A. W. BROWNE.

DENTAL ENGINE HANDPIECE SWIVEL.

APPLICATION FILED MAR. 23, 1909.

941,612.

Patented Nov. 30, 1909.

FIG. I.

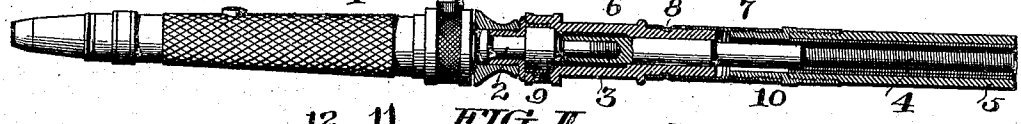


FIG. II.

FIG. III.

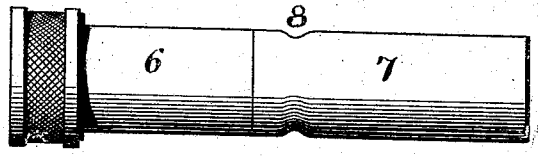


FIG. IV.

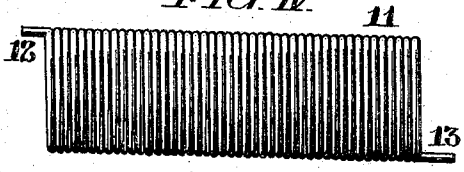


FIG. V.

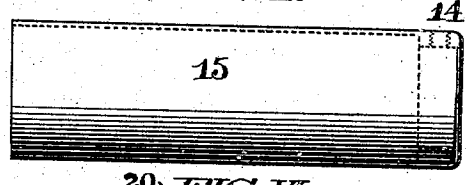


FIG. VII.

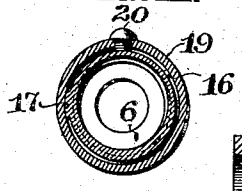


FIG. VI.

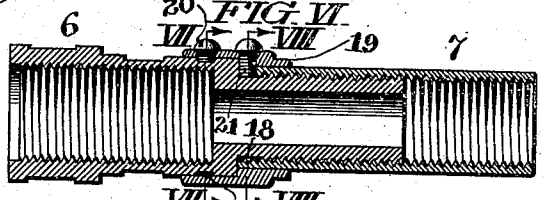


FIG. VIII.

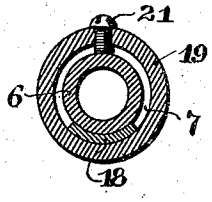


FIG. IX.

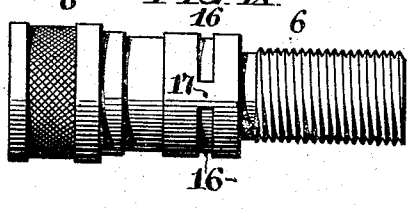


FIG. X.

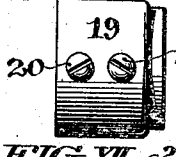


FIG. XI.

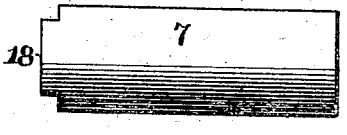


FIG. XII.

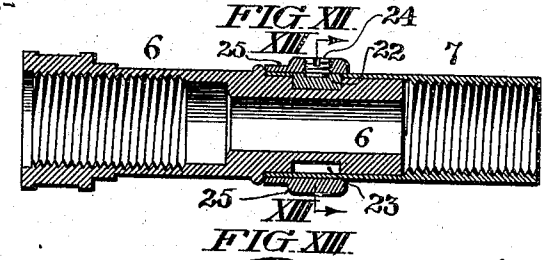
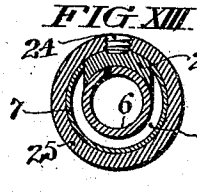


FIG. XIII.



Witnesses

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UNITED STATES PATENT OFFICE.

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DENTAL-ENGINE-HANDPIECE SWIVEL.

