, pivotally suspended at its upper forward end on a pivot-pin 20, mounted in and transversely of the body of the spindle-section and across the upper forward end of the slot 18. (See Figs. 2 and 3.) The upper cam-face of the lever 19 is serrated or formed with a series of notches, as shown at 21, and the forward end or nose of the lever is adapted to abut the rear end of a chuck-operating rod 22, which lies within and slidingly engages the rear end of the forward section 17 of the spindle. Within the same section of the spindle and directly in advance of the chuck-operating rod 22 is located an axially-bored connection-piece 23, which latter is entered at its rear end by a centering-pin 22^a on the forward end of the chuck-operating rod 22 and at its forward end is inwardly beveled or tapered to receive the rear end of a tubular chuck 24, which latter is split at both ends, as shown, and receives the shank of the tool 25. The bore of the forward end of the spindle is gradually contracted, from which it will be evident that an endwise pressure exerted longitudinally of the spindle by the lever 19, acting through the chuck-operating rod 22 and the connection-piece 23, will tend to force the chuck 24 forwardly within the spindle, which serves as a containing-sleeve therefor, in such a manner as to cause the split ends of the chuck to clamp and hold the tool. The tapered end of connection-piece 23 also compresses and closes the rear end of the chuck.

Referring now specifically to the means I prefer to employ for actuating the lever 19 to thus clamp and release the tool 26 designates a sleeve mounted to slide frictionally over the rear portion of the outer casing 9, which contains the slot 11. In an external annular rib 27, formed about said sleeve, is pivoted at its base a locking-finger 28, which finger overlies the slot 11 and is provided with a depending lug 29, which passes through said slot 11 when the finger lies upon and parallel with the wall of the sleeve and is withdrawn therefrom when the finger is swung outwardly on its pivot. The rear end of the sleeve 26 is exteriorly screw-threaded and is engaged by an internally-threaded ring 30, and a longitudinal groove or socket is cut through the screw-threads of the sleeve in alinement with the finger 28, as shown at 31, to provide a seat for an extended projection or nose 32, formed integral with the finger 28, which may be overrun by the ring 30, thereby locking the finger 28 in its operative position, all as best shown in the detail view, Fig. 7. This sleeve 26 thus constituted and equipped I have termed the "outer" locking-sleeve, and the same is adapted to be slid forwardly or rearwardly of the casing of the handpiece without undue friction thereon.

Within the casing and slidably mounted upon the rear slotted section 15 of the spindle and in such a location relatively to the sleeve 26 as to lie within the latter is an inner locking-sleeve, (designated by 33.) This sleeve has a circumferential groove 34 formed therein at its rear end, which groove is adapted to receive the depending lug 29 when the finger 28 is in its closed or operative position. A screw-threaded pin 35 screws through the wall of the sleeve 33 in advance of the groove 34 and enters the slot 18, formed in the rear section 15 of the spindle, the lower end of this pin engaging the serrated or notched cam-face of the lever 19, all as plainly shown in Fig. 2. By reason of its screw-threaded engagement with the sleeve this pin may be finely adjusted to enter the slot to varying degrees of depth therein as the proper adjustment of the parts affected thereby may require.

The operation of the parts thus formed and arranged may be briefly described as follows: With the several parts in the relative positions shown in Fig. 2, the shank of the tool 25 has been entered and is loosely held between the jaws of the chuck in the manner usual in this class of tools. In order to lock the tool in the chuck, the outer sliding sleeve 26 is pushed forward upon the casing, and through the engagement of the lug 29 with the groove of the inner collar 33 the latter collar is simultaneously slid forward upon the spindle 15. This latter forward travel of the collar 33 of course advances the pin 35 upward over the cam-face of the cam-lever 19, the lower end of the pin slipping from one notch to the next and tending by reason of its engagement with said notches to hold the cam-lever locked in each successively increasingly depressed position. This depression of the rearwardly-extending body portion of the cam-lever tends to thrust its front face forward against the rod 22, thereby advancing the latter and the connection-piece 23, and through these connections crowding the chuck 24 hard up into the forward inwardly-tapered end of the spindle, thereby causing the chuck to grasp and clamp the tool with great firmness at both ends thereof. A reverse movement imparted to the sleeve 26 by the operator will serve to release the tool by permitting the chuck and connection-piece to recede slightly and the clamp-jaws thereof to expand under the natural elasticity of the metal of which it is composed.

