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PAINLESS DRILLING DENTAL INSTRUMENT

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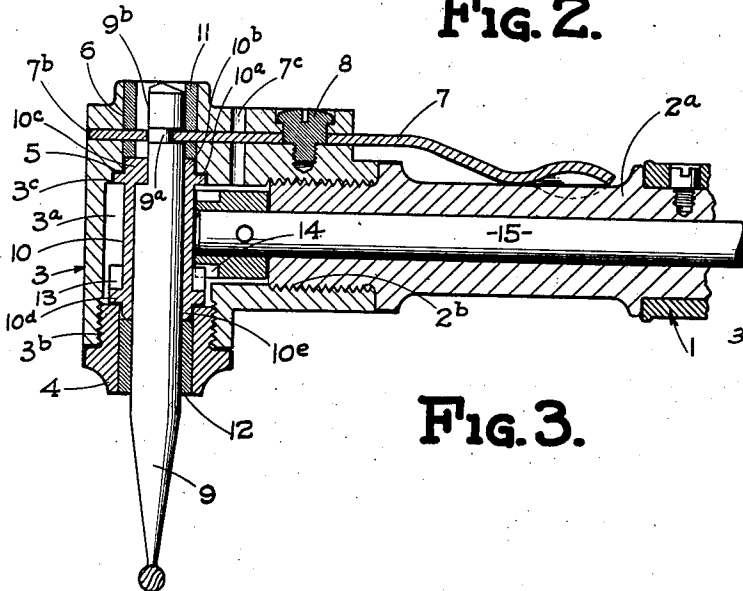
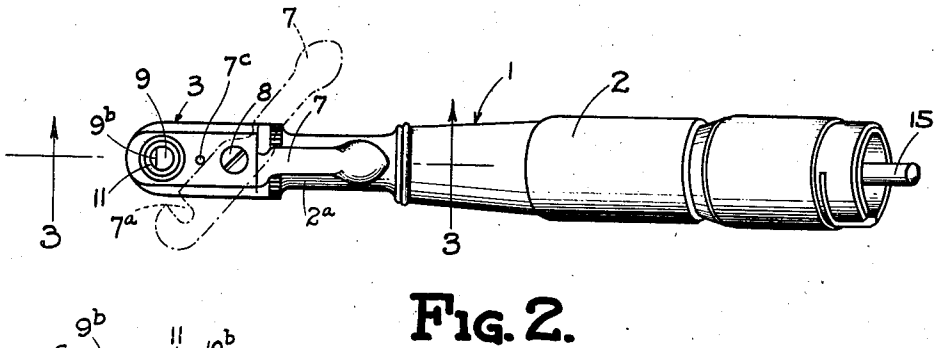
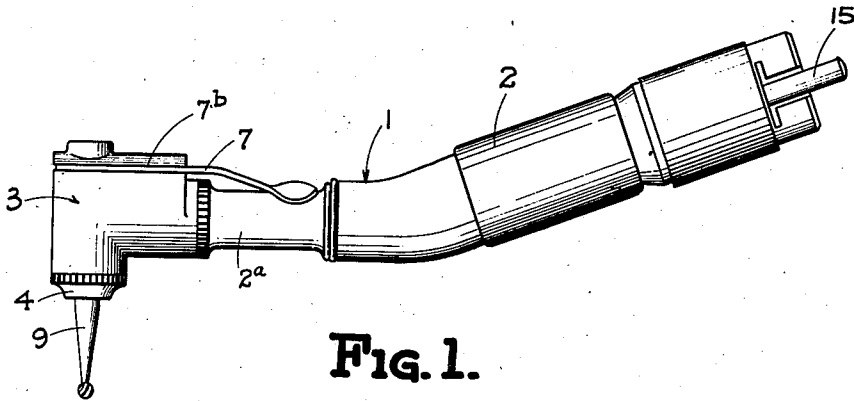
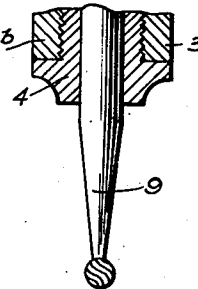


FIG. 4



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## UNITED STATES PATENT OFFICE

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## PAINLESS DRILLING DENTAL INSTRUMENT

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1 Claim. (Cl. 32—26)

As is well known by the dental profession, in drilling the cavities of teeth by a drill forming part of the instrument known to the trade as a contra-angle, the pain incidental to this operation by a skillful manipulator is due almost entirely to the vibration of the operating end of the drill and is practically negligible where such vibration is absent. Notwithstanding this knowledge, the profession has been using for years a standard construction of contra-angle wherein the manner of mounting the drill renders it inherently incapable of operating over any considerable interval of time without the occurrence of such vibrations.

