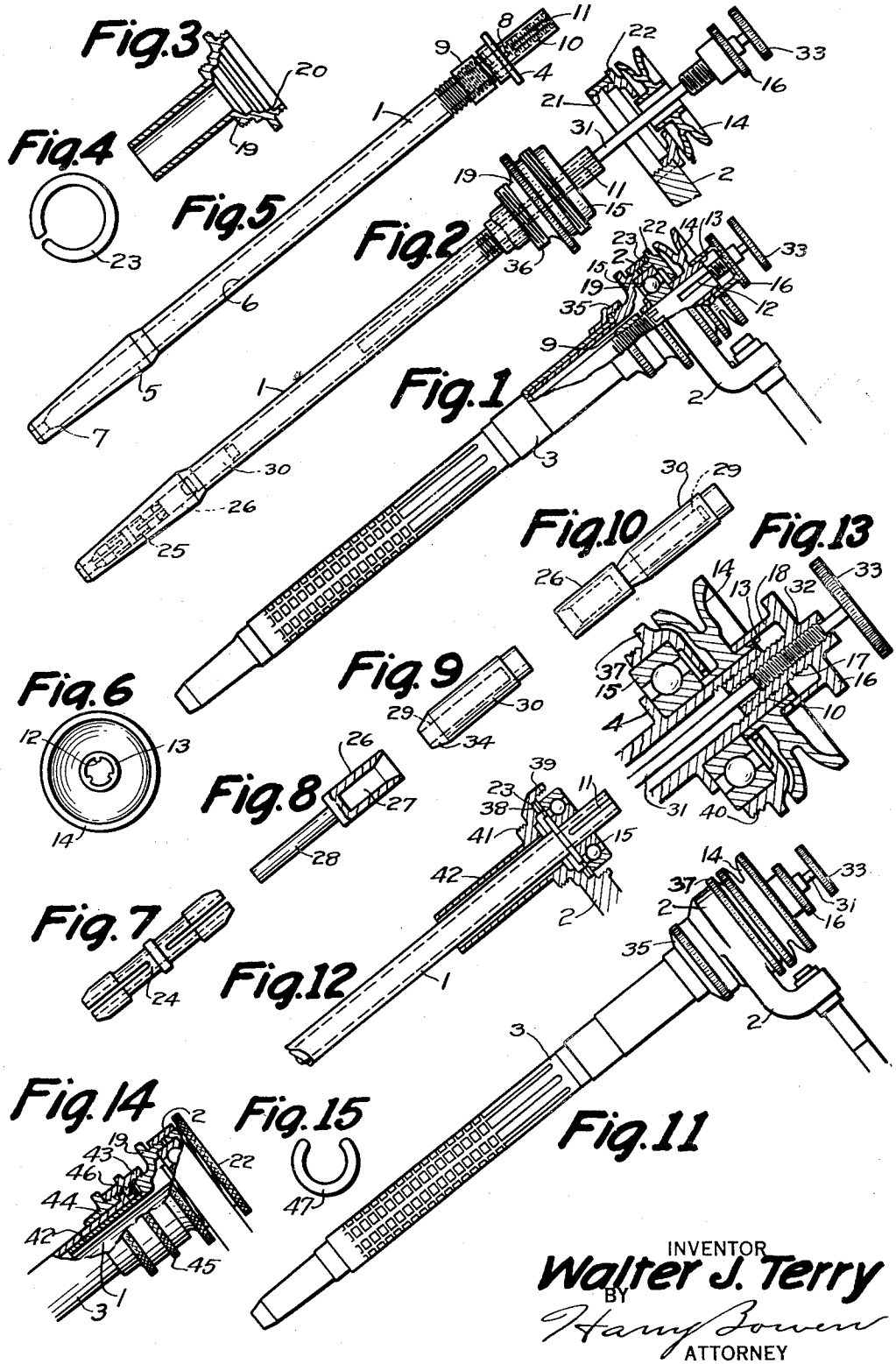
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STRAIGHT DENTAL HANDPIECE

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INVENTOR
Walter J. Terry
BY
Harry Bowen
ATTORNEY

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STRAIGHT DENTAL HANDPIECE

Walter J. Terry, Seattle, Wash.