941,612. Specification of Letters Patent. **Patented Nov. 30, 1909.**

Application filed March 23, 1909. Serial No. 485,229.

To all whom it may concern:

Be it known that I, ARTHUR W. BROWNE, a citizen of the United States, residing at Prince Bay, in the county of Richmond and State of New York, have invented certain new and useful Improvements in Dental-Engine-Handpiece Swivels; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to dental engine handpiece swivels of the flexible cable type of engine. In this class of dental engines a flexible cable or shaft is employed for transmitting motion from the engine head to the handpiece spindle; said spindle turning in the handpiece casing, and the cable being surrounded by a non-rotating flexible sheath. The handpiece swivel is located between the handpiece casing and the non-rotating flexible sheath and permits of said casing being turned or rotated in respect to said sheath, this movement being essential for the proper manipulation of the handpiece. Should the friction between the handpiece spindle and the handpiece casing be greater at any time than that between the parts of the swivel, there will be a tendency for the entire handpiece to rotate This is objectionable at times, particularly in the case of electric dental engines when the handpiece and cable are permitted to hang loose while the motor is running.

The object of my invention is to prevent this objectionable and unintentional rotation or twirling of the handpiece without improperly interfering with its necessary freedom of movement.

For this purpose my invention consists of a swivel connection having means for restricting the turning of the handpiece casing relatively to the flexible sheath; said means being either a friction device, a positive or definite stop device, or a combined friction and positive stop device, as indicated in the accompanying drawings, described in the following specification and pointed out in the claims at the conclusion thereof.

In said drawings Figure 1 is a view partly in elevation and partly in central longitudinal section of a handpiece, flexible cable, sheath and swivel connection of well known construction; this view being on a smaller scale than the other views. Figs. 2, 3, 4, and 5 indicate one form of my improved handpiece swivel connection; Fig. 2 being a view in central longitudinal section, while Figs. 3, 4 and 5 are views in elevation of the several parts of the connection separated. Figs. 6, 7, 8, 9, 10 and 11 indicate another form of my improved swivel connection; Fig. 6 being a view in central longitudinal section; Figs. 7 and 8 transverse sectional views on the lines 7—7 and 8—8 respectively of Fig. 6; and Figs. 9, 10 and 11 are views in elevation of the parts of the connection separated. Fig. 12 is a view in central longitudinal section of still another form of my improved handpiece swivel connection; and Fig. 13 is a transverse sectional view thereof on the line 13—13.

Fig. 1 of the drawings illustrates a dental engine handpiece of well known construction, having a casing 1 and a spindle 2. Connected to said spindle by the screw connection 3 is a flexible cable or shaft 4, the opposite end of which is operatively connected with an engine head not herein shown. A flexible sheath 5 surrounding the cable 4 is connected at one end to the handpiece casing by way of a tubular piece 6, 7, and at its other end to a non-rotating part of the before mentioned engine head, whereby the flexible sheath is non-rotatable. The tubular connecting piece is made in two sections 6 and 7, united by a simple swivel joint 8, the section 6 being secured to the handpiece casing at 9, while the other section 7 is secured to the flexible sheath at 10.

The purpose of the swivel connection formed by the tubular connecting piece is to permit of the handpiece casing being freely turned or rotated, which is necessary for its proper manipulation; but, as stated in the introduction to this specification, the unrestricted rotation of the handpiece casing afforded by the simple swivel connection is sometimes objectionable.

The means I have devised for restricting the rotation of the handpiece casing relatively to the non-rotating sheath, thus preventing the twirling of the handpiece while at the same time permitting said casing to be rotated sufficiently to provide for the proper manipulation of the handpiece, is herein shown embodied in three different forms.