It is the general purpose and object of my invention to so improve the manner of mounting the drills in the heads of contra-angle dental instruments as to practically eliminate the infliction of pain upon the patients whose teeth are being subjected to the action of the said drills.

Drilling instruments of the character referred to comprise in general a housing element which also serves as a handle, a shaft mounted for rotation in the housing element, a head detachably connected to the housing element, and a drill detachably mounted in the head and driven by the said shaft.

As constructed heretofore, the drills have been mounted within and connected to drill tubes so as to rotate therewith, the upper and lower ends of the drill tubes constituting bearings for the drills within the heads and the drill tubes each having a pinion formed therewith adapted to mesh with a pinion on the end of the shaft. The upper ends of the drill tubes are each fitted within a bore provided therefor in the head while the lower end projects through the bore of a nut threaded into the lower end of the head.

Owing to the hard surfaces to which the operating or grinding ends of the drills are subjected, they are generally discarded at the end of each day's use and replaced with new ones. Due to the manner in which they are mounted for rotation within their respective heads, the drill tubes are unable to withstand for any considerable length of time the wear to which they are subjected. The drills as thus mounted have in time past been rotated by application of foot-power to pedals and have been rotated at a comparatively low rate of speed. Even as thus operated, the wear which occurred between the lower ends of the drill tubes and the surrounding surfaces of the nuts would in a comparatively short time cause a vibratory movement

to be set up between these parts, with a resultant much greater vibratory movement of the operating ends of the drills and a consequent infliction of pain upon the patients; in addition, due to the loose fitting of the lower ends of the drill tubes in the nuts, caused by this wear, lubricant supplied to the operating parts within the head would enter the mouths of the patients. This liability to wear and to induce vibration is greatly increased where drills are operated by electricity, wherein the speed of rotation is as high as approximately 2800 R. P. M.

I accomplish the major object of my invention by so mounting the drills in the heads of dental instruments of the contra-angle type that tendency to vibration in the operating ends of the drills will be eliminated throughout long intervals of time, notwithstanding the high speeds at which they may be rotated.

A still further and more limited object of the invention is to provide, for existing drilling instruments of the contra-angle type an improved drill-mounting means which will enable the advantages pointed out hereinbefore to be readily and conveniently obtained in connection with existing types of the said instruments, including existing types of drill heads.

I accomplish the foregoing objects and other and more limited objects which will be set forth hereinafter in and through the construction and arrangement of parts shown in the drawing hereof wherein Fig. 1 represents a side elevation of a drilling instrument having my invention incorporated therein; Fig. 2 a plan view of the instrument shown in Fig. 1; Fig. 3 an enlarged central sectional view taken through the drill head and the adjacent portion of the housing on the line 3—3 of Fig. 2 and looking in the direction indicated by the arrows; and Fig. 4 a detail in section of the lower end of the drilling instrument shown in Fig. 3 and showing the modification described on page 2, column 2, lines 40—47.

Describing the parts by reference characters, 1 denotes generally the housing of the drilling instrument, said housing being of the usual construction and provided with a handle portion 2 mounted thereon and having therewithin an elongated core 2<sup>a</sup> forming a bearing for the flexible shaft. Detachably secured to the operating end of the core is the head 3, the head being shown as threaded onto the reduced adjacent end 2<sup>b</sup> of the core. The head is provided with a through bore comprising a chamber 3<sup>a</sup> intermediate of the ends thereof, the lower end of

the chamber being provided with an internal thread 3<sup>b</sup> adapted to receive a nut 4. The upper end of the chamber 3<sup>a</sup> is provided with a short reduced cylindrical extension 3<sup>c</sup> the top of which is defined by an annular shoulder 5, the inner edge of said shoulder merging with the reduced cylindrical portion 6 of the bore.