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The invention is a straight handpiece with a one piece spindle having a straight bore which permits the drill chuck and its closer to be readily inserted and removed from the rear without taking the handpiece apart, and is so arranged that it may be readily adjusted to take up longitudinal play that develops from wear.

The object of the invention is to provide means for constructing a straight handpiece which permits a one piece spindle, and which is provided with means for opening the upper end to permit the drill chuck and its closer to be readily removed and replaced without taking the handpiece apart.

Another object of the invention is to provide a straight handpiece in which the spindle is held in the frame by a ball bearing.

Another object of the invention is to provide a chuck attachment for a spindle of a straight handpiece handle by which the chuck operates satisfactorily for both long and short burs.

A still further object of the invention is to provide means for adjusting the length of the attachment to eliminate end play that may develop therein.

And a still further object of the invention is to provide a straight dental handpiece having a straight spindle, which is of a simple and economical construction.

With these ends in view the invention embodies a spindle, a frame, means for adjusting the position of the spindle, means for holding the spindle in the frame, a removable sheath, a chuck, a closer for the said chuck, a pin for operating the said closer, and a pulley mounted on the upper end of the spindle.

Other features and advantages of the invention will appear from the following description taken in connection with the drawing, wherein:—

Figure 1 is a view showing an assembly of the handpiece.

Figure 2 is a view showing the interior parts with the sheath removed.

Figure 3 is a view showing the top sheath bearing.

Figure 4 is a view showing one of the adjusting washers.

Figure 5 is a view showing the spindle.

Figure 6 is a view showing the pulley with the splines in the hub thereof.

Figure 7 is a view showing the chuck.

Figure 8 is a view showing a special portion of the closer to be used in the position shown when short burs are held in the chuck.

Figure 9 is a view showing the upper portion of the closer.

Figure 10 is a view showing both sections of the closer assembled and in the position in which they are used with burs having long shanks.

Figure 11 is an assembly view of a straight handpiece in which the arrangement of the upper part thereof is slightly different to that shown in Figure 1.

Figure 12 is a view showing the position of the spindle and bearing in the frame shown in Figure 11.

Figure 13 is a cross section through the upper part of the handpiece shown in Figure 11.

Figure 14 is a view showing part of a handpiece with part broken away showing an alternate means for adjusting the position of the sheath in relation to the spindle.

Figure 15 is a view showing an adjusting washer as used in the design shown in Figure 14.

In the drawing the handpiece is shown as it would be made wherein numeral 1 indicates the spindle, numeral 2 the frame, and numeral 3 the sheath.

It will be appreciated that heretofore the spindle has been made in several pieces, and in order to remove the chuck it has been necessary to remove the spindle from the handpiece and then take the several pieces of the spindle apart; whereas, in this handpiece the spindle 1 is made of a single piece of material, as shown in Figure 5, with a collar 4 adjacent one end, and an enlarged bearing section 5 at the other. The intermediate section is tubular with a circular opening 6 extending from the upper end to a point 7 adjacent the opposite end from where it tapers inward a short distance, and then extends to the tip with a smaller circular opening as shown. The outer surface of the portion 5 is inclined as shown, to form a bearing in the lower end of the sheath. The collar 4 is slidably mounted on the spindle and keyed by splines 8, and below the collar is a nut 9 which is threaded on the spindle. It will be noted in Figure 1 and also in Figure 13, where an alternate design is shown in that the collar 4 is made integral with the spindle, that the bearing is locked against the collar 4 and the collar 4 is clamped between the nut 9 and the bearing, so that by adjusting the position of the nut on the spindle the position of the spindle in the sheath may be adjusted as hereinafter described. The upper end of the spindle is threaded internally, as indicated by the numeral

10, and the outer surface is provided with grooves 11 in which the splines 12 in the hub 13 of the pulley 14 are placed to prevent the pulley rotating upon the spindle, or to cause the spindle to rotate with the pulley. It will be noted that these splines eliminate the necessity of placing a small set screw through the pulley groove as has been done heretofore.