In the form indicated in Figs. 2, 3, 4 and

the means for restricting the rotation of the handpiece casing consists of a coiled spring 11 surrounding both sections 6 and 7 of the tubular connecting piece, said spring being connected at one end to the section 6 and at its opposite end to the other section 7 of said connecting piece. The spring may be connected in this manner by bending its opposite ends parallel with its axis, as at 12 and 13, respectively, the end 12 entering a hole in an enlarged part of the section 6, and the other end 13 entering a like hole in a collar 14 attached to the section 7. A sleeve or tube 15 attached to or forming an extension of the collar 14, serves as a covering for the spring, which is thus inclosed in an annular space between the outer surface of the swivel connection and the inner surface of said sleeve 15. The distance between these surfaces is slightly greater than the diameter of the wire from which the spring is wound; and the spring is of the proper diameter to occupy a position equidistant from either surface, when at rest or in its normal condition.

The operation of the device, assuming that the handpiece and cable are hanging free, is as follows:—When the cable starts to revolve in one direction the handpiece casing will not revolve until the friction of its running parts exceeds that of the swivel. When this takes place the spring winds up until sufficient resistance is exerted upon the swivel to overcome the friction of the handpiece parts, at which point the rotation of the casing will be arrested. Upon reversing the engine and revolving the cable in the opposite direction, exactly the same conditions are met with, except that the spring exerts resistance by unwinding instead of by winding. In either case the handpiece may be taken in the hand and the casing revolved in either direction until the spring is either tightly wound upon itself around the swivel connection to bring it to a full stop; or until the spring unwinds and expands against the inner surface of the covering sleeve 15, which brings it to a full stop in the opposite direction.

The spring illustrated in the drawings is so constructed as to restrict the swivel to one and a half revolutions in either direction from a normal position, which is maintained by the spring when the engine is not running. Obviously, by altering the dimensions of the spring, or the surfaces between which it is confined, the amount of revolution permitted the swivel may be increased or diminished as desired.

It will be seen that the construction just described restricts the rotation of the handpiece casing in two ways, first, by applying friction, and second, by providing a positive or definite stop. Ordinarily the resistance or friction offered by the spring will be greater than the friction between the handpiece spindle and casing so that the positive stop provided by this construction will not come into play unless the friction between the spindle and casing is unusually great. Even when the positive stop does come into action ample rotation of the handpiece casing is permitted to provide for all exigencies of manipulation.

In Figs. 6, 7, 8, 9, 10 and 11 is indicated a restricting device in which no friction is employed, but which provides a definite or positive stop. The two-part tubular connecting piece 6 and 7 instead of having the usual simple swivel joint is in this instance provided with a threaded union, the internally threaded section 7 screwing upon the exteriorly threaded section 6.

An annular groove 16 is formed on the section 6, this groove extending entirely around the section except for a stop or lug 17 which renders it incomplete and on the inner end of the section 7 is a lug 18. A collar 19 surrounds the sections of the connecting piece and is provided with two lugs or stops, one of which enters the groove 16 and the other enters the space between the inner end of the section 7 and the unthreaded portion of the section 6. The lugs or stops of the collar may consist of screws 20 and 21.

The stop 18 may be termed a "fixed stop" because it is fixed to the flexible sheath which does not rotate; the stop 17 may be termed a "movable stop" because it moves or rotates; and the stops 20 and 21 may appropriately be called "intermediate stops."

Section 6 of the connecting-piece, to which the handpiece casing is attached, may be given a full turn in respect to the collar 19 less the width of the movable stop 17; and said collar 19 may be given a full turn in respect to the section 7 of the connecting-piece less the width of the fixed stop 18. In this way the handpiece casing may swivel in respect to the non-rotating sheath a distance equal to the combined turning movements afforded by the connections between the section 6 and collar 19 and between said collar 19 and section 7, but it is restricted to this amount of turning. In this particular embodiment of my invention the stops are so proportioned as to permit of the handpiece casing being turned a complete circle and a half, this being sufficient to afford the requisite freedom of movement of the handpiece. Of course the swivel movement allowed the handpiece casing may be made more or less, as desired, by simply altering the proportions of the stops.

Were the intermediate stops not employed and the fixed and movable stops allowed to contact with each other, the swivel movement permitted the handpiece casing would be considerably less than a complete circle,

this depending upon the width of said stops, and this would restrict the swivel movement of said casing to an undesirable extent.