7 denotes a locking lever which is pivoted intermediate of its ends to the upper portion of the head upon the cylindrical body of a stud 8 which is mounted within a recess in the said head and threaded into the latter. The lever 7 is provided with a notch 7<sup>a</sup> which is adapted to receive the reduced portion 9<sup>a</sup> of the drill 9 and to permit such reduced portion to rotate freely therewithin, the body of the drill above and below said slot enabling the drill to be held by the lever against movement longitudinally of the head. One side of the head is provided with a slot 7<sup>b</sup> whereby the lever is adapted to be swung outwardly to the position shown in broken lines in Fig. 2, thereby to permit the insertion of a drill into the head 3 or the removal of a drill from said head. The head is also provided with a small bore 7<sup>c</sup> to enable the pinions on the shaft and drill tube to be lubricated.

A segment of the upper cylindrical end of the drill is cut away, as shown at 9<sup>b</sup>, whereby it may be operatively connected with the surrounding drill tube, to which reference has been made hereinbefore.

In the construction which I employ, a comparatively short portion of the drill 9 is surrounded by the drill tube, the said drill tube being indicated at 10 and having at its upper end an annular shoulder 10<sup>a</sup> adapted to be received within the annular recess provided by the surfaces 3<sup>c</sup> and 5, with a short cylindrical extension 10<sup>b</sup> adapted to be received within the lower end of the bore extension 6. This upper end of the drill tube is provided with a segmental bore 10<sup>c</sup> which is adapted to receive and form a close fit with the upper end of the drill. The connection between the drill tube and the drill is the same as has been employed heretofore, but the upper end of the drill tube does not surround the remaining part of the upper portion of the drill and form a bearing therefor in the head. This bearing is provided by a bushing 11 of wear-resistant material, such as bronze. When the bushing extends downwardly beyond the lever, the bushing will be slotted at one side, as shown at 7<sup>b</sup>, to permit the lever 7 to be swung into and out of engagement with the upper end of the drill. The lower end of the drill tube 10 is provided with an annular shoulder 10<sup>d</sup> forming the base of the pinion 13 and with a cylindrical extension 10<sup>e</sup> below said shoulder adapted to enter the top of the bore of the nut and preferably be rotatively supported upon the top of the bushing 12, said bushing being made of bronze or similar material and being mounted within the nut and surrounding the drill 9, whereby the nut provides a bearing for the portion of the drill therewithin. The pinion 13 of the drill tube meshes with a pinion 14 on the

end of the shaft 15 which is mounted within the housing. A slight clearance is preferably provided between the top of the shoulder 10<sup>a</sup> of the drill tube and the shoulder 5 to enable the lower end of the bushing 11 to constitute an end thrust bearing for the upper end of the drill tube.

In the drawing, I have shown my invention embodied in a complete new head, wherein the bore 6 is somewhat elongated as compared with the bores in existing heads, for the purpose of affording a longer bearing for the bushing 11, and the upper end of the drill 9 is likewise correspondingly elongated.

For purposes of replacement in the heads of existing drilling instruments, it will be necessary only to machine the bores of the nuts 4 sufficiently to enable them to form a snug fit with the bushings 12 and, if necessary, to machine the upper ends of the bores 6 to form snug fits for the bushings 11. When these alterations have been effected, the drills may be changed as frequently as hertofore, but true bearings will be provided therefor which will enable them to be operated over long periods of time without producing vibrations or oscillations in the operating ends of the same. Furthermore, this alteration of the mountings for the drills can be effected quickly and economically, with a great saving in the expense of operating these instruments over long periods of time.

Reference has been made hereinbefore to the fact that the upper end of the head 3 shown herein projects a greater distance above the chamber 3<sup>a</sup> than is ordinary in contra-angle instruments heretofore made. However, as explained, my invention can be incorporated in existing contra-angle instruments without any change in the head 3 and in the drill except in respect to the mountings for the drill.

In place of separate bushings for the nuts 4, I contemplate making the nuts of such materials as will enable them to constitute bearings for the lower ends of the drills without recourse to bushings. This can be effected by making the nuts of bronze or similar material, in which case the bores of the nuts will be of such size as to constitute bearings for the lower ends of the drills, see Fig. 4 of the drawing.

Having thus described my invention, what I claim is:

A dental drilling instrument of the contra-angle type comprising a head having a bore extending therethrough from top to bottom thereof, a bushing fitted within the upper portion only of said bore and providing an upper bearing for a drill, a nut secured to the lower end of said head and providing a lower bearing for a drill, and a drill having its upper and lower end portions mounted respectively within the bearings provided therefor by the bushing in the upper portion of the bore and by the nut, the said drill being provided with a drill tube intermediate of said bearings, the said drill tube having a driving pinion thereon.

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