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DENTAL ENGINE HANDPIECE

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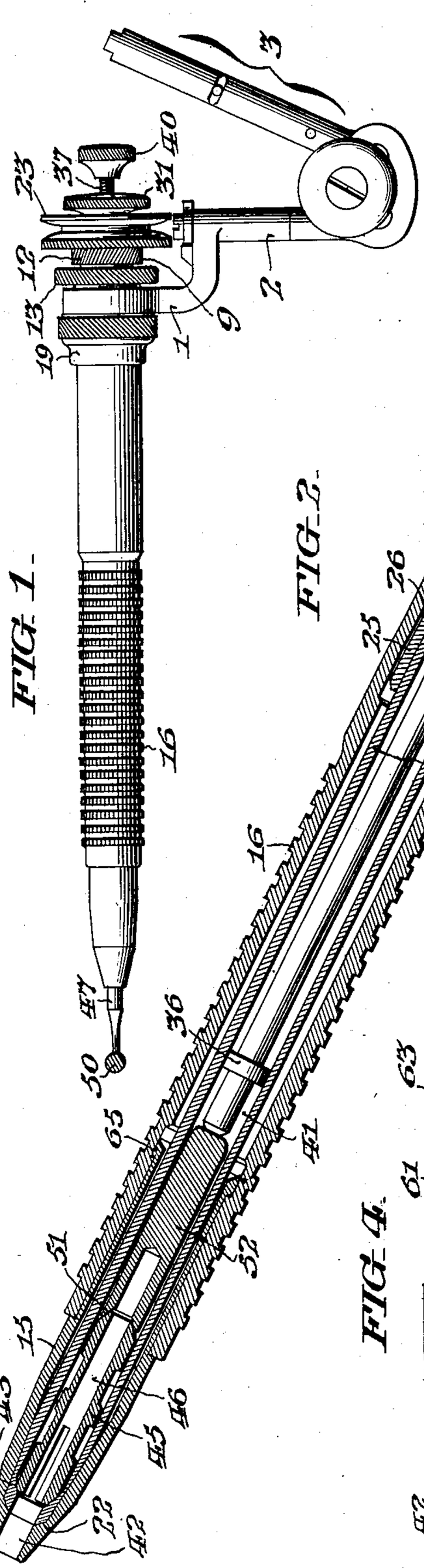

FIG. 1.