A ball bearing, as indicated by the numeral 15, is placed on the spindle and against the collar 4 and a bearing cap placed over it as shown. Then the pulley is placed on the splined section so that the inner surface of the pulley hub will engage the ball bearing and hold it against the collar 4 as shown in Figure 13. A nut 16 is then threaded into the threads 10 at the upper end of the spindle with a cylindrical portion 17 passing into the spindle and an outer cylindrical sleeve 18 passing over the hub of the pulley to hold the pulley against the bearing, with the bearing against the collar 4 and the collar against the nut 9. The sleeve 18 may be made sufficiently large to hold the adjusting washers of the design shown in Figures 14 and 15 so that any extra washers, or washers that have been removed, may be stored therein. Before the bearing cap, pulley 14, nut 16, and sleeve 18 are placed on the spindle, the spindle and bearing are placed into the top sheath bearing 19, which is shown in detail in Figure 3, with the bearing against the shoulder 20, and it will be noted that the threads in the outer surface of the member 19 around the bearing may be screwed into the internal threads 21 of the frame 2. The bearing cap, which is indicated by the numeral 22, fits over the opposite side of the ball bearing 15 and is also screwed into the threads 21 of the frame 2 from the opposite side, as shown. It will be noted in Figure 1 that a clearance is provided between the inner surfaces of the members 19 and 22 and between the outer surface of the ball bearing and frame 2 so that the members 19 and 22 will lock against the surfaces of the outer race of the ball bearing, and with the inner race of the ball bearing locked against the nut 9 it will be observed that the position of the spindle in relation to the frame may readily be adjusted by adjusting the position of the nut 9 on the spindle.

Although this arrangement of adjusting the position of the spindle in relation to the sheath and frame is preferred, the spindle may also be adjusted by a plurality of thin washers 23, as shown in Figure 4. These washers are placed against the member 19 as shown in Figure 14 or against a shoulder in the frame shown in Figure 12, and it will be observed that by removing some of the washers the spindle may be moved slightly downward into the sheath to take up wear that may have developed therein. With this arrangement the collar 4 may be made integral with the spindle as shown in Figure 13, and the washers may be positioned between the bearing and shoulder of the frame, as shown in Figure 12.

It will be appreciated that when assembling, the pulley 14 and the nut 16 are removed until the top sheath 19 is screwed into the frame 2 with the ball bearing 15 therein and then the bearing cap 22 and the pulley are placed on the end of the spindle with the cap 22 screwed into the frame and the pulley 14 held by the nut 16, as hereinbefore described.

Before inserting the nut 16, the chuck, as indicated by the numeral 24 and shown in Figure 7, is inserted in the spindle so that it will drop downward into the position shown by the dotted lines 25 in Figure 2, and then the chuck closer, which is made in two parts and shown in Figure 10, is also placed in the spindle with the lower section 26 against the chuck.

It will be noted that the beveled lower end of the chuck engages the beveled surface between the points 7 and 8 of the spindle so that as the chuck is forced downward it will grip the shank of a bur that may be inserted therein. The upper end of the chuck is shaped in a similar manner and the outer end of an opening 27 in the section 26 is also tapered so that it will force the jaws of the chuck against the upper end of the bur shank when a bur with a long shank is used. With this arrangement the pin 28 of the member 26 is placed upward into an opening 29 in the upper member 30 of the closer, and as the members 30 and 26 are forced inward against the chuck by a pin 31 the bur will be gripped and held. The pin 31 is provided with a threaded section 32, which is screwed into the cylindrical portion 17 of the nut 16 and the outer end of the rod 31 is provided with a head 33 by which it may readily be turned by hand.