When a handpiece provided with this particular form of my improved swivel is permitted to hang loosely while the engine is running and there is a tendency for the handpiece casing to turn, as above explained, it will turn only so far as is permitted by the stops. When, however, the handpiece is held in the hand while the engine is running, the swivel movement allowed the handpiece casing is ample for the free and unrestricted handling of the handpiece, which is provided for by the usual swivel connection.

Still another form of restricting device is indicated in Figs. 12 and 13. In this embodiment of my invention the restriction to the rotation of the handpiece casing is accomplished by friction only. The means for producing the friction in this instance consists of a simple swivel joint and an adjustable bearing block or brake shoe 22. Section 6 of the connecting piece, which enters the other section 7, is formed with an uninterrupted annular groove 23. The bearing block 22 is fitted in this groove and is connected by way of a screw 24 to a collar 25 surrounding the section 7. By adjusting the screw 24, any desired amount of friction may be applied to the swivel, said screw also serving to hold the block 22 and collar 25 in proper position. In a swivel connection of this latter form the handpiece casing may be continuously rotated in either direction in respect to the non-rotating sheath, it only being necessary in this instance to so adjust the bearing block as to apply more friction to the swivel connection than exists between the handpiece casing and spindle. When so adjusted there will be no tendency for the handpiece casing to turn relatively to the sheath and consequently there will be no twirling of the handpiece when hanging loose while the engine is running.

My improved handpiece swivel is susceptible of other modifications than those herein shown and described without departing from the spirit of my invention.

I claim as my invention:—

1. In a dental engine handpiece the combination of the handpiece casing, the handpiece spindle, the flexible cable connected to said spindle for transmitting rotary motion thereto, the non-rotating flexible sheath surrounding said flexible cable, a two part swivel connection between said non-rotating flexible sheath and said handpiece casing to permit the latter to be rotated relatively to the former, and a device forming part of said swivel connection for restricting the rotation of said casing relatively to said sheath.

2. In a dental engine handpiece the combination of the handpiece casing, the handpiece spindle, the flexible cable connected to said spindle for transmitting rotary motion thereto, the non-rotating flexible sheath surrounding said flexible cable, a two part swivel connection between said non-rotating flexible sheath and said handpiece casing to permit the latter to be rotated relatively to the former, and a friction device for applying friction to said swivel connection for restricting the rotation of said casing relatively to said sheath.

3. In a dental engine handpiece the combination of the handpiece casing, the handpiece spindle, the flexible cable connected to said spindle for transmitting rotary motion thereto, the non-rotating flexible sheath surrounding said flexible cable, a two part swivel connection between said non-rotating flexible sheath and said handpiece casing to permit the latter to be rotated relatively to the former, and a combined friction and positive stop device for restricting rotation of said casing by applying friction to said swivel connection and also by providing a positive stop therefor.

4. In a dental engine handpiece the combination of the handpiece casing, the handpiece spindle, the flexible cable connected to said spindle for transmitting rotary motion thereto, the non-rotating flexible sheath surrounding said flexible cable, a two part swivel connection between said non-rotating flexible sheath and said handpiece casing to permit the latter to be rotated relatively to the former, and a spring device for restricting rotation of said casing by applying friction to said swivel connection and also by providing a positive stop therefor.

5. In a dental engine handpiece the combination of the handpiece casing, the handpiece spindle, the flexible cable connected to said spindle for transmitting rotary motion thereto, the non-rotating flexible sheath surrounding said flexible cable, a two part swivel connection between said non-rotating flexible sheath and said handpiece casing to permit the latter to be rotated relatively to the former, a coiled spring surrounding said swivel connection, one end of said spring being secured to one section of said swivel connection and the opposite end of said spring being connected to the other section of said connection, and a sleeve secured to one section and enveloping both sections, the coiled spring being confined between the inner surface of said sleeve and the outer surface of said swivel connection.

In testimony whereof I affix my signature in presence of two witnesses.

ARTHUR W. BROWNE.

Witnesses:

GEO. D. HECK,

ALBERT A. SIEVERS.