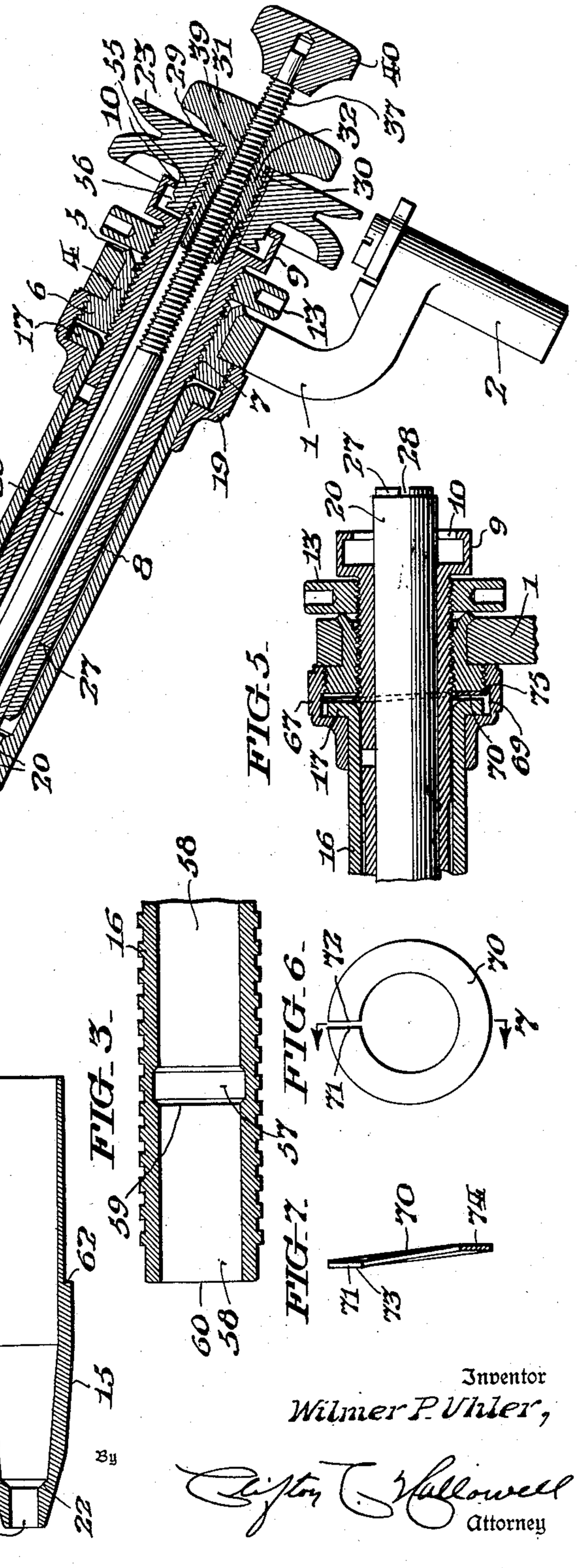

FIG. 2.

FIG. 5.

FIG. 4.

FIG. 3.

FIG. 6.

FIG. 7.

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DENTAL ENGINE HANDPIECE

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5 Claims. (Cl. 32—26)

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My invention relates particularly to that class of handpieces that are adapted to be employed in connection with dental engines and in which the rotating parts include chuck mechanism that is arranged to detachably engage drills, burs, discs, and such other implements as are commonly employed in the practice of dentistry, and in which the tool actuating parts are belt driven and the assembly is generally known as an all cord handpiece.

The principal objects of my invention are to provide a dental engine handpiece in which the several parts are so cooperatively formed as to lend themselves to such a convenient relatively interengaged assemblage as will afford a considerable curtailment of the expense in the ultimate production of the assembled structure.

Other objects of my invention are to provide a dental engine handpiece in which the spindle and sheath may be conveniently removed for purpose of sterilization and adjustment and replaced without displacing the driving belt from the spindle driving pulley.

Further objects of my invention are to provide means to prevent, while not in use, any rotation or so called spinning of the handpiece casing or sheath which may be incident to the torque exerted between the relatively rotative parts of the running engine and the handpiece while hanging idle.

My invention comprehends such novel features of procedure in the manufacture of the parts of the handpiece as to eliminate soldering, brazing or other heat treatment processes as may tend to expand or distort the structure in its process of production.

The form of my invention as hereinafter more specifically described comprises a dental engine handpiece in which its nosepiece and knurled casing are swaged together to form the sheath which is removably engaged by a union nut with the wrist-joint frame through which an elongated rear bearing for the tubular tool actuating spindle is threadedly engaged for axial adjustment of the swaged forward conoidal end portion of said spindle with respect to its forward bearing in the aforesaid nosepiece, said elongated bearing being rearwardly cupped and outwardly knurled to afford a thumb knob, which not only serves to catch excess oil dripping from the driving pulley, but also serves to support said pulley when the handpiece parts, including the spindle, are withdrawn for sterilizing purposes.

My invention also includes all of the various

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novel features of construction and arrangement as hereinafter more definitely specified in detail.

In the accompanying drawing, Figure 1 is a side elevational view of a handpiece constructed in accordance with my invention; Fig. 2 is an enlarged central vertical longitudinal sectional view showing the internal structure of the handpiece illustrated in Fig. 1, certain parts being shown in elevation, and the wrist-joint structure being omitted for convenience of illustration; Fig. 3 is an enlarged fragmentary central vertical longitudinal sectional view of the forward end portion of the handpiece sheath or casing, illustrating the annular internal groove into which the inner end of the nosepiece may be swaged and thereby expanded into interlocked integral relation; Fig. 4 is an enlarged central vertical longitudinal sectional view of the nosepiece in the form arranged to be inserted into the bore of the forward fragment of the handpiece casing shown in Fig. 3; Fig. 5 is a fragmentary rear end vertical sectional view of the handpiece illustrated in Fig. 2, modified by providing for the insertion of a spring friction washer designed to prevent undesirable rotation of the handpiece casing when hanging idle; Fig. 6 is a front elevational view of said washer; and Fig. 7 is a transverse vertical sectional view of said washer taken on the line 7 in Fig. 6.

In said figures, the wrist-joint frame 1 is provided with the hollow supporting swivel post 2, which is swivelly engaged with the wrist-joint structure 3 of well known construction.

The wrist-joint frame 1 is provided with the supporting hub 4 which is engaged therein by its swaged rearwardly disposed flange 5 and which is provided with the radially directed flange 6 and has the screw threaded bore 7 through which the elongated spindle bearing 8 extends in threaded engagement therewith for axial adjustments.

Said spindle bearing 8 is formed at its inner end with a cupped enlargement 9 terminating in an inturned flange 10 and having its outer cylindrical surface provided with knurling 12 to facilitate the axial adjustment of said spindle bearing 8 through its supporting hub 4, and in which adjusted position it may be retained by the spindle bearing retaining nut 13, as best illustrated in Fig. 2.