When burs with short shanks are used the members 26 and 30 are inserted in the positions shown in Figures 8 and 9 with the pin 28 extending into the chuck and the beveled surface 34 at the lower end of the member 30 engaging a similar surface at the outer end of the opening 27 in the member 26. It will be noted that the over-all length of the closer will be the same with either arrangement, so that the position of the pin 31 will be the same in either case. With these parts assembled the sheath 3 is placed over the spindle and bearing 19 and is held in place by a lock nut 35 which is screwed upon the threads 36 of the bearing 19. The handpiece is then complete and ready for use.

In the design shown in Figure 11, the spindle, bearing and the arrangement of the members at the upper end of the spindle, are the same as shown in Figure 1, however, in this design the bearing is held in a nut 37 and the top sheath bearing 19 is made integral with the frame 2, and it will be observed that when the nut 37 is unscrewed from the frame the spindle and bearing may be withdrawn from the upper end of the sheath and frame without removing the sheath so that the spindle may readily be oiled or repaired and replaced without dismantling the entire device. In this design the frame is provided with a shoulder 38 against which the adjusting washers 23 are placed and the bearing is placed against these washers as shown in Figure 12. The upper side of the frame is provided with internal threads 39 into which threads 40 on the nut 37 are screwed, and the lower side of the frame is provided with threads 41 upon which the sheath lock nut 35 is screwed as the sheath is placed over the extended portion of the sheath bearing 19. It will also be noted that in this design the nut 16 may readily be removed without removing any of the other parts except the pin 31, and then the chuck with its closure may readily be removed and replaced. With this construction in combination with the spindle it is therefore possible for a dentist to remove and replace the chuck, or practically any

part of the handpiece in a comparatively few seconds.

In the design shown in Figure 14, the longitudinal adjustment through which the wear or play of the spindle is taken up is arranged so that the sheath is drawn upward on the spindle, whereas, in the former designs the spindle is moved downward into the sheath. In this arrangement an auxiliary reversible nut 43 is provided which screws upon the threads 41 of the sheath bearing 19 and holds the sheath through the sheath lock nut which in this design is indicated by the numeral 44. The nut 43 is formed with an outer central knurled ridge 45 with similar internally threaded sleeves extending from each side and an inner central shoulder 46. This nut 43 is threaded upon the threads 41 of the cap 19 with a plurality of thin washers 47 between the shoulder 46 and the shoulder at the end of the threads 41 as shown. The end of the sheath 3 is placed in the opposite side of the nut 43 and then the lock nut 44 is screwed into place to lock the flange at the end of the sheath against the shoulder 46. By removing one or any number of the washers 47, it will be noted that the nut 43 will move upward on the cap 19 and the sheath may be drawn upward to take up wear that may develop between the sheath and spindle. This provides a very simple and efficient method of taking up the wear, and it will be noted that the washers 47 may be stored in the sleeve 18 of the nut 16 as they are removed. The washers 47 are made as shown in Figure 15, so that they will pass over the spindle when being removed or replaced so that it will not be necessary to take the sheath off of the spindle. The openings may be staggered when the washers are in place so that it will not be difficult to remove them one at a time.

It will be understood that changes may be made in the construction without departing from the spirit of the invention, one of which changes may be in the use of the spindle with a handpiece of any other type or design, another may be in the use of other means for holding the bearing and pulley upon the spindle, another may be in the use of other means for holding the spindle in the frame, and still another may be in the use of other means for attaching the sheath to the spindle.

Having thus fully described the invention, what I claim as new and desire to secure by Letters Patent, is:—

1. In a dental handpiece of the character described, a continuous one piece tubular spindle having a bearing formed by the outer surface thereof at the tip thereof, a removable bearing at the opposite or head end thereof, a removable pulley slidably mounted on the head end of said spindle, a lock nut threaded in the head end of said spindle holding said pulley and bearing thereon, a bur holding chuck in said spindle and adjacent the tip thereof, a rod threaded in said lock nut and extending thru said spindle to operate said bur holding chuck, a sheath surrounding said spindle and in which the bearing at the tip of said spindle is held, a frame, means holding said sheath in said frame, means adjusting the position of said sheath in relation to said spindle, and a locking cap holding said removable spindle bearing and sheath in said frame.