When it is desired to dismantle or take the tool apart, by unscrewing the ring 30 the finger 28 may be released and swung outwardly, thereby withdrawing the lug 29 and breaking the connection between the inner and outer sleeves. By then unscrewing and withdrawing the rear collet 12 the rotary spindle and its contained parts may be withdrawn for cleaning, oiling, adjustment, or replacement of parts, or for any other purpose. It will be obvious that the connection-piece 23 is by no means an essential element of the invention, since the chuck-operating rod 22 may be made of such a length that its forward end will directly engage the rear end of the chuck. This connection-piece is, however, a useful adjunct of the device, for the reason that different dental operators prefer handpieces of varying lengths, and the use of the connection-piece 23 enables the chucks and the chuck-operating rods to be all made in one size and used in spindles of varying lengths by means of connection-pieces of correspondingly varied lengths.

What I regard as an important feature of my present invention resides in the location and arrangement of the chuck-closing devices relatively to the spindle and its casing, whereby the chuck is clamped through a forward sliding movement of the chuck-operating devices and is released through a rear movement of said devices. In many constructions heretofore employed wherein the chuck is clamped and released through the operation of an external sliding member mounted upon the outer casing of the handpiece—as, for instance, in my former patent, No. 533,574, February 5, 1895, upon which this invention is an improvement—the chuck has been released by a forward movement and clamped by a rearward movement of the chuck-operating sleeve or other device. The result of this has often been that the chuck has been released accidentally through a forward thrust or pressure of the hand of the operator upon the exterior of the handpiece while engaged in the drilling operation. My present invention entirely obviates this danger, because the harder the forward pressure upon

the external locking-sleeve 26 the more tightly will the tool be held in the chuck.

I do not regard the corrugating or notching of the cam-face of the cam-lever as absolutely essential to the carrying out of my invention, since it is obvious that owing to the slight pitch or inclination of the cam-face the pin 35 would remain frictionally engaged therewith in any adjusted position; but the construction shown is preferred, for the reason that while it does not interfere with the forward sliding of the sleeve for purposes of adjustment it does in a measure tend to check any external rearward movement of the sleeve and consequent loosening of the tool in the chuck while the device is in operation.

I do not limit myself to the exact means shown and described for effecting the longitudinal interlocking of the two sleeves 26 and 33 nor to the exact means disclosed for locking the finger 28 in its inner or operative position, except to the extent that these devices are made the subject of specific claims, since any other mechanically equivalent and obvious means for effecting the same results might be employed within the spirit and purview of my invention.

I claim—

1. In a dental handpiece, the combination with an outer casing and a spindle mounted to rotate therein, of a tool-holding chuck in the forward end of the spindle, a lever pivotally mounted at its forward end in said spindle longitudinally thereof, said lever having a short front face and a relatively long straight inwardly-inclined cam-face extending from its pivotal point to its rear end, longitudinally-slidable connections intermediate the front face of said lever and the chuck, an external longitudinally-slidable sleeve mounted on the casing, an inner sleeve slidably mounted upon the spindle within the casing, a locking device intermediate said sleeves which permits a rotary movement only of the inner sleeve relatively to the outer sleeve, and an inwardly-extending projection on the inner sleeve which rides upon the rearwardly-extending cam-face of the lever and rocks the latter upon the advance movement of the sleeves, substantially as described.

2. In a dental handpiece, the combination with an outer casing and a spindle mounted to rotate therein, said spindle being longitudinally slotted through a portion of its length, of a tool-holding chuck in the forward end of the spindle, a lever pivotally mounted at its forward end in the slot of the spindle, said lever having a short front face and a relatively long straight inwardly-inclined corrugated or notched cam-face disposed at substantially a right angle to the front face of the lever, longitudinally-slidable connections intermediate the front face of said lever and the chuck, an external longitudinally-slidable sleeve mounted on the casing, an inner sleeve slidably mounted upon the spindle within the casing, a locking device intermediate said sleeves which permits a rotary movement only of the inner sleeve relatively to the outer sleeve, and an inwardly-extending pin in said inner sleeve the lower end of which rides upon the notched cam-face of the lever and rocks the latter upon the forward movement of the sleeves, substantially as described.

3. In a dental handpiece, the combination with an outer casing and a spindle mounted to rotate therein, of a tool-holding chuck in the forward end of the spindle, a cam-lever pivotally mounted in said spindle longitudinally thereof, longitudinally-slidable connections intermediate the forward face of said lever and the chuck, an external longitudinally-slidable sleeve mounted on the casing, an inner sleeve slidably mounted upon the spindle within the casing and within said outer sleeve, said inner sleeve having an annular groove formed in its outer surface, a locking-finger pivoted upon said outer sleeve and having a lug or detent which extends through the casing and into the annular groove of the inner sleeve, means for locking said finger and its lug in locking engagement with the inner sleeve, an inwardly-extending pin in said inner sleeve, the lower end of which impinges upon and rides over the rearwardly-extending face of the cam-lever, actuating the latter in a direction to effect the clamping of the tool by the chuck upon the forward movement of the sleeves, substantially as described.

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