The handpiece sheath comprising the nosepiece 15 and tubular knurled casing 16 which has the radially directed terminal flange 17, is removably

supported by and engaged with the screw threaded flange 6 of the supporting hub 4 by the union nut 19 embracing said flange 17, as shown in Fig. 2.

The spindle 20 extends throughout the handpiece and is formed of tubing of one piece, the forward end portion of which is swaged inwardly to provide the cone bearing which conforms to the cone bearing 22 in the bore of the nosepiece 15, and said spindle is supported in the longitudinally adjustable bearing 8 from which it projects rearwardly to receive the driving pulley 23.

As shown in Fig. 2, the spindle 20 is provided near its middle region with the elongated bearing collar 25, which encircles said spindle and bears at its inner end 26 against the outer end 27 of the bearing 8, whereby axial adjustment of said bearing 8 tends to vary the relation between the conical bearing surfaces of said spindle and nosepiece.

In order to prevent distortion of the spindle 20 incident to attaching the collar 25 by the process of soldering or brazing, and to provide a true and smooth bearing, the rearward third portion, approximately, of said spindle is ground or otherwise slightly reduced to a region intermediate of the ends of said collar 25 when in the position shown.

Said collar 25 having been made to approximately slip fit the slightly reduced portion of the spindle 20 is forced axially forward over said slightly reduced region until it encounters the unreduced region of said spindle whereupon relatively higher forces may advance it forwardly to integrally engage said spindle with its bearing edge 26 at a predetermined relation with respect to the conical bearing 22 in the nosepiece 15.

The spindle 20 terminates rearwardly in a reduced axially extended flange 27 which has diametrically disposed notches 28, see Fig. 5, to respectively receive the diametrically disposed key projections 29 and 30 on the driving pulley 23 which is maintained in removable engagement on said spindle by the chuck-rod collet 31 whose stem 32 extends into the rear end of said spindle 20 in threaded engagement therewith.

The chuck rod 33 extends forwardly through the spindle 20 being provided with the collar 36 by which it is maintained centrally located within said spindle and having the screw threads 37 interengaged with screw threads 39 in the bore of the chuck-rod collet 31 and being provided with the knurled knob 40 by which said chuck rod may be rotated to effect its axial advancement or its retraction.

As shown in Fig. 2, the forward end of the bore 41 of the spindle 20 is conically tapered toward the axially aligned tool receiving aperture 42 and affords a conical forward seat 43 for the longitudinally split chuck 45 through the bore 46 of which the shank 47, of the tool which is illustrated in Fig. 1 and which comprises the bur head 50, extends.

The chuck 45 is normally expanded to loosely receive the tool shank 47 and has its opposite ends formed conical and respectively arranged to engage the conical seat 43 in the bore of the spindle 20 and the conical seat 51 in the forward end of the follower 52 which is disposed for axial movement in the bore 41 of the spindle 20 and arranged to be forced forward to effect contraction of the chuck 45 by axial adjustment of the chuck rod 33 when rotated by the knob 40.

As shown in Fig. 2, the hub 55 of the driving pulley 23 is provided with a circumferential

V-shaped groove 58 which is arranged to arrest any excess lubrication and deposit it into the receptacle formed by the cupped enlargement head 9 of the bearing 8. This V-shaped groove 58 also serves in cooperation with the inturned flange 10 of the cupped enlargement head 9 of the bearing 8 to arrest and so support the driving pulley 23 as to avoid the necessity of disconnection of the driving belt therefrom when the handpiece parts are disassembled for sterilization purposes, a feature that is deemed to be highly desirable in saving the operator's time.

In handpieces wherein the sheath has been formed of composite units such as the casing and its connected nosepiece, it has been the general practice to join them by solder or by brazing, which often causes undesirable warping or distortion and tends to throw the thus joined parts out of true axial alignment.

In the handpiece as illustrated in Figs. 2, 3 and 4, the separately formed parts of the sheath comprising the casing 16 and nosepiece 15 are joined solely by frictional engagement to form a sturdy integral sheath structure by swaging the nosepiece into the casing.

As shown in Figs. 2 and 3, the casing 16 is provided with the internal annular groove 57 in its bore 58 forming a forwardly directed shoulder 59 disposed at a predetermined distance from the forward end 60 of said casing 16.

The nosepiece 15, as best shown in Fig. 4, is provided with a reduced rearwardly projecting cylindrical extension 61 which forms the annular abutment shoulder 62, the length of said extension 61 being in excess of the distance between the forward end 60 of the casing 16 and the shoulder 59 in the bore thereof.