2. In a dental handpiece of the character described, a continuous one piece tubular spindle having a bearing formed by the outer surface at the tip thereof, a ball bearing on the opposite or head end of said spindle, a removable pulley slidably mounted on the head end of said spindle and splined thereto, a lock nut adapted to hold said pulley and bearing on said spindle, a removable bur holding chuck in said spindle, a rod extending thru said spindle and adapted to hold said chuck in the position of clamping a bur therein, a sheath surrounding said spindle having a bearing at the tip thereof corresponding with the bearing of said spindle, a frame, a bushing holding said sheath in said frame, a locking cap holding said spindle and ball bearing in said bushing and frame, and means adjusting the position of said spindle in relation to said sheath.

3. In a dental handpiece of the character described, a continuous one piece tubular spindle having a bearing formed by the outer surface at the tip thereof, a ball bearing at the opposite or head end thereof, an adjustable collar on said spindle against which said ball bearing may be held, a pulley slidably mounted on the head end of said spindle, a lock nut threaded in said spindle adapted to hold said pulley and bearing, a bur holding chuck in said spindle and adjacent the tip thereof, a rod threaded in said lock nut extending thru said spindle and adapted to engage said chuck, a sheath surrounding said spindle having a bearing at the tip thereof adapted to hold the bearing surface of the spindle, a frame, means holding said sheath in said frame, and a locking cap adapted to hold said spindle and ball bearing in said sheath and frame.

4. In a dental handpiece, a continuous one piece tubular spindle having a collar thereon and an exterior bearing surface adjacent the tip thereof, a ball bearing on said spindle positioned against said collar, a pulley splined on said spindle and positioned against said ball bearing, a nut threaded at the end of said spindle adapted to hold said pulley and bearing against said collar, a removable bur holding chuck in said spindle, a rod extending thru said spindle adapted to operate said chuck, a sheath surrounding said spindle having a bearing at the tip corresponding with the bearing of the spindle, a frame, means holding said sheath in said frame, means holding said spindle in said frame, and means adjusting the position of said spindle in said sheath.

5. In a dental handpiece, a continuous one piece tubular spindle having a collar thereon and an exterior bearing surface adjacent the tip thereof, a ball bearing on said spindle positioned against said collar, a pulley splined on said spindle and positioned against said ball bearing, a nut threaded at the end of said spindle adapted to hold said pulley and bearing against said collar, a removable bur holding chuck in said spindle, a rod extending thru said spindle adapted to operate said chuck, a sheath surrounding said spindle having a bearing at the tip corresponding with the bearing of the spindle, a frame, a bushing threaded in said frame, a nut holding said sheath to said bushing, said bushing adapted to hold one side of the outer surface of said ball bearing, and another bushing holding the other side of the outer surface of said bearing and adapted to lock the same in said frame.

6. In a dental handpiece of the character described, a continuous one piece tubular spindle

having a bearing formed by the outer surface thereof at the outer end thereof, a removable bearing on the opposite or head end of said spindle, a removable pulley slidably mounted on the head end of said spindle adjacent said bearings, means holding said pulley and bearing rigidly on said spindle, a bur holding chuck removably mounted in said spindle, said chuck adapted to be removed with the spindle in the handpiece and the position of said chuck adapted to be reversed to hold long or short burs, a rod extending into said spindle adapted to hold said chuck, means holding said rod in the outer end of said spindle, a sheath surrounding said spindle and in which the bearing at the outer end of said spindle is held, a frame, means holding said sheath in said frame, means adjusting the position of said sheath in relation to said spindle, and means holding the spindle in said frame thru the removable bearing thereon, said holding means transmitting radial and thrust strains between said spindle and frame thru said removable bearing.

7. In a handpiece as described in claim 6, a closure in said spindle and between the chuck and rod by which the chuck is held.

WALTER J. TERRY.