The assembly of the sheath structure may be readily effected by slipping the cylindrical extension 61 of the nosepiece 15 into the bore 58 of the casing 16 until the shoulder 62 of the nosepiece 15 engages the forward end 60 of the casing 16, as shown in Fig. 2, whereupon the inner end region 63 of said extension 61 that projects inwardly beyond the shoulder 59 is spun or staked by a suitable tool extended through the bore 58 of the casing 16 from the inner end thereof and thus expanded to form the annular locking flange 65 shown in Fig. 2, whereby to provide a rigid integral sheath structure having its assembled parts in perfect alignment.

When the spindle 20 is rotated in the sheath, some torque may be transmitted to the sheath due to the viscosity of the oil film in the bearings, or possibly due to a slight malalignment of the spindle bearings, thus tending to cause the sheath to rotate when the handpiece is hanging idle while the engine is running.

As illustrated in Fig. 5, the fragmentary structure depicting the wrist-joint frame 1, the supporting hub 4, the spindle bearing 8, spindle 20 and spindle bearing nut 13, shows the casing 16 engaged in operative position by the union nut 67, of modified structure, which is provided with the slightly undercut annular pocket 69 arranged to receive the split spring washer 70 which, as best shown in Fig. 6, has its opposed ends 71 and 72 preferably separated so as to better lend itself to be inserted into said undercut pocket 69.

As illustrated in Fig. 7, the spring washer 70 is normally distorted so that its diametrically opposite upper and lower faces 73 and 74 respectively conform to relatively spaced planes and better serve to frictionally engage the opposed

plane surfaces of the flange 17 and the spindle bearing supporting hub 4, as shown in Fig. 5.

As will be obvious from an inspection of Fig. 5, the washer 70, by its engagement with the undercut annular shoulder 75, serves to retain the union nut 67 on the casing 16 of the handpiece sheath while said sheath is removed for sterilizing purposes.

I do not desire to limit my invention to the precise details of construction and arrangement as herein set forth, as it is obvious that various modifications may be made therein without departing from the essential features of my invention as defined in the appended claims.

Having thus described my invention, I claim:

1. A dental engine handpiece comprising a sheath, having a forward bearing, a support for said sheath, means arranged to removably engage said sheath with said support, an elongated axially adjustable bearing in said support, a tool driving spindle mounted to rotate in said bearings and having a collar mounted medially thereon and engaged therewith solely by friction and cooperative with the forward end of said elongated bearing to maintain said spindle engaged with said forward bearing, the inner end of said spindle being reduced in diameter to provide an axially extended flange having diametrically opposite notches in its free edge, and a driving pulley mounted on said spindle and having axially projecting keys slidingly engaged in said notches and insuring their contemporaneous rotation.

2. A dental engine handpiece comprising a sheath having a forward bearing, a support for said sheath, means arranged to removably engage the sheath with said support, an axially adjustable bearing threadedly mounted in said support and terminating rearwardly in a cupped adjusting head having an inturned flange and provided with knurling on its outer cylindrical surface to facilitate rotary adjustment of said bearing, a spindle bearing nut arranged to maintain said bearing in any axial adjusted position, a tool actuating spindle mounted to rotate in said bearings and having a collar with which the forward end of said adjustable bearing engages, a belt actuated driving pulley mounted on said spindle and having a forwardly projecting hub provided with an annular groove arranged to direct surplus lubricant into said cupped head when the handpiece parts are in operation and to engage the inturned flange of said head and rest thereon with the driving belt intact when the handpiece parts are dissembled for sterilizing or other purposes.

3. A dental engine handpiece comprising a sheath terminating rearwardly in a radially extended flange, a support including a tool driving spindle bearing, a union nut connecting said sheath with said support, and an axially distorted spring washer effecting axial thrust interposed between said flange and support.

4. A dental engine handpiece comprising a sheath terminating in a transverse surface, a support having a relatively opposed transverse surface, and yielding means comprising an axially distorted washer interposed between said surfaces tending to restrict the relative rotation of said sheath and support, and serving as a retarding brake.

5. A dental engine handpiece comprising a sheath terminating in a transverse annular surface, a support for said sheath having an opposed annular surface and a screw threaded exterior, a union nut in threaded relation therewith and having an annular internal recess arranged to engage said sheath with said support, and a split spring washer interposed between said surfaces and having its peripheral margin extended into said recess, tending to yieldingly exert axial pressure and thereby frictionally retard the relative rotation of said sheath and its support, and serving to retain said union nut engaged with said sheath when separated from its support.

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